

|                                                                                    |                                                                                                                                                                                                 |                                                                                                                                                                  |       |                                                                                                                                                                                                                                                                                                                      |                  |                                                         |                                                                                                                                                                                                                                            |                                                                                                                                                     |                   |                                                |        |               |                                                          |         |
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|    |                                                                                                                                                                                                 | CONTRACTOR'S NAME & ADDRESS<br><br><b>BHEL PIPING CENTRE, CHENNAI</b><br><br>SUPPLIED BY OWNER / OWNER'S Q&I CONSULTANT APPROVED SUB-VENDORS AND SUB-CONTRACTORS |       | <b>MANUFACTURING QUALITY PLAN</b>                                                                                                                                                                                                                                                                                    |                  |                                                         |                                                                                                                                                                                                                                            | PROJECT : PANKI TPS EXTN - (1X 660 MW)<br><br>PACKAGE : EPC PACKAGE<br><br>CONTRACT No.: CS-9962-001-102<br><br>MAIN-SUPPLIER : BHEL, Piping centre |                   |                                                |        |               |                                                          |         |
|                                                                                    |                                                                                                                                                                                                 |                                                                                                                                                                  |       | ITEM : SEAMLESS BW FITTINGS CONFORMING TO ASME SA234 WP91, SA182 F91/F92 & ASTM A234 WP92 (BOUGHTOUT ITEM)                                                                                                                                                                                                           |                  | QP.No: 7263QPC20<br><br>Rev: 01<br><br>Date: 20.05.2019 |                                                                                                                                                                                                                                            |                                                                                                                                                     |                   |                                                |        |               |                                                          |         |
| S.No                                                                               | COMPONENT & OPERATIONS                                                                                                                                                                          | CHARACTERISTICS                                                                                                                                                  | CLASS | TYPE OF CHECK                                                                                                                                                                                                                                                                                                        | QUANTUM OF CHECK |                                                         | REFERENCE DOCUMENT #                                                                                                                                                                                                                       | ACCEPTANCE NORMS                                                                                                                                    | FORMAT OF RECORDS |                                                | AGENCY |               |                                                          | REMARKS |
|                                                                                    |                                                                                                                                                                                                 |                                                                                                                                                                  |       |                                                                                                                                                                                                                                                                                                                      | M                | C/N                                                     |                                                                                                                                                                                                                                            |                                                                                                                                                     |                   |                                                | M      | C             | N                                                        |         |
| 1                                                                                  | 2                                                                                                                                                                                               | 3                                                                                                                                                                | 4     | 5                                                                                                                                                                                                                                                                                                                    | 6                | C/N                                                     | 7                                                                                                                                                                                                                                          | 8                                                                                                                                                   | 9                 | D*                                             | ** 10  |               |                                                          | 11      |
| 1.0                                                                                | Raw Materials & Fittings shall be procured from Owner/ Owner's Q&I Consultant approved Sources. The Test Certificate received from RM manufacturer shall meet IBR requirements, & project Spec. |                                                                                                                                                                  |       |                                                                                                                                                                                                                                                                                                                      |                  |                                                         |                                                                                                                                                                                                                                            |                                                                                                                                                     |                   |                                                |        |               |                                                          |         |
| 1.1                                                                                | Seamless Pipe/Forging                                                                                                                                                                           | a) Chemical Composition, Mechanical Properties                                                                                                                   | Major | Verification of MTC                                                                                                                                                                                                                                                                                                  | 100%             | 100%                                                    | ASME SA335P91/P92<br>ASME SA182F91/F92<br>For Grade 92 : Ni-03%Max and Cu-025%Max                                                                                                                                                          | MTC                                                                                                                                                 | ✓                 | P                                              | V      | V             | MTC - Mill Test Certificate                              |         |
