



Rev.: 0

HISTORY DOCKET

Customer: *Husky Oil Operations Ltd.*

P.O. No.: 8400927697

Description: 15" Stabilizer Reboiler (Bundle Replacement)

Ellett Job No.: 44612

Shipment Date: *February 2015*



Revision:	Description:	Date:
0		2/3/2015

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PART

CERTIFIED BY ELLETT IND. LTD.
SERIAL NO. 44612 YEAR 2015
GRN E1711.2

FORM U-2 MANUFACTURER'S PARTIAL DATA REPORT**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer****As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**1. Manufactured and certified by ELLETT INDUSTRIES LTD. 1575 KINGSWAY AVENUE Port Coquitlam British Columbia V3C 4E5 CANADA
(Name and address of Manufacturer)2. Manufactured for Husky Oil Operations Limited Box 4490, Stn D, Calgary, Alberta T2P 3G7 CANADA
(Name and address of Purchaser)3. Location of installation Husky Energy LSD 07-27-51-19W5 Ansell Gas Plant, 5964 3rd Ave, Edson, Alberta T7E 1R8 CANADA
(Name and address)4. Type U-Tube Bundle 44612 F1711.2
[Description of vessel part (shell, two-piece head, tube bundle)] (Manufacturer's serial number) (CRN)
- H4-808-1 Rev. G Ellett Industries Ltd. 2015
(National Board number) (Drawing number) (Drawing prepared by) (Year built)5. ASME Code, Section VIII, Div. 1 2013 Edition none -
[Edition and Addenda, if applicable (date)] (Code Case number) [Special service per UG-120(d)]*Items 6 - 11 incl. to be completed for single wall vessels, jackets of jacketed vessels, shell of heat exchangers, or chamber of multichamber vessels.*6. Shell: (a) Number of course(s) - (b) Overall length -

Course(s)			Material	Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter	Length	Spec./Grade or Type	Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time
1	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-

Body Flanges on Shells

No.	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Location	Bolting			
									Num & Size	Bolting Material	Washer (OD, ID, thk)	Washer Material
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-

7. Heads: (a) - (b) -
(Material spec. number, grade or type) (H.T. - time and temp.) (Material spec. number, grade or type) (H.T. - time and temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(b)	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Body Flanges on Heads

	Location	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Bolting			
									Num & Size	Bolting Material	Washer (OD, ID, thk)	Washer Material
(a)	-	-	-	-	-	-	-	-	-	-	-	-
(b)	-	-	-	-	-	-	-	-	-	-	-	-

8. Type of jacket - Jacket closure -
(Describe as ogee and weld, bar, etc.)If bar, give dimensions - If bolted, describe or sketch.9. MAWP - - at max. temp. - - Min. design metal temp. - at -
(Internal) (External) (Internal) (External)10. Impact test - at test temperature of -
[Indicate yes or no and the component(s) impact tested]11. Hydro., pneu., or comb. test pressure - Proof test -*Items 12 and 13 to be completed for tube sections.*12. Tubesheet SA-516-70N 20 1/2" 2 3/4" 0.1875" Bolted (BY OTHERS)
[Stationary (material spec. no.)] [Diameter (subject to pressure)] (Nominal thickness) (Corr. allow.) [Attachment (welded or bolted)]
- - - - -
[Floating (material spec. no.)] (Diameter) (Nominal thickness) (Corr. allow.) (Attachment)13. Tubes SA-179 3/4" 14 BWG (0.083") MIN. WALL 52 U
(Material spec. no., grade or type) (O. D.) (Nominal thickness) (Number) [Type (straight or U)]

FORM U-2 (Cont'd)

Items 14-18 incl. to be completed for inner chambers of jacketed vessels or channels of heat exchangers.

14. Shell: (a) No. of course(s) _____ (b) Overall length _____

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter	Length	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time
1	-	-	-		-	-	-	-	-	-	-	-	-	-
2	-	-	-		-	-	-	-	-	-	-	-	-	-
3	-	-	-		-	-	-	-	-	-	-	-	-	-

Body Flanges on Shells												
No.	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Location	Bolting			
									Num & Size	Bolting Material	Washer (OD, ID, thk)	Washer Material
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-

15. Heads: (a) _____ (b) _____
 (Material spec. number, grade or type) (H.T. - time and temp.) (Material spec. number, grade or type) (H.T. - time and temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(b)	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Body Flanges on Heads												
	Location	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Bolting			
									Num & Size	Bolting Material	Washer (OD, ID, thk)	Washer Material
(a)	-	-	-	-	-	-	-	-	-	-	-	-
(b)	-	-	-	-	-	-	-	-	-	-	-	-

16. MAWP 180 PSIG at max. temp. 390°F Min. design metal temp. -20°F at 180 PSIG
 (Internal) (External) (Internal) (External)

17. Impact test _____ at test temperature of _____
 [Indicate yes or no and the component(s) impact tested]

18. Hydro., pneu., or comb. test pressure 270 PSIG Proof test _____

19. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or Size	Type	Material		Nozzle Thickness		Reinforcement Material	Attachment Details		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

20. Identification or part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's. Drawing No.	CRN	National Board No.	Year Built
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

20. Supports: Skirt _____ Lugs _____ Legs _____ Others _____ Attached _____
 (Yes or no) (Number) (Number) (Describe) (Where and how)

22. Remarks -M.A.W.P. / M.D.M.T: TUBE SIDE U-BUNDLE ONLY -Hydrotested to 1983 Edition (1.5 Ratio)

-Over pressure protection is the RESPONSIBILITY OF THE OWNER/USER per UG-125

-U-Bends Electric Resistance Heat Treated to 1200°F MIN.

-Husky Oil Operations Limited -15" Stabilizer Reboiler (Replacement U-Tube Bundle) -P.O. No.: 8400927697

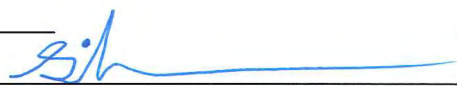
FORM U-2 (Cont'd)

CERTIFICATE OF SHOP/FIELD COMPLIANCE

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization Number 2901 Expires 12/30/2017

Date 2/2/2015 Name ELLETT INDUSTRIES LTD.
(Manufacturer)

Signed 
(Representative)

CERTIFICATE OF SHOP/FIELD INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and employed by
British Columbia Safety Authority (BCSA) of British Columbia

have inspected the pressure vessel part described in this Manufacturer's Data Report on 1/30/2015

and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the inspector nor his / her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 2/2/2015 Signed 
(Authorized Inspector)

Commissions N.B. 12069-A / BC# 67
[National Board (incl. endorsements)]

Customer: Husky Energy

CRN: F1711.2

Description: 15" Stabilizer Reboiler (Replacement U-Tube Bundle)

B.C. No.: None

Drawing No.: H4-808-1 Rev. F

Nat'l Brd. No.: None

P.O. No.: 8400927697

"R" No.: None

Cust. Equip./Item/Tag No.: E-101

"CM" No.: None

CODE: ASME Section VIII Div.1, 2013 Edition

Customer Specifications: None

DESIGN, DRAWING and DOCUMENTATION R-Review, W-Witness, V-Verification, H-Hold

Item	Acceptance		
	Ellett	Customer	Auth. Insp.
Approved Design Drawing on File	H GG JAN 13 2015	Jan 30/15	H WB JAN 13/15
Materials	H GG JAN 20 2015	Jan 20/15	V WB JAN 29/15
Welding Procedures	N/A		N/A
Welders Qualified	N/A		N/A
NDE Procedures and Personnel Qualified	H GG JAN 13 2015	Jan 20/15	V WB FEB 2/15
Heat Treatment Procedure	N/A		N/A

NON-DESTRUCTIVE TESTING REQUIREMENTS AND SPECIAL INSPECTIONS

Item	Tube Side	Comments
Radiography	None – UW-11(c)	
Hydro Test (Horiz.)	270 PSIG	Hydrotested to 1983 Edition (1.5 Ratio)
Ultrasonic Testing	Plates over 1" (25mm) thick shall be ultrasonically examined for laminations and defects. Inspection shall be performed in accordance with ASME code, Section V, SA-435	

MATERIAL IDENTIFICATION

Item	Specification
Tubesheet	SA-516-70N
Tubes	SA-179
Support Plate, Spacers, Tie-Rods, Bar Plugs, Tie Rod Nuts	CS

IN-PROCESS INSPECTION R-Review, W-Witness, V-Verification, H-Hold

	Applicable Procedure and/or Instruction	Acceptance		
		Ellett	Customer	Auth. Insp.
Cutting and Shearing		V GG		
Layout		H GG	R/W	
Machining	Notes in drawing	V GG	R	
Weld Joint Prep.	UW-32	N/A		
Forming		N/A		
Fit-up		N/A		
Tube Exp. Calculation		V GG JAN 29 2015	R	
Tube Bundle Insertion		N/A		
Assembly		V GG JAN 29 2015	W	

A.I. Initial Review:

Date: JAN 13 2015Drawing Rev. F

FINAL INSPECTION R-Review, W-Witness, V-Verification, H-Hold

Item		Ellett	Customer	Auth. Insp.
Nozzle Orientation		N/A		
Internal Inspection	Shell Side	N/A		
	Tube Side	H GG JAN 29 2015	H [Signature] Jan 29/15	H WB Jan 29/15
External Inspection	Shell Side	N/A		
	Tube Side	H GG JAN 29 2015	H [Signature] Jan 29/15	H WB Jan 29/15
Final Dimensions		V GG FEB 02 2015	R	
Supports and Repads		N/A		
Painting		N/A		
Mill Certificates		V GG JAN 20 2015	R [Signature]	V WB Jan 29/15
Weld Maps		N/A		
NDT Reports		H GG JAN 09 2015	R [Signature]	V WB Jan 29/15
Heat Treatment Verification	U-Bends	V GG JAN 20 2015	R [Signature]	V WB Jan 29/15
Hydro Report		N/A		
NCR (if any)	NCR No. none	H GG JAN 30 2015	R	H WB Jan 30/15
Partial Data Report	U-2	H GG JAN 30 2015	R [Signature] Jan 30/15	H WB FEB 2/15
Data Report		N/A		
Code Stamping	ASME, U PART	H GG JAN 30 2015	R [Signature] Jan 30/15	H WB FEB 2/15
Shipping		H		

NON -DESTRUCTIVE EXAMINATIONS AND TEST RECORD

Item	Ellett	Customer	Auth. Insp.
Ultrasonic Testing Reports	V GG JAN 09 2015	R [Signature]	V WB Jan 29/15
Tubeside Hydro Test @ 270 PSIG Gauge #s 607, 611	H GG JAN 30 2015	W [Signature] Jan 30/15	H WB Jan 30/15

Remarks: _____

FINAL ACCEPTANCE (Drawing Sht.-Rev. 1- G 2- E)

Authorized Inspector: H

WB FEB 2, 2015

Customer: [Signature] Jan 30/15

Ellett Q.C. Inspector: H

[Signature]

FEB 02 2015



PACIFIC NDE

And Consulting Services Ltd.
(a Division of Western Inspection Ltd.)

