

| VENDOR'S NAME & ADDRESS: | | TYPICAL MANUFACTURING QUALITY PLAN | | | | | | QAP. NO | | | | | |
|---|--|--|-------|------------------------|--|--|------------------|------------------|---|--------|---|-----|-------------------------|
| | | CUSTOMER: BHEL, HYDERABAD –32. PROJECT: PRODUCT: Gate, Globe & Check Valve | | | BHEL P.O.NO.: P.O.DATE: BHEL SPEC: REV: | | | REV NO: | | DATE: | | | |
| | | | | | | | | PAGE 1 OF 5 | | | | | |
| SL NO | COMPONENTS | CHARACTERISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | * | AGENCY | | | REMARKS |
| | | | | | | | | | | D | P | W | |
| 1.0 RAW MATERIALS & BOUGHT OUT ITEMS | | | | | | | | | | | | | |
| 1.1 | Body, Cover Bonnet / Yoke | Chemical & Mech. properties | Major | Chem. & Mech. Analysis | One per Heat | BHEL Specification / Approved Drawing / Data sheet | | MTC | ✓ | 2 | | 1&3 | |
| 1.2 | | Impact Test | Major | Destructive test | One per Heat | | | TC | ✓ | 2 | 2 | 1&3 | |
| 1.3 | | Heat Treatment | Major | HT chat review | 100% | | | HT chat | ✓ | 2 | 2 | 1&3 | |
| 1.4 | | RT/UT Test | Major | NDE | As per spec. | | | NDE Reports | ✓ | 2 | 2 | 1&3 | Note : 8 |
| 1.5 | | IGC | Major | IGC Test | One per Heat | | | TC | ✓ | 2 | 2 | 1&3 | Note : 9 |
| 1.6 | Trim (Stem, Seat, Flap / Disc, Hinge pin, arm, body seat, body seat ring, disc seat, disc nut, thrust plate, back seat bushing, Wedge, Spindle, back seat as applicable) | Chemical & Mech. properties | Major | Chem. & Mech. Analysis | One per Heat | | | MTC | ✓ | 2 | | 1&3 | |
| 1.7 | | MPI* | Major | NDT | 100% | | | TC | ✓ | 2 | 2 | 1&3 | *Other than SS material |
| 1.8 | | Hardness value | Major | Hardness Test | 100% | | | TC | ✓ | 2 | 2 | 1&3 | Note :10 |
| 1.9 | | IGC | Major | IGC Test | One per Heat | | | TC | ✓ | 2 | 2 | 1&3 | |
| 1.10 | Gaskets | Chemical & Mech. properties | Major | Chem. & Mech. Analysis | One per Heat | | | MTC | ✓ | 2 | | 1&3 | |
| 1.11 | | Visual, Dimensions, Type, Compressibility test etc. | Major | Visual & Measurement | 100% | | | TC | ✓ | 2 | 2 | 1&3 | |
| 1.12 | FASTENERS (Bolt, Nut, Stud, | Chemical & Mechanical Properties | Major | Chem. & Mech. Analysis | One per Heat | | | MTC | ✓ | 2 | | 1&3 | |

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| LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL (OR BHEL NOMINATED INSPECTION AGENCY), 2 FOR VENDOR/SUB VENDOR & 3 END USER / CUSTOMER AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS. | PREPARED BY | APPROVED BY | APPROVED BY |
| | VENDOR'S SIGNATURE & STAMP | BHEL QA SIGNATURE & STAMP | CUSTOMER'S SIGNATURE & STAMP |

