

Post-It™ Fax Note

7671E

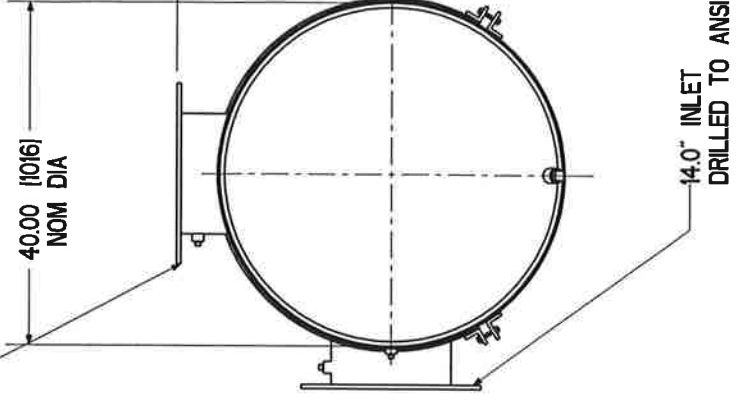
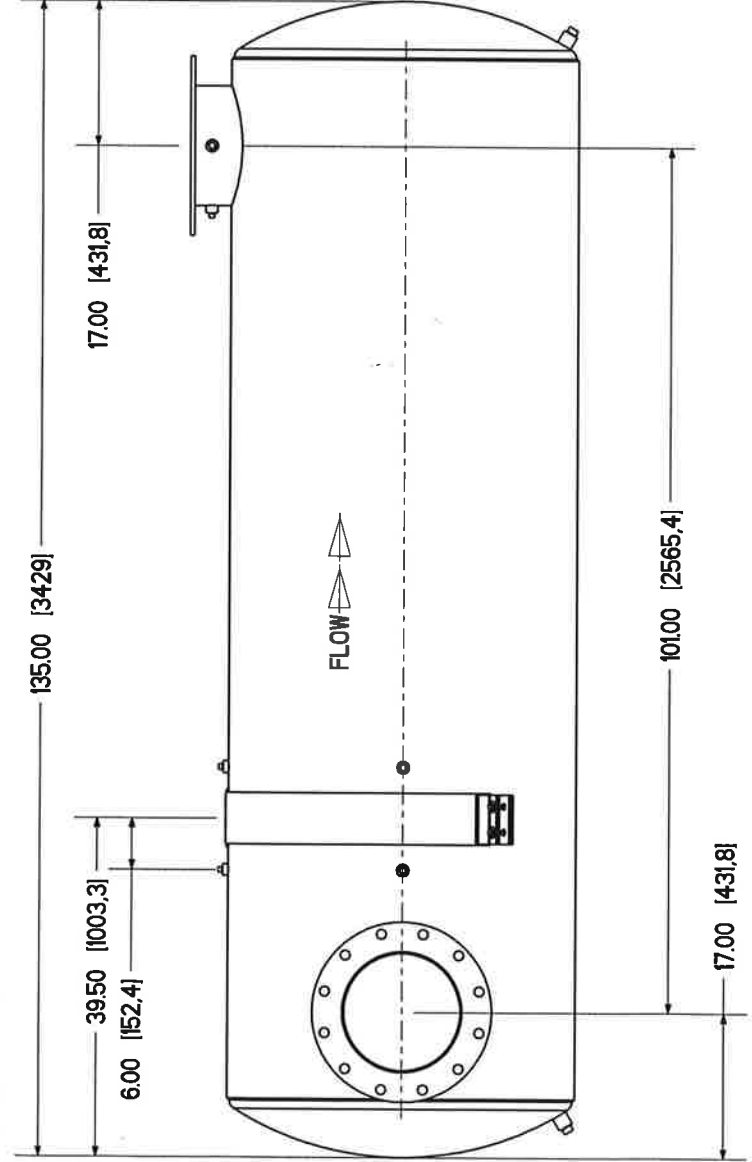
Date	MA 10/2	# of Pages	ONE
To	MARINA PALUMBOS	From	LONG
Co./Dept.	SILEX	Co.	BIDELL
Phone #	1-800-387-7810	Phone #	203-3768
Fax #	905-612-8999	Fax #	

03-248

APPROVED

[Signature]

14.0" OUTLET
DRILLED TO ANSI 150"



VIEW FROM OUTLET END

NOTES:

1. HIGH TEMPERATURE ALUMINUM / BLACK PAINT.
2. SILENCER IS DESIGNED TO SUPPORT OWN WEIGHT ONLY.
3. STANDARD SILEX CONSTRUCTION TOLERANCE APPLY $\pm 1/8"$.
4. ALL WELDED CONSTRUCTION.
5. DRAWING SUBJECT TO CHANGE WITHOUT NOTICE.

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED. TOLERANCES APPLY AS SHOWN BELOW: $\pm 1/8"$ HP FRAC; ± 0.125 HP DEC ± 3.175 MM METRIC; $\pm 2^\circ$ ANGULAR		DRAWING TYPE: SALES DATE: 05/07/04		6659 Orcon Drive Mississauga, Ontario L5T 1M6 Tel: (905) 612-4000 Fax: (905) 612-8999 1-800-387-7818 www.silex.com	
DIM - HOLD - CRITICAL DIMENSION THE INFORMATION HEREIN IS THE PROPERTY OF SILEX EQUIPMENT LTD. AND IS NOT TO BE REPRODUCED OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF SILEX EQUIPMENT LTD. THIS DRAWING IS PROVIDED AS STRICTLY PROHIBITED. DO NOT SCALE DRAWING.		APPROVED BY: DATE:		TITLE: HOSPITAL GRADE CATALYTIC SILENCER	
THIRD ANGLE PROJECTION		SCALE: 0.046" = 1"		DRAWING NO.: BIDELL EQUIPMENT LTD-AB	
ORDER: 1		SHIP DATE:		REV: 00	
				PROJECT/WORK ORDER NO.: JDD5-14-OX-50-40-SISO-9,12 AS	
				SHEET: 1 OF 1	



Power Ignition and Controls
a division of Spartan Controls

Power Ignition & Controls Ltd.

305 – 27th Street SE
Calgary, Alberta
T2A 7V2

Phone: (403) 236-2115 Fax: (403) 236-2147

QUOTATION # 219408SQ

May 4, 2004

Bidell Equipment Ltd.

Calgary, Alberta
Fx: 272-7749
Ph: 203-3768

Attention: Long Ta

Subject: Catalytic Converter

Reference: Waukesha L7042GSI (1478 HP at 1200 RPM)

Dear Long,

Please accept the following proposal for the above noted requirements for this project.

Catalytic Converter

We are proposing a Miratech catalytic converter for the above noted engine. For an operating speed of 1200 RPM, the Waukesha L7042GSI (1478 HP) engine is suited for continuous operation with an inlet water temperature of 130 °F. These engines produces approximately 13.1gr/BHP-Hr with the air fuel ratio controlled to +/- .5% of .995 on the lambda scale or a 15.95:1 air/fuel ratio which is just rich of stoichiometric. We would expect a service life of 5 years on the catalyst element provided the system is properly maintained and protected. Please refer to the service contract option attached. This catalyst offers a convenient modular design affording easy access to the dual wound metallic substrate catalyst element and will reduce NOx emissions by over 85%. The replaceable catalyst element is of a dual wound metallic construction and is virtually impervious to shock or vibration. Unlike ceramic elements this system requires no backfire relief valve.

