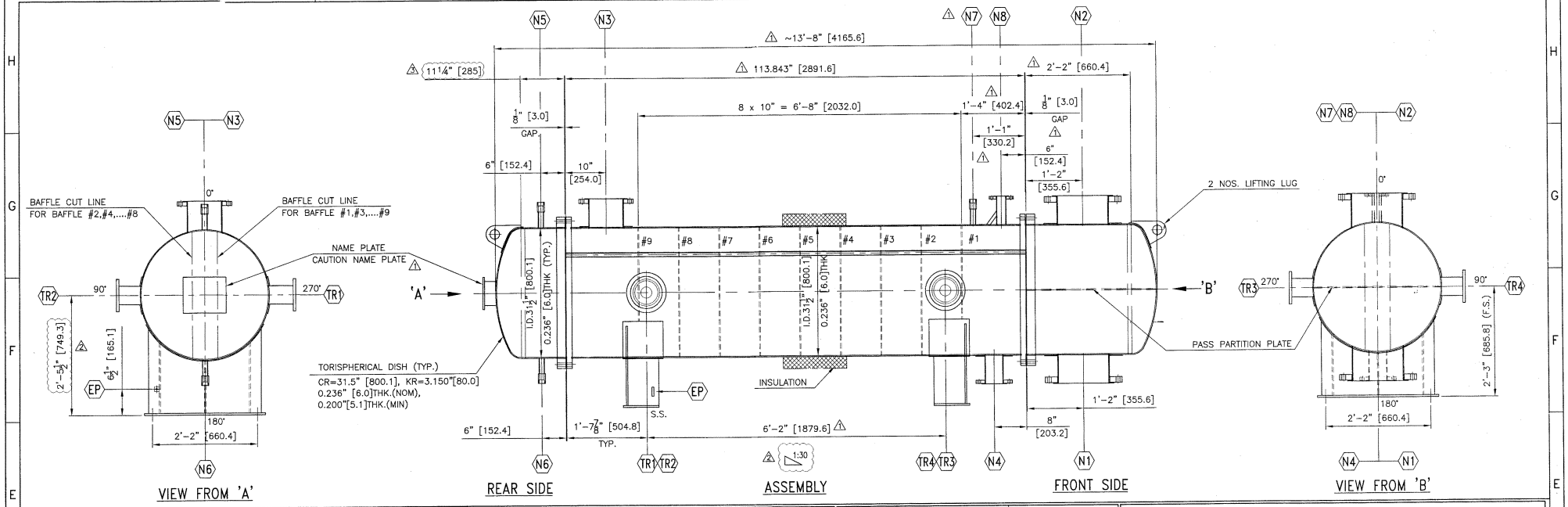


| NO. | DESCRIPTION |
|---|---|
| 22) | ALL NOZZLE FLANGES SHALL BE CLOSED WITH 3 mm THK. NACF GASKET & 1.6 mm THK. AISI 304 SHEET, DULY TIED WITH ø1.6 AISI 304 WIRE TO AVOID ENTRY OF FOREIGN MATERIALS DURING TRANSPORTATION/STORAGE. |
| 21) | CHLORIDE CONTENT OF WATER USED FOR HYDROTEST SHALL NOT EXCEED 25 PPM. |
| 20) | CARBON STEEL BLIND FLANGES ALONG WITH RING GASKET (1/8" THK.) TO BE USED DURING HYDROTEST. |
| 19) | HYDROSTATIC TEST AT SHOP SHALL BE CARRIED OUT IN HORIZONTAL POSITION. |
| 18) | MINIMUM METAL TEMP. OF EQUIPMENT DURING HYDROTEST SHALL BE MAINTAINED BETWEEN 62°F TO 104°F |
| 17) | R.F. PAD VENT HOLES SHALL BE PNEUMATICALLY TESTED Ø15 psi (g) & CHECKED WITH SOAP SOLUTION. |
| 16) | ATTACHMENT WELDS OF ANY PERMANENT ATTACHMENT TO SHELL/DISH SHALL BE PENETRANT TESTED. |
| 15) | THE ROOT & FINAL PASS OF ALL CLOSING SEAMS OR INACCESSIBLE BUTT WELDS SHALL BE PENETRANT TESTED. |
| 14) | ALL WELD OVERLAYS SHALL BE EXAMINED BY PENETRANT TEST AFTER MACHINING. |
| 13) | PROPER CARE SHOULD BE TAKEN BY SHOP TO PROTECT THREADING OF NIPPLE OR SOCKET. |
| 12) | INSIDE EDGES OF TUBE SHEET & BAFFLES SHALL BE CAREFULLY DEBURRED TO AVOID DAMAGE TO TUBES. |
| 11) | LARGE OPENING IN VESSLE SHALL BE FABRICATED AS PER RECOMMENDATIONS OF APPENDIX 1-7(c) OF ASME SEC. VIII DIV I AND WELDS SHALL BE GROUND TO CONCAVE CONTOUR & INSIDE CORNER OF OPENING ROUNDED TO GENEROUS RADIUS TO REDUCE STRESS CONCENTRATION & SHALL BE LIQUID PENETRANT TESTED. |