ULTRASONIC INSPECTION REPORT

REPORTED TO: Ellett Industries Ltd.
1575 Kingsway Ave
Port Coquitlam, BC
V3C 4E5

ATTENTION: Graeme Gibson

LOCATION: Customer's Premises

PROJECT: HUSKY ENERGY – REPLACEMENT BUNDLE ONLY

DWG Ref.: H4-808-1 Rev. F

SCOPE: 100% UT Inspection for laminations and defects of 20 1/2" O.D., 2 3/4" Thick steel plate.

INSP. DATE: Jan 09, 2015

PNDE JOB NO: 15-0042

P.O. NO:

CUST. REF. NO: 44612

REPORT NO: 29706-01

PAGE NO: 1 of 1

ACC. CODE: ASME Section V, SA-435, Para 6	Procedure Reference: PNDE-UT-6 / ASME V, SA-435
MATERIAL: SA-516-70N	CALIB. STD.: IIW / Back Wall
SCAN SURFACE: Clean Surface (Scan from one side)	THICKNESS: 2 3/4"
INSTRUMENT MAKE: Sonatest, MODEL: Masterscan 380M, S.No. I008075, Cal. Due Oct 25, 2015	
SEARCH UNITS:	
ANGLE BEAM:	SENSITIVITY:
STRAIGHT BEAM: 0°, 1" Dia., 1.0 MHz, S.No.64095 - Technisonic	SENSITIVITY: BWS @ 80% FSH @ 14.2db
COUPLANT: Sonatech UTX	CABLE LENGTH: 2 m

DESCRIPTION	I.D.	DEP.	LEN.	AMP.	REMARKS	ACC / REJ	Welder ID
PT: 102- Tube Sheet, 20 1/2" O.D., 2 3/4" Thick, HT # 360550-16025-01,	=	=	=	=	No relevant indications observed.	ACCEPT	=

All dimensions in mm, unless otherwise stated.



X ju

Inspector:

Jatinder Dhaliwal

SNT – VT/MT/PT/UT Level II

CGSB#6564- MT/PT/UT Level II

CWB Welding Inspector # 7920 - Level I

Coating Inspector NACE # 49953 - CIP Level I

Unit C21 - 19257 Enterprise Way, Surrey, BC V3S 6J8
TEL: 604-532-6021 FAX: 604-532-6061
E-Mail: pnnde@telus.net

Reviewed by:

GG
Ellett Q.C.

Date:

JAN 10 2015

Remarks:

TUBES INC.

900 E. PECAN
SAND SPRINGS, OK 74063
918-245-5100

MANUFACTURER'S CERTIFICATE OF COMPLIANCE

IN ACCORDANCE WITH EN 10204 3.1

CUSTOMER: ELLETT INDUSTRIES

CUSTOMER ORDER NO: 58637

CUSTOMER JOB NO: 58637

OUR ORDER NO: T-52060-20

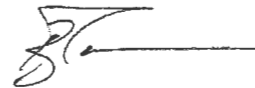
PRODUCT DESCRIPTION: SA179 CARBON STEEL U-BENDS
52 PCS 3/4" OD X .083 MW X V/L

ALL U-BENDS WERE STRESS RELIEF ANNEALED @ 1150 +/- 25°F IN ACCORDANCE WITH PURCHASE ORDER REQUIREMENTS.

ALL U-BENDS BENT IN ACCORDANCE TO TEMA RCB 2.31

WE CERTIFY THAT THIS MATERIAL HAS BEEN MANUFACTURED, INSPECTED, AND TESTED IN ACCORDANCE WITH THE SPECIFICATIONS TO WHICH IT WAS ORDERED, AND THAT THE ABOVE INFORMATION IS CORRECT AS CONTAINED IN THE RECORDS OF THIS CORPORATION.

ELLETT
Q.C.
S.N. 44612
P.N. 101
PER GG
DATE JAN 20 2015



BRIAN TURNER - QUALITY
CERTIFICATION COORDINATOR

This material meets ASME Section II

Edition 13 Addenda ✓

Verified by: Ellett QC Inspector

Signature GG Date JAN 20 2015

Benteler Steel/Tube GmbH
Postfach 13 40
33043 Paderborn
Deutschland
Tel.: +49.5254.81-0 Fax: +49.5254.13666

BENTELER 

Steel/Tube

ABNAHMEPRÜFZEUGNIS EN 10204-3.1
INSPECTION CERTIFICATE EN 10204-3.1
CERTIFICAT DE RECEPTION EN 10204-3.1
EN 10204:2005-01

Benteler Steel/Tube GmbH - Postfach 1340 - 33043 Paderborn - Deutschland

Tubes Inc.
900 E. Pecan
SAND SPRINGS OK 74063
USA

Dokument-Nr.: 41-825843/001/P
Document No.:
No. du document:

Kunden-Bestell-Nr.: 46002343 / Tubes Inc. 1827-T-14
Purchase Order No.:
No. de commande du client:

Benteler Auftrags-Nr.: 1599750
Benteler Order No.:
No. de commande Benteler:

Versandanzeigen-Nr.: 4185283
Dispatch Note No.:
No. d'avis d'expédition:

Produkt: NAHTLOSE STAHLROHRE
Product: SEAMLESS STEEL TUBES
Produit: TUBES D'ACIER SANS SOUDURE

Prüf-Nr.:
Inspection No.:
No. du certificat:

Hersteller: Warmrohrwerk/Zieherei
Manufacturer: (DIN EN ISO 3001 ISO/TS-16949 CERTIFIED BY TÜV NORD CERT)
Producteur: (PED 97/23/EC CERTIFIED BY TÜV NORD SYSTEMS)

Herstellerzeichen: 
Manufacturer's brand:
Marque du producteur:

Stempel des Abnahmebeauftragten: WA
Stamp of the inspection representative:
Poinçon du contrôleur:

Stahlschmelzungsverfahren: ELEKTROSTAHL
Steelmaking process: ELECTRIC FURNACE
Procédé d'élaboration de l'acier: FOUR ELECTRIQUE

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ELLETT
Q.C.
S.N. 44612
P.N. 101
PER GG
DATE JAN 20 2015

Lieferbedingungen: ASTM-A 179-1990a, ASTM-A 334-2004a-CD, ASME SA-334-CD, ASME Section II Part A Edition 2013, ASME
Terms of delivery: SA-179, ASME Section II Part A Edition 2013, NACE Standard MR0103-2010, ANSI/NACE MR0175/ISO
Conditions de livraison: 15156-1: 2009, ANSI/NACE MR0175/ISO 15156-2: 2009

Maße - Toleranzen: ASME SA-450-CFS, ASME Section II Part A Edition 2013, ASTM-A 450-2010-CD, ASTM-A 1016-13-CF, ASME SA-1016-CFS
Dimensions-tolerances: ASME Code Section II Part A Edition 2013
Dimensions-tolérances:

Stahlsorte: A 179, GRADE 1, SA 179

Steel grade:
Nuance d'acier:

Lieferzustand: Normalized

Delivery condition:
État de livraison:

Produktkennzeichnung: see attachment product marking

Product marking:
Marquage du produit:

TUBES, INC.
1-888-537-8800

THESE MILL TEST REPORTS APPLY TO:

YOUR P.O. NO. 58637

JOB NUMBER _____

Pos.	Stück	Maße	Länge	Gewicht	Schmelzen-Nr.	Prüfdruck	Rohr-Nr.-Gruppe	Vielfachlängen
Item	Number	Dimensions	Length	Weight	Heat No.	Test pressure	Tubenumber group	Multiple lengths
Poste	Nombre	Dimensions	Longueur	Poids	No. de coulée	Pression d'épreuve	Série de no. des tubes	Longueurs multiples
		feet	feet	lbs				
0001	1213	0.750" O.D. * 0.083" MW 20 FT	24260,04	15441	232741			
0002	506	0.750" O.D. * 0.083" MW 36 FT 1 "	18258,20	11460	232794	✓		
0003	502	0.750" O.D. * 0.083" MW 40 FT 1 "	20121,85	12588	232533			

Benteler Steel/Tube GmbH
Postfach 13 40
33043 Paderborn
Deutschland
Tel.: +49.5254.81-0 Fax: +49.5254.13666

BENTELER 
Steel/Tube

ABNAHMEPRÜFZEUGNIS EN 10204-3.1
INSPECTION CERTIFICATE EN 10204-3.1
CERTIFICAT DE RECEPTION EN 10204-3.1

Dokument-Nr.: 41-825843/001/P
Document No.:
No. du document:

Prüf-Nr.:
Inspection No.:
No. du certificat:

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Page:
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Pos.	Stück	Maße	Länge	Gewicht	Schmelzen-Nr.	Prüfdruck	Rohr-Nr.-Gruppe	Vielfachlängen
Item	Number	Dimensions	Length	Weight	Heat No.	Test pressure	Tube number group	Multiple lengths
Poste	Nombre	Dimensions	Longueur	Poids	No. de coulée	Pression d'épreuve	Série de no. des tubes	Longueurs multiples
		feet	feet	lbs				
0004	506	0.750" O.D. * 0.083" MW 44 FT 1 "	22306,17	14088	232793			
0006	440	0.750" O.D. * 0.095" MW 28 FT	12320,01	8642	587079			
0007	414	0.750" O.D. * 0.095" MW 44 FT 1 "	18250,50	12871	587079			
0008	377	0.750" O.D. * 0.109" MW 36 FT 1 "	13603,41	10748	232923			
0009	761	0.750" O.D. * 0.109" MW 40 FT 1 "	30503,48	24207	587274			
0010	318	0.750" O.D. * 0.109" MW 52 FT 1 "	16562,53	13106	232879			
0011	420	0.750" O.D. * 0.109" MW 32 FT 1 "	13475,00	10679	586782			
0012	503	0.750" O.D. * 0.109" MW 48 FT 1 "	24185,93	19013	586898			

ELLETT
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S.N. 44612
P.N. 101
PER GG
DATE JAN 20 2015

Schmelzenanalyse [%] / Heat analysis [%] / Analyse sur coulée [%]

Pos.	Schmelzen-Nr.	C	SI	MN	P	S	CR	MO	NI	CU	SN	V
Item	Heat No.											
Poste	No. de coulée											
0001	232741	0,095	0,180	0,47	0,007	0,003	0,12	0,03	0,09	0,18	0,015	0,002
0002	232794	0,100	0,180	0,47	0,007	0,002	0,13	0,02	0,08	0,18	0,019	0,001
0003	232533	0,100	0,140	0,47	0,007	0,003	0,12	0,04	0,09	0,15	0,012	0,002
0004	232793	0,100	0,155	0,48	0,007	0,003	0,13	0,02	0,09	0,17	0,012	0,002
0006	587079	0,100	0,170	0,46	0,007	0,002	0,13	0,03	0,11	0,20	0,012	0,001
0007	587079	0,100	0,170	0,46	0,007	0,002	0,13	0,03	0,11	0,20	0,012	0,001
0008	232923	0,110	0,120	0,46	0,005	0,003	0,10	0,02	0,08	0,15	0,011	0,002
0009	587274	0,110	0,120	0,46	0,005	0,003	0,10	0,02	0,08	0,15	0,011	0,002
0010	232879	0,110	0,145	0,48	0,005	0,003	0,10	0,02	0,08	0,14	0,011	0,002
0011	586782	0,100	0,140	0,44	0,005	0,003	0,10	0,02	0,07	0,10	0,009	0,001
0012	586898	0,090	0,160	0,46	0,007	0,003	0,12	0,03	0,11	0,17	0,011	0,001

