



## QAP GUIDELINES & FORMAT

(ANNEXURE-2)


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 QAP for BHEL /CUSTOMER approval.
2. No deviation to reference document is acceptable.

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<b>COPYRIGHT AND CONFIDENTIAL</b> 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><b><u>GUIDELINES TO VENDORS FOR PREPARATION OF QUALITY ASSURANCE PLAN</u></b></p> <ol style="list-style-type: none"> <li>1. QAP shall be made in landscape mode on A4 size paper as per the format enclosed. Font size shall be minimum 10.</li> <li>2. Each page of QAP shall contain the following information. <ol style="list-style-type: none"> <li>a) Vendor's name &amp; address.</li> <li>b) Customer: BHEL, Hyderabad.</li> <li>c) Project.</li> <li>d) BHEL Product Standard Number/revision number as referred in P.O.</li> <li>e) BHEL Purchase Order Number &amp; Date.</li> <li>f) Product as per P.O. description.</li> <li>g) QAP Number (unique and shall not repeat)/revision number/date.</li> <li>h) Page number and number of pages</li> </ol> </li> <li>3. QAP shall contain four parts / stages as follows. <ol style="list-style-type: none"> <li>a) Raw materials and bought out items.</li> <li>b) In process Control / Inspection.</li> <li>c) Final assembly, Inspection &amp; Testing.</li> <li>d) Painting, preservation &amp; packing.</li> </ol> </li> <li>4. Under 'Component', indicate name of the component (say casing, rotor, pressure gauge, etc).</li> <li>5. Under 'Characteristics', indicate appropriately (say chemical analysis, mechanical properties, NDT (UT,DP etc.), hydrostatic test, calibration check etc.)</li> <li>6. Under 'Class', indicate minor, major or critical depending on the importance of characteristic.</li> <li>7. Under 'Type of check', indicate appropriately (say chemical, mechanical, UT, DP etc.)</li> <li>8. Under 'Quantum of check', indicate appropriately (say 100%, 10%, sample, per melt, per heat, all pieces etc.)</li> <li>9. Under 'Reference document' and 'Acceptance norms', appropriate National &amp; 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 &amp; approval by our Engineering dept.</li> <li>10. Under 'Format of record', indicate appropriately supplier's test certificate, calibration certificate, lab report, inspection report etc.</li> </ol>		
	Ref. Doc	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 2: (Vendor / Sub vendor)	

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<b>COPYRIGHT AND CONFIDENTIAL</b> 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>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 code 1.</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 &amp; 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 &amp; Approved Drawings.</p> <p>15. The following operations/characteristics/check points may be included (AS APPROPRIATE)</p> <ul style="list-style-type: none"> <li>a) Visual check</li> <li>b) Dimensional check</li> <li>c) Mechanical and Chemical properties.</li> <li>d) Surface preparation before painting (by chemical cleaning, sand blasting, shot blasting etc. as the case may be.)</li> <li>e) Painting check for shade, Dry Film Thickness (DFT), Adhesion/ peel off test etc.</li> <li>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.</li> <li>g) Verification of test certificate for protection class for the enclosures.</li> <li>h) Mechanical functioning of switches.</li> <li>i) Continuity of earthing and provision of earth points.</li> <li>j) Colour coding of wiring, size, tightness &amp; dressing of wiring.</li> <li>k) Review of test certificates of assembled items, raw materials, internal test reports etc.</li> <li>l) Witness of functional checks, which may include mechanical run &amp; electrical run, H.V.test, IR measurement, Electrical and Mechanical tests etc.</li> <li>m) PQR, WPS, Welder Qualification Record, welding records (fit up, DP) etc.</li> <li>n) Material identification ( for punch marks of serial numbers, Heat No, Melt No, Inspector's stamp etc.)</li> <li>o) Hydraulic Pressure Test, Pneumatic Pressure Test, Liquid Penetration Examination and other Non-Destructive Tests.</li> <li>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)</li> <li>q) All tests as per BHEL Product Standard &amp; approved drawings including Type tests and Routine tests on individual items and on System as a whole.</li> <li>r) Packing and Preservation.</li> </ul> <p>16. <b>QAP Format enclosed.</b></p> <p>17. <b>Typical Manufacturing QAP(s) is /are attached.</b></p>		
	Ref. Doc			





**TYPICAL MANUFACTURING QUALITY PLAN**

MQP. NO.:

PROJECT ENGINEERING & SYSTEMS DIVISION  
BHEL,  
RC PURAM, HYD-502032

PROJECT:  
PACKAGE: **SOLENOID VALVE**

REV NO:

DATE:

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SL NO	COMPONENT S	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
										D	P	W	

1	<b>RAW MATERIAL</b> Gehause, Deckel	Material composition check	Major	Chemical Analysis	Sample or Heat lot	NIL	Relevant IS/ DIN/ ASTM standard for metal.	Approved Drawing.	Manufactures Tests Certificate or Lab Test Reports.	P	R		Review of Certificates for parts of respective valve.
2	<b>DIMENSION</b> Overall Dimension / Assembly	Dimensions	Major	Physical Dimension Measurement.	As per Inspection procedure Master Card	NIL	ROTEX Drawings	Dimensions as per GA drawing.	Internal Inspection Report.	P	R		Review of Report.
3	<b>ASSEMBLY : OPERATION OF VALVE</b>												
3(a)	Actuation Test	Checking operational performance	Major	Visual	100%	NIL	Refer Test Procedure P-I	Capacity as per Data Sheet/ Spec.of Valve	Internal Inspection Report	P	R		Review of Report.
3(b)	Seat Leakage Test at rated pressure	Checking seat Tightness	Major	Visual	100%	NIL	Refer Test Procedure P-II	No leakage bubble tight shutt off or as agreed upon	Internal Inspection. Report	P	R		Review of Report.
3(c)	Flow through the Valve.	Testing Valve Assembly for Flow	Major	Visual	One of each design	NIL	Refer Test Procedure P-III	+/- 10% capacity as per Data sheet/ Specification	Internal Inspection Report	P	R		Review of Report.