Additional Considerations

Overtemperature Shutdown

The catalyst element used in these converters is an expensive product and every consideration should be given to protect this element from premature failure. One of the primary causes of element failure is thermal deactivation. In an application of this nature, the typical cause of this is engine misfire. Considering that the catalyst is an exothermic device which sees a temperature increase across the catalyst, if unspent fuel is seen in the catalyst it will burn in the catalyst and cause excessive temperatures resulting in thermal deactivation. For this reason, an overtemperature shutdown is strongly recommended to shut the engine down if a situation of this nature should occur. Our approach is to monitor the inlet and outlet temperatures of the catalyst with a 2 point pyrometer. This gives us the advantage of also monitoring the exotherm of the catalyst which gives us a good indication of conversion efficiency.

Lubricating Oil

With the use of any catalytic converter, the type of lubricating oil used is a prime consideration. We recommend using oils with sulphated ash content less than .5%. Sulphated ash will block the pore spaces on the catalyst causing decreased conversion efficiency and increased back pressure. Waukesha's specifications for VHP series engines requires a medium ash oil .35% minimum; however, higher ash oils such as GLX30 or GLX40 are commonly used (.7% sulphated ash) in an effort to extend valve life. Esso Oil has recommended to Power Ignition Controls, Esso lube GMA40 for use on VHP engines in conjunction with catalytic converters. It meets all of Waukesha's specifications and has a sulphated ash content of .45%.

There are also several elements used in some oils which will "poison" the catalyst. If you intend to use any oil other than GMA40 please contact PIC to ensure the oil will not damage the catalyst.

Positive Crankcase Ventilation

On a turbo-charged Waukesha engine, the crankcase is vented to the exhaust system downstream of the turbocharger. There is a venturi set up that allows the correct amount of vacuum to the crankcase. This approach must be abandoned and re-routed downstream of the catalyst as the oil carry over from this tends to poison, mask or foul the catalyst element. An ejector system, available through Waukesha, should be installed utilising excess turbo air to create a venturi at the engine and enough flow to carry the length of pipe into the exhaust.

Hospital Grade- 2.0 g/bhp-hr (L7042GSI)

Engine Data

# of Engines:	1
Engine Operation:	Compressor Driver
Engine Make:	Waukesha
Engine Model:	L 7042 GSI
Power Output:	1478 bhp
Fuel:	Natural Gas
Design Exhaust Temp:	1125 F
Design Exhaust Flow Rate:	129281 scfh
Lubrication Oil:	0.6 wt% sulfated ash or less

Catalytic Converter System Data

Catalytic Converter Model:	MHS-36Y3018-14-C1
Inlet / Outlet Pipe Size:	14 inches
Overall Length:	136 inches
Diameter:	36 inches
Weight (including catalyst):	1720 lbs
Converter Pressure Loss:	7.14Inches of WC
Sound Attenuation:	30-35 dBA
Catalyst Section Internals:	304 SS
Shell / Body Constructions:	Carbon Steel
Inlet / Outlet Connection:	Standard 125# ANSI Bolt Pattern Flanges - FF
Instrumentation Ports:	1 inlet / 1 outlet / 2 catalyst (1/2" NPT)
Oxygen Sensor Ports:	1 inlet / 1 outlet (18 mm)
Operation Temperature Limits:	750 - 1,250 degrees F (inlet); 1350 degrees F (outlet)

Emission Requirements

Exhaust Gases	Engine Outputs (g/ bhp-hr)	Reduction (%)	Converter Outputs (g/ bhp-hr)
NOx	13.00	85%	2.00
CO	9.00	0%	9.00
NMNEHC	0.06	0%	0.06
CH2O	0.05	0%	0.05
PM10	0.00	0%	0.00
Oxygen	0.3%		

Critical Grade- 2.0 g/bhp-hr (L7042GSI)

Engine Data

# of Engines:	1
Engine Operation:	Compressor Driver
Engine Make:	Waukesha
Engine Model:	L 7042 GSI
Power Output:	1478 bhp
Fuel:	Natural Gas
Design Exhaust Temp:	1125 F
Design Exhaust Flow Rate:	129281 scfh
Lubrication Oil:	0.6 wt% sulfated ash or less

Catalytic Converter System Data

Catalytic Converter Model:	MCS-30Y2421-14-C1
Inlet / Outlet Pipe Size:	14 inches
Overall Length:	102 inches
Diameter:	30 inches
Weight (including catalyst):	936 lbs
Converter Pressure Loss:	3.93 Inches of WC
Sound Attenuation:	25-30 dBA
Catalyst Section Internals:	304 SS
Shell / Body Constructions:	Carbon Steel
Inlet / Outlet Connection:	Standard 125# ANSI Bolt Pattern Flanges - FF
Instrumentation Ports:	1 inlet / 1 outlet / 2 catalyst (1/2" NPT)
Oxygen Sensor Ports:	1 inlet / 1 outlet (18 mm)
Operation Temperature Limits:	750 - 1,250 degrees F (inlet); 1350 degrees F (outlet)

Emission Requirements

Exhaust Gases	Engine Outputs (g/ bhp-hr)	Reduction (%)	Converter Outputs (g/ bhp-hr)
NOx	13.00	85%	2.00
CO	9.00	0%	9.00
NMNEHC	0.06	0%	0.06
CH2O	0.05	0%	0.05
PM10	0.00	0%	0.00
Oxygen	0.3%		

Installation

We will install the units on our standard terms which are as follows:

Travel Time	\$ 65.00/hour (based on Calgary-return)
Labour	\$ 65.00/hour
Overtime	\$ 97.50/hour
Mileage	\$ 0.70/km (based on Calgary-return)
Subsistence	At cost
Accommodation	At cost

Catalytic Converter Installation

We recommend the installation of the catalyst, exhaust piping, tubing, and conduit for this project be performed by a reliable packager. We will work with this company to provide any assistance required. The catalyst should be mounted outside the building and a stand should be erected to allow access to the converter for service. We will mount and wire the Air/Fuel ratio controller as close as practical to the engine. It is the customer/packager responsibility to run all necessary conduit and tubing for the air fuel ratio controller.

We estimate that the installation services we are to perform require 2 days and would include installation of the AFR, wiring emissions testing and commissioning of the system.

Terms and conditions

See schedule 1- Terms & Conditions

Comply with third party electrical rules.

All prices firm for 10 days from date of this quotation.

Payment terms are net 30 days unless otherwise agreed upon in writing.

Prices are GST not included.

Yours sincerely,

Jill Miller
Applications Engineering
POWER IGNITION & CONTROLS

BIDELL EQUIPMENT INC.

