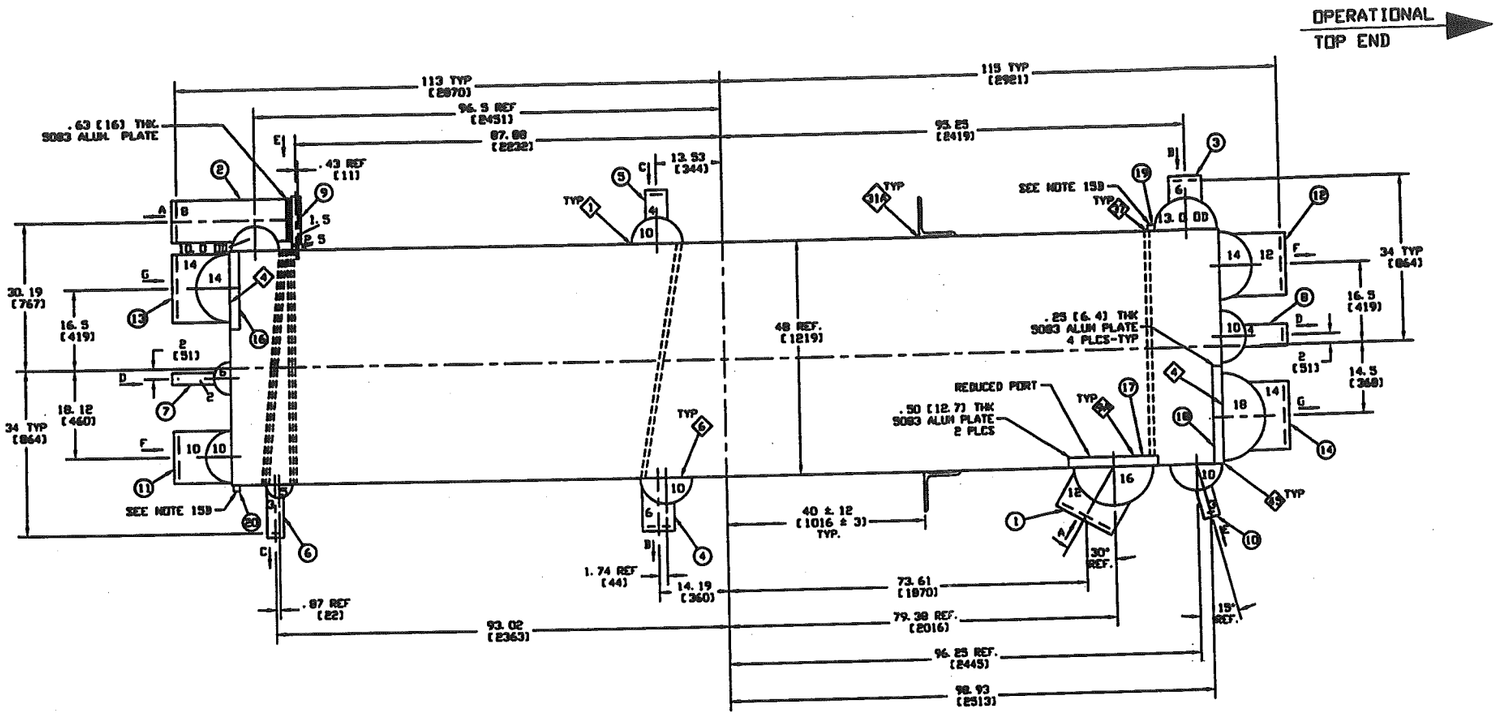


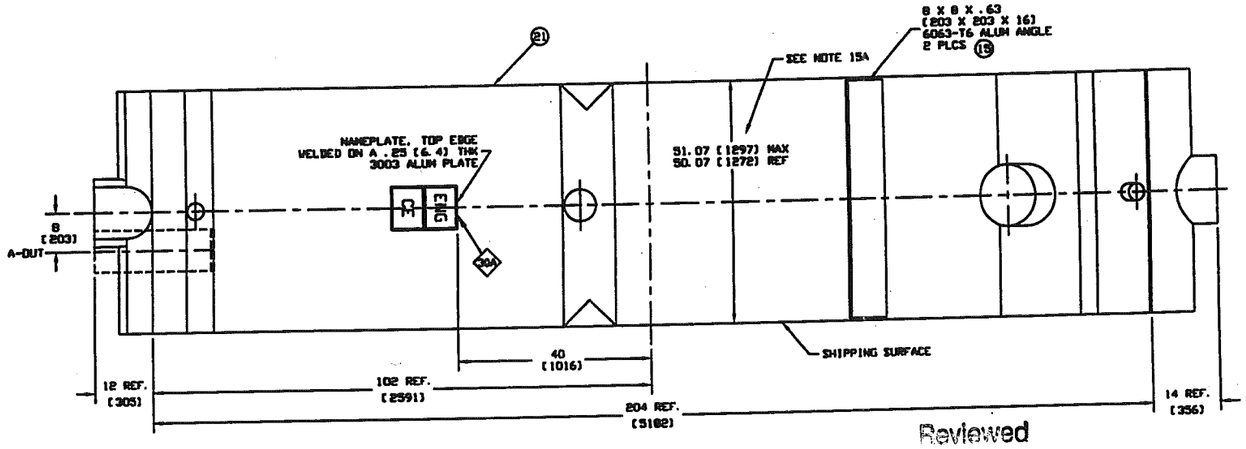


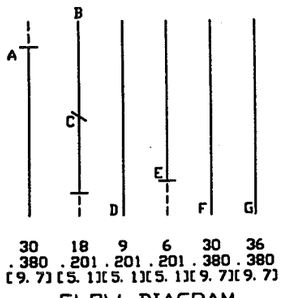

FLOW DIAGRAM

| STREAM | INLET | | OUTLET | |
|---|---|---|---|---|
| | HEADER O.D. X WALL | NOZZLE O.D. X WALL | HEADER O.D. X WALL | NOZZLE O.D. X WALL |
| A (HP-AIR) | 16.000 X .375 (406 X 9.5) | 12.750 X .375 (324 X 9.5) | 10.000 X .250 (254 X 6.4) | 8.625 X .322 (219 X 8.2) |
| B (HP-AIR) | 13.000 X 1.000 (330 X 25.4) | 6.625 X .432 (168 X 11.0) | 10.750 X .750 (273 X 19.1) | 6.625 X .432 (168 X 11.0) |
| C (HPC-AIR) | 10.750 X .750 (273 X 19.1) | 4.500 X .237 (114 X 6.0) | 5.563 X .375 (141 X 9.5) | 3.500 X .216 (89 X 5.5) |
| D (HP-GOX) | 6.625 X .375 (168 X 9.5) | 2.375 X .154 (60 X 3.9) | 10.750 X .500 (273 X 12.7) | 4.500 X .237 (114 X 6.0) |
| E (HP-GAN) | 2.875 X .203 (73 X 5.2) | 1.900 X .145 (48 X 3.7) | 10.750 X .375 (273 X 9.5) | 3.500 X .216 (89 X 5.5) |
| F (LP-GAN) | 10.750 X .250 (273 X 6.4) | 10.750 X .365 (273 X 9.3) | 14.000 X .250 (356 X 6.4) | 12.750 X .375 (324 X 9.5) |
| G (WD) | 14.000 X .250 (356 X 6.4) | 14.000 X .250 (356 X 6.4) | 18.000 X .250 (457 X 6.4) | 14.000 X .250 (356 X 6.4) |

ALL MATERIAL IN TABLE ABOVE IS 5083 ALUMINUM

Reviewed
TÜV Süddeutschland Bau und Betrieb GmbH
... to Pressure
Equipment Directive 97/23/EC
...ing Laboratory
MAR 29 2005

NOTES:

1. REFER TO BAL-ION FOR INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS. ASSURE COMPLIANCE WITH REQUIREMENTS PARTICULARLY OPERATING CONDITIONS TO PREVENT OVER PRESSURIZATION, THERMAL SHOCK AND OPERATION OUTSIDE DESIGN TEMPERATURE RANGE. REFER TO DRAWING 910-4047 FOR UNBRAZED HEAT EXCHANGER LIFTING INSTRUCTIONS AND DRAWING 910-4671 FOR INSTRUCTIONS ON ROLLING HEAT EXCHANGER TO SIDE OTHER THAN SHIPPING SURFACE.
2. CUSTOMER TO DRILL APPROPRIATE HOLES OR SLOTS IN SUPPORT ANGLES FOR MOUNTING HEAT EXCHANGER AS DESCRIBED IN BAL-ION.
3. HEAT EXCHANGER DESIGNED, CONSTRUCTED, AND STAMPED PER THE LATEST MANDATORY EDITION AND ADDENDA OF THE ASME PRESSURE VESSEL CODE, SECTION VIII, DIV. 1 AND REGISTERED WITH THE NATIONAL BOARD.
4. CORROSION ALLOWANCE: ALUMINUM = 0.0000 INCHES
5. SEE DRAWING 15770C FOR MAXIMUM ALLOWABLE PIPE LOADS.
6. THE HEADERS AND NOZZLES ARE LABELED ON THE DRAWING WITH THEIR NOMINAL PIPE SIZE (NPS). IF A STANDARD SIZE IS NOT USED THE PIPING IS LISTED AT ITS ACTUAL OUTSIDE DIAMETER AND LABELED "OD", UNLESS SHOWN OTHERWISE ALL NOZZLES ARE ON THE HEAT EXCHANGER CENTERLINE.
7. TOLERANCE ON ALL DIMENSIONS IS +/- .25 INCH [6] UNLESS OTHERWISE NOTED. ANGULAR TOLERANCE ON NOZZLES IS CONTROLLED BY THE TOLERANCE ON THE CARTESIAN COORDINATE DIMENSIONS (X, Y, Z). IN NO CASE SHALL THE ANGULAR TOLERANCE EXCEED 3 DEGREES.
8. STREAM: A B C D E F G
   MAWP (PSIG) [BARG]: 109 [7.5] | 914 [63.0] | 914 [63.0] | 580 [40.0] | 435 [30.0] | 29 [2.0] | 29 [2.0]
   DESIGN TEMP DEG. F = 150 MAX. - 350 MIN.
   (C) = [65] MAX. -196 MIN.
9. TESTING INFORMATION:

| INACTIVE AREAS = 15 PSIG [1.03 BARG] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G |
| STREAM FIRST AIR | (PSIG) [BARG] | 36 [2.5] | 50 [3.4] | 50 [3.4] | 50 [3.4] | 50 [2.4] | 10 [.7] | 10 [.7] |
| PRETEST W/ WATER | (PSIG) [BARG] | ---- | 1371 [94.5] | 1371 [94.5] | 870 [60.0] | 653 [45.0] | --- | --- |
| MPRDU | (PSIG) [BARG] | 164 [11.3] | 1005 [69.3] | 1005 [69.3] | 638 [44.0] | 479 [33.0] | 44 [3.0] | 44 [3.0] |
| LEAK | (PSIG) [BARG] | 109 [7.5] | 914 [63.0] | 914 [63.0] | 580 [40.0] | 435 [30.0] | SEE NOTES 18A | 18B |

= A.I. WITNESS REQUIRED.

MAXIMUM DRYING TEMP 250 DEG F. (121 DEG C.)

HELIUM VACUUM LEAK TEST STREAMS — MAX. ALLOW. LEAKAGE

| | |
|---|---|
| A-B | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| A-C | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| A-D | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| A-E | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| A-F | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| A-G | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| B-C | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| B-D | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| B-E | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| B-F | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| B-G | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| C-D | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| C-E | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| C-F | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| C-G | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| D-E | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| D-F | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| D-G | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| E-F | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| E-G | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |
| F-G | 1.0 E-3 STD CC/SEC [1.0 E-3 MBAR - L/SEC] |

10. THE "B" STREAM TO BE CLEANED FOR OXYGEN SERVICE.
11. CONNECTIONS TO BE SUITABLY MARKED FOR FIELD TRIM.
12. UNIT TO SHIP WITH DRY AIR AT 5 PSIG (.34 BARG) IN ALL STREAMS. GAUGES ARE REQUIRED.
13. ESTIMATED WEIGHT = 17600 LBS. (DRY) [7980 KG]
    30800 LBS. (FILLED WITH WATER) [13958 KG]
    (WARNING DO NOT HYDRO TEST IN FIELD WITH WATER)
14. STREAM VOLUME:

| STREAM | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| CU.FT. [CU.M.] | 91.1 [1.43] | 9.6 [.27] | 6.3 [1.8] | 7.9 [.22] | 5.5 [.15] | 56.4 [1.59] | 69.5 [1.97] |