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ABNAHMEPRÜFZEUGNIS EN 10204-3.1
INSPECTION CERTIFICATE EN 10204-3.1
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Produktanalyse [%] / Product analysis [%] / Analyse sur produit [%]

Pos. Item Poste	Schmelzen-Nr. Heat No. No. de coulée	C	SI	MN	P	S	CR	MO	NI	CU	SN	V
0001	232741	0,100	0,170	0,47	0,007	0,002	0,14	0,02	0,07	0,15	0,01E	0,001
0002	232794	0,100	0,180	0,47	0,008	0,002	0,14	0,02	0,07	0,16	0,01E	0,001
0003	232533	0,100	0,140	0,47	0,007	0,002	0,11	0,03	0,06	0,10	0,00E	0,001
0004	232793	0,100	0,160	0,47	0,007	0,003	0,13	0,03	0,09	0,17	0,00E	0,001
0006	587079	0,100	0,170	0,46	0,008	0,002	0,14	0,04	0,10	0,19	0,00E	0,002
0007	587079	0,100	0,170	0,46	0,008	0,002	0,14	0,04	0,10	0,19	0,00E	0,001
0007	587079	0,100	0,170	0,46	0,008	0,002	0,14	0,04	0,10	0,19	0,00E	0,001
0008	232923	0,110	0,130	0,47	0,005	0,002	0,11	0,03	0,07	0,14	0,007	0,001
0009	587274	0,110	0,120	0,46	0,005	0,002	0,12	0,03	0,07	0,14	0,008	0,001
0010	232879	0,110	0,140	0,47	0,005	0,002	0,11	0,03	0,07	0,14	0,007	0,001
0011	586782	0,110	0,140	0,44	0,005	0,004	0,11	0,02	0,06	0,10	0,007	0,001
0012	586898	0,100	0,160	0,46	0,007	0,003	0,13	0,03	0,09	0,16	0,009	0,001

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Prüfergebnisse / Test results / Résultats des essais

Die Rohre sind auf Dichtheit geprüft durch:

Hydrostatic test: eddy current testing instead of hydrostatic test

The tubes have been submitted to a leak tightness test by:

Les tubes ont passé un contrôle d'étanchéité par:

Die Rohre wurden zerstörungsfrei geprüft:

ET-test: acc. to ASME SA-450, ASTM-A 450, ASTM SA-1016, ASTM-A 1016; ET - Test
method: acc. to ASTM-E 309

PASSED

The tubes are non destructive tested:

Les tubes ont passé un essai non destructif:

Augensichtkontrolle:

PASSED

Aufweitversuch:

PASSED

Maßkontrolle:

PASSED

Visual inspection:

Drift expanding/flare test:

Dimensions examination:

Examen visuel:

Essai d'évasement:

Vérification des dimensions:

Ringfaltversuch:

PASSED

Flattening test:

Essai d'aplatissement:

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Ergebnisse der mechanischen Prüfung / Results of mechanical testing / Résultats des essais mécaniques

Die Probennahme erfolgte an Vielfachlängen.
The sampling was carried out on multiple lengths.
L'échantillonnage était réalisé aux longueurs multiples.

Zugversuch längs Vollprobe / Tensile test longitudinal Full section test specimen / Essai de traction longitudinale Eprouvette a section complete

Pos.	Proben-Nr.	Schmelzen-Nr.	Probenabmessung	Streckgrenze	Zugfestigkeit	Dehnung	Einschnürung
Item	Specimen No.	Heat No.	Specimen dimensions	Yield strength	Tensile strength	Elongation	Area reduction
Poste	No. de l'éprouvette	No. de coulée	Dimensions de l'éprouv.	Limite élastique	Résistance à la traction	Allongement	Coefficient de striction
Anforderungen				ReH	Rm	A2"	1. Formel
Requirements			mm	N/mm ²	N/mm ²	%	1. Formula
Exigences				MIN 205	MIN 380	MIN 35	1. Formule
0001	000001	232741	19,04 X 2,30	302	408	42,00	
0001	000002	232741	19,04 X 2,30	303	407	42,00	
0002	000001	232794	19,05 X 2,20	296 ✓	417 ✓	42,00 ✓	
0002	000002	232794	19,05 X 2,20	295 ✓	417 ✓	42,00 ✓	
0003	000001	232533	19,05 X 2,25	265	398	42,00	
0003	000002	232533	19,05 X 2,25	265	397	44,00	
0004	000001	232793	19,06 X 2,19	277	406	46,00	
0004	000002	232793	19,06 X 2,18	278	408	46,00	
0006	000001	587079	19,05 X 2,55	295	415	46,00	
0006	000002	587079	19,05 X 2,55	298	415	42,00	
0007	000001	587079	19,07 X 2,60	275	403	48,00	
0007	000002	587079	19,07 X 2,60	276	404	48,00	
0007	000003	587079	19,10 X 2,55	292	415	40,00	
0007	000004	587079	19,10 X 2,55	292	415	42,00	
0008	000001	232923	19,07 X 2,90	291	417	44,00	
0008	000002	232923	19,07 X 2,90	291	415	44,00	
0009	000001	587274	19,10 X 2,93	294	412	44,00	
0009	000002	587274	19,10 X 2,93	294	412	44,00	
0010	000001	232879	19,05 X 2,95	280	398	46,00	

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Zugversuch längs Vollprobe / Tensile test longitudinal Full section test specimen / Essai de traction longitudinale Eprouvette a section complete

Pos. Item Poste	Proben-Nr. Specimen No. No. de l'éprouvette	Schmelzen-Nr. Heat No. No. de coulée	Probenabmessung Specimen dimensions Dimensions de l'éprouv.	Streckgrenze Yield strength Limite élastique	Zugfestigkeit Tensile strength Résistance à la traction	Dehnung Elongation Allongement	Einschnürung Area reduction Coefficient de striction
Anforderungen Requirements Exigences			mm	ReH N/mm ² MIN 205	Rm N/mm ² MIN 380	A2" % MIN 35	1. Formel 1. Formula 1. Formule
0010	000002	232879	19,05 X 2,95	285	405	46,00	
0011	000001	586782	19,05 X 2,90	288	407	44,00	
0011	000002	586782	19,05 X 2,90	289	406	44,00	
0012	000001	586898	19,05 X 2,95	282	401	48,00	
0012	000002	586898	19,05 X 2,95	282	401	46,00	

Härteprüfung / Hardness test / Essai de dureté

Pos. Item Poste	Proben-Nr. Specimen No. No. de l'éprouv.	Schmelzen-Nr. Heat No. No. de coulée	Härte Hardness Dureté	HRC	HB	HV	HRB	HBW
Anforderungen Requirements Exigences								MAX 72
0001	000001	232741					066	
0001	000002	232741					065	
0002	000001	232794					065	✓
0002	000002	232794					066	✓
0003	000001	232533					066	
0003	000002	232533					066	
0004	000001	232793					067	
0004	000002	232793					067	
0006	000001	587079					068	
0006	000002	587079					068	
0007	000001	587079					067	
0007	000002	587079					066	

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Härteprüfung / Hardness test / Essai de dureté

Pos. Item Poste	Proben-Nr. Specimen No. No. de l'éprouv.	Schmelzen-Nr. Heat No. No. de coulée	Härte Hardness Dureté	HRC	HB	HV	HRB	HBW
Anforderungen Requirements Exigences							MAX 72	
0007	000003	587079					068	
0007	000012	587079					068	
0008	000001	232923					068	
0008	000002	232923					068	
0009	000001	587274					069	
0009	000002	587274					068	
0010	000001	232879					067	
0010	000002	232879					066	
0011	000001	586782					066	
0011	000002	586782					066	
0012	000001	586898					066	
0012	000002	586898					066	

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Kerbschlagbiegeversuch Notched bar impact test / Essai de flexion par choc (résilience) [1 CHARPY_V]

Pos. Item Poste	Proben-Nr. Specimen No. No. de l'éprouv.	Schmelzen-Nr. Heat No. No. de coulée	Probenabmessung Specimen dimensions Dimensions de l'éprouvette			Probenlage Specimen position Position de l'éprouvette	Prüftemperatur Test temperature Température d'essai	Kerbschlagarbeit Absorbed energy Energie absorbée		Kerbschlagzähigkeit Impact strength Résistance au choc		Verf.-Bruchanteil Shear fracture Rupture ductile	
Anforderungen Requirements Exigences			Länge Length Longueur	Breite Width Largeur	Höhe Height Hauteur	längs (L) longitudinal (L) longitudinal (L)		einzel single individuelle	mittel average moyenne	einzel single individuelle	mittel average moyenne	einzel single individuelle	mittel average moyenne
			mm	mm	mm	quer (Q) transversal (Q) transversal (Q)	GRAD °C	J	J	J/cm²	J/cm²	%	%
			55	10,00	10,00		-45	MIN 014	MIN 018				
0011	000001	586782	55	10,00	10,00	L	-45	157					
				10,00	10,00			150					
				10,00	10,00			147	151				

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Kerbschlagbiegeversuch Notched bar impact test / Essai de flexion par choc (résilience) [1 CHARPY_V]

Pos.	Proben-Nr.	Schmelzen-Nr.	Probenabmessung			Probenlage	Prüftemperatur	Kerbschlagarbeit		Kerbschlagzähigkeit		Verf.-Bruchanteil	
Item	Specimen No.	Heat No.	Specimen dimensions			Specimen position	Test temperature	Absorbed energy		Impact strength		Shear fracture	
Poste	No. de l'éprouv.	No. de coulée	Dimensions de l'éprouvette			Position de l'éprouvette	Température d'essai	Energie absorbée		Résistance au choc		Rupture ductile	
Anforderungen			Länge	Breite	Höhe	längs (L)		einzel	mittel	einzel	mittel	einzel	mittel
Requirements			Length	Width	Height	longitudinal (L)		single	average	single	average	single	average
Exigences			Longueur	Largeur	Hauteur	longitudinal (L)		Individuelle	moyenne	individuelle	moyenne	individuelle	moyenne
						quer (Q)	GRAD						
			mm	mm	mm	transversal (Q)	°C	J	J	J/cm²	J/cm²	%	%
			55	3,00	10,00	transversal (Q)	-45	MIN 004	MIN 005				
0008	000001	232923	55	3,00	10,00	L	-45	34					
				3,00	10,00			35					
				3,00	10,00			35	35				
0009	000001	587274	55	3,00	10,00	L	-45	39					
				3,00	10,00			39					
				3,00	10,00			35	38				
0010	000001	232879	55	3,00	10,00	L	-45	36					
				3,00	10,00			36					
				3,00	10,00			39	37				
0012	000001	586898	55	3,00	10,00	L	-45	41					
				3,00	10,00			42					
				3,00	10,00			41	41				

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Vermerk / Remark / Remarque

NACE Standard: Hardness acc. to ANSI/NACE MR0175/ISO 15156: HRC max 22., Hardness acc. to Standard MR0103 HRC max. 22.;
Certificate remarks: fully killed fine grained steel; Country of origin of the material and heat: Germany

Beiblatt Produktkennzeichnung / Attachment product marking / Supplément marquage du produit

Pos.	Produktkennzeichnung
Item	Produktkennzeichnung
Poste	Marquage du produit
0001, 0002, 0003, 0004, 0006, 0007	
FSD: BENTELER A179-A334-CD-SA334-CD-SA179 A/SA 179/1 46002343 / Tubes Inc. 1827-T-14 HEAT-NO. DIMENSIONS MW WEEK/YEAR	
MADE IN GERMANY WA	

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0008, 0009, 0010, 0011, 0012

FSD: BENTELER A179-A334-CD-SA334-CD-SA179 A/SA 179/1 46002343 / Tubes Inc. 1827-T-14 HEAT-NO. DIMENSIONS MW WEEK/EAR
MADE IN GERMANY LT 50 WA

AEZ = Ätztintenbeschriftung, Etching ink marking, Gravure à l'encre . FK = Farbkennzeichnung, colour marking, marquage par couleur . FS = Farbschablonierung, paint stencilling, marquage par peinture . FSD = Farbstrahlprüfer, Colour jet printer, Imprimante à jet d'encre de couleur . LK = Laserkennzeichnung, Laser marking, Marquage laser . PKE = Etikettenkennzeichnung, tag marking, marquage sur étiquette . PS = Prägestempel, die stamp, marquage par poinçonnage . TS = Tintenstrahlkennzeichnung, Ink jet spray marking, Imprimante à jet d'encre .