RED = ENTERED BY USER FROM ARIEL PERFORMANCE

[illegible]



Standard Specifications for Ariel Compressor Cylinder



Class: 14-1/8K

Bore: 13.625 in

Action: Double acting Stroke: 5.5 in Cylinder assy. weight-est'd: 2715 lb
Flange: 10"- 300 FF Max. Cylinder Speed: 1200 rpm Piston/Rod assy. weight-est'd: 239.6 lb

Pressure Ratings **NACE derating only if shipped prior to 19-Jul-2002*

MAWP: 635 psig RDP: 577 psig
NACE MAWP*: 430 psig HTP: 953 psig

Material Specifications

Body: Ductile Iron (ASTM A395 Grade 60-40-18)
Piston: Gray Iron (ASTM A278 Class 30)
Piston rod: Alloy Steel (AISI 4100 Series)
Piston ring: GMFTFE (Glass Moly Filled Teflon)
Piston wear band: GMFTFE (Glass Moly Filled Teflon)
Rod packing case: Gray Iron (ASTM A278 Class 30)
Rod packing rings: CFTFE (Carbon Filled Teflon)
Cylinder stress bolt: Grade 8 (Grade 8)

	-----Head End-----		-----Crank End-----	
	Suction	Discharge	Suction	Discharge
Cylinder Equivalent Area, Adjusted - in ² :	29.738	45.425	29.738	45.425
Selected Valve Data Lift per valve, in :	0.102	0.102	0.102	0.102
API lift area per valve, in ² :	12.49	12.49	12.49	12.49
Adjusted equivalent area per valve, in ² :	12.44	12.44	12.44	12.44
Type :	158CJT	158CT	158CJT	158CT
Nominal diameter, in :	7.03		7.03	
Plate material*:	Nylon	Med temp nylon	Nylon	Med temp nylon
Seat / Guard material :	AISI 416	AISI 416	AISI 416	AISI 416
Springs material(s) :	17-7PH	17-7PH	17-7PH	17-7PH
Bolt material :	AISI 410	AISI 410	AISI 410	AISI 410
Last date used in new units :	current	current	current	current

Total valves per cylinder 8 * Valve plate material shown is standard - may vary with application

Clearance Data Normal clearance :	18.7%		19.6%	
Maximum number spacers :	2	2	2	2
Added clearance per spacer :	3.2%	3.2%	3.3%	3.3%

VVCP Data

Pocket Volume	Total Turns	Total Travel	Assembly Wt.-est'd	-----Head End Added Clearance with VVCP-----				
				Closed	Pocket	Total	Change per in	Change per turn
398 in ³	32.00	4 in	425 lb	1.0%	49.6%	50.5%	12.4%	1.5%

FVCP Data

Assembly Wt.-est'd, lb	-----Head End Added Clearance with FVCP-----				-----Pocket 3-----			
	Pocket 1		Pocket 2		Pocket 3		Pocket 3	
	Closed in ³	Pocket %	Closed in ³	Pocket %	Closed in ³	Pocket %	Closed in ³	Pocket %
50.9	6.3	360	44.9					
51.4	6.4	400	49.9					
37	4.6	665	82.9					



Standard Specifications for Ariel Compressor Cylinder

Class: 14-1/8K

Bore: 13.625 in



Piston and Velocity Data:

	<u>Head End</u>	<u>Crank End</u>	<u>Total</u>
Piston Area:	145.80 in ²	142.66 in ²	
Piston Displacement at 1200 rpm:	556.88 cfm	544.88 cfm	1101.77 cfm
API Suction Valve Velocity at 1200 rpm:	6419 fpm	6281 fpm	



Standard Specifications for Ariel Compressor Cylinder



Class: 9-5/8K

Bore: 9.6250 in

Action: Double acting Stroke: 5.5 in Cylinder assy. weight-est'd: 2450 lb
Flange: 6"-600 FF Max. Cylinder Speed: 1200 rpm Piston/Rod assy. weight-est'd: 177.1 lb

Pressure Ratings **NACE derating only if shipped prior to 19-Jul-2002*

MAWP: 1270 psig RDP: 1155 psig
NACE MAWP*: 945 psig HTP: 1905 psig

Material Specifications

Body: Ductile Iron (ASTM A395 Grade 60-40-18)
Piston: Gray Iron (ASTM A278 Class 30)
Piston rod: Alloy Steel (AISI 4100 Series)
Piston ring: GMFTFE (Glass Moly Filled Teflon)
Piston wear band: GMFTFE (Glass Moly Filled Teflon)
Rod packing case: Gray Iron (ASTM A278 Class 30)
Rod packing rings: CFTFE (Carbon Filled Teflon)
Cylinder stress bolt: Grade 8 (Grade 8)

	-----Head End-----		-----Crank End-----	
	Suction	Discharge	Suction	Discharge
Cylinder Equivalent Area, Adjusted - in ² :	14.733	21.115	14.733	21.115
Selected Valve Data Lift per valve, in :	0.102	0.094	0.102	0.094
API lift area per valve, in ² :	4.61	4.26	4.61	4.26
Adjusted equivalent area per valve, in ² :	5.02	4.82	5.02	4.82
Type :	102CT	102CT	102CT	102CT
Nominal diameter, in :	4.90		4.90	
Plate material*:	Nylon	Med temp nylon	Nylon	Med temp nylon
Seat / Guard material :	AISI 416	AISI 416	AISI 416	AISI 416
Springs material(s) :	17-7PH	17-7PH	17-7PH	17-7PH
Bolt material :	AISI 410	AISI 410	AISI 410	AISI 410
Last date used in new units :	current	current	current	current

Total valves per cylinder 8 * Valve plate material shown is standard - may vary with application

Clearance Data Normal clearance :	14.5%		15.8%	
Maximum number spacers :	2	2	2	2
Added clearance per spacer :	3.0%	3.0%	3.1%	3.1%

VVCP Data

Pocket Volume	Total Turns	Total Travel	Assembly Wt.-est'd	-----Head End Added Clearance with VVCP-----				
				Closed	Pocket	Total	Change per in	Change per turn
177 in ³	32.00	4 in	310 lb	0.9%	44.2%	45.1%	11.0%	1.4%

FVCP Data

Assembly Wt.-est'd, lb	-----Head End Added Clearance with FVCP-----				-----Pocket 1-----				-----Pocket 2-----				-----Pocket 3-----			
	Closed		Pocket		Closed		Pocket		Closed		Pocket		Closed		Pocket	
	in ³	%	in ³	%	in ³	%	in ³	%	in ³	%	in ³	%	in ³	%	in ³	%
428	12.9	3.2	73	18.2												
	12.9	3.2	107	26.7												
	12.9	3.2	135	33.7												
	12.9	3.2	177	44.2												



Standard Specifications for Ariel Compressor Cylinder

Class: 9-5/8K

Bore: 9.6250 in



Piston and Velocity Data:

	<u>Head End</u>	<u>Crank End</u>	<u>Total</u>
Piston Area:	72.76 in ²	69.62 in ²	
Piston Displacement at 1200 rpm:	277.90 cfm	265.90 cfm	543.81 cfm
API Suction Valve Velocity at 1200 rpm:	8673 fpm	8298 fpm	



Standard Specifications for Ariel Compressor Cylinder



Class: 7-1/4K

Bore: 7.2500 in

Action: Double acting Stroke: 5.5 in Cylinder assy. weight-est'd: 2220 lb
Flange: 6"- 900 FF Max. Cylinder Speed: 1200 rpm Piston/Rod assy. weight-est'd: 119.9 lb

Pressure Ratings *NACE derating only if shipped prior to 19-Jul-2002

MAWP: 1900 psig RDP: 1727 psig
NACE MAWP*: 1525 psig HTP: 2850 psig

Material Specifications

Body: Ductile Iron (ASTM A395 Grade 60-40-18)
Piston: Gray Iron (ASTM A278 Class 30)
Piston rod: Alloy Steel (AISI 4100 Series)
Piston ring: GMFTFE (Glass Moly Filled Teflon)
Piston wear band: GMFTFE (Glass Moly Filled Teflon)
Rod packing case: Gray Iron (ASTM A278 Class 30)
Rod packing rings: CFTFE (Carbon Filled Teflon)
Cylinder stress bolt: Grade 8 (Grade 8)

