

FORM U-1 MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS
As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1

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1. Manufactured and certified by Sewon Cellontech Co., Ltd. 211, Gongdan-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do 642-370
Republic of Korea (Name and address of Manufacturer)

2. Manufactured for MEG Energy, 520 – 3 Avenue SW, Calgary, Alberta, Canada, T2P 0R3
(Name and address of Purchaser)

3. Location of installation Canada, Alberta
(Name and address)

4. Type Horizontal Heat Exchanger E0351-001
(Horizontal, vertical, or sphere) (Tank, separator, jkt. vessel, heat exch., etc.) (Manufacture's serial number)

W9268.2 E0351-3AE101-D-01 Rev.<4> 1224 2015
(CRN) (Drawing number) (National Board number) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 ED. + 2011 ADD. N/A N/A
[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) 5 (b) Overall length 11956 mm

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
2	I.D 1100mm	2546mm	SA516-70N		25mm	3.2mm	1	Spot	0.85	1	Spot	0.85	-	-
2	I.D 1100mm	2547mm	SA516-70N		25mm	3.2mm	1	Spot	0.85	1	Spot	0.85	-	-
1	-	1770mm												

See page 4 for the detail

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

7. Heads: (a) N/A (b) N/A
(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				Washer Material
									Num & Size	Bolting Material	Washer (OD, ID, thk)	Washer Material	
(a)	-	-	-	-	-	-	-	-	-	-	-	-	-
(b)	-	-	-	-	-	-	-	-	-	-	-	-	-

8. Type of jacket N/A Jacket closure N/A
(Describe as ogee and weld, bar, etc.)

If bar, give dimensions N/A
9. MAWP 4502 F.V kPag at max. temp. 210 210 °C Min. design metal temp. -29 °C at 4502/F.V kPag
(Internal) (External) (Internal) (External)

10. Impact test Yes, See Remarks 3 at test temperature of See Remarks 3 °C
[Indicate yes or no and the component(s) impact tested]

11. Hydro, pneu., or comb. test pressure 5982 kPag Proof test N/A

Items 12 and 13 to be completed for tube sections.

12. Tubesheet SA266-2N 1100 mm 77 mm 6.4mm Welded
[Stationary (material spec. no.)) [Diameter (subject to press.)) (Nominal thickness) (Corr. allow.) [Attachment (welded or bolted))]
N/A N/A N/A N/A N/A
[Floating (material spec. no.)) (Diameter) (Nominal thickness) (Corr. allow.) (Attachment)
13. Tubes SA179 (SEAMLESS) 25.4mm 2.11mm(Min.) 968 Straight
(Material spec. no., grade or type) (O.D.) (Nominal thickness) (Number) [Type (straight or U)]

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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) 2 (b) Overall length 1682 mm

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	I.D 1100mm	921mm	SA516-70N	13mm	3.2mm	1	Full	1.0	1	Full	1.0	-	-
1	I.D 1100mm	761mm	SA516-70N	13mm	3.2mm	1	Full	1.0	1	Full	1.0	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-

Body Flanges on Shells													
No.	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Location	Bolting				Washer Material
									Num & Size	Bolting Material	Washer (OD, ID, thk)		
1	APP.2	1100mm	1278mm	125mm	13mm	SA266-2N	Butt(Type 1)	Fixed side channel flange	U 1-8UNC x 240mm, 52 Sets	SA193-B7M/SA194-2HM	N/A		N/A
1	APP.2	1100mm	1262mm	124mm	13mm	SA266-2N	Butt(Type 1)	Fixed side channel cover flange	U 1-8UNC x 235mm, 40 Sets	SA193-B7M/SA194-2HM	N/A		N/A
1	APP.2	1100mm	1278mm	125mm	13mm	SA266-2N	Butt(Type 1)	Sliding side channel flange	U 1-8UNC x 240mm, 52 Sets	SA193-B7M/SA194-2HM	N/A		N/A
1	APP.2	1100mm	1262mm	124mm	13mm	SA266-2N	Butt(Type 1)	sliding side channel cover flange	U 1-8UNC x 235mm, 40 Sets	SA193-B7M/SA194-2HM	N/A		N/A

15. Heads: (a) SA266-2N (b) SA266-2N
 (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)	End	75mm	3.2mm	-	-	-	-	-	1262mm	-	YES	-	Seamless	1.0
(b)	End	75mm	3.2mm	-	-	-	-	-	1262mm	-	YES	-	Seamless	1.0

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

16. MAWP 1545 F.V kPag at max. temp. 210 210 °C Min. design metal temp. -29 °C at 1545/F.V kPag
 (Internal) (External) (Internal) (External)

