



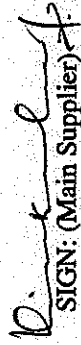
## ENDORSEMENT SHEET FOR DRAWING / DOCUMENT

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION

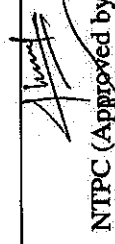
|                                           |                                                                                                                      |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Project Name</b>                       | PATRATU STPP PHASE-I - (3X 800 MW)                                                                                   |
| <b>Contract No:</b>                       | CS-9585-001-2<br>BHEL WORK ORDER NOS:- 7381, 7382, 7383, 7384, 7385 (MAIN BOILER) &<br>7386(AUX. BOILER)             |
| <b>Package name</b>                       | EPC PACKAGE                                                                                                          |
| <b>Main Supplier</b>                      | BHEL, Piping Centre, Chennai                                                                                         |
| <b>Manufacturer Name</b>                  | NTPC Approved Sub-Contractor and Sub-Vendors                                                                         |
| <b>Project/package Specific document</b>  | BHEL QP ref.: 7381:QPC:20:Rev 00.Date: 25.06.2018<br>NTPC ref.: 9585-001-102-QVM-Q-240                               |
| <b>Drawing title</b>                      | Quality Plan for SEAMLESS BW FITTINGS - Gr-91/92 MATERIAL.                                                           |
| <b>Reference Project Name</b>             | TELANGANA STPP PHASE-I (2X 800 MW)                                                                                   |
| <b>Reference Contract No:</b>             | CS-9591-101-2                                                                                                        |
| <b>Reference Package name</b>             | SG PACKAGE                                                                                                           |
| <b>Reference Main Supplier</b>            | BHEL, Piping Centre, Chennai                                                                                         |
| <b>Reference Manufacturer Name</b>        | NTPC Approved Sub-Contractor and Sub-Vendors                                                                         |
| <b>Reference Project/package document</b> | BHEL QP ref.: 7313:QPC:19:Rev 02. Date: 21.05.2018<br>NTPC Doc No.: 9591-102-102-QVM-Q-001A Rev 02. Date: 04.06.2018 |
| <b>Reference Drawing title</b>            | Quality plan for SEAMLESS BW FITTINGS - Gr-91/92 MATERIAL.                                                           |

i) ☒ Certified that the item /component is identical to that considered for reference document approval.

ii) ☐ That there are minor changes in the item / component with respect to that considered for reference document approval and the same affect the reference document slightly as indicated below.

  
SIGN: (Main Supplier)

DATE: 25-06-2018

  
NTPC (Approved by/Date/Seal)