	-----Head End-----		-----Crank End-----	
	Suction	Discharge	Suction	Discharge
Cylinder Equivalent Area, Adjusted - in ² :	9.158	19.305	9.158	19.305
Selected Valve Data				
Lift per valve, in :	0.102	0.087	0.102	0.087
API lift area per valve, in ² :	2.40	2.03	2.40	2.03
Adjusted equivalent area per valve, in ² :	2.72	2.50	2.72	2.50
Type :	77CT	77CT	77CT	77CT
Nominal diameter, in :	3.89		3.89	
Plate material*:	Nylon	Med temp nylon	Nylon	Med temp nylon
Seat / Guard material :	AISI 416	AISI 416	AISI 416	AISI 416
Springs material(s) :	17-7PH	17-7PH	17-7PH	17-7PH
Bolt material :	AISI 410	AISI 410	AISI 410	AISI 410
Last date used in new units :	current	current	current	current

Total valves per cylinder 8 * Valve plate material shown is standard - may vary with application

Clearance Data	Normal clearance :	14.8%	17.3%
	Maximum number spacers :	2	2
	Added clearance per spacer :	3.0%	3.2%

VVCP Data

-----Head End Added Clearance with VVCP-----									
Pocket Volume	Total Turns	Total Travel	Assembly Wt.-est'd	Closed	Pocket	Total	Change per in	Change per turn	
97 in ³	36.00	4.5 in	220 lb	0.7%	42.9%	43.6%	9.5%	1.2%	

FVCP Data

<u>VCP Data</u>		<u>-----Head End Added Clearance with FVCP-----</u>										
<u>Assembly</u> <u>Wt.-est'd,lb</u>	<u>-----Pocket 1-----</u>				<u>-----Pocket 2-----</u>				<u>-----Pocket 3-----</u>			
	<u>Closed</u>		<u>Pocket</u>		<u>Closed</u>		<u>Pocket</u>		<u>Closed</u>		<u>Pocket</u>	
	<u>in³</u>	<u>%</u>	<u>in³</u>	<u>%</u>	<u>in³</u>	<u>%</u>	<u>in³</u>	<u>%</u>	<u>in³</u>	<u>%</u>	<u>in³</u>	<u>%</u>
	10.4	4.6	102	44.9								
	10.4	4.6	199	87.6								

Piston and Velocity Data:

	Head End	Crank End	Total
Piston Area:	41.28 in ²	38.14 in ²	



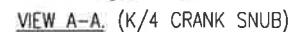
Standard Specifications for Ariel Compressor Cylinder



Class: 7-1/4K

Bore: 7.2500 in

Piston Displacement at 1200 rpm:	157.68 cfm	145.68 cfm	303.35 cfm
API Suction Valve Velocity at 1200 rpm:	9451 fpm	8732 fpm	



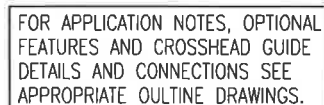
— SEE NOTE #5

13⁷/₈ OVER RAIL PADS
THIS SIDE ONLY

JGT/4 SHOWN.
FOR JGK/4, SEE
VIEW A-A.

(6) 1-1/4 DIAMETER THRU
2-1/2 DIA. SPOTFACE, 1/4
DEEP FOR MOUNTING

(6) 7/8-9 UNC
JACKING HOLES



OPTIONAL LONG
TWO COMPARTMENT
GUIDE

1-1/2 NPT L.O.-
PUMP DISCHARGE

—MIN. CLEARANCE REQ'D
TO REMOVE L.O. PUMP

- LIFT HERE USING 1-1/2-6 UNC
EYEBOLTS FURNISHED BY ARIEL

SEE NOTE #6

SEE NOTE #7

-1" NPT CRANKCASE
DRAIN

FRAME OUTLINE
① JGK:T/4 CLASS

ARIEL CORPORATION
35 BLACKJACK ROAD
MOUNT VERNON, OHIO 43050

ARIEL

2	7704
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3	8623
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3 REVISED APPLICATION NOTE. ADDED CALLOUT AT CRANK SNUB.
ADDED "K" TO TITLE BLOCK. ADDED VIEW A-A.

2 OMNI OIL TRAP STEM WAS STREET ELBOW (1/8 PIPE, 90°), ADDED OMNI OIL TRAP BODY.

REV

DESCRIPTION

REV	DESCRIPTION
-----	-------------



Ariel Compressor Frame JGK/4



Stroke: 5.50 in 140 mm Rated power: 2540 hp 1894 kW
Number of throws: 4 Rated piston speed: 1100 fpm 5.59 m/s
Maximum speed: 1200 rpm
Minimum speed*: 600 rpm

*Based on oil pump sizing. Contact Ariel Application Engineering if lower speed required. Crosshead pin loads must be checked at ALL operating conditions.

Internal Gas Rod Loads

Double acting

Compression + tension: 74,000 lb 329 kN
Tension: 37,000 lb 165 kN
Compression: 40,000 lb 178 kN

Single acting

Tension: 37,000 lb 165 kN

Lubrication

Oil pump flow rate: 26 gpm
1.6 l/s
Oil sump capacity: 37 gal
140 l
Oil heat rejection: 56,000 Btu/hr
16.4 kW

Frame Dimensions

Center line height: 17.00 in 432 mm Max. width with cylinders: 154 in 3912 mm
Max. overall height: 29 in 737 mm Length: 101 in 2565 mm
Avg. weight without cylinders: 8,500 lb 3856 kg

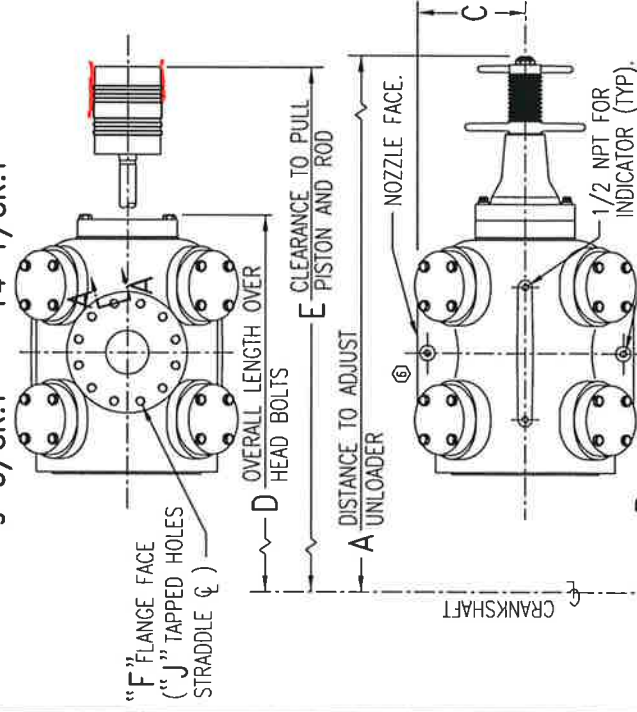
Component Dimensions

Piston rod diameter: 2.000 in 51 mm Crankshaft pin diameter: 5.625 in 143 mm
Connecting rod center distance: 13.750 in 349 mm Crankshaft journal diam.: 5.625 in 143 mm
Main bearing length: 3.375 in 86 mm

Materials

Crankcase: Gray Iron	(ASTM A278 Class 30)
Crosshead guide: Gray Iron	(ASTM A278 Class 30)
Crankshaft: Forged Carbon Steel	(ASTM A668 Class DH)
Connecting rod: Forged Carbon Steel	(AISI 1045)
Main bearing: Tri-metal	(Tri-metal)
Thrust bearing: Bronze	(SAE 660)
Connecting rod bearing: Tri-metal	(Tri-metal)
Crosshead: Ductile Iron	(ASTM A536 Grade 65-45-12)
Crosshead pin: Alloy Steel	(AISI 8620)
Crosshead pin bushing: Bronze	(SAE 660)
Stress Bolts, standard: Grade 8	(Grade 8)

CLASS: ⑤
7-1/4K:T 11 JGK:T
8-3/8K:T 12-1/2K:T
9-5/8K:T 14-1/8K:T

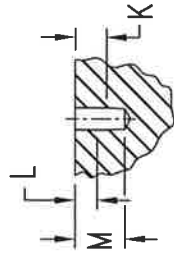


⑦ IN COLUMN "K", FULL THREAD DIM. FOR 11KT: 1-5/8 DIM. WAS 1-1/4

⑥ REVISED THERMOWELL NOTE.