|                                                                                    |                                                                                                                                                                                                 | b) UT Condition                                                                                                                                                  | Major | Verification of MTC                                                                                                                                                                                                                                                                                                  | 100%             | 100%                                                    | ## For P92 : UT as per EN10246:7 1996 or equivalent, with longitudinal notch of 5% depth of thickness (min 0.3mm and max. 1.5mm);<br>For F92 : UT as per SA388 with Cl.3.3.4 of ASME Sec-VIII, Div.2 for Forging/ Bars of dia or Thk >50mm |                                                                                                                                                     | ✓                 | P                                              | V      | V             | Refer Note 01<br>## : Hydro/UT for other material grades |         |
|                                                                                    |                                                                                                                                                                                                 | c) Hardness test                                                                                                                                                 | Major | Verification of MTC                                                                                                                                                                                                                                                                                                  | 100%             | 100%                                                    | ASME SA335P91/P92<br>ASME SA182F91/F92                                                                                                                                                                                                     |                                                                                                                                                     | ✓                 | P                                              | V      | V             |                                                          |         |
|                                                                                    |                                                                                                                                                                                                 | d) Dimensions Outer Diameter., Thickness.etc                                                                                                                     | Major | Measurement                                                                                                                                                                                                                                                                                                          | 100%             | 100%                                                    | ASME SA335P91/P92<br>ASME SA182F91/F92                                                                                                                                                                                                     | HC                                                                                                                                                  | ✓                 | P                                              | V      | V             |                                                          |         |
|                                                                                    |                                                                                                                                                                                                 | e) Material confirmation Test (Chemical)                                                                                                                         | Major | Spectro / X-ray fluorescence                                                                                                                                                                                                                                                                                         | 100%             | 100%                                                    | ASME SA335P91/P92<br>ASME SA182F91/F92                                                                                                                                                                                                     | PMI Report                                                                                                                                          | ✓                 | P                                              | W**    | V             | W** : Witness by IBR                                     |         |
| 2.0                                                                                | IN PROCESS INSPECTION                                                                                                                                                                           |                                                                                                                                                                  |       |                                                                                                                                                                                                                                                                                                                      |                  |                                                         |                                                                                                                                                                                                                                            |                                                                                                                                                     |                   |                                                |        |               |                                                          |         |
| 2.1                                                                                | Material receiving inspection                                                                                                                                                                   | Marking & transfer of identification                                                                                                                             | Major | Visual                                                                                                                                                                                                                                                                                                               | 100%             | --                                                      |                                                                                                                                                                                                                                            | HC                                                                                                                                                  | ✓                 | P                                              | V      | V             | HC : History card<br>Refer Note 02                       |         |
| 2.2                                                                                | Design Proof Test (only for Formed Fittings)                                                                                                                                                    | Qualification of Fittings                                                                                                                                        | Major | Burst Test                                                                                                                                                                                                                                                                                                           | 100%             | 100%                                                    | As per ASME B16.9 / applicable design code                                                                                                                                                                                                 | Internal report                                                                                                                                     | ✓                 | P                                              | V/W*   | V             | W*: Witness required if report is not available          |         |
| 2.3                                                                                | Fitting Forming Procedure                                                                                                                                                                       | Procedure qualification                                                                                                                                          | Major | Review                                                                                                                                                                                                                                                                                                               | 100%             | 100%                                                    | ASME SA234WP91/ASTM A234WP92<br>ASME SA182F91/F92                                                                                                                                                                                          | \$Appd. Procedure                                                                                                                                   | ✓                 | P                                              | V      | V             | \$ Vendor's procedure to be approved by BHEL             |         |