BHEL-UNIT: BHEL, Piping Centre, Chennai

| CONTRACTOR'S NAME & ADDRESS<br>BHEL PIPING CENTRE, CHENNAI                                                                                                                                                                         |  | MANUFACTURING QUALITY PLAN                                                                                                                                                                                                                                                                                                                                                                                                                  |  |                         |  |                              | PROJECT : TELANGANA STPP PHASE-I (2X 800 MW)<br>PACKAGE : SG Package<br>CONTRACT No: CS-9591-101-2<br>MAIN-SUPPLIER : BHEL, Piping centre |                     |  |                        |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------|--|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--|------------------------|--|
| ITEM : SEAMLESS BW FITTINGS CONFORMING TO<br>ASME SA234 WP91, ASTM A234WP92 & ASME SA182<br>F91/F92 (BOUGHT OUT ITEM)<br>System : Power Cycle Piping<br>BHEL Customer No's : 7313, 7314, 7325 (MAIN BOILER) &<br>7313(AUX. BOILER) |  | Q.P. No: 7313-QPC-19<br>Rev: 02<br>Dt: 21.05.2018                                                                                                                                                                                                                                                                                                                                                                                           |  | ACCEPTANCE<br>NORMS     |  | FORMAT OF<br>RECORDS         |                                                                                                                                           | AGENCY              |  | REMARKS                |  |
| S.No                                                                                                                                                                                                                               |  | CHARACTERISTICS                                                                                                                                                                                                                                                                                                                                                                                                                             |  | CLASS                   |  | TYPE OF<br>CHECK             |                                                                                                                                           | QUANTUM OF<br>CHECK |  | REFERENCE DOCUMENT #   |  |
| COMPONENT &<br>OPERATIONS                                                                                                                                                                                                          |  | 3                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 4                       |  | 5                            |                                                                                                                                           | 6a                  |  | 6b                     |  |
| 1                                                                                                                                                                                                                                  |  | 2                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 3                       |  | 4                            |                                                                                                                                           | 5                   |  | 6                      |  |
| 1.0 Raw Materials & Fittings shall be procured from NTPC approved Sources. The Test Certificate received from RM manufacturer shall meet IBR requirements.                                                                         |  |                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                         |  |                              |                                                                                                                                           |                     |  |                        |  |
| 1.1 Seamless Pipe/Forging                                                                                                                                                                                                          |  | a) Chemical Composition, Mechanical Properties                                                                                                                                                                                                                                                                                                                                                                                              |  | Major                   |  | Verification of MTC          |                                                                                                                                           | 100%                |  | 100%                   |  |
|                                                                                                                                                                                                                                    |  | b) UT Condition                                                                                                                                                                                                                                                                                                                                                                                                                             |  | Major                   |  | Verification of MTC          |                                                                                                                                           | 100%                |  | 100%                   |  |
|                                                                                                                                                                                                                                    |  | c) Hardness test                                                                                                                                                                                                                                                                                                                                                                                                                            |  | Major                   |  | Verification of MTC          |                                                                                                                                           | 100%                |  | 100%                   |  |
|                                                                                                                                                                                                                                    |  | d) Dimensions Outer Dia., Thk. etc                                                                                                                                                                                                                                                                                                                                                                                                          |  | Major                   |  | Measurement                  |                                                                                                                                           | 100%                |  | 100%                   |  |
|                                                                                                                                                                                                                                    |  | e) Material confirmation Test (Chemical)                                                                                                                                                                                                                                                                                                                                                                                                    |  | Major                   |  | Spectro / X-ray fluorescence |                                                                                                                                           | 100%                |  | 100%                   |  |
| 2.0 IN PROCESS INSPECTION                                                                                                                                                                                                          |  | Marking & transfer of identification                                                                                                                                                                                                                                                                                                                                                                                                        |  | Major                   |  | Visual                       |                                                                                                                                           | 100%                |  | 100%                   |  |
| 2.1 Material receiving inspection                                                                                                                                                                                                  |  | Qualification of Fittings                                                                                                                                                                                                                                                                                                                                                                                                                   |  | Major                   |  | Burst Test                   |                                                                                                                                           | 100%                |  | 100%                   |  |
| 2.2 Design Proof Test (only for Formed Fittings)                                                                                                                                                                                   |  | Procedure qualification                                                                                                                                                                                                                                                                                                                                                                                                                     |  | Major                   |  | Review                       |                                                                                                                                           | 100%                |  | 100%                   |  |
| 2.3 Fitting Forming Procedure                                                                                                                                                                                                      |  |                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | Major                   |  |                              |                                                                                                                                           |                     |  |                        |  |
| SIGNATURE                                                                                                                                                                                                                          |  | VIVEKANANDA YELLU<br>Dy. Mgr /QA                                                                                                                                                                                                                                                                                                                                                                                                            |  | P RAVI SHANKAR<br>AGM/Q |  | MAIN-SUPPLIER                |                                                                                                                                           | PAGE 01 OF 04       |  | THE TIME OF INSPECTION |  |
| LEGEND:                                                                                                                                                                                                                            |  | * RECORDS, IDENTIFIED WITH "TICK" (X) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br>** M: MANUFACTURER/SUB-SUPPLIER, C: THIRD PARTY INSPECTING AGENCY<br>APPROVED BY IBR&BHEL, N: NTPC, P: PERFORM, W: WITNESS, V: VERIFICATION & R: REVIEW AS APPROPRIATE<br>CHP: NTPC SHALL IDENTIFY IN COLOUR 'N' AS 'W' #: NTPC INSPECTION ENGINEER TO CHECK, APPROVAL DATE/REVISION NO. OF REF DOCUMENTS AT THE TIME OF INSPECTION |  |                         |  |                              |                                                                                                                                           |                     |  |                        |  |
| NTPC                                                                                                                                                                                                                               |  | FOR NTPC USE:                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                         |  |                              |                                                                                                                                           |                     |  |                        |  |
| REVIEWED BY                                                                                                                                                                                                                        |  | APPROVED BY                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                         |  |                              |                                                                                                                                           |                     |  |                        |  |
| APPROVAL SEAL                                                                                                                                                                                                                      |  |                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                         |  |                              |                                                                                                                                           |                     |  |                        |  |