| VENDOR'S NAME & ADDRESS: | | TYPICAL MANUFACTURING QUALITY PLAN | | | | | | | QAP. NO | | | | |
|--------------------------|---------------------------------------|---|----------|---------------------------------|------------------|---|------------------|------------------|---------|--------|--------|-----|-------------------------------|
| | | CUSTOMER: BHEL, HYDERABAD –32. | | | BHEL P.O.NO.: | | | REV NO: | | DATE: | | | |
| | | PROJECT: | | | P.O.DATE: | | | PAGE 2 OF 5 | | | | | |
| | | PRODUCT: Gate, Globe & Check Valve | | | BHEL SPEC: | | | REV: | | | | | |
| SL NO | COMPONENTS | CHARACTERISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | * D | AGENCY | | | REMARKS |
| | | | | | | | | | | P | W | V | |
| 1.13 | Eye Bolt etc.) | Visual, Dimensions, Heat Treatment, Type, Hardness etc. | Major | Visual & Measure. Hardness Test | 100% | | | TC | ✓ | 2 | 2 | 1&3 | |
| 1.14 | Accessories Like Gear / | Chemical & Mech. properties | Major | Chem. & Mech. Analysis | One per Heat | | | MTC | ✓ | 2 | | 1&3 | |
| 1.15 | Hand Wheel / Actuator | Make, Model & Operation | Major | Visual & Functional | 100% | | | TC | ✓ | 2 | 2 | 1&3 | |
| 1.16 | Gland Packing | Chemical & Mech. properties | Major | Chem. & Mech. Analysis | One per Heat | | | MTC | ✓ | 2 | | 1&3 | |
| 2.0 | INPROCESS INSPECTION | | | | | | | | | | | | |
| 2.1 | | Surface finish of Machining | Major | Visual | 100% | BHEL Specification / Approved Drawing / Data sheet | | IIR | ✓ | 2 | 2 | 1&3 | |
| 2.2 | Bonnet/bonnet/wedge/ seat ring/trim | LPI For Seating Surfaces, Welding Ends of Valves | Major | NDE | 100% | BHEL Specification / Approved Drawing / Data sheet | | NDE Report, TC | ✓ | 2 | 2 | 1&3 | |
| 2.3 | | Dimensions | Major | Measurements | 100% | | | IIR | ✓ | 2 | 2 | 1&3 | |
| 2.4 | SS & AS PARTS | PMI | Major | NDE | 100% | BHEL Specification / Approved Drawing / Data sheet | | IR | ✓ | 2 | 2 | 1&3 | |
| 3.0 | FINAL INSPECTION & TESTING | | | | | | | | | | | | |
| 3.1 | Valve Assembly | Visual Inspection, Dimensional check | Critical | Visual & measurement | 100% | MSS SP55/BHEL Specification / Approved Drawing / Data sheet | | IIR | ✓ | 2 | 1,2 &3 | | 10% shall be witnessed by 1&3 |

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| 3.2 | Valve Assembly | Hydro test for - a) body and bonnet b) seat c) back seat d) Air leak test | Critical | Pr. Testing | 100% | API 598 / BHEL Specification / Approved Drawing / Data sheet | | TC | ✓ | 2 | 1,2 &3 | | 10% shall be witnessed by 1&3 |
| 3.3 | | Gear Operation Check | Critical | Testing | 100% | BHEL Specification / Approved Drawing / Data sheet | | TC | ✓ | 2 | 1,2 &3 | | |
| 3.4 | | PMI Test | Critical | Testing | 100% | BHEL Specification / Approved Drawing / Data sheet | | IR | ✓ | 2 | 1,2 &3 | | Accessible parts of SS & AS Material |
| 3.5 | | Galvanization (Uniformity, Thickness of Coating etc.) | Major | Visual & Measurement | 100% | BHEL Specification / Approved Drawing / Data sheet | | TC / ITR | ✓ | 2 | 2 | 1&3 | for Galvanized Valve |
| 3.6 | | Name Plate Check / Tag No. | Critical | Visual & Doc Verification | 100% | | | IR | ✓ | 2 | 1,2 &3 | | 10% witnessed by 1&3 |
| 3.7 | | Fire Safe Test * | Critical | Type test | 100% | | | TC | ✓ | 2 | 2 | 1&3 | *If applicable |
| 3.8 | | IBR certification * | Critical | Verification | 100% | BHEL Specification / Approved Drawing / Data sheet/IBR Norms | | IBR certificate | ✓ | 2 | | 1&3 | *If applicable |
| 3.9 | | SPARES FOR VALVE | BOM & TC | Major | Visual & TC review | 100% | BHEL Specification / Approved Drawing / Data sheet | | TC | ✓ | 2 | 1&3 | |
| 4.0 | PRESERVATION & PACKING | | | | | | | | | | | | |
| 4.1 | Valve Assembly | Surface Preparation (Blast Cleaning) | Major | Visual & Match Card | 100% | BHEL Specification / Approved Drawing / Data sheet | | Log Book | ✓ | 2 | 2 | 1&3 | SA 2.5 Copper Grit |