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL CQS (OR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR 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.



**TYPICAL MANUFACTURING QUALITY PLAN**

MQP. NO.:  
 REV NO:                      DATE:  
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PROJECT ENGINEERING & SYSTEMS DIVISION  
 BHEL,  
 RC PURAM, HYD-502032

PROJECT:  
 PACKAGE: **SOLENOID VALVE**

SL NO	COMPONENT S	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
										D	P	W	

3(d)	Body Hydro Test (Not applicable for Valve type 24108, 24106, 24113)	Checking Leakage through joint	Major	Visual	5% of the lot.	NIL	Test Procedure P-IV	No leakage through joints/ Distortion	Internal Inspection Report		P	R	Review of Report.
4	<b>ELECTRICAL TEST</b> ( Applicable to Solenoid (Coil Assembly) only)												
4(a)	High Voltage Test	Capacity to withstand high	Major	Visual	100%	NIL	IS 8935 Refer Test Procedure E-I.	Coil should withstand 2000 Volts, 50Hz supply for one minute.	Internal Test Report		In house P	R	Review of Report.
4(b)	Insulation Resistance	Insulation Check.	Major	Measurement	100%	NIL	IS 8935 Procedure E-II.	More than 100 Mega Ohms at 500V DC.	Internal Test Report		In house P	R	Review of Report.
4(c)	Temperature Rise Test (Not applicable for Intrinsically Safe & Low Power Coils)	Temperature Rise at rated voltage.	Major	Electricals	One of each design.	NIL	Refer Test Procedure E-III	As per Test Procedure	Internal Test Report		In house P	R	Review of Report.
4(d)	Pick Up & Drop Out Voltage Test	Pick Up & Drop Out Voltage on the hot coil	Major	Measurement	100%	NIL	As per data sheet/specification Refer Test Procedure E-IV	As per Test Procedure	Internal Test Report		In house P	R	Review of Report.

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		<b>TYPICAL MANUFACTURING QUALITY PLAN</b>						MQP. NO.:						
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PROJECT: PACKAGE: <b>SOLENOID VALVE</b>			REV NO:		DATE:				
										PAGE 4 OF 4				
SL NO	COMPONENT S	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS	
										D	P	W	V	

SR. NO.	COMPONENT AND OPERATION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK BY ROTEX	QUANTUM OF CHECK BY CUSTOMER	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
										M	C		
4(e)	Degree of Protection	Degree of protection	Major	Test	Sample Type Test	NIL	Relevant Standard	Relevant Standard. IS/IEC-60529 & Approved Data Sheet	Test Report	P	R		Review of Report.
4(f)	Flame Proof Solenoid (Applicable for Exd only)	Flame Proof Test	Major	Test	Sample Type Test	NIL	Relevant Standard	Relevant Standard. IS/IEC-60079	Test Report KLPL & PESO	P	R		Review of Report.

**LEGEND :**


**P = PERFORM**  
**W = WITNESS**  
**R = REVIEW**

**M = MANUFACTURERS**  
**C = CUSTOMER QC**

**Abbreviations: -**

MTC -	Material Test certificate	WPS -	Welding Procedure Specification
IBR -	Indian Boiler Regulations	PQR -	Procedure Qualification Record
DFT -	Dry Film Thickness	WPQ -	Welder Performance Qualification
TC -	Test Certificate	NDE -	Non Destructive Examination
IS -	Indian Standards	UTS -	Ultimate Tensile Strength
G. I -	Galvanized Iron	YS -	Yield Strength
EL. -	Elongation	ID -	Internal Diameter
PMI -	Positive Material Identification	OD -	Outer Diameter

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		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PROJECT: PACKAGE: <b>SOLENOID VALVE</b>			REV NO:	DATE:				
									PAGE 4 OF 4				
SL NO	COMPONENT S	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
									D	P	W	V	

**NOTES:**

1. This Standard MQP should be read along with specification (latest revision as per PO), approved drawings & approved datasheet, approved BOM (as applicable).
2. Approved drawing/datasheet & specification shall prevail over quality plan in case contradiction if any.
3. Material test certificate shall include tensile, impact, hardness, bend, IGC, hot tensile, grain size, chemical analysis etc. as required by applicable material code /approved drwg./data sheet.
4. WPS/PQR/WPQ to be submitted for review wherever required. All welding shall be done by qualified welders. Duly endorsed documents will be submitted to BHEL/TPIA's review.
5. Hydro test shall be done in un-painted condition as per approved procedure/relevant code.
6. Any other tests/ checks indicated in specification, P.O., or drawing/data sheet & any additional checks envisaged by BHEL/Customer as part of correspondence to ensure workmanship, finish, aesthetics, etc. shall also be conducted and witnessed/verified by BHEL /TPIA /Customer as per project requirement.
7. All documents issued by statutory authorities such as CCOE /IBR, CMRI, ATEX etc., shall be submitted during inspection.
8. Only type test certificate of same design and same Material of Construction of equipment to be submitted, wherever required.
9. All the relevant test reports /certificates shall be submitted during inspection. The reviewed and certified documents by BHEL/TPIA/Customer shall be submitted to BHEL as documentation package.
10. All sub-ordered items, bought out items, electrical & instrumentation Items shall be procured from approved / agreed vendor list with BHEL/BHEL's Customer.

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