| CONTRACTOR'S NAME & ADDRESS<br>BHEL PIPING CENTRE, CHENNAI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     | MANUFACTURING QUALITY PLAN                      |          |                                   |                                     | PROJECT : TELANGANA STPP PHASE-I (2X 800 MW) |                                                                                                                                                       |                                                               |   |    |     |                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------|----------|-----------------------------------|-------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---|----|-----|------------------------------------|
| ITEM : SEAMLESS BW FITTINGS CONFORMING TO<br>ASME SA234 WP91, ASTM A234WP92 & ASME SA182 F91/F92 (BOUGHT OUT ITEM)<br>System : Power Cycle Piping<br>BHEL Customer No's : 7313, 7314, 7325 (MAIN BOILER) & 7315(AUX. BOILER)                                                                                                                                                                                                                                                                                                                                                                                   |                                     | REFERENCE DOCUMENT #                            |          | ACCEPTANCE NORMS                  | FORMAT OF RECORDS                   | AGENCY                                       | REMARKS                                                                                                                                               |                                                               |   |    |     |                                    |
| S.No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | COMPONENT & OPERATIONS              | CHARACTERISTICS                                 | CLASS    | TYPE OF CHECK                     | QUANTUM OF CHECK                    | M                                            | C                                                                                                                                                     | N                                                             |   |    |     |                                    |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2                                   | 3                                               | 4        | 5                                 | 6a                                  | 6b                                           | 7                                                                                                                                                     | 8                                                             | 9 | 10 | 11  |                                    |
| 2.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Forming of fittings                 | Process parameters                              | Critical | Temperature, Measurement & Visual | 100%                                | -                                            | Appd. Procedure                                                                                                                                       | Internal report                                               | X | P  | V   | V                                  |
| 2.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Post forming/forging Heat Treatment | Rate of Heating, Rate of Cooling & Soaking time | Critical | Temp & Time graph                 | 100%                                | 100%                                         | Refer Note 03                                                                                                                                         | HT Chart                                                      | X | P  | R   | Refer Note 03                      |
| 2.6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Test Piece Marking                  | Selection of Test coupons                       | Major    | Measurement & Marking             | One Sample / Heat / Size / HT Batch | -                                            | As per ASTM A370                                                                                                                                      | Internal report                                               | X | P  | W   | Refer Note 02 & Refer Note 07      |
| <b>3.0 TESTS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                                                 |          |                                   |                                     |                                              |                                                                                                                                                       |                                                               |   |    |     |                                    |
| 3.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Chemical properties                 | Product Analysis                                | Major    | Chemical Composition              | One Sample / Heat / Size            | One Sample / Heat / Size                     | ASME SA234WP91/ASTM A234WP92<br>ASME SA182F91/F92                                                                                                     | Test Report                                                   | X | P  | W** | W** : Witness by IBR               |
