41-E-108

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

1. Manufactured and certified by Heat Exchanger Design, Inc. 901 E. Beecher Street, Indianapolis, IN 46203
(Name and address of Manufacturer)

2. Manufactured for Range Fuels Soperton Plant, LLC, 11101 W 120th Ave., Suite 200, Broomfield, CO 80021
(Name and address of Purchaser)

3. Location of Installation Unknown
(Name and address)

4. Type: Horizontal (Horiz., vert., or sphere) | Heat Exchanger (Tank, separator, jkt. vessel, heat exh., etc.) | 4017B (Mfg's serial No.) | -- (CRN) | 4017B Rev.1 (Drawing No.) | 2931 (Nat'l. Bd. No.) | 2009 (Year built)

5. ASME Code, Section VIII, Div. 1 2007, A08 (Edition and Addenda (date)) | -- (Code Case No.) | -- (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 multi-chamber vessels.

6. Shell (a) No. of course(s): (1) (b) Overall length (ft & in.): 12'-2.875"

Course(s)			Material	Thickness		Long Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter, in.	Length (ft. & in.)	Spec./Grade or Type	Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time
(1)	12.5" ID	12'-2.875"	SA-106Gr.B	.750"	.0625"	S	--	100%	1	Spot	100%	None	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--

7. Heads: (a) SA-234Gr.WPB - 14" OD (Mat'l Spec. No., Grade or Type) H.T.-Time & Temp (b) SA-234Gr.WPB - 8.625" OD impingement dome (Mat'l Spec. No., Grade or Type) H.T.-Time & Temp

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical	Conical	Hemispherical	Flat	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle	Ratio	Apex Angle	Radius	Diameter	Convex	Concave	Type	Full, Spot, None	Eff.
(a)	End	.656"	.0625"	--	--	2:1	--	--	--	Yes	Yes	--	--	--
(b)	Top	.4375"	.0625"	--	--	2:1	--	--	--	Yes	Yes	--	--	--

If removable, bolts used (describe other fastening) -- (Mat'l Spec. No., Grade, size, No.)

8. Type of jacket None Jacket closure -- (Describe as ogee & weld, bar, etc.)

If bar, give dimensions -- If bolted, describe or sketch

9. MAWP 1270 (internal) F.V. (external) psi at max. temp. 550 (internal) 550 (external) °F Min. design metal temp. 20 °F at 1270/F.V. psi.

10. Impact test No, exempt per UG-20(f).
(Indicate yes or no and the component(s) impact tested)

11. Hydro., pneu., or comb. test press. 1651 Proof test --

Items 12 and 13 to be completed for tube sections.

12. Tubesheet: SA-516Gr.70N (Stationary (Mat'l Spec. No) | 12.75" (Dia., in. (subject to press.) | 2" (Nom. thk., in. | .0625" (Corr. Allow., in. | Welded (Attachment (welded or bolted)

None (Floating (Mat'l Spec. No.) | -- (Dia., in. | -- (Nom. thk., in. | -- (Corr. Allow., in. | -- (Attachment

13. Tubes: SA-179 (Mat'l Spec. No., Grade or Type) | 1" (O.D., in.) | .109" (Nom. thk., in. or gauge) | (32) (Number) | "U" (Type (Straight or U))

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): (1) (b) Overall length (ft & in.): 1'-1"

Course(s)			Material	Thickness		Long Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter, in.	Length (ft. & in.)	Spec./Grade or Type	Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time
(1)	12.124" ID	1'-1"	SA-106Gr.C	.938"	.0625"	S	--	100%	1	Spot	100%	None	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--

15. Heads: (a) SA-350Gr.LF2 (Mat'l Spec. No., Grade or Type) H.T.-Time & Temp (b) -- (Mat'l Spec. No., Grade or Type) H.T.-Time & Temp

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical	Conical	Hemispherical	Flat	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle	Ratio	Apex Angle	Radius	Diameter	Convex	Concave	Type	Full, Spot, None	Eff.
(a)	End	3.438"	.0625"	--	--	--	--	--	20.5"	Flat	Flat	--	--	--
(b)	--	--	--	--	--	--	--	--	--	--	--	--	--	--

If removable, bolts used (describe other fastening) (20) 1 1/4"-8 x 11" long studs SA-193Gr.B7 / (40) nuts SA-194Gr.2H

16. MAWP 1650 (internal) F.V. (external) psi at max. temp. 500 (internal) 500 (external) °F Min. design metal temp. 20 °F at 1650/F.V. psi.

