

965152/2022/BAR-QA-MECH



Ranipet

MANUFACTURER'S NAME AND ADDRESS
Customer Approved Source

MANUFACTURING QUALITY PLAN

ITEM: SLURRY PUMP PROJECT: AS PER PO
SYSTEM: FGD APPLICATION BHEL WO : AS PER INTERNAL W/O

QP NO. FGS:SLP:723, REV:00 DATE: 08.01.2021
MAIN CONTRACTOR M/S BHEL, RANIPET
PAGE NO: Page 1 of 5

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N				D*	M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.



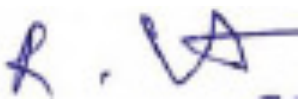
1.0 RAW MATERIALS

1.1	Volute Casing, Casing Cover	Chemical & Mechanical Properties	Major	Chemical & Mechanical Properties, Hardness check	1 Sample / Heat	NTPC Approved GA Drawing / Data Sheet/ Specification		MTC	√	P	V	V	
1.2	Impeller, Wear Plate.	Chemical & Mechanical Properties	Major	Chemical & Mechanical Properties, Hardness check	1 Sample / Heat	Drawing & Specification		MTC	√	P	V	V	
1.3	Volute Casing	Surface Defects	Major	DPT on machined surface	100%	ISO4987	ISO 4987, Level 2	DPT Report	√	P	V	V	
1.4	Cover Plate & Frame Plate	Soundness	Major	RT *	100 %	ASME Sec V, ASTM - E446 Level - 5		Test Report	√	P	V	V	*For Gypsum Bleed Pumps
1.5	Shaft	Chemical Composition	Major	Chemical composition	1 Sample /Heat	Drawing/Specification		Test Report	√	P	V	V	
		Mechanical Properties		Mechanical Tests, Heat treatment if applicable		Drawing/Specification		Test Report	√	P	V	V	HT Chart Review.

Legend: * Record, identified with "tick" (√) under column 'D' shall be submitted to customer as a QA documentation package. **M:** Manufacturer / Sub supplier, **C:** Main Contractor/BHEL/BHEL AIA. **N:** NTPC **P:** Perform: witness, **V:** review of records, **MA:** Major and **MI:** Minor, **DPT:** Dye Penetrant Test, **UT:** Ultrasonic Testing **TC:** Test Certificate, **IR:** inspection report, **MTC:** Material Test Certificate. **COC:** Certificate of conformance.

Manufacturer Sign & Seal			
	Rakesh Kr Madhu (Dy Mgr / QA)	K Renjith (Mgr / QA)	R Arunachalam (DGM/QA)
	Prepared by	Reviewed by	Approved by

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1.		2.	3.	4.	5.	M	C/N	7.	8.	9.	D*	** 10.	11.		
			Hardness Test		Mechanical Hardness	100%		Drawing/Specification		Test Report	√	P	V	V	
			Internal Soundness		UT	100%		ASTM A 388	ASTM A 788	UT Report	√	P	V	V	
			Surface & Sub Surface Defects		MT-on m/c Surface	100%		ASTM E709	ASTM A 788	MT Report	√	P	V	V	MT-Magnetic Particle Test
1.6	Impeller	Surface & Sub Surface Defects	Major	DPT	Accessible Areas			ISO4987	ISO 4987, Level 2	DPT Report	√	P	V	V	
2.0 IN PROCESS INSPECTION															
2.1	Impeller/Volute Casing/ Wear Plate / Casing Cover/ Shaft After Machining	Surface Condition/ Defects/ Measurement	Major	Visual and Measurement		100%		Drawing		IR (Protocol)		P	-	-	
2.2	Couplings	Verification of TC	Major	Review of TC		100%		Technical Specification / Drawing		COC/TC	√	P	V	-	
2.3	Rotating Parts	Balancing	Major	Static & Dynamic Balancing		100%		ISO 1940	ISO 1940, grade 2.5 or lower	Balancing Report	√	P	V	V	
2.4	Volute Casing	Soundness	Major	Static		100	20%	See	No Leakage	Test	√	P	W	Test	
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								Rakesh Kr Madhu (Dy Mgr / QA)		K Renjith (Mgr / QA)		R Arunachalam (DGM/QA)			
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MAIN CONTRACTOR

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PAGE NO:

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965152/2022/BAR-QA-MECH



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ITEM: SLURRY PUMP **PROJECT:** AS PER PO
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QP NO. **FGS:**SLP:723, REV:00 **DATE:** 08.01.2021 **MAIN CONTRACTOR** **M/S BHEL, RANIPET**
PAGE NO: **Page 3 of 5**

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N				D*	M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10.			11.