| 3.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Mechanical properties               | YS, UTS, % Elongation (Mandatory)               | Major    | Tensile Strength,                 | One Sample / Heat / Size / HT Batch | One Sample / Heat / Size / HT Batch          | ASME SA234WP91/ASTM A234WP92<br>ASME SA182F91/F92                                                                                                     | Test Report                                                   | X | P  | W** | Refer Note 04                      |
| 3.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Hardness test                       | Hardness                                        | Major    | Measurement                       | 100%                                | 10%                                          | ASME SA234WP91/ASTM A234WP92<br>ASME SA182F91/F92                                                                                                     | Test Report                                                   | X | P  | W   | # : For dia >= 200mm               |
| 3.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | NDE                                 | (a) Volumetric Defect<br>(b) Sub-surface Defect | Major    | UT#                               | 100%                                | 10%                                          | ASME B31.1<br>CL 136.4.3                                                                                                                              | Test Report                                                   | X | P  | W   | 100% witness by BHEL & 10% by NTPC |
| 3.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Photomicrographic test              | Microstructure                                  | Critical | Insitu Micro                      | One Sample / Heat / Size / HT Batch | One Sample / Heat / Size / HT Batch          | No micro fissures. Microstructure shall show tempered martensite. Grain growth if any has to be examined further.<br>For P92 : Delta Ferrite - 3%Max. | Test Report & Photomicrograph (Magnification at 500x minimum) | X | P  | W   | Refer Note 08                      |
| <div style="display: flex; justify-content: space-between;"> <div> <p><b>LEGEND:</b></p> <p>* RECORDS, IDENTIFIED WITH "TICK" (X) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.</p> <p>** M: MANUFACTURER/SUB-SUPPLIER, C: THIRD PARTY INSPECTING AGENCY APPROVED BY IBR&amp;BHEL, N: NTPC, P: PERFORM.</p> <p>W: WITNESS, V: VERIFICATION &amp; R: REVIEW AS APPROPRIATE</p> <p>CHP: NTPC SHALL IDENTIFY IN COLOUR 'N' AS 'W' #: NTPC INSPECTION ENGINEER TO CHECK, APPROVAL DATE/REVISION NO. OF REF. DOCUMENTS AT THE TIME OF INSPECTION</p> </div> <div> <p><b>NTPC</b></p> </div> </div> |                                     |                                                 |          |                                   |                                     |                                              |                                                                                                                                                       |                                                               |   |    |     |                                    |
| <div style="display: flex; justify-content: space-between;"> <div> <p><b>SIGNATURE</b></p> <p>VIVEKANANDA YELLU<br/>Dy. Mgr / QA</p> </div> <div> <p><b>MAIN-SUPPLIER</b></p> </div> <div> <p><b>REVIEWED BY</b></p> </div> <div> <p><b>APPROVED BY</b></p> </div> <div> <p><b>APPROVAL SEAL</b></p> </div> </div>                                                                                                                                                                                                                                                                                             |                                     |                                                 |          |                                   |                                     |                                              |                                                                                                                                                       |                                                               |   |    |     |                                    |
| <div style="display: flex; justify-content: space-between;"> <div> <p><b>SIGNATURE</b></p> <p>VIVEKANANDA YELLU<br/>Dy. Mgr / QA</p> </div> <div> <p><b>MAIN-SUPPLIER</b></p> </div> <div> <p><b>REVIEWED BY</b></p> </div> <div> <p><b>APPROVED BY</b></p> </div> <div> <p><b>APPROVAL SEAL</b></p> </div> </div>                                                                                                                                                                                                                                                                                             |                                     |                                                 |          |                                   |                                     |                                              |                                                                                                                                                       |                                                               |   |    |     |                                    |

