958471/2022/BAP-QA_MECH

Ranipet	MANUFACTURER'S NAME & ADDRESS	STANDARD QUALITY PLAN Item/subsystem: CENTRIFUGAL PUMP	QP NO: HZ PUMP:610 Rev:00 Date:15.06.2021 Page 1 of 3	PROJECT: STANDARD

SL NO 1	COMPONENT & OPERATION 2	CHARACTERISTICS 3	CLASS 4	TYPE OF CHECK 5	QUANTUM OF CHECK 6		REFERENCE DOCUMENTS 7	ACCEPTANCE NORMS 8	FORMAT OF RECORD 9 D	AGENCY 10			REMAR KS 11
					M	B/C				M	B	C	
	RAW MATERIAL INSPECTION												
1	CASTING	CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	1 SAMPLE / HEAT		RELEVANT MATERIAL SPECS AS PER APPD. DRG. / DATA SHEETS	MTC	√	P	V	-	NO REPAIR WELDING IS PERMITTED ON CI AS CAST / PUNCHED HEAT NO SHALL BE PROVIDED FOR CORRELATION
		MECHANICAL PROPERTIES	MAJOR	TENSILE TEST	1 SAMPLE / HEAT		RELEVANT MATERIAL SPECS AS PER APPD. DRG. / DATA SHEETS	MTC	√	P	V	-	
		SURFACE EXAMINATION	MAJOR	VISUAL INSPECTION	100%		CASTING WILL BE FREE FROM CRACKS, SHRINKAGE , COLD SHUT, INJURIES, POROSITY SAND FUSION ETC	IR	√	P	V	-	
2	IMPELLER	CHEMICAL COMPOSITION	MAJOR	CHEMICAL ANALYSIS	1 SAMPLE / HEAT		RELEVANT MATERIAL SPECS AS PER APPD. DRG. / DATA SHEETS	MTC	√	P	V	-	
		MECHANICAL PROPERTIES	MAJOR	TENSILE TEST & HARDNESS	1 SAMPLE / HEAT		RELEVANT MATERIAL SPECS AS PER APPD. DRG. / DATA SHEETS	MTC	√	P	V	-	
		HEAT TREATMENT (As applicable)	CRITICAL	REVIEW OF TIME- TEMP CHART	100%		RELEVANT MATERIAL SPECS AS PER APPD. DRG. / DATA SHEETS	HT CAHRT	√	P	V	-	
		SURFACE EXAMINATION	MAJOR	VISUAL INSPECTION	100%		CASTING WILL BE FREE FROM CRACKS, SHRINKAGE , COLD SHUT, INJURIES, POROSITY SAND FUSION ETC	IR		P	V	- V	
3	SHAFT / SHAFT SLEEVES	CHEMICAL COMPOSTION	MAJOR	CHEMICAL ANALYSIS	1 SAMPLE / HEAT		RELEVANT MATERIAL SPECS AS PER APPD. DRG. / DATA SHEETS	MTC	√	P	V	-	
		MECHANICAL PROPERTIES	MAJOR	TENSILE TEST	1 SAMPLE / HEAT		RELEVANT MATERIAL SPECS AS PER APPD. DRG. / DATA SHEETS	MTC	√	P	V	-	
		SOUNDNESS	CRITICAL	VISUAL INSPECTION	100%		RELAVANT PROCEDURE	UT Report	√	P	V	-	FOR BAR DIA.≥50 MM.
4	WEARING RINGS	CHEMICAL PROPERTIES	MAJOR	CHEMICAL ANALYSIS	1 SAMPLE / HEAT		RELEVANT MATERIAL SPECS AS PER APPD. DRG. / DATA SHEETS	MTC	√	P	V	-	
		MECHANICAL PROPERTIES	MAJOR	TENSILE TEST & HARDNESS	1 SAMPLE / HEAT		RELEVANT MATERIAL SPECS AS PER APPD. DRG. / DATA SHEETS	Report	√	P	V	-	

M – Manufacturer / Subcontractor,
B - BHEL /BHEL Authorized Inspection Agency,
C- End Customer , P - perform,
V - Verification of reports, IR – Inspection Report.
W - Witness, TC - Test certificate, DP- Dye penetrant.
DR – Dimensional report. MTC- Material test Certificate.
* Record, identified with "tick" (√) under column 'D' shall be submitted to customer as a QA documentation package.