17. Impact test Yes, See Remarks 3 at test temperature of See Remarks 3 °C
 [Indicate yes or no and the component(s) impact tested]

18. (Hydro), pneu., or comb. Test pressure 2157 kPag Proof test N/A

19. Nozzle, 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	
SHELL SIDE INLET / OUTLET (S1,S2)	2	NPS 12	Cl.600 flg.	SA106-B	SA105N	14.27mm	3.2mm	SA516-70N	Fig.UW-16.1 (d)	Butt (Type1), Spot	-
TUBE SIDE INLET (T1)	1	NPS 16	Cl.300 flg.	SA516-70N (*)	SA105N	13mm	3.2mm	SA516-70N	Fig.UW-16.1 (d)	Butt (Type1), Full	-
TUBE SIDE OUTLET (T2)	1	NPS 12	Cl.300 flg.	SA106-B	SA105N	14.27mm	3.2mm	SA516-70N	Fig.UW-16.1 (d)	Butt (Type1), Full	-
DRAIN (W/B.F) / VENT (W/B.F) (T3,T4)	2	NPS 2	Cl.300 lwn.	SA105N	SA105N	16.65mm	3.2mm	Inherent	Fig.UW-16.1 (d)	Integral	-
FIELD HYDROTEST (W/B.F) (S3,S4)	2	NPS 1	Cl.600 lwn.	SA105N	SA105N	14.25mm	3.2mm	Inherent	Fig.UW-16.1 (c)	Integral	-
FIELD HYDROTEST (W/B.F) (T5,T6)	2	NPS 1	Cl.300 lwn.	SA105N	SA105N	14.25mm	3.2mm	Inherent	Fig.UW-16.1 (c)	Integral	-
DRAIN (W/B.F) / VENT (W/B.F) (V1~3, D1~3)	6	NPS 1/2	Cl.600 lwn.	SA105N	SA105N	12.7mm	3.2mm	Inherent	Fig.UW-16.1 (d)	Integral	-

20. Supports: Skirt No Lugs N/A Legs N/A Others 2-SADDLES Attached Welded to shell
 (Yes or no) (Number) (Number) (Describe) (Where and how)

21. Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report (list of the name of part, item number, Manufacturer's name and identifying number): N/A

22. Remarks 1. Item No. : 3A-E-101A, Sewon Job No. : E-0351
 2. Over pressure protection is provided by others.
 3. Impact test for all pressure parts were performed at -29°C for tubesheets, channel covers, except that the impact test of shell, girth flanges, nozzle neck & flange and stud bolt/nuts were exempted as per UCS-66, UG-20(f) and Fig. UCS-66 General Note (c).

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22. Remarks

4. Pressure retaining cover

T3,T4: NPS 2 ASME 300# BL.RF, SA105N, Stud B/Heavy Hex. 2NS, SA193-B7M/SA194-2HM,
 U5/8-11UNCx100mm, 4 Sets/each.

S3,S4: NPS 1 ASME 600# BL.RF, SA105N, Stud B/Heavy Hex. 2NS, SA193-B7/SA194-2H,
 U5/8-11UNCx100mm, 4 Sets/each.

T5,T6: NPS 1 ASME 300# BL.RF, SA105N, Stud B/Heavy Hex. 2NS, SA193-B7M/SA194-2HM,
 U5/8-11UNCx90mm, 4 Sets/each.

V1~V3, D1~D3: NPS 1/2 ASME 600# BL.RF, SA105N, Stud B/Heavy Hex. 2NS, SA193-B7/SA194-2H,
 U1/2-13UNCx85mm, 4 Sets/each.

5. PWHT was performed for channel parts for 1.8 hrs. at 635~642°C.

6. (*)Full RT was performed at nozzle longitudinal seam.

7. UT for final closure seam(CWL-03,08) were performed as per UW-11(a)(7).

CERTIFICATE OF SHOP COMPLIANCE

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

U Certificate of Authorization Number 22,125 Expires Aug. 25, 2017

Date Feb. 3 '16 Name Sewon Cellontech Co., Ltd. Signed J. A. Pate
 (Manufacturer) (Representative)

CERTIFICATE OF SHOP INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and employed by
HSB Global Standards of Hartford CT

have inspected the pressure vessel described in this Manufacturer's Data Report on _____, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel 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 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 _____ Signed _____ Commissions _____
 (Authorized Inspector) [National Board (incl. endorsements)]

CERTIFICATE OF FIELD ASSEMBLY COMPLIANCE

We certify that the statements in this report are correct and that the field assembly construction of all parts of this vessel conforms with the requirements of ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. U Certificate of Authorization Number _____ Expires _____

Date _____ Name _____ Signed _____
 (Assembler) (Representative)

