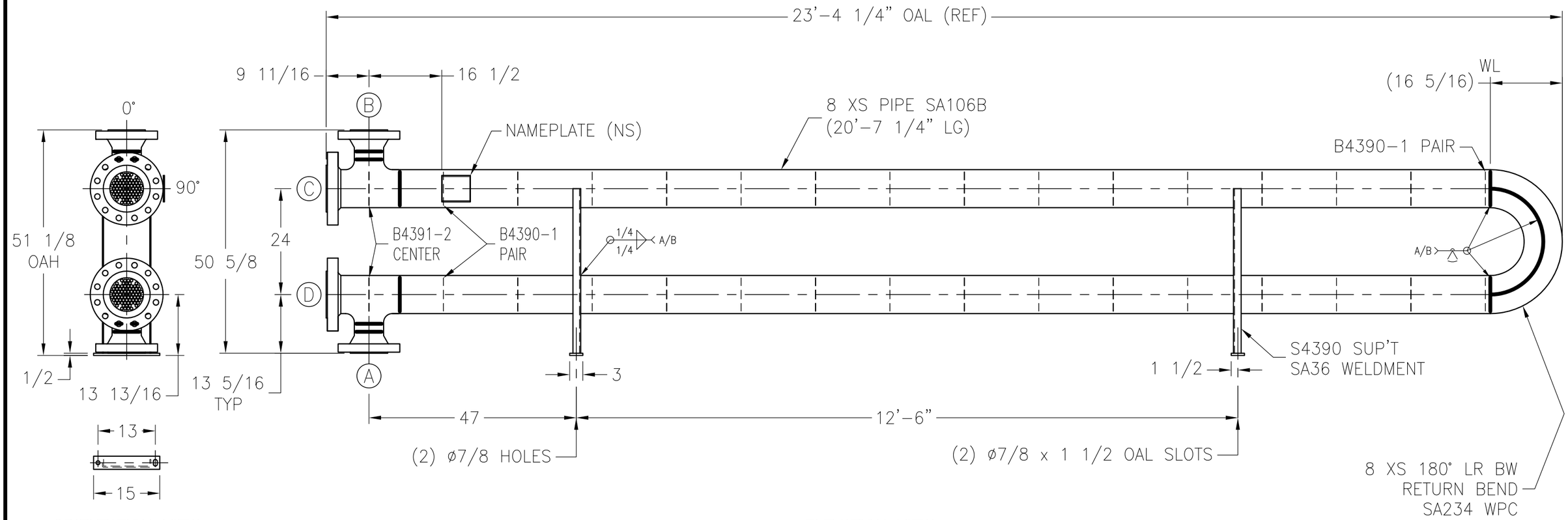


## ORIENTATION VIEW

## ELEVATION VIEW
LIFT USING STRAPS

NB LATER

U W-RT3

Manufactured & Certified by
HEAT EXCHANGER DESIGN, INC.
Indy USA

Shell Side 1435 PSI @ 125 °F
Tube Side 1435 PSI @ 125 °F
Maximum Allowable Working Pressure

Shell Side -20 °F @ 1435 PSI
Tube Side -20 °F @ 1435 PSI
Minimum Design Metal Temperature

Serial Number 4390

Hydro Test Pressure
1866 / 1866
Shell Side / Tube Side

CUSTOMER: CREDENCE GAS SERVICES LLC
P.O.#: JT-1024 SURF AREA-1468 FT2
SERVICE: GAS-GAS EXCHANGER
ITEM: E-1 Year Built: 2012

NAMEPLATE FACSIMILE (SS316)
MTD ON 4" SA36 STAND OFF BKT

MISC CONSTRUCTION NOTATION
1) FOR MECHANICAL CALCULATIONS SEE CC4390 (& RELATED)
2) DIMENSIONS ARE IN INCHES & SYMM UNLESS NOTED OTHERWISE
3) BOLTING BY OTHERS
4) GASKETS BY OTHERS
5) TUBES SHALL BE STRENGTH WELDED, DOUBLE GROOVED AND ROLL EXPANDED (0.735 60° PITCH)
6) CORROSION ALLOWANCE SHALL NOT BE APPLIED TO TUBES