| 10) | ALL INSIDE WELDS TO BE FLUSHED AND OUTSIDE WELD JOINTS TO BE GROUND SMOOTH. |
| 9) | BOLTING DIMENSIONS OF NOZZLE FLANGES UPTO NPS 24 SHALL BE AS PER ASME B16.5-2003 AND FOR NPS 26 & ABOVE ARE AS PER ASME B16.47-1996, #150, SERIES A, ALSO HALF COUPLINGS WITH PLUG SHALL BE AS PER ASME B16.11-2001. |
| 8) | GASKET SEATING SURFACE OF TUBESHEET & FLANGE SHALL HAVE SERRATED CONCENTRIC FINISH OF 125 TO 250 MICRO INCH AND AVERAGE CONCENTRIC SERRATIONS 44 TO 55 PER INCH AS PER ASME B16.5-6.4.4.3. |
| 7) | ALL MATERIALS SHALL CONFIRM TO ASME SEC.II PART A EDITION 2004 ADDENDA 06. MATERIAL TEST REPORTS ARE REQUIRED FOR ALL PRESSURE PARTS. |
| 6) | EQUIPMENT IS FOR NON-LETHAL SERVICE. CYCLIC LOADING/IMPACT SHOCK LOADING ARE NOT APPLICABLE. |
| 5) | STAINLESS STEEL MATERIAL IS EXEMPTED FROM IMPACT TESTING AS PER UHA-51(d) & UHA-51(e) FOR THE REQUIRED MINIMUM DESIGEN METAL TEMPARATURE, BUT FLANGES OF SA 516 GR.70 (NORMALIZED) OVER 5" (127 mm) THK. SHALL BE IMPACT TESTED AT MDMT. |
| 4) | PWHT IS NOT REQUIRED FOR COMPLETE EQUIPMENT, EXEMPTED AS PER UHA-32. IF CARBON STEEL FLANGES OVER 38 mm THK. ARE WELDED IN SEGMENTS THEN PWHT SHALL BE CARRIED OUT AFTER COMPLETE WELDING OF FLANGES ONLY. |
| 3) | ALL BOLT HOLES TO STRADDLE WITH PRINCIPLE CENTER LINE. |
| 2) | NOZZLE PROJECTIONS ARE MEASURED FROM CENTER LINE OF EQUIPMENT OR FIXED REFERENCE LINE UPTO THE GASKET SEATING SURFACE. |
| 1) | ALL DIMENSIONS ARE IN US CUSTOMERY UNITS & THOSE IN BRACKET ARE IN "mm" UNLESS OTHERWISE SPECIFIED. |

