


# Annexure-19

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## Typical QAP & Guidelines for QAP

**PROJECT: 1X370 MW YELAHANKA COMBINED CYCLE  
POWER PLANT**


		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.: SMQP/GCS/29102014					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: GAS CONDITIONING SKIDS			REV NO: 00		DATE:			
								PAGE 1 OF 7					
SL NO	COMPONENT S	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	

<b>1.0</b>	<b>RAW MATERIALS &amp; BOUGHT OUT ITEMS</b>												
1.1	Steels, Structures	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	MTC	√	2		1	
1.2	Pipes	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat			MTC/TC	√	2		1	
1.21		Hydro Test	Major	Hydro Test	100%				√	2		1	
1.3	Pipe Fittings	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat			MTC, NDE Report	√	2		1	
1.31		NDE #	Major	MPI/LPT	20%				√	2		1	# Refer Note:1
1.4	Flanges	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat			MTC/ TC	√	2		1	
1.41		Rating, Type etc.	Major	Visual	100%				√	2		1	
1.5	Plates	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat			MTC	√	2		1	
1.51		UT if thickness >=16mm	Major	Chem., Mech. Analysis	100%			IR	√	2		1	
1.6	Valves	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat			MTC/TC, NDE Report, Type Test	√	2		1	


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


<div>बी एच ई एल</div> <div>BHEL</div>		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.: SMQP/GCS/29102014					
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										P	W	V	
1.61		Hydro Test, NDE, Fire Safe certificate, etc. #	Major	Hydro, NDE	As per BHEL Spec/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	Certificate	√	2		1	# as applicable
1.7	Control Valves	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat			MTC/TC, NDE Report, Type Test Certificate	√	2		1	
1.71		Seat Leakage test, Hydro test, Cv test, Actuator pneumatic test, Functional, Completeness#	Major	TC Review	100%			MTC/TC, NDE Report, Type Test Certificate	√	2		1	# as applicable
1.8	Safety Relief Valve	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat			MTC/TC,	√	2		1	
1.81		Hydro Test, Set Pressure Test	Major	Hydro, Functional	100%				√	2		1	
1.9	Instruments	Chemical & Mechanical Properties, Calibration	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat, 100%			MTC/TC, Type Test Certificate	√	2		1	
1.91		Hydro test(as applicable), Type Test(Weather Proof & Hazardous area certification etc.)#	Major	Hydro, Type Test	100%				√	2		1	# as applicable
1.10	Junction Box	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat			MTC/TC, Type Test Certificate	√	2		1	

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		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PRODUCT: <b>GAS CONDITIONING SKIDS</b>			REV NO: 00		DATE:			
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SL NO	COMPONENT S	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.10.1		Type Tests (Weather Proof & Hazardous area certification etc.)	Major	Type Test	100%				√	2		1	
1.11	Strainer	Chemical & Mechanical Properties ,Rating, Hydro Test	Major	Chem., Mech. Analysis, Hydro test	One per Lot/Batch /Heat, 100%	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	MTC/TC	√	2		1	
1.12	Filter Elements	Chemical & Mechanical Properties, Degree of filtration	Major	Chem., Mech. Analysis, Testing	One per Lot/Batch /Heat			MTC	√	2		1	
1.13	Cable & Cable Gland	Chemical & Mechanical Properties, Routine test, Type test	Major	Chem., Mech. Analysis	One per Lot/Batch /Heat			MTC	√	2		1	
1.14	Local Gauge Board	Chemical Analysis, Routine tests, Weather proof protection	Major	Chem. Analysis, Routine test, IP Cert.	100%			MTC, TC	√	2		1	
1.15	Heater Element, Baffle Plate, Terminal box	Chemical & Mechanical Properties, Type test (IP, Ex-proof)	Major	Visual	100%			MTC, TC	√	2		1	
1.16	Gaskets , Fasteners, Lugs	Chemical & Mechanical Properties	Major	Visual	100%			MTC, TC	√	2		1	