| CONTRACTOR'S NAME & ADDRESS<br>BHEL PIPING CENTRE, CHENNAI                                                                                                                                                                                                                                                                                                                                                                                          |                                  | MANUFACTURING QUALITY PLAN                                                                                                                    |          |                              |      | PROJECT : TELANGANA STPP PHASE-I (2X 800 MW)<br>PACKAGE : SG Package<br>CONTRACT No: CS-9591-101-2<br>MAIN-SUPPLIER : BHEL, Piping centre |                                                   |                  |   |                                 |   |                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------|---|---------------------------------|---|-----------------------------------------------------------------------|
| ITEM : SEAMLESS BW FITTINGS CONFORMING TO<br>ASME SA234 WP91, ASTM A234WP92 & ASME SA182<br>F91/F92 (BOUGHT OUT ITEM)<br>System : Power Cycle Piping<br>BHEL Customer No's : 7313, 7314, 7325 (MAIN BOILER) &<br>7315(AUX. BOILER)                                                                                                                                                                                                                  |                                  | REFERENCE DOCUMENT #                                                                                                                          |          | ACCEPTANCE NORMS             |      | FORMAT OF RECORDS                                                                                                                         |                                                   | AGENCY           |   | REMARKS                         |   |                                                                       |
| S.No                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                  | CHARACTERISTICS                                                                                                                               |          | CLASS                        |      | TYPE OF CHECK                                                                                                                             |                                                   | QUANTUM OF CHECK |   | DRAWINGS & applicable standards |   |                                                                       |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                  | 3                                                                                                                                             |          | 4                            |      | 5                                                                                                                                         |                                                   | 6a               |   | 7                               |   |                                                                       |
| 3.6                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                  | Ovality, Thicknning & other dimensions                                                                                                        |          | Major                        |      | Measurement                                                                                                                               |                                                   | 100%             |   | 8                               |   |                                                                       |
| 4.0                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                  | FINAL INSPECTION                                                                                                                              |          | Major                        |      | Measurement                                                                                                                               |                                                   | 100%             |   | 9                               |   |                                                                       |
| 4.1                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Dimensional Inspection           | Surface check, Bend angle, Radius, End-to-end dimn, Ovality, Thickness, Wrinkles, dt at ends, Edge preparation & other dimensions as per Drg. | Major    | Measurement                  | 100% | 100%                                                                                                                                      | ASME B16.9, BHEL Drg.. & P.O.                     | Report           | X | P                               | W | 11                                                                    |
| 4.2                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Positive Material Identification | Chemical check                                                                                                                                | Critical | Spectro / X-ray fluorescence | 100% | 100%                                                                                                                                      | ASME SA234WP91/ASTM A234WP92<br>ASME SA182F91/F92 | Test Report      | X | P                               | W | Chemical properties shall meet the requirements of SI.No.1.1(g) above |
| 4.3                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Marking & Identification         | Marking / Color coding                                                                                                                        | Major    | Visual                       | 100% | 100%                                                                                                                                      | Refer Note 12                                     | Report           | X | P                               | V | Refer Note 12                                                         |
| 4.4                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Surface Protection & Painting    | Appearance & DFT                                                                                                                              |          | Visual & Measurement         | 100% | 100%                                                                                                                                      | Project Specific NTPC approved Painting Scheme    | Report           | X | P                               | W | Refer Note 13                                                         |
| 4.5                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Preservation & Packing           | End Protection                                                                                                                                | Major    | Visual                       | 100% | 100%                                                                                                                                      | Refer Note 13                                     | Report           | X | P                               | V | Refer Note 14                                                         |
| 5.0 DOCUMENTATION                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                  |                                                                                                                                               |          |                              |      |                                                                                                                                           |                                                   |                  |   |                                 |   |                                                                       |
| 5.1                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Inspection clearance             | (a) IBR Certification                                                                                                                         | Major    | All tests as per IBR         | 100% | 100%                                                                                                                                      | IBR                                               | FORM-IIIIC       | X | P                               | V | -                                                                     |
| 5.2                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Despatch Clearance               | (b) Documentation                                                                                                                             | Major    | Verification                 | 100% | 100%                                                                                                                                      | All reports as required in this QAP               | Report           | X | P                               | V | V                                                                     |
| LEGEND:<br>* RECORDS, IDENTIFIED WITH "TICK" (X) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br>** M: MANUFACTURER/SUB-SUPPLIER, C: THIRD PARTY INSPECTING AGENCY APPROVED BY IBR&BHEL, N: NTPC, P: PERFORM, W: WITNESS, V: VERIFICATION & R: REVIEW AS APPROPRIATE<br>CHP: NTPC SHALL IDENTIFY IN COLOUR 'N' AS 'W' #: NTPC INSPECTION ENGINEER TO CHECK, APPROVAL DATE/REVISION NO. OF REF DOCUMENTS AT THE TIME OF INSPECTION |                                  |                                                                                                                                               |          |                              |      |                                                                                                                                           |                                                   |                  |   |                                 |   |                                                                       |
| VIVEKANANDA YELLU<br>Dy.Mgr/QA                                                                                                                                                                                                                                                                                                                                                                                                                      |                                  | P. RAVI SHANKAR<br>AGM/Q                                                                                                                      |          | NTPC                         |      | DOC. NO. 9591-102-102-QVM-Q-001A REV. .... CAT...                                                                                         |                                                   | REVIEWED BY      |   | APPROVED BY                     |   | APPROVAL SEAL                                                         |
| MAIN-SUPPLIER                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                  | MAIN-SUPPLIER                                                                                                                                 |          | FOR NTPC USE:                |      |                                                                                                                                           |                                                   |                  |   |                                 |   |                                                                       |
| SIGNATURE                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                  | PAGE 03 OF 04                                                                                                                                 |          |                              |      |                                                                                                                                           |                                                   |                  |   |                                 |   |                                                                       |