|  |                                                                                                                                                                                                 |                                                                               |       | LEGEND:<br>* RECORDS, IDENTIFIED WITH "TICK" ( ✓ ) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br><br>** M: MANUFACTURER / SUB-SUPPLIER, C: THIRD PARTY INSPECTING AGENCY APPROVED BY IBR & BHEL, N: OWNER / OWNER Q&I CONSULTANT<br><br>P: PERFORM W: WITNESS AND V: VERIFICATION AS APPROPRIATE |                  |                                                         |                                                                                                                                                                                                                                            | For Customer Use                                                                                                                                    |                   | DOC.NO 9962-001-PC-102-QVM-Q-017 REV... CAT... |        |               |                                                          |         |
| V KARTHIKEYAN<br>Dy.Engr /QA                                                       |                                                                                                                                                                                                 | VIVEKANANDA YELLU<br>Dy.Mgr /QA                                                                                                                                  |       |                                                                                                                                                                                                                                                                                                                      |                  |                                                         |                                                                                                                                                                                                                                            |                                                                                                                                                     |                   |                                                |        |               |                                                          |         |
| MAIN-SUPPLIER                                                                      |                                                                                                                                                                                                 | MAIN-SUPPLIER                                                                                                                                                    |       |                                                                                                                                                                                                                                                                                                                      |                  |                                                         |                                                                                                                                                                                                                                            |                                                                                                                                                     |                   |                                                |        |               |                                                          |         |
| SIGNATURE                                                                          |                                                                                                                                                                                                 | PAGE 01 OF 04                                                                                                                                                    |       |                                                                                                                                                                                                                                                                                                                      |                  |                                                         |                                                                                                                                                                                                                                            | REVIEWED BY                                                                                                                                         |                   | APPROVED BY                                    |        | APPROVAL SEAL |                                                          |         |

|    |                                     | CONTRACTOR'S NAME & ADDRESS<br><br><b>BHEL PIPING CENTRE, CHENNAI</b><br><br>SUPPLIED BY OWNER / OWNER'S Q&I CONSULTANT APPROVED SUB-VENDORS AND SUB-CONTRACTORS |          | <b>MANUFACTURING QUALITY PLAN</b>                                                                                                                                                                                                                                                                                    |                                    |                                                         |                                                                                                                                                       | PROJECT : PANKI TPS EXTN - (1X 660 MW)<br><br>PACKAGE : EPC PACKAGE<br><br>CONTRACT No.: CS-9962-001-102<br><br>MAIN-SUPPLIER : BHEL, Piping centre |                                                                |                                                |        |             |   |                                                                            |
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|                                                                                    |                                     |                                                                                                                                                                  |          | System : Power Cycle Piping<br><br><b>BHEL Customer nos. : 7363,7364 &amp; 7365</b>                                                                                                                                                                                                                                  |                                    |                                                         |                                                                                                                                                       |                                                                                                                                                     |                                                                |                                                |        |             |   |                                                                            |
| S.No                                                                               | COMPONENT & OPERATIONS              | CHARACTERISTICS                                                                                                                                                  | CLASS    | TYPE OF CHECK                                                                                                                                                                                                                                                                                                        | QUANTUM OF CHECK                   |                                                         | REFERENCE DOCUMENT #                                                                                                                                  | ACCEPTANCE NORMS                                                                                                                                    | FORMAT OF RECORDS                                              |                                                | AGENCY |             |   | REMARKS                                                                    |
|                                                                                    |                                     |                                                                                                                                                                  |          |                                                                                                                                                                                                                                                                                                                      | M                                  | C/N                                                     |                                                                                                                                                       |                                                                                                                                                     |                                                                |                                                | M      | C           | N |                                                                            |
| 1                                                                                  | 2                                   | 3                                                                                                                                                                | 4        | 5                                                                                                                                                                                                                                                                                                                    | 6                                  |                                                         | 7                                                                                                                                                     | 8                                                                                                                                                   | 9                                                              | D*                                             | ** 10  |             |   | 11                                                                         |
