



BHARAT HEAVY ELECTRICAL LIMITED, BHOPAL
QUALITY CONTROL- MOTOR GROUP
QUALITY PLAN FOR COPPER FLAT/ROTOR BAR/DAMPER BAR

Customer		BHEL, Bhopal			QAP No. QA/MT/BOI/052		Rev. No.04	LEGEND		
Material description		Copper Flat/Rotor Bar/Damper Bar			Date : 06/04/2021			RR: Record Review		TPIA: Third party inspection agency
Specification		P.O./ drg./ Spec						W: Witness		
Sr. No	Stage	Characteristics	Method	Reference Document	Acceptance Criteria	Extent of check	Record of format	Inspection by	Mode of inspection	Remarks
1.	Raw material	a) Chemical Properties	Spectra Analysis	As Per Spec called in PO	As Per Spec called in PO	1 No./ Heat	Supplier TC	TPIA/BHEL	RR	(Test lab should be NABL accredited)
		b) Oxygen content as called in Specification	Spectra Analysis	-do-	-do-	1 No./ Heat	Supplier TC	TPIA/BHEL	RR	
2.	In-process									
2.1	Drawing and Annealing	No of passes and annealing temperature and time	Die dimensions, Temp and time	As per manufacturer practice	As per manufacturer practice	100%	Inspection record	TPIA/BHEL	RR	Supplier to give Die dimension for minimum 2 pass after extrusion. Annealing Temp and duration to be recorded.
2.2	Identification of test sample	Sample identification	Hard punch	Random sample selection, cutting & hard punch identification shall be done in presence of TPIA/ BHEL.					Witness	
2.3	Testing on sample (Electrical mechanical & chemical) as called in Specification	a) Tensile b) Hardness c) Conductivity d) Chemical (for O2 content ,check in external lab)	As per Po specification	As per spec -do- -do- -do-	As per spec -do- -do- --do--	One sample per lot	Test certificate -do- -do- -do-	-do- -do- -do- --do--	Witness Witness Witness RR	Check calibration status of testing equipment (calibrated by NABL accredited lab. / OEM/GOVT.Lab)

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3	Defect Free	Ultrasonic Test for flats greater than 30mm thickness	NDT	As per BHEL Spec	As per BHEL Spec	100%	Test Report	TPIA/BHEL	Witnessing	BHEL / TPIA
4	Dimensions & visual inspection in finished	Dimension, surface finish, hard punch identification i.e. vendor name	Measurement / visual	BHEL drawing/ spec	BHEL drawing/ spec	100%	Inspection report	TPIA/BHEL	Witnessing 10% by BHEL	No sharp edges, sliver’s, burrs, pitting defects allowed.
5	Dispatch	Visual inspection/ packing & marking (PO, size, spec, Qty, etc.	Drawing/ packing instruction	---do---	----do---	100%	Inspection report	-do-	RR	
6	Document submission duly verified by TPIA	1. Source raw material TC. 2. Test report (Elect, Mech & Chemical) 3. Final dimension and visual report. 4. Third party inspection report (applicable BHEL)								


Note: On receipt of supply at BHEL works, surveillance testing shall be carried out by BHEL QC on samples drawn randomly for Electrical/Chemical/Mechanical properties.

