

CODE SHEET

VISTA Projects Limited VENDOR DRAWING/DOCUMENT SQUAD CHECK			
A	Reviewed without exception. Proceed with fabrication. Issue final drawings/ documents.		
B	Reviewed except as marked and/or noted. Proceed with fabrication and resubmit drawing/document. Shipment will not be released, if any drawings/documents requiring approval, as per purchase order conditions, are at this code.		
C	Not accepted. Revise as marked and resubmit drawing/document for review. Shipment will not be released, if any drawings/documents requiring approval, as per purchase order conditions, are at this code.		
D	Not required for review. Received for information.		
Reviewed only as to general conformity with the design concept and specifications provided. The engineer does not warrant or represent that the information contained on this drawing/document is either accurate or complete. Sole responsibility for correct design, detail and dimensions shall remain with the party submitting the drawing/document.			
SDR CODE	EQUIPMENT TAG	REVIEWED BY	DATE
DB01	BU-1100	P. VALLA	21 JAN 2013

PROJECT NAME: MURPHY CADOTTE / 1780

VENDOR NAME: ABB- BER-MAC / 1780-024

DOCUMENT
NUMBER: 1780-024- DATABOOK

VENDOR
REVISION: 2

DOCUMENT
DESCRIPTION: DATA BOOK MCC BUILDING

VENDOR
TRANSMITTAL
NUMBER: _____

Table of Contents

1. Purchase Order

- Change Orders – N/A

2. As Built Data Sheets – N/A to Scope

3. As Built Drawings

- | | | |
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| • HVAC Drawings | • 1780-67-001-1 | • 1780-81-014-1 |
| • 1780-52-001-1 REV 0 | • 1780-67-001-2 | • 1780-81-015-1 |
| • 1780-52-002-1 REV 0 | • 1780-68-001-1 | • 1780-81-016-1 |
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| • 1780-53-001-1 REV 0 | • 1780-68-001-3 | • 1780-81-019-1 |
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| • 1780-53-004-1 | • 1780-68-001-6 | • 1780-81-022-1 |
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| • 1780-53-006-1 | • 1780-69-005-1 | • 1780-81-024-1 |
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| • 1780-53-008-1 | • 1780-69-007-1 | • 1780-81-002-1 |
| • 1780-53-009-1 | • 1780-69-008-1 | • 1780-81-007-1 |
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| • 1780-53-011-1 | • 1780-69-014-1 | • 1780-81-012-1 |
| • 1780-54-001-1 | • 1780-81-003-1 | • 1780-81-013-1 |
| • 1780-54-002-1 | • 1780-81-004-1 | • 1780-81-018-1 |
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| • 1780-57-003-1 | • 1780-81-006-1 | |
| • 1780-57-004-1 | • 1780-81-008-1 | |
| • 1780-57-005-1 | • 1780-81-009-1 | |
| • 1780-64-030-1 | • 1780-81-010-1 | |

4. Catalogue Data & Manuals

- Fiber Glass Building Insulation
- Supreme Windows
- Wall –Mount Air Conditioner
- Suspended Unit Heater
- Photoelectric – T900 Series
- Receptacles
- Single Phase Nema Manual Starting Switches
- Cooper Lighting – Metalux

5. QAQC Documents

PROJECT INFORMATION SHEET

Project Data

Sales Order Type:	PSO - Project Sales Order
Project Classification:	CPC - Construction and Professional Services Combined
Field Rate Sheet:	Use Services Rate Sheet Attached
Professional Services Rate Sheet:	Use Services Rate Sheet Attached
Sell Price:	\$289,000
Currency:	Canadian Dollars
Material Mark-Up = Landed Cost +	15.0%
End User:	Murphy Oil
Project Description:	MCC Bldg Seal
Project Location:	Alberta
Location Details:	
Legal Survey Description:	
Originating Quote Number:	Q2012-039
Assigned Project Number / Sales Order Number:	
Project Start Date:	February 28, 2012
Expected Project Finish Date:	August 31, 2012
Sales Group:	C - Calgary (601)
Project Sponsor - Corporate Account Manager:	Tony Manning
Project Manager (Person Responsible):	Dale Williams
Electrical Permit Details:	Alberta

Invoicing Information

Revenue Recognition Method:	CCM - Completion Contract Method
Inco terms:	FCA - Free Carrier
Inco terms location:	Calgary
Billing Type:	LS - Lump Sum
Billing Plan:	BOC - Bill on Completion
SAP WBS Template to Use:	Role Based - Simple (TBM8295P1)
Sold To Party:	Murphy Oil
Ship To Party:	Murphy Oil
Client AFE #:	54115177
Client PO #:	54115177-120
Client Job #:	
Additional Client Coding:	
Bill To:	Murphy Oil Canada
C/O (if applicable):	
Street Address:	4000,520 - 3 Avenue SW
City / Province:	Calgary, Alberta
Postal Code:	T2P 3Y3
Attention:	Procurement Project Accounting
Client Project Contact Person:	Brant Lu
Telephone Number:	403-258-4768
Cell Phone Number:	
Email Address:	
Fax Number:	403-258-2192
GST:	5% GST
PST:	No PST - Alberta
HST:	Not Applicable
Will Invoice "Hold Backs" be required?	Yes - 10%
Project Comments:	This is a comment that will go to the billing department and describe special circumstances for the project. If additional comments are required then attach separate sheet(s) to the PIS.

Estimated Project Hours / Activity Type / Job Cost

	WBS	Hours	Payroll	Estimated Costs
PROJECT TOTAL:		925	Activity Type	
Professional Services Group Total:	PSG	117	N/A	
Field Services Group Total:	FSG	808	N/A	
Panel Shop Labour Total:	PNLP	0	N/A	
Panel Shop Material Total:	PNLM			\$0.00
Material Total:	MAT			\$191,141.00
Equipment Total:	EQP			\$3,780.00
Expenses Total:	EXP			\$0.00



PURCHASE ORDER

54115177-120

This number must appear on all correspondence.

54115177-120
ABB BER-MAC

Buyer MURPHY OIL CANADA 4000, 520 - 3 Avenue SW Calgary, AB, CA T2P 3Y3 Ryan Dick T: 403-294-8038 E: ryan_dick@murphyoilcorp.com	PO Description MCC BUILDING		PO Date 28-Feb-2012
Vendor Quotation Reference Q2012-039-01	Project Name Seal CSS Pilot B	EPC Company Vista Projects Limited	Invoice Payment Terms Net 45 Days
Vendor ABB BER-MAC 250 42 Avenue SE Calgary, AB, CA T2G 1Y4 Shane Carnahan T: 403-831-1617 E: shane.c.carnahan@ca.abb.com	Location 13-09-85-17 W5M	EPC Project Number 1780	Order Currency CDN\$
Delivery 09-Jul-2012	Murphy AFE Number 54115177	Shipping Terms FCA, Sellers Facility	
Invoice To MURPHY OIL CANADA 4000, 520 - 3 Avenue SW Calgary, AB, CA T2P 3Y3 Facilities Attn: Ryan Dick		Ship To	

ABB BER-MAC			MCC BUILDING		
Item	Quantity	Description	Major-Minor	Unit Cost	Total
1	1.00 set	TAG #: BU-1100 - MCC BUILDING PACKAGE -Includes Documentation Requirements of 3 Hardcopies and 2 Electronic -Includes Inspection Requirements Details of the MCC Building shall be as per all attached PO documents (Commercial and Technical)	9024-449	\$289,000.00	\$289,000.00
				Sub Total	\$289,000.00 (plus GST)

Direct Questions About This PO To
 Brant Lu @ Vista Projects Ltd.
 T: 403-258-4678 E: brant.lu@vistaprojects.com

Instructions to Vendor - Show PO Number 54115177-120 on all Invoices and correspondence pertaining to this order - Attach a copy of this Purchase Order to ALL INVOICES when submitting for payment - Attached as Exhibit 'A' are Terms and Conditions which are made a part hereof for all purposes - One (1) copy of this order is to be duly signed and returned upon receipt. Retention for more than ten (10) working days shall constitute acceptance of this order in its entirety - Work performed is not to deviate from the scope of this Purchase Order - No costs are to exceed the amounts indicated on this Purchase Order	Order Prepared By Sheella Dykstra Order Approved By Ryan Dick, Jeff Sand, Col Buchanan	Total Value of Purchase Order \$289,000.00 (plus GST)
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\$289,000.00
 (plus GST)

54115177-120
 Page 1 of 1

CONFIDENTIAL / PROPRIETARY INFORMATION OF MURPHY OIL COMPANY LTD. AND ABB BER-MAC FOR AUTHORIZED COMPANY USE ONLY

Handwritten signature



Purchase Order #: 1780-024
Murphy Oil Company Ltd.
Murphy Cadotte Pilot CSS Project



Purchase Order Number: 1780-024 (Vista)
54115177-120 (Murphy)

MCC Building

PO Total Commitment: \$289,000.00 + gst

Required Delivery Date: July 9, 2012

CORPORATION	VENDOR NAME
Murphy Oil Company Ltd	ABB Ber-Mac
PROJECT CONSULTANT Vista Projects Limited Attention: Brant Lu	250 42 Avenue SE Calgary AB T2G 1Y4 Attention: Shane Carnahan
Telephone: (403) 258-4768 Fax: (403) 258-2192 Email: brant.lu@vistaprojects.com	Telephone: 403-831-1617 Email: Shane.c.carnahan@ca.abb.com

March 7, 2012

PO Issue Date

Seller's Acceptance

Please sign and return this cover page

Shane Williams
Seller's Signature
ABB Ber-Mac

MAR. 19, 2012
Date

Amra Tiling
Tiling
ABB

March 19, 2012

AW

SUMMARY BID CALCULATION SHEET

Is this a FIRM BID select one

YES

BID Type-select one

Lump Sum

Business area - select one

E-House

Murphy Oil Company Ltd. (Vista) xxx			Client's Ref.			ABB ref.
BU-1100 MCC/Instrument Air Bldg xxx			COST	SELL		Revision no.
Q2012-039 Feb. 17th Clarifications			CAD	CAD	Mark up %	
Customer Price if no detailed breakdown						
Purchases:						
Third Party	Material	\$ 35,643.49	\$ 42,892.29	✓ 20.34%		
	Engineering and Services (not including DSP)	\$ 148,600.00	\$ 174,004.68	✓ 17.10%		
	Installation		\$ -			
	Equipment	\$ 4,413.29	\$ 5,167.79	✓ 17.10%		
	Other	\$ 1,772.13	\$ 2,075.09	✓ 17.10%		
	Insurance, Bonds, Permits		\$ -			
	Freight	\$ 713.00	\$ 834.89	✓ 17.10%		
	Hours QTY		\$ -			
Own cost	Project/Construction Management	28.41	\$ 3,125.10	\$ 3,659.37	✓ 17.10%	
	Craft labour	779.36	\$ 39,512.66	\$ 46,267.75	17.10%	
	Engineering labour	30	\$ 3,073.20	\$ 3,598.59	17.10%	
	Design and Drafting labour	87	\$ 5,116.47	\$ 5,991.18	17.10%	
	Panel shop labour			\$ -		
	Health and Safety			\$ -		
	Project support (admin,scheduling etc)			\$ -		
	Trucks	200	\$ 3,780.00	\$ 4,426.23	17.10%	
	Travel			\$ -		
	Subsistence/LOA			\$ -		
	Health & Safety			\$ -		
	Material Overhead		980	\$		2.75%
	Insurance overhead		722	\$		0.25%
	Contingency		5,780	\$		2.00%
Provision	Warranty		722	\$		0.25%
	Additional Risk / Accubid Final Adjustment		0	\$82	#DIV/0!	
TOTAL PRODUCTION COST /SELL			253,955	\$289,000	13.80%	
Gross Profit				\$35,045		
Gross Margin %				12.13%		
SG&A (Internal from table)				\$24,276		8.40%
TOTAL SG&A				\$24,276		
SG&A %				8.40%		
Net Profit				\$10,769		
Net Margin %				3.7%		
TOTALS				CAD		
Total Gross Result				\$35,045		
Total Gross Margin %				12.13%		
Total SG&A				\$24,276		
Total Contingency & Risk				\$5,780		
Total Net Result				\$10,769		
Total Net Result %				3.7%		

Approved by Project Manager	
Approved by Business Line Manager	
Approved by General Manager	
Approved by Controller	
Terms & Conditions Reviewed	
Approval from Table of Authority	
Bid Submission date	
Bid Validity Date	

tdinger March 19, 2012

SAP 255,709
FCM 253,955
1754 - mat OH

PH

Cost Center	Acty Type	Cost ctr short text	Act. type short text	Profit Center	RT/OT	\$/Hr	Hours QTY	Labour cost
2855	ADMO	PANEL SHOP	Admin	PNL	RT	60.00		0.00
2855	PM03	PANEL SHOP	PROJ MGR-3	PNL	RT	92.00		0.00
2855	PNLP	PANEL SHOP	PANEL PERSONNEL	PNL	RT	71.97		0.00
2855	PNLR	PANEL SHOP	CONT SYS SHOP RATE	PNL	RT	57.91		0.00
1295	P005	MATERIAL BU 4443-O	PURCHSG FOR CLIENT	PSO/POLY	RT	65.00		0.00
2123	ADM1	ORDER ADMIN	Project Support	PSO/POLY	RT	60.00		0.00
2125	ADDC	PROJECT MANAGEMENT	PROJ DOC CONTROL	PSO/POLY	RT	60.00		0.00
2125	PM01	PROJECT MANAGEMENT	PROJ MGR-1	PSO/POLY	RT	100.00		0.00
2125	PM02	PROJECT MANAGEMENT	PROJ MGR-2	PSO/POLY	RT	110.00		0.00
2125	PM03	PROJECT MANAGEMENT	PROJ MGR-3	PSO/POLY	RT	121.78		0.00
2125	PSRV	PROJECT MANAGEMENT	PROJ SERVICES	PSO/POLY	RT	100.00		0.00
5047	PM03	ENG. CUST. MGMT	PROJ MGR-3	PSO/POLY	RT	125.00		0.00
2128	DN01	POLYMER HYDRATION	DESIGN TECH-1	PSO/POLY	RT	81.48		0.00
2128	DN02	POLYMER HYDRATION	DESIGN TECH-2	PSO/POLY	RT	81.48		0.00
2128	DN03	POLYMER HYDRATION	DESIGN TECH-3	PSO/POLY	RT	81.48		0.00
2128	EE03	POLYMER HYDRATION	ELECTRICAL ENG-3	PSO/POLY	RT	81.48		0.00
2128	ME01	POLYMER HYDRATION	Mechanical Engineer	PSO/POLY	RT	81.48		0.00
2128	PM03	POLYMER HYDRATION	PROJ MGR-3	PSO/POLY	RT	121.78		0.00
5039	ADMDC	DESIGN & DRAFTING	Doc admin	PSO/POLY	RT	60.00		0.00
5039	DF01	DESIGN & DRAFTING	DRAFT TECH-1	PSO/POLY	RT	48.96		0.00
5039	DF02	DESIGN & DRAFTING	DRAFT TECH-2	PSO/POLY	RT	53.88		0.00
5039	DF03	DESIGN & DRAFTING	DRAFT TECH-3	PSO/POLY	RT	58.81	87.00	5,116.47
5039	DN01	DESIGN & DRAFTING	DESIGN TECH-1	PSO/POLY	RT	65.93		0.00
5039	DN02	DESIGN & DRAFTING	DESIGN TECH-2	PSO/POLY	RT	72.88		0.00
5039	DN03	DESIGN & DRAFTING	DESIGN TECH-3	PSO/POLY	RT	90.51		0.00
5039	DNC1	DESIGN & DRAFTING	DESIGN COORDINATOR	PSO/POLY	RT	90.51		0.00
5041	ADMDC	DESIGN&DRAFT-OFFSITE	Doc admin	PSO/POLY	RT	60.00		0.00
5041	DF01	DESIGN&DRAFT-OFFSITE	DRAFT TECH-1	PSO/POLY	RT	60.00		0.00
5041	DF02	DESIGN&DRAFT-OFFSITE	DRAFT TECH-2	PSO/POLY	RT	66.68		0.00
5041	DF03	DESIGN&DRAFT-OFFSITE	DRAFT TECH-3	PSO/POLY	RT	69.21		0.00
5041	DN01	DESIGN&DRAFT-OFFSITE	DESIGN TECH-1	PSO/POLY	RT	69.34		0.00
5041	DN02	DESIGN&DRAFT-OFFSITE	DESIGN TECH-2	PSO/POLY	RT	76.12		0.00
5041	DN03	DESIGN&DRAFT-OFFSITE	DESIGN TECH-3	PSO/POLY	RT	90.80		0.00
5041	DNC1	DESIGN&DRAFT-OFFSITE	DESIGN COORDINATOR	PSO/POLY	RT	90.51		0.00
5042	AE01 / AS01	SAGD	Automation Eng-1/ Automation Spc-1	PSO/POLY	RT	56.41		0.00
5042	AE02 / AS02	SAGD	Automation Eng-2/ Automation Spc-2	PSO/POLY	RT	71.54		0.00
5042	AE03 / AS03	SAGD	Automation Eng-3/Automation Spc-3	PSO/POLY	RT	96.67		0.00
5042	PM01	SAGD	PROJ MGR-1	PSO/POLY	RT	100.00		0.00
5042	PM02	SAGD	PROJ MGR-2	PSO/POLY	RT	110.00		0.00
5042	PM03	SAGD	PROJ MGR-3	PSO/POLY	RT	121.78		0.00
5043	AE01 / AS01	FIELD AUT. & SERVICE	Automation Eng-1/ Automation Spc-1	PSO/POLY	RT	60.41		0.00
5043	AE02 / AS02	FIELD AUT. & SERVICE	Automation Eng-2/ Automation Spc-2	PSO/POLY	RT	75.54		0.00
5043	AE03 / AS03	FIELD AUT. & SERVICE	Automation Eng-3/Automation Spc-3	PSO/POLY	RT	100.67		0.00
5044	ADMO	INDUSTRIAL AUT. PRG	Admin	PSO/POLY	RT	60.00		0.00
5044	ADM1	INDUSTRIAL AUT. PRG	Project Support	PSO/POLY	RT	60.00		0.00
5044	AE01 / AS01	INDUSTRIAL AUT. PRG	Automation Eng-1/ Automation Spc-1	PSO/POLY	RT	61.50		0.00
5044	AE02 / AS02	INDUSTRIAL AUT. PRG	Automation Eng-2/ Automation Spc-2	PSO/POLY	RT	76.49		0.00
5044	AE03 / AS03	INDUSTRIAL AUT. PRG	Automation Eng-3/Automation Spc-3	PSO/POLY	RT	106.69		0.00
5044	PM01	INDUSTRIAL AUT. PRG	PROJ MGR-1	PSO/POLY	RT	100.00		0.00
5044	PM02	INDUSTRIAL AUT. PRG	PROJ MGR-2	PSO/POLY	RT	110.00		0.00
5044	PM03	INDUSTRIAL AUT. PRG	PROJ MGR-3	PSO/POLY	RT	121.78		0.00
5045	EE01 / ES01	ENGINEERING-OFFSITES	ELECTRICAL ENG-1/ELECTRICAL SPC-1	PSO/POLY	RT	58.93		0.00
5045	EE02 / ES02	ENGINEERING-OFFSITES	ELECTRICAL ENG-2/ELECTRICAL SPC-2	PSO/POLY	RT	80.90		0.00
5045	EE03 / ES03	ENGINEERING-OFFSITES	ELECTRICAL ENG-3/ELECTRICAL SPC-3	PSO/POLY	RT	106.42		0.00
5046	IS01	INDUST ENG-OFFSITES	INSTRUMENT SPC-1	PSO/POLY	RT	60.00		0.00
5046	IS02	INDUST ENG-OFFSITES	INSTRUMENT SPC-2	PSO/POLY	RT	82.00		0.00
5046	IS03	INDUST ENG-OFFSITES	INSTRUMENT SPC-3	PSO/POLY	RT	97.16		0.00
5048	IS01	INDUST ENGINEERING	INSTRUMENT SPC-1	PSO/POLY	RT	52.25		0.00
5048	IS02	INDUST ENGINEERING	INSTRUMENT SPC-2	PSO/POLY	RT	67.09		0.00
5048	IS03	INDUST ENGINEERING	INSTRUMENT SPC-3	PSO/POLY	RT	86.83		0.00
5049	EE01 / ES01	ENGINEERING	ELECTRICAL ENG-1/ELECTRICAL SPC-1	PSO/POLY	RT	54.81		0.00
5049	EE02 / ES02	ENGINEERING	ELECTRICAL ENG-2/ELECTRICAL SPC-2	PSO/POLY	RT	73.56		0.00
5049	EE03 / ES03	ENGINEERING	ELECTRICAL ENG-3/ELECTRICAL SPC-3	PSO/POLY	RT	102.44	30.00	3,073.20
VEHICLES		VEHICLES	VEHICLES	PSO/POLY	RT	18.90	200.00	3,780.00
All Branches	E001/I001	All Branches	Elec. AP-1YR/INST APPR - 1YR	FS	RT	36.33		0.00
All Branches	E002/I002	All Branches	Elec. AP-2YR/INST APPR - 2YR	FS	RT	42.38	194.84	8,257.32
All Branches	E003/I003	All Branches	Elec. AP-3YR/INST APPR - 3YR	FS	RT	48.44		0.00
All Branches	E004/I004	All Branches	Elec. AP-4YR/INST APPR - 4YR	FS	RT	54.49	194.84	10,616.83

All Branches	EJ01/IJ01	All Branches	1 yr Elec Journey/1 yr Inst Journeyman	FS	RT	60.55	194.84	11,797.56
All Branches	EJ02/IJ02	All Branches	2 yr Elec Journeyman/2 yr Inst Journeyman	FS	RT	63.58		0.00
All Branches	EJ03/IJ03	All Branches	3 yr Elec Journeyman/3 yr Inst Journeyman	FS	RT	65.39		0.00
All Branches	ELH/ILH	All Branches	Electrical Lead Hand/Instr. Lead Hand	FS	RT	68.02		0.00
All Branches	EFM/IFM	All Branches	Electrical Foreman 1/Instrumentation F-1	FS	RT	74.02	194.84	14,422.06
All Branches	ET03	All Branches	Estimator	FS	RT	77.50		0.00
All Branches	FC01/FC02/FC03/PM1	All Branches	Branch Manager/Project Manager	FS	RT	79.08		0.00
VEHICLES		VEHICLES	VEHICLES	FS	RT	18.90		0.00
3892/3894	CM01	LFP/Ehouse all cost centers	CONSTRUCT.MGR-1	LFP/Ehouse	RT	110.00	28.41	3,125.10
3892/3894	CM02	LFP/Ehouse all cost centers	CONSTRUCT.MGR-2	LFP/Ehouse	RT	110.00		0.00
3892/3894	CM03	LFP/Ehouse all cost centers	CONSTRUCT.MGR-3	LFP/Ehouse	RT	110.00		0.00
3892/3894	PSRV	LFP/Ehouse all cost centers	PROJ SERVICES	LFP/Ehouse	RT	110.00		0.00
3892/3894	QA01	LFP/Ehouse all cost centers	QA/QC	LFP/Ehouse	RT	110.00		0.00
3892/3894	ADM0	LFP/Ehouse all cost centers	Admin	LFP/Ehouse	RT	60.00		0.00
3892/3894	CS1	LFP/Ehouse all cost centers	SAFETY	LFP/Ehouse	RT	65.00		0.00
3892/3894	CS1OT	LFP/Ehouse all cost centers	SAFETY OT	LFP/Ehouse	OT	88.00		0.00
3892/3894	CSO	LFP/Ehouse all cost centers	SAFETY OFFICER	LFP/Ehouse	RT	110.00		0.00
3896	ET03	Estimating	Estimator	LFP/Ehouse	RT	77.50		0.00
VEHICLES		VEHICLES	VEHICLES	LFP/Ehouse	RT	18.90		0.00
3323	E001/I001	E-HOUSES APPRENTICE	Elec. AP-1YR/INST APPR - 1YR	LFP/Ehouse	RT	26.00		0.00
3323	E001OT/I001OT	E-HOUSES APPRENTICE	Elec. AP-1YR OT/INST APPR - 1YR OT	LFP/Ehouse	OT	34.90		0.00
3323	E002/I002	E-HOUSES APPRENTICE	Elec. AP-2YR/INST APPR - 2YR	LFP/Ehouse	RT	32.00		0.00
3323	E002OT/I002OT	E-HOUSES APPRENTICE	Elec. AP-2YR OT/INST APPR - 2YR OT	LFP/Ehouse	OT	42.68		0.00
3323	E003/I002	E-HOUSES APPRENTICE	Elec. AP-3YR/INST APPR - 3YR	LFP/Ehouse	RT	37.00		0.00
3323	E003OT/I003OT	E-HOUSES APPRENTICE	Elec. AP-3YR OT/INST APPR - 3YR OT	LFP/Ehouse	OT	49.46		0.00
3323	E004/I004	E-HOUSES APPRENTICE	Elec. AP-4YR/INST APPR - 4YR	LFP/Ehouse	RT	42.00		0.00
3323	E004OT/I004OT	E-HOUSES APPRENTICE	Elec. AP-4YR OT/INST APPR - 4YR OT	LFP/Ehouse	OT	56.24		0.00
3325	EJ01_3/IJ01_3	E-HOUSES -JOURNEYMEN	Elec Journey/Instr Journeyman	LFP/Ehouse	RT	52.00		0.00
3325	EJ01_3OT/IJ01_3OT	E-HOUSES -JOURNEYMEN	Elec Journey OT/Instr Journeyman OT	LFP/Ehouse	OT	69.80		0.00
3325	EJ05/IJ05	E-HOUSES -JOURNEYMEN	5 yr Elec/Instr Journeyman	LFP/Ehouse	RT	90.00		0.00
3325	EJ05OT/IJ05OT	E-HOUSES -JOURNEYMEN	5 yr Elec/Instr Journeyman OT	LFP/Ehouse	OT	121.56		0.00
3325	ELH1/ILH1	E-HOUSES -JOURNEYMEN	Electrical/Instr.Lead Hand	LFP/Ehouse	RT	55.00		0.00
3325	ELH1OT/ILH1OT	E-HOUSES -JOURNEYMEN	Electrical/Instr Lead Hand OT	LFP/Ehouse	OT	73.55		0.00
3325	EFM1/IFM1	E-HOUSES -JOURNEYMEN	Electrical Foreman 1	LFP/Ehouse	RT	64.00		0.00
3325	EFM1OT/IFM1OT	E-HOUSES -JOURNEYMEN	Elect Foreman 1 OT	LFP/Ehouse	OT	85.25		0.00
3893	NEE1/NEI1	APPRENTICE CONSTR	NE ELEC /INSTR APRENTICE 1	LFP/Ehouse	RT	29.50		0.00
3893	NEE1OT/NEI1OT	APPRENTICE CONSTR	NE ELEC/INSTR APPRENT 1 OT	LFP/Ehouse	OT	38.77		0.00
3893	NEE2/NEI2	APPRENTICE CONSTR	NE ELEC / INSTR APRENTICE 2	LFP/Ehouse	RT	34.50		0.00
3893	NEE2OT/NEI2OT	APPRENTICE CONSTR	NE ELEC/INSTR APPRENT 2 OT	LFP/Ehouse	OT	45.62		0.00
3893	NEE3/NEI3	APPRENTICE CONSTR	NE ELEC / INSTR APRENTICE 3	LFP/Ehouse	RT	39.50		0.00
3893	NEE3OT/NEI3OT	APPRENTICE CONSTR	NE ELEC / INSTR APPRENT 3 OT	LFP/Ehouse	OT	52.48		0.00
3893	NEE4/NEI4	APPRENTICE CONSTR	NE ELEC / INSTR APRENTICE 4	LFP/Ehouse	RT	44.50		0.00
3893	NEE4OT/NEI4OT	APPRENTICE CONSTR	NE ELEC / INSTRAPPRENT 4 OT	LFP/Ehouse	OT	59.33		0.00
3893	WBE1/WBI1	APPRENTICE CONSTR	WB ELEC / INSTR APRENTICE 1	LFP/Ehouse	RT	31.50		0.00
3893	WBE1OT/WBI1OT	APPRENTICE CONSTR	WB ELEC / INSTR APPRENT 1 OT	LFP/Ehouse	OT	41.56		0.00
3893	WBE2/WBI2	APPRENTICE CONSTR	WB ELEC / INSTR APRENTICE 2	LFP/Ehouse	RT	36.50		0.00
3893	WBE2OT/WBI2OT	APPRENTICE CONSTR	WB ELEC / INSTR APPRENT 2 OT	LFP/Ehouse	OT	48.57		0.00
3893	WBE3/WBI3	APPRENTICE CONSTR	WB ELEC / INSTR APRENTICE 3	LFP/Ehouse	RT	41.50		0.00
3893	WBE3OT/WBI3OT	APPRENTICE CONSTR	WB ELEC / INSTR APPRENT 3 OT	LFP/Ehouse	OT	55.58		0.00
3893	WBE4/WBI4	APPRENTICE CONSTR	WB ELEC / INSTR APRENTICE 4	LFP/Ehouse	RT	46.50		0.00
3893	WBE4OT/WBI4OT	APPRENTICE CONSTR	WB ELEC / INSTR APPRENT 4 OT	LFP/Ehouse	OT	62.60		0.00
3895	NEEJ1_3/NEIJ1_3	JOURNEYMAN CONSTR	NE ELEC / INSTR JOURNEYMAN 1_3	LFP/Ehouse	RT	55.50		0.00
3895	NEJ1_3OT/NEIJ1_3OT	JOURNEYMAN CONSTR	NE ELEC / INSTR Journey 1_3 OT	LFP/Ehouse	OT	74.04		0.00
3895	NEEJ5/NEIJ5	JOURNEYMAN CONSTR	NE ELEC / INSTR JOURNEYMAN 5	LFP/Ehouse	RT	80.00		0.00
3895	NEJ5OT/NEIJ5OT	JOURNEYMAN CONSTR	NE ELEC / INST Journey 5 OT	LFP/Ehouse	OT	107.50		0.00
3895	NEELH1/NEILH1	JOURNEYMAN CONSTR	NE ELEC / INSTR LEAD HAND	LFP/Ehouse	RT	57.50		0.00
3895	NELHOT	JOURNEYMAN CONSTR	NE ELEC / INSTR LEAD HAND OT	LFP/Ehouse	OT	76.79		0.00
3895	NEEFM1/NEIFM1	JOURNEYMAN CONSTR	NE ELEC/INSTR FOREMAN 1	LFP/Ehouse	RT	60.00		0.00
3895	NEFMOT	JOURNEYMAN CONSTR	NE ELEC/INSTR FOREMAN 1 OT	LFP/Ehouse	OT	80.04		0.00
3895	WBEJ1_3/WBIJ1_3	JOURNEYMAN CONSTR	WB ELEC / INSTR JOURNEYMAN 1_3	LFP/Ehouse	RT	58.50		0.00
3895	WEJ1_3OT/WIJ1_3OT	JOURNEYMAN CONSTR	WB ELEC / INSTR Journey 1_3 OT	LFP/Ehouse	OT	78.62		0.00
3895	WBEJ5/WBIJ5	JOURNEYMAN CONSTR	WB ELEC / INSTR JOURNEYMAN 5	LFP/Ehouse	RT	80.00		0.00
3895	WEJ5OT/WIJ5OT	JOURNEYMAN CONSTR	WB ELEC / INST Journey 5 OT	LFP/Ehouse	OT	107.50		0.00
3895	WBELH1/WBILH1	JOURNEYMAN CONSTR	WB ELEC / INSTR LEAD HAND	LFP/Ehouse	RT	61.00		0.00
3895	WEL1OT/WIL1OT	JOURNEYMAN CONSTR	WB ELEC / INSTR LEAD HAND OT	LFP/Ehouse	OT	81.88		0.00
3895	WBEFM1/WBIFM1	JOURNEYMAN CONSTR	WB ELEC/INSTR FOREMAN 1	LFP/Ehouse	RT	63.50		0.00
3895	WEF1OT/WIFM1OT	JOURNEYMAN CONSTR	WB ELEC/INSTR FOREMAN 1 OT	LFP/Ehouse	OT	85.13		0.00



BID PREPARATION CHECKLIST

Client:	Murphy Oil Company Ltd. (Vista Projects)		
Is this a Firm or Budgetary Proposal?	Firm	Project / Proposal	BU-1100 MCC/Instrument Air Bldg
		ABB Proposal #	Q2012-039
Enter Currency quoted.	CAD	Ensure all Hedging costs are accounted for. List reasons for not quoting in CAD in comment section below.	

Export Validation

Is the final customer outside of Canada?

No

T&C's

Are "ABB Standard Terms and

If above reply is no - answer following question

Confirm ABB Legal Dept reviewed

No

Confirmed

Is the Bid conditional on credit approval

If above reply is no - answer following question

Confirm credit approval been done by

Yes

Confirmed

Cost Assessment Completion/Realistic/Accuracy/Reliability/ Consistent

Material & sub-supplier costs are

Historical Basis

0.0%

Budgetary Quote

0.0%

Firm
Quote/Established
Price List

100.0%

Total

100.0%

Engineering Labour costs are based

Historical Basis

0.0%

Engineering Manager
sign off

100.0%

Total

100.0%

Project manager costs are based on :

Historical Basis

0.0%

Project/Operation
Manager sign off

0.0%

Cost Calculation
Model

100.0%

Total

100.0%

Have all other costs been considered as per the Current Full Cost Calculation model - Risk, Warranty,

Yes

General

Confirm Bid has been reviewed as per
the Table of Authority?

Confirmed

Does bid require on site services of any type?

No

OHS: Risks to our personnel (or

No

Environment:

No

Is a Risk Review required?
(See Note 1)

No

Prepared by: Dale Williams

Last Modified Date:

19-Mar-2012

Comments:

Notes

1) Use the Risk Review process as per the following guidelines

1a) Use ABB Ber-Mac risk review process for Lump Sum proposals with a value greater than \$500KCAD

1b) Use the ABB Canada Process Automation Division risk review process for proposals with a value greater than \$2MCAD and less than \$5MCA

1c) Use the ABB Group risk review process using the Risk Review database for all proposals with a value greater than \$5MCAD

Approvals

Name Signature

Name Signature

Name Signature

Add names and signature as per ToA

Contract Review Checklist

Project Manager : **Dale Williams**

Project No.:

Project Name : **Seal CSS Pilot B**

Customer Name: **Murphy Oil**

	YES	NO	N/A
A Written and signed (or equivalent authorization) Customer PO is supports the Order to be booked	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The PO received matches the tender submitted by ABB and all differences are clarified in writing with the	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documents handed over from the Bid Team include:			
Full Cost model and costing details	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
SOX Bid Checklist	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Risk Review. (Ref No. _____ where applicable)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ABB internal authorizations and risk review requirements were obtained in accordance with the	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Non Standard T&C's are reviewed and approved by the Corporate Legal department	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Prepared by: Dale Williams

Date: Feb.18/12



ABB BER-MAC



Friday, February 17, 2012

Letter: Q2012-039-01_cb

Murphy Oil Company Ltd. c/o Vista Projects Limited
Vista Projects Ltd.
#330-4000 4 Street SE,
Calgary, Alberta, T2G 2W3

Attention: Brant Lu
Subject: Quote # 1780-RFQ-024
Project Name: MCC/Instrument Air Building BU-1100 Construction

Dear Brant:

ABB Ber-Mac is pleased to submit our proposal for MCC Construction, in the Lump Sum amount of **TWO HUNDRED, EIGHTY-NINE THOUSAND CANADIAN DOLLARS (CAD 289,000.00)** excluding taxes, with regards to the scope of work as indicated below, for one building.

ABB BER-MAC
250 42 Avenue SE
Calgary, Alberta T2G 1Y4

T (403) 287-6026
F (403) 287-6099
www.ber-mac.com

DW

INCLUDED IN OUR PROPOSAL:

Table 1 Self Framing Building

Item	Qty	Description
1.	1	14'-10" wide x 48'-2" long x 12'-6" eave (4.53M x 14.683M x 3.81M), gable style with 4:12 slope
2.	Lot	22 gauge galvalume exterior walls and roof
3.	Lot	R12 batt insulation in walls, R20 batt in roof with 6 mil vapor barrier throughout
4.	Lot	20 ga white perforated aluminum interior liner (10% free area) above 3' with 24 gauge white fluted aluminum below 3'
5.	Lot	Caulked interior joints
6.	Lot	Climaseal fasteners
7.	1	Inactive ridge (non-ventilating)
8.	2	6' x 7' steel man doors (20 ga doors, 18 ga frames, R12 insulated) with locking panic hardware and hydraulic door closures on active leafs, barrel bolts on inactive leafs, 24" x 24" IWG windows on both leafs, check chains, weather stripping, and aluminum thresholds
9.	2	double door bolt-on transoms
10.	1	full height and width partition wall with 10% perforated white aluminum interior liner on one side and 3" Roxul insulation
11.	Lot	Misc. wall cutouts as required
12.	Lot	Ice rakes at lower eaves
13.	Lot	Continuous eaves trough with 2 – downspouts
14.	Lot	Designed to accommodate a wind load of 150 km/hr and snow load of 2.2 kPa
15.	Note	Engineer stamped building drawings (AB registered)
16.	Lot	Building to be installed on the following steel skid in Vendors Calgary yard

DL

Table 2 Skid Base, Upper Steel and Platforms

Item	Qty	Description
1.	1	14'-10" wide x 48'-2" long skid base
2.	Lot	Material and fabrication
3.	Lot	Structural steel to conform to CSA-G40.21, Grade 300W/350W
4.	Lot	Welding to conform to CSA W59 and CSA W47.1
5.	Lot	Metal cored arc welding (MCAW)
6.	Lot	W18x50 perimeter and main beams w/ W16x36 intermediate members
7.	Lot	C4x5.4 cross members on 24" centers
8.	Lot	HSS 3"x3"x1/4" posts welded inside of the walls and attached to W6x15 cross members at top for 2 level cable tray supports (x3 frames)
9.	8	Eight (8) removable lifting lugs
10.	Lot	Non-destructive testing (NDT): <ul style="list-style-type: none"> - 100% MPI on lifting lugs - 10% MPI on fillet welds - All other NDT is extra, if required
11.	Lot	1/4" flat plate decking w/anti-slip paint
12.	Lot	Floor plate fully seal welded at all seams and stitch welded around the perimeter and u/s to floor members
13.	Lot	Painting, excluding u/s of floor plate as follows: <ul style="list-style-type: none"> o Surface preparation as per SSPC-SP-6, commercial blast cleaning o prime with 1 coat of Cloverdale 710 series primer (1.5 - 2.0 mils DFT) o topcoat with 1 coat of Cloverdale 74 series industrial enamel (1.25 - 1.75 mils DFT) o Underside of building floor plate is bare metal (unpainted) o Finish color (TBC)
14.	Lot	3"- R20 spray foam polyurethane insulation c/w Towerthon II fire retardant coating u/s of the building floor
15.		Standard QC package
16.		Engineer stamped building drawings (AB registered)

Table 3 HVAC

Based on non-classified area

5 kW of heat gains ASSUMED (to be confirmed)

Based on 3 ACPH continuous

Item	Qty	Description
1.	1	<p><u>MCC/IA Building:</u> (4530x14683x3800) Based on 5 kW of heat gain</p> <p>1 – Bard Packaged Wall mount units W42A1-C15EPXXXJ c/w</p> <p>3.5 ton cooling and 15 kW of heat 480/3/60</p> <p>Supply/Return Grilles</p> <p>J control module</p> <p>Economizer</p> <p>TEC 40 Temperature controller</p> <p>Tec 40 to control Bard Unit and unit heater</p> <p>c/w fire shutdown contact, common trouble alarm from unit</p> <p><u>Note:</u> Fan to run continuously, balanced to 3 ACPH</p> <p>8 week delivery</p>
2.	1	1 – 15 kW OAS Electric unit heater 480/3/60 c/w wall bracket and built in thermostat (installation by others)
3.	1	<p><u>Compressor Room:</u></p> <p>1 – ET12-1 GP exhaust fan 120/1/60 1140 rpm motor TEFC c/w shutter, back guard and hood</p> <p>1 – 12" x 12" XF445W fixed intake louver c/w BDX Damper, filter and hood</p> <p>1 – 20 kW OAS Electric Unit heater 480/3/60 c/w wall bracket and built in thermostat</p>
4.	1	HVAC platform supported by the building on the north side of the building.
5.	Note	Price includes Eng/Drwgs/Startup/Balancing – on site in Vendors yard in Calgary
6.	Note	<p><u>Not included in HVAC:</u></p> <ul style="list-style-type: none"> ○ Sliders if required ○ Design and supply of stand/platform/access platform for HVAC units ○ Humidity control ○ BAS building automation system ○ Gas or fire detection systems ○ Fire extinguishers ○ Alberta building code schedules ○ Site Work

Table 4 Supply, Installation and Connection of the following:

Item	Qty	Description
1.	Lot	Cables as per cable schedule.
2.	1	CPNL-100 Contactor Panel
3.	1	TNS-100 45 KVA 480-120/208 3 Phase Dry Type Transformer
4.	1	DP-100 Distribution Panel
5.	12	Industrial 2 lamp 4' fluorescent light fixtures c/w Gards.
6.	2	1-pole switch's for interior lights.
7.	3	70W HPS wall mount outdoor light (Hubbell PVL-070S-521 or equivalent)
8.	4	Wall Pack 313-175MAL-T 175w MH (In Compressor Room)
9.	2	EXIT SIGN Install
10.	1	Tork1 photo cell
11.	2	Receptacle 15A/120V
12.	1	Exterior GFCI Receptacle Install
13.	2	Emergency Stop ESD stations. (Cooper GHG series)
14.	2	Crusader weather shrouds for ESD stations.
15.	2	MMS for exhaust fans
16.	3	Smoke Detectors (2 - MCC room, 1 – Compressor Room)
17.	1	Red Strobe
18.	1	Blue Strobe
19.	1	Amber Strobe
20.	Lot	Grounding of Equipment
21.	Lot	Cable Tray as per drawings
22.	4	¼" X 2" X 24" isolated ground bars
23.	2	Thermostats for H-VAC Control
24.	1	Power connections Unit Heater
25.	1	Power connection of Exhaust fan c/w MMS Install
26.	1	Power connection o Bard Packaged Wall mount units W42A1-C15EPXXXJ f
27.	Lot	Visual inspection and cleaning of the Owner supplied equipment
28.	Lot	Preparation of the Building Electrical for transportation

dh

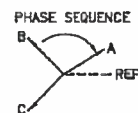
Table 5 Installation and Connection of Owner Supplied Equipment

Item	Qty	Description
1.	1	Set Owner supplied PNL-PLC-100
2.	1	Set Owner supplied TNS-UPS-100
3.	1	Set Owner supplied DP-UPS-100
4.	1	Set Owner supplied BATT-100
5.	1	Set Owner supplied MCC-100
6.	1	Set Owner supplied PNL-101 (Well Monitoring Panel)
7.	1	Set Owner supplied PNL-102 (PROMORE Panel)
8.	1	Set Owner Supplied NGR-100

DL

Table 6 Clarifications & Exceptions

Item	Description
1.	Quotation to be reviewed upon receipt of IFC drawings.
2.	We have quoted our standard gable and shed style self-framing buildings with typical materials, finishes and hardware
3.	Building wiring quoted as general purpose.
4.	E.M.T. conduit to be used inside the building. Rigid aluminum conduit will be used outside.
5.	We have not included on/off switches for IA Compressors as most of these units are furnished with control stations and starters as part of the package.
6.	Electrical permit has been included in quotation.
7.	One set of red line as-built drawings has been included in the quotation.
8.	QA/QC as per ABB Ber-Mac standards has been included in the quotation.
9.	Continuity testing and meggar testing has been included in the quotation.
10.	Loading of completed building package onto Owner supplied transport has been included in quotation.
11.	Work to be carried out in Calgary, Alberta.
12.	If the building Vendor's standard colors cannot be used, additional charges will apply for powder coating.
13.	Building Permits by others.
14.	The building and doors are not fire rated.
15.	Building accessories (unless otherwise noted) are not included.
16.	Building security swipe card system not included.
17.	Door platforms & stairs not included.
18.	Work schedule based on 10 hours per day 5 days per week. Weekends and Statutory holidays not included.
19.	We have included temporary heat and power for construction with quotation.
20.	We have included 480vac temporary power for testing.
21.	Fire suppression system has not been included in the quotation.
22.	Transportation of building to site has not been included in the quotation.
23.	Load calculations and all transportation insurances are by others.
24.	All Mechanical and Instrumentation on Instrument Air compressor unit.
25.	Site work has not been included in the quotation.
26.	Electrical Engineer stamped drawings have been included in the quotation.
27.	All commissioning assistance will be at force account rates.
28.	All information provided within this quote is confidential.
29.	Quotation validity 30 days
30.	Payment terms net 45 days.
31.	Please see attached ABB Inc exceptions to Terms and Conditions



#2 GREEN
NGR100-P2
(TO GROUND GRID)

NGR-100
NGR CABINET (STARTCO)
5A CONT.
55.4 OHM

NGR100-P6

MCC-100 MOTOR CONTROL CENTER

TO MCC GROUND BUS

(SEE NOTE 6&7)

FPB: NOT RECOMMENDED
- CAL/CM2
AT 45.72cm

480V, 3#, 3 WIRE, 1200A, 42kA SYM. BRACING

R1M
15AT
100AF

LINE REACTOR
VFD
LOAD FILTER

PART OF
MCC100-A1
MCC100-C2

ACM5010-C1

5 HP

ACM-5010
PRODUCED GAS
COOLER FAN MOTOR

1780-63-001-1

R6M
50AT
100AF

LINE REACTOR
VFD
LOAD FILTER

PART OF
MCC100-A1
MCC100-C2

ACM5020-C1

25 HP

ACM-5020
BOILER FEED WATER
COOLER FAN MOTOR

1780-63-002-1

F2M
150AT
150AF

LINE REACTOR
VFD
LOAD FILTER

PART OF
MCC100-A1
MCC100-C2

PM4010-C1

100 HP

PM-4010
PUMP JACK MOTOR
WELL 18-B

1780-63-003-1

F3M
150AT
150AF

LINE REACTOR
VFD
LOAD FILTER

PART OF
MCC100-A1
MCC100-C2

PM4020-C1

100 HP

PM-4020
PUMP JACK MOTOR
WELL 13-9

1780-63-004-1

R2M
150AT
150AF

LINE REACTOR
VFD
LOAD FILTER

PART OF
MCC100-A1
MCC100-C2

PM4030-C1

100 HP

PM-4030
PUMP JACK MOTOR
WELL 12-9

1780-63-005-1

R5M
100AT
100AF

LINE REACTOR
VFD
LOAD FILTER

PART OF
MCC100-A1
MCC100-C2

PM6000-C1

50 HP

PM-6000
SOURCE WATER WELL
PUMP MOTOR

1780-63-006-1

TO MCC-100 'N1' & 'N2'
TERMINALS REFER TO
NOTES 2 TO 4

#8 WHITE
NGR100-P1

NGR100-P4

PART OF
MCC100-C1

MCC100-P1
MCC100-P2
MCC100-P3

NOTE 1

1000AT L.S.L.
1200AF TRIP UNIT
(100% RATED)

1000:5A

3A

1.5A

SHUNT TRIP

FT-1

CUSTOMER
METERING
PK-4000

PART OF
MCC100-C1

PLC

ATCO UTILITY 25KV
O/H LINE

ATCO UTILITY
TRANSFORMER
750kVA
25000-480/277VAC

1000A:5A

3A

UTILITY
METERING

ATCO MURPHY OIL

SOFT MAX CABLE
(SEE NOTE 3)

GEN-100
NATURAL GAS
GENSET PACKAGE
(NOTES 2 TO 4)

500kW, 480V
LOAD BANK

10FT MAX

FUSED
DISCONNECT

25FT MAX

FOR FUTURE USE

NATURAL GAS
GENERATOR 1250kW,
480V, 3#, 60 HZ

NOTES:

- MCC VENDOR SHALL ALLOW SPACE INSIDE MCC FOR UTILITY METERING CT'S.
- ONE GENSET SHALL BE RENTED BY OWNER TO PROVIDE TEMPORARY POWER TO THE SITE UNTIL THE PERMANENT UTILITY POWER IS INSTALLED. GENSET VENDOR TO PROVIDE AUTOMATIC TRANSFER SWITCH, DISCONNECT SWITCHES, LOAD BANK, AND ALL TEMPORARY FEEDER CABLES.
- FIELD ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR TERMINATION OF GENSET VENDOR SUPPLIED CABLES BETWEEN GENSET PACKAGE EQUIPMENT AND BETWEEN GENSET AND MCC.
- SOLID GROUNDING OF THE GENERATOR NEUTRAL SHALL BE REMOVED BY THE GENSET VENDOR. SITE ELECTRICAL CONTRACTOR SHALL SUPPLY AND INSTALL CABLES AS REQUIRED FOR THE CONNECTION OF THE GENERATOR NEUTRALS TO THE NEUTRAL GROUND RESISTOR LOCATED ON TOP OF MCC-100.
- OWNER SUPPLIED PUMP & PUMP MOTOR.
- ARC FLASH HAZARD ANALYSIS AS PER CSA Z462 AND IEEE 1584 STANDARDS DETERMINED THAT THE ARC FLASH PROTECTIVE BOUNDARY (FPB) IS NOT RECOMMENDED OR DOES NOT EXIST AND THE INCIDENT ENERGY EXPOSURE LEVEL AT 45.72CM (18IN), EXCEEDS THE INCIDENT ENERGY LEVELS UNDER WHICH WORK TASKS PERFORMED ON ENERGIZED EQUIPMENT IS ALLOWED BY WEARING THE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT.
- WARNING! DUE TO POSSIBLE VERY HIGH INCIDENT ENERGY EXPOSURE LEVELS DURING A FAULT, RACKING MCC BUCKETS IN AND OUT OR PERFORMING MCC MAINTENANCE WHILE MCC BUS IS ENERGIZED IS NOT RECOMMENDED AS IT MAY RESULT IN EITHER SEVERE INJURY OR DEATH.

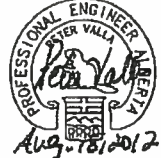
LEGEND:

- PHASE FAILURE/SEQUENCE/UNBALANCE RELAY
- 1780-63-001-1 INDICATES SCHEMATIC DRAWING
- FT-1 TEST SWITCH
- TERMINAL BLOCK
- ARC-FLASH HAZARD RATING
- A. FPB: "FLASH PROTECTIVE BOUNDARY" INCIDENT ENERGY OF 1.2CAL/CM2 AT SPECIFIED FPB DISTANCE.
- B. INCIDENT ENERGY AT SPECIFIED WORKING DISTANCE.

STICK FILE

AS BUILT
OCT 22 2012
BAC

PERMIT TO PRACTICE
VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta



0-1780-63-004-1 MAJOR EQUIPMENT LAYOUT MCC/INSTRUMENT AIR BUILDING
0-1780-63-002-1 ELECTRICAL SYMBOL LEGEND
0-1780-63-001-1 CABLE AND CONDUIT SCHEDULE

ISSUED FOR CONSTRUCTION

2012.08.10

PKC

BT

178062001_RA

DESIGNED BY: RB
DRAWN BY: PKC
CHECKED BY: PV/RB
ENGINEER'S APPROVAL: PV
COMPUTER FILE: 178062001_RA

MURPHY
OIL CANADA

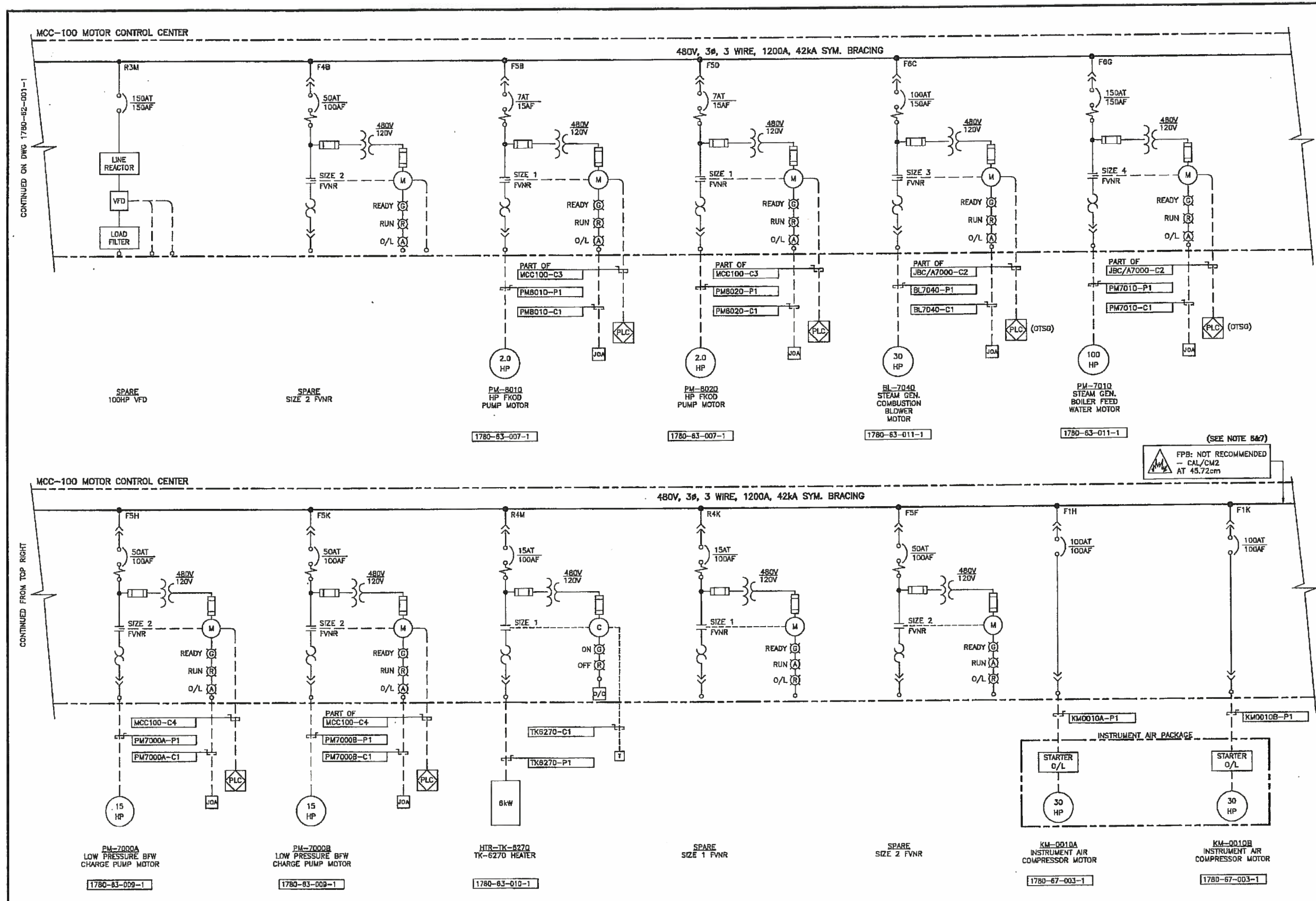
MURPHY CADOTTE PILOT CSS 16-8-85-17 WSM

SINGLE LINE DIAGRAM
MCC-100

Vista
Projects Limited

SCALE: N.T.S.
DATE: 06 JULY 2011
SHEET No: 0
VISTA Dwg No: 1780-62-001-1
CLIENT Dwg No: REV: 0

2012-Jul-04 8:11:02 AM



- NOTES:**
- MCC VENDOR SHALL ALLOW SPACE INSIDE MCC FOR UTILITY METERING CTS.
 - ONE GENSET SHALL BE RENTED BY OWNER TO PROVIDE TEMPORARY POWER TO THE SITE UNTIL THE PERMANENT UTILITY POWER IS INSTALLED. GENSET VENDOR TO PROVIDE AUTOMATIC TRANSFER SWITCH, DISCONNECT SWITCHES, LOAD BANK, AND ALL TEMPORARY FEEDER CABLES.
 - FIELD ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR TERMINATION OF GENSET VENDOR SUPPLIED CABLES BETWEEN GENSET PACKAGE EQUIPMENT AND BETWEEN GENSET AND MCC.
 - SOLID GROUNDING OF THE GENERATOR NEUTRAL SHALL BE REMOVED BY THE GENSET VENDOR. SITE ELECTRICAL CONTRACTOR SHALL SUPPLY AND INSTALL CABLES AS REQUIRED FOR THE CONNECTION OF THE GENERATOR NEUTRALS TO THE NEUTRAL GROUND RESISTOR LOCATED ON TOP OF MCC-100.
 - OWNER SUPPLIED PUMP & PUMP MOTOR.
 - ARC FLASH HAZARD ANALYSIS AS PER CSA Z462 AND IEEE 1584 STANDARDS DETERMINED THAT THE ARC FLASH PROTECTIVE BOUNDARY (FPB) IS NOT RECOMMENDED OR DOES NOT EXIST AND THE INCIDENT ENERGY EXPOSURE LEVEL AT 45.72CM (18IN). EXCEEDS THE INCIDENT ENERGY LEVELS UNDER WHICH WORK TASKS PERFORMED ON ENERGIZED EQUIPMENT IS ALLOWED BY WEARING THE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT.
 - WARNING! DUE TO POSSIBLE VERY HIGH INCIDENT ENERGY EXPOSURE LEVELS DURING A FAULT, RACKING MCC BUCKETS IN AND OUT OR PERFORMING MCC MAINTENANCE WHILE MCC BUS IS ENERGIZED IS NOT RECOMMENDED AS IT MAY RESULT IN EITHER SEVERE INJURY OR DEATH.

LEGEND:

(PFR) PHASE FAILURE/SEQUENCE/UNBALANCE RELAY

1780-63-001-1 INDICATES SCHEMATIC DRAWING

FT-1 TEST SWITCH

TERMINAL BLOCK

ARC-FLASH HAZARD RATING

A. FPB: "FLASH PROTECTIVE BOUNDARY" INCIDENT ENERGY OF 1.2CAL/CM2 AT SPECIFIED FPB DISTANCE.

B. INCIDENT ENERGY AT SPECIFIED WORKING DISTANCE.

STICK FILE

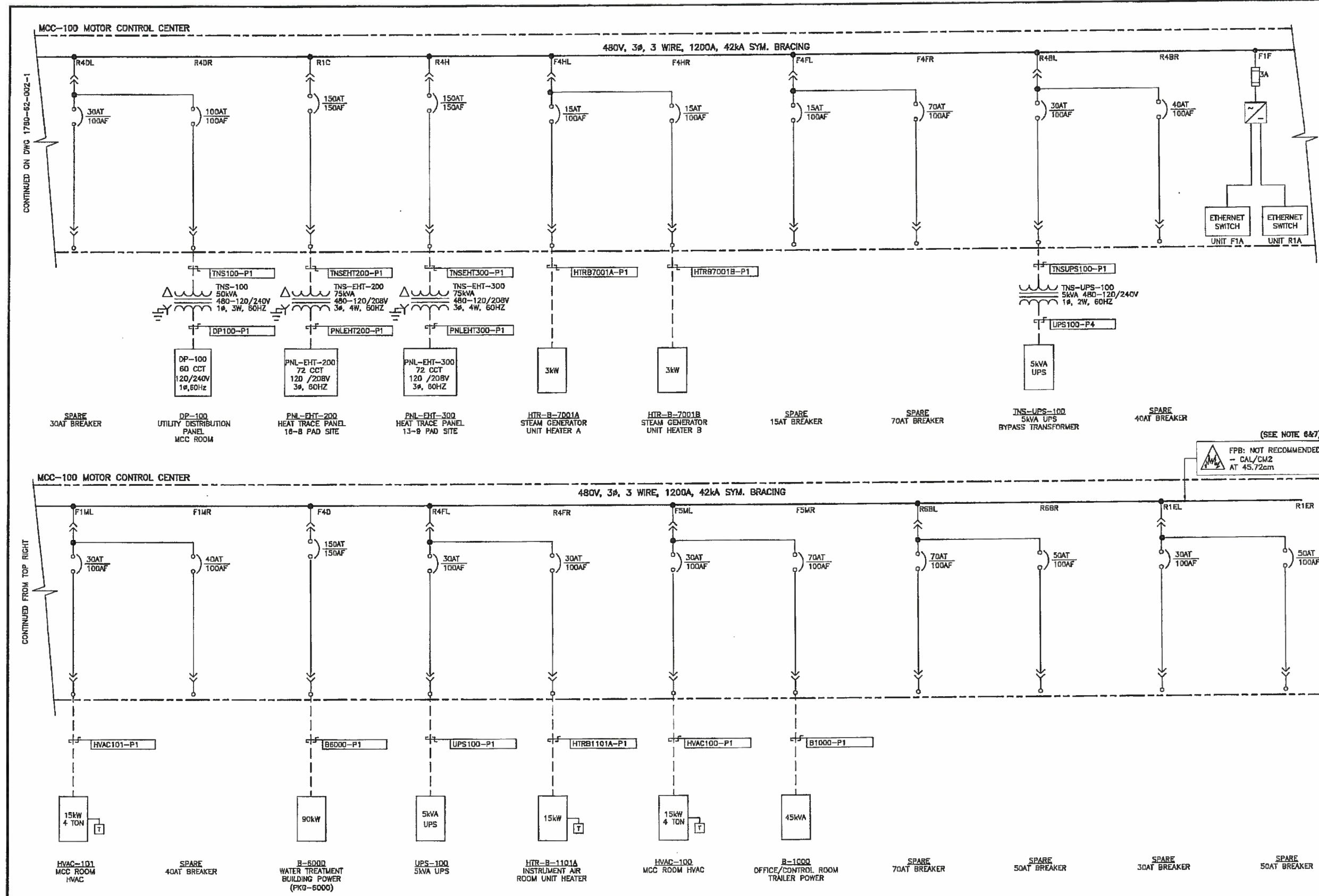
AS BUILT

OCT 22 2012

DAR

<p>PERMIT TO PRACTICE VISTA PROJECTS LIMITED</p> <p>APEGGA PERMIT No. P 04559</p> <p>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</p>		1780-69-004-1 MAJOR EQUIPMENT LAYOUT MCC/INSTRUMENT AIR BUILDING		DESIGNED BY: RB		<p>MURPHY OIL CANADA</p> <p>MURPHY CADOTTE PILOT CSS 18-B-85-17 WSM</p> <p>SINGLE LINE DIAGRAM MCC-100</p>	<p>Vista Projects Limited</p> <p>SCALE: N.T.S.</p> <p>DATE: 06 JULY 2011</p> <p>SHEET No: D VISTA PROJ No: 1780-62-002-1</p> <p>CLIENT PROJ No: REV: 0</p>
		1780-60-002-1 ELECTRICAL SYMBOL LEGEND		CHECKED BY: PKC			
		1780-68-001-1 CABLE AND CONDUIT SCHEDULE		DESIGNER'S APPROVAL: PV			
		TITLE: REFERENCE DRAWINGS		COMPUTER FILE: 178062001_RA			
NUMBER: 0		ISSUED FOR CONSTRUCTION		DATE: 2012.08.10		BY: PKC	
DESCRIPTION: REVISIONS							

2012-Jul-04 11:50:31 AM



- NOTES:**
- MCC VENDOR SHALL ALLOW SPACE INSIDE MCC FOR UTILITY METERING CT'S.
 - ONE GENSET SHALL BE RENTED BY OWNER TO PROVIDE TEMPORARY POWER TO THE SITE UNTIL THE PERMANENT UTILITY POWER IS INSTALLED. GENSET VENDOR TO PROVIDE AUTOMATIC TRANSFER SWITCH, DISCONNECT SWITCHES, LOAD BANK, AND ALL TEMPORARY FEEDER CABLES.
 - FIELD ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR TERMINATION OF GENSET VENDOR SUPPLIED CABLES BETWEEN GENSET PACKAGE EQUIPMENT AND BETWEEN GENSET AND MCC.
 - SOLID GROUNDING OF THE GENERATOR NEUTRAL SHALL BE REMOVED BY THE GENSET VENDOR. SITE ELECTRICAL CONTRACTOR SHALL SUPPLY AND INSTALL CABLES AS REQUIRED FOR THE CONNECTION OF THE GENERATOR NEUTRALS TO THE NEUTRAL GROUND RESISTOR LOCATED ON TOP OF MCC-100.
 - OWNER SUPPLIED PUMP & PUMP MOTOR.
 - ARC FLASH HAZARD ANALYSIS AS PER CSA Z462 AND IEEE 1584 STANDARDS DETERMINED THAT THE ARC FLASH PROTECTIVE BOUNDARY (FPB) IS NOT RECOMMENDED OR DOES NOT EXIST AND THE INCIDENT ENERGY EXPOSURE LEVEL AT 45.72CM (18IN), EXCEEDS THE INCIDENT ENERGY LEVELS UNDER WHICH WORK TASKS PERFORMED ON ENERGIZED EQUIPMENT IS ALLOWED BY WEARING THE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT.
 - WARNING! DUE TO POSSIBLE VERY HIGH INCIDENT ENERGY EXPOSURE LEVELS DURING A FAULT, RACKING MCC BUCKETS IN AND OUT OR PERFORMING MCC MAINTENANCE WHILE MCC BUS IS ENERGIZED IS NOT RECOMMENDED AS IT MAY RESULT IN EITHER SEVERE INJURY OR DEATH.

LEGEND:

⊗ PHASE FAILURE/SEQUENCE/UNBALANCE RELAY

1780-63-001-1 INDICATES SCHEMATIC DRAWING

□ FT-1 TEST SWITCH

□ TERMINAL BLOCK

⚡ ARC-FLASH HAZARD RATING

A. FPB: "FLASH PROTECTIVE BOUNDARY" INCIDENT ENERGY OF 1.2CAL/CM² AT SPECIFIED FPB DISTANCE.



B. INCIDENT ENERGY AT SPECIFIED WORKING DISTANCE.

STICK FILE

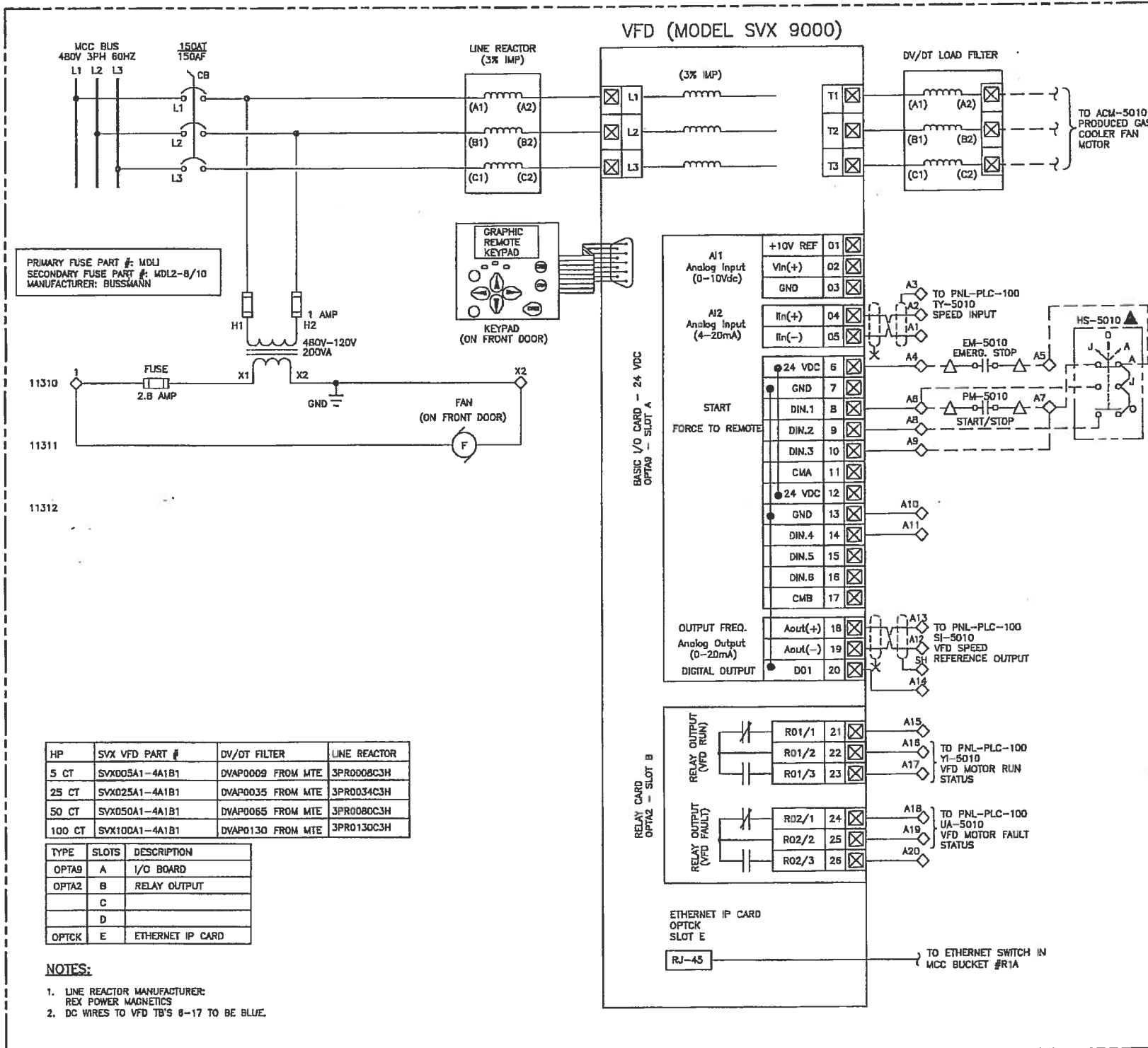
AS BUILT

OCT 22 2012

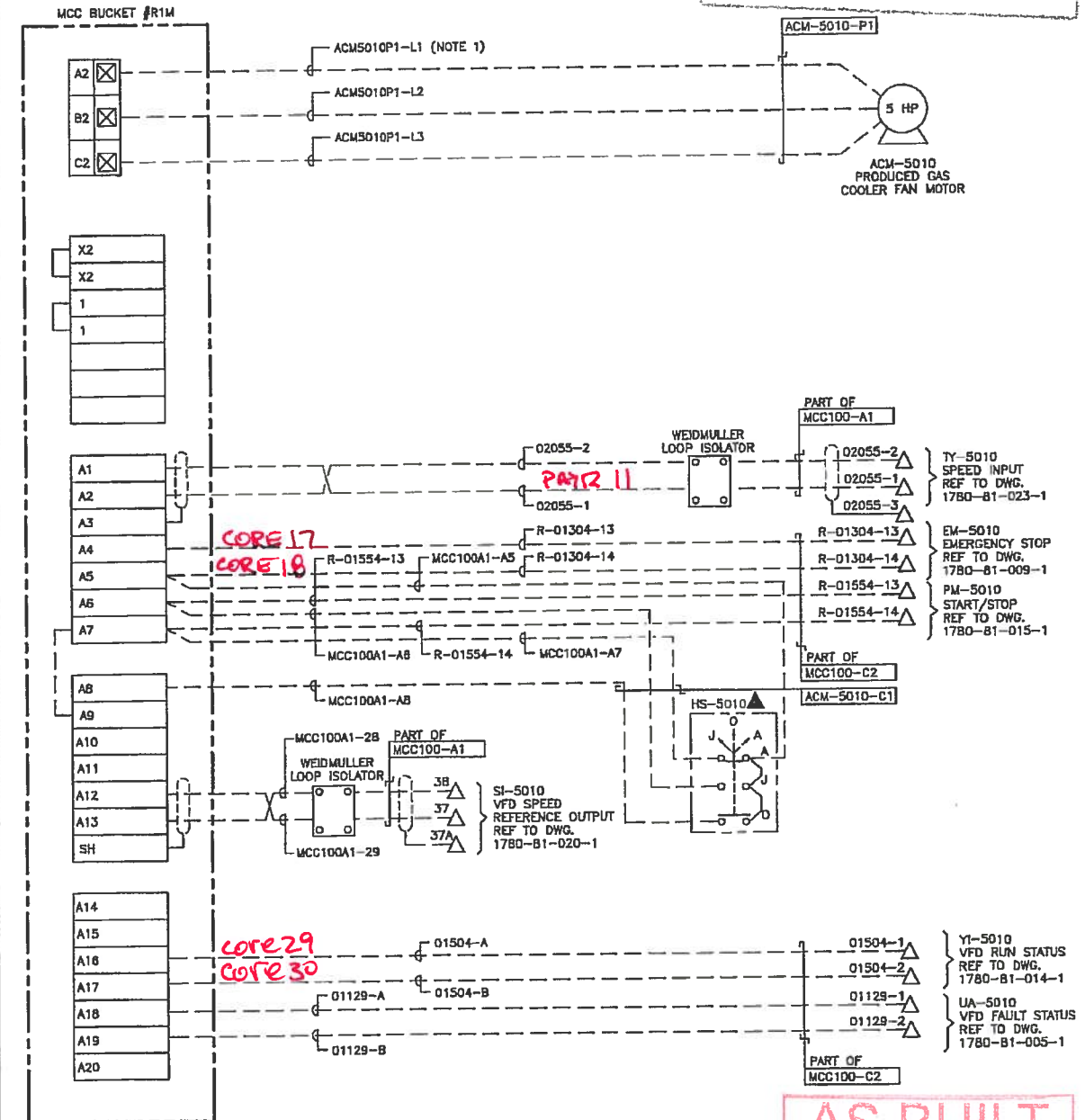
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<div>2012-Jul-04 12:51:57 PM</div> <div>PERMIT TO PRACTICE VISTA PROJECTS LIMITED</div> <div>APEGGA PERMIT No. P 04559</div> <div>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</div>	<div><div>PROFESSIONAL ENGINEER VISTA PROJECTS LIMITED</div><div> Aug-18-2012</div></div>									DESIGNED BY: RB		<div> MURPHY CADOTTE PILOT CSS 18-B-85-17 WSM</div> <div>SINGLE LINE DIAGRAM MCC-100</div>	<div>SCALE: N.T.S.</div> <div>DATE: 06 JULY 2011</div> <div>SHEET No. 0</div> <div>VISTA PROJ. No. 1780-62-003-1</div> <div>CLIENT Dwg. No. _____</div> <div>REV. 0</div>		
		1780-68-004-1 MAJOR EQUIPMENT LAYOUT MCC/INSTRUMENT AIR BUILDING								CHECKED BY: PKC			ENGINEER'S APPROVAL: PV		
		1780-68-002-1 ELECTRICAL SYMBOL LEGEND											COMPUTER FILE: 178062001_RA		
		1780-68-001-1 CABLE AND CONDUIT SCHEDULE													
NUMBER		TITLE		0 ISSUED FOR CONSTRUCTION		2012.08.10		PKC							
		REFERENCE DRAWINGS													

ACM-5010 PRODUCED GAS COOLER FAN MOTOR
MCC-BUCKET # R1M



INTERCONNECTION DIAGRAM



AS BUILT

OCT 22 2012

LEGEND

- △ PLC TERMINAL
- ◇ MCC WRAPPER UNIT TERMINAL
- ⊗ VFD TERMINAL
- ▲ FIELD LOCATED (BY CONTRACTOR)
- FIELD WIRING (BY CONTRACTOR)
- MANUFACTURER/VENDOR WIRING

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1780-60-003-1 ELECTRICAL SYMBOL LEGEND
1780-62-001-1 SINGLE LINE DIAGRAM
1780-68-001-1 CONDUIT AND CABLE SCHEDULE

NUMBER TITLE
REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

REVISIONS

DESIGNED BY: RB
DRAWN BY: PKC
CHECKED BY: RB/PV
ENGINEER'S APPROVAL: PV
COMPUTER FILE: 178063001-1_R0

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 18-08-05-17 WSM
480V MOTOR CONTROL SCHEMATIC
ACM-5010 VFD
PRODUCED GAS COOLER FAN MOTOR

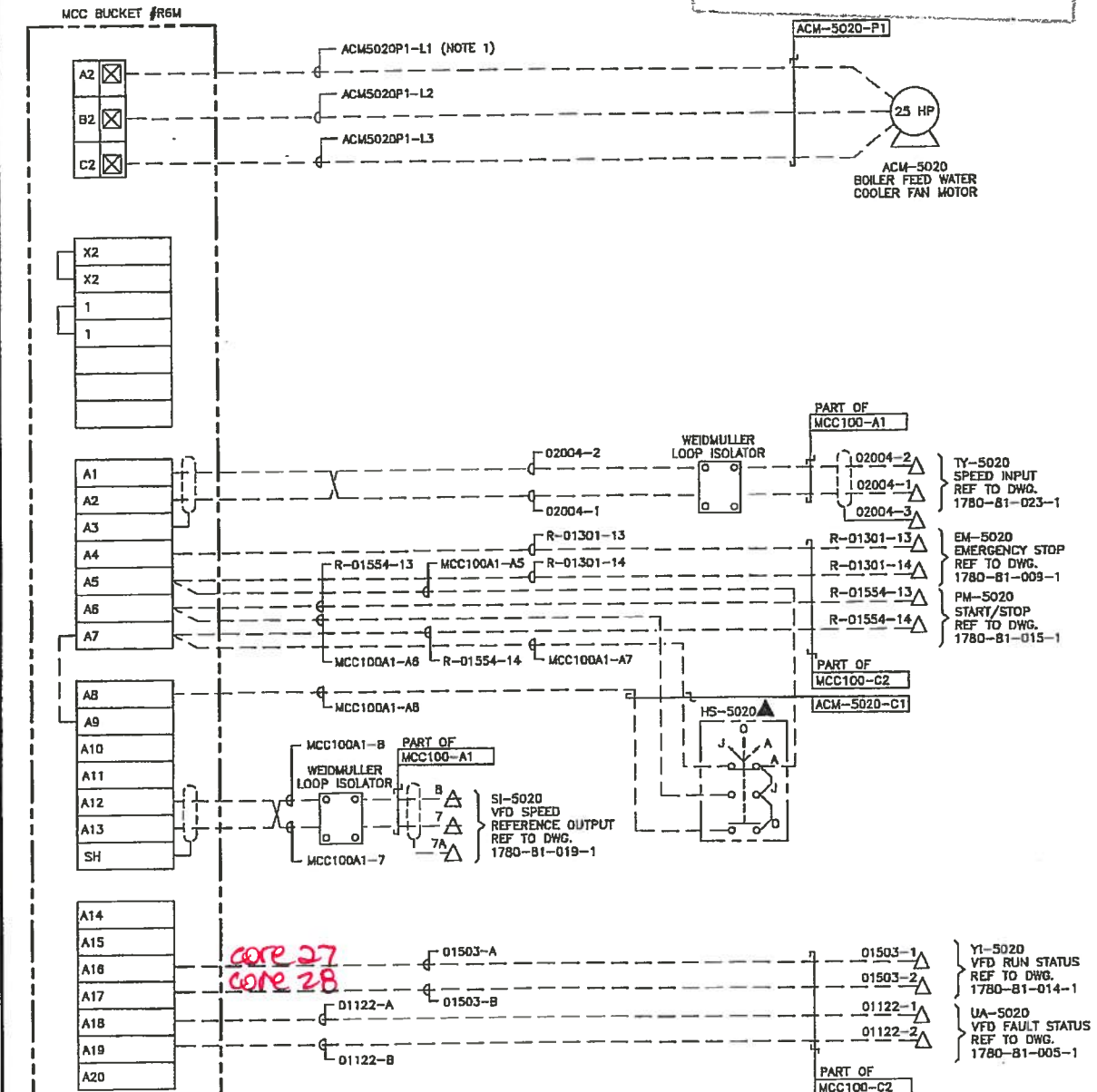
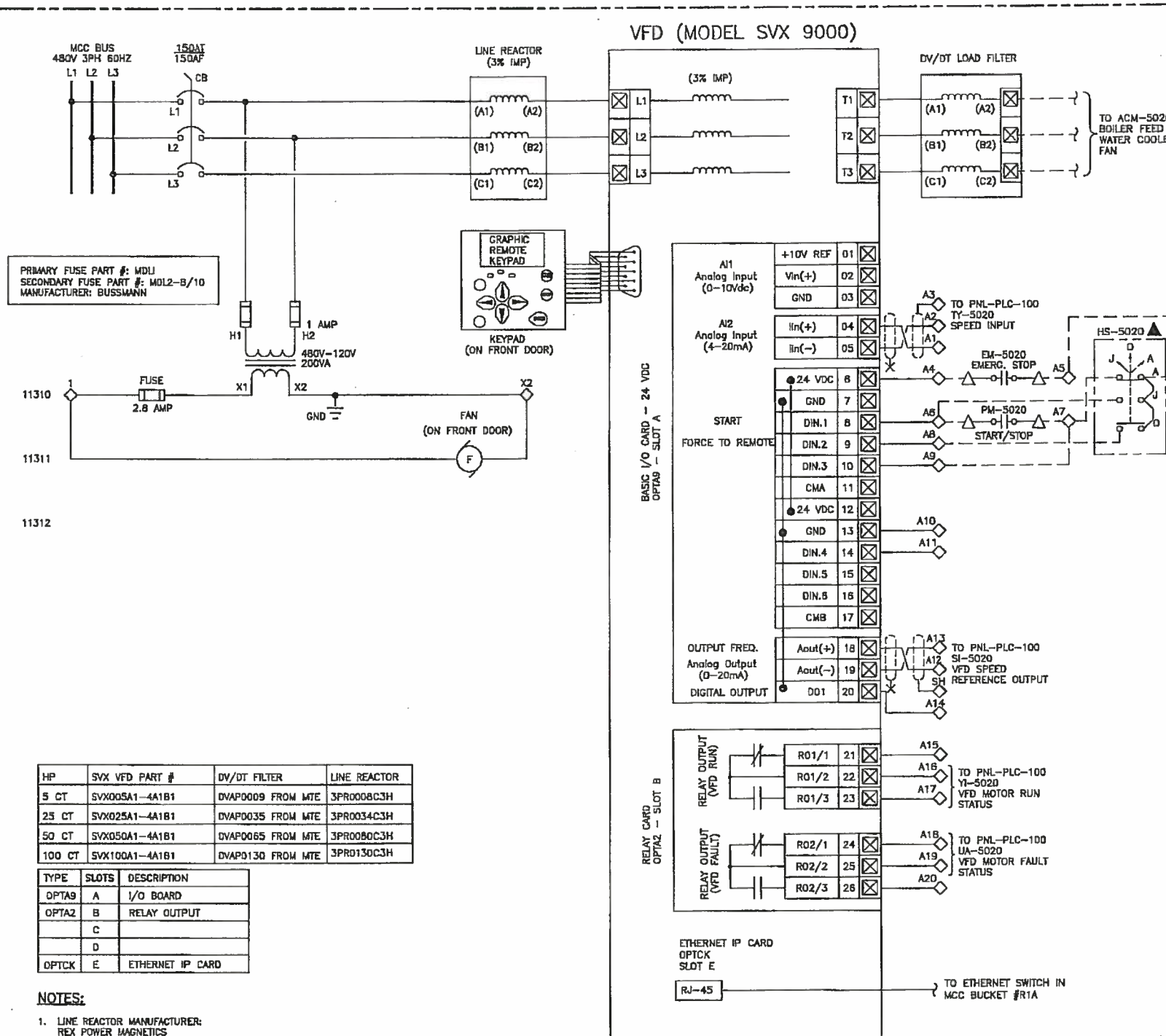
Vista
Projects Limited

SCALE: N.T.S.
DATE: 06 JUN 2012
DWG No: D VISTA Dwg No: 1780-63-001-1
CLIENT Dwg No: REV: 0

ACM-5020 BOILER FEED WATER COOLER FAN MOTOR MCC-BUCKET # R6M

STICK FILE

INTERCONNECTION DIAGRAM



NOTES:

- WIRE TAGS SHOWN TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

AS BUILT

OCT 22 2012

LEGEND

- △ PLC TERMINAL
- ◇ MCC WRAPPER UNIT TERMINAL
- ⊗ VFD TERMINAL
- ▲ FIELD LOCATED (BY CONTRACTOR)
- FIELD WIRING (BY CONTRACTOR)
- MANUFACTURER/VENDOR WIRING

2012-Jun-12 2:53:07 PM

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1780-60-003-1 ELECTRICAL SYMBOL LEGEND
1780-62-001-1 SINGLE LINE DIAGRAM
1780-68-001-1 CONDUIT AND CABLE SCHEDULE

ISSUED FOR CONSTRUCTION

REFERENCE DRAWINGS

REVISIONS

DESIGNED BY: RB
DRAWN BY: PKC
CHECKED BY: RB/PV
ENGINEER APPROVAL: PV
COMPUTER FILE: 178063002-1_R0

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 16-08-B5-17 WSM
480V MOTOR CONTROL SCHEMATIC
ACM-5020 VFD
BOILER FEED WATER COOLER FAN MOTOR

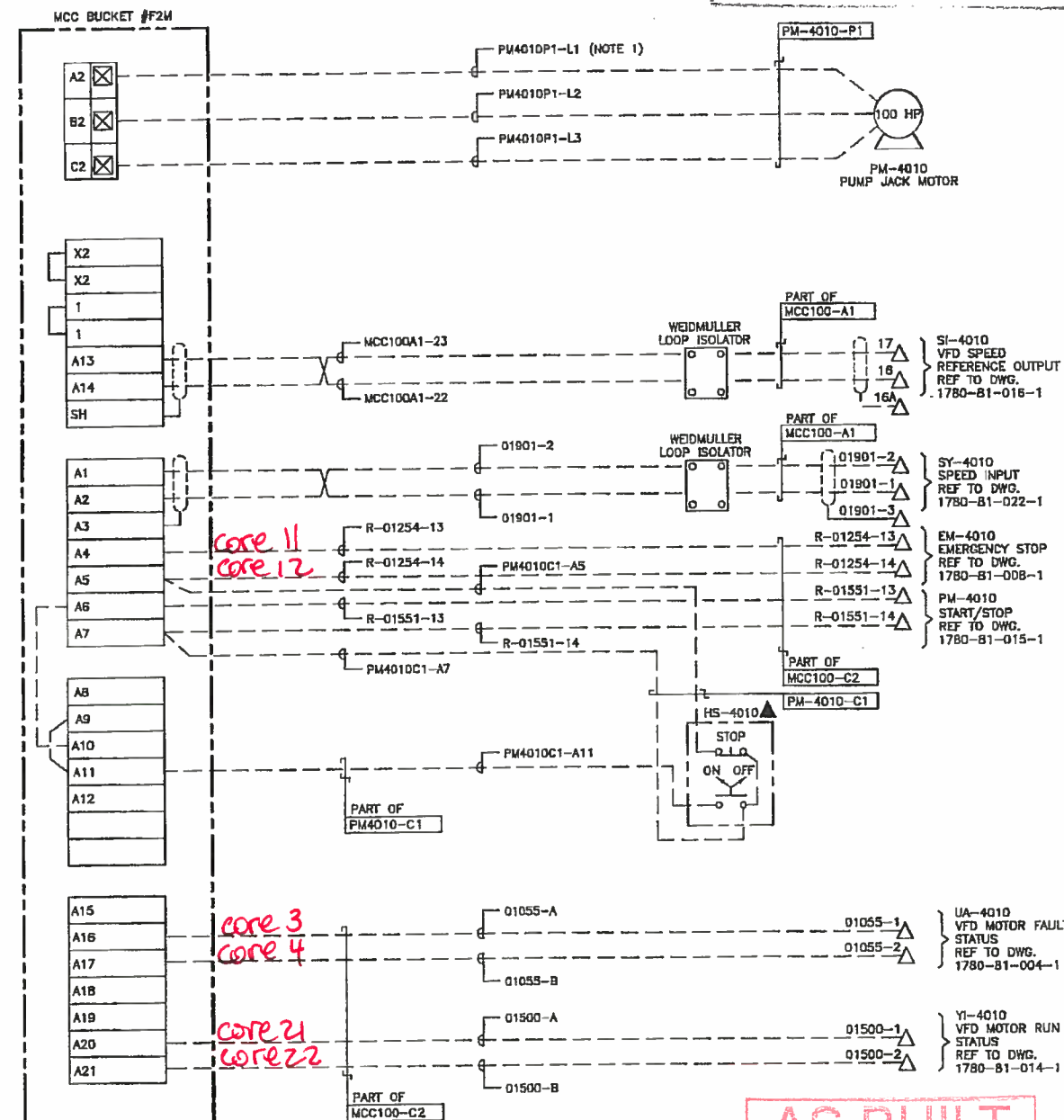
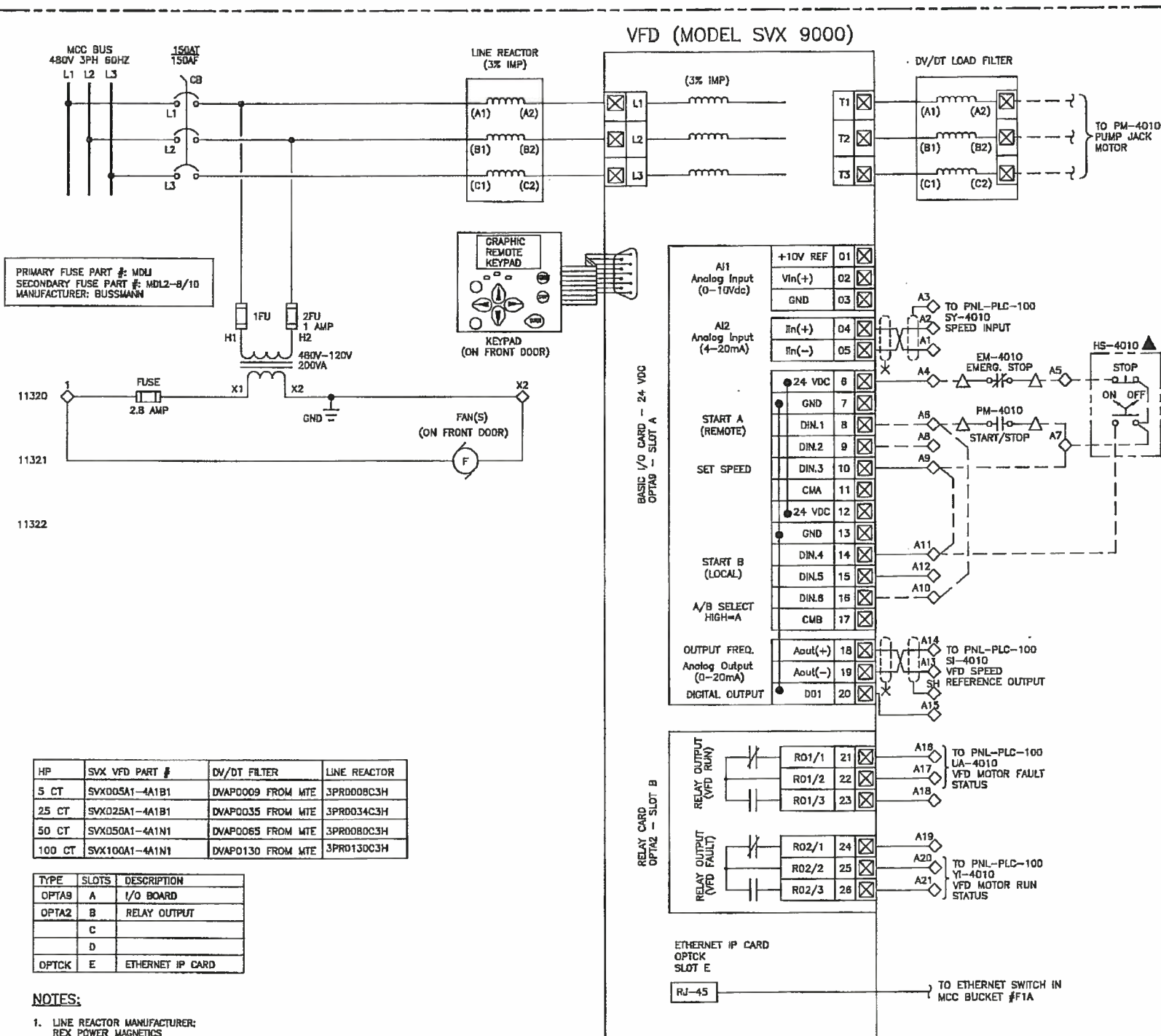
Vista
Projects Limited

SCALE: N.T.S.
DATE: 06 JUN 2012
VISTA DWS No. 1780-63-002-1
CLIENT DWS No. REV: 0

STICK FILE

PM-4010 VFD PUMP JACK MOTOR MCC-BUCKET # F2M

INTERCONNECTION DIAGRAM



AS BUILT
OCT 22 2012

- LEGEND**
- △ PLC TERMINAL
 - ◇ MCC WRAPPER UNIT TERMINAL
 - ⊗ VFD TERMINAL
 - ▲ FIELD LOCATED (BY CONTRACTOR)
 - FIELD WIRING (BY CONTRACTOR)
 - MANUFACTURER/VENDOR WIRING

2012-Jun-11 12:43:39 PM

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1780-80-003-1 ELECTRICAL SYMBOL LEGEND
1780-82-001-1 SINGLE LINE DIAGRAM
1780-88-001-1 CONDUIT AND CABLE SCHEDULE

REFERENCE DRAWINGS

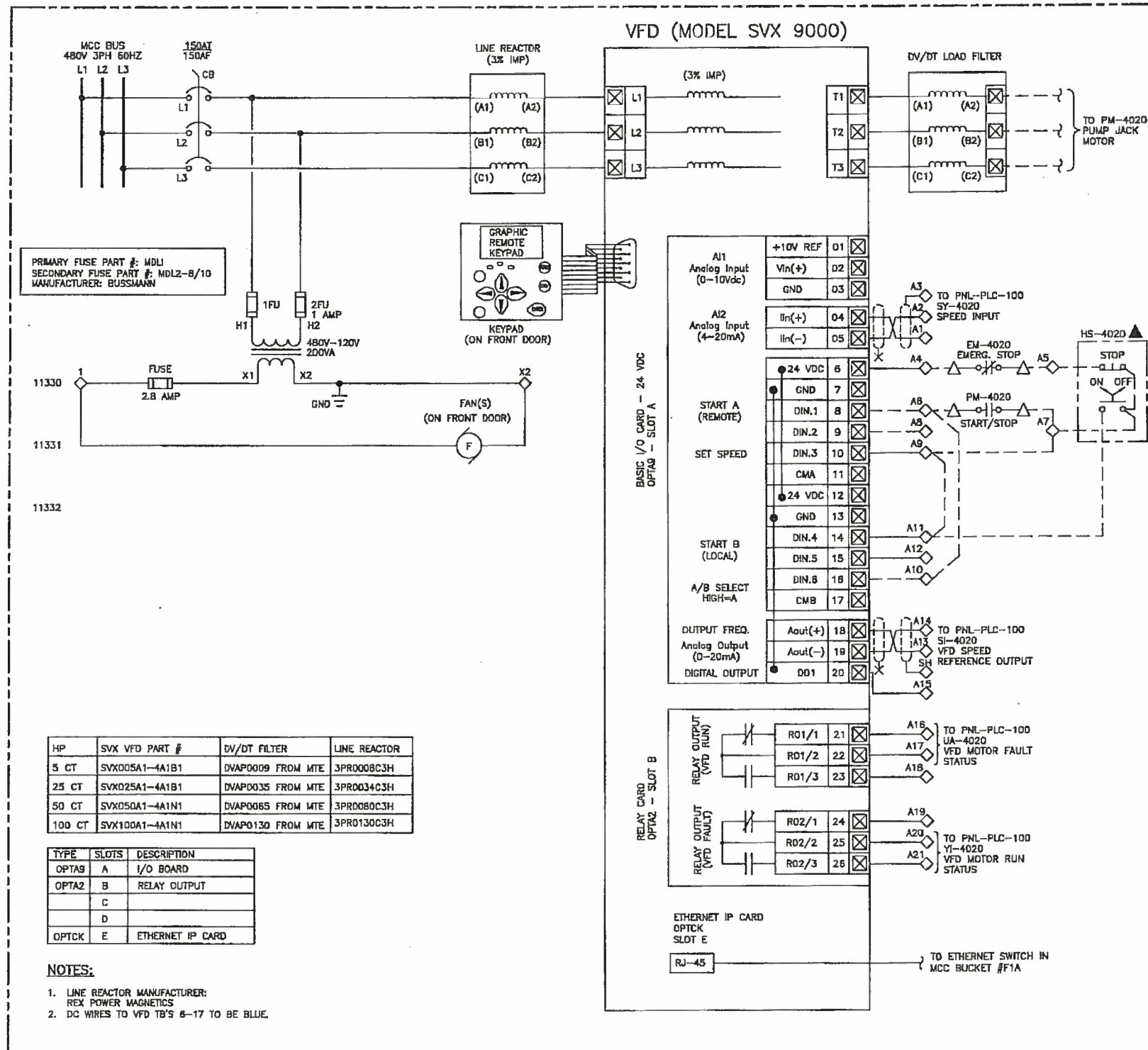
ISSUED FOR CONSTRUCTION
DATE 2012.08.10
BY PKC

DESIGNED BY RB
DRAWN BY PKC
CHECKED BY RB/PV
ENGINEER'S APPROVAL PV
COMPUTER FILE 178063003-1_R0

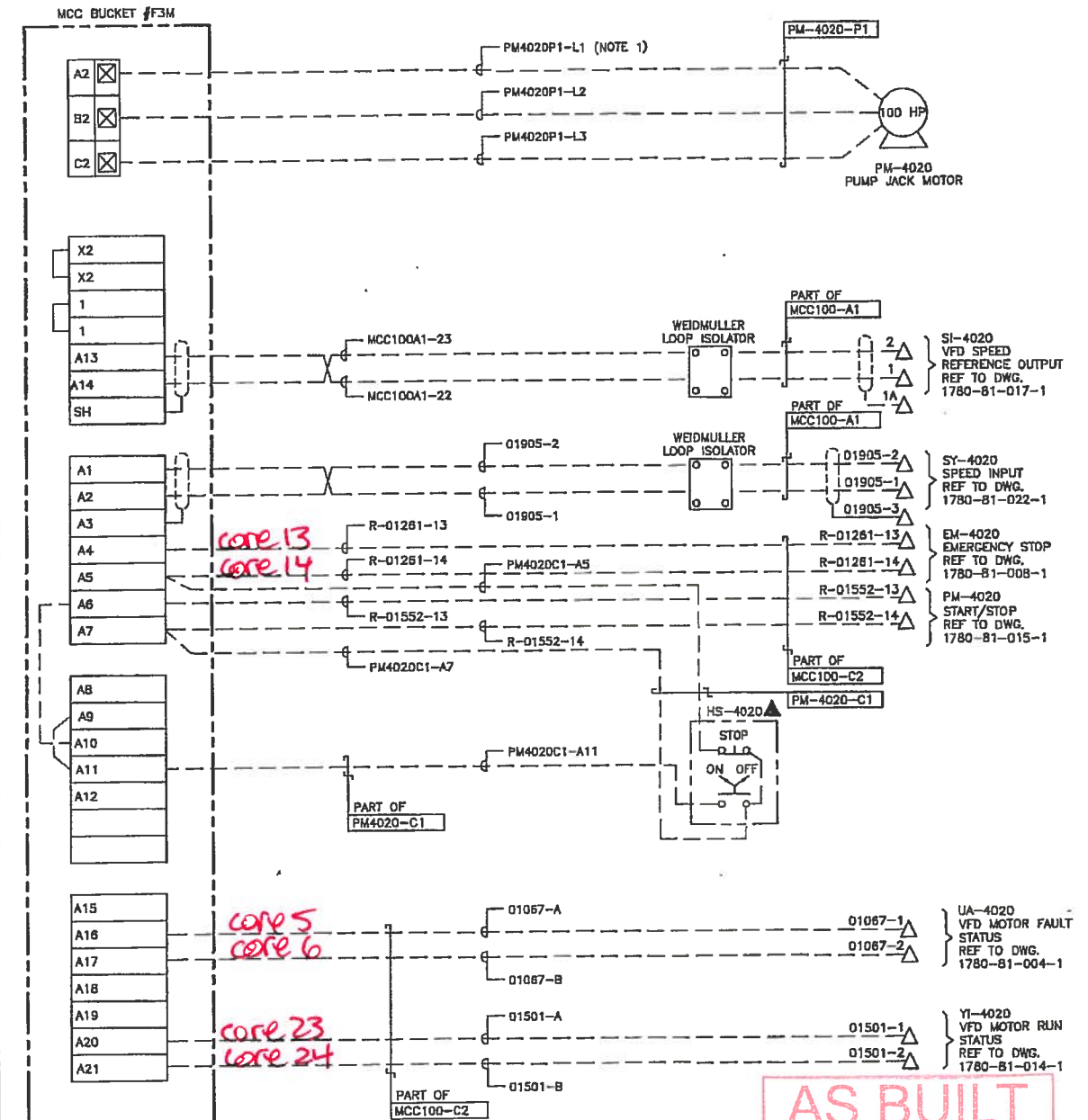
MURPHY OIL CANADA
MURPHY CADOTTE PILOT CSS 16-08-85-17 WSM
480V MOTOR CONTROL SCHEMATIC
PM-4010 VFD
PUMP JACK MOTOR

Vista Projects Limited
SCALE N.T.S.
DATE 08 JUN 2012
DWG No. D VISTA OWS No. 1780-63-003-1
CLIENT OWS No. REV. 0

PM-4020 VFD PUMP JACK MOTOR
MCC-BUCKET # F3M



INTERCONNECTION DIAGRAM



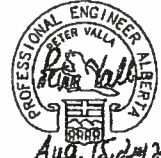
AS BUILT

OCT 22 2012

LEGEND

- PLC TERMINAL
- MCC WRAPPER UNIT TERMINAL
- VFD TERMINAL
- FIELD LOCATED (BY CONTRACTOR)
- FIELD WIRING (BY CONTRACTOR)
- MANUFACTURER/VENDOR WIRING

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1780-60-003-1 ELECTRICAL SYMBOL LEGEND
1780-62-001-1 SINGLE LINE DIAGRAM
1780-68-001-1 CONDUIT AND CABLE SCHEDULE

REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

REVISIONS

DESIGNED BY: RB
DRAWN BY: PKC
CHECKED BY: RB/PV
ENGINEER'S APPROVAL: PV
COMPUTER FILE: 178063004-1_R0

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 13-09-85-17 WSM
480V MOTOR CONTROL SCHEMATIC
PM-4020 VFD
PUMP JACK MOTOR

Vista
Projects Limited

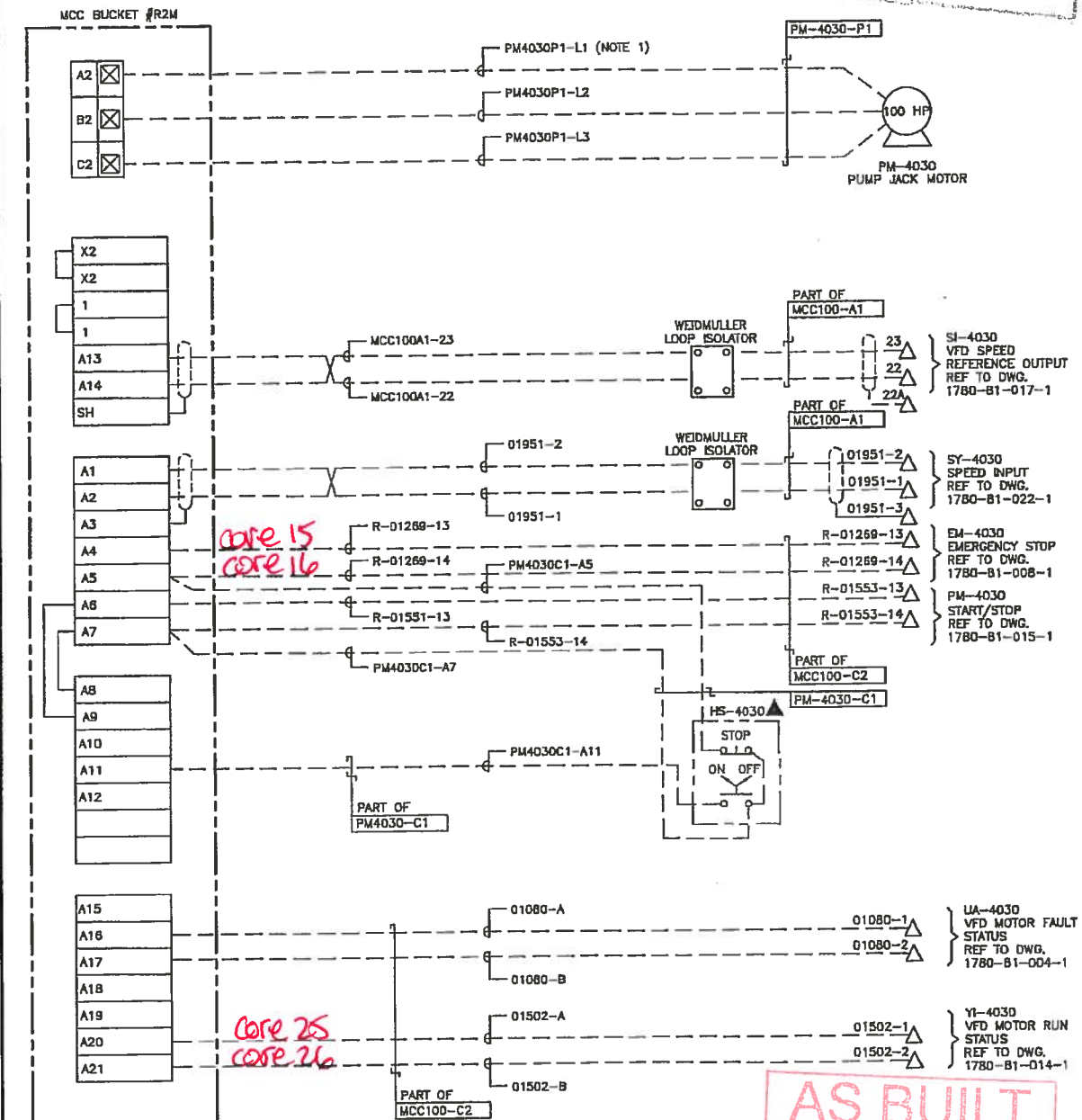
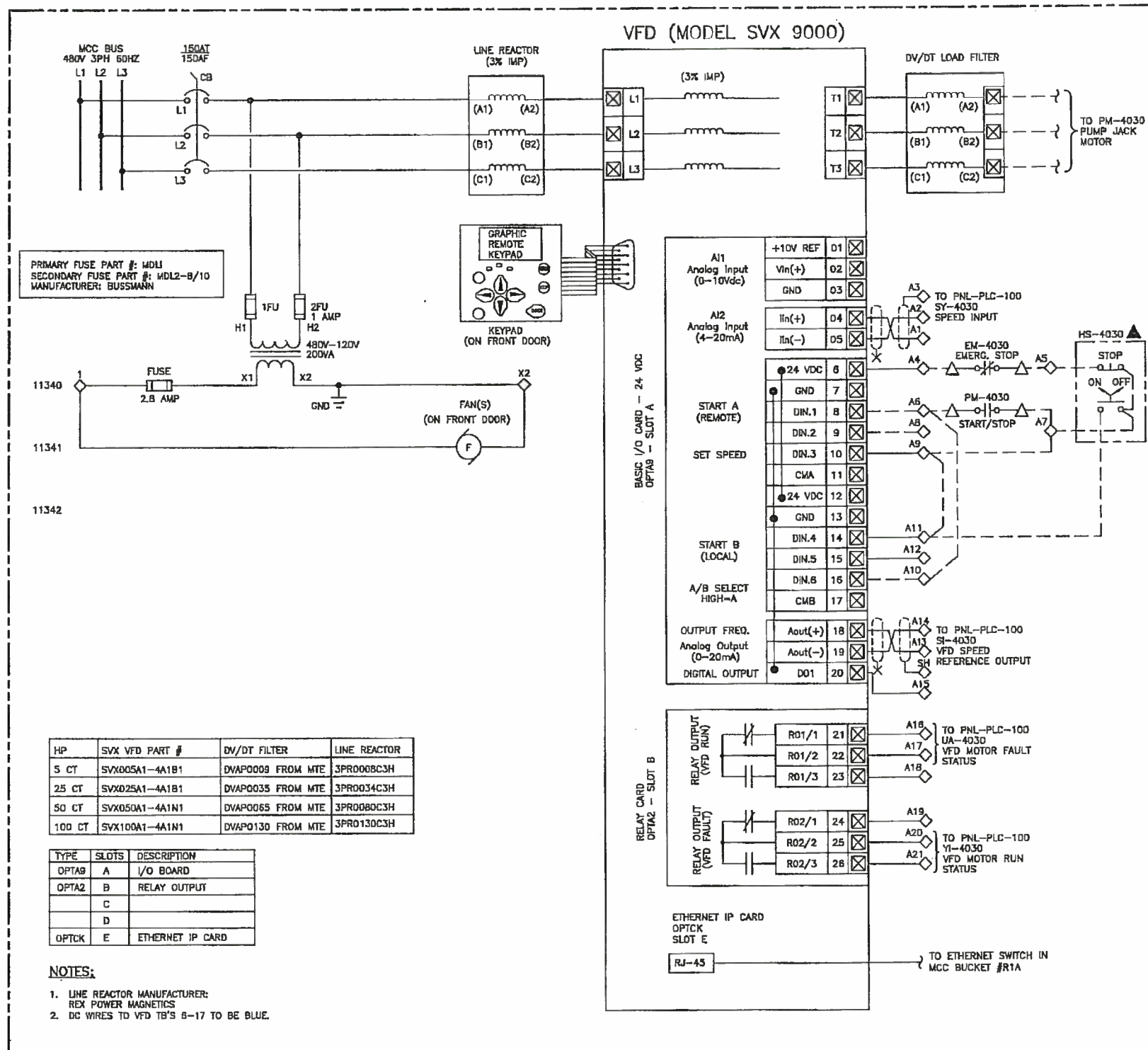
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DATE: 06 JUN 2012
VISTA DWG No. 1780-63-004-1
REV. 0

2012-Jun-12 1:40:24 PM

STICK FILE

PM-4030 VFD PUMP JACK MOTOR
MCC-BUCKET # R2M

INTERCONNECTION DIAGRAM



NOTES:

- WIRE TAGS SHOWN TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

2012-Jun-12 3:11:21 PM

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Aug 15, 2012

1780-60-003-1 ELECTRICAL SYMBOL LEGEND
1780-62-001-1 SINGLE LINE DIAGRAM
1780-68-001-1 CONDUIT AND CABLE SCHEDULE

NUMBER TITLE

REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

DATE BY

REVISIONS

DESIGNED BY

RB

DRAWN BY

PKC

CHECKED BY

RB/PV

ENGINEER'S APPROVAL

PV

COMPUTER FILE

178063005-1_R0

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 13-09-85-17 WSM

480V MOTOR CONTROL SCHEMATIC
PM-4030 VFD
PUMP JACK MOTOR

Vista
Projects Limited

SCALE N.T.S.

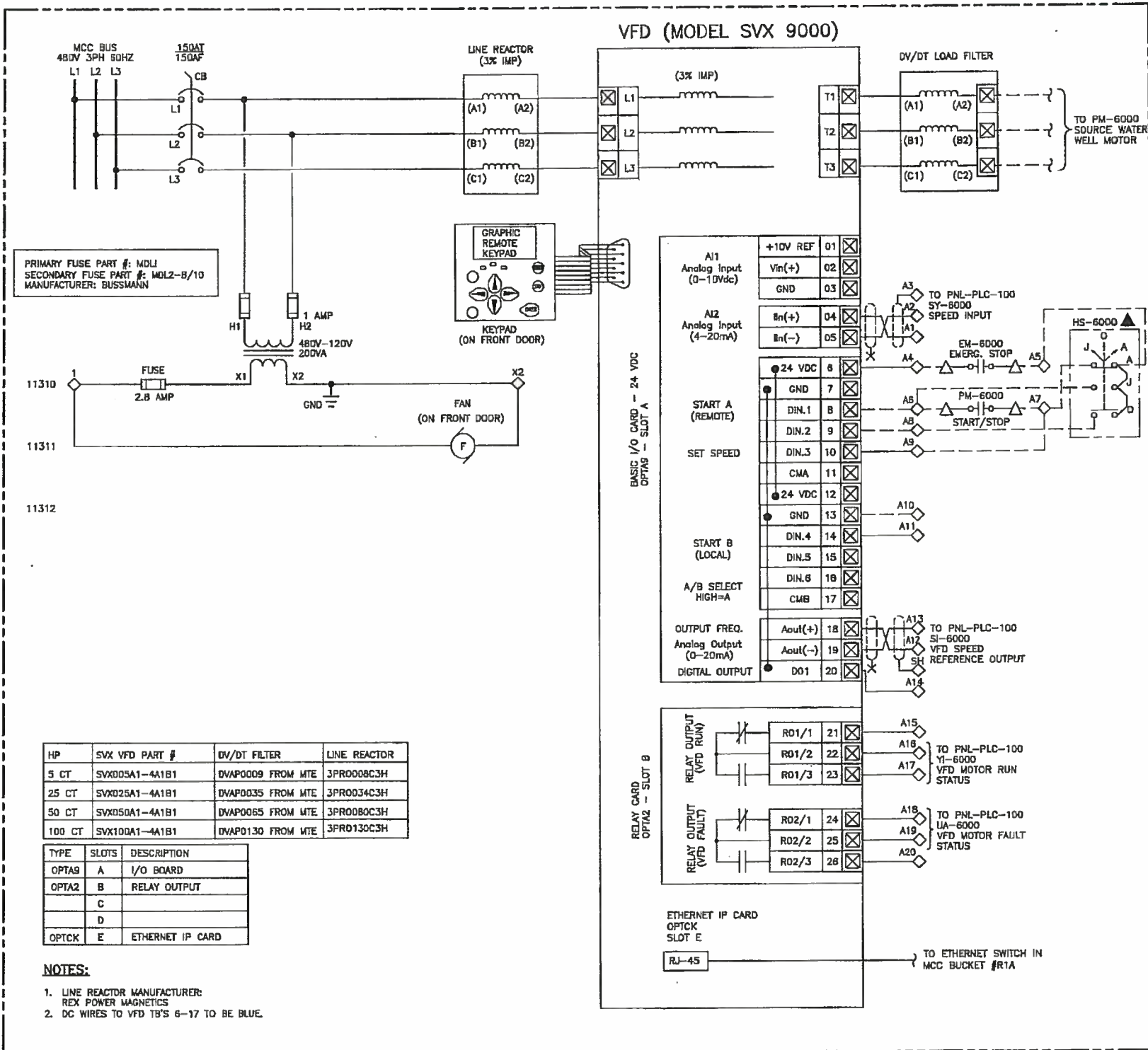
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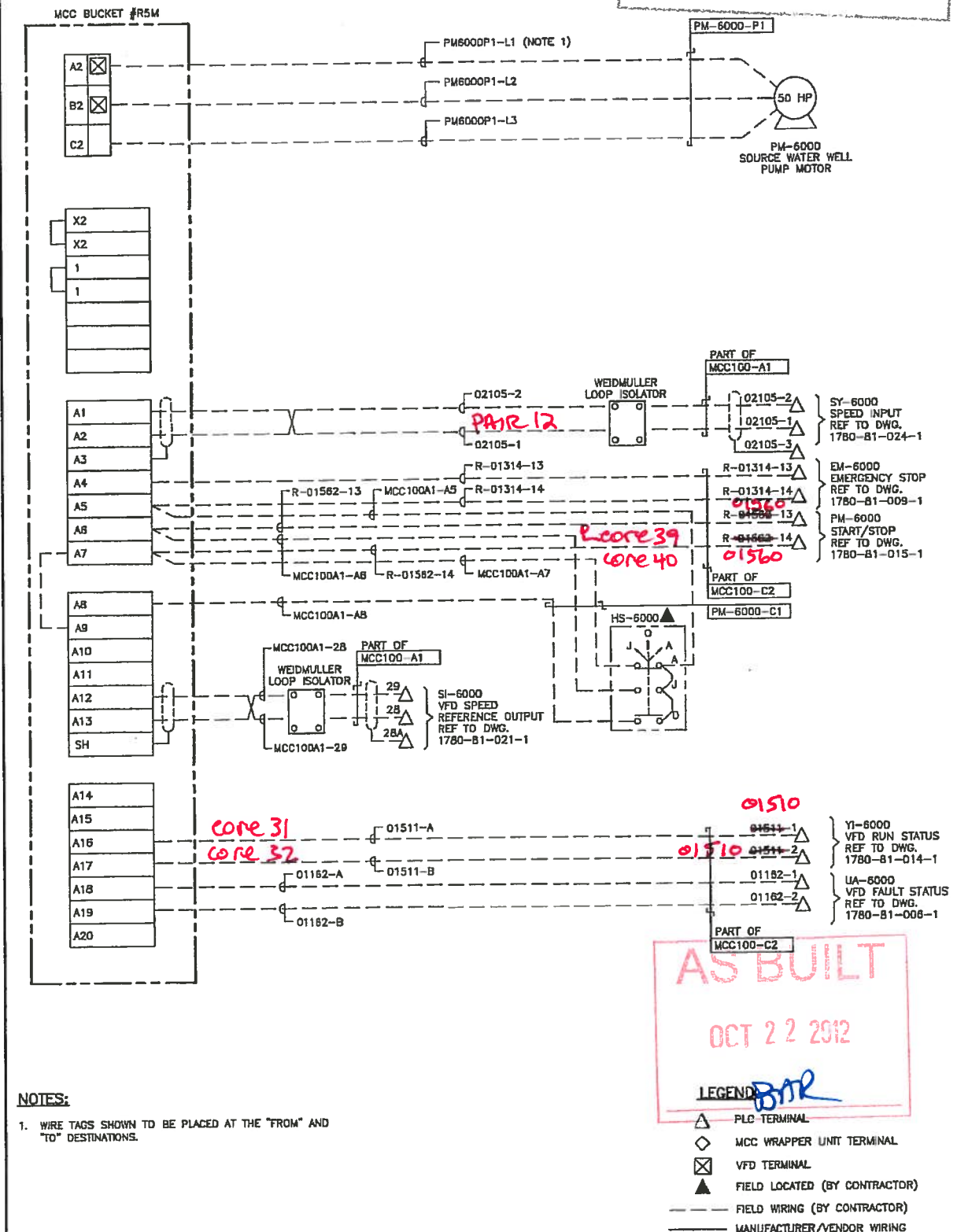
CLIENT Dwg No.

REV 0

PM-6000 SOURCE WATER WELL PUMP MOTOR
MCC-BUCKET # R5M



INTERCONNECTION DIAGRAM



STICK FILE

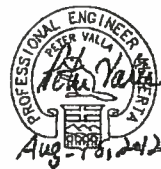
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OCT 22 2012

LEGEND

- PLC TERMINAL
- MCC WRAPPER UNIT TERMINAL
- VFD TERMINAL
- FIELD LOCATED (BY CONTRACTOR)
- FIELD WIRING (BY CONTRACTOR)
- MANUFACTURER/VENDOR WIRING

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APEGA PERMIT NO.
P 04559
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1780-80-003-1 ELECTRICAL SYMBOL LEGEND
1780-82-001-1 SINGLE LINE DIAGRAM
1780-88-001-1 CONDUIT AND CABLE SCHEDULE

REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

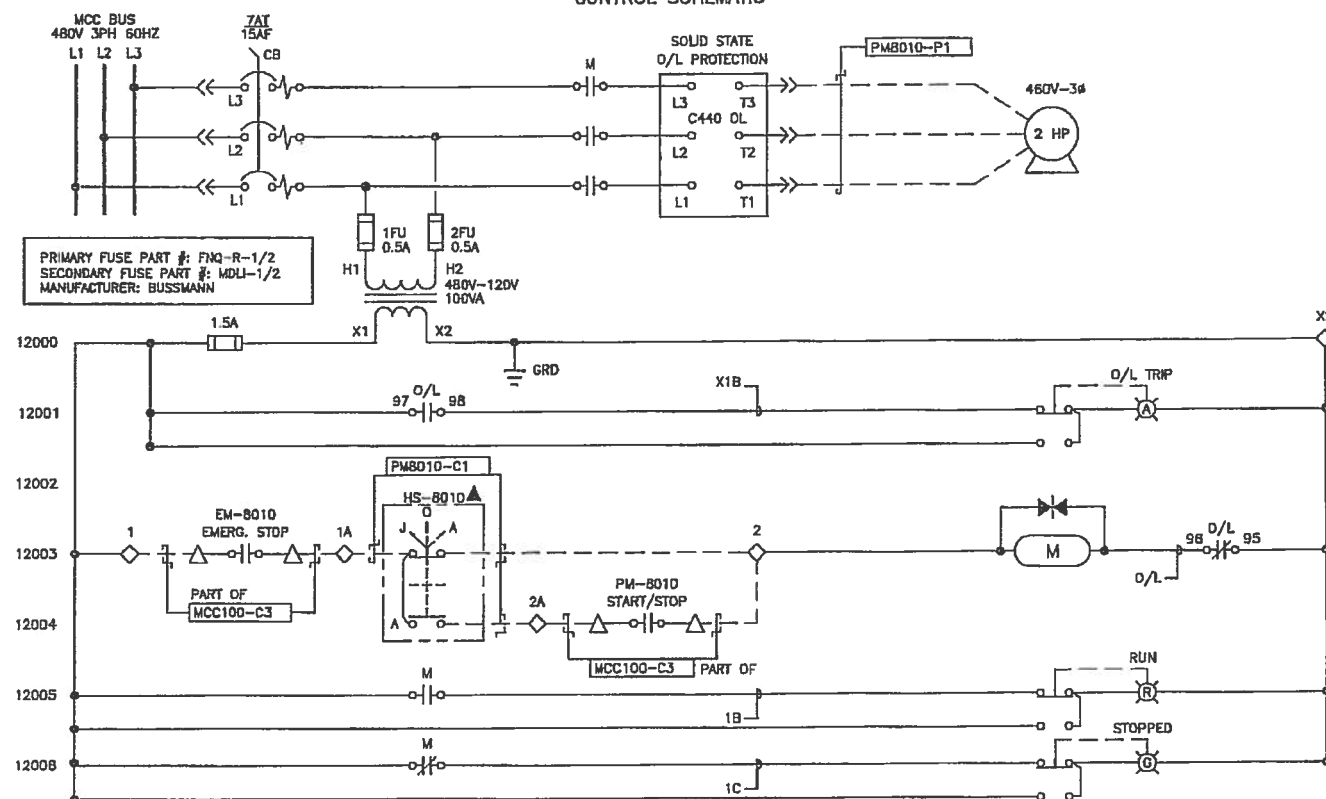
REVISIONS

DESIGNED BY: RB
DRAWN BY: PKC
CHECKED BY: RB/PV
DIAGRAMS APPROVAL: PV
COMPUTER FILE: 178063006-1_R0

MURPHY
OIL CANADA
MURPHY CADOTTE PILOT CSS 13-09-85-17 W5M
480V MOTOR CONTROL SCHEMATIC
PM-6000 VFD
SOURCE WATER WELL PUMP MOTOR

Vista
Projects Limited
SCALE: N.T.S.
DATE: 06 JUN 2012
DWS: D
VISTA DWS NO.: 1780-83-006-1
REV: 0

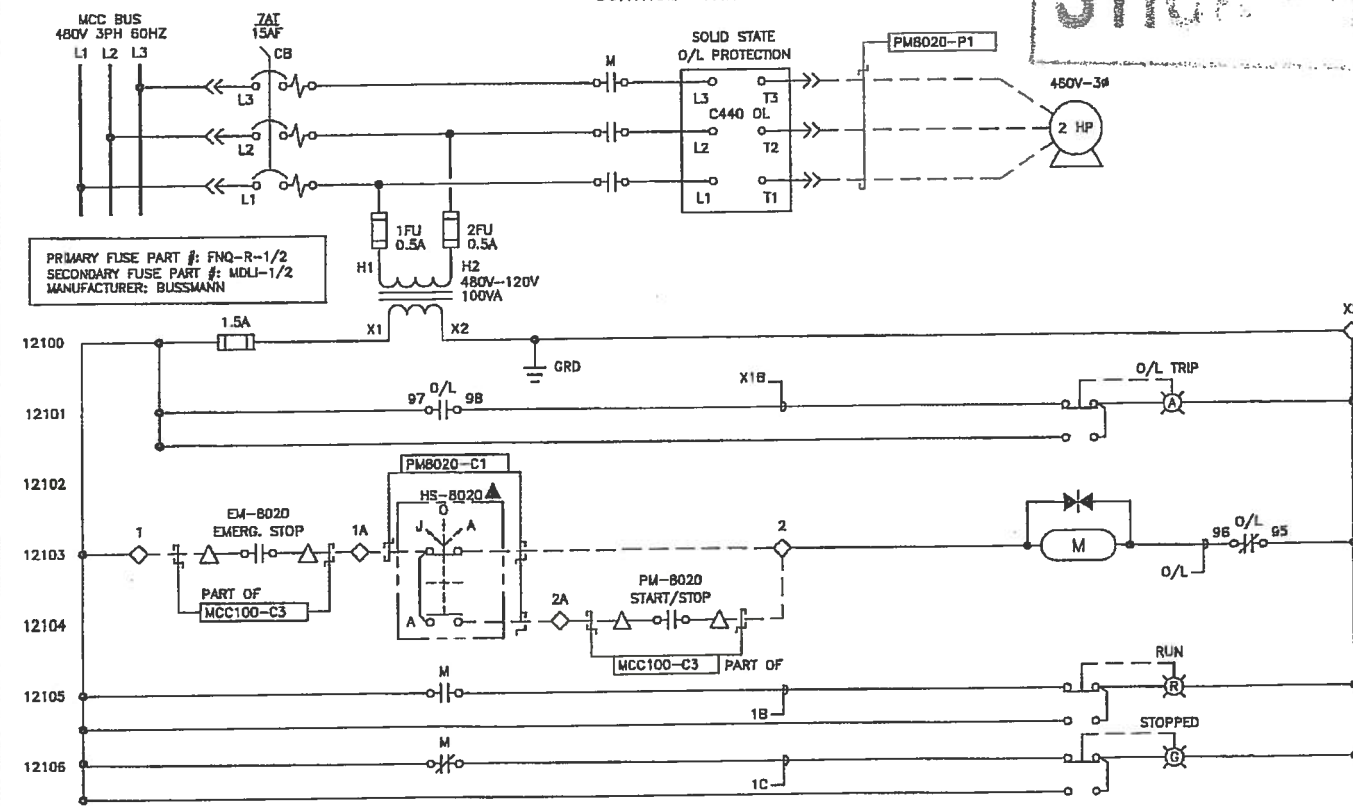
PM-8010 MOTOR
HP FKO0 AREA
MCC-100 BUCKET-F5R
CONTROL SCHEMATIC



LEGEND
 ▲ PLC TERMINAL
 ◇ MCC TERMINAL
 ▲ FIELD LOCATED (BY CONTRACTOR)
 --- FIELD WIRING (BY CONTRACTOR)
 --- MANUFACTURER/VENDOR WIRING

NOTE:
 1. WIRE TAGS SHOWN TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

PM-8020 MOTOR
HP FKO0 AREA
MCC-100 BUCKET-F5R
CONTROL SCHEMATIC



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2012-Jul-20 8:34:01 AM

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1780-60-003-1 ELECTRICAL SYMBOL LEGEND
 1780-62-001-1 SINGLE LINE DIAGRAM
 1780-68-001-1 CONDUIT AND CABLE SCHEDULE

REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

REVISIONS

DESIGNED BY RB
 DRAWN BY PKC
 CHECKED BY RB/PV
 ENGINEER APPROVAL PV
 COMPUTER FILE 178063007-1_R0

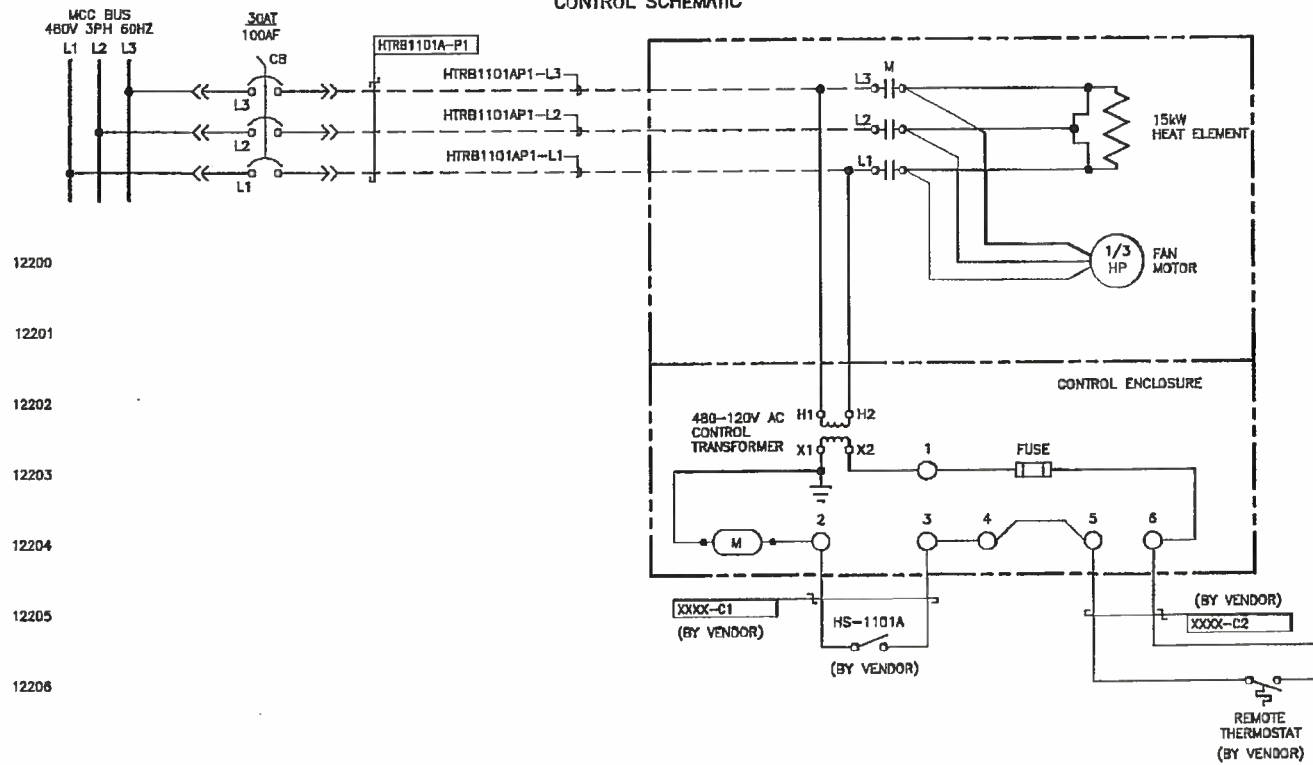
MURPHY
 OIL CANADA

MURPHY CADOTTE PILOT CSS 16-08-85-17 WSM
 480V FVNR MOTOR CONTROL SCHEMATIC
 PM-8010 & PM-8020

Vista
 Projects Limited

SCALE N.T.S.
 DATE 06 JUN 2012
 DWG No 1780-63-007-1
 CLIENT DWG No. 0

HTR-B-1101A
UNIT HEATER
INSTRUMENT AIR ROOM
MCC-100 BUCKET RAER
CONTROL SCHEMATIC

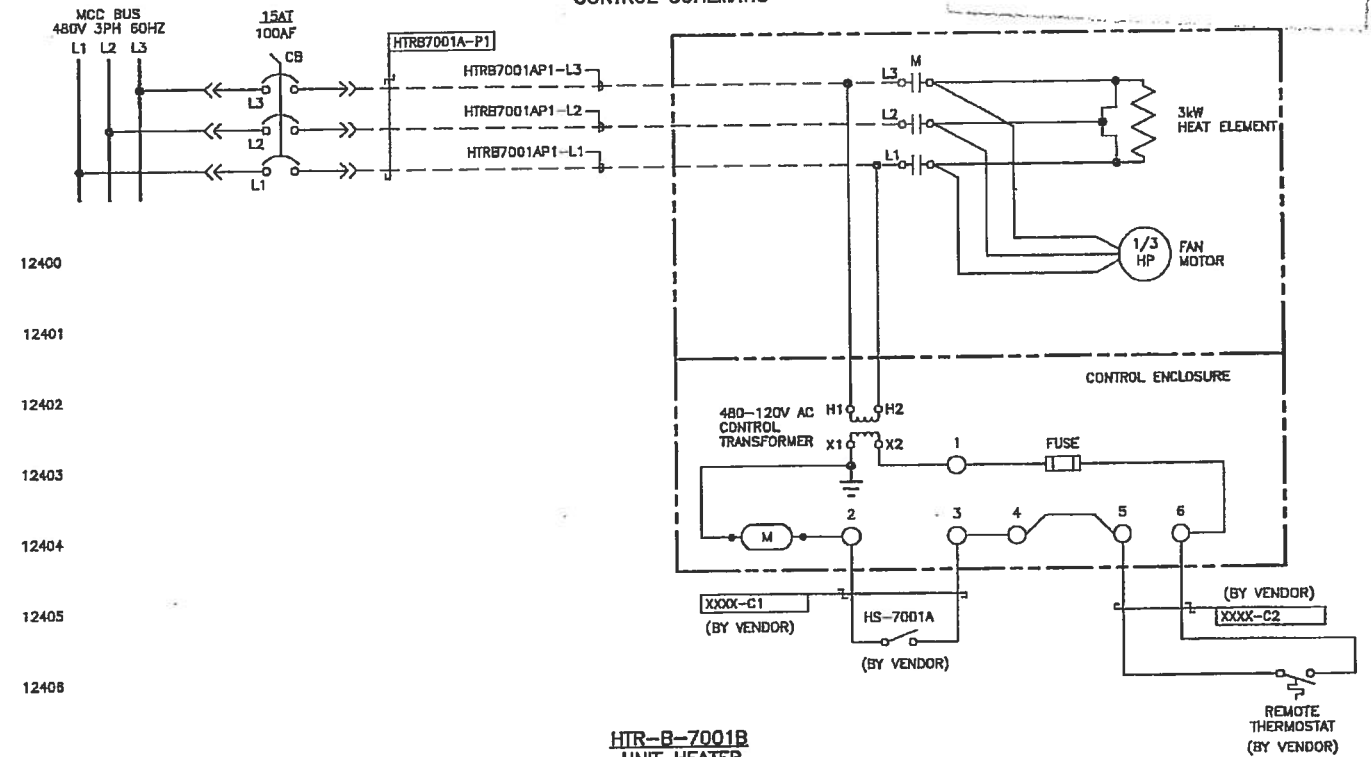


LEGEND

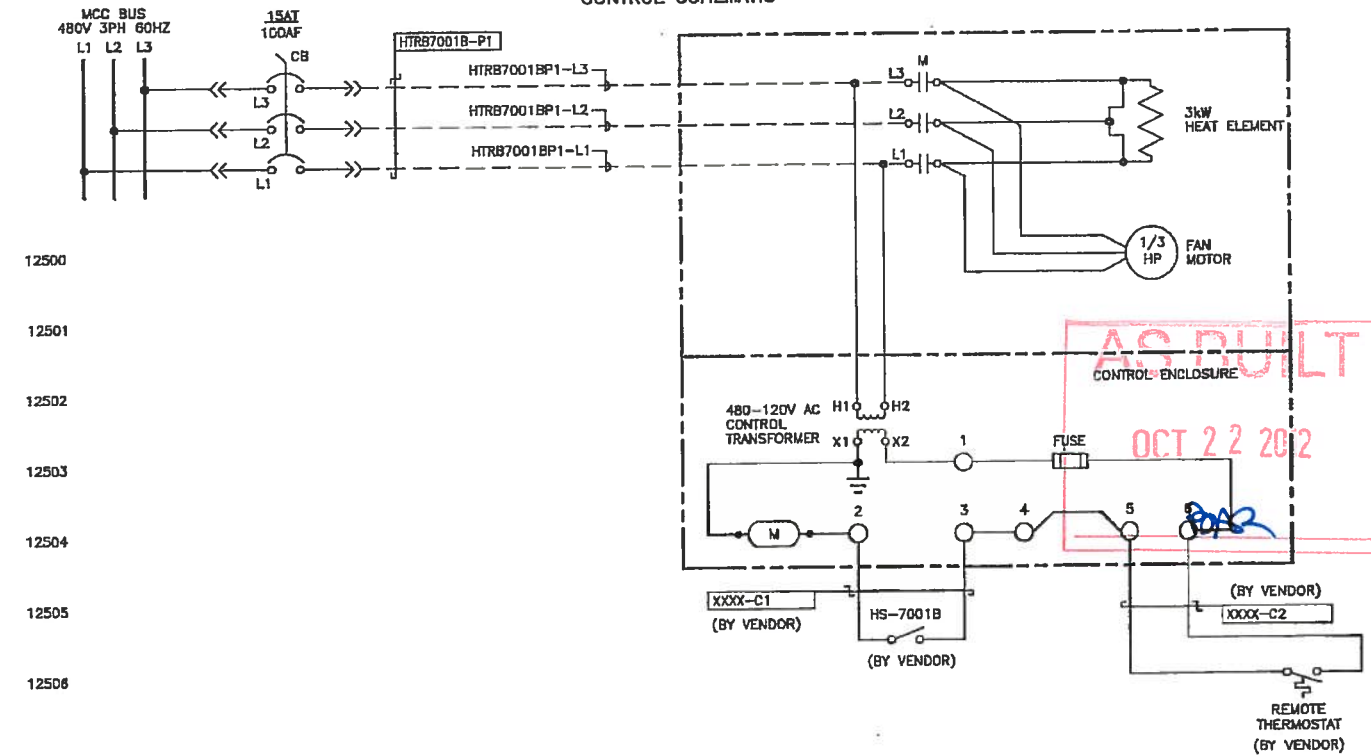
- △ PLC TERMINAL
- ◇ MCC TERMINAL
- ▲ FIELD LOCATED (BY CONTRACTOR)
- FIELD WIRING (BY CONTRACTOR)
- MANUFACTURER/VENDOR WIRING

NOTE:
1. WIRE TAGS SHOWN TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

HTR-B-7001A
UNIT HEATER
STEAM GEN. BUILDING
MCC-100 BUCKET FAHL
CONTROL SCHEMATIC



HTR-B-7001B
UNIT HEATER
STEAM GEN. BUILDING
MCC-100 BUCKET FAHL
CONTROL SCHEMATIC



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1780-60-003-1 ELECTRICAL SYMBOL LEGEND
1780-62-001-1 SINGLE LINE DIAGRAM
1780-68-001-1 CONDUIT AND CABLE SCHEDULE

NUMBER TITLE
REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

DATE BY
2012.08.10 PKC

DESIGNED BY RB

REVIEW BY PKC

CHECKED BY PV/RB

DESIGNING APPROVAL PV

COMPUTER FILE

178063008-1_RD

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 16-08-85-17 WSM

480V UNIT HEATER MOTOR CONTROL SCHEMATIC
HTR-B-1101A, HTR-B-7001A
& HTR-B-7001B

Vista
Projects Limited

SCALE N.T.S.