Verkäufer(in) / Sales personnel / Personne chargée : Mr Höke, Tel.: 05254 81-204263, Fax: 204269

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PER <u>GG</u>
DATE <u>JAN 20 2015</u>

Paderborn Schloß Neuhaus, 06.08.2014, TEL.: 05254.81-201765 FAX: 05254.81-201752

Abnahmebeauftragter
Inspection representative
Contrôleur
THOMAS GOLLAN / GUT

Es wird bestätigt, daß die gelieferten Erzeugnisse den techn. Lieferbedingungen des Auftrages entsprechen. Dieses Dokument wurde mittels EDV erstellt und ist ohne Unterschrift rechtsgültig.
We certify that the supplied products comply with the order specification. This document was prepared by means of electronic data processing and is valid without signature.
Nous attestons que les produits livrés sont conformes aux stipulations de la commande. Ce document a été établi par traitement électronique de l'information et est valide sans signature.

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This material meets ASME Section II

Edition 13 Addenda

Verified by: Ellett QC Inspector

Signature GG Date JAN 20 2015

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EN 10204:2005-01

Benteler Steel/Tube GmbH - Postfach 1340 - 33043 Paderborn - Deutschland

Tubes Inc.
900 E. Pecan
SAND SPRINGS OK 74063
USA

Dokument-Nr.: 41-836223/001/P

Document No.:

No. du document:

Kunden-Bestell-Nr.: 46002650 / Tubes Inc. 1848T-14

Purchase Order No.:

No. de commande du client:

Benteler Auftrags-Nr.: 1602329

Benteler Order No.:

No. de commande Benteler:

Versandanzeigen-Nr.: 4191381

Dispatch Note No.:

No. d'avis d'expédition:

Produkt: NAHTLOSE STAHLROHRE

Product: SEAMLESS STEEL TUBES

Produit: TUBES D'ACIER SANS SOUDURE

Prüf-Nr.:

Inspection No.:

No. du certificat:

Hersteller: Warmrohrwerk/Zieherei

Manufacturer:

Producteur: (DIN EN ISO 9001, ISO/TS-16949 CERTIFIED BY TÜV NORD CERT)
(PED 97/23/EC CERTIFIED BY TÜV NORD SYST EMS)

Herstellerzeichen:

Manufacturer's brand:

Marque du producteur:

Stempel des Abnahmebeauftragten: WA

Stamp of the inspection representative:

Poinçon du contrôleur:

Stahlschmelzungsverfahren: ELEKTROSTAHL

Steelmaking process: ELECTRIC FURNACE

Procédé d'élaboration de l'acier: FOUR ELECTRIQUE

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Lieferbedingungen:

Terms of delivery:

Conditions de livraison:

Maße - Toleranzen:

Dimensions-tolerances:

Dimensions-tolérances:

Stahlsorte:

Steel grade:

Nuance d'acier:

Lieferzustand:

Delivery condition:

État de livraison:

Produktkennzeichnung:

Product marking:

Marquage du produit:

ASTM-A 179-1990a, ASTM-A 334-2004a-CD, ASME SA-334-CD, ASME Section II Part A Edition 2013, ASME

SA-179, ASME Section II Part A Edition 2013, NACE Standard MR0103-2010, ANSI/NACE MR0175/ISO

15156-1: 2009, ANSI/NACE MR0175/ISO 15156-2: 2009

ASME SA-450-CFS, ASME Section II Part A Edition 2013, ASTM-A 450-2010-CD, ASTM-A 1016-13-CF, ASME SA-1016-CFS

ASME Code Section II Part A Edition 2013

A 179, GRADE 1, SA 179

Normalized

see attachment product marking

TUBES, INC.

1-888-537-8880

THESE MILL TEST REPORTS APPLY TO:

YOUR P.O. NO. 58637

JOB NUMBER

Pos.	Stück	Maße	Länge	Gewicht	Schmelzen-Nr.	Prüfdruck	Rohr-Nr.-Gruppe	/elfachlängen
Item	Number	Dimensions	Length	Weight	Heat No.	Test pressure	Tube number group	/multiple lengths
Poste	Nombre	Dimensions	Longueur	Poids	No. de coulée	Pression d'épreuve	Série de no. des tubes	/longueurs multiples
		feet	feet	lbs				
0001	420	0.750" O.D. * 0.065" MW	32 FT 1 "	13475,00	6843	587673		
0002	327	0.750" O.D. * 0.065" MW	36 FT 1 "	11799,25	5952	587772		
0003	530	0.750" O.D. * 0.065" MW	40 FT 1 "	21244,16	10714	587674		

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Pos.	Stück	Maße	Länge	Gewicht	Schmelzen-Nr.	Prüfdruck	Rohr-Nr.-Gruppe	Vielfachlängen
Item	Number	Dimensions	Length	Weight	Heat No.	Test pressure	Tube number group	Multiple lengths
Poste	Nombre	Dimensions	Longueur	Poids	No. de coulée	Pression d'épreuve	Série de no. des tubes	Longueurs multiples
		feet	feet	lbs				
0004	550	0.750" O.D. * 0.065" MW 44 FT 1 "	24245,83	12258	234283			
0005	1200	0.750" O.D. * 0.065" MW 48 FT 1 "	57700,00	29247	234283			
0005	120	0.750" O.D. * 0.065" MW 48 FT 1 "	5770,01	2932	234426			
0006	1289	0.750" O.D. * 0.083" MW 20 FT	25779,99	16213	234265			
0007	528	0.750" O.D. * 0.083" MW 32 FT 1 "	16940,03	10723	234364			
0008	347	0.750" O.D. * 0.083" MW 34 FT 1 "	11826,94	7452	234273			
0008	300	0.750" O.D. * 0.083" MW 34 FT 1 "	10225,00	6440	234364			
0008	255	0.750" O.D. * 0.083" MW 34 FT 1 "	8691,24	5496	234422			
0009	501	0.750" O.D. * 0.083" MW 36 FT 1 "	18077,76	11424	234265			
0010	550	0.750" O.D. * 0.083" MW 40 FT 1 "	22045,80	13913	234204			
0012	310	0.750" O.D. * 0.083" MW 48 FT 1 "	14905,84	9392	234265			
0013	307	0.750" O.D. * 0.109" MW 32 FT 1 "	9849,57	7729	587795			
0013	100	0.750" O.D. * 0.109" MW 32 FT 1 "	3208,33	2524	588225			
0015	534	0.750" O.D. * 0.109" MW 40 FT 1 "	21404,53	16832	234008			
0016	299	0.750" O.D. * 0.109" MW 42 FT 1 "	12582,91	9910	234008			
0017	440	0.750" O.D. * 0.109" MW 44 FT 1 "	19396,65	15289	234006			
0018	276	0.750" O.D. * 0.109" MW 48 FT 1 "	13271,00	10130	234006			

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Schmelzenanalyse [%] / Heat analysis [%] / Analyse sur coulée [%]

Pos.	Schmelzen-Nr.	C	SI	MN	P	S	CR	MO	NI	CU	SN	V
Item	Heat No.											
Poste	No. de coulée											
0001	587673	0,100	0,130	0,44	0,005	0,003	0,12	0,04	0,09	0,14	0,019	0,001
0002	587772	0,100	0,180	0,47	0,007	0,002	0,10	0,03	0,11	0,15	0,010	0,002
0003	587674	0,100	0,130	0,45	0,004	0,004	0,12	0,04	0,09	0,14	0,018	0,001
0004	234283	0,100	0,155	0,46	0,006	0,003	0,11	0,04	0,10	0,15	0,014	0,002
0005	234283	0,100	0,155	0,46	0,006	0,003	0,11	0,04	0,10	0,15	0,014	0,002

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Schmelzenanalyse [%] / Heat analysis [%] / Analyse sur coulée [%]

Pos. Item Poste	Schmelzen-Nr. Heat No. No. de coulée	C	SI	MN	P	S	CR	MO	NI	CU	SN	V
0005	234426	0,100	0,155	0,46	0,006	0,003	0,11	0,04	0,10	0,15	0,011	0,002
0006	234265	0,095	0,160	0,48	0,008	0,003	0,13	0,03	0,09	0,16	0,011	0,002
0007	234364	0,100	0,160	0,47	0,007	0,003	0,16	0,04	0,10	0,17	0,011	0,001
0008	234273	0,110	0,150	0,48	0,010	0,004	0,11	0,02	0,08	0,15	0,011	0,001
0008	234364	0,100	0,160	0,47	0,007	0,003	0,16	0,04	0,10	0,17	0,011	0,001
0008	234422	0,110	0,150	0,48	0,010	0,004	0,11	0,02	0,08	0,15	0,011	0,001
0009	234265	0,095	0,160	0,48	0,008	0,003	0,13	0,03	0,09	0,16	0,011	0,002
0010	234204	0,100	0,180	0,47	0,008	0,003	0,13	0,05	0,08	0,12	0,011	0,002
0012	234265	0,095	0,160	0,48	0,008	0,003	0,13	0,03	0,09	0,16	0,011	0,002
0013	587795	0,100	0,130	0,47	0,014	0,004	0,16	0,03	0,09	0,15	0,011	0,002
0013	588225	0,110	0,150	0,46	0,008	0,003	0,15	0,03	0,14	0,16	0,011	0,001
0015	234008	0,100	0,140	0,47	0,007	0,002	0,16	0,03	0,08	0,16	0,011	0,002
0016	234008	0,100	0,140	0,47	0,007	0,002	0,16	0,03	0,08	0,16	0,011	0,002
0017	234006	0,100	0,155	0,45	0,011	0,003	0,15	0,05	0,09	0,14	0,011	0,003
0018	234006	0,100	0,155	0,45	0,011	0,003	0,15	0,05	0,09	0,14	0,011	0,003

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Produktanalyse [%] / Product analysis [%] / Analyse sur produit [%]