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| 4.2 | Valve Assembly | Painting (Shade, DFT etc.) Marking | Major | Visual & DFT Measurement | Random | BHEL Specification / Approved Drawing / Data sheet | | IR | ✓ | 2 | 1,2 &3 | | Note: 12 |
| 4.3 | | Preservation and End Protection | Major | Visual | 100% | | | ITR | ✓ | 2 | 1,2 &3 | | 10% witnessed by 1&3 Note: 13 |
| 4.4 | | Packing* | Major | Visual | Random | | | BHEL Specification / Approved Drawing / Data sheet | Packing list | ✓ | 2 | 1,2 &3 | |

Notes:-

1. This QAP should be read along with specification (latest revision), approved drawings & approved data sheet.
2. Specification/drawing/data sheet shall prevail over quality plan for contradiction if any between Quality plan and drawing/specification.
3. All test certificates/reports reviewed and certified by TPI/BHEL shall be submitted to BHEL as documentation package.
4. Any project/customer specific requirements, which shall be notified, have to be fulfilled by the vendor at the time of execution of order.
5. Material test certificate shall include tensile, impact, hardness, bend, IGC, hot tensile, grain size, chemical analysis etc. as required by applicable material code / approved drawing /data sheet.
6. Welding shall be done as per approved WPS if involved.
7. One product analysis of each heat shall be carried out and reported. Chemical analysis shall be as per applicable specification with carbon content not exceeding 0.23% and Carbon Equivalent (Ce) shall not exceed 0.43.
8. Radiography Test (min 2 shots in diff. directions) for Castings and Ultrasonic Test for Forgings as per ASME B 16.34. RT & UT- Quantum of check is as per spec AA0851403, Cl. No 5.4.1 and 5.4.2 of Table 3.
9. IGC test as per ASTM A262 Practice B/E and Microscopic Structure Examination at 250X Magnification for SS Valves.
10. Hardness values as per the technical delivery conditions for valves spec. AA0851403, Cl. No 2.6 of Table I.
11. Hydro test shall be done in un-painted condition as per approved procedure/relevant code.
12. Marking inspection as per the technical delivery conditions for valves spec AA0851403, Cl. No 10.
13. Preservation inspection as per the technical delivery conditions for valves spec AA0851403, Cl. No 11 & 12

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14. NACE requirement: For valves coming under NACE category, all tests, reports, MTC and certificates shall be submitted as per NACE requirements (MR0103).
Valve material should be resistance to Sulfide Stress Cracking and Stress Corrosion Cracking in sour environment.
15. All lab reports shall be from NABL accredited lab.