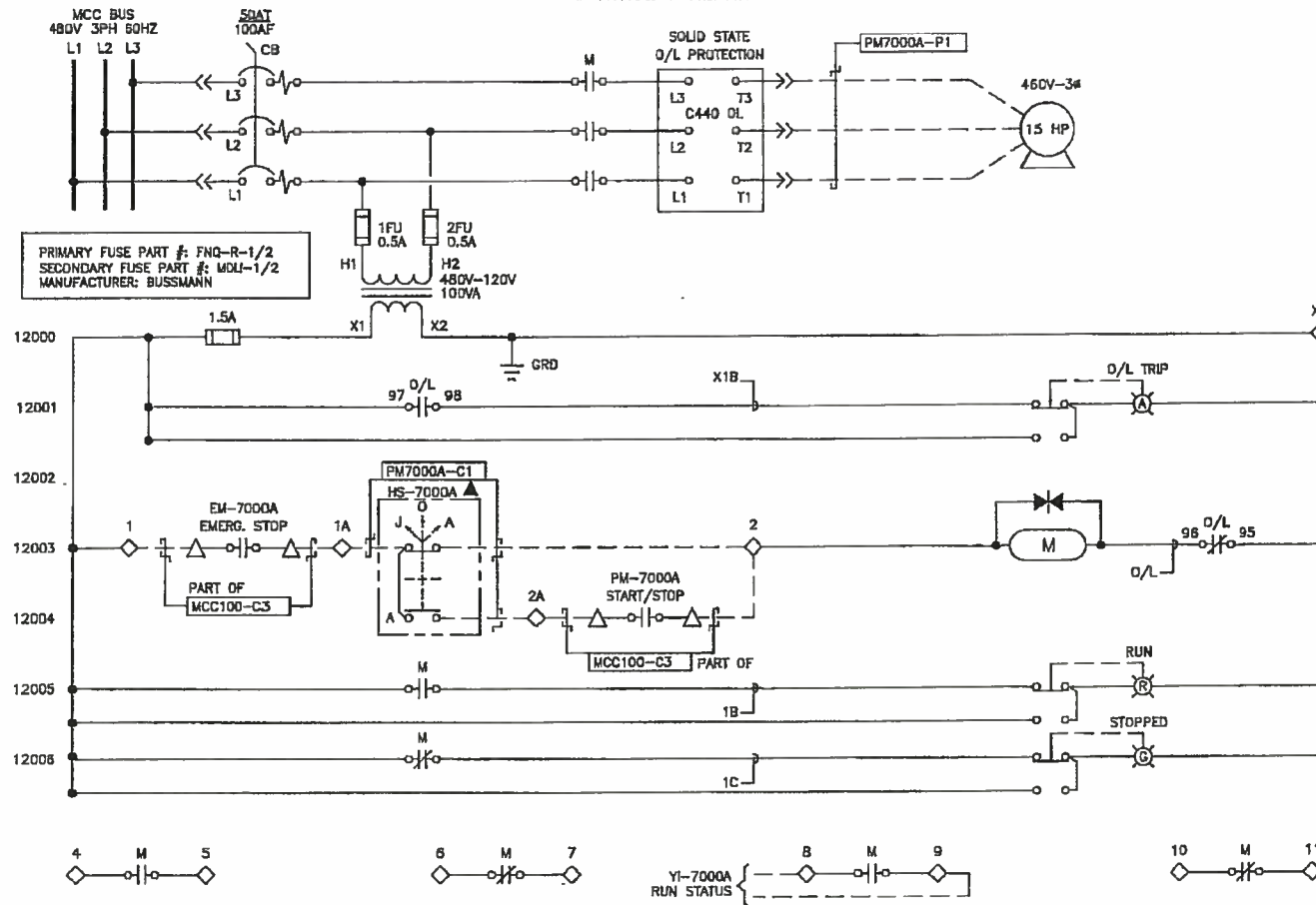
DATE 28 FEB 2012

048 Size D VISTA Dwg No. 1780-63-008-1

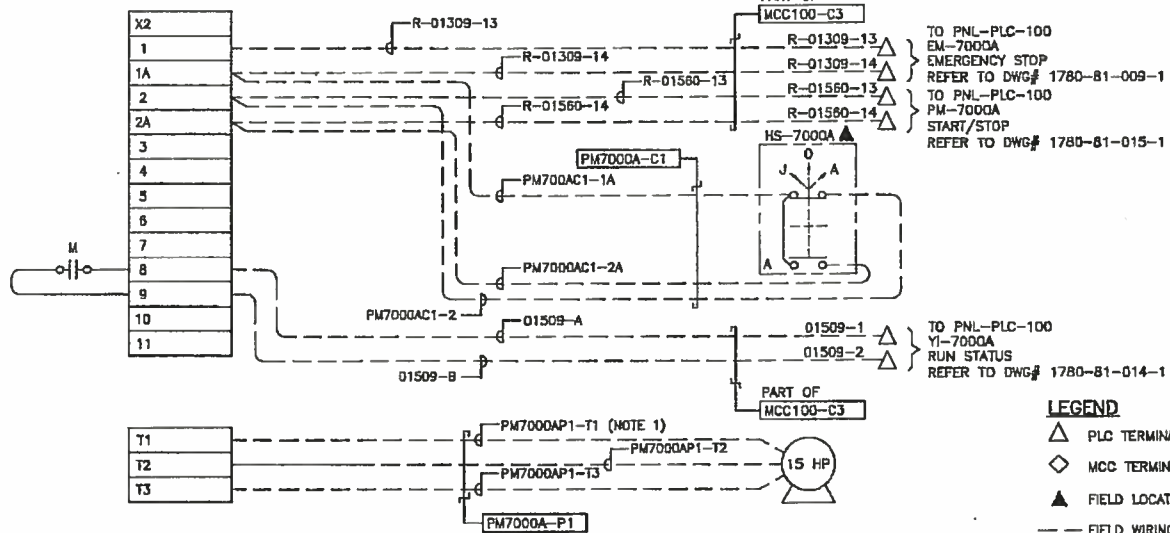
CLIENT Dwg No.

REV 0

PM-7000A MOTOR
LP BFW CHARGE PUMP
MCC-100 BUCKET-F5H
CONTROL SCHEMATIC



INTERCONNECTION DIAGRAM



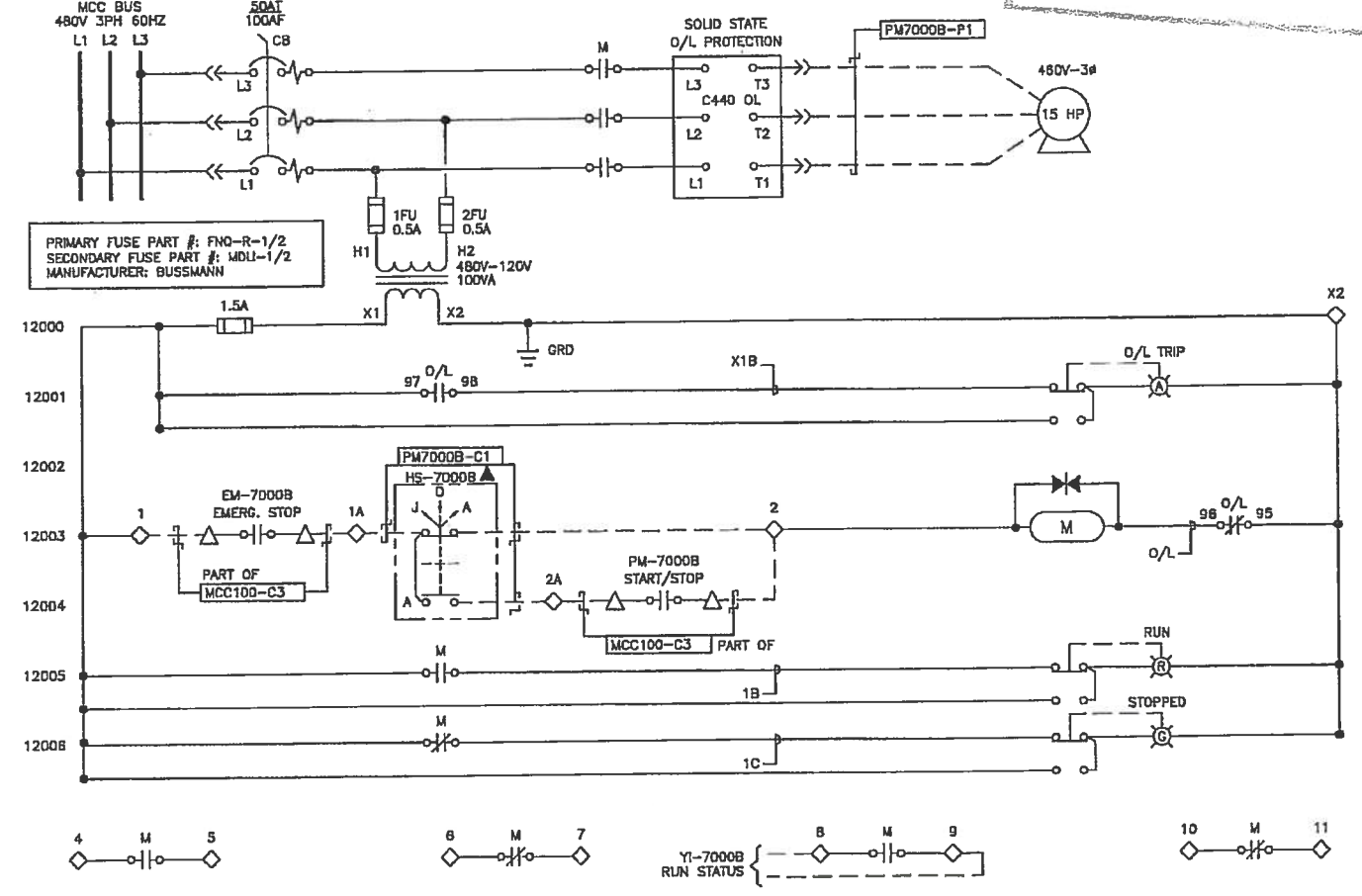
LEGEND

- ▲ PLC TERMINAL
 ◇ MCC TERMINAL
 ▲ FIELD LOCATED (BY CONTRACTOR)
 --- FIELD WIRING (BY CONTRACTOR)
 ——— MANUFACTURER/VENDOR WIRING

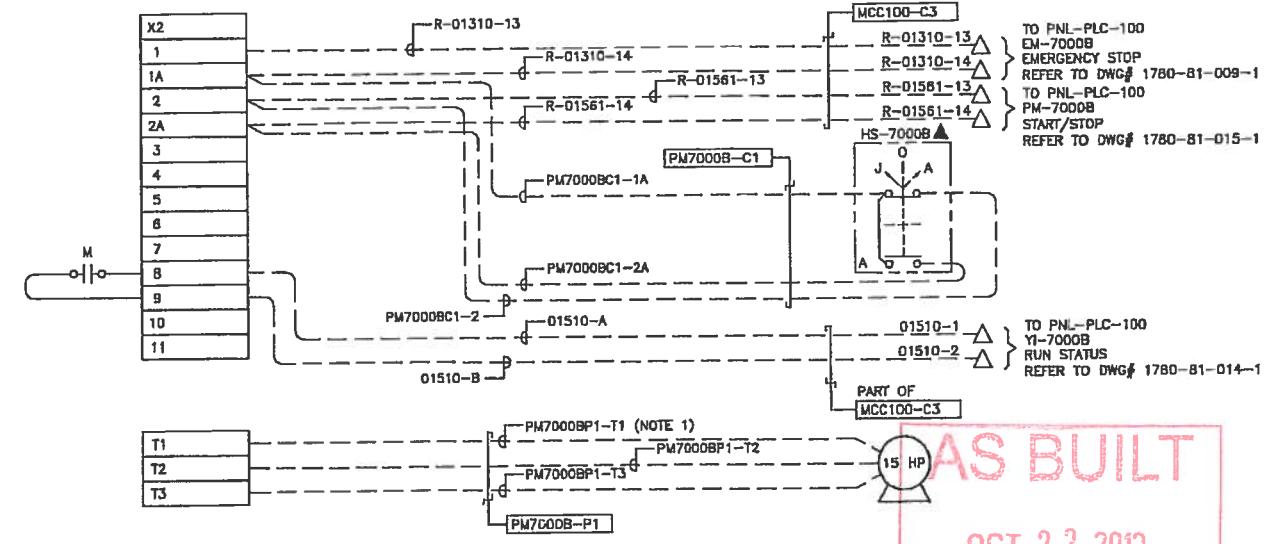
NOTE:

1. WIRE TAGS SHOWN TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

PM-7000B MOTOR
1P BFW CHARGE PUMP
MCC-100 BUCKET-FSK
CONTROL SCHEMATIC



INTERCONNECTION DIAGRAM



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OCT 22 2012

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VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559

Association of Professional Engineers
Geologists and Geophysicists of Alberta



1780-60-003-1	ELECTRICAL SYMBOL LEGEND
1780-62-001-1	SINGLE LINE DIAGRAM
1780-68-001-1	CONDUIT AND CABLE SCHEDULE

NUMBER	TITLE
REFERENCE DRAWINGS	

0	ISSUED FOR CONSTRUCTION
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NO.	DESCRIPTION
	REVISIONS

DESIGNED BY:	RB
DRAWN BY:	BTM
CHECKED BY:	PV/RB
ENGINEER'S APPROVAL:	PV
COMPUTER FILE	178063009-1_RD



MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 18-DB-85-17 WSM
480V FVNR MOTOR CONTROL SCHEMATIC
PM-7000A & PM-7000B

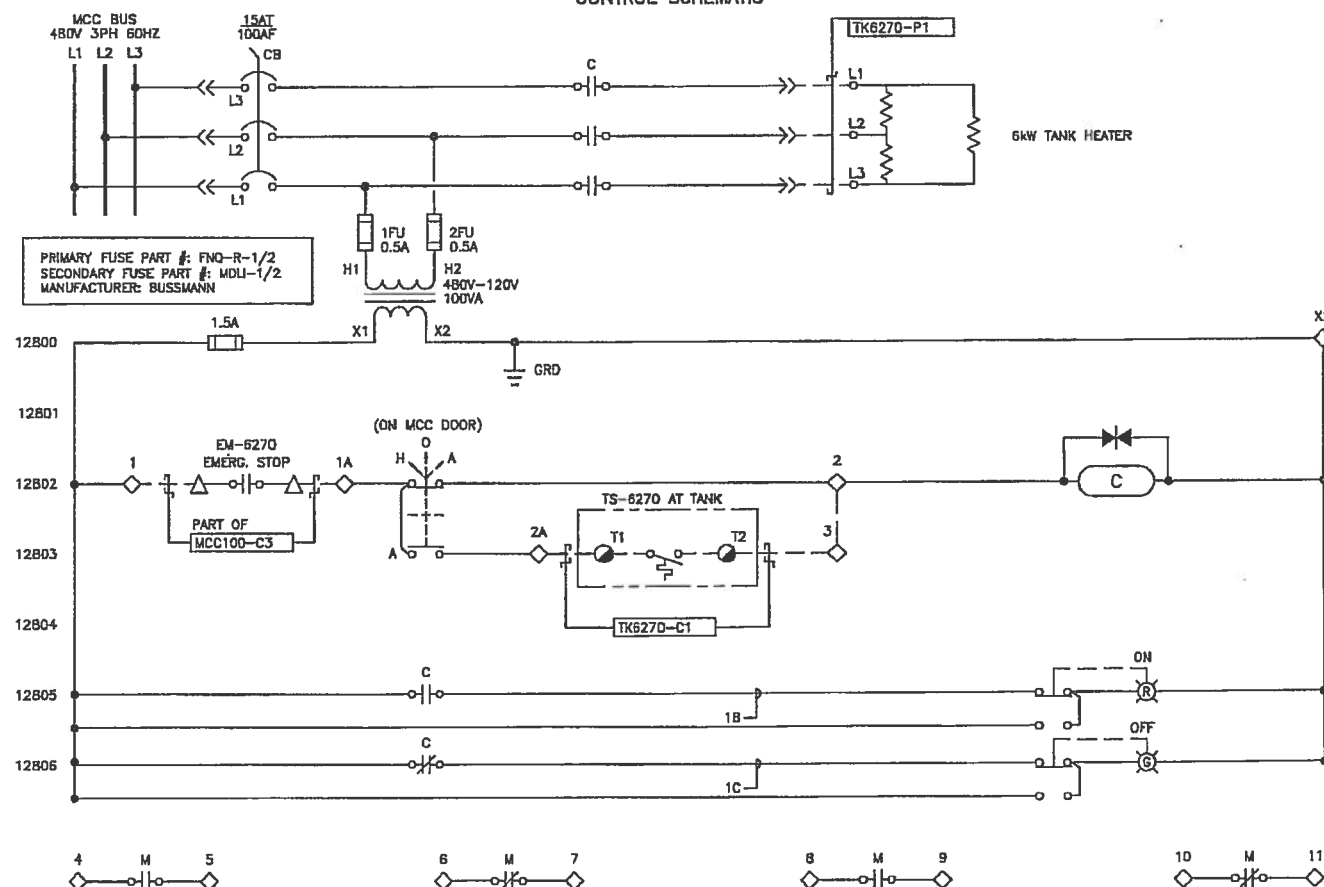


SCALE	N.T.S.		
DATE	28 FEB 2012		
DWG Size	D	VISTA DOC No.	1780-63-009-1
CLIENT DOC No.			REV. 0

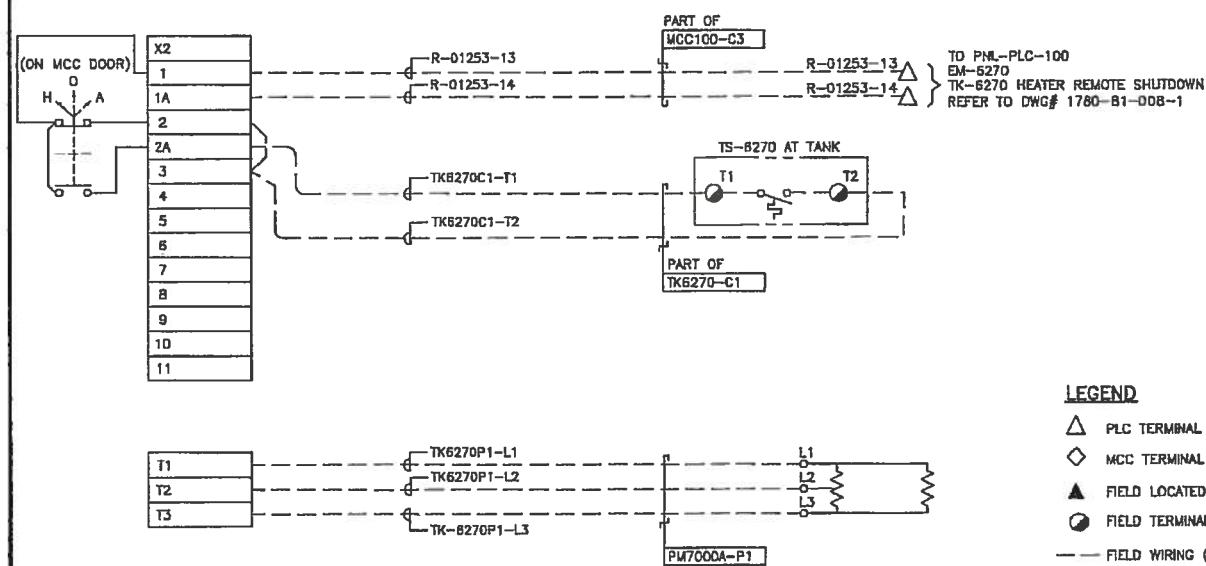
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STOCK FILE

HTR-TK-6270 TK-6270 MCC BUCKET-R4M CONTROL SCHEMATIC



INTERCONNECTION DIAGRAM



LEGEND

- △ PLC TERMINAL
- ◇ MCC TERMINAL
- ▲ FIELD LOCATED (BY CONTRACTOR)
- FIELD TERMINAL
- FIELD WIRING (BY CONTRACTOR)
- MANUFACTURER/VENDOR WIRING

NOTE:

1. WIRE TAGS SHOWN TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

AS BUILT

OCT 22 2012

PMR

2012-Jun-29 12:15:16 PM

PERMIT TO PRACTICE
VISTA PROJECTS LIMITED
APEGA PERMIT No.
P 04559
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1780-60-003-1 ELECTRICAL SYMBOL LEGEND
1780-62-001-1 SINGLE LINE DIAGRAM
1780-68-001-1 CONDUIT AND CABLE SCHEDULE

NUMBER TITLE NO. DESCRIPTION

ISSUED FOR CONSTRUCTION

DATE BY

DESIGNED BY: RB
DRAWN BY: PKC
CHECKED BY: RB/PV
ENGINEER'S APPROVAL: PV
COMPUTER FILE: 178063010-1_R0

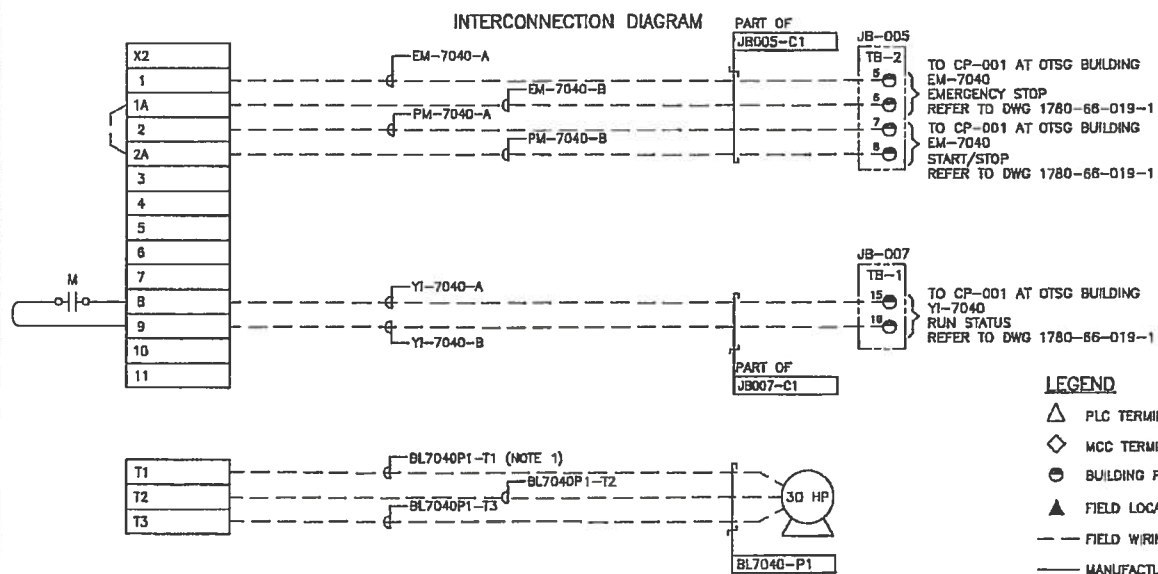
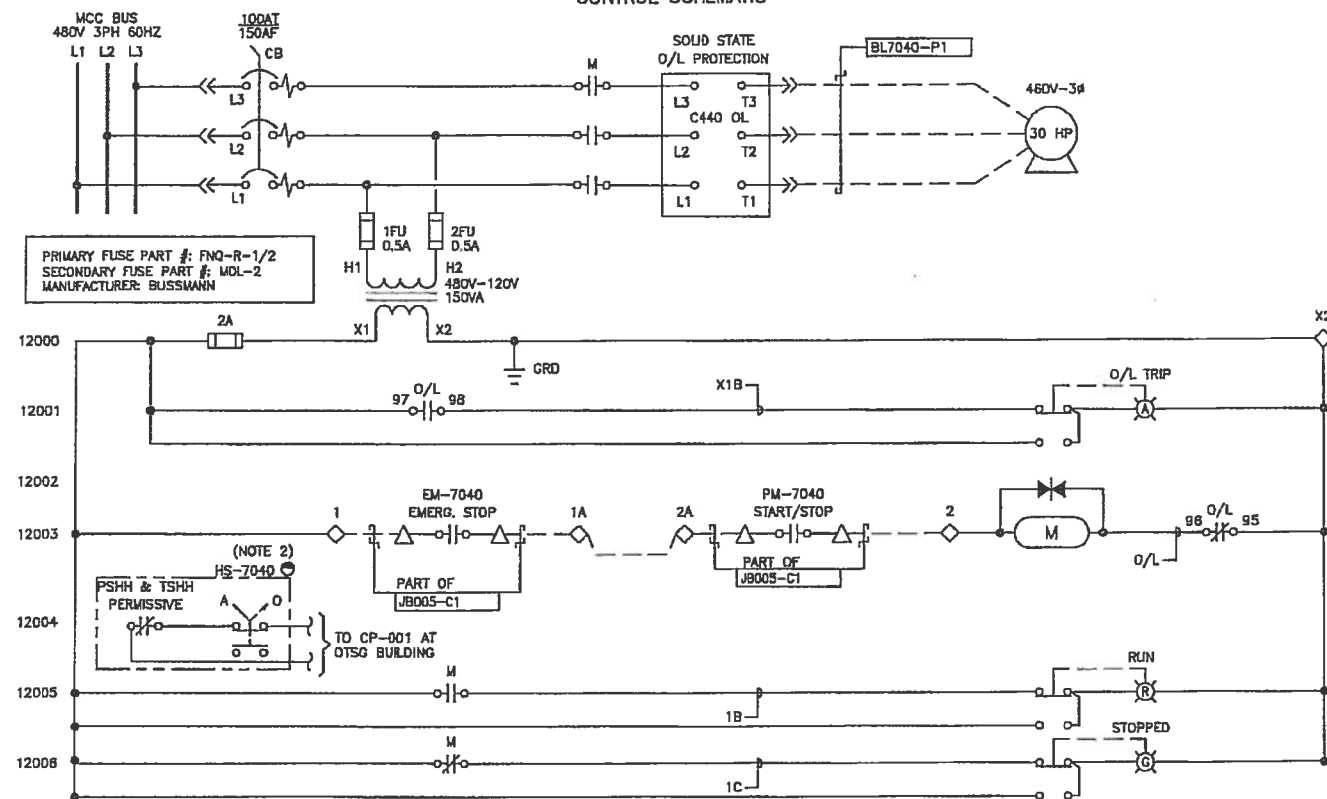
MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 18-08-85-17 W514
480V FVC HEATER CONTROL SCHEMATIC
HTR-TK-6270

Vista
Projects Limited

SCALE: N.T.S.
DATE: 28 FEB 2012
VISTA DWG No. 1780-63-010-1
CLIENT DWG No. REV: 0

BL-7040 MOTOR
STEAM GEN. COMBUSTION BLOWER MOTOR
MCC-100 BUCKET-FBC
CONTROL SCHEMATIC



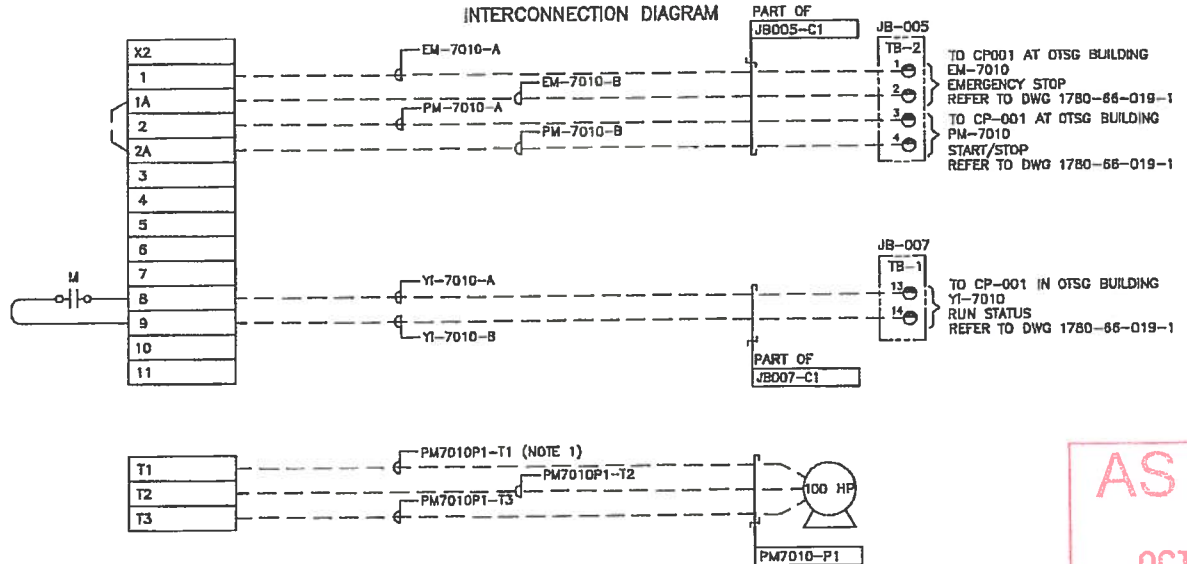
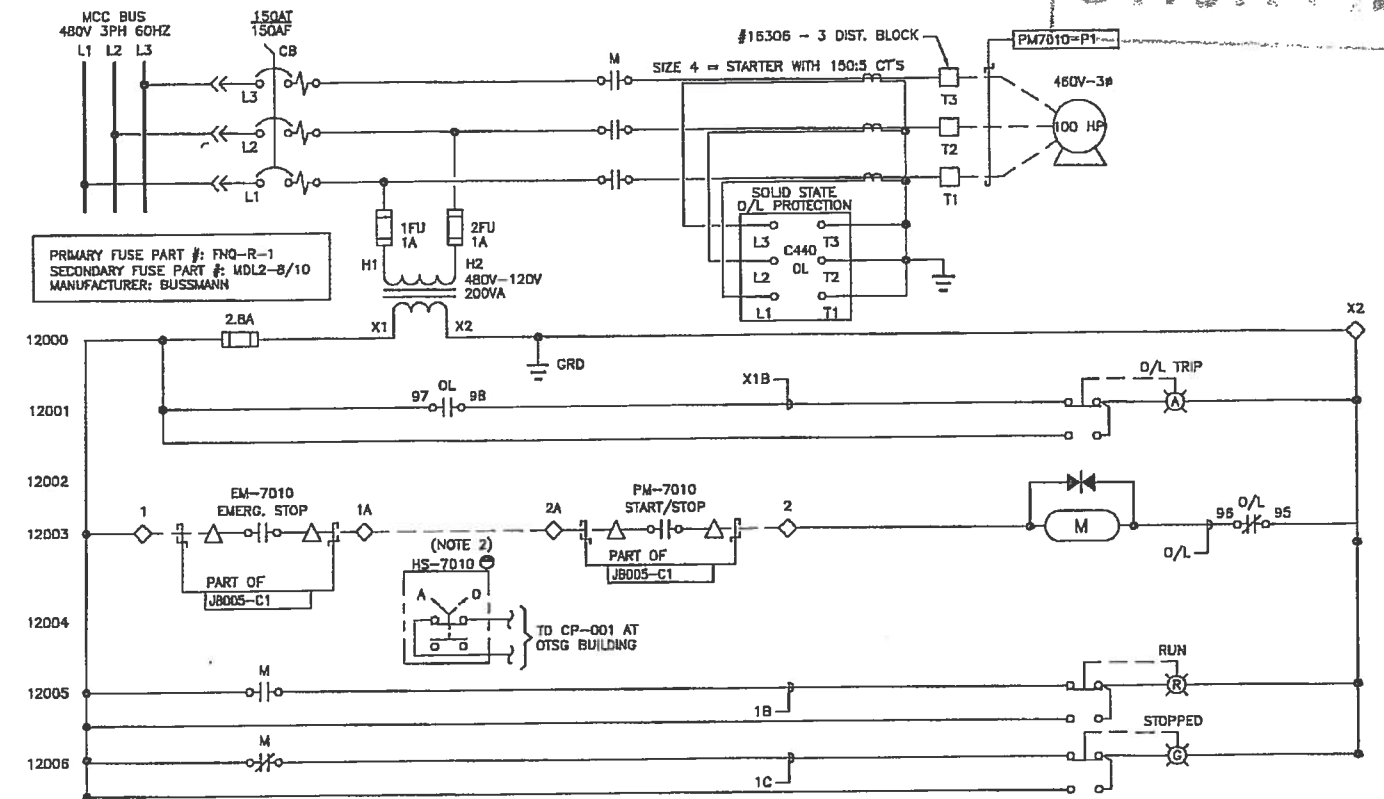
LEGEND

- ▲ PLC TERMINAL
 ◇ MCC TERMINAL
 ● BUILDING PACKAGE (BY VENDOR)
 ▲ FIELD LOCATED (BY CONTRACTOR)
 --- FIELD WIRING (BY CONTRACTOR)
 — MANUFACTURER/VENDOR WIRING

NOTES:

1. WIRE TAGS SHOWN TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.
2. CONTROL STATION AND/OR PERMISSIVE SWITCHES ARE INTERCONNECTED WITH VENDOR CONTROL PANEL CP-001 AT OTSG BUILDING.

PM-7010
STEAM GEN BOILER FEED WATER MOTOR
MCC-100 BUCKET-F6G
CONTROL SCHEMATIC



AS BUILT

OCT 22 2012

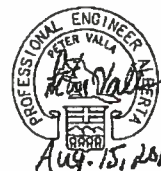
Porter

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YISTA PROJECTS LIMITED

APEGGA PERMIT No.
P 04559

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta



1780-60-003-1	ELECTRICAL SYMBOL LEGEND
1780-62-001-1	SINGLE LINE DIAGRAM
1780-68-001-1	CONDUIT AND CABLE SCHEDULE

NUMBER	TITLE
	REFERENCE DRAWINGS

0	ISSUED FOR CONSTRUCTION
NO.	DESCRIPTION
	REVISIONS

DESIGNED BY:	RB
DRAWN BY:	PKC
CHECKED BY:	PV/RB
ENGINEER'S APPROVAL:	PV
COMPUTER FILE	178063011-1_R0



MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 16-08-85-17 WSM

480V FVNR MOTOR CONTROL SCHEMATIC
BL-7040 & PM-7010

SCALE	N.T.S.		
DATE	06 JUN 2012		
INFO Size	D	VISTA DRG No.	1780-63-011-1
CLIENT DRG No.			REV.

	0
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STOCK

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OCT 22 2012

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2012-Jun-07 8:54:16 AM

STC

VOLTS	<u>120V AC</u>	PANEL	<u>DP-UPS-100</u>	225A	AMP BUS
HERTZ	<u>60</u>			100A	AMP MAIN CB
PHASE	<u>1</u>	LOCATION	<u>B-1100</u>	N/A	SOLID NEUTRAL
WIRE	<u>2</u>	FEEDER	<u>2C #BANG</u>	SURFACE	MOUNTING
XFMR		SIZE		<u>7.5S-UPS-100</u> <u>5KVA</u>	




LOAD DESCRIPTION	LOAD (W)	TRIP AMP	CCT. No.	BUS		CCT. No.	TRIP AMP	LOAD (W)	LOAD DESCRIPTION
				L1	N				
CONTROL PANEL PNL-PLC-100	1800	20A	1	●	●	2	15A	200	PROMDRE PANEL IN B-1100
B-1000 OFFICE RECEPT.-W	400	15A	3	●	●	4	15A	200	KM-0010 CONTROL PANEL IN B-1100
B-1000 OFFICE RECEPT.-E & B-1000 SMOKE ALARMS	400	15A	5	●	●	6	15A	400	SPARE UPS FEED TO OFFICE B-1000
SPARE	-	15A	7	●	●	8	15A	180	POWER SUPPLY IN JB-P1000
SPARE	-	15A	9	●	●	10	15A	-	SPARE
CP-001 STEAM GENERATOR PLC PANEL	1200	15A	11	●	●	12	15A	500	FLARE STACK IGNITION FL-8010
SPARE	-	15A	13	●	●	14	15A	500	FLARE STACK IGNITION FL-8020
SPARE	-	15A	15	●	●	16	15A	-	SPARE
BMS JUNCTION BOX 15-08 POWER	250	15A	17	●	●	18	15A	300	BMS JUNCTION BOX 13-09 POWER
SPARE	-	15A	19	●	●	20	20A	-	SPARE
	4050							2280	

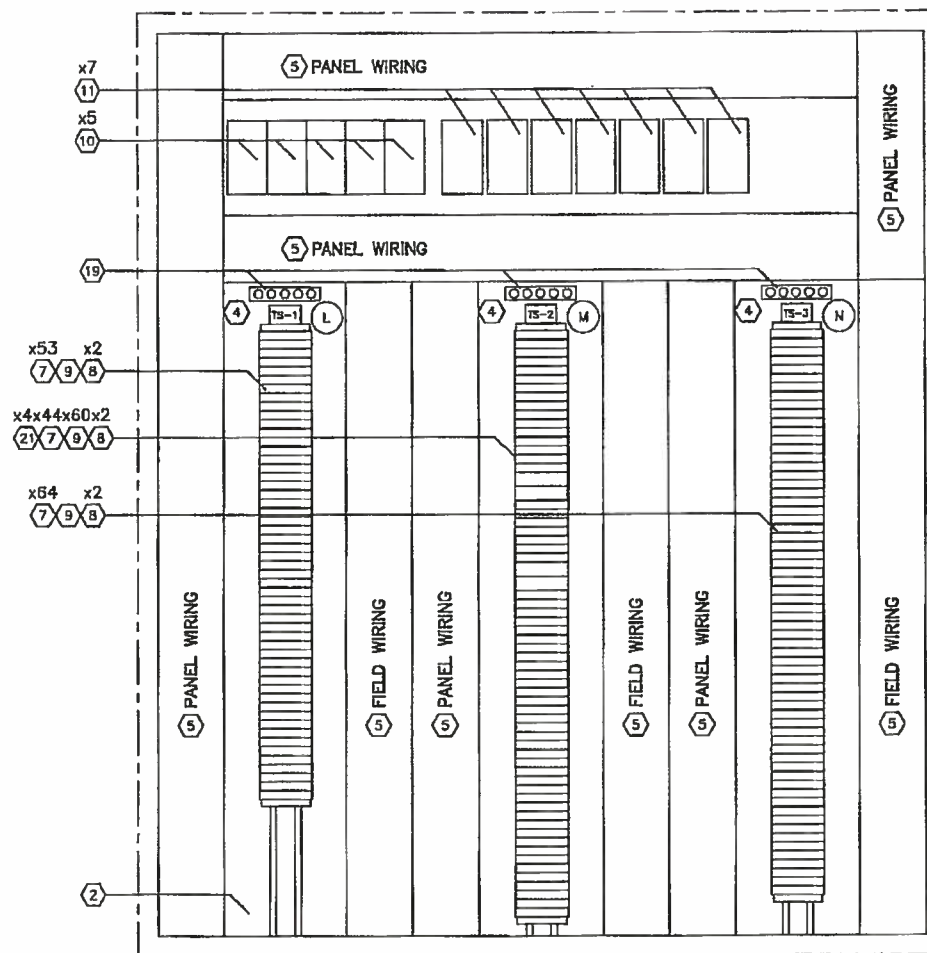
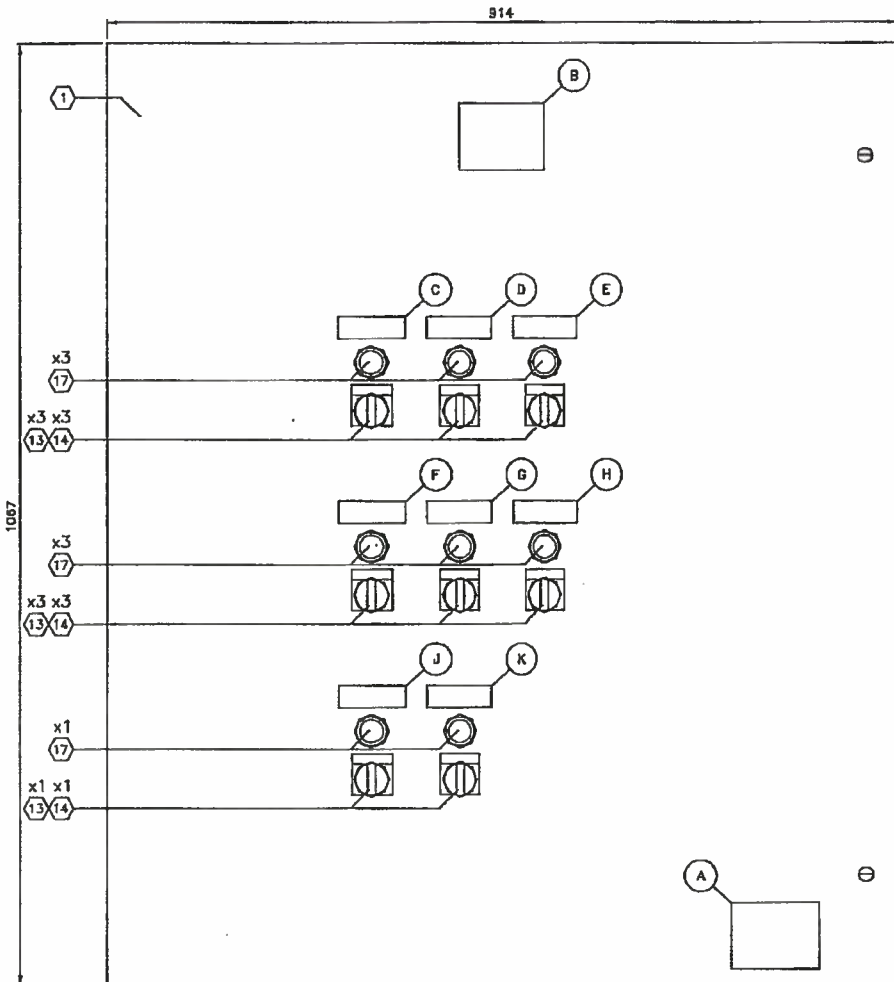
REMARKS: PANEL TOTAL	-	6330W
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AS BUILT

OCT 22 2012

2002

<div style="border: 1px solid black; padding: 5px; text-align: center;"> PERMIT TO PRACTICE VISTA PROJECTS LIMITED APEGGA PERMIT No. P 04559 <small>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</small> </div>		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:10%;">NUMBER</th> <th style="width:40%;">TITLE</th> <th style="width:10%;">DATE</th> <th style="width:10%;">BY</th> <th style="width:10%;">DESCRIPTION</th> <th style="width:10%;">DATE</th> <th style="width:10%;">BY</th> </tr> <tr> <td>1780-00-004-1</td> <td>MCD/INSTRUMENT AIR BUILDING LAYOUT</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>1780-02-003-1</td> <td>SINGLE LINE DIAGRAM</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>1780-02-002-1</td> <td>SINGLE LINE DIAGRAM</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>1780-02-001-1</td> <td>SINGLE LINE DIAGRAM</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>1780-00-001-1</td> <td>CABLE AND CONDUIT SCHEDULE</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="7" style="text-align: center;">REFERENCE DRAWINGS</td> </tr> </table>	NUMBER	TITLE	DATE	BY	DESCRIPTION	DATE	BY	1780-00-004-1	MCD/INSTRUMENT AIR BUILDING LAYOUT						1780-02-003-1	SINGLE LINE DIAGRAM						1780-02-002-1	SINGLE LINE DIAGRAM						1780-02-001-1	SINGLE LINE DIAGRAM						1780-00-001-1	CABLE AND CONDUIT SCHEDULE						REFERENCE DRAWINGS							<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">DESIGNED BY: RB</td> <td style="width:50%;"></td> </tr> <tr> <td>DRAWN BY: PKC</td> <td></td> </tr> <tr> <td>CHECKED BY: PV/RB</td> <td></td> </tr> <tr> <td>ENGINEER'S APPROVAL: PV</td> <td></td> </tr> <tr> <td>COMPUTER FILE: 178064002-1_R3</td> <td></td> </tr> </table>	DESIGNED BY: RB		DRAWN BY: PKC		CHECKED BY: PV/RB		ENGINEER'S APPROVAL: PV		COMPUTER FILE: 178064002-1_R3		<div style="border: 1px solid black; padding: 5px;">  <p>MURPHY CADOTTE PILOT CSS 16-08-085-17 WSM</p> <p>DISTRIBUTION PANELS DP-UPS-100</p> </div>	<div style="border: 1px solid black; padding: 5px;">  <p>SCALE: N.T.S.</p> <p>DATE: 11 FEB 2012</p> <p>DWG No: D VISTA PROJ No: 1780-64-002-1</p> <p>CUSTOMER No: REV: 1</p> </div>
NUMBER	TITLE	DATE	BY	DESCRIPTION	DATE	BY																																																										
1780-00-004-1	MCD/INSTRUMENT AIR BUILDING LAYOUT																																																															
1780-02-003-1	SINGLE LINE DIAGRAM																																																															
1780-02-002-1	SINGLE LINE DIAGRAM																																																															
1780-02-001-1	SINGLE LINE DIAGRAM																																																															
1780-00-001-1	CABLE AND CONDUIT SCHEDULE																																																															
REFERENCE DRAWINGS																																																																
DESIGNED BY: RB																																																																
DRAWN BY: PKC																																																																
CHECKED BY: PV/RB																																																																
ENGINEER'S APPROVAL: PV																																																																
COMPUTER FILE: 178064002-1_R3																																																																



MATERIAL LIST

ITEM	QTY	DESCRIPTION	MANUFACTURER	CATALOG No.	SIZE	SUPPLIER
1	1	CONTACTOR PANEL	HOFFMAN	CSD423610	1067Hx914Wx254D	VENDOR
2	1	BACK PAN	HOFFMAN	CP4236	1021Hx869W	VENDOR
3						
4	3	SCHT 5S RAIL MARKER	WEIDMULLER	1631930	6x38	VENDOR
5	AS REQ'D	WIREWAY	OPEN	GREY	75x100	VENDOR
6						
7	177	TERMINAL	WEIDMULLER	1020300000	WDU 10	VENDOR
8	6	TERMINAL END BRACKET	WEIDMULLER	1061200000	WEW 35/2	VENDOR
9	AS REQ'D	TERMINAL MOUNTING RAIL	WEIDMULLER	0498000000	TS 35x15	VENDOR
10	5	CONTACTOR	ALLEN-BRADLEY	100L-C20ND4	-	VENDOR
11	7	CONTACTOR	ALLEN-BRADLEY	100-C09D400	-	VENDOR
12						
13	7	H.O.A. SELECTOR SWITCH	ALLEN-BRADLEY	800T-J2A	-	VENDOR
14	7	HAND-OFF-AUTO STANDARD LEGEND	ALLEN-BRADLEY	800T-X511	-	VENDOR
15						
16						
17	7	PILOT LIGHT	ALLEN-BRADLEY	800T-Q10G	GREEN	VENDOR
18						
19	3	GROUND BAR	OPEN	-	-	VENDOR
20						
21	4	TERMINAL	WEIDMULLER	1028800000	WDU35	VENDOR
22						
23						
24						
25						
26						
27						
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30						
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38						
39						
40						

NOTES

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE.
- TERMINAL STRIPS TO BE RAISED UP OFF THE BACK PAN BY STEEL SECTION TO ALLOW FOR EASE OF ACCESS TO TERMINALS.
- DOOR TO BE PROVIDED WITH ALL AROUND NEOPRENE GASKET.
- CONTACTOR PANEL TO BE PROVIDED WITH A POCKET TO STORE ASSOCIATED DRAWINGS AND/OR HANDBOOKS INSIDE THE PANEL.
- ALL WIRING FROM CONTACTOR TERMINALS TO BE MIN. #12 AWG COPPER.
-HOT WIRING SHALL BE BLACK.
-SWITCHED WIRING SHALL BE BROWN.
-NEUTRAL WIRING SHALL BE WHITE.

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OCT 22 2012

NAMEPLATE SCHEDULE

ITEM	QTY	COLOUR	ENGRAVING DESCRIPTION	SIZE
A	1	WHITE ON RED	CAUTION / VOLTAGES FROM MORE / THAN ONE SOURCE	75x100
B	1	BLACK ON WHITE	CPNL-100 CONTACTOR PANEL	75x100
C	1	BLACK ON WHITE	EXTERIOR AND YARD LIGHTING	25x75
D	1	BLACK ON WHITE	EF-B-1100 I/A EXHAUST FAN	25x75
E	1	BLACK ON WHITE	EF-B-4000A/B EXHAUST FAN	25x75
F	1	BLACK ON WHITE	EF-B-7005A/B EXHAUST FAN	25x75
G	1	BLACK ON WHITE	EF-B-7000A/B EXHAUST FAN	25x75
H	1	BLACK ON WHITE	EF-B-6000 EXHAUST FAN	25x75
J	1	BLACK ON WHITE	EF-B-5030 EXHAUST FAN	25x75
K	1	BLACK ON WHITE	EF-B-8000 EXHAUST FAN	25x75
L	1	BLACK ON WHITE	TS-1	6x38
M	1	BLACK ON WHITE	TS-2	6x38
N	1	BLACK ON WHITE	TS-3	6x38

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Aug 15, 2012

1780-69-001-1 MAJOR EQUIPMENT LAYOUT MCC/INSTRUMENT AIR BUILDING
1780-67-001-1 CONTACTOR PANEL SCHEMATIC
1780-68-001-1 CABLE AND CONDUIT SCHEDULE

HANDOUT REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

DATE 2012.08.10

DESCRIPTION

REVISIONS

DESIGNED BY:

RB

DRAWN BY:

PKC

CHECKED BY:

PV/RB

DRAWINGS APPROVAL:

PV

COMPUTER FILE

178064030-1_R0

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM

CONTACTOR PANEL LAYOUT
CPNL-100

Vista
Projects Limited

SCALE 1:4

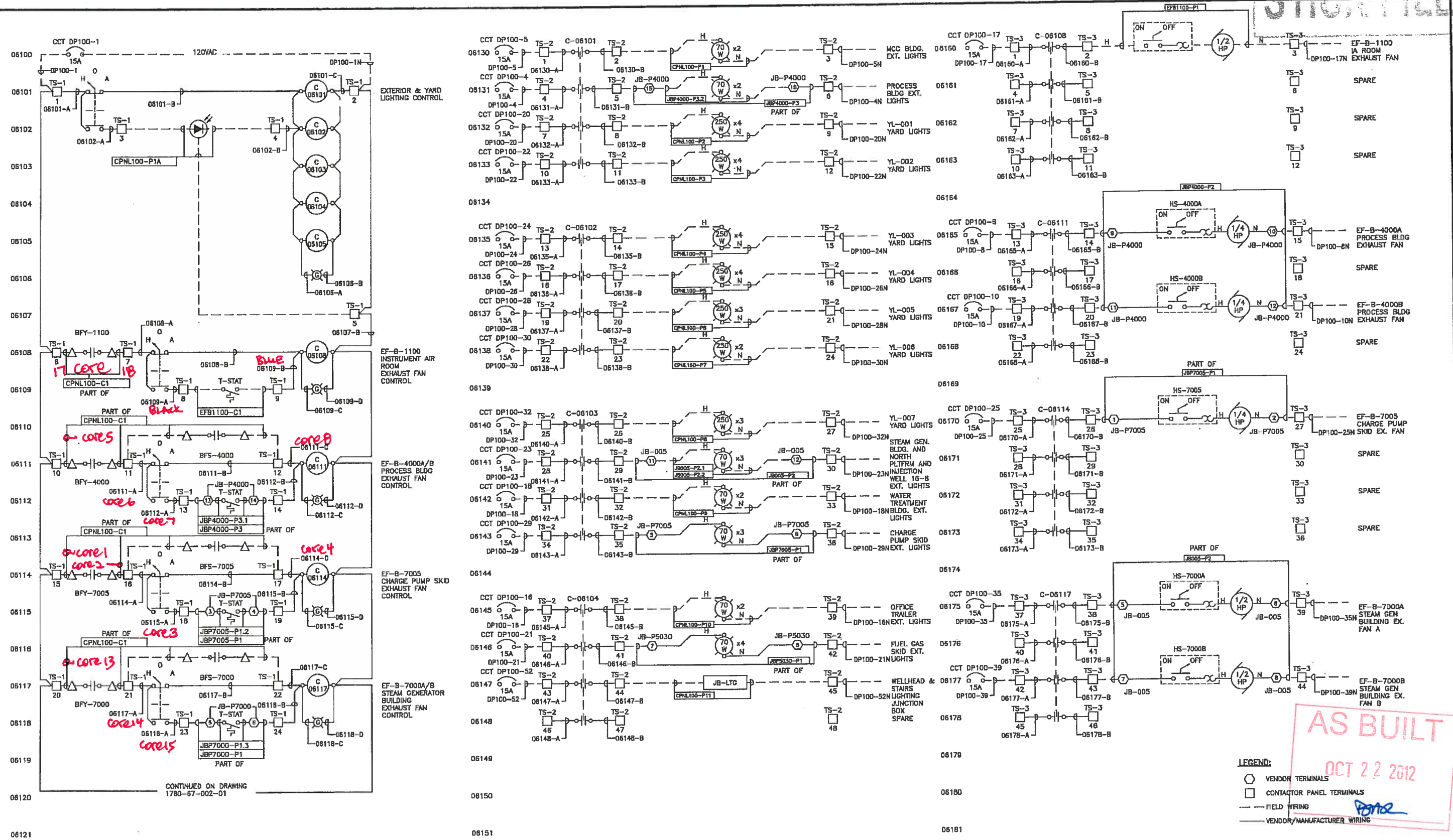
DATE 17 JAN 2012

SHT No. D VISTA PROJ No. 1780-64-030-1

CLIENT PROJ No.

REV. 0

STOCK FILE



2012-May-09 12:59:34 PM

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VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
VISTA PROJECTS LIMITED
Aug. 16, 2012

NUMBER	TITLE
1780-69-004-1	INSTRUMENT AIR BUILDING EQUIPMENT LAYOUT
1780-68-001-1	CABLE AND CONDUIT SCHEDULE
1780-64-030-1	CONTACTOR PANEL LAYOUT CPNL-100
1780-60-003-1	ELECTRICAL SYMBOL LEGEND

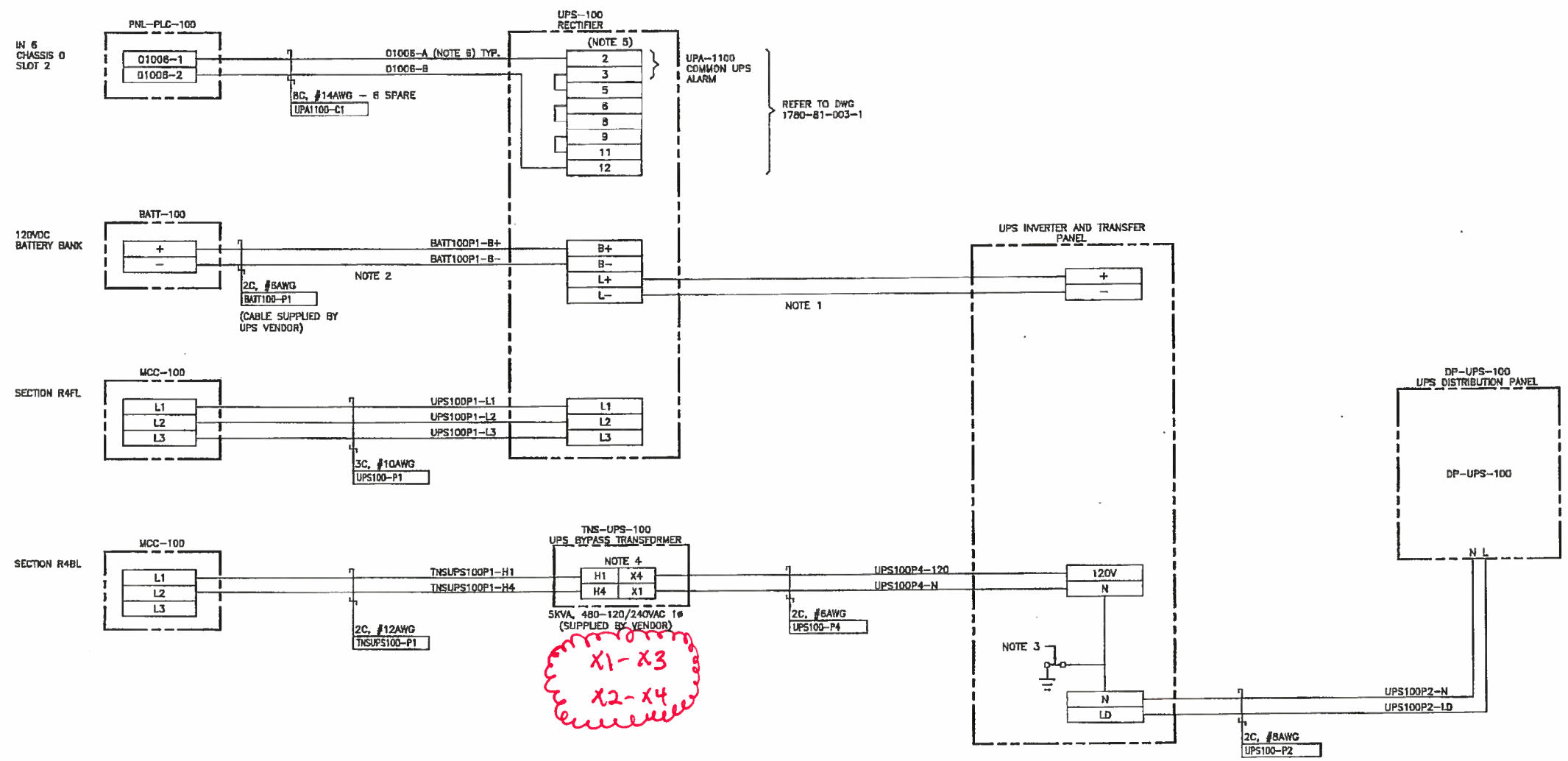
NO.	REVISIONS
0	ISSUED FOR CONSTRUCTION

DESIGNED BY	BRN BY	CHECKED BY	DATE	BY
RB	PKC	PV/RB	2012.08.10	PKC
COMPUTER FILE 178067001-1_RD				

MURPHY
OIL CANADA
MURPHY CADOTTE PILOT CSS 18-08-85-17 WSM
CONTACTOR PANEL SCHEMATIC
CPNL-100
SHEET 1

Vista
Projects Limited
SCALE N.T.S.
DATE 17 JAN 2012
SHEET No. D VISTA DIB No. 1780-67-001-1
CUST. DIB No. 1780-67-001-1
REV. 0

STICK FILE



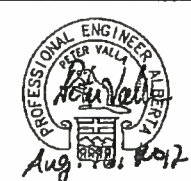
AS BUILT
OCT 22 2012

LEGEND:
--- FIELD WIRING
--- MANUFACTURER/VENDOR WIRING

- NOTES:
1. INTERWIRING FACTORY INSTALLED.
 2. BATTERY CABLES SUPPLIED BY VENDOR, INSTALLED BY OWNER.
 3. REMOVE JUMPER.
 4. INTERCONNECT H2 TO H3 AND X2 TO X4.
 5. SERIES WIRE ALL ALARM COMMON CONTACTS TO PROVIDE ONE CONTACT CONNECTION POINT.
 6. WIRE TAGS SHOWN ARE TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

2012-Aug-10 10:02:51 AM

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VISTA PROJECTS LIMITED
APEGGA PERMIT No.
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Geologists and Geophysicists of Alberta



NUMBER	TITLE	NO.
1780-69-006-1	POWER AND CABLE TRAY LAYOUT MCC/INSTRUMENT AIR BUILDING	
1780-69-001-1	CONDUIT AND CABLE SCHEDULE	

REVISIONS	DATE	BY	DESCRIPTION
ISSUED FOR CONSTRUCTION	2012.08.10	BTM	

DESIGNED BY:	RB
DRAWN BY:	BTM
CHECKED BY:	RB/PV
ENGINEER'S APPROVAL:	PV
COMPUTER FILE	178067002-1_R0

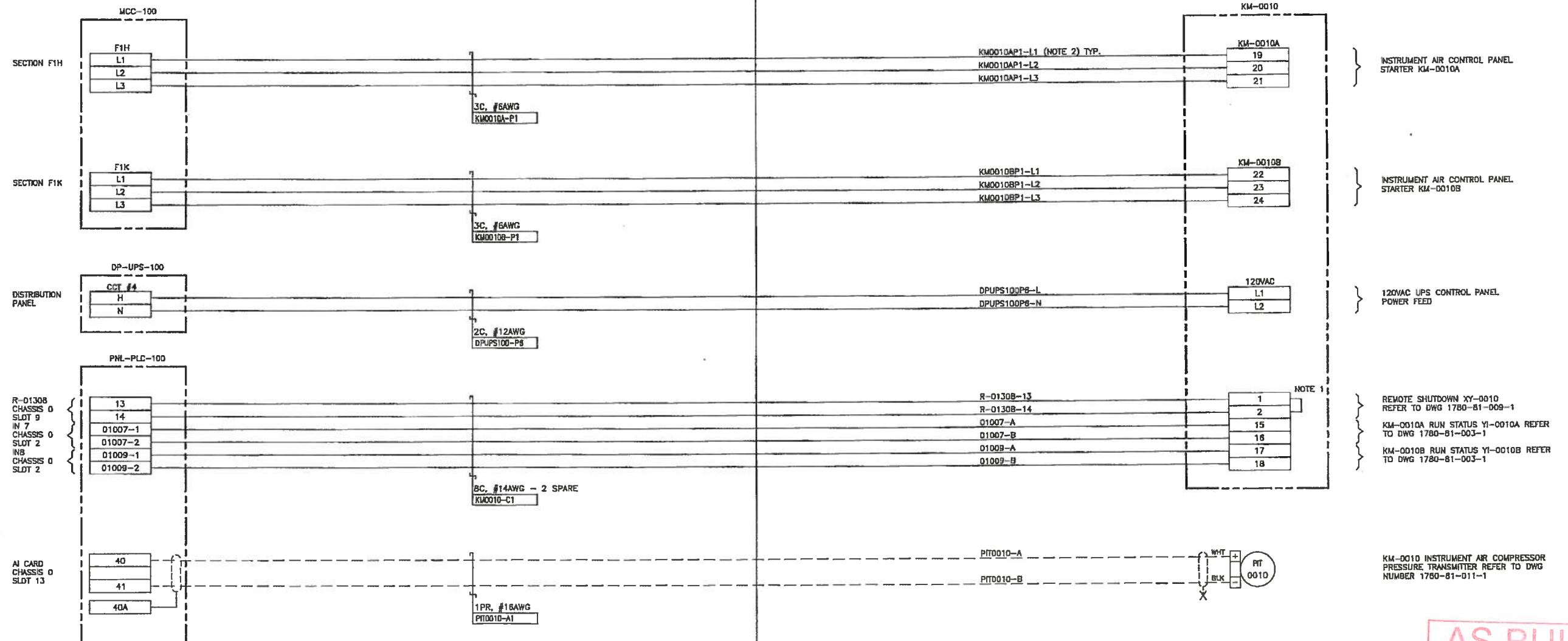
MURPHY OIL CANADA
MURPHY CADOTTE PILOT CSS 18-08-85-17 WSM
ELECTRICAL INTERCONNECTION WIRING DIAGRAM
UPS SYSTEM

Vista Projects Limited
SCALE: N.T.S.
DATE: 06 JUL 2012
JWS Sh D VISTA DWG No. 1780-67-002-1
CLIENT DWG No. REV. 0

B-1100 BUILDING - MCC ROOM

B-1100 BUILDING - INSTRUMENT AIR ROOM

STOCK FILE



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OCT 22 2012

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LEGEND:

- FIELD WIRING
- MANUFACTURER/VENDOR WIRING

NOTES:

1. REMOVE FACTORY JUMPER CABLE BETWEEN TERMINALS ONE AND TWO.
2. WIRE TAGS SHOWN ARE TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

2012-Aug-10 10:55:58 AM

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1780-69-006-1 POWER AND CABLE TRAY LAYOUT MCC/INSTRUMENT AIR BUILDING

1780-68-001-1 CONDUIT AND CABLE SCHEDULE

REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

REVISIONS

DESIGNED BY: RB

DRAWN BY: BTM

CHECKED BY: RB/PV

ENGINEERS APPROVAL: PV

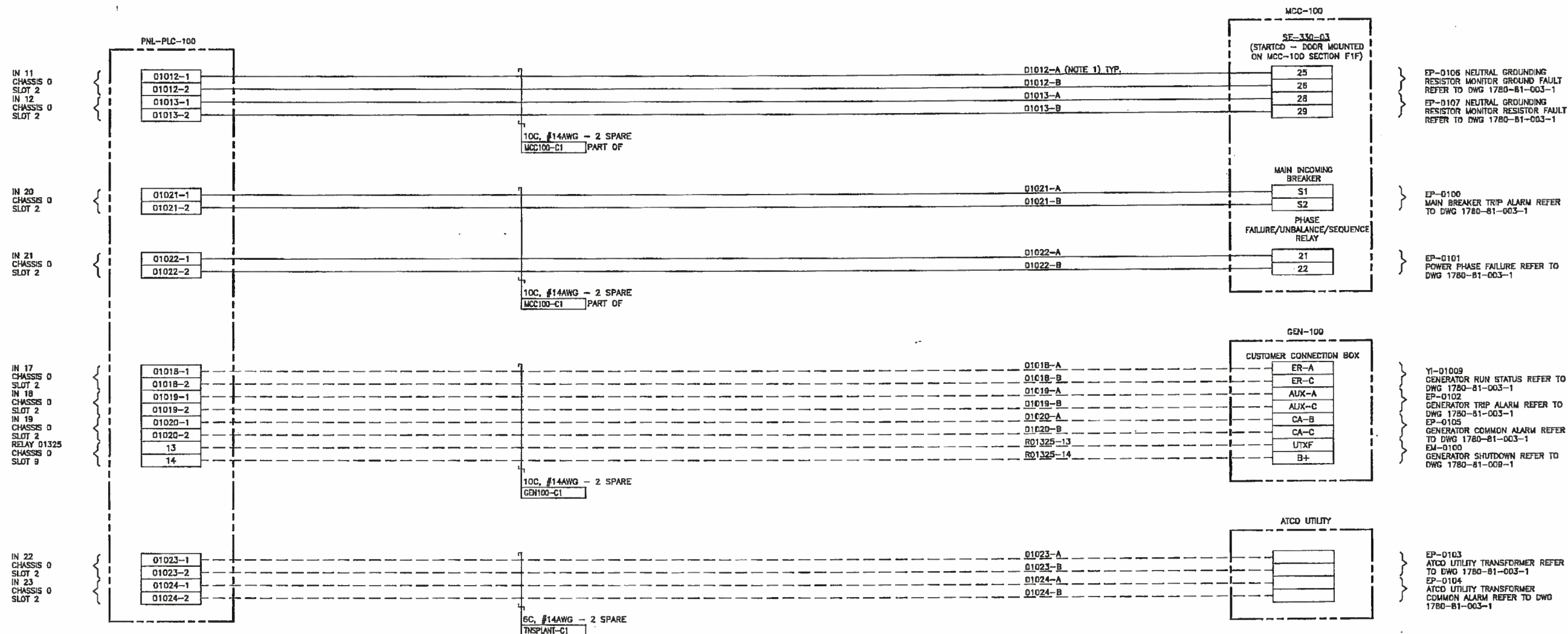
COMPUTER FILE: 178067003-1_R0

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 16-08-85-17 WSM
ELECTRICAL INTERCONNECTION WIRING DIAGRAM
I/A COMPRESSORS AND CONTROL PANEL
KM-0010

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Projects Limited

SCALE: N.T.S.
DATE: 08 JUL 2012
DWG No: D VISTA DWG No: 1780-67-003-1
CREDIT DWG No: REV: 0



STICK FILE

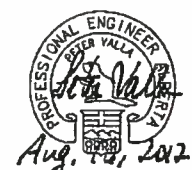
OCT 22 2012

LEGEND:
--- FIELD WIRING
--- MANUFACTURER/VENDOR WIRING

NOTES:
1. WIRE TAGS SHOWN ARE TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

2012-Aug-10 10:10:31 AM

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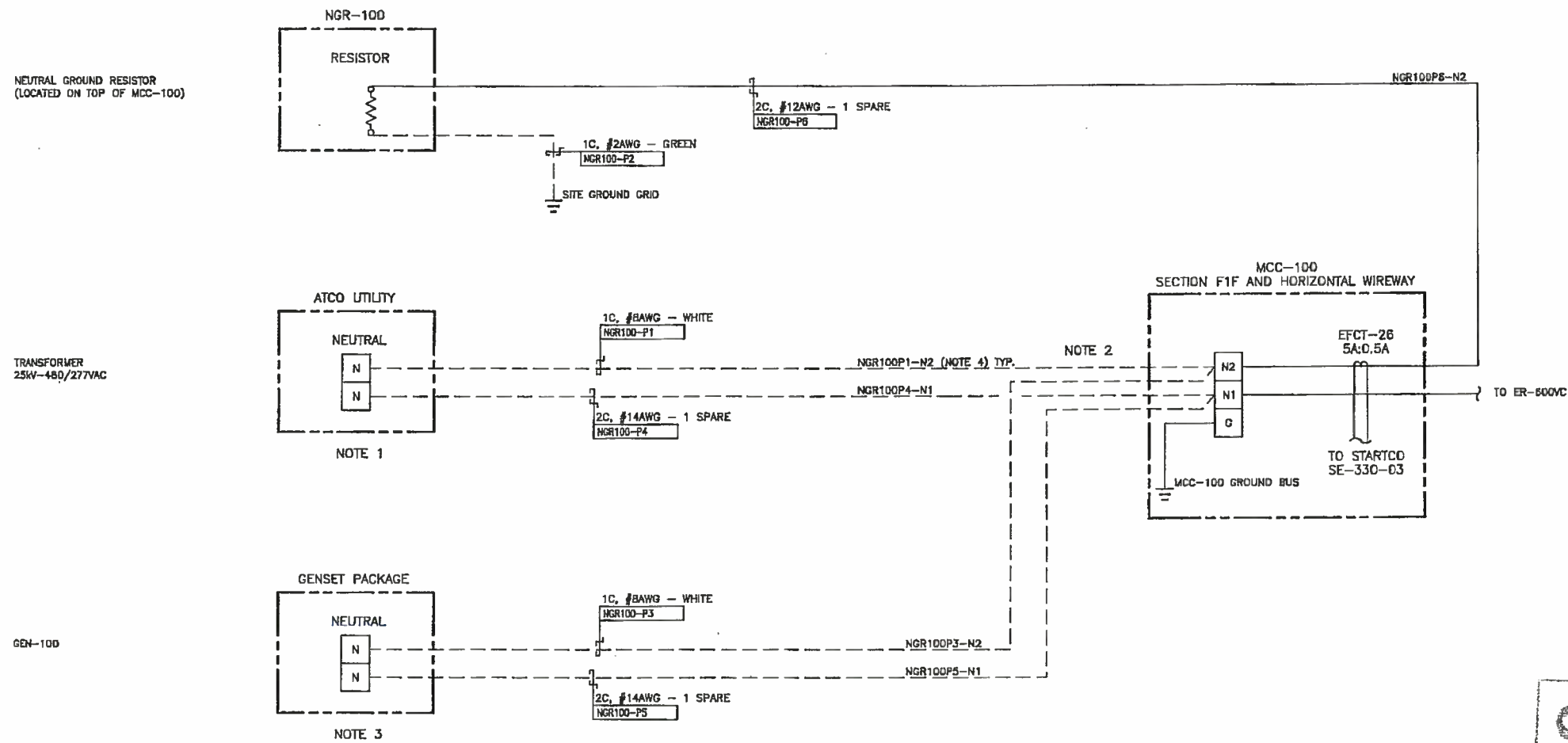
NUMBER	TITLE
1780-69-018-1	FUEL GAS LET DOWN AND METERING SKID STATION PKG-5030 LAYOUT
1780-69-008-1	POWER AND CABLE TRAY LAYOUT MCC/INSTRUMENT AIR BUILDING
1780-68-001-1	CONDUIT AND CABLE SCHEDULE

NO.	DESCRIPTION	DATE	BY
0	ISSUED FOR CONSTRUCTION	2012.08.10	BTM

DESIGNED BY:	RB
DRAWN BY:	BTM
CHECKED BY:	RB/PV
DIGESTED APPROVAL:	PV
COMPUTER FILE	178057004-1_R03

MURPHY OIL CANADA
MURPHY CADOTTE PILOT CSS 16-08-85-17 WSM
ELECTRICAL INTERCONNECTION WIRING DIAGRAM
UTILITY AND GENERATOR CONTROL

Vista Projects Limited	SCALE: N.T.S.
DATE: 06 JUL 2012	DWG No: D
VISTA DWG No: 1780-57-004-1	CLIENT DWG No:
REV: 0	



STICK FILE

AS BUILT

OCT 22 2012

LEGEND:

--- FIELD WIRING
--- MANUFACTURER/VENDOR WIRING

NOTES:

1. TEMPORARY POWER TO BE PROVIDED TO SITE BY GENSET PACKAGE GEN-100 UNTIL SUCH TIME PERMANENT UTILITY POWER IS PROVIDED BY ATCO UTILITY.
2. CONNECTION OF ATCO UTILITY NEUTRALS OR GENSET NEUTRALS IS DEPENDENT UPON WHICH POWER SOURCE IS IN USE.
3. SOLID GROUNDING OF THE GENERATOR NEUTRAL SHALL BE REMOVED BY THE GENSET VENDOR.
4. WIRE TAGS SHOWN ARE TO BE PLACED AT THE "FROM" AND "TO" DESTINATIONS.

2012-Aug-10 10:13:03 AM

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1780-69-018-1	FUEL GAS LET DOWN AND METERING SKID STATION PKG-5030 LAYOUT
1780-69-006-1	POWER AND CABLE TRAY LAYOUT MCC/INSTRUMENT AIR BUILDING
1780-69-001-1	CONDUIT AND CABLE SCHEDULE

NUMBER	TITLE
	REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

DESCRIPTION

DATE

BY

DESIGNED BY:

RB

DRAWN BY:

BTM

CHECKED BY:

RB/PV

ENGINEER'S APPROVAL:

PV

COMPUTER FILE

178067005-1_RD



MURPHY CADOTTE PILOT CSS 16-08-85-17 WSW
ELECTRICAL INTERCONNECTION WIRING DIAGRAM
UTILITY GROUNDING CONTROL



SCALE	N.T.S.
DATE	06 JUL 2012
DWG No.	1780-67-005-1
CUSTOMER No.	
REV.	0

CABLE/CONDUIT NO.	LOAD		RUN		CONDUIT	CONDUCTORS					Length NOTE 1	REMARKS	Rev
	HP/LOAD	VOLTAGE	FROM	VIA		TOTAL NO.	SIZE	INSULATION	VOLTAGE	SP			
HTRB7001A-P1	3KW	480V	MCC-100(SECTION F4HL)	TRAY	STEAM GENERATOR BUILDING UNIT HEATER A	3C	10	XLPE/TECK	600V		80		0
HTRB7001B-P1	3KW	480V	MCC-100(SECTION F4HR)	TRAY	STEAM GENERATOR BUILDING UNIT HEATER B	3C	10	XLPE/TECK	600V		80		0
TNSEHT200-P1	75kVA	480V	MCC-100(SECTION R1C)	TRAY	TNS-EHT-200 EHT TRANSFORMER BY TK-6050	3C	2/0	XLPE/TECK	1000V		30		0
DPEHT200-P1		208V	TNS-EHT-200 EHT TRANSFORMER BY TK-6050	TRAY	EHT DISTRIBUTION PANEL DP-EHT-200 BY TK-6050	4C	250	XLPE/TECK	1000V		3		0
TNSEHT300-P1	75kVA	480V	MCC-100(SECTION R4H)	TRAY	TNS-EHT-300 EHT XFMR BY AIR COOLER ACM-5010	3C	2/0	XLPE/TECK	1000V		184		0
DPEHT300-P1		208V	TNS-EHT-300 EHT XFMR BY AIR COOLER ACM-5010	TRAY	EHT DISTRIBUTION PANEL DP-EHT-300 BY AIR COOLER 5010	4C	250	XLPE/TECK	1000V		3		0
COMM-1			PNL-PLC-100 CONTROL PANEL	TRAY/UG	B-1000 OFFICE BUILDING MEDIA CONVERTER	FIBER OPTIC		ARMOURED	MULTI MODE		260	NOTE 4	0
COMM-2			PNL-PLC-100 CONTROL PANEL	TRAY	B-6000 WATER TREATMENT BUILDING PLC CONTROL PANEL	4PR	24	CAT5e	ARMOURED		30	NOTE 5	0
COMM-3			PNL-PLC-100 CONTROL PANEL	TRAY	B-7000 STEAM GEN BUILDING PLC CONTROL PANEL	4PR	24	CAT5e	ARMOURED		60	NOTE 6	0
COMM-4			PNL-PLC-100 CONTROL PANEL (MDS RADIO)	TRAY/CNDT	ANTENNA	-	-	COAX	COAX	-	-	LENGTH AND TYPE AS REQUIRED	0
EFB5030-P1		120V	CPNL-100 CONTACTOR PANEL CCT #53	TRAY	EF-B-5030 FUEL GAS SKID EXHAUST FAN	2C	12	XLPE/TECK	600V		25		0
EFB5030-C1		120V	CPNL-100 CONTACTOR PANEL TS-1, 33 AND 34	TRAY	EF-B-5030 FUEL GAS SKID EXHAUST FAN T-STAT	2C	14	XLPE/TECK	600V		25		0
EFB6000-P1		120V	CPNL-100 CONTACTOR PANEL CCT #41	TRAY	EF-B-6000 WATER TREATMENT BUILDING EXHAUST FAN	2C	12	XLPE/TECK	600V		32		0
EFB6000-C1		120V	CPNL-100 CONTACTOR PANEL TS-1, 28 AND 29	TRAY	JB-120 WATER TREATMENT BUILDING	2C	14	XLPE/TECK	600V		32		0
EFB6000-C1.1		120V	JB-120 WATER TREATMENT BUILDING	CONDUIT	EF-B-6000 WATER TREATMENT BLD EX FAN T-STAT	2C	14	XLPE	600V		5	BY WATER TREATMENT BUILDING VENDOR	0
TNSPLANT-C1		24VDC	ATCO UTILITY TRANSFORMER	TRAY	PNL-PLC-100 CONTROL PANEL	6C	14	XLPE/TECK	600V	2	20	EP-0103, EP-0104	0
TK6270-P1	6KW	480V	MCC-100 CONTACTOR(TK-6270 CONTACTOR)	TRAY	TANK HEATER ON TK-6270 (HTR-TK-6270)	3C	12	XLPE/TECK	600V		65		0
TK6270-C1		120V	MCC-100 CONTACTOR(TK-6270 CONTACTOR)	TRAY	THERMOSTAT FOR TANK HEATER ON HTR-TK-6270	2C	14	XLPE/TECK	600V		65		0
GEN100-P1		480V	GEN-100 REMOTE GENERATOR	TRAY	MCC-100 MAIN INCOMING SECTION	9C	4/0	XLPE/TECK	1000V		40	3-1C PER PHASE	0
GEN100-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	GEN-100 GEN SET ALARMS	10C	14	XLPE/TECK	600V	2	40	YI-01009, EP-0102, EP-0105, EM-100	0
B6005-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	B-6005 EMERGENCY SHOWER ALARMS	6C	14	XLPE/TECK	600V	2	35	TAH-6005, XA-6005	0
PNL-PRO-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	PROMORE PANEL IN MCC ROOM BU-1100	4C	14	XLPE/TECK	600V		10	NOTE 2	0
PNL-PRO-C2		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	PROMORE PANEL IN MCC ROOM BU-1100	4PR	18	ACIC	300V		10	NOTE 2	0
PNL-PRO-C3		4-20 mA	PROMORE PANEL IN MCC ROOM BU-1100	TRAY	PROMORE WELLHEAD EQUIPMENT PM-4010	4PR	18	ACIC	300V		138		0
PNL-PRO-C4		4-20 mA	PROMORE PANEL IN MCC ROOM BU-1100	TRAY	PROMORE WELLHEAD EQUIPMENT PM-4020	4PR	18	ACIC	300V		302		0
PNL-PRO-C5		4-20 mA	PROMORE PANEL IN MCC ROOM BU-1100	TRAY	PROMORE WELLHEAD EQUIPMENT PM-4030	4PR	18	ACIC	300V		302		0
CPNL100-C1		24VDC	CPNL-100 CONTACTOR PANEL	TRAY	PNL-PLC-100 CONTROL PANEL	30C	14	XLPE/TECK	600V	4	10	NOTE 2	0
EFB1100-P1	0.5HP	120V	CPNL-100 CONTACTOR PANEL CCT #17	TRAY	EF-B-1100 INSTRUMENT AIR ROOM EXHAUST FAN	3C	18	XLPE/TECK	600V		8	NOTE 2	0
EFB1100-C1		120V	CPNL-100 CONTACTOR PANEL	TRAY	EF-B-1100 INSTRUMENT AIR RM EX FAN THERMOSTAT	4C	18	XLPE/TECK	600V		8	NOTE 2	0
CPNL100-P1	280W	120V	CPNL-100 CONTACTOR PANEL CCT #5	SURFACE	MCC BUILDING EXTERIOR LIGHTS	2C	12	XLPE	600V		15	NOTE 2	0
CPNL100-P1A		120V	CPNL-100 CONTACTOR PANEL	SURFACE	EXTERIOR PHOTOCELL	3/4"	3C	12	XLPE	600V	10	NOTE 2	0
CPNL100-P2	1000W	120V	CPNL-100 CONTACTOR PANEL CCT #20	TRAY	YARD LIGHT NO 1	2C	12	XLPE/TECK	600V		30		0
CPNL100-P3	1000W	120V	CPNL-100 CONTACTOR PANEL CCT #22	TRAY	YARD LIGHT NO 2	2C	10	XLPE/TECK	600V		45		0
CPNL100-P4	1000W	120V	CPNL-100 CONTACTOR PANEL CCT #24	TRAY	YARD LIGHT NO 3	2C	10	XLPE/TECK	600V		60		0
CPNL100-P5	1000W	120V	CPNL-100 CONTACTOR PANEL CCT #26	TRAY	YARD LIGHT NO 4	2C	8	XLPE/TECK	1000V		150		0
CPNL100-P6	750W	120V	CPNL-100 CONTACTOR PANEL CCT #28	TRAY	YARD LIGHT NO 5	2C	8	XLPE/TECK	1000V		170		0
CPNL100-P7	500W	120V	CPNL-100 CONTACTOR PANEL CCT #30	TRAY	YARD LIGHT NO 6	2C	8	XLPE/TECK	1000V		200		0
CPNL100-P8	750W	120V	CPNL-100 CONTACTOR PANEL CCT #32	TRAY	YARD LIGHT NO 7	2C	4	XLPE/TECK	1000V		250		0
CPNL100-P9	140W	120V	CPNL-100 CONTACTOR PANEL CCT #18	TRAY	B-8000 WATER TREATMENT BLDG EXT. LIGHTS	2C	12	XLPE/TECK	600V		30		0
CPNL100-P10	140W	120V	CPNL-100 CONTACTOR PANEL CCT #16	TRAY	B-1000 OFFICE TRAILER EXTERIOR LIGHTS	2C	12	XLPE/TECK	600V		200		0
CPNL100-P11	490W	120V	CPNL-100 CONTACTOR PANEL CCT #52	TRAY	WELLHEAD AND STAIRS LIGHTING JUNCTION BOX	2C	8	XLPE/TECK	600V		250		0
CPNL100-P11.1	140W	120V	WELLHEAD AND STAIRS LIGHTING JUNCTION BOX	TRAY	WELLHEAD STANCHION LIGHTING 13-09	2C	12	XLPE/TECK	600V		20		0
CPNL100-P11.2	140W	120V	WELLHEAD AND STAIRS LIGHTING JUNCTION BOX	TRAY	WELLHEAD STANCHION LIGHTING 12-09	2C	12	XLPE/TECK	600V		20		0
CPNL100-P11.3	210W	120V	WELLHEAD AND STAIRS LIGHTING JUNCTION BOX	TRAY	STAIRS AND PLATFORM STANCHION LIGHTING	2C	12	XLPE/TECK	600V		20		0
BATT100-P1		120VDC	BATT-100 BATTERY RACK	SURFACE	UPS SYSTEM UPS-100 IN B-1100 MCC BUILDING	2C	8	XLPE	1000V		10	NOTE 3	0

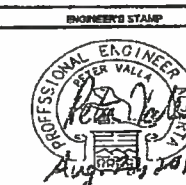
NOTES:

- ESTIMATED CABLE LENGTHS ARE IN METERS. FIELD CONTRACTOR TO CONFIRM CABLE RUN LENGTHS BEFORE ORDERING.
- CABLE SHALL BE SUPPLIED AND INSTALLED BY MCC BUILDING VENDOR
- CABLE SUPPLIED BY UPS VENDOR AND INSTALLED BY MCC BUILDING VENDOR
- CABLE TO BE ARMOURD PREFER OPTIC - CORROSION PART NO. 8121UC-T4131D20 C/W FAN KIT PAK-0025-01 AND ST15T CONNECTORS
- CABLE TO BE ARMOURD CAT5e - BUILDING PART NO. 121780A OR EQUIVALENT C/W RJ-45 CONNECTORS

REFERENCE DRAWINGS		NO.	DATE	REVISION	DWN	CHCKD	APPR
DWG. NO.	TITLE						
		8	2013-08-17	ISSUED FOR CONSTRUCTION	RS	PVWB	PLU

PERMIT STAMP
PERMIT TO PRACTICE
VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
The State of California Department of Industrial Relations
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STICK FILE



MURPHY OIL CORPORATION

Vista Projects Limited

Murphy Cadotte Pilot CSS

OCT 22 2011

15-0813-08-005-17 VISA

JOB NO. 1780 DWG. NO. 1780-08-001-2 REV.

CLIENT DWG. NO. H.T.S. CONDUIT & CABLE SCHEDULE SHEET 2 0

EFB1100-P1 deleted
and substituted
with EFB1100-C1
4C #10 contains
circuits from
EFB1100-P1

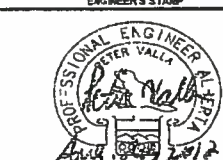
CABLE/CONDUIT NO.	LOAD		RUN		CONDUIT	CONDUCTORS					Length NOTE 1	REMARKS	Rev
	HP/LOAD	VOLTAGE	FROM	VIA		SIZE	TOTAL NO.	SIZE	INSULATION	VOLTAGE	SP		
TNSUPS100-P1	5kVA	480V	MCC-100(SECTION R4BL)	TRAY	UPS BY PASS TRANSFORMER TNS-UPS-100		2C	10	XLPE/TECK	600V	6	NOTE 2	0
UPS100-P4		120VAC	UPS BY PASS TRANSFORMER TNS-UPS-100	TRAY	UPS SYSTEM UPS-100 IN B-1100 MCC BUILDING		2C	6	XLPE/TECK	1000V	2	NOTE 2	0
UPS100-P1	5kVA	480V	MCC-100(SECTION R4FL)	TRAY	UPS SYSTEM UPS-100 IN B-1100 MCC BUILDING		3C	10	XLPE/TECK	600V	6	NOTE 2	0
UPS100-P2		120V UPS	UPS SYSTEM UPS-100 IN B-1100 MCC BUILDING	TRAY	UPS DISTRIBUTION PANEL DP-UPS-100		2C	8	XLPE/TECK	1000V	2	NOTE 2	0
UPA100-C1		24VDC	UPS SYSTEM UPS-100 IN B-1100 MCC BUILDING	TRAY	PNL-PLC-100 CONTROL PANEL		8C	14	XLPE/TECK	600V	8	NOTE 2	0
DPUPS100-P1		120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#1	TRAY	PNL-PLC-100 CONTROL PANEL		2C	12	XLPE/TECK	600V	7	NOTE 2	0
DPUPS100-P2	250W	120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#17	TRAY	BMS TRANSFORMER JUNCTION BOX 18-8 POWER		2C	10	XLPE/TECK	600V	40		0
DPUPS100-P2.1	65W	120V UPS	BMS TRANSFORMER JUNCTION BOX 18-8 POWER	TRAY	BMS CONTROL PANEL BMS-8055		2C	12	XLPE/TECK	600V	15		0
DPUPS100-P2.2	65W	120V UPS	BMS TRANSFORMER JUNCTION BOX 18-8 POWER	TRAY	BMS CONTROL PANEL BMS-8085		2C	12	XLPE/TECK	600V	15		0
DPUPS100-P2.3	16W	120V UPS	BMS TRANSFORMER JUNCTION BOX 18-8 POWER	TRAY	FQIT-7010 (NEAR B-7005)		2C	14	XLPE/TECK	600V	20		0
DPUPS100-P3	800W	120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#3.5	TRAY/UG	OFFICE BUILDING UPS POWER JB (JB-P1000)		4C	4	XLPE/TECK	1000V	260		0
DPUPS100-P4		120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#12	TRAY	FL-8010 FLARE IGNITION PANEL		2C	10	XLPE/TECK	600V	350		0
DPUPS100-P5		120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#14	TRAY	FL-8020 FLARE IGNITION PANEL		2C	10	XLPE/TECK	600V	350		0
DPUPS100-P6		120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#4	TRAY	KM-0010 INSTRUMENT AIR DRYER CONTROL PANEL		2C	12	XLPE/TECK	600V	10	NOTE 2	0
DPUPS100-P7		120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#2	TRAY	PROMORE PANEL IN MCC ROOM B-1100		2C	12	XLPE/TECK	600V	5	NOTE 2	0
DPUPS100-P8	300W	120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#18	TRAY	BMS TRANSFORMER JUNCTION BOX 13-9 POWER		2C	6	XLPE/TECK	1000V	200		0
DPUPS100-P8.1	65W	120V UPS	BMS TRANSFORMER JUNCTION BOX 13-9 POWER	TRAY	BMS CONTROL PANEL BMS-9015		2C	12	XLPE/TECK	600V	15		0
DPUPS100-P8.2	65W	120V UPS	BMS TRANSFORMER JUNCTION BOX 13-9 POWER	TRAY	BMS CONTROL PANEL BMS-9025		2C	12	XLPE/TECK	600V	15		0
DPUPS100-P8.3	65W	120V UPS	BMS TRANSFORMER JUNCTION BOX 13-9 POWER	TRAY	BMS CONTROL PANEL BMS-9035		2C	12	XLPE/TECK	600V	15		0
DPUPS100-P9	180W	120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#6.8	TRAY/UG	OFFICE BLDG UPS POWER JB-1000 SPARE AND XFMR		4C	4	XLPE/TECK	1000V	260		0
DPUPS100-P9.1	100W	24VDC	OFFICE BLDG UPS POWER JB-1000 - XFMR FEED	CONDUIT	FIBER OPTIC MEDIA CONVERTER		2C	12	XLPE	600V	8		0
TNS100-P1	50kVA	480V	MCC-100(SECTION R4DR)	TRAY	TNS-100 UTILITY DISTRIBUTION TRANSFORMER		3C	4	XLPE/TECK	1000V	10	NOTE 2	0
DP100-P1		240V	TNS-100 UTILITY DISTRIBUTION TRANSFORMER	CONDUIT	UTILITY DISTRIBUTION PANEL DP-100 IN BU-1100		3C	250	XLPE	1000V	3	NOTE 2	0
DP100-P2		120V	UTILITY DISTRIBUTION PANEL DP-100 VARIOUS CCTS	SURFACE	CPNL-100 CONTACTOR PANEL		10C	10	XLPE	600V	3	NOTE 2	0
DP100-P2A		120V	UTILITY DISTRIBUTION PANEL DP-100 VARIOUS CCTS	SURFACE	CPNL-100 CONTACTOR PANEL		10C	10	XLPE	600V	3	NOTE 2	0
DP100-P3		120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #3	SURFACE	MCC ROOM INTERIOR LIGHT SWITCH		2C	12	XLPE	600V	12	NOTE 2	0
DP100-P3A		120V	MCC ROOM INTERIOR LIGHT SWITCH	SURFACE	MCC ROOM INTERIOR LIGHTS		2C	12	XLPE	600V	12	NOTE 2	0
DP100-P4		120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #11	SURFACE	INSTRUMENT AIR ROOM LIGHT SWITCH		2C	12	XLPE	600V	12	NOTE 2	0
DP100-P4A		120V	INSTRUMENT AIR ROOM LIGHT SWITCH	SURFACE	INSTRUMENT AIR ROOM LIGHTS		2C	12	XLPE	600V	12	NOTE 2	0
DP100-P5		120V	UTILITY DISTRIBUTION PANEL DP-100 CCT#7	SURFACE	MCC ROOM INTERIOR RECEPTACLE		2C	12	XLPE	600V	12	NOTE 2	0
DP100-P6		120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #9	SURFACE	MCC ROOM EXTERIOR RECEPTACLE		2C	12	XLPE	600V	12	NOTE 2	0
DP100-P7		120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #13	SURFACE	INSTRUMENT AIR ROOM INTERIOR RECEPTACLE		2C	12	XLPE	600V	12	NOTE 2	0
DP100-P8		120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #15	SURFACE	INSTRUMENT AIR ROOM EXTERIOR RECEPTACLE		2C	12	XLPE	600V	12	NOTE 2	0
DP100-P9		120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #19	SURFACE	MCC BUILDING EMERGENCY AND EXIT LIGHTS		2C	12	XLPE	600V	12	NOTE 2	0
DP100-P10	0.3 HP	120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #14	TRAY	P-6280 WATER DRAIN TANK PUMP IN PACKAGE-6000		2C	12	XLPE/TECK	600V	30		0
DP100-P11		120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #23	TRAY	PNL HVAC-100 UTILITY POWER SUPPLY		2C	12	XLPE/TECK	600V	8	NOTE 2	0
DP100-P12	7.2KW	240V	UTILITY DISTRIBUTION PANEL DP-100 CCT #43.45	TRAY	B-6005 EMERGENCY SHOWER POWER SUPPLY		3C	6	XLPE/TECK	1000V	30		0
DP100-P13		240V	UTILITY DISTRIBUTION PANEL DP-100 CCT #40, 42	TRAY	GEN-100 SHORE POWER		3C	6	XLPE/TECK	1000V	30		0
DP100-P14	240W	120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #36	TRAY	FUEL GAS BUILDING INTERIOR AND EMERGENCY LIGHTS		2C	12	XLPE/TECK	600V	25		0
DP100-P15	100W	120V	UTILITY DISTRIBUTION PANEL DP-100 CCT #38	TRAY	FUEL GAS BUILDING CATADYNE HEATER IGNITION		2C	12	XLPE/TECK	600V	25		0
FL8010-C1		24VDC	PNL-FL8010 REMOTE CONTROL PANEL	TRAY	JB-FL8010 BASE MOUNTED FLARE JUNCTION BOX		4C	14	XLPE/TECK	600V	30		0
FL8020-C1		24VDC	PNL-FL8020 REMOTE CONTROL PANEL	TRAY	JB-FL8020 BASE MOUNTED FLARE JUNCTION BOX		4C	14	XLPE/TECK	600V	30		0
HVAC100-P1		480V	MCC-100(SECTION F5ML)	TRAY	HVAC UNIT HVAC-100 IN B-1100		3C	10	XLPE/TECK	600V	8	NOTE 2	0
HVAC101-P1		480V	MCC-100(SECTION F1ML)	TRAY	HVAC UNIT HVAC-101 IN B-1100		3C	10	XLPE/TECK	600V	8	NOTE 2	0
XXXX-C1		120V	UNIT HEATER HTR-B-1100A MCC ROOM	SURFACE	HAND SWITCH HS-1100		2C	14	XLPE	600V	3	NOTE 2	0
XXXX-C2		120V	UNIT HEATER HTR-B-1100B MCC ROOM	SURFACE	REMOTE THERMOSTAT		2C	14	XLPE	600V	3	NOTE 2	0
HTRB1101A-P1	15KW	480V	MCC-100(SECTION R4FR)	TRAY	UNIT HEATER HTR-B-1101A I/A ROOM		3C	10	XLPE/TECK	600V	10	NOTE 2	0
XXXX-C1		120V	UNIT HEATER HTR-B-1101A I/A ROOM	SURFACE	HAND SWITCH HS-1101A		2C	14	XLPE	600V	3	NOTE 2	0
XXXX-C2		120V	UNIT HEATER HTR-B-1101A I/A ROOM	SURFACE	REMOTE THERMOSTAT		2C	14	XLPE	600V	3	NOTE 2	0
PNL HVAC-100-C1		24VDC	PNL HVAC-100 ONT PNL TROUBLE, FAIL, STATUS	TRAY	PNL-PLC-100 CONTROL PANEL		10C	14	XLPE/TECK	600V	2	NOTE 2	0
HY1100-C1		24VDC	HVAC UNIT MCC ROOM HVAC-100 (FIRE SHUTDOWN)	TRAY	PNL-PLC-100 CONTROL PANEL		2C	14	XLPE/TECK	600V	5		0
ASH1100A-C1		24VDC	PNL-PLC-100 CONTROL PANEL	SURFACE	SMOKE DETECTOR ASH-1100A IN MCC ROOM		4C	14	XLPE	600V	6	NOTE 2	0
ASH1100B-C1		24VDC	PNL-PLC-100 CONTROL PANEL	SURFACE	SMOKE DETECTOR ASH-1100B IN MCC ROOM		4C	14	XLPE	600V	12	NOTE 2	0
ASH1100C-C1		24VDC	PNL-PLC-100 CONTROL PANEL	SURFACE	SMOKE DETECTOR ASH-1100C IN INSTRUMENT AIR RM		4C	14	XLPE	600V	18	NOTE 2	0
ESD1100A-C1		24VDC	PNL-PLC-100 CONTROL PANEL	SURFACE	ESD BUTTON ESD-1100A EXTERIOR MCC ROOM		2C	14	XLPE	600V	8	NOTE 2	0
ESD1100B-C1		24VDC	PNL-PLC-100 CONTROL PANEL	SURFACE	ESD BUTTON ESD-1100B EXTERIOR I/A ROOM		2C	14	XLPE	600V	16	NOTE 2	0
AH1100-C1		24VDC	PNL-PLC-100 CONTROL PANEL	SURFACE	EXTERIOR HORN AH-1100 MCC BUILDING		6C	14	XLPE	600V	16	NOTE 2	0
AL1100A-C1		24VDC	PNL-PLC-100 CONTROL PANEL	SURFACE	EXTERIOR AMBER STROBE AL-1100A MCC BUILDING		2C	14	XLPE	600V	16	NOTE 2	0
AL1100B-C1		24VDC	PNL-PLC-100 CONTROL PANEL	SURFACE	EXTERIOR BLUE STROBE AL-1100B MCC BUILDING		2C	14	XLPE	600V	16	NOTE 2	0
AL1100C-C1		24VDC	PNL-PLC-100 CONTROL PANEL	SURFACE	EXTERIOR RED STROBE AL-1100C MCC BUILDING		2C	14	XLPE	600V	16	NOTE 2	0
JBC1000-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	OFFICE BUILDING CONTROL JB-C1000		25C	14	XLPE/TECK	600V	17		0
JBC1000-C2		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	OFFICE BUILDING CONTROL JB-C1000		12C	12	XLPE/TECK	600V	1		0

- NOTES:
- ESTIMATED CABLE LENGTHS ARE IN METERS. FIELD CONTRACTOR TO CONFIRM CABLE RUN LENGTHS BEFORE ORDERING.
 - CABLES SHALL BE SUPPLIED AND INSTALLED BY MCC BUILDING VENDOR.
 - CABLE SUPPLIED BY UPS VENDOR AND INSTALLED BY MCC BUILDING VENDOR.
 - CABLE TO BE ARMOURD FIBER OPTIC - CORDING PART NO. 912TUC-14191030 COW FAN KIT FAN-0025-06 AND STRIP CONNECTORS
 - CABLES TO BE ARMOURD CAT6 - BELDEN PART NO. 121708A OR EQUIVALENT COW RJ-45 CONNECTORS

REFERENCE DRAWINGS		NO.	DATE	REVISION
DWG. NO.	TITLE			
		0	2012-08-17	ISSUED FOR CONSTRUCTION

PERMIT STAMP			ENGINEER'S STAMP		
BY	CHKD	APPR			
RB	PVDB	PVDB			

STICK FILE



OCT 22 2012

MURPHY
OIL CORPORATION

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Projects Limited

Murphy Cadotte Pilot CSS

JOB NO.	1780	16-0813-00-005-17 WIR	1780-00-01-4	REV
CLIENT DWG. NO.				
Scale	N.T.S.	CONDUIT & CABLE SCHEDULE - SHEET 3		6

CABLE/CONDUIT NO.	LOAD		RUN			CONDUIT	CONDUCTORS					Length NOTE 1	REMARKS	Rev
	HP/LOAD	VOLTAGE	FROM	VIA	TO	SIZE/TYPE	TOTAL NO.	SIZE	INSULATION	VOLTAGE	SP			
JBP4000-P1		120V	UTILITY DISTRIBUTION PANEL DP-100 CCT# 2, 6, 12	TRAY	PROCESS BUILDING POWER JB-P4000		8C	10	XLPE/TECK	600V	2	190		0
JBP4000-P2		120V	CPNL-100 CONTACTOR PANEL CCT #8, 10	TRAY	PROCESS BUILDING POWER JB-P4000		4C	6	XLPE/TECK	1000V		190		0
JBP4000-P3		120V	CPNL-100 CONTACTOR PANEL CCT #4 AND T-STAT	TRAY	PROCESS BUILDING POWER JB-P4000		4C	6	XLPE/TECK	1000V		190		0
JBC4000-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	PROCESS BUILDING CONTROL JB-C4000		30C	14	XLPE/TECK	600V	12	190		0
JBC4000-C2		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	PROCESS BUILDING CONTROL JB-C4000		8C	12	XLPE/TECK	600V		190		0
JBA4000-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	PROCESS BUILDING ANALOG JB-A4000		16PR	16	ACIC	300V	2	190		0
JBA4000-A2		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	PROCESS BUILDING ANALOG JB-A4000		8TRI	16	ACIC	300V	1	190		0
JBA4000-A3		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	PROCESS BUILDING ANALOG JB-A4000		8PR	16	ACIC	300V	4	190		0
JBA4000-A4		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	PROCESS BUILDING ANALOG JB-A4001		2TRI	16	ACIC	300V		190		0
JBC4010-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	PUMPJACK AREA 16-8 CONTROL JB-C4010		40C	14	XLPE/TECK	600V	6	130		0
JBC4010-C1.1		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	EDY/ZSC/ZSO-4011 NEAR WELLHEAD 16-8		6C	14	XLPE/TECK	600V		10		0
JBC4010-C1.2		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	EDY/ZSC/ZSO-4012 NEAR WELLHEAD 16-8		6C	14	XLPE/TECK	600V		10		0
JBC4010-C1.3		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	EDY/ZSC/ZSO-4013 NEAR WELLHEAD 16-8		6C	14	XLPE/TECK	600V		10		0
JBC4010-C1.4		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	PSHH-4011 NEAR WELLHEAD 16-8		2C	14	XLPE/TECK	600V		10		0
JBC4010-C1.5		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	PSHH-4019 NEAR WELLHEAD 16-8		2C	14	XLPE/TECK	600V		10		0
JBC4010-C1.6		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	PYV-4012 NEAR WELLHEAD 16-8		2C	14	XLPE/TECK	600V		10		0
JBC4010-C1.7		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	PYV-4013 NEAR WELLHEAD 16-8		2C	14	XLPE/TECK	600V		10		0
JBC4010-C1.8		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	PYV-4018 NEAR WELLHEAD 16-8		2C	14	XLPE/TECK	600V		10		0
JBC4010-C1.9		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	PSHH-4017 NEAR WELLHEAD 16-8		2C	14	XLPE/TECK	600V		10		0
JBC4010-C1.10		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	HOV-4015 NEAR WELLHEAD 16-8		2C	14	XLPE/TECK	600V		10		0
JBC4010-C1.11		24VDC	PUMPJACK AREA 16-8 CONTROL JB-C4010	TRAY	HOV-4016 NEAR WELLHEAD 16-8		2C	14	XLPE/TECK	600V		10		0
JBA4010-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	PUMPJACK AREA 16-8 ANALOG JB-A4010		16PR	16	ACIC	300V	4	130		0
JBA4010-A1.1		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	PY-4013 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBA4010-A1.2		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	PIT-4013 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBA4010-A1.3		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	TIT-4013 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBA4010-A1.4		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	PT-4010 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBA4010-A1.5		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	TIT-4012 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBA4010-A1.6		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	PIT-4018 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBA4010-A1.7		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	PY-4018 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBA4010-A1.8		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	PIT-4012 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBA4010-A1.9		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	PY-4012 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBA4010-A1.10		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	FT-4010 NEAR WELLHEAD 16-8		2PR	16	ACIC	300V		10		0
JBA4010-A1.11		4-20 mA	PUMPJACK AREA 16-8 ANALOG JB-A4010	TRAY	TIT-4014 NEAR WELLHEAD 16-8		1PR	16	ACIC	300V		10		0
JBC4020-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	PUMPJACK AREA 13-9 CONTROL JB-C4020		40C	14	XLPE/TECK	600V	6	290		0
JBC4020-C1.1		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	EDY/ZSC/ZSO-4021 NEAR WELLHEAD 13-9		6C	14	XLPE/TECK	600V		10		0
JBC4020-C1.2		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	EDY/ZSC/ZSO-4022 NEAR WELLHEAD 13-9		6C	14	XLPE/TECK	600V		10		0
JBC4020-C1.3		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	EDY/ZSC/ZSO-4023 NEAR WELLHEAD 13-9		6C	14	XLPE/TECK	600V		10		0
JBC4020-C1.4		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	PSHH-4021 NEAR WELLHEAD 13-9		2C	14	XLPE/TECK	600V		10		0
JBC4020-C1.5		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	PSHH-4029 NEAR WELLHEAD 13-9		2C	14	XLPE/TECK	600V		10		0
JBC4020-C1.6		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	PYV-4022 NEAR WELLHEAD 13-9		2C	14	XLPE/TECK	600V		10		0
JBC4020-C1.7		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	PYV-4023 NEAR WELLHEAD 13-9		2C	14	XLPE/TECK	600V		10		0
JBC4020-C1.8		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	PYV-4028 NEAR WELLHEAD 13-9		2C	14	XLPE/TECK	600V		10		0
JBC4020-C1.9		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	PSHH-4027 NEAR WELLHEAD 13-9		2C	14	XLPE/TECK	600V		10		0
JBC4020-C1.10		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	HOV-4025 NEAR WELLHEAD 13-9		2C	14	XLPE/TECK	600V		10		0
JBC4020-C1.11		24VDC	PUMPJACK AREA 13-9 CONTROL JB-C4020	TRAY	HOV-4028 NEAR WELLHEAD 13-9		2C	14	XLPE/TECK	600V		10		0
JBA4020-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	PUMPJACK AREA 13-9 ANALOG JB-A4020		16PR	16	ACIC	300V	5	290		0
JBA4020-A1.1		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	PY-4023 NEAR WELLHEAD 13-9		1PR	16	ACIC	300V		10		0
JBA4020-A1.2		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	PIT-4023 NEAR WELLHEAD 13-9		1PR	16	ACIC	300V		10		0
JBA4020-A1.3		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	TIT-4023 NEAR WELLHEAD 13-9		1PR	16	ACIC	300V		10		0
JBA4020-A1.4		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	PT-4020 NEAR WELLHEAD 13-9		1PR	16	ACIC	300V		10		0
JBA4020-A1.5		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	TIT-4022 NEAR WELLHEAD 13-9		1PR	16	ACIC	300V		10		0
JBA4020-A1.6		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	PIT-4028 NEAR WELLHEAD 13-9		1PR	16	ACIC	300V		10		0
JBA4020-A1.7		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	PY-4028 NEAR WELLHEAD 13-9		1PR	16	ACIC	300V		10		0
JBA4020-A1.8		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	PIT-4022 NEAR WELLHEAD 13-9		1PR	16	ACIC	300V		10		0
JBA4020-A1.9		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	PY-4022 NEAR WELLHEAD 13-9		1PR	16	ACIC	300V		10		0
JBA4020-A1.10		4-20 mA	PUMPJACK AREA 13-9 ANALOG JB-A4020	TRAY	FT-4020 NEAR WELLHEAD 13-9		2PR	16	ACIC	300V		10		0

- NOTES:
- ESTIMATED CABLE LENGTHS ARE IN METERS. FIELD CONTRACTOR TO CONFIRM CABLE RUN LENGTHS BEFORE ORDERING.
 - CABLE SHALL BE SUPPLIED AND INSTALLED BY MCG BUILDING VENDOR
 - CABLE SUPPLIED BY UPS VENDOR AND INSTALLED BY MCG BUILDING VENDOR
 - CABLE TO BE ARMoured FIBER OPTIC - CORNING PART NO. 012TUC-T413 1020 GOW FAN VST FAN-0025-04 AND STST CONNECTORS
 - CABLE TO BE ARMoured CAT6a - Belden PART NO. 121700A OR EQUIVALENT GOW RJ-45 CONNECTORS

REFERENCE DRAWINGS		NO.	DATE	REVISION	DWN BY	CHKD BY	APPR BY	PERMIT STAMP	ENGINEER'S STAMP	LSD:	JOB NO.	DWG. NO.	CLIENT DWG. NO.	Scale:	CONDUIT & CABLE SCHEDULE - SHEET 4	REV
DWG. NO.	TITLE															
		0	2012-09-17	ISSUED FOR CONSTRUCTION	RS	PVRS	PV				1780			N.T.S.		0

STICK FILE

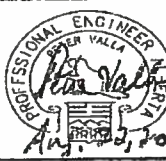
MURPHY OIL CORPORATION

Vista Projects Limited

Murphy Cadotte Pilot CSS

AS BUILT

OCT 22 2012



CABLE/CONDUIT NO.	LOAD		RUN		CONDUIT					Length NOTE 1	REMARKS	Rev
	HP/LOAD	VOLTAGE	FROM	VIA	TO	SIZE/TYPE	TOTAL NO.	SIZE	INSULATION	VOLTAGE	SP	
JBC4030-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	PUMPJACK AREA 12-9 CONTROL JB-C4030		40C	14	XLPE/TECK	600V	8	290
JBC4030-C1.1		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	EDY/ZSC/ZSO-4031 NEAR WELLHEAD 12-9		6C	14	XLPE/TECK	600V		10
JBC4030-C1.2		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	EDY/ZSC/ZSO-4032 NEAR WELLHEAD 12-9		6C	14	XLPE/TECK	600V		10
JBC4030-C1.3		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	EDY/ZSC/ZSO-4033 NEAR WELLHEAD 12-9		6C	14	XLPE/TECK	600V		10
JBC4030-C1.4		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	PSHH-4031 NEAR WELLHEAD 12-9		2C	14	XLPE/TECK	600V		10
JBC4030-C1.5		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	PSHH-4039 NEAR WELLHEAD 12-9		2C	14	XLPE/TECK	600V		10
JBC4030-C1.6		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	PYV-4032 NEAR WELLHEAD 12-9		2C	14	XLPE/TECK	600V		10
JBC4030-C1.7		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	PYV-4033 NEAR WELLHEAD 12-9		2C	14	XLPE/TECK	600V		10
JBC4030-C1.8		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	PYV-4038 NEAR WELLHEAD 12-9		2C	14	XLPE/TECK	600V		10
JBC4030-C1.9		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	PSHH-4037 NEAR WELLHEAD 12-9		2C	14	XLPE/TECK	600V		10
JBC4030-C1.10		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	HOV-4035 NEAR WELLHEAD 12-9		2C	14	XLPE/TECK	600V		10
JBC4030-C1.11		24VDC	PUMPJACK AREA 12-9 CONTROL JB-C4030	TRAY	HOV-4038 NEAR WELLHEAD 12-9		2C	14	XLPE/TECK	600V		10
JBA4030-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	PUMPJACK AREA 12-9 ANALOG JB-A4030		16PR	16	ACIC	300V	5	290
JBA4030-A1.1		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	PY-4033 NEAR WELLHEAD 12-9		1PR	16	ACIC	300V		10
JBA4030-A1.2		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	PIT-4033 NEAR WELLHEAD 12-9		1PR	16	ACIC	300V		10
JBA4030-A1.3		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	TIT-4033 NEAR WELLHEAD 12-9		1PR	16	ACIC	300V		10
JBA4030-A1.4		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	PT-4030 NEAR WELLHEAD 12-9		1PR	16	ACIC	300V		10
JBA4030-A1.5		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	TIT-4032 NEAR WELLHEAD 12-9		1PR	16	ACIC	300V		10
JBA4030-A1.6		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	PIT-4038 NEAR WELLHEAD 12-9		1PR	16	ACIC	300V		10
JBA4030-A1.7		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	PY-4038 NEAR WELLHEAD 12-9		1PR	16	ACIC	300V		10
JBA4030-A1.8		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	PIT-4032 NEAR WELLHEAD 12-9		1PR	16	ACIC	300V		10
JBA4030-A1.9		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	PY-4032 NEAR WELLHEAD 12-9		1PR	16	ACIC	300V		10
JBA4030-A1.10		4-20 mA	PUMPJACK AREA 12-9 ANALOG JB-A4030	TRAY	FT-4030 NEAR WELLHEAD 12-9		2PR	16	ACIC	300V		10
JBC/A4050-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050		10C	14	XLPE/TECK	600V	8	210
JBC/A4050-C1.1		24VDC	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	LSHH-4020 (ON VESSEL TK-4020)		2C	14	XLPE/TECK	600V		10
JBC/A4050-C1.2		24VDC	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	PSHH-4034 (NEAR TK-4020)		2C	14	XLPE/TECK	600V		20
JBC/A4050-C1.3		24VDC	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	PSHH-4024 (NEAR E-4050)		2C	14	XLPE/TECK	600V		20
JBC/A4050-C1.4		24VDC	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	PSHH-4014 (NEAR E-4080)		2C	14	XLPE/TECK	600V		20
JBC/A4050-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050		16PR	16	ACIC	300V	4	210
JBC/A4050-A1.1		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	PDIT-4011 (NEAR EXCHANGER E-4050)		1PR	16	ACIC	300V		18
JBC/A4050-A1.2		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	TY-4015 (NEAR EXCHANGER E-4050)		1PR	16	ACIC	300V		18
JBC/A4050-A1.3		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	TIT-4015 (NEAR EXCHANGER E-4050)		1PR	16	ACIC	300V		18
JBC/A4050-A1.4		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	FIT-4050 (NEAR EXCHANGER E-4050)		2PR	16	ACIC	300V		18
JBC/A4050-A1.5		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	PIT-4016 (NEAR EXCHANGER E-4050)		1PR	16	ACIC	300V		18
JBC/A4050-A1.6		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	PY-4016 (NEAR EXCHANGER E-4050)		1PR	16	ACIC	300V		18
JBC/A4050-A1.7		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	FIT-4043 (NEAR EXCHANGER E-4060)		2PR	16	ACIC	300V		18
JBC/A4050-A1.8		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	TY-4040 (NEAR EXCHANGER E-4060)		1PR	16	ACIC	300V		18
JBC/A4050-A1.9		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	TIT-4040 (NEAR EXCHANGER E-4060)		1PR	16	ACIC	300V		18
JBC/A4050-A1.10		4-20 mA	EXCHANGER AREA CONTROL/ANALOG JB-C/A4050	TRAY	TIT-4016 (NEAR EXCHANGER E-4050)		1PR	16	ACIC	300V		18
JBC/A5010-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010		10C	14	XLPE/TECK	600V	8	185
JBC/A5010-C1.1		24VDC	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010	TRAY	VSHH-5010 (ON AIR COOLER AC-5010)		2C	14	XLPE/TECK	600V		10
JBC/A5010-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010		16PR	16	ACIC	300V	6	185
JBC/A5010-A1.1		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010	TRAY	TIT-5012 (ON AIR COOLER AC-5010)		1PR	16	ACIC	300V		15
JBC/A5010-A1.2		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010	TRAY	TY-5012A (NEAR AIR COOLER AC-5010)		1PR	16	ACIC	300V		15
JBC/A5010-A1.3		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010	TRAY	TIT-5010 (ON AIR COOLER AC-5010)		1PR	16	ACIC	300V		15
JBC/A5010-A1.4		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010	TRAY	FIT-5014 (SIG AND PWR NEAR AC-5010)		2PR	16	ACIC	300V		15
JBC/A5010-A1.5		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010	TRAY	FIT-5011 (SIG AND PWR NEAR AC-5010)		2PR	16	ACIC	300V		15
JBC/A5010-A1.6		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010	TRAY	FIT-5013 (SIG AND PWR NEAR AC-5010)		2PR	16	ACIC	300V		15
JBC/A5010-A1.7		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5010	TRAY	PIT-5010 (NEAR AIR COOLER AC-5010)		1PR	16	ACIC	300V		15
JBC/A5020-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020		10C	14	XLPE/TECK	600V	8	60
JBC/A5020-C1.1		24VDC	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020	TRAY	VSHH-5020 (ON AIR COOLER AC-5020)		2C	14	XLPE/TECK	600V		10
JBC/A5020-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020		12PR	16	ACIC	300V	4	60
JBC/A5020-A1.1		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020	TRAY	TIT-5022 (ON AIR COOLER AC-5020)		1PR	16	ACIC	300V		10
JBC/A5020-A1.2		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020	TRAY	TY-5022A (NEAR AIR COOLER AC-5020)		1PR	16	ACIC	300V		10
JBC/A5020-A1.3		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020	TRAY	TIT-5020 (ON AIR COOLER AC-5020)		1PR	16	ACIC	300V		10
JBC/A5020-A1.4		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020	TRAY	PY-5020 (ON AIR COOLER AC-5020)		1PR	16	ACIC	300V		10
JBC/A5020-A1.5		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020	TRAY	TY-5020 (ON AIR COOLER AC-5020)		1PR	16	ACIC	300V		10
JBC/A5020-A1.6		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020	TRAY	PT-5020 (NEAR AIR COOLER AC-5020)		1PR	16	ACIC	300V		10
JBC/A5020-A1.7		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020	TRAY	PT-7010 (NEAR AC-5020)		1PR	16	ACIC	300V		10
JBC/A5020-A1.8		4-20 mA	AIR COOLER AREA CONTROL/ANALOG JB-C/A5020	TRAY	TIT-7036 (NEAR STEAM GEN BLDG B-7000)		1PR	16	ACIC	300V		10
JBC/A5030-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	FUEL GAS AREA CONTROL/ANALOG JB-C/A5030		10C	14	XLPE/TECK	600V	4	20
JBC/A5030-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	FUEL GAS AREA CONTROL/ANALOG JB-C/A5030		16PR	16	ACIC	300V	4	20
JBC/A5030-A1.1		4-20 mA	FUEL GAS AREA CONTROL/ANALOG JB-C/A5030	TRAY	FIT-9000 (NEAR B-5030)		2PR	16	ACIC	300V		10

- NOTES:
- ESTIMATED CABLE LENGTHS ARE IN METERS. FIELD CONTRACTOR TO CONFIRM CABLE RUN LENGTHS BEFORE ORDERING.
 - CABLE SHALL BE SUPPLIED AND INSTALLED BY MCC BUILDING VENDOR.
 - CABLE SUPPLIED BY UPS VENDOR AND INSTALLED BY MCC BUILDING VENDOR.
 - CABLE TO BE ARMoured FIBER OPTIC - CONFORMS PART NO. 912TUC-74131020 CW FAN KIT FAN-025-01 AND 51ST CONNECTORS
 - CABLE TO BE ARMoured CAT5e - CONFORMS PART NO. 121703A OR EQUIVALENT CW RJ-45 CONNECTORS

STICK FILE

MURPHY OIL CORPORATION

Vista Projects Limited

Murphy Cadotte Pilot CSS

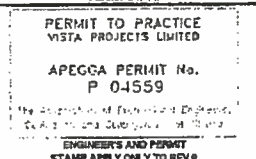
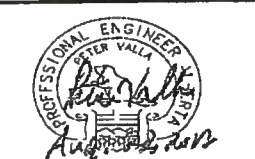
AS BUILT

OCT 22 2012

REFERENCE DRAWINGS		NO.	DATE	REVISION	DWG.	CHKD.	APPR.	PERMIT STAMP		ENGINEER'S STAMP		LSD:		JOB NO.		CLIENT DWG. NO.		Stamp		CONDUIT & CABLE SCHEDULE - SHEET 8		REV
DWG. NO.	TITLE	8	2012-08-17	ISSUED FOR CONSTRUCTION	BY	RS	PVRB	BY	PVRB	APPR.	PVRB	PERMIT TO PRACTICE VISTA PROJECTS LIMITED		APEGGA PERMIT No. P 04559		1706		1700-05-001-6		N.T.S.		0