### NOZZLE SCHEDULE

| NOZ. | SIZE / RATING | SERVICE |
|---|---|---|
| A | 6" 600# RFWN (XS) | SHELL IN (SA105/106B/234 WPC) |
| B | 6" 600# RFWN (XS) | SHELL OUT (SA105/106B/234 WPC) |
| C | 8" 600# RF | TUBE IN (SA516 70N) |
| D | 8" 600# RF | TUBE OUT (SA516 70N) |

### TUBE DATA

| | |
|---|---|
| (#) SIZE | (81) ø5/8 OD x 0.06 THK |
| | HELICAL LO-FIN (19 fpi) |
| | (0.049 MIN WALL UNDER FINS) 22'-0" ST LEGS |
| MATERIAL | 1 BARE ENDS -252 FIN LENGTH- SA214 |
| BAFFLES | DBL SEG, 16.875" PITCH |
| | 10GA C-STL (B4390-1 & 2) |
| TUBESHEET | SA516 70N (T4390) |

### DESIGN CONDITIONS

| | SHELLSIDE | TUBESIDE |
|---|---|---|
| DESIGN PRESSURE (PSI) | 1435 | 1435 |
| DESIGN TEMPERATURE (°F) | 125 | 125 |
| CORROSION ALLOWANCE | 1/16 | 1/16 |
| HYDROTEST PRESSURE (PSI) | 1866 | 1866 |
| RADIOGRAPHY | SPOT | NONE |
| MINIMUM TEMPERATURE (°F) | -20 | -20 |

### SPECIAL DATA

ASME SECTION VIII, DIV.1, 2010 ED., A11

| | |
|---|---|
| T.E.M.A. CLASS | N/A |
| CLIENT INSPECT | AS REQUIRED |
| WEIGHT (lbs) | 4450 |
| AREA (SQ') | 1468 |
| SURFACE PREP. | HAND TOOL CLEAN |
| PAINTING SPEC. | SHOP PRIMER |

### REVISION LOG

| NO. | DATE | COMMENT |
|---|---|---|
| 1 | 6-JUN | FABRICATION DWG RELEASE |
| A | 29-MAY | APPROVAL DWG RELEASE |

### CUSTOMER DATA

| | |
|---|---|
| CUSTOMER: CREDENCE GAS SERVICES, LLC | P.O.#: JT-1024 |
| USER: | ITEM: E-1 |
| SERVICE: GAS-GAS EXCHANGER | SIZE: W8A81-22-00-W-6C8C |

HEAT EXCHANGER DESIGN, INC. Indy USA

TOLERANCES EXCEPT AS NOTED OTHERWISE
DECIMAL ±0.125"
FRACTIONAL ±1/4"
ANGULAR ±1/2"

UNIT IS.... HAIRPIN TYPE HEAT EXCHANGER SINGLE PASS COUNTERFLOW

DRAWN BY Sam Nouri
APPROVED BY

TITLE: GENERAL ARRANGEMENT

DATE 29-MAY-2012
DRAWING NUMBER 4390
REV 1
SHT 1

# HEAT EXCHANGER DESIGN, INC.

P. O. Box 524
Indianapolis, IN 46206-0524

Heat Exchanger Specification Sheet

Phone: (317)686-9000
Fax: (317)686-9100

| | | | |
|---|---|---|---|
| | | Job No. | 4390 |
| Customer | Credence Services | Ref No. | Credence PO# JT-1024 |
| Address | | Proposal I | 198-12 |
| Plant Location | Grace Unit Inlet J-T Skid No. 11 | Date | 5/23/2012 Rev. 0 |
| Service of Unit | Gas/Gas Exchanger | Item No | E-1 |

Size 8 - 5/8 x 264 Type **W 8A81-22-00-VV-6C8C** Connected in 1 Parallel 1 Series
Surf/Unit (Eff) 1468 ft² Shells/Unit 1 Surface/Shell (Effective) 1468 ft²