| 2.4                                                                                | Forming of fittings                 | Process parameters                                                                                                                                               | Critical | Temperature, Measurement & Visual                                                                                                                                                                                                                                                                                    | 100%                               | --                                                      | Appd.Procedure                                                                                                                                        |                                                                                                                                                     | Internal report                                                | ✓                                              | 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                                                       | ✓                                              | P      | R           | 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                                                | ✓                                              | P      | W           | V | Refer Note 02 & Refer Note 07                                              |
| 3.0 TESTS                                                                          |                                     |                                                                                                                                                                  |          |                                                                                                                                                                                                                                                                                                                      |                                    |                                                         |                                                                                                                                                       |                                                                                                                                                     |                                                                |                                                |        |             |   |                                                                            |
| 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                                                    | ✓                                              | P      | W**         | V | 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                                                    | ✓                                              | P      | W**         | V | Refer Note 04                                                              |
| 3.3                                                                                | Hardness test                       | Hardness                                                                                                                                                         | Major    | Measurement                                                                                                                                                                                                                                                                                                          | 100%                               | 10% / 10%                                               | ASME SA234WP91/ASTM A234WP92<br>ASME SA182F91/F92                                                                                                     |                                                                                                                                                     | Test Report                                                    | ✓                                              | P      | W           | W |                                                                            |
| 3.4                                                                                | NDE                                 | (a) Volumetric Defect                                                                                                                                            | Major    | UT#                                                                                                                                                                                                                                                                                                                  | 100%                               | 10% / 10%                                               | ASME SA388 / ASME SecVIII Div-2, Cl3.3.4                                                                                                              |                                                                                                                                                     | Test Report                                                    | ✓                                              | P      | W           | W | # For dia≥200mm 100% witness by BHEL & 10% by OWNER / OWNER Q&I CONSULTANT |
|                                                                                    |                                     | (b) Sub-surface Defect                                                                                                                                           | Critical | WET MPI                                                                                                                                                                                                                                                                                                              | 100%                               | 10% / 10%                                               | ASTM E709 / ASME B31.1 Cl. 136.4.3                                                                                                                    |                                                                                                                                                     | Test Report                                                    | ✓                                              | P      | W           | W |                                                                            |
| 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 & Photo micrograph (Magnification at 500x minimum) | ✓                                              | P      | W           | V | Refer Note 08                                                              |
|  |                                     |                                                                               |          | LEGEND:<br>* RECORDS, IDENTIFIED WITH "TICK" ( ✓ ) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br><br>** M: MANUFACTURER / SUB-SUPPLIER, C: THIRD PARTY INSPECTING AGENCY APPROVED BY IBR & BHEL, N: OWNER / OWNER Q&I CONSULTANT<br><br>P: PERFORM W: WITNESS AND V: VERIFICATION AS APPROPRIATE |                                    |                                                         |                                                                                                                                                       | <b>For Customer Use</b>                                                                                                                             |                                                                | DOC.NO 9962-001-PC-102-QVM-Q-017 REV... CAT... |        |             |   |                                                                            |
| <b>V KARTHIKEYAN</b><br>Dy.Engr /QA                                                |                                     | <b>VIVEKANANDA YELLU</b><br>Dy.Mgr /QA                                                                                                                           |          |                                                                                                                                                                                                                                                                                                                      |                                    |                                                         |                                                                                                                                                       |                                                                                                                                                     |                                                                |                                                |        |             |   |                                                                            |
| MAIN-SUPPLIER                                                                      |                                     | MAIN-SUPPLIER                                                                                                                                                    |          |                                                                                                                                                                                                                                                                                                                      |                                    |                                                         |                                                                                                                                                       |                                                                                                                                                     |                                                                |                                                |        |             |   |                                                                            |