CABLE/CONDUIT NO.	LOAD		RUN			CONDUIT SIZE/TYPE	CONDUCTORS					Length NOTE 1	REMARKS	Rev
	HP/LOAD	VOLTAGE	FROM	VIA	TO		TOTAL NO.	SIZE	INSULATION	VOLTAGE	SP			
JBC/A5030-A2		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	FUEL GAS AREA CONTROL/ANALOG JB-C/A5030		4TRI	16	ACIC	300V		20		0
JBP5030-P1		120VAC	CPNL-100 CONTACTOR PANEL	TRAY	FUEL GAS LET DOWN SKID POWER JB-P5030		10C	10	XLPE/TECK	600V	2	20		0
JBP5030-P2		120VAC	UTILITY DISTRIBUTION PANEL DP-100 CCT# 36, 38	TRAY	FUEL GAS LET DOWN SKID POWER JB-P5030		8C	10	XLPE/TECK	600V		20		0
JBA6000-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	SOURCE WATER WELL ANALOG JB-A6000		8PR	16	ACIC	300V	4	140		0
JBA6000-A1.1		4-20 mA	SOURCE WATER WELL ANALOG JB-A6000	TRAY	PIT-6000 (NEAR PUMP P-6000)		1PR	16	ACIC	300V		20		0
JBA6000-A1.2		4-20 mA	SOURCE WATER WELL ANALOG JB-A6000	TRAY	TIT-6000 (NEAR PUMP P-6000)		1PR	16	ACIC	300V		20		0
JBA6000-A1.3		4-20 mA	SOURCE WATER WELL ANALOG JB-A6000	TRAY	FIT-6000 (SIG AND PWR NEAR P-6000)		2PR	16	ACIC	300V		20		0
JBC/A6050-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	WATER TANK AREA CONTROL/ANALOG JB-C/A6050		12C	14	XLPE/TECK	600V	4	40		0
JBC/A6050-C1.1		24VDC	WATER TANK AREA CONTROL/ANALOG JB-C/A6050	TRAY	XY/XA/6055 (ON BMS PACKAGE PK-6055)		6C	14	XLPE/TECK	600V	2	18		0
JBC/A6050-C1.2		24VDC	WATER TANK AREA CONTROL/ANALOG JB-C/A6050	TRAY	LSHH-6051 (ON TK-6050)		2C	14	XLPE/TECK	600V		18		0
JBC/A6050-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	WATER TANK AREA CONTROL/ANALOG JB-C/A6050		8PR	16	ACIC	300V	6	40		0
JBC/A6050-A1.1		4-20 mA	WATER TANK AREA CONTROL/ANALOG JB-C/A6050	TRAY	LIT-6050 (ON TANK TK-6050)		1PR	16	ACIC	300V		18		0
JBC/A6050-A1.2		4-20 mA	WATER TANK AREA CONTROL/ANALOG JB-C/A6050	TRAY	TIT-6050 (ON TANK TK-6050)		1PR	16	ACIC	300V		18		0
JB005-P1		120V UPS	UPS DISTRIBUTION PANEL DP-UPS-100 CCT#11	TRAY	STEAM GENERATION BUILDING POWER JB-P005		4C	8	XLPE/TECK	1000V	2	80		0
JB005-P2		120VAC	CPNL-100 CONTACTOR PANEL	TRAY	STEAM GEN BUILDING POWER JB-P005		10C	8	XLPE/TECK	1000V	2	80		0
JB005-P2.1		120VAC	STEAM GEN BUILDING EXTERIOR LIGHT FIXTURE	TRAY	STEAM GEN BLDG NORTH PLATFORM STANCHION LIGHT		2C	12	XLPE/TECK	600V		80		0
JB005-P2.2		120VAC	STEAM GEN BLDG NORTH PLATFORM STANCHION LIGHT	TRAY	WELLHEAD 18-08 STANCHION LIGHT		2C	12	XLPE/TECK	600V		80		0
JB005-P3		120VAC	UTILITY DISTRIBUTION PANEL DP-100 CCT#34,51	TRAY	STEAM GEN BUILDING POWER JB-P7000		8C	10	XLPE/TECK	600V	4	80		0
JB005-C1		24VDC	MCC-100 SECTION 8	TRAY	STEAM GEN BLDG CONTROL/ANALOG JB-005		12C	14	XLPE/TECK	600V		80	EM-7040,PM-7040,YI-7040,EM-7010,PM-7010,YI-7010	0
JB007-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	STEAM GEN BLDG CONTROL/ANALOG JB-007		20C	14	XLPE/TECK	600V	8	80		0
JB007-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	STEAM GEN BLDG CONTROL/ANALOG JB-007		8PR	16	ACIC	300V	5	80		0
JB007-A2		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	STEAM GEN BLDG CONTROL/ANALOG JB-007		4TRI	16	ACIC	300V	2	80		0
JBP7005-P1		120VAC	CPNL-100 CONTACTOR PANEL	TRAY	CHARGE PUMP SKID POWER JB-P7005		10C	12	XLPE/TECK	600V	4	50		0
JBP7005-P2		120VAC	UTILITY DISTRIBUTION PANEL DP-100 CCT#44, 46, 48	TRAY	CHARGE PUMP SKID POWER JB-P7005		8C	12	XLPE/TECK	600V	2	50		0
JBC/A7005-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	CHARGE PUMP SKID CONTROL/ANALOG JB-C/A7005		20C	14	XLPE/TECK	600V	8	50		0
JBC/A7005-C1.1		24VDC	CHARGE PUMPS CONTROL/ANALOG JB-C/A7005	TRAY	XY/XA/7065 (ON BMS PACKAGE PK-6065)		6C	14	XLPE/TECK	600V	2	18		0
JBC/A7005-C1.2		24VDC	CHARGE PUMPS CONTROL/ANALOG JB-C/A7005	TRAY	LSHH-6081 (ON SOFT WATER TANK TK-6080)		2C	14	XLPE/TECK	600V		18		0
JBC/A7005-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	CHARGE PUMPS CONTROL/ANALOG JB-C/A7005		12PR	16	ACIC	300V	5	50		0
JBC/A7005-A1.1		4-20 mA	CHARGE PUMPS CONTROL/ANALOG JB-C/A7005	TRAY	PDY-7000 (NEAR CHARGE PUMPS P-7000A/B)		1PR	16	ACIC	300V		18		0
JBC/A7005-A1.2		4-20 mA	CHARGE PUMPS CONTROL/ANALOG JB-C/A7005	TRAY	PDIT-7000 (NEAR CHARGE PUMPS P-7000A/B)		1PR	16	ACIC	300V		18		0
JBC/A7005-A1.3		4-20 mA	CHARGE PUMPS CONTROL/ANALOG JB-C/A7005	TRAY	LIT-6060 (ON SOFT WATER TANK TK-6060)		1PR	16	ACIC	300V		18		0
JBC/A7005-A1.4		4-20 mA	CHARGE PUMPS CONTROL/ANALOG JB-C/A7005	TRAY	TIT-6060 (ON SOFT WATER TANK TK-6060)		1PR	16	ACIC	300V		18		0
JBC/A7005-A1.5		4-20 mA	CHARGE PUMPS CONTROL/ANALOG JB-C/A7005	TRAY	LIT-6270 (ON TANK TK-6270)		1PR	16	ACIC	300V		20		0
JBC/A7005-A2		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	CHARGE PUMPS CONTROL/ANALOG JB-C/A7005		4TRI	16	ACIC	300V	2	50		0
JBC/A8000-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	FKOD AREA CONTROL/ANALOG JB-C/A8000		15C	14	XLPE/TECK	600V	7	245		0
JBC/A8000-C1.1		24VDC	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	XA-8020 (IN FLARE IGNITER PANEL FL-8020)		2C	14	XLPE/TECK	600V		120		0
JBC/A8000-C1.2		24VDC	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	LSHH-8021 (ON FKOD VESSEL V-8020)		2C	14	XLPE/TECK	600V		10		0
JBC/A8000-C1.3		24VDC	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	XA-8010 (IN FLARE IGNITER PANEL FL-8010)		2C	14	XLPE/TECK	600V		120		0
JBC/A8000-C1.4		24VDC	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	LSHH-8011 (ON FKOD VESSEL V-8010)		2C	14	XLPE/TECK	600V		10		0
JBC/A8000-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	FKOD AREA CONTROL/ANALOG JB-C/A8000		12PR	16	ACIC	300V	4	245		0
JBC/A8000-A1.1		4-20 mA	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	LIT-8020 (NEAR FKOD VESSEL V-8020)		1PR	16	ACIC	300V		10		0
JBC/A8000-A1.2		4-20 mA	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	FIT-8020 (NEAR FLARE STACK FL-8020)		2PR	16	ACIC	300V		100		0
JBC/A8000-A1.3		4-20 mA	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	FIT-8010 (NEAR FLARE STACK FL-8010)		2PR	16	ACIC	300V		100		0
JBC/A8000-A1.4		4-20 mA	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	LIT-8010 (NEAR FKOD VESSEL V-8010)		1PR	16	ACIC	300V		10		0
JBC/A8000-A1.5		4-20 mA	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	LIT-8011 (NEAR FKOD VESSEL V-8010)		1PR	16	ACIC	300V		10		0
JBC/A8000-A1.6		4-20 mA	FKOD AREA CONTROL/ANALOG JB-C/A8000	TRAY	LIT-8021 (NEAR FKOD VESSEL V-8020)		1PR	16	ACIC	300V		10		0
JBC/A9000-C1		24VDC	PNL-PLC-100 CONTROL PANEL	TRAY	EMULSION TANK CONTROL/ANALOG JB-C/A9000		30C	14	XLPE/TECK	600V	6	160		0
JBC/A9000-C1.1		24VDC	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	LSHH-9011 (ON TANK TK-9010)		2C	14	XLPE/TECK	600V		15		0
JBC/A9000-C1.2		24VDC	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	LSHH-9021 (ON TANK TK-9020)		2C	14	XLPE/TECK	600V		15		0
JBC/A9000-C1.3		24VDC	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	LSHH-9031 (ON TANK TK-9030)		2C	14	XLPE/TECK	600V		15		0
JBC/A9000-C1.4		24VDC	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	XY/XA/9015 (ON BMS PACKAGE PK-9015)		6C	14	XLPE/TECK	600V	2	15		0
JBC/A9000-C1.5		24VDC	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	XY/XA/9025 (ON BMS PACKAGE PK-9025)		6C	14	XLPE/TECK	600V	2	15		0
JBC/A9000-C1.6		24VDC	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	XY/XA/9035 (ON BMS PACKAGE PK-9035)		6C	14	XLPE/TECK	600V	2	15		0
JBC/A9000-A1		4-20 mA	PNL-PLC-100 CONTROL PANEL	TRAY	EMULSION TANK CONTROL/ANALOG JB-C/A9000		8PR	16	ACIC	300V	2	160		0
JBC/A9000-A1.1		4-20 mA	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	TIT-9010 (ON TANK TK-9010)		1PR	16	ACIC	300V		15		0
JBC/A9000-A1.2		4-20 mA	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	LT-9010 (ON TANK TK-9010)		1PR	16	ACIC	300V		15		0
JBC/A9000-A1.3		4-20 mA	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	TIT-9020 (ON TANK TK-9020)		1PR	16	ACIC	300V		15		0
JBC/A9000-A1.4		4-20 mA	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	LT-9020 (ON TANK TK-9020)		1PR	16	ACIC	300V		15		0
JBC/A9000-A1.5		4-20 mA	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	TIT-9030 (ON TANK TK-9030)		1PR	16	ACIC	300V		15		0
JBC/A9000-A1.6		4-20 mA	EMULSION TANK CONTROL/ANALOG JB-C/A9000	TRAY	LT-9030 (ON TANK TK-9030)		1PR	16	ACIC	300V		15		0

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 - CABLE SHALL BE SUPPLIED AND INSTALLED BY MCC BUILDING VENDOR
 - CABLE SUPPLIED BY UPS VENDOR AND INSTALLED BY MCC BUILDING VENDOR
 - CABLE TO BE ARMORABLE FIBER OPTIC - CORROSION PART NO. 912TUC-74151020 C/W FAN KIT FAN-0025-08 AND STST CONNECTORS
 - CABLE TO BE ARMORABLE CAT5e - BULDERN PART NO. 121760A OR EQUIVALENT C/W RJ-45 CONNECTORS

REFERENCE DRAWINGS		NO.	DATE	REVISION	DATE	BY	CHKD	APPR	PERMIT STAMP	ENGINEER'S STAMP
DWG. NO.	TITLE	0	2812-08-17	ISSUED FOR CONSTRUCTION		RB	PVRB	PV		
<div style="display: flex; justify-content: space-between;"> <div> <p>AS BUILT</p> <p>01/12/2012</p> <p><i>[Signature]</i></p> </div> <div> <p>MURPHY OIL CORPORATION</p> <p>Vista Projects Limited</p> <p>Murphy Cadotta Pilot CSS</p> </div> </div>										
JOB NO.		1700		DWG. NO.		1700-08-001-4		REV		
CLIENT DWG. NO.		N.T.A.		CONDUIT & CABLE SCHEDULE - SHEET 6						

CABLE/CONDUIT NO.	LOAD		RUN		CONDUIT	CONDUCTORS					Length NOTE 1	REMARKS	Rev
	HP/LOAD	VOLTAGE	FROM	VIA		TOTAL NO.	SIZE	INSULATION	VOLTAGE	SP			
DPEHT200-P1		120/208VAC	DP-EHT-200 DISTRIBUTION PANEL VARIOUS CCTS	CONDUIT	PNL-EHT-200 EHT CONTROLLER VARIOUS HTR CCTS	63mm	42C	8	XLPE	600V	1.5		0
DPEHT200-P2		120/208VAC	DP-EHT-200 DISTRIBUTION PANEL VARIOUS CCTS	CONDUIT	PNL-EHT-200 EHT CONTROLLER VARIOUS HTR CCTS	63mm	42C	8	XLPE	600V	1.5		0
DPEHT200-P3		120/208VAC	DP-EHT-200 DISTRIBUTION PANEL VARIOUS CCTS	CONDUIT	PNL-EHT-200 EHT CONTROLLER VARIOUS HTR CCTS	63mm	26C	8	XLPE	600V	1.5		0
DPEHT200-P4	100W	120VAC	DP-EHT-200 DISTRIBUTION PANEL CCT # 69	TRAY	B-7005 CHARGE PUMP SKID CATADYNE HEATER IGNITION		2C	12	XLPE/TECK	600V	25		0
DPEHT200-P5	100W	120VAC	DP-EHT-200 DISTRIBUTION PANEL CCT # 71	TRAY	B-7000 STEAM GEN BUILDING CATADYNE HEATER IGN.		2C	12	XLPE/TECK	600V	45		0
PNLEHT200-C1		24VDC	PNL-EHT-200 TRIP ALARM	TRAY	PNL-PLC-100 CONTROL PANEL		2C	14	XLPE/TECK	600V	30	HTA-100	0
PJBIS0003-1-P1	1104W	120VAC	PNL-EHT-200 EHT CONTROLLER HTR #13	TRAY	PJB-IS-0003-1 FIELD JUNCTION BOX		2C	8	XLPE/TECK	600V	70		0
RTDIS0003-1-C1			PNL-EHT-200 EHT CONTROLLER RTD #13	TRAY	RTD-IS-0003-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	72		0
PJBIS0006-1-P1	636W	120VAC	PNL-EHT-200 EHT CONTROLLER HTR #14	TRAY	PJB-IS-0006-1 FIELD JUNCTION BOX		2C	8	XLPE/TECK	600V	100		0
RTDIS0006-1-C1			PNL-EHT-200 EHT CONTROLLER RTD #14	TRAY	RTD-IS-0006-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	100		0
PJBFTT7060-1-P1	84W	120VAC	PNL-EHT-200 EHT CONTROLLER HTR #18	TRAY	PJB-FIT7060-1 FIELD JUNCTION BOX		2C	8	XLPE/TECK	600V	75		0
RTDFIT7060-1-C1			PNL-EHT-200 EHT CONTROLLER RTD #18	TRAY	RTD-FIT7060-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	75		0
DPEHT300-P1		120/208VAC	DP-EHT-300 DISTRIBUTION PANEL VARIOUS CCTS	CONDUIT	PNL-EHT-300 EHT CONTROLLER VARIOUS HTR CCTS	63mm	42C	8	XLPE	600V	1.5		0
DPEHT300-P2		120/208VAC	DP-EHT-300 DISTRIBUTION PANEL VARIOUS CCTS	CONDUIT	PNL-EHT-300 EHT CONTROLLER VARIOUS HTR CCTS	63mm	42C	8	XLPE	600V	1.5		0
DPEHT300-P3		120/208VAC	DP-EHT-300 DISTRIBUTION PANEL VARIOUS CCTS	CONDUIT	PNL-EHT-300 EHT CONTROLLER VARIOUS HTR CCTS	63mm	26C	8	XLPE	600V	1.5		0
DPEHT300-P4	100W	120VAC	DP-EHT-300 DISTRIBUTION PANEL CCT # 71	TRAY	B-4000 PROCESS BUILDING CATADYNE HEATER IGNITION		2C	12	XLPE/TECK	600V	15		0
PNLEHT300-C1		24VDC	PNL-EHT-300 TRIP ALARM	TRAY	PNL-PLC-100 CONTROL PANEL		2C	12	XLPE/TECK	600V	184	HTA-101	0
PJBV8020-1-P1	1644W	208VAC	PNL-EHT-300 EHT CONTROLLER HTR #2	TRAY	PJB-V-8020-1 FIELD JUNCTION BOX		2C	10	XLPE/TECK	600V	60		0
RTDV8020-1-C1			PNL-EHT-300 EHT CONTROLLER RTD #2	TRAY	RTD-V-8020-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	60		0
PJBV8010-1-P1	1644W	208VAC	PNL-EHT-300 EHT CONTROLLER HTR #3	TRAY	PJB-V-8010-1 FIELD JUNCTION BOX		2C	10	XLPE/TECK	600V	60		0
RTDV8010-1-C1			PNL-EHT-300 EHT CONTROLLER RTD #3	TRAY	RTD-V-8010-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	60		0
PJBHR0007-1-P1	2310W	208VAC	PNL-EHT-300 EHT CONTROLLER HTR #4	TRAY	PJB-HR-0007-1 FIELD JUNCTION BOX		2C	10	XLPE/TECK	600V	5		0
RTDHR0007-1-C1			PNL-EHT-300 EHT CONTROLLER RTD #4	TRAY	RTD-HR-0007-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	5		0
PJBHR0001-1-P1	168W	120VAC	PNL-EHT-300 EHT CONTROLLER HTR #14	TRAY	PJB-HR-0001-1 FIELD JUNCTION BOX		2C	10	XLPE/TECK	600V	10		0
RTDHR0001-1-C1			PNL-EHT-300 EHT CONTROLLER RTD #14	TRAY	RTD-HR-0001-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	9		0
PJBHR0002-1-P1	168W	120VAC	PNL-EHT-300 EHT CONTROLLER HTR #15	TRAY	PJB-HR-0002-1 FIELD JUNCTION BOX		2C	10	XLPE/TECK	600V	10		0
RTDHR0002-1-C1			PNL-EHT-300 EHT CONTROLLER RTD #15	TRAY	RTD-HR-0002-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	10		0
PJBHR0005-1-P1	168W	120VAC	PNL-EHT-300 EHT CONTROLLER HTR #16	TRAY	PJB-HR-0005-1 FIELD JUNCTION BOX		2C	10	XLPE/TECK	600V	15		0
RTDHR0005-1-C1			PNL-EHT-300 EHT CONTROLLER RTD #16	TRAY	RTD-HR-0005-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	13		0
PJBIS0007-1-P1	696W	120VAC	PNL-EHT-300 EHT CONTROLLER HTR #17	TRAY	PJB-IS-0007-1 FIELD JUNCTION BOX		2C	10	XLPE/TECK	600V	90		0
RTDIS0007-1-C1			PNL-EHT-300 EHT CONTROLLER RTD #17	TRAY	RTD-IS-0007-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	90		0
PJBIS0008-1-P1	696W	120VAC	PNL-EHT-300 EHT CONTROLLER HTR #18	TRAY	PJB-IS-0008-1 FIELD JUNCTION BOX		2C	10	XLPE/TECK	600V	90		0
RTDIS0008-1-C1			PNL-EHT-300 EHT CONTROLLER RTD #18	TRAY	RTD-IS-0008-1 FIELD JUNCTION BOX		1TRI	16	ACIC	300V	90		0

NOTES:
1. ESTIMATED CABLE LENGTHS ARE IN METERS. FIELD CONTRACTOR TO CONFORM CABLE RUN LENGTHS BEFORE ORDERING.
2. CABLE SHALL BE SUPPLIED AND INSTALLED BY MCC BUILDING VENDOR
3. CABLE SUPPLIED BY UPS VENDOR AND INSTALLED BY MCC BUILDING VENDOR
4. CABLE TO BE ARMORED FIBER OPTIC - CORNING PART NO. 9121UC-T4191028 CAN FAN KIT FAN-0025-06 AND 57ST CONNECTORS
5. CABLE TO BE ARMORED CAT5e - Belden Part No. 12170A OR EQUIVALENT COW RJ-45 CONNECTORS

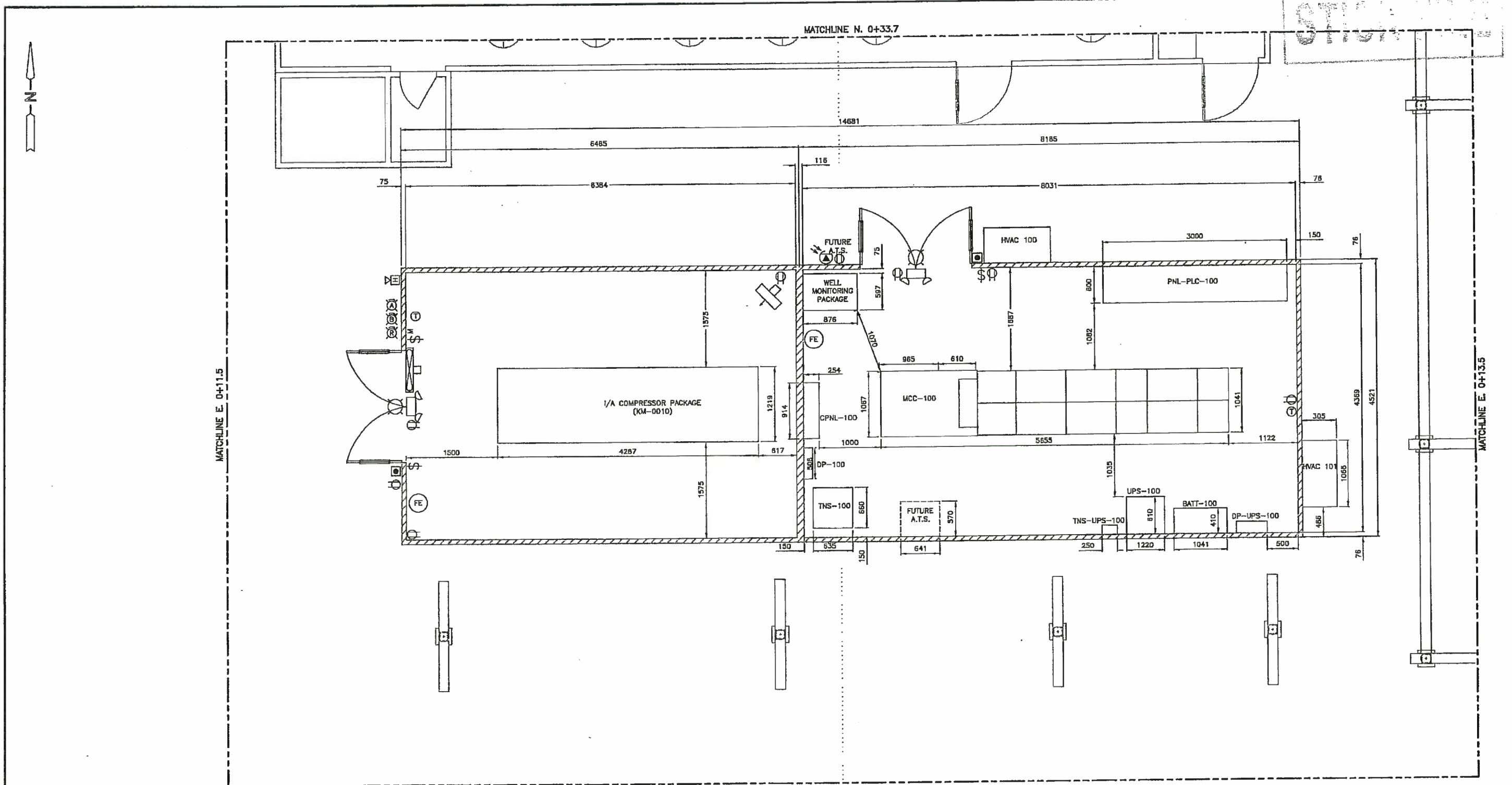
REFERENCE DRAWINGS		NO.	DATE	REVISION	OWN	CHKD	APPR
DWG. NO.	TITLE						
		0	2012-08-17	ISSUED FOR CONSTRUCTION	RS	PJRS	PV

PERMIT STAMP
PERMIT TO PRACTICE
VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
ENGINEER'S AND PERMIT
STAMP APPLY ONLY TO REV 0

ENGINEER'S STAMP
PROFESSIONAL ENGINEER
VISTA PROJECTS LIMITED
Aug 22 2012

AS BUILT
MURPHY
OIL CORPORATION
Vista
Projects Limited
Murphy Cadotte Pilot-CSS
OCT 22 2012

LEG:
JOB NO. 1790
CLIENT DWG. NO. 1790-03-001-7
Scale: N.T.S.
CONDUIT & CABLE SCHEDULE - SHEET 7
REV



MCC BUILDING
(PLAN VIEW)

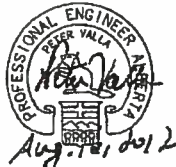
NOTES:

1. ALL DIMENSIONS ARE IN mm, UNLESS OTHERWISE.
2. MATCHLINES ARE IN METRES.

AS BUILT
OCT 22 2012

2012-May-03 3:00:22 PM

PERMIT TO PRACTICE
VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta



NUMBER	TITLE
1780-69-007-1	ELECTRICAL CROSS SECTION LAYOUT MCC/INSTRUMENT AIR BUILDING
1780-69-008-1	MCC/INSTRUMENT AIR BUILDING ELECTRICAL & INSTRUMENT LAYOUT
1780-69-009-1	MCC/INSTRUMENT AIR BUILDING LIGHTING & INSTRUMENT LAYOUT
NUMBER	TITLE
	REFERENCE DRAWINGS

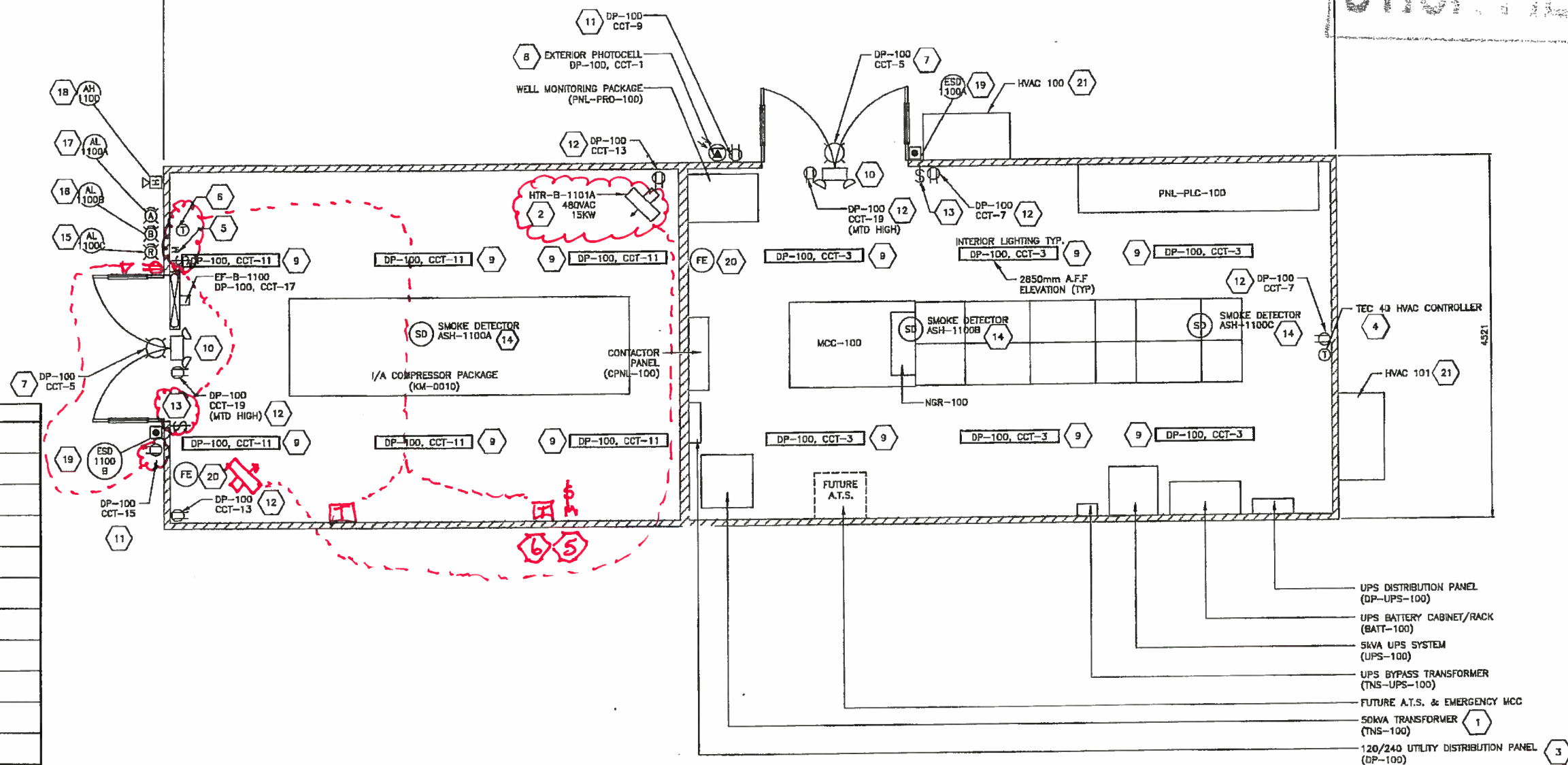
NO.	DESCRIPTION	DATE	BY
0	ISSUED FOR CONSTRUCTION	2012.08.10	PKC
NO.	DESCRIPTION	DATE	BY
	REVISIONS		

DESIGNED BY:	RB
DRAWN BY:	PKC
CHECKED BY:	PV/RB
ENGINEER APPROVAL:	PV
COMPUTER FILE:	178069004-1_R0

MURPHY
OIL CANADA
MURPHY CADOTTE PILOT CSS 13-9-05-17 WSM
MCC/INSTRUMENT AIR BUILDING
MAJOR EQUIPMENT LAYOUT

Vista
Projects Limited
SCALE: 1:30
DATE: 08 DEC 2011
SHEET NO: D VISTA PROJ NO: 1780-69-004-1
CLIENT PROJ NO: REV: 0

STOCK FILE



ITEM	QTY	DESCRIPTION
1	1	50KVA TRANSFORMER 480-120/240VAC 1 PHASE
2	1	15KW UNIT HEATER C/W INTEGRAL THERMOSTAT
3	1	80CCT 120/240V 1PH 3W DISTRIBUTION PANEL
4	1	HVAC CONTROLLER
5	1	MANUAL MOTOR STARTER
6	1	THERMOSTAT
7	2	WALL MOUNT 70W HPS FIXTURE
8	1	PHOTOCELL
9	12	2 LAMP FLUORESCENT LIGHT FIXTURE
10	2	EMERGENCY/EXIT LIGHT
11	2	GFCI RECEPTACLE
12	6	RECEPTACLE
13	2	SINGLE POLE SWITCH
14	3	SMOKE DETECTOR
15	1	RED STROBE
16	1	BLUE STROBE
17	1	AMBER STROBE
18	1	HORN
19	2	ESD STATION 9001K56YM - FINGER HOLES FOR PUSH-PULL OPERATORS COMES WITH LEGEND PLATE MARKED STOP
20	2	FIRE EXTINGUISHER
21	2	WALL MOUNT HVAC UNIT

UPS DISTRIBUTION PANEL (DP-UPS-100)
 UPS BATTERY CABINET/RACK (BATT-100)
 5KVA UPS SYSTEM (UPS-100)
 UPS BYPASS TRANSFORMER (TNS-UPS-100)
 FUTURE A.T.S. & EMERGENCY MCC
 50KVA TRANSFORMER (TNS-100)
 120/240 UTILITY DISTRIBUTION PANEL (DP-100)

AS BUILT
 OCT 22 2012
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2012-May-03 3:10:16 PM

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 VISTA PROJECTS LIMITED
 APEGA PERMIT No.
 P 04559
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta



NUMBER	TITLE	DATE	BY
1780-69-007-1	ELECTRICAL CROSS SECTION LAYOUT MCC/INSTRUMENT AIR BUILDING		
1780-69-008-1	MCC/INSTRUMENT AIR BUILDING ELECTRICAL & INSTRUMENT LAYOUT		
1780-69-004-1	MCC/INSTRUMENT AIR BUILDING EQUIPMENT LAYOUT		

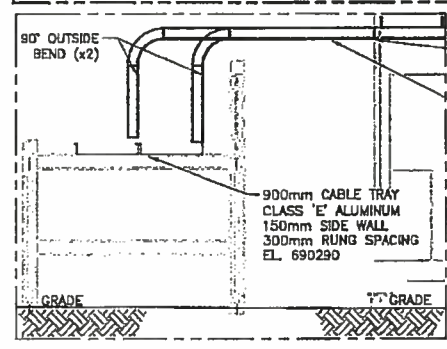
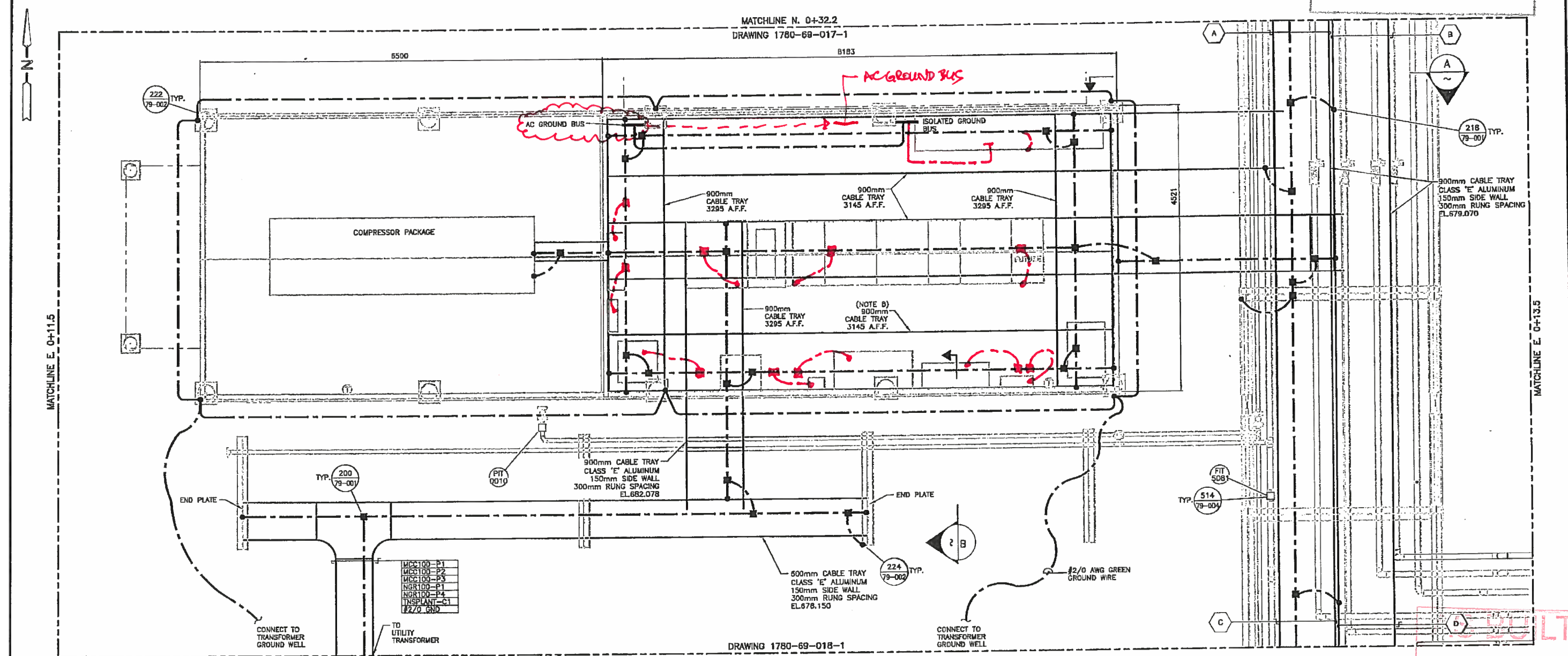
REVISIONS	DESCRIPTION	DATE	BY
0	ISSUED FOR CONSTRUCTION	2012.08.10	PKC

DESIGNED BY:	RB
TRAINED BY:	PKC
CHECKED BY:	PV/RB
ENGINEER'S APPROVAL:	PV
COMPUTER FILE:	178069005-1_RD

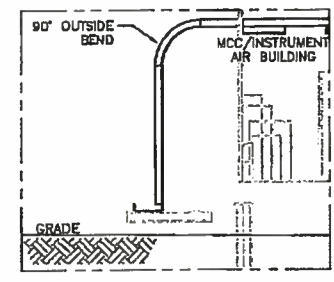
MURPHY OIL CANADA
 MURPHY CADOTTE PILOT CSS 03-9-85-17 WSM
 MCC/INSTRUMENT AIR BUILDING
 LIGHTING & INSTRUMENT LAYOUT

Vista Projects Limited	SCALE: N.T.S.
DATE: 09 JAN 2012	SHEET No: D
VISTA Dwg No: 1780-69-005-1	REV: 0

STICK FILE



A DETAIL CROSS SECTION
SCALE=1:50



B DETAIL CROSS SECTION
SCALE=1:75

MCC BUILDING
(PLAN VIEW)

A		B		C		D	
ACM5020-P1	PM4010-P1	ACM5020-C1	PM4010-C1	ACM5010-P1	JBP4000-P1	ACM5010-C1	JBC/A5010-C1
BS0000-P1	PM6000-P1	BS0005-C1	PM6000-C1	81000-P1	JBP4000-P2	GEN100-C1	JBC/A5010-A1
BL7040-P1	PM7000A-P1	BS0000-C1	PM7000A-C1	CPNL100-P2	JBP4000-P3	JBC1000-C1	JBC/A5030-C1
CPNL100-P3	PM7000B-P1	BL7040-C1	PM7000B-C1	CPNL100-P5	PM4020-P1	JBC1000-C2	JBC/A5030-A1
CPNL100-P4	PM7010-P1	JBA4010-A1	PM7010-C1	CPNL100-P6	PM4030-P1	JBA4000-A1	JBC/A5030-A2
CPNL100-P9	TK8270-P1	JBC/A5020-A1	TK8270-C1	CPNL100-P7	PM8010-P1	JBA4000-A2	JBC/A5000-C1
DP100-P10	INSCH100-P1	JBC/A5020-C1	COMM-2	CPNL100-P8	PM8020-P1	JBA4000-A3	JBC/A5000-A1
DP100-P12	TK270-GND	JBC/A5020-C1	COMM-3	CPNL100-P10	INSCH100-P1	JBC4000-C1	JBC/A9000-C1
DPUP100-P2		JBA5000-A1		CPNL100-P11	TK270-GND	JBC4000-C2	JBC/A9000-A1
HRB7001B-P1		JBC/A6050-C1		DP100-P14		JBA4020-C1	PM4020-C1
JBP7005-P1		JBC/A6050-A1		DPUP100-P3		JBA4020-A1	PM4030-C1
JBP7005-P2		JBC/A7000-C1		DPUP100-P4		JBC4030-C1	PM8010-C1
JBP7000-P1		JBC/A7000-A1		DPUP100-P5		JBA4030-A1	PM8020-C1
JBP7000-P2		JBC/A7005-C1		DPUP100-P8		JBC/A4050-C1	COMM-1
JBP7000-P3		JBC/A7005-A1		DPUP100-P9		JBC/A4050-A1	

- NOTES:
1. ALL CABLES TO ENTER/EXIT THE BOTTOM OF THE JUNCTION BOXES.
 2. DEVICE LOCATIONS MAY NOT BE EXACTLY AS SHOWN. ELECTRICAL CONTRACTOR TO VERIFY.
 3. ALL EXPOSED COPPER CONNECTIONS TO BE GYPTALLED.
 4. DIMENSIONS INDICATED ON DRAWING ARE IN mm, UNLESS SHOWN OTHERWISE.
 5. ELECTRICAL INSTALLATION DETAILS SHOWN SUCH AS
REFERS TO DRAWING NO.1780-79-001-1 DETAIL NO.205
 6. EXPANSION JOINTS SHALL BE PROVIDED EVERY 20m INTERVAL IN CONTINUOUS RUNS OF CABLE TRAY.
 7. MATCHLINES ARE IN METERS.
 8. CABLE TRAYS AND FITTINGS INSIDE MCC/INSTRUMENT BUILDING ARE BY VENDOR, AND ALL FIELD TRAY IS BY FIELD CONTRACTOR.
 9. SEPARATE POWER AND CONTROL CABLE TO OPPOSITE SIDES OF TRAY AS IT TRANSITIONS FROM MCC-100 TO EXTERIOR OF BUILDING.

OCT 22 2012

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VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
VISTA PROJECTS LIMITED
Aug. 10, 2012

NO.	DATE	DESCRIPTION	BY
1780-69-007-1		ELECTRICAL CROSS SECTION MCC/INSTRUMENT AIR BUILDING	
1780-69-005-1		BILL OF MATERIAL MCC/INSTRUMENT AIR BUILDING	
1780-69-004-1		MAJOR EQUIPMENT LAYOUT MCC/INSTRUMENT AIR BUILDING	
1780-69-001-1		CONDUIT AND CABLE SCHEDULE	

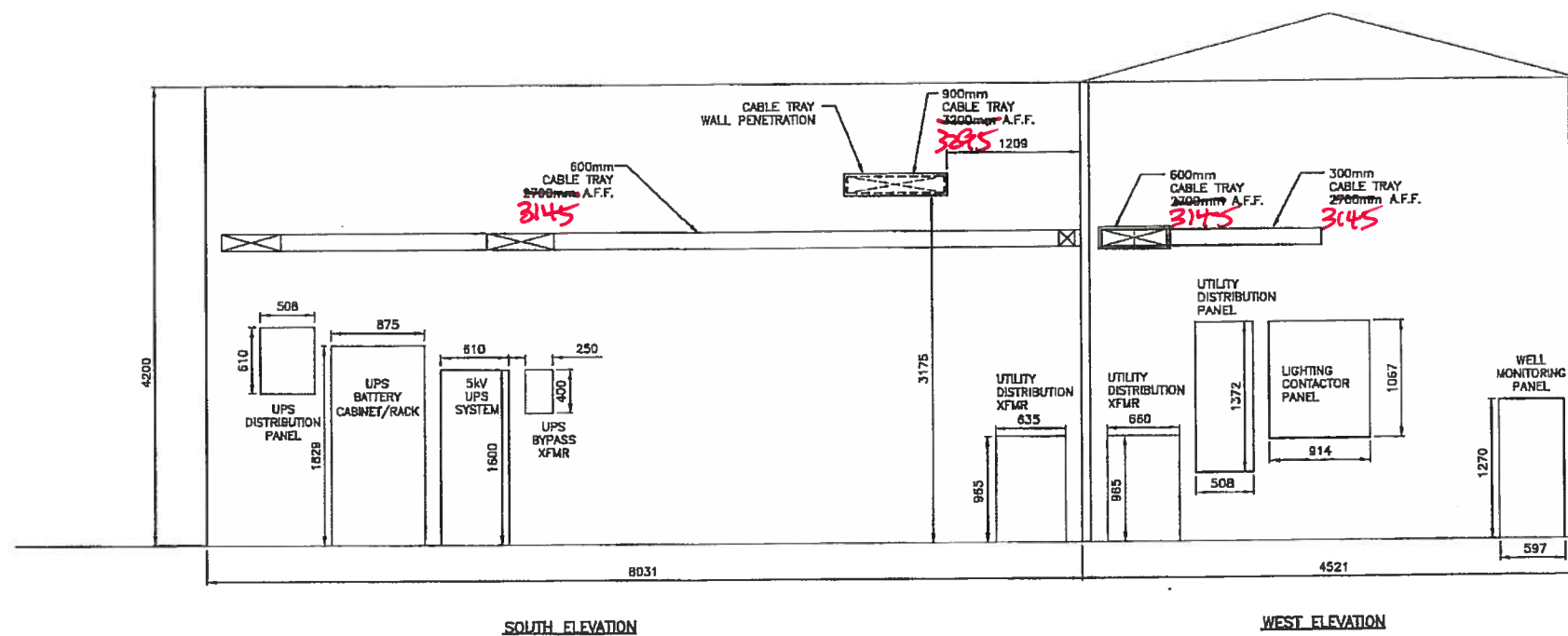
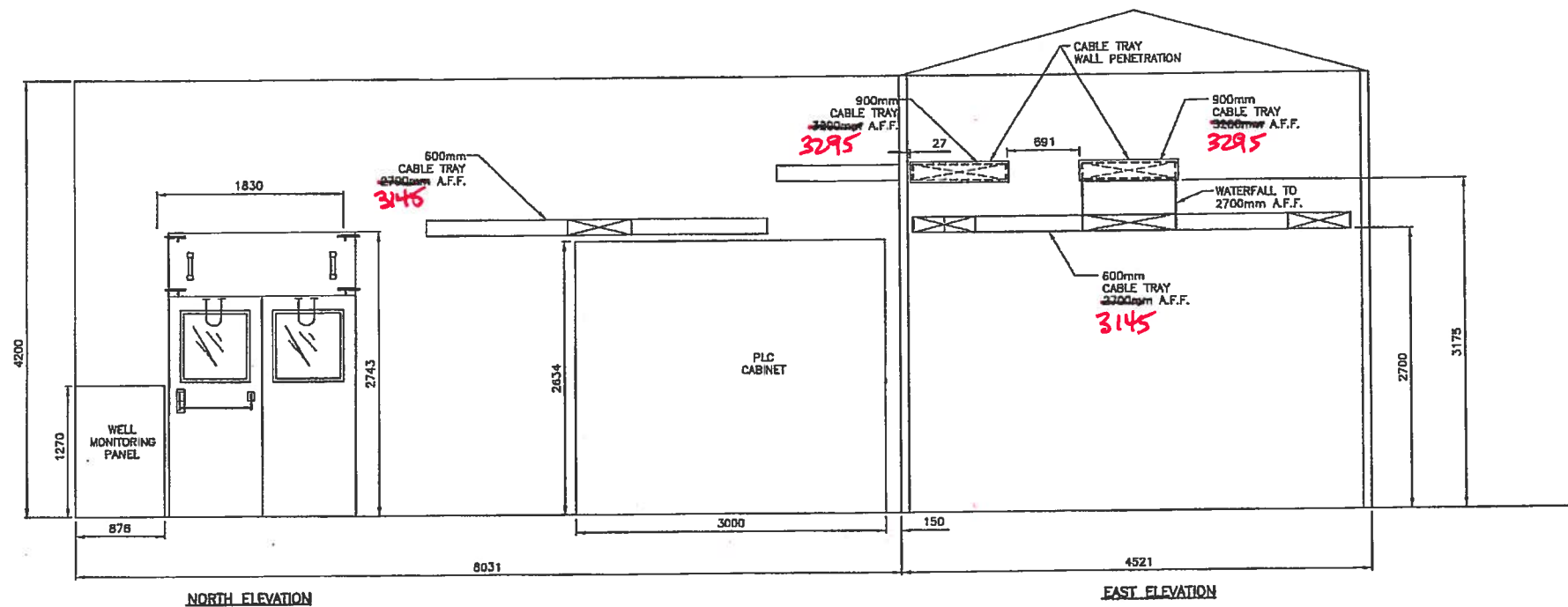
ISSUED FOR CONSTRUCTION
2012.08.10
PKC

DESIGNED BY: RB
DRAWN BY: PKC
CHECKED BY: PV/RB
DIRECTOR'S APPROVAL: PV
COMPUTER FILE: 178069006-1_RD

MURPHY OIL CANADA
MURPHY CADOTTE PILOT CSS 18-08-05-17 WSM
MCC/INSTRUMENT AIR BUILDING
ELECTRICAL & INSTRUMENT LAYOUT

Vista Projects Limited
SCALE: 1:30
DATE: 08 DEC 2011
SHEET No: D
VISTA Dwg No: 1780-69-006-1
CLIENT Dwg No: REV: 0

STUCK FILE



AS BUILT

OCT 22 2012

BAR

MCC/INSTRUMENT AIR BUILDING - MCC ROOM WALL ELEVATIONS

PERMIT TO PRACTICE
VISTA PROJECTS LIMITED

APEGGA PERMIT No.
P 04559

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Geologists and Geophysicists of Alberta



NUMBER	TITLE	DATE	BY	REVISIONS
1780-69-008	POWER AND CABLE TRAY LAYOUT MCC/INSTRUMENT AIR BUILDING			
1780-69-005	BILL OF MATERIAL MCC/INSTRUMENT AIR BUILDING			
1780-69-004	MAJOR EQUIPMENT LAYOUT MCC/INSTRUMENT AIR BUILDING			
0	ISSUED FOR CONSTRUCTION	2012.08.10	PKC	
REFERENCE DRAWINGS				
REVISIONS				

DESIGNED BY	RB
DRAWN BY	PKC
CHECKED BY	PV/RB
ENGINEER'S APPROVAL	PV
COMPUTER FILE	178069007-1_R0



MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM

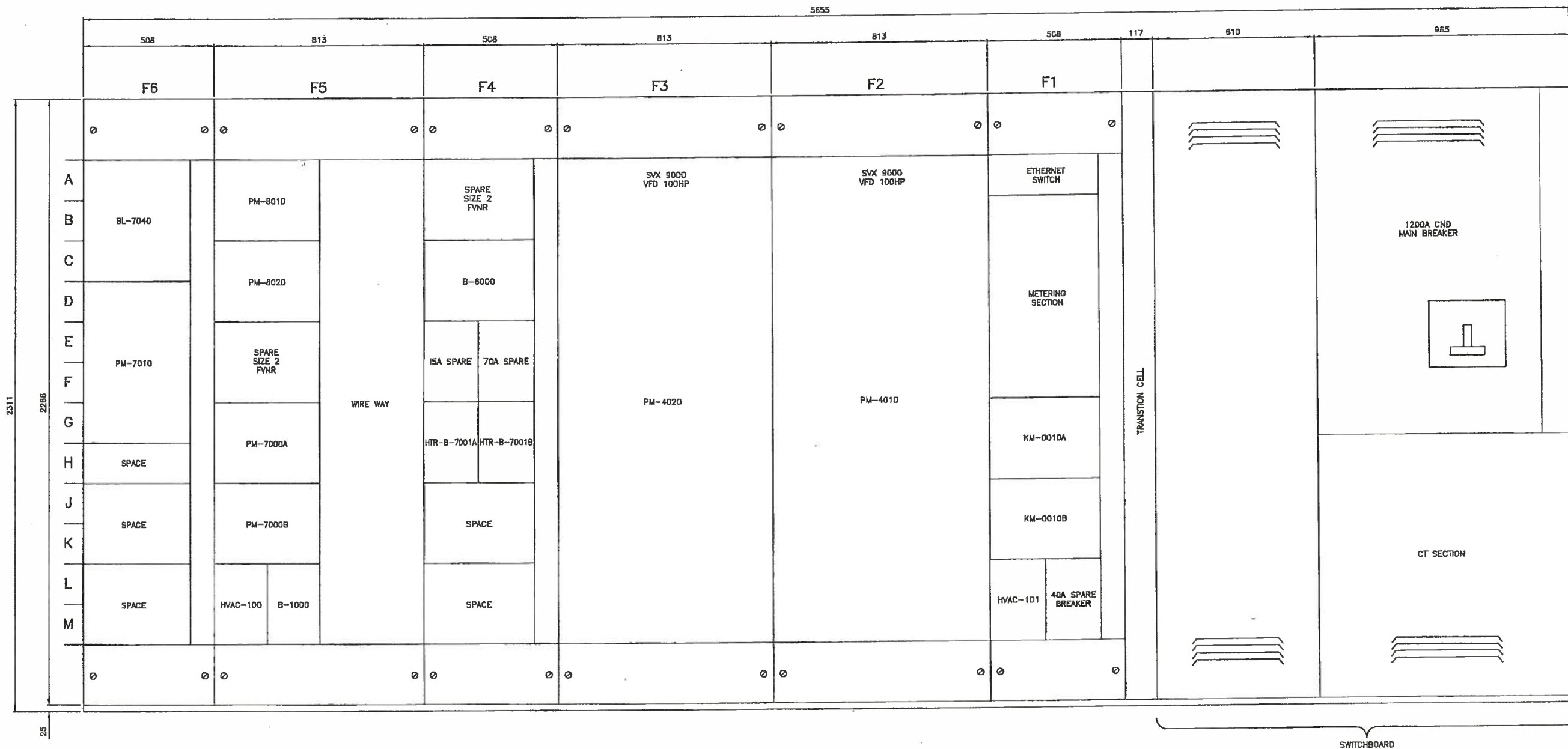
ELECTRICAL CROSS SECTION
MCC/INSTRUMENT AIR BUILDING



SCALE	1:30
DATE	08 DEC 2011
SHEET No.	D
VISTA DWS No.	1780-69-007-1
CLIENT DWS No.	
REV.	0

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FRONT ELEVATION MOTOR CONTROL CENTER (MCC-100)

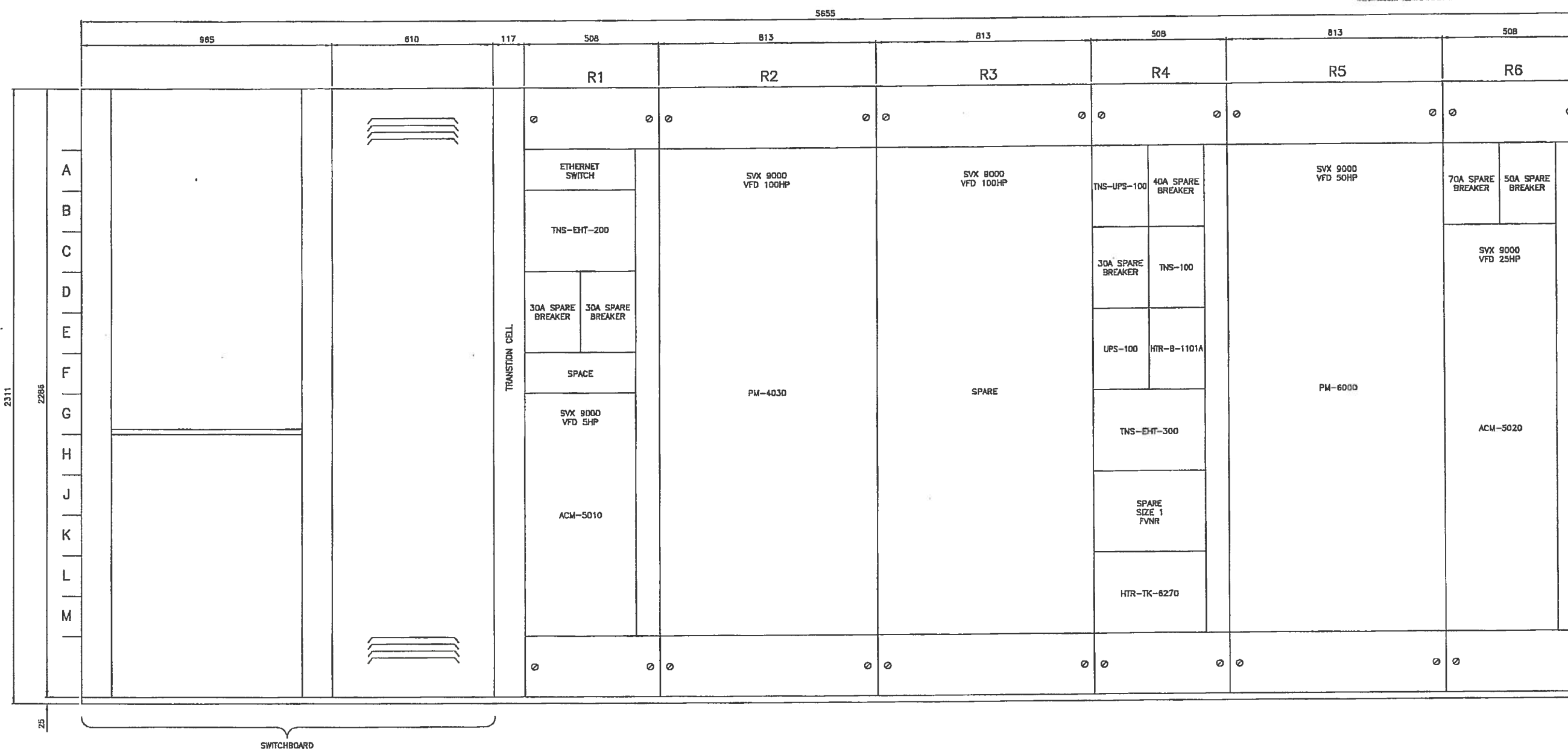
AS BUILT
OCT 22 2012
BTL

NOTES:
1. DIMENSIONS INDICATED ON DRAWING ARE IN mm, UNLESS SHOWN OTHERWISE.

<p>PERMIT TO PRACTICE VISTA PROJECTS LIMITED</p> <p>APEGGA PERMIT No. P 04559</p> <p>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</p>		1780-69-004-1 MAJOR EQUIPMENT LAYOUT MCC/INSTRUMENT AIR BUILDING		DESIGNED BY: RB		<p>MULPHY CADOTTE PILOT CSS 16-08-85-17 WSM</p> <p>MCC/INSTRUMENT AIR BUILDING MCC-100 FRONT ELEVATION LAYOUT</p>	<p>SCALE: 1:10 DATE: 01 MAY 2012 SHT No: D VISTA DES No: 1780-69-040-1 CLIENT Dwg No: 0</p>
		1780-62-003-1 SINGLE LINE DIAGRAM MCC-100		CHECKED BY: PKC			
1780-62-002-1 SINGLE LINE DIAGRAM MCC-100		1780-62-001-1 SINGLE LINE DIAGRAM MCC-100		ENGINEER'S APPROVAL: PV			
1780-62-001-1 SINGLE LINE DIAGRAM MCC-100		ISSUED FOR CONSTRUCTION		2012.08.10		COMPUTER FILE: 178069040-1_RO	
NUMBER		TITLE		DATE		BY	
REFERENCE DRAWINGS		REVISIONS					

2012-May-02 12:14:39 PM

STICK FILE



REAR ELEVATION MOTOR CONTROL CENTER (MCC-100)

AS BUILT

OCT 22 2012

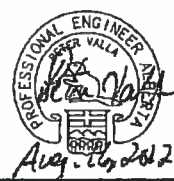
NOTES:

1. DIMENSIONS INDICATED ON DRAWING ARE IN mm, UNLESS SHOWN OTHERWISE.

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VISTA PROJECTS LIMITED

APEGA PERMIT No.
P 04559

The Association of Professional Engineers,
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1780-09-004-1 MAJOR EQUIPMENT LAYOUT MCC/INSTRUMENT AIR BUILDING
1780-02-003-1 SINGLE LINE DIAGRAM MCC-100
1780-02-002-1 SINGLE LINE DIAGRAM MCC-100
1780-02-001-1 SINGLE LINE DIAGRAM MCC-100

REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

REVISIONS

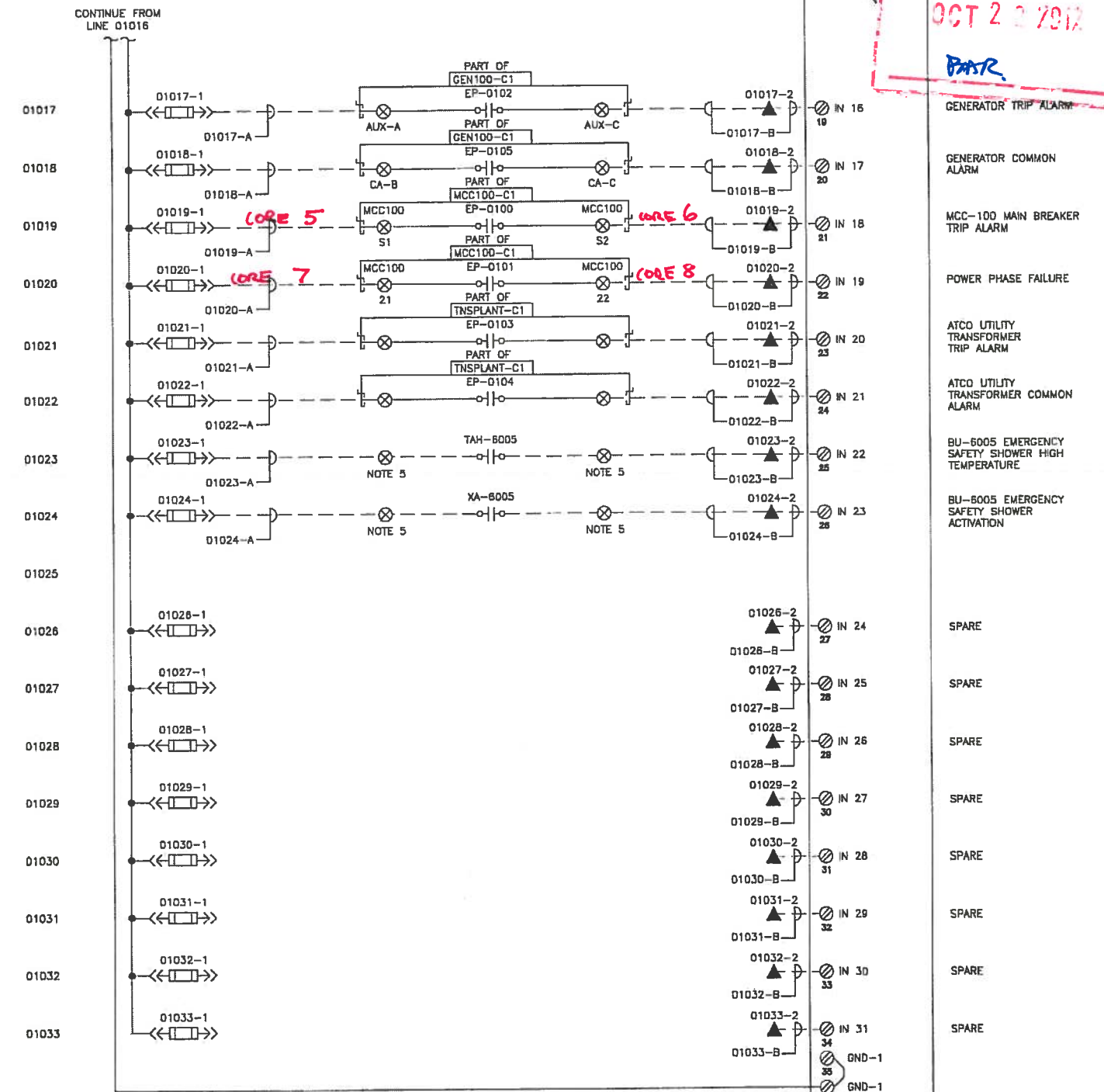
DESIGNED BY: RB
DRAWN BY: PKC
CHECKED BY: PV/PB
ENGINEER APPROVAL: PV
COMPUTER FILE: 178069041-1_R3

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 16-08-B5-17 WSM
MCC/INSTRUMENT AIR BUILDING
MCC-100 REAR ELEVATION
DETAIL

Vista
Projects Limited

SCALE: 1:10
DATE: 01 MAY 2012
SHEET No: 1780-09-041-1
CLIENT: WSM



1. ALL ALARM POINTS SHALL BE WIRED IN SUCH A WAY THAT AN OPEN CONTACT INDICATES ABNORMAL SITUATION.
2. ALL VALVE SWITCHES SHALL BE WIRED IN SUCH A WAY THAT FOR ZSD SWITCH CLOSED INDICATES VALVE IS OPEN; FOR ZSC SWITCH CLOSED INDICATES VALVE IS CLOSED.
3. ALL LEVEL SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR LSHH SWITCH OPEN INDICATES LEVEL HIGH; FOR LSLI SWITCH OPEN INDICATES LEVEL LOLO.
4. ALL PRESSURE SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR PSHH SWITCH OPEN INDICATES PRESSURE HIGH; FOR PSLI SWITCH OPEN INDICATES PRESSURE LOLO.
5. REFER TO REPECTIVE BUILDING VENDER JUNCTION BOX DRAWING FOR TERMINAL NUMBER.

	CONTROL PANEL FUSED TERMINAL
	CONTROL PANEL DISCONNECT TERMINAL
	FUSED TERMINAL PLC PANEL
	STRAIGHT THRU TERMINAL PLC PANEL
	STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
	VENDOR TERMINAL

SLOT 0	SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10	SLOT 11	SLOT 12	SLOT 13	SLOT 14	SLOT 15	SLOT 16
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CHASSIS 0 (PSS)

CHASSIS 0 (PSS)

2012-May-02 10:42:13 AM

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VISTA PROJECTS LIMITED
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P 04559
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Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
Mike Tamm
Aug 03, 2012

1780-BB-001-1 CONDUIT AND CABLE SCHEDULE
B096-D-007 DC WIRING CONTROL PANEL PNL-PLC-100
NUMBER TITLE
REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION 2012.08.03 PKC
ISSUED FOR REVIEW 2012.08.27 PKC
DESCRIPTION REVISIONS

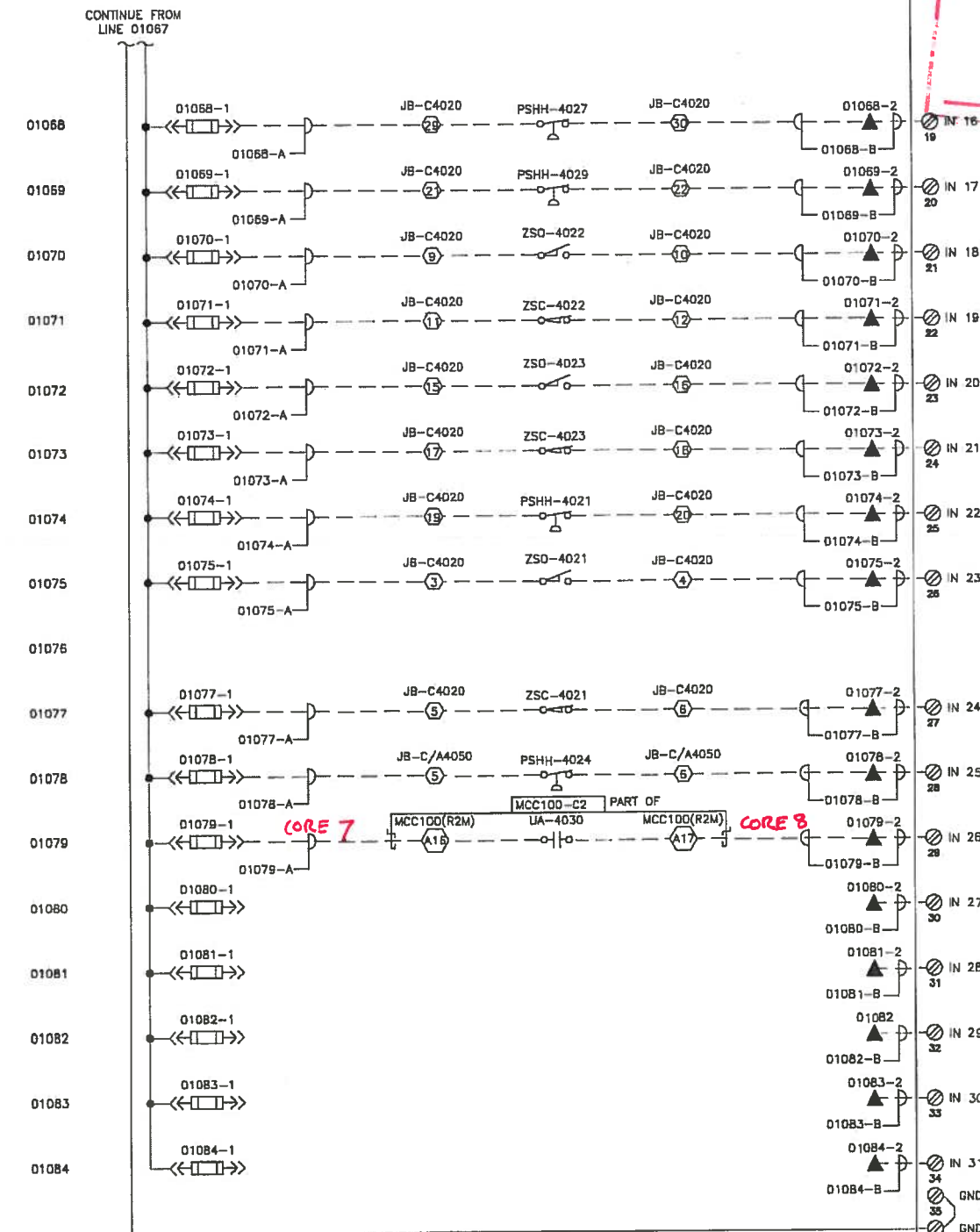
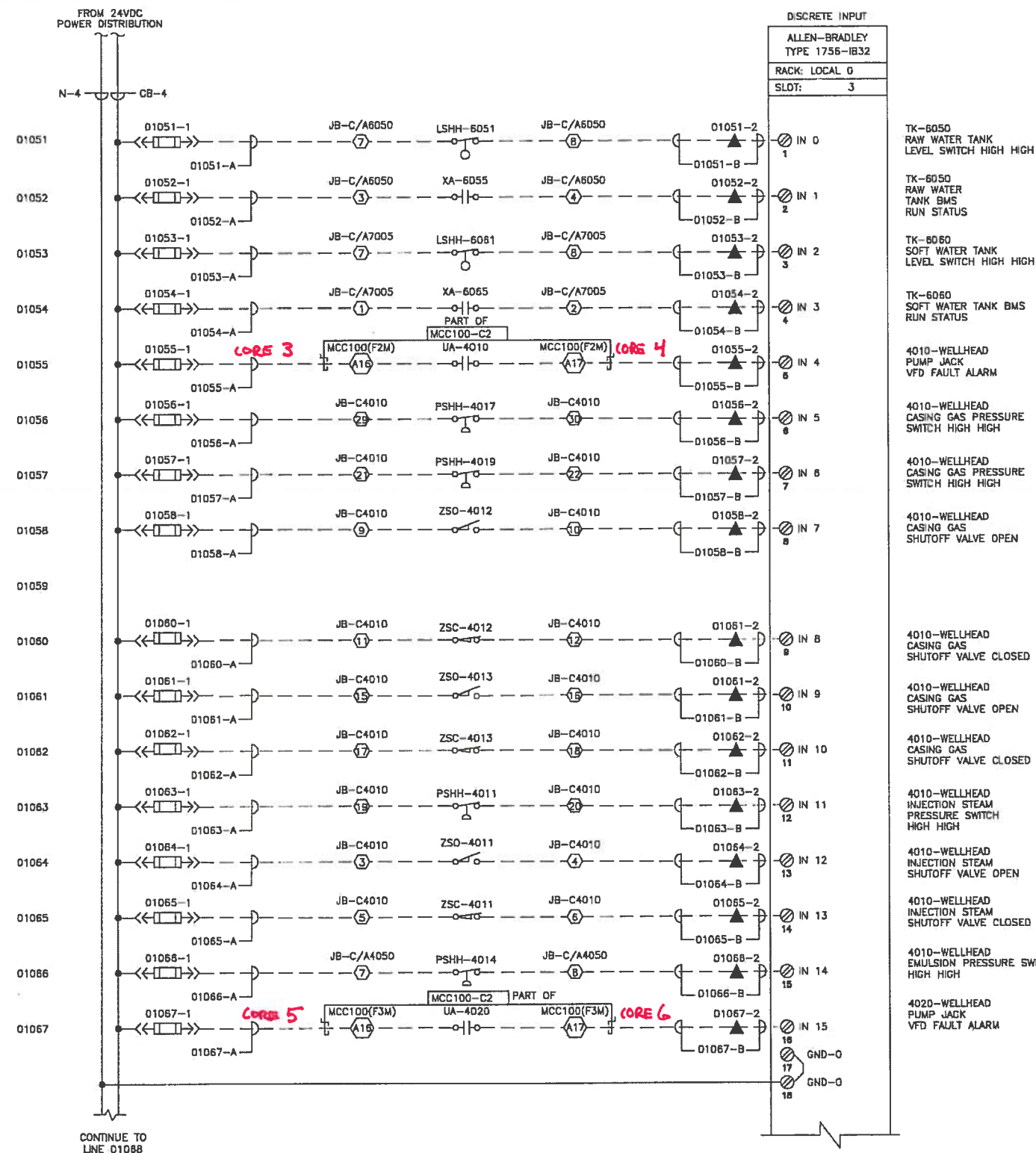
DESIGNED BY: MT MT
DRAWN BY: PKC
CHECKED BY: DT/PV
ENGINEER'S APPROVAL: DT
COMPUTER FILE: 1780B1004-1_R0

MURPHY
OIL CANADA
MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM

PLC SCHEMATIC - CHASSIS 0
DISCRETE INPUT (DI)

Vista
Projects Limited

SCALE: N.T.S.
DATE: 14 MAY 2012
SHT No: D VISTA DWG No: 1780-B1-004-1
CLIENT DWG No: REV: 0



NOTES

1. ALL ALARM POINTS SHALL BE WIRED IN SUCH A WAY THAT AN OPEN CONTACT INDICATES ABNORMAL SITUATION.
2. ALL VALVE SWITCHES SHALL BE WIRED IN SUCH A WAY THAT FOR ZSD SWITCH CLOSED INDICATES VALVE IS OPEN; FOR ZSC SWITCH CLOSED INDICATES VALVE IS CLOSED.
3. ALL LEVEL SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR LSHH SWITCH OPEN INDICATES LEVEL HIGH; FOR LSLH SWITCH OPEN INDICATES LEVEL LOLO.
4. ALL PRESSURE SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR PSHH SWITCH OPEN INDICATES PRESSURE HIGH HIGH; FOR PSLH SWITCH OPEN INDICATES PRESSURE LOLO.

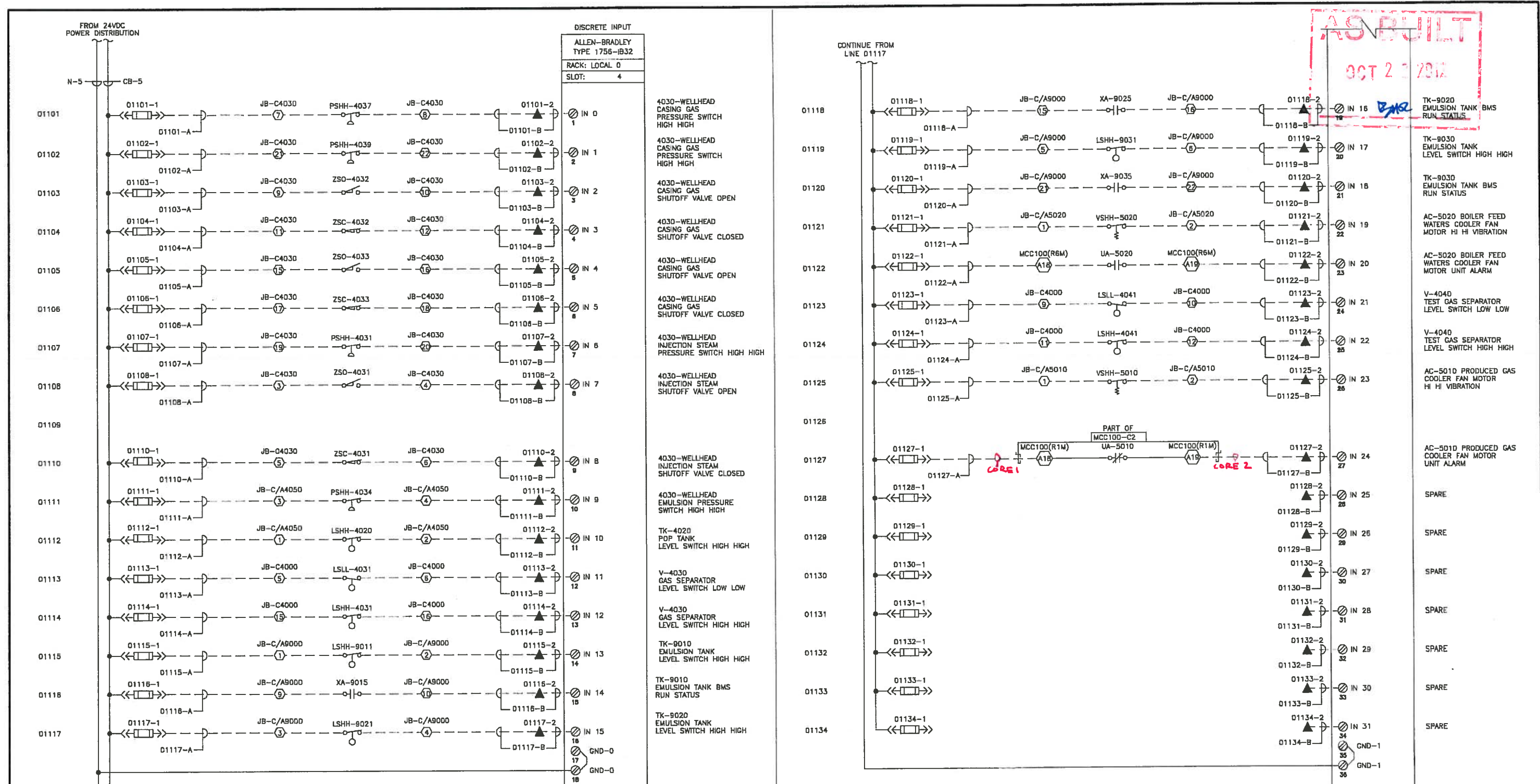
LEGEND

- ◻ CONTROL PANEL FUSED TERMINAL
- ◻ CONTROL PANEL DISCONNECT TERMINAL
- ▲ FUSED TERMINAL PLC PANEL
- △ STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- ⊗ VENDOR TERMINAL

SLOT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

CHASSIS 0 (PSS)

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OCT 2 2 2012
PAC



2012-May-02 10:42:13 AM

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P 04559

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
WILE TANG

Aug 03, 2012

1780-88-001-1	CONDUIT AND CABLE SCHEDULE
8086-D-007	DC WIRING CONTROL PANEL PNL-PLC-100
NUMBER	TITLE
REFERENCE DRAWINGS	

0	ISSUED FOR CONSTRUCTION	2012.08.03	PKC
A	ISSUED FOR REVIEW	2012.08.27	PKC
NO.	DESCRIPTION	DATE	BY
REVISIONS			

DESIGNED BY: MT MT

DRAWN BY: PKC

CHECKED BY: DT/PV

ENGINEER'S APPROVAL: DT

COMPUTER FILE: 178081005-1_R0

MURPHY OIL CANADA

MURPHY CADOTTE PILOT CSS 13-9-B5-17 WSM

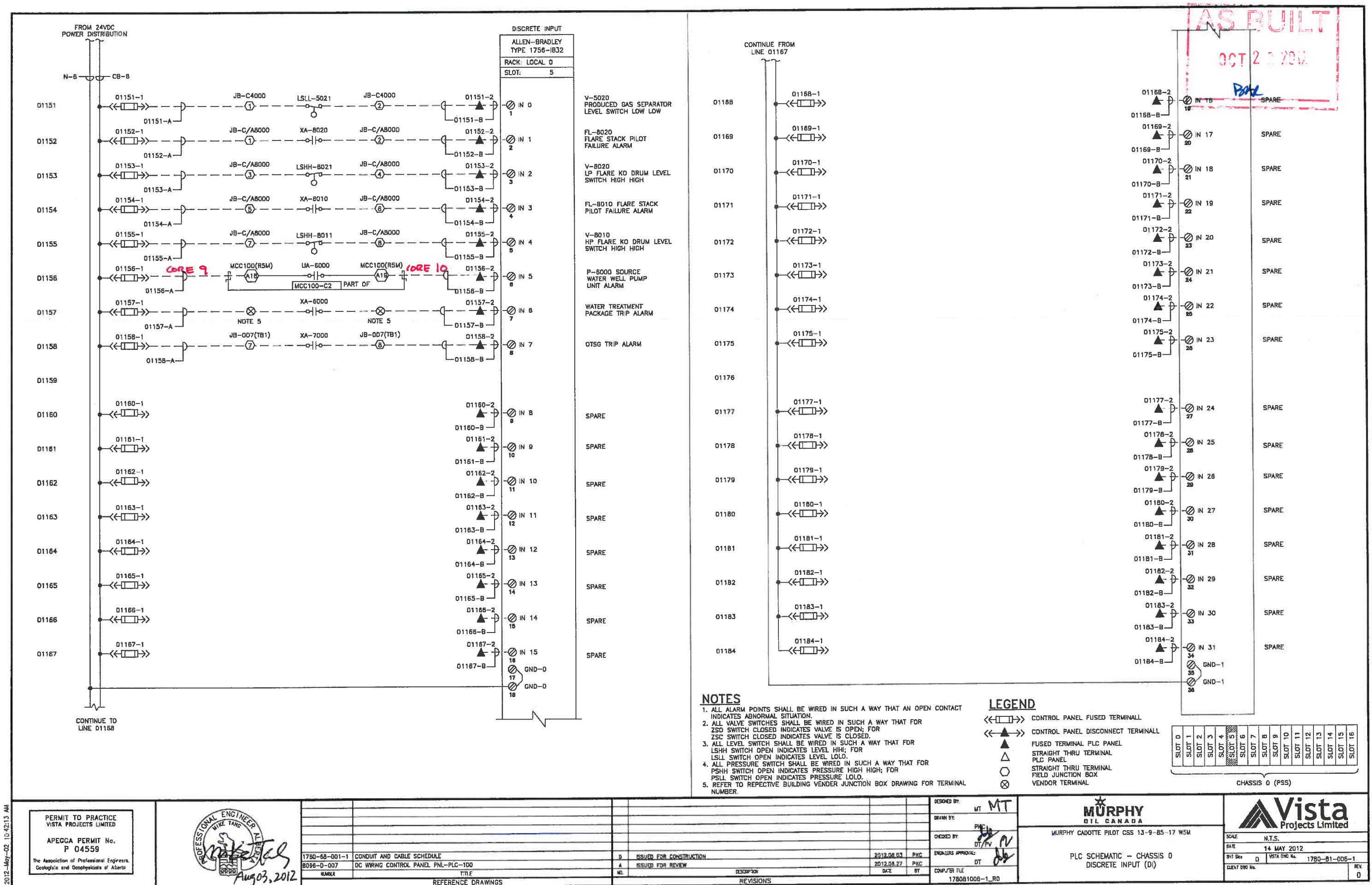
PLC SCHEMATIC - CHASSIS 0
DISCRETE INPUT (DI)

Vista Projects Limited

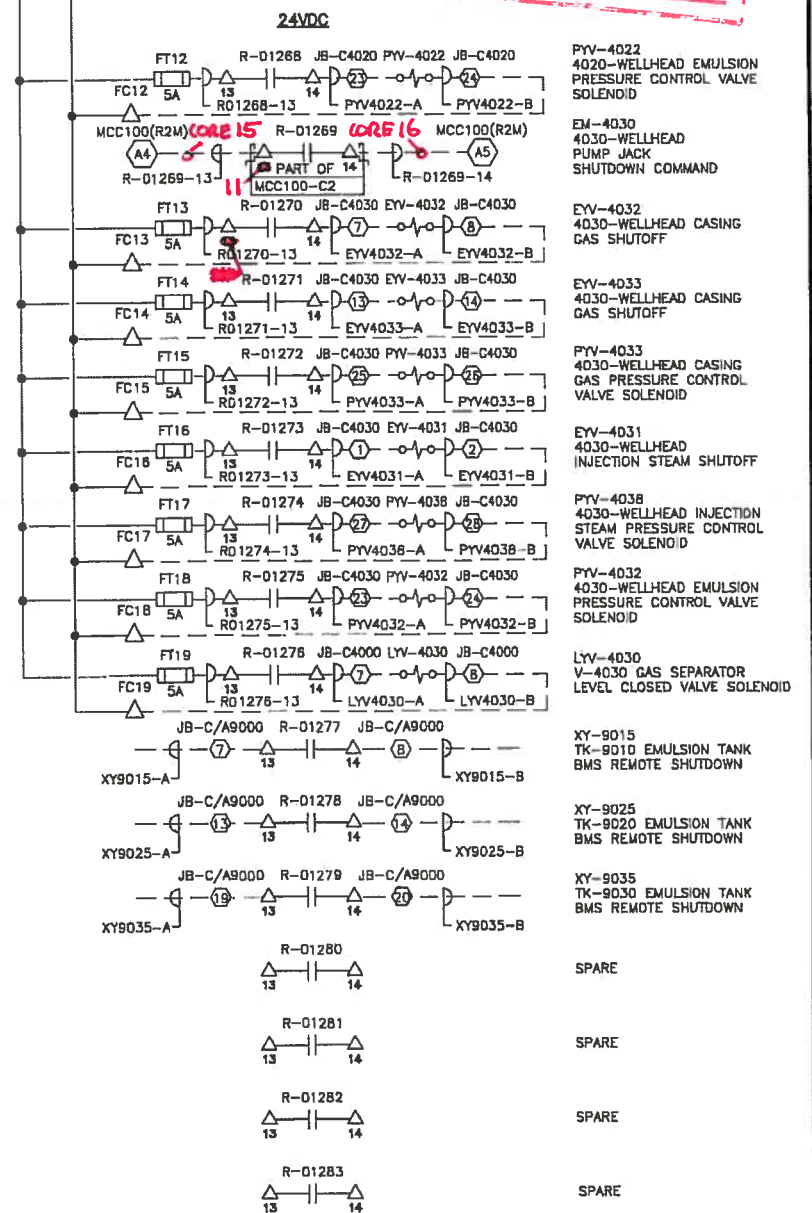
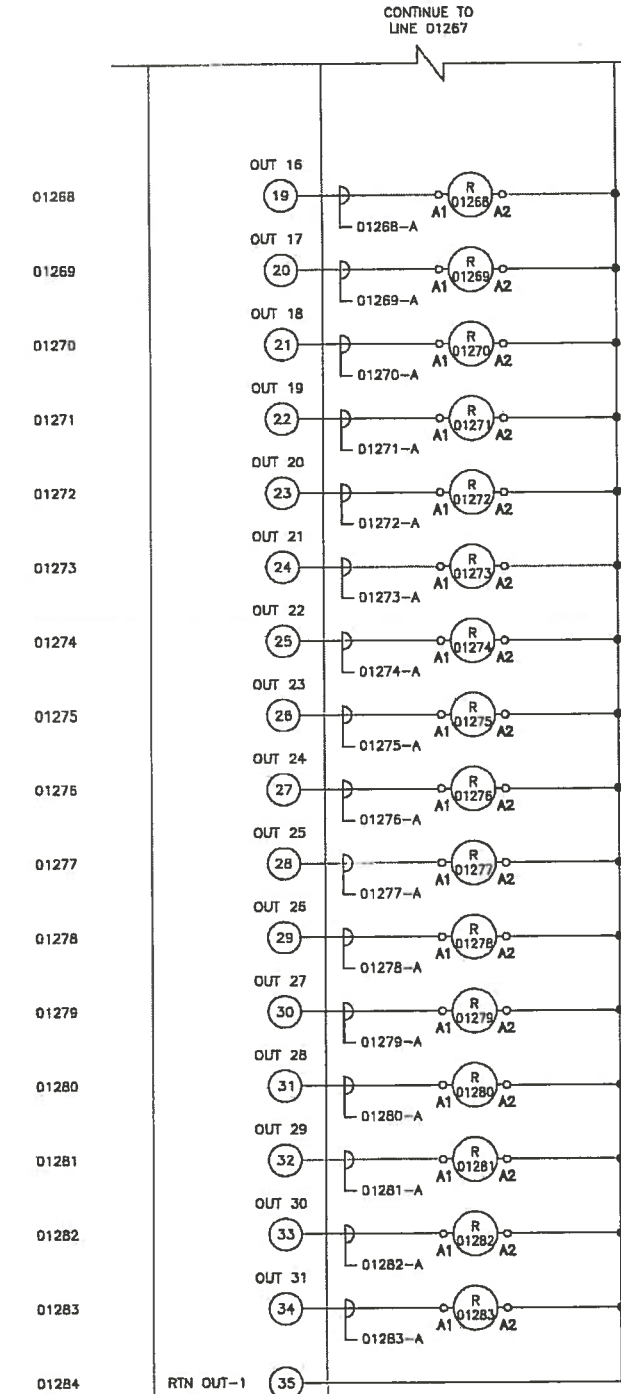
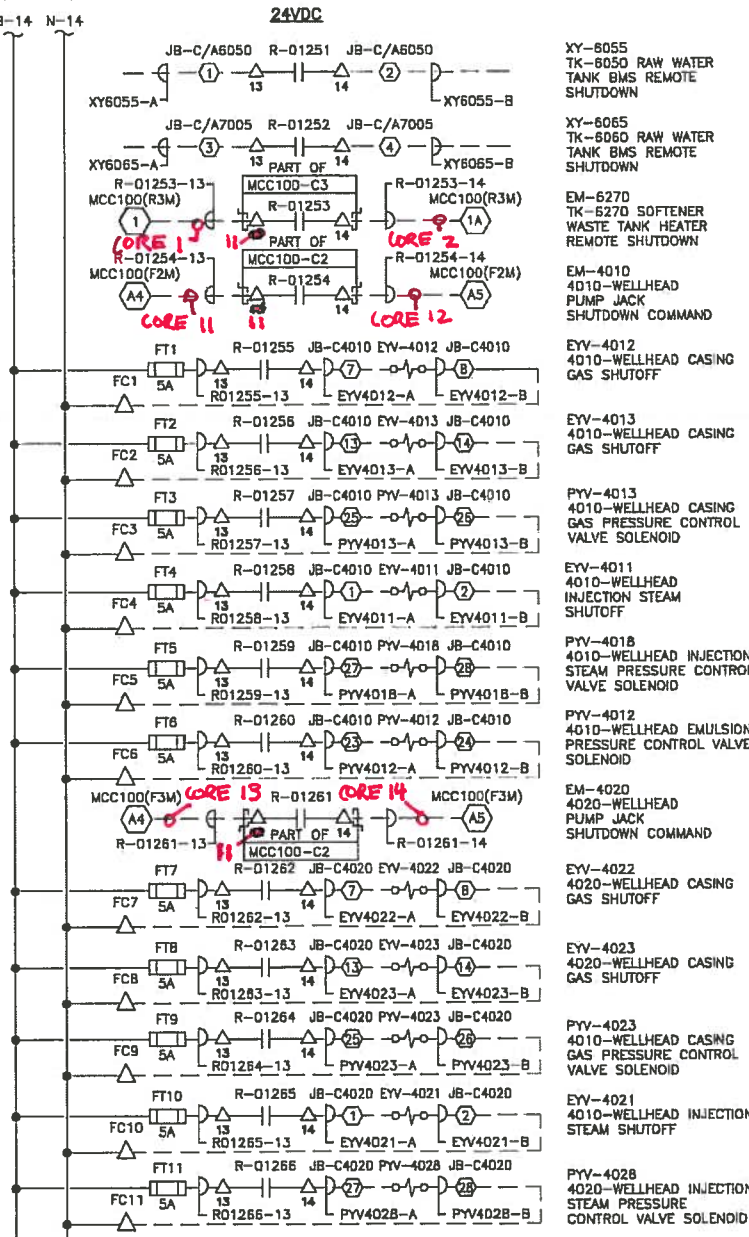
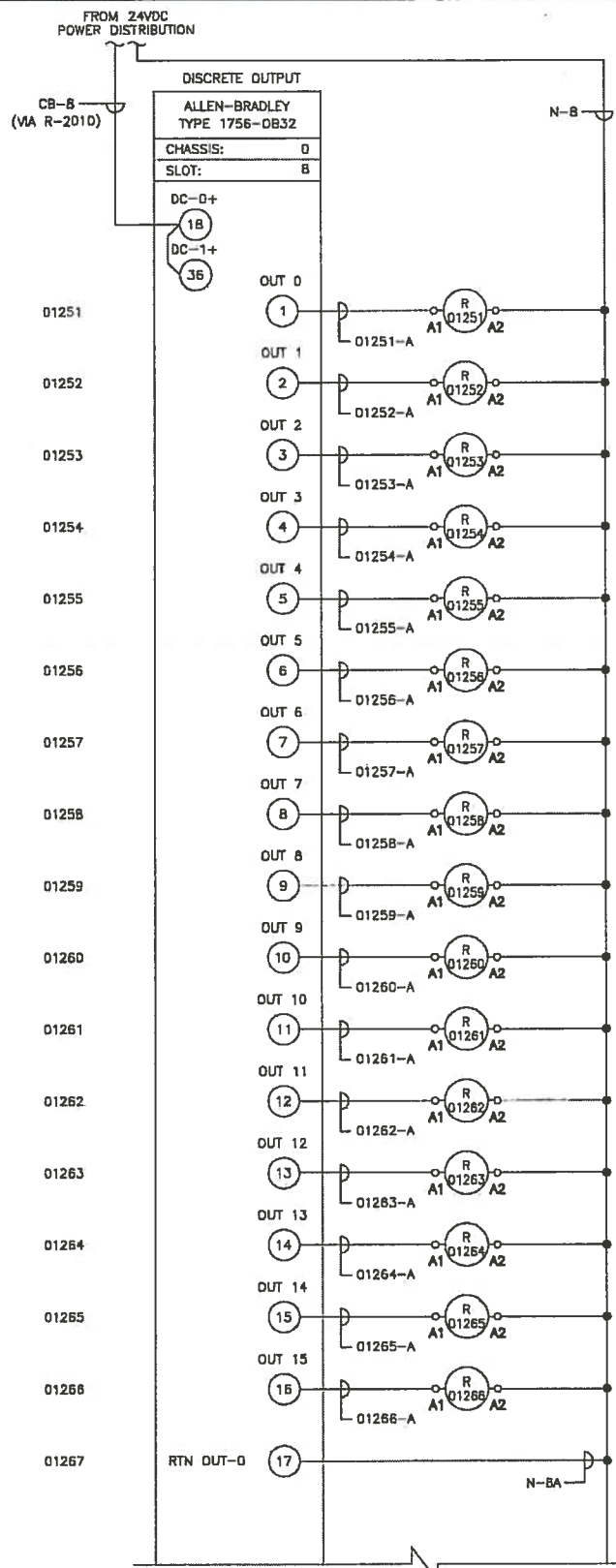
SCALE: N.T.S.

DATE: 14 MAY 2012

REV: 0



AS BUILT
OCT 2 2 2012
BAR.



LEGEND

- CONTROL PANEL FUSED TERMINAL
- CONTROL PANEL DISCONNECT TERMINAL
- FUSED TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- VENDOR TERMINAL

NOTES

- ALL ALARM POINTS SHALL BE WIRED IN SUCH A WAY THAT AN OPEN CONTACT INDICATES ABNORMAL SITUATION.
- ALL VALVE SWITCHES SHALL BE WIRED IN SUCH A WAY THAT FOR ZSO SWITCH CLOSED INDICATES VALVE IS OPEN; FOR ZSC SWITCH CLOSED INDICATES VALVE IS CLOSED.
- ALL LEVEL SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR LSHH SWITCH OPEN INDICATES LEVEL HIGH; FOR LSLH SWITCH OPEN INDICATES LEVEL LOLO.
- ALL PRESSURE SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR PSHH SWITCH OPEN INDICATES PRESSURE HIGH; FOR PSLL SWITCH OPEN INDICATES PRESSURE LOLO.

SLOT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

2012-May-02 10:42:13 AM

PERMIT TO PRACTICE
VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
Mike Tang
Aug 03, 2012

NUMBER	TITLE
1780-68-001-1	CONDUIT AND CABLE SCHEDULE
8096-D-007	DC WIRING CONTROL PANEL PNL-PLC-100

REFERENCE DRAWINGS

NO.	DESCRIPTION	DATE	BY
0	ISSUED FOR CONSTRUCTION	2012.08.03	PKC
1	ISSUED FOR REVIEW	2012.08.27	PKC

REVISIONS

DESIGNED BY:	MT
DRAWN BY:	PKC
CHECKED BY:	DT/PV
ENGINEER APPROVAL:	DT
COMPUTER FILE	178081008-1_RD

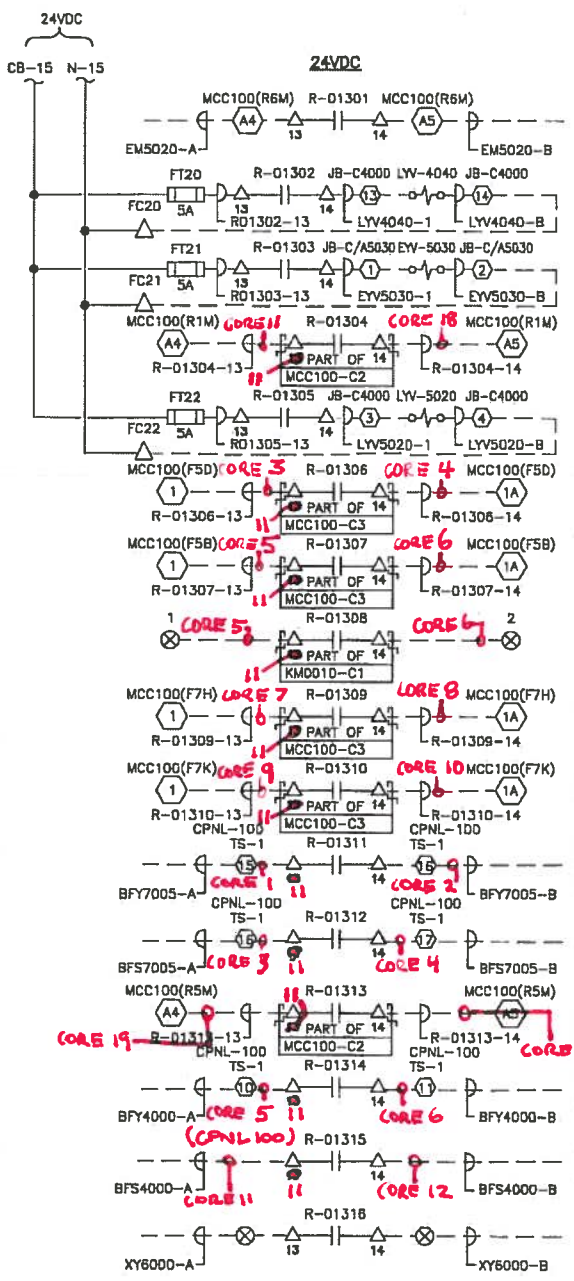
MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM

PLC SCHEMATIC - CHASSIS 0
DISCRETE OUTPUT (DO)

Vista
Projects Limited

SCALE	N.T.S.
DATE	14 MAY 2012
SPT Size	D
VISTA DOC No.	1780-81-008-1
DESKT ENG No.	
REV.	0



EM-5020
AC-5020 BOILER FEED
WATERS COOLER FAN MOTOR
SHUTDOWN COMMAND

LYW-4040
V-4040 TEST GAS
SEPARATOR EMULSION LEVEL
CONTROL VALVE SOLENOID

EYV-5030
MAIN FUEL GAS SUPPLY
SHUTOFF VALVE SOLENOID

EM-5010
AC-5010 PRODUCED GAS
COOLER FAN MOTOR
SHUTDOWN

LYW-5020
P-5020 PRODUCED GAS
SEPARATOR GAS CONDENSATE
LEVEL CONTROL SOLENOID

EM-8020
P-8020 SHUTDOWN

EM-8010
P-8010 SHUTDOWN

XY-0010
K-0010A/B INSTRUMENT
AIR COMPRESSOR
REMOTE SHUTDOWN

EM-7000A
P-7000A SHUTDOWN

EM-7000B
P-7000B SHUTDOWN

BFY-7005
LP CHARGE PUMP SKID
EXHAUST FAN
SHUTDOWN COMMAND

BFS-7005
LP-CHARGE PUMP SKID
EXHAUST FAN AUTO START
COMMAND

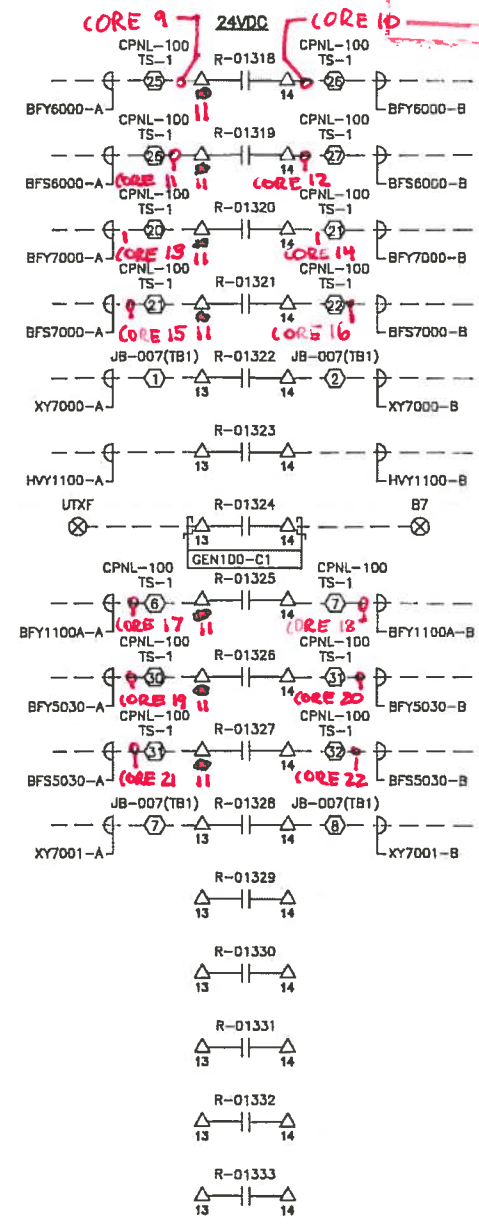
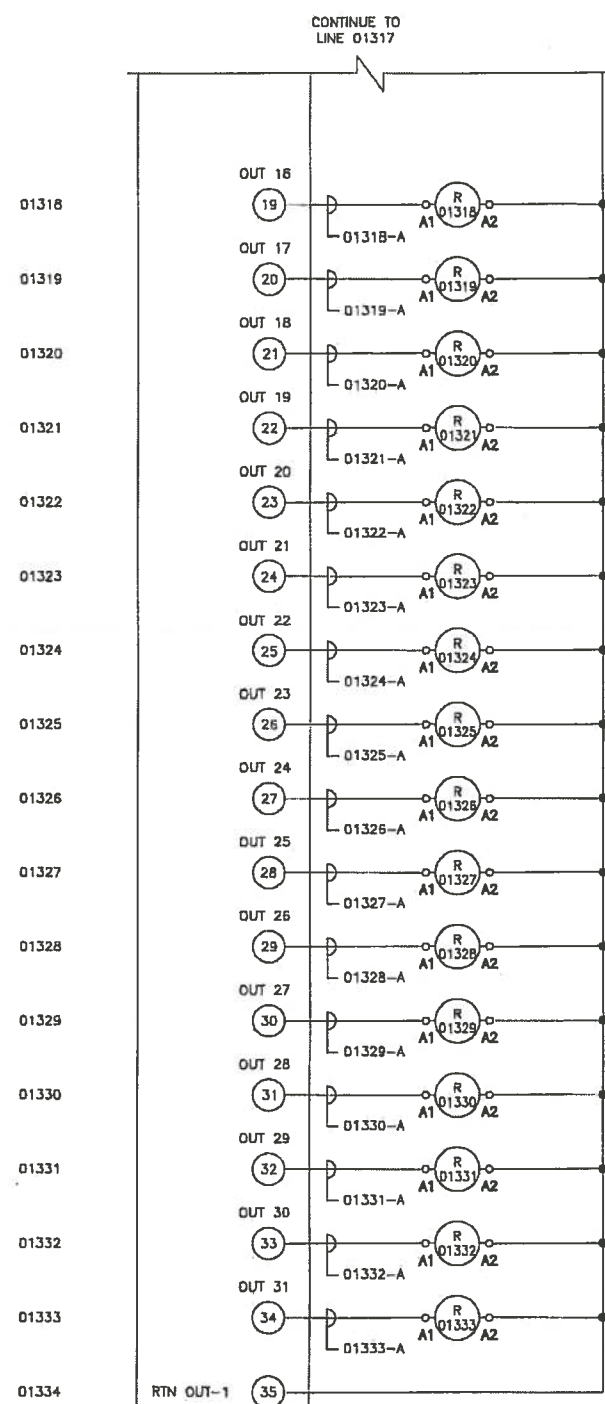
EM-6000
P-6000 SOURCE WATER
WELL PUMP SHUTDOWN
COMMAND

20

BFY-4000
PROCESS BUILDING B-4000
EXHAUST FAN SHUTDOWN
COMMAND

BFS-4000
PROCESS BUILDING B-4000
EXHAUST FAN AUTO START
COMMAND

XY-6000
WATER TREATMENT PACKAGE
REMOTE SHUTDOWN



BFY-6000
 WATER TREATMENT BUILDING
 B-6000 EXHAUST FAN
 SHUTDOWN COMMAND

 BFS-6000
 WATER TREATMENT BUILDING
 B-6000 EXHAUST FAN
 AUTO START COMMAND

 BFY-7000
 OTSG BUILDING
 B-7000 EXHAUST FAN
 SHUTDOWN COMMAND

 BFS-7000
 OTSG BUILDING
 B-7000 EXHAUST FAN
 AUTO START COMMAND

 XY-7000
 OTSG ESD

 HYY-1100
 HVAC 100 SHUTDOWN
 MCC BUILDING

 EM-0100
 GENERATOR SHUTDOWN







 BFY-1100A
 MCC BUILDING B-1100
 I/A ROOM EXHAUST FAN
 SHUTDOWN

 BFY-5030
 FUEL GAS SKID EXHAUST
 FAN SHUTDOWN

 BFS-5030
 FUEL GAS SKID EXHAUST
 FAN AUTO START COMMAND

 XY-7001
 OTSG CONTROLLED
 SHUTDOWN


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OCT 22 2012
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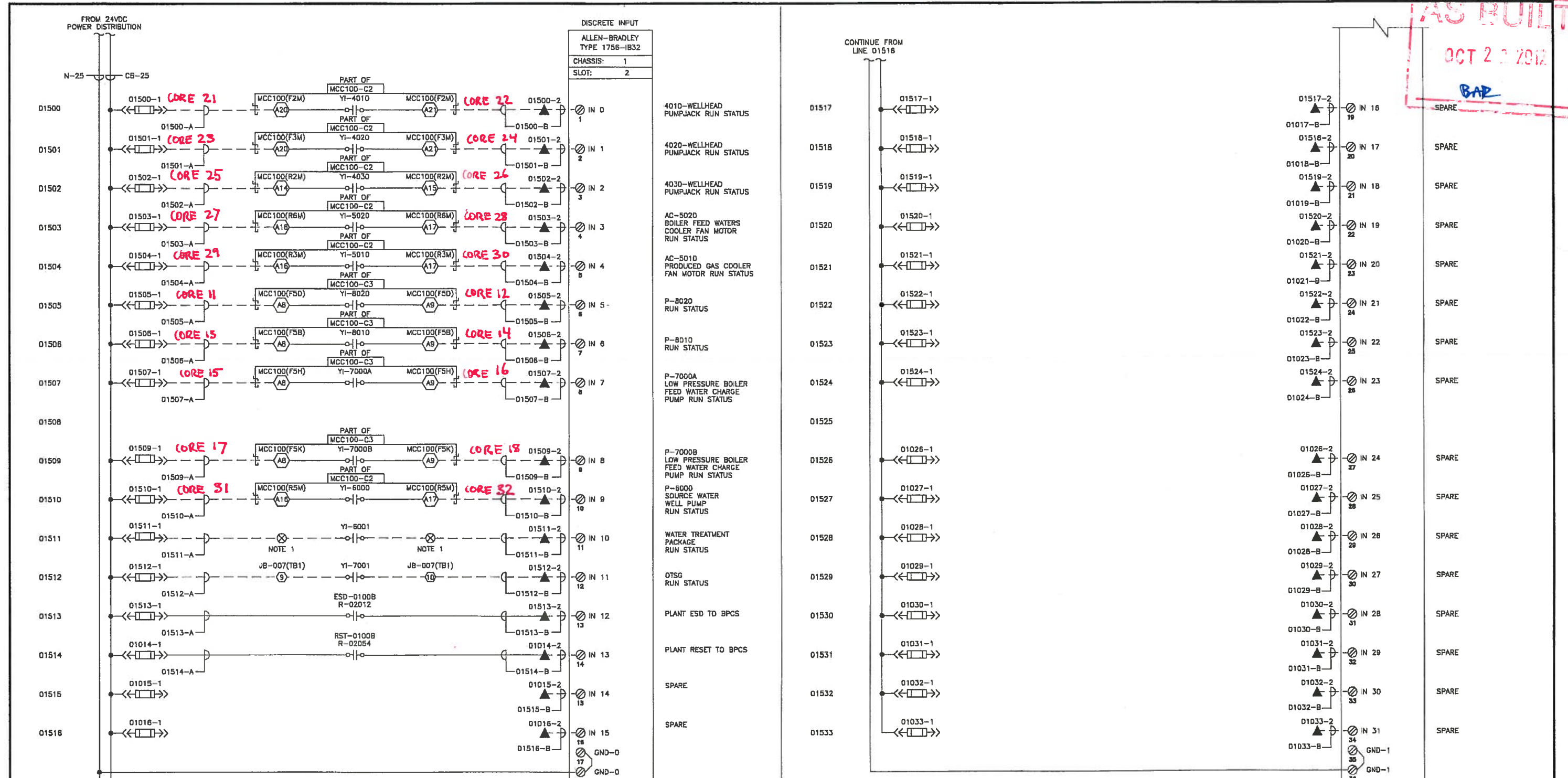
- ### LEGEND
- | | |
|---|--|
|  | CONTROL PANEL FUSED TERMINAL |
|  | CONTROL PANEL DISCONNECT TERMINAL |
|  | FUSED TERMINAL PLC PANEL |
|  | STRAIGHT THRU TERMINAL
PLC PANEL |
|  | STRAIGHT THRU TERMINAL
FIELD JUNCTION BOX |
|  | VENDOR TERMINAL |

- ## NOTES
1. ALL ALARM POINTS SHALL BE WIRED IN SUCH A WAY THAT AN OPEN CONTACT INDICATES ABNORMAL SITUATION.
 2. ALL VALVE SWITCHES SHALL BE WIRED IN SUCH A WAY THAT FOR ZSD SWITCH CLOSED INDICATES VALVE IS OPEN; FOR ZSC SWITCH CLOSED INDICATES VALVE IS CLOSED.
 3. ALL LEVEL SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR LSHH SWITCH OPEN INDICATES LEVEL HIGH; FOR LSLH SWITCH OPEN INDICATES LEVEL LOLO.
 4. ALL PRESSURE SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR PSHH SWITCH OPEN INDICATES PRESSURE HIGH HIGH; FOR PSLH SWITCH OPEN INDICATES PRESSURE LOLO.

SLOT 0
SLOT 1
SLOT 2
SLOT 3
SLOT 4
SLOT 5
SLOT 6
SLOT 7
SLOT 8
SLOT 9
SLOT 10
SLOT 11
SLOT 12
SLOT 13
SLOT 14
SLOT 15
SLOT 16

CHASSIS D (PSS)

 Vista Projects Limited	
SCALE	N.T.S.
DATE	14 MAY 2012
SHT Size	D VISTA ENG No. 1780-81-009-1
CLIENT ENG No.	REV. 0



AS BUILT
OCT 2 2012
BAR

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APEGGA PERMIT No.
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The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
WIKI TANG
1780-88-001-1
8096-D-007
Aug 03, 2012

NUMBER	TITLE	REVISIONS
1780-88-001-1	CONDUIT AND CABLE SCHEDULE	0 ISSUED FOR CONSTRUCTION 2012.08.03 PKC
8096-D-007	DC WIRING CONTROL PANEL PNL-PLC-100	A ISSUED FOR REVIEW 2012.08.27 PKC

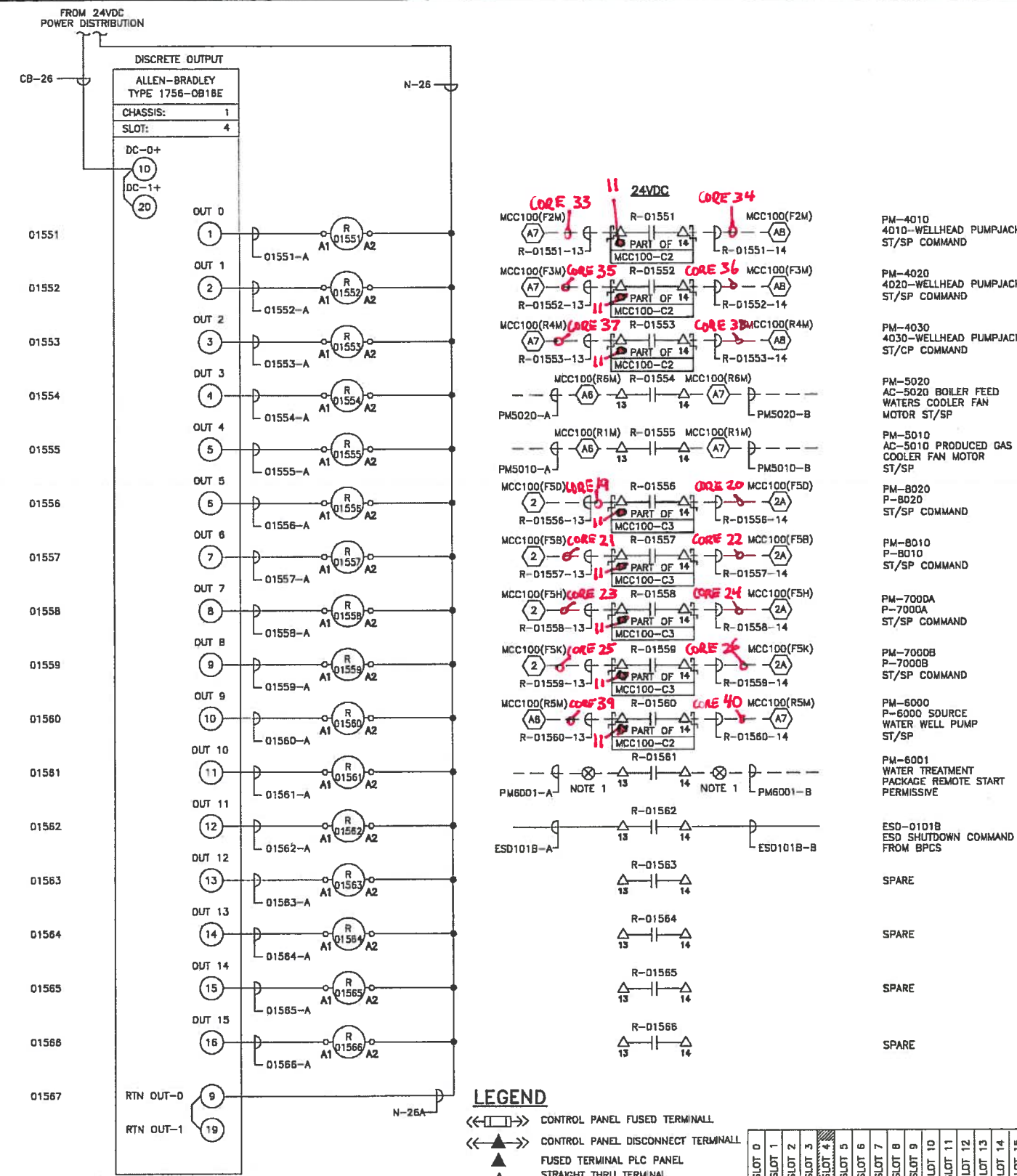
DATE	BY	DESCRIPTION
2012.08.03	PKC	ISSUED FOR CONSTRUCTION
2012.08.27	PKC	ISSUED FOR REVIEW

DESIGNED BY:	MT
DRAWN BY:	PKC
CHECKED BY:	DT
EXAMINER APPROVAL:	DT
COMPUTER FILE:	178081014-1_RD

MURPHY OIL CANADA
MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM
PLC SCHEMATIC - CHASSIS 1
DISCRETE INPUT (DI)

Vista Projects Limited
SCALE: N.T.S.
DATE: 14 MAY 2012
SHT No: D VISTA DNG No: 1780-81-014-1
CLIENT DNG No: REV: 0

AS BUILT
OCT 2 2012
BAR

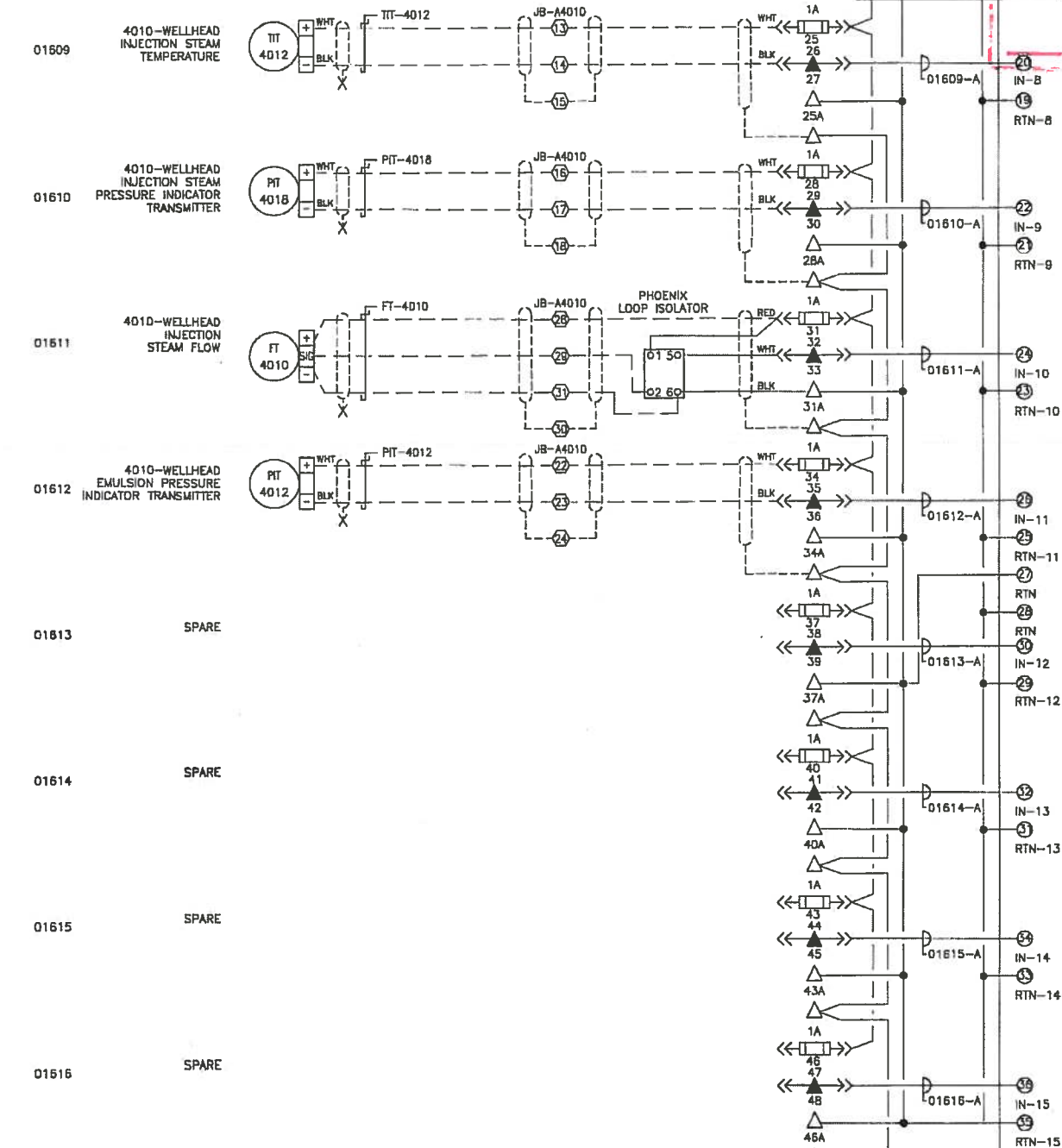
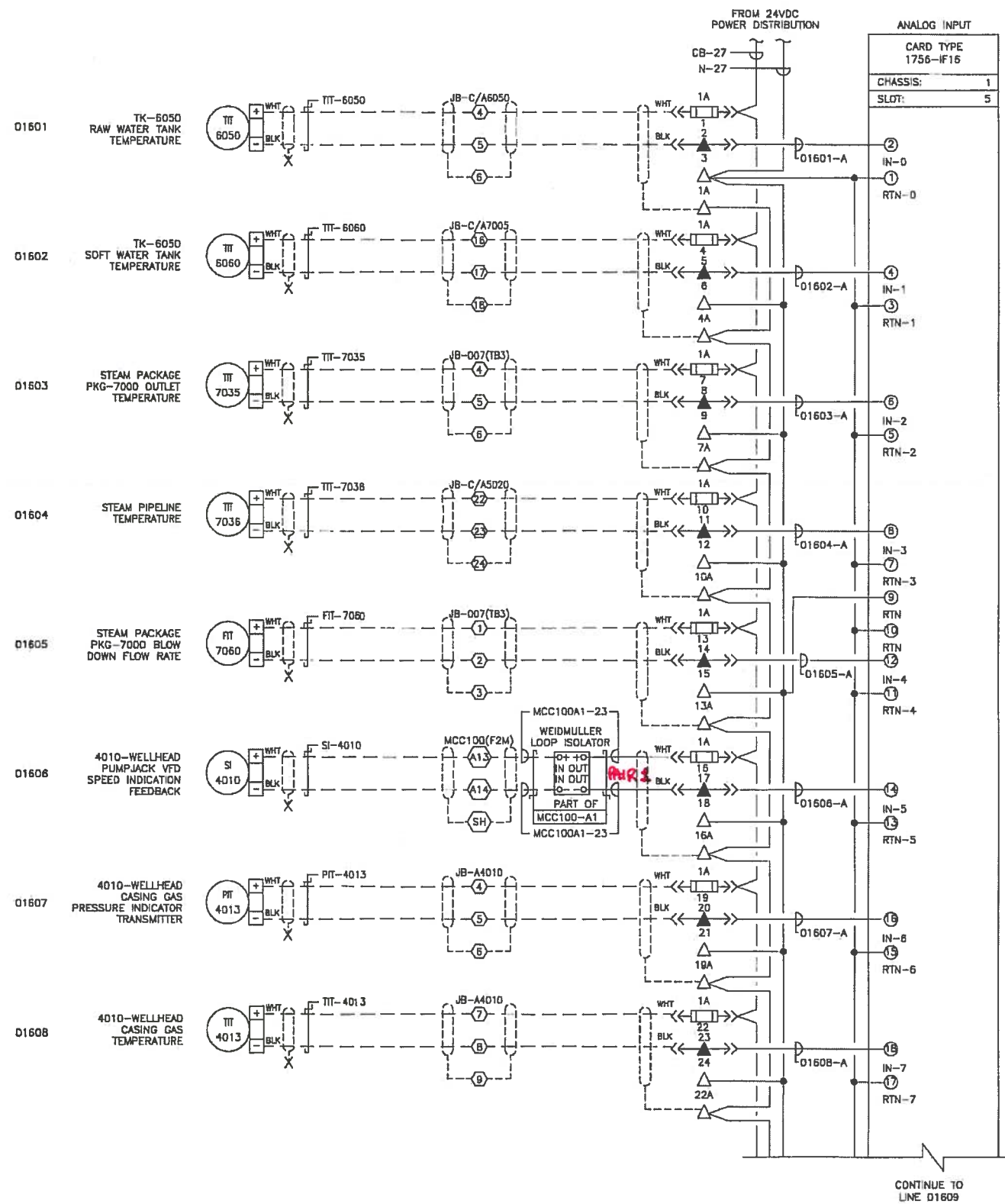


NOTES

1. REFER TO RESPECTIVE BUILDING VENDOR JUNCTION BOX DRAWING FOR TERMINAL NUMBER.

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<p>PERMIT TO PRACTICE VISTA PROJECTS LIMITED</p> <p>APEGGA PERMIT No. P 04559</p> <p>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</p>		<p>PROFESSIONAL ENGINEER WIKI TANG</p> <p>1780-B8-001-1</p> <p>8096-D-007</p> <p>CONDUIT AND CABLE SCHEDULE</p> <p>DC WIRING CONTROL PANEL PNL-PLC-100</p> <p>1780-B8-001-1</p> <p>8096-D-007</p> <p>CONDUIT AND CABLE SCHEDULE</p> <p>DC WIRING CONTROL PANEL PNL-PLC-100</p>		<p>ISSUED FOR CONSTRUCTION</p> <p>2012.08.03</p> <p>PKC</p> <p>ISSUED FOR REVIEW</p> <p>2012.08.27</p> <p>PKC</p> <p>DATE</p> <p>BY</p>		<p>DESIGNED BY: MT</p> <p>DRAWN BY: PKC</p> <p>CHECKED BY: D/PV</p> <p>ENGINEERS APPROVAL: DT</p> <p>COMPUTER FILE: 1780B1015-1_RD</p>		<p>MURPHY OIL CANADA</p> <p>MURPHY CADOTTE PILOT CSS 13-9-B5-17 WSM</p> <p>PLC SCHEMATIC - CHASSIS 1 DISCRETE OUTPUT (DO)</p>		<p>Vista Projects Limited</p> <p>SCALE: N.T.S.</p> <p>DATE: 14 MAY 2012</p> <p>SHEET No: 0</p> <p>VISTA ENG No: 1780-B1-015-1</p> <p>CLIENT ENG No: REV: 0</p>	
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LEGEND

- ◁ ▷ CONTROL PANEL FUSED TERMINAL
- ◁ ▷ CONTROL PANEL DISCONNECT TERMINAL
- ▲ FUSED TERMINAL PLC PANEL
- △ STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- ⊗ VENDOR TERMINAL

CHASSIS 1 (PSS)

SLOT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

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1780-81-016-1 CONDUIT AND CABLE SCHEDULE

8096-D-007 DC WIRING CONTROL PANEL PNL-PLC-100

REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION

ISSUED FOR REVIEW

REVISIONS

DESIGNED BY: MT

DRAWN BY: PKC

CHECKED BY: DT/PV

DATE: 2012.08.27

COMPUTER FILE: 178081016-1_R0

MURPHY
OIL CANADA

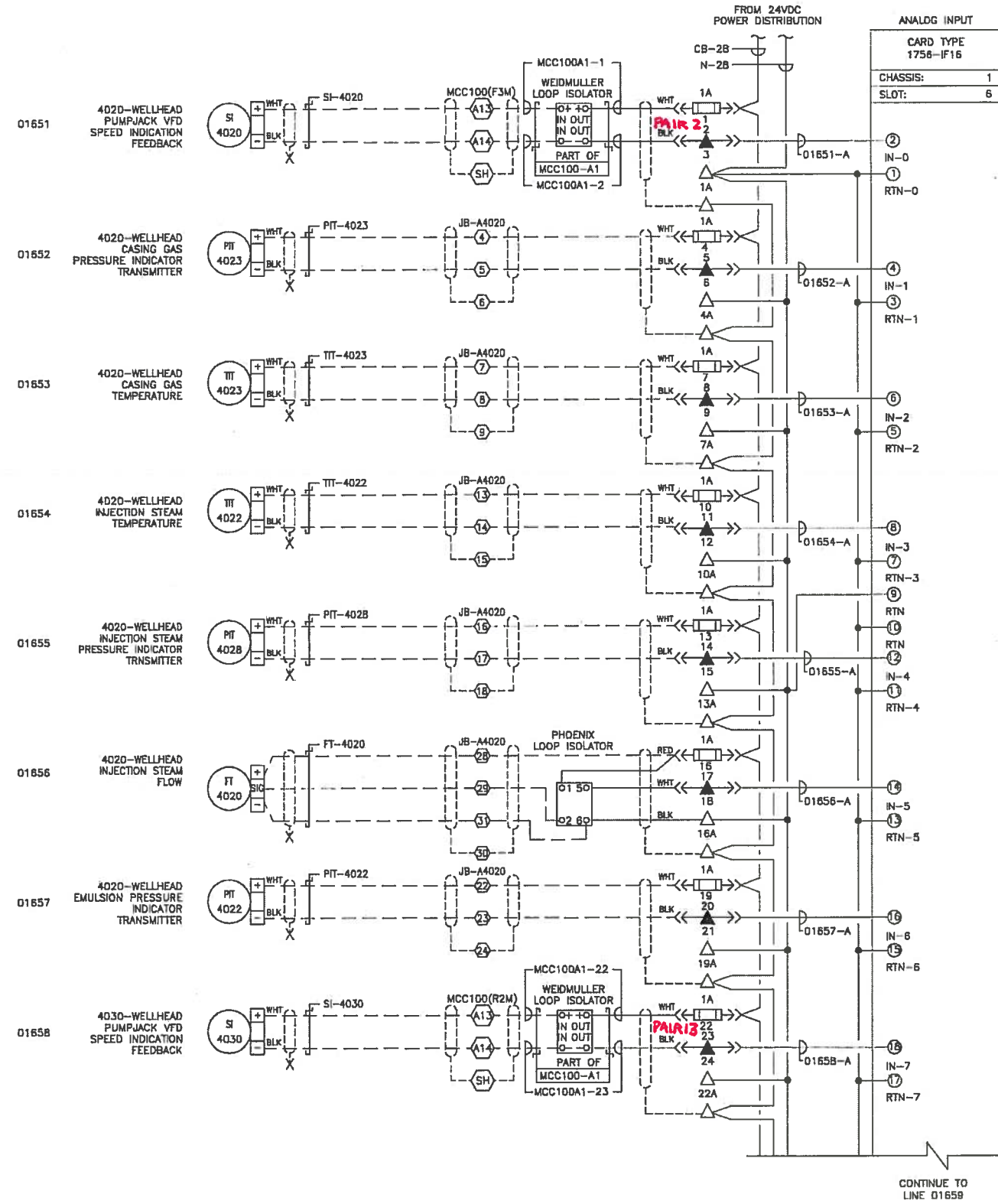
MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM

PLC SCHEMATIC - CHASSIS 1
ANALOG INPUT (AI)