|                                                                                     |  |                                                                       |  |                                                                                                                                                                                                                                                                               |  |              |  |                                                                                                                                                                         |  |                         |  |                             |  |                         |  |                          |  |               |  |                |  |
|-------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------|--|-----------------------------|--|-------------------------|--|--------------------------|--|---------------|--|----------------|--|
|  |  | <b>CONTRACTOR'S NAME &amp; ADDRESS</b><br>BHEL PIPING CENTRE, CHENNAI |  | <b>MANUFACTURING QUALITY PLAN</b><br><b>ITEM : SEAMLESS BW FITTINGS CONFORMING TO</b><br>ASME SA234 WP91, ASTM A234WP92 & ASME SA182<br>F91/F92 (BOUGHT OUT ITEM)<br>System : Power Cycle Piping<br>BHEL Customer No's : 7313, 7314, 7325 (MAIN BOILER) &<br>7315(AUX BOILER) |  |              |  | <b>PROJECT : TELANGANA STPP PHASE-1 (2X 800 MW)</b><br><b>PACKAGE : SG Package</b><br><b>CONTRACT No. : CS-9591-101-2</b><br><b>MAIN-SUPPLIER : BHEL, Piping centre</b> |  |                         |  |                             |  |                         |  |                          |  |               |  |                |  |
| <b>S.No</b>                                                                         |  | <b>COMPONENT &amp; OPERATIONS</b>                                     |  | <b>CHARACTERISTICS</b>                                                                                                                                                                                                                                                        |  | <b>CLASS</b> |  | <b>TYPE OF CHECK</b>                                                                                                                                                    |  | <b>QUANTUM OF CHECK</b> |  | <b>REFERENCE DOCUMENT #</b> |  | <b>ACCEPTANCE NORMS</b> |  | <b>FORMAT OF RECORDS</b> |  | <b>AGENCY</b> |  | <b>REMARKS</b> |  |
| 1                                                                                   |  | 2                                                                     |  | 3                                                                                                                                                                                                                                                                             |  | 4            |  | 5                                                                                                                                                                       |  | 6a                      |  | 7                           |  | 8                       |  | 9                        |  | D*            |  | M C N          |  |
|                                                                                     |  |                                                                       |  |                                                                                                                                                                                                                                                                               |  |              |  |                                                                                                                                                                         |  |                         |  |                             |  |                         |  |                          |  |               |  |                |  |