CERTIFICATE OF FIELD ASSEMBLY INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and employed by _____

of _____, have compared the statements in this Manufacturer's Data Report with the described pressure vessel and state that parts referred to as data items _____, not included in the certificate of shop inspection, have been inspected by me and to the best of my knowledge and belief, the Manufacturer has constructed and assembled this pressure vessel in accordance with the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. The described vessel was inspected and subjected to a hydrostatic test of _____. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel 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 _____ Signed _____ Commissions _____
 (Authorized Inspector) [National Board (incl. endorsements)]

FORM U-4 MANUFACTURER'S DATA REPORT SUPPLEMENTARY SHEET Page 4 of 4
As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1

1. Manufactured and certified by Sewon Cellontech Co., Ltd. 211, Gongdan-ro, Seongsan-gu, Changwon-si, Gyeongsangnam-do 642-370
Republic of Korea

(Name and address of Manufacturer)

2. Manufactured for MEG Energy, 520 - 3 Avenue SW, Calgary, Alberta, Canada, T2P 0R3

(Name and address of Purchaser)

3. Location of installation Canada, Alberta

(Name and address)

4. Type Horizontal Heat Exchanger E0351-001

(Horizontal, vertical, or sphere)

(Tank, separator, jkt. vessel, heat exch., etc.)

(Manufacture's serial number)

W9268.2

E0351-3AE101-D-01 Rev.<4>

1224

2015

(CRN)

(Drawing number)

(National Board number)

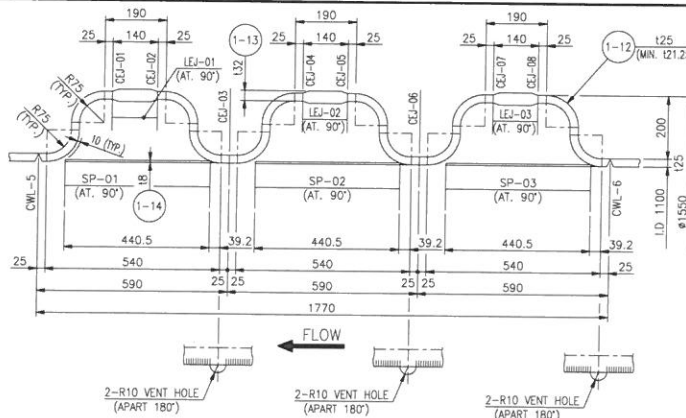
(Year built)

Data Report
Item Number

6. Shell:

EXPANSION JOINTS							
Material	Dimensions	Condition	part	MMT(°C)	Spring Rate		Axial Movement (mm)
					uncorroded (kgf/mm)	corroded (kgf/mm)	
SA516-70N	t32mmxH200mm - Corr. 3.2mm	Design	shell side	130.13	167399.98	121399.99	+2.903
			Tubeside	136.94			
		MAXIMUM OPERATING TEMPERATURE	shell side	130.13	167399.98	121399.99	+2.903
			Tubeside	136.94			
		MAXIMUM OPERATING PRESSURE	shell side	130.13	167399.98	121399.99	+2.903
			Tubeside	136.94			
		MAXIMUM PG FLOW	shell side	135.16	166999.98	121199.99	+2.903
			Tubeside	144.30			
		STEAM OUT	shell side	10.00	172899.98	125599.99	+10.529
			Tubeside	83.5			
		SHUTDOWN	shell side	-39	175999.97	127699.99	+0.072
			Tubeside	-39			
		HYDRO TEST SHELL SIDE	shell side	20.00	252499.98	200399.98	+3.839
			Tubeside	15.00			
		HYDRO TEST TUBE SIDE	shell side	10.00	172899.98	125599.99	+1.366
			Tubeside	20.00			
		PRO.GAS CV FAILS CLOSED	shell side	98.00	247500.00	195799.98	+2.903
			Tubeside	99.21			
		BFW PUMP EMERGENCY S/D	shell side	135.27	166999.98	121199.99	+5.937
			Tubeside	172.32			
		START UP TUBE SIDE	shell side	10.00	172899.98	125599.99	+11.803
			Tubeside	92.00			
		HYDRO TEST SHELL SIDE	shell side	98.00	247500.00	195799.98	+2.848
			Tubeside	98.00			

These expansion joints were constructed to the rules of ASME Section VIII Division 1 Mandatory Appendix 5 and U-2(g).



DETAIL OF EXPANSION JOINT

Certificate of Authorization : Type U No. 22,125 Expires Aug. 25, 2017
Date Feb. 3 '16 Name Sewon Cellontech Co., Ltd. Signed J. A. Park
(Name and address of Manufacturer) (Representative)
Date _____ Name _____ Commissions _____
(Authorized Inspector) [National Board (incl. endorsements)]