REV DESCRIPTION

⑥ "H" THERMOWELL INSTALLATION LENGTH
(MAXIMUM), 1/2 NPT FOR SUCTION & DISCHARGE
TEMP. (1) SUCTION, (1) DISCHARGE, (2) HOLES TOTAL,
SAME SIDE.

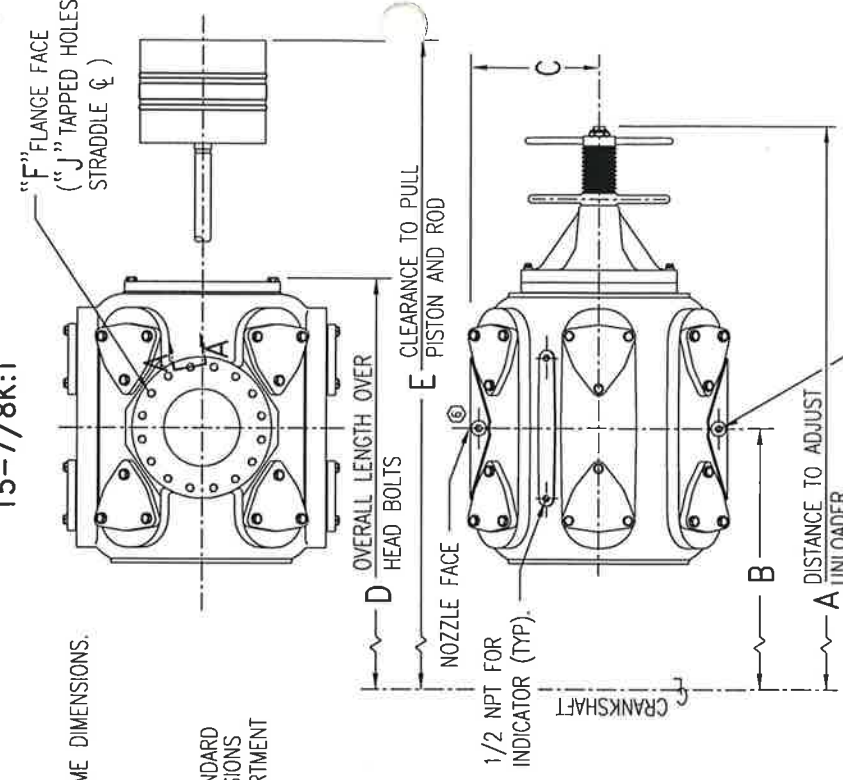


Section A-A

NOTES:

1. REFER TO FRAME OUTLINE DRAWINGS FOR FRAME DIMENSIONS.
2. DEFLECTION DIMENSION USED TO SHIM UNSUPPORTED CROSSHEAD GUIDE.
3. DIMENSIONS SHOWN WITH * ARE FOR THE STANDARD CROSSHEAD GUIDE. ADD 9" TO THESE DIMENSIONS WHEN USING THE OPTIONAL LONG TWO COMPARTMENT CROSSHEAD GUIDE.

CLASS: ⑤
15-7/8K:T



CYLINDER CLASS	OVER STEM A	NOZZ. B	FLANGE HEIGHT C	OVER ALL D	CLEAR-ANCE E	ANSI FLANGE F	INSERT LENGTH H	SIZE THD./IN. J	FULL THREADS K	MIN.BOLT ENGAGE L	TAP DRILL DEPTH M	DEFLECTION SEE NOTE #2
⑤ 7-1/4 K:T	92.5	54.75	11.750	71.5	111.0	6"-900#	6.75	1-1/8-7	1-13/16	1-11/16	2-3/8	.009
⑤ 8-3/8 K:T	92.5	54.75	12.250	71.5	111.5	6"-1500#	6.75	1-3/8-6	2-3/16	2-1/16	2-7/8	.009
⑤ 9-5/8 K:T	91.0	54.75	13.500	72.0	112.5	6"-900#	6.50	1-1/8-7	1-13/16	1-11/16	2-3/8	.009
⑤ 11 K:T	91.0	54.75	13.250	71.5	111.0	6"-600#	6.50	1"-8	1-5/8	1-1/2	2-1/8	.009
⑤ 12-1/2 K:T	91.0	54.75	13.500	71.5	111.0	6"-900#	6.625	1-1/8-7	1-13/16	1-11/16	2-3/8	.009
⑤ 14-1/8 K:T	94.0	56.75	13.250	75.0	118.0	8"-400#	7.25	1"-8	1-5/8	1-1/2	2-1/8	.010
⑤ 15-7/8 K:T	94.0	56.75	13.500	75.0	118.0	8"-600#	7.25	1-1/8-7	1-13/16	1-11/16	2-3/8	.010
⑤ 16-3/4 K:T	94.0	56.75	13.750	74.5	118.0	8"-300#	6.50	7/8-9	1-7/16	1-5/16	1-7/8	.010
⑤ 17-1/2 K:T	94.0	56.75	14.000	75.0	118.0	8"-400#	6.50	7/8-9	1-7/16	1-5/16	1-7/8	.010
⑤ 18-1/2 K:T	94.0	56.75	14.750	75.5	119.0	10"-300#	7.75	1"-8	1-5/8	1-1/2	2-1/8	.011
⑤ 19-1/2 K:T	94.0	56.75	15.000	75.5	119.0	10"-400#	7.75	1-1/8-7	1-13/16	1-11/16	2-3/8	.011
⑤ 20-1/2 K:T	94.0	56.75	16.000	76.0	119.0	10"-300#	7.75	1"-8	1-5/8	1-1/2	2-1/8	.011

ARIEL CORPORATION
35 BLACKJACK ROAD
MOUNT VERNON, OHIO 43050

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CYLINDER OUTLINE
⑤ "JGK:T" CLASS