**NOTES:**

- The raw materials shall be as per drawing and NTPC Technical Specifications and to be procured from NTPC approved vendors.
- Seal transfer on pieces to be cut shall be done by IBR inspector.
- POST FORMING / FORGING HEAT TREATMENT :-**  
Normalise at 1050 - 1080 deg.C & Temper at 750-780 deg.C  
Normalising and Tempering shall be carried out within 72 hours after completion of forming. The items shall be kept dry and stress free. The temperature shall be brought down to 0 to 100 deg.C after hot forming before normalizing and also after normalizing before tempering. Normalising and tempering of Gr91/Gr92 shall be done encompassing the entire component. Soaking shall be 1Hrs minimum.
- Chemical & Mechanical tests shall be performed at in-house or reputed laboratories.
- All NDE procedures shall be submitted to BHEL for review. NDE procedures shall have Level-III certified personnel approval in-house. Increase of non-availability of inhouse facility.
- NDE shall be performed by reputed laboratories.
- Items shall be visually checked. No hard scales shall be present on inside & outside surfaces.
- Gas cutting & Plasma cutting are prohibited for Gr91/Gr92 material. Repair by welding is prohibited.
- Three replicas in one fitting. Actual magnification shall be indicated in the photomicrograph. Photomicrographs shall be provided as records for review & acceptance and future in-service reference. Delta Ferrite <or=3%, when measured as per VD TUV1272 for P92 fittings
- All items shall be inspected and cleared by BHEL, IBR authorities & NTPC.
- Necessary IBR Requirements shall be fulfilled and IBR documents to be submitted.
- ~~The Sub-Vendor shall co-ordinate with NTPC and obtain MB06 before despatch of finished material and same shall be furnished to BHEL.~~
- The finished components shall be punched with DU code (14 digit work order du details), Heat number, material specification, maker's emblem, Inspectors seal and Statutory authorities seal. In addition, the DU code, Heat no. and Material specification shall also be paint stencilled. Colour Coding : Gr91 - Brown & Red; Gr92 - Brown & Blue
- Surveillance of Surface preparation, adhesion, Painting process & DFT by NTPC inspector.
- Machined ends shall be well protected using end caps and suitably packed to avoid transit & other damages. Tack welding is prohibited.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                         |  |                                                   |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------|--|---------------------------------------------------|--|
| <b>LEGEND:</b><br>* RECORDS, IDENTIFIED WITH "TICK" (X) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br>** M: MANUFACTURER/SUB-SUPPLIER, C: THIRD PARTY INSPECTING AGENCY APPROVED BY IBR&BHEL, N: NTPC, P: PERFORM, W: WITNESS, V: VERIFICATION & R: REVIEW AS APPROPRIATE<br>CHP: NTPC SHALL IDENTIFY IN COLOUM 'N' AS 'W' #: NTPC INSPECTION ENGINEER TO CHECK, APPROVAL DATE/REVISION NO. OF REF. DOCUMENTS AT THE TIME OF INSPECTION |  | <b>NTPC</b>             |  | DOC. NO. 9591-102-102-QVM-Q-001A REV..... CAT.... |  |
| VIVEKANANDA YELLU<br>Dy.Mgr /QA                                                                                                                                                                                                                                                                                                                                                                                                                             |  | P RAVI SHANKAR<br>AGM/Q |  |                                                   |  |
| MAIN-SUPPLIER                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | MAIN-SUPPLIER           |  |                                                   |  |
| SIGNATURE                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | PAGE 04 OF 04           |  | FOR NTPC USE:                                     |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                         |  | REVIEWED BY                                       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                         |  | APPROVED BY                                       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                         |  | APPROVAL SEAL                                     |  |