Prepared by	Reviewed by	Approved by
Rakesh Kr Madhu (Dy.Mgr/QA)	K Renjith (Manager/QA)	R Arunachalam (DGM/QA)

Ranipet	MANUFACTURER'S NAME & ADDRESS	STANDARD QUALITY PLAN Item/subsystem: CENTRIFUGAL PUMP	QP NO: HZ PUMP:610 Rev:00 Date:15.06.2021 Page 2 of 3	PROJECT: STANDARD

SL NO 1	COMPONENT & OPERATION 2	CHARACTERISTICS 3	CLASS 4	TYPE OF CHECK 5	QUANTUM OF CHECK 6		REFERENCE DOCUMENTS 7	ACCEPTANCE NORMS 8	FORMAT OF RECORD 9 D	AGENCY 10			REMAR KS 11
					M	B/C				M	B	C	
	IN PROCESS INSPECTION												
5	CASING & WEAR AREA	DIMENSIONAL	MAJOR	MEASURE	100%		MANUFACTURING DRAWING		IR	√	P	V	-	
		HYDROSTATIC TEST OF CASTING	CRITICAL	PRESSURE TEST	100%	20%	SEE NOTE 2	NO LEAKAGE	IR	√	P	W	-	SEE NOTE -1
6	IMPELLER	DIMENSIONAL	MAJOR	MEASURE	100%		MANUFACTURING DRAWING		IR	√	P	V	-	
		DYNAMIC BALANCING	CRITICAL	MEASURE	100%	20%	ISO 1940, GR. 6.3		IR	√	P	W	-	SEE NOTE-1
7	DPT OF MACHINED AREA OF CASINGS & IMPELLER	SOUNDNESS OF CASTING	MAJOR	NDT-DPT	100%		MANUFACTURER PROCEDURE		DPT Report	√	P	V	-	
8	SHAFT & SLEEVES	DIMESIONAL	MAJOR	VISUAL	100%		MANUFACTURING DRAWING		IR	√	P	V	-	
		SOUNDNESS	CRITICAL	ULTRASONIC TEST	1005		RELAVANT PROCEDURE		UT Report	√	P	W	-	FOR SHAFT DIA≥50 MM ONLY (EXCEPT THREADED PORTION) SEE NOTE-1
		DP TEST ON MACHINED AREA	MAJOR	DP TEST	100%		RELAVANT PROCEDURE		DPT Report	√	P	V	-	
	FINAL INSPECTION													

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Rakesh Kr Madhu (Dy.Mgr/QA)	K Renjith (Manager/QA)	R Arunachalam (DGM/QA)

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Ranipet	MANUFACTURER'S NAME & ADDRESS	STANDARD QUALITY PLAN Item/subsystem: CENTRIFUGAL PUMP	QP NO: HZ PUMP:610 Rev:00 Date:15.06.2021 Page 3 of 3	PROJECT: STANDARD

SL NO 1	COMPONENT & OPERATION 2	CHARACTERISTICS 3	CLASS 4	TYPE OF CHECK 5	QUANTUM OF CHECK 6		REFERENCE DOCUMENTS 7	ACCEPTANCE NORMS 8	FORMAT OF RECORD 9 D	AGENCY 10			REMAR KS 11
					M	B/C				M	B	C	
9	PUMP ASSEMBLY	DIMENSIONAL	MAJOR	MEASURE	100%	100%	APPROVED G.A. DRAWING	IR	√	P		V	-
10	PERFORMANCE TEST WITH JOB MOTOR	Q VS H Q VS P Q VS E	CRITICAL	MEASURE	100%	100%	APPROVED PERFORMANCE TEST PROCEDURE & APPROVED DATA SHEET	IR	√	P		W	-
		NOISE LEVEL	MAJOR	MEASURE				IR		P		W	-
		VIBRATION	MAJOR	MEASURE				IR		P		W	-
		BEARING TEMP	MAJOR	MEASURE				IR		P		W	-
11	NPSHR TEST	NPSHR TEST	CRITICAL	MEASURE	100%	1 NO / MODEL	APPROVED NPSHR TEST PROCEDURE	IR	√	P		W	-
12	PAINTING AND PACKING	TYPE OF PAINT. APPERANCE. DFT CONFORMANCE TO PACKING SPECIFICATION	MAJOR	VISUAL & MEASURE	100%		TECHNICAL SPECIFICATION /CUSTOMER APPROVED PAINTING SCHEDULE	IR	√	P		V	-

