

### INSPECTION & TEST PLAN

| No.      | INSPECTION ATTRIBUTE LIST                                                                                                                                                                                                                                                                             | PROCEDURE REFERENCE                                                                      | ACCEPTANCE LEVEL                                                     | INSPECTION POINT           |                            |                             |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------|----------------------------|-----------------------------|
|          |                                                                                                                                                                                                                                                                                                       |                                                                                          |                                                                      | BIDDER                     | BCPL                       | T. P. I.                    |
| <b>A</b> | <b>GENERAL:</b>                                                                                                                                                                                                                                                                                       |                                                                                          |                                                                      |                            |                            |                             |
| 1        | Approval for:<br>- Fabrication , Inspection & test plan<br>- Welding procedures and procedure qualification reports (WPS / PQR)<br>- Liquid penetrant and radiographic examination procedure<br>- Proprietary alloy compositions, if applicable<br>- Shop drawing/ fabrication details<br>- Weld Maps | As per Licencer Doc.<br>No: BA62559SPC1200<br>As per Licencer Doc.<br>No: BA62559SPC1200 |                                                                      | x<br>x<br>x<br>x<br>x<br>x | A<br>A<br>A<br>A<br>A<br>A |                             |
| 2        | Welder and welding operator qualification - On file                                                                                                                                                                                                                                                   |                                                                                          |                                                                      | x                          |                            |                             |
| 3        | NDT personnel qualification - On File                                                                                                                                                                                                                                                                 |                                                                                          |                                                                      | x                          |                            |                             |
| <b>B</b> | <b>TUBE SECTION</b>                                                                                                                                                                                                                                                                                   |                                                                                          |                                                                      |                            |                            |                             |
| 1        | Chemical composition of each heat + check analysis for first ten melts then 10% of all heats<br>Trace element on two melts of each alloy (sample on cold end)                                                                                                                                         | As per Licencer Doc.<br>No: BA62559SPC1200<br>As per Licencer Doc.<br>No: BA62559SPC1200 |                                                                      | x<br>x                     | R<br>R                     | R<br>R                      |
| 2        | Hydro / Air pressure test (To be conducted at vendor's shop after assembling): 75 psi for 5 minutes for 100% (including fluorescent liquid penetrant on OD)                                                                                                                                           | As per Licencer Doc.<br>No: BA62559SPC1200                                               | No leak                                                              | x                          |                            | S + spot check              |
| 3        | Visual Inspection: 100% of as cast tube sections                                                                                                                                                                                                                                                      |                                                                                          | ASTM A 608 / As per Licencer Doc. No: BA62559SPC1200                 | x                          |                            | S + spot check              |
| 4        | Dimensional control on as cast tubes including roughness on OD for 100%                                                                                                                                                                                                                               |                                                                                          | Approved drawings                                                    | x                          |                            | Spot check 10%              |
| 5        | Marking for 100 %                                                                                                                                                                                                                                                                                     | As per Licencer Doc.<br>No: BA62559SPC1200                                               |                                                                      | x                          |                            | Spot Check                  |
| 6        | Mechanical properties at room temperature                                                                                                                                                                                                                                                             | ASTM A 370                                                                               | Approved Material specification                                      |                            |                            | R                           |
| 7        | Creep test: 10% of melts for each alloys                                                                                                                                                                                                                                                              | ASTM A 608 S3                                                                            | Duration Min (50 or 100 h), 2 tests to rupture for each alloy        | x                          |                            | R                           |
| 8        | Aged Ductility Tests: 10% of melts, Aging : 870 deg C - 100 h                                                                                                                                                                                                                                         | ASTM A 370                                                                               | E = 25% Min, As per Licencer Doc. No: BA62559SPC1200                 | x                          |                            | R                           |
| 9        | Macroetching: 10% of tube sections for each alloy (samples to be taken from cold ends Metallurgical structure and test of tubes- review macro-etch rings                                                                                                                                              |                                                                                          | As per Licencer Doc. No: BA62559SPC1200<br>20% equiaxed min. from ID | x                          |                            | Spot Check                  |
| 10       | Eddy Current test: 100%                                                                                                                                                                                                                                                                               |                                                                                          | No inside defect                                                     | x                          |                            | R                           |
| 11       | Roughness control (machined inside roughness) for 100% tube sections                                                                                                                                                                                                                                  |                                                                                          | As per Licencer Doc. No: BA62559SPC1200                              | x                          |                            | S + spot check              |
| 12       | Dye penetrant examination of weld bevels 100% + Mini 2X nominal diameter of the outside & inside surfaces                                                                                                                                                                                             |                                                                                          | ASME VIII Div 1 Appendix 8                                           |                            |                            | R + Spot Check              |
| 13       | Dimensional control for 100% tube sections after machining                                                                                                                                                                                                                                            |                                                                                          | As per Licencer Doc. No: BA62559SPC1200                              |                            |                            | S                           |
| 14       | Radiographic examination of 100% weld bevel (For vendor's shop welding RT will be conducted at vendor's shop)                                                                                                                                                                                         |                                                                                          | ASME VIII Div 1 Para UW 51                                           | x                          |                            | R + Spot Check<br>10% films |
| 15       | Stress-rupture test shall be performed on 5% of the heats                                                                                                                                                                                                                                             | As per Licencer Doc.<br>No: BA62559SPC1200                                               | ASTM A 608 S3                                                        | x                          | R                          | R                           |

