

LOT 7595H-1141AR

107572

ASME

National Board Number: 2033

Mr. Representative: J. A. 107 Date: APR 17/2015

Authorized Inspector: [Signature] Date: Apr. 18, 2015

## FORM U-1 MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS

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As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1

1. Manufactured and certified by Ilseung Corporation #74 Daejeong-Ro, Onsan-Eub, Ulju-Gun, Ulsan 689-892, Republic Korea.  
(Name and address of Manufacturer)
2. Manufactured for SHELL CANADA ENERGY 400 4AVE. S.W., BOX 100, STATION M, CALGARY, ALBERTA T2P 0J4  
(Name and address of Purchaser)
3. Location of installation CARMON CREEK EXPANSION IN PEACE RIVER COMPLEX, ALBERTA, CANADA  
(Name and address)
4. Type Horizontal Heat Exchanger 14-HE-049  
(Horizontal, vertical, or sphere) (Tank, separator, etc., vessel, heat exch., etc.) (Manufacturer's serial number)
- W8069.2 VP-SG07-E10140-001 Rev.7 2033 2014  
(CRN) (Drawing number) (National Board number) (Year built)
5. ASME Code, Section VIII, Div. 1 2010 ED, 2011 ADD (July 01, 2011) 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) 3 (b) Overall length 7497mm

| 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. 690mm | 2600mm | SA516-70(+1)        | 14mm      | 1.5mm | 1                    | Full             | 1.0  | 1                             | Full             | 1.0  | 626°C          | 1.1Hr. |
| 1         | I.D. 690mm | 2297mm | SA516-70(+1)        | 14mm      | 1.5mm | 1                    | Full             | 1.0  | 1                             | Full             | 1.0  | 626°C          | 1.1Hr. |
| (BLANK)   |            |        |                     |           |       |                      |                  |      |                               |                  |      |                |        |

| 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 |  |
| 1                      | (+2) | 690mm | 878mm | 85mm       | 14mm        | (+3)     | Single, butt weld | End      | 36, 1 1/8"-8UNx370L | SA320-L7M        | 58, 32, 6mm        | ASTM-F436       |  |
| (BLANK)                |      |       |       |            |             |          |                   |          |                     |                  |                    |                 |  |
|                        |      |       |       |            |             |          |                   |          |                     |                  |                    |                 |  |

7. Heads: (a) SA516-70(+1) / H.T.-1.1Hr@626°C (+13) (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 |                  |      |
|-----|------------------------------|-----------|-------|--------|---------|------------------|--------------------|----------------------|---------------|------------------|---------|------------|------------------|------|
|     |                              | Mh.       | Corr. | Crown  | Knuckle |                  |                    |                      |               | Convex           | Concave | Type       | Full, Spot, None | Eff. |
| (a) | End                          | 12.75mm   | 1.5mm | -      | -       | 2:1              | -                  | -                    | -             | YES              | YES     | -          | -                | -    |
| (b) | (BLANK)                      |           |       |        |         |                  |                    |                      |               |                  |         |            |                  |      |

| 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)                   | (BLANK)  |      |    |    |            |             |          |              |            |                  |                      |                 |  |
| (b)                   |          |      |    |    |            |             |          |              |            |                  |                      |                 |  |

8. Type of jacket N/A Jacket closure N/A  
(Describe as ogee and weld, bar, etc.)
- If bar, give dimensions N/A If bolted, describe or sketch.

9. MAWP 2814kPa F.V at max. temp. 200°C 200°C Min. design metal temp. -45°C at 2814kPa  
(Internal) (External) (Internal) (External)

10. Impact test YES(SHELL-AQ2) at test temperature of -45°C  
(Indicate yes or no and the component(s) impact tested)

11. Hydro., pneum., or comb. test pressure 4400kPa Proof test -

Items 12 and 13 to be completed for tube sections.

12. Tubesheet SA765-II(+1) 690mm 84mm 3mm Bolted  
(Stationary (material spec. no.)) (Diameter (subject to press.)) (Nominal thickness) (Corr. allow.) (Attachment (welded or bolted))
- [Floating (material spec. no.)] (Diameter) (Nominal thickness) (Corr. allow.) (Attachment)
13. Tubes SA179 19.05mm 2.03mm 231 U  
(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) 1 (b) Overall length 470mm

| 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. 690mm | 470mm  | SA516-70(+1)        | 12mm      | 1.5mm | 1                    | Full             | 1.0  | 1                             | Full             | 1.0  | 626°C          | 1.1Hr. |
|           | (BLANK)    |        |                     |           |       |                      |                  |      |                               |                  |      |                |        |

| 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 |  |
| 1                      | (+2) | 690mm | 878mm | 120mm      | 12mm        | (+3)     | Single, butt weld | End      | 36,1 1/8"-8UNx290L | SA320-L7         | 58, 32, 6mm          | ASTM-F436       |  |
| 1                      | (+2) | 690mm | 878mm | 120mm      | 12mm        | (+3)     | Single, butt weld | End      | (+15)              | (+15)            | (+15)                | (+15)           |  |
| (BLANK)                |      |       |       |            |             |          |                   |          |                    |                  |                      |                 |  |