W

NOTES:

:

a. All the inspection/ test reports shall be submitted to Inspection agency for review and record purpose.
b. Latest revision of Drawings, specification and standard shall be used.
c. Materials shall be procured in compliance to Functional Technical Specification.
d. Gauges and measuring instruments with valid calibration only shall be used.
e. Inspection / Inspection wavier / approval by BHEL does not absolve Supplier's responsibility for conformity of the specification as per the terms of PO.
f.. BHEL /BHEL Authorized representatives shall have the right to witness the necessary inspection and testing of goods mentioned in the PO.
g. In case of Vendor Drawing, it needs approval by BHEL Engineering.
h. This QP Shall be read along with relevant PO, BHEL Specification/Drawing/Approved Datasheet.
i. This QP is applicable for Mandatory spare supply also specific to the item/project wise.

M – Manufacturer / Subcontractor,
B - BHEL /BHEL Authorized Inspection Agency,
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V - Verification of reports, IR – Inspection Report.
W - Witness, TC - Test certificate, DP- Dye penetrant.
DR – Dimensional report. MTC- Material test Certificate.
* Record, identified with "tick" (√) under column 'D' shall be submitted to customer as a QA documentation package.

Prepared by	Reviewed by	Approved by
Rakesh Kr Madhu (Dy.Mgr/QA)	K Renjith (Manager/QA)	R Arunachalam (DGM/QA)

Annexure Q

	Indent No: Enquiry no:	
Sl.No	**BHEL / Customer Requirements**	**## Specific confirmations by the manufacturer (Acceptable/Not acceptable)**
1	**Quality Plan Requirement: (If SQP is not given & Vendor QP applicable)**	
	(i) MQP (Manufacturing Quality Plan) shall be submitted in attached format for BHEL/Customer review & approval. Our SQP/Typical MQP/ MQP Format is attached for guidance & use.	
	(ii) MQP shall invariably cover w.r.t Inward inspection including on Raw material Procurement, In process and Final inspection in elaborated way/details.	
	(iii) Bidder shall also to give specific confirmation that on need basis, their competent officials shall visit to BHEL / customer for finalization of Quality plan including test procedure/methodology during preaward / post award approval / detailed engineering in the event of an order.	
	(iv) No deviation on BHEL/Customer approved MQP/ SQP (In case BHEL SQP is provided) is acceptable.	
	(v) Bidder shall agree to submit all cross referred documents other than codes/standards to BHEL/Customer/Consultant.	
	Important Notes shall be included in MQP : (a) Latest revision of Standard s & Specification shall apply. Only International Standards are applicable. (b) Materials shall be procured in compliance to Functional Technical Specification. (c) Inspection shall be in compliance with Approved Quality Control Procedure for the Product. (d) NDT shall be carried out by Qualified Personnel with compliance to Approved NDT Procedures and Acceptance Norms, as per ASME standard. (e) Gauges and measuring Instruments, with valid calibration only shall be used. (f) Cleaning and Painting of products shall be carried out as per Approved Painting Schedule. (g) Finished Products shall be packed to comply with Approved Packing Schedule. (h) Welding shall be carried out by Qualified Personnel with compliance to Approved NDT Procedures and Acceptance Norms, as per ASME standard.	
2	**Domestic / Inland Inspection** will be carried out by BHEL/BHEL appointed Third Party Inspection Agency (TPIA) / Customer/Customer Appointed Inspection Agency/Consultant. 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 Instrumentation Diagram / Process Flow Diagram / Single Line Diagram) etc. (as applicable).	
3	**Inspection Agency for Foreign Bidders and also for Indian Bidder but importing from Foreign Sources**: (1) Any one of the following Third Party Inspection Agency (TPIA) shall be appointed by the bidder and same shall be furnished by the bidder in techno commercial bid itself. (2) The details of TPIA with contact details like Name of the official, Phone no, Email id shall also to be submitted during pre/post award. However cost for such inspection agency shall be borne by the bidder only. Inspection charges for such inspection agency shall be indicated separately so that if BHEL/Customer is undertaking the inspection by on their own , then these charges are non claimable by the bidder. For NTPC Project ensure TPI Approved by NTPC. Refer our QC Procurement email in this regard. **List of TPIA** 1.M/s Bureau Veritas 2.M/s TUV-Nord 3.M/s TUV-SUD 4.M/s TUV Rheinland 5.M/s Lloyds Register 6.M/s SGS 7.M/s Germanischer Lloyds 8.M/s QUEST 9.M/s Certification Engineers International 10.M/s Intertek 11.M/s IR Class Systems and Solutions 12.M/s DNV 13. M/s Fichtner 14. M/s ABS Inspection Services	