				Pressure Testing of Casing	%	/10 % of each type	Remarks Column		Report				W	Pressure at 2x rated head or 1.5x shut of head whichever is higher for 30min.
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3.0 FINAL INSPECTION

3.1	Complete Pump Assembly	Completeness	Major	Visual & Dimensional	100 %	*	Approved GA Drawing	IR	√	P	W	W	
		Measurement- Flow vs Head(Complete operating range), Power, Efficiency	Major	Performance testing of pump	100 %	*	Approved Drawing /Data Sheet	Performance Test Report	√	P	W	W	*BHEL to witness 20% of each type of Pump and NTPC-one Pump per type.
		Vibration Velocity RMS [MM/S] Bearing Temperature Noise Level RMS[MM/S]		Measurement	100 %	*	Approved Drawing. Approved Data Sheet	Performance Test Report	√	P	W	W	
		NPSH Test	Major	Measurement	1 Pump / each type		Design Standard of Pump	NPSH Test	√	P	W	W	



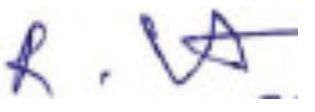
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	Prepared by	Reviewed by	Approved by

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1.		2.	3.	4.	5.	6.	7.	8.	9.	D*	** 10.			11.
						/ design			Report					
3.2	Complete Pump Assembly	Leak test	Major	Leakage testing	100%	Mfg. Drawing, Approved Data Sheet	No Leakage	Report	√	P	W	W		
3.3		Strip Down Test (Not Required If Performance Test is Fine.)	Major	Visual	100%	Mfg. Drawing, Approved Data Sheet		Report	√	P	W	W	Only Required in case of Abnormal Sound	
3.4	Painting	Dry Film Thickness/Paint shade	Major	Visual & Measurement	100%	NTPC Approved Painting Schedule		IR(Protocol)	√	P	V	V		
3.5	Packing	Preservation	Major	Visual & Measurement	100%	Technical Spec/ BHEL approved Packing Procedure/Drawing		COC	√	P	V	-		
4.0 DOCUMENTATION														
4.1	Check of Quality Assurance Documentation	Compliance to MQP	Major	Check of Compliments	100%	Manufacturing Quality Plan		Protocol	√	V	V	V		

NOTE: 1. (\$) – 10 % of each type for NTPC (Customer).

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965152/2022/BAR-QA-MECH		MANUFACTURER'S NAME AND ADDRESS Customer Approved Source		MANUFACTURING QUALITY PLAN									
Ranipet				ITEM: SLURRY PUMP				PROJECT: AS PER PO					
				SYSTEM: FGD APPLICATION				BHEL WO : AS PER INTERNAL W/O					
				QP NO.	FGS:SLP:723, REV:00		DATE: 08.01.2021		MAIN CONTRACTOR		M/S BHEL, RANIPET		
								PAGE NO:		Page 5 of 5			

- All other items, which are not cover under this QP, shall be manufactured inspected as per OEM (Original equipment Manufacturer)/BHEL standard practice and relevant standard. Relevant TC/COC will be submitted for the same.
- This QP is applicable for Mandatory Spare supply also.
- Separate MQP to be submitted for Electric Motor.

SI No	Types of Pumps	Quantity	No of Pumps as Per Approved Datasheet / GA Drawing
01.	Limestone slurry feed Pump	06	
02.	Gypsum bleed Pump	06	
03.	Primary hydro cyclone feed tank Pump	02	
04.	Filtrate water tank Pump	02	
05.	Secondary hydrocyclone feed tank	02	
06.	Waste water tank Pump	04	
07.	Auxiliary absorbent tank Pump	02	
08.	Emergency transfer Pump	03	
09.	Absorber area drain sump Pump	06	
10.	Gypsum area drain sump Pump	02	
11.	Limestone area drain sump Pump	02	

Record of revision

Rev no	Date	Description
00	08.01.2021	Original Issue – First submission.