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SL NO	COMPONENT S	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
1.17	Instruments Tubing, Ferrule, Bite coupling and Fitting	Chemical & Mechanical Properties	Major	Chem., Mech. Analysis	100%			MTC	√	2		1	
<b>2.0 INPROCESS INSPECTION</b>													
2.1	For SS & AS Material	PMI	Major	PMI Check	Random	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	TC	√	2	1	-	
2.2	Fabrication of vessels and piping	WPS, PQR, WQR	Major	Doc. Verification	100%			WPS, PQR, WQR	-	2	-	1	
2.21		Fit up of shell, shell to disc ends, shell to nozzle, nozzle to flange etc.	Major	Doc. Verification	100%			Log book/register /IR	√	2		1	
2.3	NDE on Welds	Radiography	Major	RT	As per BHEL Spec			NDE Reports, IR	√	2	-	1	
2.31		Liquid penetrant	Major	LPT					√	2	1	-	
2.4	Vessels and Piping	Thickness check	Major	Thickness check	Random			TC/IR	√	2	1	-	
2.41	Hydro test of vessels and piping	Hydro Test	Major	Hydro Test	100%			TC	√	2	1	-	
2.5	Skid Assembly	Visual, Dimension, Alignment and Orientation	Major	Visual, Measurement	100%			IR	-	2	2	-	
<b>3.0 FINAL INSPECTION &amp; TESTING</b>													
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										P	W	V	
<b>A</b>	<b>SCRUBBER AND FILTER SEPERATOR SKID</b>												
3.1	Skid Assembly	Visual, Dimensional, Alignment, BOM	Major	Visual, Measure ment	100%	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	IR	√	2	1, 3		
3.12		Hydro test of assembled skid	Critical	Hydro Test	100%			IR	√	2	1, 3		
3.13		Pneumatic leak test of assembled skid	Major	Hydro Test	100%			IR	√	2	1, 3		
<b>B</b>	<b>ELECTRIC HEATER SKID</b>												
3.2	Skid Assembly	Visual, Dimensional, Alignment, BOM	Major	Visual, Measure ment	100%	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	IR	√	2	1		
3.21		Hydro test of assembled skid	Critical	Hydro Test	100%			IR	√	2	1		
3.22		Pneumatic leak test of assembled skid	Major	Pneumatic Test	100%			IR	√	2	1		
3.23		HV/IR , Resistance, Wattage test	Major	Testing	100%			IR	√	2	1		
3.3	Control Panel /System	Demonstration of proper functioning of all hardware, Alarm simulations, Operator interface functions etc.	Major	Functional	100%			IR	√	2	1		
<b>C</b>	<b>STEAM HEATER SKID</b>												
3.3	Skid Assembly	Visual, Dimensional, Alignment, BOM	Major	Visual, Measure ment	100%	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	IR	√	2	1		
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3.31		Hydro test of assembled skid	Critical	Hydro Test	100%			IR	√	2	1		
3.32		Pneumatic leak test of assembled skid	Major	Hydro Test	100%			IR	√	2	1		
D	FINE FILTER SKID												
3.4	Skid Assembly	Visual, Dimensional, Alignment, BOM	Major	Visual, Measure ment	100%	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	IR	√	2	1		
3.41		Hydro test of assembled skid	Critical	Hydro Test	100%			IR	√	2	1		
3.42		Pneumatic leak test of assembled skid	Major	Hydro Test	100%			IR	√	2	1		
E	Coalescent Filter SKID												
3.5	Skid Assembly	Visual, Dimensional, Alignment, BOM	Major	Visual, Measure ment	100%	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	IR	√	2	1		
3.51		Hydro test of assembled skid	Critical	Hydro Test	100%			IR	√	2	1		
3.52		Pneumatic leak test of assembled skid	Major	Hydro Test	100%			IR	√	2	1		
3.6	Commissioning / Mandatory Spares	Visual, TC verification	Major	Visual, Doc. Verificati on	100%	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	IR	√	2	1		10% witness by BHEL
4.0	PRESERVATION & PACKING												
4.1		Surface preparation, Painting (Shade, DFT)# Marking	Major	Visual, Measure ment	Random	BHEL Spec/ Appd. Dwgs/ Datasheet	BHEL Spec/ Appd. Dwgs/ Datasheet	TC	√	2	1		#as applicable

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										P	W	V	
4.2		Packing#	Major	Visual	Random			Packing List	✓	2		1	# Sea worthy packing in case of Export orders

**Notes:-**


- MPI/LPT Should be carried on Knuckle of Reducers, Outer bend portion of Elbows and Neck portion of Tees.  
a) CS & AS ( $\geq 2"$ ) Material – MPI      b) SS Material ( $\geq 2"$ ) – LPT.
- This Standard MQP should be read along with specification (Latest revision as per PO), approved drawings & approved datasheet.
- Drawing/datasheet shall prevail over quality plan for contradiction if any.
- All type test reports submitted shall not be older than 5 yrs from the date of purchase order.
- Any project/customer specific requirements which shall be notified have to be fulfilled by the vendor at the time of execution of order.
- The applicability of above items/products depends on scope of supply. Same to be considered accordingly during inspections.


**Abbreviations:-**


MTC	-	Material Test certificate	WPS	-	Welding Procedure Specification
PQR	-	Procedure Qualification Record	MPI	-	Magnetic Particle Inspection
WPQ	-	Welder Performance Qualification	LPT	-	Liquid Penetrant Test
NDE	-	Non Destructive Examination	TC	-	Test Certificate
PMI	-	Positive Material Identification	CS	-	Carbon Steel
SS	-	Stainless Steel	DFT	-	Dry Film Thickness
IR	-	Inspection Report			

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TD-201 Rev No. 00 Form No.	 HYDERABAD	<b>PRODUCT STANDARD</b> PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE
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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.	<div>QAP GUIDELINES &amp; FORMAT</div> <div>( ANNEXURE - )</div> <p>The QAP format and guidelines for filling up the format shall be used by vendor for preparation and submission of QAP after order placement.</p> <p><b>Note :</b></p> <ol style="list-style-type: none"><li>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.</li><li>2. No deviation to reference document is acceptable.</li></ol>		

Form No.	 HYDERABAD	<b>PRODUCT STANDARD</b> PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE Rev No. 00 Page 2 of 3
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 style="text-align: center;"><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>		
	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)		

Form No.	 HYDERABAD	<p align="center"><b>PRODUCT STANDARD</b></p> <p align="center">PROJECT ENGINEERING &amp; SYSTEMS DIVISION HYDERABAD</p>	ANNEXURE Rev No. 00 Page 3 of 3
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>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 &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 is attached.</b></p>		
	Ref. Doc		

VENDOR'S NAME & ADDRESS:			<b>MANUFACTURING QUALITY PLAN</b>						QP. NO.:						
			CUSTOMER: BHEL, HYDERABAD – 32.			BHEL P.O.NO.:			REV NO:		DATE:				
			PROJECT:			P.O.DATE:									
			PRODUCT:			BHEL SPEC:			REV:		PAGE 1 OF 1				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS		
										P	W	V			
1.0	<b>RAW MATERIALS &amp; BOUGHT OUT ITEMS</b>														
2.0	<b>INPROCESS INSPECTION</b>														
3.0	<b>FINAL INSPECTION &amp; TESTING</b>														
4.0	<b>PRESERVATION &amp; PACKING</b>														

**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.

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.	PREPARED BY	APPROVED BY	APPROVED BY
	VENDOR'S SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP