QUALITY PLAN

General points related to Quality Assurance:	
1	The inspection & testing of the cooling towers & its various components shall be as per quality plans approved by the purchaser/ Customer. Bidder shall submit the quality plans based on the guidelines given in specification & quality plans enclosed herein. The customer hold points of BHEL/ Customer/Customer nominated agency shall be marked in the QP at the contract stage, in the event of order & inspection/ testing shall be carried out as per same apart from various test certificates/ inspection records etc.
2	Equipments for which quality plan is not covered in the specification, bidder shall submit QP's for same on the basis of similar guidelines & submit for approval in the event of order.
3	Purchaser / Customer or their authorized representatives shall have the right to inspect at any stage of manufacture & construction, all materials, components & workmanship & testing of material. The bidder shall provide all facilities for inspection & testing without any extra cost to the purchaser/ Consultant.
4	The contractor/ manufacturer shall conduct the following minimum specific tests to ensure that the equipment shall conform to the requirements of specification and in full compliance with the requirements spelt out in applicable codes and standards
4.1	Material identification and testing of regulating valve assemblies, screen assemblies, all supporting structural assemblies, PVC fills, all nuts and bolts, sluice valves, nozzles and all other applicable components constituting each cooling tower.
4.2	Hydrostatic testing of hot water distribution piping regulating valves and all other pressure parts at a pressure and duration as spelt out in this specification.
4.3	Visual, dimensional checking of all components of each cooling tower.
4.4	Material testing of all components, hydrostatic testing of all pressure parts at a pressure and duration in compliance with this specification, static and dynamic balancing tests of all rotating components such as pump shaft, line shaft, impeller etc. and complete performance testing as minimum for each sludge pump in each cooling tower.
4.5	Tests for hoists, chain pulley blocks and all other lifting tackle shall be carried out as per relevant Indian/ equivalent international standards.
5	Any other tests deemed necessary for safe, reliable and satisfactory operation of the equipment.

SN	TESTS/CHECK / ITEMS / COMPONENTS	Material Test	WPS/PQR/Welder Qualification	Ultrasonic test	DPT/MPI	Balancing	Assembly Fit up	Dimension	RT	Hydraulic / Water Fill	Test as per relevant Std/ Approved Data Sheets	Other Tests
1	**PVC FILL & DRIFT ELIMINATOR**	Y[1]					Y	Y			Y	Y[2]
2	**GATE/ GLOBE/ CHECK VALVES**	Y[a]			Y[b]		Y			Y	Y	Y[3]
3	**BUTTERFLY VALVES**				Y		Y	Y		Y	Y	Y[4]
3.1	Body (Cast) , Disc (Cast)	Y[a]			Y[b]			Y				
3.2	Body & Disc both fabricated	Y[a]	Y	Y	Y[b]			Y	Y[5]			
3.3	Shaft	Y[a]		Y[c]	Y[b]			Y				
4	**ROLLED & WELDED PIPES.**	Y[a]	**REFER NOTE – 6 FOR ALL CHECKS**									
5	**WRAPPING & COATING OF PIPES**	Y[7]						Y			Y	Y
6	**HOISTS & CHAIN PULLEY BLOCKS**	Y[a]	Y		Y		Y	Y			Y	Y[8]
7	**VENTILATION FANS**	Y[a]	Y	Y[c]	Y[b]	Y	Y	Y			Y	Y[9]
8	**RE JOINTS**	Y[a]					Y	Y		Y[10]		Y[11]
9	**Fiber Glass- Reinforced Pipes**	The FRP pipes shall conform to CTI-154										

	Legend/ Notes:
a.	One per Heat/Heat Treatment batch/Lot
b.	On machined surfaces only of castings and forgings. Also 100% after root run/ back gauging for butt welds and 10% after final butt welds and fillet welds.

c.	UT shall be done for shafts with Diameter 50 mm or above & Plates of Thickness 25 mm or above.	
1.	PVC material shall meet the requirements of CTI Bulletin STD-136. However impact test may be done as per ASTM-D-256 and Flammability test may be done as per ASTM-D-635 with extinguishing type PVC. Density & VICAT softening temperature tests shall also be conducted.	
2.	UV exposure shall be carried out on samples, at reputed third party laboratories as per ASTM -G26 method- C/standard specified in engineering portion of the specification for cooling tower. Impact test before and after UV exposure shall be conducted as per ASTM D-256.	
3.	Blue matching, Wear travel for Gate valves & reduced pressure test for Check valves shall be conducted as per relevant standards.	
4.	For POD of Butterfly Valves refer respective engineering section of the technical specification.	
5.	In case of fabricated construction of Butterfly Valves and companion flanges, UT on Plates of Thickness 20 mm or above for body and disc, and RT on 100% Butt welds shall also be carried out. Welders and WPS shall be qualified as per ASME section -IX. Stress reliving after complete welding shall be carried out as per ASME Section - IX	
6.	Tests	Quantum of Check
	WPS, PQR, Welder Qualification Test	100%
	DPT on root run	100% on pipes up to 1200 mm diameter
	DPT after back gauging	100% on pipes above 1200 mm diameter
	RT/ UT by TOFD Technique/PAUT	5% (covering 100% of `T'-joints)
	DPT on finished welds	10%
	Hydraulic Test	100%, Test pressure = 1.5 times the design pressure or 2 times the working pressure whichever is higher.
	Note:- After erection, the complete piping system shall be tested at 1.5 times, the design pressure or two times the maximum working pressure whichever greater. No leakage/seepage is acceptable. Butt weld joints which would not be hydro-tested shall be subjected to 100% RT test/ 100% UT by TOFD /PAUT Technique.	
7.	Spark test, adhesion test and material tests for primer & enamel and coal tar tapes as per IS: 10221 & IS 15337.	

8.	Ropes shall meet relevant Code requirements. All motions & safety features shall be tested at Works. Full load & 25% overload test shall also be conducted at works. At site, Full load test shall be conducted with all motions and safety features.
9.	One Fan of each type & size will be performance tested as per corresponding Code, for Air Flow, Static pressure, Total pressure, Speed, Efficiency, Power Consumption, Noise, and Vibration & Temperature rise. Also, all fans shall be subjected to run test of 4 hours during which Noise, Vibration, Temperature rise & current drawn shall be measured.
10.	During Hydraulic & Vacuum test at 30 mm Hg absolute in 3 different positions, the change in Circumference of the Arch should not be more than 1.5%. Permanent Set, after 24 hours of the test, should not exceed 0.5% of Arch.
11.	Tests on Rubber for Tensile, Elongation, Hardness, Hydraulic Stability as per ASTM D-471, Ozone Resistance test as per IS: 3400 Part 20, Aging test, Adhesion strength of Rubber to Fabric and Rubber to Metal shall be carried out.

PIPES, FITTINGS, BENDS, VALVES, COATING-WRAPPING, STRAINERS EXPANSION, JOINTS, TANKS, FASTENERS, LINING ETC.

	Tests/Check / Items / Components	Material Test	DPT/MPI / RT	Ultrasonic Test	WPS/ WQS/PQR	Hydraulic / Water Fill Test	Pneumatic Test	Assembly Fit up	Dimensions	Functional/operational Test	Other Tests	All Tests as per relevant Std	REMARKS
1	Pipes & Pipe Fittings	Y[a]	Y[b]			Y1			Y			Y	
2	Diaphragm Valves	Y[a]				Y[5]			Y		Y[6]		
3A	Cast Butterfly Valves (Low Pressure)					Y		Y	Y	Y	Y[7]		
	Body	Y[a]	Y[b]										
	Disc	Y[a]	Y[b]										
	Shaft	Y[a]	Y	Y[c]									
3B	Fabricated Butterfly Valves	**REFER NOTE 14**											
4	Gate/ Globe/Swing Check / Ball Valves	Y[a]	Y[b]	Y[c]		Y[5]	Y	Y	Y	Y	Y[8]		
5	Dual Plate Check Valves	Y[a]	Y[b]	Y[c]		Y	Y	Y	Y	Y	Y[4]		
6	Rolled & Welded Pipes and Mitre Bends	Y[a]	Y[3]		Y	Y[3]			Y		Y[3&15]	Y	
7	Coating & Wrapping of Pipes	Y[2]									Y[2]		
8	Tanks & Vessels	Y[a]	Y[b]		Y	Y			Y		Y[16]		
9	Strainers	Y[a]	Y[b]		Y #	Y					Y[11]		#For Fabricated Strainer
10	Rubber Expansion Joints	Y[a]				Y[12]		Y	Y		Y[13]		
11	Internal Lining of Pipes	Y[a]							Y		Y[9]		
12	Site Welding		Y[10]		Y	Y							

	NOTES (MEANING OF SUPERSCRIPTS)
a	One per heat/heat treatment batch/lot.
b	On machined surfaces only for castings and on butt welds.
c	For shaft/spindles > or = 40 mm
1	100% Hydraulic test shall be carried out. Weld joints not subjected to hydraulic test due to some unavoidable reasons, shall be subjected to 100% RT/PAUT.
2	Spark Test, Adhesion Test and Material Test for primer and enameled & Coal Tar Tapes as per AWWA-C-203-91/ IS-10221 & IS 15337 as applicable.
3	Followings are the testing requirements for fabrication of pipes at site