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		Prepared by	Reviewed by	Approved by

Sl.No	BHEL / Customer Requirements	##Specific confirmations by the manufacture(Acceptable/Not acceptable)
4	Stage Inspection during manufacturing Process : Stage Inspection during manufacturing shall be carried out as per approved quality plan and all necessary documents shall be provided for review,verification and clearanace for further processing. This inspection call shall be given well in advance (atleast 2 weeks before for Indeginious and 45 days forforeign) to TPI/Bidder's own inspection agency to avoid delay in the manufacturing processes.	
5	Inspection before despatch for domestic supplier : Inspection before despatch at supplier's works shall be carried out by Bidder appointed Inspection agency(As in Sl no.3.) Inspection shall be done as per approved Quality plan/ Technical specification/ Approved Drawing/ Approved Data sheet .	
6	Inspection at Forign Source/Supplier: (a) As in sl no: 3. shall be ensured without fail (b) No materail / items shall be despatched without getting the written communication from BHEL / Customer inspection carried out by Bidder apointed Third Party Inspection Agency (As per Sl no.3) / Customer/Customer Apointed Inspection Agency/Consulatnat. This is applicable for all Stage inspection and Final Inspection identified as "W" - Witness or "CHP" - Customer Hold Point as per customer approved Quality Plan/ Technical specification / Approved Drawing/ Approved Data sheet / Scheme / PID / PFD / SLD (Process Instrumentaion Diagram / Process Flow Diagram / Single Line Diagram) etc (As applicable). Inspection before despatch for Foreign supplier : Inspection before despatch at supplier's works shall be carried out by bidder appointed inspection agencies having international presence at vendors and or vendor's sub vendor works. Inspection shall be done as per approved Quality plan/ Technical specification/ Approved Drawing/ Approved Data sheet by TPIA mentioned in Sl no: 03 at supplier's cost.	
7	Painting shall be done strictly as per BHEL/Customer approved painting schedule / scheme only. Paint Thickness / Paint shade shall be ensured as per BHEL / Customer approved painting schedule / specification / data sheet etc. No deviation is acceptable unless otherwise accepted by BHEL/Customer in writing. Any conflict if any among BHEL / Customer approved painting schedule / Spec / data sheet etc shall be brought to the notice to BHEL well in advanvce before proceding including the BOI being procured for assy / skid like motors etc	
8	Specific conformation for document package in the event of an order (2 Hard copies & soft copy in PDF file) is to be given containing the following with proper linkages (i) Index Sheet (ii) MQP/RQP/Endorsement Sheet (As applicable) (iii) TCs identified by BHEL/ Customer for record for "CHP" / "W" and Verification portion ("V") as given in approved QP. (iv) Final inspection report + TC including Chemical + Mechnaical + HT + NDT etc (v) Third party Inspection report + TC (vi) Customer CHP/ MDCC (vii) Type test / Performance Test reports conducted (viii) Type test / Performance Test approval/ clearance obtained from BHEL/Customer (ix) BOM with As Build Drgs with actual make / rating used with BHEL/customer approved drawings.	
9	Packing / Seaworthy Packing shall be as per BHEL Packing schedule / approved drg / sketch. This shall be ensured to take care tarnsit / handling / transhipment in Road / Sea / Air. Photographs are to be submitted for BHEL review before despatching the material as per contract conditions.	
10	Outsourcing of test facilities: Bidder shall ensure all the testing facilities in house. However If any of the test facilities are not available with successful bidder, then bidder shall ensure the same at NABL accreadted third party lab / Govt / Govt Lab for major testing such as NDT, Electrical & Mechanical testing.	
11	Important Note: No deviation on the above requirement 01 to 10 is acceptable w.r.t Quality Requirement and those offers not meeting these specific customer requirement is liable for rejection and hence the bidder shall submit all the required documentary evidances in the offer itself.	
12	## Necessorily to be filled up by the bidder at the time of offer itself otherwise the offer may not be considered w.r.t Quality Requirement being customer specific requirement.	
13	If the OEM/Principal engaging the services of an agent to participate on their behalf, Then mention OEM /vendor Name & address as well as agent details with their sign and seal.	
VENDOR SIGN AND STAMP:		Vendor Name & Address:

<p>PROJECT: SAGARDIGHI (1X660 MW) (BHEL W.O no: R681)</p> <p>MAIN CONTRACTOR: BHEL - RANIPET SUB CONTRACTOR & ADDRESS:</p> <p>(To be filled by VENDOR)</p>	<p>CONTRACT QUALITY REQUIREMENTS (CQR) for LT MOTOR</p> <p>SAGARDIGHI (BHEL W.O no: R681)</p>	<p>DOC.NO: BAP/CQR/R681/SAGAR/L TM: 001 Rev NO.: 01</p> <p>PAGE : Page 1 of 1</p> <p>DATE: : 02.07.2022</p>	<p>##INDENT No:</p> <p>## Supplier Name & Address:</p> <p>##Offer reference:</p> <p>##Date:</p> <p>Contact Official Name: Mobile no: Email id:</p>
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ITEM: LT MOTOR

01	Quality Plan Requirement	<p>BHELSQLP (Standard Quality Plan) no. QA:CI:STD:QP:24 Rev.05 is applicable for these LT MOTOR inspection. (Copy attached)</p> <p>Vendor shall conduct all the test requirements as mentioned in SQP in totality in the event of an order including successful conduction/completion /submission of all valid type tests reports/certificates of LT MOTOR as indicated in the SQP for BHEL/ BHEL AIA review and approval in line with approved Data sheet /specification /Drg. etc.</p>	
02	Painting Requirements	<p>Painting requirement like paint shade and painting thickness including no of coats if any are to be ensured by LT MOTOR supplier for these LT MOTOR as per BHEL approved data sheet/drg/spec (As applicable).</p>	
03	Inspection Methodology	<p>No material shall be dispatched without BHEL or its authorized inspection agency.</p>	
04	For inspection call	<p>To raise inspection call by BHEL/BHEL AIA inspection including for type test witnessing , vendor is requested to contact Mr R Kesavan., DGM (QCProc)., Mobile no: +91 9443006303., Email id: kesavan@bhel.in and Mr Zeeshan Ali., SE (QC-Proc)., Mobile no: +91 9443149691., Email id: zeeshan@bhel.in for inspection related activities for immediate response / resolutio</p>	
05	Packing	<p>Required Packing & preservation shall also to be ensured as per requirements stipulated in Engg spec / drg / data sheet to avoid any damage during transit, handling damages & storage at site.</p>	

Supplier signature with seal





Necessarily to be filled up by the vendor at the time of offer itself otherwise the offer may not be considered w.r.t Quality Requirements being customer specific requirements.



CONTROLS AND INSTRUMENTATION/QA/FB

STANDARD QUALITY PLAN FOR

LT INDUCTION MOTORS

Rev	Date	Prepared	Reviewed		Approved	Revision history
			Engg.	QA		
00	18/04/1996	--Sd--	--	--Sd--	--Sd--	Initial Release
01	16/06/1997	--Sd--	--	--Sd--	--Sd--	Format revised
02	21/03/2002	--Sd--	--	--Sd--	--Sd--	Department name changed, CTQ requirements added & General revision
03	07/12/2007	--Sd--	--	--Sd--	--Sd--	SQP is revised for Flame proof application
04	10/01/2015	--Sd--	--	--Sd--	--Sd--	Revised to include EE motors. General revisions.
05	28/11/2017	V.AVINASH 	V M SELVARAAJ 	RM.VARAVAN 	D.MAHENDRABABU 	Revised as per discussion with C&I/Engg. Quantum of check changed. Standards are updated. Common QP for all induction motors.



