



**Quality Assurance**  
**MANUFACTURER'S NAME & ADDRESS**  
 M/S BHEL: BAP/ RANIPET  
 TAMIL NADU-632 406

**STANDARD QUALITY PLAN**

**ITEM /SUB SYSTEM:**  
**Speed Reducer**  
**( Type I, II, III, 4HR, 8APB & 9APB)**

**DOC. NO** SQP APH 111

**Rev. No:** 02

**Date:** 17/06/2015

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SL NO	COMPONENT & OPERATION	CHARACTERISTICS	Class	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	Agency		REMARKS
									M	B	
1	2	3	4	5	6	7	8	9	10	11	12

1.0	Raw Material Inspection										
1.1	Gear Case ( CI )	Surface Defect	Major	Visual	100%	Vendor Drawing	As per relevant Standard	Inspection Report	W	V	Material specified as per BHEL approved drawing
1.2	Pinion shaft, Gears (Case hardened steel) and output shaft	Tensile Strength	-do-	Tensile Strength	Sample Per heat	-do-	-do-	-do-	W	V	
		Chemical	-do-	Chemical Analysis	-do-	-do-	-do-	-do-	W	V	
2.0	Inprocess Inspection	SOUNDNESS	-do-	UT	100%	-do-	-do-	-do-	W	V	
		Microstructure	-do-	Microtest	100%	-do-	-do-	-do-	W	V	
2.1	Gear Case	Shot blasting	-do-	Visual	100%				W	V	
		Primer Painting (1 coat of zinc phosphate -white - shade )	-do-	-do-	100%	As per approved Drg	30 microns (Min)	-do-	W	V	

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 R - Report, HT - Heat treatment.

Prepared By (S.DAMODARAN) DY.MANAGER / QA	Reviewed By (R.RUNACHALAM) SR MANAGER / QA	Approved By (J.RAVISHANKAR) SDGM/QA,BE,QC(Proc)
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		Dimensions	-do-	Measurement	100%	BHEL appvd drawing / vendor drawing	BHEL appvd drawing / vendor drawing	-do-	W	V	(##) When back wall echo is set to 100% of FSH in sound area.
2.2	Pinion shaft & gears	Dimensions	-do-	-do-	-do-	-do-	-do-	-do-	W	V	
		Soundness	-do-	UT	100%	ASTM A 388 (##)		-do-	W	V	a) Defect echo not to exceed 20% of FSH during scan.
		Surface Hardness	-do-	Hardness	100%	BHEL appvd drawing / vendor drawing		-do-	W	V	
		Case Depth	-do-	Case Depth	100%	-do-		-do-	W	V	
2.3	Output Shaft & Input shaft	Dimension	Major	Measurement	100%	BHEL appvd drawing / vendor drawing	BHEL appvd drawing / vendor drawing	-do-	W	W	b) Back wall echo loss permissible 20% of FSH
		Soundness	-do-	UT	100%	ASTM A 388 (##)		-do-	W	V	
		Surface Hardness	-do-	Hardness	-do-	BHEL approved drawing / vendor drawing.		-do-	W	V	
2.4	Pre Assembly Test	Blue match	-do-	Visual	-do-	-do-	25%min for Helical & 40%for Bevel gear DIN 3990	-do-	W	W#	W#- NOTE 1

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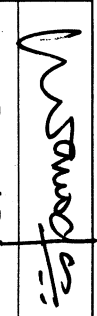


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		Bearings	-do-	make	-do-	-do-	-do-	-do-	W	V	
		Over running clutch	-do-	make	-do-	-do-	-do-	-do-	W	V	
3.0	Final Inspection										
3.1	Assembly	Verification of arrangement/ Direction of rotation	Critical	Visual	100%	BHEL appvd drawing /vendor drawing	BHEL appvd drawing /vendor drawing	-do-	W	W	
3.2	Mounting dimension (Air motor,electric motor,spare motor,distance between input drive /gear box to output shaft) etc	dimension	-do-	-do-	-do-	-do-	-do-	-do-	W	W	
3.3	No load test run	Leakage	Critical	Visual	100%	No leakage	No leakage	-do-	W	W	
		Reduction ratio	Major	Measurement	100%	BHEL appvd drawing /vendor drawing	BHEL appvd drawing /vendor drawing	-do-	W	W	
		Temperature rise (4hrs)	-do-	-do-	-do-	Ambient temperature	30 degree over ambient temperature	-do-	W	W	

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		Noise level ( 85 db max , 4 hrs run ) Maximum	Major	Measurement	100%	BHEL appvd drawing /vendor drawing	BHEL appvd drawing /vendor drawing	-do-	W	W	
		Vibration	-do-	-do-	100%	Velocity – Max.7.5mm/sec Displacement- Max. 50 µ	Velocity – Max.7.5mm/sec Displacement- Max. 50 µ	-do-	W	W	
		Lube oil pump	Major	Make	100%	BHEL appvd drawing /vendor drawing	BHEL appvd drawing /vendor drawing	-do-	W	W \$	W \$- NOTE-2
		Pressure gauge	Major	make	100%	BHEL appvd drawing /vendor drawing	BHEL appvd drawing /vendor drawing	-do-	W	W \$	
		Oil seals	Major	make	100%	BHEL appvd drawing /vendor drawing	BHEL appvd drawing /vendor drawing	-do-	W	V	

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4.0	Painting	Visual	Major	Visual	100%	2 coats of Red Oxide Zinc Phosphate Primer to IS: 12744 DFT of 60 micron min. and 3 coats of Synthetic Enamel to IS 2932 Smoke Grey Shade No. 692 of IS 5 DFT of 60 micron min. Total DFT of 120 micron min.	-do-	W	W		
5.0	Packing (polythene cover, wooden packing)	Visual	Major	Visual	100%	BHEL appvd drawing / vendor drawing	-do-	W	W@		

Note:-

- 1) W#-One number of each 50 nos will be dismantled to verify the record for Type I, II, 8APB & 9APB only.
- 2) W\$ - NOT APPLICABLE FOR SPEED REDUCER TYPE III & 4 HR.
- 3) Protection cover screws should not be of through hole type. 4) W @ Packing : One typical packing is to shown to TPI .

**RECORD OF REVISION**

**DETAILS OF REVISION MADE**

REV NO	DATE	DETAILS OF REVISION MADE
REV. 00	--	Original Issue - First submission
REV 01	25-02-2010	Type 4HR also added in the scope. Dismantling requirement is restricted to Type I&II only.
REV 02	17-06-2015	Type 8APB & 9APB also added in the scope. Vibration value updated. Dismantling requirement is restricted to Type I,II,8APB & 9APB only.

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