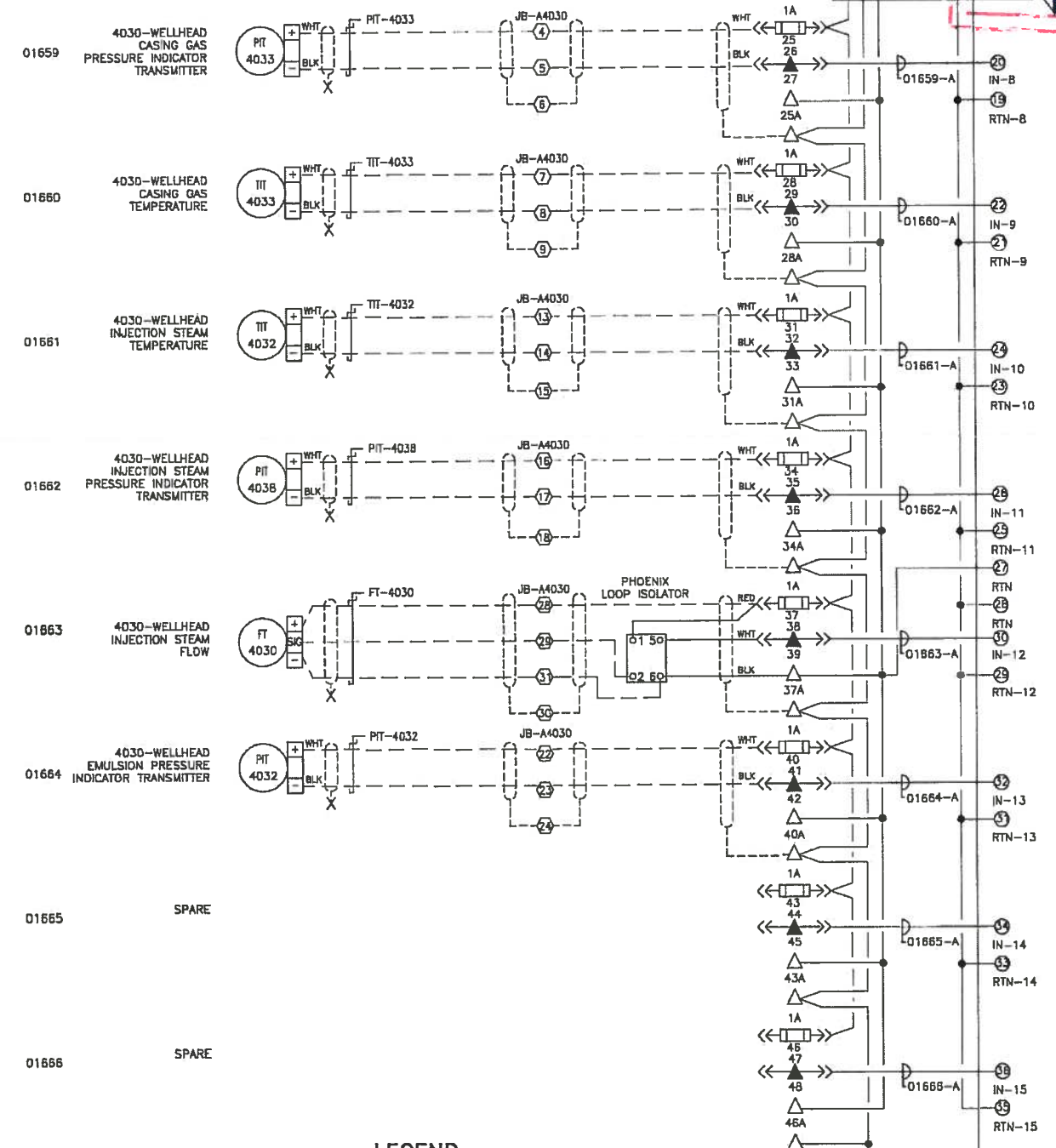
Vista
Projects Limited

SCALE: N.T.S.
DATE: 14 MAY 2012
SHEET No: 0
VISTA PROJ No: 1780-81-016-1
CLIENT PROJ No: 0

AS BUILT
 OCT 2 2012
 CONTINUE TO
 LINE 01658



CONTINUE TO
 LINE 01659



LEGEND

- ◁◁ □ ▷▷ CONTROL PANEL FUSED TERMINAL
- ◁◁ ▲ ▷▷ CONTROL PANEL DISCONNECT TERMINAL
- ▲ FUSED TERMINAL PLC PANEL
- △ STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- ⊗ VENDOR TERMINAL

NOTE

1. REFER TO INSTRUMENTATION INSTALLATION DETAILS XXXX FOR WIRING.

SLOT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

CHASSIS 1 (BPCS)

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PERMIT TO PRACTICE
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 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
 MIKE TANG
 AUG 03 2012

1780-BB-001-1	CONDUIT AND CABLE SCHEDULE	0	ISSUED FOR CONSTRUCTION	2012.08.03	PKC
8096-D-007	DC WIRING CONTROL PANEL PNL-PLC-100	A	ISSUED FOR REVIEW	2012.08.27	PKC
		NO.		DATE	ST

REVISIONS	DESCRIPTION	DATE	BY

DESIGNED BY:	MT
DRAWN BY:	PKC
CHECKED BY:	DT/PV
ENGINEER'S APPROVAL:	DT
COMPUTER FILE:	1780B1017-1_RD

MURPHY OIL CANADA
 MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM
 PLC SCHEMATIC - CHASSIS 1
 ANALOG INPUT (AI)

Vista Projects Limited
 SCALE: N.T.S.
 DATE: 14 MAY 2012
 SHEET No: D
 VISTA DOC No: 1780-B1-017-1
 CLIENT DOC No: REV. D

01751 AC-5020 BOILER
FEED WATER COOLER
INSIDE TEMPERATURE

01752 AC-5020 BOILER
FEED WATER COOLER
OUTLET TEMPERATURE

01753 AC-5020 BOILER
FEED WATER COOLER
FAN MOTOR VFD
SPEED INDICATION

01754 E-4060 COLD BFW
FLOW MEASUREMENT

01755 E-4060 EXCHANGER
OUTLET TEMPERATURE

01756 V-4040 TEST GAS
SEPARATOR WATER
CUT ANALYZER

01757 V-4040 TEST GAS
SEPARATOR EMULSION
FLOW MEASUREMENT

01758 V-4040 TEST GAS
SEPARATOR
EMULSION LEVEL
CONTROL

NOTES

1. JUNCTION BOX NUMBER AND TERMINAL NUMBERS TO BE CONFIRMED.

FROM 24VDC
POWER DISTRIBUTION

ANALOG INPUT

CARD TYPE
1756-IF16

CHASSIS: 1

SLOT: 8

IN-0

RTN-0

IN-1

RTN-1

IN-2

RTN-2

IN-3

RTN-3

RTN

RTN

IN-4

RTN-4

IN-5

RTN-5

IN-6

RTN-6

IN-7

RTN-7

CONTINUE TO
LINE 01759

01759 V-4040 TEST GAS
SEPARATOR FUEL GAS
FLOW MEASUREMENT

01760 V-4040 TEST GAS
SEPARATOR
PRODUCED GAS
PRESSURE CONTROL

01761 V-4040 TEST GAS
SEPARATOR
PRODUCED GAS
FLOW MEASUREMENT

01762 4010-WELLHEAD
EMULSION PIPELINE
TEMPERATURE
INDICATOR TRANSMITTER

01763 SPARE

01764 SPARE

01765 SPARE

01766 SPARE

LEGEND

- ◻ CONTROL PANEL FUSED TERMINAL
- ◻ CONTROL PANEL DISCONNECT TERMINAL
- ▲ FUSED TERMINAL PLC PANEL
- △ STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- ⊗ VENDOR TERMINAL

SLOT 0	SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10	SLOT 11	SLOT 12	SLOT 13	SLOT 14	SLOT 15	SLOT 16
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CHASSIS 1 (BPCS)

DESIGNED BY: MT

DRAWN BY: PKD

CHECKED BY: DT

ENGINEER'S APPROVAL: DT

COMPUTER FILE: 178081019-1_RD

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM

PLC SCHEMATIC - CHASSIS 1
ANALOG INPUT (AI)

Vista
Projects Limited

SCALE: N.T.S.
DATE: 14 MAY 2012
SHT No: 0 VISTA PROJ No: 1780-B1-019-1
CLIENT ENG No: REV: 0

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VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
Mike Tang
Aug 03, 2012

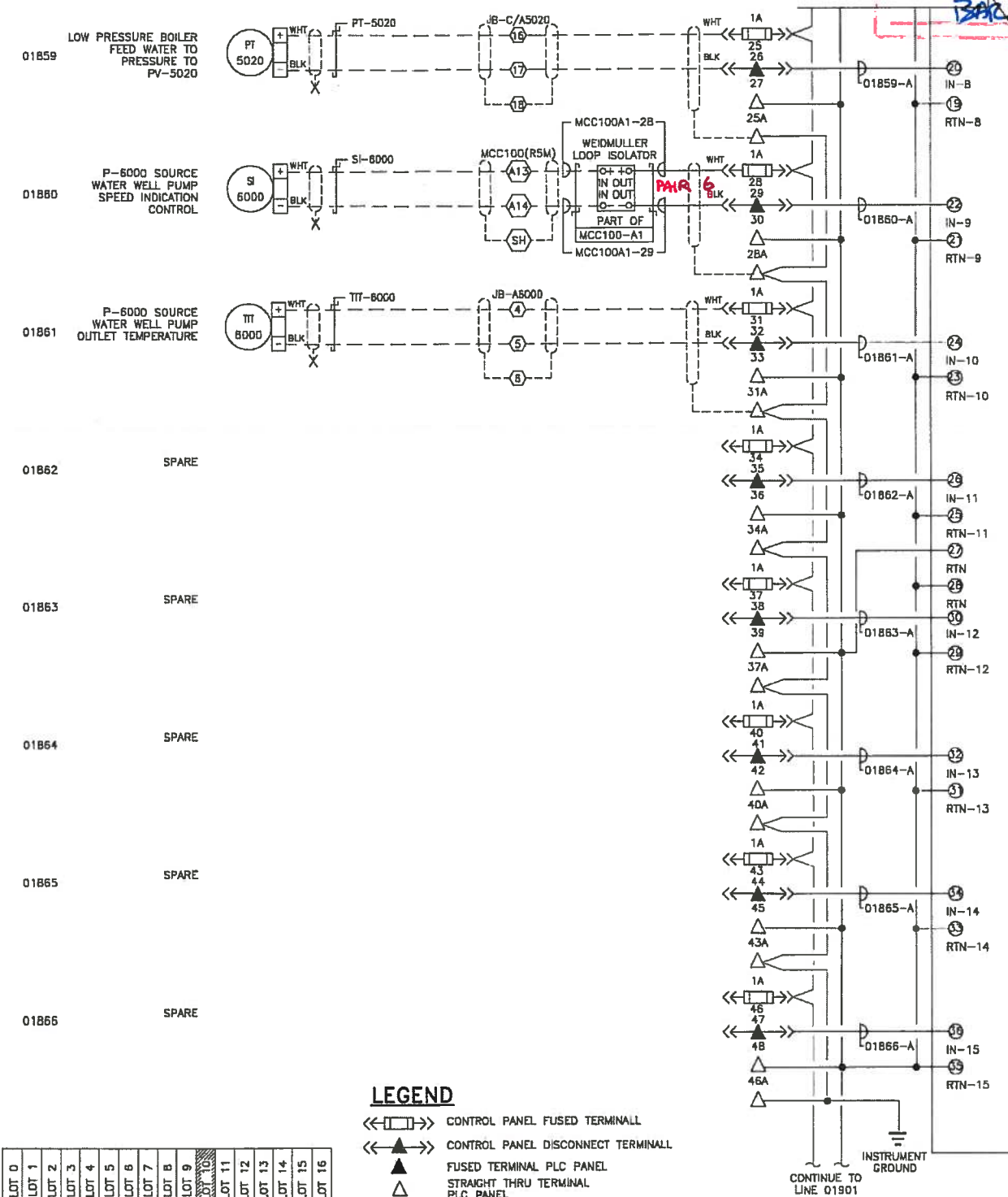
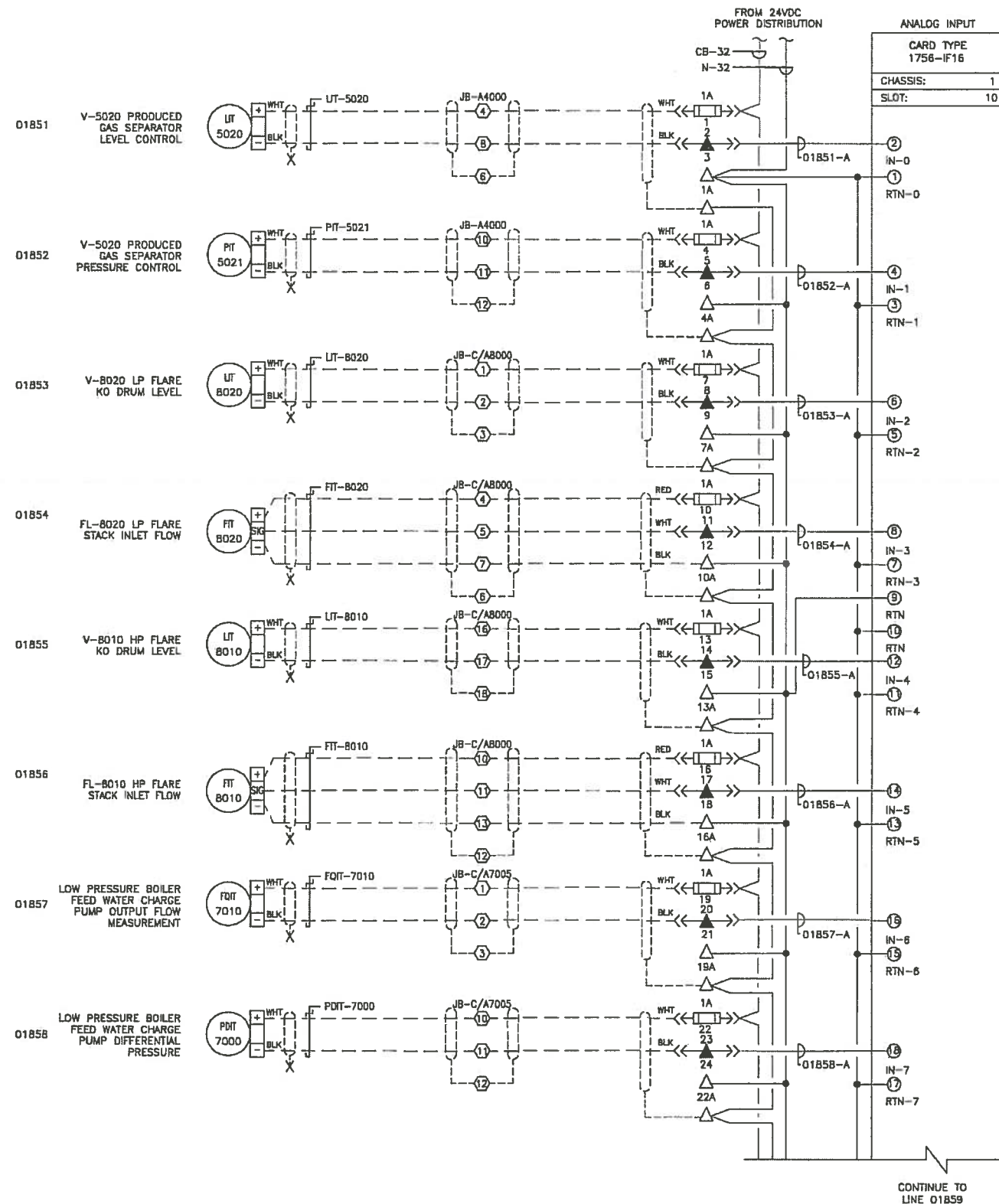
1780-88-001-1	CONDUIT AND CABLE SCHEDULE	0	ISSUED FOR CONSTRUCTION	2012-08-03	PKD
8096-D-007	DC WIRING CONTROL PANEL PNL-PLC-100	A	ISSUED FOR REVIEW	2012-05-27	DT
NUMBER	TITLE	NO.	DESCRIPTION	DATE	BY
REFERENCE DRAWINGS					
REVISIONS					

Both



 Vista Projects Limited	
SCALE	N.T.S.
DATE	14 MAY 2012
SNT Sys	D
VISTA DWG No.	1780-81-020-1
CLIENT DWG No.	
	REV. 0

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OCT 23 2012
CONTINUE TO
LINE 01858



LEGEND

- ◻ CONTROL PANEL FUSED TERMINAL
- ◻ CONTROL PANEL DISCONNECT TERMINAL
- ▲ FUSED TERMINAL PLC PANEL
- △ STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- ⊗ VENDOR TERMINAL

SLOT 0	SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10	SLOT 11	SLOT 12	SLOT 13	SLOT 14	SLOT 15	SLOT 16

CHASSIS 1 (BPCS)

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APEGGA PERMIT No.
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Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
Mike Taylor
Aug 03, 2012

1780-B8-001-1	CONDUIT AND CABLE SCHEDULE	0	ISSUED FOR CONSTRUCTION	2012.08.03	PKC
8086-D-007	DC WIRING CONTROL PANEL PNL-PLC-100	A	ISSUED FOR REVIEW	2012.08.27	PKC
REFERENCE DRAWINGS		REVISIONS			

DESIGNED BY: MT
DRAWN BY: PKC
CHECKED BY: DT/PV
ENGINEERS APPROVAL: DT
COMPUTER FILE: 1780B1021-1_R0

MURPHY
OIL CANADA

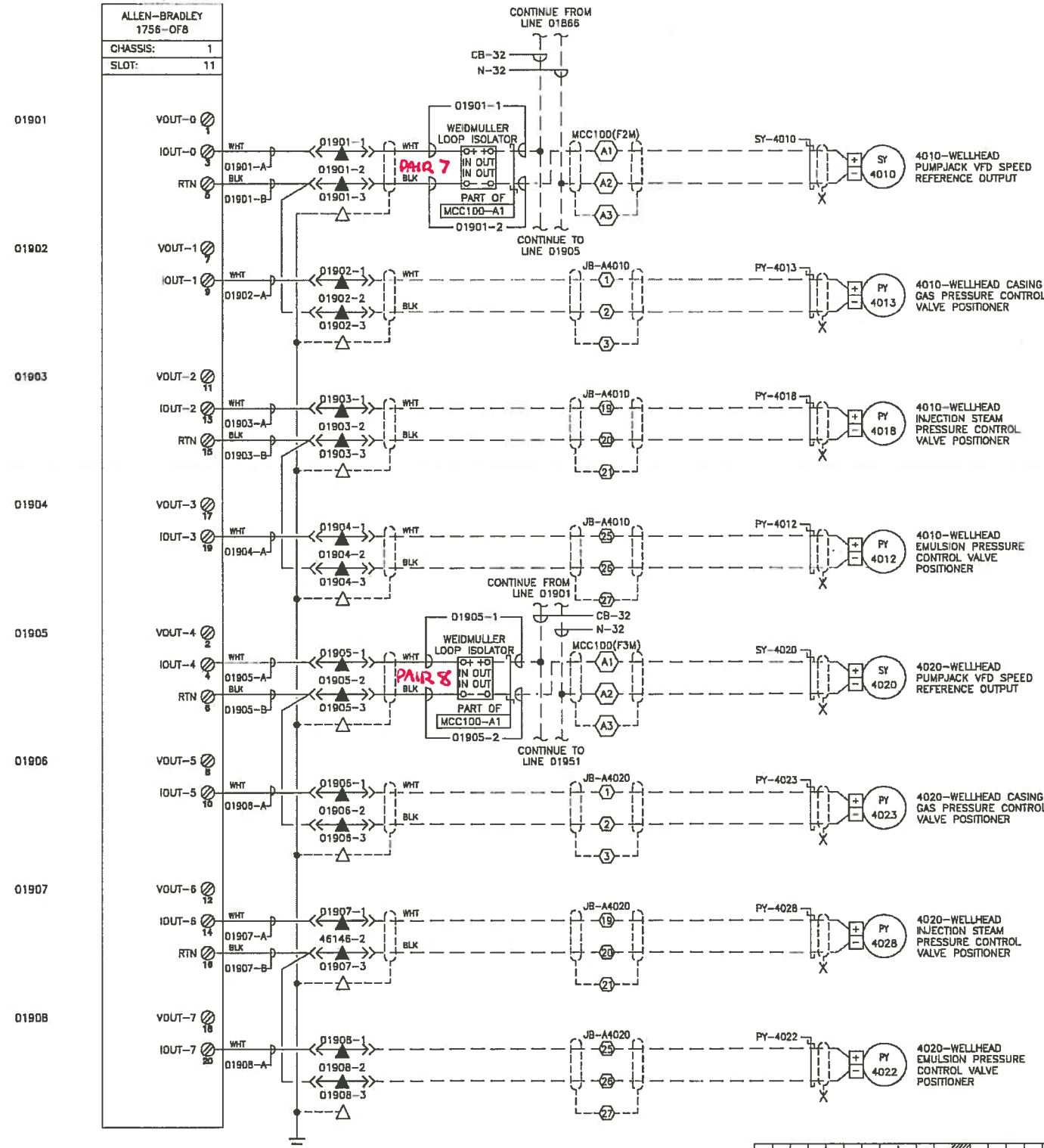
MURPHY CADOTIE PILOT CSS 13-9-B5-17 WSM

PLC SCHEMATIC - CHASSIS 1
ANALOG INPUT (AI)

Vista
Projects Limited

SCALE	N.T.S.
DATE	14 MAY 2012
SHT No	D
VISTA DWG No.	1780-B1-021-1
CREAT DWG No.	
REV.	0

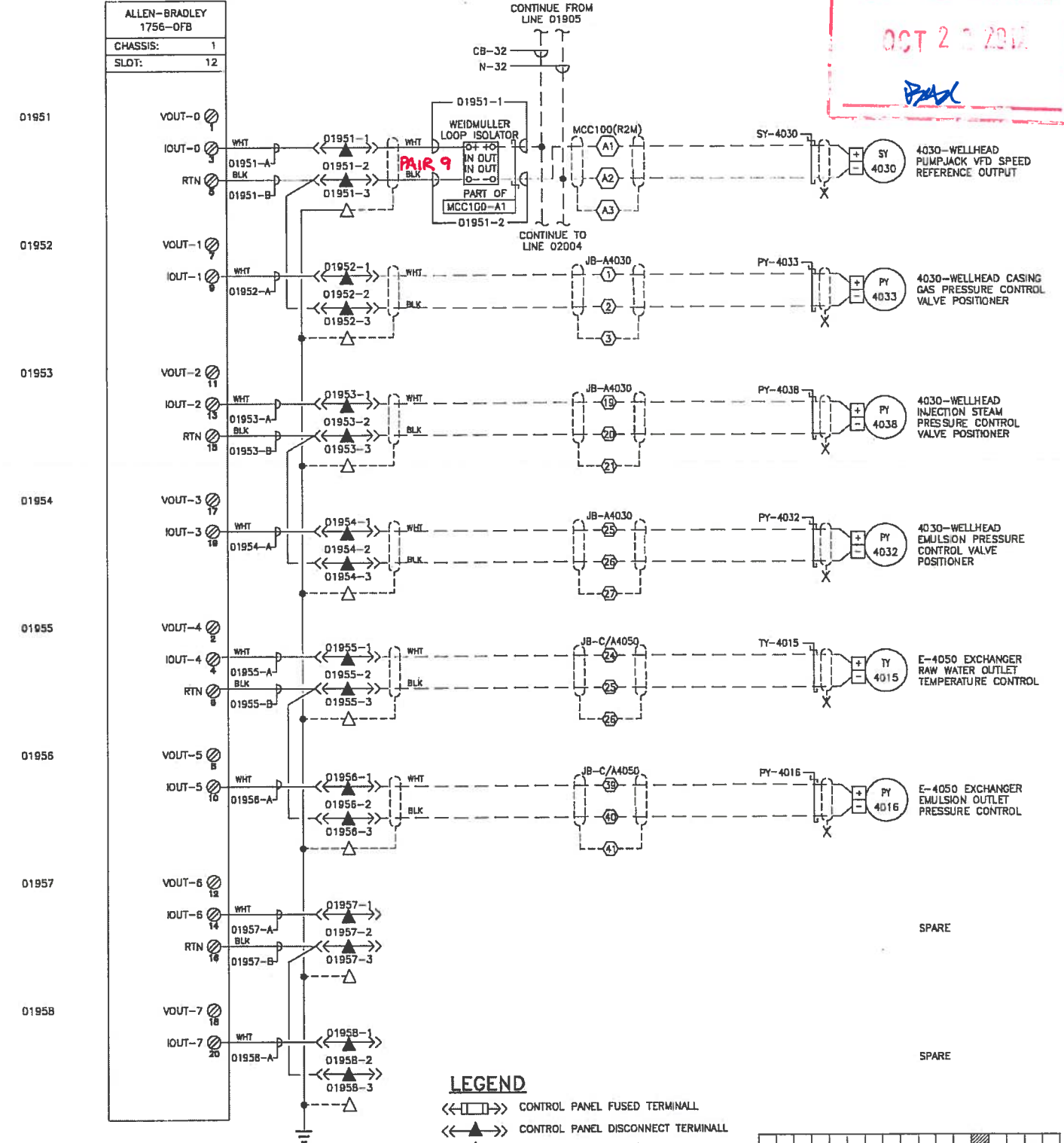
ANALOG OUT
 ALLEN-BRADLEY
 1756-OF8
 CHASSIS: 1
 SLOT: 11



SLOT 0	SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10	SLOT 11	SLOT 12	SLOT 13	SLOT 14	SLOT 15	SLOT 16
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CHASSIS 1 (BPCS)

ANALOG OUT
 ALLEN-BRADLEY
 1756-OF8
 CHASSIS: 1
 SLOT: 12



SLOT 0	SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10	SLOT 11	SLOT 12	SLOT 13	SLOT 14	SLOT 15	SLOT 16
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CHASSIS 1 (BPCS)

LEGEND

- ◻ CONTROL PANEL FUSED TERMINAL
- ◻ CONTROL PANEL DISCONNECT TERMINAL
- ▲ FUSED TERMINAL PLC PANEL
- △ STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- ⊗ VENDOR TERMINAL

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 P 04559
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
 MIKE TANG
 2012-05-02

1780-BB-001-1 CONDUIT AND CABLE SCHEDULE
 8098-D-007 DC WIRING CONTROL PANEL PNL-PLC-100
 NUMBER TITLE

REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION
 2012.08.03 PKC
 ISSUED FOR REVIEW
 2012.08.27 PKC

REVISIONS

DESIGNED BY: MT
 DRAWN BY: PKC
 CHECKED BY: DT/PV
 ENGINEER'S APPROVAL: DT
 COMPUTER FILE: 1780B1022-1_R0

MURPHY
 OIL CANADA

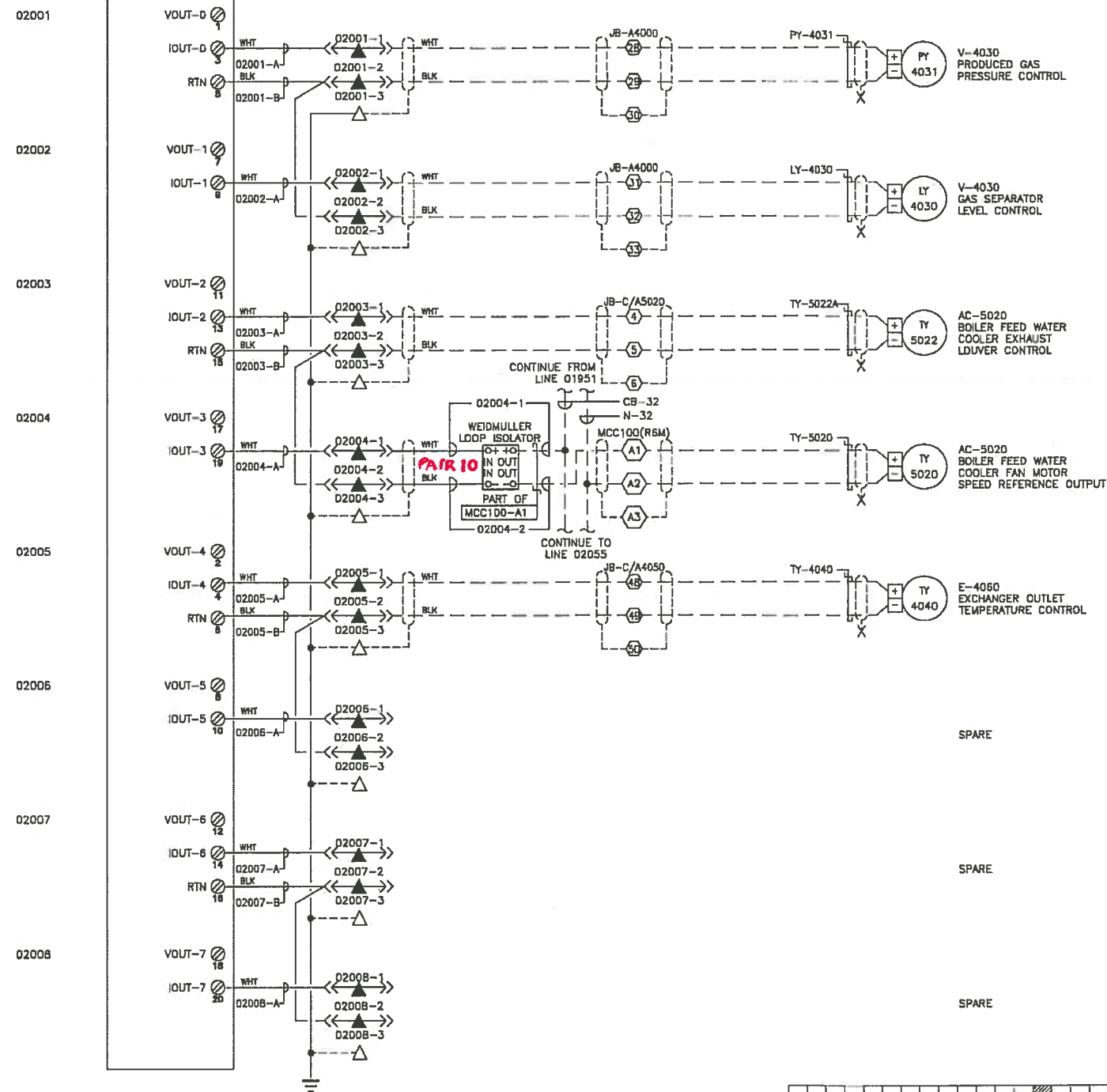
MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM

PLC SCHEMATIC - CHASSIS 1
 ANALOG OUTPUT (AO)

Vista
 Projects Limited

SCALE: N.T.S.
 DATE: 14 MAY 2012
 BY: D
 CHECKED: D
 1780-B1-022-1
 REV: 0

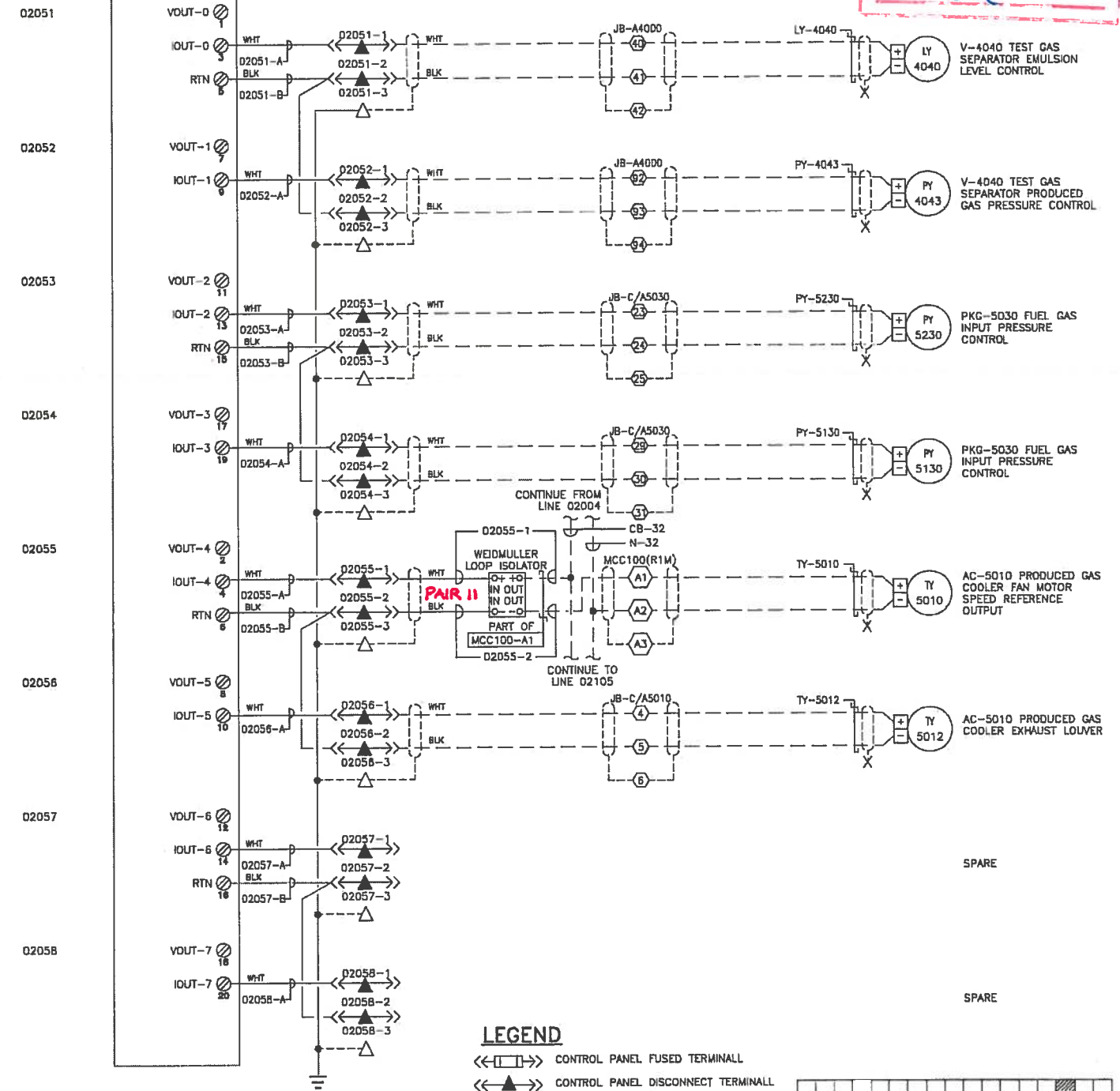
ANALOG OUT
 ALLEN-BRADLEY
 1756-OFB
 CHASSIS: 1
 SLOT: 13



SLOT 0	SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10	SLOT 11	SLOT 12	SLOT 13	SLOT 14	SLOT 15	SLOT 16

CHASSIS 1 (BPCS)

ANALOG OUT
 ALLEN-BRADLEY
 1756-OFB
 CHASSIS: 1
 SLOT: 14



LEGEND

- ◁▷ CONTROL PANEL FUSED TERMINAL
- ◁▷ CONTROL PANEL DISCONNECT TERMINAL
- ▲ FUSED TERMINAL PLC PANEL
- △ STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- ⊗ VENDOR TERMINAL

SLOT 0	SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10	SLOT 11	SLOT 12	SLOT 13	SLOT 14	SLOT 15	SLOT 16

CHASSIS 1 (BPCS)

PERMIT TO PRACTICE
 VISTA PROJECTS LIMITED
 APEGGA PERMIT No.
 P 04559
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
 ALLEN
 Mike Tang
 Aug 03. 2012

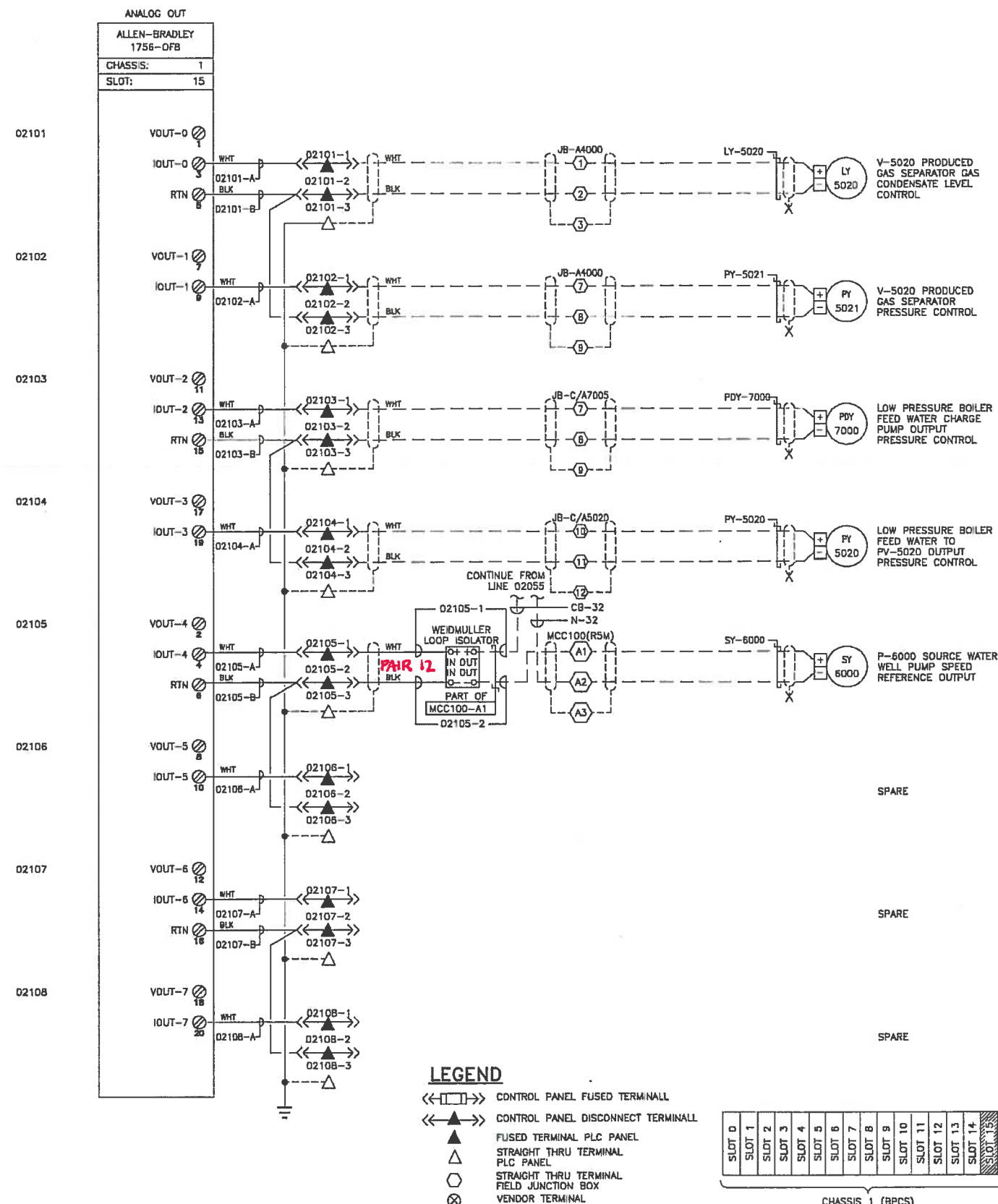
1780-68-001-1	CONDUIT AND CABLE SCHEDULE	0	ISSUED FOR CONSTRUCTION	2012.08.03	PKC
8096-D-007	DC WIRING CONTROL PANEL PNL-PLC-100	A	ISSUED FOR REVIEW	2012.08.27	PKC
NAME	TITLE	NO.	DESCRIPTION	DATE	BY
REFERENCE DRAWINGS			REVISIONS		

DESIGNED BY: MT
 DRAWN BY: PKC
 CHECKED BY: DT
 DATE: 2012.08.03
 COMPUTER FILE: 1780B1023-1_R0

MURPHY
 OIL CANADA
 MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM
 PLC SCHEMATIC - CHASSIS 1
 ANALOG OUTPUT (AO)

Vista
 Projects Limited
 SCALE: N.T.S.
 DATE: 14 MAY 2012
 SHEET No: 0
 VISTA DWG No: 1780-B1-023-1
 CLIENT DWG No: REV: 0

AS BUILT
OCT 2 2012
Btd



2012-May-02 10:42:13 AM

PERMIT TO PRACTICE
VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
WIKI TANG
Aug 3, 2012

1780-88-001-1	CONDUIT AND CABLE SCHEDULE	0	ISSUED FOR CONSTRUCTION	2012.08.03	PKC	ENGINEER'S APPROVAL
8096-D-007	DC WIRING CONTROL PANEL PNL-PLC-100	A	ISSUED FOR REVIEW	2012.06.27	PKC	DT
REFERENCE DRAWINGS		REVISIONS				COMPUTER FILE 178081024-1_R0

DESIGNED BY: MT
DRAWN BY: PKC
CHECKED BY: D/PV
DATE: 2012.08.03
BY: DT

MURPHY
OIL CANADA

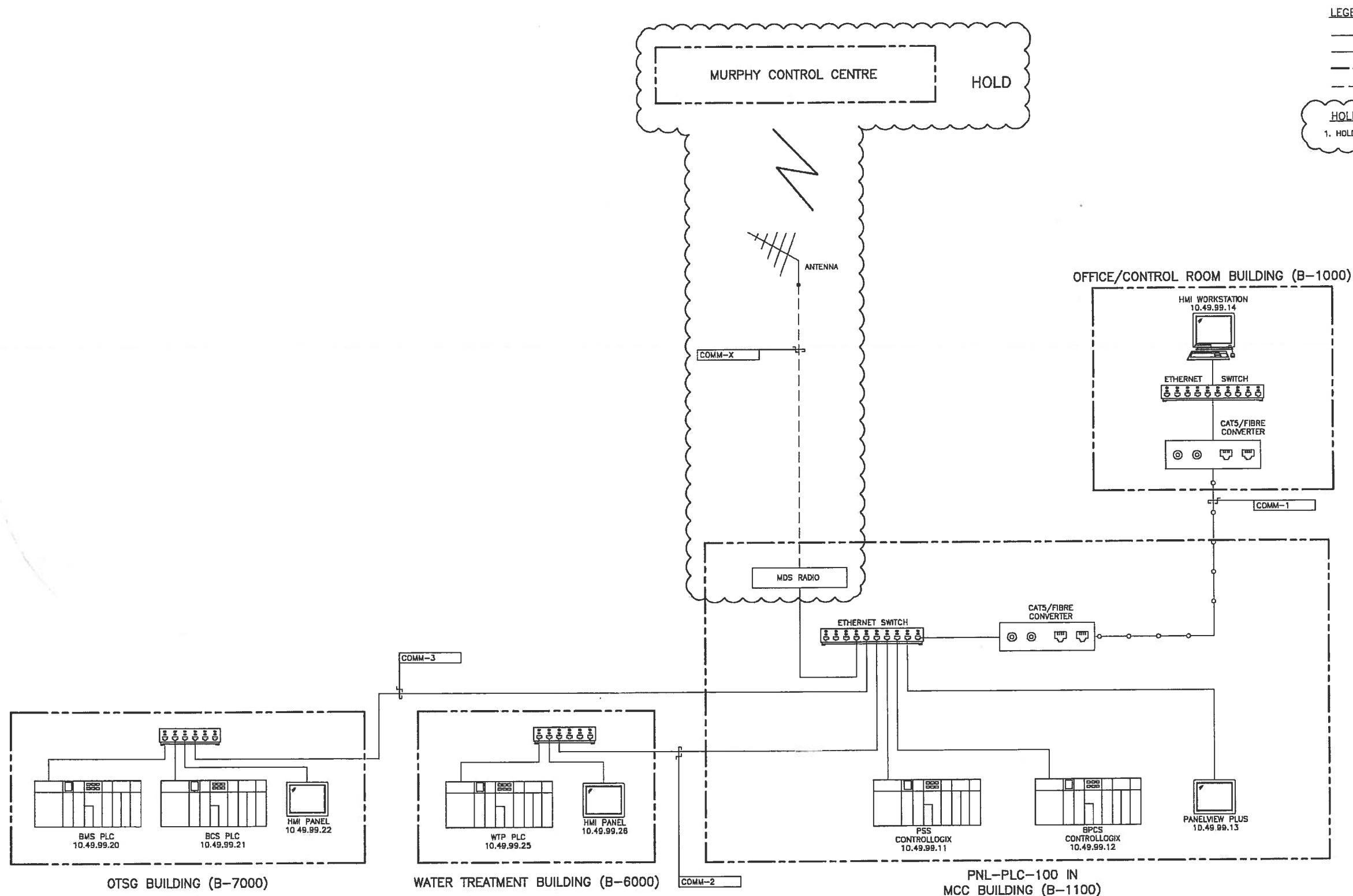
MURPHY CADOTTE PILOT CSS 13-9-B5-17 WSM

PLC SCHEMATIC - CHASSIS 1
ANALOG OUTPUT (AO)

Vista
Projects Limited

SCALE: N.T.S.
DATE: 14 MAY 2012
SHEET: 0 VISTA DOC No. 1780-81-024-1
CLIENT DOC No. REV. 0

2012-May-02 10:42:13 AM



		DESIGNED BY: MT			
		DRAWN BY: PWC			
		CHECKED BY: DT/PT			
		ENGINEER'S APPROVAL: DT			
		COMPUTER FILE: 1780B1001-1_R0			
1780-B8-001-1	CONDUIT AND CABLE SCHEDULE	B	ISSUED FOR IMPLEMENTATION	2012.08.03	PKC
8096-D-007	DC WIRING CONTROL PANEL PNL-PLC-100	A	ISSUED FOR REVIEW	2012.06.27	PKC
NUMBER	TITLE	NO.	DESCRIPTION	DATE	BY
REFERENCE DRAWINGS			REVISIONS		

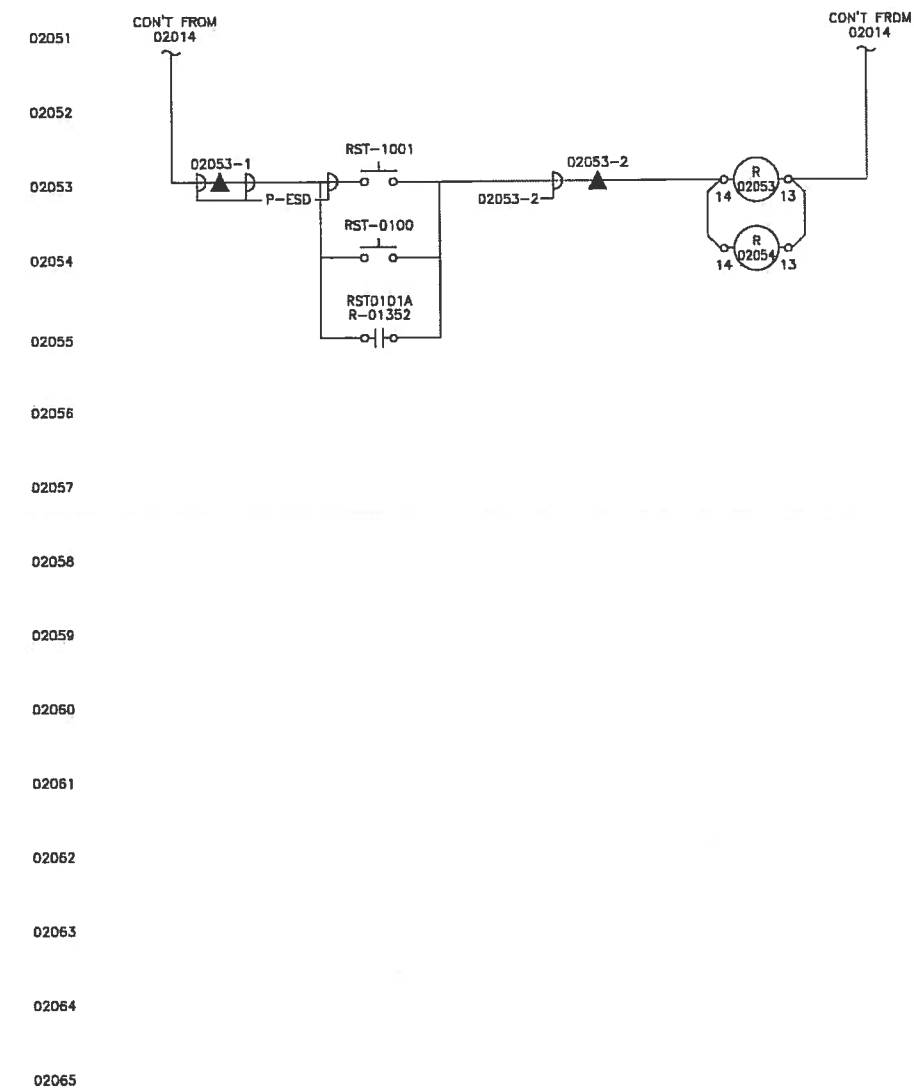


MURPHY CADOTTE PILOT CSS 13-9-B5-17 WSM

CONTROL SYSTEM ARCHITECTURE





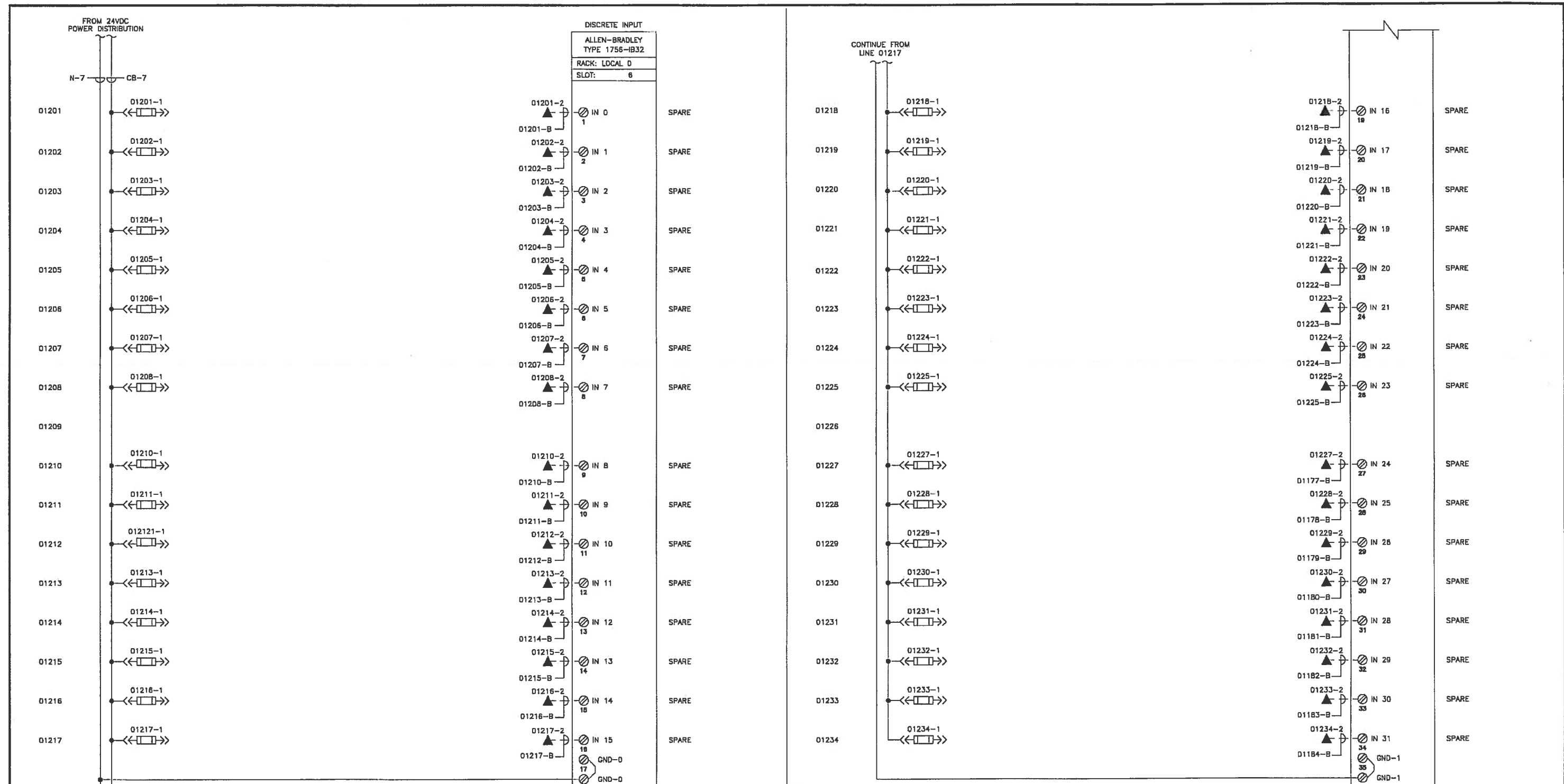
SCALE	N.T.S.
DATE	14 MAY 2012
SHT No	D
VISTA DNG No.	1780-B1-001-1
CLIENT DNG No.	
REV.	B



2012-May-02 10:42:13 AM

PROFESSIONAL ENGINEER
MIKE TANG
Aug 03, 2012

						DESIGNED BY: MT MT		 MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM		 SCALE: N.T.S. DATE: 14 MAY 2012 SHT SIZE: D VISTA DWG NO.: 1780-81-002-1 CLIENT DWG NO.:	
						DRAWN BY:					
						CHECKED BY: PKC DT/PV AJ		PNL-PLC-100 ESD/RESET WIRING DIAGRAM			
						ENGINEER'S APPROVAL: DT JLB					
1780-68-001-1 CONDUIT AND CABLE SCHEDULE		O ISSUED FOR CONSTRUCTION		2012.08.03		PKC					
8089-D-007 DC WIRING CONTROL PANEL PNL-PLC-100		A ISSUED FOR REVIEW		2012.08.27		PKC					
NUMBER TITLE		NO.		DESCRIPTION		DATE BY		COMPUTER FILE		REVISIONS	
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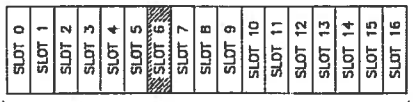


NOTES

- 1. ALL ALARM POINTS SHALL BE WIRED IN SUCH A WAY THAT AN OPEN CONTACT INDICATES ABNORMAL SITUATION.
- 2. ALL VALVE SWITCHES SHALL BE WIRED IN SUCH A WAY THAT FOR ZSO SWITCH CLOSED INDICATES VALVE IS OPEN; FOR ZSC SWITCH CLOSED INDICATES VALVE IS CLOSED.
- 3. ALL LEVEL SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR LSHH SWITCH OPEN INDICATES LEVEL HIGH; FOR LSLH SWITCH OPEN INDICATES LEVEL LOLO.
- 4. ALL PRESSURE SWITCH SHALL BE WIRED IN SUCH A WAY THAT FOR PSHH SWITCH OPEN INDICATES PRESSURE HIGH HIGH; FOR PSLH SWITCH OPEN INDICATES PRESSURE LOLO.

LEGEND

- ◁◁-□-▷▷ CONTROL PANEL FUSED TERMINAL
- ◁◁-▲-▷▷ CONTROL PANEL DISCONNECT TERMINAL
- ▲ FUSED TERMINAL PLC PANEL
- △ STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- ⊗ VENDOR TERMINAL



2012-May-02 10:42:13 AM

PERMIT TO PRACTICE
VISTA PROJECTS LIMITED
APEGA PERMIT No.
P 04559
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

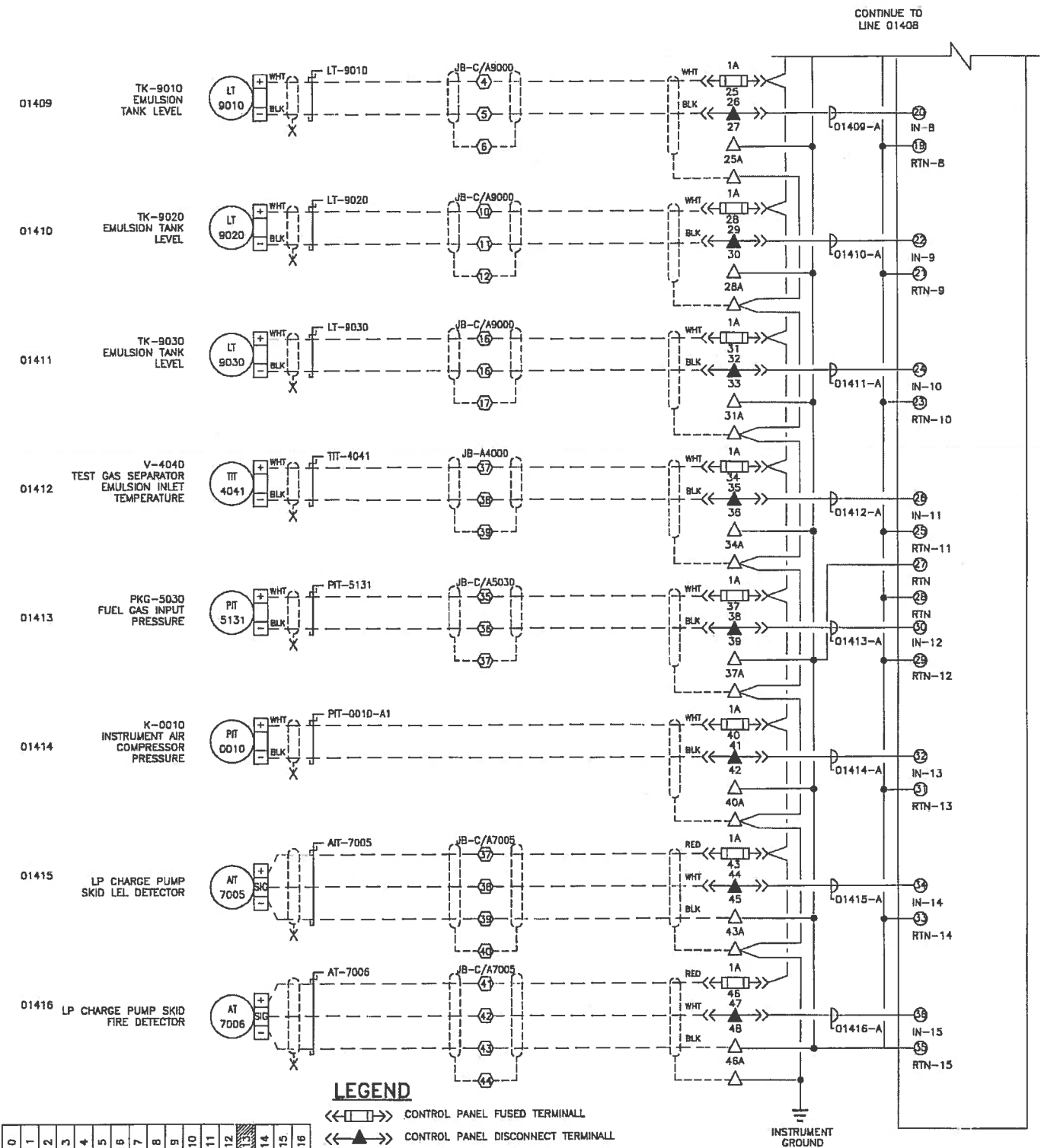
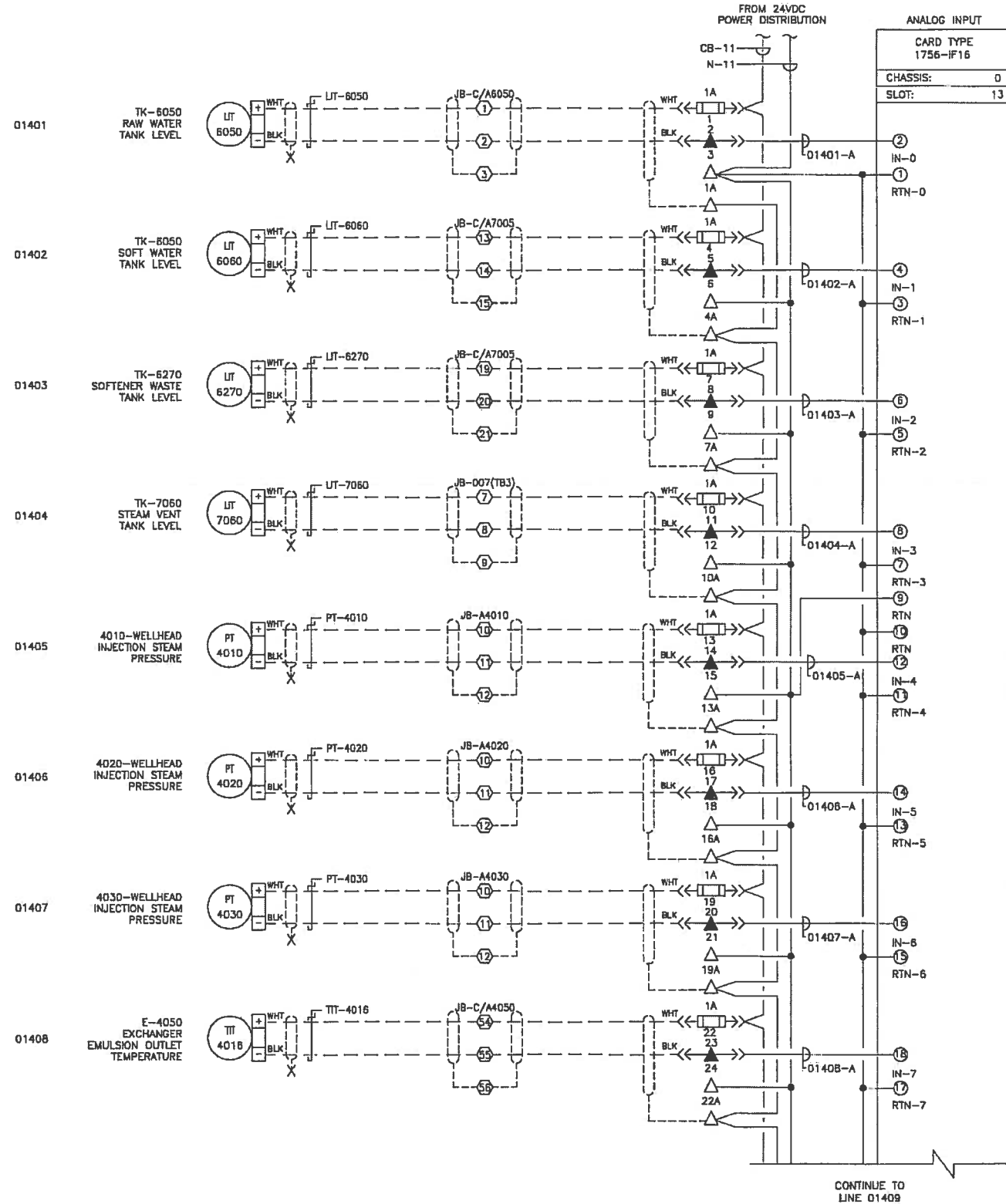
PROFESSIONAL ENGINEER
WILLIAM TANG
1780-B1-007-1
Aug 03, 2012

NUMBER	TITLE	REVISIONS
1780-B1-001-1	CONDUIT AND CABLE SCHEDULE	D ISSUED FOR CONSTRUCTION
8096-D-007	DC WIRING CONTROL PANEL PNL-PLC-100	A ISSUED FOR REVIEW

DESIGNED BY: MT
DRAWN BY: PKC
CHECKED BY: DT/PV
DATE: 2012.08.03
DATE: 2012.06.27
COMPUTER FILE: 1780B1007-1_RD

MURPHY OIL CANADA
MURPHY CADOTIE PILOT CSS 13-9-B5-17 WSM
PLC SCHEMATIC - CHASSIS 0
DISCRETE INPUT (DI)

Vista Projects Limited
SCALE: N.T.S.
DATE: 14 MAY 2012
SHEET No: D
VISTA PROJ No: 1780-B1-007-1
CLIENT ENG No: REV: 0



2012-May-02 10:42:13 AM

PERMIT TO PRACTICE
VISTA PROJECTS LIMITED
APEGGA PERMIT No.
P 04559
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
MIKE TANG
Aug 03, 2012

1780-68-001-1 CONDUIT AND CABLE SCHEDULE
8096-D-007 DC WIRING CONTROL PANEL PNL-PLC-100
NUMBER TITLE

REFERENCE DRAWINGS

ISSUED FOR CONSTRUCTION
ISSUED FOR REVIEW
DATE BY

REVISIONS

DESIGNED BY: MT
DRAWN BY: PKC
CHECKED BY: DT/PV
ENGINEER'S APPROVAL: DT
COMPUTER FILE: 1780B1011-1_R0

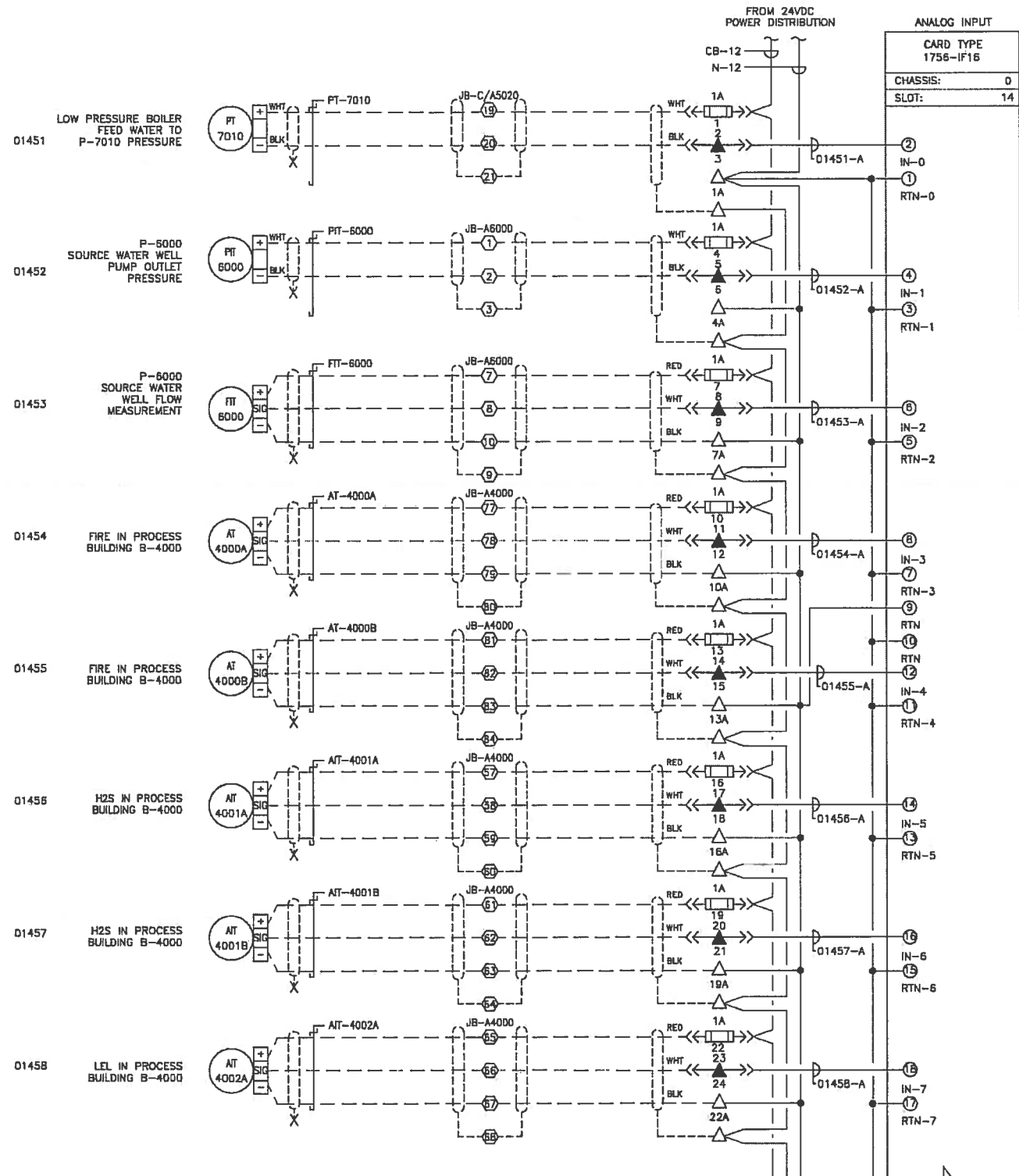
MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM

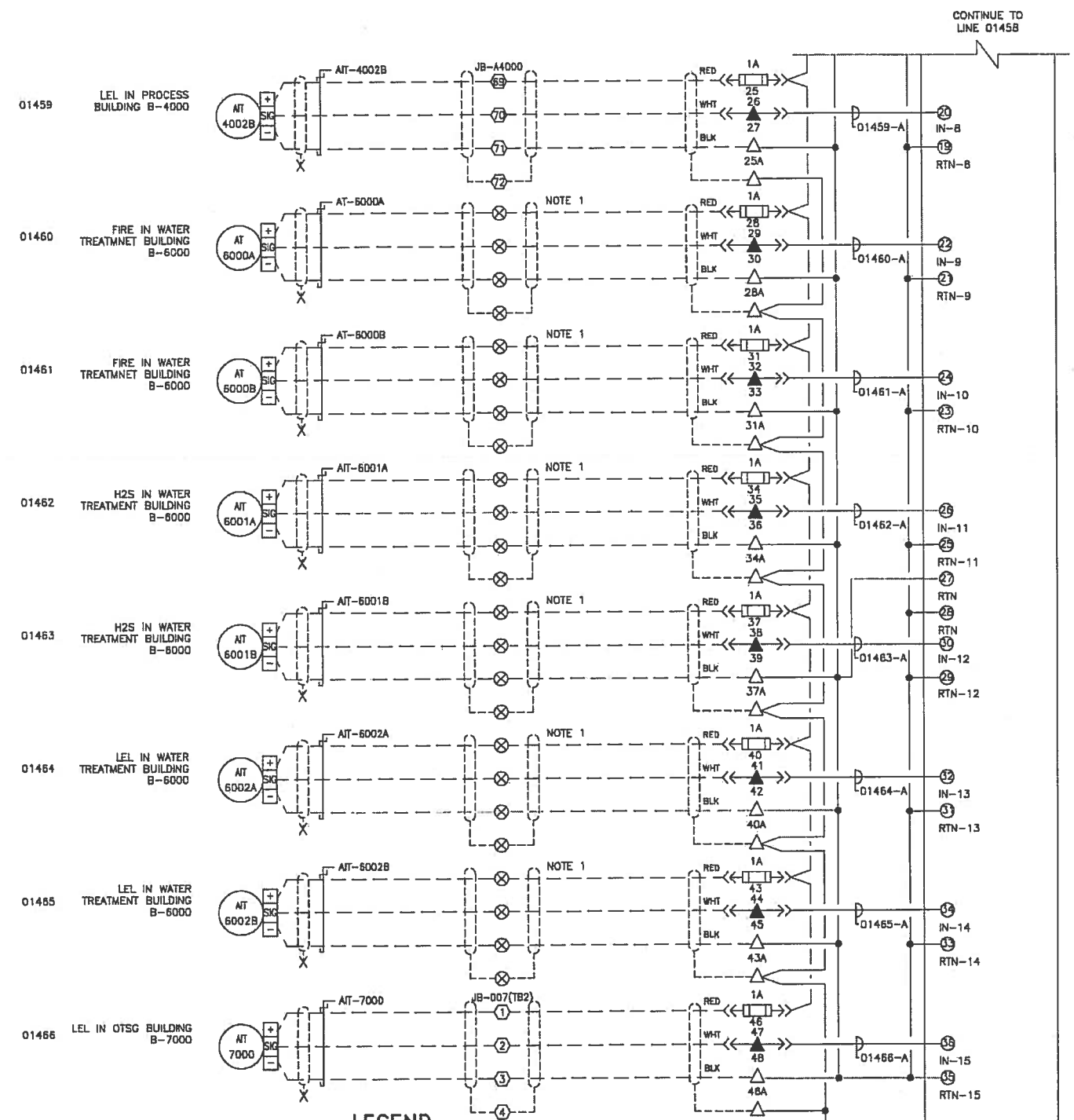
PLC SCHEMATIC - CHASSIS D
ANALOG INPUT (AI)

Vista
Projects Limited

SCALE: N.T.S.
DATE: 14 MAY 2012
SHEET No: D VISTA PNL No: 1780-81-011-1
CLIENT PNL No: REV: 0



NOTES
 1. REFER TO THE RESPECTIVE BUILDING VENDOR JUNCTION BOX DRAWING FOR TERMINAL NUMBERS.



LEGEND

◀◀ [] ▶▶ CONTROL PANEL FUSED TERMINAL

◀◀ [] ▶▶ CONTROL PANEL DISCONNECT TERMINAL

▲ FUSED TERMINAL PLC PANEL

△ STRAIGHT THRU TERMINAL PLC PANEL

○ STRAIGHT THRU TERMINAL FIELD JUNCTION BOX

⊗ VENDOR TERMINAL

INSTRUMENT GROUND

PERMIT TO PRACTICE
VISTA PROJECTS LIMITED

APEGA PERMIT No.
P 04559

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
Mike Tang
Aug 03, 2012

1780-68-001-1	CONDUIT AND CABLE SCHEDULE	0	ISSUED FOR CONSTRUCTION	2012.08.03	PKC
8095-0-007	DC WIRING CONTROL PANEL PNL-PLC-100	A	ISSUED FOR REVIEW	2012.08.27	PKC
REFERENCE DRAWINGS		REVISIONS			

DESIGNED BY: MT

DRAWN BY: PKC

CHECKED BY: DT/PV

ENGINEER'S APPROVAL: DT

COMPUTER FILE: 178081012-1_R0

MURPHY
OIL CANADA

MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM

PLC SCHEMATIC - CHASSIS 0
ANALOG INPUT (AI)

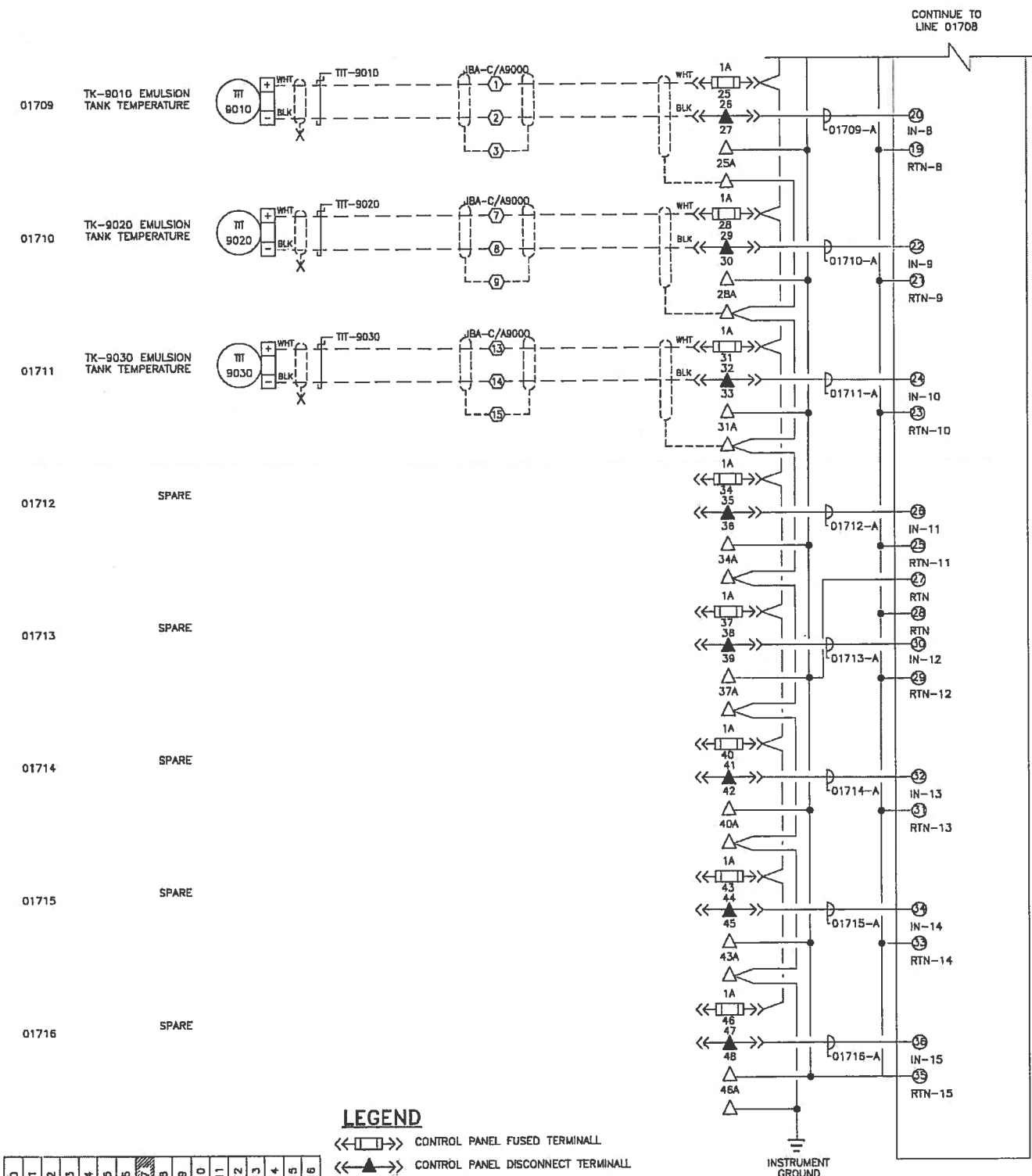
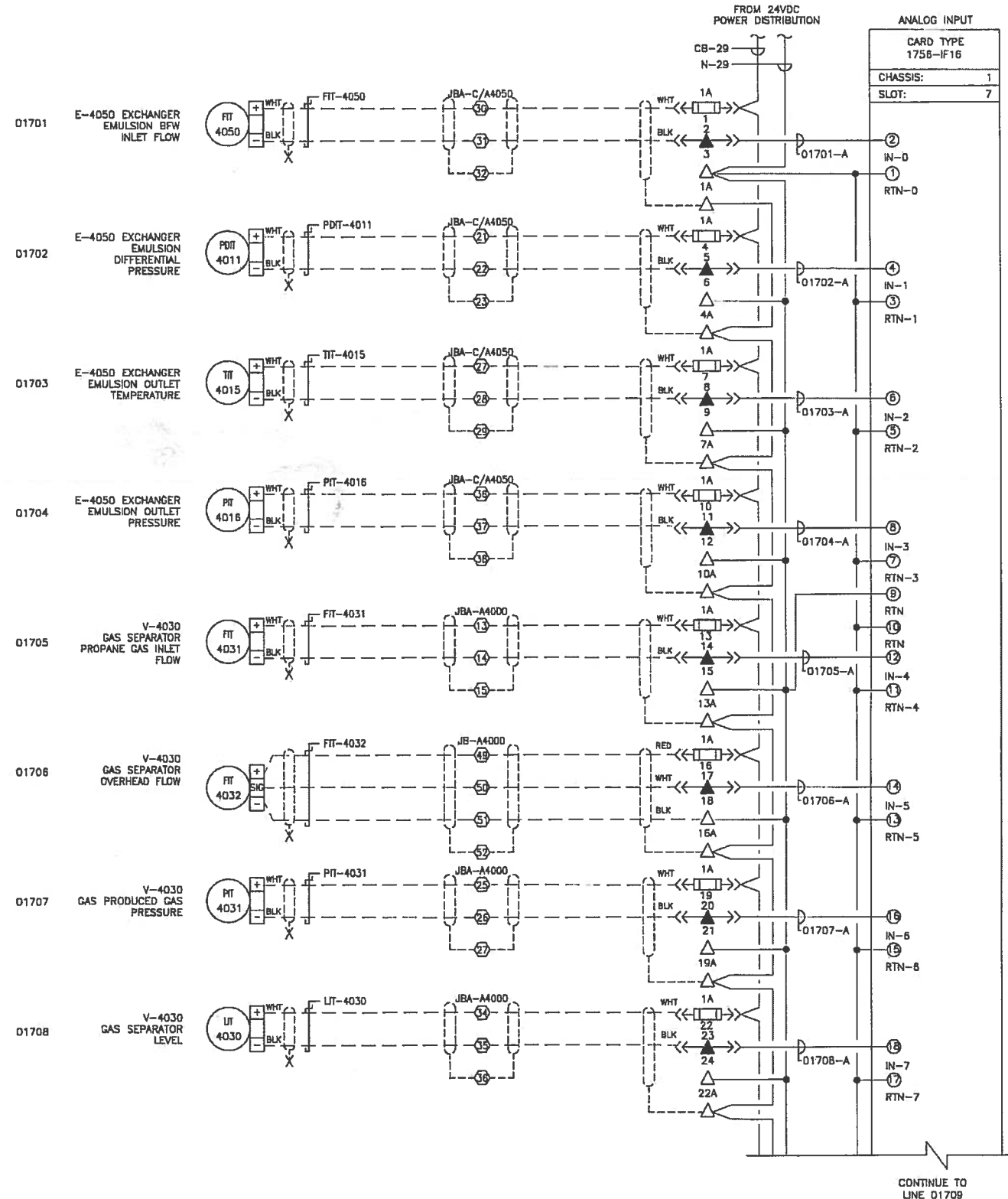
Vista
Projects Limited

SCALE: N.T.S.

DATE: 14 MAY 2012

SHT No: D VISTA SNG No: 1780-B1-012-1

CLIENT DWG No: 0




LEGEND



- ◀◀◻▶▶ CONTROL PANEL FUSED TERMINAL
- ◀◀◻▶▶ CONTROL PANEL DISCONNECT TERMINAL
- ▲ FUSED TERMINAL PLC PANEL
- △ STRAIGHT THRU TERMINAL PLC PANEL
- STRAIGHT THRU TERMINAL FIELD JUNCTION BOX
- ⊗ VENDOR TERMINAL

SLOT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

CHASSIS 1 (BPCS)

2012-05-02 10:42:13 AM

PERMIT TO PRACTICE VISTA PROJECTS LIMITED APEGGA PERMIT No. P 04559 The Association of Professional Engineers, Geologists and Geophysicists of Alberta	 Mike Tang Aug 03. 2012	1780-BB-001-1 CONDUIT AND CABLE SCHEDULE		0	ISSUED FOR CONSTRUCTION	2012.08.03	PKC
		1780-BB-007 DC WIRING CONTROL PANEL PNL-PLC-100		A	ISSUED FOR REVIEW	2012.08.27	PKC
		REFERENCE DRAWINGS		REVISIONS		DATE	

DESIGNED BY:	MT	 MURPHY OIL CANADA MURPHY CADOTTE PILOT CSS 13-9-85-17 WSM PLC SCHEMATIC - CHASSIS 1 ANALOG INPUT (AI)	 Vista Projects Limited
DRAWN BY:	PKC		
CHECKED BY:	DT/PV		
ENGINEER'S APPROVAL:	DT		
COMPUTER FILE		1780B101B-1_R0	

SCALE	N.T.S.
DATE	14 MAY 2012
SHT No.	D
VISTA DOC No.	1780-B1-018-1
CLIENT DOC No.	
REV.	0

Clarification

"All rights, title and interests, including copyright ownership, to all information and materials that may be provided by ABB Inc. ("ABB") shall remain the property of ABB.

Terms:

Our price is based on progress invoicing due "Net 30 days", and is calculated on percent complete of project. We have based our pricing with anticipation of work being performed in the second quarter of 2012. Due to fluctuation of copper our cable and wire pricing is to be revised at time of order based on most current market pricing.

Sincerely,

ABB BER-MAC

Christa Boutin

Estimator

T 403-357-3733

C

christa.l.boutin@ca.abb.com

Copied to: File

Attachments: ABB Inc.-Terms and Conditions of Sale-BerMac.pdf

Area Office: Red Deer

T 403-357-3733

F



Warwick Primary source of standard 20GA Doors

50 % of 3'-0" x 7'-0" x 20GA Honey comb core lock seam Blank doors

DAYBAR

▶ **About Daybar**

- A Truly North American Company
- Company History

▶ **The Delta Advantage**

▶ **Warranty Programs**

▶ **Our Products**

- New Prime Painted Products
- Delta Series Doors
- LS Series Doors
- Decorator Series Door
- Pressed Steel Frames
- Expandable Frames

▶ **Our Services**

- Stock Program
- Custom Program
- Distributor Services

▶ **Our People**

▶ **Our Distributors**

▶ **Press Releases**

▶ **Technical Documents & Articles**

▶ **Daybar International**

▶ **Downloadable Forms**



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ASSOCIATION
A DIVISION OF NAAMM

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ourproducts

LS SERIES DOORS

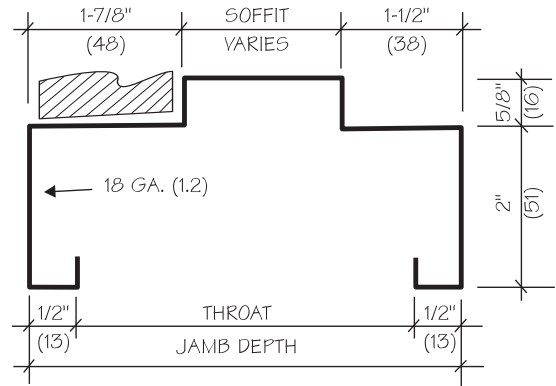
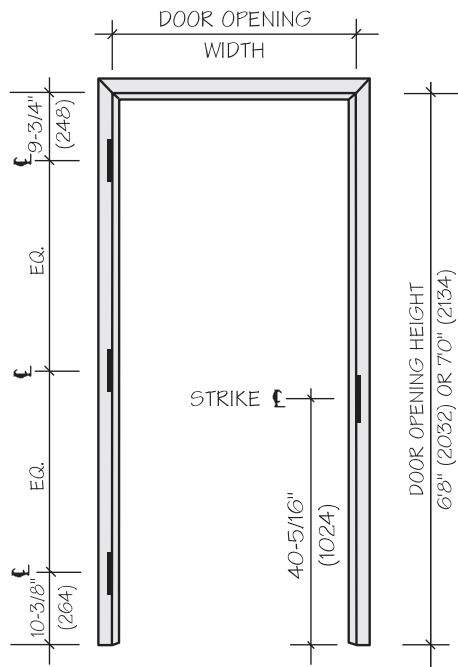


Daybar's LS Series of doors combine many of the must have product features in an economical and cost effective package. These doors offer excellent value and are ideally suited for light commercial and industrial applications. All LS Series doors are manufactured to CSDMA, SDI and HMMA / NAAMM specifications.

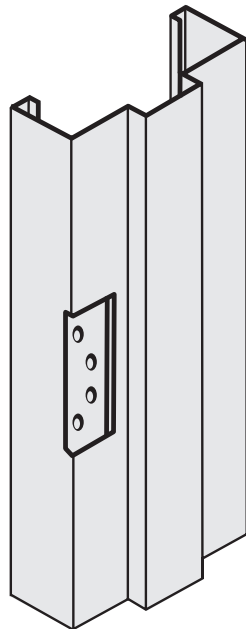
Product Feature	LS Series Door
Design	Lock Seam Bevelled Edge
Base Material	A60 Galvanneal
Skin Gages Available	20 Gage
Compliance	SDI 100 Warnock Hersey Fire Rated*
Standard Core	1" Kraft Honeycomb Cell
Hinge Reinforcement	10 gage Galvanneal

*Contact [Product Services](#) for full details

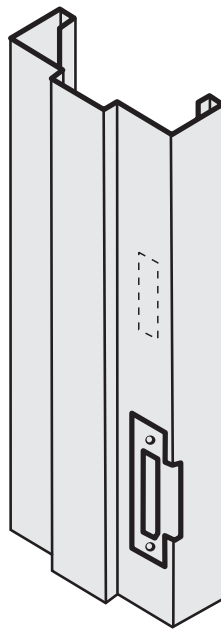
K SERIES STANDARD FRAMES



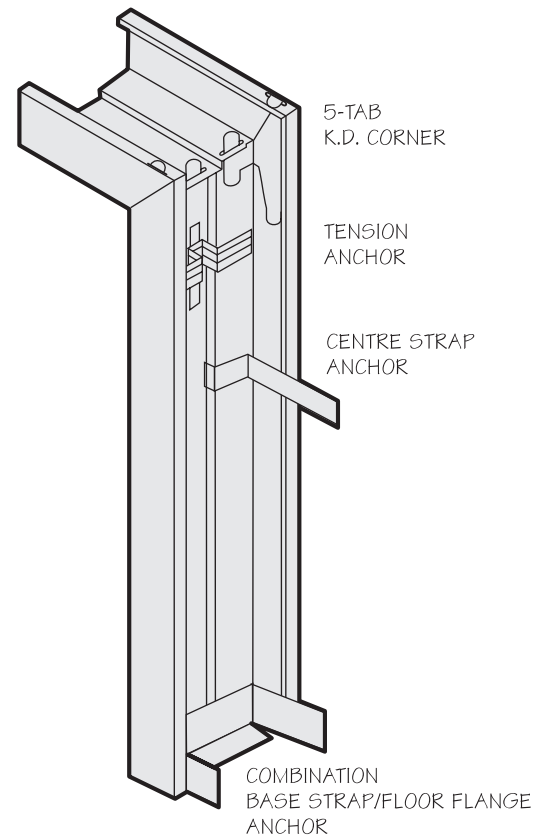
MODEL	THROAT	JAMB DEPTH	SOFFIT
350K	3-1/2" (89)	4-1/2" (114)	1-1/8" (28)
462K	4-5/8" (118)	5-5/8" (143)	2-1/4" (57)
487K	4-7/8" (124)	5-7/8" (149)	2-1/2" (64)
525K	5-1/4" (133)	6-1/4" (159)	2-7/8" (73)
675K	6-3/4" (172)	7-3/4" (197)	4-3/8" (111)



4-1/2" (114) HINGE
PREPARATION-
10 GA. (3.4) REINF.
WITH DUST BOX



4-7/8" (124) STRIKE
PREPARATION
[ANSI A115.1]
14 GA. (2.0) REINF.
WITH DUST BOX.
MULTI-CENTRE
DEADBOLT KNOCKOUT
WITH DUST BOX.



PRINTED IN CANADA

PROJECT:

DATE:

SH: OF

☒ LH ☐

SWING KEY

☐ RH ☒

Fibre Glass Building Insulation

1. PRODUCT NAME

CertainTeed Fibre Glass Building Insulation

2. MANUFACTURER

CertainTeed Corporation
P.O. Box 860
Valley Forge, PA, USA 19482-0105
Phone: 800-233-8990
610-341-7000
Fax: 610-341-7994
Fax-On-Demand: 800-947-0057
Website: www.certainteed.com

3. PRODUCT DESCRIPTION

Basic Use: Fibre glass building insulation is intended for use in either residential or commercial construction as thermal and acoustical insulation in ceilings, walls and floors.

The product is unfaced and designed for use in standard wood stud and steel frame assemblies.

Benefits: Installing fibre glass building insulation is an easy, cost effective method to help conserve energy in residential and commercial new construction, remodeling, and

reinsulation projects. In addition to its thermal properties, fibre glass building insulation also provides excellent acoustical performance. It is compression packaged for ease of handling, and its broad availability of R-values and sizes ensures the right product for the job.

Composition and Materials: The product is composed of yellow, uniformly textured, inorganic glass fibres.

Sizes: Available standard sizes are listed in the table below. Contact CertainTeed for non-standard sizes.

Limitations: Insulation shall not be installed over or within 75 mm (3 in.) of recessed light fixtures, unless the fixture is identified for contact with insulation, Type IC.

Because of potential skin irritation, unfaced building insulation should not be used in an exposed installation.

All building insulation should be kept dry. Wet fibre glass insulation will lose its effectiveness until it dries. Fibre glass will often dry naturally and regain its original R-value.



UNFACED

However, under conditions where the insulation will not dry thoroughly it should be removed and allowed to dry or be replaced.

4. TECHNICAL DATA

Applicable Standards:

- National Building Code 1995
Article 9.25.2.2
CAN/ULC-S702-1997
CCMC Evaluation Listing
No. 13020-L
CSA A101-M1993
CAN/CGSB-51.11-92

Fire Resistance:

- CAN/ULC-S102-1998
Flame Spread: 5
Smoke Developed: 0
CAN4-S114-1980
Noncombustibility—Pass
ULC-S129-1995
Smolder Resistance—Pass

Quality Assurance: Many of CertainTeed's manufacturing plants are registered to ISO 9001-2000 standards.

Available Sizes							
R-Value		Thickness		width		Length	
R	RSI	in.	mm	in.	mm	in.	mm
12	2.1	3 1/2	89	15, 23 16, 24	381, 584 406, 610	47 48	1194 1219
13	2.3	3 1/2	89	15, 23	381, 584	47	1194
14	2.4	3 1/2	89	15, 23	381, 584	47	1194
20	3.5	6	152	15, 23 16, 24	381, 584 406, 610	47 48	1194 1219
22	3.9	5 1/2	140	15, 14.75	315	47	1194
24	4.2	6	152	15, 23	381, 584	47	1194
28	4.9	8 1/2	216	16, 24	406, 610	48	1219
31	5.4	9 1/2	241	16, 24	406, 610	48	1219
35	6.1	10 1/2	267	16, 24	406, 610	48	1219
40	7.0	11 1/4	286	16, 24	406, 610	48	1219

5. INSTALLATION

The standard practice for installing fibre glass batts in wood studs is to friction fit batts into stud cavities. When batts completely fill stud cavities, they are constrained by studs at their edges and by wall facings front and rear.

- When fibre glass batts are installed in ceiling or floor joists, they must be supported by a ceiling finish material or another material such as wire.
- Where vapour control is required, the vapour retarder shall be installed per the 1995 National Building Code, Section 9.25.

6. AVAILABILITY AND COST

For availability and cost, contact your local distributor, or call CertainTeed Sales Support Group at 800-233-8990.

7. WARRANTY

Refer to CertainTeed's Lifetime Limited Insulation Warranty for Fibre Glass Building Insulation (30-21-1321).

8. MAINTENANCE

No maintenance required.

9. TECHNICAL SERVICES

Technical assistance can be obtained by calling CertainTeed at 800-233-8990.



ASK ABOUT OUR OTHER CERTAINTEED PRODUCTS AND SYSTEMS:

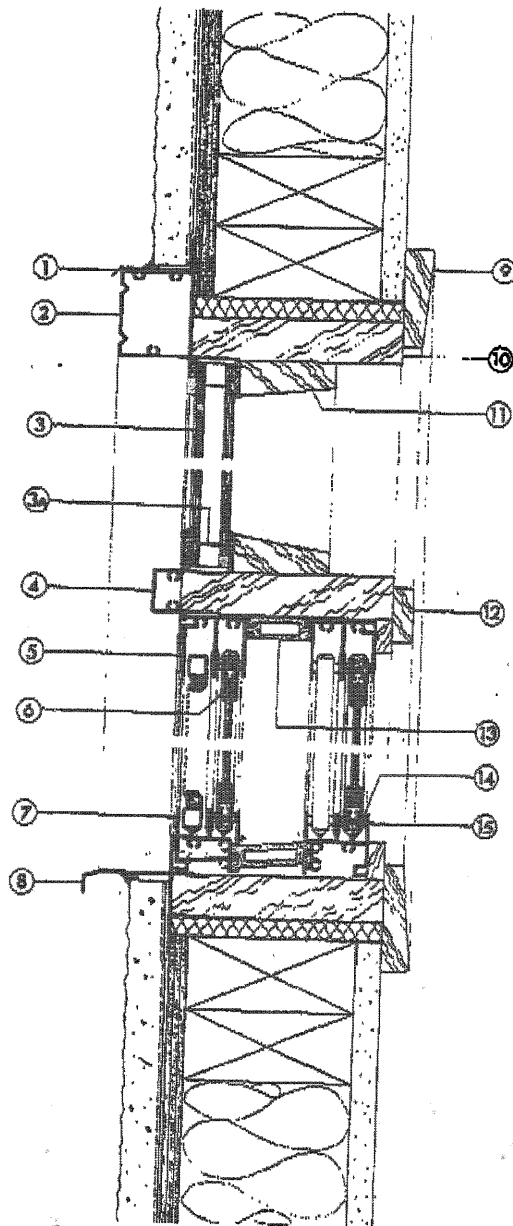
EXTERIOR: ROOFING • SIDING • WINDOWS • FENCE • RAILING • TRIM • DECKING • FOUNDATIONS • PIPE
INTERIOR: INSULATION • GYPSUM • CEILINGS

CertainTeed Corporation
P.O. Box 860
Valley Forge, PA 19482

Professional: 800-233-8990
Consumer: 800-782-8777
www.certainteed.com

CertainTeed 

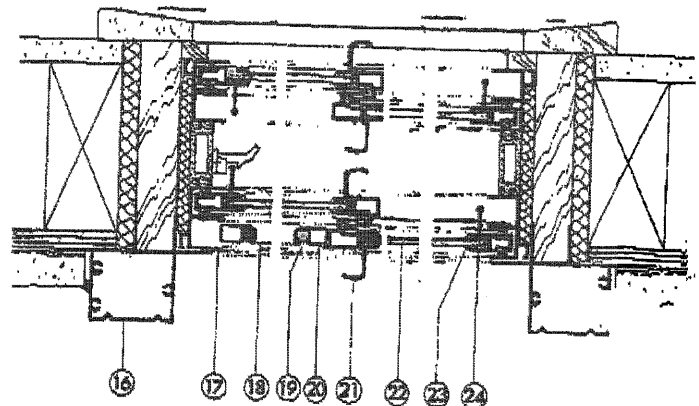
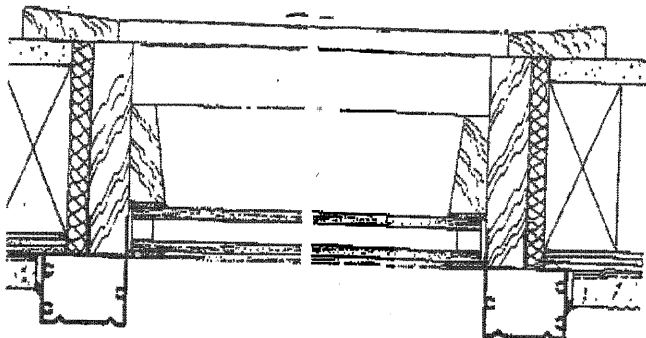
Sealed Units with Slider below



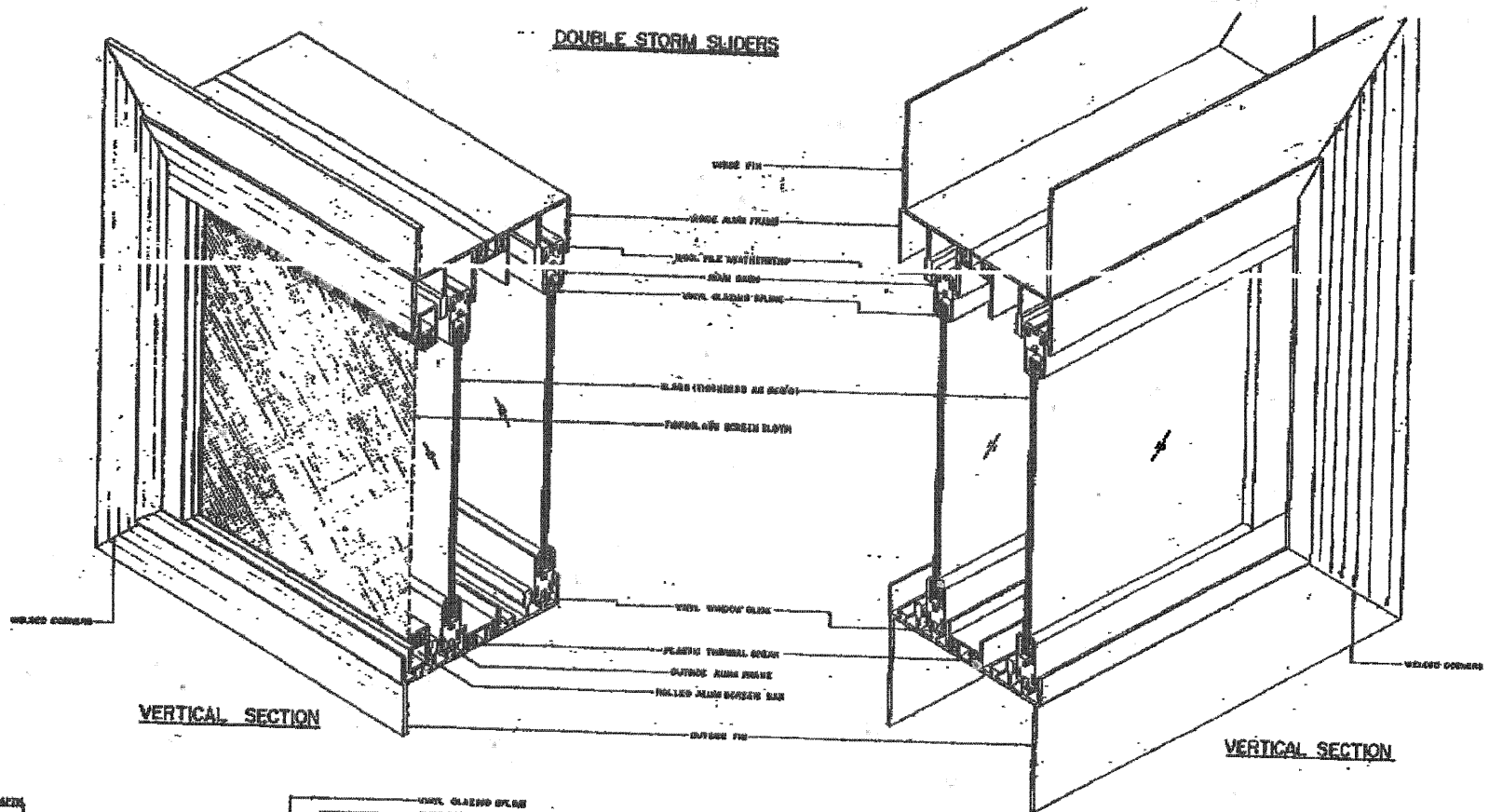
1. Weather Flashing by Others
2. Extruded Aluminum Double Beaded Casing (Baked enamel finish avail.)
3. Sealed Unit (3A) — Sealed Unit Frame
4. Extruded Aluminum Horizontal Mullion Casing
5. Thermo Slider Top Track
6. Thermo Slider Sash
7. Thermo Slider Bottom Track
8. Extruded Aluminum Sill Drip Cap
9. Inside Wood Casing Supplied by Others
10. Wooden Top Frame for Sealed Unit
11. Wooden Stops
12. Wood Casing Inside Supplied by Others
13. Vinyl Thermo Break (Thermo Slider)
14. Double Pile Weather Stripping
15. Inside Bottom Track Thermo Slider
16. Thermo Casing Side Porion
17. Outside Track Thermo Slider
18. Fibreglass Screen Cloth
19. Vinyl Screen Spline
20. Aluminum Screen Bar
21. Extruded Aluminum Tubular Meeting Rail
22. Glass as per CMHC Specs.
23. Vinyl Glazing
24. Extruded Aluminum Tubular Lift Rail with Double Weather Stripping

SUPREME
ALUMINUM WINDOW SYSTEMS
12200-100 Street, Edmonton, Alberta

Phone 447-1070 Fax 447-1659

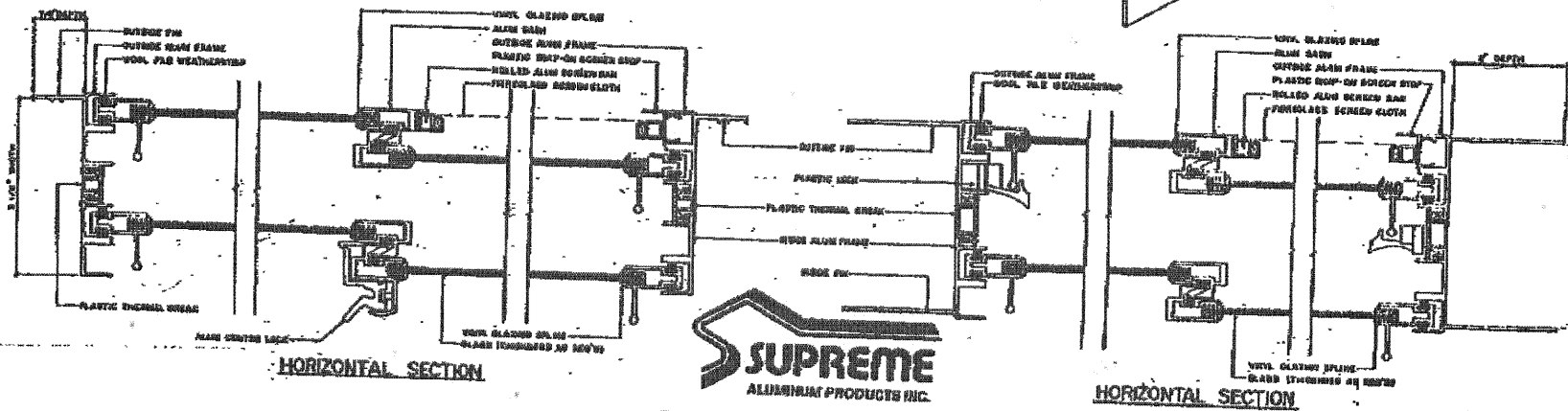


DOUBLE STORM SLIDERS



VERTICAL SECTION

VERTICAL SECTION



HORIZONTAL SECTION

HORIZONTAL SECTION

SUPREME
ALUMINUM PRODUCTS INC.

Edmonton, Alberta T5V 1A9 Phone 447-1070 Fax 447-1659









11530-142 Sp.

OUELLET MODEL OAS
 15kW HEATING CAPACITY
 480/3/60
 c/w WALL BRACKET AND
 BUILT-IN THERMOSTAT

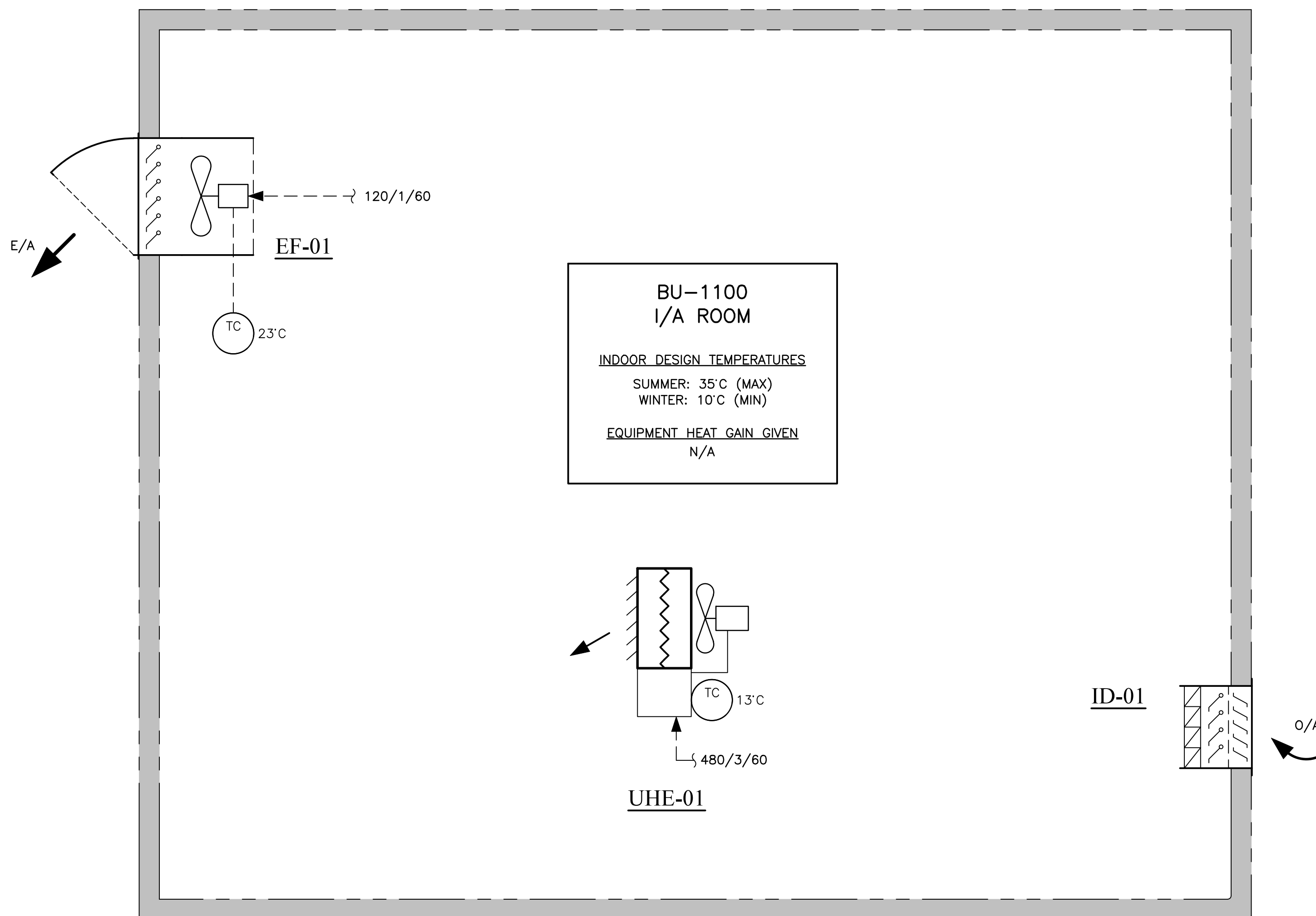
ENERTECH MODEL ET12-1GP
236L/s [500CFM]
120/1/60
c/w SHUTTER, BACKGUARD
AND T'STAT

WESTVENT MODEL XF-445W
FIXED EXTERIOR INTAKE LOUVRE
610x610 [24x24]
c/w BACKDRAFT DAMPER
BDX-3C3-LB BIRDSCREEN AND
CARTRIDGE FILTER

(**devices not by EnerTech UNO)

	PROP FAN w/ MOTOR
	BACKDRAFT DAMPER
	DAMPER
	FILTERS
	ELECTRIC HEATING ELEMENT
	DAMPER ACTUATOR
	DISCONNECT SWITCH
DS	AIR CHANGE PER HOUR
S/A	SUPPLY AIR
R/A	RETURN AIR
O/A	OUTSIDE AIR
E/A	EXHAUST AIR
EM	ECONOMIZER MODULE
ES	ENTHALPY SENSOR
TE	TEMP SENSOR
TC	TEMP CONTROLLER
----	FIELD WIRING
-----	FACTORY WIRING
----	BLDG OUTLINE
— SL —	REFRIG SUCTION LINE
— LL —	REFRIG LIQUID LINE
	AIR FLOW
**	NOT PROVIDED BY FNRTECH

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE PROJECT DRAWINGS AND SPECS. REFER TO THE APPLICABLE EQUIPMENT DATASHEETS FOR FURTHER DETAILS.
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4. DISCONNECT SWITCHES ARE NOT SUPPLIED BY ENERTECH UNLESS OTHERWISE NOTED.
5. ALL FIELD WIRING BY ELECTRICAL CONTRACT.
6. WEATHER HOODS ARE PROVIDED AS SHOWN. EXHAUST HOODS SHALL BE 45° AND INTAKE HOODS SHALL BE 90°. ALL HOODS SHALL BE c/w 25mm BIRD SCREEN AND SUPPLIED BY BUILDING VENDOR.



1.0 H&V SYSTEM – DESIGN OVERVIEW

- 1.1 ROOM CONSISTS OF ONE ELECTRIC UNIT HEATER, ONE EXHAUST FAN AND ONE INTAKE DAMPER.
- 1.2 HEATING IS BY THE UNIT HEATER AND IS CONTROLLED BY ITS BUILT-IN THERMOSTAT.
- 1.3 COOLING IS BY OUTDOOR AIR CONTROLLED BY THE EXHAUST FAN'S THERMOSTAT.
- 1.4 DESIGN INDOOR TEMP/PRESSURE LIMITS:
 - MAX TEMP: 30°C
 - MIN TEMP: 10°C
 - BLDG PRESSURE: NEGATIVE WHEN EXHAUST FAN IS RUNNING
- 1.5 RUN TIME SCHEDULES, INITIAL SET POINTS ETC. SHALL BE EVALUATED DURING COMMISSIONING AND ADJUSTED TO MEET THE FINAL DESIGN REQUIREMENTS/INTENT.

- 2.1 ROOM IS MECHANICALLY VENTILATED WHEN ROOM TEMPERATURE REACHES ITS COOLING SET POINT.
- 2.2 COOLING VENTILATION OF EF-01 IS CYCLED ON/OFF BASED ON THE THERMOSTAT SET POINT.
- 2.3 ALL VENTILATION IS DRAWN INTO THE ROOM THROUGH ID-01.

- 3.1 WHEN THE ROOM TEMP FALLS BELOW THE HEATING SET POINT THE UNIT HEATER STARTS.
- 3.2 ONCE THE ROOM TEMP REACHES SET POINT THE UNIT HEATER SHUTS DOWN.

BU-1100 - MCC/IA BLDG.
HVAC - FLOW DIAGRAM

SCALE	NTS
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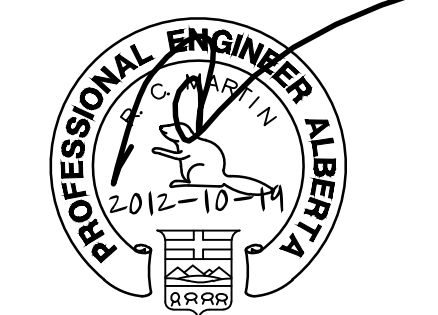
2	2012-10-19	ISSUED FOR CONSTRUCTION
1	2012-08-03	ISSUED FOR REVIEW
REV	DATE	DESCRIPTION

REVISIONS



by

EVER.TECH
17321 - 106th Ave, Edmonton, Alberta
780.483.0141



PERMIT TO PRACTICE

Signature [Signature]

Date 2012-10-19

PERMIT NUMBER: P 2487

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

proje

**Murphy Oil Canada - Cadotte
Cyclic Steam Stimulation (CSS)
Pilot Project**

near Peace River/Slave Lake, AB.
LSD: 13-09-085-17 W5M

dwg title

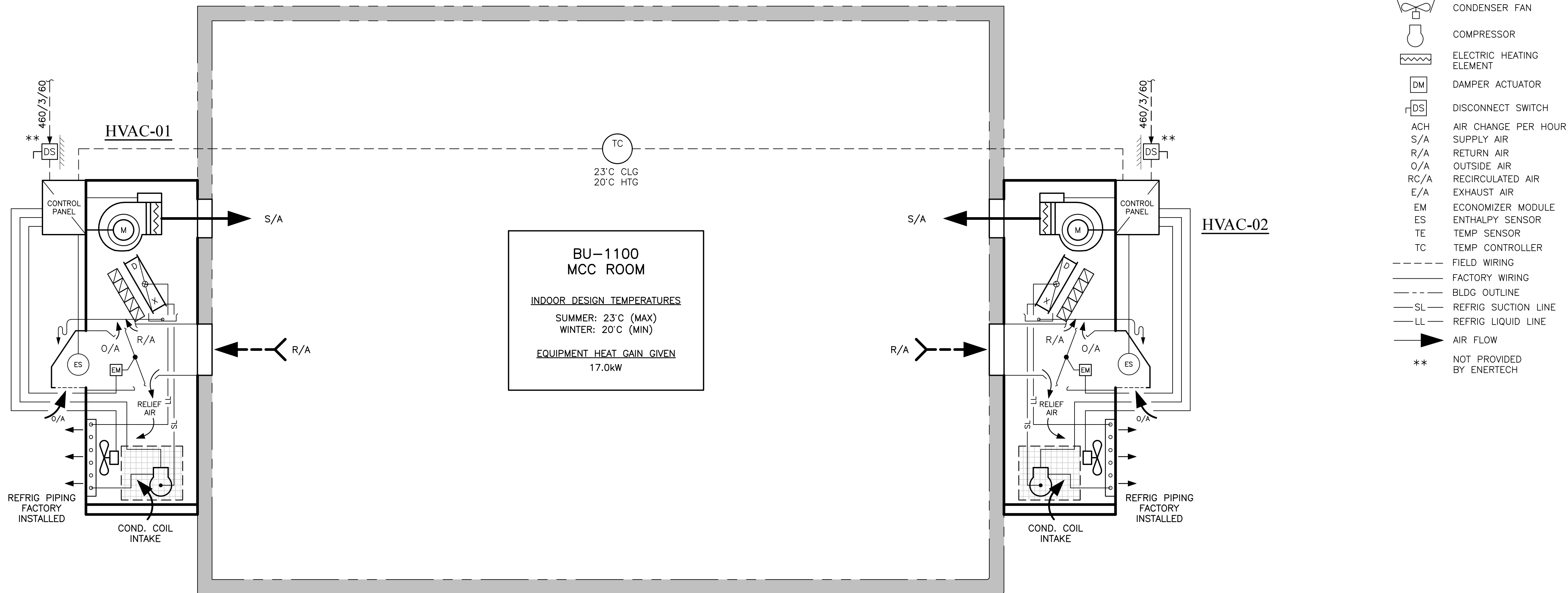
BU-1100 - MCC/IA BUILDING
IA COMP ROOM H&V FLOW DIAGRAM

drawn by DD	checked by MS	approved by
ener-tech no.	sheet size A1	scale AS SHOWN

deg. no. **M1.**

HVAC-01/02
WALL MOUNTED
HVAC UNIT

BARD MODEL W48A1-C15EPXXJ
732L/s @ 20Pa ESP
10% 73L/s MIN O/A
0.37kW INDOOR BLOWER MOTOR
0.25kW OUTDOOR FAN MOTOR
460/3/60, MCA=27A
NOMINAL 4TON COOLING CAPACITY AT 35°C AMBIENT
13.8kW TOTAL, 10.8kW SENSIBLE
R410A REFRIGERANT
15kW ELECTRIC HEATING COIL
EACH UNIT IS SELF CONTAINED AND OPERATED BY THE
ROOM MOUNTED TEC-40 CONTROLLER.
c/w SUPPLY/RETURN GRILLES, FIRE SHUTDOWN CONTACT
AND COMMON TROUBLE ALARM.



LEGEND

(**devices not by EnerTech UNO)

- BLOWER
- MOTOR
- DX EVAPORATOR COOLING COIL
- CONDENSING COIL
- FILTERS
- DAMPER
- CONDENSER FAN
- COMPRESSOR
- ELECTRIC HEATING ELEMENT
- DAMPER ACTUATOR
- DISCONNECT SWITCH
- ACH AIR CHANGE PER HOUR
- S/A SUPPLY AIR
- R/A RETURN AIR
- O/A OUTSIDE AIR
- RC/A RECIRCULATED AIR
- E/A EXHAUST AIR
- EM ECONOMIZER MODULE
- ES ENTHALPY SENSOR
- TE TEMP SENSOR
- TC TEMP CONTROLLER
- FIELD WIRING
- FACTORY WIRING
- BLDG OUTLINE
- SL REFRIG SUCTION LINE
- LL REFRIG LIQUID LINE
- AIR FLOW
- ** NOT PROVIDED BY ENERTECH

HVAC — SEQUENCE OF OPERATION

1.0 HVAC SYSTEM — DESIGN OVERVIEW

- ROOM CONSISTS OF TWO HVAC UNITS AND ONE TEMP CONTROLLER.
- THE TEMP CONTROLLER, OPERATES THE HVAC UNITS IN A STAGED ARRANGEMENT BASED ON THE SPACE TEMP.
- DESIGN INDOOR TEMP/PRESSURE LIMITS:
 - MAX TEMP: 23°C
 - MIN TEMP: 20°C
 - BLDG PRESSURE: POSITIVE (UNMONITORED)
- RUN TIME SCHEDULES, INITIAL SETPOINTS ETC. SHALL BE EVALUATED DURING COMMISSIONING AND ADJUSTED TO MEET THE FINAL DESIGN REQUIREMENTS/INTENT.

2.0 HVAC SYSTEM — VENTILATION

- VENTILATION OCCURS ONLY WHEN UNIT(S) ARE RUNNING. EACH UNIT PROVIDES 1.5ACH.

3.0 HVAC SYSTEM — 'FREE COOLING' OPERATION

- HVAC UNITS ARE EACH EQUIPPED WITH AN ECONOMIZER TO PROVIDE FREE COOLING WHEN THE CONDITIONS ARE RIGHT. THIS IS CONTROLLED WITHIN EACH UNIT BASED ON THE OUTDOOR AIR ENTHALPY AND THE INDOOR SPACE TEMP.
- ONCE THE HVAC UNITS CAN NO LONGER HOLD THE COOLING SET POINT BY FREE COOLING THEY WILL AUTOMATICALLY SWITCH OVER TO MECHANICAL COOLING. SEE 4.0.

4.0 HVAC SYSTEM — 'MECHANICAL COOLING'

- WHEN THE HVAC UNITS CAN NO LONGER HOLD THE COOLING SET POINT WITH FREE COOLING PER 3.0, MECHANICAL COOLING IS INITIATED. THIS IS CONTROLLED BY THE J MODULE OF THE HVAC UNITS.
- WHEN MECHANICAL COOLING IS ENERGIZED THE ECONOMIZER DAMPER RETURNS TO ITS MIN O/A POSITION AND THE DX COOLING SYSTEM IS STARTED.
- IF THE COOLING SET POINT IS NOT MET WITHIN 10 MINUTES, THE CONTROLLER CALLS FOR THE DX COOLING FROM THE SECONDARY UNIT.
- ONCE COOLING SET POINT IS MET, THE DX COOLING FROM EACH UNIT IS CYCLED OFF. WHILE THE DX COOLING IS OFF AND THE O/A TEMP IS >10°C, THE ECONOMIZER DAMPER WILL BE IN ITS MIN O/A POSITION TO CONTINUE TO VENTILATE THE BUILDING. IF THE BUILDING TEMP RISES ABOVE SET POINT THE MECHANICAL COOLING CYCLE BEGINS AGAIN FROM 4.3.
- MECHANICAL COOLING IS LOCKED OUT WHEN THE O/A TEMP IS ≤10°C.

5.0 HVAC SYSTEM — 'HEATING' OPERATION

- EACH HVAC UNIT IS EQUIPPED WITH AN ELECTRIC HEATER SIZED TO COVER THE VENTILATION AND THE ROOM LOSSES TO MAINTAIN THE ROOM AT ITS MINIMUM TEMPERATURE OF 20°C.
- THE UNIT'S HEATERS ARE CONTROLLED INTERNALLY BY THEIR CONTROLLER.
- WHEN THE ROOM TEMP DROPS BELOW THE HEATING SET POINT, THE LEAD UNIT ENERGIZES THE HEATING. THE ECONOMIZER DAMPERS WILL ALREADY BE IN THEIR MINIMUM O/A POSITION AS THEY COME OFF THEIR 'FREE COOLING' CYCLE DESCRIBED IN 3.0.
- IF THE HEATING SET POINT IS NOT MET WITHIN 5 MINUTES, HEATING FROM THE SECOND UNIT IS ENERGIZED.
- ONCE HEATING SET POINT IS MET, THE HEATERS IN EACH UNIT ARE CYCLED OFF.
- IF THE ROOM TEMP FALLS BELOW THE HEATING SET POINT THE HEATING CYCLE BEGINS AGAIN FROM 5.3.

6.0 HVAC SYSTEM — EMERGENCY SHUTDOWN

- ON A REMOTE EMERGENCY SHUT DOWN SIGNAL FROM OTHERS STOPS HVAC UNITS.
- UNITS ARE PERMITTED TO OPERATE ONCE SHUTDOWN CONTACT IS CLOSED AGAIN.

BU-1100 — MCC/IA BLDG.
HVAC — FLOW DIAGRAM

1
M1.0

SCALE

NTS

NOTES

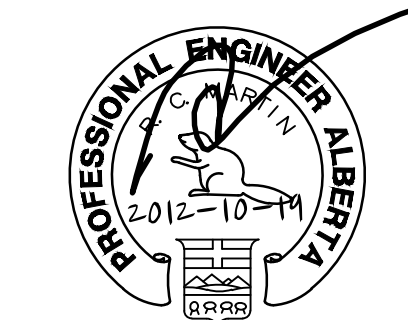
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- DISCONNECT SWITCHES ARE NOT SUPPLIED BY ENERTECH UNLESS OTHERWISE NOTED.
- ALL FIELD WIRING OF HVAC SYSTEM AND VFD RECIRC/EXHAUST DUCT BY ELECTRICAL.
- WEATHER HOODS ARE PROVIDED AS SHOWN. EXHAUST HOODS SHALL BE 45' AND INTAKE HOODS SHALL BE 90'. ALL HOODS SHALL BE c/w 25mm BIRD SCREEN AND SUPPLIED BY BUILDING VENDOR.

REV	DATE	DESCRIPTION
2	2012-10-19	ISSUED FOR CONSTRUCTION
1	2012-08-03	ISSUED FOR REVIEW

REVISIONS



EnerTech
17321 — 106th Ave, Edmonton, Alberta
780.483.0141



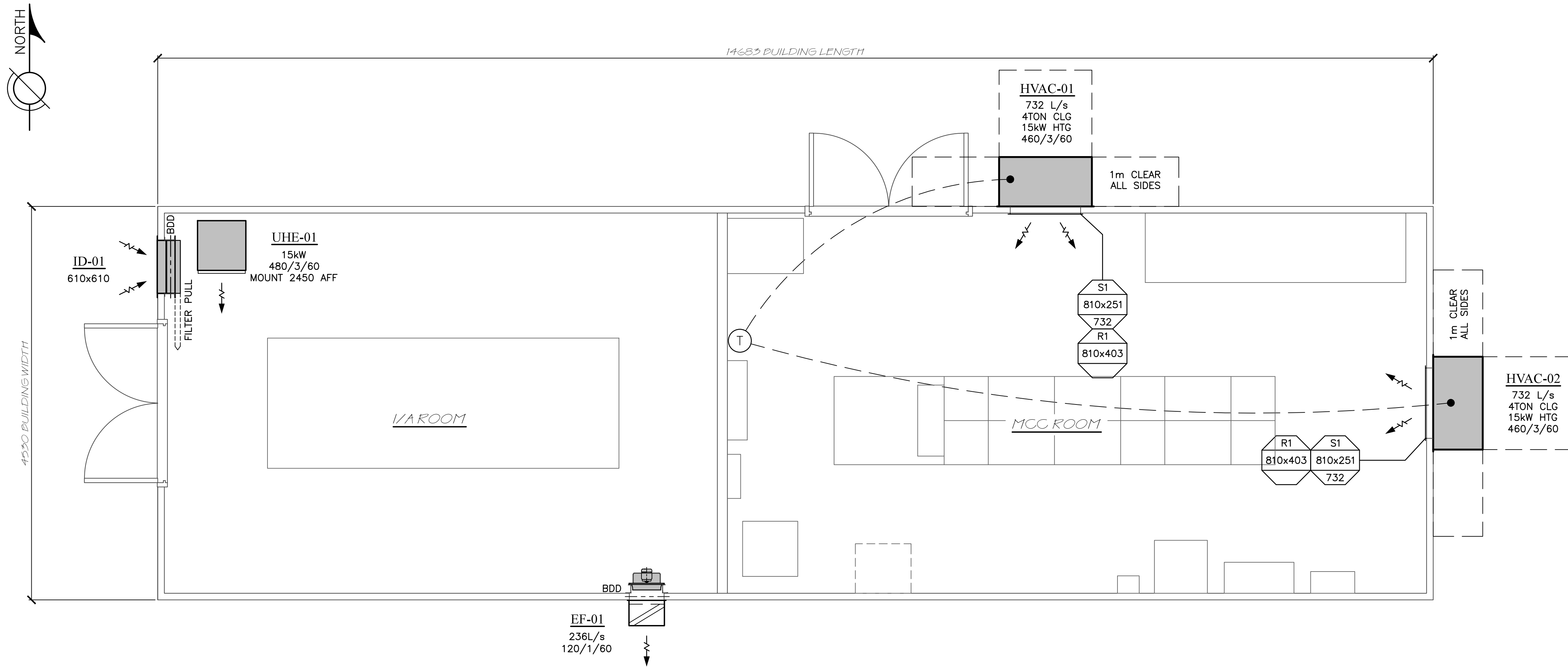
PERMIT TO PRACTICE
Signature: [Signature]
Date: 2012-10-19
PERMIT NUMBER: P 2487
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Project: Murphy Oil Canada - Cadotte
Cyclic Steam Stimulation (CSS)
Pilot Project
near Peace River/Slave Lake, AB.
LSD: 13-09-085-17 W5M

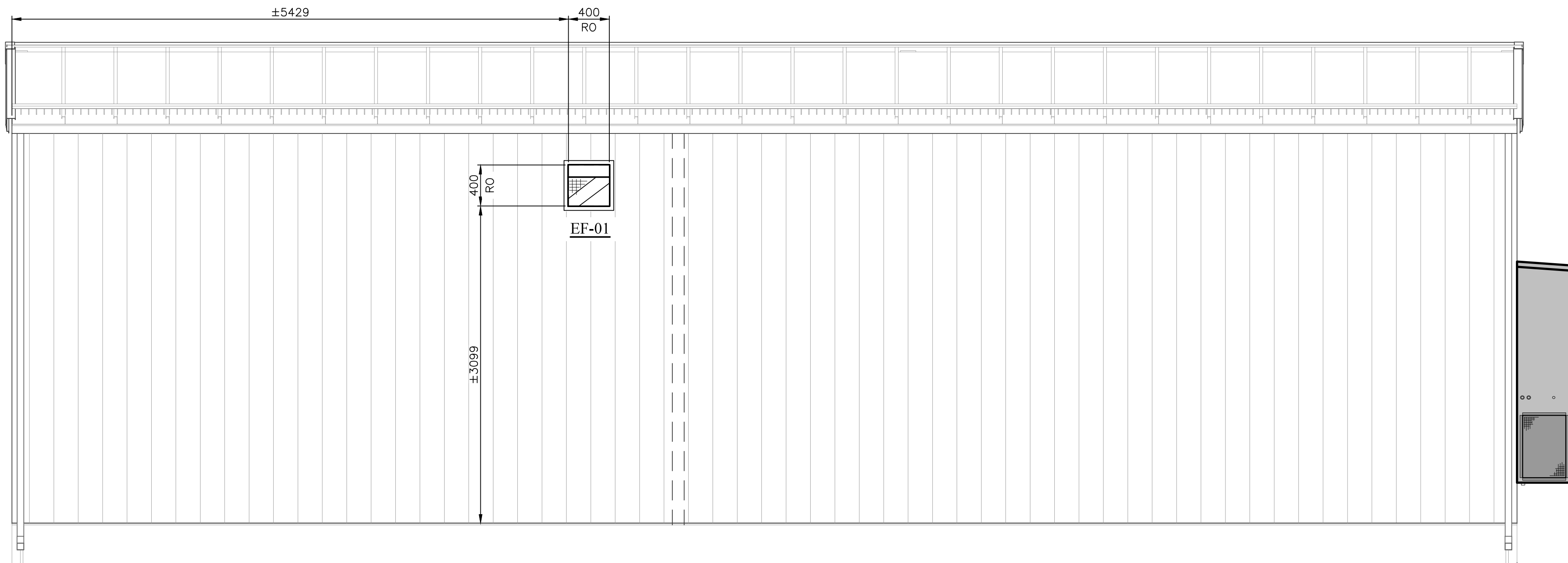
Fig title: BU-1100 - MCC/IA BUILDING
MCC ROOM HVAC FLOW DIAGRAM

drawn by DD	checked by MS	approved by
ener-tech no.	sheet size A1	scale AS SHOWN

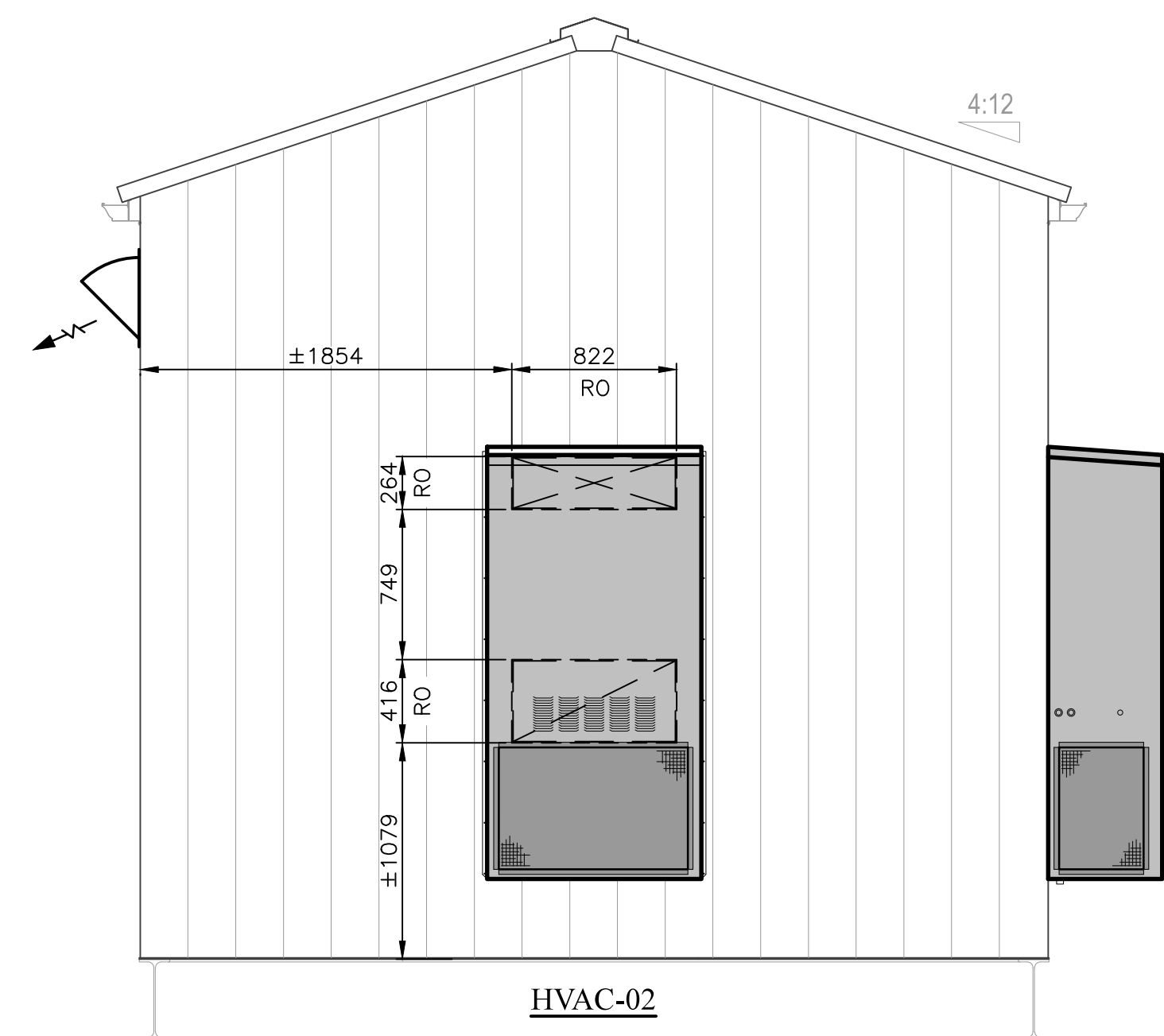
Fig no. M1.1



BU-1100 - MCC/IA BLDG.
HVAC - PLAN VIEW
1
M2.0 SCALE 1:30



BU-1100 - MCC/IA BLDG.
HVAC - SOUTH ELEVATION
2
M2.0 SCALE 1:30



BU-1100 - MCC/IA BLDG.
HVAC - EAST ELEVATION
3
M2.0 SCALE 1:30

LEGEND

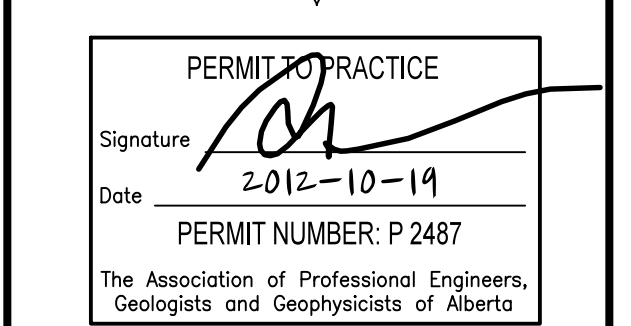
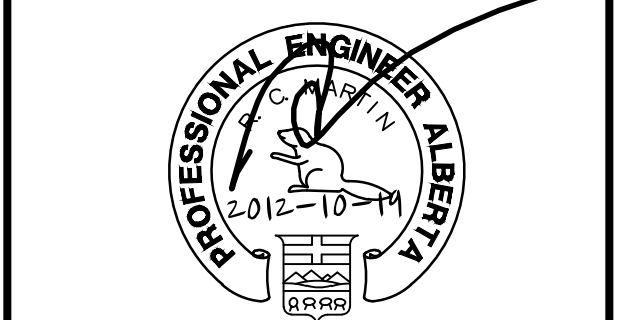
- # TYPE
SIZE
VOL
- S1 - SUPPLY AIR:
DOUBLE DEFLECTION GRILLE
EH PRICE, MODEL
620F/S/A OR EQUAL
- R1 - RETURN AIR:
45° FIXED LOUVRE
EH PRICE, MODEL
630F/L/A OR EQUAL
- *GRILLES SUPPLIED BY
UNIT MANUFACTURER
- ⊗ S/A - SUPPLY AIR
⊘ R/A - RETURN AIR
⊙ E/A - EXHAUST (RELIEF) AIR
⊠ O/A - OUTSIDE AIR
RO ROUGH OPENING

NOTES

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- HVAC EQUIPMENT INSTALLATION BY BUILDING VENDOR PER MANUFACTURER'S RECOMMENDATIONS. SUPPORT, SEALING, ACCESSORIES AS PER ASHRAE & SMACNA STANDARDS. MAKE WEATHERTIGHT.
- "±" DIMENSIONS MAY BE ALTERED TO SUIT BUILDING STEEL, CABLE TRAYS, OVERHEAD CRANES, EQUIPMENT ETC.
- INSTALL THERMOSTATS 1500mm AFF MINIMUM UNLESS NOTED OTHERWISE.
- ALL FIELD WIRING OF HVAC SYSTEM BY OTHERS.
- ALL WEATHER HOODS BY BUILDING VENDOR.