Sl. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc & Acceptance STD	Form of record	Agency			Remarks
					M	B/C			M	B	C	
A RAW MATERIALS & BOUGHT OUT COMPONENTS												
01	Double coated Enamelled copper wire	a. Overall diameter	Major	MEAS	OSPL		IS 13730 / IEC 60317	LGB	P			
		b. Bare conductor diameter	Major	MEAS	-do-	-	-do-	LGB	P	-	-	
		c. Peel off test (above 1mm dia Wire)	Major	VISU	-do-	-	-do-	LGB	P	-	-	
		d. Jerk test (below and up to 1mm diameter wire)	Major	VISU	-do-	-	-do-	LGB	P	-	-	
		e. Mandrel winding test	Major	VISU	-do-	-	-do-	LGB	P	-	-	
		f. Resistance to abrasion	Major	VISU	-do-	-	-do-	LGB	P	-	-	
		g. Breakdown Voltage i) at room temperature ii) at elevated temperature	Major	MEAS	-do-	-	-do-	LGB	P	-	-	
		h. Electrical resistance (up to 1 mm dia)	Major	MEAS	-do-	-	-do-	LGB	P	-	-	Above 1 mm dia, only diameter will be checked
		i. Heat shock test	Major	VISU	-do-	-	-do-	LGB	P	-	-	
		j. Elongation	Major	MEAS	-do-	-	-do-	LGB	P	-	-	
		k. Cut through test	Major	THER	-do-	-	-do-	LGB	P	-	-	
		l. Solvent test	Major	CHEM	-do-	-	-do-	LGB	P	-	-	
		m. Springiness	Major	MEAS	-do-	-	-do-	LGB	P	-	-	
		n. Continuity of insulation	Major	MEAS	-do-	-	IEC-60317 IS 13730 Pt.3	LGB	P	-	-	
		o. Tan delta test	Major	MEAS	-do-	-	IS 13778 Pt.5	Supplier TC	V	-	-	
02	Insulation material											
02.1	Sleeve (over taping in brazed joints & end connection coil leads)	a. Bore diameter	Major	MEAS	-do-	-	IS 11654	LGB	P	-	-	
		b. Wall thickness	Major	MEAS	-do-	-	IS 11654	LGB	P	-	-	
		c. Bending before / after ageing	Major	VISU	-do-	-	IS 11654	LGB	P	-	-	
		d. BDV in air at room temperature	Major	MEAS	-do-	-	IS 11654	LGB	P	-	-	
		e. Insulation resistance	Major	MEAS	-do-	-	IS 11654	LGB	P	-	-	
		f. Stability of coating	Major	VISU	-do-	-	IS 11654	LGB	P	-	-	
		g. Burning test	Major	CHEM	-do-	-	IS 11654	LGB	P	-	-	



Sl. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc & Acceptance STD	Form of record	Agency			Remarks
					M	B/C			M	B	C	
02.2	Slot insulation (slot liner, packing strip, coil separator on overhangs)	a. Thickness	Major	MEAS	OSPL	-	Mfr. Standard	LGB	P	-	-	
		b. Tensile strength & elongation	Major	MEAS	-do-	-	IS 12747	LGB	P	-	-	
		c. BDV before & after ageing	Major	MEAS	-do-	-	IS 12747	LGB	P	-	V	
		d. Temperature stability -as received -after folding in "U" shaped slot liner	Major	MEAS	-do-	-	Mfr. Standard	LGB	P	-		
		e. Substance (specific gravity)	Major	MEAS	OSPL	-	Mfr. Standard	LGB	P	-		
02.5	Impregnation Varnish	a. Density	Major	MEAS	-do-	-	Mfr. Standard	LGB	P	-		
		b. Viscosity	Major	MEAS	-do-	-	Mfr. Standard	LGB	P	-		
		c. Non-volatile matter	Major	MEAS	-do-	-	Mfr. Standard	LGB	P	-		
		d. Dry test	Major	PHYS	-do-	-	Mfr. Standard	LGB	P	-		
		e. Compatibility with thinner % min	Major	CHEM	-do-	-	Mfr. Standard	LGB	P	-		
		f. Re-softening	Major	VISU	-do-	-	Mfr. Standard	LGB	P	-		
		g. Reaction of varnish with bare copper	Major	CHEM	-do-	-	Mfr. Standard	LGB	P	-		
		h. Stability of varnish in air open vessel	Major	CHEM	-do-	-	Mfr. Standard	LGB	P	-	-	
		i. Effect of varnish on enamelled wire	Major	MEAS	-do-	-	Mfr. Standard	LGB	P	-		
		j. BDV test	Major	MEAS	-do-	-	Mfr. Standard	LGB	P	-		
		k. Shelf life	Major	VISU	-do-	-	Mfr. Standard	LGB	P	-		
03	Shaft Material	a. Dimensions	Major	MEAS	OSPL/ heat	-	Mfr. Drawing	LGB	V	-		
		b. Chemical composition	Major	CHEM	-do-	-	Mfr. Standard	LGB	V	-		
		c. Hardness	Major	MEAS	OSPL/heat	-	Mfr. Standard	Supplier TC	V	-	-	
		d. Yield strength	Major	MEAS	-do-	-	Mfr. Standard	Supplier TC	V	-		
		e. Tensile strength	Major	MEAS	-do-	-	Mfr. Standard	Supplier TC	V	-	-	
		f. Elongation	Major	MEAS	-do-	-	Mfr. Standard	Supplier TC	V	-	-	
		g. Grain size inclusion rating	Major	MEAS	-do-	-	Mfr. Standard	Supplier TC	V	-		
		h. Heat treatment cycle	Major	THER	100%	-	Mfr. Standard	Supplier TC	V			
		i. Ultrasonic test	Major	NDT	-do-	-	Mfr. Standard	Supplier TC	P	-	-	
04	Stamping steel sheets	a. Specific core loss before / after ageing	Major	MEAS	OSPL	-	IS 648	Supplier TC	V	-	-	
		b. Magnetisation (Permeability)	Major	MEAS	OSPL	-	IS 648	Supplier TC	V	-	-	
		c. Insulation Resistance	Major	MEAS	-do-	-	IS 648	Supplier TC	V	-	-	



