

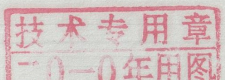


注

1. 设备安装时, 固定支座采用两个螺母拧紧, 活动支座的第一个螺母拧紧后倒退一圈, 然后用第二个螺母锁紧, 使鞍座能在基础上自由滑动。
2. 图中所注筒体和封头的厚度不包括制造减薄量, 成品厚度不得小于图上所注厚度。
3. 设备铭牌应按本图设计数据填写, 铭牌应焊于管箱封头上, 且应在热处理之前焊好。
4. 管口表中管壳程进出口均不带对应法兰。
5. 本设备的保温按 SH3010-2004《石油化工设备和管道隔热技术规范》施工与验收, 但不得采用充填结构。
6. 本设备的管程侧需涂复合 TH901 防腐涂料。且应按 SH/T3540-2007《钢制换热设备管束复合涂层施工及验收规范》进行施工与验收。
7. 设计使用年限 15 年只针对壳体, 不包括管束。
8. 件 3 及件 12 (尺寸见双头螺栓) 按 JB/T4707-2000 进行加工制造, 但其螺紋的基尺寸应按 GB/T196 规定的细牙普通螺紋。

### 技术要求

4. 本设备所用 Q245R 钢板 (管帽件 1-0 除外, 除应符合 GB713-2008 中对 Q245R 钢板的要求外, Q245R 钢板应以正火状态交货, 钢板产品化学成分分析应符合  $\text{C}(\text{Nb}+\text{V}) \leq 0.02\%$ , 且焊后热处理温度不能低于  $610^\circ\text{C}$ 。
5. 本设备的壳程侧钢板还须按 JB/T4730.3-2005 的要求逐块制卷, 进行超声检测, 整张钢板进行 100% 扫查, 检测结果应符合 I 级规定。
6. 本设备应进行焊后热处理, 热处理后焊缝金属、热影响区、母材等硬度  $\leq 200\text{HB}$ 。
4. 本设备的所有  $16\text{Mn}$  钢板 (含管束的管板), 除应符合 JB4726 规定外, 还应满足下列要求:
- a.  $16\text{Mn}$  钢板应进行  $-30^\circ\text{C}$  CV 型冲击功试验, 其结果三个试样平均值  $\geq 34\text{J}$ , 其中一个试样最低值  $24\text{J}$ 。
- b.  $16\text{Mn}$  钢板化学成分应符合 JB4726 规定外,  $\text{Mn} \leq 1.36\%$ , 碳当量  $C_E = \text{C} + \text{Mn}/6 + (\text{Cr} + \text{Mo} + \text{V})/5 + (\text{Ni} + \text{Cu})/15 = 0.43$ 。
5. 本设备的所有 Q245R 钢板 (管帽用钢板除外), 除应符合 GB713-2008 中规定外, 还应满足下列要求:
- a. 本设备应进行  $-20^\circ\text{C}$  CV 型冲击功试验, 其结果三个试样平均值  $\geq 31\text{J}$ , 其中一个试样最低值  $22\text{J}$ 。



20-0 年生产用图

9.16

油机

赵楠

设

[illegible]

|      |        |     |                  |          |       |                 |                      |
|------|--------|-----|------------------|----------|-------|-----------------|----------------------|
| 20   | 接地板B   | 1   | 钢板6              | DCr18Ni9 | 2     | SDE4002         |                      |
| 19-0 | 外头盖    | 1   |                  | 组合件      | 1372  | 16500Q-DN2-1503 |                      |
| 18-0 | 浮头盖    | 1   |                  | 组合件      | 703   | 16500Q-DN2-1504 |                      |
| 17   | 等长双头螺栓 | 60  | M27x380-B        | 35CrMoA  | 1.45  | 87              | JB/T4707-2000        |
| 螺母   | 120    | M27 | 35               | 0.251    | 30.1  |                 | SH3404 II J-96       |
| 5-0  | 浮头垫片   | 1   | 波齿垫F5-1400-4.0-4 |          |       |                 | BCEQ-8716            |
| 14   | 铜圈     | 1   | 16mmII           |          | 176   |                 | 16500Q-DN2-1504      |
| 13-0 | 外头盖垫片  | 1   | 波齿垫W5-1400-4.0   |          |       |                 | BCEQ-8717            |
| 12   | 等长双头螺栓 | 64  | M36x3405-B       | 40MnB    | 2.79  | 178.6           | JB/T4707-2000 注8     |
| 11   | 螺母     | 128 | M36x3            | 35       | 0.558 | 71.42           | SH3404 II J-96       |
| 10-0 | 管箱垫片   | 1   | 波齿垫S5-1400-4.0-4 |          |       |                 | BCEQ-8717            |
| 9-0  | 管箱侧垫片  | 1   | 波齿垫C5-1400-4.0   |          |       |                 | BCEQ-8717            |
| 8-0  | 固定板式支座 | 1   | DN1400-BM-950    | 组合件      | 161   | SDE02005        |                      |
| 7-0  | 活动板式支座 | 1   | DN1400-BM-950    | 组合件      | 161   | SDE02005        |                      |
| 6-0  | 管架     | 1   |                  | 组合件      | 13701 | 16500Q-DN2-1502 |                      |
| 5-0  | 壳体     | 1   |                  | 组合件      | 5988  | 16500Q-DN2-1503 |                      |
| 4    | 旁角双头螺栓 | 4   | 圆钢250            | 40MnB    | 3.3   | 13.2            | 16500Q-DN2-1503 L=60 |
| 3    | 等长双头螺栓 | 56  | M36x3450-B       | 40MnB    | 3.2   | 179.2           | JB/T4707-2000 注8     |
| 2    | 螺母     | 120 | M36x3            | 35       | 0.558 | 66              | SH3404 II J-96       |
| 1    | 管箱     | 1   |                  | 组合件      | 1973  | 16500Q-DN2-1503 |                      |

| 件号<br>ITEM NO. | 名 称<br>NAME | 数量<br>QUANTITY | 材 料<br>MATERIAL | 单件         | 总计         | 图号或标准号<br>DWG. NO. OR STAND. NO. | 备 注<br>REMARKS |
|----------------|-------------|----------------|-----------------|------------|------------|----------------------------------|----------------|
|                |             |                |                 | 重量<br>(kg) | 重量<br>(kg) |                                  |                |