REV	DATE	DESCRIPTION
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REVISIONS

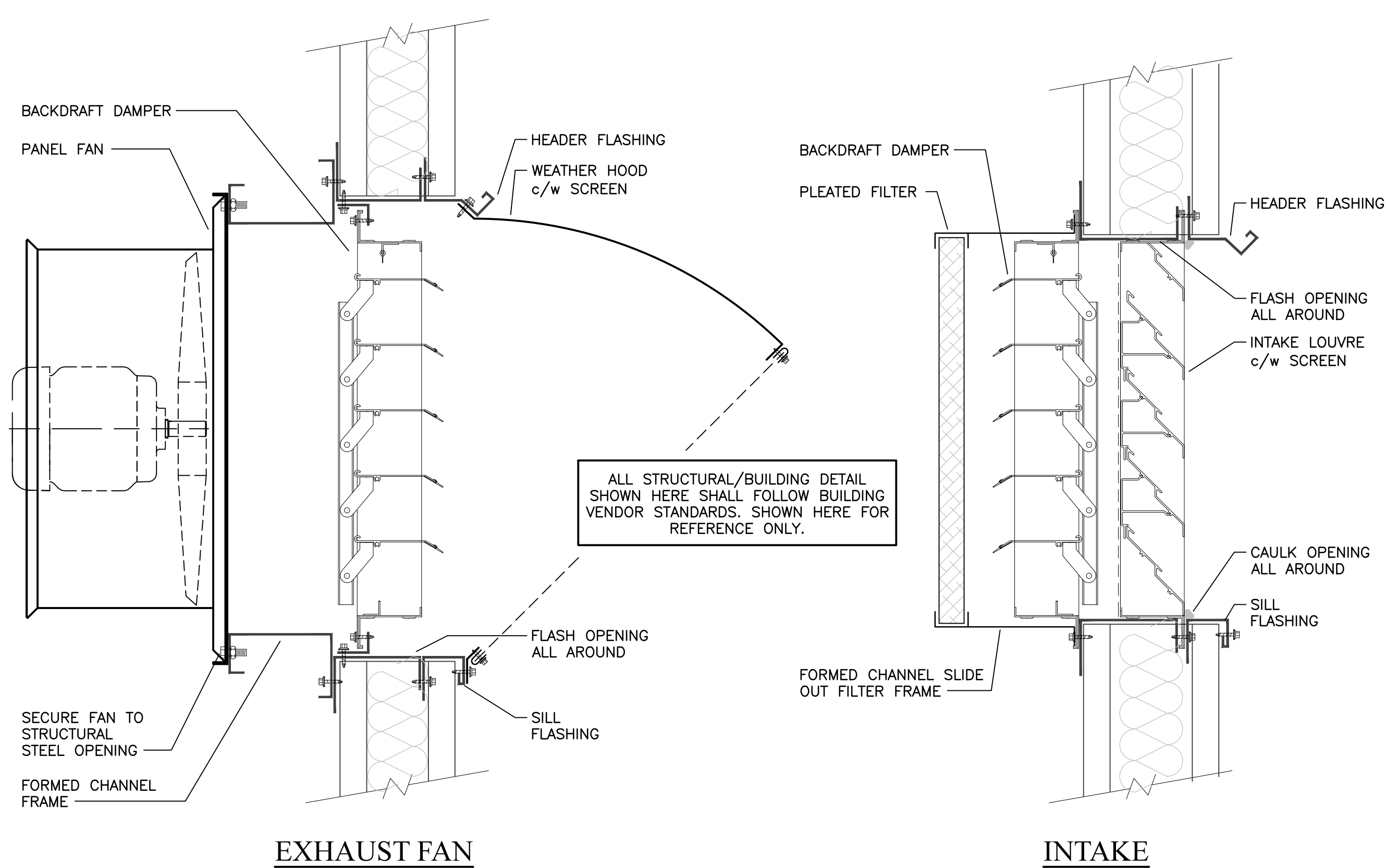
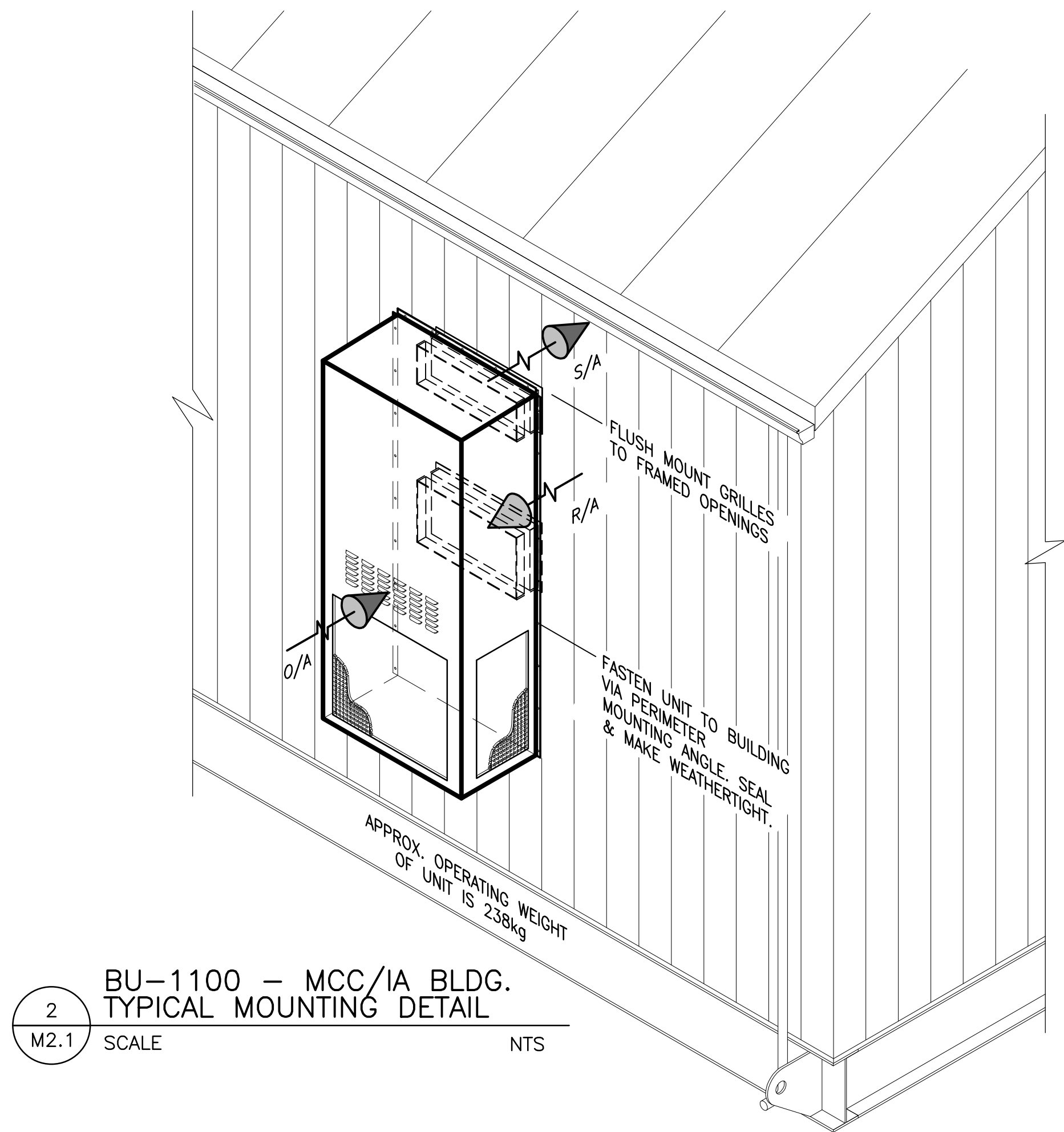


project
Murphy Oil Canada - Cadotte
Cyclic Steam Stimulation (CSS)
Pilot Project
near Peace River/Slave Lake, AB
LSD: 13-09-085-17 W5M

sheet title
BU-1100-MCC/IA BUILDING
HVAC GENERAL ARRANGEMENT

drawn by DD	checked by MS	approved by
sheet-tech no.	sheet size A1	scale AS SHOWN

sheet no.
M2.0



LEGEND

- # TYPE
SIZE
VOL
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DOUBLE DEFLECTION GRILLE
EH PRICE, MODEL
620F/S/A OR EQUAL
- R1 - RETURN AIR:
45° FIXED LOUVRE
EH PRICE, MODEL
630F/L/A OR EQUAL
- *GRILLES SUPPLIED BY
UNIT MANUFACTURER
- ⊗ S/A - SUPPLY AIR
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⊙ E/A - EXHAUST (RELIEF) AIR
⊠ O/A - OUTSIDE AIR
- RO ROUGH OPENING

NOTES

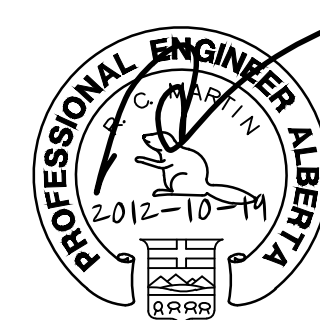
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- INSTALL THERMOSTATS 1500mm AFF MINIMUM UNLESS NOTED OTHERWISE.
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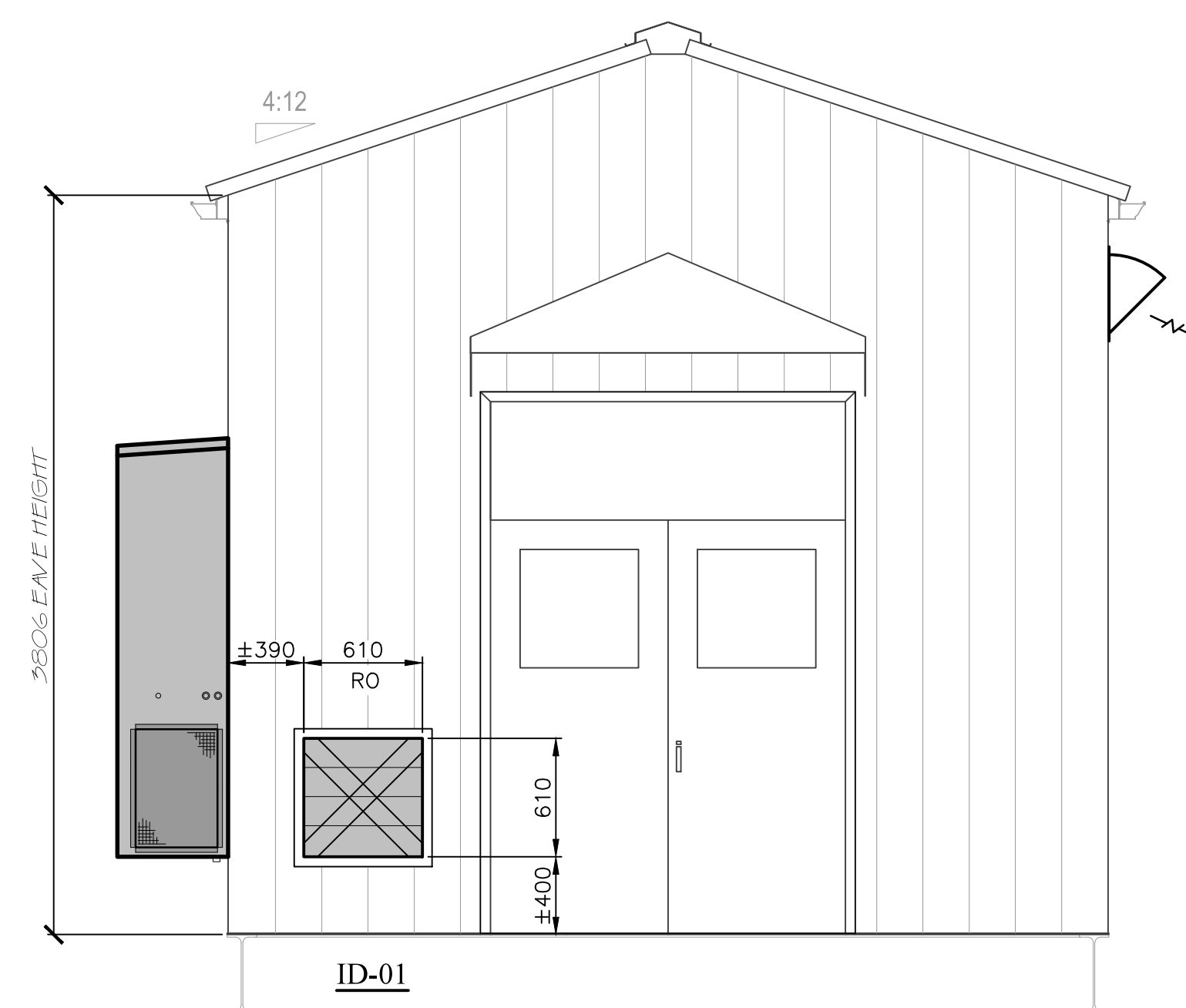
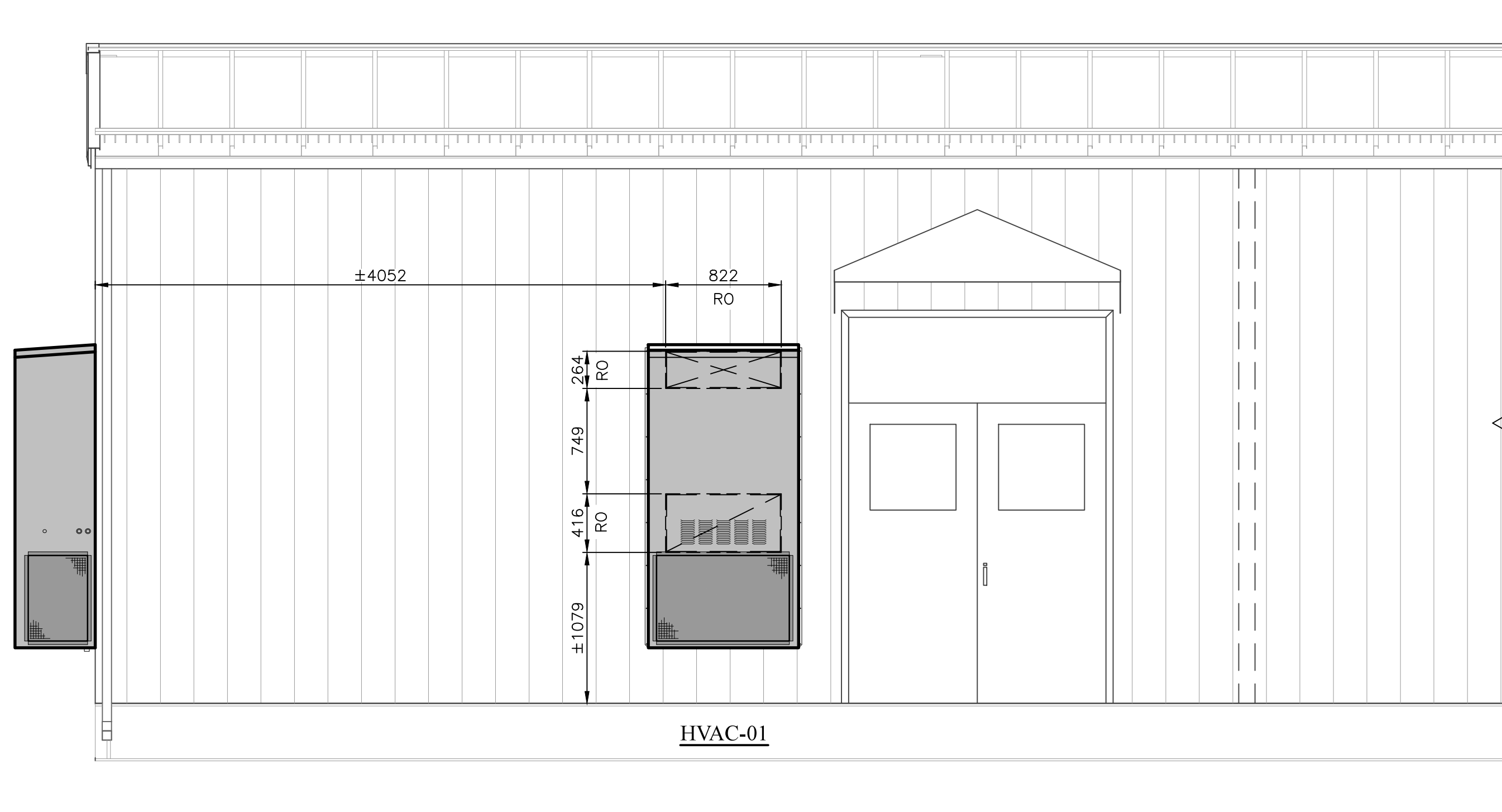
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project:
Murphy Oil Canada - Cadotte
Cyclic Steam Stimulation (CSS)
Pilot Project
near Peace River/Slave Lake, AB
LSD: 13-09-085-17 WSM

dwg title:
BU-1100-MCC/IA BUILDING
HVAC GENERAL ARRANGEMENT

drawn by DD	checked by MS	approved by
ener-tech no.	sheet size A1	scale AS SHOWN
dwg no.		

M2.1



BU-1100 - MCC/IA BLDG.
HVAC - PARTIAL NORTH ELEVATION
3 M2.1 SCALE 1:30

BU-1100 - MCC/IA BLDG.
HVAC - WEST ELEVATION
4 M2.1 SCALE 1:30

Heat Transfer Calculation By:

ENER.TECH

17321 - 106 Ave
Edmonton, Alberta
T5S 1E7
p: (780) 483-0141
f: (780) 489-4302



Rev: 2 - Issued for Construction
Date: 2012-09-19

For: Murphy Oil - Cadotte Heavy Oil Field
Cyclic Steam Stimulation (CSS) pilot
I/A Room (BU-1100)
Heating & Ventilation System Design

Design Conditions: Latitude: 56 Time: 4:00 PM

Indoor:

Summer temperature: 95 F (35 C)
Winter temperature: 50 F (10 C)
Hum. Ratio ΔW: n/a
Elevation: 2221 ft (677 m)

U-Values (1/R):

Floor: R 28 = 1 / 28 = 0.036
Walls: R 12 = 1 / 12 = 0.083
Roof: R 20 = 1 / 20 = 0.050
Windows: R 2 = 1 / 2 = 0.500
Doors: R 6 = 1 / 6 = 0.167

Outdoor:

Summer temperature: dB 84 F (29 C)
WB 65 F (18 C)
Winter temperature: -49 F (-45 C)
Summer grains of moisture: 76 gr/lb
Daily temperature range: 18 F (10 C)

Bldg Volume:

measured from drawings 4,339 ft³(122.87 m³)

Building Components:

	Area, Length CFM or BTUH	Sensible Gain (BTUH)	Latent Gain (BTUH)	Total Heat Gain (BTUH)	Total Heat Loss (BTUH)
Floor	317 sqft	0	0	0	1,121
N Wall	266 sqft	0	0	0	2,195
W Wall	204 sqft	0	0	0	1,681
Window Area	8 sqft	609	0	609	396
2 Man Doors	34 sqft	0	0	0	561
S Wall	266 sqft	0	0	0	2,195
Partition	204 sqft	0	0	0	0
Roof	334 sqft	785	0	785	1,653
Summer Infiltration	72 CFM	0	0	0	0
Winter Infiltration	145 CFM	0	0	0	15,794
People	2 kW	500	400	900	0
Given Ht Gain	0 kW	0	0	0	0
Ventilation	0 CFM	0	0	0	0
Lighting (1W/sqft)	317 W	1,082	0	1,082	0
		2,976	400	3,376	25,594

Summary:

Heat Loss:

Ventilation Loss 0 BTUH (0.0 kW)
Building Loss (+10%) 28,154 BTUH (8.3 kW)
Total Heat Loss 28,154 BTUH (8.3 kW)

Heat Gain:

Given Heat Gain 0 BTUH (0.0 kW)
Building Gain (+10%) 3,713 BTUH (1.1 kW)
Total Heat Gain 3,713 BTUH (1.1 kW)

Heat Transfer Calculation By:



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Edmonton, Alberta
T5S 1E7
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f: (780) 489-4302

Rev: 2 - Issued for Construction

Date: 2012-09-19

For: **Murphy Oil - Cadotte Heavy Oil Field**
Cyclic Steam Stimulation (CSS) pilot
I/A Room (BU-1100)
Heating & Ventilation System Design

System Description:

The heating & ventilation system in this room consists of the following equipment. One 236L/s wall mounted exhaust fan. One 610x610 intake damper c/w filter. One 15kW electric unit heater c/w built-in thermostat. All equipment shall be rated for use in a general purpose area with 480/3/60 and 120/1/60 power supplied.

Summer (cooling):

As the room temp rises above the cooling set point, the exhaust fan starts and operates until set point is met. The room cooling set point is initially set at 74F (23C).

Winter (heating):

As the room temp falls below the heating set point, the unit heater starts and operates until the heating set point is met. The room heating set point is initially set at 55F (13C).

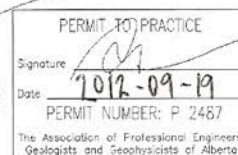
Notes:

1. HVAC system is designed based on the project specs which were available at the time of design.
2. The calc assumes lighting load to be in addition to the given heat gains and is based on one watt per square foot of floor space.
3. Building infiltration is estimated based on one air change for the cooling load and two air changes for the heating load.
4. Building envelope assumed to be constructed to an "average" tightness as defined by ASHRAE.
5. Heating requirements are based on building losses with no internal equipment heat gains present.
6. Room volume is measured from the building drawings provided and represents the volume when the room is empty.
7. Partition wall assumed to be uninsulated.
8. Refer to HVAC Flow Diagram for full sequence of operation of the HVAC system.

Heat Transfer Calculation By:

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Rev: 2 - Issued for Construction
Date: 2012-09-19

For: **Murphy Oil - Cadotte Heavy Oil Field**
Cyclic Steam Stimulation (CSS) Pilot
MCC Rm (BU-1100)
HVAC System Design

Design Conditions: Latitude: 56 Time: 4:00 PM

Indoor:
Summer temperature: 74 F (23 C)
Winter temperature: 68 F (20 C)
Hum. Ratio ΔW: 0.00209
Elevation: 2221 ft (677 m)

U-Values (1/R):
Floor: R 28 = 1 / 28 = 0.036
Walls: R 12 = 1 / 12 = 0.083
Roof: R 20 = 1 / 20 = 0.050
Windows: R 2 = 1 / 2 = 0.500
Doors: R 6 = 1 / 6 = 0.167

Outdoor:
Summer temperature: dB 84 F (29 C)
WB 65 F (18 C)
Winter temperature: -49 F (-45 C)
Summer grains of moisture: 76 gr/lb
Daily temperature range: 18 F (10 C)

Bldg Volume:
measured from drawings 5,477 ft³ (155.09 m³)

Building Components:

	Area, Length CFM or BTUH	Sensible Gain (BTUH)	Latent Gain (BTUH)	Total Heat Gain (BTUH)	Total Heat Loss (BTUH)
Floor	400 sqft	192	0	192	1,671
N Wall	335 sqft	115	0	115	3,263
Window Area	8 sqft	240	0	240	468
2 Man Doors	34 sqft	115	0	115	663
E Wall	204 sqft	424	0	424	1,986
S Wall	335 sqft	509	0	509	3,263
Partition	204 sqft	1,499	0	1,499	1,989
Roof	424 sqft	1,442	0	1,442	2,480
Summer Infiltration	91 CFM	803	923	1,726	0
Winter Infiltration	183 CFM	0	0	0	23,560
People	2 ppl	500	400	900	0
Given Eq Ht Gain	17.0 kW	58,001	0	58,001	0
Ventilation (10%)	310 CFM	0	0	0	40,006
Lighting (1W/sqft)	400 W	1,365	0	1,365	0
		65,204	1,323	66,528	79,351

Summary:

Heat Loss:

Ventilation Loss 40,006 BTUH (11.7 kW)
Building Loss (+10%) 43,279 BTUH (12.7 kW)
Total Heat Loss 83,285 BTUH (24.4 kW)

Heat Gain:

Given Heat Gain 58,001 BTUH (17.0 kW)
Building Gain (+10%) 9,380 BTUH (2.7 kW)
Total Heat Gain 67,381 BTUH (19.7 kW)

Heat Transfer Calculation By:



17321 - 106 Ave
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Rev: 2 - Issued for Construction
Date: 2012-09-19

For: **Murphy Oil - Cadotte Heavy Oil Field**
Cyclic Steam Stimulation (CSS) Pilot
MCC Rm (BU-1100)
HVAC System Design

System Description:

The HVAC system in this room consists of the following equipment. Two 4ton, 732L/s wall mounted HVAC units c/w 15kW electric heat. One thermostat controller. All equipment shall be rated for use in a general purpose area with 460/3/60 power supplied.

Summer (cooling):

As the room temp rises above the cooling set point, the unit controller starts the lead unit's cooling system. If set point is not met within a set time the controller will start the lag unit until the set point is met. The room cooling set point is initially set at 74F (23C).

Winter (heating):

As the room temp falls below the heating set point, the unit controller starts the lead unit's heating system. If set point is not met within a set time the controller will start the lag unit until the set point is met. The room heating set point is initially set at 68F (20C).

Notes:

1. HVAC system is designed based on the project specs which were available at the time of design.
2. The calc assumes lighting load to be in addition to the given heat gains and is based on one watt per square foot of floor space.
3. Building infiltration is estimated based on one air change for the cooling load and two air changes for the heating load.
4. Building envelope assumed to be constructed to an "average" tightness as defined by ASHRAE.
5. Heating requirements are based on building losses with no internal equipment heat gains present.
6. Room volume is measured from the building drawings provided and represents the volume when the room is empty.
7. Partition wall assumed to be uninsulated.
8. Refer to HVAC Flow Diagram for full sequence of operation of the HVAC system.



THE WALL-MOUNT™ AIR CONDITIONERS - 9.0 EER, (60HZ)

Models W18A to W60A
1.5 to 5 Ton (16,400 to 55,000 Btuh)
Right Side Control Panel 60Hz

GREEN REFRIGERANT
R-410A

The Bard Wall-Mount Air Conditioner is a self contained energy efficient system, which is designed to offer maximum indoor comfort at a minimal cost without using valuable indoor floor space or outside ground space. This unit is the ideal product for versatile applications such as: new construction, modular offices, school modernization, telecommunication structures, portable structures or correctional facilities. Factory or field installed accessories are available to meet specific job requirements.

Engineered Features

Aluminum Finned Copper Coils:

Grooved tubing and enhanced louvered fin for maximum heat transfer and energy efficiency.

Twin Blowers:

Move air quietly. Most models feature multispeed blower motors providing airflow adjustment for high and low static operation. Motor overload protection is standard on all models.

Air Conditioner Compressor:

Scroll Compressors eliminate need for crankcase heater. Standard on 1½ to 5 ton.

R-410A Refrigerant:

Designed with R-410A (HFC) non-ozone depleting refrigerant in compliance with the Montreal protocol and 2010 EPA requirements.

Phase Rotation Monitor:

Standard on all 3 phase scroll compressors. Protects against reverse rotation if power supply is not properly connected.

Galvanized 20 Gauge Zinc Coated Steel Cabinet:

Cleaned, rinsed, sealed and dried before the polyurethane primer is applied. The cabinet is handsomely finished with a baked on textured enamel, which allows it to withstand 1000 hours of salt spray tests per ASTM B117-03.

Foil Faced Insulation:

Standard on all units.

Full Length Mounting Brackets:

Built into cabinet for improved appearance and easy installation. NOTE: Bottom mounting bracket included to assist in installation.

Electrical Components:

Are easily accessible for routine inspection and maintenance through a right side, service panel opening. Features a lockable, hinged access cover to the circuit breaker or toggle disconnect switch.

Electric Heat Strips:

Features an automatic limit and thermal cut-off safety control. Heater packages can be factory or field installed for all 1½ through 5 ton models.

Filter Service Door:

Separate service door provides easy access for filter change.

One Inch, Disposable Air Filters:

Are standard equipment. Optional one inch washable filters available and filter racks permit the addition of 2" pleated filter. Factory or field installed.

Condenser Fan and Motor Shroud Assembly:

Slides out for easy access.

Barometric Fresh Air Damper:

Standard on all units. Allows up to 25% outside fresh air. Optional ventilation packages available.

Built-in Circuit Breakers:

Standard on all electric heat versions of single (230/208 volt) and three phase (230/208 volt) equipment. Toggle disconnects are standard on all electric heat versions of three phase (460 volt) equipment.

Slope Top:

Standard feature for water run-off.

Top Rain Flashing:

Standard feature on all models.



MEA # 357-93-E

Liquid Line Filter Drier:

Standard on all units. Protects system against moisture.

Compressor Control Module:

Standard on all units. Built-in off-delay timer adjustable from 30 seconds to 5 minutes. 2-minute on-delay if power interrupt. 120-second bypass for low pressure control, and both soft and manual lockouts for high and low pressure controls. Alarm output for alarm relay.

High & Low Pressure Switches are Auto-Reset:

Standard on all units. Built-in lockout circuit resets from the room thermostat. Provides commercial quality protection to the compressor.

- Complies with efficiency requirements of ANSI/ASHRAE/IESNA 90.1-2007.
- Certified to ANSI/ARI Standard 390-2003 for SPVU (Single Package Vertical Units).
- Commercial Product - Not intended for Residential application.



Capacity and Efficiency Ratings

MODELS	W18A1	W24A1	W30A1	W36A1	W42A1	W48A1	W60A1
Cooling Capacity BTUH ①	16,400	24,000	29,400	35,400	41,000	47,000	55,000
EER ②	9.00	9.00	9.00	9.00	9.20	9.00	9.00

① Capacity is certified in accordance with ANSI/ARI Standard 390-2003.

② EER = Energy Efficiency Ratio and is certified in accordance with ANSI/ARI Standard 390-2003.

All ratings based on fresh air intake being 100% closed (no outside air introduction).

Specifications 1-1/2 Ton through 3 Ton

MODELS	W18A1-A	W24A1-A	W24A1-B	W24A1-C	W30A1-A	W30A1-B	W30A1-C	W36A1-A	W36A1-B	W36A1-C
Electrical Rating--60 Hz	230/208 - 1	230/208 - 1	230/208 - 3	460 - 3	230/208 - 1	230/208 - 3	460 - 3	230/208 - 1	230/208 - 3	460 - 3
Operating Voltage Range	197-253	197-253	197-253	414-506	197-253	197-253	414-506	197-253	197-253	414-506
Compressor--Circuit A										
Voltage	230/208	230/208	230/208	460	230/208	230/208	460	230/208	230/208	460
Rated Load Amps	6.5/7.2	11/12.4	7.2/8.1	5.0	11.7/13.3	7.5/8.5	5.3	15.9/17.7	11.8/13.1	6.0
Branch Circuit Selection Current	9.0	12.9	8.4	5.2	14.2	9.0	5.7	18	13.3	6.0
Lock Rotor Amps	48/48	64/64	58/58	28	78/78	71/71	38	112/112	88/88	44
Compressor Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Fan Motor & Condenser										
Fan Motor--HP--RPM	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075
Fan Motor--Amps	1.2	1.2	1.2	1.4	1.5	1.5	1.4	1.5	1.5	1.4
Fan--DIA/CFM	18" - 1600	18" - 1600	18" - 1600	18" - 1600	20" - 2100	20" - 2100	20" - 2100	20" - 1900	20" - 1900	20" - 1900
Blower Motor & Evap.										
Blower Motor--HP-RPM-SPD	1/6-1100-2	1/6-1100-1	1/6-1100-1	1/3-1100-2	1/3-1100-2	1/3-1100-2	1/3-1100-2	1/3-1100-2	1/3-1100-2	1/3-1100-2
Blower Motor--Amps	1.0	1.0	1.0	1.1	2.2	2.2	1.1	2.2	2.2	1.1
CFM Cooling & E.S.P. w/Filter (Rated-Wet Coil)	600 - .20	800 - .20	800 - .20	800 - .20	1000 - .40	1000 - .40	1000 - .40	1100 - .30	1100 - .30	1100 - .30
Filter Sizes (inches) STD.	16x25x1	16x25x1	16x25x1	16x25x1	16x30x1	16x30x1	16x30x1	16x30x1	16x30x1	16x30x1
Shipping Weight --LBS.	300	300	300	300	355	355	355	355	355	355

Specifications 3-1/2 Ton through 5 Ton

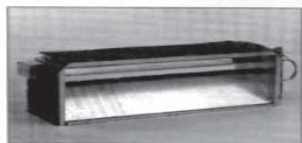
MODELS	W42A1-A	W42A1-B	W42A1-C	W48A1-A	W48A1-B	W48A1-C	W60A1-A	W60A1-B	W60A1-C
Electrical Rating--60 Hz	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3
Operating Voltage Range	197-253	197-253	414-506	197-253	197-253	414-506	197-253	197-253	414-506
Compressor--Circuit A									
Voltage	230/208	230/208	460	230/208	230/208	460	230/208	230/208	460
Rated Load Amps	16.7/18.9	11/12.5	5.8	20/21.9	13.9/15.2	6.8	22.6/25.5	13.5/15.2	7.6
Branch Circuit Selection Current	19.9	13.2	6.1	23.1	16.1	7.1	26.3	15.7	7.8
Lock Rotor Amps	109/109	83.1/83.1	41	134/134	91/91	46	134/134	110/110	52
Compressor Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Fan Motor & Condenser									
Fan Motor--HP-RPM-SPD	1/3-825-2	1/3-825-2	1/3-825-1	1/3-825-2	1/3-825-2	1/3-825-1	1/3-825-2	1/3-825-2	1/3-825-1
Fan Motor--Amps	2.5	2.5	1.3	2.5	2.5	1.3	2.5	2.5	1.3
Fan--DIA/CFM	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600
Blower Motor & Evap.									
Blower Motor--HP-RPM-SPD	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2
Blower Motor--Amps	3.3	3.3	1.9	3.3	3.3	1.9	3.3	3.3	1.9
CFM Cooling & E.S.P. w/Filter (Rated-Wet Coil)	1400 - .30	1400 - .30	1400 - .30	1550 - .20	1550 - .20	1550 - .20	1700 - .30	1700 - .30	1700 - .30
Filter Sizes (inches) STD.	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1
Shipping Weight --LBS.	500	500	500	500	500	500	500	500	500

Ventilation System Packages

Bard Wall-Mounts are designed to provide optional ventilation packages to meet all of your ventilation and indoor air quality requirements. All units are equipped with a barometric fresh air damper as the standard ventilation package. All ventilation packages can be built-in at the factory or field-installed at a later date.



Barometric Fresh Air Damper



Motorized Fresh Air Damper



Commercial Room Ventilator



Economizer



Energy Recovery Ventilator

BAROMETRIC FRESH AIR DAMPER - BFAD

The barometric fresh air damper is a standard feature on all models. It is installed on the inside of the service door and allows outside ventilation air, up to 25% of the total airflow rating of the unit, to be introduced through the air inlet openings and to be mixed with the conditioned air. The damper opens during blower operation and closes when the blower is off. Adjustable blade stops allow different amounts of outside air to be introduced into the building and can be easily locked closed if required.

STANDARD

BLANK OFF PLATE - BOP

A blank off plate is installed on the inside of the service door. It covers the air inlet openings, which restricts any outside air from entering the unit. The blank off plate should be utilized in applications where outside air is not required to be mixed with the conditioned air.

OPTIONAL

MOTORIZED FRESH AIR DAMPER - MFAD

The motorized fresh air damper is internally mounted behind the service door and allows outside ventilation air, up to 25% of the total airflow rating of the unit, to be introduced through the air inlet openings and to be mixed with the conditioned air. The two position damper can be fully open or closed. The damper blade is powered open by a 24VAC motor with spring return on power loss. The damper can be controlled by indoor blower operation or can be field connected to be managed based on building occupancy.

OPTIONAL

NOTE: The above vent systems are intake only without built-in exhaust capability. Building will likely require separate field installed barometric relief or mechanical exhaust elsewhere within the conditioned space. Balancing dampers in the return air grille may be required to achieve specified amount of outdoor air intake.

COMMERCIAL ROOM VENTILATOR - CRV

The built-in commercial room ventilator is internally mounted behind the service door and allows outside ventilation air, up to 50% of the total airflow rating of the unit, to be introduced through the air inlet openings. It includes a built-in exhaust air damper.

OPTIONAL

The commercial room ventilator (CRV) is a simple and innovative approach to improving the indoor air quality by providing fresh air intake and exhaust capability through the CRV. The damper can be easily adjusted to control the amount of fresh air supplied into the building. The CRV can be controlled by indoor blower operation or field controlled based on room occupancy. Two versions available (except on 1.5 and 2-Ton models). The CRV and CRVS are power open - spring return on power loss, and CRVP is power open and power close. Complies with ANSI/ASHRAE Standard 62.1 "Ventilation for Acceptable Indoor Air Quality".

ECONOMIZER - EIFM

The built-in economizer system is internally mounted behind the service door and allows outdoor air to be introduced through the air inlet openings. The amount of outdoor air varies in response to the system controls and settings defined by the end user. It includes a built-in exhaust air damper. The economizer is designed to provide "free cooling" when outside air conditions are cool and dry enough to satisfy cooling requirements without running the compressor. This in turn provides lower operating costs, while extending the life of the compressor.

OPTIONAL

Standard Features:

- One Piece Construction - Easy to install with no mechanical linkage adjustment required.
- Exhaust Air Damper - Built in with positive closed position. Provides exhaust air capability to prevent pressurization of tight buildings.
- Actuator Motor - 24 volt, power open, spring return with built in torque limiting switch.
- Proportioning Type Control - for maximum "free cooling" economy and comfort.
- Moisture Eliminator & Prefilter - permanent, washable aluminum construction.
- Enthalpy Control - adjustable to monitor outdoor temperature and humidity.
- Minimum Position Potentiometer - adjustable to control minimum damper blade position for ventilation purposes.
- Mixed Air Sensor - to monitor outside and return air to automatically modulate damper position.

WALL-MOUNT ENERGY RECOVERY VENTILATOR - ERV

The wall-mount energy recovery ventilator (ERV) is a highly innovative approach to meeting indoor air quality ventilation requirements as established by ANSI/ASHRAE Standard 62.1. The ERV allows from 200 to 450 CFM (depending upon model) of fresh air and exhaust through the unit while maintaining superior indoor comfort and humidity levels. In most cases this can be accomplished without increasing equipment sizing or operating costs. Heat transfer efficiency is up to 67% during summer and 75% during winter conditions.

OPTIONAL

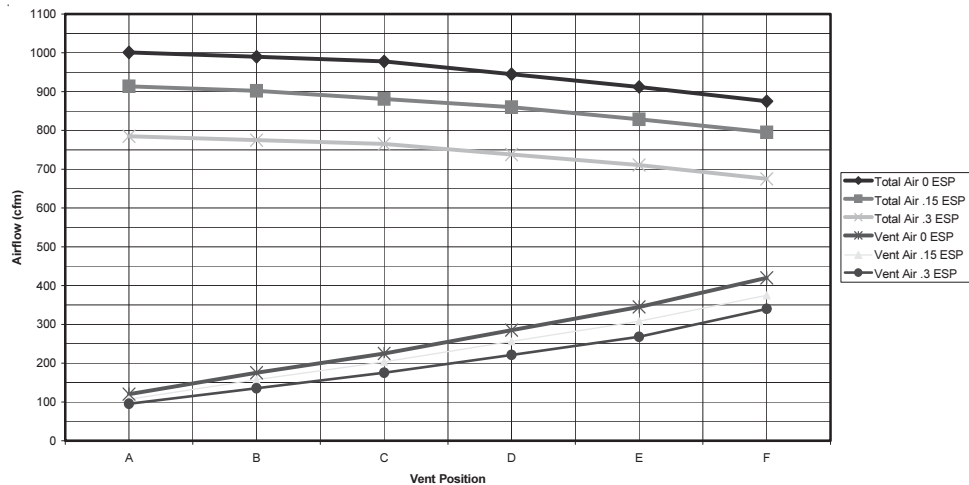
The ERV consists of a unique "rotary energy recovery cassette" that provides effective sensible and latent heat transfer capabilities during summer and winter conditions. Various control schemes are addressed including limiting ventilation during building occupancy only.

The ERV is designed to be internally mounted behind the service door in the W**A, W**H or W**L model wall-mount units. It can be built-in at the factory or field installed as an option. ERVF-*3 and ERVF-*5 can be independently adjusted for intake and exhaust rates.

Manufactured under U.S. Patent Nos. 5,485,878; 5,301,744;
5,002,116; 4,924,934; 4,875,520; 4,825,936; 6,310,330.

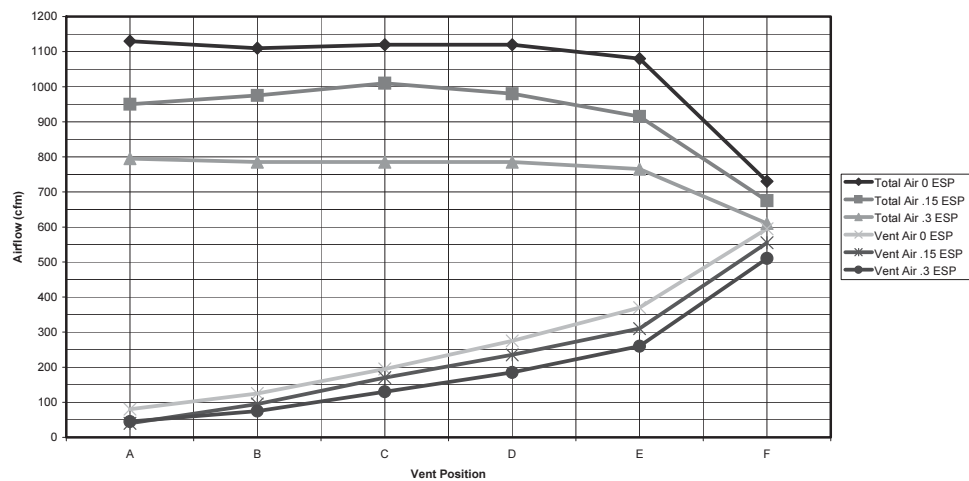
Commercial Room Ventilator Performance Data - CRV-2

W18A & W24A TOTAL AND VENTILATION AIRFLOW

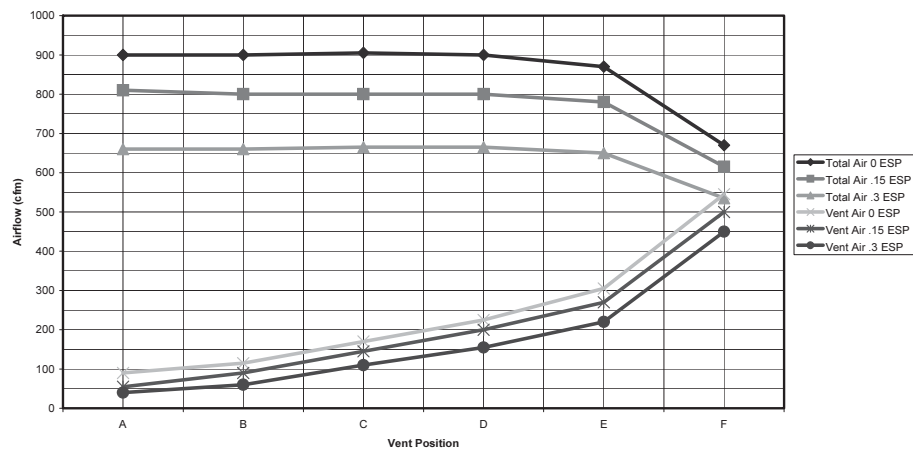


Commercial Room Ventilator Performance Data - CRVS-3 and CRVP-3

W30A & W36A HIGH SPEED TOTAL AND VENTILATION AIRFLOW

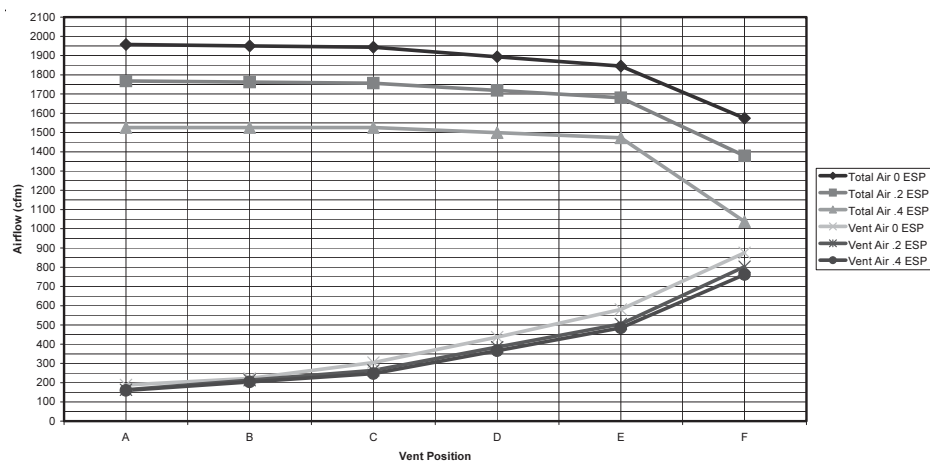


W30A & W36A LOW SPEED TOTAL AND VENTILATION AIRFLOW



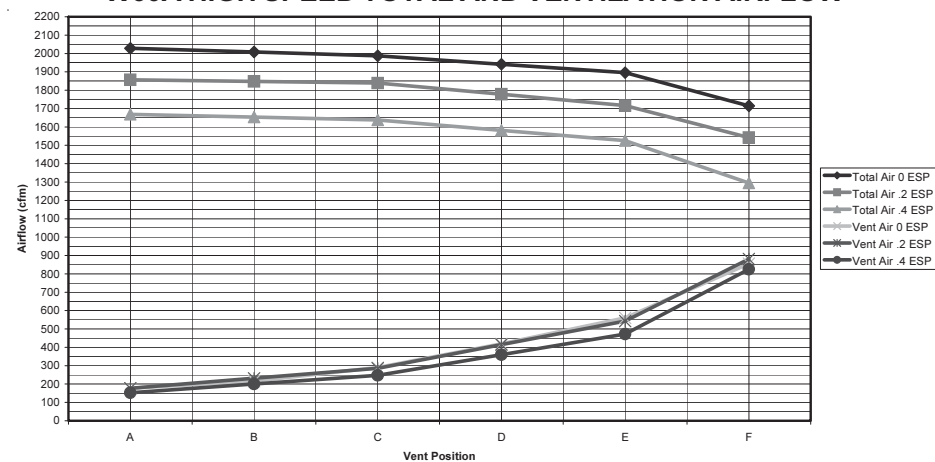
Commercial Room Ventilator Performance Data - CRVS-5 and CRVP-5

W42A & W48A HIGH SPEED TOTAL AND VENTILATION AIRFLOW

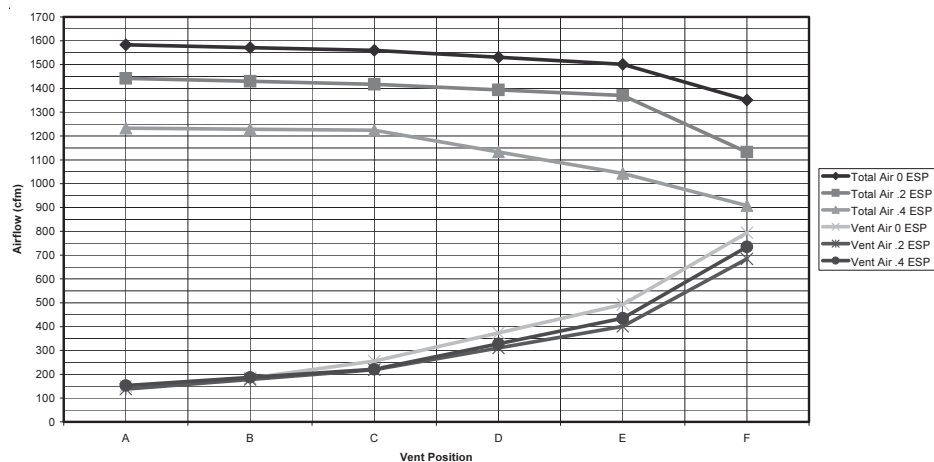


Commercial Room Ventilator Performance Data - CRVS-5 and CRVP-5

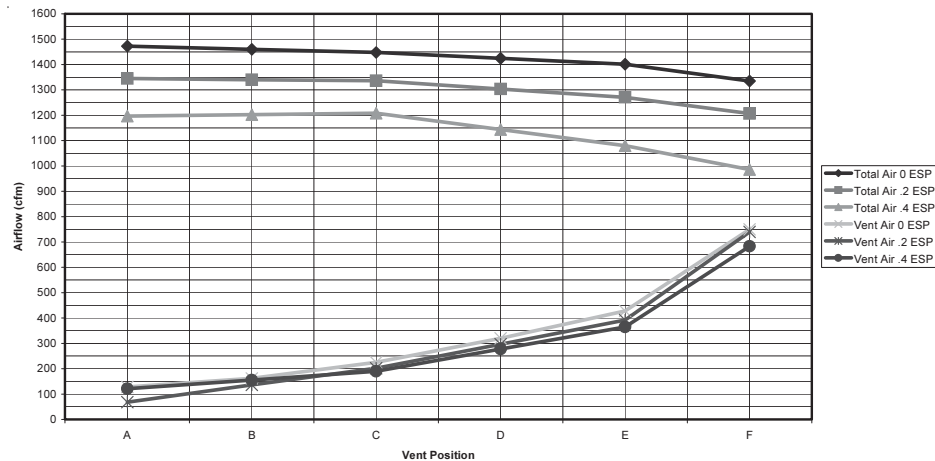
W60A HIGH SPEED TOTAL AND VENTILATION AIRFLOW



W42A & W48A LOW SPEED TOTAL AND VENTILATION AIRFLOW



W60A LOW SPEED TOTAL AND VENTILATION AIRFLOW



Performance and Application Data- ERVF-A2

SUMMER COOLING PERFORMANCE (INDOOR DESIGN CONDITIONS 75°DB/62°WB)

Ambient O.D.		VENTILATION RATE -- 250 CFM 62% EFFICIENCY						VENTILATION RATE -- 225 CFM 63% EFFICIENCY						VENTILATION RATE -- 200 CFM 63% EFFICIENCY					
DB/ WB	F	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL
105	75	11925	8100	1325	7394	5022	822	10727	7287	3441	6758	4591	2168	9540	6480	3060	6010	4082	1928
	70	8100	8100	0	5022	5022	0	7287	7287	0	4591	4591	0	6480	6480	0	4082	4082	0
	65	8100	8100	0	5022	5022	0	7287	7287	0	4591	4591	0	6480	6480	0	4082	4082	0
100	80	17550	6750	10800	10881	4185	6696	15788	6072	9716	9946	3826	6121	14040	5400	8640	8845	3402	5443
	75	11925	6750	5175	7394	4185	3209	10727	6072	4655	6758	3826	2933	9540	5400	4140	6010	3402	2608
	70	6863	6750	113	4255	4185	70	6173	6072	101	3889	3826	64	5490	5400	90	3458	3402	56
	65	6750	6750	0	4185	4185	0	6072	6072	0	3826	3826	0	5400	5400	0	3402	3402	0
	60	6750	6750	0	4185	4185	0	6072	6072	0	3826	3826	0	5400	5400	0	3402	3402	0
95	80	17550	5400	12150	10881	3348	7533	15788	4858	10930	9946	3060	6886	14040	4320	9720	8845	2722	6124
	75	11925	5400	6525	7394	3348	4046	10727	4858	5870	6758	3060	3698	9540	4320	5220	6010	2722	3289
	70	6863	5400	1463	4255	3348	907	6173	4858	1315	3889	3060	829	5490	4320	1170	3458	2722	737
	65	5400	5400	0	3348	3348	0	4858	4858	0	3060	3060	0	4320	4320	0	2722	2722	0
	60	5400	5400	0	3348	3348	0	4858	4858	0	3060	3060	0	4320	4320	0	2722	2722	0
90	80	17550	4050	13500	10881	2511	8370	15788	3643	12145	9946	2295	7651	14040	3240	10800	8845	2041	6804
	75	11925	4050	7875	7394	2511	4883	10727	3643	7084	6758	2295	4463	9540	3240	6300	6010	2041	3969
	70	6863	4050	2813	4255	2511	1744	6173	3643	2530	3889	2295	1594	5490	3240	2250	3458	2041	1417
	65	4050	4050	0	2511	2511	0	3643	3643	0	2295	2295	0	3240	3240	0	2041	2041	0
	60	4050	4050	0	2511	2511	0	3643	3643	0	2295	2295	0	3240	3240	0	2041	2041	0
85	80	17550	2700	14850	10881	1674	9207	15788	2429	13359	9946	1530	8416	14040	2160	11880	8845	1361	7484
	75	11925	2700	9225	7394	1674	5720	10727	2429	8298	6758	1530	5228	9540	2160	7380	6010	1361	4649
	70	6863	2700	4163	4255	1674	2581	6173	2429	3744	3889	1530	2359	5490	2160	3300	3458	1361	2098
	65	2700	2700	0	1674	1674	0	2429	2429	0	1530	1530	0	2160	2160	0	1361	1361	0
	60	2700	2700	0	1674	1674	0	2429	2429	0	1530	1530	0	2160	2160	0	1361	1361	0
80	75	11925	1350	10575	7394	837	6557	10727	1214	9513	6758	765	5993	9540	1080	8460	6010	680	5330
	70	6863	1350	5513	4255	837	3418	6173	1214	4959	3889	765	3124	5490	1080	4410	3458	680	2778
	65	2363	1350	1013	1465	837	628	2125	1214	911	1339	765	547	1890	1080	810	1190	680	510
	60	1350	1350	0	837	837	0	1214	1214	0	765	765	0	1080	1080	0	680	680	0
75	70	6863	0	6863	4255	0	4255	6173	0	6173	6889	0	3889	5490	0	5490	3458	0	3458
	65	2363	0	2363	1465	0	1465	2125	0	2125	1339	0	1339	1890	0	1890	1190	0	1190
	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ERVF-A2 WINTER HEATING PERFORMANCE (INDOOR DESIGN CONDITIONS 70°F DB)

Ambient O.D.	VENTILATION RATE					
	250 CFM 74% EFF.		225 CFM 75% EFF.		200 CFM 75% EFF.	
DB/°F	WVL	WHR	WVL	WHR	WVL	WHR
65	1350	999	1214	911	1080	810
60	2700	1998	2429	1822	2160	1620
55	4050	2997	3643	2733	3240	2430
50	5400	3996	4858	3643	4320	3240
45	6750	4995	6072	4554	5400	4050
40	8100	5994	7287	5465	6480	4860
35	9450	6993	8501	6376	7560	5670
30	10800	7992	9716	7287	8640	6480
25	12150	8991	10930	8198	9720	7290
20	13500	9990	12145	9108	10800	8100
15	14850	10989	13359	10019	11880	8910

NOTE: Sensible performance only is shown for winter application.

LEGEND:

VLT = Ventilation Load - Total
 VLS = Ventilation Load - Sensible
 VLL = Ventilation Load - Latent
 HRT = Heat Recovery - Total
 HRS = Heat Recovery - Sensible
 HRL = Heat Recovery - Latent
 WVL = Winter Ventilation Load
 WHR = Winter Heat Recovery

Performance and Application Data- ERVF-*3

SUMMER COOLING PERFORMANCE
(INDOOR DESIGN CONDITIONS 75°DB/62°WB)

Ambient O.D.		VENTILATION RATE -- 400CFM 63% EFFICIENCY						VENTILATION RATE -- 325 CFM 64% EFFICIENCY						VENTILATION RATE -- 250 CFM 65% EFFICIENCY					
DB/ WB	F	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL
105	75	19080	12960	6120	12020	8164	3855	15502	10530	4972	9921	6739	3182	11925	8100	3825	7751	5265	2486
	70	12960	12960	0	8164	8164	0	10530	10530	0	6739	6739	0	8100	8100	0	5265	5265	0
	65	12960	12960	0	8164	8164	0	10530	10530	0	6739	6739	0	8100	8100	0	5265	5265	0
100	80	28080	10800	17280	17690	6804	10886	22815	8775	14040	14601	5616	8985	17550	6750	10800	11407	4387	7019
	75	19080	10800	8280	12020	6804	5216	15502	8775	6727	9921	5616	4305	11925	6750	5175	7751	4387	3363
	70	10980	10800	180	6717	6804	113	8921	8775	146	5709	5616	93	6862	6750	112	4460	4387	73
	65	10800	10800	0	6804	6804	0	8775	8775	0	5616	5616	0	6750	6750	0	4387	4387	0
95	60	10800	10800	0	6804	6804	0	8775	8775	0	5616	5616	0	6750	6750	0	4387	4387	0
	80	28080	8640	19440	17690	5443	12247	22815	7020	15795	14601	4492	10108	17550	5400	12150	11407	3510	7897
	75	19080	8640	10440	12020	5443	6577	15502	7020	8482	9921	4492	5428	11925	5400	6525	7751	3510	4241
	70	10980	8640	2340	6917	5443	1474	8921	7020	1901	5709	4492	1216	6862	5400	1462	4460	3510	950
90	65	8640	8640	0	5443	5443	0	7020	7020	0	4492	4492	0	5400	5400	0	3510	3510	0
	60	8640	8640	0	5443	5443	0	7020	7020	0	4492	4492	0	5400	5400	0	3510	3510	0
	80	28080	6480	21600	17690	4082	13608	22815	5265	17550	14601	3369	11232	17550	4050	13500	11407	2632	8774
	75	19080	6480	12600	12020	4082	7938	15502	5265	10237	9921	3369	6552	11925	4050	7875	7751	2632	5118
85	70	10980	6480	4500	6917	4082	2835	8921	5265	3656	5709	3369	2340	6862	4050	2812	4460	2632	1828
	65	6480	6480	0	4082	4082	0	5265	5265	0	3369	3369	0	4050	4050	0	2632	2632	0
	60	6480	6480	0	4082	4082	0	5265	5265	0	3369	3369	0	4050	4050	0	2632	2632	0
	80	28080	4320	23760	17690	2721	14968	22815	3510	19305	14601	2246	12355	17550	2700	14850	11407	1755	9652
80	75	19080	4320	14760	12020	2721	9298	15502	3510	11992	9921	2246	7675	11925	2700	9225	7751	1755	5996
	70	10980	4320	6660	6917	2721	4195	8921	3510	5411	5709	2246	3463	6862	2700	4162	4460	1755	2705
	65	4320	4320	0	2721	2721	0	3510	3510	0	2246	2246	0	2700	2700	0	1755	1755	0
	60	4320	4320	0	2721	2721	0	3510	3510	0	2246	2246	0	2700	2700	0	1755	1755	0
75	75	19080	2160	16920	12020	1360	10659	15502	1755	13747	9921	1123	8798	11925	1350	10575	7751	877	6873
	70	10980	2160	8820	6917	1360	5556	8921	1755	7166	5709	1123	4586	6862	1350	5512	4460	877	3583
	65	3780	2160	1620	2381	1360	1020	3071	1755	1316	1965	1123	842	2362	1350	1012	1535	877	658
	60	2160	2160	0	1360	1360	0	1755	1755	0	1123	1123	0	1350	1350	0	877	877	0
75	70	10980	0	10980	6917	0	6917	8921	0	8921	5709	0	5709	6862	0	6862	4460	0	4460
	65	3780	0	3780	2381	0	2380	3071	0	3071	1965	0	1965	2362	0	2362	1535	0	1535
	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ERVF-*3 WINTER HEATING PERFORMANCE (INDOOR DESIGN CONDITIONS 70°F DB)

Ambient O.D.	VENTILATION RATE					
	400 CFM 75% EFFICIENCY		325 CFM 76% EFFICIENCY		250 CFM 77% EFFICIENCY	
DB/°F	WVL	WHR	WVL	WHR	WVL	WHR
65	2160	1620	1755	1333	1350	1039
60	4320	3240	3510	2667	2700	2079
55	6480	4860	5265	4001	4050	3118
50	8640	6480	7020	5335	5400	4158
45	10800	8100	8775	6669	6750	5197
40	12960	9720	10530	8002	8100	6237
35	15120	11340	12285	9336	9450	7276
30	17280	12960	14040	10670	10800	8316
25	19440	14580	15795	12004	12150	9355
20	21600	16200	17550	13338	13500	10395
15	23760	17820	19305	14671	14850	11434

NOTE: Sensible performance only is shown for winter application.

LEGEND:

VLT = Ventilation Load - Total
VLS = Ventilation Load - Sensible
VLL = Ventilation Load - Latent
HRT = Heat Recovery - Total
HRS = Heat Recovery - Sensible
HRL = Heat Recovery - Latent
WVL = Winter Ventilation Load
WHR = Winter Heat Recovery

Performance and Application Data- ERVF-*5

SUMMER COOLING PERFORMANCE
(INDOOR DESIGN CONDITIONS 75°DB/62°WB)

Ambient O.D.		VENTILATION RATE 450 CFM 65% EFFICIENCY						VENTILATION RATE 375 CFM 66% EFFICIENCY						VENTILATION RATE 300 CFM 67% EFFICIENCY					
DB/ WB	F	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL
105	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075
	70	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
	65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
100	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	6682	10692	21060	8100	12960	14110	5427	8683
	75	21465	12150	9314	13952	7897	6054	17887	10125	7762	11805	6682	5123	14310	8100	6210	9587	5427	4160
	70	12352	12150	202	8029	7897	131	10293	10125	168	6793	6682	111	8235	8100	135	5517	5427	90
	65	12150	12150	0	7897	7897	0	10125	10125	0	6682	6682	0	8100	8100	0	5427	5427	0
	60	12150	12150	0	7897	7897	0	10125	10125	0	6682	6682	0	8100	8100	0	5427	5427	0
95	80	31590	9720	21870	20533	6318	14215	26325	8100	18225	17374	5345	12028	21060	6480	14580	14110	4341	9768
	75	21465	9720	11744	13952	6318	7634	17887	8100	9787	11805	5345	6459	14310	6480	7830	9587	4341	5246
	70	12352	9720	2632	8029	6318	1711	10293	8100	2193	6793	5345	1447	8235	6480	1755	5517	4341	1175
	65	9720	9720	0	6318	6318	0	8100	8100	0	5345	5345	0	6480	6480	0	4341	4341	0
	60	9720	9720	0	6318	6318	0	8100	8100	0	5345	5345	0	6480	6480	0	4341	4341	0
90	80	31590	7290	24300	20533	4738	15794	26325	6075	20250	17374	4009	13365	21060	4860	16200	14110	3256	10854
	75	21465	7290	14175	13952	4738	9213	17887	6075	11812	11805	4009	7796	14310	4860	9450	9587	3256	6331
	70	12352	7290	5062	8029	4738	3290	10293	6075	4218	6793	4009	2784	8235	4860	3375	5517	3256	2261
	65	7290	7290	0	4738	4738	0	6075	6075	0	4009	4009	0	4860	4860	0	3256	3256	0
	60	7290	7290	0	4738	4738	0	6075	6075	0	4009	4009	0	4860	4860	0	3256	3256	0
85	80	31590	4860	26730	20533	3159	17374	26325	4050	22275	17374	2672	14701	21060	3240	17820	14110	2170	11939
	75	21465	4860	16605	13952	3159	10793	17887	4050	13837	11805	2672	9132	14310	3240	11070	9587	2170	7416
	70	12352	4860	7492	8029	3159	4870	10293	4050	6243	6793	2672	4120	8235	3240	4995	5517	2170	3346
	65	4860	4860	0	3159	3159	0	4050	4050	0	2672	2672	0	3240	3240	0	2170	2170	0
	60	4860	4860	0	3159	3159	0	4050	4050	0	2672	2672	0	3240	3240	0	2170	2170	0
80	75	21465	2430	19035	13952	1579	12372	17887	2025	15862	11805	1336	10469	14310	1620	12690	9587	1085	8502
	70	12352	2430	9922	8029	1579	6449	10293	2025	8268	6793	1336	5457	8235	1620	6615	5517	1085	4432
	65	4252	2430	1822	2764	1579	1184	3543	2025	1518	2338	1336	1002	2835	1620	1215	1899	1085	814
	60	2430	2430	0	1579	1579	0	2025	2025	0	1336	1336	0	1620	1620	0	1085	1085	0
75	70	12352	0	12352	8029	0	8029	10293	0	10293	6793	0	6793	8235	0	8235	5517	0	5517
	65	4252	0	4252	2764	0	2764	3543	0	3543	2338	0	2338	2835	0	2835	1899	0	1899
	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Electrical Specifications

Model	Rated Volts and Phase	No. Field Power Circuits	Single Circuit				Dual Circuit							
			③ Minimum Circuit Ampacity	① Maximum External Fuse or Ckt. Brkr.	② Field Power Wire Size	② Ground Wire	③ Minimum Circuit Ampacity		① Maximum External Fuse or Ckt. Brkr.		② Field Power Wire Size		② Ground Wire Size	
							Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B
W18A1 - A00, A0Z	230/208-1	1	16	20	12	12								
A05		1	30	30	10	10								
A08		1	46	50	8	10								
A10		1	56	60	6	10								
W24A1 - A00, A0Z	230/208-1	1	21	30	10	10								
A05		1	30	30	10	10								
A08		1	46	50	8	10								
A10		1	56	60	6	10								
W24A1 - B00, B0Z	230/208-3	1	15	15	14	14								
B06		1	22	25	10	10								
W24A1 - C00, C0Z	460-3	1	10	15	14	14								
C06		1	12	15	14	14								
W30A1 - A00*, A0Z*	230/208-1	1	24	35	8	10								
A05*		1	32	35	8	10								
A08		1	48	50	8	10								
A10*		1	58	60	6	10								
A15		1 or 2	84	90	4	8	58	26	60	30	6	10	10	10
W30A1 - B00*, B0Z*	230/208-3	1	18	20	12	12								
B06		1	24	25	10	10								
B09*		1	33	35	8	10								
B15		1	51	60	8	10								
W30A1 - C00*, C0Z*	460-3	1	11	15	14	14								
C06		1	12	15	14	14								
C09*		1	17	20	12	12								
C15		1	26	30	10	10								
W36A1 - A00*, A0Z*	230/208-1	1	29	35	8	10								
A05*		1	32	35	8	10								
A08		1	48	50	8	10								
A10*		1	58	60	6	10								
A15		1 or 2	84	90	4	8	58	26	60	30	6	10	10	10
W36A1 - B00*, B0Z*	230/208-3	1	23	30	10	10								
B06		1	24	30	10	10								
B09*		1	33	35	8	10								
B15		1	51	60	6	10								
W36A1 - C00*, C0Z*	460-3	1	12	15	14	14								
C06		1	12	15	14	14								
C09*		1	17	20	10	10								
C15		1	26	30	10	10								
W42A1 - A00, A0Z ④	230/208-1	1	33	50	8	10								
A05 ④		1	33	50	8	10								
A10 ④		1	59	60	6	10								
A15		1 or 2	85	90	4	8	59	26	60	30	6	10	10	10
A20		1 or 2	111	125	2	6	59	52	60	60	6	6	10	10
W42A1 - B00, B0Z ④	230/208-3	1	25	35	8	10								
B09 ④		1	34	35	8	10								
B15		1	53	60	6	10								
B18 ④		1	62	70	6	8								
W42A1 - C00, C0Z ④	460-3	1	13	15	14	14								
C09 ④		1	18	20	12	12								
C15		1	27	30	10	10								
W48A1 - A00, A0Z ④	230/208-1	1	37	50	8	10								
A05 ④		1	37	50	8	10								
A10 ④		1	59	60	6	10								
A15		1 or 2	85	90	4	8	59	26	60	30	6	10	10	10
A20		1 or 2	111	125	2	6	59	52	60	60	6	6	10	10
W48A1 - B00, B0Z ④	230/208-3	1	29	40	8	10								
B09 ④		1	34	40	8	10								
B15		1	52	60	6	10								
B18 ④		1	62	70	6	8								
W48A1 - C00, C0Z ④	460-3	1	14	20	12	12								
C09 ④		1	18	20	12	12								
C15		1	27	30	10	10								
W60A1 - A00, A0Z ④	230/208-1	1	41	60	8	10								
A05 ④		1	41	60	8	10								
A10 ④		1	59	60	6	10								
A15		1 or 2	85	90	4	8	59	26	60	30	6	10	10	10
A20		1 or 2	111	125	2	6	59	52	60	60	6	6	10	10
W60A1 - B00, B0Z ④	230/208-3	1	28	40	8	10								
B09 ④		1	34	40	8	10								
B15 ④		1	53	60	6	10								
B18 ④		1	62	70	6	10								
W60A1 - C00, C0Z ④	460-3	1	15	20	12	12								
C09 ④		1	18	20	12	12								
C15		1	27	30	10	10								

① Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.

② Based on 75C copper wire. All wiring must conform to the National Electrical Code and all local codes.

③ These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing.

④ These models are available with dehumidification with hot gas reheat.

Caution: When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.

* Top outlet supply option is available only factory installed and only on the selected models.

IMPORTANT: While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses & conductor wires in accordance with the National Electrical Code & all local codes.

Indoor Blower Performance - CFM at Rated Volts

ESP in H ₂ O	W18A1		W24A1	W30A1 W36A1		W42A1 W48A1		W60A1	
	High Speed Dry/Wet Coil	Low Speed Dry/Wet Coil	Single Speed Dry/Wet Coil	High Speed Dry/Wet Coil	Low Speed Dry/Wet Coil	High Speed Dry/Wet Coil	Low Speed Dry/Wet Coil	High Speed Dry/Wet Coil	Low Speed Dry/Wet Coil
0	925/885	670/655	1020/975	1395/1315	950/935	1885/1800	1650/1600	2200/2000	1600/1450
.1	875/845	650/630	960/905	1340/1270	930/915	1770/1665	1550/1500	2100/1900	1525/1375
.2	825/795	625/600	865/800	1285/1190	910/885	1635/1550	1450/1400	2000/1800	1465/1200
.3	775/740	575/555	820/735	1205/1100	855/830	1500/1400	1350/1300	1875/1700	-/-
.4	710/670	525/500	735/650	1110/1000	800/755	1370/1285	1300/1175	1775/1600	-/-
.5	635/600	465/440	615/535	1005/870	-/-	1250/1150	-/-	1650/1475	-/-

Above data is with 1" standard throwaway filter and 1" washable filter.

For optional 2" pleated filter - reduce ESP by .15 in.

See installation instructions for maximum ESP information on various KW application.

Speeds marked "bold" above
are **Factory Connected**.

Electric Heat Table - Refer to Electrical Specifications for Availability by Unit Model

Nominal KW	At 240V (1)				At 208V (1)				At 480V (2)			At 460V (2)		
	Kw	1-Ph Amps	3-Ph Amps	Btuh	Kw	1-Ph Amps	3-Ph Amps	Btuh	Kw	3-Ph Amps	Btuh	Kw	3-Ph Amps	Btuh
5.0	5.0	20.8		17,065	3.75	18.0		12,799						
6.0	6.0		14.4	20,478	4.50		12.5	15,359	6.0	7.2	20,478	5.52	6.9	18,840
8.0	8.0	33.3		27,304	6.00	28.8		20,478						
9.0	9.0		21.7	30,717	6.75		18.7	23,038	9.0	10.8	30,717	8.28	10.4	28,260
10.0	10.0	41.7		34,130	7.50	36.1		25,598						
15.0	15.0	62.5	36.1	51,195	11.25	54.1	31.2	38,396	15.0	18.0	51,195	13.80	17.3	47,099
18.0	18.0		43.3	61,434	13.50		37.5	46,076	18.0	21.7	61,434	16.56	20.8	56,519
20.0	20.0	83.3		68,260	15.00	72.1		51,195						

(1) These electric heaters are available in 230/208V units only.

(2) These electric heaters are available in 480V units only.

Heater Packages - Field Installed

- Designed for adding Electric Heat to 0 KW Units
- Circuit Breaker Standard on 230/208V Models

- ETL US & Canada Listed
- Toggle Disconnect Standard on 460V Models

Air Conditioner Models	-A00 Models 230/208-1		-B00 Models 230/208-3		-C00 Models 460-3	
	Heater Model #	KW	Heater Model #	KW	Heater Model #	KW
W18A1	EHWA02-A05 EHWA02A-A08 EHWA02A-A10	5 8 10	N/A		N/A	
W24A1	EHWA02-A05 EHWA02A-A08 EHWA02A-A10	5 8 10	EHWA24-B06	6	EHWH24B-C06	6
W30A1	EHWA03-A05 EHWA03-A08 EHWA03-A10 EHWA03-A15	5 8 10 15	EHWA03-B06 EHWA03-B09 EHWA37-B15	6 9 15	EHWC03A-C06 EHWC03A-C09 EHWA03A-C15	6 9 15
W36A1	EHWA03-A05 EHWA03-A08 EHWA03-A10 EHWA03-A15	5 8 10 15	EHW36A-B06 EHWA03-B09 EHWA37-B15	6 9 15	EHWC03A-C06 EHWC03A-C09 EHWA03A-C15	6 9 15
W42A1 W48A1	EHWA05-A05 ① EHWA05-A10 ① EHWA05-A15 EHWA05-A20	5 10 15 20	EHWA05-B09 ① EHWA05-B15 EHWA05A-B18 ①	9 15 18	EHWA05A-C09 ① EHWA05A-C15	9 15
W60A1	EHWA60-A05 ① EHWA05-A10 ① EHWA05-A15 EHWA05-A20	5 10 15 20	EHW60A-B09 ① EHWA05-B15 ① EHWA05A-B18 ①	9 15 18	EHWA05A-C09 ① EHWA05A-C15	9 15

NOTE: Field installed Heater Packages are not approved for use with top supply opening models.

① These heater packages approved for use in dehumidification versions with hot gas reheat.

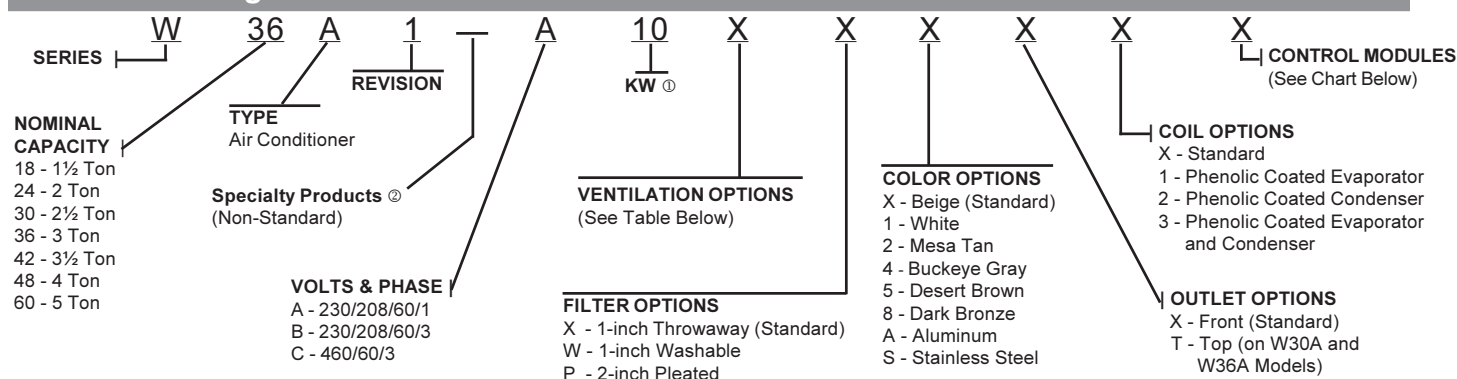
Cooling Application Data - Outdoor Temperature ①

Model	D.B./W.B. ②	Cooling Capacity	75°F	80°F	85°F	90°F	95°F	100°F	105°F	110°F	115°F	120°F	
W18A1	75/ 62	Total Cooling Sensible Cooling	17,500 13,900	16,700 13,500	15,900 13,200	15,100 12,800	14,300 12,500	13,600 12,200	12,900 11,800	12,200 11,500	11,600 11,100	10,800 10,700	
	80/ 67	Total Cooling Sensible Cooling	18,600 13,400	18,100 13,200	17,600 13,000	17,000 12,800	16,400 12,600	15,800 12,400	15,200 12,100	14,500 11,800	13,900 11,500	13,100 11,200	
	85/ 72	Total Cooling Sensible Cooling	22,200 13,800	21,200 13,400	20,200 13,100	19,200 12,800	18,300 12,400	17,300 12,000	16,400 11,600	15,500 11,100	14,600 10,600	13,700 10,200	
W24A1	75/ 62	Total Cooling Sensible Cooling	26,000 20,100	24,500 19,700	23,300 19,200	22,100 18,800	20,900 18,400	20,000 17,900	19,100 17,400	18,400 16,900	17,600 16,400	17,100 15,900	
	80/ 67	Total Cooling Sensible Cooling	27,700 19,500	26,700 19,300	25,800 19,000	24,900 18,800	24,000 18,500	23,300 18,200	22,500 17,800	21,900 17,400	21,200 17,000	20,700 16,600	
	85/ 72	Total Cooling Sensible Cooling	33,000 20,000	31,200 19,600	29,700 19,100	28,100 18,700	26,700 18,200	25,500 17,600	24,300 17,000	23,300 16,300	22,300 15,700	21,500 15,000	
W30A1	75/ 62	Total Cooling Sensible Cooling	31,100 24,500	29,700 24,000	28,300 23,500	27,000 22,900	25,800 22,400	24,700 21,800	23,700 21,300	22,700 20,700	21,700 20,100	20,900 19,500	
	80/ 67	Total Cooling Sensible Cooling	33,200 23,700	32,300 23,500	31,400 23,200	30,400 22,900	29,400 22,600	28,600 22,200	27,800 21,800	27,000 21,400	26,100 20,900	25,300 20,400	
	85/ 72	Total Cooling Sensible Cooling	39,600 24,300	37,800 23,900	36,100 23,300	34,500 22,800	32,900 22,200	31,500 21,500	30,100 20,800	28,800 20,100	27,500 19,300	26,300 18,500	
W36A1	75/ 62	Total Cooling Sensible Cooling	38,100 28,500	35,900 27,800	34,100 27,100	32,300 26,400	30,800 25,800	29,600 25,200	28,600 24,700	27,700 24,200	26,900 23,700	26,400 23,200	
	80/ 67	Total Cooling Sensible Cooling	40,600 27,600	39,100 27,200	37,800 26,800	36,500 26,400	35,400 26,000	34,500 25,600	33,700 25,300	33,000 25,000	32,400 24,600	32,000 24,300	
	85/ 72	Total Cooling Sensible Cooling	48,400 28,300	45,700 27,600	43,400 26,900	41,200 26,200	39,300 25,500	37,800 24,800	36,400 24,100	35,100 23,500	34,100 22,700	33,300 22,000	
W42A1	75/ 62	Total Cooling Sensible Cooling	43,600 35,500	41,500 34,500	39,600 33,600	37,600 32,700	35,700 31,800	33,900 31,000	32,100 30,100	30,400 29,200	28,700 28,400	27,000 27,500	
	80/ 67	Total Cooling Sensible Cooling	46,500 34,400	45,200 33,800	43,900 33,300	42,500 32,700	41,000 32,100	39,500 31,500	37,900 30,900	36,200 30,200	34,500 29,500	32,700 28,800	
	85/ 72	Total Cooling Sensible Cooling	55,400 35,200	52,900 34,300	50,400 33,500	48,000 32,500	45,600 31,500	43,200 30,500	40,900 29,500	38,500 28,300	36,300 27,200	34,000 26,000	
W48A1	75/ 62	Total Cooling Sensible Cooling	49,600 39,900	47,300 39,100	45,100 38,200	43,000 37,300	40,900 36,400	39,000 35,500	37,100 34,500	35,100 33,600	33,300 32,700	31,400 31,600	
	80/ 67	Total Cooling Sensible Cooling	52,900 38,700	51,500 38,300	50,100 37,800	48,600 37,300	47,000 36,700	45,400 36,100	43,700 35,400	41,900 34,700	40,000 34,000	38,100 33,100	
	85/ 72	Total Cooling Sensible Cooling	63,000 39,600	60,200 38,900	57,500 38,000	54,900 37,100	52,200 36,000	49,700 34,900	47,100 33,800	44,600 32,500	42,000 31,300	39,600 29,900	
W60A1	75/ 62	Total Cooling Sensible Cooling	59,200 45,200	56,200 43,800	53,300 42,300	50,500 41,000	47,900 39,700	45,400 38,500	43,100 37,300	40,800 36,100	38,600 35,000	36,600 33,900	
	80/ 67	Total Cooling Sensible Cooling	63,200 43,800	61,200 42,900	59,200 41,900	57,100 41,000	55,000 40,100	52,900 39,200	50,800 38,300	48,700 37,300	46,500 36,400	44,300 35,500	
	85/ 72	Total Cooling Sensible Cooling	75,300 44,900	71,600 43,600	68,000 42,100	64,500 40,700	61,100 39,300	57,900 37,900	54,800 36,500	51,800 35,000	48,900 33,500	46,000 32,100	
									Capacity Multiplier Factors				
									% of Rated Airflow		-10	Rated	+10
									Total BTUH Sensible BTUH		0.975 0.950	1.0 1.0	1.02 1.05

① Below 65°F (18.3C), unit requires a factory or field installed low ambient control.

② Return air temperature.

Air Conditioning Wall-Mount Model Nomenclature



① For 0KW and circuit breakers (230/208 Volt) or toggle disconnects (460 Volt) applications, insert 0Z in the KW field of the model number.

② Insert "D" for dehumidification with hot gas reheat — Models W42 - 60 only. See Form 7960-572 for complete details.

Ventilation Options

Models	W18A1, W24A1		W30A1, W36A1		W42A1, W48A1, W60A1	
Description	Factory Installed Code No.	Field Installed Part No.	Factory Installed Code No.	Field Installed Part No.	Factory Installed Code No.	Field Installed Part No.
Barometric Fresh Air Damper - Standard	X	BFAD-2	X	BFAD-3	X	BFAD-5
Blank-Off Plate	B	BOP-2	B	BOP-3	B	BOP-5
Motorized Fresh Air Damper	M	MFAD-2	M	MFAD-3	M	MFAD-5
Commercial Ventilator - Spring Return w/Exhaust	V	CRV-2	V	CRVS-3	V	CRVS-5
Commercial Ventilator - Power Return w/Exhaust	---	---	P	CRVP-3	P	CRVP-5
Economizer - Fully Modulating ①	E	EIFM-2B	E	EIFM-3C	E	EIFM-5C
Economizer - Fully Modulating ①②	D	N/A	D	N/A	D	N/A
Energy Recovery Ventilator - 230 Volt *	R	ERV-F-A2	R	ERV-F-A3 ③	R	ERV-F-A5 ③
Energy Recovery Ventilator - 460 Volt *	N/A	ERV-F-C2 ④	R	ERV-F-C3 ③	R	ERV-F-C5 ③
Door Kit for ERVF (Required)	N/A	WMDK2-*	N/A	WMDK3-*	N/A	WMDK5-*

① Low ambient control is required with economizer for low temperature compressor operation.

② For use only with "V" Control Module and TCS23 Controller.

③ Intake and exhaust can be independently adjusted.

④ Model W24A1-C only.

* WMDK Door Kit must be ordered in addition to ERVF Assembly and color matched to unit ("X" = Beige; "4" = Buckeye Gray; "8" = Dark Bronze)

Air Conditioning Control Modules

Air Conditioning Control Modules									All Models Except As Noted	
HPC ①	LPC ②	CCM ③	LAC ④⑪	ALR ⑤	SK ⑥	SK ⑦	ODT ⑧	DDC ⑨	Factory Installed Code	Field Installed Part
STD	STD	STD							X	N/A
STD	STD	STD	●						E ⑪	CMA-28
STD	STD	STD	●	●					J ⑪	Factory Only
STD	STD	STD	●		●				K ⑪	CMC-15 and CMA-28
STD	STD	STD	●	●	●				M ⑪	Factory Only
STD	STD	STD		●					N, W18A Only ⑫	N/A
STD	STD	STD			●				Field Installed Only	CMC-15
STD	STD	STD					●		Field Installed Only	CMA-14
STD	STD	STD	●	●				●	V ⑩⑪	Factory Only
STD	STD	STD						●	Field Installed Only	CMA-23 for W18-36A CMA-24 for W42-60A
STD	STD	STD				●			Field Installed Only	SK111

STD = Standard equipment for these specified models.

① HPC. High pressure control is auto reset. Always used with compressor control module (CCM) which is included. See note ③.

② LPC. Low pressure control is auto reset. Always used with compressor control module (CCM) which is included. See note ③.

③ CCM. Compressor control module has adjustable 30-second to 5-minute delay-on-break timer. On initial power-up, or any time the power is interrupted, the delay-on-make will be 2-minutes plus 10% of the delay-on-break setting. There is no delay-on-make during routine operation of the unit. The module also provides the lockout feature (with 1 retry) for high and/or low-pressure controls, and a 2-minute timed bypass for low-pressure control.

④ LAC. Low ambient control permits cooling operation down to 0°F

⑤ ALR. The alarm relay has a set of normally open and normally closed dry contacts to provide the ability to signal a condition of shutdown on either high or low pressure controls.

⑥ SK. PTCR start kit can be used with all -A single phase models. Increases starting torque 2-3x. Not used for -B or -C three phase models. Do not use if SK111 is used.

⑦ SK. Start capacitor and potential relay start kit can be used with all -A single phase models. Increases starting torque 9x. Not used for -B or -C three phase models. Do not use if CMC-15 is used.

⑧ ODT. Outdoor thermostat is adjustable from 0 to 50°F. It is suitable for use as a compressor cut-off thermostat.

⑨ DDC. Incorporates 4 additional sensors: discharge air temperature, indoor blower airflow, compressor current, and dirty filter. These sensing devices function to input analog data such as temperature, as well as digital data such as airflow, compressor status or filter status.

⑩ "V" control module should be ordered in conjunction with direct digital controller (DDC) model TCS23. Refer to DDC specification sheet S3280 for more information.

⑪ Option not available for Model W18A.

⑫ Use option N for Alarm Relay on Model W18A only.

Clearances Required for Service Access and Adequate Condenser Inlet Airflow

MODELS	LEFT SIDE	RIGHT SIDE
W18A, W24A, W30A, W36A	15"	20"
W42A, W48A, W60A	20"	20"

NOTE: For side by side installation of two (2) WA models there must be 20" between units. This can be reduced to 15" by using a WL model (left side compressor and controls) for the left unit and WA (right side compressor and controls) for right unit. See WL Specifications S3400.

Minimum Clearances Required to Combustible Materials

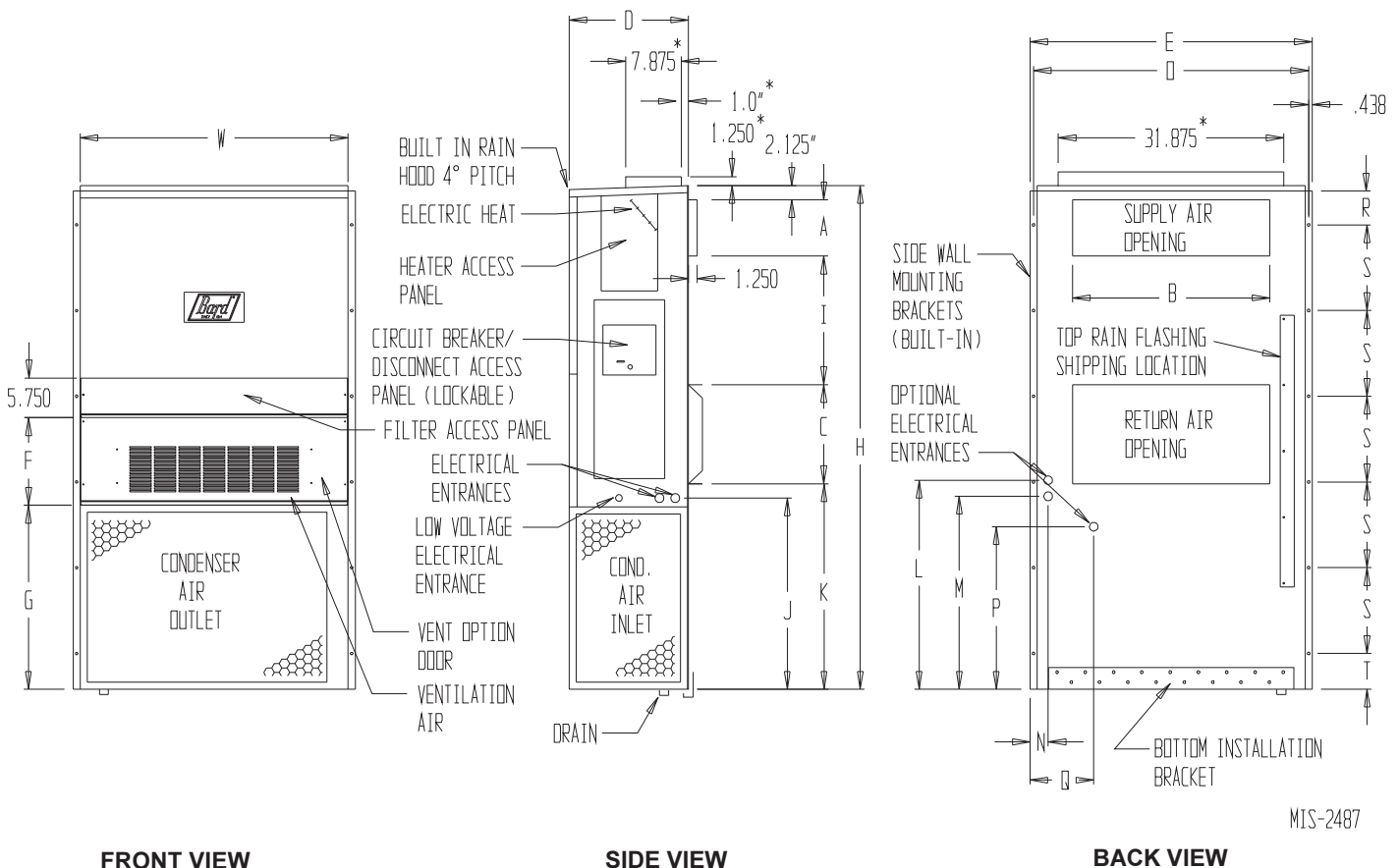
MODELS ①	SUPPLY AIR DUCT FIRST THREE FEET	CABINET
W18A, W24A	0"	0"
W30A, W36A	1/4"	0"
W42A, W48A, W60A	1/4"	0"

① Refer to the Installation Manual for more detailed information.

Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)

MODEL	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN																
				A	B	C	B	E	F	G	I	J	K	L	M	N	O	P	Q	R	S	T
W18A W24A	33.300	17.125	70.563	7.88	19.88	11.88	19.88	35.00	18.50	25.75	20.56	26.75	28.06	29.25	27.00	2.63	34.13	22.06	10.55	4.19	12.00	5.00
W30A W36A	38.200	17.125	70.563	7.88	27.88	13.88	27.88	40.00	18.50	25.75	17.93	26.75	28.75	29.25	27.00	2.75	39.13	22.75	9.14	4.19	12.00	5.00
W42A W48A W60A	42.075	22.432	84.875	9.88	29.88	15.88	29.88	43.88	19.10	31.66	30.00	32.68	26.94	34.69	32.43	3.37	43.00	23.88	10.00	1.44	16.00	1.88

All dimensions are in inches. Dimensional drawings are not to scale.



MIS-2487

*Optional top outlet (factory installed only) for W30A and W36A models only.



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Since 1914 . . . Moving ahead, just as planned.

Due to our continuous product improvement policy, all specifications subject to change without notice.

Before purchasing this appliance, read important energy cost and efficiency information available from your retailer.

Form No.
S3397
January, 2009

Supersedes: S3397-1008

INSTALLATION INSTRUCTIONS

WALL MOUNTED PACKAGE AIR CONDITIONERS

MODELS W17A1

W18A1	W18L1
W24A1	W24L1
W30A1	W30L1
W36A1	W36L1
W42A1	W42L1
W48A1	W48L1
W60A1	W60L1
W70A1	W70L1



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
Since 1914...Moving ahead just as planned.

Manual : 2100-508B
Supersedes: 2100-508A
File: Volume III Tab 16
Date: 03-03-10

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GETTING OTHER INFORMATION AND PUBLICATIONS

These publications can help you install the air conditioner or heat pump. You can usually find these at your local library or purchase them directly from the publisher. Be sure to consult current edition of each standard.

National Electrical Code ANSI/NFPA 70

Standard for the Installation ANSI/NFPA 90A
of Air Conditioning and Ventilating Systems

Standard for Warm Air ANSI/NFPA 90B
Heating and Air Conditioning Systems

Load Calculation for ACCA Manual J
Residential Winter and Summer Air Conditioning

Duct Design for Residential ACCA Manual D
Winter and Summer Air Conditioning and Equipment
Selection

FOR MORE INFORMATION, CONTACT THESE PUBLISHERS:

ACCA **Air Conditioning Contractors of America**
1712 New Hampshire Ave. N.W.
Washington, DC 20009
Telephone: (202) 483-9370
Fax: (202) 234-4721

ANSI **American National Standards Institute**
11 West Street, 13th Floor
New York, NY 10036
Telephone: (212) 642-4900
Fax: (212) 302-1286

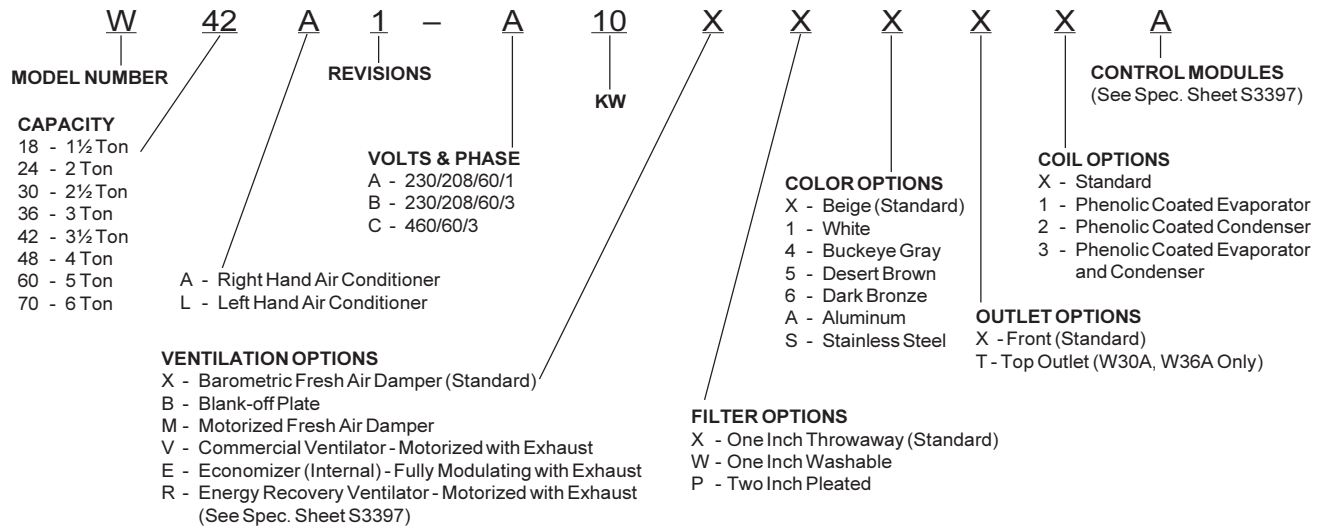
ASHRAE **American Society of Heating, Refrigeration
and Air Conditioning Engineers, Inc.**
1791 Tullie Circle, N.E.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400
Fax: (404) 321-5478

NFPA **National Fire Protection Association**
Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9901
Telephone: (800) 344-3555
Fax: (617) 984-7057

Manufactured under the following
U.S. Patent numbers:
5,485,878; 5,301,777; 5,002,116

WALL MOUNT GENERAL INFORMATION

AIR CONDITIONER WALL MOUNT MODEL NOMENCLATURE



NOTE: Vent options X, B and M are without exhaust capability. May require separate field supplied barometric relief in building.

SHIPPING DAMAGE

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

GENERAL

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.

The refrigerant system is completely assembled and charged. All internal wiring is complete.

The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.

These instructions explain the recommended method to install the air cooled self-contained unit and the electrical wiring connections to the unit.

These instructions and any instructions packaged with any separate equipment required to make up the entire air conditioning system should be carefully read before beginning the installation. Note particularly "Starting Procedure" and any tags and/or labels attached to the equipment.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See Page 3 for information on codes and standards.

Size of unit for a proposed installation should be based on heat loss calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

DUCT WORK

All duct work, supply and return, must be properly sized for the design airflow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage.

Refer to Maximum ESP of operation Electric Heat Table 6.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct runs through unheated spaces, it should be insulated with a minimum of one inch of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

Models W18 & W24 as approved for zero inch clearance to the supply duct. For model series W30, W36, W42, W48, W60 and W70 a 1/4 inch clearance to combustible material for the first three feet of duct attached to the outlet air frame is required. See Wall Mounting Instructions and Figures 3 and 4 for further details.

Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.

Some installations may not require any return air duct. A metallic return air grille is required with installations not requiring a return air duct. The spacing between louvers on the grille shall not be larger than 5/8 inch.

Any grille that meets with 5/8 inch louver criteria may be used. It is recommended that Bard Return Air Grille Kit RG2 through RG5 or RFG2 through RFG5 be installed when no return duct is used. Contact distributor or factory for ordering information. If using a return air filter grille, filters must be of sufficient size to allow a maximum velocity of 400 fpm.

NOTE: *If no return air duct is used, applicable installation codes may limit this cabinet to installation only in a single story structure.*

FILTERS

A 1-inch throwaway filter is standard with each unit. The filter slides into position making it easy to service. This filter can be serviced from the outside by removing the filter access panel. A 1-inch washable filter and 2-inch pleated filter are also available as optional accessories. The internal filter brackets are adjustable to accommodate the 2-inch filter by bending two (2) tabs down on each side of the filter support bracket.

FRESH AIR INTAKE

All units are built with fresh air inlet slots punched in the service door.

If the unit is equipped with a fresh air damper assembly, the assembly is shipped already attached to the unit. The damper blade is locked in the closed position. To allow the damper to operate, the maximum and minimum blade position stops must be installed. See Figure 1.

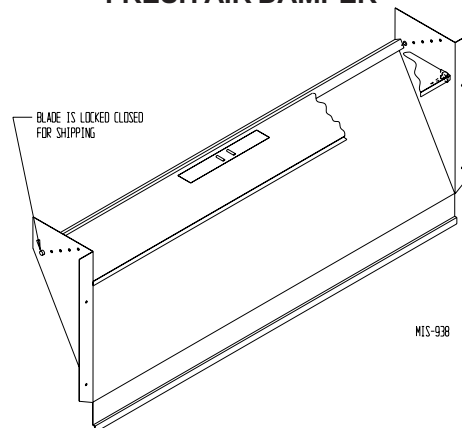
All capacity, efficiency and cost of operation information is based upon the fresh air blank-off plate in place and is recommended for maximum energy efficiency.

The blank-off plate is available upon request from the factory and is installed in place of the fresh air damper shipped with each unit.

CONDENSATE DRAIN

A plastic drain hose extends from the drain pan at the top of the unit down to the unit base. There are openings in the unit base for the drain hose to pass through. In the event the drain hose is connected to a drain system of some type, it must be an open or vented type system to assure proper drainage.

**FIGURE 1
FRESH AIR DAMPER**



INSTALLATION INSTRUCTIONS

WALL MOUNTING INFORMATION

1. Two holes for the supply and return air openings must be cut through the wall as shown in Figure 3.
2. On wood frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration.
3. Concrete block walls must be thoroughly inspected to insure that they are capable of carrying the weight of the installed unit.

WARNING

Failure to provide the 1/4 inch clearance between the supply duct and a combustible surface for the first 3 feet of duct can result in fire causing damage, injury or death.

MOUNTING THE UNIT

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting bracket, attached to skid for shipping, is provided for ease of installation, but is not required.
2. The unit itself is suitable for 0 inch clearance, but the supply air duct flange and the first 3 feet of supply air duct require a minimum of 1/4 inch clearance to combustible material for model series W30, W36, W42, W48, W60 and W70. However, it is generally recommended that a 1-inch clearance is used for ease of installation and maintaining the required clearance to combustible material. See Figure 3 for details on opening sizes.
3. Locate and mark lag bolt locations and bottom mounting bracket location. See Figure 3.
4. Mount bottom mounting bracket.
5. Hook top rain flashing, attached to front - right of supply flange for shipping, under back bend of top.
6. Position unit in opening and secure with 5/16 lag bolts; use 7/8 inch diameter flat washers on the lag bolts.
7. Secure rain flashing to wall and caulk across entire length of top. See Figure 3.
8. For additional mounting rigidity, the return air and supply air frames or collars can be drilled and screwed or welded to the structural wall itself (depending upon wall construction). Be sure to observe required clearance if combustible wall.
9. On side-by-side installations, maintain a minimum of 20 inches clearance on right side to allow access to control panel and heat strips, and to allow proper airflow to the outdoor coil. Additional clearance may be required to meet local or national codes.

Clearances Required for Service Access and Adequate Condenser Airflow

MODELS	LEFT SIDE	RIGHT SIDE
W17A, W18A, W24A, W30A, W36A	15"	20"
W18L, W24L, W30L, W36L	20"	15"
W42A, W48A, W60A, W70A	20"	20"
W42L, W48L, W60L, W70L	20"	20"

NOTE: For side by side installation of two (2) W**A models there must be 20" between units. This can be reduced to 15" by using a W**L model (left side compressor and controls) for the left unit and WA (right side compressor and controls) for right unit.

See W**A Specification S3397 & W**L Specification S3400.

Minimum Clearances Required to Combustible Materials

MODELS	SUPPLY AIR DUCT FIRST THREE FEET	CABINET
W18A, L / W24A, L	0"	0"
W30A, L / W36A, L	1/4"	0"
W42A, L / W48A, L W60A, L / W70A, L	1/4"	0"

Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)

All dimensions are in inches. Dimensional drawings are not to scale.

Front View

- Overall Width: W
- Overall Height: G
- Condenser Air Outlet (bottom section)
- Ventilation Air (middle section)
- Vent Option Door
- Filter Access Panel
- C. Breaker/Disconnect Access Panel (Lockable)
- Electric Heat
- Heater Access Panel
- Built In Rain Hood 4° Pitch
- Dimensions: 7.88⁽²⁾, 1.00⁽²⁾, 2.13
- Height segments: A, C, H, J, K
- Drain (at bottom right)

Side View

- Overall Depth: D
- Cond. Air Inlet (bottom section)
- Low Voltage Electrical Entrance
- High Voltage Electrical Entrance
- Side Wall Mounting Brackets (Built In)
- Top Rain Flashing Shipping Location
- Optional Electrical Entrances
- Dimensions: 31.88⁽²⁾, .44
- Height segments: R, S, S, S, S⁽¹⁾, S⁽¹⁾, T

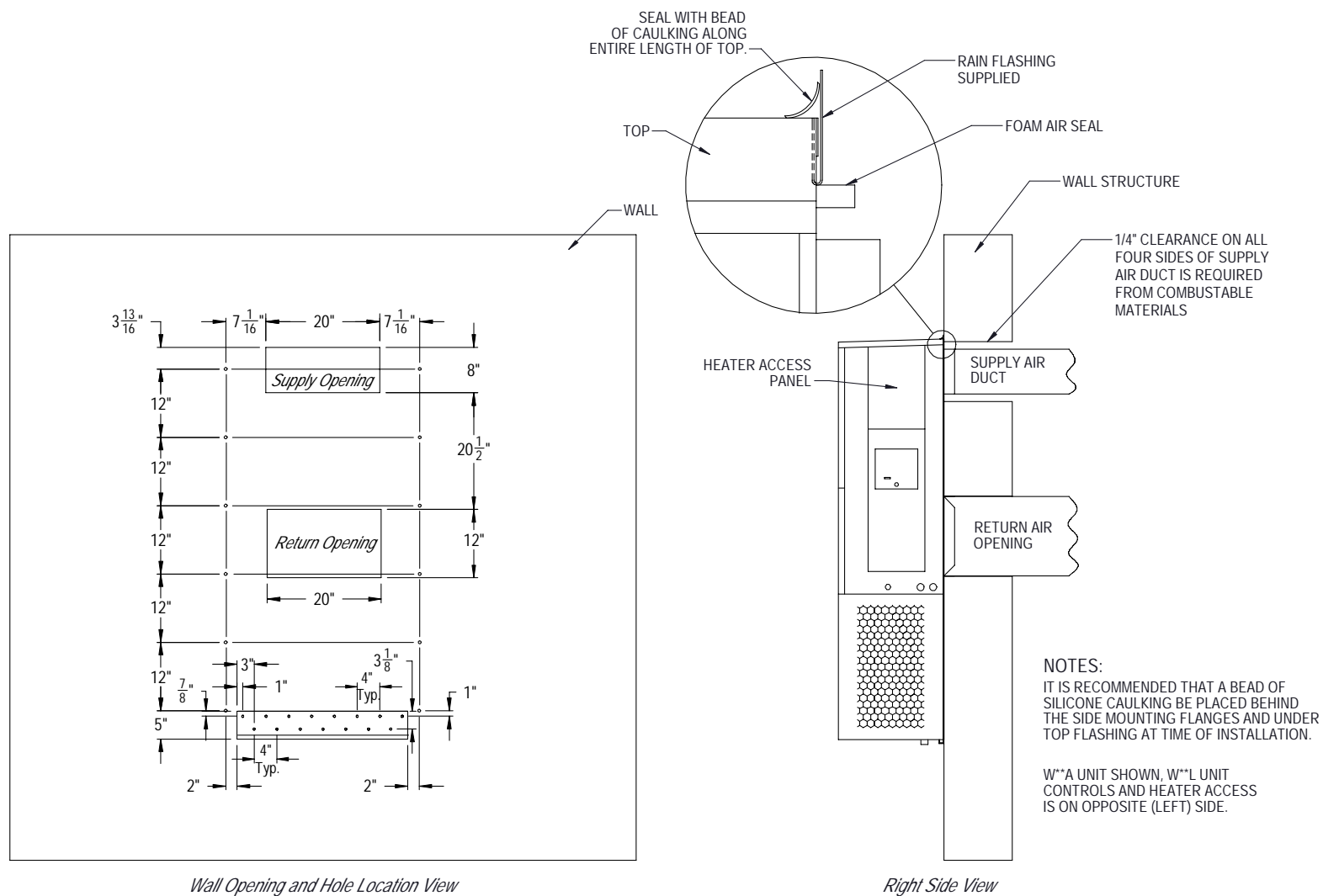
Back View

- Overall Width: O
- Supply Air Opening (top section)
- Return Air Opening (middle section)
- Bottom Installation Bracket
- Dimensions: N, Q

MIS-2487

-
- W**L LEFT UNIT**
- Back View**
- Dimensions: E, O, .44, R, S, S, S, S, S, S, T, 2.63, 9.06
 - Labels: Supply Air Opening, Return Air Opening, Side Wall Mounting Brackets (Built In), Top Rain Flashing Shipping Location, Optional Electrical Entrances, Drain, Bottom Installation Bracket
- Side View**
- Dimensions: D, 2.13, A, C, H, K, J, L, M, P
 - Labels: Built In Rain Hood 4° Pitch, Electric Heat, Heater Access Panel, C. Breaker/Disconnect Access Panel (Lockable), Filter Access Panel, Ventilation Air, Vent Option Door, Low Voltage Electrical Entrance, High Voltage Electrical Entrance, Cond Air Inlet
- Front View**
- Dimensions: W, 5.75, F, G
 - Labels: Condenser Air Outlet
- MIS-2488 B

FIGURE 3A
W17A1, W18A1, W18L1, W24A1, W24L1
MOUNTING INSTRUCTIONS



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Diagram illustrating the Right Side View of the furnace unit, showing the installation details for the top and side connections.

Labels and components shown:

- SEAL WITH BEAD OF CAULKING ALONG ENTIRE LENGTH OF TOP.
- RAIN FLASHING SUPPLIED
- FOAM AIR SEAL
- WALL STRUCTURE
- 1/4" CLEARANCE ON ALL FOUR SIDES OF SUPPLY AIR DUCT IS REQUIRED FROM COMBUSTIBLE MATERIALS
- SUPPLY AIR DUCT
- RETURN AIR OPENING
- HEATER ACCESS PANEL
- TOP
- WALL

NOTES:

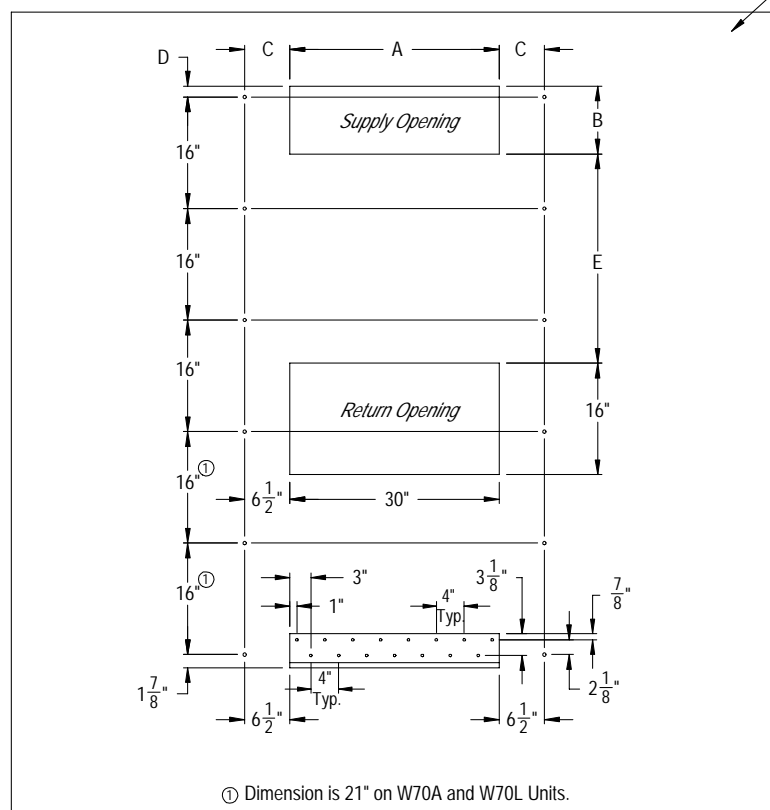
- IT IS RECOMMENDED THAT A BEAD OF SILICONE CAULKING BE PLACED BEHIND THE SIDE MOUNTING FLANGES AND UNDER TOP FLASHING AT TIME OF INSTALLATION.
- W**A UNIT SHOWN, W**L UNIT CONTROLS AND HEATER ACCESS IS ON OPPOSITE (LEFT) SIDE.

Right Side View

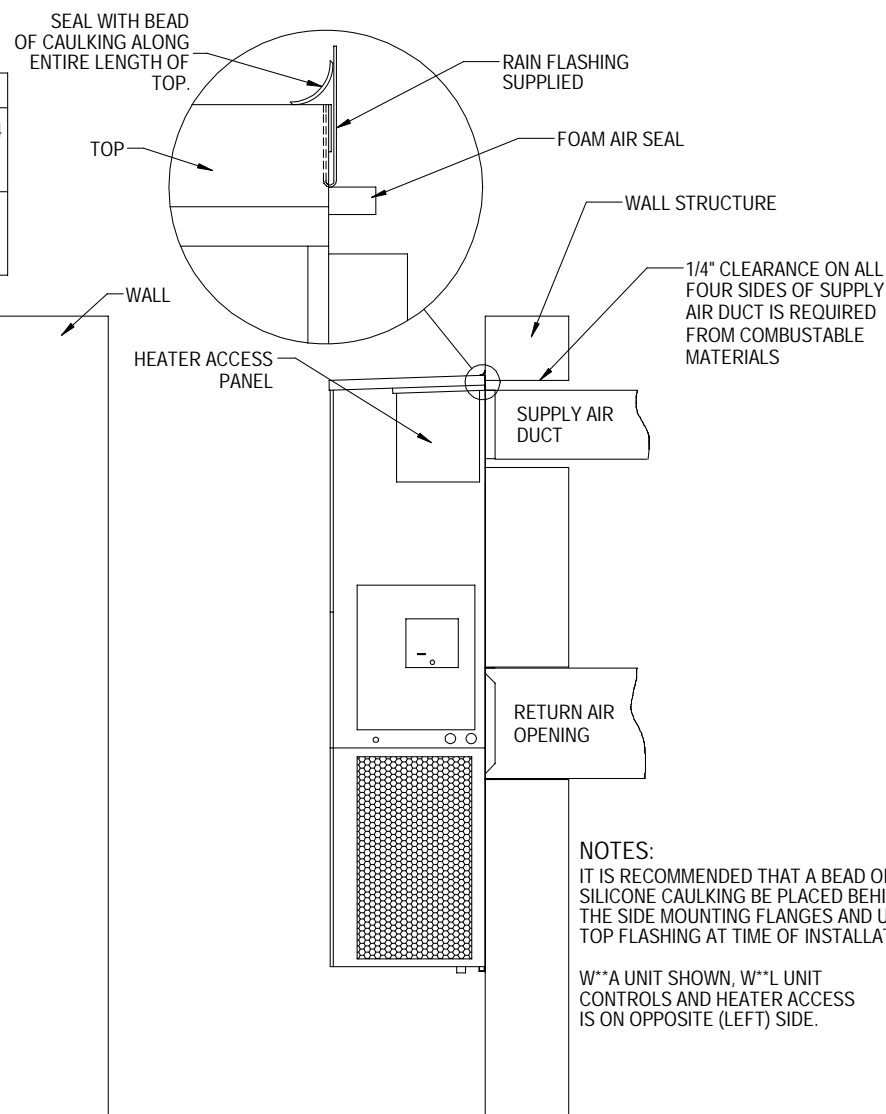
W**A UNIT SHOWN, W**L UNIT
CONTROLS AND HEATER ACCESS
IS ON OPPOSITE (LEFT) SIDE.

FIGURE 3C
W42A1, W42L1, W48A1, W48L1, W60A1, W60L1, W70A1, W70L1
MOUNTING INSTRUCTIONS

	A	B	C	D	E
REQUIRED DIMENSIONS TO MAINTAIN 1/4" MIN. CLEARANCE FROM COMBUSTIBLE MATERIALS	30 1/2	10 1/2	6 1/4	1 1/4	29 3/4
REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1" CLEARANCE FROM COMBUSTIBLE MATERIALS	32	12	5 1/2	2	29



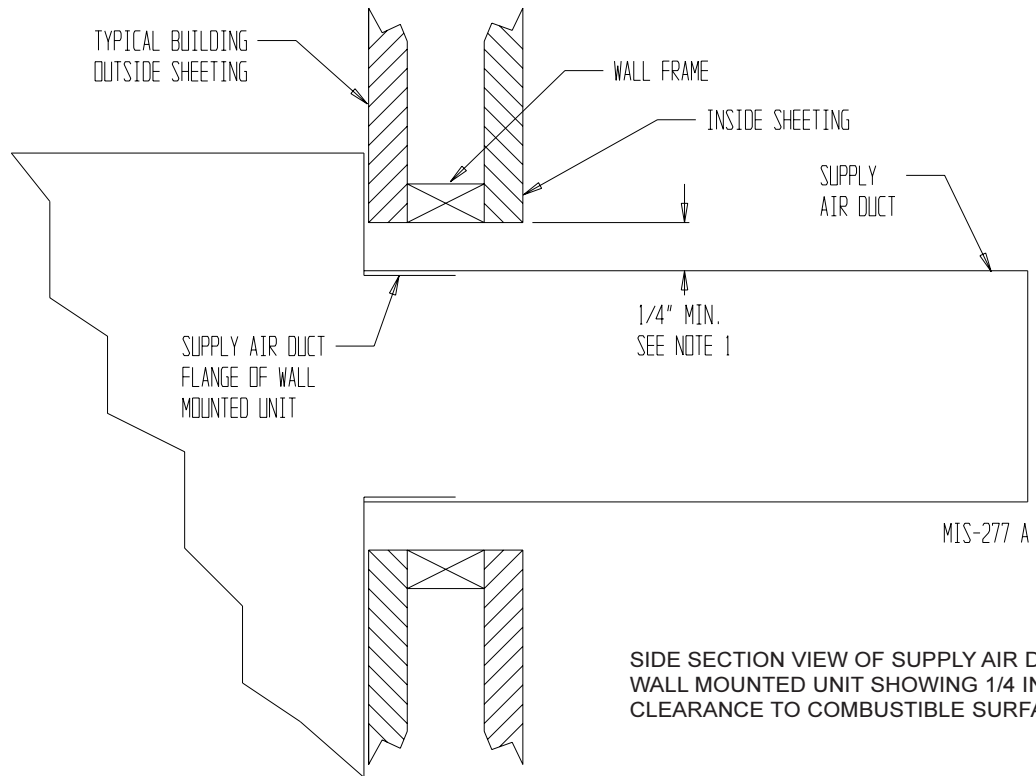
Wall Opening and Hole Location View



NOTES:
 IT IS RECOMMENDED THAT A BEAD OF SILICONE CAULKING BE PLACED BEHIND THE SIDE MOUNTING FLANGES AND UNDER TOP FLASHING AT TIME OF INSTALLATION.
 W**A UNIT SHOWN, W**L UNIT CONTROLS AND HEATER ACCESS IS ON OPPOSITE (LEFT) SIDE.

Right Side View

FIGURE 4
ELECTRIC HEAT CLEARANCE
W30A1, W30L1, W36A1, W36L1, W42A1, W42L1, W48A1, W48L1, W60A1, W60L1, W70A1, W70L1



SIDE SECTION VIEW OF SUPPLY AIR DUCT FOR
WALL MOUNTED UNIT SHOWING 1/4 INCH
CLEARANCE TO COMBUSTIBLE SURFACES.

WARNING

A **minimum** of 1/4 inch clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3 feet of ducting.

It is important to insure that the 1/4 inch minimum spacing is maintained at all points.

Failure to do this could result in overheating the combustible material and may result in a fire causing damage, injury or death.

FIGURE 5
WALL MOUNTING INSTRUCTIONS

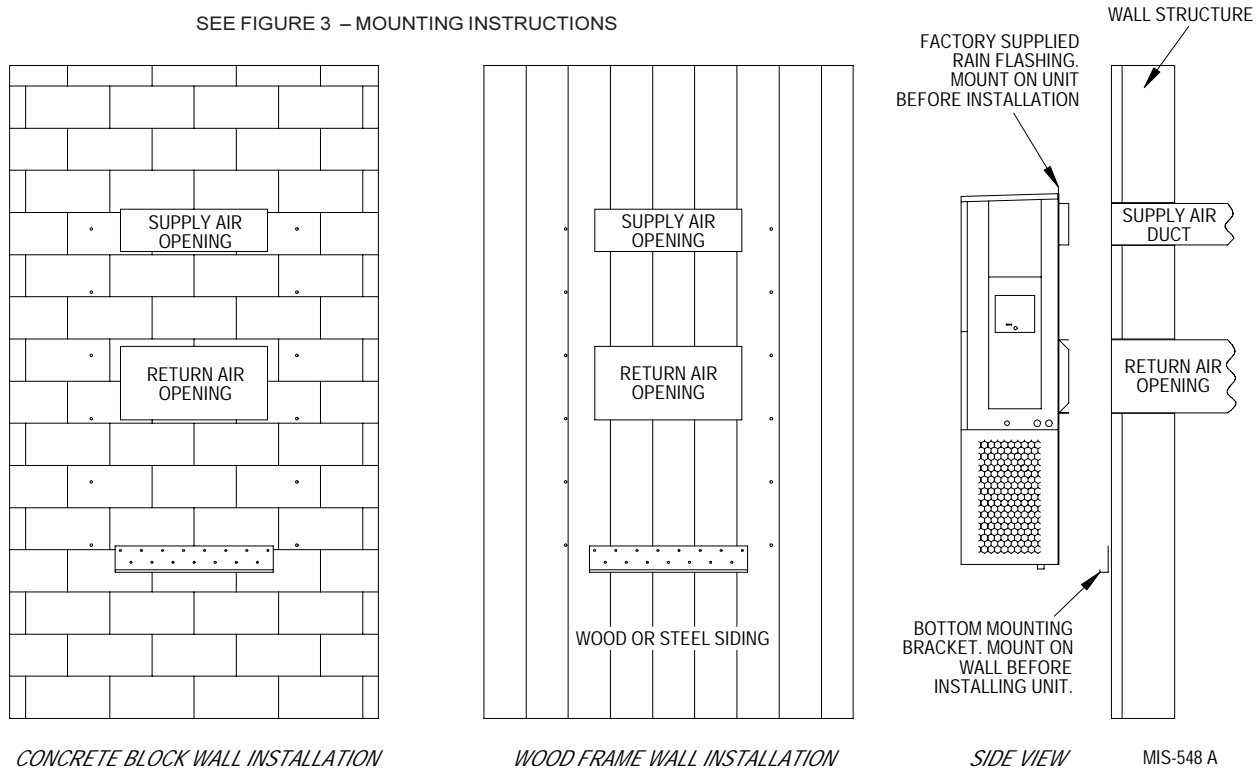
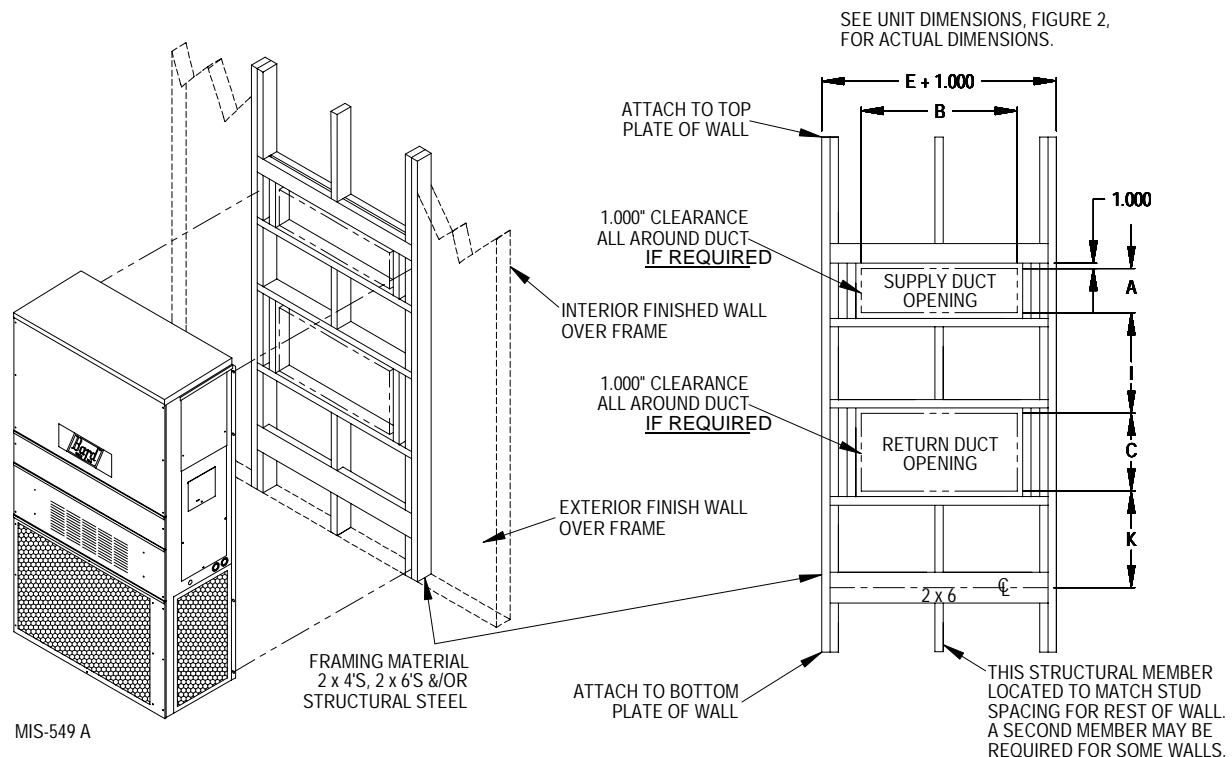
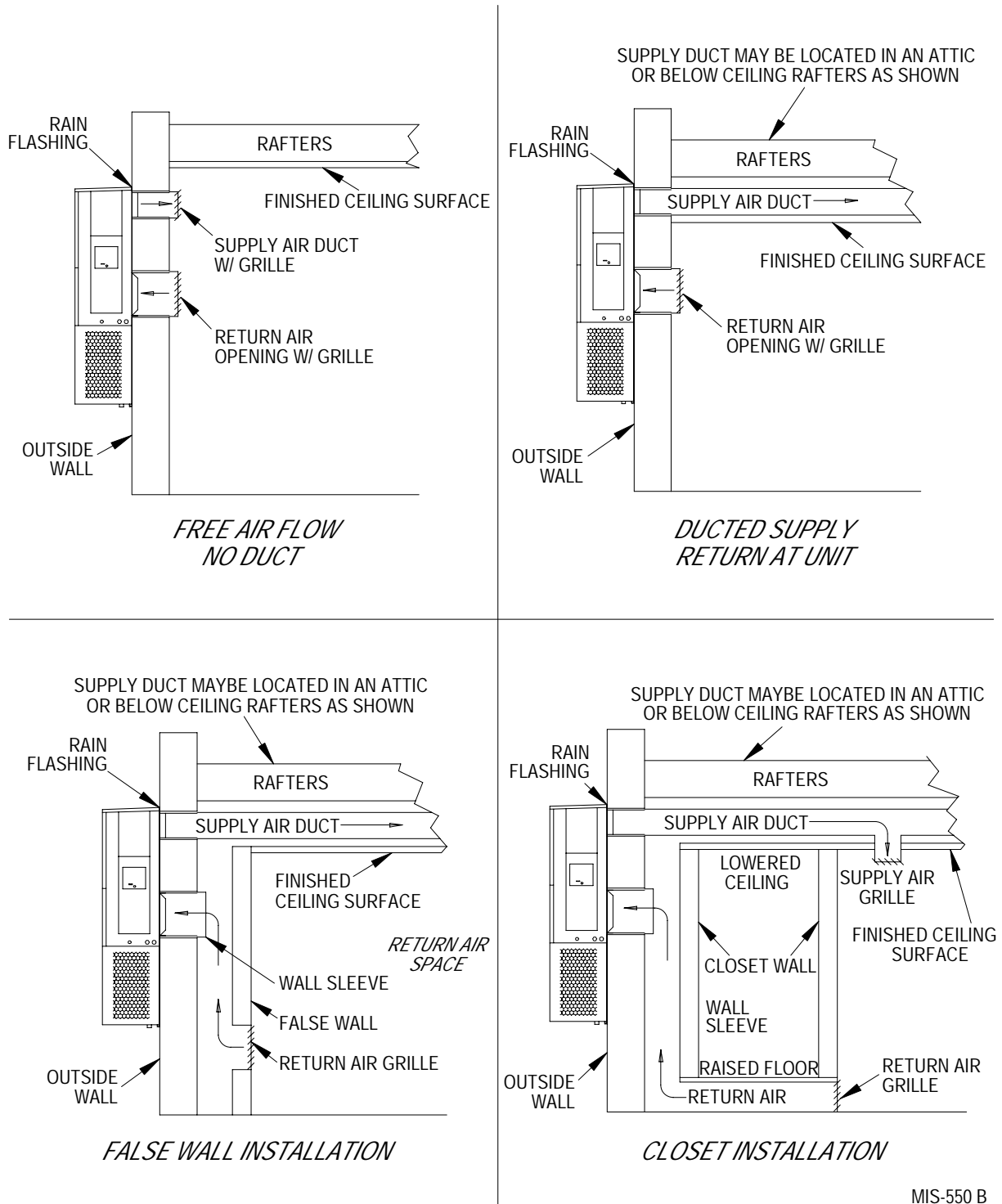


FIGURE 6
WALL MOUNTING INSTRUCTIONS



**FIGURE 7
COMMON WALL MOUNTING INSTALLATIONS**



WIRING – MAIN POWER

Refer to the unit rating plate for wire sizing information and maximum fuse or “HACR” type circuit breaker size. Each outdoor unit is marked with a “Minimum Circuit Ampacity”. This means that the field wiring used must be sized to carry that amount of current.