| <b>SIGNATURE</b>                                                                   |                                     | PAGE 02 OF 04                                                                                                                                                    |          |                                                                                                                                                                                                                                                                                                                      |                                    |                                                         |                                                                                                                                                       |                                                                                                                                                     |                                                                | REVIEWED BY                                    |        | APPROVED BY |   | APPROVAL SEAL                                                              |

|    |                                  | CONTRACTOR'S NAME & ADDRESS<br><br><b>BHEL PIPING CENTRE, CHENNAI</b><br><br>SUPPLIED BY OWNER / OWNER'S Q&I CONSULTANT APPROVED SUB-VENDORS AND SUB-CONTRACTORS |          | <b>MANUFACTURING QUALITY PLAN</b>                                                                                                                                                                                                                                                                                      |                  |      |                                                                          | PROJECT : PANKI TPS EXTN - (1X 660 MW)<br><br>PACKAGE : EPC PACKAGE<br><br>CONTRACT No.: CS-9962-001-102<br><br>MAIN-SUPPLIER : BHEL, Piping centre |                   |                                                |        |   |             |                                                                       |               |  |
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| S.No                                                                               | COMPONENT & OPERATIONS           | CHARACTERISTICS                                                                                                                                                  | CLASS    | TYPE OF CHECK                                                                                                                                                                                                                                                                                                          | QUANTUM OF CHECK |      | REFERENCE DOCUMENT #                                                     | ACCEPTANCE NORMS                                                                                                                                    | FORMAT OF RECORDS |                                                | AGENCY |   |             | REMARKS                                                               |               |  |
|                                                                                    |                                  |                                                                                                                                                                  |          |                                                                                                                                                                                                                                                                                                                        | M                | C/N  |                                                                          |                                                                                                                                                     |                   |                                                | M      | C | N           |                                                                       |               |  |
| 1                                                                                  | 2                                | 3                                                                                                                                                                | 4        | 5                                                                                                                                                                                                                                                                                                                      | 6                |      | 7                                                                        | 8                                                                                                                                                   | 9                 | D*                                             | ** 10  |   |             | 11                                                                    |               |  |
| 3.6                                                                                | First Off Trail (FOT)            | Ovality, Thicknning & other dimensions                                                                                                                           | Major    | Measurement                                                                                                                                                                                                                                                                                                            | 100%             | 100% | Drawings & applicable standards                                          |                                                                                                                                                     | FOT Report        | ✓                                              | P      | W | V           |                                                                       |               |  |
| 4.0                                                                                | FINAL INSPECTION                 |                                                                                                                                                                  |          |                                                                                                                                                                                                                                                                                                                        |                  |      |                                                                          |                                                                                                                                                     |                   |                                                |        |   |             |                                                                       |               |  |
| 4.1                                                                                | Dimensional Inspection           | Surface check, Bend angle, Radius, End-to-end dimn, Ovality, Thickness, Wrinkles, d1 at ends, Edge preparation & other dimensions as per Drg.                    | Major    | Measurement                                                                                                                                                                                                                                                                                                            | 100%             | 100% | ASME B16.9, BHEL Drg.. & P.O.                                            |                                                                                                                                                     | Report            | ✓                                              | P      | W | W           |                                                                       |               |  |
| 4.2                                                                                | Positive Material Identification | Chemical check                                                                                                                                                   | Critical | Spectro / X-ray fluorescence                                                                                                                                                                                                                                                                                           | 100%             | 100% | ASME SA234WP91/ASTM A234WP92<br>ASME SA182F91/F92                        |                                                                                                                                                     | Test Report       | ✓                                              | P      | W | V           | Chemical properties shall meet the requirements of Sl.No.1.1(g) above |               |  |
| 4.3                                                                                | Marking & Identification         | Marking / Color coding                                                                                                                                           | Major    | Visual                                                                                                                                                                                                                                                                                                                 | 100%             | 100% | Refer Note 12                                                            |                                                                                                                                                     | Report            | ✓                                              | P      | V | V           | Refer Note 12                                                         |               |  |
| 4.4                                                                                | Surface Protection & Painting    | Appearance & DFT                                                                                                                                                 |          | Visual & Measurement                                                                                                                                                                                                                                                                                                   | 100%             | 100% | Project Specific OWNER / OWNER'S Q&I CONSULTANT approved Painting Scheme |                                                                                                                                                     | Report            | ✓                                              | P      | W | V           | Refer Note 13                                                         |               |  |