Sl.No	BHEL / Customer Requirements	## Specific confirmations by the manufacturer (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 clearance for further processing. This inspection call shall be given well in advance (at least 2 weeks before) 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 BHEL appointed Inspection agency (as in Sl no. 2). Inspection shall be done as per approved Quality plan/ Technical specification/ Approved Drawing/ Approved Data sheet .	
6	**Inspection at Foreign Source/Supplier:** (a) As in sl no: 3. shall be ensured without fail (b) No material / items shall be despatched without getting the written communication from BHEL / Customer inspection carried out by Bidder appointed Third Party Inspection Agency (As per Sl no.3) / Customer/Customer Appointed Inspection Agency/Consultant. 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 Instrumentation 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 of BHEL well in advance before proceeding 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 + Mechanical + 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 transit / 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 accredited 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 with respect to 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 evidences in the offer itself.	
12	## Necessarily 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.	
	VENDOR SIGN AND STAMP:	Vendor Name & Address:

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

ITEM: LT MOTOR

01	**Quality Plan Requirement**	BHELSQP (Standard Quality Plan) no. QA:CI:STD:QP:24 Rev.05 is applicable for these LT MOTOR inspection. (Copy attached) 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.	
02	**Painting Requirements**	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).	
03	**Inspection Methodology**	No material shall be dispatched without BHEL or its authorized inspection agency.	
04	**For inspection call**	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	
05	**Packing**	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.	

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.

BHARAT HEAVY ELECTRICALS LIMITED TIRUCHIRAPPALLI - 620014	QUALITY PLAN FOR LT INDUCTION MOTORS	QA:CI:STD:QP:24 Rev: 05 Page: 2 of 8

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-	-	IS 648	Supplier TC	V	-	-	
		e. Ductility	Major	MEAS	-do-	-	IS 648	Supplier TC	V	-	-	
		f. Visual Check (waviness)	Major	VISU	-do-	-	IS 648	LGB	V	-	-	
		g. Temperature withstand capacity	Major	MEAS	-do-	-	IS 648	LGB	V	-	-	
		h. Thickness of stamping & thickness of varnish coating	Major	MEAS	-do-	-	IS 648	LGB	V	-	-	
		i. Stamping Burr height	Major	MEAS	-do-	-	IS 648	LGB	V	-	-	
05	Aluminium ingots	a. Chemical Composition	Major	CHEM	-do-	-	IS 4026	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	-	IS 210	Supplier TC	V	-	-	
		d. Tensile strength	Major	MEAS	-do-	-	IS 210	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

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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 CMRI 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	IS 15999 (Part 2/Sec 1)	Inspection Report	P	V	-	Applicable only for Energy Efficient Motors

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E.NOTESL:

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 & IS 13730	:	Specification for particular type of winding wires
IS 13778 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
IS 12747	:	Combined flexible materials for electrical insulation
IS648	:	Cold rolled non-oriented electrical steel sheet and strip