***PERFORMANCE OF ONE UNIT***

| Fluid Allocation | | **Shellside** | **Tubeside** |
|---|---|---|---|
| Fluid Name | | Residue Gas | Inlet Gas |
| Total Fluid Entering | lb/hr | 11,028 | 11,428 |
| Vapor | | 11,028 | 11,428 |
| Liquid | | 0 | 0 |
| Steam | | | |
| Noncondensable | | | |
| Fluid Vaporized or Condensed | | 0 | 0 |
| Liquid Density (In/Out) | lb/ft³ | 0.000/0.000 | 0.000/0.000 |
| Liquid Viscosity | cP | 0.000 | 0.000 |
| Liquid Specific Heat | Btu/lb-F | 0.000 | 0.000 |
| Liquid Thermal Conductivity | Btu/hr-ft-F | 0.000 | 0.000 |
| Vapor Mol. Weight (In/Out) | | 19.29/19.29 | 19.45/19.45 |
| Vapor Viscosity | cP | 0.0130 | 0.0146 |
| Vapor Specific Heat | Btu/lb-F | 0.637 | 0.692 |
| Vapor Thermal Conductivity | Btu/hr-ft-F | 0.020 | 0.024 |
| Temperature (In/Out) | °F | 32.0/100.0 | 109.0/48.0 |
| Operating Pressure | psi(Abs) | 759.700 | 1,139.700 |
| Velocity | ft/sec | 2.150 | 10.159 |
| Pressure Drop (Allow/Calc) | psi | 10.000/2.714 | 10.000/1.344 |
| Fouling resistance | hr-ft²-F/Btu | 0.001500 | 0.001000 |

| | | | | |
|---|---|---|---|---|
| Heat Exchanged | 491,225 Btu/hr | mtd (corr) | 12.166 °F | |
| Transfer Rate, Service | 27.5 | Clean | 40.6 Btu/hr-ft²-F | |

***CONSTRUCTION OF ONE SHELL***

| | | **Shellside** | **Tubeside** |
|---|---|---|---|
| Design/Test Pres. psi | | 1,435/Code | 1,435/Code |
| Design Temp. °F | | -20 / 125 | -20 / 125 |
| No. Passes per Shell | | 1 | 1 |
| Corrosion Allow. in | | 0.0625 | 0.0625 |
| Connections Size & Rating | In | 6" | 8" |
| | Out | 6" | 8" |
| | Intermediate | 600# RFWN | 600# RFWN |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tube No | 81 | OD 0.625 in | | Thk 0.060 | | Length 22.00 ft | |
| Tube Type | (19/in) LO-FIN | | | Material | | SA-214 | |
| Shell | SA-106 | OD 8.625 in | | Shell Cover | | C.S INT | |
| Channel or Bonnet | | C.S | | Channel Cover | | N/A | |
| Tubesheet-Stationary | | C.S | | Tubesheet-Floating | | N/A | |
| Floating Head Cover | | N/A | | Impingement Protection | | NO | |
| Baffles Cross | A-36 | Type VERT-DBL-SEG | | | | | |
| Baffles-Long | | N/A | | Seal Type | | | |
| Supports-Tube | A-36 | | U-Bend | | Type | | |
| Bypass Seal Arrangement | | | | Tube-Tubesheet Joint | | Welded | |
| Expansion Joint | | N/R | | Type | | | |
| Rho-V2 Inlet Nozzle | | 355 | Bundle Entrance | | 548 | Bundle Exit | 861 |
| Gasket-Shellside | | | Tubeside | | Sp.Wound | Floating Head | N/A |
| Code Requirement | | ASME Section 8, Divsion 1 | | | | TEMA Class | C (Except tube pitch) |
| Weight/Shell | | 4450 | Filled with Water | 5100 | | Bundle | N/A |

Remarks: 1. Above is a fix-tubesheet hairpin design. Tubesheet has the bolt-hole pattern of 8", 600# ANSI flange and directly connects to tubeside piping. 2. Nitrogen purge provided. 4. Note that this is a near-duplicate of HED's 3665.