| 4.5                                                                                | Preservation & Packing           | End Protection                                                                                                                                                   | Major    | Visual                                                                                                                                                                                                                                                                                                                 | 100%             | 100% | Refer Note 13                                                            |                                                                                                                                                     | Report            | ✓                                              | P      | V | V           | Refer Note 14                                                         |               |  |
| 5.0                                                                                | DOCUMENTATION                    |                                                                                                                                                                  |          |                                                                                                                                                                                                                                                                                                                        |                  |      |                                                                          |                                                                                                                                                     |                   |                                                |        |   |             |                                                                       |               |  |
| 5.1                                                                                | Inspection clearance             | (a) IBR Certification                                                                                                                                            | Major    | All tests as per IBR                                                                                                                                                                                                                                                                                                   | 100%             | 100% | IBR                                                                      |                                                                                                                                                     | FORM-IIIC         | ✓                                              | P      | V | --          |                                                                       |               |  |
|                                                                                    |                                  | (b) Documentation                                                                                                                                                | Major    | Verification                                                                                                                                                                                                                                                                                                           | 100%             | 100% | All reports as required in this QAP                                      |                                                                                                                                                     | Report            | ✓                                              | P      | V | V           |                                                                       |               |  |
| 5.2                                                                                | Despatch Clearance               | Despatch Clearance                                                                                                                                               | Major    | Verification                                                                                                                                                                                                                                                                                                           | 100%             | 100% |                                                                          |                                                                                                                                                     | MDCC              | ✓                                              | P      | V | CHP         | Refer Note 11                                                         |               |  |
|  |                                  |                                                                               |          | LEGEND:<br>* RECORDS, IDENTIFIED WITH "TICK" ( ✓ ) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br><br>** M: MANUFACTURER / SUB-SUPPLIER, C: THIRD PARTY INSPECTING AGENCY APPROVED BY IBR & BHEL, N: OWNER / OWNER'S Q&I CONSULTANT<br><br>P: PERFORM W: WITNESS AND V: VERIFICATION AS APPROPRIATE |                  |      |                                                                          | For Customer Use                                                                                                                                    |                   | DOC.NO 9962-001-PC-102-QVM-Q-017 REV... CAT... |        |   |             |                                                                       |               |  |
| V KARTHIKEYAN<br>Dy.Engr /QA                                                       |                                  | VIVEKANANDA YELLU<br>Dy.Mgr /QA                                                                                                                                  |          |                                                                                                                                                                                                                                                                                                                        |                  |      |                                                                          |                                                                                                                                                     |                   |                                                |        |   |             |                                                                       |               |  |
| MAIN-SUPPLIER                                                                      |                                  | MAIN-SUPPLIER                                                                                                                                                    |          |                                                                                                                                                                                                                                                                                                                        |                  |      |                                                                          |                                                                                                                                                     |                   |                                                |        |   |             |                                                                       |               |  |
| SIGNATURE                                                                          |                                  | PAGE 03 OF 04                                                                                                                                                    |          |                                                                                                                                                                                                                                                                                                                        |                  |      |                                                                          |                                                                                                                                                     |                   | REVIEWED BY                                    |        |   | APPROVED BY |                                                                       | APPROVAL SEAL |  |

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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                        |                                                                                                                                                                  |       | ITEM : SEAMLESS BW FITTINGS CONFORMING TO ASME SA234 WP91, SA182 F91/F92 & ASTM A234 WP92 (BOUGHTOUT ITEM)<br><br><b>System : Power Cycle Piping</b><br><br><b>BHEL Customer nos. : 7363,7364 &amp; 7365</b>                                                                                                                |                  | QP.No: 7263QPC20<br><br>Rev: 01<br><br>Date: 20.05.2019 |                      |                                                                                                                                                     |                   |                                                       |        |             |   |             |  |