15. CUSTOMER NOTE:
    A. ESTIMATED BRAZE HEIGHT. ACTUAL BRAZE HEIGHT MAY VARY +/- .12 INCH/FOOT (+/- 10 MM/M) OF BRAZE HEIGHT. MAX DIMENSION INCLUDES TOLERANCE ON BRAZE HEIGHT PLUS HEADER ATTACHMENT PLATES.
    B. CUSTOMER TO REMOVE PLASTIC PLUG(S) FOLLOWING INSTALLATION AND JUST PRIOR TO INSULATING UNIT.
16. CUSTOMER REQUIREMENT:
    A. ONE MITERED END PIECE JOINT TO BE SPOT RADIOGRAPH INSPECTED PER ASME PRESSURE VESSEL CODE, SECT. VIII, DIV. 1, PAR. UW-52.
    B. ALL LONGITUDINAL NOZZLE JOINTS TO BE 100% RADIOGRAPH INSPECTED PER ASME PRESSURE VESSEL CODE, SECT. VIII, DIV. 1, PAR UW-51.
    C. ALL WELDS TO BE 100% DYE PENETRANT EXAMINED PER ASME CODE, SECTION VIII, DIVISION 1.
    D. UNIT TO BE SHRINK WRAPPED IN PLASTIC W/DESICCANT.
17. PED NOTE:
    A. HEAT EXCHANGER TO COMPLY WITH EU PED 97/23/EC; ASSESSMENT MODULE "B & F
    B. PED NOTIFIED BODY IS TUV INDUSTRIE SERVICE GMBH, SUD GRUPPE.
    C. ASSESSMENT CATEGORY IS "IV". ALL WORKING FLUIES ARE GROUP 1.
18. PRODUCTION NOTES:
    A. INSTALL TWO RELIEF VALVES NOT EXCEEDING 74 PSIG (5.1 BARG) ON F STREAM.
       PERFORM LEAK TEST AT 89 PSIG (6.0 BARG).
       REMOVE RELIEF VALVES AFTER TEST.
       PRIOR TO SHIPMENT.
    B. INSTALL TWO RELIEF VALVES NOT EXCEEDING 74 PSIG (5.1 BARG) ON G STREAM.
       PERFORM LEAK TEST AT 89 PSIG (6.0 BARG).
       REMOVE RELIEF VALVES AFTER TEST.
       PRIOR TO SHIPMENT.

REVISION RECORD

| | A | B |
|---|---|---|
| ADDED PRODUCTION SYMBOLS, A-IN HDR WAS 6", 7.5 ESTIMATED WEIGHT AND A-STREAM VOLUME. ANGLED A-IN & E-OUT NOZZLES. A-OUT HDR WAS 8.0 O.D. A-OUT NOZZLE WAS STRAIGHT PCU | 1-17-05 | MOYA |
| REVISED NOTE 17B AND C. ECN 3983 | 3-16-05 | SMITH |

| | | |
|---|---|---|
| DR | SMITH | 11-3-04 |
| CHKD | EBERT | 11-15-04 |
| PROD ENG | GOETHEL | 11-17-04 |
| MFG ENG | | DATE |
| WELD ENG | | DATE |

STD ENGR SPEC: 11-6.00; NOTE 9: SEC 9-8.01 PARA 1.2, 1.3, 1.3.2 & 4.1; NOTE 10: SEC 9-14.00

THIRD ANGLE PROJECTION

CHART HEAT EXCHANGERS, LP, ALL RIGHTS RESERVED
THIS DRAWING AND INFORMATION ARE THE CONFIDENTIAL PROPERTY OF CHART HEAT EXCHANGERS, LP, WITHOUT WHOSE PRIOR WRITTEN CONSENT IT MAY NOT BE COPIED, USED OR COMMUNICATED TO OTHERS WHOLLY OR IN PART.
© CHART HEAT EXCHANGERS, LP, ALL RIGHTS RESERVED

LEGEND
- O PART NUMBER (PRODUCTION USE ONLY)
- ◇ JOINT DETAIL-REF. (PRODUCTION USE ONLY)
- □ FIN DATA INFORMATION
- △ DIMENSIONAL REVISION
- ▷ SPECIAL NOTATION

DIMENSIONS: PRIMARY IN INCHES, SECONDARY IN [MM] IN ( )

[redacted] Chart Hea...

BRAZED ALUMIN... HEAT EXCHANG... 7 STREAM PLATE...
ITEM NO. W20000

SIZE D | DRAWING NO. 15770A

509.8 (4) 11/04