Sl. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc & Acceptance STD	Form of record	Agency			Remarks
					M	B/C			M	B	C	
		d. Stacking factor	Major	MEAS	-do-	-	IS648	Supplier TC	V	-	-	
		e. Ductility	Major	MEAS	-do-	-	IS648	Supplier TC	V	-	-	
		f. Visual Check (waviness)	Major	VISU	-do-	-	IS648	LGB	V	-	-	
		g. Temperature withstand capacity	Major	MEAS	-do-	-	IS648	LGB	V	-	-	
		h. Thickness of stamping & thickness of varnish coating	Major	MEAS	-do-	-	IS648	LGB	V	-	-	
		i. Stamping Burr height	Major	MEAS	-do-	-	IS648	LGB	V	-	-	
05	Aluminium ingots	a. Chemical Composition	Major	CHEM	-do-	-	IS4026	Supplier TC	V	-	-	
06	Casting: Body & End shields	a. Grade of casting (Chemical Composition)	Major	CHEM	1 sample from each melt	-	Mfr. Drawing	Supplier TC	V	-	-	
		b. Surface defects like blow holes / cracks	Major	VISU	100%	-	No blow holes & cracks	LGB	P	-	-	
		c. Hardness	Major	MEAS	OSPL/heat	-	IS210	Supplier TC	V	-	-	
		d. Tensile strength	Major	MEAS	-do-	-	IS210	Supplier TC	V	-	-	
		e. Dimensions	Major	MEAS	do-	-	Mfr. Drawing	Inspection Record	P	-	-	
07	Fan	a. Dimensions	Major	MEAS	OSPL	-	Mfr. Standard	LGB	P	-	-	
		b. Protective paint	Major	VISU	100%	-	Mfr. Standard	LGB	P	-	-	
08	Bearings	a. Type & Make	Major	MEAS	OSPL	-	Mfr. Standard	LGB	P	-	-	
		b. Dimensions ID, OD and Width	Major	MEAS	OSPL	-	Mfr. Standard	LGB	V	-	-	
09	Terminal block	a. Dimensions	Major	MEAS	10%	-	Mfr. Drawing	LGB	P	-	-	
		b. Tracking index	Major	MEAS	OSPL	-	Mfr. Standard	LGB	V	-	-	
		c. Chemical composition	Major	CHEM	-do-	-	Mfr. Drawing	Supplier TC	V	-	-	
10	Gaskets	a. Hardness	Major	MEAS	OSPL	-	Mfr. Standard	LGB	P	-	-	
		b. Dimensions	Major	MEAS	Level-AQL-4.0%	-	Mfr. Drawing	Supplier TC	V	-	-	
11	Space heater	a. Insulation resistance	Major	MEAS	-do-	-	Mfr. Drawing	LGB	P	-	-	Wherever applicable
		b. HV test	Major	MEAS	-do-	-	Mfr. Drawing	LGB	P	-	-	Wherever applicable
		c. Resistance	Major	MEAS	-do-	-	Mfr. Drawing	LGB	P	-	-	Wherever applicable