特种设备设计许可印章  
压力容器  
威国胜  
TS1210370-2011  
2007年06月18日  
中国石化工程建设公司

|                                                                                                                                            |                          |                                                                                                             |                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|  <b>中国石化工程建设公司</b><br>SINOPEC ENGINEERING CORPORATION |                          | 地址: 北京市东城区东直门内大街 8 号<br>北京 100027<br>电话: 010-64615300<br>电传: 010-64615300<br>传真: 010-64615300<br>邮编: 100027 |                                                                                                                  |
| <b>腾龙芳烃(漳州)有限公司</b>                                                                                                                        |                          | 地址: 福建省漳州市芗城区港前街 1 号<br>漳州 363000<br>电话: 0596-2010000<br>电传: 0596-2010000<br>传真: 0596-2010000<br>邮编: 363000 |                                                                                                                  |
| <b>工艺</b><br>工艺专业<br>JPC                                                                                                                   | <b>宋智博</b><br>负责人<br>JCK | <b>加氢裂化装置</b><br><b>脱丁烷塔顶水冷器 (21-E-405) 总图</b><br>BES1400-1.3/1.19-683-6/19-4I                              | 设计号: 95602-0100<br>图号: 16500E-DW20-1501<br>比例: 1:1<br>日期: 1995.08.10<br>设计: 宋智博<br>校核: 宋智博<br>审核: 宋智博<br>批准: 宋智博 |



| Ø PIPE | BENDING RADIUS |  |
|--------|----------------|--|
| 1"     | 95             |  |
| 1 1/2" | 150            |  |
| 2"     | 210            |  |

All forces are entered at the point of attachment of the nozzle to the vessel (face of the vessel wall).

NOZZLE LOADS ACC.TO WRC107


 All forces are entered at the point of attachment of the nozzle to the vessel (face of the vessel wall).  
 NOZZLE LOADS ACC. TO WRC107

| ITEM/DN | P <sub>r</sub> | V <sub>L</sub> | V <sub>c</sub> | M <sub>L</sub> | M <sub>c</sub> | M <sub>T</sub> |
|---------|----------------|----------------|----------------|----------------|----------------|----------------|
|         | N              | N              | N              | N×m            | N×m            | N×m            |
| S1-S2   | -11810         | 30000          | 30000          | 14740          | 10710          | 27110          |

| Additional notes / Note addizionali                                                                                                                     |                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| M021) FONDI SARANNO STAMPATI A FREDDO E NORMALIZZATI                                                                                                    | M02) HEADS SHALL BE COLD FORMED AND NORMALIZED                                                                                   |
| 1) INSTALLAZIONE IN CINA. COSTRUTTORE DOVRA' ESSERE QUALIFICATO SELO. LA VERIFICA SECONDO LE REGOLAMENTAZIONI CINESI E' RESPONSABILITA' DEL COSTRUTTORE | 1) INSTALLATION IN CHINA. SUPPLIER SHALL BE SELO CERTIFIED. COMPLIANCE TO CHINA REGULATIONS IS UNDER MANUFACTURER RESPONSIBILITY |
| 2) FLANGES. HARDNESS SHALL BE 20 HB HIGHER THAN RING JOINTS. HARDNESS                                                                                   |                                                                                                                                  |

**WORK USE ONLY**

F13) ATTENZIONE - QUESTO APPARECCHIO CONTIENE GAS CHE POSSONO RISULTARE PERICOLOSI IN CASO DI INALAZIONE ANCHE SE NON SONO DEFINITI "LETALI" DALLA LEGGE F13) WARNING - THIS VESSEL CONTAINS GASES WHICH CAN BE DANGEROUS IN CASE OF INHALATIONS EVEN IF IT IS NOT DEFINED "LETHAL" ACCORDING TO THE RULE

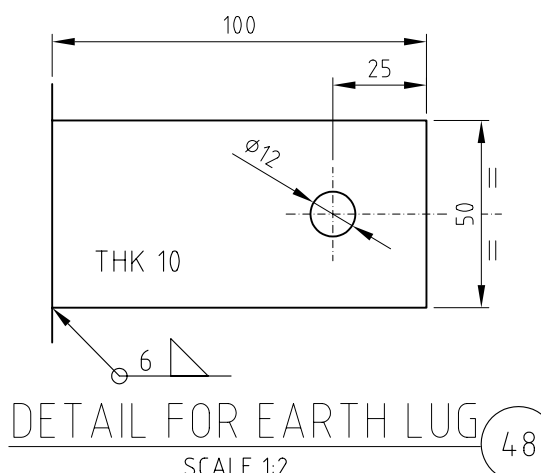
**Additional notes for U tube / Note addizionali per tubi ad U**

1. Min.thk. after bending: T1-to/ (1+d0/4R)=182 mm.
1. Spess. minimo dopo piegatura : T1-to/(1+d0/4R): 182 mm.
2. Allowable flattening after bending:  $Sc\% = 2\% \cdot (R/d0)$  Max. 10%.
2. Schiacciamento ammissibile dopo piega :  $Sc\% = 2\% \cdot (R/d0)$  Max. 10%.
3. The tubes shall be seamless
3. I tubi dovranno essere seamless
4. After bending check hydraulic test for "U" tubes 70 bar. and DP test on bending area of the most internal (210) rows.
4. Eseguire prova idraulica sui tubi ad U a 70 Bar dopo piega ed DP test sull'area curvata delle 2 file più interne.
5. After hydraulic test "U" tubes shall be protected with oil.
5. Dopo prova idraulica proteggere i tubi con oliatura interna
6. Packing to bundle "U" tube with the same radius with wood.
6. PACKING TO BUNDLE "U" TUBE WITH THE SAME RADIUS WITH WOOD.
7. Qualification of bending process for U tube upon request is required.
7. E' richiesta la qualifica del metodo di piegatura su tubo di prova.
8. Eddy current shall be performed before bending of "U" Tube.
8. Eseguire Eddy Current test prima della piegatura dei tubi

| N. APPLICABLE SPECIFICATION |                                  |                                                   |
|-----------------------------|----------------------------------|---------------------------------------------------|
| ITV 24008                   | Bursting disc assembly           | ISO 55370/3 Bursting disc arrang. (if required)   |
| ITV 24007                   | Lugs and eye bolts               | ITV 24000 Tolerances for pressure vessels         |
| ITV 04402                   | Taper partition                  | ITN 02112 Instruction for reinforcing plate       |
| ITV 24002                   | Welding partitions               | ITV 64000 Hydrostatic test procedure              |
| ITV 24003                   | Welding partitions               | ITN 04001 General supply requirement              |
| ITV 24005                   | Grooves for partitions           | ITV 24400 Baffles and support drilling            |
| ITN 07791                   | Painting system                  | ITV 24402 Baffles and support drilling            |
| ITN 07792                   | Products for painting            | ITV 24009 Groove holes for tubes drilling         |
| ITN 83000                   | Flanges requirement              | ITV 24004 Cuts on partition                       |
| SOPS586833                  | Painting specification           | ITV 24006 Execution of nubbin                     |
| SOP 562032/3                | Preparation/protect. of surfaces | ITV 24001 Clear. between shell id. / baffles      |
| SOPS689821                  | GCP                              | ITV 04400 Requirement. for tube bundle desig.     |
| SOP386450                   | PRA                              | ITN 01300/A Minim. requirement for document       |
| NP data sheet               | SOV 7350542/4                    | ITN 01303 Req. for spare parts & maintenance data |