TESTS	**QUANTUM OF CHECKS**
WPS, PQR, Welder Qualification Test	100% Welders and WPS shall be qualified as per ASME- section IX
DPT on root run	100% for pipes up to 1200 mm diameter
DPT after back gauging	100% for pipes above 1200 mm diameter

	RT / UT by (TOFD/PAUT) Technique	5% (100% of T Joints)
	DPT on finished butt weld joints	10%
	Hydraulic Test	100%, 1.5 times the design pressure or 2 times the working-pressure whichever is higher.
4	Dry Cycle Test on Dual Plate Check valve spring for one lakh Cycles shall be carried out as a type test. If Dry Cycle test carried out earlier for same material & diameter, Test report shall be reviewed.	
5	Seat Leakage Test for Actuator Operated Valves, shall be done with by closing the valves with actuator.	
6	Tests on rubber parts shall be conducted per batch of rubber mix for tensile, Elongation, hardness, adhesion, spark test, bleed resistance test. In addition, type test for 50,000 cycles of each type of diaphragm shall also be conducted.	
7	Hydraulic Test of Body, Seat and disc-strength shall be carried out in accordance with governing design standard in presence of owner / owner's representatives. Actuator operated valves shall be checked for Seat Leakage by closing the valves with actuator. For Proof of Design Test refer respective chapters of engineering portion in the technical specification.	
8	Blue matching, wear travel for gates, valves, pneumatic seat leakage, and reduced pressure test for check valves shall be done as per relevant standard. Maximum allowable vacuum loss is 0.5 mm of Hg abs. for valves to be tested for vacuum operation for internal pressure 25 mm of Hg abs. for a period of 15 minutes. Fire safe test for ball valve shall be done wherever specified. In case of already carried out, the test report shall be submitted for review and acceptance by owner / owner's representatives. Valves shall be offered for hydro test in unpainted condition.	
9	Tensile, Elongation, Hardness, Specific Gravity, Lining Thickness, Humidity Check, Pipe temperature check, Adhesion Test and Holiday Detection Test etc as per applicable standard shall be done for all lining material and application.	
10	10% of welds (Root and finished welds) shall be subjected to DPT. (100% DPT for compressed air line and boiler & deaerator fill line.).	
11	Pressure drop across the strainer for each type and size as a special test shall be carried out. In case of already carried out, the test report shall be submitted for review and acceptance by owner / owner's representatives.	
12	During hydraulic and vacuum tests at 25mm Hg abs in 3 positions, the change in the circumference of arch should not be more than 1.5%. 24 hrs after the test permanent set in dimension should not exceed 0.5%.	
13	Tests on rubber for tensile, elongation, hardness, hydraulic stability check as per ASTM D 471, ozone resistance test as per ASTM D 1149/IS 3400 Part 20 aging test and adhesion strength of rubber to fabric, rubber to metal adhesion shall be carried out.	
14	In addition of all tests as indicated for Cast Butterfly valve being applicable for fabricated butterfly valves, following test shall be done for Fabricated Butterfly Valve: a. UT as per ASTM A-435/IS 11630 & IS 4225 on plate material for body and disc shall be carried out for plate thickness 25mm and above. b. 100% RT and DPT as per ASTM, Section-VIII, Division-I, on butt joins of body and disc. 10% DPT on other welds shall be done. c. Post weld heat treatment as per ASME, Section-VIII, Division-I on butt joints of body and disc. d. Welders and WPS shall be qualified as per ASME- section IX	
15	Maximum number of segments in segmental flanges shall be four (04) only. All butt weld joints in the segmental flanges shall be examined by RT/UT. Segmental flanges exceeding 37.5 mm thickness shall be stress relieved as per norms of ASME Section VIII after welding.	
16	For pressure vessel welds RT shall be done as per design code requirements.	

All Valves shall be offered for inspection in unpainted condition.

No repair welding is permitted on Cast Iron / Alloy Cast Iron Castings.