Sl. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc & Acceptance STD	Form of record	Agency			Remarks
					M	B/C			M	B	C	
		d. Wattage	Major	MEAS	-do-	-	Mfr. Drawing	LGB	P	-	-	Wherever applicable
12	Brazing alloy	a. Chemical composition	Major	CHEM	-do-	-	Mfr. Drawing	LGB	V	-	-	
13	Paints	a. Viscosity at 32°C	Major	MEAS	OSPL	-	Mfr. Standard	LGB	P	-	-	
		b. Drying time	Major	VISU	-do-	-	Mfr. Standard	Supplier TC	V	-	-	
		c. Dry film properties	Major	VISU	-do-	-	Mfr. Standard	Supplier TC	V	-	-	
B INPROCESS INSPECTION												
01	Machined cast iron body	a. Blow holes/ cracks	Major	VISU	100%	-	No blow hole/crack on surface	LGB	P	-	-	No welding on the casting is permitted for below holes and cracks
		b. Surface finish	Major	MEAS	100%	-	-do-	LGB	P	-	-	
		c. Bore ID, concentricity & other flame path dimensions	Major	MEAS	100%	-	Mfr. Drawing	LGB	P	-	-	
2	Machined cast iron end shields, terminal box & covers	a. Blow holes/cracks	Major	MEAS	100%	-	No blow hole/crack	LGB	P	-	-	
		b. Dimensions	Major	MEAS	100%	-	Mfr. Drawing	LGB	P	-	-	
03	Stator core	a. Core length, Diameter	Major	MEAS	100%	-	Mfr. Drawing	LGB	P	-	-	
		b. Core locking & skew	Major	VISU	100%	-	Mfr. Standard	LGB	P	-	-	
		c. Rigidity of core	Major	MEAS	100%	-	Mfr. Standard	LGB	P	-	-	
		d. De burring & Cleanliness	Major	VISU	100%	-	Mfr. Standard	LGB	P	-	-	
04.1	Coil forming	a. Verification of copper wire size	Major	MEAS	100%	-	Mfr. Standard	LGB	P	-	-	
		b. Number of turns	Major	MEAS	100%	-	Mfr. Standard	LGB	P	-	-	
04.2	Wound Stator	a. Resistance	Major	MEAS	100%	-	Mfr. Standard	LGB	P	-	-	
		b. HV Test	Major	MEAS	100%	-	IS325	LGB	P	-	-	2KV for 1 minute
		c. Insulation resistance	Major	MEAS	100%	-	IS325	LGB	P	-	-	>2 mega Ohm
		d. Polarity	Major	MEAS	100%	-	Mfr. Standard	LGB	P	-	-	
		e. Surge Test(Coil short)	Major	ELEC	100%	-	Mfr. Standard	LGB	P	-	-	
		f. Workmanship of joints, slot wedge tightness, coil end connection & overhang dimension	Major	VISU	100%	-	Mfr. Standard	LGB	P	-	-	



Sl. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc & Acceptance STD	Form of record	Agency			Remarks
					M	B/C			M	B	C	
04.3	Flood Impregnation	a. Dipping & Baking Cycles	Major	MEAS	100%	-	Mfr.Standard	LGB	P	-	-	Process parameters: temperature, time, viscosity
04.4	Rotor & Shaft assembly	a. Press fitting	Major	VISUAL	100%	-	Mfr. Drawing	LGB	P	-	-	
04.5	Rotor machining	a. Rotor OD, Concentricity w.r.t bearing Seating dia	Major	MEAS	100%	-	Mfr. Drawing	LGB	P	-	-	
		b. Rotor & Fan Balancing	Major	MEAS	100%	-	ISO-1940 Gr-2.5	LGB	P	-	-	
04.6	Hydraulic pressure testing	a. Pressure withstand capacity (10 Kg/sq.mm for 1 minute)	Major	MEAS	100%	-	IS2148*	LGB	P	-	-	* As per CM RI test report for Body, End shields, Terminal box and covers
C	FINAL ASSEMBLY											
		a. Determination of Air gap		MEAS	100%	-	Mfr. Drawing	LGB	P	-	-	
		b. Proper fixing w.r.t * Gasket Fixing * Terminal Box fixing * Terminal Board fixing * Lead terminations * Provision of lugs	Critical	VISU	100%	-	Mfr. Standard	LGB	P	-	-	
D	FINAL INSPECTION											
01	Routine test	a. Marking on the Name plate details, legibility, painting & Appearance, Terminal Box Location & accessories, phase sequence & Ferrule marking	Critical	VISU	100%	100%	IS:325/Drawing	TC	P	W	-	
		b. Provision of Flame proof cable glands make, type, rating	Critical	VISUAL	100%	100%	Drawing/ Datasheet	TR	P	W	-	Wherever applicable
		c. Dimension – Mounting & Overall	Critical	MEAS	100%	100%	IS:1231	TR	P	W	-	
		d. Measurement of stator winding Resistance & Space heater	Critical	MEAS	100%	100%	IS325	TR	P	W	-	Wherever applicable