GENERAL NOTES

| NOZZLE NO. | SIZE NPS | SCH./ THK. | TYPE | RATING | PROJ. FROM CENTER LINE | SERVICE |
|---|---|---|---|---|---|---|
| NP | -- | AS PER DETAILS | | | -- | NAME PLATE (ASME) |
| EP | -- | AS PER DETAILS | | | -- | EARTHING PLATE |
| TR1-TR4 | 6 | -- | | | 1'-11" | TRUNNION |
| N8 | 2 | SCH.80 | SORF | 150# | 1'-11" | PRODUCT VAPOR OUT |
| N7 | 1 | SOCKET WITH PLUG | | 3000# | 1'-11" | SHELL SIDE VENT |
| N6 △1 | 1 | SOCKET WITH PLUG | | 3000# | 1'-9" | TUBE SIDE DRAIN |
| N5 | 1 | SOCKET WITH PLUG | | 3000# | 1'-9" | TUBE SIDE VENT |
| N4 | 4 | SCH.40 | SORF | 150# | 1'-11" | PRODUCT CONDENSATE OUT |
| N3 | 8 | SCH.40 | SOFF | 150# | 1'-11" | PRODUCT VAPORS IN |
| N2 | 12 | SCH.40 | SOFF | 150# | 1'-11" | COOLING WATER OUT |
| N1 | 12 | SCH.40 | SOFF | 150# | (1'-10¾") △3 | COOLING WATER IN |

NOZZLE SCHEDULE

| NO. | DESCRIPTION |
|---|---|
| 27) | FOR DETAILS OF NOZZLE FLANGES NPS 26 & ABOVE, REFER DRG. NO. : 06D058-4-WFD453. |
| 26) | WELD JOINTS OF BODY FLANGES/NOZZLE FLANGES (OVER NPS 24) & TUBE SHEETS MADE IN SEGMENTS SHALL BE FULLY RADIOGRAPHED TO MEET UW-11 REQUIREMENTS. |
| 25) | NOZZLE UPTO NPS 3 SHALL BE PROVIDED 2 Nos. GUSSET OF SIZE 1" W x 0.196" THK. AT 90° APART. |
| 24) | ALL STAINLESS STEEL PARTS SHALL BE PICKLED & PASSIVATED AS PER ASTM A-380 CODE-B AND CARBON STEEL PARTS SHALL BE SAND BLAST CLEANED TO SA 2 1/2 & PAINTED WITH MINIMUM ONE COAT OF EPOXY PRIMER & TWO COATES OF EPOXY FINAL PAINT. |
| 23) | AFTER HYDROTEST EQUIPMENT SHALL BE DRIED THOROUGHLY. |

GENERAL NOTES (CONT.)

| | | | |
|---|---|---|---|
| FULL OF WATER WEIGHT | lbm / [kg] | 11,240 / 5,100 | |
| EMPTY WEIGHT | lbm / [kg] | 7,165 / 3,250 | |

WEIGHTS

| | | | | |
|---|---|---|---|---|
| PAINTING | | | REFER PAINTING SPECIFICATIONS | |
| INSULATION | THICKNESS | inch / [mm] | 3" / [76.2] | N.A. |
| | TYPE | HOT / COLD | HOT | N.A. |
| SEISMIC | IMPORTANCE FACTOR | | 1.0 | |
| | SITE CLASS | | 'D' △3 | |
| | ACC. BASED FACTOR (Fv) | | 2.0 | |
| | ACC. BASED FACTOR (Fa) | | 1.6 △1 | |
| | DESIGN CODE | | IBC-2006 | |
| WIND | IMPORTANCE FACTOR | | 1.0 | |
| | EXPOSURE CONSTANT | | EXPOSURE - 'C' | |
| | SPEED | mph / [kmph] | 150 / [241.4] | |
| | DESIGN CODE | | IBC-2006 | |
| IMPACT TESTING | | | REFER NOTE 5 | |
| HEAT TREATMENT/PWHT | | | REFER NOTE 4 | |
| TUBE PITCH | | inch / [mm] | 1.25" / [31.75] | |
| TUBE SIZE | O.D.x THK. | inch / [mm] | 1" x 0.063" / [25.4 x 1.6] | |
| | LENGTH | ft-in / [mm] | 9'-6" / [2895.6] △1 | |
| NUMBER OF TUBES | | | (460) △3 | |
| NUMBER OF PASS | | | ONE | TWO |
| HEAT TRANSFER AREA | | $ft^2$ / $[m^2]$ | 1185.10 / [110.099] | |
| PROCESS FLUID DENSITY | | $lb/ft^3$ / $[kg/m^3]$ | 49.50 [793] | 62.42 / [1000] |
| PROCESS FLUID | | | PRODUCT VAPORS | COOLING WATER |
| JOINT EFFICIENCY | | SHELL/HEAD | 0.85 / -- △3 | 0.85 / 0.85 |
| NDT | RADIOGRAPHY (REF. NOTE 26) | SHELL/HEAD | SPOT / -- | SPOT / FULL |
| | DPT/LPT | | AS PER PRAJ QA PLAN | |
| CORROSION ALLOWANCE | | inch / [mm] | NIL | NIL |
| TEST FLUID | | | WATER (REFER NOTE 18 & 21) | |
| HYDRO TEST PRESSURE (HORIZONTAL) | | psi(g) / $[kg/cm^2(g)]$ | 34.136 / [2.4] | 73.96 / [5.2] |
| HYDRO TEST PRESSURE (VERTICAL) | | psi(g) / $[kg/cm^2(g)]$ | N.A./N.A. | N.A./N.A. |
| MEAN METAL TEMPERATURE | | °F / [°C] | REFER TABLE NO.1 | |
| MDMT AT MAWP | | °F / [°C] | 32 / [0] | 32 / [0] |
| DESIGN TEMPERATURE | | °F / [°C] | 293 / [145] | 122 / [50] |
| EXTERNAL MAP AT DESIGN TEMP. | | psi(g) / [MPa(g)] | N.A. | N.A. |
| MAWP AT DESIGN TEMPERATURE | | psi(g) / [MPa(g)] | 25 / [0.172] | 56 / [0.386] |
| DESCRIPTION | | UNITS | SHELL SIDE | TUBE SIDE |