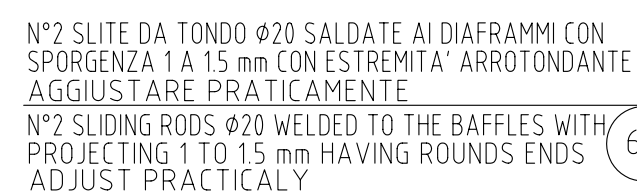
## REFERENCE DOCUMENTS

|                                     |  |
|-------------------------------------|--|
| SOP 3899168 Mechanical Calculations |  |
|                                     |  |



| Norme di progetto<br>Design Codes            | ASME VIII DIV.1 - Ed '04 + Ad '06<br>TEMA "R" Ed '99<br>+ SEL0 |                    |                       |               |                 |  |
|----------------------------------------------|----------------------------------------------------------------|--------------------|-----------------------|---------------|-----------------|--|
|                                              | Shell Side                                                     |                    |                       | Tubes Side    |                 |  |
|                                              | 610 KPa<br>611 Bar g                                           | 886.2<br>887 Bar g | 4700KPa<br>47 Bar g   | Psig<br>681.7 |                 |  |
|                                              | 5370KPa<br>53.7 BarA                                           | Psig<br>778.9      | 600 KPa<br>6 BarA     | PsiaA<br>87.0 |                 |  |
| Pressione di progetto<br>Design pressure     |                                                                |                    |                       |               |                 |  |
| Pressione di esercizio<br>Operating pressure |                                                                |                    |                       |               |                 |  |
| Temper. di progetto<br>Design Temperat.      | °C<br>200                                                      | °F<br>392          | °C<br>99              | °F<br>210.2   |                 |  |
| Temper. di esercizio<br>Operating temperat.  | °C<br>107/40                                                   | °F<br>224.6/104    | °C<br>34/40           | °F<br>93/104  |                 |  |
| Full Vacuum Design                           | NO                                                             |                    |                       | NO            |                 |  |
| Minim. Design Metal Temp.                    | 0.5 °C                                                         | 32.9 °F            | 0.5 °C                | 32.9 °F       |                 |  |
| Shop test pressure                           | 79.43 KPa<br>79.43 Bar g                                       | Psig<br>1152.0     | 611 KPa<br>6.11 Bar g | Psig<br>886.2 |                 |  |
| Field test pressure                          | 79.43 KPa<br>79.43 Bar g                                       | Psig<br>1152.0     | 611 KPa<br>6.11 Bar g | Psig<br>886.2 |                 |  |
| Corrosion allowance                          | 3.2 mm                                                         |                    | 3.2 mm                |               |                 |  |
| Efficienza/Joint Efficiency                  | 1                                                              |                    | 1                     |               |                 |  |
| P.W.H.T                                      | NO                                                             |                    | NO                    |               |                 |  |
| Fluido / Medium                              | H2+CH4                                                         |                    | COOLING WATER         |               |                 |  |
| Letalet / Lethal<br>Inspection               | SEE NOTE F13                                                   |                    | NO                    |               |                 |  |
|                                              | NP/CUSTOMER                                                    |                    |                       |               |                 |  |
| N° tubes / O.D. / Thk.                       | 280U                                                           |                    | 19.05 mm              |               | 2108mm avg thk. |  |
| Tubes Length/Pitch/Layout                    | 5250 mm                                                        |                    | 25.4 mm               |               | 30"             |  |
| HE Type/Size/Actual surface                  | BEU                                                            |                    | 720 x 5250            |               | 172.5 m2        |  |
| Tubes/Tubesheet joint                        | STRENGTH WELD                                                  |                    |                       |               |                 |  |
| Carbon/Carbon equiv. limitat.                | ≤ 0.23%                                                        |                    | ≤ 0.45%               |               |                 |  |
| Volume / Volume                              | 910 lt                                                         | 32.1 cuft          | 1390 lt               | 49 cuft       |                 |  |
| Peso vuoto / Empty Weight                    | 7190 kg                                                        |                    | 15851 lb              |               |                 |  |
| Peso fisca / Bundle Weight                   | 3550 kg                                                        |                    | 7826 lb               |               |                 |  |
| Peso prova idraul. /Hidrot. weight           | 9490 kg                                                        |                    | 20922 lb              |               |                 |  |

|                                    |                                                           |                             |                |                 |                |
|------------------------------------|-----------------------------------------------------------|-----------------------------|----------------|-----------------|----------------|
|                                    |                                                           |                             |                |                 |                |
| 1                                  | REVISED WHERE INDICATED Ø REV. SHT 1/2, 2/3, ADD. SHT 3/3 | ENGECO ROM                  | Arnato G.      | Tarallo E.      | 26/04/10       |
| 0                                  | EMISSIONE - ISSUED                                        | ENGECO ROM                  | B.F.           | E.M.            | 15/10/07       |
| REV                                | DESCRIZIONE - DESCRIPTION                                 | ESEG.<br>PREP'D             | CONTR<br>CHK'D | APPR<br>APPR'D  | DATA<br>DATE   |
| TITOLO - TITLE                     |                                                           | ITEM N°                     | 21-E-650A      |                 |                |
| 1ST STAGE INTERCOOLER<br>21-E-650A |                                                           | N° SN06452215/1             |                |                 |                |
| <b>Nuovo Pignone</b> FIRENZE       |                                                           | COMMESSA - JOB              | SCALA SCALE    | LINGUA LANGUAGE | TAVOLA - SHEET |
|                                    |                                                           | 1002993                     | 1:20           | I-A             | 1/2            |
| SOSTITUISCE IL - REPLACES          |                                                           | SOSTITUITO DA - REPLACED BY |                |                 |                |