17. Impact test No, channel body flg and flat head exempt per UCS-66(g) and remaining items per UG-20(f).
(Indicate yes or no and the component(s) Impact tested)

Hydro., pneu., or comb. test press. 2145 Proof test --

19. Nozzles, Inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or Size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp.Open)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
Shell Inlet	(1)	4"	Cl.900 rtjwn	SA-106Gr.C	SA-105	.906"	.0625"	Not Required	UW-16.1(c)	UW-16.1(a)	Top
Shell Outlet	(1)	1 1/2"	Cl.1500 rtjlwn	SA-105	SA-105	.625"	.0625"	Not Required	UW-16.1(c)	Integral	Bottom
Tube Inlet	(1)	6"	Cl.900 rtjwn	SA-106Gr.B	SA-105	.864"	.0625"	Not Required	UW-16.1(c)	Fig.2-4(6)	Bottom
Tube Outlet	(1)	6"	Cl.900 rtjwn	SA-106Gr.B	SA-105	.864"	.0625"	Not Required	UW-16.1(c)	Fig.2-4(6)	Top
Shell Vent	(1)	1"	Cl.1500 rtjlwn	SA-105	SA-105	.531"	.0625"	Not Required	UW-16.1(c)	Integral	Top
Shell Drain	(1)	1"	Cl.1500 rtjlwn	SA-105	SA-105	.531"	.0625"	Not Required	UW-16.1(c)	Integral	Bottom
PSV Conn.	(1)	1 1/2"	Cl.1500 rtjlwn	SA-105	SA-105	.625"	.0625"	Not Required	UW-16.1(c)	Integral	Top

20. Supports: Skirt No (Yes or No) Lugs -- (No.) Legs -- (No.) Others Saddle Supports (Describe) Attached Welded to shell bottom. (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 the name of part, item number, mfg's. name and identifying number)
None

22. Remarks: 1) Relief valving to be supplied in customers piping. 2) No radiography performed on nozzles, 100% Eff. 3) Channel body pipe machined to 0.625" thk. weld bevel at ID for attachment to tubesheet. 4) Shell inlet nozzle flange attached to top of impingement dome head reported on line 7(b) which is type 1 butt welded to 8" sch. 160 SA-106Gr.C pipe reported on line 19. The 8" pipe is machined to 0.5" thk. weld bevel at the ID for attachment to impingement dome.

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 Code for Pressure Vessels, Section VIII, Division 1,

Certificate of Authorization No. 23,740 Expires 9/27 20 11

Date 9/21/09 Name Heat Exchanger Design, Inc. (Manufacturer) Signed [signature] (Representative)

CERTIFICATE OF SHOP INSPECTION

I, the undersigned, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and the State or Province of IN. and employed by HSB CT of Hartford, CT. have inspected the pressure vessel described in this Manufacturer's Data Report on 9/21 20 09, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME Code Section VIII, Division 1. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his 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 9/21/09 Signed [signature] (Authorized Inspector) Commissions NB 10006 (A, B) IN1418 (Nat'l Board incl. endorsement, State, Province and No.)

CERTIFICATE OF FIELD ASSEMBLY COMPLIANCE

We certify that the statements on this report are correct and that the field assembly construction of all parts of this vessel conforms with the requirements of ASME Code, Section VIII, Division 1,

U Certificate of Authorization No. _____ Expires _____ 20 _____

Date _____ Name _____ (Assembler) Signed _____ (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 the State or Province of _____ 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 ASME Code, Section VIII, Division 1. The described vessel was inspected and subjected to a hydrostatic test of _____ psi. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his 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 _____ (Authorized Inspector) Commissions _____ (Nat'l Board incl. endorsement, State, Province and No.)

NB 2931

Manufactured & Certified by

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HEAT EXCHANGER DESIGN, INC

Tulsa USA

W RT3

Shell Side 1270 PSI @ 550 °F

Tube Side 1650 PSI @ 500 °F

Maximum Allowable Working Pressure

Serial Number

4017 B

Shell Side FV PSI @ 550 °F

Tube Side FV PSI @ 500 °F

Maximum Allowable External Working Pressure

Hydro Test Pressure

1651 / 2145

Shell Side / Tube Side

Shell Side 20 °F @ 1270/FV °F

Tube Side 20 °F @ 1650/FV °F

Minimum Design Metal Temperature

Customer RANGE FUELS SOPERTON PLANT LLC

P.O. SOP10644

SYNGAS PREHEATER

41-E-108

Year Built 2009