

QA Plan for forging/ rough machined forge components No : QTM/QAP/VENDOR/13-14/002 REV.03 Dt:26.02.2019

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	TPIA/QC**				
1	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 specification	Heat treatment report and graph to be provided to BHEL
2	Melt analysis	Chemical Composition	One sample/ heat / Lot	100% TC to be verified	Spectrometer / Wet analysis method	As per BHEL drawing/ specification	As per BHEL drawing/specification	1. TC (as per specification format) from NABL approved Lab for shaft forging. 2. TC (as per specification format) for other forging.
3	Mechanical Testing	Mechanical properties mentioned in the BHEL specification/ drawing	One sample/ Heat treatment batch / Lot	100% TC to be verified	Mechanical testing equipment	As per BHEL drawing/ specification	As per BHEL drawing/specification	3. Test sample duly approved by TPIA to be provided to BHEL for chemical & mechanical testing at BHEL works.
4	Reduction Ratio	Reduction ratio from Ingot to bloom & bloom to blank	100%	100% TC to be verified	Dimensional measuring instruments		Stage wise reduction ratio calculation & its measurement on actual job	Dimensional measurement report for reduction ratio

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Sl. No.	Name of the process	Parameters for inspection	Qualification of Check*		Mode of inspection/ equipment used	Drawing No./Spec./Std.	Acceptance norms***	Requirement from supplier (See note 1)
			TP/Supplier	TP/IA/QC**				
5	Identification marking	Identification marking by punching/engraving on the location shown in drawing or location may be taken from BHEL Engg. Dept.	100%	100%	Visual	As per BHEL drawing/specification TM12548	Identification marking as per BHEL drawing/specification TM12548	-
6	Dimensional Inspection	Forge Dimension	All drawing dimension of 100% component	All drawing dimension of 10% component	Instrument	As per BHEL drawing	<p>1) a) In case order is as per forging drawing: As per BHEL drawing.</p> <p>b) In case order is as per rough m/cd drawing: As per BHEL drawing along with concentricity less than 1mm.</p> <p>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.</p> <p>2) Centre line on each job should be marked to ensure the forge, rough m/cd dimensions as per the forging, rough m/cd drawing requirement or machining allowance on each tool point of finish machined drawing.</p>	Dimensional witness report to be provided to BHEL
		Rough machined dimension	All drawing dimension of 100% component	All drawing dimension of 20% component				


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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	TPIA/QC**				
7	Non Destructive Tests (NDT)	NDT tests (DP/MP/UT) as mentioned in the BHEL drawing/ specification	100% or Sampling percentage as mentioned in the BHEL drawing/ specification	20%	NDT equipment	As per BHEL drawing/ specification	As per BHEL drawing/ specification	NDT report to be provided to BHEL along with consignment
8	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 QAP requirement shall be submitted along with consignment.
- 2) Final acceptance will be based on inspection at BHEL, Bhopal.
- 3) (*) Quantum of inspection shall be in line with QAP unless otherwise mentioned in the drawing.
- 4) (**) Job shall be randomly selected from offered lot, the quantum of check (min. 1 no.) from the offered lot to be checked by TPIA or QC. (e.g.: If lot size is 2 then minimum one no is to be checked).
- 5) (***) Sample inspection of component does not mean that the supplier will not meet drawing & specification requirements in remaining components. In case any defect / non-conformance is observed at any stage (during processing or before and after fitment in any job), the same is liable to be rejected and same shall be replaced immediately by the supplier at BHEL or BHEL Customer site (wherever deficiency is observed) and necessary penal action will be taken as per BHEL norms.





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Part II: Requirement of clearance of 1st lot from BHEL:

- 1) First lot of item shall be supplied for quality inspection at BHEL Bhopal and supply of subsequent lots shall be undertaken only after clearance of first lot by BHEL Bhopal.
- 2) Vendor has to initiate the supplies as per PO delivery only. Delay in supply of first lot of components or rejection of components due to any non-conformity/ quality deficiency shall not be considered as reason for delay in supply of components in subsequent deliveries as per PO delivery requirement.
- 3) Initial clearance of 1st lot of items does not absolve the supplier from supply of items as per drawing and specification requirement in subsequent lots.

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 (vendor), QC-QIX.

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