DESIGN CODE : ASME SEC.VIII DIV.1, EDITION 2004 UPTO & INCLUDING ADDENDA 2006 (ASME 'U' STAMP & NATIONAL BOARD REGISTRATION IS REQD.)

DESIGN DATA

| NO. | DESCRIPTION | |
|---|---|---|
| 10 | RECOMMENDED TORQUE VALUES FOR BOLT/STUDS | STD-4-M-2801 |
| 09 | NOZZLE LOAD DATA | 06D058-NLD-401 |
| 08 | WELD PLAN | 06D058-3-WEL426 |
| 07 | STAMPING DETAILS OF CAUTION PLATE | 06D058-4-NPD430 |
| 06 | DETAILS OF ASME NAME PLATE (NP2) | 06D058-3-NPD426 |
| 05 | DESIGN CALCULATIONS | 06D058-CAL-H1608 |
| 04 | PICKLING & PASSIVATION FOR (SS) | MFG-P-219 |
| 03 | FABRICATION TOLERANCES | 06D058-FABTOL-401 |
| 02 | TUBESHEET & BAFFLE DETAILS | 06D058-2-TSL426 |
| 01 | FABRICATION DETAILS | 06D058-1-WFD426 |

LIST OF REFERENCE DRAWINGS

| | |
|---|---|
| NAME PLATE | AISI 304 |
| INSULATION CLADDING | ALUMINIUM |
| C TYPE GASKET | EPDM |
| PASS PARTITION PLATE | SA 240 TYPE 304L |
| STIFFENER | SA 240 TYPE 304L |
| REINFORCEMENT PAD | SA 240 TYPE 304L |
| SUPPORT PLATE △3 | IS 2062 GR.B |
| SUPPORT PAD PLATE | SA 240 TYPE 304L |
| STUD/NUTS/WASHER (EXT.) (FOR BODY FLANGES & NOZZLE FLANGES FROM NPS 26 & ABOVE) | SA193 Gr.B7 & SA194 Gr.2H (GREEN PASSIVATED) |
| BOLT/NUTS/WASHER (EXT.) (FOR NOZZLE FLANGES FROM NPS 6 TO NPS 24) | SA193 Gr.B7 & SA194 Gr.2H (GREEN PASSIVATED) |
| BOLT/NUTS/WASHER (EXT.) (FOR NOZZLE FLANGES UPTO NPS 4) | SA193 Gr.B8 & SA194 Gr.8 |
| GASKET | NACF (AF#154) |
| NOZZLE FLANGE (FROM NPS 26 & ABOVE) △3 | N.A. |
| NOZZLE FLANGE (NPS 6 TO NPS 24) | SA 105 (SS304L WELD OVERLAY) |
| NOZZLE FLANGE (UPTO NPS 4) | SA 182 F 304L |
| NOZZLE PIPE (NPS 14 & ABOVE) | SA 240 TYPE 304L |
| NOZZLE PIPE (UPTO NPS 12) | SA 312 TP304L (WELDED) |
| BOLT/NUTS (INT.) | AISI 304L |
| SPACER TUBE | AISI 304L |
| TIE ROD | AISI 304L |
| BAFFLE | SA 240 TYPE 304L |
| CHANNEL FLANGE △3 | SA 266 Gr.2 (NORMALIZED) (WITH SS304L WELD OVERLAY) |
| DISHEND | SA 240 TYPE 304L |
| TUBE SHEET △3 | SA 240 TYPE 304L |
| TUBE | SA 249 TP 304 |
| CHANNEL SHELL | SA 240 TYPE 304L |
| SHELL | SA 240 TYPE 304L |