DWG. NO.
WRB 10/04/95
CHECKED: 10/05/95
A-4130

BIDELL EQUIPMENT INC. UNIT # BE-03-190						
ITEM		QTY	US LIST	DISCOUNT	US TOTAL	
Model JGK/4 with Standard Equipment		1	\$98,241.00	0.704	\$69,182.35	
Throw 1: 14.125" K Cylinder @ 635 psig MAWP		1	\$36,907.00	0.704	\$25,990.30	
Throw 1: 14.125" K Head End Var Vol Clear. Pocket Mtd.		1	\$3,478.00	0.704	\$2,449.24	
Throw 1: High Clearance Valve Assembly		8	\$306.00	0.704	\$1,723.91	
Throw 3: 14.125" K Cylinder @ 635 psig MAWP		1	\$36,907.00	0.704	\$25,990.30	
Throw 3: 14.125" K Head End Var Vol Clear. Pocket Mtd.		1	\$3,478.00	0.704	\$2,449.24	
Throw 3: High Clearance Valve Assembly		8	\$306.00	0.704	\$1,723.91	
Throw 2: Stock		0	\$0.00	0.704	\$0.00	
Throw 2: Stock		0	\$0.00	0.704	\$0.00	
Throw 4: 7.250" K Cylinder @ 1900 psig MAWP		1	\$24,403.00	0.704	\$17,184.85	
Throw 4: 7.250" K Head End Var Vol Clear. Pocket Mtd.		1	\$2,843.00	0.704	\$2,002.07	
Throw 4: High Clearance Valve Assembly		8	\$188.00	0.704	\$1,059.13	
Lube oil thermostatic valve - AMOT model CM mounted - including piping and brackets		1	\$565.00	0.704	\$397.88	
Special charge for preparing export papers and one-way skid shipment to Canada		1	\$152.00	0.704	\$107.04	
TOTAL - US DOLLARS					\$150,260.22	

TOTAL DUE UPON ORDER (25%)	\$37,565.05
TOTAL DUE UPON SHIPMENT (75%)	\$112,695.17

Peter,
Please order for
stock.
Thanks,
Larry
11-SEP-03

COMPRESSOR BALANCING RECORD

BALANCE BY: PHILLIP MAGERS FRAME: JGK/4 FRAME S/N: F-19239 STROKE (inches): 5 1/2

PARTS GROUP	THROW #1 S/N: C-60599 BORE: 14-1/8K		THROW #2 S/N: CC-57866 BORE: 11K		THROW #3 S/N: C-60600 BORE: 14-1/8K		THROW #4 S/N: C-60601 BORE: 7-1/4K		THROW #5 S/N: C- BORE:		THROW #6 S/N: C- BORE:	
	S/N: C- BORE:		S/N: C- BORE:		S/N: C- BORE:		S/N: C- BORE:		S/N: BORE:		S/N: BORE:	
	PART #	LBS.	PART #	LBS.	PART #	LBS.	PART #	LBS.	PART #	LBS.	PART #	LBS.
Connecting Rod w/ Bushing, Bolts, & Bearing Shells	D-0973	89.90	D-0973	89.90	D-0973	89.60	D-0973	90.60				
Piston w/ Rings, Rod, Collar & Nut	C-2662	246.80	C-2850	210.70	C-2662	246.70	C-1016	120.20				
	C-0876		C-0876		C-0876		C-0887					
Crosshead w/ Bushing	D-3277	57.90	D-0868	75.50	D-3277	57.60	D-0871	154.70				
Balance Nut w/ Setscrews	B-0781	10.00	B-0786	29.60	B-0781	10.00	B-1573	37.90				
TOTAL WEIGHT		404.60		405.70		403.90		403.40		0.00		0.00
UNBALANCE (LBS)				1.10			0.50					

ARIEL CORPORATION INDUSTRIAL PARK, 35 BLACKJACK ROAD, MOUNT VERNON, OHIO 43050

Oct. 7. 2003 8:35AM 19182507393



AG

Equipment Co.

3401 W. Albany • Broken Arrow, OK 74012-1174
Phone: 918 / 250-7386 • Fax: 918 / 250-7393

No. 8064 P. 1/1

AG EQUIPMENT COMPANY
3401 W ALBANY
BROKEN ARROW, OK 74012-1174

Ph: 918-250-7386 Fax: 918-250-7393

Acknowledgment

Number: 19458

Date 07-Oct-03

To PETER BOOCOCK
BIDELL EQUIPMENT INC.
6900 - 112TH AVENUE SE
CALGARY, ALBERTA, T2C 4Z1 CA

Ph: 403-235-5877 Fax: 403-272-7749

Ship To BIDELL EQUIPMENT L2
FABRICATION SHOP
6900-112TH AVE. S.E.
CALGARY, ALBERTA, T2C 4Z1 CAN

Ph: 403-235-5877 Fax: 403-272-7749

Terms		Ship Via		Salesperson
Wire Transfer		SnowyOwl-Collec		HPW
Quantity	Description	Unit Price	Amount	
	PO: 23745 <i>List Price</i>			
1	PO Line: 001 Promised: 05-Dec-03 <i>FRAME #105,440.00</i> ARIEL JGK4 FRAME <i>Export paperwork #152.00</i> Part: 15400052 <i>Therm valve Rev: #588.00</i>	\$74,773.07 / each	\$74,773.07	
2	PO Line: 002 Promised: 05-Dec-03 <i>Cyl #36,907.00</i> ARIEL 14.125,635# K CYL <i>HCL VLV ASSY #306.00 ea.</i> Part: 15400902 <i>Rev:</i>	\$27,714.21 / each	\$55,428.42	
2	PO Line: 003 Promised: 05-Dec-03 <i>#3,478.00</i> ARIEL 14.125,635# K VVCP Part: 15402610 <i>Rev:</i>	\$2,449.24 / each	\$4,898.48	
1	PO Line: 004 Promised: 05-Dec-03 <i>Cyl #26,355.00</i> ARIEL 7.25,1900# K CYL <i>HCL VLV ASSY #196.00 ea.</i> Part: 15400862 <i>Rev:</i>	\$19,663.67 / each	\$19,663.67	
1	PO Line: 005 Promised: 05-Dec-03 <i>#3,014.00</i> ARIEL 7.25,1900# K VVCP Part: 15402574 <i>Rev:</i>	\$2,122.49 / each	\$2,122.49	
		Sales Order Total:	\$156,886.13	
	<i>Thank you!</i> <i>Pat</i>			

Date: MAY 13/04

File No: 03-248

COOLER SHEAVES SIZING:

ENGINE WALK 7042 GSI, 1200 RPM, 6" C" PULLEY, 9.6" P.D.

COOLER AIR-X 144 EF, 52 HP REQ'D @ 250 RPM
 $\therefore 52 \times 1.25 SF = 65 \text{ HP}$

$$1200 \times 9.6 / 16 = 723 \text{ RPM}$$

$$723 \times 10.5 / 30 = 253 \text{ RPM}$$

HP/BELT: $\frac{1200 \text{ RPM}}{700 \text{ RPM}} = \frac{17.45 \times .99}{14.49 \times .99} = \frac{17.27}{14.35} \text{ "C"}$

HP/BELT: "SV":

$$\begin{aligned} 1200 \text{ RPM} &= (19.6 + 1.19) \times .97 = 20.17 = 5 \text{ BELTS} \\ 720 \text{ RPM} &= (14.8 + 0.76) \times .97 = 15.1 = 6 \text{ BELTS} \end{aligned}$$