NOTE:  
DURING FUNCTION THE HOLES FOR PULLING EYE BOLTS  
WILL BE PLUGGED WITH PLUGS M20 POS.64



SPACER DETAIL (60)  
SCALE 1:1



DETAIL FOR JACKSCREW

SCALE 1:2

67



NOTE/NOTES:  
 PER TUTTI I FORGIATI A DISEGNO (STUB-END, PAD, LLWN, FLANGE SPECIALI...):  
 A) SCAMATE, PER QUOTE SENZA INDICAT DI TOLLER. SEC. ITN02312  
 B) ULTRASONORERO SEC. ITN02151 O ASTM A 388 CON BLOCCO DI CALIBRAZIONE E LIVELLO DI ACCETTAB. SEC. ITN02151 CLASSE 1A FOR ALL FORGING ITEM AT DWG (STUB-END, PAD, LLWN, SPECIAL FLANGE...)  
 A) FOR DIMENS. WITHOUT INDICAT. OF TOLERANCE SEC. ITN02312  
 B) ULTRASONIC TEST ACC. TO ITN02151 OR ASTM A 388 WITH CALIBRAT. BLOCK AND QUALITY LEVELS ACC. TO ITN02151 CLASS 1A

|                                    |                           |                              |                                                                                                                                                      |                |                    |                   |   |     |       |
|------------------------------------|---------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------|-------------------|---|-----|-------|
|                                    |                           |                              |                                                                                                                                                      |                |                    |                   |   |     |       |
|                                    |                           |                              |                                                                                                                                                      |                |                    |                   |   |     |       |
| 1                                  | REVISED WHERE INDICATED ◇ |                              |                                                                                                                                                      |                |                    |                   |   |     |       |
| 0                                  | EMISSIONE-ISSUED          |                              |                                                                                                                                                      |                |                    |                   |   |     |       |
| REV                                | DESCRIZIONE - DESCRIPTION |                              |                                                                                                                                                      |                |                    |                   |   |     |       |
| TITOLO - TITLE                     |                           | ITEM N°                      |                                                                                                                                                      |                |                    |                   |   |     |       |
| 1ST STAGE INTERCOOLER<br>21-E-650A |                           | 21-E-650A                    |                                                                                                                                                      |                |                    |                   |   |     |       |
|                                    |                           | N° SNO6452215/1              |                                                                                                                                                      |                |                    |                   |   |     |       |
| <b>Nuovo Pignone</b> FIRENZE       |                           | COMMESSA -<br>JOB<br>1002993 | <table><tr><td>SCALA<br/>SCALE</td><td>LINGUA<br/>LANGUAGE</td><td>TAVOLA -<br/>SHEET</td></tr><tr><td>-</td><td>I-A</td><td>2/3 ◇</td></tr></table> | SCALA<br>SCALE | LINGUA<br>LANGUAGE | TAVOLA -<br>SHEET | - | I-A | 2/3 ◇ |
| SCALA<br>SCALE                     | LINGUA<br>LANGUAGE        | TAVOLA -<br>SHEET            |                                                                                                                                                      |                |                    |                   |   |     |       |
| -                                  | I-A                       | 2/3 ◇                        |                                                                                                                                                      |                |                    |                   |   |     |       |
| SOSTITUISCE IL - REPLACES          |                           | SOSTITUITO DA - REPLACED BY  |                                                                                                                                                      |                |                    |                   |   |     |       |
|                                    |                           |                              |                                                                                                                                                      |                |                    |                   |   |     |       |

A

B

C

D

E

F

A

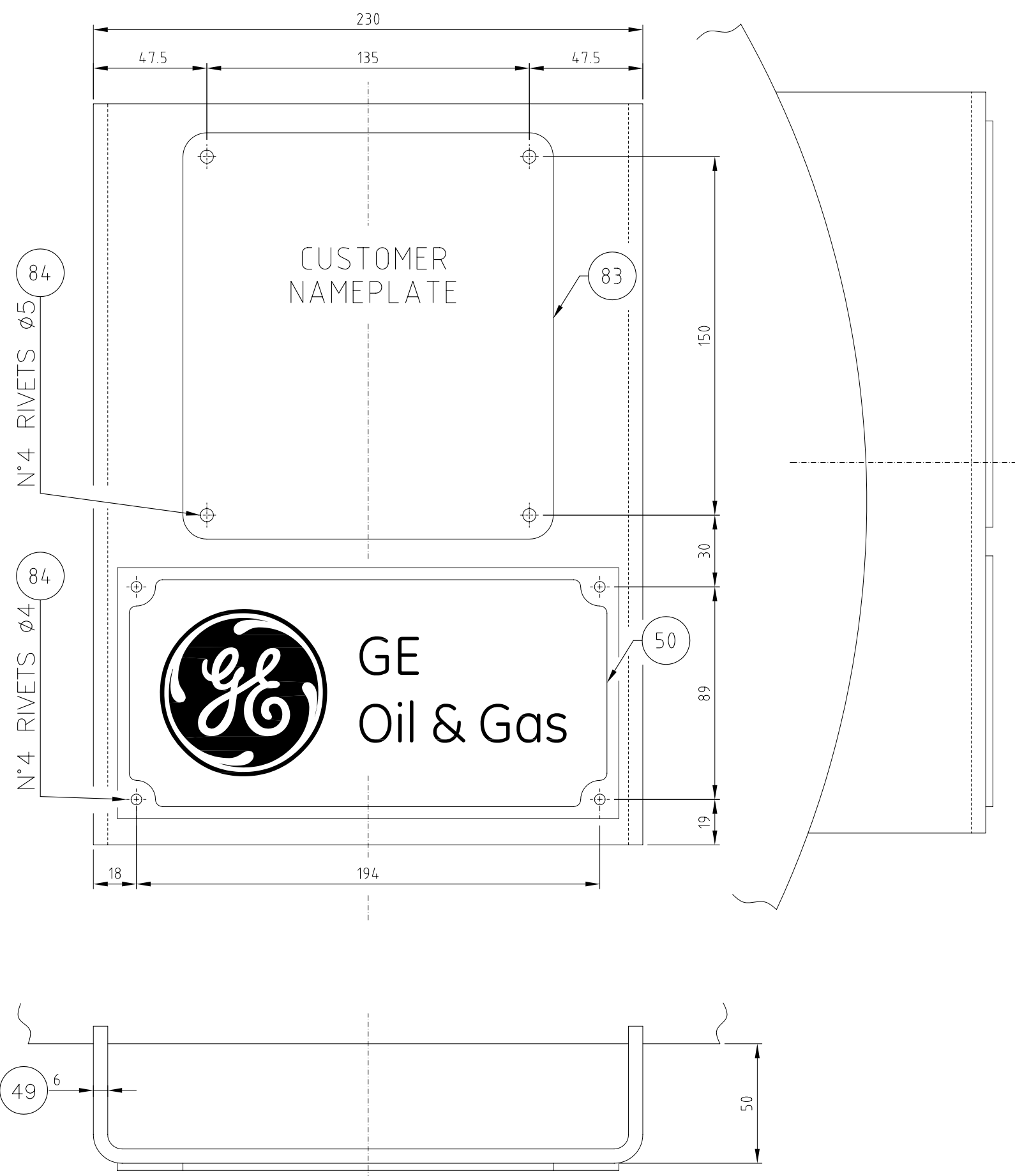
B

C

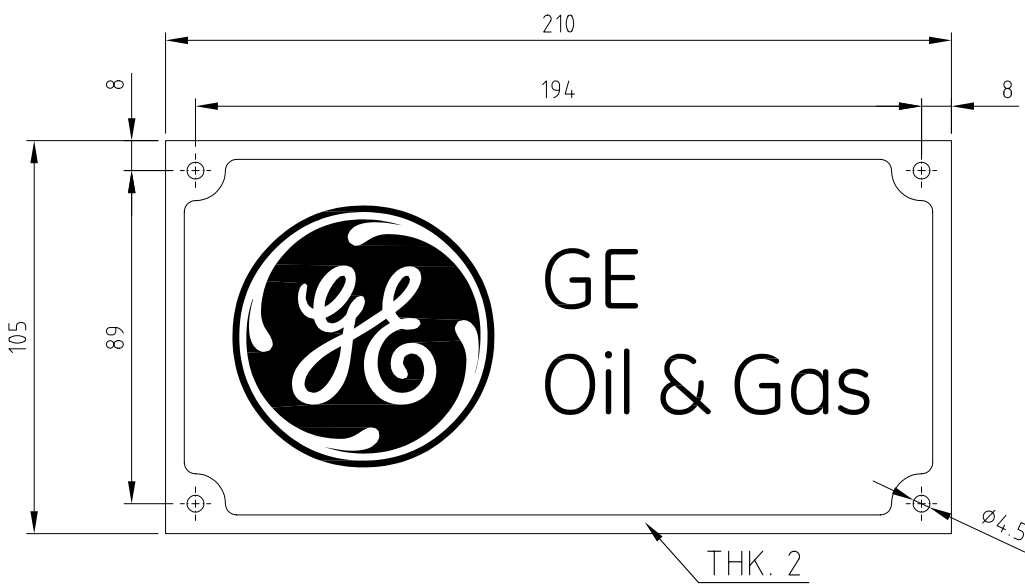
D

E

F

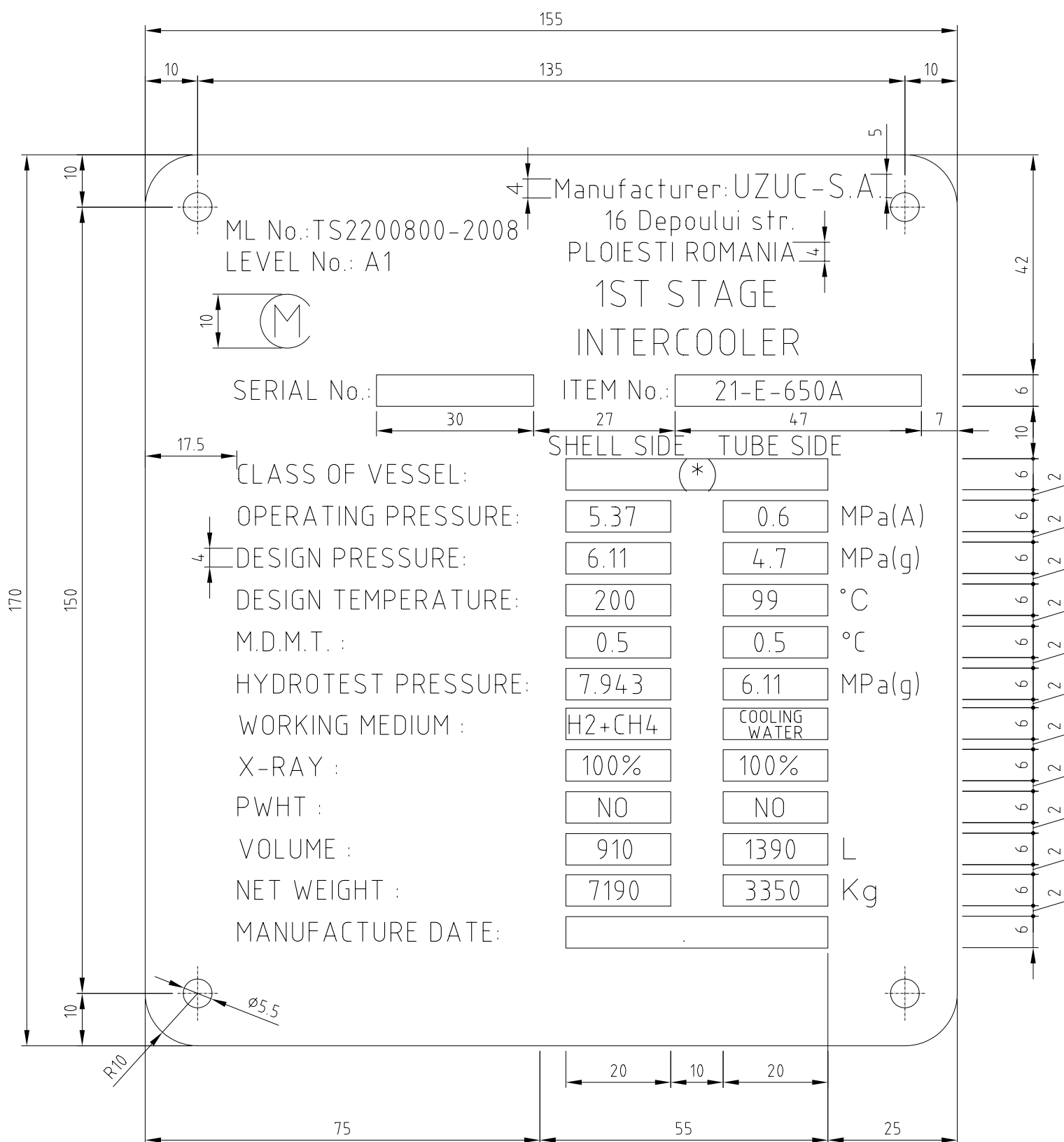


NAMEPLATE SUPPORT DETAIL



SEE ITN89410/4  
- "Version A" for colors of text, plate and frame of nameplate.

