

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY CONTROL TRANSPORTATION
QUALITY ASSURANCE PLAN (QAP)

QA Plan for casting/ rough machined cast components no. : QTM/QAP/VENDOR/13-14/001 Rev.03 Dt.: 07.05.2018

Part 1: Final inspection of the component before dispatch from vendor works (#)

Sl. No	Name of the process	Parameters for inspection	Quantum of check		Mode of inspection/ equipment used	Drawing No./Spec/ Std.	Acceptance norms	Requirement from supplier (See note 1)
			TP/Supplier	TP/IA/QC*				
1	Casting for magnet frame, stator housing, stator chamber DE & NDE suspension tube, rotor components (commutator hub, commutator 'v' ring, rotor end ring etc.) and bearing assembly components (end shields, wipers, bearing cap/ covers etc).	Source of casting	100%	100%	Proof of source of casting.	-	Casting manufacturer shall be RDSO approved class A foundry.	Proof of source of casting to be provided to BHEL.
2	Heat treatment	Soaking temperature/ soaking time	100%	100% TC to be verified.	Temperature recorder/ Time Temperature charts.	Heat treatment requirement as per BHEL specification mentioned in the drawing.	Mechanical properties as specified in the BHEL spec.	Heat treatment report and graph to be provided to BHEL.
3	Shot/Sand Blasting	Casting surface finish.	100%	20%	Instrument	As per BHEL drawing.	Surface finish to be less than 50µm in 100% area except profile transition zone (Ref. IS: 3073).	Report of shot/sand blasting and surface finish to be provided to BHEL.

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4	Melt analysis	Chemical Composition	One sample per heat/ per heat treatment batch.	100% TC to be verified	Spectrometer / Wet analysis method	As per BHEL Drawing/ specification	As per BHEL Drawing/spec.	TC (as per specification) to be provided to BHEL. One sample per heat / per heat treatment batch is to be verified by TPIA (for heat & heat treatment batch punched by supplier matching with test certificate reports above) for chemical & mechanical testing at BHEL works.
5	Mechanical Testing	Mechanical properties mentioned in the BHEL spec. /drawing.	One sample per heat/ per heat treatment batch.	100% TC to be verified.	Mechanical testing equipment	As per BHEL Drawing/ specification	As per BHEL Drawing/spec.	
6	Identification marking	Identification marking of casting manufacturer by embossing on castings as location shown in drawing or location may be taken from Engg. Dept.	100%	100%	Visual	As per BHEL drawing/ specification TM12548	Identification marking as per BHEL drawing/spec. TM12548.	-

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7	Dimensional Inspection	Cast Dimensions	All drawing dimension of 100% component	All drawing dimension of 10% component	Instrument	As per BHEL drawing	1) a) In case order is as per casting drawing: As per BHEL drawing. b) In case order is as per rough m/cd drawing: As per BHEL drawing along with concentricity less than 1mm. c) In case order is from finish machined drawing: 4(+/-0.5) mm machining allowances on each tool point along with concentricity less than 1mm. 2) Centre line on each job should be marked to ensure the cast, rough m/cd dimensions as per the casting, rough m/cd drawing requirement or machining allowance on each tool point of finish machined drawing. 	Dimensional witness report to be provided to BHEL.
		Rough machined Dimensions	All drawing dimension of 100% component	All drawing dimension of 20% component				

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			TP/Supplier	TP/IA/QC*				
8	Non Destructive Tests (NDT)	NDT tests (DP/MPI/UT/ Radiography) as mentioned in the BHEL drg./ spec.	100% (DP) or Sampling percentage as mentioned in the BHEL drg. / spec.	20% (DP)	NDT equipment	As per BHEL Drawing/ specification	As per BHEL Drawing/ specification	NDT (DP/MPI/UT) report of 100% components or sampling percentage as mentioned in the BHEL drg. / spec. shall be submitted along with consignment. Report issuing inspector shall be ISNT/ASNT level-II in respective NDT test and reports shall be duly signed & stamped by inspector.
			100% (UT) or Sampling percentage as mentioned in the BHEL drg. / spec.	20% (UT)				
			100% (MPI) or Sampling percentage as mentioned in the BHEL drg. / spec.	20% (MPI)				

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8	Non Destructive Tests (NDT)	NDT tests (DP/MPI/UT/ Radiography) as mentioned in the BHEL drg./ spec.	10% (Radiography) or Sampling percentage as mentioned in the BHEL drg. / spec. (whichever is higher)	Verification of Radiography report & films	NDT equipment	As per BHEL Drawing/ specification	As per BHEL Drawing/ specification	Radiography report & films of 10% components or sampling percentage as mentioned in the BHEL drg. / spec. shall be submitted along with consignment. Report issuing inspector shall be ISNT/ASNT level-II in radiography and reports shall be duly signed & stamped by inspector.
9	Visual Inspection	Component to be free from any abnormality such as blow hole, pin hole, dent etc.	100%	100%	Visual	As per BHEL drawing/ Specification	Free from visual defect.	-



Notes:

- 1) All test records checked by TP, TPIA/QC (dully signed & sealed) as per above CAP requirement shall be submitted along with consignment.
- 2) Final acceptance will be based on inspection at BHEL, Bhopal.
- 3) If at any stage during processing of job any defect is observed then job/ lot is liable to be rejected.
- 4) (*) Job shall be randomly selected as per quantum of check (min. 1 no.) from the offered job by TPIA/QC.

Part II: Requirement of prototype clearance by firm from BHEL:

1. In case of any supply of components (against a particular drawing) for which no supply has been done earlier by vendor to BHEL, prototype clearance of 2 nos. or 2 sets (in case of procurement in kit form) of components from BHEL will be required before bulk supply.
2. In case of change of pattern for any castings against a particular drawing, prototype clearance of 2 nos. or 2 sets (in case of procurement in kit form) of component from BHEL will be required before bulk supply.

Note: Prototype clearance of castings does not absolve the supplier from supply of castings as per drawing & specification requirements during bulk supply.

Meaning of Legends: '#' - Supplier to submit test certificates & reports of above mentioned parameters.

Abbreviation: TPIA - BHEL appointed third Party Inspecting Agency, T P - Task Performer / Supplier.

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