Depending on the installed KW of electric heat, there may be two field power circuits required. If this is the case, the unit serial plate will so indicate. All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked “Use Copper Conductors Only”. These instructions **must be** adhered to. Refer to the National Electrical Code (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

The electrical data lists fuse and wire sizes (75° C copper) for all models including the most commonly used heater sizes. Also shown are the number of field power circuits required for the various models with heaters.

The unit rating plate lists a “Maximum Time Delay Relay Fuse” or “HACR” type circuit breaker that is to be used with the equipment. The correct size must be used for proper circuit protection and also to assure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

The disconnect access door on this unit may be locked to prevent unauthorized access to the disconnect. To convert for the locking capability, bend the tab located in the bottom left-hand corner of the disconnect opening under the disconnect access panel straight out. This tab will now line up with the slot in the door. When shut, a padlock may be placed through the hole in the tab preventing entry.

See “Start Up” section for important information on three phase scroll compressor start ups.

See Tables 4 & 5 for Electrical Specifications.

WIRING – LOW VOLTAGE WIRING

230/208V, 1 phase and 3 phase equipment dual primary voltage transformers. All equipment leaves the factory wired on 240V tap. For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240 and 208V taps are:

TAP	RANGE
240	253 – 216
208	220 – 187

NOTE: The voltage should be measured at the field power connection point in the unit and while the unit is operating at full load (maximum amperage operating condition).

For wiring size and connections, refer to Wiring Manual 2100-507.

START UP

THESE UNITS REQUIRE R-410A REFRIGERANT AND POLYOL ESTER OIL.

GENERAL:

1. Use separate service equipment to avoid cross contamination of oil and refrigerants.
2. Use recovery equipment rated for R-410A refrigerant.
3. Use manifold gauges rated for R-410A (800 psi/250 psi low).
4. R-410A is a binary blend of HFC-32 and HFC-125.
5. R-410A is nearly azeotropic - similar to R-22 and R-12. Although nearly azeotropic, charge with liquid refrigerant.
6. R-410A operates at 40-70% higher pressure than R-22, and systems designed for R-22 cannot withstand this higher pressure.
7. R-410A has an ozone depletion potential of zero, but must be reclaimed due to its global warming potential.
8. R-410A compressors use polyolester oil.
9. Polyol Ester oil is hygroscopic; it will rapidly absorb moisture and strongly hold this moisture in the oil.
10. A liquid line dryer must be used - even a deep vacuum will not separate moisture from the oil.
11. Limit atmospheric exposure to 15 minutes.
12. If compressor removal is necessary, always plug compressor immediately after removal. Purge with small amount of nitrogen when inserting plugs.

TOPPING OFF SYSTEM CHARGE

If a leak has occurred in the system, Bard Manufacturing recommends reclaiming, evacuating (see criteria above), and charging to the nameplate charge. If done correctly, topping off the system charge can be done without problems.

With R-410A, there are no significant changes in the refrigerant composition during multiple leaks and recharges. R-410A refrigerant is close to being an azeotropic blend (it behaves like a pure compound or single component refrigerant). The remaining refrigerant charge, in the system, may be used after leaks have occurred and then “top-off” the charge by utilizing the charging charts on the inner control panel cover as a guideline.

REMEMBER: When adding R-410A refrigerant, it must come out of the charging cylinder/tank as a liquid to avoid any fractionation, and to insure optimal system performance. Refer to instructions for the cylinder that is being utilized for proper method of liquid extraction.



WARNING

Failure to conform to these practices could lead to damage, injury or death.

SAFETY PRACTICES:

1. Never mix R-410A with other refrigerants.
2. Use gloves and safety glasses, Polyol Ester oils can be irritating to the skin, and liquid refrigerant will freeze the skin.
3. Never use air and R-410A to leak check; the mixture may become flammable.
4. Do not inhale R-410A – the vapor attacks the nervous system, creating dizziness, loss of coordination and slurred speech. Cardiac irregularities, unconsciousness and ultimate death can result from breathing this concentration.
5. Do not burn R-410A. This decomposition produces hazardous vapors. Evacuate the area if exposed.
6. Use only cylinders rated DOT4BA/4BW 400.
7. Never fill cylinders over 80% of total capacity.
8. Store cylinders in a cool area, out of direct sunlight.
9. Never heat cylinders above 125°F.
10. Never trap liquid R-410A in manifold sets, gauge lines or cylinders. R-410A expands significantly at warmer temperatures. Once a cylinder or line is full of liquid, any further rise in temperature will cause it to burst.

START UP (Continued)

IMPORTANT INSTALLER NOTE

For improved start up performance wash the indoor coil with a dish washing detergent.

HIGH PRESSURE SWITCH

All W**A/W**L wall mounted air conditioner series models are supplied with a remote reset for the high and low pressure switch. If tripped, this pressure switch may be reset by turning the thermostat off then back on again.

THREE PHASE SCROLL COMPRESSOR START UP INFORMATION

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. Direction of rotation is not an issue with single phase compressors since they will always start and run in the proper direction.

However, three phase compressors will rotate in either direction depending upon phasing of the power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, verification of proper rotation must be made. Verification of proper rotation direction is made by observing that suction pressure drops and discharge pressure rises when the compressor is energized. Reverse rotation also results in an elevated sound level over that with correct rotation, as well as substantially reduced current draw compared to tabulated values.

Verification of **proper rotation** must be made at the time the equipment is put into service. If improper rotation is corrected at this time, there will be no negative impact on the durability of the compressor. However, reverse operation for over one hour may have a negative impact on the bearing due to oil pump out.

NOTE: If compressor is allowed to run in reverse rotation for several minutes, the compressor's internal protector will trip.

All three phase compressors are wired identically internally. As a result, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same Fusite terminal should maintain proper rotation direction.

The direction of rotation of the compressor may be changed by reversing any two line connections to the unit.

PHASE MONITOR

All units with three phase scroll compressors are equipped with a 3 phase line monitor to prevent compressor damage due to phase reversal.

The phase monitor in this unit is equipped with two LEDs. If the Y signal is present at the phase monitor and phases are correct the green LED will light.

If phases are reversed, the red fault LED will be lit and compressor operation is inhibited.

If a fault condition occurs, reverse two of the supply leads to the unit. ***Do not reverse any of the unit factory wires as damage may occur.***

CONDENSER FAN OPERATION

Applies to W42, W48, W60 and W70 models only. The condenser fan motor on 230/208 volt, one and three phase, 60 HZ units is a two-speed motor that comes factory wired on high speed for peak performance. If ambient conditions permit, it can be reconnected to low speed (red wire) for lower sound level. See wiring diagram.

50 HZ models must have fan wired on low speed. These models are factory wired on low speed.

SERVICE HINTS

1. Caution owner/operator to maintain clean air filters at all times. Also, not to needlessly close off supply and return air registers. This reduces airflow through the system, which shortens equipment service life as well as increasing operating costs.
2. Check all power fuses or circuit breakers to be sure they are the correct rating.
3. Periodic cleaning of the outdoor coil to permit full and unrestricted airflow circulation is essential.

SEQUENCE OF OPERATION

COOLING – Circuit R-Y makes at thermostat pulling in compressor contactor, starting the compressor and outdoor motor. The G (indoor motor) circuit is automatically completed on any call for cooling operation or can be energized by manual fan switch on subbase for constant air circulation. On a call for heating, circuit R-W1 make at the thermostat pulling in heat contact for the strip heat and blower operation. On a call for second stage heat, R-W2 makes bringing on second heat contactor, if so equipped.

COMPRESSOR CONTROL MODULE

The compressor control module is standard on all models covered by this manual. The compressor control module is an anti-short cycle/lockout timer with high and low pressure switch monitoring and alarm relay output.

Adjustable Delay On Make And Break Timer

On initial power up or anytime power is interrupted to the unit, the *delay on make* period begins, which will be 2 minutes plus 10% of the *delay on break* setting. When the delay on make is complete and the high pressure switch and low pressure switch is closed, the compressor contactor is energized. Upon shutdown, the delay on break timer starts and prevents restart until the delay on break and delay on make periods have expired.

During routine operation of the unit with no power interruptions, the compressor will operate on demand with no delay.

High Pressure Switch and Lockout Sequence

If the high pressure switch opens, the compressor contactor will de-energize immediately. The lockout timer will go into a *soft lockout* and stay in soft lockout until the high pressure switch closes and the delay on break time has expired. If the high pressure switch opens again in this same operating cycle, the unit will go into *manual lockout* condition and the alarm relay circuit will energize. Recycling the wall thermostat resets the manual lockout.

Low Pressure Switch, Bypass, and Lockout Sequence

If the low pressure switch opens for more than 120 seconds, the compressor contactor will de-energize and go into a soft lockout. Regardless the state of the low pressure switch, the contactor will reenergize after the delay on make time delay has expired. If the low pressure switch remains open, or opens again for longer than 120 seconds, the unit will go into manual lockout condition and the alarm relay circuit will energize. Recycling the wall thermostat resets the manual lockout.

Alarm Relay Output

Alarm terminal is output connection for applications where alarm relay is employed. This terminal is powered whenever the compressor is locked out due to HPC or LPC sequences as described.

NOTE: Both high and low pressure switch controls are inherently automatic reset devices. The high pressure switch and low pressure switch cut out and cut in settings are fixed by specific air conditioner unit model. The lockout features, both soft and manual, are a function of the Compressor Control Module.

ADJUSTMENTS

Adjustable Delay on Make and Delay on Break Timer

The potentiometer is used to select Delay on Break time from 30 seconds to 5 minutes. Delay on Make (DOM) timing on power-up and after power interruptions is equal to 2 minutes plus 10% of Delay on Break (DOB) setting:

0.5 minute (30 seconds)	DOB = 123 second DOM
1.0 minute (60 seconds)	DOB = 126 second DOM
2.0 minute (120 seconds)	DOB = 132 second DOM
3.0 minute (180 seconds)	DOB = 138 second DOM
4.0 minute (240 seconds)	DOB = 144 second DOM
5.0 minute (300 seconds)	DOB = 150 second DOM

During routine operation of the unit with no power interruptions the compressor will operate on demand with no delay.

Typical Settings for Dual Unit Installation:

Unit 1: DOB set at 2 minutes, and DOM is 132 seconds

Unit 2: DOB set at 4 minutes, and DOM is 144 seconds

PRESSURE SERVICE PORTS

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. A pressure table can be found later in the manual covering all models. It is imperative to match the correct pressure table to the unit by model number. See Table 3.

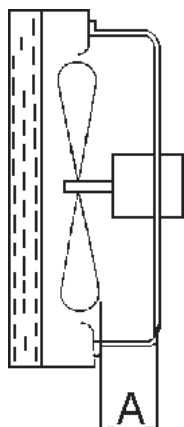
TROUBLESHOOTING

FAN BLADE SETTING DIMENSIONS

Shown in Figure 8 is the correct fan blade setting for proper air delivery across the outdoor coil. Refer to Table 1 for unit specific dimension.

Any service work requiring removal or adjustment in the fan and/or motor area will require that the dimensions below be checked and blade adjusted in or out on the motor shaft accordingly.

**FIGURE 8
FAN BLADE SETTING**



MIS-1724

**TABLE 1
FAN BLADE DIMENSION**

Model	Dimension A
W17A1 W18A1 / W18L1 W24A1 / W24L1	1.00"
W30A1 / W30L1 W36A1 / W36L1	1.25"
W42A1 / W42L1 W48A1 / W48L1 W60A1 / W60L1	1.75"
W70A1 / W70L1	.75"

REMOVAL OF FAN SHROUD

1. Disconnect all power to the unit.
2. Remove the screws holding both grilles, one on each side of unit, and remove grilles.
3. Remove screws holding fan shroud to condenser and bottom. Nine (9) screws.
4. Unwire condenser fan motor.
5. Slide complete motor, fan blade, and shroud assembly out the left side of the unit.
6. Service motor/fan as needed.
7. Reverse steps to reinstall.

REFRIGERANT CHARGE

The correct system R-410A charge is shown on the unit rating plate. Optimum unit performance will occur with a refrigerant charge resulting in a suction line temperature (6" from compressor) as shown in Table 2A. If charge quantity is in doubt, reclaim unit and recharge to factory nameplate quantity.

**TABLE 2A
REFRIGERANT CHARGE**

Model	Rated Airflow	95°F OD Temperature	82°F OD Temperature
W17A1 W18A1 / W18L1	600	61 - 65	62 - 66
W24A1 / W24L1	800	56 - 60	56 - 60
W30A1 / W30L1	1000	57 - 61	57 - 61
W36A1 / W36L1	1100	56 - 60	57 - 61
W42A1 / W42L1	1400	58 - 62	60 - 64
W48A1 / W48L1	1550	63 - 67	65 - 69
W60A1 / W60L1	1650	63 - 67	64 - 68

The suction line temperatures in Table 2 above are based upon 80°F dry bulb / 67°F wet bulb (50% R.H.) temperature and rated airflow across the evaporator during cooling cycle.

**TABLE 2B
REFRIGERANT CHARGE**

Model	Rated Airflow	95°F Subcooling	82°F Subcooling
W70A1 / W70L1	1800	15 - 18°	16 - 19°

The correct system R-410A charge is shown on the unit nameplate. Optimum unit performance will occur with a refrigerant charge resulting in a liquid subcooling as shown in Table 2B. If charge is in doubt, reclaim and recharge to factory nameplate charge.

TABLE 3
COOLING PRESSURE TABLE

Air Temperature Entering Outdoor Coil °F

Model	Return Air Temperature	Pressure	75	80	85	90	95	100	105	110	115	120
W17A1 W18A1/L1	75 deg. DB	Low Side	127	129	131	133	135	137	138	140	141	143
	62 deg. WB	High Side	295	316	337	360	383	407	432	457	484	511
	80 deg. DB	Low Side	136	138	140	142	144	146	148	150	151	153
	67 deg. WB	High Side	303	324	346	369	393	417	443	469	496	524
	85 deg. DB	Low Side	141	143	145	147	149	151	153	155	156	158
	72 deg. WB	High Side	314	335	358	382	407	432	459	485	513	542
W24A1/L1	75 deg. DB	Low Side	121	123	125	127	130	132	134	135	137	138
	62 deg. WB	High Side	326	350	375	401	426	450	477	502	527	553
	80 deg. DB	Low Side	129	132	134	136	139	141	143	144	146	148
	67 deg. WB	High Side	334	359	385	411	437	462	489	515	541	567
	85 deg. DB	Low Side	134	137	139	141	144	146	148	149	151	153
	72 deg. WB	High Side	346	372	398	425	452	478	506	533	560	587
W30A1/L1	75 deg. DB	Low Side	121	122	125	127	130	132	134	136	137	138
	62 deg. WB	High Side	335	357	380	404	429	454	481	509	537	566
	80 deg. DB	Low Side	129	131	134	136	139	141	143	145	146	148
	67 deg. WB	High Side	344	366	390	414	440	466	493	522	551	581
	85 deg. DB	Low Side	134	136	139	141	144	146	148	150	151	153
	72 deg. WB	High Side	356	379	404	428	455	482	510	540	570	601
W36A1/L1	75 deg. DB	Low Side	123	125	127	129	131	133	136	138	140	143
	62 deg. WB	High Side	350	372	396	420	445	470	496	524	552	581
	80 deg. DB	Low Side	132	134	136	138	140	142	145	148	150	153
	67 deg. WB	High Side	359	382	406	431	456	482	509	537	566	596
	85 deg. DB	Low Side	137	139	141	143	145	147	150	153	155	158
	72 deg. WB	High Side	372	395	420	446	472	499	527	556	586	617
W42A1/L1	75 deg. DB	Low Side	128	130	132	133	135	137	138	140	142	144
	62 deg. WB	High Side	341	362	383	406	429	453	480	506	534	564
	80 deg. DB	Low Side	137	139	141	142	144	146	148	150	152	154
	67 deg. WB	High Side	350	371	393	416	440	465	492	519	548	578
	85 deg. DB	Low Side	142	144	146	147	149	151	153	155	157	159
	72 deg. WB	High Side	362	384	407	431	455	481	509	537	567	598
W48A1/L1	75 deg. DB	Low Side	125	127	129	131	133	136	137	140	143	146
	62 deg. WB	High Side	349	370	391	415	440	467	495	526	557	590
	80 deg. DB	Low Side	134	136	138	140	142	145	147	150	153	156
	67 deg. WB	High Side	358	379	401	426	451	479	508	539	571	605
	85 deg. DB	Low Side	139	141	143	145	147	150	152	155	158	161
	72 deg. WB	High Side	371	392	415	441	467	496	526	558	591	626
W60A1/L1	75 deg. DB	Low Side	126	128	130	132	133	135	137	137	139	141
	62 deg. WB	High Side	352	373	396	418	442	466	491	517	544	571
	80 deg. DB	Low Side	135	137	139	141	142	144	146	147	149	151
	67 deg. WB	High Side	361	383	406	429	453	478	504	530	558	586
	85 deg. DB	Low Side	140	142	144	146	147	149	151	152	154	156
	72 deg. WB	High Side	374	396	420	444	469	495	522	549	578	607
W70A1/L1	75 deg. DB	Low Side	118	119	121	122	123	125	127	130	132	135
	62 deg. WB	High Side	326	347	370	392	416	440	465	489	516	542
	80 deg. DB	Low Side	126	127	129	131	132	134	136	139	141	144
	67 deg. WB	High Side	334	356	379	402	427	451	477	502	529	556
	85 deg. DB	Low Side	130	131	134	136	137	139	141	144	146	149
	72 deg. WB	High Side	346	368	392	416	442	467	494	520	548	575

Low side pressure ± 2 PSIG

High side pressure ± 5 PSIG

Tables are based upon rated CFM (airflow) across the evaporator coil. If there is any doubt as to correct operating charge being in the system, the charge should be removed, system evacuated and recharged to serial plate charge weight.

NOTE: Pressure table based on high speed condenser fan operation. If condensing pressures appear elevated check condenser fan wiring. See "Condenser Fan Operation".

TABLE 4

Electrical Specifications — WA Series**

Model	Rated Volts and Phase	No. Field Power Circuits	Single Circuit				Dual Circuit							
			⊙ Minimum Circuit Ampacity	⊙ Maximum External Fuse or Ckt. Brkr.	⊙ Field Power Wire Size	⊙ Ground Wire	⊙ Minimum Circuit Ampacity		⊙ Maximum External Fuse or Ckt. Brkr.		⊙ Field Power Wire Size		⊙ Ground Wire Size	
							Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B
W17, 18A1 - A00, A0Z A05 A08 A10	230/208-1	1 1 1 1	16 30 46 56	20 30 50 60	12 10 8 6	12 10 10 10								
W24A1 - A00, A0Z A05 A08 A10	230/208-1	1 1 1 1	21 30 46 56	30 30 50 60	10 10 8 6	10 10 10 10								
W24A1 - B00, B0Z B06	230/208-3	1 1	15 22	15 25	14 10	14 10								
W24A1 - C00, C0Z C06	460-3	1 1	10 12	15 15	14 14	14 14								
W30A1 - A00*, A0Z* A05* A08 A10* A15	230/208-1	1 1 1 1 1 or 2	24 32 48 58 84	35 35 50 60 90	8 8 8 6 4	10 10 10 10 8	58	26	60	30	6	10	10	10
W30A1 - B00*, B0Z* B06 B09* B15	230/208-3	1 1 1 1	18 24 33 51	20 25 35 60	12 10 8 8	12 10 10 10								
W30A1 - C00*, C0Z* C06 C09* C15	460-3	1 1 1 1	11 12 17 26	15 15 20 30	14 14 12 10	14 14 12 10								
W36A1 - A00*, A0Z* A05* A08 A10* A15	230/208-1	1 1 1 1 1 or 2	29 32 48 58 84	35 35 50 60 90	8 8 8 6 4	10 10 10 10 8	58	26	60	30	6	10	10	10
W36A1 - B00*, B0Z* B06 B09* B15	230/208-3	1 1 1 1	23 24 33 51	30 30 35 60	10 10 8 6	10 10 10 10								
W36A1 - C00*, C0Z* C06 C09* C15	460-3	1 1 1 1	12 12 17 26	15 15 20 30	14 14 10 10	14 14 10 10								
W42A1 - A00, A0Z A05 A10 A15 A20	230/208-1	1 1 1 1 or 2 1 or 2	33 33 59 85 111	50 50 60 90 125	8 8 6 4 2	10 10 10 8 6	59 59	26 52	60 60	30 60	6 6	10 6	10 10	10 10
W42A1 - B00, B0Z B09 B15 B18	230/208-3	1 1 1 1	25 34 53 62	35 35 60 70	8 8 6 6	10 10 10 8								
W42A1 - C00, C0Z C09 C15	460-3	1 1 1	13 18 27	15 20 30	14 12 10	14 12 10								
W48A1 - A00, A0Z A05 A10 A15 A20	230/208-1	1 1 1 1 or 2 1 or 2	37 37 59 85 111	50 50 60 90 125	8 8 6 4 2	10 10 10 8 6	59 59	26 52	60 60	30 60	6 6	10 6	10 10	10 10
W48A1 - B00, B0Z B09 B15 B18	230/208-3	1 1 1 1	29 34 52 62	40 40 60 70	8 8 6 6	10 10 10 8								
W48A1 - C00, C0Z C09 C15	460-3	1 1 1	14 18 27	20 20 30	12 12 10	12 12 10								
W60A1 - A00, A0Z A05 A10 A15 A20	230/208-1	1 1 1 1 or 2 1 or 2	41 41 59 85 111	60 60 60 90 125	8 8 6 4 2	10 10 10 8 6	59 59	26 52	60 60	30 60	6 6	10 6	10 10	10 10
W60A1 - B00, B0Z B09 B15 B18	230/208-3	1 1 1 1	28 34 53 62	40 40 60 70	8 8 6 6	10 10 10 10								
W60A1 - C00, C0Z C09 C15	460-3	1 1 1	15 18 27	20 20 30	12 12 10	12 12 10								
W70A1 - A00, A0Z A05 A10 A15 A20	230/208-1	1 1 1 or 2 1 or 2 1 or 2	49 49 59 85 111	60 60 60 90 125	8 8 6 4 2	10 10 10 8 6	59 59	26 52	60 60	30 60	6 6	10 6	10 10	10 10
W70A1 - B00, B0Z B09 B15 B18	230/208-3	1 1 1 2	43 43 53 N/A	60 60 60 N/A	8 8 6 N/A	10 10 10 N/A	43	28	60	30	8	10	10	10
W70A1 - C00, C0Z C09 C15	460-3	1 1 1	23 23 27	30 30 35	10 10 8	10 10 10								

① Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.

② Based on 75C copper wire. All wiring must conform to the National Electrical Code and all local codes.

③ These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing.

Caution: When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.

* Top outlet supply option is available only factory installed and only on the selected models.

IMPORTANT: While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes.

TABLE 5

Electrical Specifications — WL Series**

Model	Rated Volts and Phase	No. Field Power Circuits	Single Circuit				Dual Circuit							
			Ⓢ Minimum Circuit Ampacity	Ⓢ Maximum External Fuse or Ckt. Brkr.	Ⓢ Field Power Wire Size	Ⓢ Ground Wire	Ⓢ Minimum Circuit Ampacity		Ⓢ Maximum External Fuse or Ckt. Brkr.		Ⓢ Field Power Wire Size		Ⓢ Ground Wire Size	
							Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B
W18L1 - A00, A0Z A05 A08 A10	230/208-1	1 1 1 1	16 30 46 56	20 30 50 60	12 10 8 6	12 10 10 10								
W24L1 - A00, A0Z A05 A08 A10	230/208-1	1 1 1 1	21 30 46 56	30 30 50 60	10 10 8 6	10 10 10 10								
W24L1 - B00, B0Z B06	230/208-3	1 1	15 22	15 25	14 10	14 10								
W30L1 - A00*, A0Z* A05* A08 A10* A15	230/208-1	1 1 1 1 1 or 2	24 32 48 58 84	35 35 50 60 90	8 8 8 6 4	10 10 10 10 8	58	26	60	30	6	10	10	10
W30L1 - B00*, B0Z* B09* B15	230/208-3	1 1 1	18 33 51	20 35 60	12 8 8	12 10 10								
W30L1 - C00*, C0Z* C09* C15	460-3	1 1 1	11 17 26	15 20 30	14 12 10	14 12 10								
W36L1 - A00*, A0Z* A05* A10* A15	230/208-1	1 1 1 1 or 2	29 32 58 84	35 35 60 90	8 8 6 4	10 10 10 8	58	26	60	30	6	10	10	10
W36L1 - B00*, B0Z* B09* B15	230/208-3	1 1 1	23 33 51	30 35 60	10 8 6	10 10 10								
W36L1 - C00*, C0Z* C09* C15	460-3	1 1 1	12 17 26	15 20 30	14 10 10	14 10 10								
W42L1 - A00, A0Z A05 A10 A15	230/208-1	1 1 1 1 or 2	33 33 59 85	50 50 60 90	8 8 6 4	10 10 10 8	59	26	60	30	6	10	10	10
W42L1 - B00, B0Z B09 B15	230/208-3	1 1 1	25 34 53	35 35 60	8 8 6	10 10 10								
W42L1 - C00, C0Z C09 C15	460-3	1 1 1	13 18 27	15 20 30	14 12 10	14 12 10								
W48L1 - A00, A0Z A05 A10 A15	230/208-1	1 1 1 1 or 2	37 37 59 85	50 50 60 90	8 8 6 4	10 10 10 8	59	26	60	30	6	10	10	10
W48L1 - B00, B0Z B09 B15	230/208-3	1 1 1	29 34 52	40 40 60	8 8 6	10 10 10								
W48L1 - C00, C0Z C09 C15	460-3	1 1 1	14 18 27	20 20 30	12 12 10	12 12 10								
W60L1 - A00, A0Z A05 A10 A15	230/208-1	1 1 1 1 or 2	41 41 59 85	60 60 60 90	8 8 6 4	10 10 10 8	59	26	60	30	6	10	10	10
W60L1 - B00, B0Z B09 B15	230/208-3	1 1 1	28 34 53	40 40 60	8 8 6	10 10 10								
W60L1 - C00, C0Z C09 C15	460-3	1 1 1	15 18 27	20 20 30	12 12 10	12 12 10								
W70L1 - A0Z A05 A10 A15	230/208-1	1 1 1 or 2 1 or 2	49 49 59 85	60 60 60 90	8 8 6 4	10 10 10 8	59	26	60	30	6	10	10	10
W70L1 - B0Z B09 B15	230/208-3	1 1 1	43 43 53	60 60 60	8 8 6	10 10 10								
W70L1 - C0Z C09 C15	460-3	1 1 1	23 23 27	30 30 35	10 10 8	10 10 10								

① Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.

② Based on 75C copper wire. All wiring must conform to the National Electrical Code and all local codes.

③ These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing.

Caution: When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.

* Top outlet supply option is available only factory installed and only on the selected models.

IMPORTANT: While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes.

**TABLE 6
RECOMMENDED AIRFLOW**

Model	Rated CFM *	Rated ESP *	Recommended Airflow Range	Factory Speed Connection
W17A W18A, W18L	550	.40	575 - 725	High
W24A, W24L	800	.20	700 - 950	High
W30A, W30L	1000	.40	930 - 1300	High
W36A, W36L	1100	.30	930 - 1350	High
W42A, W42L	1400	.30	1600 - 1150	High
W48A, W48L	1550	.20	1750 - 1285	High
W60A, W60L	1650	.30	1950 - 1375	High
W70A, W70L	1800	.20	2000 - 1475	High

* Rated CFM and ESP on high speed tap.

**TABLE 7
INDOOR BLOWER PERFORMANCE**

E.S.P. In H ₂ O	W17A W18A/L, W24A/L		W30A/L, W36A/L				W42A/L, W48A/L				W60A/L, W70A/L			
	High Speed		High Speed		Low Speed		High Speed		Low Speed		High Speed		Low Speed	
	Dry Coil	Wet Coil	Dry Coil	Wet Coil	Dry Coil	Wet Coil	Dry Coil	Wet Coil	Dry Coil	Wet Coil	Dry Coil	Wet Coil	Dry Coil	Wet Coil
.0	1020	975	1395	1315	950	935	1885	1800	1650	1600	2200	2000	1600	1450
.1	960	905	1340	1270	930	915	1770	1665	1550	1500	2100	1900	1525	1375
.2	865	800	1285	1190	910	885	1635	1540	1450	1400	2000	1800	—	—
.3	820	735	1205	1100	855	830	1500	1400	1350	1300	1875	1700	—	—
.4	735	650	1110	1000	800	755	1370	1285	1300	1175	1775	1600	—	—
.5	615	535	1005	870	—	—	1250	1150	—	—	1650	1475	—	—

**TABLE 8
MAXIMUM ESP OF OPERATION
ELECTRIC HEAT ONLY**

Model	W17A W18A/L, W24A/L	W30A/L, W36A/L				W42A/L, W48A/L		W60A/L, W70A/L	
Outlet	FRONT	FRONT		TOP		FRONT		FRONT	
Speed	Single	High	Low	High	Low	High	Low	High	Low
-A0Z	.50	.50	.50	.50	.50	.50	.50	.50	.50
-A04				.50	.45				
-A05	.50	.50	.50			.50	.50	.50	.50
-A08	.50	.50	.50						
-A10		.50	.45	.50	.35	.50	.50	.50	.50
-A15		.40	.35			.50	.50	.50	.50
-A20						.50	.45	.50	.40
-B0Z	.50	.50	.50	.50	.50	.50	.50	.50	.50
-B06	.50	.50	.40						
-B09		.50	.50	.45	.40	.50	.50	.50	.50
-B15		.45	.30			.50	.50	.50	.50
-B18						.50	.50	.50	.50
-C0Z		.50	.50	.50	.50	.50	.50	.50	.50
-C06		.50	.50						
-C09		.50	.40	.45	.40	.50	.50	.50	.50
-C15		.45	.35			.50	.50	.50	.50

Values shown are for units equipped with standard 1-inch throwaway filter or 1-inch washable filter.
Derate ESP by .15 for 2-inch pleated filters.

**TABLE 9
ELECTRIC HEAT**

Models	240V-1		208V-1		240V-3		208V-3		460V-3	
KW	Amps	BTUH	Amps	BTUH	Amps	BTUH	Amps	BTUH	Amps	BTUH
4	16.7	13650	14.4	10240						
5	20.8	17065	18.1	12800						
6					14.4	20500	12.5	15360	7.2	20500
8	33.3	27300	28.8	20475						
9					21.7	30600	18.7	23030	10.8	30700
10	41.6	34130	36.2	25600						
12									14.4	40950
15	62.5	51250	54.0	38400	36.2	51200	31.2	38400	18.0	51200
18					43.3	61430	37.5	46100		
20	83.2	68260	72.1	51200						

**TABLE 10
OPTIONAL ACCESSORIES**

Part Number		W1718A1-A	W24A1-A	W24A1-B	W24A1-C	W30A1-A	W30A1-B	W30A1-C	W36A1-A	W36A1-B	W36A1-C	W42A1-A	W42A1-B	W42A1-C	W48A1-A	W48A1-B	W48A1-C	W60A1-A	W60A1-B	W60A1-C	W70A1-A	W70A1-B	W70A1-C
HEATER KITS	EHWA02-A05	X	X																				
	EHW02A-A08	X	X																				
	EHWA02A-A10	X	X																				
	EHWA24-B06			X																			
	EHWH24B-C06				X																		
	EHWA03-A05					X			X														
	EHWA03-A08					X			X														
	EHWA03-A10					X			X														
	EHWA03-A15					X			X														
	EHWA03-B06						X																
	EHW36A-B06									X													
	EHWA03-B09					X			X														
	EHWA37-B15					X			X														
	EHWC03A-C06							X			X												
	EHWC03A-C09							X			X												
	EHWA03A-C15							X			X												
	EHWA05-A05											X			X								
	EHWA05-A10											X			X		X				X		
	EHWA05-A15											X			X		X				X		
	EHWA05-A20											X			X		X				X		
	EHWA05-B09											X			X								
	EHWA05-B15											X			X			X				X	
	EHW05A-B18											X			X			X				X	
	EHWA05A-C09												X			X			X				X
	EHWA05A-C15												X			X			X				X
	EHWA60-A05																X				X		
	EHWA60-B09																	X				X	
CIRCUIT BREAKER (WMCB) & PULL DISCONNECT (WMPD)	WMCB-01B			X																			
	WMCB-02A	X																					
	WMCB-02B						X																
	WMCB-03A		X																				
	WMCB-04B									X													
	WMCB-05A					X			X														
	WMCB-05B											X			X								
	WMCB-06B																	X					
	WMCB-08A											X			X								
	WMCB-09A																X				X		
	WMPD-01C				X			X			X			X			X			X			X
	WMCB-09B																					X	

TABLE 11
VENT & CONTROL OPTIONS

Part Number	Description	W17, W18, W24	W30, W36	W42, W48, W60, W70
CMC-14	ODT	X	X	X
CMC-15	Start Kit (230V 1-Phase)	X	X	X
CMC-23	DDC	X	X	
CMC-24	DDC			X
CMC-28	LAC	X	X	X
BFAD-2	Barometric Fresh Air Damper - Standard	X		
BOP-2	Blank Off Plate	X		
MFAD-2	Motorized Fresh Air Damper	X		
CRV-2	Commercial Ventilator - Spring Return	X		
EIFM-2B	Economizer	X		
ERV-2A	Energy Recovery Ventilator - 230 Volt	X		
BFAD-3	Barometric Fresh Air Damper - Standard		X	
BOP-3	Blank Off Plate		X	
MFAD-3	Motorized Fresh Air Damper		X	
CRVS-3	Commercial Ventilator - Spring Return		X	
CRVP-3	Commercial Ventilator - Power Return		X	
EIFM-3C	Economizer		X	
ERV-3A	Energy Recovery Ventilator - 230 Volt		X	
ERV-3C	Energy Recovery Ventilator - 460 Volt		X	
BFAD-5	Barometric Fresh Air Damper - Standard			X
BOP-5	Blank Off Plate			X
MFAD-5	Motorized Fresh Air Damper			X
CRVS-5	Commercial Ventilator - Spring Return			X
CRVP-5	Commercial Ventilator - Power Return			X
EIFM-5C	Economizer			X
ERV-5A	Energy Recovery Ventilator - 230 Volt			X
ERV-5C	Energy Recovery Ventilator - 460 Volt			X



TEC40 Environmental Controller

The TEC40 is an electronic multi-stage controller for control of 3 or 4 air conditioners as 1 stage systems, or 2 air conditioners each operating as 2 stage systems. The latter is an excellent control method for dual air conditioners each with economizers, allowing maximum benefit of the economizer and switching to mechanical cooling based on building demand rather than a predetermined outdoor enthalpy condition.

Engineered Features

Unit Operation

LED's indicate the primary unit running and which stage(s) of cooling or heating are energized. The controller is powered (24VAC, 50/60 Hz) from any of the air conditioners controlled. In the event of a power loss to one or more air conditioners the controller will continue to operate from any other air conditioner still being powered. If all power is interrupted to the building the controller has a power loss memory and will remember the unit sequence when power is restored. An On/Off for controller activation is provided.

Thermostat

The thermostat is an integrated 4-stage cool and 4-stage heat electronic control with a 2°F differential between each stage. Adjustable thermostat range is 55°F (13°C) to 90°F (32°C) and has a thermistor type sensor. The "dead band" between heating and cooling is adjustable between 4°F and 20°F.

Staging Delay Periods

The following delays are built in for both cooling and heating: stage 1 - 0 seconds; stage 2 - 10 seconds; stage 3 - 15 seconds; stage 4 - 20 seconds.

Fire Suppression

Dedicated terminals (F1 and F2) are provided for use with a field supplied fire suppression system, and will de-energize all air conditioners in the event of a fire.

Compact size

The TEC40 controller is 7 inches wide, 11.5 inches high, and 3 inches deep. Twelve (12) .875 inch diameter knock-outs are provided for wiring connections.

Isolation Circuitry

The TEC40 circuitry totally isolates the 24VAC power supplies of all connected air conditioners from each other to prevent feedback or phasing problems.



Sequence Timer

The jumper selectable sequence timer can be set for 1, 3, 7, 14 or 24 days to rotate in sequence each connected air conditioner to the lead position and equalize run time. There is also a 0 day position available if necessary to halt rotation for test purposes or other reasons. There is a speed-up feature located inside controller to accelerate the timer switch over periods (approximately 1 second per day).

Manual Sequence Advance

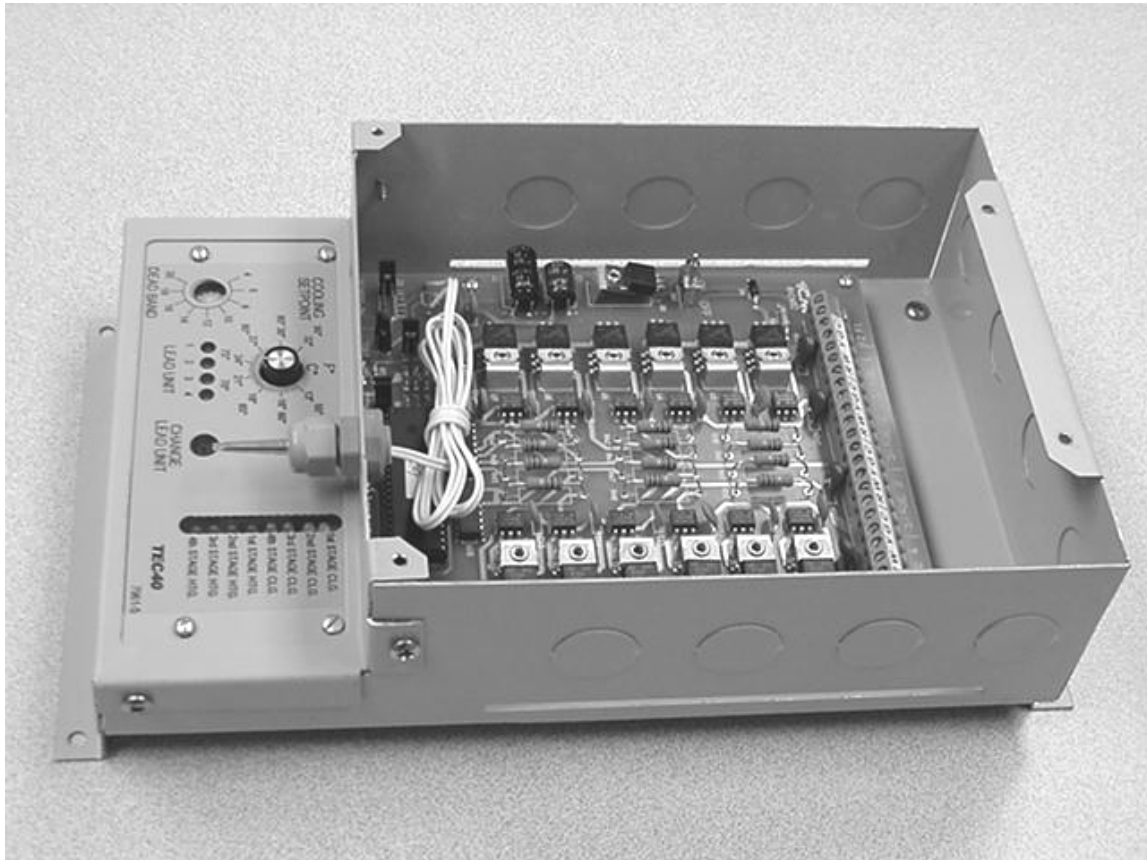
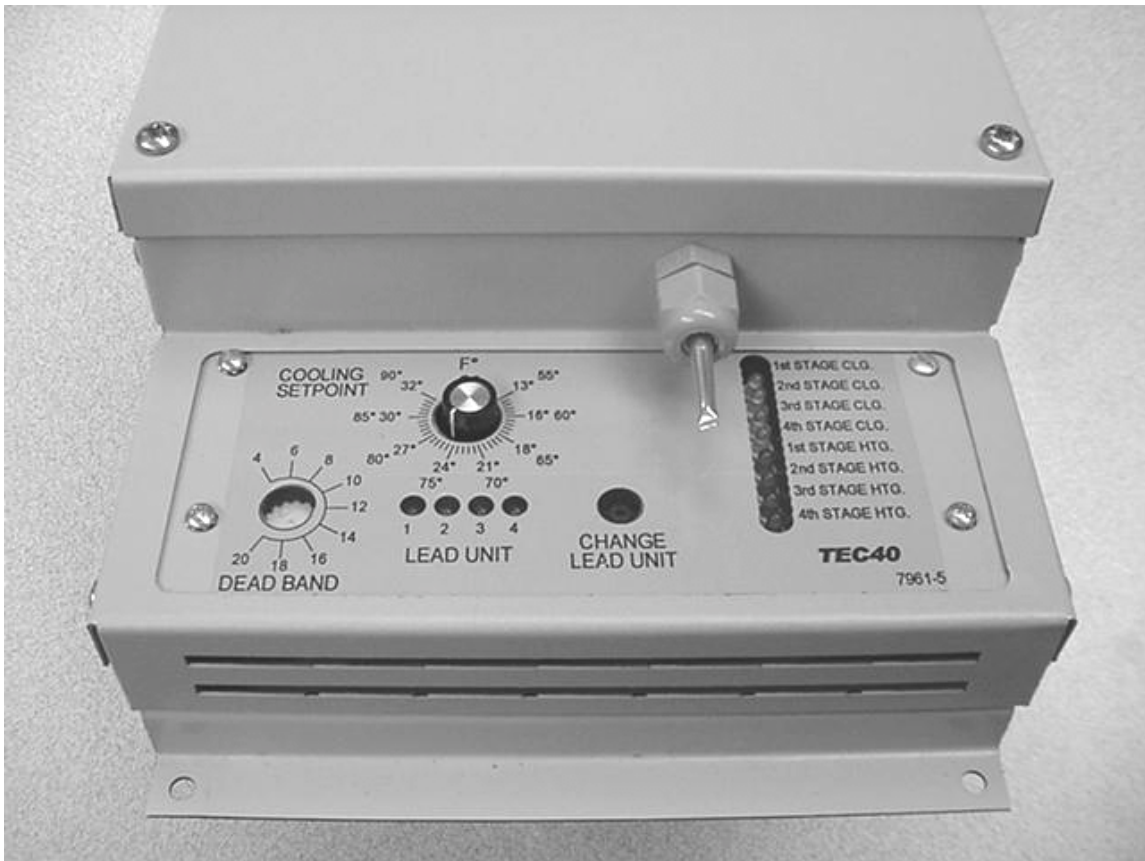
A recessed but externally accessible push-button advance button is provided for testing and service. This feature will force the lead unit to last place, and restart the selected sequence timer period.

Lead Unit Continuous Blower Option

The blower on the air conditioner in the number 1 (lead unit) position can be forced to run continuously if desired by making a simple jumper selection.

2 Unit / 2-Stage Operating Sequences

Both alternating and non-alternating sequence option can be selected to control 2 air conditioners with economizers.



BARD MANUFACTURING CO.
BRYAN, OH 43506

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S3353
May, 2001**

NEW

INSTALLATION INSTRUCTIONS

TEC40 ELECTRONIC CONTROLLER



CLIMATE CONTROL SOLUTIONS

BARD MANUFACTURING COMPANY
Bryan, Ohio 43506
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Manual:	2100-393E
Supersedes:	2100-393D
File:	Volume III Tab 19
Date:	12-18-04

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**** IMPORTANT ****

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians. Please read entire manual before proceeding.

SHIPPING DAMAGE

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

GENERAL

These instructions explain the operation, installation and troubleshooting of the TEC40 controller.

All internal wiring is complete. Only attach low voltage field wiring to designated terminal strips.

The controller is for use with up to four (4) Bard air conditioning wall mount series units. The TEC40 is for use with units with or without economizers.

It is recommended that a five (5) minute compressor time delay relay be factory or field installed in each unit.

The TEC40 controller is suitable for both 50 and 60 HZ operation.

THEORY OF OPERATION

The controller is used to control up to four wall mount air conditioners from one thermostat. It provides total redundancy for the structure and equal wear on all units. It can be used with units with economizers, but all units must be equipped alike. That is, all must have economizers or all must be without economizers. See Figure 1 for component locations.

LEAD-LAG CHANGEOVER TIME

The lead-lag changeover time period is user selectable. Time periods available are 0, 1, 3, 7, 14 and 28 days. Once every time period the lead unit will be advanced to the next unit providing equal wear on the units. For timer speed up, push and hold the change lead unit push-button for one second. Timer speed up is supplied for ease of trouble shooting.

Lead unit cycles between all 4 units in four unit mode; between 1, 2 and 3 in three unit mode; and between units 1 and 2 in both two unit modes.

In the event of a unit(s) failure, the changeover time jumper may be set to 0 days. This will prevent the TEC40 from switching lead unit to the next unit. Push the push-button to make a functional unit the lead unit if necessary. If power is lost the controller will remember which unit was the lead unit when power is reapplied.

MODES OF OPERATION

The TEC40 has four modes of operation.

1. Four Unit Mode
2. Three Unit Mode
3. Two Unit Alternating Mode
4. Two Unit Non-Alternating Mode.

STAGING DELAY PERIODS

The following delays are built in for both cooling and heating: stage 1 – 0 seconds; stage 2 – 10 seconds; stage 3 – 15 seconds; and stage 4 – 20 seconds. The delays are active anytime there is a power interruption or the controller ON–OFF switch is exercised.

FOUR UNIT MODE

In four unit mode the TEC40 will control four air conditioners with or without economizers. Make connections per Figure 2 on Page 6.

Sequence of Operation – Cooling

First stage cooling set point is determined by the position of the cooling set point potentiometer. On a call for first stage cooling, the blower and either economizer or compressor of the lead unit is energized. The enthalpy control on the economizer will make the decision as to which is energized. If not equipped with economizers the compressor will energize. First stage cooling LED will light.

Second stage cooling set point is 2.0 degrees warmer than first stage cooling set point. On a call for second stage cooling, the blower and either economizer or compressor of the next unit is energized. The enthalpy control on the economizer will make the decision as to which is energized. If not equipped with economizer the compressor will energize. Second stage cooling LED will light.

Third stage cooling set point is 2.0 degrees warmer than second stage cooling set point. On a call for third stage cooling, the blower and either economizer is energized. The enthalpy control on the economizer will make the decision as to which is energized. If not equipped with economizer the compressor will energize. Third stage cooling LED will light.

Fourth stage cooling set point is 2.0 degrees warmer than third stage cooling set point. On a call for fourth stage cooling, the blower and either economizer or compressor of the next unit is energized. The enthalpy control on the economizer will make the decision as to which is energized. If not equipped with economizer the compressor will energize. Fourth stage cooling LED will light.

Sequence of Operation – Heating

First stage heating set point is determined by subtracting the dead band setting from cooling set point setting. For example, if the cooling set point is 74 degrees and the dead band adjustment is set at 4 degrees the heating set point is 70 degrees. On a call for first stage heating, the blower and electric heat of the lead unit is energized. First stage heating LED will light.

Second stage heating set point is 2.0 degrees colder than first stage heating set point. On a call for second stage heating, the blower and electric heat of the next unit is energized. Second stage heating LED will light.

Third stage heating set point is 2.0 degrees colder than second stage heating set point. On a call for third stage heating, the blower and electric heat of the next unit is energized. Third stage heating LED will light.

Fourth stage heating set point is 2.0 degrees colder than third stage heating set point. On a call for fourth stage heating, the blower and electric heat of the next unit is energized. Fourth stage heating LED will light.

THREE UNIT MODE

In three unit mode the TEC40 will control three air conditioners with or without economizers. Make connections per Figure 3 on Page 7.

Sequence of Operation

The cooling and heating sequence of operation are the same as four unit mode except that the fourth stage heating or cooling is not available.

TWO UNIT NON-ALTERNATING MODE

In two unit non-alternating mode the TEC40 will control two air conditioners with two speed or dual compressors. Make connections per Figure 5 on Page 9.

Sequence of Operation – Cooling

First stage cooling set point is determined by the position of the cooling set point potentiometer. On a call for first stage cooling, the blower and low speed or first compressor of the lead unit is energized. First stage cooling LED will light.

Second stage cooling set point is 2.0 degrees warmer than first stage cooling set point. On a call for second stage cooling, the high speed or second compressor of the lead unit will energize. Second stage cooling LED will light.

Third stage cooling set point is 2.0 degrees warmer than second stage cooling set point. On a call for third stage cooling the blower and low speed or first compressor of the lag unit will energize. Third stage cooling LED will light.

Fourth stage cooling set point is 2.0 degrees warmer than third stage cooling set point. On a call for fourth stage cooling, the high speed or second compressor of the lag unit will energize. Fourth stage cooling LED will light.

Sequence of Operation – Heating

First stage heating set point is determined by subtracting the dead band setting from cooling set point setting. For example, if the cooling set point is 74 degrees and the dead band adjustment is set at 4 degrees the heating set point is 70 degrees. On a call for first stage heating, the blower and electric heat of the lead unit is energized. First stage heating LED will light.

Second stage heating set point is 2.0 degrees colder than first stage heating set point. On a call for second stage heating, the second electric heat (if equipped) of the lead unit is energized. Second stage heating LED will light.

Third stage heating set point is 2.0 degrees colder than second stage heating set point. On a call for third stage heating, the blower and electric heat of the lag unit is energized. Third stage heating LED will light.

Fourth stage heating set point is 2.0 degrees colder than third stage heating set point. On a call for fourth stage heating, the second electric heat (if equipped) of the lag unit is energized. Fourth stage heating LED will light.

TWO UNIT ALTERNATING MODE

In two unit alternating mode the TEC40 will control two air conditioners with two speed or dual compressor or two air conditioners with economizers with full redundancy. For two air conditioners with economizers, make connections per Figure 4 on Page 8. For two air conditioners with two-speed or dual compressors, make connections per Figure 6 on Page 10.

Sequence of Operation – Cooling with Economizers

First stage cooling set point is determined by the position of the cooling set point potentiometer. On a call for first stage cooling, the blower and either economizer or compressor of the lead unit is energized. The enthalpy control on the economizer will make the decision as to which is energized. First stage cooling LED will light.

Second stage cooling set point is 2.0 degrees warmer than first stage cooling set point. On a call for second stage cooling, the blower and either economizer or compressor of the lag unit is energized. The enthalpy control on the economizer will make the decision as to which is energized. Second stage cooling LED will light.

Third stage cooling set point is 2.0 degrees warmer than second stage cooling set point. On a call for third stage cooling, the compressor of the lead unit will energize and the economizer will return to minimum position if open. Third stage cooling LED will light.

Fourth stage cooling set point is 2.0 degrees warmer than third stage cooling set point. On a call for fourth stage cooling, the compressor of the lag unit will energize and the economizer will return to minimum position if open. Fourth stage cooling LED will light.

Sequence of Operation – Heating

First stage heating set point is determined by subtracting the dead band setting from cooling set point setting. For example, if the cooling set point is 74 degrees and the dead band adjustment is set at 4 degrees the heating set point is 70 degrees. On a call for first stage heating, the blower and electric heat of the lead unit is energized. First stage heating LED will light.

Second stage heating set point is 2.0 degrees colder than first stage heating set point. On a call for second stage heating, the electric heat of the lag unit is energized. Second stage heating LED will light.

Third stage heating set point is 2.0 degrees colder than second stage heating set point. On a call for third stage heating, the second electric heat (if equipped) of the lead unit is energized. Third stage heating LED will light.

Fourth stage heating set point is 2.0 degrees colder than third stage heating set point. On a call for fourth stage heating, the second electric heat (if equipped) of the lag unit is energized. Fourth stage heating LED will light.

INSTALLATION INSTRUCTIONS

MOUNTING

Included in the controller carton is the controller and installation instructions.

The controller should be installed on a vertical wall approximately four (4) feet above the floor away from drafts and outside doors or windows. Four (4) mounting holes are provided for mounting to the wall and holes for conduit connections are provided in both the base, side and top of the controller. The controller should not be mounted directly to a block wall; space away from wall with insulation or plywood.

Once mounted, slide the thermistor sensor down into the fitting on the bottom of the TEC40. Position the sensor so that 15/16 inch is protruding from the bottom of the fitting. Tighten the fitting to hold the sensor in position.

LOW VOLTAGE FIELD WIRING

The TEC40 is powered from the air conditioners that it is controlling, 24 VAC, 50/60 HZ, low voltage only.

Circuitry in the TEC40 isolate the power supplies of all connected air conditioners so that no back feeds or phasing problems can occur. Additionally if one or more air conditioners loose power the TEC40 and the other air conditioners are unaffected and will continue to operate normally.

Connect the low voltage field wiring from each unit per the low voltage field wiring diagrams in Figure 2, 3, 4 or 5 depending on the mode of operation desired.

FIRE SUPPRESSION CIRCUIT

To disable the TEC40 and shut down all air conditioners, terminal F1 and F2 may be used. The F1 and F2 terminals must be jumpered together for normal operation. A normally closed set of contacts may be connected across the terminals and the factory jumper removed for use with a field installed fire suppression system. The contacts must open if a fire is detected. Contacts should be rated for pilot duty operation at 2 amp 24 VAC minimum.

IMPORTANT NOTE: Bard models employ an electronic blower control that has a 60-second blower off-delay. In order to have immediate shutdown of the blower motor in addition to disabling the run function of the air conditions will require a simple wiring modification at the blower control located in the electrical control panel of the air conditioners being controlled by the lead/lag controller. To eliminate the 60- second blower off-delay disconnect and isolate the wire that is factory connected to the "R" terminal to the electronic blower control, and then connect a jumper from the "G" terminal on the blower control to the "R" terminal on the blower control. The electronic blower control will now function as an on-off relay with no off-delay, and the blower motor will stop running immediately when the F1-F2 fire suppression circuit is activated (opened).

ADJUSTMENTS

See Figure 1.

COOLING SET POINT

Set the cooling set point in degrees C° or F° as indicated on the front of the TEC40.

DEAD BAND

The dead band is the span between heating set point and cooling set point where no heating or cooling takes place. The cooling set point minus the dead band equals the heating set point. Adjustable from 4° to 20° F.

Turn the potentiometer fully counter clockwise for 4° dead band. Turn fully clockwise for 20° dead band. The arrow on top of the potentiometer does not indicate dead band setting.

LEAD CHANGE PUSH-BUTTON

Pushing the lead change push-button will immediately change the lead unit to the lag unit. It also resets the lead/lag changeover timer to zero and restarts the selected timing period.

ON/OFF SWITCH – UNDER COVER

This disables the TEC40. This switch must be ON for any heating or cooling to operate.

NOTE: Whenever the on/off switch is first turned ON, all 4 red LED's for lead unit indication will flash 4 or 5 times as the controller sequences itself, and then will revert to whichever unit was lead when on/off switch was turned OFF.

CHANGING SELECTABLE FEATURES

To change any selectable feature turn on/off switch OFF. Change jumpers as necessary and turn switch ON. Jumper changes do not take effect unless on/off switch is turned OFF, jumper plug moved, and on/off switch turned back ON.

CHANGE OVER TIME JUMPER – UNDER COVER

The changeover period for the sequence can be adjusted to 0, 1, 3, 7, 14 or 28 days.

If the jumper is set to 7 days (or other selected choice), units will rotate upwards: first to second, second to third, third to fourth, and fourth to first place. If connected for three units then three will go to first, and fourth position is ignored.

The 0 day position is supplied in the event of a unit failure or if only one air conditioner is used with the TEC40. If the unit needs to run for a time and not switch to the lag unit, set the jumper to “0” and push the lead change push-button to make the functional or single unit the lead unit. When the jumper is in the 0 position the lead unit will never switch.

TEST MODE JUMPER – UNDER COVER

There is a test mode to accelerate the timing circuit from days to seconds. For example, if the timing selection jumper plug were set to the 7 day position, then utilizing the test mode feature the lead unit would advance in 7 seconds.

To use the test feature take the following steps:

1. Turn the on/off switch to OFF.
2. Place the jumper across the test mode pins.
3. Turn the on/off switch to ON.
4. The lead unit will now advance in upward sequence through the enabled unit positions.
5. To stop the accelerated sequence turn the on/off switch to OFF, remove the jumper, and then turn the on/off switch back ON.
6. After the 4 red LED's stop flashing the lead unit may be the one indicated at the time the on/off switch was turned OFF or it may be the next one up, depending on where the timer was in the accelerated sequence when switch was turned OFF.

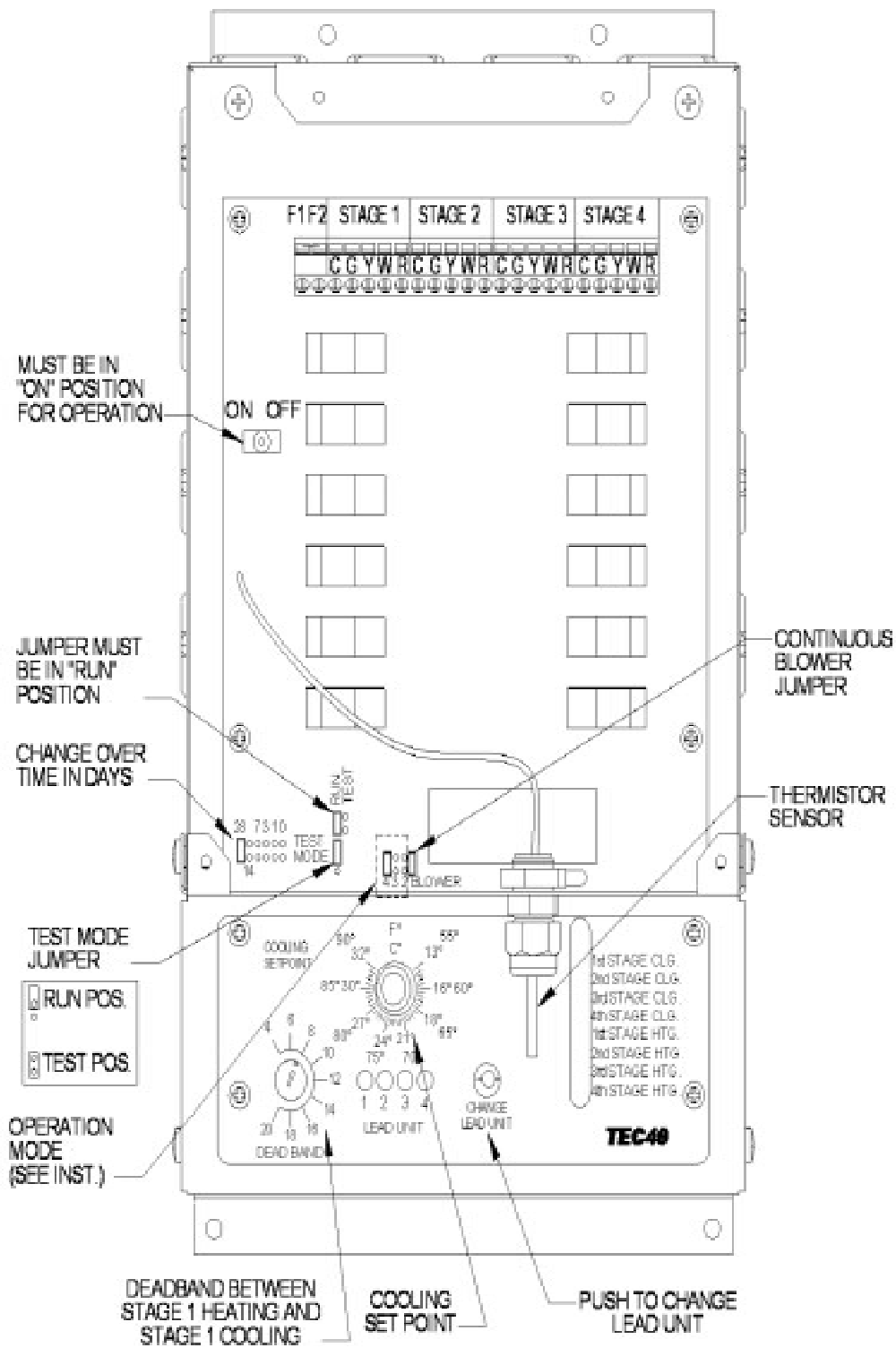
OPERATION MODE JUMPER – UNDER COVER

Position jumper across pins 4 for four unit mode.
Position jumper across pins 3 for three unit mode.
Position jumper across pins 2 for two unit non-alternating mode. Remove jumper for two unit alternating mode.

CONTINUOUS BLOWER JUMPER – UNDER COVER

Position jumper across pins for continuous blower on the lead unit. Remove jumper to have the lead unit blower cycle with the compressor.

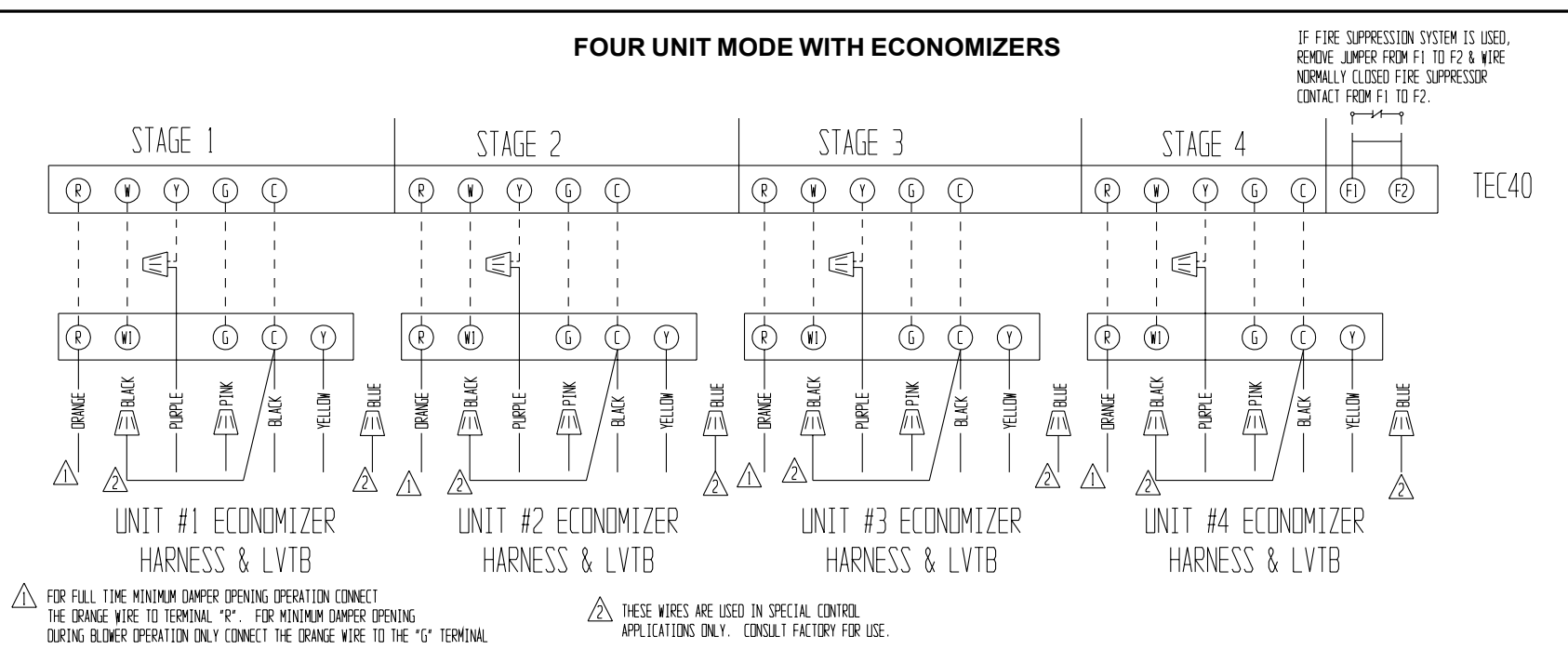
**FIGURE 1
CONTROL LOCATIONS**



7960-477

FIGURE 2

FOUR UNIT MODE WITH ECONOMIZERS



FOUR UNIT MODE WITHOUT ECONOMIZERS

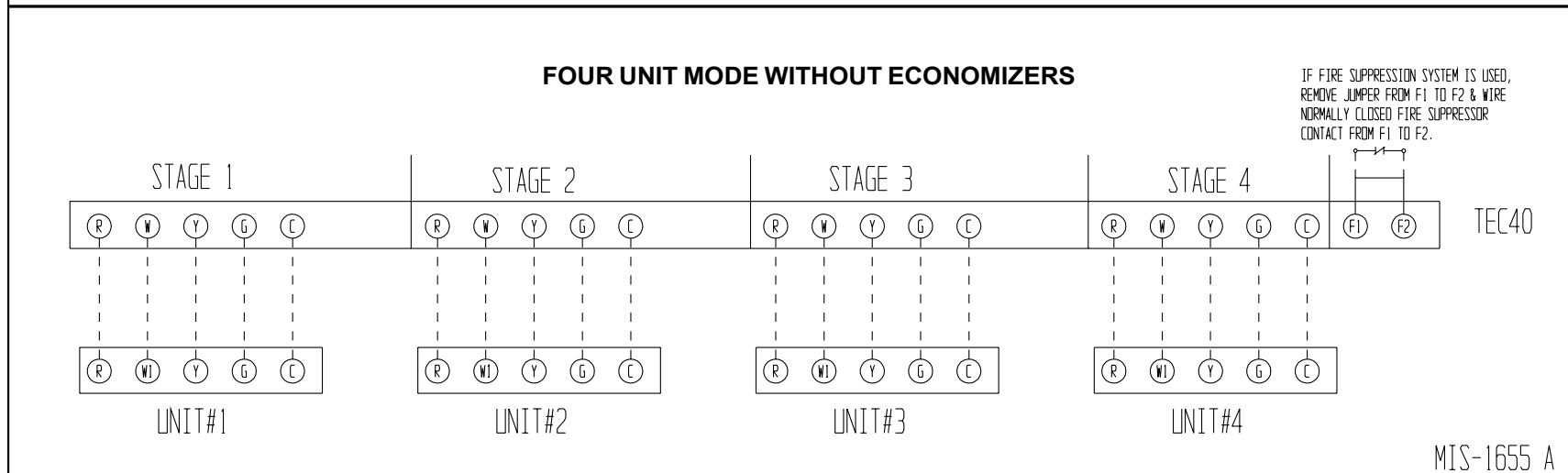


FIGURE 3

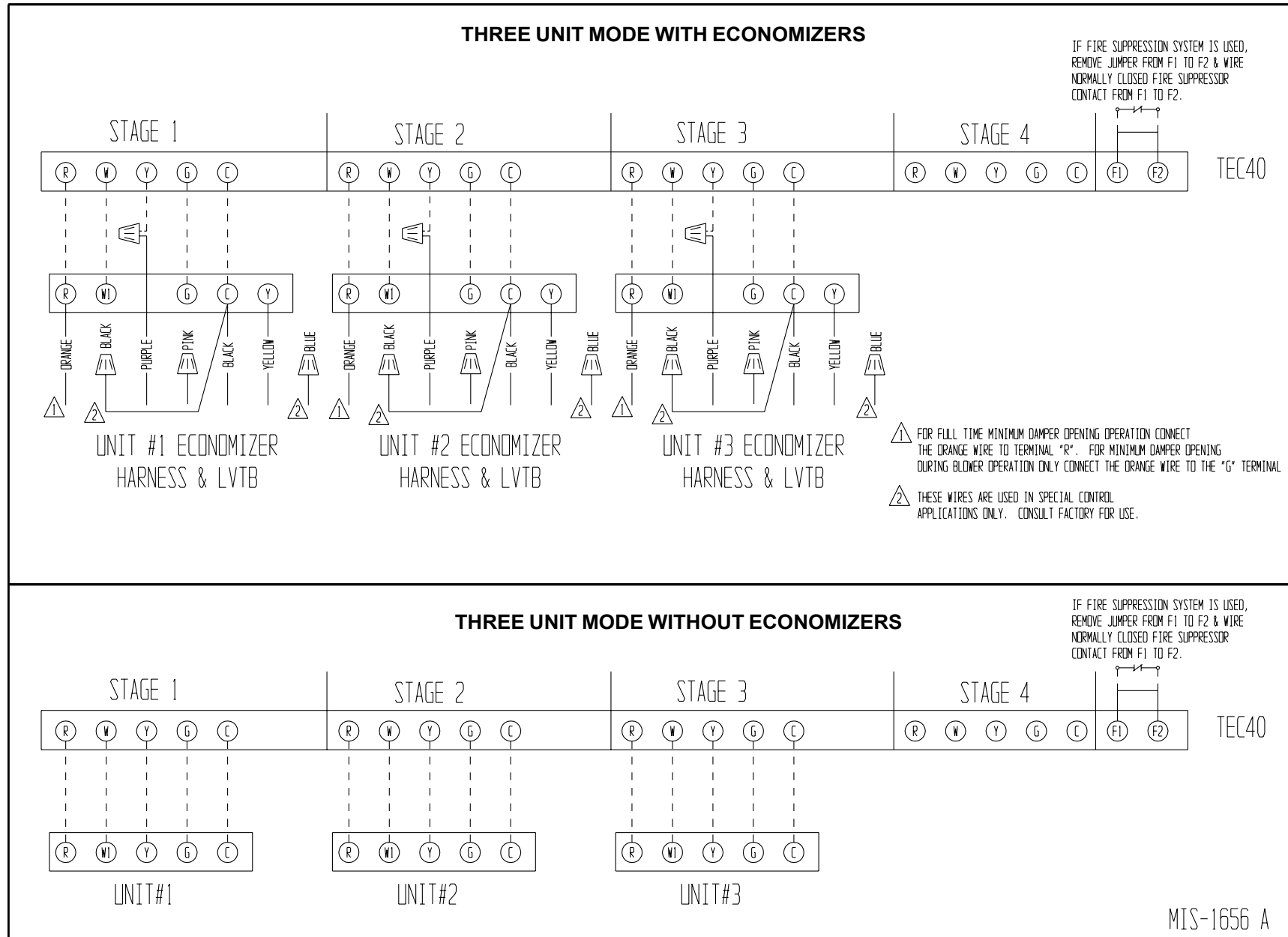
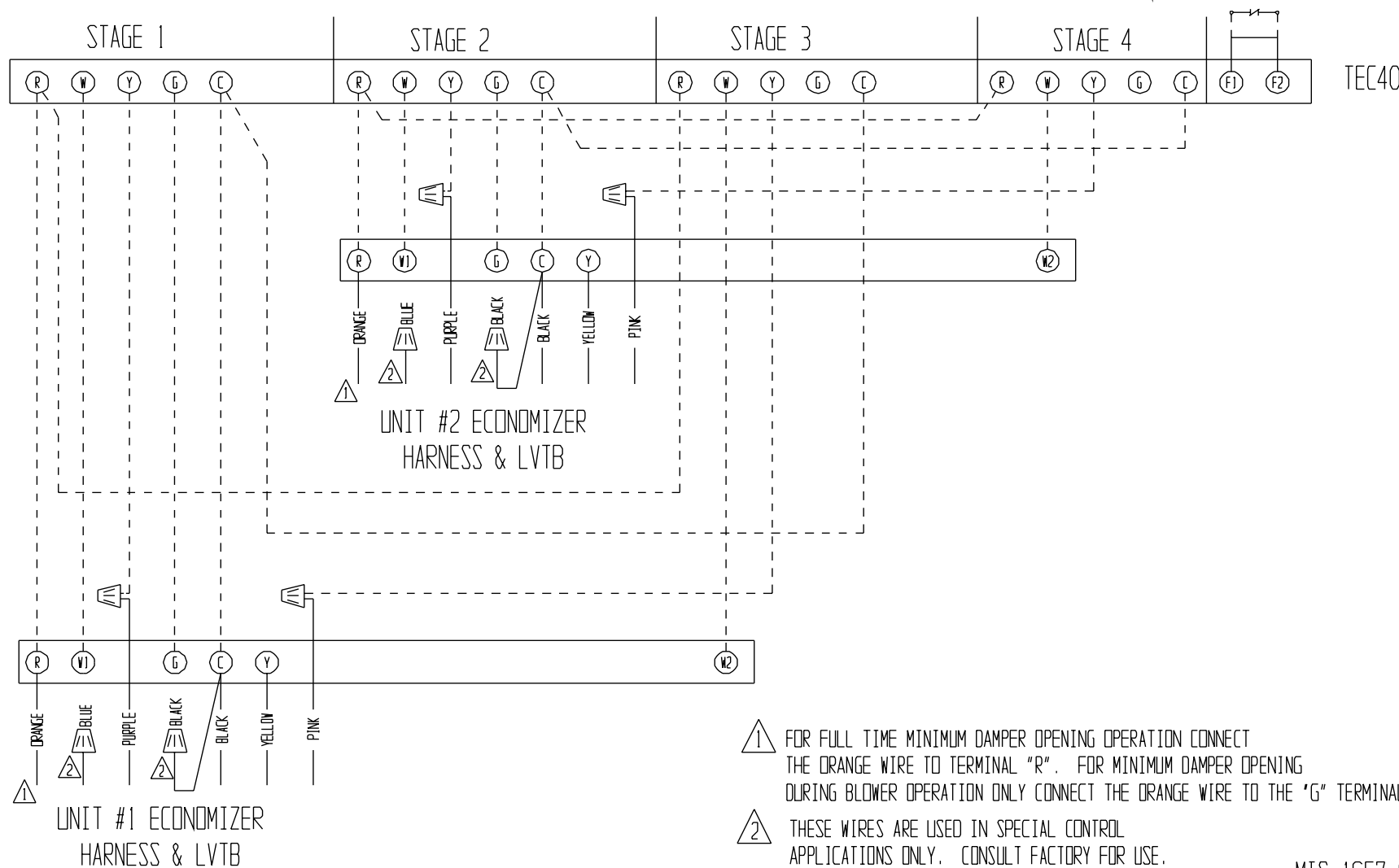


FIGURE 4

TWO UNIT ALTERNATING MODE WITH ECONOMIZERS

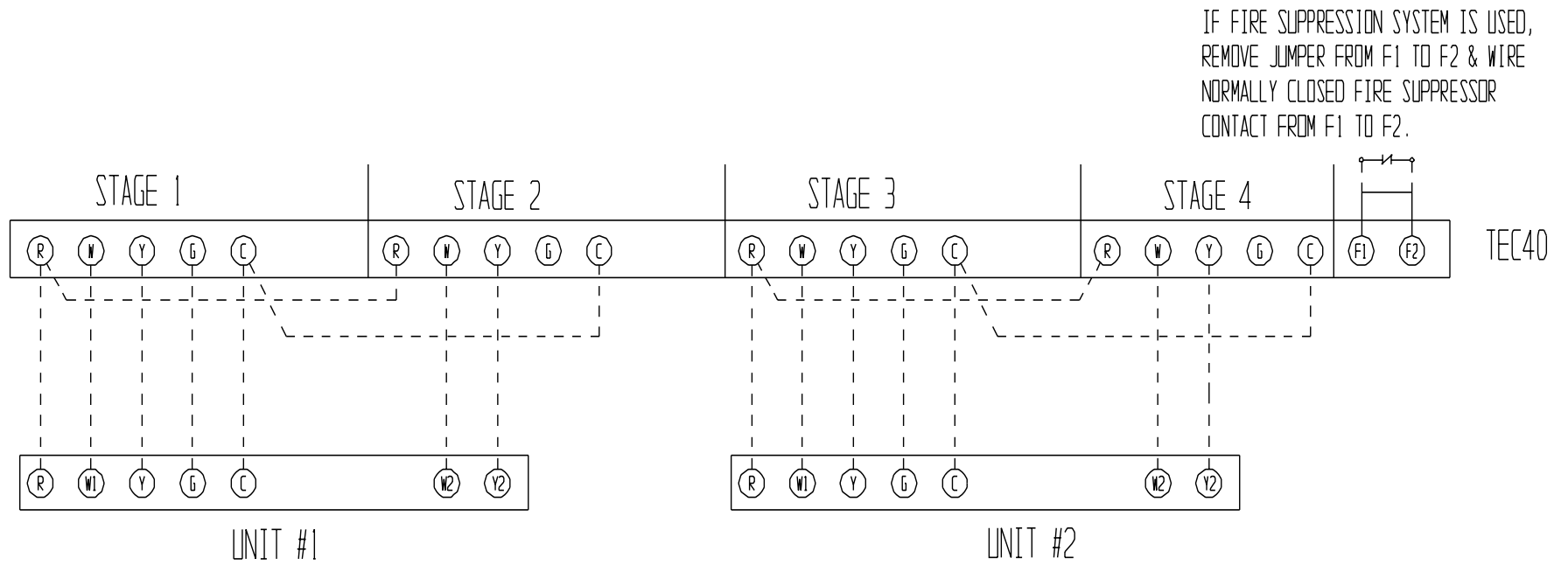
IF FIRE SUPPRESSION SYSTEM IS USED,
REMOVE JUMPER FROM F1 TO F2 & WIRE
NORMALLY CLOSED FIRE SUPPRESSOR
CONTACT FROM F1 TO F2.



MIS-1657 C

FIGURE 5

TWO UNIT NON-ALTERNATING MODE WITH 2-SPEED OR DUAL COMPRESSORS

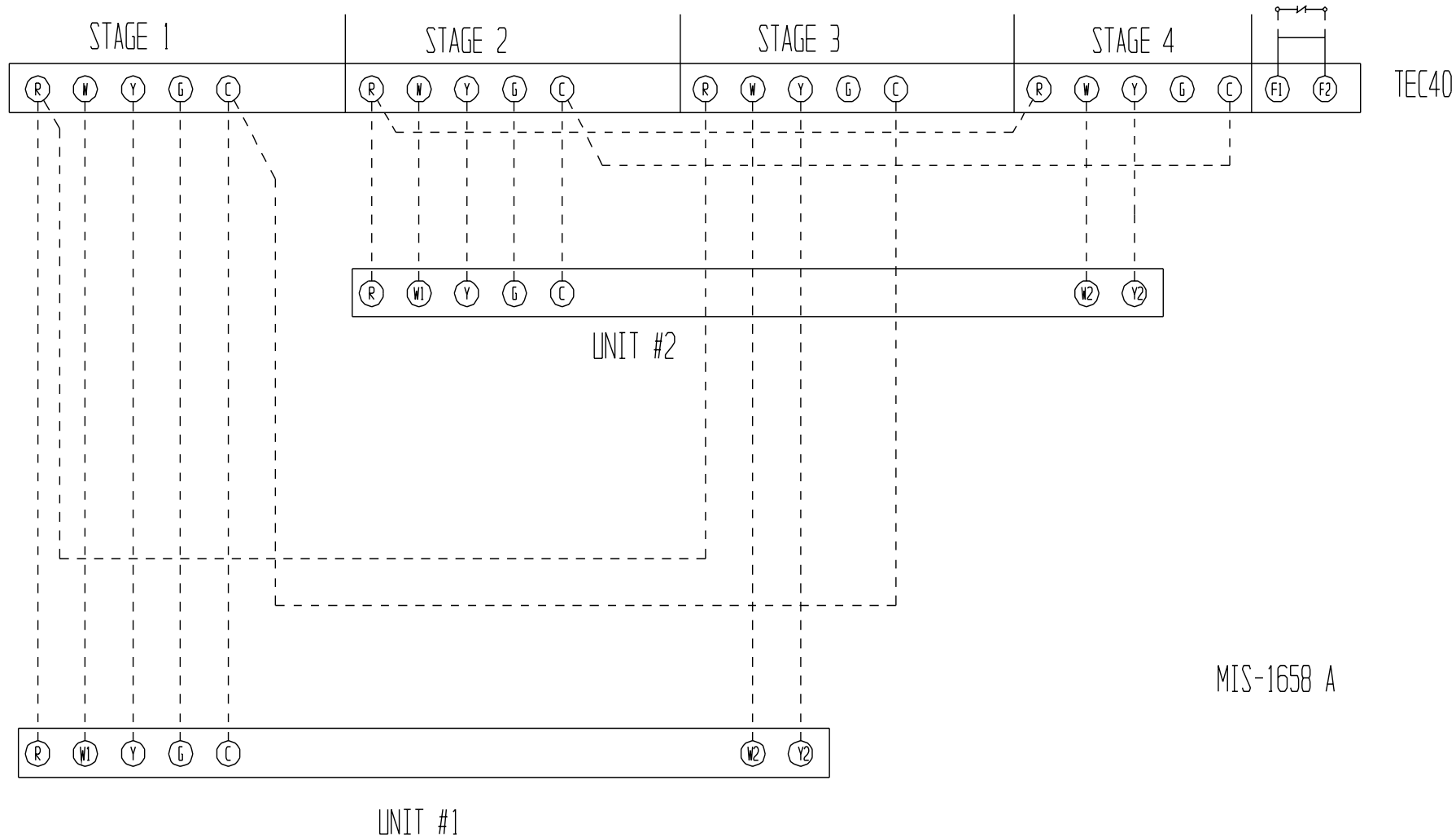


MIS-2032

FIGURE 6

TWO UNIT ALTERNATING MODE WITH 2-SPEED OR DUAL COMPRESSORS

IF FIRE SUPPRESSION SYSTEM IS USED,
REMOVE JUMPER FROM F1 TO F2 & WIRE
NORMALLY CLOSED FIRE SUPPRESSOR
CONTACT FROM F1 TO F2.



MIS-1658 A

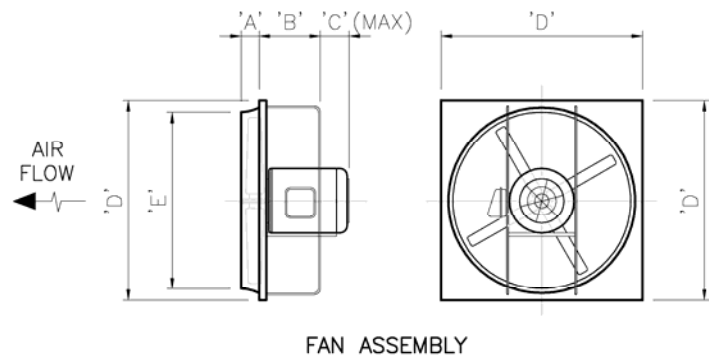
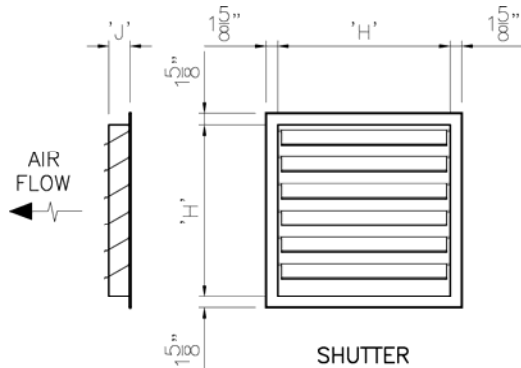
MODEL ET PROPELLER FANS

Standard Airflow

MODEL	A	B	C	D	E	H	J
ET-12	2 1/2"	8 1/2"	4"	16"	12 3/4"	12"	3"
ET-16	2 1/2"	8 1/2"	4"	20"	16 3/4"	16"	3"
ET-20	2 1/2"	8 1/2"	4"	24"	20 3/4"	20"	3"
ET-24	2 1/2"	8 1/2"	4"	28"	24 3/4"	24"	3"

Dimensions given on this sheet are correct within limits suitable for normal installation requirements

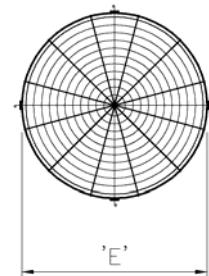
Project:	Murphy Oil W28406/P12495
Location:	
Architect:	
Engineer:	
Contractor:	WARWICK
Submitted By:	Ener-Tech Industries
Date:	July 30,2012



FEATURES

ET FANS, designed for heavy-duty ventilation applications. Fans with explosion proof motors designed to exhaust atmospheres containing flammable, explosive vapors or gases. Explosion proof motors are CSA approved for Class I, Group D and Class II, Groups E, F and G hazardous locations. Air deliveries based on AMCA test code for exhaust systems. Heavy-duty venturi panel, fixed position motor base with rigid tubular supports. Fan blades are non-sparking cast or fabricated aluminium. Back guard is heavy gauge steel wire.

STANDARD SHUTTERS. For normal applications. Mill finish aluminum vanes with steel pivot pins. 19ga. welded steel frame. Gray enamel finish. Vanes counter-balanced for easy operation, steel reinforced, felted for quiet, weather tight closure. Tie rod attached to vanes on fan side. 9/32" Ø mounting holes.



REAR & FRONT
FAN GUARD

SPECIFICATIONS		FAN				MOTOR			OPTIONAL ACCESSORIES
Reference	QTY	Size	Model	CFM	SP	HP	Current	Type	
	1	12"	ET12-1	500	.25	1/4	120/1/60	TE	Shutter & backguard

TE - totally enclosed
WC - wall collar

EX - explosion proof motor
BA - back (motor side) guard

2S - two speed motor
FA - front guard

INSTALLATION & MAINTENANCE INSTRUCTIONS

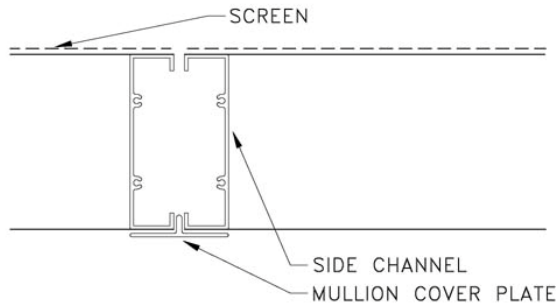
RECEIVING AND INSPECTION: Immediately inspect the fan and accessories noting any visible signs of damage on the delivery receipt. Report damage to the carrier within 15 days. Check to assure that impeller set screws are tight. Turn impeller by hand to see that it turns freely and does not bind. Whenever possible, fans should be stored indoors in clean, dry locations. If storage outdoors is necessary, fans should be protected against the elements and accumulation of dirt and moisture. Special care must be taken to keep motors and bearing assemblies dry and clean.

INSTALLATION

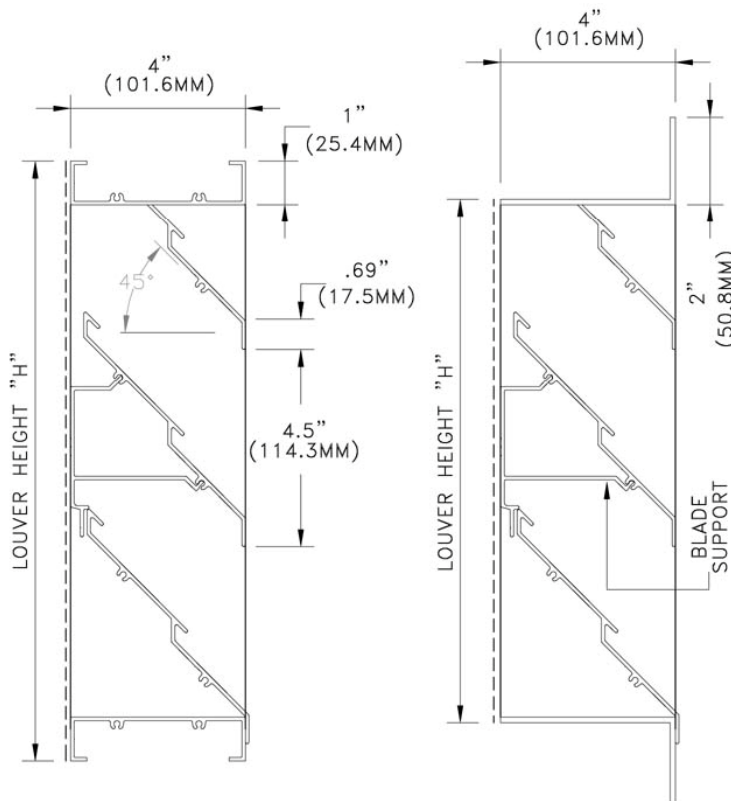
1. **CAUTION!** This unit has rotating parts and safety precautions should be exercised during installation, operation and maintenance.
2. **WARNING!** DO NOT use in HAZARDOUS ENVIRONMENTS where fans electrical system could provide ignition to combustible or flammable materials, unless unit is specifically built for hazardous environments.
3. To install uncrated fan provide a square opening in the wall equal to the outside dimensions of the fan. It is preferable to frame in the opening with 2 X 4 material, or a metal frame in metal buildings.
4. Slide the fan into the framed opening in the wall. Securely fasten with bolts or screws provided by the installer.
5. When using an automatic shutter, be sure to position the shutter at least 6" from fan blades.
6. Guards must be installed when fan is within reach of personnel or within seven (7) feet of working level or when deemed advisable for safety.
7. All wiring should be in accordance with local ordinances and the National Electric code.
8. Before starting, check all fasteners for tightness particularly in the propeller hub. Turn the propeller by hand to make sure it is in alignment with the orifice and fan blades do not strike.
9. **WARNING!** Check voltage being supplied to the fan to see that it corresponds with the motor nameplate voltage; high or low voltage can seriously damage the motor. On multi-voltage motors check motor terminal connections to make sure motor is internally connected for voltage being supplied. Motor wiring diagram is located on the side of the motor. Extra care should be taken when wiring two speed motors since improper connections will damage motor and void motor warranty.
10. Operate under power and compare propeller rotation with directional arrow on fan. In the case of three phase motors, the direction can be changed by interchanging any two of the three motor leads. In the case of single phase motors, the reversing instructions will appear on the wiring diagram in the motor wiring compartment.

MAINTENANCE

1. **REGULAR MAINTENANCE:** Determined by the condition of the air passing through the fan, regularly scheduled inspection of all fan parts establishes a good maintenance routine. When the air is clean, maintenance can be as infrequent as once a year. When air is contaminated with grease vapors from cooking operations, maintenance may be required as often as once a week. Regular maintenance should include inspection and cleaning of all fan parts.
2. **MOTORS:** Motor bearings are prelubricated. Consult information printed on motor for lubrication instructions. If motor required replacement, a comparable one to the original with the same service factor and enclosure must be used.



HORIZONTAL SECTION



XC-445W

XF-445W

westvent®

ALUMINUM LOUVER XC-445W XF-445W

STANDARD SPECIFICATIONS

- CONST.** - 6063-T5 EXTRUDED ALUMINUM, WELDED ASSEMBLY
- FRAME** - 4" X 1" X .081" (101.6MM X 25.4MM X 2.1MM) CHANNEL UP TO 48" (1219.2MM), 4" X 1.5" X .081" (101.2MM X 38.1MM X 2.1MM) OVER 48" (1219.2MM), BUTT CORNERS
- BLADES** - 4" X .081" (101.6MM X 2.1MM) SET AT 45° 4.5" (114.3MM) SPACING, SUPPORTS AT 48" (1219.2) W CENTERS
- FINISH** - MILL ALUMINUM
- SCREEN** - .5" X .5" (12.7MM X 12.7MM) X 18 GAUGE GALVANIZED, SCREW FASTENED
- SIZE** - MINIMUM 12 "W" X 12 "H" (304.8MM X 304.8MM)
MAXIMUM SECTION WIDTH 144" (3657.6MM)
MAXIMUM SECTION HEIGHT 144" (3657.6MM)
MAXIMUM SECTION SIZE 72 SQ. FT.

OPTIONS

- CONST.** - HEAVIER GAUGE, CONTINUOUS BLADES, ROUND, TRIANGULAR SHAPES, ETC.
- FRAME** - XF-FLANGE FRAME 2" X .125" (50.8MM X 3.2MM), MITRED CORNERS
- SCREEN** - AS PER REQUEST
- FINISH** - BAKED ENAMEL, ANODIZED & OTHERS

TECHNICAL NOTES

- MAX. REC. INTAKE VEL.** - 744 FPM THROUGH FREE AREA
- SHIPPING WEIGHT** - APPROX. 5 LBS./SQ. FT.

LOUVERS ARE MANUFACTURED .5" (12.7MM) SMALLER THAN ORDERED SIZE UNLESS EXACT DIMENSIONS ARE STATED.

* FOR MORE INFORMATION, CONTACT OUR FACTORY *

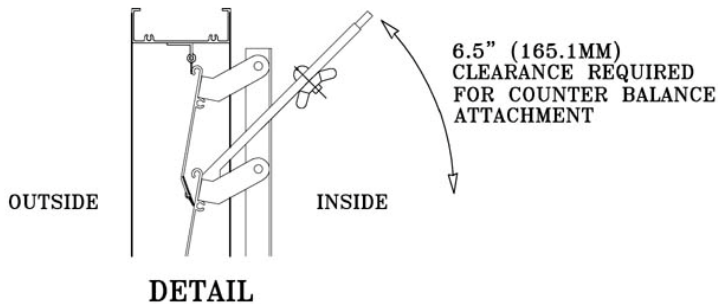
NOTES

1 - 24" X 24" XF445W fixed exterior louver with birdscreen mounted in common 20ga galv sleeve c/w Interior BDX-3C3-LB Barometric Intake Damper c/w 2" filter,

DATE: July 30/12
PROJECT: MURPHY OIL W28406/P12495
ENGINEER:
CUSTOMER: WARWICK
DISTRIBUTOR: ENER-TECH INDUSTRIES

APPROVAL

XC-445W



BACKDRAFT DAMPER BDX-3C3-LB

STANDARD SPECIFICATIONS

- CONST.** - EXTRUDED ALUMINUM, WELDED FRAME
FRAME - 3" X 1" (76.2MM X 25.4MM) EXTRUDED ALUMINUM
BLADES - 3.5" X .06" (88.9MM X 1.5MM) TAPERED EXTRUDED ALUMINUM, 3.06" (77.7MM) BLADE SPACING
SEALS - DUAL DUROMETER VINYL BLADE SEAL, -40° F. TO +200° F.
SHAFTS - .19" X 1.25" (4.8MM X 31.8MM) PLATED STEEL
BEARINGS - .19" (4.8MM) NYLON BUSHINGS
LINKAGE - INSIDE AIRSTREAM, ON ENTERING SIDE
C.B. WTS. - AS REQUIRED
FINISH - MILL ALUMINUM
SIZE - MINIMUM 12" W X 12" H (304.8MM X 304.8MM)
 - MAXIMUM 32" W X 60" H (812.8MM X 1524MM)

OPTIONS

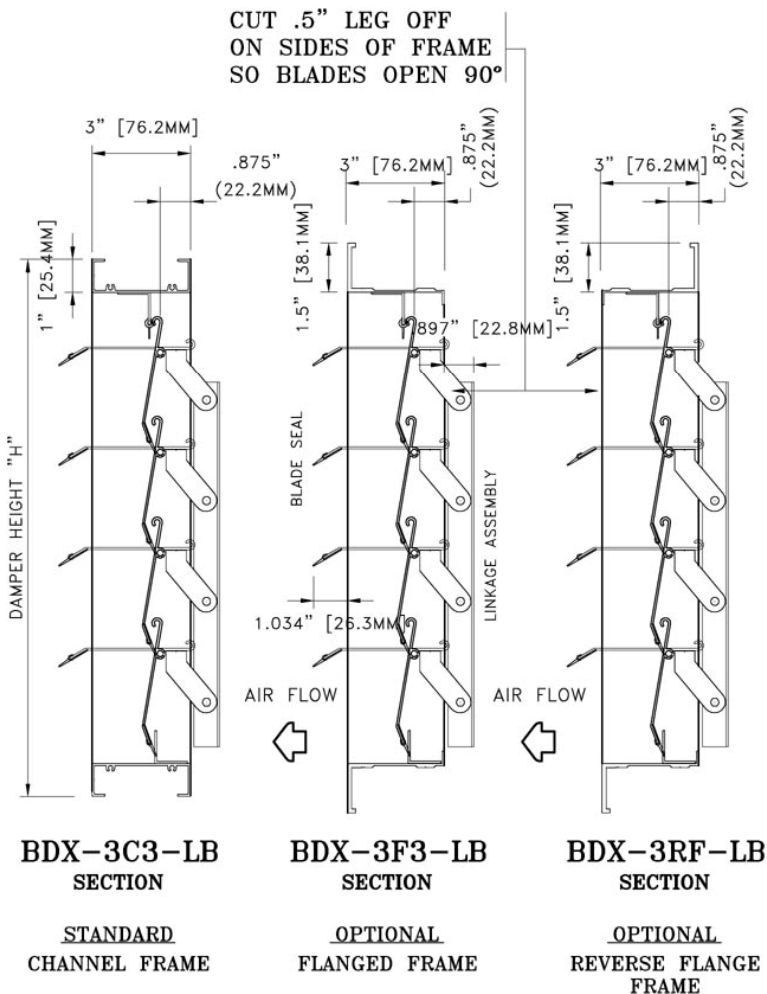
- FRAME** - FLANGE, REVERSE FLANGE 3" X 1.5" 76.2MM X 38.1MM)
SCREEN - AS REQUIRED, BDX-3C3-LB, SCREEN IS ON FACE. WHEN SCREEN IS USED BLADES ONLY OPEN TO APPROX. 45°.
FINISH - ANODIZED, PRIME COAT, BAKED ENAMEL

TECHNICAL NOTES

- CAUTION** - DO NOT USE FOR INTAKE UNLESS WITH OUTSIDE WEATHER COWL
BDX-3C3-LB - RECOMMENDED ON LARGER DAMPERS BECAUSE OF LINKAGE WEIGHT
MAX. RECOMMENDED VEL. - 3000 FPM
MAXIMUM TEMPERATURE - 200° F.
MAXIMUM WIDTH - 5.5" (139.7MM) WHEN BLADE IS IN FULL OPEN POSITION PLUS CLEARANCE FOR COUNTER BALANCE WEIGHTS SEE ABOVE
SHIPPING WEIGHT - APPROX. 5 LB/SQ. FT.

DAMPERS 3F3 & 3RF ARE MANUFACTURED TO .5 (12.7MM) SMALLER THAN OPENING SIZE UNLESS EXACT DIMENSIONS ARE STATED AND 3C3 IS .25" (6.4MM) UNDERSIZED.

* FOR MORE INFORMATION, CONTACT OUR FACTORY *



BDX-3C3-LB
SECTION

STANDARD
CHANNEL FRAME

BDX-3F3-LB
SECTION

OPTIONAL
FLANGED FRAME

BDX-3RF-LB
SECTION

OPTIONAL
REVERSE FLANGE FRAME

NOTE: PLEASE SPECIFY WHETHER YOU WANT - CHANNEL FLANGE, OR REVERSE FLANGE AND WALL MOUNT OR CEILING MOUNT.

NOTES

1 - 24" X 24" Interior BDX-3C3-LB Barometric Intake Damper c/w 2" filter, mounted in common 20ga galv sleeve c/w XF445W fixed exterior louver with birdscreen

DATE: July 30/12
 PROJECT: Murphy Oil W28406/P12495
 ENGINEER:
 CUSTOMER: WARWICK
 DISTRIBUTOR: Ener-Tech Industries

APPROVAL

BDX-3C3-LB



CONTROL DAMPERS

HANDLING, INSTALLATION & MAINTENANCE

HANDLING:

Because of the nature of control dampers, careful handling is the first step required for successful operation and performance. Dampers must be handled with care to prevent bending or twisting of frames, blades and linkage control parts.

INSTALLATION:

Dampers must be installed in all cases, squarely, without twisting or bending of frames, blades or linkages. The protrusion of screws, bolts, angles or other fastening devices must not interfere with damper operation. Dampers should be installed with blades in a horizontal position unless ordered otherwise. Dampers with blades required in a vertical position shall be c/w ball bearings or thrust washers.

STRUCTURAL SUPPORTS:

Structural supports are not supplied with any Westvent product but will be required to support any multi-section dampers. Structural supports to be supplied and installed by others.

COMMISSIONING:

The effects of improper installation and operation are the responsibility of the customer and the installer. If there are any problems with the dampers, please advise 'Westvent' before system startup for correction. Western Ventilation Products Ltd. cannot and will not accept responsibility for selection of product or damage that may be caused by faulty installation or operation of system.

MAINTENANCE:

The severity of operating conditions will normally indicate the frequency of service maintenance. Severe and abrupt changes in temperature, humidity and/or dust particles in the air stream will require a seasonal maintenance check. The recommended minimum frequency for maintenance checks is once every three months, an industry standard.

A: LINKAGE

Clean and lubricate with a light lubricating oil. Concealed channel linkage may require complete removal of damper.

B: BLADE TIP SEALS

Check for damage and replace if necessary. No need to remove damper to service.

C: BLADE END (JAMB) SEALS

Clean and lubricate with a light lubricating oil. To replace the side seals, remove the bolts holding the pivot shaft pins to the blades, and install new seals if required.

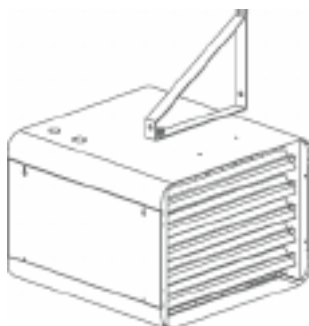
IF YOU HAVE ANY FURTHER QUESTIONS PLEASE CONTACT "WESTVENT" AT PH (403) 250 3348
FX (403) 250 7786

DATE OF ISSUE: OCT 11/2007

SERIES OAS

SUSPENDED UNIT HEATER

COMMERCIAL/INDUSTRIAL FORCED-AIR HEATER



Features

Colour	Almond.
Finish	Epoxy/polyester powder paint.
Voltage	208, 240, 277*, 347, 480* or 600 Volts, 1 or 3-phase units. Other voltages available upon request. Some units may be field converted from 3 to 1-phase.
Construction	18 and 20-gauge steel. Adjustable louvers to direct air flow.
Fan	High-limit temperature control with automatic reset. Motor mounted in cold compartment. Thermally-protected motor. Totally enclosed and factory-lubricated ball bearing motor (except for 15 to 25 kW at 208/240-volt). 58 dBA fan (2-10 kW), 67 dBA fan (15-30 kW) and 77 dBA fan (40-60 kW). Fan over-ride purges heater of residual heat.
Heating element	Durable tubular heating elements; stainless steel (2-10 kW); finned (15-60 kW). Concentric disposition of heating elements.
Control	All models have a factory-installed contactor. 240/208-Volt control circuit standard (with transformer if necessary). Also available with 24-Volt relay, with or without transformer. Optional built-in thermostat. 120-Volt control circuit available.
Installation	Horizontal mounting from wall or from ceiling using 1 of 2 supplied brackets which allow 360° rotation**. Vertical mounting using 4 threaded rods 1/2" X 13 UNC (not included). Diffuser cones available. Large and easily accessible control compartment. Maximum recommended height (horizontal): 2-10 kW: 2.4 m (8 ft); 15-30 kW: 3.0 m (10 ft); 40-60 kW: 4.5 m (15 ft). Protective screen allows lower mounting height (except 40-60 kW). Minimum height of 2.4 m (8 ft) for 40-60 kW heaters. 30°C (85°F) maximum operating temperature.
Warranty	1-year warranty against defects.

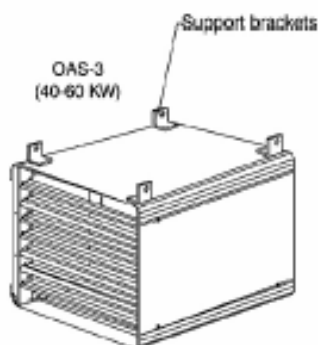
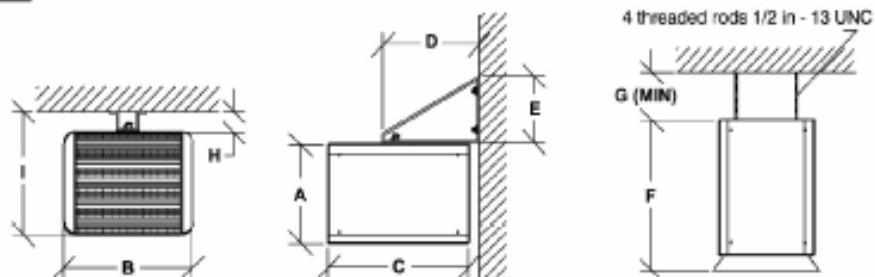
Applications Commercial hall, milk house, stair opening.

* 277- and 480-Volt models available upon request.

** Horizontal mounting only for 40, 50 and 60 kW secured by 4 hooks (ceiling only).

Ouellet highly recommend using a wall thermostat for a greater comfort.

OAS SERIES



	2-10 kW		15-30 kW		40-60 kW	
	mm	in	mm	in	mm	in
A	305.0	12.0	444.0	17.5	585.0	23.0
B	420.0	16.5	560.0	22.0	641.0	25.2
C	432.0	17.0	572.0	22.5	870.0	34.3
D	343.0	13.5	470.0	18.5	-	-
E	285.0	11.2	393.0	15.5	-	-
F	490.0	19.3	630.0	24.8	930.0	36.6
G	305.0	12.0	305.0	12.0	305.0	12.0
H	127.0	5.0	152.0	6.0	305.0	12.0
I	433.0	17.0	572.0	22.5	900.0	35.0
Weight	kg	lbs	kg	lbs	kg	lbs
	20.0	45.0	39.0	85.0	68.0	150.0

Type	Qty	Model and description Other informations	Volts	Phase	Watts	Length mm / in	Informations Color/Installation c/w built in thermostat
	1	OAS15034-T	480/3/60	3	15000	22.5"	

Specifications may change without prior notice.

Project : Murphy Oil W28406/P12495
Engineer :
Contractor : Warwick
Distributor : Ener-Tech Industries
Date: July 30/12

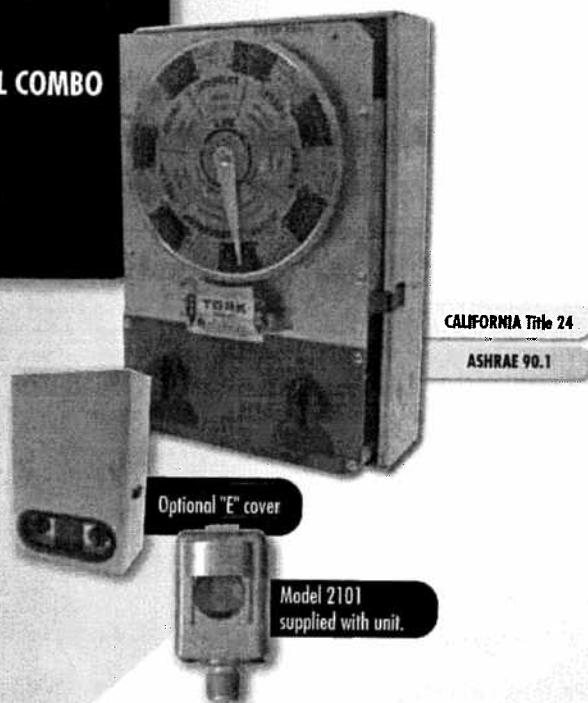
Shop Drawings
Approval
Information

T900 SERIES

PHOTOELECTRIC & 7 DAY CONTROL COMBO
DIFFERENT SCHEDULES EACH DAY
RESERVE POWER STANDARD
2 & 3 CIRCUIT LIGHTING
CONTROL CENTERS

APPLICATIONS

- Parking lot lighting
- HVAC
- Display lighting
- Security lighting
- Lighted signage
- Storefront lighting



FEATURES

SCHEDULING:

CIRCUIT 1: ON automatically at dusk, OFF at individual preset times each day, including skipping days when desired. Unit can be set to turn ON before dawn for early morning lighting.

CIRCUIT 2: ON at dusk, OFF at dawn automatically, daily.

CIRCUIT 3: Individual daily ON and OFF settings at desired times, including skipping any desired day or days. Minimum ON is setting 1 hour with a minimum OFF setting of 2 hours. Minimum 8 hours between 2 OFF settings. 7 day calendar dial will accommodate up to 2 pairs of ON-OFF trippers per day — 7 pairs are supplied.

SKIP-A-DAY: Omit operations on any day.

MANUAL BY-PASS SWITCHES: Single pole, 20 Amps — one per circuit. Factory pre-wired to terminal strip. ON/OFF/AUTO positions for each circuit is independent — will not disturb automatic settings.

RESERVE POWER: Standard feature on all models keep dial on time up to 24 hours during power outage.

NOTE: All models are designed to control a contactor circuit and are not recommended for direct switching of most lighting loads.

ORDERING INFO

CATALOG NO.	UPC CODE	INPUT SUPPLY (VAC) 60Hz	OUTPUT CONTACTS	ENCLOSURE TYPE
T920L	41033	120	2 SPDT	Metal Indoor NEMA 1
T920L-E	41034	120	2 SPDT	Metal Indoor NEMA 1 with switch access
T920L-O	41035	120	2 SPDT	Metal Indoor/outdoor NEMA 3
T930L	41055	120	3 SPDT	Metal Indoor NEMA 1
T930L-E	41056	120	3 SPDT	Metal Indoor NEMA 1 with switch access
T930L-O	41057	120	3 SPDT	Metal Indoor/outdoor NEMA 3
Replacement Trippers	#P69 for 7 pairs of ON/OFF trippers.			
Replacement Motor	#36 (120V)			
Replacement Bypass Switch	#66061			

ELECTROMECHANICAL
CONTROLS

SPECIFICATIONS

INPUT VOLTAGE: 120 or 208-277VAC, 60 Hz, varies by model.

TIMING ACCURACY: Line frequency.

TERMINAL RANGE: #8 - #14AWG.

OPERATING TEMPERATURE:
-40° to 165°F (-40° to +74°C).

POWER CONSUMPTION: 5 watts maximum.

ENCLOSURE: Indoor NEMA 1 Metal with lockable hasp. Other enclosures include cover for access to by-pass switches with suffix "E" or Indoor/Outdoor NEMA 3 metal with suffix "O" (see page 153 for enclosure dimensions).

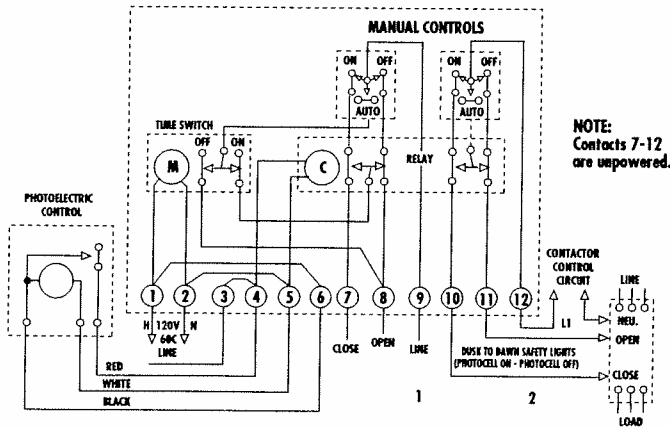
CONTACT RATINGS

TYPE	VOLTAGE	CONTACT RATING
General Purpose	120/277VAC	20A
Motor	120VAC 240VAC	1HP 2HP

WIRING DIAGRAMS

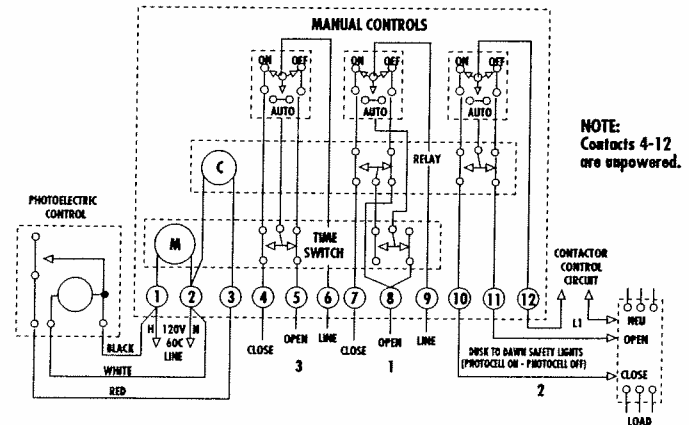
T920L

ONLY CIRCUITS 1 AND 2 ARE INCLUDED IN T920L



T930L

ALL 3 CIRCUITS ARE INCLUDED IN T930L



SPECIFICATION WRITER'S GUIDE

T900 SERIES — Furnish and install, where shown, a TORK Photo/Time Control of the 7 Day Calendar dial type, which shall be suitable to operate mechanically-held contactor(s). Photo/Time Control shall be pre-wired to a central terminal block which provides connecting terminals for Photocontrol and independent contactor control circuit(s). Time switch shall function to prevent energization of lighting for preset periods each day. Time switch dial shall permit different ON/OFF settings for each day of the week, with provision for omitting selected days. Control shall include pre-wired manual switching for each contactor circuit specified. Enclosure shall be NEMA 1 surface. Photocontrol to be remotely installed in appropriate outside location. It shall be fully temperature compensated and shall provide for time delay of at least 15 seconds to prevent false switching. Photocontrol shall operate control center to energize whenever natural lighting falls below 1.5 - 5.5 foot candles turn on. Spring driven reserve timing motor shall be provided sufficient to operate time switch controls at least 24 hours after power failure. On restoration of power, time switch shall transfer to synchronous motor drive and automatically rewind reserve power unit. **FOR DUSK-TO-DAWN LIGHTS:** Control shall provide additional contactor circuit to above specifications except that it shall be responsive to Photocontrol only. Tork Model T-920L or equal. **FOR PRESET ON/PRESET OFF:** Control shall provide for additional contactor circuit to above specification except that it shall be responsive to time switch only. Tork Model T-930L.

Straight Blade Devices

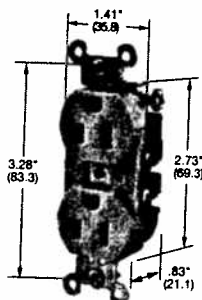
15 and 20 Ampere, 125 Volts

2 Pole, 3 Wire Grounding

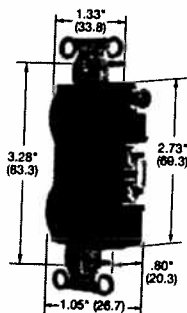
Hubbell-Pro™ Series Receptacles



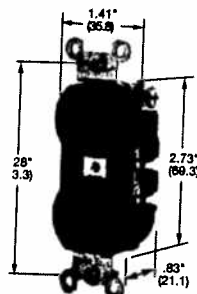
Fed. Spec.



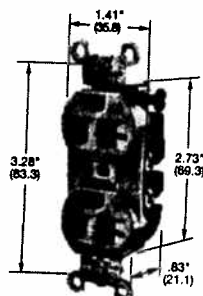
5252AI



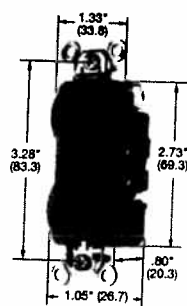
IG5352



5262B



5362IWR



CR5252IG

Receptacles

Hubbell-Pro™ Heavy Duty, Specification Grade, Duplex, Back and Side Wired



15A 125V
NEMA 5-15R
UL CSA
0.5 HP



20A 125V
NEMA 5-20R
UL CSA
1 HP

Description	Color	Catalog Number	
Smooth nylon face.	Almond	5252AAL	5352AAL
	Black	5252ABLK	5352ABLK
	Brown	5252AB	5352AB
	Gray	5252AG	5352AG
	Ivory	5252AI	5352AI
	Light Almond	5252ALA	5352ALA
	Office White	5252AOW	5352AOW
	Red	5252AR	5352AR
	White	5252AW	5352AW
Isolated ground ⁽¹⁾ , smooth face.	Almond	IG5252AL	IG5352AL
	Gray	IG5252GY	IG5352GY
	Ivory	IG5252I	IG5352I
	Light Almond	IG5252LA	IG5352LA
	Orange	IG5252	IG5352
	White	IG5252W	IG5352W
Finder groove nylon face.	Almond	5262AL	5362AL
	Black	5262BLK	5362BLK
	Blue	-	5362BL
	Brown	5262B	5362B
	Gray	5262G	5362G
	Ivory	5262I	5362I
	Light Almond	5262LA	5362LA
	Office White	5262OW	5362OW
	Red	5262R	5362R
	White	5262W	5362W
Weather-Resistant, finder groove nylon face.	Black	5262BKWR	5362BKWR
	Brown	5262WR	5362WR
	Gray	5262GYWR	5362GYWR
	Ivory	5262IWR	5362IWR
	White	5262WWR	5362WWR
Isolated ground ⁽¹⁾ , finder groove face.	Black	CR5252IGBK	CR5352IGBK
	Blue	-	CR5352IGBL
	Gray	CR5252IGGY	CR5352IGGY
	Ivory	CR5252IGI	CR5352IGI
	Orange	CR5252IG	CR5352IG
	Office White	CR5252IGOW	CR5352IGOW
	White	CR5252IGW	CR5352IGW

Note: (1) See Section J for complete line of isolated ground devices.
See page A-46 for accessories.
See page A-55 for technical information.
Horsepower ratings listed above are AC only.
See Section K for wallplates.



Single Phase NEMA Manual Starting Switches

Product Overview/Product Selection

Bulletin 600



Type 1 General Purpose Enclosure with Neon Pilot Light

Bulletin 600

- Starting and overload protection of small 1Ø AC/DC motors used on the following:
unit heaters
stokers
refrigeration compressors
fans
pumps

Bulletin 600 manual switches consist of a snap switch combined with a thermal overload device operating on the solder-ratchet principle. The switch is designed to prevent being held closed under a sustained motor overload. To reset the overload mechanism, the switch lever is moved to the OFF position. The motor can be restarted by pushing the switch lever to the ON position. Applications include compressors, fans and pumps.

- Hazardous Location:
UL Listed (File No. E10314)
CSA (LR11924)

Table of Contents

Accessories	1-180
Modifications	1-180
Approximate Dimensions	1-180
Standards Compliance and Certifications	
UL Listed — Enclosed Products (File No. E14841; Guide No. NLRV)	
UL — Open Style Products (File No. E14841; Guide No. NLRV2)	
CSA Certified LR1234	
American Bureau of Shipping CE Marked (Per 60947)	

Your order must include: 1) Cat. No. of the switch, 2) Cat. No. of the heater element(s), and 3) if required, Cat. No. of any accessories.

Ratings

Single Pole — 1 HP 115...230V AC, 1 HP 277V AC, Open Type without Enclosure or Type 1 General Purpose Enclosure
Two Pole — 1 HP 115...230V AC, 1 HP 277V AC, Open Type without Enclosure or Type 1 General Purpose Enclosure, 3/4 HP 115...230V DC

Selector Switch — 1 HP 115...230V AC, 1 HP 277V AC, Open Type without Enclosure or Type 1 General Purpose Enclosure
Heater Element — See page 1-151 for heater element selection table.

Description	Open Type Without Enclosure Includes Legend Plate Cat. No.	Type 1 General Purpose Enclosure Surface Mounting Cat. No.	Type 1 General Purpose Enclosure Flush Mounting Includes Flush Plate but not Switch Box Stainless Steel Flush Plate Cat. No.	Type 4 Watertight Enclosure Cat. No.	Type 7 & 9 Enclosure Class I, Groups C & D Class II, Groups E, F & G - Divisions 1 & 2 - Hazardous Locations Cat. No.
Switch Only					
Toggle Type — 1-Pole	600-TOX4	600-TAX4	600-TQX4	—	—
— 2-Pole	600-TOX5	600-TAX5	600-TQX5	600-TCX5	600-TEX5
Key Type — 2-Pole	600-TOX49	600-TAX49	600-TQX49	—	—
Lever Type — 1-Pole	600-TOX149	600-TAX149	—	—	—
Switch with Neon Pilot Light (115 or 230V)					
Toggle Type — 1-Pole	600-TOX216	600-TAX216	600-TQX216	—	—
— 2-Pole	600-TOX109	600-TAX109	600-TQX109	—	—
Key Type — 2-Pole	600-TOX110	600-TAX110	600-TQX110	—	—
Switch with Incandescent Pilot Light					
Toggle Type — 2-Pole 115V	—	—	—	600-TCX7	600-TEX7
— 2-Pole 230V	—	—	—	600-TCA7	600-TEA7
Switch and "Hand-Off-Auto" Selector Switch (for use on AC only)					
Toggle Type — 2-Pole	—	600-TAX9	600-TQX9	600-TCX9	600-TEX9
Switch with Neon Pilot Light and "Hand-Off-Auto" Selector Switch (115 or 230V, AC only)					
Toggle Type — 2-Pole	—	600-TAX142	600-TQX142	—	—
Key Type — 2-Pole	—	600-TAX145	—	—	—
Two Switch Units in One Enclosure					
Toggle Type — 2-Pole	—	600-TAX10	—	600-TCX10	600-TEX10
Two Switch Units in One Enclosure Neon Pilot Light on Both Units (115 or 230V)					
Toggle Type — 2-Pole	—	600-TAX144	600-TQX144	—	—
Two Speed Switch					
Toggle Type — 2-Pole	—	600-TAX298	—	—	—
Two Speed Switch with Neon Pilot Lights (115 or 230V)					
Toggle Type — 2-Pole	—	600-TAX293	600-TQX293	—	—
Separate Cover and Switch Assembly *					
Toggle Type — 2-Pole	—	—	—	—	600-N12
Selector Switch	—	—	—	—	600-N14
Hand-Off-Auto	—	—	—	—	—

* For use with Bulletin 800H, Type 7 and 9, Series C or later bases. See page 10-153 for Base Listings.

Allen-Bradley

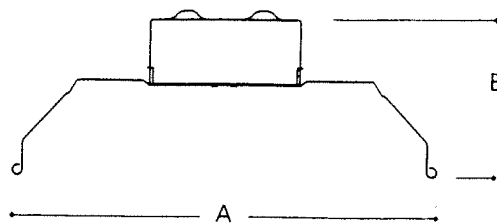
Visit our website: www.ab.com/catalogs

COOPER LIGHTING - METALUX®

DESCRIPTION

The IA Series is an energy efficient family of light duty industrials that features premium performance and durability. The series incorporates sturdy embossed reflectors that precisely direct and effectively control light. The IA Series can be installed using various mounting methods and numerous options and accessories are available. The series is available with both Apertured (IA) and Closed Top (IC) reflector combinations. The IA Series can be utilized in simple task and area lighting and industrial applications.

DIMENSIONS



IA, IC SERIES

4' or 8' Industrial
2 Lamps

INDUSTRIAL

- Equipped with energy Saving ballasts/complies with federal energy efficiency standards
- Die formed channels
- Heavy gauge apertured, (IA) or closed top, (IC) reflector
- Baked white enamel finish
- Pressure lock lampholders (RS), spring loaded lampholders (SL, HO)
- Wire guards available for special application
- SilverLining Reflector Finish available ⁽³⁾
- Apertured reflector (IA) standard with 8% uplight
- Also available in tandem 8' lengths
- UL/CUL Listed. Suitable for damp locations.

NOMINAL LENGTH

	A	B
4' 8"	12' 305mm	4' 5.8" 117mm
4' HO, 8' HO	12' 305mm	5' 3.8" 137mm

ORDERING INFORMATION

SAMPLE NUMBER: IA-232-120V-EB81-U

Tandem
Blank=4' Length
8T=8' Length

Silver Reflector
SS=Silver-Lining Reflector ⁽³⁾

Number of Lamps
2 Lamps
(Not included)

Series
IA=Apertured Reflector
IC=Closed Top Reflector
ICW=Extra Wide Channel Reference STW Series With Symmetric Reflector

Wattage (Length)
40=34/40W T12 (48")
32=32W T8 (48")
48=40W T12 (48") SL
48HO=60W T12 (48") HO
48HO=44W T8 (48") HO
96=60/75W T12 (72") SL
96=59W T8 (96") SL
96HO=95/110W T12 (96") HO
96HO=86W T8 (96") HO

Voltage ⁽¹⁾
120V=120 Volt
277V=277 Volt
347V=347 Volt
UNV=Universal Voltage 120-277⁽²⁾

Options
GL=Single Element Fuse
GM=Double Element Fuse
Emergency - for EM installed, see EM options table

Options
(See Options Section)

Packaging
U=48" x 12" x 12"
48

Ballast Type ⁽¹⁾

Blank=Standard Magnetic Ballast
LE3=T12 Magnetic Energy Saving
LEOC8=T8 Magnetic Energy Saving
EB8=T8 Electronic Instant Start.
Total Harmonic Distortion < 20%

No. of Ballast
1, 2 or 3

EB8_/PLUS= T8 Electronic Instant Start.
High Ballast Factor >1.13. Total Harmonic Distortion < 20%

No. of Ballast
1, 2 or 3

EB8_= T8 Electronic Program Rapid Start.
Total Harmonic Distortion < 10%

No. of Ballast
1, 2 or 3

TEB8_= T8 Electronic Instant Start. Total Harmonic Distortion < 10%

No. of Ballast
1, 2 or 3

EB2_=T12 Electronic Rapid Start.

No. of Ballast
1 or 2

⁽¹⁾For complete details on specifications, see manufacturer's ballast see pg 28⁽²⁾

NOTES ⁽¹⁾Products also available in non-US voltages and frequencies for international markets. ⁽²⁾Not available when specifying emergencies, voltage must be 277V.
⁽³⁾Silver lining not available on fixtures with HO.

For complete product data, reference the Fluorescent Specification Index. Specifications & dimensions subject to change without notice. Consult your Cooper Lighting Representative for availability and ordering information.



180, 3rd Avenue , L'Islet, Quebec, G0R 2C0, CANADA
Phone: (418) 247-3947/1 800 463-7043
Fax: (418) 247-7801/1 800 662-7801
www.ouellet.com

INSTRUCTIONS

For installation of the suspended unit heater
«OAS Series»

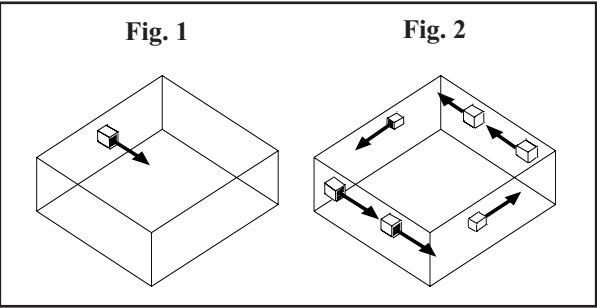
LOCATION OF HEATERS AND REMOTE
THERMOSTATS

1- For best results, do not exceed mounting heights as per table below :

Maximum recommended mounting height :

2 - 10 kW	2.4 m (8 ft)
15 - 30 kW	3.0 m (10 ft)
40 - 60 kW	4.5 m (15 ft)

- 2- Direct discharge air streams :
- Away from room occupants.
 - Away from columns, posts, machinery and partitions.
 - Parallel to outside walls.
 - Along the windward side of buildings exposed to prevailing winds.
- 3- Locate thermostats on interior partitions, walls or posts (insulate from cold steel posts). Install thermostats away from cold drafts, internal heat sources and from heater discharge.
- 4- Small rooms require only one unit heater. In large rooms, arrange multiple units to provide perimeter circulation as illustrated in fig. 1 and 2.



POWER SUPPLY CONNECTIONS

The power supply may be single or three phase as shown on the nameplate. The wiring diagram is on the inside of the terminal compartment cover. Wire heater in accordance with local and national codes.

TEST

- To test the unit heater, temporarily set thermostat to maximum temperature.
- Make sure that the fan rotates in the correct direction; airflow should be in the direction of the arrow such as indicated on the fig. 4.

WARNING

- Disconnect all power supplies before working on circuit.
- Do not heat air containing combustible materials.
- Mount heater out of reach.
- Install at least 61 cm (2 ft) from floor except 40 - 60 kW at least 2.4 m (8 ft) from floor.

Minimum clearance from walls and ceiling are :

2 - 10 kW	10 cm (4 in.)
15 - 30 kW	15 cm (6 in.)
40 - 60 kW	30 cm (12 in.)