Pos. Item Poste	Schmelzen-Nr. Heat No. No. de coulée	C	SI	MN	P	S	CR	MO	NI	CU	SN	V
0001	587673	0,070	0,140	0,44	0,004	0,003	0,13	0,04	0,08	0,13	0,011	0,001
0002	587772	0,090	0,180	0,47	0,007	0,002	0,11	0,03	0,10	0,14	0,001	0,001
0003	587674	0,110	0,130	0,45	0,005	0,004	0,13	0,05	0,08	0,13	0,011	0,001
0004	234283	0,090	0,130	0,46	0,007	0,005	0,13	0,05	0,08	0,13	0,011	0,001
0005	234283	0,090	0,130	0,46	0,007	0,005	0,13	0,05	0,08	0,13	0,011	0,001
0005	234426	0,110	0,130	0,45	0,005	0,005	0,13	0,05	0,08	0,13	0,011	0,001
0006	234265	0,100	0,160	0,50	0,010	0,002	0,11	0,02	0,07	0,16	0,011	0,002

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Produktanalyse [%] / Product analysis [%] / Analyse sur produit [%]

Pos. Item Poste	Schmelzen-Nr. Heat No. No. de coulée	C	SI	MN	P	S	CR	MO	NI	CU	SN	V
0007	234364	0,100	0,150	0,47	0,007	0,003	0,18	0,05	0,09	0,17	0,011	0,001
0008	234273	0,090	0,150	0,45	0,007	0,003	0,10	0,02	0,07	0,11	0,008	0,001
0008	234364	0,100	0,150	0,47	0,007	0,003	0,18	0,05	0,09	0,17	0,011	0,001
0008	234422	0,100	0,140	0,46	0,010	0,004	0,12	0,02	0,07	0,13	0,008	0,001
0009	234265	0,100	0,160	0,50	0,010	0,002	0,11	0,02	0,07	0,16	0,012	0,002
0010	234204	0,090	0,170	0,47	0,008	0,002	0,14	0,06	0,08	0,12	0,007	0,001
0012	234265	0,100	0,160	0,50	0,010	0,002	0,11	0,02	0,07	0,16	0,012	0,002
0013	587795	0,080	0,130	0,46	0,013	0,005	0,16	0,03	0,08	0,13	0,008	0,001
0013	588225	0,100	0,150	0,46	0,009	0,003	0,17	0,04	0,11	0,15	0,015	0,001
0015	234008	0,100	0,140	0,45	0,008	0,002	0,17	0,03	0,07	0,14	0,008	0,001
0016	234008	0,100	0,140	0,45	0,008	0,002	0,17	0,03	0,07	0,14	0,008	0,001
0017	234006	0,100	0,170	0,42	0,008	0,002	0,14	0,06	0,08	0,12	0,008	0,002
0018	234006	0,100	0,170	0,42	0,008	0,002	0,14	0,06	0,08	0,12	0,008	0,002

Prüfergebnisse / Test results / Résultats des essais

Die Rohre sind auf Dichtheit geprüft durch:

The tubes have been submitted to a leak tightness test by:

Les tubes ont passé un contrôle d'étanchéité par:

Hydrostatic test: eddy current testing instead of hydrostatic test

Die Rohre wurden zerstörungsfrei geprüft:

The tubes are non destructive tested:

Les tubes ont passé un essai non destructif:

ET-test: acc. to ASME SA-450, ASTM-A 450, ASTM SA-1016, ASTM-A 1013; ET - Test
method: acc. to ASTM-E 309

PASSED

Augensichtkontrolle:

Visual inspection:

Examen visuel:

PASSED

Aufweitversuch:

Drift expanding/flare test:

Essai d'évasement:

PASSED

Maßkontrolle:

Dimensions examination:

Vérification des dimensions

PASSED

Ringfaltversuch:

Flattening test:

Essai d'aplatissement:

PASSED

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Ergebnisse der mechanischen Prüfung / Results of mechanical testing / Résultats des essais mécaniques

Die Probennahme erfolgte an Vielfachlängen.
The sampling was carried out on multiple lengths.
L'échantillonnage était réalisé aux longueurs multiples.

Zugversuch längs Vollprobe / Tensile test longitudinal Full section test specimen / Essai de traction longitudinale Eprouvette à section complète

Pos. Item Poste	Proben-Nr. Specimen No. No. de l'éprouvette	Schmelzen-Nr. Heat No. No. de coulée	Probenabmessung Specimen dimensions Dimensions de l'éprouv.	Streckgrenze Yield strength Limite élastique	Zugfestigkeit Tensile strength Résistance à la traction	Dehnung Elongation Allongement	Einschnürung Area reduction Coefficient de striction
Anforderungen Requirements Exigences			mm	ReH N/mm ² MIN 205	Rm N/mm ² MIN 380	A2" % MIN 35.00	1. Formel 1. Formula 1. Formule
0001	000001	587673	19,03 X 1,75	294	416	45,00	
0001	000002	587673	19,03 X 1,75	295	416	46,00	
0002	000001	587772	19,02 X 1,75	296	421	48,00	
0002	000002	587772	19,02 X 1,75	294	420	46,00	
0003	000001	587674	19,05 X 1,75	280	410	40,00	
0003	000002	587674	19,05 X 1,75	281	411	40,00	
0004	000001	234283	19,05 X 1,75	296	404	41,00	
0004	000002	234283	19,05 X 1,75	297	404	41,00	
0005	000001	234283	19,05 X 1,75	297	405	40,00	
0005	000002	234283	19,05 X 1,75	296	404	42,00	
0005	000001	234426	19,06 X 1,75	291	414	40,00	
0005	000002	234426	19,06 X 1,75	293	416	44,00	
0006	000001	234265	19,05 X 2,25	294	420	44,00	
0006	000002	234265	19,05 X 2,25	293	420	45,00	
0007	000001	234364	19,06 X 2,20	294	427	41,00	
0007	000002	234364	19,06 X 2,20	294	428	41,00	
0008	000001	234273	19,05 X 2,22	287	422	43,00	
0008	000002	234273	19,05 X 2,22	287	422	43,00	
0008	000001	234364	19,06 X 2,20	294	429	40,00	

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Zugversuch längs Vollprobe / Tensile test longitudinal Full section test specimen / Essai de traction longitudinale Eprouvette a section complete

Pos.	Proben-Nr.	Schmelzen-Nr.	Probenabmessung	Streckgrenze	Zugfestigkeit	Dehnung	Einschnürung
Item	Specimen No.	Heat No.	Specimen dimensions	Yield strength	Tensile strength	Elongation	Area reduction
Poste	No. de l'éprouvette	No. de coulée	Dimensions de l'éprouv.	Limite élastique	Résistance à la traction	Allongement	Coefficient de striction
Anforderungen				ReH	Rm	A2"	1. Formel
Requirements			mm	N/mm ²	N/mm ²	%	1. Formel
Exigences				MIN 205	MIN 380	MIN 35.00	1. Formel
0008	000002	234364	19,06 X 2,20	295	428	42,00	
0008	000001	234422	19,05 X 2,23	313	420	48,00	
0008	000002	234422	19,05 X 2,23	304	419	48,00	
0009	000001	234265	19,05 X 2,25	293	421	42,00	
0009	000002	234265	19,05 X 2,25	294	418	45,00	
0010	000001	234204	19,05 X 2,22	283	416	45,00	
0010	000002	234204	19,05 X 2,22	290	420	46,00	
0012	000001	234265	19,05 X 2,25	292	414	42,00	
0012	000002	234265	19,05 X 2,25	295	415	43,00	
0013	000001	587795	19,06 X 2,94	294	412	48,00	
0013	000002	587795	19,06 X 2,94	294	412	50,00	
0013	000001	588225	19,05 X 2,90	312	425	44,00	
0013	000002	588225	19,05 X 2,90	312	425	44,00	
0015	000001	234008	19,03 X 2,94	317	412	42,00	
0015	000002	234008	19,03 X 2,94	318	413	48,00	
0016	000001	234008	19,03 X 2,94	317	412	46,00	
0016	000002	234008	19,03 X 2,94	318	412	42,00	
0017	000001	234006	19,08 X 2,95	282	411	48,00	
0017	000002	234006	19,08 X 2,95	280	408	48,00	
0018	000001	234006	19,08 X 2,95	279	407	48,00	
0018	000002	234006	19,08 X 2,95	282	411	48,00	

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Härteprüfung / Hardness test / Essai de dureté

Pos. Item Poste	Proben-Nr. Specimen No. No. de l'éprouv.	Schmelzen-Nr. Heat No. No. de coulée	Härte Hardness Dureté	HRC	HB	HV	HRB	HBW
Anforderungen Requirements Exigences								MAX 72
0001	000001	587673					067	
0001	000002	587673					067	
0002	000001	587772					069	
0002	000002	587772					068	
0003	000001	587674					067	
0003	000002	587674					068	
0004	000001	234283					066	
0004	000002	234283					066	
0005	000001	234283					066	
0005	000002	234283					067	
0005	000001	234426					068	
0005	000002	234426					068	
0006	000001	234265					068	
0006	000002	234265					067	
0007	000001	234364					070	
0007	000002	234364					070	
0008	000001	234273					069	
0008	000002	234273					069	
0008	000001	234364					070	
0008	000002	234364					070	
0008	000001	234422					067	
0008	000002	234422					068	
0009	000001	234265					067	

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Härteprüfung / Hardness test / Essai de dureté

Pos. Item Poste	Proben-Nr. Specimen No. No. de l'éprouv.	Schmelzen-Nr. Heat No. No. de coulée	Härte Hardness Dureté					
Anforderungen Requirements Exigences			HRC	HB	HV	HRB	HBW	
						MAX 72		
0009	000002	234265				067		✓
0010	000001	234204				068		
0010	000002	234204				066		
0012	000001	234265				068		
0012	000002	234265				068		
0013	000001	587795				069		
0013	000002	587795				068		
0013	000001	588225				069		
0013	000002	588225				069		
0015	000001	234008				068		
0015	000002	234008				068		
0016	000001	234008				068		
0016	000002	234008				068		
0017	000001	234006				066		
0017	000002	234006				066		
0018	000001	234006				066		
0018	000002	234006				067		

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Kerbschlagbiegeversuch Notched bar impact test / Essai de flexion par choc (résilience) [1 CHARPY_V]

Pos.	Proben-Nr.	Schmelzen-Nr.	Probenabmessung			Probenlage	Prüftemperatur	Kerbschlagarbeit		Kerbschlagzähigkeit		Verf.-Bruchanteil	
Item	Specimen No.	Heat No.	Specimen dimensions			Specimen position	Test temperature	Absorbed energy		Impact strength		Shear fracture	
Poste	No. de l'éprouv.	No. de coulée	Dimensions de l'éprouvette			Position de l'éprouvette	Température d'essai	Energie absorbée		Résistance au choc		Rupture ductile	
Anforderungen			Länge	Breite	Höhe	längs (L)		einzel	mittel	einzel	mittel	einzel	mittel
Requirements			Length	Width	Height	longitudinal (L)		single	average	single	average	single	average
Exigences			Longueur	Largeur	Hauteur	longitudinal (L)		individuelle	moyenne	individuelle	moyenne	individuelle	moyenne
						quer (Q)	GRAD						
			mm	mm	mm	transversal (Q)	°C	J	J	J/cm²	J/cm²	%	%
			55	3,00	10,00	transversal (Q)	-45	MIN 004	MIN 005				
0013	000001	587795	55	3,00	10,00	L	-45	37					
				3,00	10,00			37					
				3,00	10,00			38	37				
0013	000001	588225	55	3,00	10,00	L	-45	39					
				3,00	10,00			38					
				3,00	10,00			38	38				
0015	000001	234008	55	3,00	10,00	L	-45	40					
				3,00	10,00			43					
				3,00	10,00			45	43				
0016	000001	234008	55	3,00	10,00	L	-45	40					
				3,00	10,00			43					
				3,00	10,00			45	43				
0017	000001	234006	55	3,00	10,00	L	-45	42					
				3,00	10,00			45					
				3,00	10,00			39	42				
0018	000001	234006	55	3,00	10,00	L	-45	42					
				3,00	10,00			45					
				3,00	10,00			39	42				