	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
1	2	3	4	5	6		7	8	9	D	**			
					M	C/ N					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	HEMA KUSHWAHA	Checked by:		KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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

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

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

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MANUFACTURER'S NAME & ADDRESS
CROMPTON GREAVES LTD
LT MOTORS DIVISION
A-6/2, MIDC
AHMEDNAGAR – 414111
MAHARASHTRA

REFERENCE QUALITY PLAN

Item /equipment : LT INDUCTION MOTORS (50KW TO 200 KW)
sub-system :

QP No.: NTPC-RQP 1
Rev. No.:'4'
Date:-
PAGE : Page 1 of 5

SIGN OF MANUFACTURER
MIQ

NTPC

To be filled in by NTPC

QP No.: 0000-999-QVE-P-044
Rev. No.: 4
Date :-20-6-12

Reviewed by:
V SHRIVASTAV
RAJIV GARG
P K BASU

Approved By:
AK GARG.....

Valid upto:19-06-15

Sr. No.	ITEM	Characteristics	Class	Type of Check	Quantum of check M	Quantum of check C/N	Reference Documents	Acceptance Norms	Format of Record	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9	10				11
A. INCOMING INSPECTION: RAW MATERIAL / COMPONENT														
1	COPPER WIRE dual coated enameled round copper wire	1.Dimension	MA	Measurement	1 Sample / lot	1 Sample/lot	MSA-091-02-R0	MSA-091-02R0	Inspn. Record		P	V	–	
		2.Elongation	MA	Mechanical	-do-	-do-	-do-	-do-	-do-		P	V	–	
		3.Mandrel Winding Test	MA	Visual	-do-	-do-	-do-	-do-	-do-		P	V	–	
		4.Peel Test	MA	Test	-do-	-do-	-do-	-do-	-do-		P	V	–	
		5.BD Voltage Test	CR	Electrical	-do-	-do-	-do-	-do-	-do-		P	V	V	
		6.Cut Through Test	MA	Electrical	-do-	-do-	-do-	-do-	-do-		P	V	–	
		7.Heat Shock Test	MA	Test	-do-	-do-	-do-	-do-	-do-		P	V	–	
		8.Resistance	MA	Electrical	-do-	-do-	-do-	-do-	-do-		P	V	–	
		9.Springiness	MA	Mechanical	-do-	-do-	-do-	-do-	-do-		P	V	–	
		10.Abrasion Test	MA	Performance	-do-	-do-	-do-	-do-	-do-		P	V	–	
		11.Continuity Test	MI	Electrical	-do-	-do-	-do-	-do-	-do-		P	V	–	
		12.Tan Delta bending Point test	MA	Thermal	Each supplier once a month	-do-	-do-	-do-	-do-		V	V	V	
2	STEEL SHAFT Straightened steel bar in black finish	1.Dimension – OD	MA	Measurement	1 Sample/lot/heat	-do-	MSA-072-01R0	MSA-072-01R0	Supp. TC	√	V	V	–	
		2.Hardness	MA	Measurement	1 Sample/lot/heat	-do-	-do-	-do-	-do-	√	V	V	–	
		3.Chemical comp.	MI	Chemical	1 Sample/lot/heat	-do-	-do-	-do-	-do-	√	V	V	V	
		4.Tensile strength	MA	Mechanical	1 Sample/lot/heat	-do-	-do-	-do-	-do-	√	V	V	V	
		5.Yield strength	MA	Mechanical	1 Sample/lot/heat	-do-	-do-	-do-	-do-	√	V	V	–	
		6.% Elongation	MA	Mechanical	1 Sample/lot/heat	-do-	-do-	-do-	-do-	√	V	V	–	
		7.Ultrasonic test	MA	Mechanical	100%	-do-	-do-	-do-	-do-	√	V	V	V	
		8.Metallographic test	MA	Chemical	1 Sample/lot/heat	-do-	-do-	-do-	-do-	√	V	V	V	
		9 Normalizing	MA	Mechanical	100%	-do-	-do-	-do-	-do-	√	V	V	V	
3	AL INGOTS EC GRADE PURITY 99.5%	Chem. Comp.	MA		1 Sample/Lot	–	IS4026:1992	IS4026:1992	Supp. TC		V	–	–	

LEGENDS:* RECORDS IDENTIFIED WITH " TICK" ✓ SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION **
M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER, N : NTPC, P: PERFORM, W : WITNESS, 'V: VERIFICATION.
AS APPROPRIATE CHP: NTPC SHALL BE INDICATED IN COLUMN 'N' AS 'W'

Note:# *NTPC Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection*

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MANUFACTURER'S NAME & ADDRESS
CROMPTON GREAVES LTD
LT MOTORS DIVISION
A-6/2, MIDC
AHMEDNAGAR – 414111
MAHARASHTRA

REFERENCE QUALITY PLAN

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PAGE : Page 2 of 5

SIGN OF MANUFACTURER
MiQ

NTPC

To be filled in by NTPC

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Reviewed by:
V SHRIVASTAV
RAJIV GARG
P K BASU