MATERIAL OF CONSTRUCTION

[SPACE FOR 'ASME' STAMPS]

| 205.00 | 170.00 | 195.00 | 123.00 | 190.00 | 116.50 |
|---|---|---|---|---|---|
| SHELL SIDE | TUBE SIDE | SHELL SIDE | TUBE SIDE | SHELL SIDE | TUBE SIDE |
| STARTUP | | NORMAL OPERATION | | UPSET | |

TABLE NO.1 : MEAN METAL TEMPERATURE (°F)

| SR.NO. | DESCRIPTION | MATERIAL | SIZE |
|---|---|---|---|
| 07 | TUBE | SA 249 TP 304 | 0.063"THK. (REF.DRG.NO.: 06D058-1-WFD426) |
| 06 | TUBESHEET | SA 240 TYPE 304L | 1.417"THK. (REF.DRG.NO.: 06D058-2-TSL426) |
| 05 | CHANNEL FLANGE | SA 266 GR.2 △3 | 2.165"THK. (REF.DRG.NO.: 06D058-1-WFD426) |
| 04 | CHANNEL SHELL F.S. | SA 240 TYPE 304L | 0.236"THK. (REF.DRG.NO.: 06D058-1-WFD426) |
| 03 | CHANNEL SHELL R.S. | SA 240 TYPE 304L | 0.236"THK. (REF.DRG.NO.: 06D058-1-WFD426) |
| 02 | TORISPHERICAL DISHED END | SA 240 TYPE 304L | 0.236"THK. (REF.DRG.NO.: 06D058-1-WFD426) |
| 01 | SHELL | SA 240 TYPE 304L | 0.236"THK. (REF.DRG.NO.: 06D058-1-WFD426) |

PART DETAILS

AS BUILT

| REV. NO. | DESCRIPTION | DRAWN | CHKD. | APPD. | DATE |
|---|---|---|---|---|---|
| 3 | AS BUILT △3 | A.S.J. | Y.S.G. | K.B. | 13-DEC-2008 |
| 2 | REVISED AS MARKED △2 | P.S.Z. | Y.S.G. | K.B. | 07/02/2008 |
| 1 | REVISED AS MARKED △1 | P.S.Z. | Y.S.G. | K.B. | 24/01/2008 |
| 0 | FOR FABRICATION | PSK | Y.S.G. | K.B. | 19/10/2007 |

CLIENT : LOUISIANA GREEN FUELS LLC.
PLANT : 22.45 MGPY DEHYDRATED ETHANOL (UNDENATURED)
LOCATION : LA CASSINE, LOUISIANA, USA

PRAJ INDUSTRIES

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| TITLE : | I.D. NO. | PIL JOB CODE |
|---|---|---|
| G.A. DRAWING FOR PRODUCT CONDENSER (H 1608) | H 1608 | 06D058 |
| | SCALE N.T.S. | CAD FILE NAME 06D058-2-GAD426 |
| DWG. NO. 06D058-2-GAD426 | SHEET 1 OF 1 | REV. 3 |