Abbreviations:-

MTC – Material Test certificate,
IIR – Internal Inspection Report
DFT – Dry Film Thickness

TC – Test Certificate,
IBR – Indian Boiler Regulations
NDE – Non Destructive Examination

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**PROJECT ENGINEERING & SYSTEMS DIVISION
RC PURAM, HYDERABAD.
QUALITY & BUSINESS EXCELLENCE**

INSPECTION / TC REVIEW FORMAT

| | | | | | |
|---|-------------------|--|---|--------------------------|--|
| 1 | Vendor's Name: | | 5 | Applicable BHEL Spec No: | |
| 2 | Project: | | 6 | Approved Drawing No: | |
| 3 | PO No: | | 7 | Approved Data Sheet No: | |
| 4 | Item Description: | | 8 | Approved QAP No: | |

OFFER LIST

| S.No | BBU/ PO Sr. No. | Item Description | Total Qty as per PO/BBU | Qty. already accepted | Qty offered for TC review | Cumulative Qty | Balance Qty |
|------|-----------------|------------------|-------------------------|-----------------------|---------------------------|----------------|-------------|
| A | | | | | | | |
| B | | | | | | | |
| C | | | | | | | |
| D | | | | | | | |

TC REVIEW REQUISITION

| BBU / PO Sr. No. | QAP Clause No. | Format of Record | Certificate No. & Date | Page No. | REMARKS |
|-----------------------------|----------------|------------------|------------------------|----------|---------|
| A. Item Description: | | | | | |
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| B. Item Description: | | | | | |
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| C. Item Description: | | | | | |
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| D. Item Description: | | | | | |
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| E. Item Description: | | | | | |
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| <p>SUPPLIER / VENDOR SIGNATURE WITH SEAL</p> <p>Dt:</p> | <p>BHEL/ BHEL's TPIA SIGNATURE WITH SEAL</p> <p>Dt:</p> |
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QAP GUIDELINES & FORMAT

(ANNEXURE -)


The QAP format and guidelines for filling up the format shall be used by vendor for preparation and submission of QAP after order placement.


Note :

1. Typical /Indicative /Standard QAP(s) for equipment /package attached is reference document and to use by successful bidder in future for preparation and submission of detailed QAP for BHEL /CUSTOMER approval.
2. No deviation to Typical /Indicative /Standard QAP is acceptable.

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|--|--|---|--|-----------|
| | Form No. |  HYDERABAD | <p align="center">PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD</p> | ANNEXURE- |
| <p align="center">COPYRIGHT AND CONFIDENTIAL</p> <p>The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.</p> | | <p align="center"><u>GUIDELINES TO VENDORS FOR PREPARATION OF QUALITY ASSURANCE PLAN</u></p> <ol style="list-style-type: none"> 1. QAP shall be made in landscape mode on A4 size paper as per the format enclosed. Font size shall be minimum 10. 2. Each page of QAP shall contain the following information. <ol style="list-style-type: none"> a) Vendor's name & address. b) Customer: BHEL, Hyderabad. c) Project. d) BHEL Product Standard Number/revision number as referred in P.O. e) BHEL Purchase Order Number & Date. f) Product as per P.O. description. g) QAP Number (unique and shall not repeat)/revision number/date. h) Page number and number of pages 3. QAP shall contain four parts / stages as follows. <ol style="list-style-type: none"> a) Raw materials and bought out items. b) In process Control / Inspection. c) Final assembly, Inspection & Testing. d) Painting, preservation & packing. 4. Under 'Component', indicate name of the component (say casing, rotor, pressure gauge, etc). 5. Under 'Characteristics', indicate appropriately (say chemical analysis, mechanical properties, NDT (UT,DP etc.), hydrostatic test, calibration check etc.) 6. Under 'Class', indicate minor, major or critical depending on the importance of characteristic. 7. Under 'Type of check', indicate appropriately (say chemical, mechanical, UT, DP etc.) 8. Under 'Quantum of check', indicate appropriately (say 100%, 10%, sample, per melt, per heat, all pieces etc.) 9. Under 'Reference document' and 'Acceptance norms', appropriate National & International standards, BHEL standards, approved drawing references etc. should be indicated. It is not correct to mention as "Vendor's internal standards or Vendor's standard practice etc.". If vendors' internal standards are referred, same shall be in line with BHEL Spec. indicated in the P.O. These may require review & approval by our Engineering dept. | | |
| Ref. Doc | <ol style="list-style-type: none"> 10. Under 'Format of record', indicate appropriately supplier's test certificate, calibration certificate, lab report, inspection report etc. 11. Please refer 'Agency' in QAP format. Under P: Perform, W: Witness, V: Verify Indicate against each characteristic 1: (BHEL CQS/Nominated inspection agency), OR | | | |