Vermerk / Remark / Remarque

NACE Standard: Hardness acc. to ANSI/NACE MR0175/ISO 15156: HRC max 22., Hardness acc. to Standard MR0103 HRC max. 22.;
Certificate remarks: fully killed fine grained steel, Country of origin of the material and heat: Germany

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Beiblatt Produktkennzeichnung / Attachment product marking / Supplément marquage du produit

Pos.	Produktkennzeichnung
Item	Produktkennzeichnung
Poste	Marquage du produit

0001, 0002, 0003, 0004, 0005, 0006, 0007, 0008, 0009, 0010, 0012

FSD: BENTELER A179-A334-CD-SA334-CD-SA179 A/SA 179/1 46002650 / Tubes Inc. 1848T-14 HEAT-NO. DIMENSIONS MW WEEK/YEAR
MADE IN GERMANY WA

0013, 0015, 0016, 0017, 0018

FSD: BENTELER A179-A334-CD-SA334-CD-SA179 A/SA 179/1 46002650 / Tubes Inc. 1848T-14 HEAT-NO. DIMENSIONS MW WEEK/YEAR
MADE IN GERMANY LT 50 WA

AEZ = Ätztintenbeschriftung, Etching ink marking, Gravure à l'encre, FK = Farbkennzeichnung, colour marking, marquage par couleur, FS = Farbschablonierung, paint stencilling, marquage par peinture, FSD = Färbstrahldrucker, Colour jet printer, Imprimante à jet d'encre de couleur, LK = Laserkennzeichnung, Laser marking, Marquage laser, PKE = Etikettenkennzeichnung, tag marking, marquage sur étiquette, PS = Prägestempel, die stamp, marquage par poinçonnage, TS = Tintenstrahlkennzeichnung, Ink jet spray marking, Imprimante à jet d'encre.

Verkäufer(in) / Sales personnel / Personne chargée: Mr Höke, Tel.: 05254 81-204263, Fax: 204269

ELLETT
Q.C.
S.N. 44612
P.N. 101
PER GG
DATE JAN 20 2015

Paderborn Schloß Neuhaus, 08.10.2014, TEL.: 05254.81-201765 FAX: 05254.81-201752

Abnahmebeauftragter
Inspection representative
Contrôleur

THOMAS COLLAN / GUT

Es wird bestätigt, daß die gelieferten Erzeugnisse den techn. Lieferbedingungen des Auftrages entsprechen. Dieses Dokument wurde mittels EDV erstellt und ist ohne Unterschrift rechtsgültig.
We certify that the supplied products comply with the order specification. This document was prepared by means of electronic data processing and is valid without signature.
Nous attestons que les produits livrés sont conformes aux stipulations de la commande. Ce document a été établi par traitement électronique de l'information et est valide sans signature.



Erläuterungen siehe Rückseite/Explications voir au verso/See reverse for explanations (www.dillinger.de/certificate)

A02 INSPECTION CERTIFICATE 3.1 AS PER EN 10204:2004 INSPECTION CERTIFICATE 3.1.B AS PER EN 10204:1991+A1:1995 + AS PER ISO 10474:1991 MATERIAL TEST REPORT (MTR)		A10 Advice of dispatch No./ Date of dispatch 393048-03.07.11	A08/ Manufacturer's order/ A03 Certificate No. 364320-002	Sheet 1/...
A05 Established inspecting body DH	A06 Purchaser TERRA NOVA ST., DELTA Final receiver TERRA NOVA ST., DELTA	A07.1 No. TNS 8052 A07.2 No.	B01 Product HOT ROLLED PLATES	
B02/ Steel design. SA516-70		This material meets ASME Section II Edition 13 Addenda		
B03 Any suppl. ASME-II-A:10 requirements		Verified by: Ellett QC Inspector signature GG Date JAN 08 2015		

B01-B99 Description of the product

B14 Item No.	B08 Number of pieces	B09 Thickness	B10 Width	B11 Length	B12 Theoretical mass KG	B04 Product delivery condition	B07.2 Heat No.	B07.1 Rolled plate No./ Test No.	A09 Purchaser article number
			INCH						
02	1	2,7500 x	120,00000 x	240,00000	10188	N	360550	16023-01	
02	1	2,7500 x	120,00000 x	240,00000	10188	N	360550	16025-01	
**	2				20376				
03	1	3,0000 x	120,00000 x	240,00000	11114	N	360550	16020-01	
04	1	3,5000 x	96,00000 x	240,00000	10373	N	360550	16019-01	
05	1	4,0000 x	96,00000 x	240,00000	11855	N	360550	16024-01	
05	1	4,0000 x	96,00000 x	240,00000	11855	N	360550	16026-01	
**	2				23710				
***	6				65573				

ELLETT
Q.C.
S.N. 44612
P.N. 102
PER GG
DATE APR 02 2012

B04 Product delivery condition

ITEM NO.: 02-05
N: HT: 910 GR.C +20 -15 GR.C
SOAKING TIME TO ATTAIN THE TARGET TEMPERATURE OVER THE WHOLE SECTION: 1-1,75 MIN/MM (25-45 MIN/INCH)
COOLING IN STILL AIR

B06 Marking of the product

ITEM NO.: 02-05
STEEL DESIGNATION SA516 70MTLTV
HEAT NO. / TRADEMARK / ROLLED PLATE NO.-TEST NO. / INSPECTOR'S STAMP

B07-B99 Further information about the product

ITEM NO.: 02-05
THICKNESS REDUCTION RATIO $\geq 3,0$ IS FULFILLED (CF. A/SA20 PAR. 5.3)

A04 Manufacturer's mark	Z01/Z02/Z03 We hereby certify, that the above mentioned materials have been delivered in accordance with the terms of order.	B. BALDAUF Test House Manager	AHB Inspector's stamp	AG der Dillinger Hüttenwerke Postfach 1580, D-66748 Dillingen/Saar Inspection department	A01
		Date 04.07.11	PP	1	

QM-System: Certification as per ISO 9001



DILLINGER HÜTTE

Erläuterungen siehe Rückseite/Explications voir au verso/See reverse for explanations (www.dillinger.de/certificate)

A02 INSPECTION CERTIFICATE 3.1 AS PER EN 10204:2004 INSPECTION CERTIFICATE 3.1.B AS PER EN 10204:1991+A1:1995 + AS PER ISO 10474:1991 MATERIAL TEST REPORT (MTR)		A10 Advice of dispatch No./ Date of dispatch 393048-03.07.11	A08/ Manufacturer's order/ A03 Certificate No. 364320-002	Sheet 2/...
A05 Established inspecting body DH	A06 Purchaser TERRA NOVA ST., DELTA Final receiver TERRA NOVA ST., DELTA	A07.1 No. TNS 8052 A07.2 No.	B01 Product HOT ROLLED PLATES	
B02/ Steel design. SA516-70 B03 Any suppl. ASME-II-A:10 requirements			ELLETT Q.C. S.N. <u>44612</u> P.N. <u>102</u> PER <u>GG</u> DATE <u>APR 02 2012</u>	

C10-C29 Tensile test

B14 Item No.	B07.2 Heat No.	B07.1 Rol.plate/ Test No.	B05 Reference (heat) treatment	C01	C02/ C01	C03 Temp. GR.C	C10 MPA RP02	C11	C12 RM	C13	A % L0=2IN	C14-C15
02	360550	16023		K1	QV	RT	363		524		38	
02	360550	16025		K1	QV	RT	353		522		38	
03	360550	16020		K1	QV	RT	352		516		39	
04	360550	16019		K1	QV	RT	354		514		38	
05	360550	16024		K1	QV	RT	346		515		38	
05	360550	16026		K1	QV	RT	341		515		39	

C40-C49 Impact test

B14 Item No.	B07.2 Heat No.	B07.1 Rol.plate/ Test No.	B05 Reference (heat) treatment	C01	C02/ C01	C03 Temp. GR.C	C41 Width of test piece	C40 Type of test piece	C44 Testing method	C46 Energy Joule	C45 AV	C42 Individual values AV=J	C43 Mean value
02	360550	16023		K1	LV	-46	✓	CHP-V		750	AV	134 175 156	155
02	360550	16025		K1	LV	-46		CHP-V		750	AV	152 145 132	143
03	360550	16020		K1	LV	-46		CHP-V		600	AV	150 147 132	143
04	360550	16019		K1	LV	-46		CHP-V		600	AV	47 154 163	121
05	360550	16024		K1	LV	-46		CHP-V		600	AV	116 153 162	144
05	360550	16026		K1	LV	-46		CHP-V		600	AV	157 159 121	146

C70-C99 Chemical composition % - Heat analysis

B07.2 Heat	C70	C	SI	MN	P	S	CU	MO	NI	CR	V	NB	TI	AL-T
360550	Y	0,157	0,377	1,45	0,011	0,0007	0,021	0,005	0,029	0,030	0,001	0,016	0,002	0,033

C94 Heat analysis Carbon equivalent / Alloying restrictions

B07.2 Heat	FO-55=	0,09	FO-78=	0,04
360550				

A04 Z01/Z02/Z03 We hereby certify, that the above mentioned materials have been delivered in accordance with the terms of order.



B. Baldauf

B. BALDAUF
Test House Manager



Inspector's stamp

AG der Dillinger Hüttenwerke
Postfach 1580, D-66748 Dillingen/Saar
Inspection department

Date 04.07.11

PP 1

A01

ORIGINAL

MILL TEST CERTIFICATE

DK DONGKUK STEEL

Order No. : J12C500019
 PO No. : LPP201211012
 Commodity : STEEL PLATE
 Specification : ASTM A516-70N/ASME SA516-70N
 Supplier : DONGKUK INTERNATIONAL, INC.
 Customer : SALZGITTER
 Certificate No. : DP3-1-130208-015-001
 Date of issue : Feb. 08, 2013

Dimension Unit Inch: ", mm: Space	Product No	Quantit y	Weight kg	Heat No	P o s i t i o n	Tensile Test			Impact Test	D i v i s i o n	Chemical Composition(%)													Remarks	
						GL	YP02	TS	EL		S u b	-50.8 ° F	C 2	Si 2	Mn 2	P 3	S 3	Cr 3	Ni 2	Cu 2	Mo 3	Nb 3	Ti 3		V 3
							ksi					%													
9.52*2438*9754 .375*X96*X384 *Specimen No:DP06861121-a, DP06861121-c ** Normalized: 1670 ° F, 23min	A337526-01, 02, 03, 04		1,778	LFH9124	T 1	50	76	27	1	1:126 2:135 3:132 A:132	L	18	39	143	14	4	20	1	1	1	1	1	1	1	22PG
Sub Total (30)		4	7,112																						
9.52*2438*9754 .375*X96*X384 *Specimen No:DP06860108-a, DP06860108-c ** Normalized: 1670 ° F, 23min	A337009-01, 02, 03		1,778	LFH9127	T 1	50	77	26	1	1:89 2:104 3:82 A:95	L	16	39	148	14	4	20	1	1	1	1	2	2	22PG	
Sub Total (30)		3	5,334																						
9.52*2438*9754 .375*X96*X384 *Specimen No:DP06860109-a, DP06860109-c ** Normalized: 1670 ° F, 23min	A337010-01, 02, 03		1,778	LFH9127	T 1	50	77	26	1	1:89 2:119 3:90 A:99	L	16	39	148	14	4	20	1	1	1	1	2	2	22PG	
Sub Total (30)		3	5,334																						

ELLETT
Q.C.
S.N. 44612
P.N. 103,104
PER GG
DATE JUL 29 2013

This material meets ASME Section II
Edition 13 Addenda
Verified by: Ellett QC Inspector
Signature GG Date JAN 08 2015

ELLETT
Q.C.