COOLER SHEAVE: 5" C" GROOVES 30" P.D. c/w 2 15/16" Q.D. BUSHING

COOLER IDLER: 5" C" GROOVES 12" P.D. c/w 2 3/16" Q.D. BUSHING

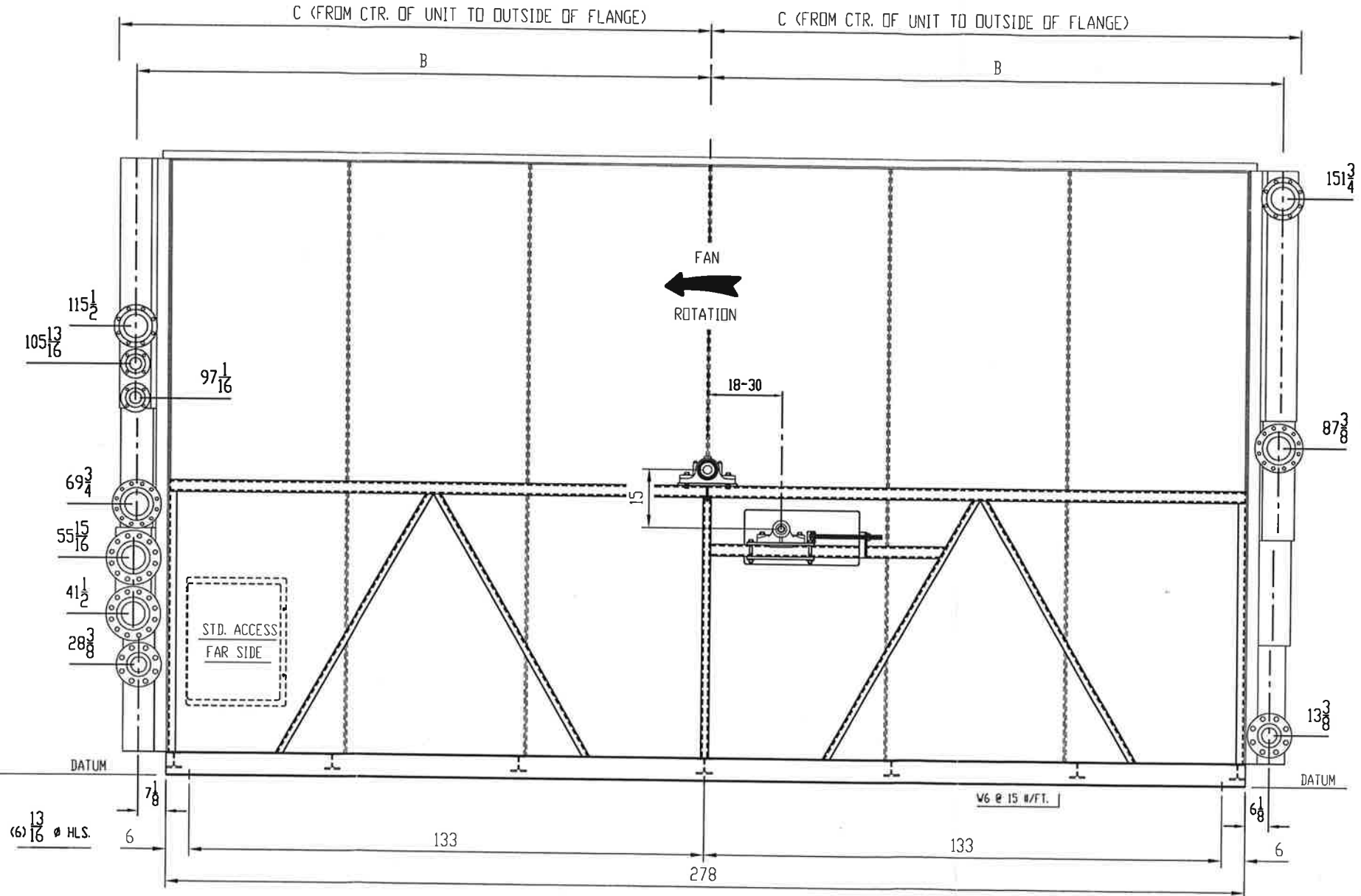
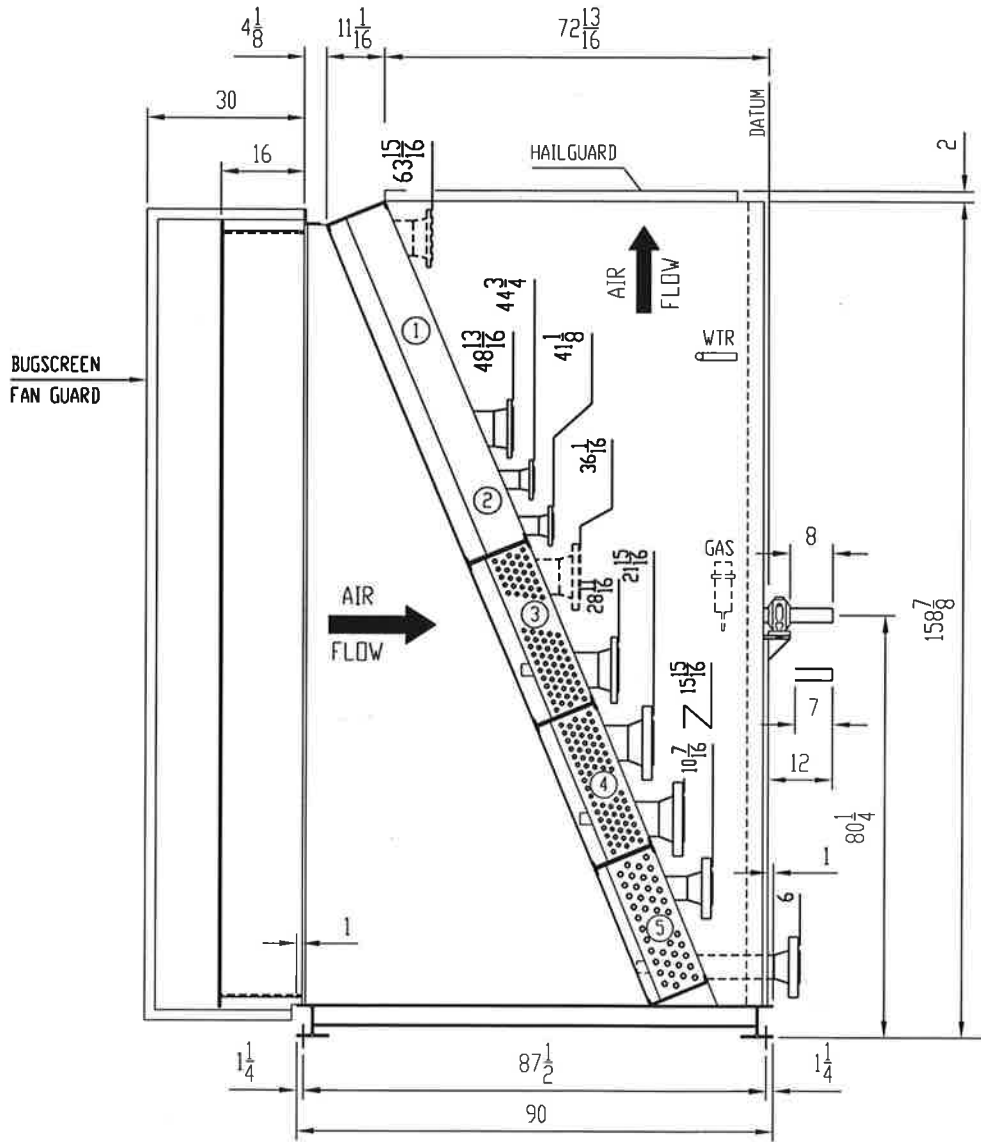
JACKSHAFT SHEAVE: 5" C" GROOVES 16" P.D. c/w
 3 9/16" Q.D. BUSHING