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| COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company. | | <p>2: (Vendor / Sub vendor) Note: Performing agency is normally vendor or his sub vendor (Legend 2). Where witness points are indicated in specification, P.O., Drawing etc., for such operations, under Witness (W) column use 1. Under 'Verify' column, use code1.</p> <p>12. Under 'D' please put (<input type="checkbox"/> Tick) against each characteristic where vendor proposes to submit test certificate/report etc. OR as required as per BHEL Specification.</p> <p>13. Vendor's signature & stamp should be available on each page of QAP.</p> <p>14. Vendor should read the BHEL Product Standard thoroughly and QAP should be made only inline and relevant to the Specification & Approved Drawings.</p> <p>15. The following operations/characteristics/check points may be included (AS APPROPRIATE)</p> <ul style="list-style-type: none"> a) Visual check b) Dimensional check c) Mechanical and Chemical properties. d) Surface preparation before painting (by chemical cleaning, sand blasting, shot blasting etc. as the case may be.) e) Painting check for shade, Dry Film Thickness (DFT), Adhesion/ peel off test etc. f) Check for correctness for all components mounted as per General arrangement Drawing, Bill Of Materials (BOM), etc. for range, rating, make, color, size, location as per GA, quantity, label description including tag nos., annunciator facia, loose components, accessories, spares etc. g) Verification of test certificate for protection class for the enclosures. h) Mechanical functioning of switches. i) Continuity of earthing and provision of earth points. j) Colour coding of wiring, size, tightness & dressing of wiring. k) Review of test certificates of assembled items, raw materials, internal test reports etc. l) Witness of functional checks, which may include mechanical run & electrical run, H.V.test, IR measurement, Electrical and Mechanical tests etc. m) PQR, WPS, Welder Qualification Record, welding records (fit up, DP) etc. n) Material identification (for punch marks of serial numbers, Heat No, Melt No, Inspector's stamp etc.) o) Hydraulic Pressure Test, Pneumatic Pressure Test, Liquid Penetration Examination and other Non Destructive Tests. p) Tests on Galvanised items (Visual, Hammer Test, Knife Test, Thickness, Pierce Test (Copper sulphate test), Hydrogen evaluation test, Stripping test (for Mass of Zinc coating) q) All tests as per BHEL Product Standard & approved drawings including Type tests and Routine tests on individual items and on System as a whole. r) For loose items, test certificate or COC is required. s) Packing and Preservation. <p>16. QAP Format enclosed.</p> <p>17. Typical Manufacturing QAP is attached.</p> | Page 3 of 3 |
| | Ref. Doc | | |

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| 2.0 | INPROCESS INSPECTION | | | | | | | | | | | | |
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| 3.0 | FINAL INSPECTION & TESTING | | | | | | | | | | | | |
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| 4.0 | PRESERVATION & PACKING | | | | | | | | | | | | |
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VENDOR TO NOTE: THIS FORMAT IS IN MICROSOFT WORD. HEADER & FOOTER SHALL BE AVAILABLE IN EACH PAGE OF QP. QP SHALL BE IN LANDSCAPE & A4 SIZE ONLY. FONT SIZE SHALL BE MIN 10. VENDOR SHALL SIGN & STAMP IN EACH PAGE OF QP. LOI REF. & DATE ARE NOT ACCEPTABLE. P.O.NO. & DATE SHALL BE INDICATED. QP NO. SHOULD BE UNIQUE AND SHALL NOT REPEAT. ALL THE TESTS / CHECKS INDICATED IN THE BHEL SPEC. SHALL BE INDICATED IN THE QP.

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