S.N. 44612

P.N. 103, 104

PER GG

DATE JUL 29 2013

This material meets ASME Section II

Edition 13 Addenda

Verified by: Ellett QC Inspector

Signature GG Date JAN 08 2015

* Tensile Test Direction-Transverse
 * Impact Test Direction-1/4T, Longitudinal
 * Ceq = C+Mn/6+(Ni+Cu)/15+(Cr+Mo+V)/5
 * Supply Condition - Normalized
 * Chemical Composition Unit - 2-x100, 3-x1000, 4-x10000

We hereby certify that the material has been made by Basic oxygen process (Vacuum degassed Fully killed steel, Fine grain practice) and satisfactorily tested in accordance with above specification requirements called for by the above order. All materials have been produced as per ASME SECTION II PART A SA516 GR70 MT LTV+SA20 - 2010 EDITION. * Inspection documents: According to EN 10204 Type 3.2.

* Specimen No. : a-Tension, c-Impact
 * 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*1A,
 7-5d, 8-4d, 9-8d
 * T(S), Al : Total(Soluble) Al *Tr : Trace
 * NRL Result : G-No Break, B-Break

When using the ordered product for other uses, rather than the above specification use, product damage and safety accidents may be caused.

원본검증 방법 : 동국제강 홈페이지 접속 (www.dongkuk.co.kr) → e비즈니스 클락(홈페이지 하단) → 검사증명서 원본검증 클릭 → 정보입력후 검색

Surveyor to

Surveyor to

Surveyor to

Surveyor to

Chief of Quality Control Team

Dangjin Works, 400 Hanjin-ri, Songak-eup, Dangjin-si, Chungcheongnam-do, 343-823, Korea/Quality Control Team, TEL. 041-351-4679

Page : 1/2

SOLD TO: WILKINSON STEEL & METALS INC
888 SE MARINE DR
VANCOUVER BC V5X 2V3
CANADA

SHIP TO: WILKINSON STEEL & METALS
888 S E MARINE DR
(MILL CERTIFICATE SCANNER)
VANCOUVER BC V5X 2V3
CANADA

NUCOR
NUCOR STEEL SEATTLE, INC.

CERTIFIED MILL TEST REPORT

Page: 2

Ship from:

Nucor Steel Seattle, Inc.
2424 SW Andover
SEATTLE, WA 98106-1100
206-933-2222

Date: 19-Mar-2013
B.L. Number: 448511
Load Number: 279613

Material Safety Data Sheets are available at www.nucorbar.com or by contacting your inside sales representative.

NBMG-08 January 1, 2012

LOT # HEAT #	DESCRIPTION	PHYSICAL TESTS					CHEMICAL TESTS									
		YIELD P.S.I.	TENSILE P.S.I.	ELONG % IN 8"	BEND	WT% DEF	C Ni	Mn Cr	P Mo	S V	Si Cb	Cu Sn	C.E.			
PO# =>	P30308KR006V															
SE1310029601	Nucor Steel - Seattle Inc	54,388	72,924	25.0%		***	.15	.80	.014	.030	.18	.36	.34			
SE13100296	1/2" (.5000) Round	375MPa	503MPa				.09	.10	.020	.005	.006					
	20' A36/44W	54,549	73,034	29.7%												
	CSA G40.21-04 44W/ASTM A36/A36M-08	376MPa	504MPa													
	ASTM A709/A709M-11 GR 36 [250]															
	ASME SA36-2007 EDITION-2011 ADDE NDA															
	ASTM A36/A36M-08, A709/709M-11 G R36, ASME SA36-10 Ed '11 Ad.															
PO# =>	P30308KR005V															
SE1310036701	Nucor Steel - Seattle Inc	53,583	75,279	28.1%		***	.16	.87	.012	.044	.17	.28	.35			
SE13100367	2x2x3/16 Angle	369MPa	519MPa				.09	.09	.020	.005	.006					
	40' A36/44W	53,511	75,197	29.7%												
	CSA G40.21-04 44W/ASTM A36/A36M-08	369MPa	518MPa													
	ASTM A709/A709M-11 GR 36 [250]															
	ASME SA36-2007 EDITION-2011 ADDE NDA															
	ASTM A36/A36M-08, A709/709M-11 G R36, ASME SA36-10 Ed '11 Ad.															

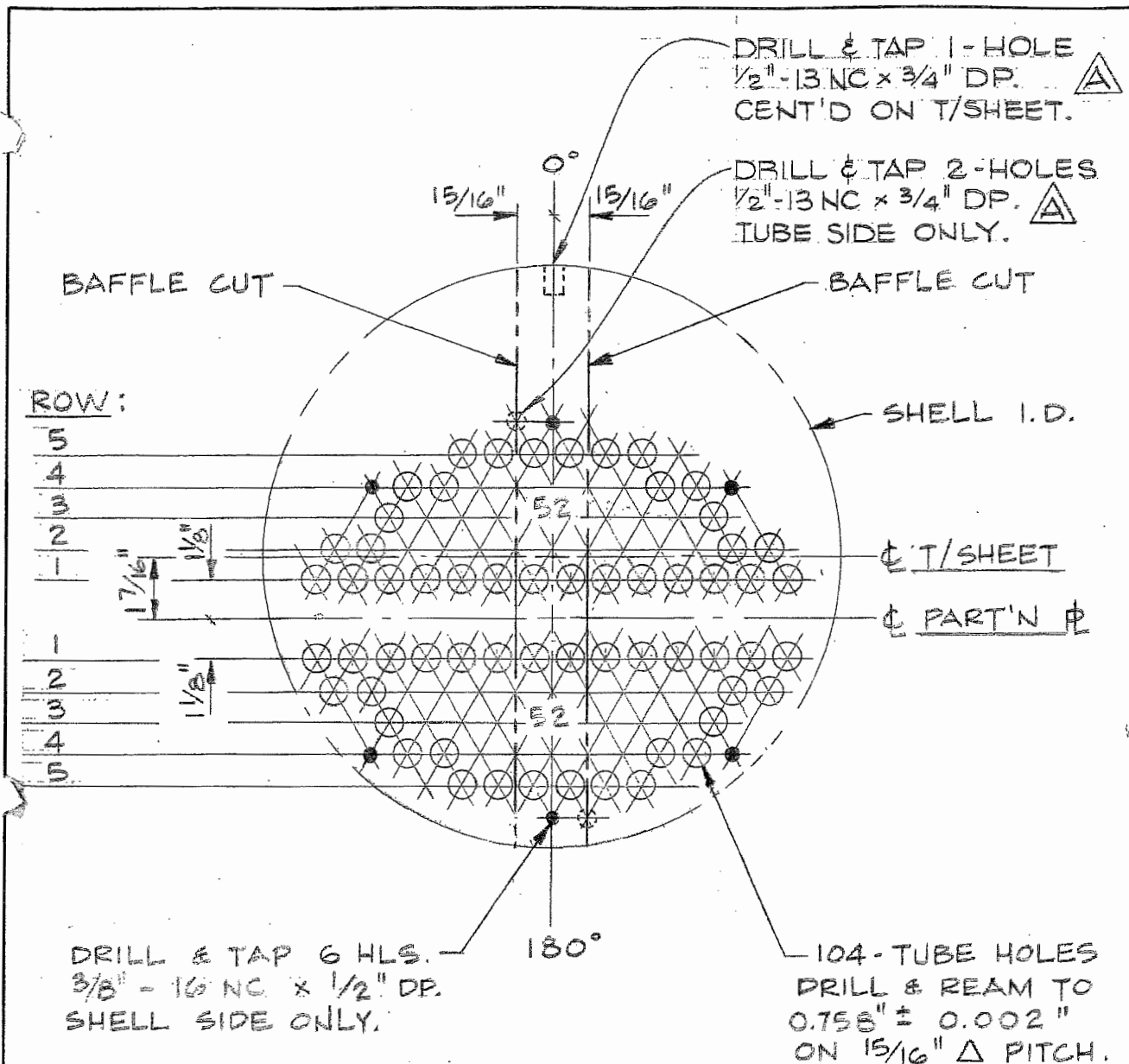
ELLETT
Q.C.
S.N. 44612
P.N. 109
PER GG
DATE MAY 09 2013