JACKSHAFT PULLEY: 5" C" GROOVES 10.5" P.D. c/w
 3 9/16" Q.D. BUSHING

→ OK BY KELLY

ITEM	SERVICE	MAWP	CODE	NOZZLES		COUPLINGS VENT&TEMP	REF. DIMENSIONS		LOUVERS	BUG SCREEN	DRIVE ENGINE DRIVE SHEAVES, BELTS, AND GUARDS BY OTHERS Ø2.1875 IDLER SHAFT WITH .5 x .25 KWHY (WITH ENCLOSURE)	FAN 144Ø MOORE 10K, 60, VT 10 BLADE, 13.5 PA LH ROTATION 250 RPM @ 52.0 HP REQ'D Ø2.9375 BORE WITH .75 x .375 KWHY.	FINISH STRUCTURE STD. PRIMER W/ WARM GRAY ENAMEL TOP COAT
				INLET	OUTLET		B	C					
1	EJW (COMBINED) 70.5 GALS **	14 PSI @ 300/-20°F	NONE	6-150 RFWN	6-150 RFWN	NONE	147.375	152.875	MANUAL	YES			
2	AUX-W (COMBINED) 22.0 GALS **	14 PSI @ 300/-20°F	NONE	3-150 RFWN	3-150 RFWN	NONE	147.375	151.125					
	IC-1	655 PSI @ 300/-20°F	ASME	6-300 RFWN	6-300 RFWN	1-6000	146.875	153.125	AUTO				
4	IC-2	1315 PSI @ 300/-20°F	ASME	6-600 RFWN	6-600 RFWN	1-6000	147.625	154.625					
5	AC	1800 PSI @ 300/-20°F	ASME	4-900 RFWN	4-900 RFWN	1-6000	146.125 L 145.125 R	151.875					

** FROM AXC JOB 004339



RELEASED
FABRICATION OF THIS
ORDER HAS BEGUN

						FOR: BIDELL EQUIPMENT
						P.O. NO: 21533
						CUST. TAG: 03190
						USER: STOCK 7042GSI 3-STG SOUR
						JOB SITE: AB, BC, SK, CANADA
						JOB NO: 37581
						WORK ORDER NO.: 8696
						DR: MIKE DATE: 06/17/03
						CK: L.W. DATE: 06/17/03
						APPD: DATE:
1	ANCHOR HOLE LOCATIONS					LES M.B. 7/9/03
REV	REVISION DESCRIPTION					BY CK APP DATE

ESTIMATED DRY WEIGHT 25,900#

air-x-hemphill
TULSA, OKLAHOMA

CERTIFIED DRAWING
MODEL 144EF-104-24 QUANTITY: 1

CERTIFIED DRAWING NUMBER
37581-CRT

DATE: 06/17/03 SCALE: FULL REV 1

air-x-hemphill		2230 East 49th Street Tulsa, OK 74105 Info@airxhemphill.com		Phone (918) 712-8268 Fax (918) 712-8269 www.airxhemphill.com		Proposal / Job No 37581 Date 6/9/2003 Page 1 OF 1	
Purchaser BIDELL/BE-00-XX 7042GSI-3STAGE		Ultimate User					
Inquiry / PO#		Destination STOCK-ALBERTA					
# Units 1		Model 144EF-102-24		Reference SOUR			
Assembly PACKAGED		Draft FORCED		Overall Size (WxL), F.		Est Wt 24800 LBS	
THERMAL & MECHANICAL DESIGN							
Service	EJW **	AUX-W **	IC-1	IC-2	AC		
Flow	578GPM	80GPM	12.7MMSCFD	12.4MMSCFD	12.4MMSCFD		
Fluid	50%GLY	50%GLY	.65SPGR	.65SPGR	.65SPGR		
Temp. In / Out, °F	180.0 / 164.7	150.0 / 130.8	197.0 / 122.0	236.0 / 123.5	200.0 / 121.0		
Pressure, PSI			351PSIG	667PSIG	1000PSIG		
Pressure Drop, PSI	3.4	6.1	2.1	7.6	10.9		
Heat Load, BTU/HR	4013500	698000	1110781	1715378	1274101		
True LMTD	45.2	27.3	40.2	46.9	39.8		
Overall Rate, U	154.0	147.4	76.0	94.5	111.9		
Fouling Factor	.0005	.0005	.0020	.0020	.0020		
Surface, Tube / Total, Sq Ft	588 / 8755	177 / 2640	364 / 5420	387 / 5767	286 / 6121		
Sections, #	(1) - COMBINED	(1) - COMBINED	(1)	(1)	(1)		
Design Temp, °F Max / Min	300 / -20	300 / -20	300 / -20	300 / -20	300 / -20		
MWP / Test Press, PSIG	* 14 / 75	* 14 / 75	655 / 852	1315 / 1710	1800 / 2340		
Pass Arrangement	CROSSFLOW	CROSSFLOW	CROSSFLOW	CROSSFLOW	CROSSFLOW		
# Tube Rows	4	4	5	5	4		
# Tube Passes	1	2	1	2	3		
Tubes, OD x BWG	3/4X16	3/4X16	3/4X16	3/4X16	1X14		
Material	SA214 STEEL	SA214 STEEL	SA179 STEEL	SA179 STEEL	SA179 STEEL		
# Per Section / Length, Ft	126 / 24	38 / 24	78 / 24	83 / 24	46 / 24		
Turbulators							
Accelerators							
Fins, Type	HI-EFF	HI-EFF	HI-EFF	HI-EFF	HI-EFF		
Material	AL	AL	AL	AL	AL		
Nozzles, Rating / Type	150RF	150RF	300RF	600RF	900RF		
Material	SA105	SA105	SA105	SA105	SA105		
# Inlets / Size In	(1) 6	(1) 3	(1) 6	(1) 6	(1) 4		
# Outlets / Size In	(1) 6	(1) 3	(1) 6	(1) 6	(1) 4		
Headers, Type	REC TUBE	REC TUBE	BOX	BOX	BOX		
Material	A500	A500	SA516-70N	SA516-70N	SA516-70N		
Corrosion Allow, In			.1250	.1250	.1250		
Grooved Tubesheet			DBL	DBL	DBL		
Plugs, Type	TAPER	TAPER	SHOULDER	SHOULDER	SHOULDER		
Plugs Material	STEEL	STEEL	A105 STEEL	A105 STEEL	A105 STEEL		
PWHT			YES	YES	YES		
ASME Code Stamp & NB			YES	YES	YES		
Add'l Specs & Certs							
CRN			AB, BC, SK	AB, BC, SK	AB, BC, SK		
API							
Inspection / NDT			BX, UT	BX, UT	BX, UT		
FX= 100% X-Ray of all header seam, attachment & nozzle butt welds. SX= Spot X-Ray of 1 long seam & 1 end closure, per header BX= 100% X-Ray of all nozzle butt welds. UT = 100% UT of all header seam, attachment & nozzle butt welds. H = Hardness testing.							
AIR-SIDE PERFORMANCE		FAN DATA		DRIVER DATA		ACCESSORIES	
Ambient Air Temp, In °F	95	Fan(s)	(1) MOORE60-10000VT	Type		Guards	FAN
Elevation, Ft	2200	Blade Material	ALUMINUM	V-BELT BY OTHERS			SOFT BUGSCREEN
Air Flow, SCFM	175,000	HP / Fan	52				DISCHARGE GUARD
Outlet Air Temp, °F	140.9	Dia, In / # Blades	144 / 10				
Min Air Temp, °F	-20	RPM	250				
		Tipspeed, FPM	9424				
		Pitch, Deg	13.5				
Additional Information:							
*-BUILT TO STANDARD 50# DESIGN; BUT DESIGNATED 14# TO ELIMINATE NECESSITY OF PROVINCIAL REGISTRATION							
**-EJW AND AUX-W SECTIONS ARE FROM EXISTING AXC S/N 004339.							
Noise Data: 85 dBA @ 1m, 68dBA @ 15m.							