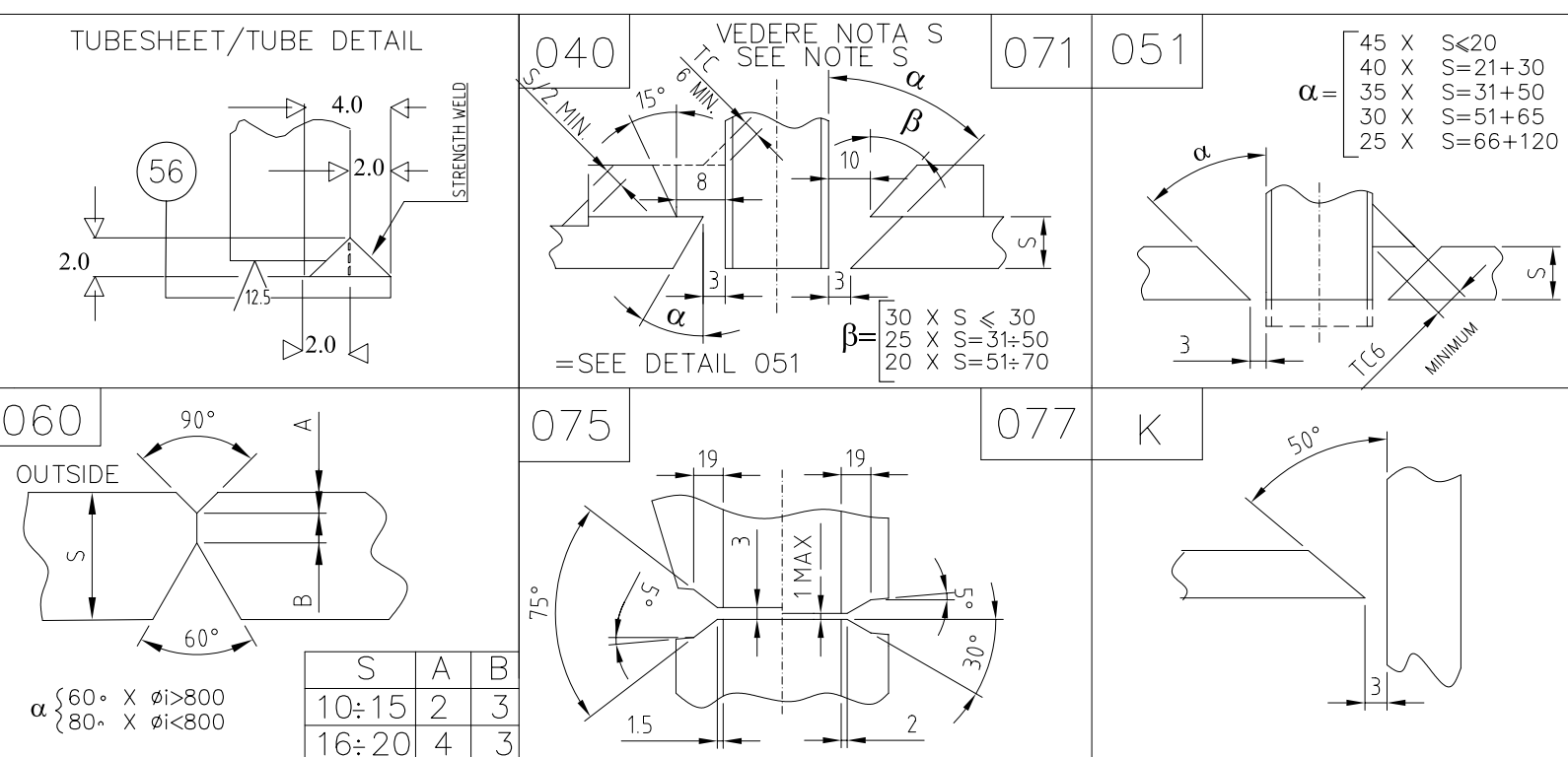
GE-LOGO NAMEPLATE DETAIL



(\*) To be defined by Manufacturer

CUSTOMER NAMEPLATE

Particolari di Saldatura ( vedere ITN02500) / Welding detail ( see ITN 02500)



|           |                                      |          |                                             |                                       |   |
|-----------|--------------------------------------|----------|---------------------------------------------|---------------------------------------|---|
| 84        | CHIODI RIVETS                        | 4+4      | ø=4 x 20/ø=5 x 20 ITN35351                  | AISI 304                              |   |
| 83        | TARGA CLIENTE CUSTOMER NAMEPLATE     | 1        | SEE SHT. 3/3                                | AISI 304                              |   |
| 82        | GUARNIZ S11 GASKET S11               | 1+2      | ø=1" 600# ITN84609 R16                      | AISI 316L                             |   |
| 81        | DADI S11 NUTS S11                    | 8        | ø=5/8" UNC Ø=H ITN34050/9                   | ASTM SA 194 2H                        | C |
| 80        | TIRANTI S11 BOLTS S11                | 4        | ø=5/8" UNC L= 95 ITN33200                   | ASTM SA 193 B7                        | C |
| 79        | F. CIECA S11 BL. FL. S11             | 1        | ø=1" B 600#RTJ                              | ASTM SA105                            | C |
| 78        | FLANGIA S11 FLANGE S11               | 1        | ø=1" LWN 600#RTJ L=170                      | ASTM SA105                            | C |
| 77        | NERV S4 RIBS S4                      | 2        | PL THK= 6 L= 80 x 350                       | ASTM SA 516 GR 60                     |   |
| 76        | GUARNIZ S4 GASKET S4                 | 1+2      | ø=1" 600# ITN84609 R16                      | AISI 316L                             |   |
| 75        | DADI S4 NUTS S4                      | 8        | ø=5/8" UNC Ø=H ITN34050/9                   | ASTM SA 194 2H                        | C |
| 74        | TIRANTI S4 BOLTS S4                  | 4        | ø=5/8" UNC L= 95 ITN33200                   | ASTM SA 193 B7                        | C |
| 73        | F. CIECA S4 BL. FL. S4               | 1        | ø=1" B 600#RTJ                              | ASTM SA 105                           | C |
| 72        | CURVA S4 ELBOW S4                    | 1        | ø=1" RL SCH.XXS ITN 82034                   | ASTM SA 234 GR WPB                    | C |
| 71        | T.D.T. S4 STUBEND S4                 | 1        | ø=1" øe=50 THK= 17.4                        | ASTM SA 105                           | C |
| 70        | TRONCH. S4 NOZZLE S4                 | 1        | ø=1" SCH.XXS L= 400                         | ASTM SA 106 GR B                      | C |
| 69        | FLANGIA S4 FLANGE S4                 | 1        | ø=1" WN 600#RTJ SCH.XXS                     | ASTM SA 105                           | C |
| 68        | SLITTE SLIDING RODS                  | 2        | ø20 L= 4287                                 | ASTM SA 675 GR 70                     |   |
| 67        | JACKSCREW                            | 4        | M16 L= 130 ITN32211                         | AISI 304                              |   |
| 66        | LIFTING EYE BOLT                     | 1        | ø30 L= 300                                  | ASTM SA 675 GR 70                     |   |
| 65        | IMPINGEMENT PLATE                    | 1        | PL THK= 6 L= 240 x 240                      | ASTM SA 516 GR 60                     |   |
| 64        | TAPPI P.T. PLUG                      | 2        | M 20 L= 40 ITN32500                         | ASTM SA 182 F304                      |   |
| 63        | GOLFARI PULLING EYE BOLT             | 2        | M 20 ITN 33105                              | ASTM SA 105                           |   |
| 62        | DADI NUTS                            | 14       | M12 UNI 3740                                | 6S                                    |   |
| 61        | TIRANTI TIERODS                      | 7        | ø13 L= 5137                                 | ASTM SA 675 GR 70                     |   |
| 60        | DISTANZ. SPACERS                     | 95       | øe= 19.05 THK. 2.108 L= SEE TABLE           | ASTM A 179                            |   |
| 59        | DIAPRAMMI BAFFLE                     | 1        | PL THK= 8 L= 730 x 730                      | ASTM SA 516 GR 60                     |   |
| 58        | DIAPRAMMI BAFFLE                     | 8        | PL THK= 8 L= 730 x 580                      | ASTM SA 516 GR 60                     |   |
| 57        | DIAPRAMMI BAFFLE                     | 8        | PL THK= 8 L= 730 x 580                      | ASTM SA 516 GR 60                     |   |
| 56        | TUBIO FASCIO TUBES                   | 280      | øe= 19.05 THK. 2.108 Avg. thk. L= SEE TABLE | ASTM A 179 F. KILLED                  | C |
| 55        | PIASTRA TUB. TUBESHEET               | 1        | øe= 94.5 THK= 120                           | ASTM SA350 LF2 Cl.1                   | C |
| 54        | PASS PARTITION PLATE                 | 1        | PL THK= 13 L= 730 x 990                     | ASTM SA 516 GR 70                     |   |
| 53        | WEAR PLATE FOR LIFTING LUGS ON SHELL | 2        | PL THK= 10 L= 210 x 110                     | ASTM SA 516 GR 70                     | C |
| 52        | LIFTING LUGS ON SHELL                | 2        | PL THK= 21 L= 160 x 180                     | ASTM SA 516 GR 70                     |   |
| 51        | LIFTING LUGS CHANNEL                 | 2        | PL THK= 18 L= 80 x 110                      | ASTM SA 516 GR 70                     | C |
| 50        | TARGA GE GE NAMEPLATE                | 1        | SEE SHT. 3/3                                | AISI 304                              |   |
| 49        | TARGA-SOTTOT. NAMEPLATE-SUPP.        | 1        | SEE SHT. 3/3                                | ASTM SA 516 GR 60                     |   |
| 48        | EARTHING LUG                         | 2        | PL THK= 10 L= 110 x 60                      | SA 516 GR 60                          |   |
| 47        | BASE BASE                            | 2        | PL THK= 15 L= 210 x 760                     | ASTM SA 516 GR 60                     |   |
| 46        | CULLA WEAR PLATE                     | 2        | PL THK= 10 L= 260 x 940                     | ASTM SA 516 GR 70                     | C |
| 45        | NERV GUSSET PL.                      | 8        | PL THK= 15 L= 110 x 450                     | ASTM SA 516 GR 60                     |   |
| 44        | SOST WEB PLATE                       | 2        | PL THK= 15 L= 760 x 550                     | ASTM SA 516 GR 60                     |   |
| 43        | GUARNIZ T7A/B GASKET T7A/B           | 2+4      | ø=1" 600# ITN84609 R16                      | AISI 316L                             |   |
| 42        | DADI T7A/B NUTS T7A/B                | 16       | ø=5/8" UNC Ø=H ITN34050/9                   | ASTM SA 194 2H                        | C |
| 41        | TIRANTI T7A/B BOLTS T7A/B            | 8        | ø=5/8" UNC L= 95 ITN33200                   | ASTM SA 193 B7                        | C |
| 40        | F. CIECA T7A/B BL. FL. T7A/B         | 2        | ø=1" B 600#RTJ                              | ASTM SA105                            | C |
| 39        | FLANGIA T7A/B FLANGE T7A/B           | 2        | ø=1" LWN 600#RTJ L=170                      | ASTM SA105                            | C |
| 38        | GUARNIZ T5A/B GASKET T5A/B           | 2+4      | ø=3/4" 600# ITN84609 R13                    | AISI 316L                             |   |
| 37        | DADI T5A/B NUTS T5A/B                | 16       | ø=5/8" UNC Ø=H ITN34050/9                   | ASTM SA 194 2H                        | C |
| 36        | TIRANTI T5A/B BOLTS T5A/B            | 8        | ø=5/8" UNC L= 95 ITN33200                   | ASTM SA 193 B7                        | C |
| 35        | F. CIECA T5A/B BL. FL. T5A/B         | 2        | ø=3/4" B 600#RTJ                            | ASTM SA105                            | C |
| 34        | FLANGIA T5A/B FLANGE T5A/B           | 2        | ø=3/4" LWN 600#RTJ L=170                    | ASTM SA105                            | C |
| 33        | P.D.R. T2 REINF. T2                  | 1        | PL THK= 18 L= 470 x 470                     | ASTM SA 516 GR 70                     | C |
| 32        | TRONCH. T2 NOZZLE T2                 | 1        | ø=10" SCH.80 L= 270                         | ASTM SA 106 GR B                      | C |
| 31        | FLANGIA T2 FLANGE T2                 | 1        | ø=10" WN 600#RTJ SCH.80                     | ASTM SA 105                           | C |
| 30        | P.D.R. T1 REINF. T1                  | 1        | PL THK= 18 L= 470 x 470                     | ASTM SA 516 GR 70                     | C |
| 29        | TRONCH. T1 NOZZLE T1                 | 1        | ø=10" SCH.80 L= 270                         | ASTM SA 106 GR B                      | C |
| 28        | FLANGIA T1 FLANGE T1                 | 1        | ø=10" WN 600#RTJ SCH.80                     | ASTM SA 105                           | C |
| 27        | GUARNIZ S7A/B GASKET S7A/B           | 2+4      | ø=1" 600# ITN84609 R16                      | AISI 316L                             |   |
| 26        | DADI S7A/B NUTS S7A/B                | 16       | ø=5/8" UNC Ø=H ITN34050/9                   | ASTM SA 194 2H                        | C |
| 25        | TIRANTI S7A/B BOLTS S7A/B            | 8        | ø=5/8" UNC L= 95 ITN33200                   | ASTM SA 193 B7                        | C |
| 24        | F. CIECA S7A/B BL. FL. S7A/B         | 2        | ø=1" B 600#RTJ                              | ASTM SA105                            | C |
| 23        | FLANGIA S7A/B FLANGE S7A/B           | 2        | ø=1" LWN 600#RTJ L=170                      | ASTM SA105                            | C |
| 22        | GUARNIZ S5A/B GASKET S5A/B           | 2+4      | ø=3/4" 600# ITN84609 R13                    | AISI 316L                             |   |
| 21        | DADI S5A/B NUTS S5A/B                | 16       | ø=5/8" UNC Ø=H ITN34050/9                   | ASTM SA 194 2H                        | C |
| 20        | TIRANTI S5A/B BOLTS S5A/B            | 8        | ø=5/8" UNC L= 95 ITN33200                   | ASTM SA 193 B7                        | C |
| 19        | F. CIECA S5A/B BL. FL. S5A/B         | 2        | ø=3/4" B 600#RTJ                            | ASTM SA105                            | C |
| 18        | FLANGIA S5A/B FLANGE S5A/B           | 2        | ø=3/4" LWN 600#RTJ L=170                    | ASTM SA105                            | C |
| 17        | P.D.R. S2 REINF. S2                  | 1        | PL THK= 21 L= 370 x 370                     | ASTM SA 516 GR 70                     | C |
| 16        | TRONCH. S2 NOZZLE S2                 | 1        | ø=8" SCH.100 L= 230                         | ASTM SA 106 GR B                      | C |
| 15        | FLANGIA S2 FLANGE S2                 | 1        | ø=8" WN 600#RTJ SCH.100                     | ASTM SA 105                           | C |
| 14        | P.D.R. S1 REINF. S1                  | 1        | PL THK= 21 L= 370 x 370                     | ASTM SA 516 GR 70                     | C |
| 13        | TRONCH. S1 NOZZLE S1                 | 1        | ø=8" SCH.100 L= 230                         | ASTM SA 106 GR B                      | C |
| 12        | FLANGIA S1 FLANGE S1                 | 1        | ø=8" WN 600#RTJ SCH.100                     | ASTM SA 105                           | C |
| 11        | FONDO SH. COVER øi= 720 x 18         | 1        | PL THK= 21 L= 940 x 940                     | ASTM SA 516 GR 70                     | C |
| 10        | CIL. DISTR. SHELL CHANNEL            | 1        | PL THK= 18 L= 2420 x 630                    | ASTM SA 516 GR 70                     | C |
| 9         | FLANGIA BODY FLANGE CHANNEL          | 1        | øe= 94.5 / øi= 720 h= 155                   | ASTM SA266 Gr.4 - NORM.               | C |
| 8         | GUARNIZ GASKET CHANNEL SIDE          | 1+2      | ø826 / ø800 THK. 3.2                        | SS 316L DOUBLE JACKETED MINERAL FIBER |   |
| 7         | GUARNIZ GASKET SHELL SIDE            | 1+2      | ø826 / ø800 THK. 3.2                        | SS 316L DOUBLE JACKETED MINERAL FIBER |   |
| 6         | DADI NUTS                            | 96       | ø=1 3/8" 8UN ø=H ITN34050/9                 | ASTM SA 194 2H                        | C |
| 5         | TIRANTI BOLTS                        | 48       | ø=1 3/8" 8UN L= 44.5 ITN33200               | ASTM SA 193 B7                        | C |
| 4         | FLANGIA BODY FLANGE SHELL            | 1        | øe= 94.5 / øi= 720 h= 155                   | ASTM SA266 Gr.4 - NORM.               | C |
| 3         | FONDO SH. COVER øi= 720 x 21         | 1        | PL THK= 25 L= 960 x 960                     | ASTM SA 516 GR 70                     | C |
| 2         | CIL. MANTELLO SHELL                  | 1        | PL THK= 21 L= 2420 x 1230                   | ASTM SA 516 GR 70                     | C |
| 1         | CIL. MANTELLO SHELL                  | 2        | PL THK= 21 L= 2420 x 2030                   | ASTM SA 516 GR 70                     | C |
| REV. POS. | DENOMINAZIONE DENOMINATION           | No. PEZ. | DIMENSIONI DIMENSIONS                       | MATERIALE MATERIAL                    |   |

C= CERTIFICATO MATERIALI SECONDO EN 10204 ed.2004 - 3.1 (EQUIVALENTE A EN 10204 ed.1991 - 3.1.B)  
MATERIALS CERTIFICATE ACC. TO EN 10204 ed.2004 - 3.1 (EQUIVALENT TO EN 10204 ed.1991 - 3.1.B)

DISTINTA MATERIALI GREZZI -- LIST OF RAW MATERIALS

|      |                             |         |           |  |  |
|------|-----------------------------|---------|-----------|--|--|
| 1    | ADD. SHEET                  |         |           |  |  |
| 0    | EMISSIONE-ISSUED            |         |           |  |  |
| REV. | DESCRIZIONE - DESCRIPTION   | ITEM N° | 21-E-650A |  |  |
|      | TITOLO - TITLE              |         |           |  |  |
|      | 1ST STAGE INTERCOOLER       |         |           |  |  |
|      | 21-E-650A                   |         |           |  |  |
|      | Nuovo Pignone               | FIRENZE |           |  |  |
|      | SCALDA - JOB                | 1002993 |           |  |  |
|      | SCALA SCALE                 | -       |           |  |  |
|      | LINGUA LANGUAGE             | I-A     |           |  |  |
|      | TAVOLA - SHEET              | 3/3     |           |  |  |
|      | SOSTITUISCE IL - REPLACES   |         |           |  |  |
|      | SOSTITUITO DA - REPLACED BY |         |           |  |  |