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		BHARAT HEAVY ELECTRICALS LIMITED BHOPAL QUALITY PLAN FOR COPPER TG ITEMS						Page 1 of 1	
QAP PLAN NO. QC/TCB/QAP/BO 14		Rev 01		Date: 25/07/2019					
SL.No.	COMPONENTS/ STAGE	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	FORMAT OF RECORD	AGENCY		REMARKS
							S	B/T	
1) RAW MATERIAL									
1.1	Copper	Chemical Composition, Electrical & Mechanical Properties	Test	One sample/ Melt	AA12023, AA12001	TC/TR	P	V	Copper raw material Supplier/ Rolling Mill TC Verification by BHEL/TPIA
1.2	Brazing Alloy	Chemical Composition	Test	1 from each lot	AA77015	TC/TR	P	V	
2) FINAL INSPECTION									
2.1	Brazing procedure & Brazer Qualification	Only trained and qualified brazers to be deployed.	Verify	100%	ASME SEC IX/ BP0631199/ BHEL Drg.	TC/TR	P	V	BHEL Qualified/ BHEL customer qualified brazers to be deployed.
2.2	Copper sheet / Plate / Sections	Surface finish	Visual	100%	AA12023, AA12001, BHEL drawing	TC/TR	P	W	The Surface shall be clean, bright, smooth and free from defects.
		Conductivity- Hardness, Elongation, Tensile strength, Bend Test (as applicable) -Chemical Composition	Test	One Sample each lot	AA12023, AA12001	TC/TR	P	W/V	1) Copper raw material TC traceability verification. 2) Witness for conductivity & hardness test if tests performed at Suppliers Lab. 3) Record review for tests which are performed at NABL accredited lab
2.3	Finish of brazed joints	Check brazed joints for a) Adequate Filler material b) Under cuts & brazing defects	Visual	100%	BHEL drawing	TC/TR	P	W	
2.4	Silver/Tin plating (As applicable)	Coating Thickness	Measurement/ Visual	100%	BHEL drawing	TC/TR	P	W	
2.5	Dimensions check	All dimensions as per drawing (Straightness, Edge radius, machining and bending of parts (as applicable))	Measurement	100%	BHEL drawing	TC/TR	P	W	Dimensions check for 25% per lot by BHEL/ TPIA
2.6	Oil resistant red paint	Paint finish and shade (As applicable)	Visual	100%	BHEL drawing	TC/TR	P	W	
V - VISUAL, M - MEASUREMENT, T - TEST, DRG - DRAWING, TC/TR - Test certificate/ Test Report, TPIA - THIRD PARTY INSPECTION AGENCY (APPROVED BY BHEL), CHP- CUSTOMER HOLD POINT, S= SUPPLIER/ VENDOR, B/T= BHEL/TPIA, P= PERFORM, V= VERIFICATION/REVIEW, W= WITNESS NOTE: Surveillance test at BHEL Lab as per BHEL Norms shall be applicable.									

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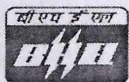
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QUALITY ASSURANCE DEPARTMENT

QA PLAN FOR - S.C. BAR/ SEGMENTS

(SH. 01 OF 01)

QGX-9

QA PLAN NO. - QSP/HG/105

REV-01 DTD. 27/08/2016

S. NO.	COMPONENT /ASSEMBLY/ OPERATION	CHARACTERISTICS	CLASS	TYPE	QUANTUM OF CHECK	REF. DOC.	RECORD FORMAT	AGENCY PERFORM	WITNESS	REMARKS
1.0	INSPECTION AT SUPPLIER'S WORK									
1.1	RAW MATERIAL IDENTIFICATION	a) IDENTIFICATION W.R. TO LOT NO./ BATCH NO.	MINOR	REVIEW	100%	HG04002	SUPP QC RECORD	SUPPLIER	-	RECORD REVIEW BY BHEL/TPI
		b) CHEMICAL COMPOSITION	MAJOR	REVIEW	SAMPLE	HG04002	TC	-	-	RECORD REVIEW BY BHEL/TPI
1.2	FINISHED COMPONENTS	a) VISUAL CHECKS (FREEDOM FROM DEFECTS LIKE FINS, SPILLS, SCALLING, BLISTERS, CRACKS ETC.)	CRITICAL	VISUAL	100%	HG04002 / DRAWING	SUPP QC RECORD	SUPPLIER	BHEL / TPI	-WITNESS 10 % RANDOM SAMPLE FROM EACH LOT
		b) DIMENSIONAL CHECKS (LENGTH, DIAMETER & STRAIGHTNESS)	MAJOR	DIMENSIONAL	100%	HG04002 / DRAWING	SUPP QC RECORD	SUPPLIER	BHEL / TPI	
		c) MECHANICAL PROPERTIES	MAJOR	MECHANICAL	SAMPLE	HG04002	SUPP QC RECORD	SUPPLIER	BHEL / TPI	ONE SAMPLE PER LOT
		d) ELECTRICAL RESISTIVITY	MAJOR	ELECTRICAL	SAMPLE	HG04002	SUPP QC RECORD	SUPPLIER	BHEL / TPI	
		d) PACKING	MAJOR	VISUAL	100%	HG04002 / DRAWING	SUPP QC RECORD	SUPPLIER	BHEL / TPI	

Certification : Supplier shall furnish number of copies of test certificates as called in PO duly countersigned by BHEL or its authorised representative incorporating the following :-

a) LOT / BATCH IDENTIFICATION

b) Results of tests for mechanical properties and Electrical resistivity

c) Dimensional record sheets.

Abbreviations: TC - Test Certificate, Supp. - Supplier, QC - Quality Control, TPI - THIRD PARTY INSPECTION

HGE

OHG

QA-Hydro

Rev. Details : Rev. 00 dated 13/10/93