


SL No.		COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1		2	3	4	5	6	7	8	9	10			11
										P	W	V	
1.0		MATERIAL											
1.1		Casing, Impeller Pedestal & Hub - M.S sheets & plates	Visual, Chemicals & Physical	Major	Visual Measurement Physical & Chemical test	Sample / heat	Appr. drg./ Appr. Data sheet	Appr. drg./ Appr. Data sheet	Arrival note & test certificate	3		2,1	Material testing is carried out periodically at random by OEM authorised testing lab & test report is kept. Sample are drawn & tested from each lot. Report will be submitted to BHEL / Customer for verification
1.2		SHAFT (EN-8)	Visual, Chemicals & Physical UT if DIA > 50mm (in proof machined condition)	Critical Critical	- do - NDT	100% 100%	- do - ASTMA 388	- do - When back wall echo set to 100% of FSH in sound area of material, defects echo shall not exceed 20% of FSH and or back wall echo shall not fall to less than 80% of FSH. Max. no of acceptable defects indication as scanned above shall be 5 in 1 mtr length of	- do - IR	3 3		2,1 2,1	
1.3		BEARING	Visual	-----do-----	Check for make & no	100%	Mfg. Drg.	Mfg. Drg.	Arrival note	3			
1.4		PULLEYS - C.I.	Visual & dimension	Major	Visual & Measurement	100%	ABB P.O.	Manufacturer catalogue / drg	Arrival note	3			
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									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1.5	V-BELT	Visual	Minor	Visual & check for make	10%	-----do-----	Dimension as per P.O.	Arrival note	3			
1.6	Base frame-MS channel & Angle	Visual	Minor	Visual & measurement	100%	Mfg. Drg	Mfg. Drg	Inspection report	3			
1.7	Outlet damper	Visual & dimensional	Major	-----do-----	100%	-----do-----	-----do-----	-----do-----	3			
2.0	IN PROGRESS INSPECTION											
2.1	Casing /impeller fabrication	DPT of welding	Major	NDT	20%	ASTME 165	No relevant indication	-----do-----	3		2,1	
2.2	Shaft machining	DPT	---do----	---do----	100%	-----do-----	-----do-----	-----do-----	3		2,1	
2.3	Impeller balancing (Static & Dynamic)	Balancing level	Critical	Balancing	100%	VDI-2060 / ISO 1940 Gr. 6.3	VDI-2060 / ISO 1940 Gr. 6.3	Balancing register	3	2,1		20% of each type and size to be witnessed by BHEL
3.0	ASSEMBLY											
3.1	Overall dimension	Visual & measurement	Major	Measurement	100%	Approved drg	Approved drg	Inspection report	3	2,1	2,1	At random by BHEL / CUSTOMER
3.2	Final painting	Visual & dimensional	Major	Visual	100%	Approved drg	Approved drg	-----do-----	3			
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1		2	3	4	5	6	7	8	9	P	W	V	11
4.0		FINAL ACCEPTANCE											
4.1		Motors			REFER QP FOR MOTORS								
4.2		Run test of fan for 4 hours or till stabilisation or temp. rise which ever is earlier	Visual & measurement	Critical	Measurement a) Speed b) Vibration c) Temperature rise d) Power input to motor e) Noise	100%	IS-4894 & VDI-2056 / ISO-10816-1	Approved data sheet. Vibration-acceptable zone as per VDI-2056 / ISO-10816-1 Temp. rise; 40 deg C. Maximum above ambient	Runtest report	3	2,1		One of each type & size to be run tested and witnessed by BHEL / customer. Noise at shop for reference only
4.3		Performance test of Fan	Measurement	Critical	Measurement a) Flow b) Pressure c) Speed d) Power consumption	One of each type & size	AMCA-210 / IS-4894/ appvd data sheet	Performance IS-4894	PT report	3	2,1		P.T. will be conducted for D.I.D.W fan as per AMCA-210 providing test duct piece at fan outlet. P.T. for S.I.S.W fan will be conducted providing test duct piece at fan inlet as per IS-4894. However In both the cases testing will be conducted with available test motor rating, may be at increased RPM depending on availability of drive set.
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1		2	3	4	5	6	7	8	9	10			11
4.4	Painting	Visual / Dft	Major	e) Efficiency f) Noise g) Vibration h) Temp. rise	Visual & Measurement	100%	Appvd. Drg.	Noise - 85dBA at 1.0mtr Vibration acceptance zone as per VDI-2056 / ISO-10816-1 Temp rise -40 deg C max above ambient	Insp. Report	3	2	1	Results thus obtained will be interpolated / extrapolated to check the fan performance at rated RPM. Based on the above guaranteed power Tolerance will be as per IS-4894 noise & vibration value at shop is for reference only.
5	Review of Q.A documentation						Appvd. Q.P.	Appvd. Q.P.				2,1	CHP
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LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER


		MANUFACTURE'S NAME & ADDRESS		STANDARD QUALITY PLAN				PROJECT:				
				ITEM : AIR HANDLING UNIT		QP. NO. :		PACKAGE :				
				SYSTEM :		REV. :		CONTRACT NO. :				
						DATE :		MAIN CONTRACTOR :				
								SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1.0 RAW MATERIAL AND BOUGHT OUT CONTROL												
1.1	Casing, Fan impeller, Hub, Damper	1. Physical properties 2. Thickness, surface finish	Major Major	Physical tests Meas., Visual	1/Lot 100%	Appd. Data sheet Appd. Data sheet	Appd. Data sheet Appd. Data sheet	Test Report Inspection report	3,2 3,2		2,1 2,1	
1.2	Shaft, cooling coil tubes & fins	1. Physical, chemical props. 2. Dimensions, finish	Major Major	Phy. Chem anal. Meas., visual	1/batch 100%	----do---- ----do----	----do---- ----do----	Test Report Inspection report	3,2 3,2		2,1 2,1	
1.3	V-Belts	Physical properties, dimensions, defects	Major	Physical test, measurement, visual	Sample as per ISS	----do----	----do----	Manufacturer's report	3,2		2,1	
1.4	Bearings	1.Make, W'Ship & finish, bearing number	Major	Visual	100%	Manufacturing drawing	Manufacturing drawing	Log Book	3,2			
2.0 IN-PROCESS CONTROL												
2.1	Fabrication of casing & impeller, damper	1.Workmanship & finish, 2.Dimensions	Major Major	Visual Measurement	100% 100%	----do---- ----do----	----do---- ----do----	----do---- ----do----	3,2 3,2			
2.2	Tube bending (Mock-up)	1.Thinning	Major	Measurement	1 tube of shortest rarius	Manufacturing specification	Manufacturing specification	Inspection report	3,2	2	1	
2.3	Impeller	1.Residual unbalance	Critical	Static, dynamic balancing	100%	ISO-1940	ISO-1940 G6.3	Inspection report	3,2	2	1	
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									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
2.4	Shaft	1.Workmanship and finish, dimensions 2.Hardness 3.Surface defects	Major Major Major	Visual, measurement Measurement Penetrant test	100% 100% 100%	Mfg. Drawing Mfg. Drawing ASTME 165	Mfg. Drawing Mfg. Drawing No surface defect	Log Book Log Book Inspection report	3,2 3,2 3,2		2,1 2,1	
2.5	Galvanised components	1.Uniformity, adhesion, weight of Zinc coating	Critical	Dip, adhesion, strip tests	1/batch	Appd. Data sheet	Appd. Data sheet	Inspection report	3,2		1	
2.6	Soldering process control	1.Bath temperature 2.Soldering quality	Critical Critical	Periodic meas. Visual	100% 100%	Mfg specification Mfg specification	Mfg specification Mfg specification	Log book Log book	3,2 3,2			
3.0 SUB ASSEMBLY/ASSEMBLY & FINAL INSPECTION AND TEST												
3.1	Cooling coil assembly	1.No of fins/CM 2.Overall dimension, wormanship & finish 3.Leak thightness	Critical Critical Critical	Measurement Measurement, Visual Pneumatic test at 1.25 x Design pressure	100% 100% 100%	Appd. Data sheet, technical spe. ----do---- ----do----	Appd. Data sheet, technical spe. ----do---- No leakage	Inspection report ----do---- ----do----	3,2 3,2 3,2	2,1 2,1 2,1		
3.2	Rotor assembly	Residual unbalance	Critical	Static, dynamic balancing	100%	ISO : 1940	ISO : 1940 G 6.3	----do----	3,2	2,1		
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				NAME								
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		MANUFACTURE'S NAME & ADDRESS		STANDARD QUALITY PLAN				PROJECT:				
				ITEM : AIR HANDLING UNIT SYSTEM :				QP. NO. : REV. : 0 DATE :				
								PACKAGE : CONTRACT NO. : MAIN CONTRACTOR : SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
									10			
3.3	Complete Air Handling Unit with unit motor & unit filter	1. Completeness, correctness, clearances, orientation, workmanship & finish 2. Overall dimensions 3*. Air delivery & power consumed at rated static pressure & rated RPM noise and vibration 4. Free running, functioning of controls	Major Major Critical Major	Visual Measurement Performance test Free run test	100% 100% 1/type/size 100%	Appd. Data sheet / drawing, technical specification ----do---- ----do----	Appd. Data sheet / drawing, technical specification ----do---- ----do----	Inspection report ----do---- Performance test report Test report	3,2 3,2 3,2	2,1 2,1 2,1*		
3.4	PAINTING * AIR HANDLING UNIT SHALL BE TESTED FOR PERFORMANCE AT SITE ALONG WITH AC-PLANT	UNIFORMITY AND THICKNESS OF PAINT	Major	Visual, MEASUREMENT	100%	Technical specification	Technical specification	Inspection report	3		2,	
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				NAME								
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		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :					
				ITEM : COOLING COIL	Q.P. NO. :	PACKAGE :	CONTRACT NO. :	MAIN CONTRACTOR :	SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
1	2	3	4	5	6	7	8	9	P	W	V	11	
										10			
1.0 MATERIAL													
1.1	Copper tube	Chemical composition, Physical, Dimensions	Critical	Chemical test, tensile, hardness, flattening & flare test, tube OD, thk, length	BS 2871	BS 2871	BS 2871 / C-106 1/2 H condition	Mfg / Lab TC	3			2,1	
		Visual Dimension		Surface defect Measurement	100% Sample	BS 2871 Drawing	BS 2871 Drawing	IR	3				
1.2	Aluminium Strip	Dimension, chemical composition, mechanical properties	Major	Measurement & Chemical / Mechanical (Only tensile)	Sample per batch	IS-737 Gr. 40800	IS-737 Gr. 40800	TC	3			2,1	
1.3	GI Sheet	Dimension, mechanical properties & galvanising test	Major	Measurement/Visual, zinc coating & bend test	Sample per batch	IS-277 Gr. 120	IS-277 Gr. 120	Inspection report/Lab TC	3			2,1	
1.4	Header (MS Pipe)	Dimension, mechanical properties & chemical	Major	Measurement/visual/chemical/mechanical & hydro test	Sample per batch	Approved drawing/data sheet	Approved drawing/data sheet	Mfg test report	3			2,1	
				DESIGNATION		DATE		DATE				DATE	
				NAME									
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		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :				
				ITEM : COOLING COIL		QP. NO. :		PACKAGE :				
				SUB-SYSTEM :		REV. :		CONTRACT NO. :				
						DATE :		MAIN CONTRACTOR :				
								SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
									10			
2.0	<u>INPROCESS INSPECTION</u>											
2.1	Cooling coil tube	Dimension Cleanliness	Critical	Measurement Visual	At random 100%	Mfg fabrication drawing	As per approved drawing/data sheet	Inspection report	3			
2.2	Fin tube bundles	Dimension, fin bonding Leak tightness	Critical	Visual/ Measurement Pr.test at 21kg/cm ²	100%	Mfg fabrication drawing	As per approved drawing & no movement of fins No leakage during pneumatic test	Inspection report	3		2,1	
2.3	U bends	Dimension, cleanliness	Major	Visual/ Measurement	At random	----do----	Appvd. Drawing	----do----	3			
	Tube sheet/drilling/punching/folding & top bottom sheet folding	Dimension	Major	----do----	100%	----do----	Appvd. Drawing	Mfg Inspection report	3			
3.0	<u>FINAL INSPECTION</u>											
3.1	Assembly	Dimension, cleanliness	Critical	Visual/ Measurement	100%	Approved drawing/data sheet	Approved drawing/data sheet	Mfg Inspection report	3	2,1		CHP
3.2	Pressure test	Leak proofness	Critical	Pneumatic test at 21kg/cm ² for 1 hr	100%	Approved drawing/data sheet	No leakage during pressure test and no droop in pressure	Mfg Inspection report	3	2,1		CHP
4.0	<u>REVIEW OF QA DOCUMENTS</u>			AS PER APPROVED QP								CHP
				DESIGNATION		DATE		DATE				DATE
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		MANUFACTURE'S NAME & ADDRESS		STANDARD QUALITY PLAN				PROJECT:				
				ITEM : INDUCED DRAFT FRP PACKAGE COOLING TOWER		SYSTEM :		QP. NO. :	REV. :	DATE :	PACKAGE :	CONTRACT NO. :
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1		3	4	5	6	7	8	9	P	W	V	11
10												
1.0 RAW MATERIAL & BOUGHT -OUT CONTROLS												
1.1	Casing/basin-laminates & resin	1.Physical, Chemical props.	Major	Physical, chemical, annalysis	1 / Batch	Mfg. Spec	Mfg. Spec	Mfg TC	3/2		2,1	
1.2	Fan Blade	1.Physical, Chemical props.	Major	----do----	1 / Heat	Appd. Data Sheet	Appd. Data Sheet	TC	3/2		2,1	
1.3	Nozzles/sprinklers, drift-eliminators, distributor	1.Dimensions, workmanship & finish	Minor	Measurement, visual	Random samples	Mfg. Drawings	Mfg. Drawings	Inspection report	3/2		2	
1.4	Wire mesh	1.Mesh size, surface finish	Minor	Measurement, visual exam	----do----	----do----	----do----	----do----	3/2		2	
1.5	Wire, fasteners	1.Chemical properties	Major	Chemical analysis	----do----	Appd. Data Sheet	Appd. Data Sheet	Lab report	3/2		2	
1.6	Wire, fasteners, fan guard (Galvanised)	1.Uniformity, adhesion, Wt. Of zinc coating	Major	Dip, Adhesion, strip tests	IS : 4826, 1/batch	IS : 4826, Appvd. Data sheet	IS : 4826, Appvd. Data sheet	----do----	3/2		2,1	
1.7	Pipes	1.Dimesnions, leaktightness, workmanship & finish	Major	Measurement, Visual	100%	Mfg. Drg	Mfg. Drg	Log book/Mfr. TC	3/2		2,1	
1.8	Motors	i) Type tests	Critical	Verification of certificates	1/Type/size	Tech. Spec. appvd. Data sheet/Drg	Tech. Spec. appvd. Data sheet/Drg	Type test cert.	3		2,1	See note A below
			Critical	----do----	1/Type	----do----	----do----	From Ind. Lab	3		2,1	
			Major	Elect. Tests	100%	----do----	----do----	Routine test cert.	3	2,1		
			Major	Measurement, Visual	100%	----do----	----do----	Inspection report	3	2,1		
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				NAME								
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		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :				
				ITEM : INDUCED DRAFT FRP PACKAGE COOLING TOWER		QP. NO. :		PACKAGE :				
				SYSTEM :		REV. :		CONTRACT NO. :				
						DATE :		MAIN CONTRACTOR :				
								SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1		3	4	5	6	7	8	9	10			11
2.0	IN-PROCESS CONTROL											
2.1	Casing/Basin (Cured)	i) Glass content ii) Chemical Resistance iii) Tensile strength iv) Hardness v) Dimensions & Ovalty vi) Workmanship & finish	Critical	Chem. Analysis Phy.test,meas Visual exam	1/Batch	Apvd. Data sht IS : 10661, MFG STD./Drg	Apvd. Data sht IS : 10661, MFG STD./Drg	Test Cert/ Inspection Report/Log Book	3/2		2,1	
2.2	Fan Blade	i)Residual unbalance	Critical	Static/Dynamic balancing	100%	ISO:1940	Mfg. Std	Inspection report	3/2	2	1	
3.0	ASSEMBLY CONTROL, FINAL INSPECTION AND TESTS											
3.1	Complete cooling tower with motor	i) Cooling capacity ii) Drift & evaporation losses iii) Outlet temperature iv) Power consumption v) Noise, vibration vi) Overall dimensions vii) Workmanship & finish viii) No load running, noise, vibration, overall dimensions, workmanship and finish	Critical	Performance test, Meas., Visual exam	1/Type/size	Tech. Spec./appvd. Data sht/ appvd. Drg	Tech. Spec./appvd. Data sht/ appvd. Drg	----do----	3/2	2,1		All test shall be carried out at size except sl no vi,vii,viii of column no (3)
			Major	No load running, meas, visual exam	100%	----do----	----do----	----do----	3/2	2,1		At manufactur works with assemble conditon
NOTE 'A': IF TYPE TEST CERTIFICATE FOR SIMILAR TYPE IS NOT AVAILABLE, ACTUAL TYPE TESTS SHALL BE CONDUCTED IN THE PRESENCE OF BHEL												
				DESIGNATION		DATE		DATE				DATE
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SL No.		COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
										P	W	V	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)			(11)	
1.0	RAW MATERIAL AND BOUGHT OUT CONTROL												
1.1	IMPELLER & HUB	1. PHYSICAL, CHEM. PROPERTIES 2. - DO -	MA MA	PHY., CHEM. TEST - DO -	1/HEAT ONE/LOT	APPD. DATA SHEET - DO -	APPD. DATA SHEET - DO -	FOUNDRY REPORT LAB. REPORT - DO -	3 3 3	-	2,1 2,1 2,1		
1.2	CASING	DIMENSIONS	MA	MEASUREMENT	100%	- DO -	- DO -	- DO -	3	-	2,1		
2.0	IN PROCESS CONTROL												
2.1	IMPELLER, HUB & CASING AFTER MACHINING/ FABRICATION	WORKMANSHIP AND FINISH DIMENSIONS	MA	VISUAL, MEAS.	100%	MFG. DRAWING	MFG. DRAWING	INSPN. REPORT/ LOG BOOK	3/2	-	2,1		
2.2	IMPELLER & HUB	STATIC, DYNAMIC, RESIDUAL BALANCE	CR	STATIC, DYNAMIC BALANCING	100%	ISO:1940	ISO:1940 G.6.3	INSPN. REPORT	3/2	-	2,1		
2.3	MOTOR	ROUTINE TESTS, TYPE TESTS, DRG. OF PROTECTION	MA	ELECTRICAL TESTS	100%	APPD. DATA SHEET	APPD. DATA SHEET	IIR/LOG BOOK	3/2	-	2,1	REFER NOTE-1	
3.0	ASSY. CONTROL, FINAL INSPECTION & TESTS												
3.1	COMPLETE FAN ASSY. WITH UNIT MOTOR	COMPLETENESS, CORRECTNESS, CLEANLINESS, FREE RUN BY HAND, CLEARANCES	MA	VISUAL, MEAS.	100%	MFG. DRG./ APPD. DRG.	MFG. DRG./ APPD. DRG.	INSPN. REPORT	3/2	-	2,1		
3.2	COMPLETE FAN ASSY. WITH UNIT MOTOR	TYPE TESTS	CR	PERFORMANCE TEST	ONE/TYPE/ SIZE	APPD. DATA SHEET	APPD. DATA SHEET,	TYPE TEST REPORT	3/2	2,1	-		
			SIGNATURE	DATE			DATE					DATE	
			NAME										
			PARTY		CUSTOMER/CONSULTANT		BHEL		VENDOR				

		MANUFACTURE'S NAME & ADDRESS 		STANDARD QUALITY PLAN QP. NO. : ITEM : AXIAL FAN REV. : SYSTEM : DATE :				PROJECT : PACKAGE : CONTRACT NO. : MAIN CONTRACTOR : SUB CONTRACTOR :				
S.NO. (1)	COMPONENT/OPERATI (2)	CHARACTERISTICS (3)	CATE- (4)	TYPE/METHOD (5)	EXTENT (6)	REFERENCE (7)	ACCEPTANCE (8)	FORMAT OF (9)	AGENCY			REMARKS (11)
									P	W	V	
		(10)										
3.3	COMPLETE FAN ASSY. WITH UNIT MOTOR	ACCEPTANCE TESTS	MA	ACCEPTANCE TEST	100%	APPD. DATA SHEET	APPD. DATA SHEET,	TEST REPORT	3/2	-	2,1	
3.4	COMPLETE FAN ASSY. WITH MOTOR	AIR DELIVERY	CR	AIR DELIVERY TEST	APPD. DATA SHEET	APPD. DATA SHEET	APPD. DATA SHEET,	- DO -	3/2	-	2,1	
3.5	COMPLETE FAN ASSY. WITH MOTOR	ROUTINE TESTS	MA	ROUTINE TESTS	100%	- DO -	- DO -	- DO -	3/2	-	2,1	
3.6	COMPLETE FAN ASSY. WITH MOTOR	DIMENSIONS, WORKMANSHIP, FINISH, COMPLETENESS	MI	MEAS., VISUAL	100%	APPD. DATA SHEET, MFRS. DRG.	APPD. DATA SHEET, MFRS. DRG.	INSPN. REPORT	3/2	-	2,1	
3.7	PAINTING & PACKING	SURFACE, PREPN. FILM THICKNESS, FINISH & SHADE, SOUNDNESS, WEATHER PROOFNESS OF PACKING	MI	VISUAL EXAM.	100%	TECHNICAL SPEC./ MFG. DRG.	TECHNICAL SPEC./ MFG. DRG.	- DO -	3/2	-	2,1	
		SIGNATURE	DATE				DATE					DATE
		NAME										
		PARTY		CUSTOMER/CONSULTANT			BHEL				VENDOR	
LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION 3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER												


		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :				
				ITEM : PIPES, FITTINGS, PIPE WORK	QP. NO. :	PACKAGE :	CONTRACT NO. :	MAIN CONTRACTOR :	SUB CONTRACTOR :	REV. :	DATE :	
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
										10		
1.0 MATERIAL CONTROL												
1.1	Pipes (Mill made)	Physical, chemical properties, dimensions surface finish, heat treatment (If applicable), leak tightness	Major	Physical, chemical, tests, measurement, visual exam., ver. Of HT chart, Hydro test	Technical specification IS : 4711	Appd. Data sheet/tech. Specification	Appd. Data sheet/tech. Specification	Mfg. TC/Lab report	3			2,1
1.2	<u>Fittings</u>	Physical, chemical properties, dimensions surface finish, heat treatment (If applicable)	Major	----do----	1/heat, 100%	----do----	----do----	----do----	3			2,1
1.3	Plate for flanges, fabricated piping & forgings for flanges	Physical, chemical properties, dimensions surface finish, heat treatment	Major	----do----	1/cast	----do----	----do----	----do----	3			2,1
2.0 IN-PROCESS CONTROL												
2.1	Pipes, fittings, flanges-machining, bending	Dimensions including thinning, ovality, finish, wrinkles etc	Major	Measurement, visual exam	100%	Manufacturing drawing	Manufacturing drawing	I.I.R	3			2,1
2.2	Welding procedure specification	Correctness	Major	Exam	100%	IS : 7307/ASTME IX	IS : 7307/ASTME IX	Format of IS : 7307 ASME	3			2,1
				DESIGNATION		DATE		DATE				DATE
				NAME								
PAGE No				PARTY	CUSTOMER/CONSULTANT		BHEL		VENDOR			

		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :				
				ITEM : PIPES, FITTINGS, PIPE WORK		QP. NO. :		PACKAGE :				
				SUB-SYSTEM :		REV. :		CONTRACT NO. :				
						DATE :		MAIN CONTRACTOR :				
								SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
									10			
2.3	Procedure qualification & welder's qualification	Weld soundness	Major	Physical tests	ASME IX/IS : 7310 / IS : 7307	IS : 7310 / ASME IX	IS : 7310 / ASME IX	Format of IS : 7310 ASME	3	2	1	
2.4	Weld Fit - UPS	Dimensions, alignment orientation	Major	Measurement visual	100%	W.P.S, Approved drawings	W.P.S approved drawings	I.R	3,2	2	1	
2.5	Welds											
	A) Butt welds with joint efficiency											
	i) Root run	Weld defects	Major	Penetrant test	100%	IS : 3658/ASME 165	ASME VIII DIV/ANSIB 31.1	Inspection report	3,2	2	1	
	ii) Final run	Weld defects	Major	Penetrant test	100%	----do----	----do----	----do----	3,2		2,1	
				RT	100% for JT. Eff 1.0 & 10% for 0.9	ANSI B 31.1	ANSIB 31.1	----do----	3,2		2,1	
	B) Butt welds with joint efficiency less than 0.9	----do----	Major	Penetrant test	100% for 100NB & above, 10% for other	IS : 3658/ASTME 165	----do----	----do----	3,2		2,1	
		----do----	Major	RT	10% for THK>/20mm & Spot for other							
3.0	Complete pipe work & pipes	Workmanship & finish dimensions, orientation, leak tightness	Critical	Measurement, visual hydro test at 1.5 x design pressure	100%	Appd. Drawing	Appd. Drawing No leakage	I.R BHEL Format	3		2,1	
				DESIGNATION		DATE		DATE				DATE
				NAME								
	PAGE No			PARTY	CUSTOMER/CONSULTANT		BHEL				VENDOR	


LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER

		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :					
				ITEM : G.I SHEET	Q.P. NO. :	PACKAGE :	CONTRACT NO. :	MAIN CONTRACTOR :	SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
1		3	4	5	6	7	8	9	P	W	V	11	
										10			
1.0	<u>MATERIAL</u>												
1.1	G.I Sheet	A) Chemical	Major	Chemical	One per Heat	IS-277 Gr-275	IS-277 Gr-275	Mfg TC	3		2/1	Co-related Mfg's T.C will be submitted for verification	
		B) Bend	Major	Physical	One per Heat	IS-277 Gr-275	IS-277 Gr-275	Mfg TC	3		2/1		
		C) Sheet Thickness	Major	Dimension	One per Sheet	IS-277 Gr-275	IS-277 Gr-275	Mfg TC	3		2/1		
		D) Zinc Coating	Major	Grade	One per Sheet	IS-277 Gr-275	IS-277 Gr-275	Mfg TC	3		2/1		
2.0	<u>FINAL ACCEPTANCE</u>												
2.1	Jacketted Sheet/Coil	Identification	Major	Visual verification	100%	Mfg standard	Mfg standard	Inspection report	3	2	1	* Witness by vendor & Verification of TC by BHEL	
				DESIGNATION		DATE		DATE				DATE	
				NAME									
	PAGE No			PARTY	CUSTOMER/CONSULTANT		BHEL				VENDOR		

LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER

		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :				
				ITEM : FILTER	Q.P. NO. :	REV. :	PACKAGE :	CONTRACT NO. :	MAIN CONTRACTOR :	SUB CONTRACTOR :		
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1		3	4	5	6	7	8	9	P	W	V	11
10												
1	<u>MATERIALS</u>											
1.1	Filter Frame	Thickness of sheet	Major	Measure	Random	App. Drg/Data Sheet	App. Drg/Data Sheet	Inspection Report	3		2,1	
1.2	Spacer	Thickness of sheet	Major	Measure	Random	App. Drg/Data Sheet	App. Drg/Data Sheet	Inspection Report	3		2,1	
1.3	Filter Media	Gram / Sq.M	Major	Weight	Random	----do----	----do----	----do----	3		2,1	
1.4	Wirenet	Mesh Count	Minor	Measure	Random	----do----	----do----	----do----	3		2,1	
2.0	<u>IN PROCESS INSPECTION</u>											
2.1	Filter Frame	Dimensional	Major	Visual	Randomk	Appd. Data Sheet/ Drg	Appd. Data Sheet/ Drg	Inspection Report	3		2,1	
2.2	Media Stitching	Dimensional	Major	Visual	Randomk	----do----	Tech. Spec.	----do----	3		2,1	
3.0	<u>FINAL INSPECTION</u>											
3.1	Assembly	Dimensional	Major	Measure	Randomk	----do----	----do----	----do----	3	2,1		} CHP at Random 5% (min 2 per visit for each size)
3.2	End Seal	Tightness	Major	Physical	100%	----do----	----do----	----do----	3	2,1		
3.3	Aesthetics	Visual	Major	Visual	100%	----do----	----do----	----do----	3	2,1		
4.0	<u>PERFORMANCE</u>											
4.1	Initial and final pressure drop	Pressure drop Vs flow	Critical	Test	1 / Lot *	(As per BS : 6540 Part-I / Ashare 52-latest)	Appd. Data Sheet/ Drg	Inspection Report	3	2,1		CHP
4.2	Av. Synth. Dust weight arrestance	Efficiency	Critical	Test	1 / Lot *	----do----	----do----	----do----	3	2,1		CHP
4.3	Review of TC / IR as per approved QAP										2,1	CHP
* LOT SIZE SHALL BE MAX 500 NOS OR PARTS OFFERED PER VISIT FOR EACH SIZE OF FILTER												
NOTE : FOR AVERAGE SYN. DUST WEIGHT ARRESTANCE, HEPA FILTER WITH EFF. 98.97% DOWN TO 0.3 MICRON SHALL BE USED												
				DESIGNATION		DATE		DATE				DATE
				NAME								
PAGE No				PARTY	CUSTOMER/CONSULTANT		BHEL				VENDOR	


LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER

		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :					
				ITEM : WATER SOFTENING PLANT	QP. NO. :	PACKAGE :	CONTRACT NO. :	MAIN CONTRACTOR :	SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
1	2	3	4	5	6	7	8	9	P	W	V	11	
										10			
I	PRESSURE VESSEL & TANKS												
	Material Identification for Major Material	Completeness	Major	Visual & Dimensional check	100%	Drg / Relevant spec / Appvd Data Sheet / Catalogue	Drg / Relevant spec / Appvd Data Sheet / Catalogue	Inspection Report	3		2,1	COC for material of these components shall be submitted	
	a) Softener Vessel												
	b) Filter												
	c) Multiport Valve												
	d) Brine Measuring Tank												
	e) Pipe												
II	BOIs												
	a) Resin	Verification	Major	Make & Type verification	100%	IEI standard	IEI standard	Inspection Report	3		2,1		
	b) Pressure Gauge	Verification	Major	Review of Mfg.TC alongwith calibration certificate	100%	IEI Std / Mfg. Std	IEI Std / Mfg. Std	Mfg. TC	3		2,1		
III	FINAL INSPECTION												
	1) Final Dimension Check-up	Dimensional conformity	Major	Visual & Measurement	100%	Detailed Drawing / Relevant specification	Detailed Drawing / Relevant specification	Log & IR	3		2,1		
	2) Finishing	Cleanliness	Major	Visual		-----do-----	-----do-----	Report	3		2,1		
	3) Pressure Testing of Vessel	Leakproofness	Critical	Hydro Test	100%	Drg / Relevant spec / Appvd Data Sheet / Catalogue	Drg / Relevant spec / Appvd Data Sheet / Catalogue	Report	3		2,1		
	4) Water Fill Test for BMT	Leakproofness	Major	Visual	100%	Water fill test	No-Leakage	Report	3		2,1		
	5) Review of QA documents	Verification	-	-	-	As per appvd. QAP	As per appvd. QAP		3		2,1		
				DESIGNATION		DATE		DATE				DATE	
				NAME									
	PAGE No			PARTY	CUSTOMER/CONSULTANT		BHEL				VENDOR		


LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER


SL No.		COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
										P	W	V	
1		2	3	4	5	6	7	8	9	10			11
1.0 MATERIAL CONTROL													
1.1	Body, cap	Physical, Chemical Properties	Major	Physical, chemical analysis	1/heat/batch	Appd. Data sheet / technical specification	Appd. Data sheet / technical specification	Lab report	3,2			2,1	
1.2	Mesh	Chemical properties, mesh size	Major	Chemical analysis, measurement	1/sheet, 100%	----do----	----do----	----do----	3,2			2,1	
2.0 IN-PROCESS CONTROL													
2.1	All components	Workmanship, finish, dimensions	Major	Visual, examination, measurement	100%	Mfg. Drawing	Mfg. Drawing	I.I. Report	3,2			2	
3.0 ASSEMBLY CONTROL													
3.1	Complete strainer	Overall dimensions, leak tightness, workmanship & finish	Critical	Measurement, hydro test at 1.5 times design pressure, visual examination	100%	Approved drawing	Approved drawing	Inspection report	3,2	2		1	
					DESIGNATION		DATE		DATE				DATE
					NAME								
PAGE No					PARTY	CUSTOMER/CONSULTANT		BHEL		VENDOR			

LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER


		MANUFACTURE'S NAME & ADDRESS		STANDARD QUALITY PLAN				PROJECT :				
				ITEM : NON RETURN VALVE SYSTEM :				QP. NO. : REV. : DATE : 27.12.2004				
								PACKAGE : CONTRACT NO. : MAIN CONTRACTOR : SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1.0	<u>MATERIAL</u>											
1.1	Body, cover, disc, hinge	1.Physical, chemical properties	Major	Physical, chemical, tests	1/Heat	Appd. Drawing/technical specification	Appd. Drawing/technical specification	TC	3,2	2	1	
2.0	<u>TESTING</u>											
2.1	Body	1.Leak tightness	Critical	Hydraulic test	100	Appd. Drawing/technical specification	No leakage	TC/IBR certificate (If required)	3,2	2	1	
2.2	Seat	Leal tightness	Critical	Hydraulic test : 1) At specified pressure 2.)At ATM Pressure	100%	-----do-----	-----do-----	-----do-----	3,2	2	1	
3.0	End connection details	1.Dimensions	Major	Measurement	100%	Appd. Drawing/relevant standard	Appd. Drawing/relevant standard	Inspection report	3,2		2,1	
		2.Surface defects for BW end	Critical	Pentrant test	100%	ASTME-165	ASTME-165	TC	3,2	2	1	
4.0	Final Inspection	1.Cleanliness & completeness	Major	Visual	100%	Appd. Drawing/technical spec.	Appd. Drawing/technical spec.	Inspection report	3,2	2	1	
				DESIGNATION		DATE		DATE				DATE
				NAME								
	PAGE No			PARTY	CUSTOMER/ CONSULTANT		BHEL			VENDOR		

LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
 3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER


		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :					
				ITEM : BUTTERFLY VALVES	Q.P. NO. :	PACKAGE :	CONTRACT NO. :	MAIN CONTRACTOR :	SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
1	2	3	4	5	6	7	8	9	P	W	V	11	
										10			
1.	RAW MATERIAL INSPECTION BOUGHT OUT ITEMS												
1.1	Body / Disc	a) Dimensions	Major	Measurement	100%	Appd. Data Sheet / Relevant Std.	Appd. Data Sheet / Relevant Std.	GRN	3			2,1	
		b) Mechanical Properties	Major	Lab Analysis	1 per Heat	Appd. Data Sheet / Relevant Std.	Appd. Data Sheet / Relevant Std.	MTC	3			2,1	
1.2	Shaft	c) Chemical Properties	Major	Lab Analysis	1 Per Lot	Appd. Drg / Data Sheet	Appd. Drg / Data Sheet	TC	3			2,1	
1.3	Operating Hand Lever	a) Dimensions	Major	Measurement	10%	Drawing	Drawing	IR	3			2,1	
		b) Surface Quality	Major	Visual	100%	Drawing	Drawing	IR	3			2,1	
				DESIGNATION		DATE		DATE				DATE	
				NAME									
	PAGE No			PARTY	CUSTOMER/CONSULTANT		BHEL			VENDOR			

		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :				
				ITEM : BUTTERFLY VALVES		QP. NO. :		PACKAGE :				
				SUB-SYSTEM :		REV. :		CONTRACT NO. :				
						DATE :		MAIN CONTRACTOR :				
								SUB CONTRACTOR :				
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
									10			
2.	<u>IN PROCESS INSPECTION</u>											
2.1	Machining of Body / Disc / Shaft	a) Dimensions	Major	Measurement	100%	Mfg. Drg	Mfg. Drg	Insp. Report	3			2,1
		b) Finish	Major	Visual	100%	Mfg. Drg	Mfg. Drg	Insp. Report	3			2,1
3.	<u>FINAL INSPECTION</u>											
3.1	Assembled Valves	a) Dimensions	Major	Measurement	100%	Appd. Drg/Data Sheet	Appd. Drg/Data Sheet	Insp. Report	3	2,1*		*At random
		b) Seat Hydro Test	Major	Leakage Test	100%	----DO----	----DO----	Insp. Report	3	2,1*		* 10% will bw offered for witteness
		c) Operation Gear Lever	Major	Manual	100%	90° Opening	Smooth Operation	Insp. Report	3	2,1		
4.	<u>PAINING & PACKING</u>											
		Surface Preparation, packing marking	Minor	Visual	100%	A.I.S.I.L Plant Standard	A.I.S.I.L Plant Standard	Insp. Report / Check List	3			2,1
				DESIGNATION		DATE		DATE				DATE
				NAME								
	PAGE No			PARTY	CUSTOMER/CONSULTANT		BHEL			VENDOR		


LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER

		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :					
				ITEM : C I GLOBE VALVE	QP. NO. :	REV. :	DATE :	PACKAGE :	CONTRACT NO. :	MAIN CONTRACTOR :	SUB CONTRACTOR :		
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
1		3	4	5	6	7	8	9	P	W	V	11	
										10			
1.1	Body, cover, door, hinge bracket	Tensile & Hardness	Major	Physical analysis	One / Heat	Appd. Drawing / Data Sheet	Relevant material STD. As per Col-7	T/C of testing laboratory	3		2,1		
1.2	Hinge Pin	Tensile & Chemical	Major	Mechanical, chemical, analysis	One / size	Appd. Drawing / Data Sheet	Relevant material STD. As per Col-7		3		2,1		
1.3	Seat rings	Chemical	Major	Chemical analysis	One / Heat	Appd. Drawing / Data Sheet	Relevant material STD. As per Col-7		3		2,1		
1.4	Assembly of valves	Overall diaminsion	Major	Measurement	100%	Approved Drg	Design.STD,Apd drg	Inspection	3	2,1*		*At random	
		Flange drilling	Major	Measurement	100%	Approved Drg	Col-7	Inspection	3	2,1*			
		Visual examination	Major	Visual	100%	Approved Drg	Re;evamt desig.std	Inspection	3	2,1*			
1.5	Operation	Open / Close	Major	Smooth movement full travel	100%	Relevant design standard	Col-7	Inspection	3	2,1*			
1.6	Testing	Body Leakage	Major	Hydrostatic	100%	Approved drawing	Col-7	Inspection report	3	2,1*		CHP	
		Seat leakage	Major	Hydrostatic	100%	Approved drawing	Col-7	Inspection report	3	2,1*		CHP	
				DESIGNATION		DATE		DATE				DATE	
				NAME									
PAGE No				PARTY	CUSTOMER/CONSULTANT		BHEL		VENDOR				


LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER

SL No.		COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1		2	3	4	5	6	7	8	9	P	W	V	11
					DESIGNATION		DATE		DATE				DATE
					NAME								
PAGE No		1 OF 1			PARTY	CUSTOMER/CONSULTANT		BHEL		VENDOR			
				MANUFACTURE'S NAME & ADDRESS			MANUFACTURING QUALITY PLAN			PROJECT :			
							ITEM : INSULATION MATERIALS (THERMAL & ACCOUSTIC) REV. : 0			PACKAGE :			
							SUB-SYSTEM :			CONTRACT NO. :			
										MAIN CONTRACTOR :			
										SUB CONTRACTOR :			
1	MATERIAL	Resinbonded & Glasswood	Bulk density	Major	Physical	Sample as per IS 8183	Approved Data Sheet / IS	Approved Data Sheet / IS	Inspection Report	3	2,1		Review of Certificate for k-value test done at Laboratory on sample from insulation material manufactured within 12 months period
			Compression	Major	----do----	----do----	----do----	----do----	----do----	3	2,1		
			Shot content	----do----	----do----	----do----	----do----	----do----	----do----	3	2,1		
			Moisture apsrption & Moisture content	----do----	----do----	----do----	----do----	----do----	----do----	3	2,1		
			Sulphur content	----do----	Chemical	----do----	----do----	----do----	----do----	3	2,1		
			Dimensional & Visual	----do----	Physical	----do----	----do----	----do----	----do----	3	2,1		
			Incombustibility	----do----	Physical	----do----	----do----	----do----	----do----	3	2,1		
			Recovedry after compression	----do----	Physical	----do----	----do----	----do----	----do----	3	2,1		
			Thermal conductivity	Critical	Physical	Once in 12 months per density & type 100%	IS 3346	Appd. Data sheet	Lab Report	3		2,1	
			Final Inspection for making & packing	Major	Visual		IS : 8183	IS : 8183	----do----			2,1	
			Review of QA documentation					As per Appvd QP				2,1	





LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER

		MANUFACTURE'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN				PROJECT :				
				ITEM : FIRE DAMPER		SUB-SYSTEM :		QP. NO. :	REV. :	DATE :	PACKAGE :	CONTRACT NO. :
SL No.	COMPONENT & OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6	7	8	9	P	W	V	11
										10		
I. RAW MATERIALS												
1	Damper - Casing	Bend Test &	Major	Lab Test	Sample From Lot	IS 277-1992	IS 2771992	Testing Lab Report	3			2,1
2	Damper - Louver	Chemical Analysis				ZN coating-120	ZN coating-120					
3	Damper - Shaft	Chemical & Mechanical	Major	Lab Test	----DO----	IS 9550-1980	IS 9550-1980	----DO----				
4	Bearings	Visual & Operation	Major	Visual	100%	Mfg Standard	Mfg Standard	Internal Inspection Report	3			2,1
5	Electric Solenoid	Operation characteristic	Major	Functional	100%	Appd. Drg/Data Sheet	Appd. Drg/Data Sheet	Mfg Test Certificate	3			2,1
6	Limit Switch	Visual & Operation	Major	Visual	100%	Mfg Standard	Mfg Standard	Internal Inspection Report	3			2,1
II FINISHED DAMPER												
1	Visual Inspection	Surface Defects	Minor	Visual	100%	Mfg Standard	Mfg Standard	Internal Inspection Report	3			2,1
		Tag Details	Minor	Visual	100%	Appd. Drg	Appd. Drg	Internal Inspection Report	3			2,1
2	Dimensional Check	Measurement	Major	Dimentional	100%	Appd. Drg	Appd. Drg	Dimm. Report	3	2,1		2,1
3	Damper operation with actuator	Functional/performance	Major	Functional	100%	Appd. Drg	Appd. Drg/Smooth & proper operation	Internal Inspection Report	3	2,1		2,1
4	Limit Switch operation	Functional	Major	Functional	100%	----do----	----do----	Internal Inspection Report	3	2,1		2,1
5	Review of QA documents					Appd. QAP	Appd. QAP					2,1
6	Painting	Visual	Minor	Finish	100%	Appd. Drg	Appd. Drg	Internal Inspection Report	3			2,1
Note : Test Report of Inspection Reporte test as per UL-555 for similar type of fInspection Reporte damper shall be furnished at the time of inspection												
				DESIGNATION		DATE		DATE				DATE
				NAME								
PAGE No				PARTY	CUSTOMER/CONSULTANT		BHEL			VENDOR		

LEGEND : P- PERFORMANCE, W - WITNESS, V- VERIFICATION
3 - OEM/VENDOR, 2- BHEL, 1 - CUSTOMER

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC. NO :		DATE:	
		CUSTOMER :			QP NO.: PE-QP-999-Q-006, REV-02		DATE: 17.04.2020	
		PROJECT:			PO NO.:		DATE:	
		ITEM: AC ELECT. MOTORS UPTO 50 KW (415V)		SYSTEM:	SECTION: II		SHEET 1 of 2	


S. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS			
					M	C/ N						*	**	
1	2	3	4	5	6	7	8	9	D	M	C	N		
1.0	ASSEMBLY	1.WORKMANSHIP	MA	VISUAL	100%	-	MFG. SPEC.	MFG. SPEC.	LOG BOOK		P	-	-	
		2.DIMENSIONS	MA	VISUAL	100%	-	MFG. DRG./ MFG. SPEC.	MFG. DRG./ MFG. SPEC.	LOG BOOK		P	-	-	
		3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	-	MFG.SPEC./	MFG.SPEC.	LOG BOOK		P	-	-	
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	-	MFG. SPEC/ APPROVED DATASHEET	MFG. SPEC/ APPROVED DATASHEET	LOG BOOK	✓	P	V	-	
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST	MA	VISUAL	100%	-	IS-325 / IS-12615/ APPROVED DATA SHEET	IS-325 / IS-12615/ APPROVED DATA SHEET	TEST/ INSPN. REPORT	✓	P	V*	-	* NOTE -1
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	-	APPROVED DRG/ DATA SHEET	APPROVED DRG/ DATA SHEET	TEST/ INSPN. REPORT	✓	P	V*	-	* NOTE -1 & NOTE-2

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		HEMA KUSHWAHA	Checked by:		KUNAL GANDHI
Reviewed by:		PRAVEEN DUTTA	Reviewed by:		RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	Seal

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

THIS IS PART OF TECHNICAL SPECIFICATION PE-TS-497-5D1-A502 Rev 0

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN				SPEC. NO :				DATE:			
		CUSTOMER :				QP NO.: PE-QP-999-Q-006, REV-02				DATE: 17.04.2020			
		PROJECT:				PO NO.:				DATE:			
		ITEM: AC ELECT. MOTORS UPTO 50 KW (415V)		SYSTEM:		SECTION: II				SHEET 2 of 2			


		3.NAMEPLATE DETAILS	MA	VISUAL	100%	-	IS-325 / IS-12615 / APPROVED DATA SHEET	SAME AS COL. 7	TEST/ INSPN. REPORT	✓	P	V	-	
4.0	PACKING	SURFACE FINISH & COMPLETENESS	MA	VISUAL	100%	100%	AS PER MFG. STANDARD / (#)	AS PER MFG. STANDARD / (#).	INSPC. REPORT	✓	P	W	-	(#) REFER NOTE-8

NOTES:

1. Routine tests on 100% motors shall be done by the vendor. However, BHEL/ Customer shall witness routine tests on random samples. The sampling plan shall be mutually agreed upon.
2. For exhaust/ventilation fan motors of rating up to 1.5 KW, only routine test certificates shall be furnished for scrutiny.
3. In case test certificates for these tests on similar type, size and design of motor from independent laboratory are available, the same is valid for 5 years.
4. BHEL reserves the right to perform repeat test, if required.
5. After packing and prior to issue MDCC, photographs of items to be despatched shall be sent to BHEL for review.
6. In case of any changes in QP commented by customer at contract stage, same shall be carried out by bidder without any implication to BHEL/ Customer.
7. Project specific QP to be developed based on customer requirement.
8. For export job, BHEL technical specification for seaworthy packing to be followed.
9. Packing shall be suitable for storage at site in tropical climate conditions.
10. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) indicated in QP shall be referred.

LEGENDS:

*RECORDS, IDENTIFIED WITH "TICK"(✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
 ** **M:** SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B:** MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C:** CUSTOMER,
P: PERFORM, **W:** WITNESS, **V:** VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI:** MINOR, **CR:** CRITICAL
D: DOCUMENTATION

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal		Sign & Date	Name	Seal	
Prepared by:	HEMA KUSHWAHA	HEMA KUSHWAHA	Checked by:		KUNAL GANDHI			Reviewed by:			
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL			Approved by:			

THIS IS PART OF TECHNICAL SPECIFICATION PE-TS-497-501-A502 Rev 0

QP FOR MOTORS ABOVE 50 KW



CLAUSE No.

CHAPTER NAME

MOTOR

TESTS/CHECKS TEMS/COMPONENTS	Visual	Dimensional	Make/Type/Rating /General Physical Inspection	Mech/Chem. Properties	NDT /DP/MPI/UT	Metallography	Electrical Characteristics	Welding/Brazing(WPS/PQR)	Heat Treatment	Magnetic Characteristics	Hydraulic/Leak/Pressure Test	Thermal Characteristics	Run out	Dynamic Balancing	Routine & Acceptance tests as per IS-4722 /IS- 9283/IS 2148/IEC60034\IEC 60079-I/ IS-12615	Vibration	Over speed	Tan delta, shaft voltage & polarization index test	Paint shade, thickness & adhesion
Plates for stator frame, end shield, spider etc.	Y	Y	Y	Y	Y				Y										
Shaft	Y	Y	Y	Y	Y	Y			Y										
Magnetic Material	Y	Y	Y	Y			Y			Y		Y							
Rotor Copper/Aluminium	Y	Y	Y	Y			Y		Y										
Stator copper	Y	Y	Y	Y			Y		Y			Y							
SC Ring	Y	Y	Y	Y	Y		Y	Y	Y										
Insulating Material	Y		Y	Y			Y					Y							
Tubes, for Cooler	Y	Y	Y	Y	Y				Y		Y								
Sleeve Bearing	Y	Y	Y	Y	Y				Y		Y								
Stator/Rotor, Exciter Coils	Y	Y	Y				Y	Y											
Castings, stator frame, terminal box and bearing housing etc.	Y	Y	Y	Y	Y			Y											
Fabrication & machining of stator, rotor, terminal box	Y	Y			Y			Y	Y										
Wound stator	Y	Y					Y	Y											
Wound Exciter	Y	Y					Y	Y											
Rotor complete	Y	Y					Y						Y	Y					
Exciter, Stator, Rotor, Terminal Box assembly	Y	Y					Y												

LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATION SECTION – VI	PART - B SUB-SECTION-VI E-42	Page 1 of 2
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Accessories, RTD, BTD, CT, Space heater, antifriction bearing, gaskets etc.	Y	Y	Y																
Complete Motor	Y	Y	Y											Y	Y	Y	Y1	Y	

Note:

1. The manufacture is to furnish a detailed Quality Plan indicating the practices & Procedure followed along with relevant supporting documents during QP finalization. However, following methodology to be followed for Inspection Categorization:

Note for LT Motor:

i) Motor rating up to 50 KW: Inspection CAT- III : Acceptance of Motor up to 50 KW is based on COC of the Manufacturer and Main Contractor confirming as follows:
 “It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage frequency variation, hot s KVA/KW, temperature rise, distance between center of stud gland plate and tested in accordance with approved drawing /data sheets.”

ii) Motor rating above 50 KW & less than 75 KW: Inspection CAT- II as per NTPC approved MQP: Acceptance of Motor rating above 50 KW & less than 75 KW is based on NTPC rev report as per IS:12615 - 2018 (including latest revision) duly witnessed by main contractor along with COC of the Manufacturer and Main Contractor confirming as follows:
 “It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage frequency variation, hot s KVA/KW, temperature rise, distance between center of stud gland plate, space heater and tested in accordance with approved drawing /data sheets.”

iii) Motor rating 75 KW & above: Inspection CAT-I: As per NTPC approved MQP.

2. Additional routine tests for Flame proof motors shall be applicable as per relevant standard

3. Makes of major bought out items for HT motors will be subject to NTPC approval.

4. Y1 = for HT Motor / Machines only.

5. For LT Motors, stator core stack length & grade, no load loss and winding resistance w.r.t. type tested motor for IE2/IE3 shall be checked/verified in addition to Compliance of relevant standard IS:12615/IEC requirement. In case actual results are not within the tolerance limit as declared by manufacturer during QP submission, the motor shall be subjected to efficiency test.



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Note: This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted alongwith relevant supporting documents.

MEASURING INSTRUMENTS

Item Components Sub System Assembly	Dimensions (R)	Make, Model, Type, Rating (R)	Process / Electrical connection (R)	Calibration (R)	Test as per standard(R)	Insulation Resistance (R)	IBR Certification (As applicable)(R)	Hydro Test(R)	Material Test certificate (R)
Pressure Gauge (IS-3624)	Y	Y	Y	Y	Y				
Pressure /Differential Pressure Switch(BS-6134)	Y	Y	Y	Y	Y	Y			
Electronic Transmitter(IEC-60770)	Y	Y	Y	Y	Y	Y			
Transducer (IS-14570)	Y	Y	Y	Y	Y	Y			
R-Routine Test A- Acceptance Test Y – Test applicable									



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PROCESS CONNECTION AND PIPING

Tests Items	Visual & Dimensions ®	GA, BOM, Layout of component & construction feature, Paint Shade/thickness ®	Flattening,flaring,hy drotest,hardness check as per ASTM standard (A)	Component Ratings ®	Wiring ®	Make, Model, Type, Rating®	IR & HV ®	Review of TC for instrument/devices (R)	Accessibility of TBs/Devices illumination,groundi ng ®	Tubing ®		Chemical/physical	Proof pressure	Tests as per
Local Instrument enclosure	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y			
Local instruments racks	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y			
Junction Box	Y	Y*		Y		Y	Y							
Impulse pipes and tubes	Y		Y			Y						Y		
Socket weld fittings ANSI B-16.11	Y					Y						Y		Y
Compression fittings	Y					Y					Y	Y	Y	
Instrument valves & Valve manifolds	Y					Y					Y	Y		
*-applicable for painted junction boxes.														

®-Routine Test A-Acceptance Test Y – Test applicable



ELECTRICAL ACTUATOR

Test/Attributes Characteristics														
ITEM/ COPONENT/ SUB SYSTEM ASSEMBLY/ TESTING	RPM @	No Load Current @	IR & HV Test@	Mounting Dimension@	All routine Test as per Standard & Specification@	Correct Phase Sequence@	Operation & Setting of limit Switch/Torque Switch@	Stall Torque/Current (A)	Hand Wheel operation/ Auto de clutch function (A)	Function of Aux. like Potentiometer, space heater, position indicator @	EPT output @	Local/ Remote (Open-Stop-Close)		
ELECTRICAL ACTUATOR with Integral Starter , Non- Intrusive Electrical Actuator (EN15714-2)														
Motor	Y	Y	Y	Y	Y									
Final Testing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
⑥ - Routine Test A - Acceptance Test Y - Test applicable														
Note:														
1) SIL 2 certificate														

LOCAL CONTROL PANEL

Tests									
Items	Pre Power on Check (#) (R)	Post Power on Check (%) (R)	Internal cabling /Wiring checking(R)	Door Alignment, waviness, and Locking (R)	Louvers, Fans, wire mesh, Lifting arrangement (R)	HV /IR on wired panels (R)	Paint Shade, Thickness and Illumination (R)	Hardware/Make as per BOM (R)	Dimensions, GA layout (R)
Local Control Panel	Y	Y	Y	Y	Y	Y	Y	Y	Y
R-Routine Test A- Acceptance Test Y – Test applicable									
Note:									
2) Pre power on check: - Wire dressing, looseness, Availability of Fuses and MCB, Modules are inserted properly, Earthing connection, Input Voltage checking.									
3) Manufacturer also needs to include their practices and procedure in MQP along with relevant supporting documents.									



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SUB VENDOR LIST			
SI. NO.	ITEM / EQUIPMENT	SUB SUPPLIER	REMARKS
1	SCREW CHILLER	YORK	
		TRANE	
		CARRIER	
		KIRLOSKAR	
		DUNHAMBUSH	
		MCQUAY(DAIKIN)	
		BLUESTAR	
		VOLTAS	
2	PACKAGE UNIT	VOLTAS	
		BLUESTAR	
		CARRIER	
3	SPLIT/CASSETTE AIR CONDITIONER	VOLTAS	
		BLUESTAR	
		CARRIER	
		HITACHI	
5	CENTRIFUGAL FAN	FLAKT	
		KRUGGER	
		DRAFTAIR	
		HYDERABAD POLLUTION CONTROL	
		ADVANCE VENTILATION	
		PATELAIR	
		NICOTRA	
		SKSYSTEM	
		MARATHON	
		CBDOCTOR	
SARLA			
6	AXIAL FLOW FANS/RE UNITS	HYDERABAD POLLUTION	
		SKSYSTEM	
		ADVANCE VENTILATION	
		KRUGER	
		NICOTRA	
		MARATHON	
		FLAKT	
		CBDOCTOR	
		PATELAIR	
SITAL			
7	CENTRIFUGAL WATER PUMP	BEST&CROMPTON	
		JYOTI	
		SAMTURBO	
		KBL	
		KSB	



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		M&P	
		VOLTAS	
		BEACON-WEIR	
		WORTHINGTON	
		FLOWMORE	
		SULZER	
		BHARATPUMPS & COMPRESSORSLTD	
		FLOW SERVE INDIA CONTROL PVT LTD	
		V-FLOWPUMPS & SYSTEMS CO	
8	AIR HANDLING UNITS	VOLTAS	
		BLUESTAR	
		ZECO	
		CARRYAIRE(FLAKT)	
		EDGETECH	
		ETHOS	
		SYSTEMAIR	
		WAVESAIRCON	
9	AHU FAN (CENTRIFUGAL FAN)	CB.DOCTOR	
		FLAKT	
		KRUGER	
		NICOTRA	
		COMEFRI	
		MARATHON	
		PATELAIR	
10	CENTRIFUGAL PUMP	BEST&CROMPTON	
		JYOTI	
		SAMTURBO	
		KBL	
		KSB	
		M&P	
		VOLTAS	
		BEACON-WEIR	
		WORTHINGTON	
		FLOWMORE	
		SULZER	
		BHARATPUMPS & COMPRESSOR SLTD	
		FLAWSERVE INDIA CONTROL PVT LTD	
		V-FLOWPUMPS & SYSTEMS CO	
11	COOLING TOWER	PAHARPUR	
		MIHIR	
		PCT	
		FLOWTECH	
		BELL	
12	INDUCTION MOTORS (LT)	ABB	FARIDABAD (UPTO 55 KW), BANGALORE & SWEDEN (UPTO 55 KW)



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		CGL	AHMEDNAGAR, RQP, FOR FLAME PROOF MOTOR
		MARATHON	KOLKATA, RQP (UPTO 690V & 600 KW) FOR FLAME PROOF ALSO
		KEC	BANGALORE/ HUBLI* *UPTO 90KW, RQP, FOR FLAME PROOF ALSO
		BHARAT BIJLEE	MUMBAI, RQP, FOR FLAME PROOF ALSO
		NGEF	BANGALORE, UPTO 15 KW
		JYOTI	VADODARA
		LHP	SOLAPUR
		TIPM	JAPAN, UPTO 15 KW (NON FLAME PROOF)
		HYOSUNG	SOUTH KOREA
		WEG	BRAZIL
		HYUNDAI	SOUTH KOREA
		TMEIC	JAPAN (NAGASAKHI)
		HAVELL	NEEMRANA (UPTO 90 KW)
		KAWAMATA	JAPAN (UPTO 75 KW)
		TIPS	JAPAN (UPTO 45 KW)
13	AIR FILTER	PUROLATOR	
		FMI	
		ANFILCO	
		TENACITY	
		JOHNFOWLER	
		SPECTRUM	
		AIRTECH	
		PUROMATIC	
14	AXIAL FANS / F.A. FANS	FLAKT	
		KHAITAN	
		PATEL	
		NICOTRA	
		SARLA	
		KRUGER	
		MARATHON	
		CDOCTOR	
15	INSULTATION MATERIAL	BEARDSHELL	
		K-FLEX	
		PARAMONT	
		ARMAFLEX	



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		SUPREME	
		LLOYDS	
		UPTWIGA	
		AEROCELL	
16	BALANCING VALVE	ADVANCE	
17	BUTTERFLY VALVE	AUDCO	
		FOURESS	
		INTERVALVE	
		BDK	
		WEIRBDK	
		TYCO	
		CRANE PROCESS	
		KEYSTONE	
18	NON RETURN VALVE	LEADER	
		H.SARKAR	
		FLUIDLINE	
		HI-TECH	
		CRESENT	
		AVVALVES	
		BANKIM&COMPANY	
		SHIVADURGA	
19	GATE/GLOBE VALVES	CRESENT	
		BDK	
		AUDCO	
		FOURESS	
		KIRLOSKAR	
		SANT	
		BOMBAY METAL & ALLOYS	
		BANKIM	
		LEADER	
		HSARKAR	
		AVVALVES	
		VENUSPUMPSANDENGG	
		SAMSON CONTROLSPVT.LTD	
		INSTRUMENTATION LTD.	
		Koso India Private Limited,	
20	3 WAY MIXING VALVE WITH ACTUATING MOTOR	SIEMENS BUILDING ECHNOLOGY	
		JOHNSON	
		BELIMO	
		HONEYWELL	
		RAPIDCONTROL	
		ALC	
21	MOTORIZED BUTTERFLY VALVE	ANERGY	
		ADVANCE	
		BELIMO	
		JOHNSON	



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		HONEYWELL	
		SIEMENS	
22	Y / POT STRAINER	MULTITEX	
		GREAVESCOTTON	
		JAYPEE	
		SANT	
		OTOKLIN	
		GRANDPRIX	
		GUJARATOTOLIFT	
		DSENGG	
		SAROJINI ENTERPRISE	
		BHATIAENGINEERING	
		FILTRATION ENGINEERS INDIA PVT LTD	
		SUNGOV ENGINEERING	
23	PIPING - ERW	SURYAROSHNI	
		TISCO	
		DADUPIPES	
		INDUSTUBE	
		WELSPUN	
		TATA	
		BST	
		JINDAL	
		SAIL	
24	PIPING - CS SEAMLESS (ASTM A 106)	ISMT	
		MAHARASHTRA SEAMLESS	
25	GI SHEETS FOR DUCTING	TISCO	
		INDIAN IRON&STEEL CO LTD.	
		RASHITRYA ISPAT NIGAMLTD.	
		ESSAR	
		ISPATINDUSTRIES	
		JSWSTEEL	
		LLOYDSSTEEL	
		BHUSHAN	
		TATA	
		SAIL	
		JINDAL	
26	FIRE DAMPER	TSC	
		CARRYAIRE	
		RAVISTAR(SYSTEMAIR)	
27	GRILL/DIFFUSER/VOLUME CONTROL DAMPER	AIRFLOW	
		TSC	
		AIRMASTER	
		CARYAIRE	
		RAVISTAR(SYSTEMAIR)	



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28	STRIP HEATER	ESCORTS	
		RACOLD	
		DASPASS	
		ALCO	
		HEATCO	
		HOTSET	
29	PAN HUMIDIFIER	RAPIDCOOL	
		HOTSET	
		ALCO	
30	RELIEF / PURGE VALVE	BRASSO MATIC	
31	THERMOSTATS	HONEYWELL	
		RANCO	
		PENN	
		DANFOSS	
		INDFOSS	
		JHONSON CONTROL	
		RANUTROL	
32	HUMID STAT	JHONSON CONTROL	
		HONEYWELL	
		PENN	
33	ANTI FREEZE THERMOSTAT	RANCO	
		HONEYWELL	
		PENN	
		DANFOSS	
		INDFOSS	
34	PRESSURE GAUGE	GENERAL INST CONSORTIUM	
		BELL	
		H.GURUINSTP.LTD.	
		WAAREE INSTRUMENTS	
		H.GURUIND	
		FORBESMARSHALL	
		MANOMETER	
		A.N.INST	
		GAUGESBOURDON	
		GLUCK	
		WIKA	
		ASHCROFT	
		BAUMERTECHNOLOGIES	
		PRECISION MASS PRODUCTSPVT.LTD.	
BOSE PANDAINSTT.PVT.LTD			



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35	TEMPERATURE GAUGE	H.GURUIND	
		H.GURUINST	
		FORBES MARSHALL	
		DETRIVEINST&ELECTRONICS	
		PYROELECTRIC	
		TOSHNIWAL BROSS	
		WAREE INSTRUMENTS	
		A.N.INST	
		GOA INSTRUMENTS	
		WIKA	
		ASHCROFT	
		HGURU(SI)	
		BAUMERTECHNOLOGIES	
		GOA THERMOSTATIC	
		GAUGE BOURDON	
BUDENBERG GAUGE			
PRECISION MASSPRODUCTS			
36	LEVEL GAUGE	GENERAL INSTRUMENTS	
		CHEMTROLS	
		SBEM,PUNE	
		AUTOMAT MUMBAI	
		SIGMA	
		TOSHNIWAL	
		TECHNOMATIC	
		TELACO	
		LEVCON	
		DK INSTRUMENTS	
		PUNE TECHTROL	
		FLOWSTAR	
		BLISSANAND	
37	PRESSURE SWITCH / DP	BELLS	
		DANFOSS	
		DK INSTRUMENTS	
		DRESSER	



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		SORINC	
		VASU	
		SWITZER	
		INDFOSS	
		TRAFAG	
		GIC	
		ASHCROFT	
		KASTURBA UDYOG	
		BARKSDALE	
		PRECISION MASSPRODUCTS	
		MITTAL REFRIGERATION	
38	TEMPERATURE SWITCH	INDFOSS	
		SEIMENS	
		DANFOSS	
		DK INSTRUMENTS	
		SORINC	
		VASU	
		DRESSER	
		TOSHNIWAL	
		SWITZER	
39	FLOW SWITCH	SWITZER	
		LEVCON	
		DK INSTRUMENT	
		SBEM	
		V.AUTOMATE	
		SIEMENS	
40	LEVEL SWITCH	SBEM	
		BLISSANAND	
		HITECH	
		RAMANINST	
		SIGMA	
		SORINC	
		WAREEINST	
		LEVCON	
		DK INSTURMENT	
		VATUOMATE	
		CHEMTROLS	
		SIMENS	
		FLOWSTAR	
		TRAC	
		FLOWTECH	
		NIVO CONTROLS	
		PUNE TECHTROL	
		SAPCON	
		BAUMER TECHNOLOGIES	
		GIC	



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		SBEM	
41	TRANSMITTERS	TAYLOR	
		ABB	
		BRISTOL BABCOCK	
		BIRLA KENTTAYLOR	
		BLISSANAND	
		SBEM	
		SMARTINST	
		VAUTOMATION&INST	
		FISHER-ROSEMOUNT	
		SIEMENS	
		TATA HONEYWELL	
		PUNE TECHTROL	
		NIVO CONTROLS	
		PANAM ENGINEERS	
		EMERSON	
		MOORE INDUSTRIES	
		TOSHINIWAL INDUSTRIES	
YOKOGAWA			
E&H			
ABB			
42	SIGHT FLOW INDICATORS	SIGMA	
		LEVCON	
		VAUTOMAT	
		TELLACE	
		EUREKA	
		TATA HONEYWELL	
		BLISSANAND	
		SCIENTIFIC DEVICES	
		BK EQUIPMENTS	
		INSTRUMENTATION ENGINEERS	
43	FLOW ELEMENT	BRISTOLBABCOCK	
		BALIGA	
		LIGHTING EQUIP	
		ENGINEERING SPECIALITIES	
		IL	
		MINCO	
		MICROPRECISION	
STARMECH			
44	TEMPERATURE ELEMENT	GENERAL INST CONSORTIUM	
		PYROELECTRIC	



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		WAAREE INSTRUMENTS	
		DETRIVEINST&ELECTRONICS	
		TOSHNIWAL	
		GOA INSTRUMENTS	
		GAUGE BOURDON	
		TECHNO INSTRUMENTS	
		TEMSENS INSTRUMENTS	
		THERMAL INSTRUMENTS	
		TMTECHNOMATIC	
		BAUMER TECHNOLOGIES	
45	FLOW METER	EUREKA	
		INSTRUMENTATION ENGINEERS PVT LTD	
		PLACKA	
		TRAC	
		FLOWSTAR	
		SCIENTIFICDEVICE	
46	RH SENSOR/TEMP SENSOR	HONEYWELL	
		JOHNSON	
		SIEMENS	
		GENERAL INSTRUMENTS	
47	OVS / PC	HP	
		COMPAQ	
		DELL	
		HCL	
		IBM	
		LENOVO	
48	PRINTER	HP	
		CANON	
		EPSON	
		XEROX	
		IBM	
		LEXMARK	
49	UPS	HITACHI-HIREL	
		APC	
		DELTA	
		EMERSON	
		DBPOWER	
		APLAB	
50	FIBRE OPTIC CABLE	BIRLAERICSON	
		FINOLEX	
		AKSHFIBRE	
51	ANNUNCIATOR FOR PANEL	ICC	
		PECON	
		PROCON	
52	LT ADAPTER BOX FOR AL	CONTROL DEVICE	



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	TO CU CABLE CONVERTOR	SYSTEM POWER CONTROL	
		JACKSON	
		UNILEC	
		ELECTRICALLIED PRODUCT	
53	METERING PUMP	SHAPOTOOLS	
		VKPUMPS	
54	WATER SOFTENING PLANT	THERMAX	
		IONEXCHANGE	
		DOSIION	
55	PRESSURE TRANSMITTER	ABB	
		ENDRESS+HAUSER(INDIA)	
		MOORE	
		SIEMENS	
		SMART INSTRUMENT BRAZIL	
		SBEM	
		TOSHNIWAL	
		V.AUTOMAT	
		EMERSON	
		YOKOGAWA	
		HONEYWELL	
		FUJI	
56	BATTERY CHARGER	AMARARAJA	
		CHHABI ELECTRICAL	
		DUBASENGG.	
		HBL POWERSYSTEM	
		STATCON	
		CALDYNE	
57	BATTERY (NI -Cd)	HBLPOWER	
		AMCOSAFT	
		SAFT	
58	CONTROL PANEL	INDUSTRIAL CONTROL&APPLIANCE	
		PYROTECH	
		POSITRONICS	
		CONTROL&SWITCHGEAR	
		SIEMENS	
		L&T	
		GEPOWER	
		RITTAL	
		HOFFMAN	
59	TEMPERATURE TRANSMITTER	ABB	
		ENDRESS+HAUSER(INDIA)	
		MOORE	
		SIEMENS	
		SMART INSTRUMENT BRAZIL	
		SBEM	
		TOSHNIWAL	




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		V.AUTOMAT	
		EMERSON	
		YOKOGAWA	
		HONEYWELL	
60	ROTAMETER	CHEMTROLSSAMIL	
		EUREKAIND	
		IL	
		TRANSDUCERS AND CONTROL	
61	ALARM ANNUNCIATORS	PROCON	
		IIC	
62	DIGITAL METERS (A/V/PF/HZ)	SCHNEIDER ELECTRIC	
		SECURE	
		AE	
		SOCOMEK	
		NEPTUNE	
		HAGER	
63	CONTROL / SELECTOR SWITCHES	L&T	
		HAVELLS	
		HPL	
		HAGER	
		C&S	
		SOCOMAC	
		ABB	
64	PUSH BUTTONS / INDICATING LAMPS	SIEMENS	
		SCHNEIDER ELECTRIC	
		TEKNIC	
		ALSTHOM	
65	AUXILIARY RELAYS	JYOTI	
		SIEMENS	
		L&T	
		OEN	
66	CONTACTOR/RELAY /TIMER	SCHNEIDER ELECTRIC	
		L&T	
		BCH	
		SIEMENS	
		LEGRAND	
		ABB	
		C&S	
		HAGER	
67	MCB, ISOLATOR, INDUSTRIAL PLUG SOCKET	SCHNEIDER ELECTRIC	
		LEGRAND	
		HAGER	
		L&T	
		C&S	
		ABB	
		SIEMENS	

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68	TERMINAL BLOCKS AND CONNECTORS	ELMAX WAGO HENSEL CONNECTWELL		
69	POTENTIAL TRANSFORMERS / CURRENT TRANSFORMER (FOR 415 VAC TO 230VAC)	AUTOMATIC ELECTRIC MATRIX PRECISE L&T KAPPA PROCOM		
70	CABLE GLANDS	ALLIED TRADERS & EXPORTERS	NOIDA	
		ARUP ENGG & FOUNDRY WORKS	KOLKATA	
		BALIGA LIGHTING EQPT.PVT.LTD.	CHENNAI	
		COMMET BRASS PRODUCTS	MUMBAI	
		DOWELLS	MUMBAI	
		ELECTROMAC INDUSTRIES	MUMBAI	
		INCAB	KOLKATA	
71	CABLE LUGS	DOWELLS	MUMBAI	
		UNIVERSAL MACHINES LTD.	KOLKATA	
72	GI CONDUITS	BIS APPROVED MAKE		
73	GI CONDUIT (EPOXY PAINTED) FLEXIBLE	BIS APPROVED MAKE		
74	FLEXIBLE CONDUIT (PVC COATED)	REPUTED MAKE		

NOTES:

1. THE SUB VENDOR LIST ABOVE IS INDICATIVE ONLY AND IS SUBJECT TO BHEL AND CUSTOMER APPROVAL DURING DETAILED ENGINEERING STAGE WITHOUT ANY COMMERCIAL & DELIVERY IMPLICATION TO BHEL. BIDDER TO PROPOSE SUB VENDOR WITHIN 4 WEEKS OF PLACEMENT OF LOI. THEREAFTER NO REQUEST FOR ADDITIONAL SUB-VENDOR SHALL BE ENTERTAINED.
2. THE INSPECTION CATEGORY WILL BE INTIMATED AFTER AWARD OF CONTRACT BY BHEL/CUSTOMER. HOWEVER THE SAME WILL BE ADHERED BY THE BIDDER WITHOUT ANY COMMERCIAL AND DELIVERY IMPLICATION TO BHEL/ CUSTOMER.



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INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
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3	FAN- AXIAL TYPE >= 5KW	1			CB DOCTOR VENTILLATOR PVT LTD	AHMEDABAD	A		up to 50000 CMH	WTP,CT.AC&VENTILATI ON,CHP,LHP&GHP,AHP
					HOWDEN SOLYVENT FLAKT INDIA PVT LTD,	CHENNAI	A		up to 125000 CMH	
					C DOCTOR &CO PVT LTD	KOLKATA	A		up to 50000 CMH	
					KRUGER VENTILATION INDUSTRIES (I) PVT LTD	SHAHPUR, THANE	A		Up to 6000 CMH	
					NADI AIRTECHNICS PVT LTD	CHENNAI	A		Up to 15000 CMH	



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					ADVANCE VENTILATION PVT LTD	KUNDALI. SONEPAT	A		up to 40000 CMH	
					SK SYSTEMS PVT LTD	KUNDALI PHASE-II, SONEPAT, HARYANA	A		up to 50000 CMH	197 of 219
					ALMONAROD (P) LIMITED	CHENNAI	A		Up to 14000 CMH	



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9.C	VALVE-BUTTERFLY > 600MM OR CLASS>150 (VALVE-BUTTERFLY UP TO 600MM & CLASS 150::CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I		INTERVALVE POONAWALA LTD	PUNE	A		SGI / CI / D2 1400MM PN10, SGI / CI 1000MM PN16,CS/SS 500MM PN16, SS 400MM CLASS#300, MS FABRICATED UPTO 2000NB	WTP, CW,CT,CPU,FDPS,CAS, AC& VENTILATION, MUW,CHP, LHP&GHP,LP PIPING,AHP
				TRILLIUM FLOW	HUBLI	A		CI/ DI BUTTERFLY VALVE UP TO 1000MM AND PN16 AND UP TO 1800MM AND PN10,CCS. UP TO 1050MM CLASS 150 AND UP TO 1800MM AND PN16 SS - UP TO 400NB PN-16 ,FABRICATED 800MM CLASS#150.	
				PENTAIR VALVES	HALOL	A		FOR SS UP TO 500 NB PN-10. CI- UP TO 900NB PN-10, UP TO 500NB PN-16, 450MM CLASS#300., MS FABRICATED UPTO 2800NB, PN6.	
				FOURES ENGINEERING	BANGALORE	A		CAST SGI/CI/ MS FABRICATED- UP TO 1200 PN-10, UP TO 350 PN-16, 2400 MM	
				KIRLOSKAR BROTHERS LTD	KONDHAPURI	A		CAST SGI/CI/CS 1400 MM PN16 , SS 300 MM PN16 , 1800MM CLASS 150, MS FABRICATED 900 NB PN40,MS FABRICATED 2800NB, PN6.	
				R & D MULTIPLE	VALSAD	A		CAST SGI/CI/MS FABRICATED- UP TO 1800 MM PN-10/CLASS # 75 ,1100MM PN25,1400MM CLASS#150, MS FABRICATED METAL SEATED, TRIPLE ECCENTRIC, SS BFW OF SIZE UPTO 100NB, AND PRESSURE RATING UPTO CLASS #300.	
				BRAY CONTROLS INDIA PVT. LTD	KANCHIPURAM	A		UPTO 450 MM AND CLASS#600	
				INSTRUMENTATION LTD.	PALAKKAD	A		UPTO 2200NB CLASS # 75	
				HAWA ENGINEERS	AHMEDABAD	A		CI/ CS & FABRICATED UPTO 1200MM, CLASS #150. SS UPTO 250MM, CLASS#150 UP TO 900MM PN10	
				CRANE PROCESS FLOW	SATARA	A			
				L & T VALVES LIMITED	COIMBATORE	A		UP TO 900MM CLASS 150	
				DEMBLA VALVES	THANE	A		UP TO 2200MM CLASS#75	



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9.D	VALVE-CONVENTIONAL GATE / GLOBE / CHECK > 600NB OR CLASS > 300	II			LEADER VALVES	JALANDHAR	A		CS GATE 600MM CLASS#600, SS GLOBE 600MM CLASS#600, CS CHECK 600MM AND CLASS#600	WTP, CW,CT,CPU,FDPS,CAS, AC& VENTILATION, MUW,CHP, LHP&GHP,LP PIPING,AHP
					HAWA ENGINEERS	AHMEDABAD	A		FCS / FSS 50 NB CLASS 800.	
					FOURES ENGINEERINGS	THANE	A		400NB CLASS 600 AND 50NB CLASS 800.	
					BHEL IVP	GOINDWAL	A		GATE UP TO 300 NB CLASS 600. GLOBE 250 NB CLASS 400, CHECK 150NB CLASS 600.	
					HITECH ENGG PVT LTD	AHEMDABAD	A		50 NB CLASS 800.	
					KSB PUMPS LTD	COIMBATORE	A		300NB CLASS 2500.	
					NITON VALVES INDIA PVT LTD	NAVI MUMBAI / AURANGABAD	A		CS GATE 900 NB CLASS 600, CHECK 300 NB CLASS 600.	
					L&T VALVES LIMITED	COIMBATORE	A		650 MM CLASS 600, 50 NB CLASS 800.	
					TRILLIUM FLOW	HUBLI	A		CONVENTIONAL CCS GATE / GLOBE / CHECK VALVES UP TO 600MM AND CLASS # 1500, CSS GATE/ GLOBE/ CHECK VALVES UP TO 200MM AND CLASS # 600, FCS GATE / GLOBE / CHECK VALVES UP TO 50MM AND CLASS # 2500.	



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26	CENTRIFUGAL FAN (≥ 5KW) MOTOR FROM NTPC ACCEPTED SOURCE	I			MARATHON ELECTRIC MOTOR(I) LTD	KOLKATA	A		UP TO 50000 CMH	AC& VENTILATION, CHP, LHP&GHP,AHP
					HOWDEN SOLYVENT FLAKT INDIA PVT LTD.	CHENNAI	A		UP TO 200000 CMH	
					ALMONAROD (P) LIMITED	CHENNAI	A		UP TO 60000 CMH	
					PATEL AIRFLOW	VATWA, AHMEDABAD	A		UP TO 250000 CMH	
					CB DOCTOR VENTILATOR PVT LTD	AHMEDABAD	A		UP TO 150000 CMH	
					WOLTER VENTILATORS INDIA (P) LTD	BHIWADI,	A		UP TO 200000 CMH	
					C DOCTOR &CO PVT LTD	KOLKATA	A		UP TO 250000 CMH	
					SUVIDHA AIR ENGINEERS	AHMEDABAD	A		UP TO 190000 CMH	
					SUBURBAN INDUSTRIAL WORKS PVT. LTD	KOLKATA	A		UP TO 100000 CMH	
					KRUGER VENTILATION INDUSTRIES (I) PVT LTD	THANE	A		UP TO 90000 CMH	
					SOLYVENT FLAKT	KOLKATA	A		UP TO 200000 CMH	
					ADVANCE VENTILATION PVT LTD	SONEPAT	A		UP TO 250000 CMH	
					SK SYSTEMS PVT LTD	SONEPAT	A		UP TO 250000 CMH	



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S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की स्थिति	Remarks/ टिप्पणी	Applicable Systems
34	SCREW CHILLER	II			KIRLOSKAR CHILLER	PUNE	A		REFRIGERATIVE SYSTEMS FOR THE TOWER UP TO 350TR	
					DAIKIN	NEEMRANA	A		UP TO 185 TR	AC& VENTILATION
					BLUE STAR (COMPRESSOR FROM HANBEL- TAIWAN)	WADA	A		SCREW CHILLER UP TO 282TR	



Project/ परियोजना : LARA-II
 Package/ पैकेज : EPC
 Supplier/ आपूर्तिकर्ता:
 Contract No./ अनुबंध सं.:

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
 AND SUB-SUPPLIER APPROVAL
 इवालिटी प्लान तथा सब-वेंडर के अनुमोदन सहित मदों की सूची
 SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

DOC. NO./ दस्तावेज सं.:
 REV. NO.:
 DATE/ तिथि : 08.06.22
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					TECHNOVAR MANUFACTURING					
3	WATER MONITOR		II		BIS APPROVED SOURCES WITH VALID BIS LICENSE					
4	PIPES-MS- (BLACK/ GI) AS PER IS:1239 & IS:3589 UPTO 1000 NB	II			(BIS MARKED, MANUFACTURERS WITH VALID BIS LICENSE)					WTP,CW,CT,CPU,FDPS,A C&VENTILATION,CHP,L HP&GHP,AHP



एक महारत्न कम्पनी

PROJECT : Lara-II (2X800MW)
 PACKAGE : EPC PACKAGES
 CONTRACTOR:
 CONTRACT NO :

LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL

REVISION NO : 00
 DATE :07.06.2022
 SUB SECTION: C&I

Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
13	Electronics Transmitter (Pressure , DP and DP based Flow/Level)										
13-A	Electronics Transmitter (Pressure , DP and DP based Flow/Level)										
		III				ABB Ltd	Bengaluru	A			2600T & critical item from ABB Italy/ Their approved source;
		III				Emerson Process Management Ltd	Pawane	A			
		III				Siemens Ltd	Thane	A			Model:-SITRANS P
		III				Honeywell Automation India Ltd	Pune	A			
		III				Baldota Control and Equipment Pvt Ltd	Navi Mumbai	A			PT & DPT of LD 301 Series (SMAR)
		III				Yokogawa India Limited	Bengaluru	A			EJA-E 110,430,530 SERIES & all raw material and BOI under knocked down condotion (sensor assembly as a single unit) shall be sourced from M/S Yokogawa Japan
		III				M/s Endress + Hauser India Automation Instrument Pvt Ltd	Aurangabad	A			
		III				Emerson (Rosemount)	USA	A			
		III				Yokogawa	Japan	A			
		III				ABB	Germany / Italy	A			2600T & critical item from ABB Italy/ Their approved source;
		III				Siemens	France	A			Sitrans P DSIII Series
		III				Fuji Electric	France	A			FCX -AIII SERIES
		III				Fuji	Japan	A			
13-B	Electronics Transmitter -Field Bus Based (Pressure , DP and DP based Flow/Level)										
		I				ABB India Ltd	Bengaluru	A			One no of Transmitter will be sent at DDCMIS supplier for function testing of field bus communication with DDCMIS during FAT



Project/ परियोजना : LARA-II
 Package/ पैकेज : EPC
 Supplier/ आपूर्तिकर्ता:
 Contract No./ अनुबंध सं.:

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
 AND SUB-SUPPLIER APPROVAL
 क्वालिटी प्लान तथा सब-वेंडर के अनुमोदन सहित मदों की सूची
 SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

DOC. NO./ दस्तावेज सं.:
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A - For these items proposed vendor is acceptable to NTPC. To be indicated with letter "A" in the list along with the condition of approval, if any. / इन मदों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त, यदि कोई हो, के साथ-साथ पत्र "क" में इंगित किया जाए।

DR - For these items "Detailed required" for NTPC review. To be identified with letter "DR" in the list. एनटीपीसी द्वारा इन मदों की समीक्षा के लिए "विस्तृत ब्यौरे की आवश्यकता" होगी। सूची में "DR" पत्र में इंगित किया जाना चाहिए।


QP / INSPECTION CATEGORY:

CAT-I / श्रेणी- I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है और एनटीपीसी द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के दौरान उपलब्ध गवाह

CAT-II / श्रेणी- II: For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved QP. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया

CAT-III/ श्रेणी-III : For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.

UNITS/WORKS इकाइयाँ / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाइयाँ / कार्यों के मुख्य सप्लायर का स्थान.

		TECHNICAL SPECIFICATION 2X800 MW LARA TPP STAGE II AIR CONDITIONING SYSTEM										PE-TS-508-553-A001 Rev. No. 00 Date : FEB 2024	
PAINTING REQUIREMENT													
Package	Condition	Surface Preparation	Primer Coat	No. of Coats	Final Coats	Intermediate Coat (in Microns)	No. of Coats	DFT (in Microns)	Final Coat	No. of Coats	DFT (in Microns)	Total DFT	
HVAC SYSTEM	MECHANICAL EQUIPMENT (OUTDOOR INSTALLATIONS)	Surface preparation: Shot blast cleaning/wire brushing.	Red oxide primer	1	30-35 µm per coat.				Synthetic enamel paint	3	25 µm per coat	105-110 µm	
HVAC SYSTEM	MECHANICAL EQUIPMENT (INDOOR INSTALLATIONS)	Surface preparation: Shot blast cleaning/wire brushing.	Red oxide primer	1	30-35 µm per coat.				Synthetic enamel paint	2	25 µm per coat	80-85 µm	
HVAC SYSTEM	PARTS COMING IN CONTACT WITH ACID FUMES (IN BATTERY ROOMS)/EQUIPMENT IN COASTAL AREA	Surface preparation: Shot blast cleaning/wire brushing.	Epoxy resin based zinc phosphate	1	30-35 µm per coat.	Epoxy resin based paint pigmented with Titanium dioxide	1	25 µm per coat.	Epoxy paint with glossy finish	1	25 µm per coat.	80-85 µm	
HVAC SYSTEM	For Indoor components such as motors, electrical parts etc	Epoxy based with suitable additives. The thickness of finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns). However in case electrostatic process of painting is offered for any electrical equipment, minimum paint thickness of 50 microns shall be acceptable for finish coat.											
	Notes	The surfaces of stainless steel, Galvanized steel, Gunmetal, brass, bronze and non-metallic components shall not be applied with any painting											
		For centrifugal fans/axial/Roof extractor fans - Casing shall have hot dip/ spray galvanization (minimum 60 micron DFT).											
		Touch up painting shall be as per standard industrial practice.											



**TECHNICAL SPECIFICATION
2X800 MW LARA TPP STAGE II
AIR CONDITIONING SYSTEM**

PE-TS-508-553-A001

Rev. No. 00

Date : FEB 2024

PACKING REQUIREMENT

COMMON GUIDELINES FOR PACKING

GENERAL:

1	
1.1	The Components/Assemblies need to be packed suitably to avoid physical damage & corrosion during transit & storage. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage of materials.
1.2	All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The Contractor shall be responsible for all loss or damage during transportation, handling and storage due to improper packing.
1.3	The identification marking indicating the name and address of the consignee shall be clearly marked in indelible ink on two opposite sides and top of each of the packages. In addition the Contractor shall include in the marking gross and net weight, outer dimension and cubic measurement.
1.4	Each package shall be accompanied by a packing note quoting specifically the name of the Contractor, the number and date of contract and names of the office placing the contract, nomenclature of contents and Bill of Material.

2. TYPES OF PACKING:


The following 5 types of packing have been standardized for packing of General Components/ Assemblies.

a	OP' - Open Type.
b	PP' - Partially Packed.
c	CP' – Crate/Box Packing - Components/Equipment requiring physical protection.
d	'CQ' - Case Packing – Machined components-Small & Medium Components/ Assemblies/ Equipment which require corrosion & physical protection.
e	'CR' - Case Packing – Electrical/Electronic Components/ Assemblies, which require special packing viz. Water Proof, Shock Proof etc...

3. DESCRIPTION OF TYPES OF PACKING:

The various types of packing, as standardized above, are described below.

3.1	'OP' - Open Type				
	In case, of components which are not affected by water & dust and do not require special protection, are generally not machined, shall be sent as open packages. However, these components may be sent in crates, wherever necessary.				
3.2	PP' - Partially Packed				
3.2.1	Components which need special protection at selected portions only shall be despatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces should be protected with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene				
3.2.2	Film. All sharp corners and edges shall be protected by rubber mats to prevent damage to the polyethylene film.				
3.3	'CP' - Crate Packing				
	Assemblies/Components which need only physical protection from the point of view of handling shall be despatched duly packed in crates.				
3.4	'CQ' - Case Packing - Machined Components/Assemblies/Equipment				
3.4.1	Small and medium sized components/assemblies/equipment due to size/weight and to avoid handling and pilferage problems shall be packed in Case/Containers. Wherever required adequate quantity of silica gel or VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed. Small machines/components of less weight shall be provided with suitable cushioning by Rubberised coir. The components inside the case shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film, wherever required. This may be prescribed for electronic parts/critical machined components/surfaces.				
3.4.2	For mechanical product like valves where motors are separately securely wrapped in polyethylene, the requirement of individual component wrapping shall be exempted.				
3.5	CR' - Case Packing - Electrical & Electronic Components/Assemblies				

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	Delicate components likely to be damaged e.g. Gauges, Instruments etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons. Adequate quantity of Silica gel packed in cotton bags of 100grams each are to be suitably placed in the cartons. The cartons shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film before being packed in the cases. VCI Powder/Tablets can be used as an alternative to Silica Gel.	

4	PREPARATION OF PACKING CASES
4.1	DIMENSIONS:
a)	Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm as per applicable drawings of the respective units/manufacturers.
b)	Width of all planks including the tongue shall be more than 125mm and after planing it shall be minimum 100mm.
c)	Minimum number of planks shall be used for a shooK.
d)	Horizontal, vertical, diagonal planks shall be given for binding (number of such planks depend on the dimension of panel).
e)	Width of binding planks shall be minimum 100mm.
f)	Distance between any 2 binding planks shall be less than 750mm.
g)	diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm
h)	Distance of the outer edges of these planks from the edge of case shall be less than 250mm.
i)	Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

4.2	HOOP IRON STRIPS
	These are used for strapping the boxes. The width of the strips shall be 19+1mm and thickness 0.6+0.01mm. The material shall be free from rust. If sufficient nailing is done for bigger boxes, strapping need not be done.


4.3	BRACKETS
	These brackets are used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of thickness min 2mm and width 25+1mm. The brackets shall be of "L" shape, the length of each side being 100+2mm. Two holes shall be provided towards the end of each side for screwing /nailing.

4.4	MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM
	100GSM (Colourless) Multi Layered Cross Laminated Polythelene Film are used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.

4.5	RUBBERISED COIR:
	The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir. For the packing of cubicles rubberized coir of thickness 25mm and width 75mm shall be used.

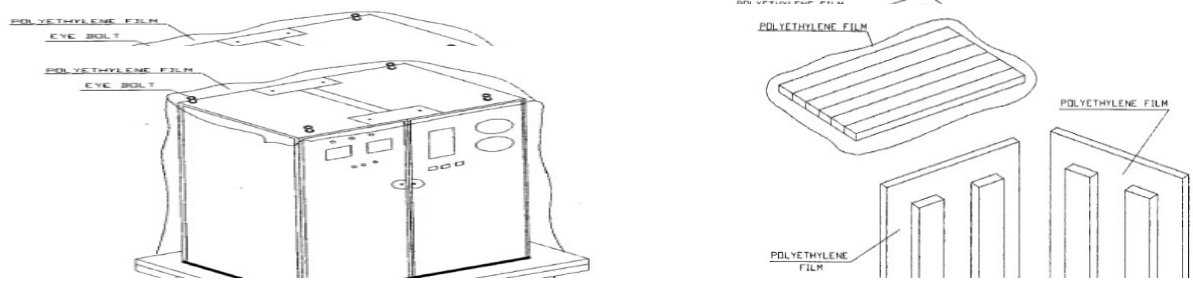
5	MULTI LAYER CROSS LAMINATED POLY FILM WHILE PACKING OF CUBICLES/CASING
5.1	The inner surface of 4 sides of shooK's shall be nailed with Multi-layer cross laminated poly film (as per 4.4) using blue nails wherever 2 pieces of Cross laminated poly film are used, the joint shall have an overlap of minimum 20mm.
5.2	The inner surface of top cover shall be nailed with Multi-layer cross laminated poly film. This sheet shall project outside on 4 sides by at least 100mm and shall be nailed properly on sides. Joining of sheets should have overlap of minimum 20mm.
5.3	The cubicles shall be covered with Multi-layer cross laminated poly film.

6	PACKING OF LOOSE ITEMS/SPARES
6.1	Inner surfaces of all 6 sides shall be lined with Multi Layered Cross Laminated Polythelene Film (as per clause 5.4) using blue nails.
6.2	Rubberized coir of minimum 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of box.
6.3	Internal packing: Items that go into the box shall be packed using 100GSM, (Colourless) Multi Layered Cross Laminated Polyethylene Film. Any space left between the job and the sides and the top of the box shall be filled with rubberized coir to get proper cushioning effect.
6.4	Certain items like transformers, reactors, breakers, etc., shall be bolted to the bottom of the box using bolts, nuts and washers.
6.5	Silica gel held in cotton bags shall be kept at proper places in the box.
6.6	Packing slip kept in polyethylene bag shall be placed in the box.
6.7	Two numbers of hoop iron strips shall be strapped tightly on the case using clips.

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6.8	Stencil marking of various details and marking of various symbols shall be done as per BHEL instructions using indelible/non-washable marking ink.	
6.9	Loose items to be kept inside the cubicle/casing	

- Other items which are given loose in addition to cubicle shall be packed in separate boxes.

7 TYPICAL PATTERN OF WOODEN BOX



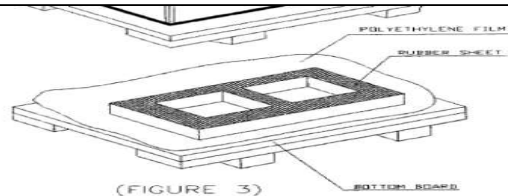


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(FIGURE 3)
Figure 2

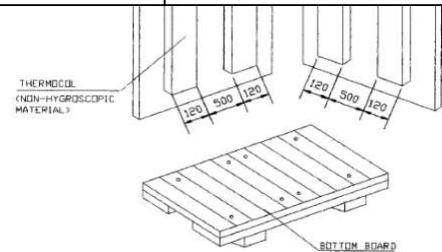


Figure 1

8 SEALED PACKING:	Components sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight. All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture. The components sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and
9 MARKINGS/STENCILINGS	
9.1 "HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER".	
9.2 Besides the caution signs the product information's shall be stencilled of letters with 13mm to 50mm height.	
9.3 In case of consignment consists of more than one package, each package shall carry its package no as given in shipping list. All caution signs shall be stencilled in high quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel.	
9.4 Caution signs & other markings shall be stencilled on both the end shooks & the side shooks.	
9.5 Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.	
9.6 In case the size of package is small for using the stencils, then hand written letters/figures shall be allowed.	

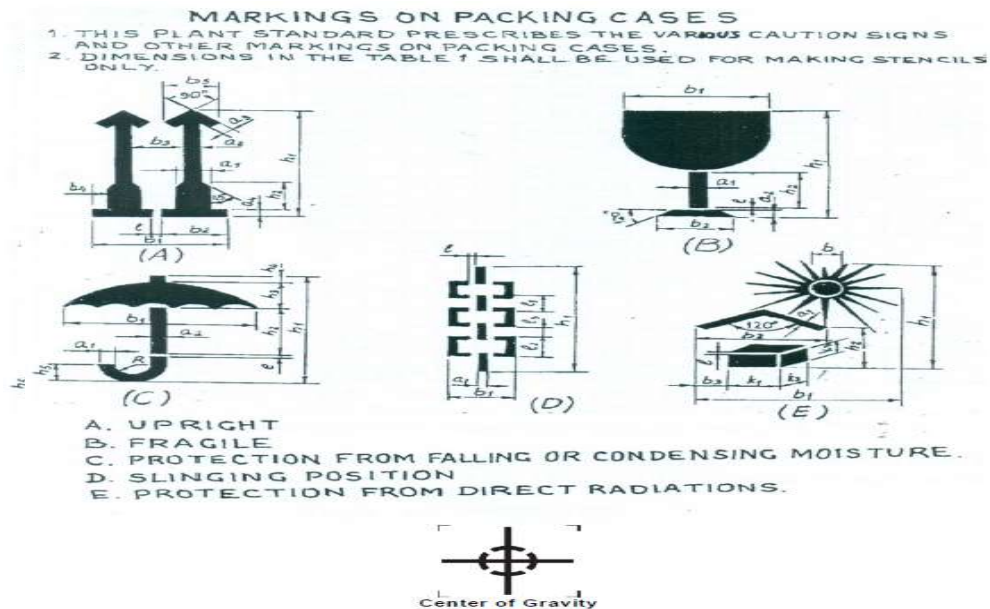


Figure 3
Figure 3



**TECHNICAL SPECIFICATION
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BHEL - <unit> - <location> - <pin>			
CI	CONSIGNEE		
M	MATERIAL		
CI	CUSTOMER REF.	MO. NO.	
DI	DESPATCH ADVICE NOTE NO	CASE NO	
AI	DIMENSIONS(MM) L x B x H	NET WT -KGS	GROSS WT -KGS
DI			
LI	SPECIAL INSTRUCTIONS	HANDLE WITH CARE - KEEP DRY DO NOT DROP - DO NOT TILT	

Figure 4 – TYPICAL MARKING PLATE (225 X 170)



Figure 5

Easy spares [Initial and O&M] Traceability and Identification at units and as well as at sites:
Easy spares [Initial and O&M] Traceability and Identification at units and as well as at sites:

10 STANDARD METHOD OF PACKING

Table 1 - Standard Method of Packing


S. No.	DESCRIPTION	CASE	CRATE	BUNDLE	BARE	DRUM
1	CHILLER	O				
2	PUMPS	O				
3	DUCTING			O		
4	AHU	O				
5	SUPPORTING STRUCTURALS				O	
6	FANS	O				
7	GASKETS	O	O			
8	FLANGES	O	O			
9	MOTORS, TRANSFORMERS, VVVF, LIMIT SWITCHES, ELECTRIC HOIST ASSEMBLY, RELAYS, FUSES, LIGHTING FIXTURES, PENDANT, ISOLATING SWITCH, RRC, TRANSMITTERS AND OTHER ELECTRICAL ACCESORIES	O				
10	CABLE TRAYS, CABLE RACKS, EARTHING MATERIAL,		O			
11	OPERATIONAL SPARES , MAINTENANCE TOOLS AND TACKLES	O				
12	ALL OTHER LOOSE ITEMS	O				


Note

Protective coating applied on machined surfaces should not be disturbed. The plastic covering should be put back carefully so that it prevents ingress of dust and moisture. Some packing may have vapour phase inhibitor (VPI) paper enclosed inside the packing cases. This should be restored to its original place as far as possible.

	TECHNICAL SPECIFICATION		PE-TS-508-553-A001	
	2X800 MW LARA TPP STAGE II		Rev. No. 00	
	AIR CONDITIONING SYSTEM			
			Date : FEB 2024	
DOCUMENTATION REQUIREMENT				
DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID				
Sl. No.	DOCUMENT TITLE			
1	PQR CREDENTIALS			
2	COMPLIANCE SHEET			
3	"NO DEVIATION" CERTIFICATE DULY STAMPED AND SIGNED.			
DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE				
S.N.	BHEL drawing No.	Title	Type of document	Schedule date of submission from date of LOI. (in weeks)
1	PE-V0-508-553-A501	STANDARD DRAWING FOR DUCT FABRICATION & SUPPORTING ARRANGEMENT	Secondary	7
2	PE-V0-508-553-A503	GA DRAWING OF EXPANSION TANKS / MAKE UP TANK / STORAGE TANK FOR AIR-CONDITIONING SYSTEM	Secondary	5
3	PE-V0-508-553-A504	GA OF AIR TERMINALS LIKE SUPPLY / RETURN AIR DIFFUSER / GRILL, NRD, VCD ETC.	Secondary	10
4	PE-V0-508-553-A508	A/C EQUIPMENT LAYOUT WITH FOUNDATION DETAILS FOR WATER SYSTEM CONTROL BUILDING, CEP VFD UNIT 1, CEP VFD UNIT 2 AND OFFICE AREA IN CONTROL TOWER OF POWER HOUSE	Primary	14
5	PE-V0-508-553-A516	A/C DUCT LAYOUT FOR MAIN POWER HOUSE AT EL 8.5 M & 17 M AND 0.0M	Secondary	18
6	PE-V0-508-553-A505	A/C PLANT ROOM LAYOUT & COOLING TOWER AREA LAYOUT WITH COMPLETE FOUNDATION DETAIL ALONGWITH PIPING LAYOUT FOR MAIN POWER HOUSE	Primary	18
7	PE-V0-508-553-A506	A/C PLANT ROOM LAYOUT WITH COMPLETE FOUNDATION DETAIL ALONGWITH PIPING LAYOUT COMMON FOR ESP CONTROL ROOM, FGD CONTROL ROOM, ASH HANDLING CONTROL ROOM	Primary	18
8	PE-V0-508-553-A537	AHU ROOM LAYOUT WITH FOUNDATION DETAIL FOR MAIN POWER HOUSE	Primary	18
9	PE-V0-508-553-A538	CHILLED WATER PIPING LAYOUT DRAWING FROM A/C PLANT ROOM TO VARIOUS AHU ROOMS FOR MAIN PLANT	Secondary	18
10	PE-V0-508-553-A517	A/C DUCT LAYOUT DRAWING COMMON FOR ESP CONTROL ROOM, FGD CONTROL ROOM, ASH HANDLING CONTROL ROOM	Secondary	18
11	PE-V0-508-553-A520	A/C DUCT LAYOUT DRAWING FOR WATER SYSTEM CONTROL BUILDING, CEP VFD UNIT 1, CEP VFD UNIT 2 AND OFFICE AREA IN CONTROL TOWER OF POWER HOUSE	Secondary	12
12	PE-V0-508-553-A527	SPLIT AC SCHEDULE	Secondary	14
13	PE-V0-508-553-A719	WRITE UP & CONTROL PHILOSOPHY FOR A/C SYSTEM FOR MAIN PLANT, A/C COMMON FOR ESP, FGD, ASH HANDLING CONTROL ROOM & VFD ROOM, WATER SYSTEM CONTROL BUILDING, CEP VFD ROOM AND OFFICE AREA IN POWER HOUSE	Primary	10
14	PE-V0-508-553-A523	P & I DIAGRAM FOR A/C SYSTEM FOR MAIN POWER HOUSE	Primary	4
15	PE-V0-508-553-A524	P & I DIAGRAM FOR A/C SYSTEM COMMON FOR ESP CONTROL ROOM, FGD CONTROL ROOM, ASH HANDLING CONTROL ROOM	Primary	4
16	PE-V0-508-553-A529	P & I DIAGRAM FOR A/C SYSTEM FOR WATER SYSTEM CONTROL BUILDING, CEP VFD UNIT 1, CEP VFD UNIT 2 AND OFFICE AREA IN CONTROL TOWER OF POWER HOUSE	Primary	4
17	PE-V0-508-553-A101	DESIGN PHILOSOPY, HEAT LOAD CALCULATION FOR A/C SYSTEM FOR MAIN POWER HOUSE, ESP/AHP/FGD BUILDINGS	Primary	7
18	PE-V0-508-553-A104	DESIGN PHILOSOPY, HEAT LOAD CALCULATION FOR A/C SYSTEM OF WATER SYSTEM CONTROL BUILDING, CEP VFD UNIT 1, CEP VFD UNIT 2 AND OFFICE AREA IN CONTROL TOWER OF POWER HOUSE	Primary	7
19	PE-V0-508-553-A107	PRESSURE DROP CALCULATION OF CONDENSER WATER PIPING AND CHILLED WATER PIPING FOR MAIN PLANT A/C SYSTEM	Primary	6

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20	PE-V0-508-553-A114	PRESSURE DROP CALCULATION OF CHILLED WATER PIPING FOR AC SYSTEM COMMON FOR ESP CONTROL ROOM, FGD CONTROL ROOM, ASH HANDLING CONTROL ROOM	Primary	6
21	PE-V0-508-553-A902	OPERATION & MAINTENANCE MANUAL	Secondary	18
22	PE-V0-508-553-A223	TECHNICAL DATA SHEET & G/A DRAWING OF WATER COOLED SCREW CHILLERS FOR MAIN PLANT A/C SYSTEM , AHP/ESP/FGD A/C SYSTEM	Primary	10
23	PE-V0-508-553-A224	TECHNICAL DATA SHEETS & G/A/DRAWING OF COOLING TOWERS	Primary	10
24	PE-V0-508-553-201	TECHNICAL DATA SHEET, GA DRAWING AND PERFORMANCE CURVES OF MOTOR FOR PUMPS, COOLING TOWER & CENTRIFUGAL FAN	Secondary	10
25	PE-V0-508-553-A225	TECHNICAL DATA SHEET & GA DRAWING FOR CONDENSER WATER PUMPS AND CHILLED WATER PUMPS	Primary	10
26	PE-V0-508-553-A227	TECHNICAL DATA SHEET OF AHU WITH COLING COIL AND CENTRIFUGAL FANS FOR AIR HANDLING UNITS	Primary	10
27	PE-V0-508-553-A226	TECHNICAL DATA SHEET OF D-X UNITS WATER SYSTEM CONTROL BUILDING, CEP VFD UNIT 1, CEP VFD UNIT 2 AND OFFICE AREA IN CONTROL TOWER OF POWER HOUSE	Secondary	12
28	PE-V0-508-553-A228	TECHNICAL DATA SHEET & G/A/ DRAWING FOR HEATER PACKAGE	Secondary	12
29	PE-V0-508-553-A245	TECHNICAL DATA SHEET & G/A/ DRAWING OF PAN HUMIDIFIER	Secondary	12
30	PE-V0-508-553-A230	TECHNICAL DATA SHEET & G/A/ DRAWING OF FRESH AIR FAN	Primary	10
31	PE-V0-508-553-A231	TECHNICAL DATA SHEET FOR HI-WALL TYPE SPLIT AIR CONDITIONER	Secondary	14
32	PE-V0-508-553-A246	TECHNICAL DATA SHEET FOR CASSETTE TYPE AIR CONDITIONER	Secondary	14
33	PE-V0-508-553-A234	TECHNICAL DATA SHEET FOR Y-STRAINERS	Secondary	10
34	PE-V0-508-553-A235	TECHNICAL DATA SHEET & G/A/DRWG/ FOR CAST IRON VALVES(GATE VALVE,CHECK VALVE, GLOBE VALVE,BUTTER FLY VALVE (MANUAL)	Secondary	12
35	PE-V0-508-553-A237	TECHNICAL DATA SHEET & GA FOR BUTTER FLY VALVE (MOTORISED)	Secondary	10
36	PE-V0-508-553-A238	TECHNICAL DATA SHEET & GA FOR 3-WAY MIXING VALVE	Secondary	10
37	PE-V0-508-553-A239	TECHNICAL DATA SHEET& G/A/DRWG/ FOR BALANCING VALVE	Secondary	10
38	PE-V0-508-553-A240	TECHNICAL DATA SHEET FOR THERMAL & ACCOUSTIC INSULATION FOR DUCTING/PIPES	Secondary	10
39	PE-V0-508-553-A241	TECHNICAL DATA SHEET & G/A/ DRAWING OF PRE-FILTER,FINE FILTER,HEPA FILTER&WATER REPELLANT FILTER	Secondary	10
40	PE-V0-508-553-A242	TECHNICAL DATA SHEET & G/A/ DRAWING OF FIRE DAMPER WITH ACTUATOR	Secondary	12
41	PE-V0-508-553-A243	TECHNICAL DATA SHEET OF G/I SHEET	Secondary	12
42	PE-V0-508-553-A244	TECHNICAL DATA SHEET OF PIPES	Secondary	12
43	PE-V0-508-553-A001	MQP Axial fan	Secondary	12
44	PE-V0-508-553-A002	MQP Balancing Valves	Secondary	12
45	PE-V0-508-553-A003	MQP Butterfly Valves	Secondary	12
46	PE-V0-508-553-A004	MQP Centrifugal fan	Secondary	12
47	PE-V0-508-553-A005	MQP Conventional Gate/Globe Valve/ Check Valve (Size >600 NB or Rating Pr Class > 300	Secondary	12
48	PE-V0-508-553-A006	MQP Horizontal Centrifugal Pumps	Secondary	12
49	PE-V0-508-553-A007	MQP MS ERW Pipe (Black/GI)	Secondary	12
50	PE-V0-508-553-A008	MQP Pipe-CS/SS seamless	Secondary	12
51	PE-V0-508-553-A009	MQP Screw Chiller	Secondary	12
52	PE-V0-508-553-A706	LIST OF INSTRUMENTS / INSTRUMENT SCHEDULE	Secondary	15
53	PE-V0-508-553-A707	CABLE INTER CONNECTION SCHEDULE	Secondary	15
54	PE-V0-508-553-A716	DRIVE LIST	Secondary	15
55	PE-V0-508-553-A717	I/O LIST	Secondary	15
56	PE-V0-508-553-A711	LOGIC DRAWING	Secondary	15
57	PE-V0-508-553-A203	TECHNICAL DATA SHEET FOR TEMPERATURE GAUGE , PRESSURE GAUGE AND LEVEL GAUGE	Secondary	15
58	PE-V0-508-553-A207	TECHNICAL DATA SHEET FOR TEMP SENSOR/ELEMENT, TEMPERATURE CUM HUMIDITY INDICATOR WITH SENSOR, HUMIDITY SENSOR	Secondary	15
59	PE-V0-508-553-A208	TECHNICAL DATA SHEET FOR PRESSURE TRANSMITTER & TYPE TEST REPORT FOR PRESSURE TRANSMITTER	Secondary	15
60	PE-V0-508-553-A209	TECHNICAL DATA SHEET FOR LEVEL TRANSMITTER & TYPE TEST REPORT FOR LEVEL TRANSMITTER	Secondary	15
61	PE-V0-508-553-A210	TECHNICAL DATA SHEET FOR TEMPERATURE TRANSMITTER & TYPE TEST REPORT FOR TEMP TRANSMITTER	Secondary	15
62	PE-V0-508-553-A211	TECHNICAL DATA SHEET FOR LEVEL SWITCH, FLOW SWITCH & DIFFERENTIAL PRESSURE SWITCH	Secondary	15
63	PE-V0-508-553-A215	TECHNICAL DATA SHEET FOR GEYSERSTAT & AIRSTAT	Secondary	15
64	PE-V0-508-553-A220	TECHNICAL DATASHEET & GA , TYPE TEST OF JUNCTION BOX	Secondary	15
65	PE-V0-508-553-A515	A/C DUCT LAYOUT ALONG WITH AHU LAYOUT FOR UPS AND SWAS ROOM OF MAIN POWER HOUSE	Secondary	16
66	PE-V0-508-553-A522	VALVE SCHEDULE	Secondary	16
67	PE-V0-508-553-A901	PG TEST PROCEDURE	Secondary	15
68	PE-V0-508-553-A247	TDS AND GA OF WATER SOFTENING PLANT	Secondary	10
Notes:-				
1	Required no. of hard and soft copies (editable) of the drawings shall be furnished as per requirement specified.			

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2	All the drawings and documents including general arrangement drawing, data sheet, calculation etc. to be furnished to the customer during detailed engineering stage shall include / indicate the following details for clarity w.r.t. Inspection, construction, erection and maintenance etc.: -	
3	All drawings and documents shall indicate the list of all reference drawings including general arrangement.	
4	All drawings shall include / show plan, elevation, side view, cross - section, skin section, blow - up view; all major self-manufactured and bought out items shall be labeled and included in BOQ / BOM in tabular form.	
5	Painting schedule shall also be made as a part of general arrangement drawing of each equipment / items indicating at least 3 trade names.	
6	All the drawings required to be furnished to customer during detailed engineering stage shall include technical parameters, details of paints and lubrication, hardness and BOQ / BOM in tabular form indicating all major components including bought out items and their quantity, material of construction indicating its applicable code / standard, weight, make etc.	
7	Drawings/ documents to be submitted for purchasers review/ approval shall be under Revision A, B, C... etc. while drawings /documents to be submitted thereafter for customer's approval after purchaser's approval shall be under R-0,1, 2, 3etc.	
8	Drawings and documents not covered above but required to check safety of machines/ system, shall be submitted during detailed engineering stage without any commercial implication	
9	All drawings shall include "B.O.M" and indicate quantity, material of construction, make along with IS/BS No., Technical parameters, dimensions, hardness, machining symbol and tolerance, requirement of radiography and hydraulic tests, painting details, elevation, side view, plan, skin section and blow-up view for clarity.	
10	All drawings shall be prepared as per BHEL's title block and shall bear BHEL's drawing No.	
11	Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's/ Customer's/ Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.	
12	Bidder to follow the following the drawing submission schedule:	
13	1st submission of drawings from date of LOI as per the submission schedule.	
14	Every revised submission incorporating comments – within 7 days.	
15	Bidder to submit revised drawings complete in all respects incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings	
16	BHEL /Customer Comment/Approval on subsequent revision shall be provided within 18 days of vendor's submission.	
17	Primary documents shall be treated as basic Engineering documents for contractual purpose.	

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The number of copies/prints/CD-ROMs/manuals to be furnished for various types of document			
S. no.	Description of Drgs./Docs.	No. of Prints	No. of Portable Hard Disk
1	Drawings, Data sheets, Design calculations, Purchase specifications and other documents		
	First submission and submission with major changes		
	Layout (A0&A1 sizes)	3	-
	Other Drawings/Documents (A0 & A1 sizes)	3	-
	P&ID (All sizes)	3	-
	Final drawings/documents (Directly to site)	4	3
	“As Built” Drawing/Documents (Directly to site)	4	3
	Analysis report of Equipment/ piping/structures componenets/system employing software packages as detailed in the specification	3	3
2	Erection Manual (Directly to site)	4	3
3	Operation & Maintenance manual Final Submission (Directly to site)	4	3
4	plant hand Book (Final submission)	2	2
	Commissioning and Performance Test Procedure manual First Submission	1	-
5	Commissioning and Performance Test Procedure manual Final submission - (Directly to site)	4	3
6	Performance and Functional Guarantee Test Report First Submission	2	-
7	Performance and Functional Guarantee Test Report Approved Copies (Direct to Site)	4	3
8	Project Completion Report (Directly to site)	4	3

2X800 MW LARA TPP
AIR CONDITIONING SYSTEM
GUARANTEED POWER CONSUMPTION FIGURES

S.NO.	DESCRIPTION OF EQUIPMENT	NO OF EQUIPMENT		TOTAL GUARANTEED POWER CONSUMPTION FOR EACH EQUIPMENT AT MOTOR INPUT TERMINAL AND CONTROL PANEL	DUTY FACTOR	TOTAL KW
		WORKING	STANDBY			
1	2	3A	3B	4	5	6=3Ax4x5
1.0	ACP-1 COMMON CONTROL ROOM FOR UNIT# 1&2 OF MAIN CONTROL ROOM AREAS, (AC PLANT - 1)					
1.1	Water Cooled Screw Compressor motor	2	1		1	
1.2	Condenser water pump	2	1		1	
1.3	Chilled water pump	2	1		1	
1.4	AHU at 25.5 m	3	1		1	
1.5	AHU AT 8.5 m	2	1		1	
2.0	ACP-2 COMMON FOR ESP CUM FGD CONTRL ROOM UNIT-1 & 2, ASH HANDLING CONTROL ROOM					
2.1	Water Cooled Screw Compressor motor for WATER cooled chiller	2	1		1	
2.2	Condenser water pump	2	1		1	
2.3	Chilled water pump	2	1		1	
2.4	AHU In AHU Room For ESP Cum FGD Control Room For Unit-1	2	2		1	
2.5	AHU In AHU Room For ESP Cum FGD Control Room For Unit-2	2	2		1	
2.6	AHU in AHU room for AHP MCC -1	1	1		1	
2.7	AHU in AHU room for AHP MCC-2	1	1		1	
2.8	AHU in AHU room for AHP MCC -3	1	1		1	
3.0	ACP-3 FOR OFFICE ROOM CCR/CER					
3.1	Air cooled condensing unit	1	1		0.5	
3.2	DX AHU	1	1		0.5	
4.0	ACP-4 FOR WATER SYSTEM CONTROL ROOM BUILDING					
4.1	Air cooled condensing unit	1	1		1	
4.2	DX AHU	1	1		1	
5.0	ACP-5 FOR CEP VFD UNIT #1					
5.1	Air cooled condensing unit	1	1		1	
5.2	DX AHU	1	1		1	
6.0	ACP-6 FOR CEP VFD UNIT #2					
6.1	Air cooled condensing unit	1	1		1	
6.2	DX AHU	1	1		1	
					TOTAL(kW)	
					TOTAL(kW)	

Note:	<p>Estimated power consumption (EPC) figure for the system (for working drives only) has been considered as 950 kW. So long bidder's quoted guaranteed power consumption (GPC) above remains within this EPC, there will be no technical loading of bid on power consumption for evaluation. However, if bidder's quoted GPC exceeds EPC, there shall be technical loading of bid for evaluation @ USD 4642 per kW of additional power over EPC.</p> <p>Bidder's guaranteed power consumption at motor input terminals (not shaft power) as furnished in relevant schedule shall be demonstrated by the successful bidder during performance testing at works/ site. In case power consumption is noted higher than EPC / bidder's quoted GPC whichever is higher, during inspection/ PG test, penalty @ USD 4642 per KW shall be levied on vendor.</p>
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**TECHNICAL SPECIFICATION
2X800 MW LARA TPP STAGE II
AIR CONDITIONING SYSTEM**


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COMPLIANCE CERTIFICATE

S. NO.	The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) and furnish same with the offer.
1	The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions, other than those mentioned under "exclusion and those resolved as per 'Schedule of Deviations', with regard to same.
2	There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'
3	Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This is within the contracted price without any extra implications to BHEL after award of the contract.
4	All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.
5	The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out. For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.
6	The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
7	All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
8	Guarantee for plant/equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions
9	In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities within the scope of work as tender specification. This clause will apply in case during site commissioning, additional requirements emerges due to customer and / or consultant's comments. No extra claims shall be put on this account

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10	Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.	
11	As built drawings shall be submitted as and when required during the project execution.	
12	The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.	
13	Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.	
14	Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.	
15	In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.	

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date