Sl. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc & Acceptance STD	Form of record	Agency			Remarks
					M	B/C			M	B	C	
		e. H.V. Test and IR test on Winding and space heater	Critical	MEAS	100%	100%	IS325	TR	P	W	-	Wherever applicable for space heater
		f. Reduced voltage running in both direction	Critical	MEAS	100%	100%	IS325	TR	P	W	-	
		g. No Load run test	Critical	MEAS	100%	100%	IS325	TR	P	W	-	
		h. Locked rotor test	Critical	MEAS	100%	100%	IS325	TR	P	W	-	
		i. Vibration test at rated Voltage & speed	Critical	MEAS	100%	100%	IS325	TR	P	W	-	
		j. Over speed test	Critical	MEAS	100%	100%	IS325	TR	P	W	-	120% of rated speed
02	Painting	a. Paint shade	Critical	VISU	100%	OSPL	Mfr. Standard	LGB	P	V	-	
03	Type test	a. All tests mentioned in routine test	Critical	ELEC	One of design	One of design	IS325	TC	P	V	-	
		b. Full load run & temp. rise test	Critical	ELEC	-do-	-do-	IS:325	TC	P	V	-	
		c. Load test at 125%,100%, 50%, 25% load	Critical	ELEC	-do-	-do-	IS325	TC	P	V	-	
		d. Momentary overload test	Critical	ELEC	-do-	-do-	IS325	TC	P	V	-	
		e. Starting (Pull up) torque test	Critical	ELEC	-do-	-do-	IS325	TC	P	V	-	
		f. Break away torque test	Critical	ELEC	-do-	-do-	IS325	TC	P	V	-	
		g. Statutory Certificates like i. BIS certificates ii. CPRI or CMRI Certificate iii. DGMS certificates iv. CCE certificates v. DGFASLI certificate	Critical	ENVI	-do-	-do-	IS/IEC 60079	TC	P	V	-	Applicable for flame proof motor
		h. Enclosure protection test	Critical	ENVI	One of Design	One of Design	IS/IEC 60079	TC	P	V	-	
		i. Efficiency Calculation	Critical	Review	One of Design	One of Design	IS15999 (Part 2/Sec 1)	Inspection Report	P	V	-	Applicable only for Energy Efficient Motors


E. NOTES:-
1. LEGENDS:

PHYS	: Physical	MEAS	: Measurement
VISU	: Visual	ELEC	: Electrical
CHEM	: Chemical	MECH	: Mechanical
THER	: Thermal	OSPL	: 1 Sample / lot
TC	: Test Certificate	LGB	: Log Book
Mfr.	: Manufacturer	Spec.	: Specification
Lot	: Offered quantity in one inspection call		

2. Vendor shall arrange all Routine test facilities at their work. Tests which are not available facilities at vendor's work, are to be carried out at recognised National Test Houses like ETDC/ CIL/ NPL/ ERTL etc., at vendor's cost.
3. Through Log book/ any other documents/ Systems available at the vendor's works, it shall be possible to correlate the finished products with raw material & in process stage checks/ Inspection carried out.
4. All measuring & Testing instruments shall be periodically calibrated from recognised test houses & certificates made available during inspection for verification
5. Packing procedure shall be as per Specification.
6. Type test certificate shall be submitted by vendor for BHEL verification. The validity shall be 5 years from the date of Purchase Enquiry.

F. REFERENCE STANDARDS: (Latest standard revision shall be referred)

IS325	: Specification for three phase Induction Motor
IS2148	: Specification for Flameproof enclosures for electrical apparatus
IS 15999 (Part 2/ sec 1)	: Specification for rotating electric machines (Part 2- method of tests section 1) Standard methods for determining losses & Efficiency
IEC 60317 & IS13730	: Specification for particular type of winding wires
IS13778 Pt. 5	: Specification for winding wires test method
ISO 1940	: Mechanical vibration balance quality requirements for rotor in a constant (rigid) state
IS/ IEC 60079	: Explosive atmospheres
IS 1231	: Dimensions of three phase foot mounted induction motors
IS210	: Grey Iron Castings
IS4026	: Aluminium ingots billets and wire bars
IS12747	: Combined flexible materials for electrical insulation
IS648	: Cold rolled non-oriented electrical steel sheet and strip