OVERTEMPERATURE PROTECTION

The motor and the electric heating elements are protected against overtemperature by automatic reset thermal high-limits. Cycling of either high-limit is an indication of abnormal operation and should be corrected at once.

LUBRIFICATION OF MOTOR

The motor includes sealed lubrication-free bearings.

MAINTENANCE

Once a year, remove the dust accumulation inside the heater using a vacuum cleaner or compressed air. Cleaning should be done while the heater is disconnected from the supply circuit.

A qualified technician should perform any other servicing.

ATTENTION

Basic precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons.

- Read all instructions before using this heater.
- Disconnect all power supplies before working on circuit.
- Do not heat air containing combustible materials.
- Mount heater out of reach.
- Install at least 61 cm (2 ft) from floor except 40 - 60 kW at least 2.4 m (8 ft) from floor.
- Do not use outdoors.
- Do not insert or allow foreign objects to enter any ventilation or exhaust opening as this may cause an electric shock or fire, or damage the heater.
- Do not block air intakes or exhaust in any manner.
- Heater contains arcing and sparking parts. Do not use it in areas where gasoline, paint, or flammable liquids are used or stored.
- Use this heater only as described in this manual. Any other use not recommended by the manufacturer may cause fire, electric shock, or injury to persons.

WARRANTY

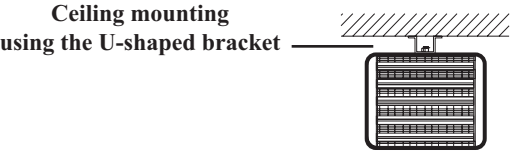
OUELLET CANADA INC. warrants the electric heating element of the OAS series for a one (1) year period ; and their component parts against defects in material and workmanship for a one (1) year period following the date of purchase, under normal use and service, when proof of purchase of such is provided to the manufacturer. The obligation of Ouellet Canada Inc., under the terms of this warranty, will be to supply a new unit and this omits the manufacturer to bear the installation costs or other secondary charges linked to replacing the unit or the component part(s).

KEEP THIS INSTRUCTION PAMPHLET
FOR THE USER INS09-200311-03

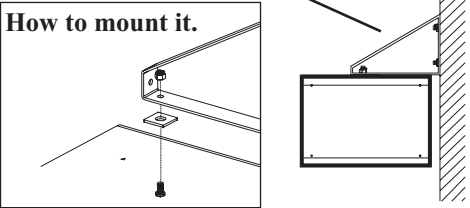


Fig. 3 - MOUNTING
OAS 2-30kW

Horizontal wall or ceiling mounting
using 1 of 2 supplied brackets
which allow 360° rotation.



Wall mounting
using the triangular bracket.



Vertical mounting
using 4 threaded rods
1/2 in - 13 UNC not included

Diffuser cone available

Fig. 4 - MOUNTING
OAS 40-60kW

4 hooks of suspension supplied
1/2 in -13 UNC threaded
rods not included

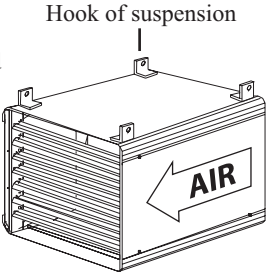
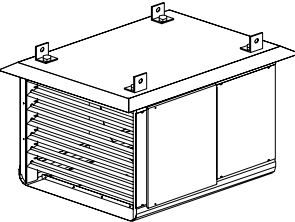


Fig. 5 - MOUNTING
OAS-MD 40-60kW
(Mining application)

4 hooks of suspension
supplied
1/2 in -13 UNC threaded
rods not included



Project# : BM0001117	Project Description: BU - 1100 Murphy Oil MCC Building	Murphy Reference #: AFE-54115177	ITP Reference #: BM000117-10.12.2012
----------------------	---	----------------------------------	--------------------------------------

Activity #	Activity Description	Inspection/Test Requirements	Reference Document	Inspection Requirements	Inspection/Acceptance Initial Date			Report Ref No.
					Ber-Mac	Warwick	Murphy	
I.0	Pre job Meeting	Purchase Order Review	P.O. Customer Requirements Specs	IP Ber-Mac IP Warwick IP Kent Steel IP/HP Murphy				
I.1	P.O.'s to Subcontractor	Purchase Order Review	P.O. Customer Requirements Spec	IP Ber-Mac IP Warwick IP Kent Steel A – Murphy				
I.2	Drawing Received Building	Visual dimensional checks &	Customer requirements National Building Code/ Alberta Building code	HP Ber-Mac HP Warwick A - Murphy				
I.3	Drawing Received Structural	Visual dimensional checks &	Customer requirements CSA W59/47.1	HP – Ber-Mac HP Warwick A - Murphy				
I.4	ITP Review Building	Verification of Compliance	P.O./Customer Requirements specs Warwick QA sheet	A – Murphy IP – Murphy HP – Ber-Mac HP Warwick				
I.5	ITP Review Structural	Verification of Compliance	P.O./Customer Requirements Specs Kent Steel ITP	A – Murphy IP – Murphy HP – Ber-Mac HP- Warwick HP – Kent Steel				

Project# : BM0001117		Project Description: BU - 1100 Murphy Oil MCC Building		Murphy Reference #: AFE-54115177		ITP Reference #: BM000117-10.12.2012	
Activity No.	Activity Description	Inspection/Test Requirements	Reference Document	Inspection Requirement(s)	Inspection/Acceptance Initial & Date		Report Reference No.:
					Ber-Mac QC	Murphy Rep	
2.0	Codes and Standards	<ul style="list-style-type: none"> Have applicable Codes and Standard been identified 	CEC 22.1, OHS Code Alberta	AR			
3.0	Grounding	<ul style="list-style-type: none"> All Grounding in accordance to CEC All Grounding installed in accordance with approved drawings and specifications. The use of ground wells and lids Size of grounding conductors Updated Red Line Drawings (As-builts) 	CEC 22.1 Approve drawings and specifications Customer specifications Manufacturer specifications FSM Section 18 FSM Section 20	IP-Ber-Mac IP- Murphy	1780-69-006- Rev 0		Grounding System Inspection Checklist FSM05008 Field As BUILTS FSM20001
4.0	Cable trays	<ul style="list-style-type: none"> Inspect for external or shipping damage before installation. Ensure hold-downs are properly installed. Expansion joints are properly installed and grounding rqrmts Grounding of tray as per approved drawings and spec Location for conflicts with other systems. All braces and supports are mechanically sound Update drawings with red lines (As-builts) 	CEC 22.1 Approve drawings and specifications Customer Specifications Manufacturer specifications Field Services Manual	IP-Ber-Mac IP- Murphy			Cable Tray Inspection Checklist FSM05007 Draw: 1780-69-006-1 Rev 0
5.0	Cables, Conduits, & Conductors	<ul style="list-style-type: none"> Continuity tests are completed as required Megger tests are completed on 480V or greater Ensure all cables and conduits are tagged in accordance with approved drawings and specifications Termination test (pull tug method) and record Complete point to point test 	CEC 22.1 Approve drawings and specifications Customer Specifications Manufacturer specifications FSM Section 11	IP-Ber-Mac IP- Murphy	Cable Schedules 1780-68-001-1-2-3 Rev 0		Control Wiring/Device Checkout Records FSM05002 Insulation Resistance & Continuity Test Report FSM11001 Megohm Meter Test Record FSM11002

Tags not 2x4ths -

68-001-1-2-3.

Project# : BM0001117		Project Description: BU - 1100 Murphy Oil MCC Building		Murphy Reference #: AFE-54115177		ITP Reference #: BM000117-10.12.2012	
Activity No.	Activity Description	Inspection/Test Requirements	Reference Document	Inspection Requirement(s)	Inspection/Acceptance Initial & Date		Report Reference No.:
					Ber-Mac QC	Murphy Rep	
6.0	Lighting Transformer	<ul style="list-style-type: none"> • Polarity and phase relationship test • Over current protection • Setting verification • Check all connections • Panel board circuit schedule filled out 	CEC 22.1 Approve drawings and specifications Customer Specifications Manufacturer specifications Field Services Manual	IP-Ber-Mac IP- Murphy			Lighting Transformer Installation Checklist FSM16003 <i>FSM 16004 ✓</i>
7.0	Lighting Panel Board	<ul style="list-style-type: none"> • Tagged accordingly to approved drawings • Covers and doors installed correctly • Grounding –internal and external as per Electrical Code • Check all connections • Panel board circuit schedule filled out 	CEC 22.1 Approve drawings and specifications Customer Specifications Manufacturer specifications Field Services Manual	IP – Ber-Mac IP- Murphy	<i>DM</i> <i>1780-68-</i> <i>005-1</i> <i>250.</i>		Lighting Panel Board Installation Checklist FSM16002
8.0	Battery & Battery Charger System	<ul style="list-style-type: none"> • Battery voltage test • Terminals and battery connectors checked • Battery and charger polarity checked 	CEC 22.1 Approve drawings and specifications Customer Specifications Manufacturer specifications Field Services Manual	IP-Ber-Mac IP- Murphy			Battery & Battery Charger System Checklist FSM16008
8.1	Uninterruptible Power System	<ul style="list-style-type: none"> • Check for shipping damage • All covers and doors • Grounding requirements • Sizing of main disconnect • Point to point • External connections 	CEC 22.1 Approve drawings and specifications Customer Specifications Manufacturer specifications Field Services Manual	IP-Ber-Mac IP- Murphy			Uninterruptible Power System Acceptance Checklist FSM16007

Project# : BM0001117		Project Description: BU - 1100 Murphy Oil MCC Building			Murphy Reference #: AFE-54115177		ITP Reference #: BM000117-10.12.2012	
Activity No.	Activity Description	Inspection/Test Requirements	Reference Document	Inspection Requirement(s)	Inspection/Acceptance Initial & Date		Report Reference No.:	
					Ber-Mac QC	Murphy Rep		
9.0	Motor Control Centres	<ul style="list-style-type: none"> Verify rating of all motor starter, fuses and circuit breakers in accordance with drawings Verify and/or torque anchorage, all bus connections, required area clearances and proper alignment Equipment checkout includes the inspection and testing of the operating mechanisms, contacts arc chutes, and auxiliary devices and adjustments as necessary Test phasing of busses visually, continuity check and resistance test Verify proper barrier and shutter installation and operation. Check for construction dust on phase barriers, cell walls and insulators 	CEC 22.1 Approve drawings and specifications Customer Specifications Manufacturer specifications Field Services Manual <i>1780-69-040-1</i> <i>Rev 0</i>	IP-Ber-Mac IP- Murphy			Motor Control Centre Acceptance Checklist FSM16014	
10.0	Motor Starters	<ul style="list-style-type: none"> Record and verify nameplate data, circuit breakers, fuses, overloads, contactors in accordance with approved drawings Verify and/or torque base attachments, equipment mounting hardware, and terminal lugs Check for shipping damage, missing parts, cracked or2 broken arc boxes All grounding requirements Verify phases for motor rotation Resistance test (Megger) on motor leads Point to point checks Check alignment of the contactor 	CEC 22.1 Approve drawings and specifications Customer Specifications Manufacturer specifications Field Services Manual <i>1780-69-040-1</i> <i>1780-69-041-1</i> <i>Rev 0</i>	IP-Ber-Mac IP- Murphy			Motor Starter Acceptance Checklist FSM16017 Torque Sheet FSM16022	
11.0	Assemble Turnover Package	<ul style="list-style-type: none"> Assemble all components of turnover package prior to shipping 	Customer specifications	HP - Ber-Mac IP/HP/DR- Murphy			Ship Loose Packing List FSM06001 Project Turnover Notice FSM17001 Punch List FSM18001 Signature & Initial Log FSM16020	

Project# : BM0001117		Project Description: BU - 1100		Murphy Reference #: AFE-54115177		ITP Reference #: BM000117-10.12.2012	
		Murphy Oil MCC Building					
Activity No.	Activity Description	Inspection/Test Requirements	Reference Document	Inspection Requirement(s)	Inspection/Acceptance Initial & Date		Report Reference No.:
					Ber-Mac Murphy Rep		
12.0	Package Loading	Review Package Loading	Customer Requirements	HP Ber-Mac HP/IP- Murphy			
13.0	Shipping Release	Release Package for Shipment	Customer Requirements	HP Ber-Mac HP- Murphy			
14.0	Packing Slip	Bill of Lading Manual	Customer Requirements	HP Ber-Mac IP/A- Murphy			
15.0	QA Data Package	Quality Documents	Customer Requirements	HP/DR- Murphy			

4

Project No.: BM-117

Project Location: Murphy Oil Cadotte Pilot CSS

Completed By: [Signature]

(Signature)

Owner Representative: [Signature]

(Signature)

Answer questions with a "✓". If answer is "No", provide comments below.

1. Conformance to specification and drawings?
2. Conductor is correct size and type?
3. Thermal connections checked. (No cold joint or burnout.)?
4. Thermal connection insulation checked?
5. Ground conductor routing per drawings/specifications?
6. Location, type and size of equipment taps per drawings?
7. Taps protected during construction?
8. Ground continuity checked?
9. Resistance readings recorded on proper Field Inspection Record?
10. All field revisions recorded on as-built drawings?
11. Compression connections checked?
12. Glyptol (or equivalent anti-corrosion coating) applied to connections?

Yes	No	Date & Initials
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>SO</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>

Comments and/or Deficiencies:

No thermal connections.

Project No.: BM-117

Project Location: Murphy Oil Cadotte Pilot CSS

Completed By: [Signature]

(Signature)

Owner Representative: [Signature]

(Signature)

Answer questions with a "✓". If answer is "No", provide comments below.

1. Conformance to specification and drawings?
2. Expansion joints properly installed?
3. All braces and supports adequate to handle weight of tray and cable?
4. Hold-downs properly installed?
5. Tray anchored only in location shown on drawings?
6. No sharp edges to cut cable?
7. No obstruction to pulling of cable?
8. All covers and partitions installed?
9. All firestops (if applicable) installed?
10. All bonding jumpers installed?
11. All tray grounded per drawings?
12. Checked for conflicts with aboveground piping?

Yes	No	Date & Initials
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>SO</u>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>SO</u>

Comments and/or Deficiencies:

No expansion joints for tray inside building.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

Project No.: BM-117		Panel/Bldg/Device Description: CPNL-100				
Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
CPNL100-C1			N/A			
BFY7005-A	YES	SO	YES	SO	YES	SO
BFY7005-B	YES	SO	YES	SO	YES	SO
BFS7005-A	YES	SO	YES	SO	YES	SO
BFS-7005-B	YES	SO	YES	SO	YES	SO
BFY4000-A	YES	SO	YES	SO	YES	SO
BFY4000-B	YES	SO	YES	SO	YES	SO
BFS4000-A	YES	SO	YES	SO	YES	SO
BFS-4000-B	YES	SO	YES	SO	YES	SO
BFY6000-A	YES	SO	YES	SO	YES	SO
BFY6000-B	YES	SO	YES	SO	YES	SO
BFS6000-A	YES	SO	YES	SO	YES	SO
BFS6000-B	YES	SO	YES	SO	YES	SO
BFY7000-A	YES	SO	YES	SO	YES	SO
BFY7000-B	YES	SO	YES	SO	YES	SO
BFS7000-A	YES	SO	YES	SO	YES	SO
BFS7000-B	YES	SO	YES	SO	YES	SO
BFY1100A-A	YES	SO	YES	SO	YES	SO
BFY1100A-B	YES	SO	YES	SO	YES	SO
BFY5030-A	YES	SO	YES	SO	YES	SO
BFY5030-B	YES	SO	YES	SO	YES	SO
BFS5030-A	YES	SO	YES	SO	YES	SO
BFS5030-B	YES	SO	YES	SO	YES	SO
SPARE-1	YES	SO	YES	SO	YES	SO
SPARE-2	YES	SO	YES	SO	YES	SO
SPARE-3	YES	SO	YES	SO	YES	SO
SPARE-4	YES	SO	YES	SO	YES	SO
SPARE-5	YES	SO	YES	SO	YES	SO
SPARE-6	YES	SO	YES	SO	YES	SO
SPARE-7	YES	SO	YES	SO	YES	SO
SPARE-8	YES					

Completed By:  (Signature)

Owner Representative: _____ (Signature)

Project No.: BM-117

Panel/Bldg/Device Description: CPNL-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
DP100-P2A			N/A			
DP100- 4H	yes		yes		yes	
DP100- 4N	yes		yes		yes	
DP100- 8H	yes		yes		yes	
DP100- 8N	yes		yes		yes	
DP100- 10H	yes		yes		yes	
DP100- 10N	yes		yes		yes	
DP100- 16H	yes		yes		yes	
DP100- 16N	yes		yes		yes	
DP100- 18H	yes		yes		yes	
DP100- 18N	yes		yes		yes	
DP100- 20H	yes		yes		yes	
DP100- 20N	yes		yes		yes	
DP100- 22H	yes		yes		yes	
DP100- 22N	yes		yes		yes	
DP100- 24H	yes		yes		yes	
DP100- 24N	yes		yes		yes	
DP100- 26H	yes		yes		yes	
DP100- 26N	yes		yes		yes	
DP100- 28H	yes		yes		yes	
DP100- 28N	yes		yes		yes	
DP100- 30H	yes		yes		yes	
DP100- 30N	yes		yes		yes	
DP100- 32H	yes		yes		yes	
DP100- 32N	yes		yes		yes	
DP100- 52H	yes		yes		yes	
DP100- 52N	yes		yes		yes	
DP100- 58H	yes		yes		yes	
DP100- 58N	yes		yes		yes	
DP100- 60H	yes		yes		yes	

DP100-60N

Completed By: Tristan Campbell
(Signature)

Owner Representative: _____
(Signature)

Project No.: BM-117		Panel/Bldg/Device Description: CPNL-100				
Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
DP100-P2A						
DP100- 4H						
DP100- 4N						
DP100- 8H						
DP100- 8N						
DP100- 10H						
DP100- 10N						
DP100- 16H						
DP100- 16N						
DP100- 18H						
DP100- 18N						
DP100- 20H						
DP100- 20N						
DP100- 22H						
DP100- 22N						
DP100- 24H						
DP100- 24N						
DP100- 26H						
DP100- 26N						
DP100- 28H						
DP100- 28N						
DP100- 30H						
DP100- 30N						
DP100- 32H						
DP100- 32N						
DP100- 52H						
DP100- 52N						
DP100- 58H						
DP100- 58N						
DP100- 60H						
DP100-60N						

Completed By: (Signature) Owner Representative: _____ (Signature)

Project No.: BM-117

Panel/Bldg/Device Description: CPNL-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
DP100-P2			N/A			
DP100-1H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-1N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-5H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-5N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-17H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-17N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-21H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-21N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-23H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-23N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-25H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-25N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-29H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-29N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-35H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-35N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-39H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-39N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-41H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-41N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-53H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-53N	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-55H	yes	[Signature]	yes	[Signature]	yes	[Signature]
DP100-55N	yes	[Signature]	yes	[Signature]	yes	[Signature]
SPARE-1	YES	[Signature]	YES	[Signature]	YES	[Signature]
SPARE-2	YES	[Signature]	YES	[Signature]	YES	[Signature]
SPARE-3	YES	[Signature]	YES	[Signature]	YES	[Signature]
SPARE-4	YES	[Signature]	YES	[Signature]	YES	[Signature]
SPARE-5	YES	[Signature]	YES	[Signature]	YES	[Signature]
SPARE-6	YES	[Signature]	YES	[Signature]	YES	[Signature]

Completed By: Tristan Campbell
(Signature)

Owner Representative: _____
(Signature)

[illegible]

Completed By:

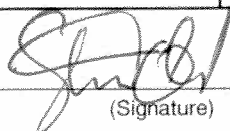
(Signature)

Owner Representative:

(Signature)

Project No.: BM-117		Panel/Bldg/Device Description: DP-100				
Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
DP100-P1	N/A		N/A			
DP100P1-LN1	YES	SO	YES	SO	YES	SO
DP100P1-LN2	YES	SO	YES	SO	YES	SO
DP100P1-LN3	YES	SO	YES	SO	YES	SO
DP100-P3	N/A		N/A			
DP100-3H	YES	SO	YES	SO	YES	SO
DP100-3N	YES	SO	YES	SO	YES	SO
DP100-P4	N/A		N/A			
DP100-11H	YES	SO	YES	SO	YES	SO
DP100-11N	YES	SO	YES	SO	YES	SO
DP100-P5	N/A		N/A			
DP100-7H	YES	SO	YES	SO	YES	SO
DP100-7N	YES	SO	YES	SO	YES	SO
DP100-P6	N/A		N/A			
DP100-9H	YES	SO	YES	SO	YES	SO
DP100-9N	YES	SO	YES	SO	YES	SO
DP100-P7	N/A		N/A			
DP100-13H	YES	SO	YES	SO	YES	SO
DP100-13N	YES	SO	YES	SO	YES	SO
DP100-P8	N/A		N/A			
DP100-15H	YES	SO	YES	SO	YES	SO
DP100-15N	YES	SO	YES	SO	YES	SO

Completed By: _____


(Signature)

Owner Representative: _____

(Signature)

[illegible]

Completed By:

(Signature)

Owner Representative:

(Signature)

Project No.: BM-117

Panel/Bldg/Device Description: DP-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
DP100-P2			N/A			
DP100-1H	YES	SD	✓	SD	✓	SD
DP100-1N	YES	SD	✓	SD	✓	SD
DP100-5H	YES	SD	✓	SD	✓	SD
DP100-5N	YES	SD	✓	SD	✓	SD
DP100-17H	YES	SD	✓	SD	✓	SD
DP100-17N	YES	SD	✓	SD	✓	SD
DP100-21H	YES	SD	✓	SD	✓	SD
DP100-21N	YES	SD	✓	SD	✓	SD
DP100-23H	YES	SD	✓	SD	✓	SD
DP100-23N	YES	SD	✓	SD	✓	SD
DP100-25H	YES	SD	✓	SD	✓	SD
DP100-25N	YES	SD	✓	SD	✓	SD
DP100-29H	YES	SD	✓	SD	✓	SD
DP100-29N	YES	SD	✓	SD	✓	SD
DP100-35H	YES	SD	✓	SD	✓	SD
DP100-35N	YES	SD	✓	SD	✓	SD
DP100-39H	YES	SD	✓	SD	✓	SD
DP100-39N	YES	SD	✓	SD	✓	SD
DP100-41H	YES	SD	✓	SD	✓	SD
DP100-41N	YES	SD	✓	SD	✓	SD
DP100-53H	YES	SD	✓	SD	✓	SD
DP100-53N	YES	SD	✓	SD	✓	SD
DP100-55H	YES	SD	✓	SD	✓	SD
DP100-55N	YES	SD	✓	SD	✓	SD
SPARE-1	YES	SD	✓	SD	✓	SD
SPARE-2	YES	SD	✓	SD	✓	SD
SPARE-3	YES	SD	✓	SD	✓	SD
SPARE-4	YES	SD	✓	SD	✓	SD
SPARE-5	YES	SD	✓	SD	✓	SD

SPARE-6

Completed By:


(Signature)

Owner Representative:

(Signature)

Project No.: BM-117		Panel/Bldg/Device Description: DP100					
Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check		
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)	
DP100-P2A <i>SEE PAGE 2</i>							
DP100- 4H							
DP100- 4N							
DP100- 8H							
DP100- 8N							
DP100- 10H							
DP100- 10N							
DP100- 16H							
DP100- 16N							
DP100- 18H							
DP100- 18N							
DP100- 20H							
DP100- 20N							
DP100- 22H							
DP100- 22N							
DP100- 24H							
DP100- 24N							
DP100- 26H							
DP100- 26N							
DP100- 28H							
DP100- 28N							
DP100- 30H							
DP100- 30N							
DP100- 32H							
DP100- 32N							
DP100- 52H							
DP100- 52N							
DP100- 58H							
DP100- 58N							
DP100- 60H							
DP100-60N							

Completed By: _____

(Signature)

Owner Representative: _____

(Signature)

Project No.: BM-117 Panel/Bldg/Device Description: MCC-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
MCC100-C1			N/A			
01012-A	yes		yes		yes	
01012-B	yes		yes		yes	
01013-A	yes		yes		yes	
01013-B	yes		yes		yes	
01020-A	yes		yes		yes	
01020-B	yes		yes		yes	
01019-A	yes		yes		yes	
01019-B	yes		yes		yes	
SPARE-1	yes		N/A		yes	
SPARE-2	yes		N/A		yes	
MCC100-C2			N/A			
✓ R-01304-13	yes		yes		yes	
✓ R-01304-14	yes		yes		yes	
✓ 01504-1	yes		yes		yes	
✓ 01504-2	yes		yes		yes	
01129-1			N/A			
01129-2			N/A			
R-01301-13			N/A			
R-01301-14			N/A			
✓ 01503-1	yes		yes		yes	
✓ 01503-2	yes		yes		yes	
01122-1			N/A			
01122-2			N/A			
✓ R-01254-13	yes		yes		yes	
✓ R-01254-14	yes		yes		yes	
✓ 01055-1	yes		yes		yes	
✓ 01055-2	yes		yes		yes	
01500-1	yes		yes		yes	
✓ 01500-2	yes		yes		yes	

Completed By: (Signature)

Owner Representative: _____ (Signature)

FIELD SERVICES

CABLE / CONTROL WIRING / DEVICE CHECKOUT RECORD

PG: 12 OF 24

Project No.: BM-117 Panel/Bldg/Device Description: MCC-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
MCC100-C2			N/A			
✓ R-01261-13	yes		yes		yes	
✓ R-01261-14	yes		yes		yes	
✓ 01067-1	yes		yes		yes	
✓ 01067-2	yes		yes		yes	
✓ 01501-1	yes		yes		yes	
✓ 01501-2	yes		yes		yes	
✓ R-01269-13	yes		yes		yes	
01080-1			N/A			
01080-2			N/A			
✓ 01502-1	yes		yes			
✓ 01502-2	yes		yes			
✓ R-01314-13	yes		yes		yes	
✓ R-01314-14	yes		yes		yes	
✓ 01511-1 1510-1	yes		yes		yes	
✓ 01511-2 1510-2	yes		yes		yes	
01162-1			N/A			
01162-2			N/A			
✓ 01127-1	yes		yes		yes	
✓ 01127-2	yes		yes		yes	
✓ 01079-1	yes		yes		yes	
✓ 01079-2	yes		yes		yes	
✓ 01156-1	yes		yes		yes	
✓ 01156-2	yes		yes		yes	
✓ R-1551-13	yes		yes		yes	
✓ R-1551-14	yes		yes		yes	
✓ R-1552-13	yes		yes		yes	
✓ R-1552-14	yes		yes		yes	
✓ R-1553-13	yes		yes		yes	
✓ R-1553-14	yes		yes		yes	
✓ R-1269-14	yes		yes		yes	

Completed By:

(Signature)

Owner Representative: _____

(Signature)

Project No.: BM-117 Panel/Bldg/Device Description: MCC-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
MCC100-C3			N/A			
R-01307-13	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01307-14	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01557-13	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01557-14	YES	[Signature]	YES	[Signature]	YES	[Signature]
01506-1	YES	[Signature]	YES	[Signature]	YES	[Signature]
01506-2	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01306-13	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01306-14	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01556-13	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01556-14	YES	[Signature]	YES	[Signature]	YES	[Signature]
01505-1	YES	[Signature]	YES	[Signature]	YES	[Signature]
01505-2	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01309-13	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01309-14	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01560-13	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01560-14	YES	[Signature]	YES	[Signature]	YES	[Signature]
01509-1	YES	[Signature]	YES	[Signature]	YES	[Signature]
01509-2	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01310-13	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01310-14	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01581-13			N/A			
R-01581-14			N/A			
01510-1	YES	[Signature]	YES	[Signature]	YES	[Signature]
01510-2	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01253-13	YES	[Signature]	YES	[Signature]	YES	[Signature]
R-01253-14	YES	[Signature]	YES	[Signature]	YES	[Signature]

Completed By: [Signature] (Signature) Owner Representative: _____ (Signature)

Project No.: BM-117

Panel/Bldg/Device Description: MCC-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
KM0010A-P1			N/A			
KM0010AP1-LN1	✓	SO	✓	SO	✓	SO
KM0010AP1-LN2	✓	SO	✓	SO	✓	SO
KM0010AP1-LN3	✓	SO	✓	SO	✓	SO
KM0010B-P1			N/A			
KM0010BP1-LN1	✓	SO	✓	SO	✓	SO
KM0010BP1-LN2	✓	SO	✓	SO	✓	SO
KM0010BP1-LN3	✓	SO	✓	SO	✓	SO
NGR100-P6	✓	SO	✓	SO	✓	SO
NGR100P6-N2	✓	SO	✓	SO	✓	SO
SPARE	✓	SO	✓	SO	✓	SO
UPS100-P1			N/A			
UPS100P1-L1	✓	SO	✓	SO	✓	SO
UPS100P1-L2	✓	SO	✓	SO	✓	SO
UPS100P1-L3	✓	SO	✓	SO	✓	SO
TNSUPS100-P1			N/A			
TNSUPS100P1-H1	✓	SO	✓	SO	✓	SO
TNSUPS100P1-H4	✓	SO	✓	SO	✓	SO
HVAC100-P1			N/A			
HVAC100P1-LN1	✓	SO	✓	SO	✓	SO
HVAC100P1-LN2	✓	SO	✓	SO	✓	SO
HVAC100P1-LN3	✓	SO	✓	SO	✓	SO
HVAC101-P1			N/A			
HVAC101-LN1	✓	SO	✓	SO	✓	SO
HVAC101-LN2	✓	SO	✓	SO	✓	SO
HVAC101-LN3	✓	SO	✓	SO	✓	SO

Completed By: _____

(Signature)

Owner Representative: _____

(Signature)

Project No.: BM-117 **Panel/Bldg/Device Description:** PNL-PLC-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
MCC100-C1 SEE PAGE 11						
01012-A						
01012-B						
01013-A						
01013-B						
01020-A						
01020-B						
01019-A						
01019-B						
SPARE-1						
SPARE-2						
MCC100-C2						
R-01304-13						
R-01304-14						
01504-1						
01504-2						
01129-1						
01129-2						
R-01301-13						
R-01301-14						
01503-1						
01503-2						
01122-1						
01122-2						
R-01254-13						
R-01254-14						
01055-1						
01055-2						
01500-1						
01500-2						

Completed By: _____

(Signature)

Owner Representative: _____

(Signature)

Project No.: BM-117 **Panel/Bldg/Device Description:** PNL-PLC-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
MCC100-C3 <i>SEE PAGE 13</i>			N/A			
R-01307-13						
R-01307-14						
R-01557-13						
R-01557-14						
01506-1						
01506-2						
R-01306-13						
R-01306-14						
R-01556-13						
R-01556-14						
01505-1						
01505-2						
R-01309-13						
R-01309-14						
R-01560-13						
R-01560-14						
01509-1						
01509-2						
R-01310-13						
R-01310-14						
R-01581-13						
R-01581-14						
01510-1						
01510-2						
R-01253-13						
R-01253-14						

Completed By: *[Signature]* (Signature) Owner Representative: _____ (Signature)

Project No.: BM-117

Panel/Bldg/Device Description: PNL-PLC-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
ASH1100A-C1			N/A			
01003-A	✓	SO	✓	SO	✓	SO
01003-B	✓	SO	✓	SO	✓	SO
ASH1100B-C1			N/A			
01004-A	✓	SO	✓	SO	✓	SO
01004-B	✓	SO	✓	SO	✓	SO
ASH1100C-C1			N/A			
01005-1	✓	SO	✓	SO	✓	SO
01005-2	✓	SO	✓	SO	✓	SO
AH1100-C1			N/A			
AH1100-A	✓	SO	✓	SO	✓	SO
AH1100-B	✓	SO	✓	SO	✓	SO
AL1100A-C1			N/A			
AL1100A-A	✓	SO	✓	SO	✓	SO
AL1100A-B	✓	SO	✓	SO	✓	SO
AL1100B-C1			N/A			
AL1100B-A	✓	SO	✓	SO	✓	SO
AL1100B-B	✓	SO	✓	SO	✓	SO
AL1100C-C1			N/A			
AL1100C-A	✓	SO	✓	SO	✓	SO
AL1100C-B	✓	SO	✓	SO	✓	SO

Completed By: _____

(Signature)

Owner Representative: _____

(Signature)

Completed By: _____ (Signature) Owner Representative: _____ (Signature)

Project No.: BM-117

Panel/Bldg/Device Description: PLN-PLC-100

Cable / Tag Number	Location Verified		Installation		Continuity / Loop Check	
	Completed?	Approved (Initial)	Completed?	Approved (Initial)	Completed?	Approved (Initial)
CPNL100-C1			N/A			
BFY7005-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY7005-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS7005-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS-7005-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY4000-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY4000-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS4000-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS-4000-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY6000-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY6000-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS6000-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS6000-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY7000-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY7000-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS7000-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS7000-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY1100A-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY1100A-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY5030-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFY5030-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS5030-A	yes	[Signature]	yes	[Signature]	yes	[Signature]
BFS5030-B	yes	[Signature]	yes	[Signature]	yes	[Signature]
SPARE-1	✓	[Signature]	✓	[Signature]	✓	[Signature]
SPARE-2	✓	[Signature]	✓	[Signature]	✓	[Signature]
SPARE-3	✓	[Signature]	✓	[Signature]	✓	[Signature]
SPARE-4	✓	[Signature]	✓	[Signature]	✓	[Signature]
SPARE-5	✓	[Signature]	✓	[Signature]	✓	[Signature]
SPARE-6	✓	[Signature]	✓	[Signature]	✓	[Signature]
SPARE-7	✓	[Signature]	✓	[Signature]	✓	[Signature]

SPARE-8

Completed By: _____

(Signature)

Owner Representative: _____

(Signature)

[illegible]

Completed By: _____ (Signature) Owner Representative: _____ (Signature)

Date: OCT 1 2012

Location: Bu 1100 MCC

Project #: BM-117

Technician Name: Stuart Old
(Print Name)

Project Name: Murphy Cadotte Pilot CSS

Customer Rep: _____

Cable, Equipment # or Description	Insulation Resistance (Megohms)						Cable Rated Volts	Equipment Temp (°C)	Tech's Initials
	Ø A to G	Ø B to G	Ø C to G	Ø A to B	Ø B to C	Ø C to A			
Teck. 10c14/05001-09-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	20	SO
Inst. 16PR16/c3-9326-1616-19							300V	20	SO
Teck. 3c6/05018-11-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	1kV	20	SO
Teck. 8c14/05001-07-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	20	SO
Teck. 4c14/05001-03-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	20	SO
Teck 30c14/05001-29-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	20	SO
Teck (Inst) 4PR16/c3-9326-1604-19							300V	20	SO
Teck 2c14/05001-01-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	20	SO
Teck 2c10/05001-01-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	20	SO
Teck 3c10/05003-02-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	20	SO
Teck 2c8/05018-02-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	1kV	20	SO
Teck 4c250/05020-04-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	1kV	20	SO
Teck 25c14/05001-24-010	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	20	SO
Teck 4c10	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	10	SO
Inst 1PR16							300V	10	SO
Teck 40c10	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	>11 MΩ	600V	10	SO

Ambient Conditions

☐ Wet

☒ Dry

LENGTH OF TEST: 3 SECONDS.

Test Equipment Used:

Make: Fluke

S/N: 17900292

Model: 1507

Last Cal.: 2012 Jul 19

CALIBRATION DUE DATE: 2013 Jul 19

(Power Control Wire and Cable)

Location: <u>Murphy Oil BU-1100 MCC</u>	Job No: <u>BM 117</u>	Test No: <u>1</u>
<u>Warwick Industries 4207 Glenmore</u>	Date: <u>Oct 16/12</u>	Test Voltage: <u>1000 VDC</u>
Ber-Mac Rep: <u>Stuart Old</u>	Customer Rep:	

Tests

Panel No Circuit No Feeder No	Wire Tagging	Voltage	Wire or Cable		Continuity Check (/)	Megohm	Supervisor Approval (sign)
			No	Size			
TNS UPS- 100 - P1	TNS UPS- 100 - P1	600V	2	10	✓	660 MΩ	<i>SO</i>
UPS100	UPS100- P1	600V	3	10	✓	660 MΩ	<i>SO</i>
TNS-100	TNS100- P1	1 kV	3	4	✓	660 MΩ	<i>SO</i>
DP-100	DP100- P1	1 kV	4	250	✓	660 MΩ	<i>SO</i>
HVAC100	HVAC100- P1	600V	3	10	✓	660 MΩ	<i>SO</i>
HVAC101	HVAC101- P1	600V	3	10	✓	660 MΩ	<i>SO</i>
HTR B 1101 A	HTRB1101A - P1	600V	4	10	✓	660 MΩ	<i>SO</i>
KM0010A	KM0010A- P1	1 kV	3	6	✓	660 MΩ	<i>SO</i>
KM0010B	KM0010B- P1	1 kV	3	6	✓	660 MΩ	<i>SO</i>



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Fax: (780) 409-9279

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Calibration Certificate

Customer: **ABB Ber-mAC**

Certificate: **567941-00-1**

UNIT IDENTIFICATION

Manufacturer: **Fluke**

Serial: **17900292**

Model: **1507**

ID: **NA**

Description: **Insulation Tester**

CALIBRATION DATE

Calibration Date: **2012-Jul-19**

Due Date: **2013-Jul-19**

CALIBRATION CONDITIONS

Temperature: **22.6 °C**

Humidity: **55 %**

Barometric Pressure: **N/A**

GENERAL INFORMATION

Procedure: **Fluke 1507: (1 year) CAL VER /5500,HVR,DMM**

Rev: **\$Revision: 1.1 \$**

As Received: **Within Specifications**

As Returned: **Within Specifications**

Data Type: **As Found-As Left** Adjusted: **No**

Remark:

STANDARDS USED

<u>ID</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Cal Date</u>	<u>Due Date</u>
0001	Fluke	5500A	2012-Jun-27	2013-Jun-27
0104	Fluke	867	2012-Feb-27	2013-Feb-27
0114	Fluke	80K-40	2011-Aug-11	2013-Aug-11

The calibration was performed using measurement standards traceable to the National Measurement Institute Standards (NMIS) part of the National Research Council of Canada (NRC) or the National Institute of Standards and Technology (NIST), or to accepted intrinsic standards or measurement, or is derived by ratio type self-calibration techniques. Measurement uncertainties given in this report are based on a coverage factor of $k=2$ corresponding to a confidence level of approximately 95%.

Calibrated by: **Barry Armer**

Approved by:

Certificate: **567941-00-1**

Asset: **17900292_1507**

Calibration Certificate

Data Type: **As Found-As Left**

Page 1 of 4

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Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Reading</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>Test Status</u>	<u>Exp Uncert</u>
Root Difference Square guardbanding method used							
UUT IDENTIFICATION							
Firmware Level: 1.02							
BATTERY TEST						Pass	
DISPLAY TEST							
Result of Operator Evaluation						Pass	
BACKLIGHT TEST						Pass	
KEYPAD TEST						Pass	
VOLTAGE ACCURACY TESTS							
600 V Range							
3.0 V		3.0	2.6	3.4	V	Pass	5.77e-002V
8.0 V		8.0	7.5	8.5	V	Pass	5.77e-002V
VAC Annunciator						Pass	
50.0 V		50.1	48.7	51.3	V	Pass	5.78e-002V
100.0 V		100.1	97.7	102.3	V	Pass	5.79e-002V
250.0 V		249.8	244.7	255.3	V	Pass	5.84e-002V
500.0 V		500.0	489.7	510.3	V	Pass	6.07e-002V
120.0 V @ 60 Hz		120.0	117.3	122.7	V	Pass	7.16e-002V
230.0 V @ 50 Hz		229.9	225.1	234.9	V	Pass	9.58e-002V
600.0 V @ 400 Hz		599.6	587.7	612.3	V	Pass	2.55e-001V
DISCHARGE CIRCUIT TEST						Pass	
INSULATION RESISTANCE ACCURACY TESTS							
10 GOhm Range							
2.10 GOhm	2.156	2.00	1.64	2.67	GΩ	Pass	3.06e+007 Ohm

Certificate: 567941-00-1

Asset: 17900292_1507

Calibration Certificate

Data Type: As Found-As Left

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Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Reading</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>Test Status</u>	<u>Exp Uncert</u>
200 MOhm Range							
1.0 MOhm		1.0	0.5	1.5	M Ω	Pass	5.77e+004 Ohm
20.0 MOhm		19.9	19.2	20.8	M Ω	Pass	7.02e+004 Ohm
100.0 MOhm		99.3	98.0	102.0	M Ω	Pass	5.03e+005 Ohm
20 MOhm Range							
0.50 MOhm		0.50	0.44	0.56	M Ω	Pass	5.80e+003 Ohm
0.20 MOhm		0.19	0.15	0.25	M Ω	Pass	5.78e+003 Ohm
0.10 MOhm		0.10	0.05	0.15	M Ω	Pass	5.77e+003 Ohm
0.06 MOhm		0.06	0.01	0.11	M Ω	Pass	5.77e+003 Ohm

EXTERNAL SENSE

Pass

SOURCE VOLTAGE ACCURACY TESTS

"R" Nominal

1000 V	1047.0	800.0	1200.0	V	Pass	1.00e+001 V
500 V	523.0	400.0	600.0	V	Pass	5.03e+000 V
500 V	519.0	400.0	600.0	V	Pass	5.03e+000 V
250 V	275.0	200.0	300.0	V	Pass	2.57e+000 V
250 V	268.0	200.0	300.0	V	Pass	2.57e+000 V
100 V	110.0	80.0	120.0	V	Pass	1.15e+000 V
100 V	106.0	80.0	120.0	V	Pass	1.15e+000 V
50 V	56.0	40.0	60.0	V	Pass	7.64e-001 V
50 V	53.0	40.0	60.0	V	Pass	7.64e-001 V

SOURCE VOLTAGE ACCURACY TESTS

Open Circuit

1000 V	1049.0	800.0	1200.0	V	Pass	1.00e+001 V
500 V	525.0	400.0	600.0	V	Pass	5.03e+000 V
250 V	275.0	200.0	300.0	V	Pass	2.57e+000 V
100 V	111.0	80.0	120.0	V	Pass	1.15e+000 V

Certificate: 567941-00-1

Asset: 17900292, 1507

Calibration Certificate

Data Type: As Found-As Left

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Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Reading</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>Test Status</u>	<u>Exp Uncert</u>
50 V		56.0	40.0	60.0	V	Pass	7.64e-001 V

I NOMINAL/LIMIT TESTS

1000V into 1Mohm Test	Pass
500V into 500kohm Test	Pass
250V into 200kohm Test	Pass
100V into 100kohm Test	Pass
50V into 60kohm Test	Pass

EARTH RESISTANCE ACCURACY TESTS

2000 Ohm Range						
810.0 Ohm	818.0	797.4	822.6	Ω	Pass	1.07e-001 Ohm
990.0 Ohm	992.0	974.8	1005.2	Ω	Pass	1.16e-001 Ohm
20 kOhm Range						
18.00 kOhm	18.05	17.70	18.30	k Ω	Pass	5.95e+000 Ohm

2 Ohm Output Current Test	Pass
---------------------------	------

OPEN CIRCUIT VOLTAGE TEST

Output Voltage Test	Pass
---------------------	------

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Calibration Certificate

Customer: *ABB Ber-mAC*

Certificate: 567604-00-1

UNIT IDENTIFICATION

Manufacturer: **Fluke**

Serial: **99470047**

Model: **1577**

ID: **na**

Description: **Insulation Multimeter**

CALIBRATION DATE

Calibration Date: 2012-May-22

Due Date: 2013-May-22

CALIBRATION CONDITIONS

Temperature: **22.1 °C**

Humidity: **33 %**

Barometric Pressure: **N/A**

GENERAL INFORMATION

Procedure: **Fluke 1577: (1 year) CAL VER /5520,DMM** Rev: **1.3**

As Received: **Within Specifications**

As Returned: **Within Specifications**

Data Type: **As Found-As Left** Adjusted: **No**

Remark:

STANDARDS USED

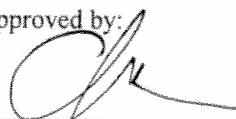
<u>ID</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Cal Date</u>	<u>Due Date</u>
0092	Fluke	5520A	2011-Oct-27	2012-Nov-27
0104	Fluke	867	2012-Feb-27	2013-Feb-27
0113	N-Tech	HVR 2000	2012-May-15	2013-Jan-15
0114	Fluke	80K-40	2011-Aug-11	2013-Aug-11

The calibration was performed using measurement standards traceable to the National Measurement Institute Standards (NMIS) part of the National Research Council of Canada (NRC) or the National Institute of Standards and Technology (NIST), or to accepted intrinsic standards or measurement, or is derived by ratio type self-calibration techniques. Measurement uncertainties given in this report are based on a coverage factor of $k=2$ corresponding to a confidence level of approximately 95%.

Calibrated by: Andrew Atton



Approved by:



Certificate: 567604-00-1

Calibration Certificate

Asset: 99470047-1577

Data Type: As Found-As Left

Page 1 of 3



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Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Reading</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Units</u>	<u>Test Status</u>	<u>Exp Uncert</u>
AC VOLTAGE TESTS							
600mV Range							
30.0 mV @ 60 Hz		30.0	29.4	30.6	mV	Pass	5.8e-005V
6V Range							
3.000 V @ 60 Hz		3.001	2.937	3.063	V	Pass	7.0e-004V
60V Range							
60.00 V @ 50 Hz		59.95	58.77	61.23	V	Pass	1.2e-002V
600V Range							
600.0 V @ 50 Hz		599.4	587.7	612.3	V	Pass	1.6e-001V
1000V Range							
1000 V @ 50 Hz		997	977	1023	V	Pass	6.3e-001V
DC VOLTAGE TESTS							
6V Range							
0.300 V		0.300	0.298	0.302	V	Pass	5.8e-004V
6.000 V		5.999	5.986	6.014	V	Pass	5.8e-004V
60V Range							
60.00 V		59.99	59.86	60.14	V	Pass	5.9e-003V
600V Range							
-600.0 V		-599.9	-601.4	-598.6	V	Pass	5.9e-002V
1000V Range							
1000 V		1000	996	1004	V	Pass	5.8e-001V
DC MILLIVOLT TEST							
600mV Range							
3.0 mV		3.0	2.9	3.1	mV	Pass	5.8e-005V
30.0 mV		30.0	29.9	30.1	mV	Pass	5.8e-005V
-600.0 mV		-599.9	-601.3	-598.7	mV	Pass	5.8e-005V
RESISTANCE TESTS							
600 Ohm Range							
0.0 Ohm		0.2	-0.2	0.2	Ω	Pass	5.8e-002 Ohm
600.0 Ohm		600.1	592.6	607.4	Ω	Pass	6.0e-002 Ohm
6 kOhm Range							
6.000 kOhm		6.001	5.926	6.074	k Ω	Pass	6.0e-001 Ohm
60 kOhm Range							
60.00 kOhm		60.00	59.26	60.74	k Ω	Pass	6.0e+000 Ohm
600 kOhm Range							
600.0 kOhm		599.9	592.6	607.4	k Ω	Pass	6.0e+001 Ohm

Certificate: 567604-00-1

Asset: 99470047-1577

Calibration Certificate

Data Type: As Found-As Left

Page 2 of 3

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Test Results

Test Description	True Value	Reading	Lower limit	Upper limit	Units	Test Status	Exp Uncert
6 MOhm Range							
6.000 MOhm		6.003	5.926	6.074	MΩ	Pass	8.6e+002 Ohm
50 MOhm Range							
50.00 MOhm		50.01	48.97	51.03	MΩ	Pass	2.2e+004 Ohm
CONTINUITY TESTS							
Beeper Off Test						Pass	
Beeper On Test						Pass	
AC MILLIAMP TESTS							
60mA Range							
3.00 mA @ 45 Hz		3.01	2.92	3.08	mA	Pass	6.3e-006 A
600mA Range							
400.0 mA @ 60 Hz		400.2	391.8	408.2	mA	Pass	2.4e-004 A
DC MILLIAMP TESTS							
60mA Range							
60.000 mA		60.000	59.380	60.620	mA	Pass	6.6e-006 A
600mA Range							
400.0 mA		400.2	395.2	404.8	mA	Pass	1.1e-004 A
Discharge Circuit Test						Pass	
INSULATION TESTS							
500V							
0.500 MOhm		0.500	0.000	1.000	MΩ	Pass	7.6e+002 Ohm
500 MOhm	529.3	526	516	542	MΩ	Pass	7.5e+006 Ohm
Overrange Test						Pass	
1000V							
600 MOhm	629.3	626	615	643	MΩ	Pass	9.0e+006 Ohm
External Sense Test						Pass	
OUTPUT VOLTAGES							
500 V		526.0	500.0	600.0	V	Pass	6.0e+000 V
1000 V		1050.0	1000.0	1200.0	V	Pass	1.1e+001 V

BER-MACELECTRICAL INSTRUMENTATION
A MEMBER OF THE ABB GROUP**FIELD SERVICES****TRANSFORMER INSTALLATION CHECKLIST****PAGE: 1 OF 1**

PROJECT: BM-117	LOCATION: BU 1100
P&ID TAG #: TNS-100	MANUFACTURER: Hammond Power Solutions
TYPE: Single Phase Dry Type	SERIAL #: 8 03423 046248
VOLTAGE: 480-120/240	PHASE: 1
SIZE: 50 KVA	FREQUENCY: 60 HZ
PRIMARY AMPS: 104A	INS: N/A

	Y	N	N/A
RECORD AND VERIFY NAMEPLATE DATA IN ACCORDANCE WITH APPROVED DRAWINGS AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VERIFY INSTALLATION OF BASE ATTACHMENTS IN ACCORDANCE WITH MANUFACTURER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
INSPECT FOR EXTERNAL OR SHIPPING DAMAGE, LOOSE AND MISSING PARTS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
INSPECT CABLES AND CONNECTIONS FOR PROPER SUPPORT AND INSULATION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK OIL LEVELS, GASKETS, & FITTINGS FOR LEAKS AND FOREIGN MATERIAL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK ALL GROUNDINGS IN ACCORDANCE WITH SPECIFICATIONS, INCLUDING CORE GROUNDING	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CHECK ROTATION AND/OR FREEDOM OF MOVEMENT ON EQUIPMENT, FAN, TAP CHANGER, ETC.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CHECK ALL NEUTRAL INSTALLATION SIZE / CONNECTIONS	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ALL HOLES ARE PLUGGED AND TIGHTLY SECURED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TERMINATIONS ARE COMPLETE AND VERIFIED IN ACCORDANCE WITH APPROVED DWG'S AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ALL CONDUCTORS ARE LABELED AND IDENTIFIED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ALL SPARE CONDUCTORS ARE ISOLATED AND IDENTIFIED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CASE AND GROUNDING RESISTORS ARE CORRECTLY INSTALLED TO MAIN GROUND SYSTEM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CORRECT PHASE ROTATION AND POLARITY	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SETTING VERIFICATION OF OUTPUT POWER AS PER APPROVED DRAWINGS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FUSE PROTECTION IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
POINT-TO-POINT CHECKS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PULL & TUG METHOD COMPLETED AFTER TERMINATION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VERIFY PROPER OPERATIONS OF FAN INDICATORS, PROTECTIVE DEVICES, AND TAP CHANGERS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
LIQUID FILL MUST SIT FOR >6 HOURS BEFORE APPLYING POWER	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
GENERAL AREA CLEANLINESS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK TRANSFORMER BUSHINGS FOR CRACKS AND CHIPS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

COMMENTS:

- 1) TEMPERATURE OF TRANSFORMER DURING TEST: 4 °C: AMBIENT CONDITIONS: ☐ DRY ☒ HUMID ☐ WET
- 2) TEST VOLTAGE: 1000 VDC ; LENGTH OF TEST: 5 SECONDS.
- 3) MEGOHM METER Fluke 1507 ; SERIAL # 17900292; CALIBRATION DUE DATE: JUL. 19/13

VERIFY PRIMARY & SECONDARY INSULATION RESISTANCE FROM PHASE/PHASE AND PHASE/GROUND (READINGS IN OHMS):

H1-G: >11.0GΩ	H2-G: >11.0GΩ	H3-G: >11.0GΩ	H1-H2: 0 MΩ	H2-H3: 0 MΩ	H3-H1: 0 MΩ
X1-G: >11.0GΩ	X2-G: >11.0GΩ	X3-G: >11.0GΩ	X1-X2: 0 MΩ	X2-X3: 0 MΩ	X3-X1: 0 MΩ

BER-MAC REPRESENTATIVE:

NAME: <u>[Signature]</u>	SIGNATURE: <u>Stuart Old</u>	DATE: <u>Oct. 16/2012</u>
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CLIENT REPRESENTATIVE:

NAME:	SIGNATURE:	DATE:
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PROJECT: BM-117	LOCATION: BM BU 1100
P&ID TAG #: TNS-UPS-100	MANUFACTURER: Hammond Power Solutions
TYPE: Single Phase Dry Type	SERIAL #: 432138
VOLTAGE: 480-120/240	PHASE: 1
SIZE: 5 KVA	FREQUENCY: 60 HZ
PRIMARY AMPS: 20.8	INS: N/A

	Y	N	N/A
RECORD AND VERIFY NAMEPLATE DATA IN ACCORDANCE WITH APPROVED DRAWINGS AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VERIFY INSTALLATION OF BASE ATTACHMENTS IN ACCORDANCE WITH MANUFACTURER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
INSPECT FOR EXTERNAL OR SHIPPING DAMAGE, LOOSE AND MISSING PARTS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
INSPECT CABLES AND CONNECTIONS FOR PROPER SUPPORT AND INSULATION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK OIL LEVELS, GASKETS, & FITTINGS FOR LEAKS AND FOREIGN MATERIAL.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK ALL GROUNDINGS IN ACCORDANCE WITH SPECIFICATIONS, INCLUDING CORE GROUNDING	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK ROTATION AND/OR FREEDOM OF MOVEMENT ON EQUIPMENT, FAN, TAP CHANGER, ETC.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CHECK ALL NEUTRAL INSTALLATION SIZE / CONNECTIONS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ALL HOLES ARE PLUGGED AND TIGHTLY SECURED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TERMINATIONS ARE COMPLETE AND VERIFIED IN ACCORDANCE WITH APPROVED DWG'S AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ALL CONDUCTORS ARE LABELED AND IDENTIFIED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ALL SPARE CONDUCTORS ARE ISOLATED AND IDENTIFIED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CASE AND GROUNDING RESISTORS ARE CORRECTLY INSTALLED TO MAIN GROUND SYSTEM <i>No Ground Resistor</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CORRECT PHASE ROTATION AND POLARITY	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SETTING VERIFICATION OF OUTPUT POWER AS PER APPROVED DRAWINGS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FUSE PROTECTION IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
POINT-TO-POINT CHECKS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PULL & TUG METHOD COMPLETED AFTER TERMINATION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VERIFY PROPER OPERATIONS OF FAN INDICATORS, PROTECTIVE DEVICES, AND TAP CHANGERS	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
LIQUID FILL MUST SIT FOR >6 HOURS BEFORE APPLYING POWER	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
GENERAL AREA CLEANLINESS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK TRANSFORMER BUSHINGS FOR CRACKS AND CHIPS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

COMMENTS:

- 1) TEMPERATURE OF TRANSFORMER DURING TEST: 15 °C: AMBIENT CONDITIONS: ☒ DRY ☐ HUMID ☐ WET
- 2) TEST VOLTAGE: 1000 VDC ; LENGTH OF TEST: 3 SECONDS.
- 3) MEGOHM METER _____ ; SERIAL # _____ ; CALIBRATION DUE DATE: _____

VERIFY PRIMARY & SECONDARY INSULATION RESISTANCE FROM PHASE/PHASE AND PHASE/GROUND (READINGS IN OHMS):

H1-G:	H2-G:	H3-G:	H1-H2:	H2-H3:	H3-H1:
X1-G:	X2-G:	X3-G:	X1-X2:	X2-X3:	X3-X1:

BER-MAC REPRESENTATIVE:

NAME:	SIGNATURE:	DATE:
-------	------------	-------

CLIENT REPRESENTATIVE:

NAME:	SIGNATURE:	DATE:
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BER-MACELECTRICAL INSTRUMENTATION
A MEMBER OF THE ABB GROUP**FIELD SERVICES****LIGHTING PANEL BOARD CHECKLIST****PAGE: 1 OF 1**

PROJECT: BM-117	LOCATION: BU 1100	AREA: N/A
P&ID TAG #: DP-100	MANUFACTURER: Eaton	
SERIAL #: 239P058H01 ✓	HP: N/A	PHASE: 1
AMPS: 225A	VOLTAGE: 120-240	
SIZE: 60 CCT	TYPE: Pow-R-Line 1a	

	Y	N	N/A
RECORD AND VERIFY NAMEPLATE DATA IN ACCORDANCE WITH APPROVED DWG'S AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VERIFY BASE ATTACHMENTS, CHANNELS, AND ANCHOR BOLTS, AS PER APPROVED DRAWINGS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
INSPECT FOR EXTERNAL SHIPPING DAMAGE, LOOSE AND MISSING PARTS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK ALL GROUNDINGS IN ACCORDANCE WITH APPROVED DWG'S AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK ALL COVERS AND DOORS HAVE BEEN INSTALLED AS PER APPROVED DWG'S AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK RATING OF OVER-CURRENT DEVICE IN ACCORDANCE WITH APPROVED DWG'S AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK PROPER ENCLOSURE FOR AREA CLASSIFICATION AS PER CODE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK TERMINATIONS COMPLETE AND VERIFIED AS PER APPROVED DWG'S AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK THAT ALL SPARE CONDUCTORS ARE ISOLATED AND IDENTIFIED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PANEL BOARD CIRCUIT SCHEDULE TO BE COMPLETED AS PER APPROVED DWG'S AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COMPLETE POINT-TO-POINT CHECKS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PULL & TUG METHOD COMPLETED AFTER TERMINATION	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ALL EQUIPMENT IS TAGGED AS PER APPROVED DWG'S AND SPECS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CHECK FOR CLEANLINESS, INSIDE OF PANEL CLEAN OF ALL STRIPPINGS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COMMENTS:			

TEST INSULATION RESISTANCE OF BUSES, INCLUDING NEUTRAL, PHASE/PHASE, AND PHASE/GROUND (READINGS IN OHMS):

A-G:	B-G:	C-G:	A-B:	B-C:	C-A:	N-ABC:	N-G:
>11.0GΩ	>11.0GΩ	N/A	>11.0GΩ	N/A	N/A	>11.0GΩ	>11.0GΩ
		N/A		N/A	N/A		

COMMENTS:

1 Phase: Two Busses. No C Phase.

BER-MAC REPRESENTATIVE:

NAME: Stuart Old	SIGNATURE: 	DATE: Oct. 17/12
------------------	--	------------------

CLIENT REPRESENTATIVE:

NAME:	SIGNATURE:	DATE:
-------	------------	-------

Project BM-117Location BU 1100Tag # UPS-100Manufacturer Hayley Industrial ElectronicsModel CCBT120H75F24H60ASerial# 18359AType CCBT120H75F24H60ABattery Size 6V 190 AhSize N/AHZ 60Voltage See CommentsHP N/AAMPS See CommentsClass N/A**Any deficiency on installation or acceptance must have a non-conformance report.****Installation**

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque in accordance with manufacturer specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify proper installation of battery racks, anchoring, earthquake braces, and cells.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all inner connections of cells and check ampacity of jumper straps.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Check electrolyte level.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Check all covers and doors are installed correctly.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Voltage: AC Input 480V DC Output 120 VDCAmps: AC 22A DC 75APrint & Sign Stuart Old
Ber-Mac RepresentativeSignature _____
Owner RepresentativeDate Oct 17/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all spare conductors are isolated and identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all external connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the protective devices.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the battery terminals for tightness and general appearance.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compare the battery and charge polarity.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Check battery voltage as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check terminals and battery connections are covered with protective coating.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Battery voltage to be assessed in the field.Print & Sign Stuart Old
Ber-Mac RepresentativeSignature _____
Owner RepresentativeDate Oct 17/12

Date _____

BER-MACELECTRICAL INSTRUMENTATION
A MEMBER OF THE ABB GROUP**FIELD SERVICES****UNINTERRUPTIBLE POWER SYSTEM ACCEPTANCE
CHECKLIST****PAGE: 1 OF 1**Project BM-117Location BU 1100Tag # UPS-100 (Inverter)Manufacturer Hayley Industrial ElectronicsModel TI-120/120-5Serial# 18359BType TI-120/120-5Size N/AVoltage See CommentsAMPS See CommentsHZ 60HP N/A**Any deficiency on installation or acceptance must have a non-conformance report.****Installation**

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque mounting equipment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all groundings in accordance with specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check tightness of all cable connections and bus joints.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all covers and doors installed correctly.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Voltage: DC Input 120 VDC AC Output 120 VAmps: DC 50A AC 42A

Print & Sign

Stuart Old
Ber-Mac Representative

Signature _____

Owner Representative

Date

OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check switch to insure positive interlock between normal & alternate sources.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perform manual transfer operations.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Continuity test where required.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: _____

Print & Sign

Stuart Old
Ber-Mac Representative

Signature _____

Owner Representative

Date

OCT 17/12

Date _____

Project	BM-117	Location	MCC-100-F1H
Tag #	KM-0010A	Manufacturer	Eaton
Type	BREAKER	Serial#	37BA 24901
Size	200A HFD	HZ	60 HZ
Voltage	480 V	HP	30
AMPS	100 A		

(13)

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date Oct. 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Check for over current protection as per specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Polarity and phase relation to be verified on site (field).

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date Oct 13/12

Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-F1K</u>
Tag #	<u>KM-0010B</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA24901</u>
Size	<u>HED</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>30</u>
AMPS	<u>100 A</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Check for over current protection as per specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check barriers or shuttles if applicable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Polarity and phase rotation to be verified in the field.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT. 17/12

Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-F1ML</u>
Tag #	<u>HVAC-101</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA24901</u>
Size	<u>HFD</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>N/A</u>
AMPS	<u>30 A</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify polarity and phase relation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for over current protection as per specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Unit tested at 480V and fully functional (heating and cooling).

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-F4D</u>
Tag #	<u>B-6000</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA24902</u>
Size	<u>HFD</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>N/A</u>
AMPS	<u>150 A</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments: B-6000 feeders to be installed, tested in field.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-F4HL</u>
Tag #	<u>HTR-B-7001A</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA24902</u>
Size	<u>HED</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>N/A</u>
AMPS	<u>15 A</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: HTR-B-7001A feeders to be installed and tested in the field.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project	BM-117	Location	MCC-100-F5ML
Tag #	HVAC-100	Manufacturer	Eaton
Type	BREAKER	Serial#	37BA24902
Size	HFD	HZ	60 HZ
Voltage	480 V	HP	N/A
AMPS	30 A		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT. 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all spare conductors are isolated and identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all external connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify polarity and phase relation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for over current protection as per specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check barriers or shuttles if applicable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Unit tested at 480V and fully functional (heating and cooling).

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-F5MR</u>
Tag #	<u>B-1000</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA24902</u>
Size	<u>HFD</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>N/A</u>
AMPS	<u>70 A</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative
Date OCT 12/12

Signature _____
Owner Representative
Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: B-1000 feeders to be installed, tested in the field.

Print & Sign Stuart Old
Ber-Mac Representative
Date OCT 17/12

Signature _____
Owner Representative
Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-R1C</u>
Tag #	<u>TNS-EHT-200</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA 24901</u>
Size	<u>HFD</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>N/A</u>
AMPS	<u>150 A</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: TNS-EHT-200 feeders to be installed, tested in the field.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project	BM-117	Location	MCC-100-R4BL
Tag #	TNS-UPS-100	Manufacturer	Eaton
Type	BREAKER	Serial#	37BA24902
Size	HFD	HZ	60 HZ
Voltage	480 V	HP	N/A
AMPS	30 A		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all spare conductors are isolated and identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all external connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify polarity and phase relation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for over current protection as per specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project	BM-117	Location	MCC-100-R4DR
Tag #	TNS-100	Manufacturer	Eaton
Type	BREAKER	Serial#	37BA24902
Size	HFD	HZ	60 HZ
Voltage	480 V	HP	N/A
AMPS	100 A		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all spare conductors are isolated and identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all external connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify polarity and phase relation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for over current protection as per specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-R4FL</u>
Tag #	<u>UPS-100</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA24902</u>
Size	<u>HFD</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>N/A</u>
AMPS	<u>30 A</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify polarity and phase relation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for over current protection as per specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: _____

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-R4FR</u>
Tag #	<u>HTR-B-1101A</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA24902</u>
Size	<u>HFD</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>N/A</u>
AMPS	<u>30 A</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all conductors are labeled & identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all spare conductors are isolated and identified.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all external connections.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify polarity and phase relation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for over current protection as per specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete point to point.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pull, tug method completed after termination.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: _____

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-R4H</u>
Tag #	<u>TNS-EHT-300</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA24902</u>
Size	<u>HFD</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>N/A</u>
AMPS	<u>150 A</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all nameplate data of cubical to drawing and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fill out QA/QC sheet on each starter.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date Oct 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: TNS-EHT-300 feeders to be installed, tested in the field.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date Oct 17/12

Date _____

Project BM-117
P & ID Tag # PM-8010
Type HMCP
Size 1
Voltage 480 V
AMPS 7A

Location MCC-100-F5B
Manufacturer Eaton
Serial# 37BA24902
HZ 60 HZ
HP 2 Max Rating 1HP

(13)

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque bolted connections accordance with manufacturer specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Inspect for external or shipping damage missing parts, cracks or broken arc boxes.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all circuit breakers, fuses, overloads and contractor to motor size.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all groundings and connections are in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Shant Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all devices are of proper size, type and rating.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify phases for motor rotation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform Meggar test on motor leads.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the alignment of the contactor.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: PM-8010 feeders to be installed, tested on site (in the field).

Print & Sign Shant Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project BM-117
P & ID Tag # BL-7040
Type HMCP
Size 3
Voltage 480 V
AMPS 100A

Location MCC-100-F6C
Manufacturer Eaton
Serial# 37BA 24902
HZ 60 HZ
HP 30

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque bolted connections accordance with manufacturer specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Inspect for external or shipping damage missing parts, cracks or broken arc boxes.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all circuit breakers, fuses, overloads and contractor to motor size.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all groundings and connections are in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Shant Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all devices are of proper size, type and rating.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify phases for motor rotation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform Meggar test on motor leads.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the alignment of the contactor.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: BL-7040 feeders to be installed, tested in the field.

Print & Sign Shant Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project BM-117
P & ID Tag # PM-7000A
Type HMCP
Size 2
Voltage 480 V
AMPS 50A

Location MCC-100-E6C
Manufacturer Eaton
Serial# 37BA24902
HZ 60 HZ
HP 15

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque bolted connections accordance with manufacturer specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Inspect for external or shipping damage missing parts, cracks or broken arc boxes.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all circuit breakers, fuses, overloads and contractor to motor size.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all groundings and connections are in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all devices are of proper size, type and rating.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify phases for motor rotation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform Meggar test on motor leads.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the alignment of the contactor.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: PM-7000 A feeders to be installed, tested in the field.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project BM-117
P & ID Tag # PM-7000B
Type HMCP
Size 2
Voltage 480 V
AMPS 50A

Location MCC-100-F6C
Manufacturer Eaton
Serial# 37BA24902
HZ 60 HZ
HP 15

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque bolted connections accordance with manufacturer specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Inspect for external or shipping damage missing parts, cracks or broken arc boxes.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all circuit breakers, fuses, overloads and contractor to motor size.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all groundings and connections are in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Shurt Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all devices are of proper size, type and rating.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify phases for motor rotation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform Meggar test on motor leads.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the alignment of the contactor.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: PM-7000B feeders to be installed, tested in the field.

Print & Sign Shurt Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project BM-117Location MCC-100-F6CP & ID Tag # BL-7040Manufacturer EatonType HMCPSerial# 37BA24902Size 3HZ 60 HZVoltage 480 VHP 30AMPS 100A**Any deficiency on installation or acceptance must have a non-conformance report.****Installation**

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque bolted connections accordance with manufacturer specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Inspect for external or shipping damage missing parts, cracks or broken arc boxes.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all circuit breakers, fuses, overloads and contractor to motor size.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all groundings and connections are in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.Print & Sign Stuart Old
Ber-Mac RepresentativeSignature _____
Owner RepresentativeDate OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all devices are of proper size, type and rating.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify phases for motor rotation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform Meggar test on motor leads.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the alignment of the contactor.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: BL-7040 feeders to be installed, tested in the field.Print & Sign Stuart Old
Ber-Mac RepresentativeSignature _____
Owner RepresentativeDate OCT 17/12

Date _____

Project BM-117
P & ID Tag # PM-7010
Type HMCP
Size 4
Voltage 480 V
AMPS 150A

Location MCC-100-F6G
Manufacturer Eaton
Serial# 37BA24902
HZ 60 HZ
HP 100

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque bolted connections accordance with manufacturer specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Inspect for external or shipping damage missing parts, cracks or broken arc boxes.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all circuit breakers, fuses, overloads and contractor to motor size.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all groundings and connections are in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all devices are of proper size, type and rating.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify phases for motor rotation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform Meggar test on motor leads.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the alignment of the contactor.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: PM-7010 feeders to be installed, tested in the field.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project BM-117

Location MCC-100-B4M

P & ID Tag # HTB-TK-6270

Manufacturer Eaton

Type HFD

Serial# 37BA24902

Size 1

HZ 60 HZ

Voltage 480 V

HP 6KW

AMPS 15

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque bolted connections accordance with manufacturer specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Inspect for external or shipping damage missing parts, cracks or broken arc boxes.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all circuit breakers, fuses, overloads and contractor to motor size.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check all groundings and connections are in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Shurt Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all devices are of proper size, type and rating.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all external connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify phases for motor rotation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform Meggar test on motor leads.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the alignment of the contactor.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: HTB-TK-6270 feeders to be installed, tested in the field.

Print & Sign Shurt Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project BM-117
Tag # PM-4010
Type HFD
Size N/A
Voltage 480 V
AMPS 150 A

Location MCC-100-E2M
Manufacturer Eaton
Serial# 37BA24902
HZ 60 Hz
HP 100

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all internal connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Unit to be tested in the field.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project BM-117
Tag # PM-4020
Type BREAKER
Size N/A
Voltage 480 V
AMPS 150 A

Location MCC-100-E3M
Manufacturer Eaton
Serial# 37BA24902
HZ 60 Hz
HP 100

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative
Date OCT 12/12

Signature _____
Owner Representative
Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all internal connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Unit to be tested in the field.

Print & Sign Stuart Old
Ber-Mac Representative
Date OCT 17/12

Signature _____
Owner Representative
Date _____

BER-MACELECTRICAL INSTRUMENTATION
A MEMBER OF THE ABB GROUP**FIELD SERVICES****VARIABLE FREQUENCY DRIVE ACCEPTANCE CHECKLIST****PAGE: 1 OF 1**

Project BM-117
Tag # ACM-5010
Type BREAKER
Size _____
Voltage 480 V
AMPS 15A

Location MCC-100-B1M
Manufacturer Eaton
Serial# 37BA24901
HZ 60 Hz
HP 5

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Shawn Old
Ber-Mac Representative

Date OCT 12/12

Signature _____
Owner Representative

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all internal connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Unit to be tested in the field.

Print & Sign Shawn Old
Ber-Mac Representative

Date OCT 17/12

Signature _____
Owner Representative

Date _____

Project BM-117
Tag # PM-4030
Type BREAKER
Size N/A
Voltage 480 V
AMPS 150 A

Location MCC-100-B2M
Manufacturer Eaton
Serial# 37BA24902
HZ 60Hz
HP 100

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Shurtell
Ber-Mac Representative
Date OCT 12/12

Signature _____
Owner Representative
Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all internal connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Unit to be tested in the field.

Print & Sign Shurtell
Ber-Mac Representative
Date OCT 17/12

Signature _____
Owner Representative
Date _____

Project	<u>BM-117</u>	Location	<u>MCC-100-B5M</u>
Tag #	<u>PM-6000</u>	Manufacturer	<u>Eaton</u>
Type	<u>BREAKER</u>	Serial#	<u>37BA24902</u>
Size	<u>N/A</u>	HZ	<u>60 HZ</u>
Voltage	<u>480 V</u>	HP	<u>50</u>
AMPS	<u>100</u>		

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 12/12

Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all internal connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Unit to be tested in the field.

Print & Sign Stuart Old
Ber-Mac Representative

Signature _____
Owner Representative

Date OCT 17/12

Date _____

Project BM-117
Tag # ACM-5020
Type BREAKER
Size N/A
Voltage 480 V
AMPS 50 A

Location MCC-100-B6M
Manufacturer Eaton
Serial# 37BA24902
HZ 60Hz
HP 25

Any deficiency on installation or acceptance must have a non-conformance report.

Installation

	Y	N	N/A
Record and verify nameplate data in accordance with approved drawings and specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify and/or torque anchorage and all buss connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify required area clearances and proper alignment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspect for external or shipping damage.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check phasing of busses visually, and /or with continuity check.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all groundings in accordance with the specifications.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check for cleanliness.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Vendor tested gear.

Print & Sign Shurtell
Ber-Mac Representative
Date OCT 12/12

Signature _____
Owner Representative
Date _____

Acceptance Testing

	Y	N	N/A
Check terminations are complete & verified in accordance with approved drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all conductors are labeled & identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all spare conductors are isolated and identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check all internal connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check the main breaker is of proper size, type and ratings.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verify polarity and phase relation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for over current protection as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Complete point to point.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pull, tug method completed after termination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check barriers or shuttles if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perform resistance test on each bus section, phase to phase and phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check for cleanliness; wipe down barriers, cell walls and insulators from construction dust.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Unit to be tested in the field.

Print & Sign Shurtell
Ber-Mac Representative
Date OCT 17/12

Signature _____
Owner Representative
Date _____

Winters, 1948

ESM06001/070728

PROJECT: BM-117

LOCATION: WARWICK INDUSTRIES CALGARY

JOB: BU-1100 MCC/I/A BLDG

PO#:

1. THE FOLLOWING FACILITIES AND/OR EQUIPMENT ARE COMPLETE AND ARE BEING TURNED OVER TO THE CLIENT FOR THEIR CUSTODY, CONTROL, AND MAINTENANCE:

BU-1100

2. WORK TO BE COMPLETED AS PER ATTACHED "PUNCH LIST":

RE-TORQUING OF ALL SPLICES AFTER SHIPPING; TERMINATION/IN-STALLATION OF BEACONS; INSTALL ALL CABLE TIES AND LAMALIDS; INSTALL GROUND CABLE FROM BUILDING GRID TO AC BUS, INSTALL GROUND CABLE FROM PLC TO KD. BUS; TERMINATE REMAINING NON-TERMINATED CONDUCTORS UPON CLARIFICATION BY IMV VISTA, TERMINATE HORN AH-1100 AT DEVICE.

3. THE CLIENT SHALL ASSUME RESPONSIBILITY OF THE EQUIPMENT SYSTEMS AND WILL NOTIFY THE CONTRACTOR IMMEDIATELY IF ANY FURTHER WORK IS TO BE PERFORMED UNDER THIS CONTRACT WITH THE EXCEPTION OF THE ATTACHED ITEMS.

4. DESCRIPTION OF WORK COMPLETED:

SCOPE OF WORK AS PER I.T.P. FSM1600CA/090208, LESS PUNCH-LIST ITEMS.

5. EFFECTIVE DATE OF TURNOVER:

BER-MAC REPRESENTATIVE:

NAME:

[Signature]

SIGNATURE:

Stuart Old

DATE:

Oct. 18/12

CLIENT REPRESENTATIVE:

NAME:

Susanne N...

SIGNATURE:

[Signature]

DATE:

Oct 18/12

Printed label on the back of the

[Signature]
Oct 22/12

Project #: BM-117	Location / Module: BU 1100
Project Name: Murphy Cadotte Pilot CSS	
Date of Inspection: OCTOBER 18 2012	Inspected By: SWAMY NARAYANA

☒ Preliminary (Internal) Inspection prior to turnover to Customer

☒ Final Inspection of Sub-contracted work

Item #	Description	Priority (1, 2 or 3)	Schedule to Complete	Date Completed	Acceptance
1	Re-torque all bus splices after shipping.	1			10/18/12
2	Mount alarm beacons on respective masts and terminate.	2			10/18/12
3	Install cable tags and lamacoids.	2	OCT 23 2012 SD	OCT 23 2012 SD	10/18/12
4	Install ground to AC Bus from grid and ground to iso. bus from THC	2			10/18/12
5	Terminate wires still pending information from Vista.	1	OCT 23 2012 SD	OCT 23 2012 SD	10/18/12
6	Terminate horn AH-1100 at device.	2			10/18/12

air field.

shipping.

air field.

air field.

BER-MAC

ELECTRICAL INSTRUMENTATION
A MEMBER OF THE ABB GROUP

FIELD SERVICES

PUNCH LIST

PAGE: OF

Project No.: BM 117 Permit No.: _____ Date: OCT 19 2012

Project Name: BU 1100, Murphy Cadotte Pilot CSS

Module 1 of 1 Module Description: Motor Control Centre and Instrument Air Building

Completed By: _____ Client Representative: _____
(Signature) (Signature)

Answer questions with a "✓". If answer is "No", provide comment at bottom of page, or on reverse.

	Yes	No	Date
1. Has internal point to point check been completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
2. Did owner witness check out?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 22/12</u>
3. Are all tech cables tagged correctly?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
4. Is every wire tagged correctly?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
5. Are all clamps in place and tight?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
6. Is all conduit straight and true?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
7. Have lights been hung and energized?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
8. Have fans, heaters, receptacles, etc. been energized?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
9. Are junction boxes complete and secure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
10. Are all end devices installed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
11. Have seals been packed and poured?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>OCT 21/12</u>
12. Are junction boxes clear of vents and windows?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
13. Have all tools and materials been returned to supply?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
14. Is worksite cleaner than the way you found it?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 21/12</u>
15. Have as-builts been turned in?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 22/12</u>
16. Have all questions regarding as-builts been answered?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 22/12</u>
17. Has all grounding been completed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>OCT 22/12</u>
18. Is the module (as per defined scope) 100 % complete?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>OCT 22/12</u>

Comments

RE #11: No explosion-proof seals in this module.
 RE #8: Energized the following circuits: inside/outside lights, inside/outside lights, receptacles, HVAC100, HVAC101, HTR B1100, EFB1100, all transformers, TEC 40 Controller.
 RE #17: Remaining grounding on punchlist.
 RE #18: Less punch list items.

Project #: BM-117

Project Name:

Murphy Cadotte Pilot CSS - Bu 1100 MCC

[illegible]



Warwick Industries

Document No: W28406

Revision: 0

INSPECTION AND TEST PLAN

Customer: ABB Ber-Mac C/O MURPHY OIL				Project Description: MCC BU-1100						
Project/Location: CADOTTE HEAVY OIL FIELD, PEACE RIVER ALBERTA				Job Number: W28406						
Customer Reference: PO 4500497048				Point of Manufacture: Calgary AB, Canada						
DESIGN & FABRICATION BY WARWICK INDUSTRIES LTD										
Item No.	Quality Activity to be Completed or Characteristic to be Inspected/Tested	Responsibility	Quality Management System Reference Document(s)	Acceptance Criteria	Verifying Documents	I N S P	WARWICK		ABB BER-MAC	
							Initial	Date	Initial	Date
A GENERAL										
1.0	Inspection and Test Plan (ITP)	Client	Warwick Best Practices and/or Quality Plan	Approval Signature	Stamped ITP	R	SMS	Apr. 25		
1.1	Cross-reference BOM with IFC Drawings	Warwick	Warwick Best Practices and/or Quality Plan	Signed BOM	Signed BOM/IFC Drawings	R	SMS	6/22/12		
1.2	Cross-reference Shipped Materials to Packing Slips	Warwick	Warwick Best Practices and/or Quality Plan	Packing Slips/Bills of Lading	Signed Packing Slips/Bills of Lading	R	SMS	6/22/12		
B WELDING										
2.1	Welding Procedures Approved (WPS)	Warwick	Warwick Best Practices and/or Quality Plan	CWB W47.1 (spec, control procedure, drawing, other)	Approved & Stamped	R	SB	May 2/12		
2.2	Welders Approved	Warwick	Warwick Best Practices and/or Quality Plan	CWB W47.1 (spec, control procedure, drawing, other)	Approved & Stamped	R	SB	May 2/12		
2.3	NDE Procedures Approved	Warwick	Warwick Best Practices and/or Quality Plan	CSA W178.1 (spec, control procedure, drawing, other)	Approved & Stamped	R	SB	May 2/12		
2.4	NDE Technicians Approved	Warwick	Warwick Best Practices and/or Quality Plan	CSA W178.2 (spec, control procedure, drawing, other)	Approved & Stamped	R	SB	May 2/12		
2.5	Weld Inspection	Warwick	Warwick Best Practices and/or Quality Plan	CSA W-59 (spec, control procedure, drawing, other)	Signed Inspection Report	R	SB	May 2/12		
2.7	Visual Inspection of Welding	Warwick	Supplier Procedures	CWB 47.1 (spec, control procedure, drawing, other)		R	SB	May 21		
2.8	Weekly Third Party Level II Welding Inspection	Warwick	Supplier Procedures	CWB 47.1 (spec, control procedure, drawing, other)						
D BUILDINGS AND ARCHITECTURAL										
3.0	Approval of Drawings	Warwick	Warwick Best Practices	Approved/Stamped Drawings	Approved IFC Drawings	R	SMS	May 18/12		
3.1	Doors (Manual)	Warwick	Warwick Best Practices	Approved Drawings (spec, control procedure, drawing, other)	Field Inspection Checklist FORM WAR-003	M	SMS	Jul 3/12		
3.2	Windows	Warwick	Warwick Best Practices	Approved Drawings (spec, control procedure, drawing, other)	Field Inspection Checklist FORM WAR-003	M	SMS	Jul 3/12		
3.3	Fans/Louvers	Warwick	Warwick Best Practices	Approved Drawings (spec, control procedure, drawing, other)	Field Inspection Checklist FORM WAR-003	M	SMS	Jul 3/12		
3.4	Wall/Roof Panels	Warwick	Warwick Best Practices	Approved Drawings (spec, control procedure, drawing, other)	Field Inspection Checklist FORM WAR-003	M	SMS	Jul 3/12		
3.5	Wall/Roof Cladding	Warwick	Warwick Best Practices	Approved Drawings (spec, control procedure, drawing, other)	Field Inspection Checklist FORM WAR-003	M	SMS	Jul 3/12		
3.6	Insulation/Vapor Barrier/Liner	Warwick	Warwick Best Practices	Approved Drawings (spec, control procedure, drawing, other)	Field Inspection Checklist FORM WAR-003	M	SMS	Jul 3/12		
3.7	Insulation/Liner	Warwick	Warwick Best Practices	Approved Drawings (spec, control procedure, drawing, other)	Field Inspection Checklist FORM WAR-003	M	SMS	Jul 3/12		
3.8	Eavestrough/Ice Rakes/Dektile	Warwick	Warwick Best Practices	Approved Drawings (spec, control procedure, drawing, other)	Field Inspection Checklist FORM WAR-003	M	SMS	Jul 3/12		
3.9	Final Building Inspection	Warwick	Warwick Best Practices	Approved Drawings (spec, control procedure, drawing, other)	Field Bldg Inspection FORM WAR-002	M	SMS	Jul 3/12		
D FABRICATION										
4.0	Company Certification	Warwick	Supplier Procedures	CWB 47.1		R	SMS	Oct. 2/12		
4.1	Engineered Drawings	Warwick	Supplier Procedures	CSA-S16.1	Approved & Stamped	R	SMS	Oct. 2/12		
E OTHER										
5.0	As-Built/Red-line Drawings	Warwick	Warwick Best Practices	Warwick	Drawing Submittal	R	SMS	Oct. 12/12		
5.1	Turnover Documentation	Warwick	Warwick Best Practices	Warwick	ITP Acceptance Signature		SMS	Oct. 5/12		

INSP: H= Hold Point M= Monitor R= Document Review W= Witness Point

ITP APPROVED:

CONTRACTOR: SMS DATE: Oct 5/12

ABB BER-MAC _____ DATE: _____



6999 - 84th Street SE
Calgary, AB Canada T2C 4T6

Phone: 403-720-9425
Fax: 403-720-9426

FIELD INSPECTION CHECKLIST

CUSTOMER: Abel/Burns
LOCATION: Warwick yards
JOB #: W28406
P.O.#: _____ Unit #: _____

<u>DESCRIPTION</u>	<u>OK</u>	<u>N/A</u>	<u>DESCRIPTION</u>	<u>OK</u>	<u>N/A</u>
Skid leveled	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sectional doors	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cross braces	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Roll-up doors	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Ridge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Eavestrough	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Roof caulked	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Ice rakes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Insulation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	T.R.P.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Vapor barrier	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Canopies	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Fans	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner caulked	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Door IWG	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Doors caulked	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Removable panels	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Windows caulked	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Windows	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Louvers caulked	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Louvers	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Doors & hardware	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Site clean-up	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Date: July 31/12

Field Crew Chief's Printed Name: DEAN HARVEY

Field Crew Chief's Signature: _____

Customer's Representative Printed Name: _____

Customer's Representative Signature: _____

Customer's Representative Comments: _____

NOTES:

- EXTERIOR WALLS TO BE: 22 GA. GALVALUME
- EXTERIOR ROOF TO BE: 22 GA. GALVALUME
- EXTERIOR TRIM TO BE: 22 GA. GALVALUME
- DOORS TO BE PAINTED: GREY
- ROLL-UP DOORS TO BE PAINTED: -NONE
- INTERIOR LINER TO BE: SEE DWG
- INSULATION IN WALLS: R12 BATT INSULATION
- INSULATION IN ROOF: R20 BATT INSULATION
- VAPOUR BARRIER TO BE: 6 mil

APPROX. BLDG. DIMENSIONS : (FOR SHIPPING)

- OVERALL WIDTH = 196" [16'-4"] (INCLUDED EAVESTROUGHS & LIFTING LUGS)
- OVERALL HEIGHT = 205" [17'-1"] (FROM BTM OF SKID TO RIDGE CAP)

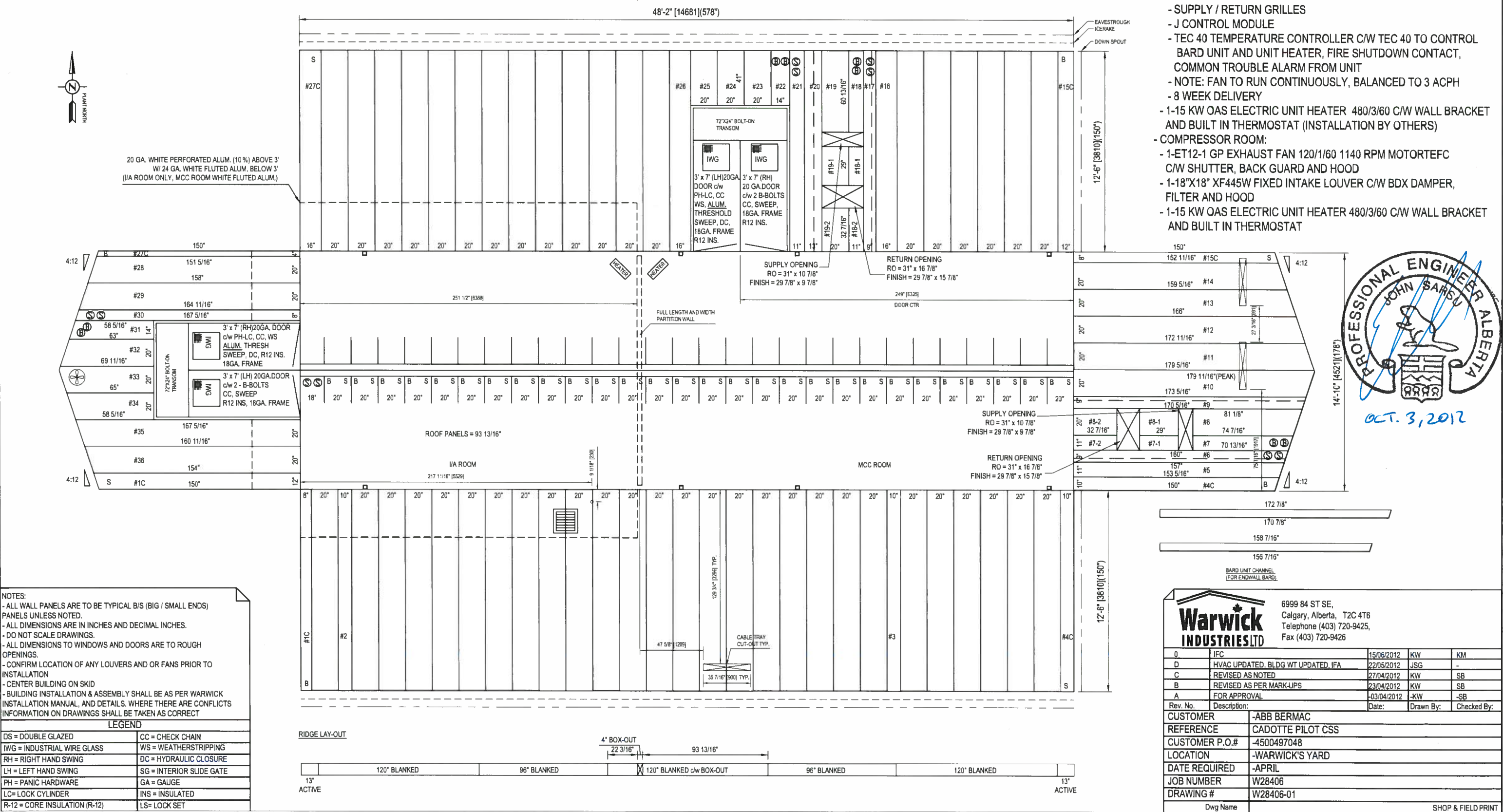
SITE LOADS FOR AB P.ENG STAMP:

LOCATION: 13-09-085-17 W5M
NEAREST TOWN = PEACE RIVER, AB
1/50 SNOW = 2.2 kPa
1/50 WIND = 1.12 kPa
-BUILDING IS DESIGNED TO COMPLY WITH THE N.B.C 2005 AS PER THE WIND AND SNOW LOAD SPECIFIED ON THE DRAWING. OWNER SHALL CONTACT WARWICK INDUSTRIES IF ACTUAL BUILDING LOCATION DIFFERS FROM THOSE SHOWN, IN ORDER TO VALIDATE THE SUITABILITY OF DESIGN FOR THE INTENDED LOCATION.

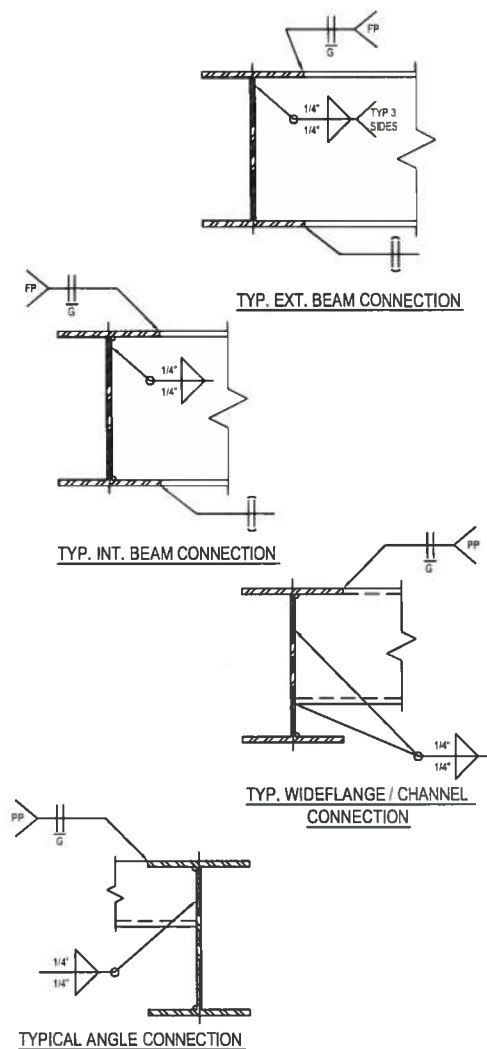
NOTES:

- CLIMASEAL FASTENERS
- CAULKED INTERIOR JOINTS
- ALL CABLE TRAY CUT-OUTS TO BE COORDINATED WITH ELECTRICAL CONTRACTOR
- HVAC (BASED ON NON-CLASSIFIED AREA):**
- 17 KW OF HEAT GAINS (T.B.C.)
- BASED ON 3 ACPH CONTINUOUS
- MCC/IA BLDG:
- (2) BARD PACKAGE WALL MOUNT UNITS W48A1-C15 EPXXXJ C/W 4 TON COOLING AND 15 KW OF HEAT 480/3/60
- SUPPLY / RETURN GRILLES
- J CONTROL MODULE
- TEC 40 TEMPERATURE CONTROLLER C/W TEC 40 TO CONTROL BARD UNIT AND UNIT HEATER, FIRE SHUTDOWN CONTACT, COMMON TROUBLE ALARM FROM UNIT
- NOTE: FAN TO RUN CONTINUOUSLY, BALANCED TO 3 ACPH
- 8 WEEK DELIVERY
- 1-15 KW OAS ELECTRIC UNIT HEATER 480/3/60 C/W WALL BRACKET AND BUILT IN THERMOSTAT (INSTALLATION BY OTHERS)
- COMPRESSOR ROOM:
- 1-ET12-1 GP EXHAUST FAN 120/1/60 1140 RPM MOTORTEFC C/W SHUTTER, BACK GUARD AND HOOD
- 1-18"X18" XF445W FIXED INTAKE LOUVER C/W BDX DAMPER, FILTER AND HOOD
- 1-15 KW OAS ELECTRIC UNIT HEATER 480/3/60 C/W WALL BRACKET AND BUILT IN THERMOSTAT

SURFACE AREA = 2,365 SQ.FT
APPROX. TOTAL SHIPPING WEIGHT = 53,958 lbs (24,628 kg) (BLDG, SKID & EQUIPMENT)

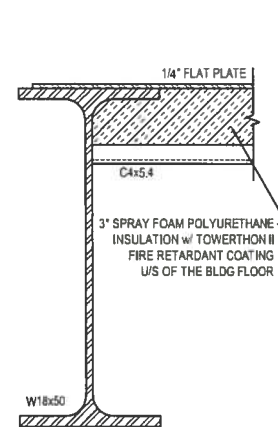
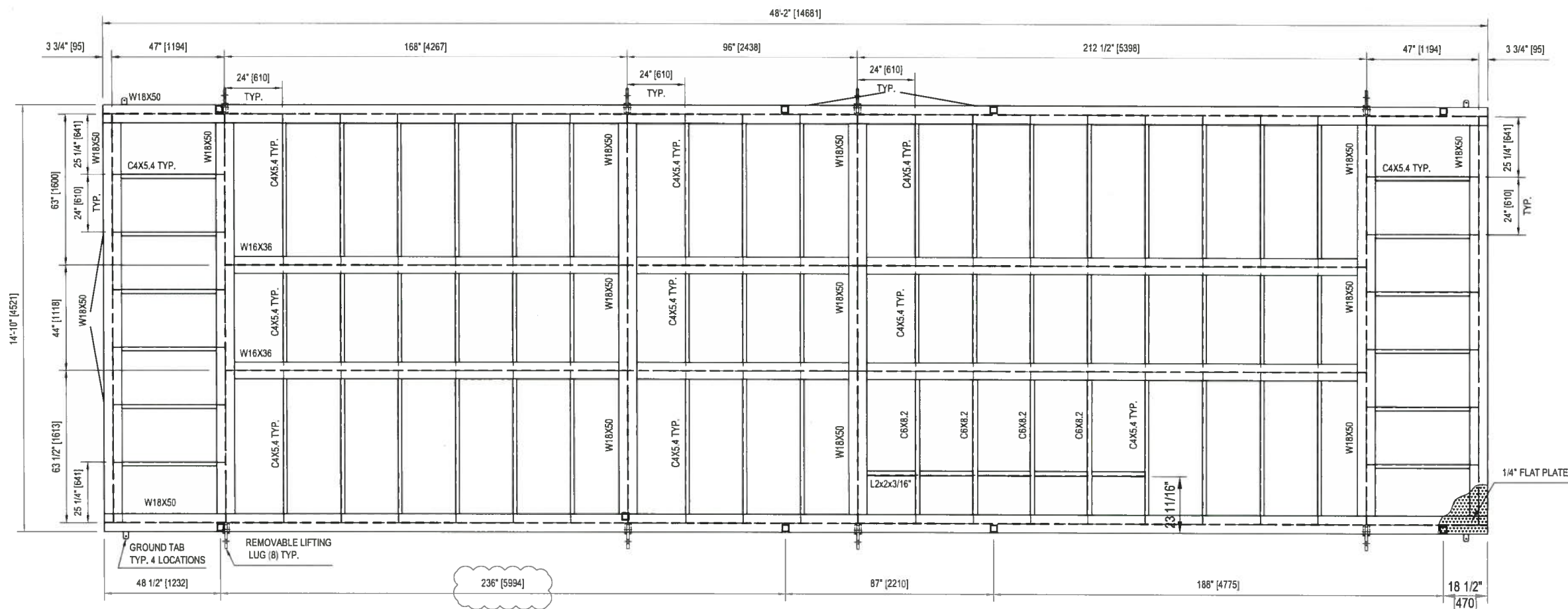


TYP. WELD DETAILS

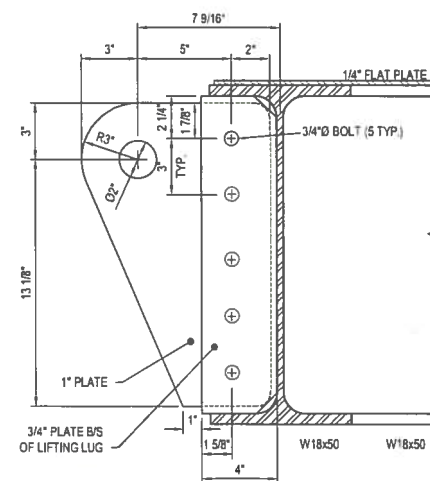


SKID / STEEL NOTES:

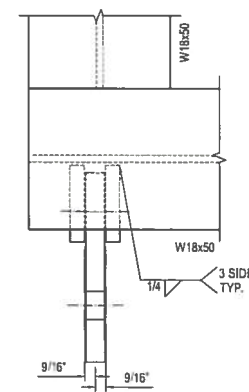
- WELDING SHALL BE IN GENERAL CONFORMANCE WITH CSA W59-2003.
- WELDS TO BE 1/4" CONTINUOUS FILLET WELD UNLESS NOTED.
- CHECKER PLATE TO BE STITCH WELDED TO SKID USING 3/16" FILLETS 2" AT 12" INTERVALS.
- CHECKER PLATE SEAMS TO BE WELDED CONTINUOUSLY ON ONE SIDE.
- ALL WORK SHALL GENERALLY CONFORM TO THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS:
 - * CSA W47.1-09
 - * CISC HANDBOOK OF STEEL CONSTRUCTION
- ALL STEEL SHALL BE OF NEW STOCK AND SHALL BE IN ACCORDANCE WITH CSA G40.21-M.
 - * STRUCTURAL STEEL = GRADE 350W
 - * CHANNELS & ANGLES = GRADE 300W
 - * LIFTING LUGS = GRADE 300W
 - * CHECKER & FLAT PLATE = GRADE 300W
- FILLER METAL SHALL CONFORM TO CSA STD. W48.5-M - E4802C-6-CH.
- 3"-R20 SPRAY FOAM POLYURETHANE INSULATION W/ TOWERTHON II FIRE RETARDANT COATING U/S OF THE BLDG FLOOR
- 1/4" FLAT PLATE DECKING W/ ANTI-SLIP PAINT
- SSPC-SP-6 SURFACE PREPARATION
- PRIME WITH ONE COAT OF CLOVERDALE 710 SERIES PRIMER
- TOPCOAT WITH ONE COAT OF CLOVERDALE 74 SERIES INDUSTRIAL ENAMEL
- STANDARD QC PACKAGE
- FINISH COLOR IS TO BE BLACK



TYP. SKID SECTION w/ INSULATION



TYP. REMOVABLE LIFTING LUG DETAIL

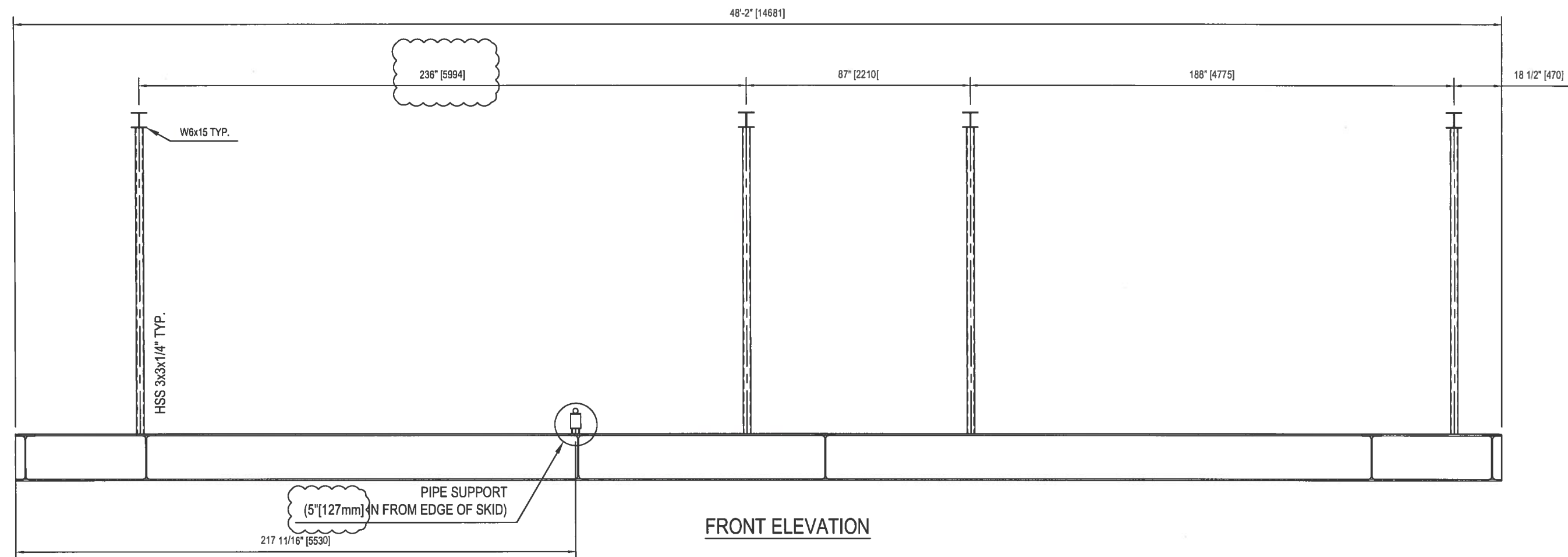


TYP. LIFTING LUG DETAIL

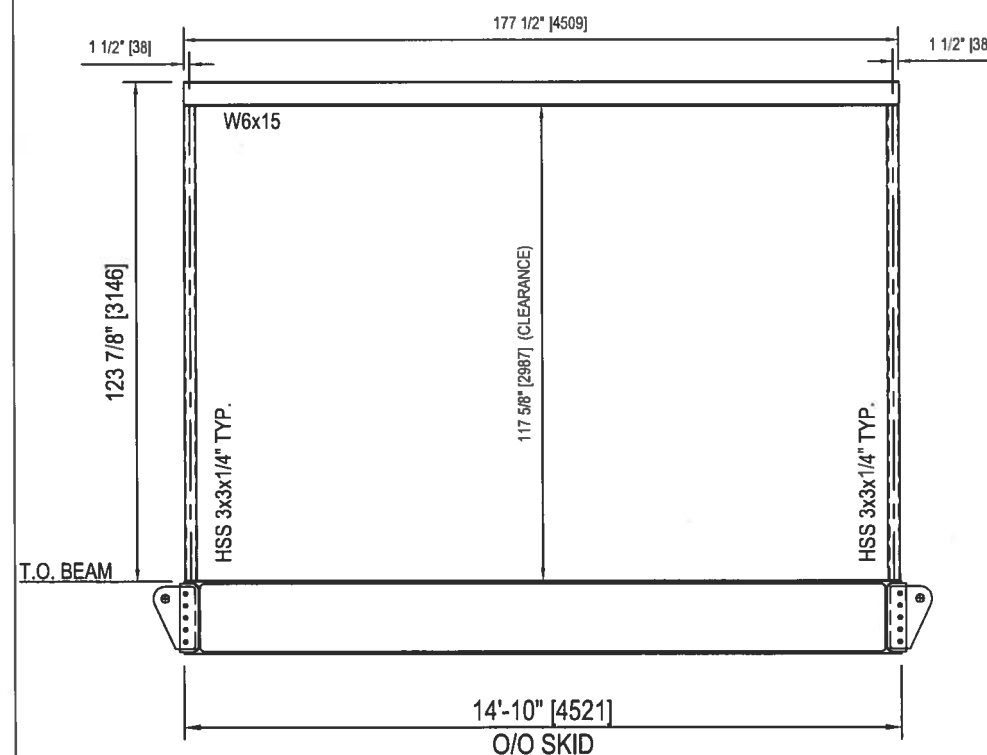


OCT. 3, 2012

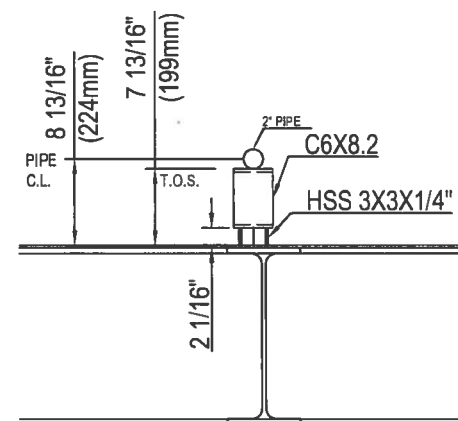
Warwick INDUSTRIES LTD		6999 84 ST SE, Calgary, Alberta, T2C 4T6 Telephone (403) 720-9425, Fax (403) 720-9426			
2	REVISED AS SHOWN, IFC	22/05/2012	JSG		
1	REVISED DIM	14/05/2012	KW		
0	IFC	01/05/2012	KW	SB	
C	MOVED CABLE TRAY POST	27/04/2012	KW	SB	
B	REVISED AS PER MARK-UPS	23/04/2012	KW	SB	
A	-FOR APPROVAL	03/04/2012	-KW	-SB	
Rev. No.	Description:	Date:	Drawn By:	Checked By:	
CUSTOMER	-ABB BERMAC				
REFERENCE	-CADOTTE PILOT CSS				
CUSTOMER P.O.#	-4500497048				
LOCATION	-WARWICK'S YARD				
DATE REQUIRED	-APRIL 2012				
JOB NUMBER	W28406				
DRAWING #	W28406-03				
Dwg Name	SKID DRAWING - SHOP & FIELD PRINT				



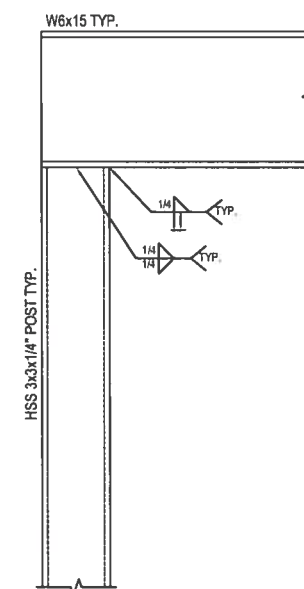
FRONT ELEVATION



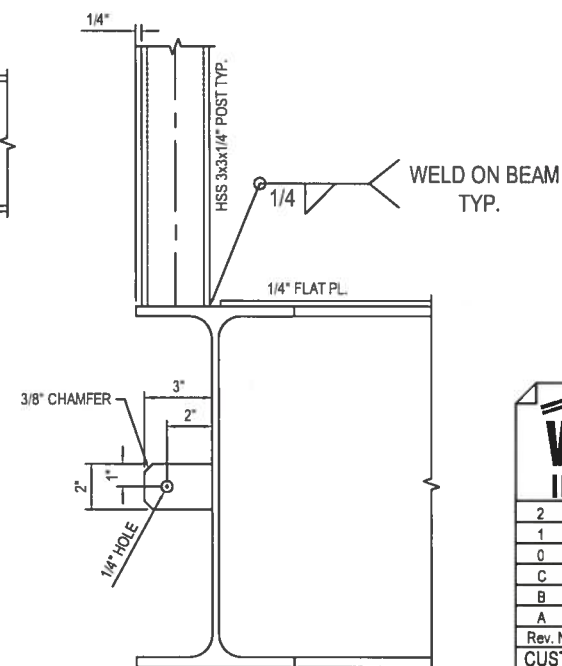
SIDE ELEVATION



PIPE SUPPORT DETAIL



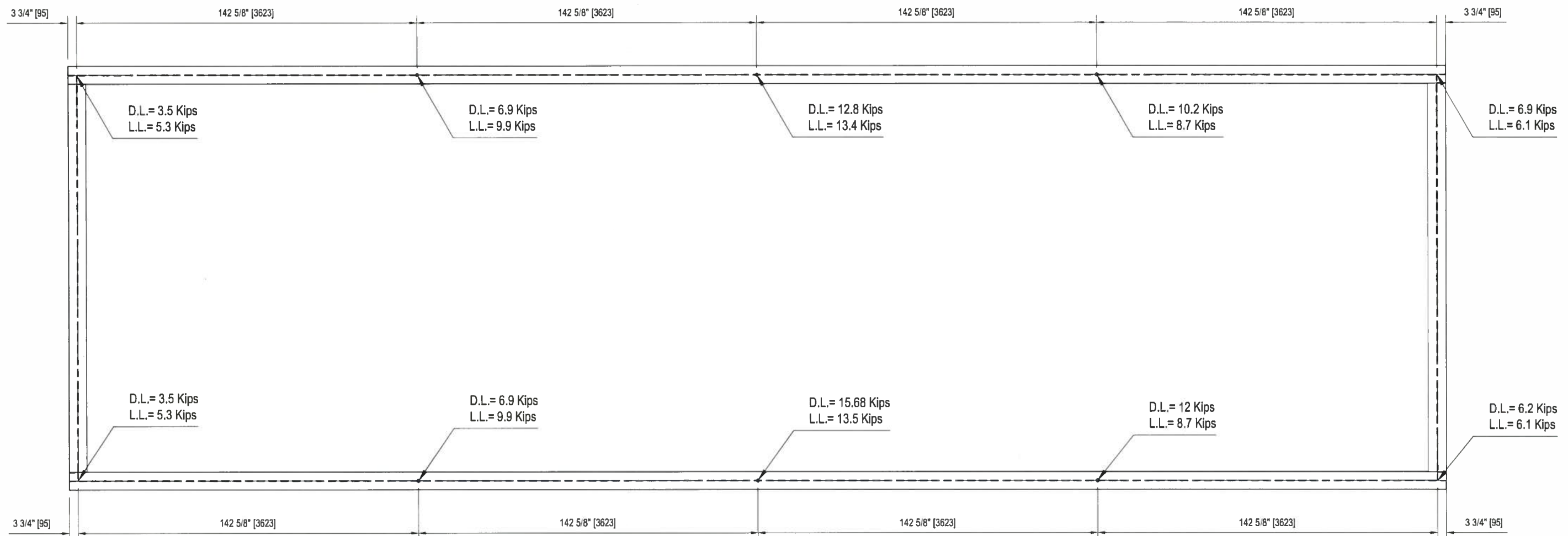
TYP. POST TO HEADER CONN.



POST TO SKID CONN. TYP. 4 LOCATIONS
GROUND TABS TYP. 4 LOCATIONS

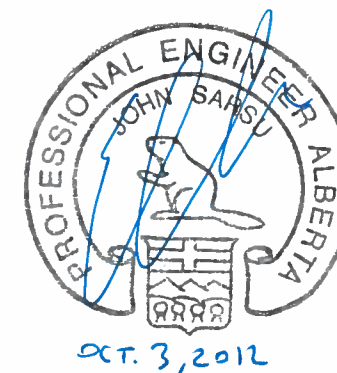


Warwick INDUSTRIES LTD		6999 84 ST SE, Calgary, Alberta, T2C 4T6 Telephone (403) 720-9425, Fax (403) 720-9426			
2	REVISED AS SHOWN, IFC	22/05/2012	JSG		
1	ADDED UPPER STEEL DIM.	01/05/2012	KW	SB	
0	IFC	01/05/2012	KW	SB	
C	MOVED CABLE TRAY POST	27/04/2012	KW	SB	
B	REVISED AS PER MARK-UPS	23/04/2012	KW	SB	
A	FOR APPROVAL	03/04/2012	KW	SB	
Rev. No.	Description:	Date:	Drawn By:	Checked By:	
CUSTOMER	-ABB BERMAC				
REFERENCE	-CADOTTE PILOT CSS				
CUSTOMER P.O.#	-4500497048				
LOCATION	-WARWICK'S YARD				
DATE REQUIRED	APRIL 2012				
JOB NUMBER	W28406				
DRAWING #	W28406-04				
Dwg Name	SKID DRAWING - SHOP & FIELD PRINT				



PILE LOADING NOTES :

- SUGGESTED PILE LOCATIONS
- PILE LOADS ARE UNFACTORED
- PILE DESIGN BY OTHERS
- LATERAL PILE LOADS BY OTHERS



Warwick INDUSTRIES LTD		6999 84 ST SE, Calgary, Alberta, T2C 4T6 Telephone (403) 720-9425, Fax (403) 720-9426	
Rev. No.	Description	Date	Drawn By: Checked By:
A	FOR APPROVAL	23/04/2012	KW SB
CUSTOMER	-ABB BERMAC		
REFERENCE	-CADOTTE PILOT CSS		
CUSTOMER P.O.#	-4500497048		
LOCATION	-WARWICK'S YARD		
DATE REQUIRED	APRIL 2012		
JOB NUMBER	W28406		
DRAWING #	W28406-05		
Dwg Name		SKID DRAWING - SHOP & FIELD PRINT	



PACKING SLIP

Customer Job#	CADOTTE PILOT CCS	Date:	June 20, 2012
Customer P.O:	4500497048	Warwick Job#:	W28406
Sold To:	ABB BERMAC	Ship To:	4207
		Attention:	

SIZE	48'X14'X12'	Color:	GALVALUME
BLDG TYPE	GABLE	Trim Color:	GALVALUME
# Doors:	1-LH DB 1-RH DBL	#Windows:	
Canopies:		Eaves&Downspout	2
Louvers:	1-18"X18"	RIDGE VENT	
Insulation:	25-R12 5-ROXUL	Ice Rakes:	2
Cross Braces:	4	Uprights:	
Liner:	60-REGULAR 44-10%PERF	COLOR	WHITE
Fans c/w hood	1-12" GP FAN WITH HOOD		

***** Trucker is responsible for final load measurements *****

2-4TON BARD UNITS
2-15KW OAS HEATERS

SHIPPING INFORMATION

Trucking Company	WARWICK		
Trucker:	ART	Truck #	11
Shipper:	DAN.A		
date shipped:	June 20, 2012		
Received By:			

Kent Steel Ltd.

MANUFACTURING INSPECTION & TEST PLAN (I.T.P) Prepared by: Kirby Kachmarski rev. 0

Product category: Structural Codes /Standards: CSA W59/W47.1

REFERENCE:

Kent Steel Job # KS 1767

P.O. # P12093

Customer: Warwick Industries W28406

Date: May 2, 2012

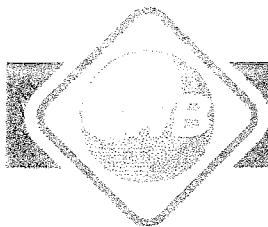
Project: ABB / Bermac

Project P.O. # 4500497048

ITP Customer - Consultant	Kent Steel QA	3 rd Party	Surveillance
QA Shop Inspection Reports Customer - Consultant	Kirby Kachmarski		
Inspection Requirement	A/R – As Required	DR – Document Review	H – Hold IP – Inspection Point N/A – Not Applicable
Description (Structural Skid): 14'10" x 48'2" c/w Upper Steel	Inspection Criteria (Specifications ,CSA –W59/47.1)		

Inspection Item	Activity	Acceptance Criteria	Meets Acceptance Criteria Yes/No	Inspection Requirement	Kent Steel Inspector's Signature	Date	Customer Signature	End User Signature	Date
Prefabrication meeting/Review Customer Specifications	Review Scope	At Kent Steel	YES	A/R	PK	MAY 2/12			
Receipt of P.O.			YES	H,DR	PK	MAY 2/12			
Drawings Received Issued for Construction		Customer requirements	YES	A/R	PK	MAY 2/12			
Welding Procedure Review		Customer requirements , CSA W-59 /47.1	YES	H	PK	MAY 2/12			
Welder Qualification		Customer requirements CSA W-59/47.1	YES	H	PK	MAY 2/12			
Materials Received		P.O. and Approved Drawings	YES	DR	PK	MAY 2/12			
Material Identity, Heat Numbers, Mill Test Reports	Review mill test reports for material identity and audit materials for project	Review to Project requirements and CSA requirements	YES	DR	PK	MAY 3/12			
Fit-Up Dimensional Check	Review dimensions on structure (attachments, etc.)	Approved drawings	Y	H, IP	PK	MAY 17/12			
Orientation Check	Review orientation of material, attachments and holes	Approved drawings	Y	H, IP	PK	MAY 17/12			

Inspection Item	Activity	Acceptance Criteria	Meets Acceptance Criteria Yes/No	Inspection Requirement	Kent Steel Inspector's Signature	Date	Customer Signature	End User Signature	Date
Support Check	Review supports for dimensional accuracy	Approved drawings	Y	H, IP	PH	MAY 21/12			
Visual Weld Check	Visually check all welds including attachment welds	Approved drawings, CSA W-59/47.1	Y	HP	PH	MAY 21/12			
Stress Relief (if required)	Review procedure for PWHT, calibration records and PWHT charts	Approved drawings, CSA W-59/47.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Radiography Procedures(if required)	Review radiography procedures, personnel qualifications, radiographs and reader sheets	Approved drawings, CSA W-59/47.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other N.D.E. and Procedures (describe)	Review requirements for additional N.D.E. including procedures, qualification and results (hardness)	Approved drawings, CSA W-59/47.1	YES	IP	PH	MAY 16/12			
Record of Elevation	Record measurements and review documentation	Customer requirements	YES	H, IP	PH	MAY 19/12			
Grating	Shipped Loose / Fixed	Approved Drawings, CSA W-59/47.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sandblasting, Prime, Paint (includes sub contractors)	Review the sandblast, prime and painting (including documentation) SP6. Rustex Primer. Industrial Enamel Black	Approved drawings	YES	IP, DR	PH	MAY 21/12			
Insulation Inspection	Adhesive and thickness check 3" PF-2444-0 plus Towerthon	Customer requirements	YES	IP	PH	MAY 17/12			
Final Documentation Review	Review the requested documentation	Customer requirements	YES	DR	PH	MAY 22/12			
Packaging, Loading	Review Packaging, Loading	Customer requirements	YES	DR, HP	PH	MAY 22/12			
Release	Release the structural for shipment	Customer requirements	YES	DR	PH	MAY 22/12			



LETTER OF VALIDATION

The CWB acknowledges that

Kent Steel Ltd.

5441 52 Avenue SE , Calgary, AB T2C 4S5

is certified to **CSA Standard W47.1**

"Certification of Companies for Fusion Welding of Steel"

in **DIVISION 2**

for the period **March 10, 2012 to April 9, 2013**

Company Code: KENTS1

Scope: Structural steel fabricator - fabrication of structural steel, miscellaneous steel and steel plate works for the oil and gas and petro-chemical industries. Also fabrication of structural steel, miscellaneous steel and steel plate works for buildings.

Registrar



For more information, visit www.cwbgroup.org

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Kent Steel Ltd.

Welding Procedure Specification SM – 1

SMAW of Carbon Steel

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A SCOPE

This Welding Procedure Specification covers welding and related operations in accordance with CSA Standard W59-03 and has been prepared to meet the requirements of Clause 10 of CSA Standard W47.1-03.

B WELDING PROCEDURE

The welding shall be done manually using the shielded metal arc welding process (SMAW). The joints shall be made by single or multiple pass welding from one or both sides as indicated on the Welding Procedure Data Sheet referring to this Specification.

C BASE METAL

The base metal shall conform to Steel Groups 1, 2 & 3 of CSA Standard W59 – Table 11.1 and Table 12.1 with the exception of the atmospheric corrosion resistant steels. A copy of Tables 11.1 and 12.1 appears in the Appendix. If atmospheric corrosion resistant steels are to be used, they shall be shown on a separate data sheet.

D BASE METAL THICKNESS

Base metal from 3mm (1/8") to unlimited thickness may be welded under this Specification. In cases where base metals less than 3mm (1/8") thick are welded refer to Clause 1.5 of CSA Standard W59.

E PREPARATION OF BASE MATERIAL

Surfaces and edges to be welded shall be smooth, uniform and free from fins, cracks and other defects that would adversely affect the quality or strength of the weld. Surfaces to be welded shall also be free, within 50mm (2") of any weld locations, from loose or thick scale (except for tightly adhering small islands of scale), slag, loose rust, paint, grease, moisture and other foreign material that will prevent welding to acceptance criteria of this standard.

Occasional notches, not more than 5mm (3/16") deep, on otherwise satisfactory surfaces shall be removed by machining or grinding. Occasional notches exceeding 5mm (3/16") and less than 10mm (3/8") deep, in oxygen cut edges of plate up to 100mm (4") thick not to be welded, may, with the Contractor's Engineer's approval, be repaired by welding. For material 100mm (4") thick or over the depth of the notch shall not exceed 15mm (9/16"). Such weld repairs shall be made by suitably preparing the defective area, welding with low-hydrogen electrodes to an approved procedure, and grinding the completed weld smooth and flush with the adjacent surface to produce a workmanlike finish.

Planar edge discontinuities of plates are to be inspected in accordance with Clause 5.3.5 of CSA Standard W59.

Re-entrant corners, except for the corners of weld access cope holes adjacent to a flange shall be filleted to a radius of not less than 12mm (1/2").

The transition from the curved to the straight surface shall be smooth and without offsets.

Preparation of surfaces or edges of the parts to be joined by welding shall be prepared by machining, shearing, grinding, chipping, air carbon arc or oxygen gouging. Back gouging of welds or the removal of defective work or material shall be done by grinding, chipping, air carbon arc or oxygen gouging. Oxygen gouging shall not be used on quenched or tempered steels. Oxygen cutting shall preferably be done by machine oxygen cutting. Oxygen cut edges shall be smooth, regular, and free of slag.

F FILLER METAL

The filler metal shall be certified by the Canadian Welding Bureau to the requirements of CSA W48-01 Filler Metals and Allied Materials for Metal Arc Welding.

G POSITION

The welding shall preferably be done in the flat position. The horizontal, vertical, or overhead positions may be used provided approved welding procedure data sheets referring to those positions and this procedure specification are followed. Unless otherwise called for on a specific data sheet, vertical welds shall be made with the progression of each pass in an

upward direction. If welds are to be made in a vertical-down sequence, the procedure shall be qualified by welder qualification in accordance with Clauses 9.9.3 of CSA Standard W47.1.

H PREHEAT AND INTERPASS TEMPERATURES

The minimum preheat and interpass temperature shall be in accordance with Table 5.3 of CSA Standard W59 (as shown in the Appendix). The preheat and interpass temperatures must be sufficient to prevent cracking. Experience has shown that the minimum levels specified in Table 5.3 are adequate to prevent cracking in most cases. However, higher preheats may be required in situations involving higher restraint, higher hydrogen, certain combinations of steel thickness, lower welding heat input, or steel composition at the top end of the steel specification. Some alternate recognized methods or guidelines for determining preheat are given in Appendix P of CSA Standard W59.

I ELECTRICAL CHARACTERISTICS

The welding current shall be AC or DC RP. The welding equipment shall have drooping voltage characteristics. The following tables show recommended amperage and voltage ranges of commonly used electrodes.

Electrode Classification E4918-1

Diameter		Amperage	Voltage
mm	inches	Range	Range
2.5	3/32	90 – 120	20 – 23
3.2	1/8	120 – 150	21 – 24
4.0	5/32	150 – 210	21 – 24
5.0	3/16	200 – 275	22 – 25
6.0	1/4	275 – 360	22 – 27

Electrode Classification E4928

Diameter		Amperage Range	Voltage
mm	inches	Flat & Horizontal	Range
3.2	1/8	130 – 170	22 – 26
4.0	5/32	180 – 240	22 – 26
5.0	3/16	230 – 300	23 – 27

Electrode Classification E4924

Diameter		Amperage Range	Voltage
mm	inches	Flat & Horizontal	Range
3.2	1/8	125 – 165	28 – 32
4.0	5/32	175 – 235	32 – 35
5.0	3/16	240 – 350	32 – 35

Electrode Classification E4310

Diameter		Amperage Range	Voltage Range
mm	inches		
3.2	1/8	90 – 140	24 – 26
4.0	5/32	120 – 175	24 – 28
5.0	3/16	140 – 225	24 – 28

The maximum tolerances on the amperage listed on the procedure data sheets referring to this Specification shall be $\pm 10\%$.

J WELDING TECHNIQUE

The maximum thickness of layers shall be:

- 6mm (1/4") - for root passes of groove welds with the minimum size being such to prevent cracking.
- 5mm (3/16") - for subsequent layers of welds made in any position.

The maximum electrode size shall be:

- 4mm (5/32") - all passes in vertical fillet and groove welds.
- 5mm (3/16") - all passes in overhead fillet and groove welds.
 - all passes in horizontal groove welds.
 - root passes in grooves with backing where the root opening is less than 6mm (1/4") in the flat position.
 - root passes in grooves without backing in the flat position.

- 6mm (1/4") - all passes for horizontal fillet welds.
 - root passes for fillets in the flat position.
 - root passes in grooves with backing where the root opening is greater than 6mm (1/4") in the flat position
- 8mm (5/16") - all passes subsequent to root passes for fillet and groove welds made in the flat position.

The maximum one pass fillet weld size shall be:

- 10mm (3/8") - in the flat position.
- 8mm (5/16") - in the horizontal or overhead position.
- 13mm (1/2") - in the vertical position.

The maximum width of one pass layers shall be such that weaving of the electrode is limited to 2 ½ times the electrode diameter.

The stringer bead technique should be used maintaining a short arc. Each pass should fuse properly into any backing plate, preceding pass, or adjacent plate metal. No unfilled or unfused pockets should be left between weld beads.

K WELDING CONDITIONS

No welding shall be done when temperatures of the base metal is lower than -18°C (0°F) except with the express consent of the Engineer. At temperatures below 0°C (32°F), the surfaces of all areas within 80mm (3") of the joint where a weld is to be deposited shall be heated to a temperature at least warm to the hand before welding is commenced - approximately 10°C (50°F).

The operator and the work shall be adequately protected against the direct effect of wind, snow, and rain.

I. WELD PROFILES

The desirable, acceptable, and unacceptable fillet weld profiles are shown in Figure 5.4 in the Appendix.

The acceptable and unacceptable groove weld profiles are shown in Figure 5.4 in the Appendix.

M TREATMENT OF UNDERSIDE OF WELDING GROOVE

Prior to depositing weld metal on the underside of a welding groove, the root shall be back gouged to produce a groove contour substantially conforming to the prequalified single U-Joint and its depth shall be adequate to ensure complete penetration into the previously deposited weld metal.

N WELD METAL CLEANING

Slag shall be removed from all finished welds and before welding over previously deposited welds.

O TACK WELDS

Tack welds that are incorporated into the final weld shall be subject to the same quality requirements as the final welds and be made with electrodes meeting the requirements of the final welds and shall be cleaned thoroughly.

Tack welds not incorporated into the final weld shall be removed – except that they need not be removed for statically loaded structures unless required by the Engineer.

Tack welds located in the path of fillet welds 10mm (3/8") or smaller in size or in the roots of joints requiring specific root penetration shall be sufficiently small that they do not produce objectionable changes in the appearance of the weld surface or result in a decrease in penetration, otherwise they shall be removed or reduced in size by any suitable means prior to welding.

P ARC STRIKES

Arc strikes outside of the area of permanent welds should be avoided on any material. When they occur in dynamically loaded structures, the surface of the arc strike should be lightly ground and checked for soundness using the magnetic particle inspection method.

Q ASSEMBLY PRACTICES

The parts to be joined by fillet welds shall be brought into as close a contact as practicable. The separation between parts shall normally not exceed 5mm (3/16") except in cases involving shapes and plates 75mm (3") thick or greater when, after straightening and in assembly, the gap cannot be closed sufficiently to meet this tolerance. In such cases, a maximum gap of 8mm (5/16") is acceptable, provided that the sealing weld or suitable backing material* is used to prevent melt-through.

If the separation is 2mm (1/16") or greater, the leg of the fillet weld shall be increased by the amount of the separation.

The separation between faying surfaces of lap joints and of butt joints landing on a backing shall not exceed 2mm (1/16"). Where irregularities in rolled shapes or plates after straightening do not permit contact within the above limits, the procedure necessary to bring the material within these limits shall be subject to the approval of the Engineer.

The parts, bearing joints excepted, to be joined by partial joint penetration having groove welds parallel to the length of the member shall be brought into as close contact as practicable. The gap between parts shall not exceed 5mm (3/16") except in cases involving rolled shapes and plates 75mm (3") or greater in thickness when, after straightening and in assembly, the gap cannot be closed sufficiently to meet this tolerance. In such cases, a maximum gap of 8mm (5/16") is acceptable provided a sealing weld or suitable backing material* is used to prevent melt-through and the final weld meets the requirements for throat size. Tolerances for bearing joints shall be in accordance with the applicable contract specification.

The use of fillers is prohibited except as specified on the drawings or as specially approved by the Engineer and made in accordance with Clause 4.6 of CSA Standard W59.

* Backing to prevent burn-through may be of flux, glass tape, iron powder or similar material or it may be provided by means of root passes deposited by a low-hydrogen electrodes or electrodes of other arc welding processes that are specified to an appropriate diffusible hydrogen designator.

Abutting parts to be joined by groove welds shall be carefully aligned. However, an offset not exceeding 10% of the thickness of the thinner part joined but in no case more than 3mm (1/8") shall be permitted as a departure from the theoretical alignment. In correcting misalignment in such cases, the parts shall not be drawn into a slope greater than 1 in 25. Measurement of the offset shall be based on centerline of parts unless otherwise shown on the drawing.

Backing for groove welds shall be continuous for the full length of the joint. Where backing is composed of individual lengths of bars, they shall be carefully aligned and welded into one continuous member.

