

VENDOR'S NAME & ADDRESS:		TYPICAL MANUFACTURING QUALITY PLAN							QP. NO.:					
		END CUSTOMER: CONSULTANT: CONTRACTOR: BHEL HYDERABAD-32 PROJECT: PRODUCT: PIPE				BHEL P.O.NO.: P.O.DATE: BHEL SPEC:			REV:		REV NO: 00		DATE:	
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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	RAW MATERIALS & BOUGHT OUT ITEMS													
	Raw Material (Mother Hollow, Billets, Plate, Sheet, Strip etc.)	Mechanical & Chemical Properties	Major	Mech., Chem. Analysis	One per Lot/Batch /Heat	BHEL Spec	BHEL Spec	MTC	√	2		1		
2.0	INPROCESS INSPECTION													
2.1	PIPES	Heat Treatment	Major	TC Review	One per Lot/Batch /Heat	BHEL Spec/ Approved drawing/ datasheet	BHEL Spec/ Approved drawing/ datasheet	TC, HT Chart	√	2	2	1	Not applicable for MS pipe	
2.2		WPS, PQR, WPQ*	Major	Doc. Review	100%			WPS,PQR, WPQ	--	2		1	*for manually Welded pipes	
2.3		NDE*	Critical	RT/UT /LP	As per BHEL Spec			NDE Reports	√	2		1	*If applicable	
3.0	FINAL INSPECTION & TESTING													
3.1	PIPES	Mechanical Analysis (UTS, YS, EL, BEND/Flattening)	Major	Mech. Analysis	One per Lot/Batch /Heat	BHEL Spec/ Approved drawing/ datasheet	BHEL Spec/ Approved drawing/ datasheet	MTC	√	2	1	1		
3.2		Chemical Analysis	Major	Chem. Analysis	One per Lot/Batch /Heat			MTC	√	2		1		
3.3		Dimensional (OD, ID, Length, Thickness, Edge preparation, Straightness, ovality, mass, etc.)	Critical	Measure ment	100%	BHEL Spec/ Approved drawing/ datasheet	BHEL Spec/ Approved drawing/ datasheet	TC	√	2	1	1	10% Witness by BHEL/BHEL's TPIA	

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	VENDOR'S SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP

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3.4		Visual inspection, appearance, workmanship, surface defect, identification marking, etc	Critical	Visual	100%	BHEL Spec/ Approved drawing/ datasheet	BHEL Spec/ Approved drawing/ datasheet	IR							
3.5		Hydrostatic Test/Non Destructive Electric test	Critical	Hydro Test ET/UT	100%			TC	√	2	1	1	10% shall be witnessed by 1.Refer Note-4		
3.6		IBR Certificate*	Critical	TC Review	100%			TC	√	2	-	1	*For IBR pipes		
3.7		PMI*	Critical	PMI test	100%	ASTM E 572 /API 578	ASTM E 572 /API 578	TC	√	2	1	1	For SS & AS pipe.10% witness by "1"		
3.8		IGC test	Major	IGC test	Highest thickness & highest carbon/HT lot	ASTM A262	ASTM A262 Practice E	Lab report	√	2		1	Refer Note-8		
3.9		Pickling and passivation	Major	Visual	100%	ASTM A380	ASTM A380	TC	√	2		1	For SS & AS pipe		

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3.10		Galvanizing (Coating weight, thickness uniformity, Adherence)	Critical	Strip test, Pierce test, Bend/ Pivot hammer test	IS 4736	IS 4736	IS 4736	TC	√	2	1		*for G.I Pipe
4.0	PRESERVATION & PACKING												
4.1		Painting*, (Shade, DFT Check) Marking	Major	Visual, Measurement	100%	BHEL Spec/Approved drawing/data sheet	BHEL Spec/Approved drawing/data sheet	TC	√	2	1		*if applicable
4.2		Packing*	Major	Visual	100%	BHEL Spec/Approved drawing/data sheet	BHEL Spec/Approved drawing/data sheet	Packing List	√	2		1	Refer Note-5

Notes:-

1. This MQP should be read along with specification, approved drawings & approved datasheet. (Latest revisions to be considered as per PO).
2. Drawing/datasheet shall prevail over quality plan for contradiction if any.
3. Any project/customer specific requirements, which shall be notified, have to be fulfilled by the vendor at the time of execution of order.
4. Both Hydro and Non Destructive Electric test shall be carried out in case of CS A53 type E pipe.
5. Seaworthy packing if applicable shall be **witnessed** BHEL/BHEL nominated inspection agency for overseas project.
6. **NACE pipe requirement:** For pipes coming under NACE category, all tests, reports, MTC and certificates shall be submitted as per NACE requirements. HIC test is required for prequalification. All material after cold forming shall be thermally stress relieved to meet a hardness requirement of maximum 200 BHN. Metallography & Microstructure examination, PWHT & Hardness test shall be carried out.
7. End Customer/Consultant inspection if any shall be intimated during quality plan approval.
8. IGC test for austenitic stainless steel shall be conducted in a NABL approved lab as follows:IGC practice" E " with acceptance criteria of "No crack observed from 20X magnification and microstructure to be observed at 250X magnification to ensure absence of any crack/fissure.Photograph of microstructure shall be submitted for records.Two samples shall be drawn from each solution annealing lot,,one correspond to highest carbon and other corresponding to highest thickness.

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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
Appd.				YS	–	Yield Strength
Dwg.	–	Approved Drawing		EL.	–	Elongation
PMI	–	Positive Material Identification		OD	–	Outer Diameter
G.I	–	Galvanized Iron		ID	–	Internal Diameter

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