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|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------|------|--------------------------|
|          |                                                                                                                                                         |                                                                                    |                                                               | BIDDER           | BCPL | T. P. I.                 |
| <b>C</b> | <b>TUBE TO TUBE ASSEMBLIES:</b>                                                                                                                         |                                                                                    |                                                               |                  |      |                          |
| 1        | Liquid penetrant examination on all root passes & final passes                                                                                          | As per Licencer Doc. No: BA62559SPC1200                                            | ASME III Div 1 Appendix 8 + No Surface porosity               | x                |      | RW                       |
| 2        | Go gauge test: 100% long tubes to be inspected                                                                                                          |                                                                                    | As per Licencer Doc. No: BA62559SPC1200                       | x                |      | S + spot check 10%       |
| 3        | Boroscope inspection of accessible ground root pass                                                                                                     | As per Licencer Doc. No: BA62559SPC1200                                            | No defect                                                     | x                |      | RW                       |
| 4        | Radiographic examination of each weld                                                                                                                   |                                                                                    | As per Licencer Doc. No: BA62559SPC1200                       | x                |      | R + Spot Check 10% films |
| 5        | Dimensional control according to drawing                                                                                                                |                                                                                    | As per approved drawing                                       | x                |      | RW                       |
| <b>D</b> | <b>STATIC CASTINGS:</b>                                                                                                                                 |                                                                                    |                                                               |                  |      |                          |
| 1        | Chemical composition of each heat + check analysis for first five melts then 1/5 heats<br>Trace element on two melts of each alloy (sample on cold end) | As per Licencer Doc. No: BA62559SPC1200<br>As per Licencer Doc. No: BA62559SPC1200 |                                                               | x<br>x           |      | R<br>R                   |
| 2        | Visual Inspection: 100% of as cast tube sections                                                                                                        |                                                                                    | ASTM A 608                                                    | x                |      | S                        |
| 3        | Mechanical properties at room temperature                                                                                                               | ASTM A 370                                                                         | Approved Material specification                               |                  |      | R                        |
| 5        | Dimensional control on as cast tubes including roughness on OD for 100%                                                                                 |                                                                                    | Approved drawings                                             | x                |      | Spot check 10%           |
| 6        | Creep test: 10% of melts for each alloys                                                                                                                | ASTM A 608 S3                                                                      | Duration Min (50 or 100 h), 2 tests to rupture for each alloy | x                |      | R                        |
| 7        | Aged Ductility Tests: 10% of melts per alloy, Aging : 870 deg C - 100 h                                                                                 | ASTM A 370                                                                         | E = 25% Min, As per para 4.4.2 of SWI spec. H-PS-H-003        | x                |      | R                        |
| 8        | Dye penetrant examination at 100% on outside & inside surfaces + weld bevels                                                                            | As per Licencer Doc. No: BA62559SPC1200                                            | ASME VIII Div 1 Appendix 7 (Body) Appendix 8 (Bevel)          |                  |      | Spot check 10%           |
| 9        | Radiographic examination: 5 first pieces and then 1/5 Gamm or X Ray                                                                                     |                                                                                    | ASME VIII Div 1 Appendix 7                                    | x                |      | R + Spot Check 10% films |
| 10       | Radiographic examination of 100% weld bevel                                                                                                             |                                                                                    | ASTM E 446 Classe I                                           | x                |      | R + Spot Check 10% films |
| 11       | Dimensional control including roughness after machining for 100% fittings                                                                               |                                                                                    | As per Licencer Doc. No: BA62559SPC1200                       | x                |      | RW                       |
| 12       | Cleaning for 100%                                                                                                                                       |                                                                                    | As per Licencer Doc. No: BA62559SPC1200                       | x                |      | RW                       |

A - Approval  
R - Review  
S - Surveillance  
W - Witness Point  
RW - Random Witness

**NOTE:**

I) This inspection & test plan is based on LHT specifications BA62559SPC1200, recommended inspection attribute list of LHT & subsequent revisions / changes duly approved by LHT / BCPL. Any further deviations, if any, duly approved by LHT will also be acceptable.

II) Inspection release note (IRN) shall be issued by third party inspection agency only after all the drawing/document as per Supplier's index of drawing/documents are submitted. Material dispatch from Supplier's works shall not commence till above condition is met. Non fulfilling above requirement shall result into appropriate penalty or with-holding of payment as per conditions of PO/PR/MR.