15. Heads: (a) SA765-II(+1)/H.T-626°C 1.1Hr (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) End  | 83mm      | 1.5mm | —      | —       | —                | —                  | —                    | 878mm         | —                | —  | —          | —                | —    |  |

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

16. MAWP 2571 kPa F.V. at max. temp. 200°C 200°C Min. design metal temp. -45°C at 2571 kPa  
 (Internal) (External) (Internal) (External)

17. Impact test YES(CHANNEL-A01) at test temperature of -45°C  
 (Indicate yes or no and the component's impact test)

18. Hydro., proof of design test pressure 4000 kPa 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 |                        |
| SHELL SIDE INLET                     | 1   | DN 150           | Cl. 300 lwn. | (+6)     | (+6)   | 26.95mm          | 3.0mm | INHERENT               | (+4)               | -      | -                      |
| SHELL SIDE OUTLET                    | 1   | DN 150           | Cl. 300 lwn. | (+6)     | (+6)   | 26.95mm          | 3.0mm | INHERENT               | (+4)               | -      | -                      |
| SHELL SIDE DRAIN(+7)                 | 1   | DN 100           | Cl. 300 lwn. | (+6)     | (+6)   | 22.25mm          | 3.0mm | INHERENT               | (+4)               | -      | -                      |
| SHELL SIDE VENT(+7)                  | 1   | DN 100           | Cl. 300 fig. | (+8)     | (+6)   | 8.56mm           | 3.0mm | INHERENT               | (+4)               | (+5)   | -                      |
| TUBE SIDE INLET                      | 1   | DN 100           | Cl. 300 fig. | SA333-6  | (+6)   | 11.13mm          | 3.0mm | SA516-70(+1)           | (+4)               | (+5)   | -                      |
| TUBE SIDE OUTLET                     | 1   | DN 100           | Cl. 300 fig. | SA333-6  | (+6)   | 11.13mm          | 3.0mm | SA516-70(+1)           | (+4)               | (+5)   | -                      |
| TUBE SIDE DRAIN(+12)                 | 1   | DN 100           | Cl. 300 lwn. | (+6)     | (+6)   | 16.65mm          | 3.0mm | INHERENT               | (+4)               | -      | -                      |
| TUBE SIDE VENT(+12)                  | 1   | DN 100           | Cl. 300 fig. | (+8)     | (+6)   | 8.74mm           | 3.0mm | INHERENT               | (+4)               | (+5)   | -                      |

20. Supports: Skirt NO Lugs N/A Legs N/A Others SADDLES Attached WELDED TO SHELL  
 (Yes or no) (Number) (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 the name of part, item number, Manufacturer's name, and identifying number):  
N/A

22. Remarks \*1. Normalized condition. \*2. Mandatory App.2 Fig.2-4(6) \*3. SA765-II(+1) \*4. FIG. UW-16.1 (d)  
\*5. Single Butt, RT-None,0.7 \*6. SA350-LF2 CL.1(+1) \*7. Pressure retaining cover : (+6), SA320-L7M/SA194-7M, 3/4"-10UNCx130L, 8 SETS.  
\*8. SA420-WPL6 + (+6) 9. Nameplate is located on the shell. 10. Inspection opening is removable bundle.  
11. Safety valve will be installed in system by others. \*12. Pressure retaining cover : (+6), SA320-L7/SA194-7, 5/8"-11UNCx100L, 8 SETS.  
\*13. Heads were performed stress relief at the H.T-879°C. & 0.6 Hr. 14. Length of tube bundle : 7631mm  
\*15. Shell flange and channel flange were connected by same bolting materials, refer to shell side bolting of ITEM No.6.





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National Board Number: 2033

Mr. Representative: S.F. W. Date: APR. 17/2015

Authorized Inspector: [Signature] Date: APR. 18, 2015

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## CERTIFICATE OF SHOP COMPLIANCE

We certify that the statements 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 32,997 Expires DEC. 04, 2016

Date APR. 17/2015 Name ILSUNG CORPORATION.

(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 employed by HSB Global Standards of Hartford CT.

have inspected the pressure vessel described in this Manufacturer's Data Report on APR. 18, 2015, 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 APR. 18, 2015 Signed S. JANG

(Authorized Inspector)

Commissions

NB# 144 12(A,N)

(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 VII, Division 1. U Certificate of Authorization Number \_\_\_\_\_ Expires \_\_\_\_\_.

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 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 VII, 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 \_\_\_\_\_

(Authorized Inspector)

Commissions \_\_\_\_\_

(National Board (incl. endorsements))