ELLETT
Q.C.
S.N. 44612
P.N. 109
PER GG
DATE MAY 09 2013

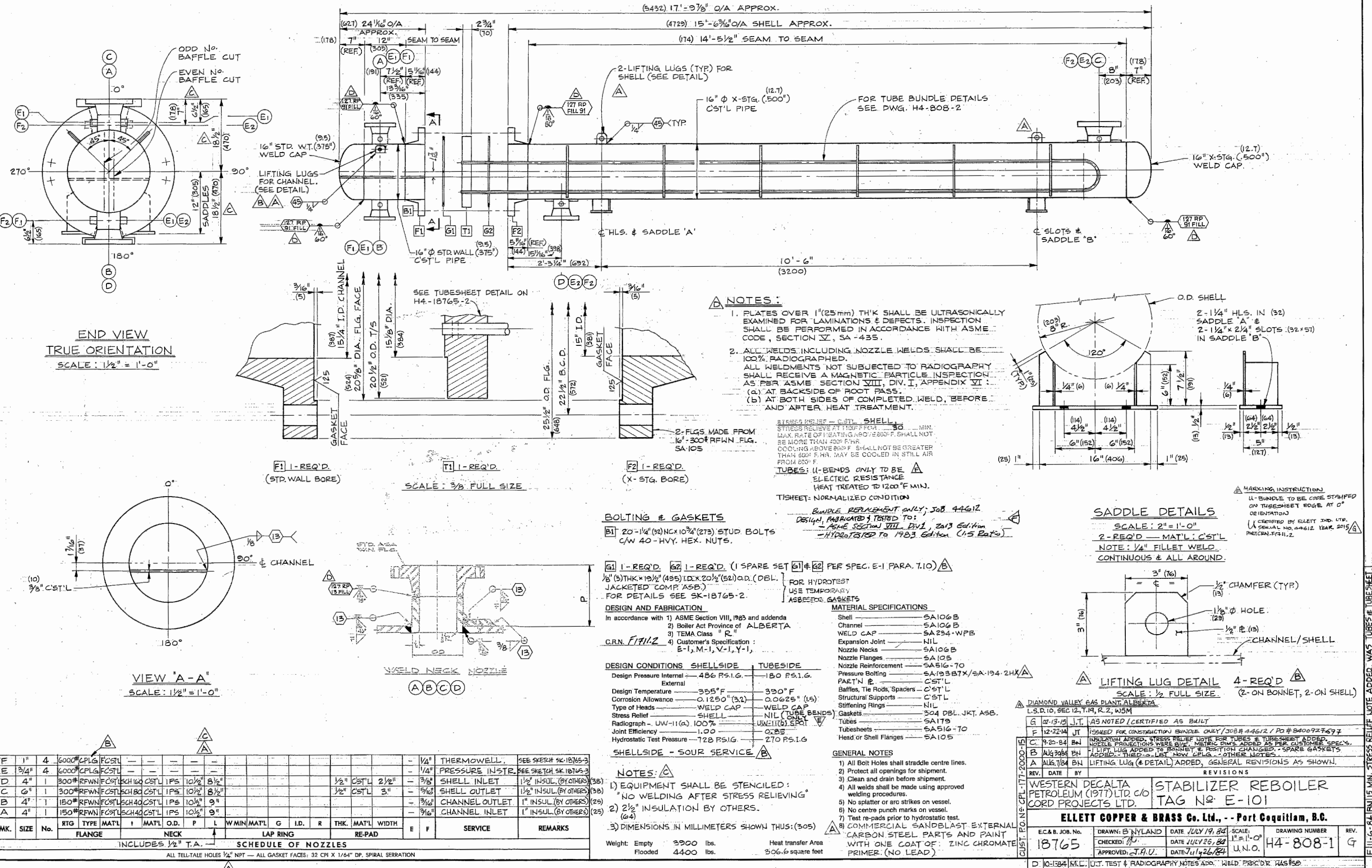
I hereby certify that the material described herein has been manufactured in accordance with the specifications and standards listed above and that it satisfies those requirements.

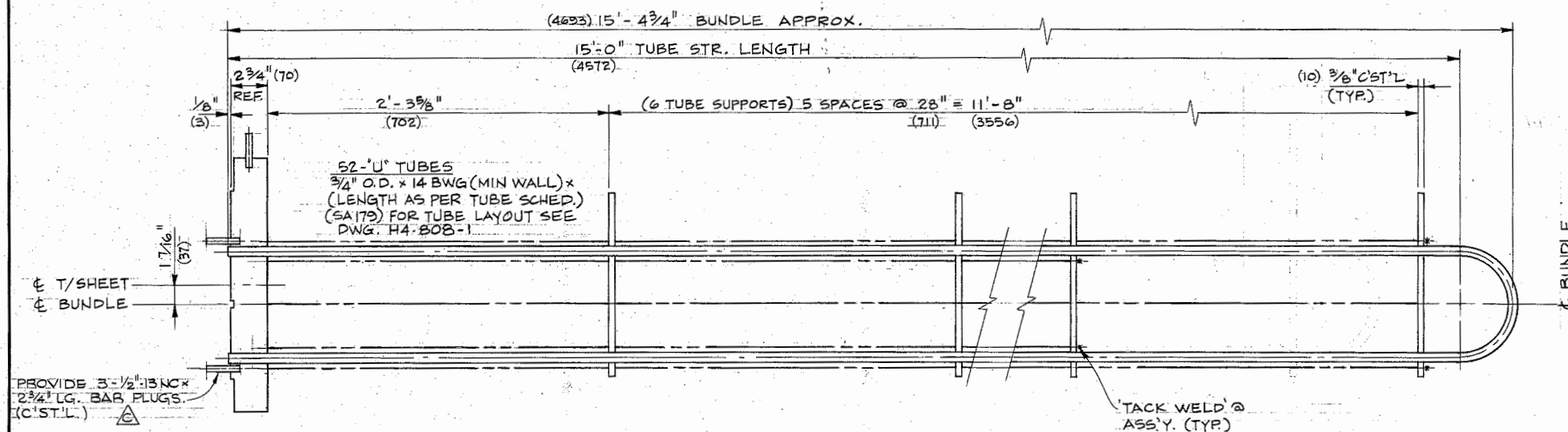
- 1.) Weld repair was not performed on this material
- 2.) Melting and Manufactured in the United States.
- 3.) Mercury, Radium, or Alpha source materials in any form have not been used in the production of this material.

QUALITY ASSURANCE: Erik Nissen

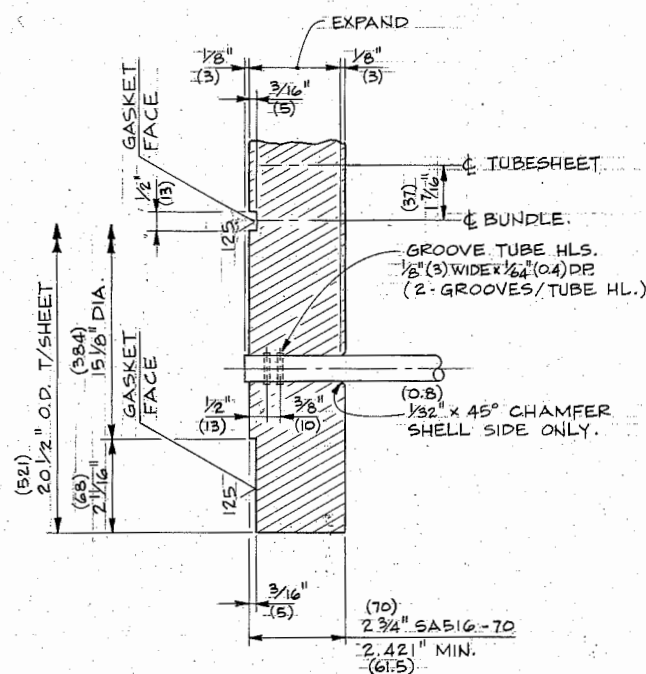


SHELL I.D. = 15"	NO TUBES = 52-"U"	B	12-22-84	J.T.	ISSUED FOR CONSTRUCTION / JOB # 44612 / PO # 8400927697
SHELL CLEAR -	TUBE O.D. = 3/4"	Δ	10-1-84	M.L.	1/2"-TH'D HLS ADDED
No. PASSES = 2	PITCH = 15/16" Δ	REV.	DATE	BY	REVISION
SUBJECT: TUBE LAYOUT - 15" ϕ STABILIZER REBOILER					Job No. 18765
CUSTOMER: CORD PROJECTS					
ELLETT COPPER AND BRASS COMPANY LIMITED, PORT COQUITLAM, B.C., CANADA					
DRAWN: B. NYLAND	CHECKED: <i>W</i> JULY 26, 84		DRAWING NO: SK-18765-1		REV: B
DATE: JULY 10/84	APPROVED: <i>J.D.V.</i> July 26/84				

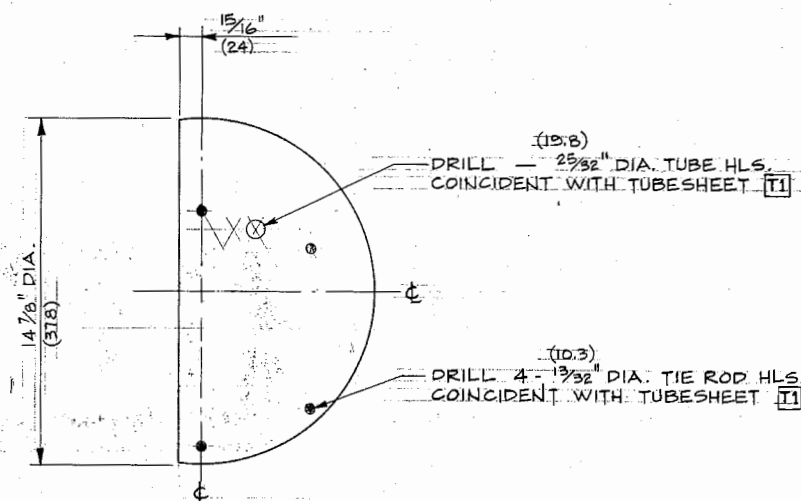
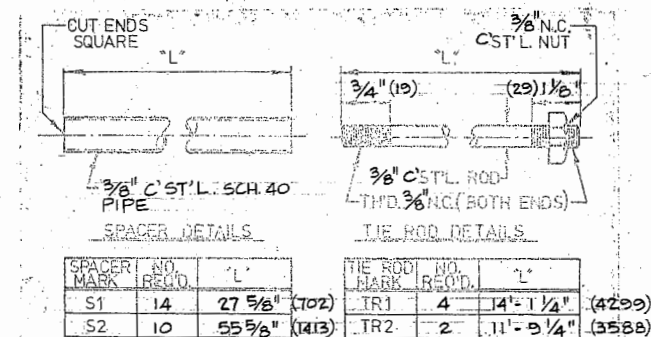




ROW	NO. REQ'D	"D"	"R"	"S"	"T"	DEV. LENGTH
1	14	2 1/4"	1 1/8"	15'-0"	15'-0 3/4"	30'-3 9/16"
2	13	3 7/8"	1 5/16"	15'-0"	15'-1 9/16"	30'-6 1/8"
3	10	5 1/2"	2 3/4"	15'-0"	15'-2 3/8"	30'-8 5/8"
4	9	7 1/8"	3 9/16"	15'-0"	15'-3 3/16"	30'-11 3/16"
5	6	8 3/4"	4 3/8"	15'-0"	15'-4"	31'-1 3/4"



TUBESHEET DETAIL
 SCALE: 3/8" FULL SIZE



TUBE SUPPORT DETAIL
 4 - REQ'D. - MAT'L 3/8" C.S.
 SCALE: 3" = 1'-0"

⚠ DIMENSIONS IN MILLIMETERS SHOWN THUS: (305)

⚠ DIAMOND VALLEY GAS PLANT, ALBERTA
 L.S.D. 10, SEC. 12, T. 19, R. 2, W. 5 M

D	12/22/14	J.T.	ISSUED FOR CONSTRUCTION: BUNDLE ONLY / JOB # 44612 / PO # 8400927877		
C	10-1-84	M.L.	BAR PLUGS ADDED.		
B	9-2-84	B.N.	METRIC DIMENSIONS ADDED AS PER CUSTOMER SPECIFICATIONS.		
A	AUG. 7/84	B.N.	ADDITION TO TITLE (ABOVE)		
REV.	DATE	BY	REVISIONS		
WESTERN DECALTA PETROLEUM (1977) LTD. C/O CORD PROJECTS LTD.			STABILIZER REBOILER TAG NO. E-101		
ELLETT COPPER & BRASS Co. Ltd., - Port Coquitlam, B.C.					
E.C. & B. JOB. No.	DRAWN: B. NYLAND	DATE JULY 19/84	SCALE:	DRAWING NUMBER	REV.
18765	CHECKED: <i>TRU</i>	DATE JULY 26, 84	2" = 1'-0"	H4-808-2	D
	APPROVED: <i>T.R.U.</i>	DATE JULY 26/84	U.N.O.		