Members to be welded shall be brought into correct alignment and held safely in position until welding has been completed. Suitable allowances shall be made for warpage and shrinkage.

R ALLOWABLE WORKMANSHIP TOLERANCES

With the exclusion of electroslag and electrogas welding and, with the exception of Clause 5.4.5.2 of CSA Standard W59 for root openings in excess of those permitted in the table below, dimensions of the cross-section of groove welded joints that vary from those shown on the detail drawings by more than the following workmanship tolerances shall be corrected in accordance with Appendix C, Clause C1.1(f) of CSA Standard W59 or referred to the Engineer for approval.

Workmanship Tolerance for Groove Welds

	Root Not Gouged	Root Gouged
Root Face of Joint	± 2mm	Not Limited
Root Opening of Joints:		
Without steel backing	±2mm	+2mm -3mm
With steel backing	+ 6mm - 2mm	Not Applicable Not Applicable
Groove Angle of Joint	+ 10° - 5°	+ 10° - 5°

S CONTROL OF DISTORTION AND SHRINKAGE STRESSES

Insofar as practicable, all welds shall be deposited in a sequence that will balance the applied heat of welding while the welding progresses.

Before the start of welding on a member or structure in which shrinkage stresses or distortion are likely to effect the adequacy of the structure, a program for welding sequence and distortion control shall be developed by the Contractor.

The direction of the general progression in welding shall be from points where the parts are relatively fixed in position with respect to each other towards points where they have a greater relative freedom of movement.

Joints expected to exhibit significant shrinkage shall be welded first (where practical) while conditions of minimum restraint prevail. Joints expected to have lesser shrinkage shall be welded second.

T QUALITY OF WELDS

1. Visual Examination

Cracks or blow holes that appear on the surface of any pass shall be removed before depositing the next covering pass. The procedure and technique shall be such that undercutting of base metal and adjacent passes is minimized.

All welds shall be visually inspected. A weld subject only to visual inspection shall be acceptable if visual inspection shows:

- (a) No surface cracks.
- (b) No visible lack of fusion between welds and base metal.
- (c) No craters.
- (d) Weld profiles in accordance with Clause 5.9 of CSA Standard W59.
- (e) In statically loaded structures, the sum of diameters of visible porosity does not exceed 10mm (3/8") in any linear 25mm (1") of weld and does not exceed 20mm (3/4") in any 300mm (12") length of weld. Any individual pore shall have a dimension not exceeding 2.5mm (3/32").

- (f) In statically loaded structures, irrespective of length, the undercut does not exceed the value shown in Figure 11.4 of CSA Standard W59 for the primary stress direction category applicable to the area containing the undercut. Further, the undercut may be twice the value permitted by Figure 11.4 (for the applicable load category) for an accumulated length of 50mm (2") in a 300mm (12") length of weld – but in no case may the undercut be greater than 1.6mm (1/16"). For weld lengths of less than 300mm (12"), the permitted accumulated length of undercut shall be proportional to the actual length of the weld.
- (g) In cyclically loaded structures, the frequency of visible porosity in fillet welds does not exceed one in each 100mm (4") length of weld and the maximum diameter does not exceed 2.5mm (3/32"). That, for fillet welds connecting intermediate transverse stiffeners to web, the sum of the diameters of visible porosity does not exceed 10mm (3/8") in any 25mm (1") of weld nor 20mm (3/4") in any 300mm (12") length of weld. That groove welds have no visible porosity.
- (h) In cyclically loaded structures, the undercut is not more than 0.25mm (0.01") deep when its direction is transverse to the primary stress in the part that is undercut. The undercut is not more than 1mm (1/32") deep when its direction is parallel to the primary stress in the part that is undercut. For members not carrying primary stresses, undercuts in excess of the amounts stated shall be subject to approval by the Engineer.

2. Radiographic and Magnetic Particle Examination

Welds that are subject to radiographic and magnetic particle testing - in addition to visual inspection - shall meet the requirements of:

- (a) Clause 11.5.4.3 of CSA Standard W59 for statically loaded structures.
- (b) Clause 12.5.4.3 of CSA Standard W59 for cyclically loaded structures.

3. Ultrasonic Inspection

Welds that are subject to ultrasonic examination in addition to visual inspection shall have no cracks and meet the following requirements:

- (a) In statically loaded structures, any weld discontinuity shall be accepted or rejected on the basis of its defect rating and its length in accordance with Table 11.3 of CSA Standard W59.

- (b) In cyclically loaded structures, welds subject to tensile stress under any conditions of loading shall conform to the requirements of Table 12.5 of CSA Standard W59.
- (c) In cyclically loaded structures, welds subject to compressive stress only and specifically indicated as such in the detail drawings shall conform to the requirements of Table 11.3 of CSA Standard W59.

U STRESS RELIEF HEAT TREATMENT

Where required by the contract drawings or specifications, welded assemblies shall be stress relieved by heat treatment. Refer to Clause 5.12 of CSA Standard W59.

V STORAGE AND CONDITIONING OF ELECTRODES

1. Low-Hydrogen Electrodes

All low-hydrogen electrodes shall be delivered in sealed containers. If such containers show evidence of damage, the low alloy steel electrodes shall be baked for at least 1 hour at a temperature between 370°C (700°F) and 430°C (800°F) before being used and carbon steel electrodes shall be baked for at least 2 hours at a temperature between 230°C (450°F) and 260°C (500°F) before being used.

Immediately after being removed from sealed containers or from baking ovens, the electrodes shall be stored in ovens held at a temperature of at least 120°C (250°F).

Low-hydrogen electrodes of the E49 classification that are not used within 4 hours after removal from the ovens - except as noted in Clause 5.2.2.4.4 of CSA Standard W59 - shall be reconditioned in accordance with clause 5.2.2.4.1.

Low-hydrogen electrodes shall be rebaked no more than once.

When approved by the Contractor's Engineer, auxiliary electrode containers or dispensers may be used to extend permissible exposure times in accordance with the following:

- a) The Contractor's Engineer shall be satisfied that such electrode containers or dispensers have been demonstrated to provide adequate atmospheric sealing protection for the contained electrodes at a relative humidity of 90% at 30°C (86°F) for the total storage time proposed for acceptance; and

- b) The electrodes so contained shall not produce diffusible hydrogen levels in weld metal in excess of the requirements of CSA Standard W48.

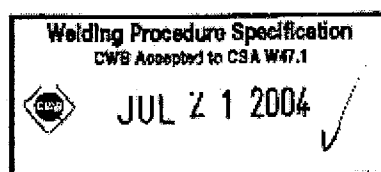
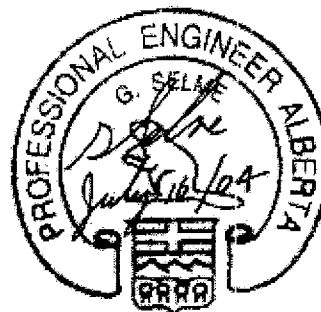
Low-hydrogen electrodes of the E49 classification that are not used within a maximum of 10 hours total exposure time after being removed from ovens and stored in approved electrode containers or dispensers shall be reconditioned in accordance with clause 5.2.2.4.1.

2. Other Than Low-Hydrogen Electrodes

All other than low-hydrogen electrodes shall be stored in warm and dry conditions and kept free from oil, grease and other deleterious matter once they have been removed from their containers and packages.

3. Wet Electrodes

Electrodes that have been wet shall be discarded.



Welding Procedure Data Sheet			No. SS2		Rev 0	Date July 16, 2009	W47.1			
Company Name Kent Steel Ltd.					Ref. WPS SSM-3					
Address 5441 - 52 Avenue SE, Calgary					Ref. Standards W47.1 & D1.6					
Welding Process SMAW		Pulsed No		Welding Position		Horizontal				
Process Mode		Manual			Joint Type		Tee			
Shielding Gas Type					Penetration		Fillet			
Gas Flow Rate					Tungsten Type					
Filler Metal Classification E309L-16					Tungsten Size					
Electrode Extension					Preheat Temp.		n/a			
Base Material Stainless Steel type 304 (t) to Steel Group 1, 2 & 3 Table 11.1 W59 (T2)					Interpass Temp. Min.		n/a			
					Interpass Temp. Max.		n/a			
Typical Joint Preparation					Typical Pass and Layer					
Mat'l Thk t	Weld Size S	T2	Layer	Pass Number	Filler Metal Size	Current Polarity	Current Amperes	Wire Feed Speed	Volts	Welding Speed
6 mm (1/4")	5 mm	5-13	1	1	3.2 mm (1/8")	DCEP	75-120			
Revision Date	App.	Explanation			CWB Approval			Engineers Seal		
Remarks										

Kent Steel Ltd.

Welding Procedure Specification FC - 1

FCAW or MCAW of Carbon Steel

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A SCOPE

This Welding Procedure Specification covers welding and related operations in accordance with CSA Standard W59-03 and has been prepared to meet the requirements of Clause 10 of CSA Standard W47.1-03.

B WELDING PROCESS

The welding shall be done semi-automatically using the flux cored arc welding process (FCAW) or metal cored arc welding process (MCAW). The joints shall be made by single or multiple pass welding – from one or both sides – as indicated on the Welding Procedure Data Sheets referring to this Specification.

C BASE METAL

The base metal shall conform to Steel Groups 1, 2 & 3 of CSA Standard W59 – Table 11.1 and Table 12.1 with the exception of the atmospheric corrosion resistant steels. When atmospheric corrosion resistant steel is used it shall be shown on a separate data sheet. A copy of Tables 11.1 and 12.1 appears in the Appendix.

D BASE METAL THICKNESS

Base metal from 3mm (1/8") to unlimited thickness may be welded under this Specification. In cases where base metals less than 3mm (1/8") thick are welded refer to Clause 1.5 of CSA Standard W59.

E PREPARATION OF BASE METAL

Surfaces and edges to be welded shall be smooth, uniform and free from fins, cracks and other defects that would adversely affect the quality or strength of the weld. Surfaces to be welded shall also be free, within 50mm (2") of any weld locations, from loose or thick scale (except for tightly adhering small islands of scale), slag, loose rust, paint, grease, moisture and other foreign material that will prevent welding to acceptance criteria of this standard.

Occasional notches, not more than 5mm (3/16") deep on otherwise satisfactory surfaces shall be removed by machining or grinding. Occasional notches exceeding 5mm (3/16") and less than 10mm (3/8") deep, in oxygen cut edges of plate up to 100mm (4") thick, not to be welded, may, with the Contractor's Engineer's approval, be repaired by welding. For material 100mm (4") thick or over the depth of the notch shall not exceed 15mm (9/16"). Such weld repairs shall be made by suitably preparing the defective area, welding with low-hydrogen electrodes to an approved procedure, and grinding the completed weld smooth and flush with the adjacent surface to produce a workmanlike finish.

Planar edge discontinuities of plates are to be inspected in accordance with Clause 5.3.5 of CSA Standard W59.

Re-entrant corners, except for the corners of weld access cope holes adjacent to a flange, shall be filleted to a radius of not less than 12mm (1/2").

The transition from the curved to the straight surface shall be smooth and without offsets.

Preparation of surfaces or edges of the parts to be joined by welding shall be prepared by machining, grinding, chipping, air carbon arc or oxygen gouging. Back gouging of welds or the removal of defective work or material shall be done by grinding, chipping, air carbon arc or oxygen gouging. Oxygen gouging shall not be used on quenched or tempered steels. Oxygen cutting shall preferably be done by machine oxygen cutting. Oxygen cut edges shall be smooth, regular, and free of slag.

F FILLER METAL

The filler metal shall be certified by Canadian Welding Bureau to the requirements of CSA W48 or AWS A5.29. Filler metal shall have a diffusible hydrogen designator of III16 or less.

G SHIELDING GAS

The shielding gas shall be as listed on the Welding Procedure Data Sheet. This gas mixture shall be a welding grade having a dew point of -40°C (-40°F) or lower.

H WELDING CONDITIONS

Welding shall not be done in a draught or wind unless the weld is protected by a shelter. This shelter shall be of material and shape appropriate to reduce wind velocity in the vicinity of the weld to a maximum of 8 km per hour (5 mph).

No welding shall be done when temperature of the base metal is lower than -18°C (0°F) except with the express consent of the Engineer. At temperatures below 0°C (32°F) the surfaces of all areas within 80mm (3") of the joint where a weld is to be deposited, shall be heated to a temperature at least warm to the hand before welding is commenced, approximately 10°C (50°F).

The operator and the work shall be adequately protected against the direct effect of wind, snow and rain.

I POSITION

The welding shall preferably be done in the flat position. The horizontal, vertical, or overhead positions may be used provided approved welding procedure data sheets referring to those positions and this procedure specification are followed. Unless called for otherwise on a specific data sheet, vertical welds shall be made with the progression of each pass in an upward direction. If welds are to be made in a vertical-down sequence, the procedure shall be qualified by welder qualification in accordance with Clause 9.9.3 of CSA Standard W47.1.

J PREHEAT AND INTERPASS TEMPERATURES

The minimum preheat and interpass temperature shall be in accordance with Table 5.3 of CSA Standard W59 (as shown in the Appendix). The preheat and interpass temperatures must be sufficient to prevent cracking. Experience has shown that the minimum levels specified in Table 5.3 are adequate to prevent cracking in most cases. However, higher preheat temperatures may be required in situations involving higher restraint, higher hydrogen, certain combinations of steel thickness, lower welding heat input, or steel composition at the top end of the steel specification. Some alternate recognized methods or guidelines for determining preheat are given in Appendix P of CSA Standard W59.

K ELECTRICAL CHARACTERISTICS

The welding equipment shall be constant voltage type with constant wire feed speed. Typical amperage, voltage, and wire feed speed ranges for welding is shown below.

Electrode Classification E491C-6M-H4

Diameter:	1.2 mm (0.045")
Amperage Range:	200 - 360
Voltage Range:	24 - 29
Wire Feed Speed Range:	230 - 510 ipm

Diameter:	1.6mm (1/16")
Amperage Range:	290 - 470
Voltage Range:	25 - 31
Wire Feed Speed Range:	235 - 410 ipm

Electrode Classification E491T-9M-H8

Diameter:	1.2 mm (0.045")
Amperage Range:	220 - 325
Voltage Range:	23 - 29
Wire Feed Speed Range:	360 - 600 ipm

L WELDING TECHNIQUE

The maximum size of a fillet weld made in one pass shall be 12mm (1/2") for the flat position and 10mm (3/8") for the horizontal position.

The thickness of weld layers — except root and surface layers — shall not exceed 6mm (1/4").

When the root opening of a groove weld is 12mm (1/2") or greater, a multiple pass split layer technique shall be used with the exception of the finishing weld layers. The split layer technique shall also be used in making all multiple pass welds when the width of the layers exceeds 16mm (5/8").

Revised Dec 4/06

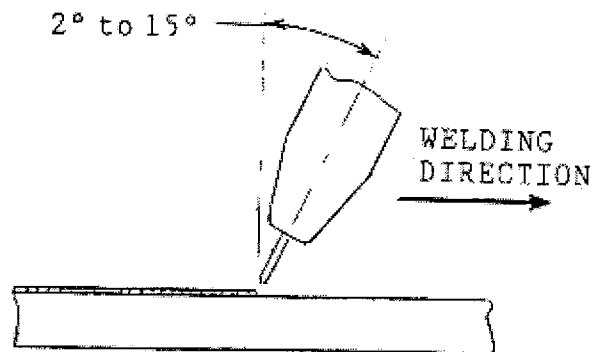
The maximum tolerances of the following parameters listed on the Welding Procedure Data Sheets referring to the Specification are listed below:

Amperage:	$\pm 10\%$
Wire Feed Speed:	$\pm 10\%$
Voltage:	$\pm 7\%$
Arc Travel Speed	$\pm 15\%$

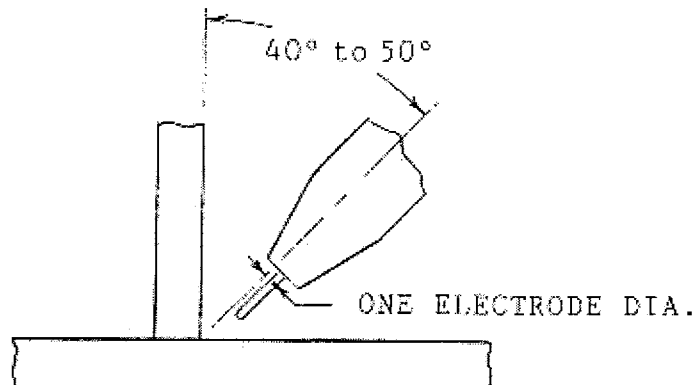
It is very important that the wire extension be kept as constant as possible during the welding operation. The electrode stickout is shown on each Welding Procedure Data Sheet referring to this Specification.

Each pass should fuse properly into any backing plate, preceding pass, or adjacent plate metal. Craters at the end of each weld pass shall be filled in to prevent undercut and cracking.

When making groove and fillet welds in the flat position, the torch should be angled 2° to 15° in the direction of travel as shown below.



When fillet welds are made in the horizontal position, the electrode should have a work angle of 40° to 50° in addition to the 2° to 15° in the direction of travel.



M TACK WELDS

Tack welds that are incorporated into the final weld shall be subject to the same quality requirements as the final welds and be made with electrodes meeting the requirements of the final welds and shall be cleaned thoroughly.

Tack welds not incorporated into the final weld shall be removed – except that they need not be removed for statically loaded structures unless required by the Engineer.

Tack welds located in the path of fillet welds 10mm (3/8") or smaller in size, or in the root of joints requiring specific root penetration, shall be sufficiently small that they do not produce objectionable changes in appearance of the weld surface or result in decrease in penetration; otherwise, they shall be removed or reduced in size by any suitable means prior to welding.

N WELD PROFILES

The desirable, acceptable, and unacceptable fillet weld profiles are shown in Figure 5.4 in the Appendix.

The acceptable and unacceptable groove weld profiles are shown in Figure 5.4 in the Appendix.

O ARC STRIKES

Arc strikes outside the area of permanent welds should be avoided on any material. When they occur in cyclically loaded structures, the surface of the arc strike should be lightly ground and checked for soundness using the magnetic particle inspection method.

P TREATMENT OF UNDERSIDE OF WELDED GROOVE

Prior to depositing weld metal on the underside of a welded groove, the root shall be back gouged to produce a groove contour substantially conforming to the prequalified single U-Joint and its depth shall be adequate to ensure complete penetration into the previously deposited weld metal.

Q WELD METAL CLEANING

Slag shall be removed from all finished welds and before welding over previously deposited metal.

R ASSEMBLY PRACTICES

The parts to be joined by fillet welds shall be brought into as close a contact as practicable. The separation between parts shall normally not exceed 5mm (3/16") except in cases involving shapes and plates 75mm (3") thick or greater when, after straightening and in assembly, the gap cannot be closed sufficiently to meet this tolerance. In such cases, a maximum gap of 8mm (5/16") is acceptable, provided that the sealing weld or suitable backing material* is used to prevent melt-through.

If the separation is 2mm (1/16") or greater, the leg of the fillet weld shall be increased by the amount of the separation.

The separation between faying surfaces of lap joints and of butt joints landing on a backing shall not exceed 2mm (1/16"). Where irregularities in rolled shapes or plates after straightening do not permit contact within the above limits, the procedure necessary to bring the material within these limits shall be subject to the approval of the Engineer.

The parts, bearing joints excepted, to be joined by partial joint penetration having groove welds parallel to the length of the member shall be brought into as close contact as practicable. The gap between parts shall not exceed 5mm (3/16") except in cases involving rolled shapes and plates 75mm (3") or greater in thickness when, after straightening and in assembly, the gap cannot be closed sufficiently to meet this tolerance. In such cases, a maximum gap of 8mm (5/16") is acceptable provided a sealing weld or suitable backing material* is used to prevent melt-through and the final weld meets the requirements for throat size. Tolerances for bearing joints shall be in accordance with the applicable contract specification.

The use of fillers is prohibited except as specified on the drawings or as specially approved by the Engineer and made in accordance with Clause 4.6 of CSA Standard W59.

* Backing to prevent burn-through may be of flux, glass tape, iron powder or similar material or it may be provided by means of root passes deposited by a low-hydrogen electrodes or electrodes of other arc welding processes that are specified to an appropriate diffusible hydrogen designator.

Abutting parts to be joined by groove welds shall be carefully aligned. However, an offset not exceeding 10% of the thickness of the thinner part joined but in no case more than 3mm (1/8") shall be permitted as a departure from the theoretical alignment. In correcting misalignment in such cases, the parts shall not be drawn into a slope greater than 1 in 25. Measurement of the offset shall be based on centerline of parts unless otherwise shown on the drawing.

Backing for groove welds shall be continuous for the full length of the joint. Where backing is composed of individual lengths of bars, they shall be carefully aligned and welded into one continuous member.

Members to be welded shall be brought into correct alignment and held safely in position until welding has been completed. Suitable allowances shall be made for warpage and shrinkage.

S ALLOWABLE WORKMANSHIP TOLERANCES

With the exclusion of electroslog and electrogas welding and, with the exception of Clause 5.4.5.2 of CSA Standard W59 for root openings in excess of those permitted in the table below, dimensions of the cross-section of groove welded joints that vary from those shown on the detail drawings by more than the following workmanship tolerances shall be corrected in accordance with Appendix C, Clause C1.1(f) of CSA Standard W59 or referred to the Engineer for approval.

Workmanship Tolerance for Groove Welds

	Root Not Gouged	Root Gouged
Root Face of Joint	± 2mm	Not Limited
Root Opening of Joints:		
Without steel backing	±2mm	+2mm -3mm
With steel backing	+ 6mm - 2mm	Not Applicable Not Applicable
Groove Angle of Joint	+ 10° - 5°	+ 10° - 5°

T CONTROL OF DISTORTION AND SHRINKAGE STRESSES

Insofar as practicable, all welds shall be deposited in a sequence that will balance the applied heat of welding while the welding progresses.

Before the start of welding on a member or structure in which shrinkage stresses or distortion are likely to affect the adequacy of the structure, a program for welding sequence and distortion control shall be developed by the Contractor.

The direction of the general progression in welding shall be from points where the parts are relatively fixed in position with respect to each other towards points where they have a greater relative freedom of movement.

Joints expected to exhibit significant shrinkage shall be welded first (where practical) while conditions of minimum restraint prevail. Joints expected to have lesser shrinkage shall be welded second.

U QUALITY OF WELDS

1. Visual Examination

Cracks or blow holes that appear on the surface of any pass shall be removed before depositing the next covering pass. The procedure and technique shall be such that undercutting of base metal and adjacent passes is minimized.

All welds shall be visually inspected. A weld subject only to visual inspection shall be acceptable if visual inspection shows:

- (a) No surface cracks.
- (b) No visible lack of fusion between welds and base metal.
- (c) No craters.
- (d) Weld profiles in accordance with Clause 5.9 of CSA Standard W59.
- (e) In statically loaded structures, the sum of diameters of visible porosity does not exceed 10mm (3/8") in any linear 25mm (1") of weld and does not exceed 20mm (3/4") in any 300mm (12") length of weld. Any individual pore shall have a dimension not exceeding 2.5mm (3/32").

- (f) In statically loaded structures, irrespective of length, the undercut does not exceed the value shown in Figure 11.4 of CSA Standard W59 for the primary stress direction category applicable to the area containing the undercut. Further, the undercut may be twice the value permitted by Figure 11.4 (for the applicable load category) for an accumulated length of 50mm (2") in a 300mm (12") length of weld – but in no case may the undercut be greater than 1.6mm (1/16"). For weld lengths of less than 300mm (12"), the permitted accumulated length of undercut shall be proportional to the actual length of the weld.
- (g) In cyclically loaded structures, the frequency of visible porosity in fillet welds does not exceed one in each 100mm (4") length of weld and the maximum diameter does not exceed 2.5mm (3/32"). That, for fillet welds connecting intermediate transverse stiffeners to web, the sum of the diameters of visible porosity does not exceed 10mm (3/8") in any 25mm (1") of weld nor 20mm (3/4") in any 300mm (12") length of weld. That groove welds have no visible porosity.
- (h) In cyclically loaded structures, the undercut is not more than 0.25mm (0.01") deep when its direction is transverse to the primary stress in the part that is undercut. The undercut is not more than 1mm (1/32") deep when its direction is parallel to the primary stress in the part that is undercut. For members not carrying primary stresses, undercuts in excess of the amounts stated shall be subject to approval by the Engineer.

2. Radiographic and Magnetic Particle Examination

Welds that are subject to radiographic and magnetic particle testing – in addition to visual inspection – shall meet the requirements of:

- (a) Clause 11.5.4.3 of CSA Standard W59 for statically loaded structures.
- (b) Clause 12.5.4.3 of CSA Standard W59 for cyclically loaded structures.

3. Ultrasonic Inspection

Welds that are subject to ultrasonic examination in addition to visual inspection shall have no cracks and meet the following requirements:

- (a) In statically loaded structures, any weld discontinuity shall be accepted or rejected on the basis of its defect rating and its length in accordance with Table 11.3 of CSA Standard W59.

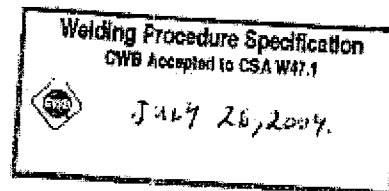
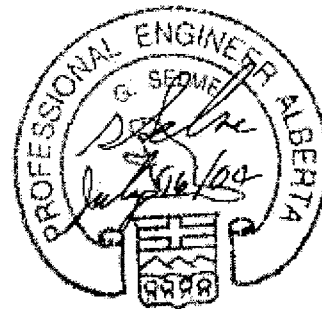
- (b) In cyclically loaded structures, welds subject to tensile stress under any conditions of loading shall conform to the requirements of Table 12.5 of CSA Standard W59.
- (c) In cyclically loaded structures, welds subject to compressive stress only and specifically indicated as such in the detail drawings shall conform to the requirements of Table 11.3 of CSA Standard W59.

V STRESS RELIEF HEAT TREATMENT

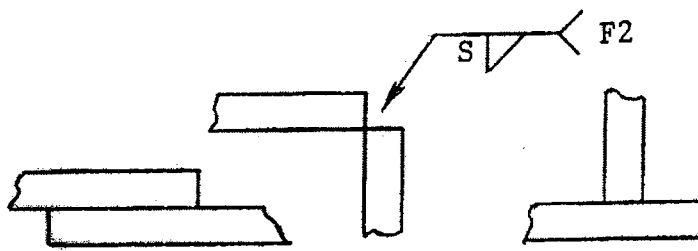
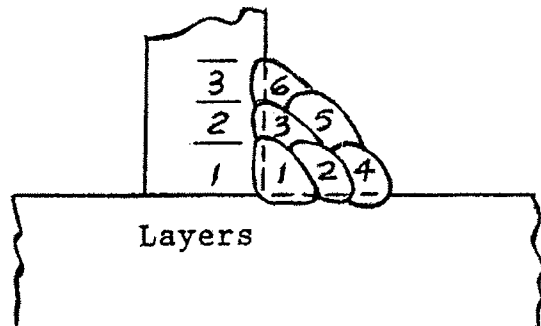
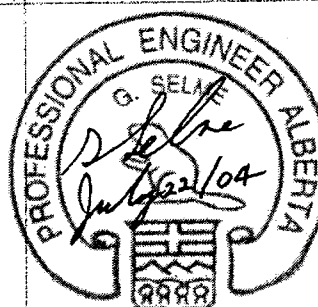
Where required by the contract drawings or specifications, welded assemblies shall be stress relieved by heat treatment. Refer to Clause 5.12 of CSA Standard W59.

W STORAGE OF ELECTRODES

The electrodes shall be stored in a clean and dry area where contamination by moisture, grease, or dirt can be avoided.



No.	F2	Date	14-Jul-04	W47.1
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Company Name: Kent Steel Ltd.							Welding Procedure Specification No. FC-1			
Address: 5441 - 52 Avenue SE, Calgary							Applicable Standards: W59 & W47.1			
Welding Process		<input type="radio"/> (1) Shielded Metal Arc (SMAW) <input type="radio"/> (4) Flux-Cored Arc (FCAW) <input type="radio"/> (2) Gas Metal Arc (GMAW) <input type="radio"/> (5) Submerged Arc (SAW) <input type="radio"/> (3) Gas Tungsten Arc (GTAW) <input checked="" type="radio"/> (6) Other <u>MCAW</u>					Filler Metal Classification: E491C-6M-H4 Shielding Gas or Flux: 90% to 92% Ar + 10% to 8% CO ₂			
Process Mode		<input type="radio"/> (1) Manual <input type="radio"/> (3) Machine <input checked="" type="radio"/> (2) Semi-Automatic <input type="radio"/> (4) Automatic		Tungsten Type:		Preheat Temp: As per				
Material Designations		Steel Groups 1, 2 & 3 Table 11.1 W59		Tungsten Size:		Min Interpass Temp: Table 5.3				
				Welding Position: Horizontal		Max Interpass Temp: W59				
(Show Welding Symbol with Data Sheet No. in tail) <div style="text-align: center;">  </div>							<div style="text-align: center;">  <p>Layers</p> </div>			
SKETCH OF TYPICAL JOINT PREPARATION							TYPICAL PASS AND LAYER SEQUENCE			
COMPLETE JOINT PENETRATION GROOVE WELD <input type="checkbox"/> (1) Back-gouged to sound metal <input type="checkbox"/> (4) Welded both sides without back gouging <input type="checkbox"/> (2) Welded onto steel backing <input type="checkbox"/> (5) Welded onto other than steel backing <input type="checkbox"/> (3) Welded from one side without backing							<input type="checkbox"/> (1) Partial Joint Penetration Groove Weld (specify effective throat) <input checked="" type="checkbox"/> (2) Fillet Weld		JOINT TYPE <input type="checkbox"/> BUTT <input checked="" type="checkbox"/> LAP <input type="checkbox"/> EDGE <input checked="" type="checkbox"/> CORNER <input checked="" type="checkbox"/> TEE <input type="checkbox"/> ARC SPOT WELD	
							Automatic, Semi-Automatic or Machine			
Mat'l Thk	Weld Size/ETT	Side No.	Layer	Pass No.	Filler Metal Size	Current Polarity	Amperes	Electrical Stickout:	Shielding Gas Flow Rate:	
t	S						+/- 10%	Wire Feed Speed ipm +/- 10%	Volts +/- 7%	
								Arc Travel Speed ipm +/- 15%		
5-12	5 mm		1	1	1.2 mm	DCRP	250	310	27	
6-20	6 mm		1	1	1.2 mm	DCRP	250	310	27	
8 & up	8 mm		1	1	1.2 mm	DCRP	250	310	27	
10 & up	10 mm		1	1	1.2 mm	DCRP	250	310	27	
			2	2,3	1.2 mm	DCRP	250	310	27	
13 & up	13 mm		1	1	1.2 mm	DCRP	250	310	27	
			2	2,3	1.2 mm	DCRP	250	310	27	
19 & up	19 mm		1	1	1.2 mm	DCRP	250	310	27	
			2,3	2-6	1.2 mm	DCRP	250	310	27	
Revision Date			Initials		Explanation		CWB Approval			
							* Engineer's Seal 			
Welding Procedure Data Sheet CWB Accepted to CSA W47.1 JUL 26 2004 Acceptance valid only when Welding Consumables certified by C.W.B. (CL 11.6.1, CSA W47.1)										

Welding Procedure Data Sheet

No. F4

Date 14-Jul-04

W47.1

Company Name: Kent Steel Ltd.

Address: 5441 - 52 Avenue SE, Calgary

Welding Procedure
Specification No.

FC-1

Applicable Standards: W59 & W47.1

Welding
Process

- ☐ (1) Shielded Metal Arc (SMAW) ☐ (4) Flux-Cored Arc (FCAW)
☐ (2) Gas Metal Arc (GMAW) ☐ (5) Submerged Arc (SAW)
☐ (3) Gas Tungsten Arc (GTAW) ☒ (6) Other MCAW

Filler Metal Classification: E491C-6M-H4

Shielding Gas or Flux: 90% to 92% Ar +
10% to 8% CO₂

Process
Mode

- ☐ (1) Manual ☐ (3) Machine
☒ (2) Semi-Automatic ☐ (4) Automatic

Tungsten Type:

Preheat Temp: As per

Tungsten Size:

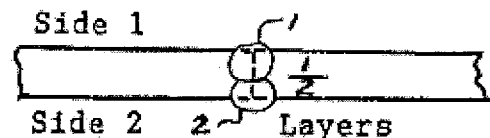
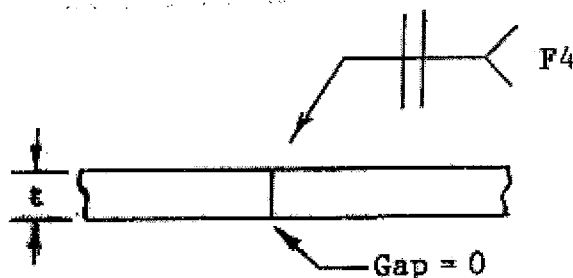
Min Interpass Temp: Table 5.3

Welding Position: Flat

Max Interpass Temp: W59

Material Steel Groups 1, 2 & 3
Designations Table 11.1 W59

(Show Welding Symbol with Data Sheet No. in tail)



SKETCH OF TYPICAL JOINT PREPARATION

TYPICAL PASS AND LAYER SEQUENCE

COMPLETE JOINT PENETRATION GROOVE WELD

- ☐ (1) Back-gouged to sound metal ☒ (4) Welded both sides without back gouging
☐ (2) Welded onto steel backing ☐ (5) Welded onto other than steel backing
☐ (3) Welded from one side without backing

- ☐ (1) Partial Joint Penetration
Groove Weld
(specify effective throat)
☐ (2) Fillet Weld

JOINT TYPE

- ☒ BUTT ☐ LAP ☐ EDGE
☐ CORNER ☐ TEE ☐ ARC SPOT
WELD

Automatic, Semi-Automatic or Machine

Mat'l Thk	Weld Size/ETT	Side No.	Layer	Pass No.	Filler Metal Size	Current Polarity	Amperes	Electrical Stickout	Shielding Gas Flow Rate	Wire Feed Speed	Volts	Arc Travel Speed
t							+/- 10%	16 mm	35 cfm	ipm +/- 10%	+/- 7%	ipm +/- 15%
5 mm		1	1	1	1.2 mm	DCRP	250			310	27	22
		2	2	2	1.2 mm	DCRP	250			310	27	22
6 mm		1	1	1	1.2 mm	DCRP	250			310	27	16
		2	2	2	1.2 mm	DCRP	250			310	27	16

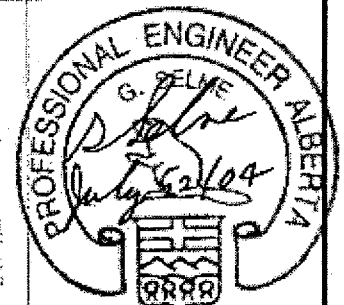
Revision Date Initials Explanation

CWB Approval

* Engineer's Seal

Welding Procedure Data Sheet
CWB Approved to CSA W47.1

JUL 20 2004
 Approved to Weld on, under Welding
 Consumables Certificate, C.W.B.
 (C) 1981 C.W.B. W47.1



Welding Procedure Data Sheet

No. F5 Date 14-Jul-04 **W47.1**

Company Name: Kent Steel Ltd. Address: 5441 - 52 Avenue SE, Calgary					Welding Procedure Specification No.: FC-1 Applicable Standards: W59 & W47.1				
Welding Process <input type="radio"/> (1) Shielded Metal Arc (SMAW) <input type="radio"/> (4) Flux-Cored Arc (FCAW) <input type="radio"/> (2) Gas Metal Arc (GMAW) <input type="radio"/> (5) Submerged Arc (SAW) <input type="radio"/> (3) Gas Tungsten Arc (GTAW) <input checked="" type="radio"/> (6) Other <u>MCAW</u>		Filler Metal Classification: E491C-6M-H4 Shielding Gas or Flux: 90% to 92% Ar + 10% to 8% CO ₂							
Process Mode <input type="radio"/> (1) Manual <input type="radio"/> (3) Machine <input checked="" type="radio"/> (2) Semi-Automatic <input type="radio"/> (4) Automatic		Tungsten Type: Tungsten Size: Welding Position: Flat			Preheat Temp: As per Min Interpass Temp: Table 5.3 Max Interpass Temp: W59				
Material Designations: Steel Groups 1, 2 & 3 Table 11.1 W59									

(Show Welding Symbol with Data Sheet No. in tail)

Side 1

Side 2 **Layers**

SKETCH OF TYPICAL JOINT PREPARATION					TYPICAL PASS AND LAYER SEQUENCE				
COMPLETE JOINT PENETRATION GROOVE WELD <input checked="" type="checkbox"/> (1) Back-gouged to sound metal <input type="checkbox"/> (4) Welded both sides without back gouging <input type="checkbox"/> (2) Welded onto steel backing <input type="checkbox"/> (5) Welded onto other than steel backing <input type="checkbox"/> (3) Welded from one side without backing					<input type="checkbox"/> (1) Partial Joint Penetration Groove Weld (specify effective throat) <input type="checkbox"/> (2) Fillet Weld		JOINT TYPE <input checked="" type="checkbox"/> BUTT <input type="checkbox"/> LAP <input type="checkbox"/> EDGE <input type="checkbox"/> CORNER <input type="checkbox"/> TEE <input type="checkbox"/> ARC SPOT WELD		
					Automatic, Semi-Automatic or Machine				
Mat'l Thk	Weld Size/ETT	Side No.	Layer	Pass No.	Filler Metal Size	Current Polarity	Amperes	Electrical Stickout: 16 mm	Shielding Gas Flow Rate: 35 cfh
							Wire Feed Speed	Volts	Arc Travel Speed
							lpm +/- 10%	+/- 7%	lpm +/- 15%
6 mm		1	1	1	1.2 mm	DCRP	250	310	27 16
		2	2	2	1.2 mm	DCRP	250	310	27 13
10 mm		1	1	1	1.2 mm	DCRP	250	310	27 13
		2	2	2	1.2 mm	DCRP	250	310	27 10
13 mm		1	1	1	1.2 mm	DCRP	250	310	27 11
		2	2	2	1.2 mm	DCRP	250	310	27 8

Revision Data <table border="1" style="width:100%;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>									CWB Approval <div style="border: 1px solid black; padding: 5px; text-align: center;"> Welding Procedure Data Sheet CWB Approved to CSA W47.1 JUL 28 2004 Approved by welding with Welding Consumables certified by C.W.B. (W 1187 CSA 407.3) </div>		* Engineer's Seal 	

Welding Procedure Data Sheet

No. F6 Date 14-Jul-04 **W47.1**

Company Name: Kent Steel Ltd.
Address: 5441 - 52 Avenue SE, Calgary

Welding Procedure Specification No. FC-1
Applicable Standards: W59 & W47.1

Welding Process
☐ (1) Shielded Metal Arc (SMAW) ☐ (4) Flux-Cored Arc (FCAW)
☐ (2) Gas Metal Arc (GMAW) ☐ (5) Submerged Arc (SAW)
☐ (3) Gas Tungsten Arc (GTAW) ☒ (6) Other MCAW

Filler Metal Classification: E491C-6M-H4
Shielding Gas or Flux: 90% to 92% Ar + 10% to 8% CO₂

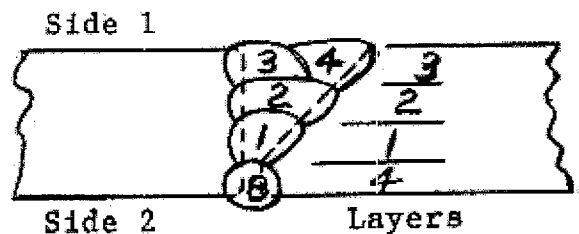
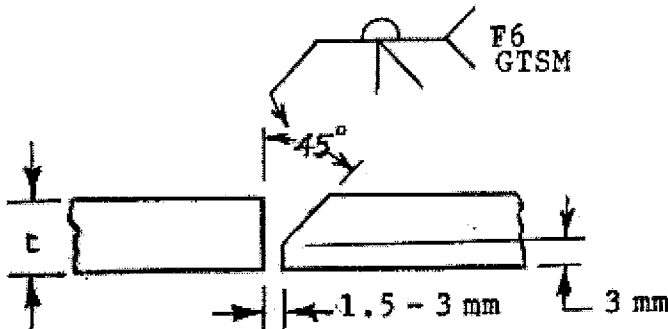
Process Mode
☐ (1) Manual ☐ (3) Machine
☒ (2) Semi-Automatic ☐ (4) Automatic

Tungsten Type:
Tungsten Size:
Welding Position: Flat

Preheat Temp: As per
Min Interpass Temp: Table 5.3
Max Interpass Temp: W59

Material Designations: Steel Groups 1, 2 & 3
Table 11.1 W59

(Show Welding Symbol with Data Sheet No. in tail)



SKETCH OF TYPICAL JOINT PREPARATION

TYPICAL PASS AND LAYER SEQUENCE

COMPLETE JOINT PENETRATION GROOVE WELD

- ☒ (1) Back-gouged to sound metal ☐ (4) Welded both sides without back gouging
☐ (2) Welded onto steel backing ☐ (5) Welded onto other than steel backing
☐ (3) Welded from one side without backing

- ☐ (1) Partial Joint Penetration Groove Weld (specify effective throat)
☐ (2) Fillet Weld

JOINT TYPE

- ☒ BUTT ☐ LAP ☐ EDGE
☐ CORNER ☐ TEE ☐ ARC SPOT WELD

Automatic, Semi-Automatic or Machine

Mat'l Thk	Weld Size/ETT	Side No.	Layer	Pass No.	Filler Metal Size	Current Polarity	Amperes	Electrical Stickout:	Shielding Gas Flow Rate:	Wire Feed Speed	Volts	Arc Travel Speed
t							+/- 10%	15 mm	35 cfm	ipm +/- 10%	+/- 7%	ipm +/- 15%
10 mm		1	1	1	1.2 mm	DCRP	250			310	27	6
		2	4	B	1.2 mm	DCRP	250			310	27	11
13 mm		1	1,2	1,2	1.2 mm	DCRP	250			310	27	7
		2	4	B	1.2 mm	DCRP	250			310	27	11
19 mm		1	1	1	1.2 mm	DCRP	250			310	27	7
		1	2,3	2-4	1.2 mm	DCRP	250			310	27	6
		2	4	B	1.2 mm	DCRP	250			310	27	11

Revision Date Initials Explanation

CWB Approval

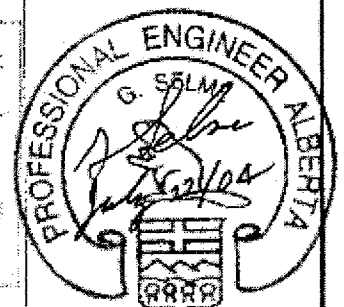
* Engineer's Seal

Welding Procedure Data Sheet
CWB Approval to CSA W47.1



14 Jul 2004

Approved for use in the field by
CWB Inspector General - C. W. B.
(C) 1997 CWSA Inc.



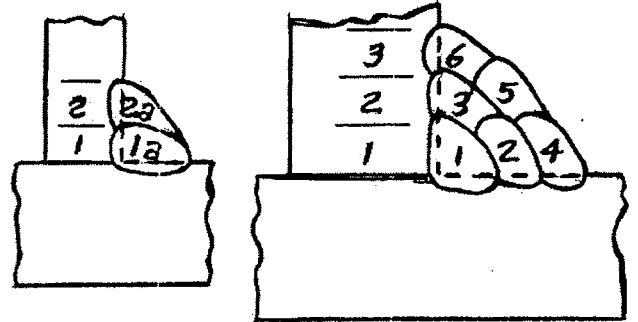
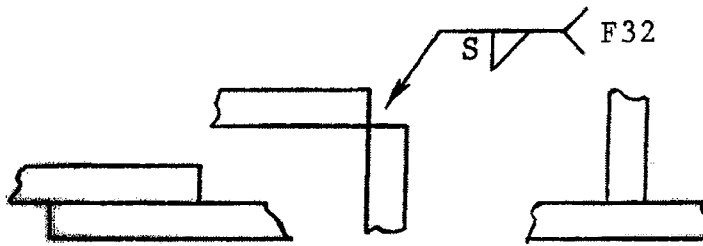
Welding Procedure Data Sheet				No. F11		Rev 0		Date February 09, 2007		W47.1	
Company Name Kent Steel Ltd.						Ref. WPS FC-1					
Address 5441 - 52 Avenue SE, Calgary						Ref. Standards W59 & W47.1					
Welding Process MCAW			Pulsed No			Welding Position Flat					
Process Mode Semi-Auto			Joint Type Butt								
Shielding Gas Type 90 - 92% Ar + 10 - 8% CO ₂			Penetration Complete								
Gas Flow Rate 35 cfh			Tungsten Type								
Filler Metal Classification E491C-6M-H4			Tungsten Size								
Electrode Extension 16 mm			Preheat Temp. As per								
Base Material Steel Groups 1, 2 & 3 Table 11.1 & 12.1 W59			Interpass Temp. Min. Table 5.3								
			Interpass Temp. Max. W59								
<p>Gap = t ± 1.5 0.0</p>						<p>Layers</p>					
Typical Joint Preparation						Typical Pass and Layer					
Mat'l Thk t	Weld Size		Layer	Pass Number	Filler Metal Size	Current Polarity	Current Amperes $\pm 10\%$	Wire Feed Speed ipm $\pm 10\%$	Burn Off Rate	Volts $\pm 7\%$	Welding Speed ipm $\pm 15\%$
3 mm			1	1	1.2 mm (0.045")	DCRP	250	310		27	17
5 mm			1	1	1.2 mm	DCRP	250	310		27	10
6 mm			1,2	1,2	1.2 mm	DCRP	250	310		27	12
8 mm			1,2	1,2	1.2 mm	DCRP	250	310		27	8
10 mm			1,2	1,2	1.2 mm	DCRP	250	310		27	6
Revision Date	App.	Explanation				CWB Approval			Engineers Seal		
Remarks						Welding Procedure Data Sheet CWB Accepted to CSA W47.1 FEB 15 2007 Acceptance valid only when Welding Consumables certified by C.W.B. (C1, 11.8.1, CSA W47.1)					

Welding Procedure Data Sheet

No. F32 Date 14-Jul-04 **W47.1**

Company Name: Kent Steel Ltd. Address: 5441 - 52 Aveune SE, Calgary		Welding Procedure Specification No. FC-1 Applicable Standards: W59 & W47.1	
Welding Process	<input type="radio"/> (1) Shielded Metal Arc (SMAW) <input type="radio"/> (4) Flux-Cored Arc (FCAW) <input type="radio"/> (2) Gas Metal Arc (GMAW) <input type="radio"/> (5) Submerged Arc (SAW) <input type="radio"/> (3) Gas Tungsten Arc (GTAW) <input checked="" type="radio"/> (6) Other <u>MCAW</u>	Filler Metal Classification: E491C-6M-H4 Shielding Gas or Flux: 90% to 92% Ar + 10% to 8% CO ₂	
Process Mode	<input type="radio"/> (1) Manual <input type="radio"/> (3) Machine <input checked="" type="radio"/> (2) Semi-Automatic <input type="radio"/> (4) Automatic	Tungsten Type:	Preheat Temp: As per
Material Designations	Steel Groups 1, 2 & 3 Table 11.1 W59	Tungsten Size:	Min Interpass Temp: Table 5.3
		Welding Position: Horizontal	Max Interpass Temp: W59

(Show Welding Symbol with Data Sheet No. in tail)



SKETCH OF TYPICAL JOINT PREPARATION

TYPICAL PASS AND LAYER SEQUENCE

COMPLETE JOINT PENETRATION GROOVE WELD <input type="checkbox"/> (1) Back-gouged to sound metal <input type="checkbox"/> (4) Welded both sides without back gouging <input type="checkbox"/> (2) Welded onto steel backing <input type="checkbox"/> (5) Welded onto other than steel backing <input type="checkbox"/> (3) Welded from one side without backing					<input type="checkbox"/> (1) Partial Joint Penetration Groove Weld (specify effective throat) <input checked="" type="checkbox"/> (2) Fillet Weld		JOINT TYPE <input type="checkbox"/> BUTT <input checked="" type="checkbox"/> LAP <input type="checkbox"/> EDGE <input checked="" type="checkbox"/> CORNER <input checked="" type="checkbox"/> TEE <input type="checkbox"/> ARC SPOT WELD			
					Automatic, Semi-Automatic or Machine					
Mat'l	Weld	Side	Layer	Pass No.	Filler Metal	Current	Amperes	Electrical	Shielding Gas	
Thk	Size/ETT	No.			Size	Polarity		Stickout:	Flow Rate:	
								19 mm	35 cfh	
								Wire Feed Speed	Volts	Arc Travel Speed
								ipm +/- 10%	+/- 7%	ipm +/- 15%
t	S									
5-12	5 mm		1	1	1.6 mm	DCRP	290	240	26	34
6-20	6 mm		1	1	1.6 mm	DCRP	290	240	26	19
8 & up	8 mm		1	1	1.6 mm	DCRP	290	240	26	12
10 & up	10 mm		1	1a	1.6 mm	DCRP	290	240	26	16
			2	2a	1.6 mm	DCRP	290	240	26	18
13 & up	13 mm		1	1	1.6 mm	DCRP	290	240	26	13
			2	2,3	1.6 mm	DCRP	290	240	26	15
19 & up	19 mm		1	1	1.6 mm	DCRP	290	240	26	12
			2,3	2-6	1.6 mm	DCRP	290	240	26	13

Revision Date Initials Explanation <div style="border: 1px solid black; height: 40px; width: 100%;"></div>	CWB Approval <div style="border: 1px solid black; padding: 5px; text-align: center;"> Welding Procedure Data Sheet CWB Accepted to CSA W47.1 JUL 26 2004 ✓ Acceptance valid only when Welding Consumables certified by C.W.B. (Cl. 11.8.1, CSA W47.1) </div>	* Engineer's Seal <div style="border: 1px solid black; padding: 10px; text-align: center;"> </div>
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Welding Procedure Data Sheet

No. F34 Date 14-Jul-04 **W47.1**

Company Name: Kent Steel Ltd.

Address: 5441 - 52 Avenue SE, Calgary

Welding Procedure

Specification No. FC-1

Applicable Standards: W59 & W47.1

Welding Process

- ☐ (1) Shielded Metal Arc (SMAW) ☐ (4) Flux-Cored Arc (FCAW)
☐ (2) Gas Metal Arc (GMAW) ☐ (5) Submerged Arc (SAW)
☐ (3) Gas Tungsten Arc (GTAW) ☒ (6) Other MCAW

Filler Metal Classification: E491C-6M-H4

Shielding Gas or Flux: 90% to 92% Ar +
10% to 8% CO₂

Process Mode

- ☐ (1) Manual ☐ (3) Machine
☒ (2) Semi-Automatic ☐ (4) Automatic

Tungsten Type:

Preheat Temp: As per

Tungsten Size:

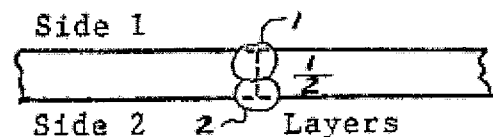
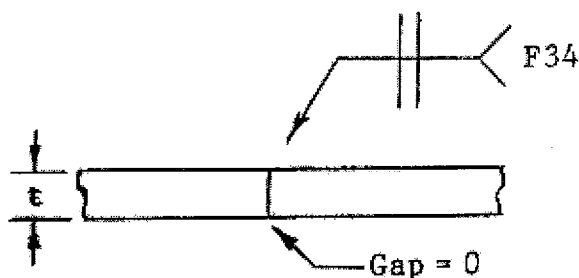
Min Interpass Temp: Table 5.3

Welding Position: Flat

Max Interpass Temp: W59

Material Steel Groups 1, 2 & 3
Designations Table 11.1 W59

(Show Welding Symbol with Data Sheet No. in tail)



SKETCH OF TYPICAL JOINT PREPARATION

TYPICAL PASS AND LAYER SEQUENCE

COMPLETE JOINT PENETRATION GROOVE WELD

- ☐ (1) Back-gouged to sound metal ☒ (4) Welded both sides without back gouging
☐ (2) Welded onto steel backing ☐ (5) Welded onto other than steel backing
☐ (3) Welded from one side without backing

- ☐ (1) Partial Joint Penetration Groove Weld (specify effective throat)
☐ (2) Fillet Weld

JOINT TYPE

- ☒ BUTT ☐ LAP ☐ EDGE
☐ CORNER ☐ TEE ☐ ARC SPOT WELD

Automatic, Semi-Automatic or Machine

Mat'l Thk Weld Size/ETT Side No. Layer Pass No. Filler Metal Size Current Polarity Amperes

Electrical Stickout: 19 mm Shielding Gas Flow Rate: 35 cfh

t							Amperes +/- 10%
5 mm	1	1	1	1.6 mm	DCRP	290	240
	2	2	2	1.6 mm	DCRP	290	240
6 mm	1	1	1	1.6 mm	DCRP	290	240
	2	2	2	1.6 mm	DCRP	290	240

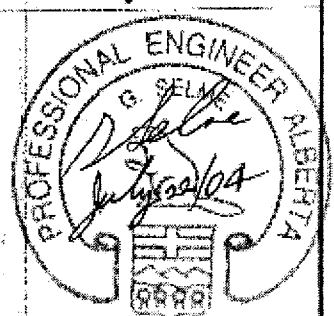
Wire Feed Speed Volts Arc Travel Speed

ipm +/- 10%	+/- 7%	ipm +/- 15%
240	26	25
240	26	25
240	26	19
240	26	19

Revision Date Initials Explanation

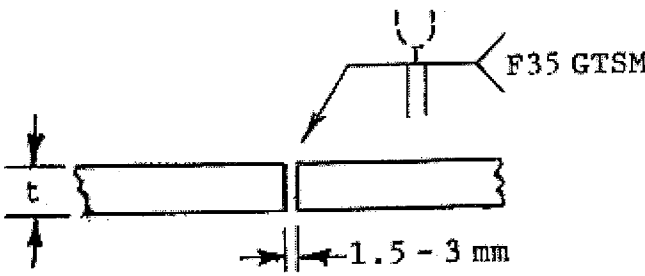
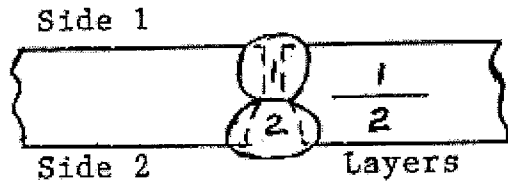
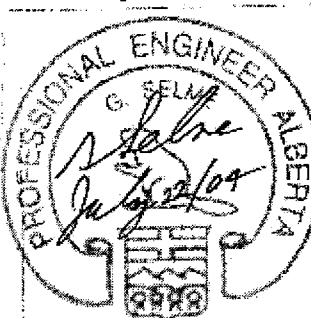
CWB Approval

* Engineer's Seal



Welding Procedure Data Sheet

No. F35 Date 14-Jul-04 W47.1

Company Name: Kent Steel Ltd. Address: 5441 - 52 Avenue SE, Calgary					Welding Procedure Specification No. FC-1 Applicable Standards: W59 & W47.1																																																																																				
Welding Process <input type="radio"/> (1) Shielded Metal Arc (SMAW) <input type="radio"/> (4) Flux-Cored Arc (FCAW) <input type="radio"/> (2) Gas Metal Arc (GMAW) <input type="radio"/> (5) Submerged Arc (SAW) <input type="radio"/> (3) Gas Tungsten Arc (GTAW) <input checked="" type="radio"/> (6) Other <u>MCAW</u>					Filler Metal Classification: E491C-6M-H4 Shielding Gas or Flux: 90% to 92% Ar + 10% to 8% CO ₂																																																																																				
Process Mode <input type="radio"/> (1) Manual <input type="radio"/> (3) Machine <input checked="" type="radio"/> (2) Semi-Automatic <input type="radio"/> (4) Automatic					Tungsten Type: Tungsten Size: Welding Position: Flat																																																																																				
Material Steel Groups 1, 2 & 3 Designations Table 11.1 W59					Preheat Temp: As per Min Interpass Temp: Table 5.3 Max Interpass Temp: W59																																																																																				
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>(Show Welding Symbol with Data Sheet No. in tail)</p>  </div> <div style="width: 45%;"> <p>TYPICAL PASS AND LAYER SEQUENCE</p>  </div> </div>																																																																																									
SKETCH OF TYPICAL JOINT PREPARATION COMPLETE JOINT PENETRATION GROOVE WELD <input checked="" type="checkbox"/> (1) Back-gouged to sound metal <input type="checkbox"/> (4) Welded both sides without back gouging <input type="checkbox"/> (2) Welded onto steel backing <input type="checkbox"/> (5) Welded onto other than steel backing <input type="checkbox"/> (3) Welded from one side without backing					JOINT TYPE <input type="checkbox"/> (1) Partial Joint Penetration Groove Weld (specify effective throat) <input type="checkbox"/> (2) Fillet Weld <input checked="" type="checkbox"/> BUTT <input type="checkbox"/> LAP <input type="checkbox"/> EDGE <input type="checkbox"/> CORNER <input type="checkbox"/> TEE <input type="checkbox"/> ARC SPOT WELD																																																																																				
Automatic, Semi-Automatic or Machine <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Mat'l Thk</th> <th>Weld Size/ETT</th> <th>Side No.</th> <th>Layer</th> <th>Pass No.</th> <th>Filler Metal Size</th> <th>Current Polarity</th> <th>Amperes</th> <th>Electrical Stickout:</th> <th>Shielding Gas Flow Rate:</th> </tr> </thead> <tbody> <tr> <td>t</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>+/- 10%</td> <td>19 mm</td> <td>35 cfh</td> </tr> <tr> <td>6 mm</td> <td></td> <td>1</td> <td>1</td> <td>1</td> <td>1.6 mm</td> <td>DCRP</td> <td>290</td> <td>Wire Feed Speed</td> <td>Volts</td> </tr> <tr> <td></td> <td></td> <td>2</td> <td>2</td> <td>2</td> <td>1.6 mm</td> <td>DCRP</td> <td>290</td> <td>ipm +/- 10%</td> <td>Arc Travel Speed</td> </tr> <tr> <td>10 mm</td> <td></td> <td>1</td> <td>1</td> <td>1</td> <td>1.6 mm</td> <td>DCRP</td> <td>290</td> <td>ipm +/- 10%</td> <td>ipm +/- 15%</td> </tr> <tr> <td></td> <td></td> <td>2</td> <td>2</td> <td>2</td> <td>1.6 mm</td> <td>DCRP</td> <td>290</td> <td>240</td> <td>26</td> </tr> <tr> <td>13 mm</td> <td></td> <td>1</td> <td>1</td> <td>1</td> <td>1.6 mm</td> <td>DCRP</td> <td>290</td> <td>240</td> <td>26</td> </tr> <tr> <td></td> <td></td> <td>2</td> <td>2</td> <td>2</td> <td>1.6 mm</td> <td>DCRP</td> <td>290</td> <td>240</td> <td>26</td> </tr> </tbody> </table>					Mat'l Thk	Weld Size/ETT	Side No.	Layer	Pass No.	Filler Metal Size	Current Polarity	Amperes	Electrical Stickout:	Shielding Gas Flow Rate:	t							+/- 10%	19 mm	35 cfh	6 mm		1	1	1	1.6 mm	DCRP	290	Wire Feed Speed	Volts			2	2	2	1.6 mm	DCRP	290	ipm +/- 10%	Arc Travel Speed	10 mm		1	1	1	1.6 mm	DCRP	290	ipm +/- 10%	ipm +/- 15%			2	2	2	1.6 mm	DCRP	290	240	26	13 mm		1	1	1	1.6 mm	DCRP	290	240	26			2	2	2	1.6 mm	DCRP	290	240	26	CWB Approval <div style="border: 1px solid black; padding: 5px; min-height: 100px;"> <!-- Signature area --> </div>				
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Revision Date Initials Explanation <table border="1" style="width:100%; border-collapse: collapse;"> <tr><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td></tr> </table>											* Engineer's Seal 																																																																														

Welding Procedure Data Sheet

No. F36 Date 14-Jul-04 **W47.1**

Company Name: Kent Steel Ltd.

Address: 5441 - 52 Avenue SE, Calgary

Welding Procedure

Specification No. FC-1

Applicable Standards: W59 & W47.1

Welding Process

- ☐ (1) Shielded Metal Arc (SMAW) ☐ (4) Flux-Cored Arc (FCAW)
☐ (2) Gas Metal Arc (GMAW) ☐ (5) Submerged Arc (SAW)
☐ (3) Gas Tungsten Arc (GTAW) ☒ (6) Other MCAW

Filler Metal Classification: E491C-6M-H4

Shielding Gas or Flux: 90% to 92% Ar +
10% to 8% CO₂

Process Mode

- ☐ (1) Manual ☐ (3) Machine
☒ (2) Semi-Automatic ☐ (4) Automatic

Tungsten Type:

Preheat Temp: As per

Tungsten Size:

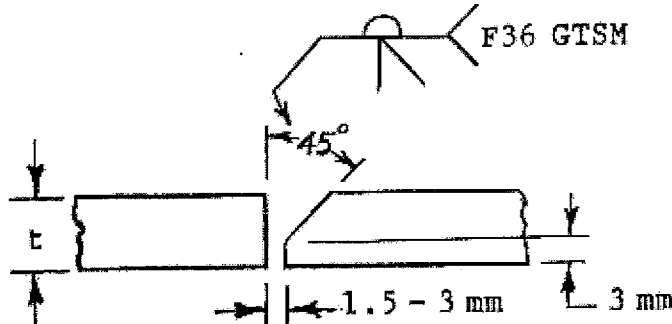
Min Interpass Temp: Table 5.3

Material Steel Groups 1, 2 & 3
Designations Table 11.1 W59

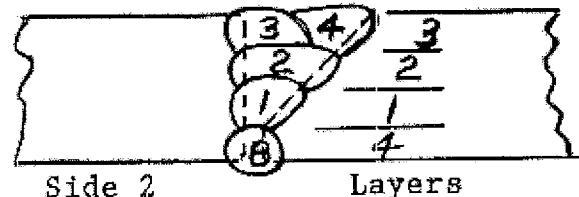
Welding Position: Flat

Max Interpass Temp: W59

(Show Welding Symbol with Data Sheet No. in tail)



Side 1



Side 2

Layers

SKETCH OF TYPICAL JOINT PREPARATION

TYPICAL PASS AND LAYER SEQUENCE

COMPLETE JOINT PENETRATION GROOVE WELD

- ☒ (1) Back-gouged to sound metal ☐ (4) Welded both sides without back gouging
☐ (2) Welded onto steel backing ☐ (5) Welded onto other than steel backing
☐ (3) Welded from one side without backing

- ☐ (1) Partial Joint Penetration Groove Weld (specify effective throat)
☐ (2) Fillet Weld

JOINT TYPE

- ☒ BUTT ☐ LAP ☐ EDGE
☐ CORNER ☐ TEE ☐ ARC SPOT WELD

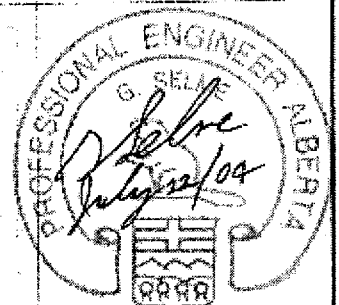
Automatic, Semi-Automatic or Machine

Mat'l Thk	Weld Size/ETT	Side No.	Layer	Pass No.	Filler Metal Size	Current Polarity	Amperes	Electrical Stickout	Shielding Gas Flow Rate	Wire Feed Speed	Volts	Arc Travel Speed
t							+/- 10%	19 mm	35 c/h	ipm +/- 10%	+/- 7%	ipm +/- 15%
10 mm		1	1	1	1.6 mm	DCRP	290			240	26	7
		2	4	B	1.6 mm	DCRP	290			240	26	13
13 mm		1	1,2	1,2	1.6 mm	DCRP	290			240	26	8
		2	4	B	1.6 mm	DCRP	290			240	26	13
19 mm		1	1	1	1.6 mm	DCRP	290			240	26	8
		1	2,3	2-4	1.6 mm	DCRP	290			240	26	7
		2	4	B	1.6 mm	DCRP	290			240	26	13

Revision Date Initials Explanation

CWB Approval

* Engineer's Seal





Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name: **SHEA W. BROWN**

Exp. Date: **Jul 18, 2013**

Employer: **Kent Steel Ltd., Calgary, AB**

Thickness Range: **3mm & above**

Material: **Carbon Steel**

Process: **FCAW/MCAW**

Mode: **SEMI-AUTO**

Standard: **CSA W47.1**

Classification: **FW**

Single Electrode Mechanized

Single Electrode Automatic

Class: **FLAT/HORIZONTAL/VERTICAL UP**

See Reverse for Conditions



Welder Qualification

The card is valid only while employed by a CWB-certified company.

Transferable Welder

Name: NICHOLAS B. CHARLESON

Exp. Date: Jan 05, 2013

Employer: Labros Enterprises Ltd., Calgary, AB

Thickness Range: 3mm & above

Material: Carbon Steel

Mode: SEMI-AUTO

Process: FCAW/MCAW

Single Electrode Mechanized

Standard: CSA W47.1

Single Electrode Automatic

Classification: S

Class: FLAT

See Reverse for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name:	NGAN D DINH	Exp. Date:	Nov 03, 2012
Employer:	T & K Iron Works Inc., Calgary	Material:	Carbon Steel
Thickness Range:	3mm & above	Process:	FCAW/MCAW
Mode of Transfer:	N/A	Standard:	CSA W47.1
Mode:	Semi Automatic	Classification:	S
	Single Electrode Mechanized		
	Single Electrode Automatic		
Class:	Fiat		

See Reverse for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name: **MICHAEL A. HARRIS**

Exp. Date: **Sep 29, 2012**

Employer: **Kent Steel Ltd., Calgary, AB**

Thickness Range: **3mm & above**

Material: **Carbon Steel**

Process: **FCAW/MCAW**

Mode: **SEMI-AUTO**

Standard: **CSA W47.1**

Single Electrode Mechanized

Classification: **S**

Single Electrode Automatic

Class: **FLAT**

See Reverse for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name: **PAUL A. HELM**

Exp. Date: **Jul 18, 2013**

Employer: **Kent Steel Ltd., Calgary, AB**

Thickness Range: **3mm & above**

Material: **Carbon Steel**

Process: **FCAW/MCAW**

Mode: **SEMI-AUTO**

Standard: **CSA W47.1**

Single Electrode Mechanized

Classification: **FW**

Single Electrode Automatic

Class: **FLAT/HORIZONTAL/VERTICAL UP**

See Reverse for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name: HUYNH L. CUONG

Exp. Date: Nov 26, 2013

Employer: Kent Steel Ltd., Calgary, AB

Thickness Range: 3mm & above

Material: Carbon Steel

Process: FCAW/MCAW

Standard: CSA W47.1

Mode: SEMI-AUTO

Classification: S

Single Electrode Mechanized

Single Electrode Automatic

Class: FLAT

See Reverse for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name: **KHUONG A. NGUYEN**

Exp. Date: **Feb 28, 2014**

Employer: **Kent Steel Ltd., Calgary, AB**

Thickness Range: **3mm & above**

Material: **Carbon Steel**

Process: **FCAW/MCAW**

Mode: **SEMI-AUTO**

Standard: **CSA W47.1**

Single Electrode Mechanized

Classification: **S**

Single Electrode Automatic

Class: **FLAT**

See Reverse for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name: **THO H. NGUYEN**

Exp. Date: **Dec 20, 2012**

Employer: **Kent Steel Ltd., Calgary, AB**

Thickness Range: **3mm & above**

Material: **Carbon Steel**

Process: **FCAW/MCAW**

Mode: **SEMI-AUTO**

Standard: **CSA W47.1**

Single Electrode Mechanized

Classification: **S**

Single Electrode Automatic

Class: **FLAT**

See Reverse for Conditions



Welder Qualification

Transferable Welder

Name: SANG T. PHAM

Exp. Date: Jan 20, 2013

Employer: Kiewit Steel Ltd., Calgary, AB

Thickness Range: 3mm & above

Material: Carbon Steel

Process: ECAW/MCAW

Mode: SEMI-AUTO

Specification: CSA W47.1

Single Electrode Mechanized

Configuration: FW

Single Electrode Automatic

Notes: PLATING CONTACT VERTICAL UP

See Reverse for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name: **ARNEL H. SANTIAGO**
Employer: **Kent Steel Ltd., Calgary, AB**
Thickness Range: **3mm & above**

Exp. Date: **Aug 10, 2013**

Mode: **SEMI-AUTO**
Single Electrode Mechanized
Single Electrode Automatic
Class: **FLAT**

Material: **Carbon Steel**
Process: **FCAW/MCAW**
Standard: **CSA W47.1**
Classification: **S**

See Reverse for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name:	GREG M SAUVIAT	Exp. Date:	Nov 15, 2012
Employer:	Kent Steel Ltd., Calgary	Material:	Carbon Steel
Thickness Range:	3mm & above	Process:	SMAW
Mode of Transfer:	N/A	Standard:	CSA W47.1
Mode:	Manual	Classification:	S
		Electrode:	N/A

Class: Flat/Horizontal/Vertical Up/Overhead

See Reverse for Conditions



Welder Qualification

Transferable Welder

Welder: DANAC SUTHERLAND

Employer: Anadarko Steel Inc., Calgary, AB

Position: Welder Joint: S & above

Welding Manual

Exp. Date: Dec 12, 2013

Material: Carbon Steel

Process: FCAW/MCAW

Spec: CSA W47.1

Position: S

Orientation: FLAT

See Website for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name:	CUONG CHI TRUONG	Exp. Date:	Sep 15, 2012
Employer:	Kent Steel Ltd., Calgary	Material:	Carbon Steel
Thickness Range:	3mm & above	Process:	FCAW/MCAW
Mode of Transfer:	N/A	Standard:	CSA W47.1
Mode:	Semi Automatic	Classification:	FW
	Single Electrode Mechanized		
	Single Electrode Automatic		
Class:	Flat/Horizontal/Vertical Up/Overhead		

See Reverse for Conditions



Welder Qualification

This card is valid only while employed by a CWB certified company

Transferable Welder

Name: **ROBERT J. WIKERUK**

Exp. Date: **Feb 28, 2014**

Employer: **Kent Steel Ltd., Calgary, AB**

Thickness Range: **3mm & above**

Material: **Carbon Steel**

Process: **FCAW/MCAW**

Mode: **SEMI-AUTO**

Standard: **CSA W47.1**

Single Electrode Mechanized

Classification: **S**

Single Electrode Automatic

Class: **FLAT**

See Reverse for Conditions



MAGNETIC PARTICLE INSPECTION REPORT

CG19-10 - MT279

Page 1 of 1

Procedures: MT -2V (IRISNDT proc.5.0)**Code:** ASME Sec. V. & VIII. Div.1 App.6
&
CSA W59 (Statically Loaded)**Job / P.O. #:** KS1767**IRISNDT #:** 252641**Date:** 16-May-12**Client:** KENT STEEL**Location:** Calgary, Alberta**Item Inspected:** Structural**Surface Condition:** Painted ☒ Sandblasted ☐ Machined ☐ As Cast ☐ As Forged ☐ Weldment ☒ Other ☐**Material:** C.S.

Thickness: 0.500"

Heat Treatment: N/A

Magnetizing Equipment: Yoke ☒ Coil ☐ Prod ☐
IRISNDT #: 40104Bench: Headshot ☐ Central Conductor ☐ Coil ☐
Mfg: Contour Probe Calibration Date: 2-Apr-12**Blacklight:** ☐ IRISNDT #:
☐ Verification per ASME V Art 7 T.777.2

Mfg: Calibration Date: --12

Whitelight: Battery Powered Min. 3V
110V Power Min. 60W Bulb☐ } Held within 30 cm (12in) of the inspection surface
☒ provides minimum 1000 Lx (100fc)**Method of Magnetization:** AC ☒ DC ☐ Continuous ☒ Residual ☐**Magnetic Particles:** Dry ☐ Wet ☒ Red ☐ Grey ☐ Black ☒ Fluorescent ☐
Batch #: 1102 Mfg: Magnaflux Type: 7C**Background:** ☒ Batch #: 1211 Mfg: Ardrex Type: 8901W**Inspection Results:** ACCEPTABLE TO CODE**Items Inspected:**WARWICK INDUSTRIES
Job# W28406
P.O#: P12093
Project; ABB / BERMAC

16 - SIDEPLATES

Inspection Limitation(s):**Unit#:** 599 **Kilometers:** _____
In: _____ **Out:** _____ **Hrs:** 1.25
In: _____ **Out:** _____ **Hrs:** _____
Personnel:
PF**Consumables:**
min. chg.**Interpretation by:**
Paul Frank

(Print)

SNT-TC-1A

II

C.G.S.B.

II

C.G.S.B. #

(Level)

7064

(Signature)

Client Representative:
(Print)I am in full
agreement with
report contents

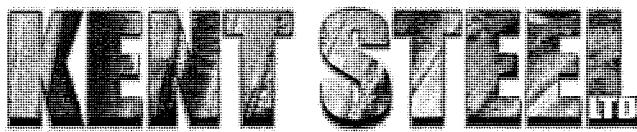
(Sign)

C. ALBERDA

5311 - 86 Street Edmonton, Alberta, T6E 5T8 Phone: (780) 437-2022 Fax: (780) 438-1436

Calgary (403) 279-6121
Lloydminster (780) 875-8455
Barrhead (780) 674-3018
Nisku (780) 955-7616Cold Lake (780) 594-1114
Fort McMurray (780) 743-1536
High Level (780) 956-4094
Red Deer (403) 347-1742
Medicine Hat (403) 427-6284Corpus Christi, TX (361) 888-4700
Deer Park, TX (281) 476-4444
Matrix, Houston, TX (713) 722-7177
Texas City, TX (409) 945-2262
Tulsa, OK (918) 446-8773

IRISNDT E-2003F



5441 52nd Avenue S.E. Calgary, AB T2C 4S5

Phone: (403) 279 7000 Fax: (403) 279 7060

Record of Elevation

To:

Date:

May 19/12

Kent Job#:

1767

Project:

Client Ref. #:

Attn:

Drawing Ref:

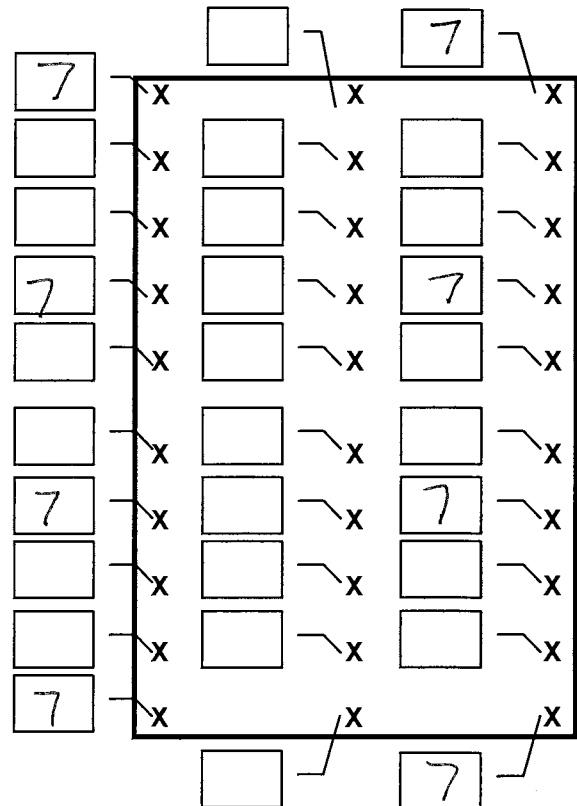
Test Equipment: North West Optical Level Model: NCL 26X SERIAL # 4073152. Calibration Date: August 12, 2010

Company Rep:

Budd Simpson Kirby Kachmarski

Specific Support Locations

Quarter Sections
Equal Spaces



1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____
9 _____
10 _____

11 _____
12 _____
13 _____
14 _____
15 _____
16 _____
17 _____
18 _____
19 _____
20 _____

DATE: May 19/12

SIGNED:

Budd Simpson

PRINT:

Kirby Kachmarski

TITLE:

Quality Control Manager

Stock



WHITBY STEEL MILL
HOPKINS STREET SOUTH
WHITBY ON L1N 5T1 CAN
(905) 668-8811

Chemical and Physical Test Report MADE IN CANADA

W-122850

DEC 29 2011

SHIP TO RUSSEL METALS INC - CALGARY C/O CALGARY DISTRIBUTION CTR 5200 84TH STREET SE CALGARY, AB T2P 2G7	INVOICE TO RUSSEL METALS INC CALGARY 5724 - 40TH STREET SE CALGARY, AB T2C 2A1	SHIP DATE 12/16/11 CUST. ACCOUNT NO 60142676
---	--	---

PRODUCED IN: WHITBY

SHAPE + SIZE	GRADE	SPECIFICATION																SALES ORDER	CUST P.O. NUMBER
A2 X 2 X 1/4	44W	A36/44W/50W/A529GR50;ASTM:A36-05;A529GR50 M-05;CSA:G40.21-04 44W/50W																1098033-01	64034957-01
HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Ti	Zn	C Eqv		
W100568	.17	.84	.021	.042	.17	.32	.10	.13	.030	.002	.003	.0001	.0160	.012	.00100	.01700	.34		

Mechanical Test: Yield 54491 PSI, 375.7 MPA Tensile: 77751 PSI, 536.07 MPA %El: 26.2/8in, 26.2/200MM

Customer Requirements CASTING: STRAND CAST

Mechanical Test: Yield 55213 PSI, 380.68 MPA Tensile: 77756 PSI, 536.11 MPA %El: 27.5/8in, 27.5/200MM

Customer Requirements CASTING: STRAND CAST

CUST ITEM NUMBER: 18310

PRODUCED IN: WHITBY

SHAPE + SIZE	GRADE	SPECIFICATION																SALES ORDER	CUST P.O. NUMBER
C4 X 6.25#	44W	A36/44W/50W/A529GR50;ASTM:A36-05;A529GR50 M-05;CSA:G40.21-04 44W/50W																1102537-01	64035044-01
HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Ti	Zn	C Eqv		
W100627	.17	.88	.010	.029	.17	.29	.09	.09	.020	.000	.002	.0001	.0150	.020	.00200	.01400	.34		

Mechanical Test: Yield 52941 PSI, 365.02 MPA Tensile: 75591 PSI, 521.18 MPA %El: 25.0/8in, 25.0/200MM

Customer Requirements CASTING: STRAND CAST

Mechanical Test: Yield 52087 PSI, 359.13 MPA Tensile: 74797 PSI, 515.71 MPA %El: 25.0/8in, 25.0/200MM

Customer Requirements CASTING: STRAND CAST

CUST ITEM NUMBER: 12700

Customer Notes

NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

This material, including the billets, was melted and manufactured in Canada

Bhaskar Yalamanchili

Quality Director

Gerda

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Metallurgical Services Manager

WHITBY STEEL MILL

Seller warrants that all material furnished shall comply with specifications subject to standard published manufacturing variations. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE BY THE SELLER, AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

In no event shall seller be liable for indirect, consequential or punitive damages arising out of or related to the materials furnished by seller.

Any claim for damages for materials that do not conform to specifications must be made from buyer to seller immediately after delivery of same in order to allow the seller the opportunity to inspect the material in question.



WHITBY STEEL MILL
HOPKINS STREET SOUTH
WHITBY ON L1N 5T1 CAN
(905) 668-8811

Chemical and Physical Test Report

MADE IN CANADA

64A018400

W-098056

09/08

SHIP TO RUSSEL METALS INC - CALGARY C/O CALGARY DISTRIBUTION 5724 - 40TH STREET SE CALGARY, AB T2C 2A1	INVOICE TO RUSSEL METALS INC CALGARY 5724 - 40TH STREET SE CALGARY, AB T2C 2A1	SHIP DATE 08/26/09 CUST. ACCOUNT NO 60142676
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PRODUCED IN: WHITBY

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
C8 X 8.2#	44W	C.S.A. G40.21-04 44W	9168261-01	64030025-01
HEAT I.D.	C	Mn P S Si Cu Ni Cr Mo V Nb B N Sn Al Ti Zr Ca C Eqv		
W902116	.17	.82 .013 .030 .19 .29 .08 .05 .023 .000 .000 .0006 .0187 .010 .037 .00000 .000 .00000 .353		

Mechanical Test: Yield 55473 PSI, 382.47 MPA Tensile: 73688 PSI, 508.06 MPA %El: 24.4/8in, 24.4/200MM Def HT: 0, 0MM %I/h 0
Mechanical Test: Yield 53025 PSI, 365.59 MPA Tensile: 72333 PSI, 498.72 MPA %El: 24.5/8in, 24.5/200MM Def HT: 0, 0MM %I/h 0L
CUST ITEM NUMBER: 12720

PRODUCED IN: WHITBY

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
C8 X 13.0#	44W	A36/44W/50W/A529GR50;ASTM:A36-05;A529GR50 M-05;CSA:G40.21-04 44W/50W	9170806-01	64030061-01
HEAT I.D.	C	Mn P S Si Cu Ni Cr Mo V Nb B N Sn Al Ti Zr Ca C Eqv		
W902136	.16	.74 .012 .036 .20 .32 .09 .07 .024 .000 .011 .0005 .0206 .010 .000 .00000 .000 .00000 .328		

Mechanical Test: Yield 55552 PSI, 383.02 MPA Tensile: 74635 PSI, 514.59 MPA %El: 24.5/8in, 24.5/200MM Def HT: 0, 0MM %I/h 0L
CUST ITEM NUMBER: 12732

This material, including the billets, was produced and manufactured in Canada

THE ABOVE FIGURES ARE CERTIFIED EXTRACTS FROM THE ORIGINAL CHEMICAL AND PHYSICAL TEST RECORDS
AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Bhaskar

Bhaskar Yalamanchilli
Quality Director
Gerdau Ameristeel

Ran

Mgr. Metallurg. Svcs.
WHITBY STEEL MILL

Seller warrants that all material furnished shall comply with specifications subject to standard published manufacturing variations. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE BY THE SELLER, AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

In no event shall seller be liable for indirect, consequential or punitive damages arising out of or related to the materials furnished by seller.

Any claim for damages for materials that do not conform to specifications must be made from buyer to seller immediately after delivery of same in order to allow the seller the opportunity to inspect the material in question.



WHITBY STEEL MILL
HOPKINS STREET SOUTH
WHITBY ON L1N 5T1 CAN
(905) 668-8811

Chemical and Physical Test Report
MADE IN CANADA

APR 09 2012

W-126055



SHIP TO RUSSEL METALS INC - CALGARY C/O CALGARY DISTRIBUTION CTR 5200 84TH STREET SE CALGARY, AB T2P 2G7	INVOICE TO RUSSEL METALS INC CALGARY 5724 - 40TH STREET SE CALGARY, AB T2C 2A1	SHIP DATE 03/26/12 CUST. ACCOUNT NO 60142676
---	--	---

PRODUCED IN: WHITBY

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
C4 X 5.4#	44W	A36/44W/50W/A529GR50;ASTM:A36-05;A529GR50 M-05;CSA:G40.21-04 44W/50W	2003826-01	64035241-01
HEAT I.D.	C	Mn P S Si Cu Ni Cr Mo V Nb B N Sn Ti Zn C Eqv		
W101046	.16	.88 .009 .037 .17 .32 .14 .07 .047 .001 .002 .0001 .0120 .025 .00120 .01600 .39		

Mechanical Test: Yield 52303 PSI, 360.62 MPA Tensile: 74469 PSI, 513.45 MPA %El: 28.1/8in, 28.1/200MM
Customer Requirements CASTING: STRAND CAST
Mechanical Test: Yield 50860 PSI, 350.67 MPA Tensile: 72900 PSI, 502.63 MPA %El: 26.9/8in, 26.9/200MM
Customer Requirements CASTING: STRAND CAST
CUST ITEM NUMBER: 12696

PRODUCED IN: WHITBY

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
C4 X 5.4#	44W	A36/44W/50W/A529GR50;ASTM:A36-05;A529GR50 M-05;CSA:G40.21-04 44W/50W	2003826-01	64035241-01
HEAT I.D.	C	Mn P S Si Cu Ni Cr Mo V Nb B N Sn Ti Zn C Eqv		
W101047	.16	.88 .010 .044 .19 .31 .13 .08 .040 .001 .002 .0001 .0240 .019 .00100 .01400 .33		

Mechanical Test: Yield 52529 PSI, 362.17 MPA Tensile: 71537 PSI, 493.23 MPA %El: 25.6/8in, 25.6/200MM
Customer Requirements CASTING: STRAND CAST
Mechanical Test: Yield 52595 PSI, 362.63 MPA Tensile: 72709 PSI, 501.31 MPA %El: 25.0/8in, 25.0/200MM
Customer Requirements CASTING: STRAND CAST
CUST ITEM NUMBER: 12696

Customer Notes

NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

This material, including the billets, was melted and manufactured in Canada

Bhaskar Yalamanchili
Quality Director
Gerdau

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Metallurgical Services Manager
WHITBY STEEL MILL

Seller warrants that all material furnished shall comply with specifications subject to standard published manufacturing variations. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE BY THE SELLER, AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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CARTERSVILLE STEEL MILL
384 OLD GRASSDALE RD NE
CARTERSVILLE GA 30121 USA
(770) 387-3300

Chemical and Physical Test Report
Made and Melted In USA

APR 16 2012

G-196911



SHIP TO RUSSEL METALS INC - CALGARY C/O CALGARY DISTRIBUTION CTR 5200 84TH STREET SE CALGARY, AB T2P 2G7	INVOICE TO RUSSEL METALS INC CALGARY 5724 - 40TH STREET SE CALGARY, AB T2C 2A1	SHIP DATE 03/28/12 CUST. ACCOUNT NO 60142676
---	--	---

PRODUCED IN: CARTERSVILLE

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
W6 X 15#	A57250/992	ASTM A572 GR50-07, ASTM A992 -06A, ASTM A709 GR50-10	2001818-03	64035199-03
HEAT I.D. G121681	C .16	Mn 1.01	S .026	Si .20

Mechanical Test: Yield 59700 PSI, 411.62 MPA Tensile: 82000 PSI, 565.37 MPA %E: 24.9/8in, 24.9/200MM

Customer Requirements CASTING: STRAND CAST

Comment: NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

Mechanical Test: Yield 58700 PSI, 404.72 MPA Tensile: 79700 PSI, 549.51 MPA %E: 24.0/8in, 24.0/200MM

Customer Requirements CASTING: STRAND CAST

Comment: NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

PRODUCED IN: CARTERSVILLE

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
W6 X 15#	A57250/992	ASTM A572 GR50-07, ASTM A992 -06A, ASTM A709 GR50-10	2001818-03	64035199-03
HEAT I.D. G121682	C .15	Mn 1.01	S .026	Si .20

Mechanical Test: Yield 57100 PSI, 393.69 MPA Tensile: 76700 PSI, 528.83 MPA %E: 23.4/8in, 23.4/200MM

Customer Requirements CASTING: STRAND CAST

Comment: NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

Mechanical Test: Yield 55500 PSI, 382.66 MPA Tensile: 76700 PSI, 528.83 MPA %E: 24.5/8in, 24.5/200MM

Customer Requirements CASTING: STRAND CAST

Comment: NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

Customer Notes

NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

All manufacturing processes including melt and cast, occurred in USA. MTR
complies with EN10204 3.1B

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE
PERMANENT RECORDS OF COMPANY.

Bhaskar

Bhaskar Yalamanchili
Quality Director
Gerdau

Zhang

Metallurgical Services Manager
CARTERSVILLE STEEL MILL

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SELLER, AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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question.

Atlas Tube (U.S.) Inc.
13101 Eckles Road
Plymouth, Michigan, USA
48170
Tel: 313-454-5600
Fax: 313-454-1474



Ref.B/L: 80476339
Date: 03.29.2012
Customer: 153



MATERIAL TEST REPORT

Sold to

Russel Metals-Calgary
5724-40 St. SE
CALGARY AB T2C 2A1
CANADA

Shipped to

RUSSEL C/O CDC (RAIL)
5724-40 ST. SE
CALGARY AB J4G 1E6 APR 11 2012
CANADA

Material: 3.0x3.0x250x20"0(7x5).-CSA-D

Material No: 30030250

Made In: USA

Melted In: Canada

Sales order: 707427

Purchase Order: M64035516

Heat No	C	Mn	P	S	SI	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
762407	0.180	0.800	0.007	0.009	0.015	0.040	0.053	0.002	0.006	0.018	0.049	0.002	0.000	0.000	0.000

Bundle No	PCs	Yield	Tensile	Eln.2In
M300611153	24	055463 Psi	067395 Psi	29.6 %

Certification
CE: 0.33
CSA G40.21-04 50W CLASS C

Material Note:
Sales Or.Note:

Material: 3.0x3.0x250x20"0(7x5).-CSA-D

Material No: 30030250

Made In: USA

Melted In: Canada

Sales order: 707427

Purchase Order: M64035516

Heat No	C	Mn	P	S	SI	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
763314	0.180	0.790	0.006	0.006	0.014	0.044	0.046	0.006	0.007	0.018	0.046	0.002	0.000	0.000	0.000

Bundle No	PCs	Yield	Tensile	Eln.2In
M300611153	11	070860 Psi	079890 Psi	29.6 %

Certification
CE: 0.33
CSA G40.21-04 50W CLASS C

Material Note:
Sales Or.Note:

Material: 3.0x3.0x250x20"0(7x5).-CSA-D

Material No: 30030250

Made In: USA

Melted In: Canada

Sales order: 707427

Purchase Order: M64035516

Heat No	C	Mn	P	S	SI	Al	Cu	Cb	Mo	Ni	Cr	V	Ti	B	N
762407	0.180	0.800	0.007	0.009	0.015	0.040	0.053	0.002	0.006	0.018	0.049	0.002	0.000	0.000	0.000

Bundle No	PCs	Yield	Tensile	Eln.2In
M300611154	35	055463 Psi	067395 Psi	29.6 %

Certification
CE: 0.33
CSA G40.21-04 50W CLASS C

Material Note:
Sales Or.Note:

Mike Whalen

Authorized by Quality Assurance:
The results reported on this report represent the actual attributes of the material furnished and indicate full compliance with all applicable specification and contract requirements.
CE calculated using the AWS D1.1 method.



KS-1767

Bill To:
RUSSEL METALS INC CALGARY
5724 - 40TH STREET SE

CALGARY AB
T2C 2A1 CA

Ship To: 22
Russel Metals - Calgary
C/O CALGARDISCEN
5724 40th Street S.E.
CALGARY AB
T2C 2A1 CA

Order Date: 10/06/2011
PO No: 64034645
Mill Order No: 3938822
Load No: 1414738
Manifest No: 2108676

CERTIFIED MATERIAL TEST REPORT

GERDAU AMERISTEEL
Midlothian Mill
300 Ward Road
Midlothian, TX 76065
(972) 775-8241

SPECIFICATIONS
ASTM A6-09, A992-06a, A572-07

SIZE
W 16 X 36# / W410 X 53

GRADE
992/572-50

LENGTH
45 FT / 13.716 M

PRODUCT
WF BEAMS



64A027334

HEAT NO: 22615430

CHEMICAL ANALYSIS

C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Al	Nb	CE
.08	.89	.014	.037	.22	.35	.12	.14	.035	.008	.002	.003	.020	.3

JAN 12 2012

PHYSICAL PROPERTIES

Yield Strength		Tensile Strength		Specimen Area		Elongation		Bend Test		ROA
KSI	MPa	KSI	MPa	Sq In	Sq cm	%	Gage Length	Dia. Result		%
57.7	397.8	73.7	508.1	0.643	4.15	25.6	8 In 200 mm			
56.3	388.2	71.9	495.7	0.659	4.25	24.9	8 In 200 mm			

TENSILE TEST RATIOS

YLD/TENS	TENS/YLD	YLD/TENS	TENS/YLD
.78	1.28	.78	1.28

All manufacturing processes of this product, including electric arc MELTING and continuous CASTING, occurred in the U.S.A. CMTR complies with EN 10204 3.1

"I hereby certify that the contents of this report are correct and accurate. All tests and operations performed by this material manufacturer or its sub-contractors, when applicable, are in compliance with the requirements of the material specifications and applicable purchaser designated requirements."

Signed: Tom L. Harrington Date: Dec. 17, 2011
Tom L. Harrington: Quality Assurance Manager

Signed: _____
Notary Public (if applicable)

Date: _____
Page: 1 of 1

Bill To:
RUSSEL METALS INC CALGARY
5724 - 40TH STREET SE

CALGARY AB
T2C 2A1 CA

Ship To: 22
Russel Metals - Calgary
5724-40th Street, SE
CALGARY AB
T2C 2A1 CA

Order Date: 01/06/2012
PO No: 64035196
Mill Order No: 3984801
Load No: 1427140
Manifest No: 2121128

CERTIFIED MATERIAL TEST REPORT

GERDAU
Petersburg Mill
25801 Hofheimer Way
Petersburg, VA 23803
(804) 524-2855

SPECIFICATIONS
ASTM A6-09, A992-06a, A572-07

SIZE
W 18 X 50# / W460 X 74

GRADE
992/572-50

LENGTH
50 FT / 15.24 M

PRODUCT
WF BEAMS

HEAT NO: 30574290

CHEMICAL ANALYSIS

C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Al	Nb	CE
.08	.95	.009	.029	.22	.30	.14	.09	.031	.014	.003	.003	.017	.29

PHYSICAL PROPERTIES

<u>Yield Strength</u>		<u>Tensile Strength</u>		<u>Specimen Area</u>		<u>Elongation</u>		<u>Bend Test</u>		<u>ROA</u>
KSI	MPa	KSI	MPa	Sq In	Sq cm	%	Gage Length	Dia. Result		%
54.0	372.3	70.3	484.7	0.864	5.57	26.0	8 In 200 mm			
53.2	366.8	69.6	479.9	0.880	5.68	26.8	8 In 200 mm			

TENSILE TEST RATIOS

YLD/TENS YLD/TENS

.76 .77

MAR 12 2012

All manufacturing processes of this product, including electric arc MELTING and continuous CASTING, occurred in the U.S.A. CMTR complies with EN 10204 3.1

"I hereby certify that the contents of this report are correct and accurate. All tests and operations performed by this material manufacturer or its sub-contractors, when applicable, are in compliance with the requirements of the material specifications and applicable purchaser designated requirements."

Signed: Wade A. Lumpkins
Wade Lumpkins: Quality Assurance Manager

Date: Feb. 22, 2012

Signed: _____
Notary Public (if applicable)

Date: _____

Page: 2 of 2

KS - 1747 / 1767 / 1775

ORIGINAL

MILL TEST CERTIFICATE



Order No. : J119500055
PO No. : LPP201109001
Commodity : STEEL PLATE
Specification : CSA G40.21 300W/350W

Supplier : DONGKUK INTERNATIONAL INC.
Customer : SALZGITTER MANNESMANN INTERNAT

Certificate No. : PP2-2-111129-015-002
Date of Issue : Nov. 29, 2011

Specification		CSA G40.21 300W/350W		Section																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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- Tensile Test Direction - Transverse
- Supply Condition - As Rolled
- Chemical Composition Unit(%) : 2-x100, 3-x1000, 4-x10000

We hereby certify that the material has been made by Basic oxygen process (Fully killed steel, Fine grain practice) and satisfactorily tested in accordance with above specification requirements called for by the above order. This mill test certificate has been issued in compliance with EN 10204 3.1.

- Specimen No. : a-Tension
- Position : T-Top, M-Middle, B-Bottom
- Division : L-Ladle Analysis, P-Product Analysis
- Sub(Sub Size, Real Value, mm) : Blank-Full Size, 1-7.5, 10, 2-5.0, 10
- GL(Gauge Length, mm) : 1-200, 2-100, 3-80, 4-70, 5-50, 6-5.65, 7-50, 8-40, 9-80
- T(S) Al : Total(Soluble) Al *Tr : Trace
- NRL Result : G-No Break, B-Break
- TTP(Through Thickness Position) : 1-Surface, 2-1/4T, 3-1/2T

When using the ordered product for other uses, rather than the above specification use, product damage and safety accidents may be caused.

S.H. An

Surveyor to _____ Surveyor to _____ Surveyor to _____ Surveyor to _____ Chief of Customer Support Team _____
Pohang Works, 680 Songdong-ri, Daesong-myeon, Nam-gu, Pohang-si, Gyeongsangbuk-do, 750-841, Korea

KS-1747 11767 11773

ORIGINAL

MILL TEST CERTIFICATE

DONGKUK STEEL

Order No. : J119500055
 PO No. : LPP201109001
 Commodity : STEEL PLATE
 Specification : CSA G40.21 300W/350W

Supplier : DONGKUK INTERNATIONAL INC.
 Customer : SALZGITTER MANNESMANN INTERNAT

Certificate No. : PP2-2-111129-015-004
 Date of issue : Nov. 29, 2011

Dimension Unit inch: " mm: Space	Product No	Quantity	Weight kg	Heat No	P O S i t i o n	Tensile Test			D i v i s i o n	Chemical Composition													Remarks
						GL	YP	TS		EL	C 2	Si 2	Mn 2	P 3	S 3	Cr 3	Ni 2	Cu 2	Mo 3	Nb 3	V 3		
							N/mm ²	%															
6.35*2438*9754 .25*X98*X384" Specimen No : PP05940014-a	7590137-01.02.03		1.186	SF06308	T	1	390	534	24	L	16	36	145	15	4	20	1	1	1	1	1	23F98	
	Sub Total (20)	3	3.558																				
6.35*2438*9754 .25*X98*X384" Specimen No : PP05948508-a	7590141-01.02 7590146-01 7590149-01.02 7590150-01.02		1.186	SF06313	T	1	395	530	24	L	15	36	142	13	5	20	1	1	1	1	1	23F98	
	Sub Total (20)	7	8.302																				
6.35*3048*12182 .25*X120*X480" Specimen No : PP05952405-a	7589068-01.02		1.852	SF06122	T	1	404	542	25	L	15	35	144	14	3	20	1	1	1	1	1	23F98	
	Sub Total (30)	2	3.704																				
<Grand Total>		71	72.470																				

• Tensile Test Direction-Transverse
 • Supply Condition - As Rolled
 • Chemical Composition Unit(%) : 2-x100, 3-x1000, 4-x10000

We hereby certify that the material has been made by Basic oxygen process (Fully killed steel, Fine grain practice) and satisfactorily tested in accordance with above specification requirements called for by the above order. This mill test certificate has been issued in compliance with EN 10204 3.1.

When using the ordered product for other uses, rather than the above specification use, product damage and safety accidents may be caused.

• Specimen No. : a-Tension
 • Position : T-Top, M-Middle, B-Bottom
 • Division : L-Ladle Analysis, P-Product Analysis
 • Sub(Sub Size, Real Value, mm) : Blank-Full Size, 1-7.5+10, 2-5.0+10
 • GL(Gauge Length, mm) : 1-200, 2-100, 3-80, 4-70, 5-50, 6-5.65VA
 7-50, 8-40, 9-30
 • T(S) : Total(Soluble) Al • Tr : Trace
 • NBT Result : G-No Break, B-Break
 • TTP(Through Thickness Position) : 1-Surface, 2-1/4T, 3-1/2T

Surveyor to

Surveyor to

Surveyor to

Surveyor to

Chief of Customer Support Team

Pohang Works, 880 Songdong-ri, Daesong-myeon, Nam-gu, Pohang-si, Gyeongsangbuk-do, 790-841, Korea

Page 4/A

Heat Number
SF06313Vendor :
SALZGITTER INT (CANADA) INC.

KS- 1747/1767/1773

ORIGINAL

MILL TEST CERTIFICATE

DONGKUK STEEL

Order No. : J119500055
 PO No. : LPP201109001
 Commodity : STEEL PLATE
 Specification : CSA G40.21 300W/350W

Supplier : DONGKUK INTERNATIONAL, INC.
 Customer : SALZGITTER MANNESMANN INTERNAT

Certificate No. : PP2-2-111117-016-001
 Date of issue : Nov. 17, 2011

Dimension Unit inch: ", mm: Space	Product No	Quantity	Weight kg	Heat No	P o s i t i o n	Tensile Test				D i v i s i o n	Chemical Composition													Remarks
						GL	YP	TS	EL		C 2	Si 2	Mn 2	P 3	S 3	Cr 3	Ni 2	Cu 2	Mo 3	Nb 3	V 3			
							N/mm²	%																
6.35*3048*12192 25"x120"x480" Specimen No : PP05677917-a	7579954-01		1.852	SF01688	T	1	370	525	26	L	15	36	146	15	4	20	1	1	1	1	1	23RFB		
	Sub Total (30)	1	1.852																					
6.35*3048*12192 25"x120"x480" Specimen No : PP05952405-a	7587391-01.02 7587393-01.02 7587394-01.02 7587395-01.02		1.852	SF06122	T	1	404	542	25	L	15	35	144	14	3	20	1	1	1	1	1	23RFB		
	Sub Total (30)	8	14.816																					
6.35*3048*12192 25"x120"x480" Specimen No : PP05948508-a	7587396-01.02 7587397-01.02		1.852	SF06313	T	1	395	530	24	L	15	36	142	13	5	20	1	1	1	1	2	23RFB		
	Sub Total (30)	4	7.408																					
7.94*2438*7315 5/16"x96"x288" Specimen No : PP05989503-a	7587182-01.02,03,04		1.111	K1122146	T	1	379	537	24	L	16	37	141	10	2	15	2	1	2	2	2	23RFB		
	Sub Total (40)	4	4.444																					
<Grand Total>		17	28.520																					

* Tensile Test Direction - Transverse
 * Supply Condition - As Rolled
 * Chemical Composition Unit(%) : 2-x100, 3-x1000, 4-x10000

We hereby certify that the material has been made by Basic oxygen process (Fully killed steel, Fine grain practice) and satisfactorily tested in accordance with above specification requirements called for by the above order. This mill test certificate has been issued in compliance with EN 10204 3.1.

When using the ordered product for other uses, rather than the above specification use, product damage and safety accidents may be caused.

* Specimen No. : a-Tension
 * Position : T-Top, M-Middle, B-Bottom
 * Division : L-Ladle Analysis, P-Product Analysis
 * Sub(Sub Size, Real Value, mm) : Blank-Full Size, 1-7.5*10, 2-5.0*10
 * GL(Gauge Length, mm) : 1-200, 2-100, 3-80, 4-70, 5-50, 6-5.65*4, 7-5d, 8-4d, 9-8d
 * T(S), Al : Total(Soluble) Al *Tr : Trace
 * NRL Result : G-No Break, B-Break
 * TTP(Through Thickness Position) : 1-Surface, 2-1/4T, 3-1/2T

Surveyor to

Surveyor to

Surveyor to

Surveyor to

Chief of Customer Support Team

Pohang Works, 880 Songdong-ro, Daesong-myeon, Nam-gu, Pohang-si, Gyeongsangbuk-do, 790-841, Korea

Page : 1/1

Heat Number
SF06313Vendor:
SALZGITTER INT (CANADA) INC.

검사증명서

MILL TEST CERTIFICATE

(INSPECTION CERTIFICATE)

MAR 08 2012

HYUNDAI STEEL

당진제철소: 충남 당진시 송악읍 고대리 167-32
Godeok-Po, Songak-Eup, Dangjin, Chungnam, Korea

주문번호
Order No. : E111200017

품명
Commodity : Hot Rolled Steel Plate

제품규격
Specification : CSA 44W/ASTM A36

고객사
Customer : RUSSEL METALS

주요자
Contractor : HYUNDAI CORPORATION



증명서 번호
Certificate No. : 20111230-PS-026-003

발행일자
Date of Issue : 2012-01-18

제품치수 Dimension	수량 Quantity	중량 Weight (Kg)	재강번호 Heat No.	제품번호 Product No.	Position	인장시험 Tensile Test								화합성분 Chemical Composition(%)														단위 Unit 2:x100 3:x1,000 4:x10,000 5:x100,000				
						YP	TS	EL	YP-EL	RA	YR	N	Division	C	S	Mn	P	S	Cr	Ni	Cu	Mo	Nb	Ti	V	Sn	Al					
						(N/mm ²)	(%)	(%)	(%)	(%)	(%)	4		3	3	4	4	2	2	3	2	3	3	3	3							
** Condition of supply : As-Rolled **																																
1.000" x 96" x 288"	1	3,555	M37435	FA19032801	T	370.2	516.2	28						L	1,555	272	1,173	156	23	2	1	17	0	29	1	1	30					
1.000" x 96" x 288"	1	3,555	M37435	FA19032802	T	370.2	516.2	28						C	1,497	273	1,162	139	20	2	1	16	0	26	2	1	30					
1.000" x 96" x 288"	1	3,555	M37435	FA19032803	T	370.2	516.2	28						L	1,555	272	1,173	156	23	2	1	17	0	29	1	1	30					
1.000" x 96" x 288"	1	3,555	M37435	FA19032804	T	370.2	516.2	28						C	1,497	273	1,162	139	20	2	1	16	0	26	2	1	30					
1.000" x 96" x 288"	1	3,555	M37435	FA19032805	T	370.2	516.2	28						L	1,555	272	1,173	156	23	2	1	17	0	29	1	1	30					
1.000" x 96" x 288"	1	3,555	M37435	FA19032806	T	370.2	516.2	28						C	1,497	273	1,162	139	20	2	1	16	0	26	2	1	30					
1.000" x 96" x 288"	1	3,555	M37435	FA19107105	T	370.2	516.2	28						L	1,555	272	1,173	156	23	2	1	17	0	29	1	1	30					
1.000" x 96" x 288"	1	3,555	M37435	FA19107105	T	370.2	516.2	28						C	1,497	273	1,162	139	20	2	1	16	0	26	2	1	30					

NOTE

- Position - T:Top, M:Middle, B:Bottom
- Tensile test - Direction:Transverse, Gauge length:200mm (Rectangular), YP method : 0.2% off-set
- Division - C:Check analysis, L:Ladle analysis

ORIGINAL

ORDER NUMBER : M64034931

상기의 제품은검사의 결과 지정된 규격에 합격한 것을 증명합니다.
WE HEREBY CERTIFY THAT THE MATERIAL HAS BEEN MADE AND TESTED IN ACCORDANCE WITH THE ABOVE SPECIFICATION AND THE REQUIREMENTS

Signature

S. B. Park

SURVEYOR TO : CHIEF OF QUALITY ASSURANCE TEAM

본 검사증명서는 복사방지마크와 이차원 바코드 등 보안시스템이 탑재된 증명서로서, 불법적인 목적으로 위.변조 시 사문서 위조 (형법231조)로 불이익을 당하실 수 있습니다.

ORIGINAL

MILL TEST CERTIFICATE

MAR 30 2012



DX DONGKUK STEEL

Order No. : J11B400064
 PO No. : LPP201110012
 Commodity : STEEL PLATE
 Specification : ASTM A36/CSA G40.21 300W

Supplier : DONGKUK INTERNATIONAL, INC.
 Customer : SALZGITTER MANNESMANN INTERNAT

Certificate No. : PP2-2-111221-027-002
 Date of issue : Dec. 21, 2011

Dimension Unit Inch: ", mm: Space	Product No	Quant Qty	Weight kg	Heat No	Position	Tensile Test			Division	Chemical Composition														Remarks
						GL	YP	TS		EL	C 2	Si 2	Mn 2	P 3	S 3	Cr 3	Ni 2	Cu 2	Mo 3	Nb 3	V 3	Caq 3		
							N/mm²	%																
19.05*2438*7315 .75*X96*X288" Specimen No : PP06031210-a	7604249-02.03.04	3	2,667	K2815691	T	1	346	500	25	L	16	25	120	12	5	20	1	1	1	1	2	366	22F8	
Sub Total (40)			8,001																					
19.05*2438*7315 .75*X96*X288" Specimen No : PP06031211-a	7604252-02.03.04 7604255-02.03.04	6	2,667	K2815691	T	1	348	500	28	L	16	25	120	12	5	20	1	1	1	1	2	368	22F8	
Sub Total (40)			16,002																					
19.05*2438*7315 .75*X96*X288" Specimen No : PP06001405-a	7604259-01.03.04	3	2,667	K28945	T	1	397	535	27	L	17	29	123	16	5	20	1	1	10	1	2	383	22F8	
Sub Total (40)			8,001																					
19.05*2438*7315 .75*X96*X288" Specimen No : PP06002111-a	7604241-01.02	2	2,667	K28951	T	1	356	514	28	L	17	27	122	14	4	30	1	2	10	1	2	384	22F8	
Sub Total (40)			5,334																					
25.40*2438*7315 1*X96*X288" Specimen No : PP06017000-a	7602694-01.02	2	3,556	K2815590	T	1	360	494	27	L	15	22	121	19	6	20	1	2	2	1	2	358	22F8	
Sub Total (50)			7,112																					

* Tensile Test Direction-Transverse
 * Caq = C+Mn/5+(Ni+Cu)/15+(Cr+Mo+V)/5
 * Supply Condition - As Rolled
 * Chemical Composition Unit(%): 2-x100, 3-x1000, 4-x10000

We hereby certify that the material has been made by Basic oxygen process (Fully killed steel, Fine grain practice) and satisfactorily tested in accordance with above specification requirements called for by the above order. This mill test certificate has been issued in compliance with EN 10204 3.1.

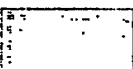
When using the ordered product for other uses, rather than the above specification use, product damage and safety accidents may be caused.

* Specimen No. : a-Tension
 * Position : T-Top, M-Middle, B-Bottom
 * Division : L-Ladle Analysis, P-Product Analysis
 * Sub(Sub Size, Real Value, mm) : Blank-Full Size, 1-7.5*10, 2-5.0*10
 * GL(Gauge Length, mm) : 1-200, 2-100, 3-80, 4-70, 5-50, 6-5.65-A, 7-5d, 8-4d, 9-8d
 * T(S), AI : Total(Soluble) AI *Tr : Trace
 * NRL Result : G-No Break, B-Break
 * TTP(Through Thickness Position) : 1-Surface, 2-1/4T, 3-1/2T

Surveyor to _____ Surveyor to _____ Surveyor to _____ Surveyor to _____
 Chief of Customer Support Team

Pohang Works, 880 Songdong-ri, Daesong-myeon, Nam-gu, Pohang-si, Gyeongsangbuk-do, 790-841, Korea.

Page : 2/3



ORIGINAL

**CERTIFICATE OF COMPLIANCE
FOR THE INSTALLATION OF INSULATION**

KENT STEEL

5441-52 ave S.E. Calgary Alberta - T2C 4S5

Phone: (403) 279-7000 Fax: (403) 279-7060

JOB No. KS - 1747

CUSTOMER: _____

REFERENCE: _____

REFER TO KENT STEEL I.T.P. FOR HOLD POINTS AND INSPECTOR SIGN-OFF

INSULATION TYPE

POLAR FOAM CLASS PF-7217-0 ☐

COMMENTS

POLAR FOAM CLASS PF-2444-0 ☒

THICKNESS REQUIRED: 3

TOP COAT YES ☐

NO ☐

IF "YES" SPECIFY TYPE: _____

AMOUNT OF LAYERS
OF INSULATION _____

TIME ALLOWED BETWEEN APPLICATIONS
(ONLY APPLIES FOR 4" AND UP) _____

SURFACE PREPARATION
(SURFACE TEMP MUST BE ABOVE -5C) _____

AMBIENT APPLICATION TEMP +70F _____

MIXING SPRAY TEMP +110F _____

EQUIPMENT USED: H-20 / 35 PLURAL COMPONENT PROPORTIONED - MAKE GRACO / GUSMER

COMPRESSOR TYPE / SIZE: 5 H.P. CHAMPION

SIZE OF MIXING CHAMBER: SIZE 70

GENERAL MAKE OUTPUT: JOHN DEERE 50KW

C.H.H.
APPLICATOR NAME (PRINT)

[Signature]
APPLICATOR NAME (SIGNATURE)

MAY 17/12
DATE

KENT STEEL Q.C. NAME (PRINT)

[Signature]
KENT STEEL Q.C. NAME (SIGNATURE)

MAY 17/12
DATE

KENT STEEL PAINT SPECIFICATION

Customer P.O.	
Kent Steel Job#	KS-1767
Customer Contact	Phone:

CUSTOMER PREPARATION AND PAINTING REQUIREMENTS

Substrate Preparation	
SSPC Requirements	SP-6
Profile	
Abrasive	CLEAN BRIST

APPLICATION

Thinner (Material and Manufacturer):	
XYLENE	CLOVERDALE

PRIMER

Type of Primer: H.S. NON LIFTING PRIMER	Manufacturer: CLOVERDALE
Type of Top Coat: BLACK	CLOVERDALE

Date: 22 MAY 2012	Time Start: 5:00	Time Finish: 7:00	Cure Time: 1 Hr
-------------------	------------------	-------------------	-----------------

Number of Coats: 1	Required DFT: 1.5	Recorded DFT: 1.9
Ambient Temp.: 15°C	Substrate Temp.: 45°C	Humidity: 38%


FINISH COAT(S)

Date: MAY 22 2012	Time Start: 9:00	Time Finish: 10:00	Cure Time:
-------------------	------------------	--------------------	------------

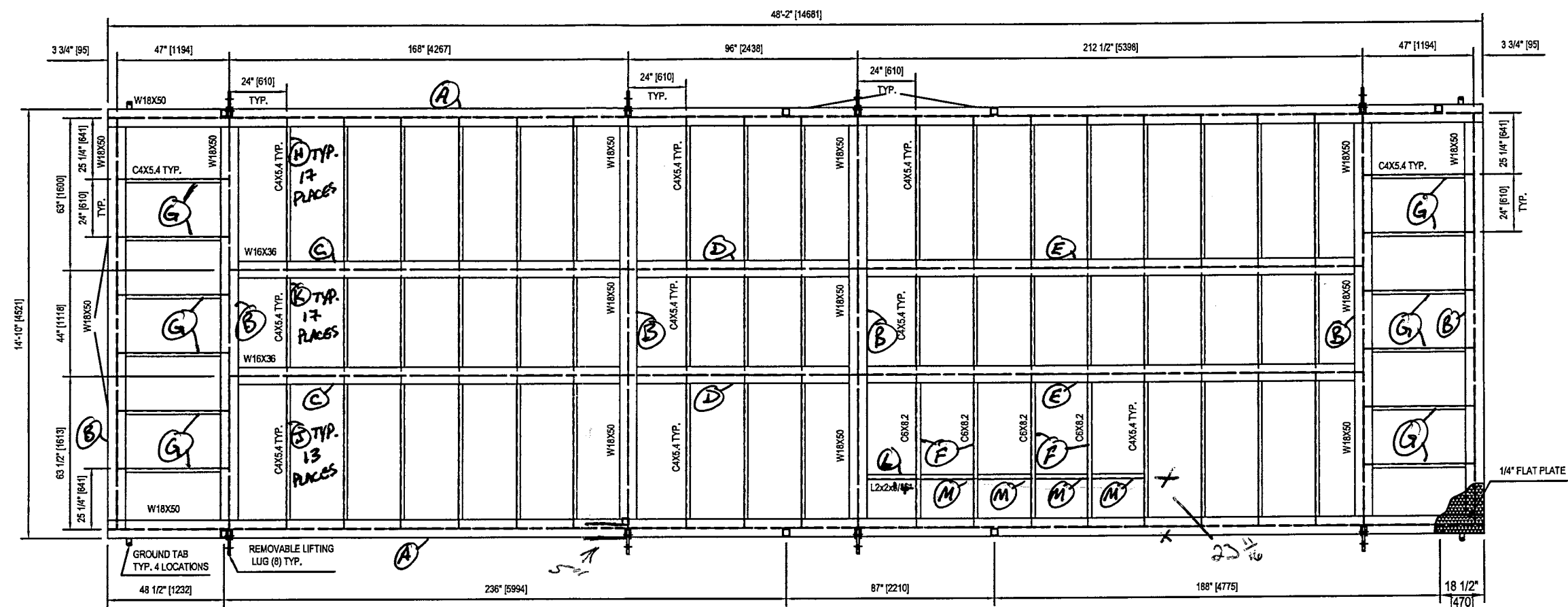
Number of Coats: 1	Required DFT: 1.25	Recorded DFT: 3.9
Ambient Temp.: 11°C	Substrate Temp.: 41°C	Humidity: 36%

COMMENTS

H.S. NON LIFTING PRIMER	S11J 4254
BLACK	S12D 5300
XYLENE	S12D 5379

Prepared By: DEULOGAN M	Date: 21 MAY 2012	Signature: 
Inspector:	Date:	Signature:

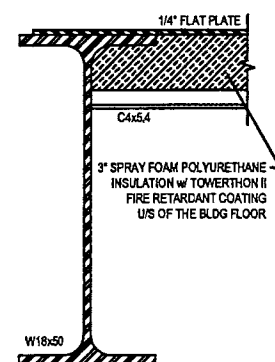
- WELDING SHALL BE IN GENERAL CONFORMANCE WITH CSA W59-2003.
- WELDS TO BE 1/4" CONTINUOUS FILLET WELD UNLESS NOTED.
- CHECKER PLATE TO BE STITCH WELDED TO SKID USING 3/16" FILLETS 2" AT 12" INTERVALS.
- CHECKER PLATE SEAMS TO BE WELDED CONTINUOUSLY ON ONE SIDE.
- ALL WORK SHALL GENERALLY CONFORM TO THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS:
 - * CSA W47.1-09
 - * CISC HANDBOOK OF STEEL CONSTRUCTION
- ALL STEEL SHALL BE OF NEW STOCK AND SHALL BE IN ACCORDANCE WITH CSA G40.21-M.
 - * STRUCTURAL STEEL = GRADE 350W
 - * CHANNELS & ANGLES = GRADE 300W
 - * LIFTING LUGS = GRADE 300W
 - * CHECKER & FLAT PLATE = GRADE 300W
- FILLER METAL SHALL CONFORM TO CSA STD. W48.5-M - E4802C-6-CH.
- 3"-R20 SPRAY FOAM POLYURETHANE INSULATION w/ TOWERTHON II FIRE RETARDANT COATING U/S OF THE BLDG FLOOR
- 1/4" FLAT PLATE DECKING W/ ANTI-SLIP PAINT
- SSPC-SP-6 SURFACE PREPARATION
- PRIME WITH ONE COAT OF CLOVERDALE 710 SERIES PRIMER
- TOPCOAT WITH ONE COAT OF CLOVERDALE 74 SERIES INDUSTRIAL ENAMEL
- STANDARD QC PACKAGE
- FINISH COLOR IS TO BE **BLACK**



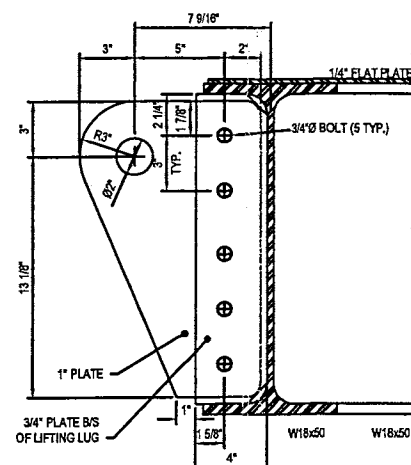
SK:d w/ plate 25,300/185
w/o plate 17,200/185
upper 1619/185

Pg 1 of 2

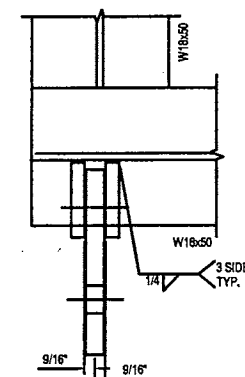
KE-1767




TYP. SKID SECTION w/ INSULATION

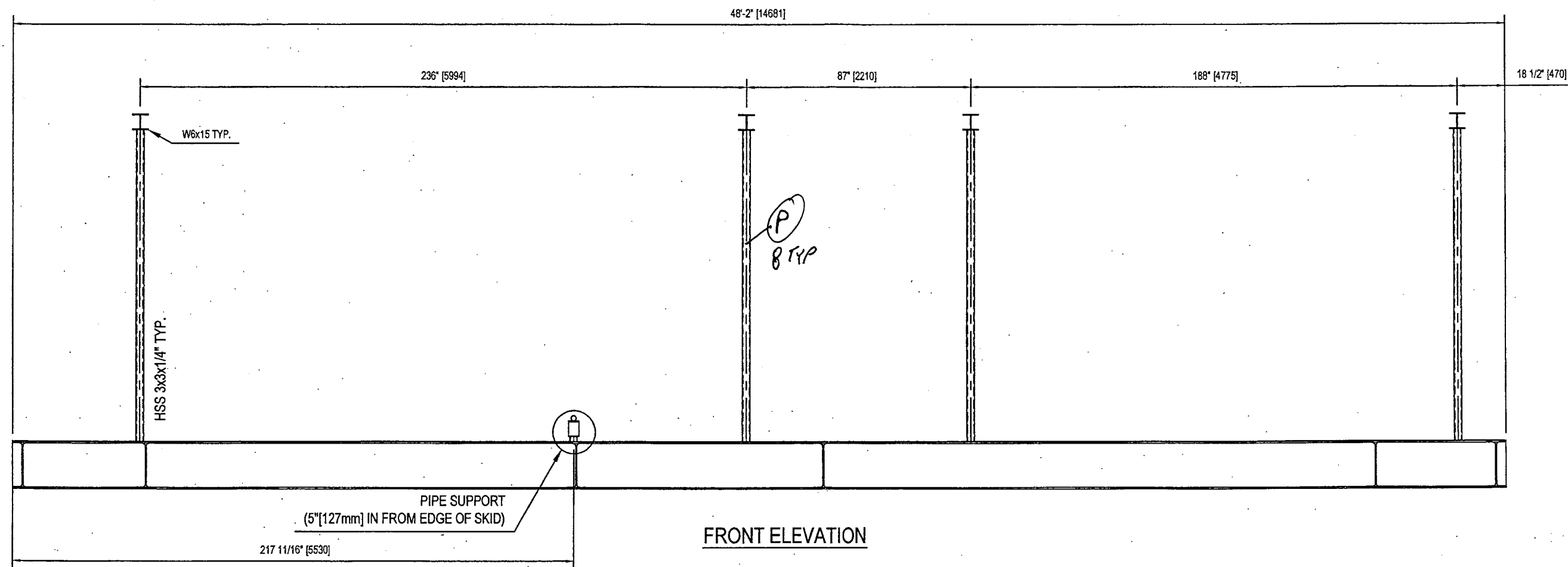


TYP. REMOVABLE LIFTING LUG DETAIL

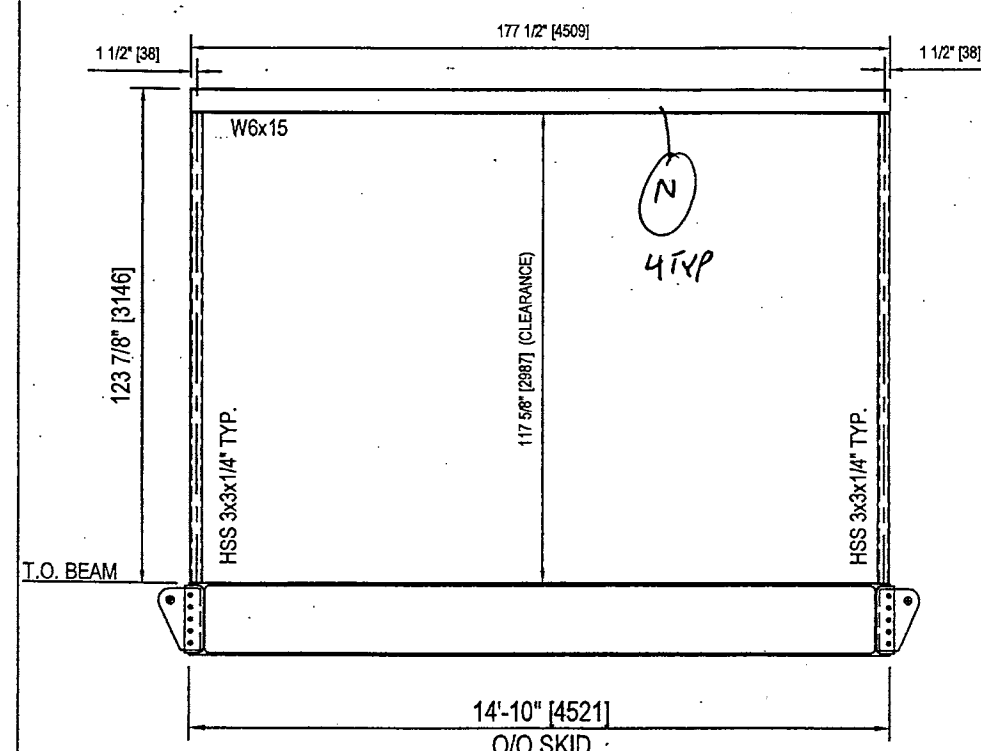


TYP. LIFTING LUG DETAIL

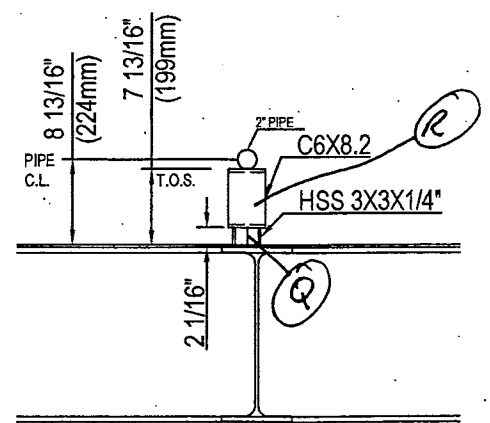
		6998 84 ST SE, Calgary, Alberta, T2C 4T6 Telephone (403) 720-9425, Fax (403) 720-9426	
-	-	-	-
0	IFC	01/05/2012	KB SB
C	MOVED CABLE TRAY POST	27/04/2012	KB SB
B	REVISED AS PER MARK-UPS	23/04/2012	KB SB
A	-FOR APPROVAL	-03/04/2012	-KB -SB
Rev. No.	Description:	Date:	Drawn By: Checked By:
CUSTOMER	-ABB BERMAC		
REFERENCE	-CADOTTE PILOT CSS		
CUSTOMER P.O.#	-4500497048		
LOCATION	-WARWICK'S YARD		
DATE REQUIRED	-APRIL 2012		
JOB NUMBER	W28406		
DRAWING #	W28406-03		
Dwg Name		SKID DRAWING - SHOP & FIELD PRIN	



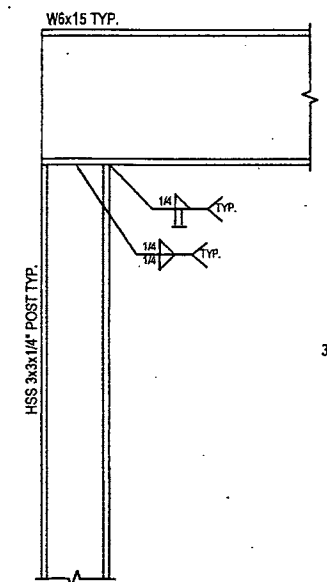
FRONT ELEVATION



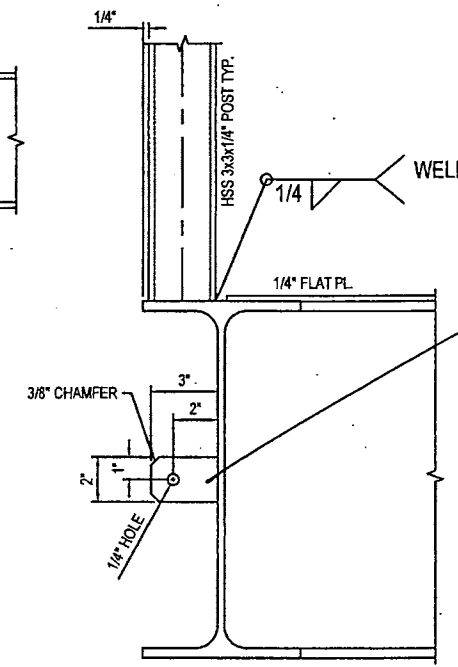
SIDE ELEVATION



PIPE SUPPORT DETAIL



TYP. POST TO HEADER CONN.



POST TO SKID CONN. TYP. 4 LOCATIONS
GROUND TABS TYP. 4 LOCATIONS

Handwritten notes: E of Beam web, KS-1767, Pg 2 of 2

Warwick INDUSTRIES LTD		6999 84 ST SE, Calgary, Alberta, T2C 4T6 Telephone (403) 720-9425, Fax (403) 720-9426	
1	ADDED UPPER STEEL DIM.	01/05/2012	KW SB
0	IFC	01/05/2012	KW SB
C	MOVED CABLE TRAY POST	27/04/2012	KW SB
B	REVISED AS PER MARK-UPS	23/04/2012	KW SB
A	FOR APPROVAL	03/04/2012	KW SB
Rev. No.	Description:	Date:	Drawn By: Checked By:
CUSTOMER	-ABB BERMAC		
REFERENCE	-CADOTTE PILOT CSS		
CUSTOMER P.O.#	-4500497048		
LOCATION	-WARWICK'S YARD		
DATE REQUIRED	APRIL 2012		
JOB NUMBER	W28406		
DRAWING #	W28406-04		
Dwg Name	SKID DRAWING - SHOP & FIELD PRINT		

Certificate of Registration

This is to certify that QUASAR has certified:

Warwick Industries Ltd.

Plants: 6999 - 84th Street SE, Calgary, AB T2C 4T6 / Gar-Don Steel Industries Ltd., 1308 - 8 Street, Nisku, AB T9E 7M1
Design Office: Laviolette Engineering Ltd., 11729 105 Ave. NW, # 101, Edmonton, AB T6G 1N4

to the Certification Standard:

CAN/CSA A660-10

"Certification of Manufacturers of Steel Building Systems"

Initial Registration
26 January 2010

Date of Issue
2 March 2012

Date of Expiry
26 January 2013

Certificate Number
WARWIO

Scope: Self framing steel buildings - design and manufacture of sheet metal parts, design and supply of steel skids and structural steel (where applicable) and erection of buildings.



Registrar



Refer to www.cwbgroup.org for current certification status.

SHIPPING BILL

Customer: Wawick Industries

Project: ABB / Bermac

Site: Pick Up

Attn:

Date : May 22, 2012

Kent Steel Job # KS 1767

Customers Job #: W28406

Customers PO#: P12093

[illegible]

CUSTOMER SIGNATURE: [Signature]

DRIVER SIGNATURE: Jim C

TRUCKING COMPANY: ENTREC

PRINT NAME : _____

PRINT NAME : _____

LOAD SAFETY DRIVER INITIAL :

KENT STEEL LTD.
5441 - 52ND. Ave. S.E. Calgary, Alberta
PH:(403)279-7000 FAX:(403)279-7060