| S.No                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | COMPONENT & OPERATIONS | CHARACTRISTICS                                                                                                                                                   | CLASS | TYPE OF CHECK                                                                                                                                                                                                                                                                                                               | QUANTUM OF CHECK |                                                         | REFERENCE DOCUMENT # | ACCEPTANCE NORMS                                                                                                                                    | FORMAT OF RECORDS |                                                       | AGENCY |             |   | REMARKS     |  |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2                      | 3                                                                                                                                                                | 4     | 5                                                                                                                                                                                                                                                                                                                           | M                | C/N                                                     | 7                    | 8                                                                                                                                                   | 9                 | D*                                                    | M      | C           | N | 11          |  |
| <b>NOTES:</b><br><br>1.0 The raw materials shall be as per drawing and OWNER / OWNER'S Q&I CONSULTANT Technical Specifications and to be procured from OWNER / OWNER'S Q&I CONSULTANT approved vendors.<br>2.0 Seal transfer on pieces to be cut shall be done by IBR inspector.<br>3.0 POST FORMING / FORGING HEAT TREATMENT :-<br><br>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.<br><br>4.0 Chemical & Mechanical tests shall be performed at in-house or reputed laboratories.<br>5.0 All NDE procedures shall be submitted to BHEL for review. NDE procedures shall have Level-III certified personnel approval incase of in-house. Incase of non-availability of inhouse facility NDE shall be performed by reputed laboratories.<br>6.0 Items shall be visually checked. No hard scales shall be present on inside & outside surfaces.<br>7.0 Gas cutting & Plasma cutting are prohibited for Gr91/Gr92 material. Repair by welding is prohibited.<br>8.0 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<br>9.0 All items shall be inspected and cleared by BHEL, IBR authorities & OWNER / OWNER'S Q&I CONSULTANT.<br>10.0 Necessary IBR Requirements shall be fulfilled and IBR documents to be submitted.<br>11.0 The Sub-Vendor shall co-ordinate with OWNER / OWNER'S Q&I CONSULTANT and obtain MDCC before despatch of finished material and same shall be furnished to BHEL.<br>12.0 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.<br>In addition, the DU code, Heat no. and Material specification shall also be paint stencilled. Colour Coding : Gr91 - Brown & Red; Gr92 - Brown & Blue<br>13.0 Surveillance of Surface preparation, adhesion,Painting process & DFT by OWNER / OWNER'S Q&I CONSULTANT.<br>14.0 Machined ends shall be well protected using end caps and suitably packed to avoid transit & other damages. Tack welding is prohibited.<br>15.0 <b>Imported Fittings</b> : - Stage Inspections witness (W) as indicated in this QP for OWNER / OWNER'S Q&I CONSULTANT, shall be treated as document verification only incase of imported fittings. |                        |                                                                                                                                                                  |       |                                                                                                                                                                                                                                                                                                                             |                  |                                                         |                      |                                                                                                                                                     |                   |                                                       |        |             |   |             |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |                                                                               |       | <b>LEGEND:</b><br>* RECORDS, IDENTIFIED WITH "TICK" ( ✓ ) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br><br>** M: MANUFACTURER / SUB-SUPPLIER, C: THIRD PARTY INSPECTING AGENCY APPROVED BY IBR & BHEL, N: OWNER / OWNER Q&I CONSULTANT<br><br>P: PERFORM W: WITNESS AND V: VERIFICATION AS APPROPRIATE |                  |                                                         |                      | <b>For Customer Use</b>                                                                                                                             |                   | <b>DOC.NO 9962-001-PC-102-QVM-Q-017 REV... CAT...</b> |        |             |   |             |  |
| <b>V KARTHIKEYAN</b><br>Dy.Engr /QA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        | <b>VIVEKANANDA YELLU</b><br>Dy.Mgr /QA                                                                                                                           |       |                                                                                                                                                                                                                                                                                                                             |                  |                                                         |                      |                                                                                                                                                     |                   |                                                       |        |             |   |             |  |
| MAIN-SUPPLIER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                        | MAIN-SUPPLIER                                                                                                                                                    |       |                                                                                                                                                                                                                                                                                                                             |                  |                                                         |                      |                                                                                                                                                     |                   |                                                       |        |             |   |             |  |
| <b>SIGNATURE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                        | PAGE 04 OF 04                                                                                                                                                    |       |                                                                                                                                                                                                                                                                                                                             |                  |                                                         |                      |                                                                                                                                                     |                   |                                                       |        | REVIEWED BY |   | APPROVED BY |  |



Reference: null102:2585

Date:26-05-19

|                                                                                                                                                    |                                            |     |                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----|------------------------------------------------------------------------------|
| From:                                                                                                                                              | SITAL KUMAR ,<br>GENERAL MANAGER           | To: | BHEL<br>4th Floor, Tower-A, Advant<br>Mavis Business Park, Sec-<br>142 Noida |
|                                                                                                                                                    |                                            | CC: | -<br>-<br>-                                                                  |
| <b>SUBJECT : PANKI, EPC-SG</b><br>Please find enclosed following drawings/documents for necessary action at your end as indicated in purpose code. |                                            |     |                                                                              |
| VENDOR DRG NO:                                                                                                                                     | 7363:QPC:17                                |     |                                                                              |
| NTPC DRG NO:                                                                                                                                       | 9962-001-PC-102-QVM-Q-017                  |     |                                                                              |
| REVISION NO:                                                                                                                                       | 01                                         |     |                                                                              |
| DRG TITLE:                                                                                                                                         | QP FOR Gr-91/92 FITTINGS (BOUGHT OUT ITEM) |     |                                                                              |
| APP CATEGORY:                                                                                                                                      | I                                          |     |                                                                              |
| RELEASE DATE:                                                                                                                                      | 26-05-19                                   |     |                                                                              |
| COMMENTS:                                                                                                                                          | Reviewed in Cat-I with comments.           |     |                                                                              |



Engineering Division  
ISO 9001:2008 Certified



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