Approved By:
Approved
A K GARG
N.P.C., Noida

Valid upto:19-06-15

Sr. No.	ITEM	Characteristics	Class	Type of Check	Quantum of check M	Quantum of check C/N	Reference Documents	Acceptance Norms	Format of Record	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9	10				11
A. INCOMING INSPECTION: RAW MATERIAL / COMPONENT														
4	CI CASTING (Body, End Shields, T.Box, Bearing Covers)	1.Surface defects	MA	Visual	100%	100%	MSA-02-01	No defect	Inspn. Rec		P	V	--	
		2.Dimn. Conformity	MA	Measurement	1 Sample / heat	--	Comp. Drg.	Comp. Drg.	-do-		P	--	--	
		3.Hardness	MA	Mechanical	1 Sample / lot	1 Sample / lot	IS 210:1993	IS 210:1993	Supp. TC		V	V	--	
		4.Tensile strength	MA	Verification	-do-	-do-	-do-	-do-	-do-		V	V	--	
		5.Chemical comp.	MA	Verification	-do-	-do-	-do-	-do-	-do-		V	V	--	
5	ALUMINUM FAN	1.Dimension	MA	Measurement	1Sample/size/lot	--	Fan Drg.	Fan Drg.	Inspn Rec.		P	--	--	
		2.Protective paint	MA	Visual	-do-	--	-do-	-do-	-do-		P	--	--	
6	VARNISH & THINNER	1.Viscosity	MA	Ford cup	1 Sample/ lot	--	MFGR's	MFGR's	Inspn. Rec.		v	--	--	
		2.Shelf life	MA	Verification	-do-	--	Catalogue	Catalogue	Label		v	--	--	
7	Bearing	ID / OD / WIDTH	MA	Measurement	1 Sample / lot	--	MFGR's Catalogue	MFGR's Catalogue	Inspn. Rec.	√	V	--	--	Surveillance verification By NTPC
8	BRAZING ALLOYS	Chemical comp.	MA	Chemical	1 Sample / lot	--	MSA-203-01R0	MSA-203-01R0	-do-		V	--	--	
9	TERMINAL BLOCK (DMC)	1.Dimension	MA	Measurement	1 Sample / lot	--	As per drg	As per drg	Supp. TC		P	--	--	
		2.Chem. Comp.	MA	Chemical	-do-	1 Sample / lot	-do-	-do-	-do-		V	--	--	
		3.Comparative Tracking Incex	MA	Electrical	-do-	--	MSA-086-01	MSA-086-01			V	V	--	
10	PAINT	Viscosity at 32 Deg C	MA	Measurement	-do-		MFGR's Catalogue	MFGR's Catalogue	Inspn. Record		P	--	--	
11	SPACE HEATER	1.IR value & HV	MA	Electrical	100%	1sample/Rating/lot	MSA-023-01R0	MSA-023-02R0	Inspn Report		P	--	-	
		2.Resistance	MA	-do-	100%	-do-	-do-	-do-	-do-		P	--	-	
12	STAMPINGS	1.Thickness	MA	Measurement	1 Sample / lot	-do-	Stamping.drg.	Comp. drg.	Supp.TC		V	V	V	
		2.Waviness	MA	Visual	-do-	-do-	MSA-060-01R0	MSA-060-01R0	-do-		V	V	V	
		3.Eurr height	MA	Measurement	-do-	-do-	-do-	<50 micron.	-do-		V	V	V	
		4.Coating Thickness	MA	Mechanical	-do-	-do-	-do-	MSA-060-01	-do-		V	V	V	
		5.Permeability	MA	Electrical	-do-	-do-	-do-	-do-	-do-		V	V	V	
		6.Specific core loss	MA	Electrical	-do-	-do-	-do-	-do-	-do-		V	V	V	
		7.IR	MA	Electrical	-do-	-do-	-do-	-do-	-do-		V	V	V-	

LEGENDS:* RECORDS IDENTIFIED WITH " T.CK" ✓ SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION '" M: MANUFACTURER/ SUB-SUPPLIER C: MAIN SUPPLIER, N : NTPC, P: PERFORM, W : WITNESS, V: VERIFICATION. AS APPRCPRIATE CHP: NTPC SHALL BE INDICATED IN COLUMN 'N' AS 'W'

Note:# NTPC Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection

Smart solutions. Strong relationships.

MANUFACTURER'S NAME & ADDRESS
CROMPTON GREAVES LTD
LT MOTORS DIVISION
A-6/2, MIDC
AHMEDNAGAR – 414111
MAHARASHTRA

REFERENCE QUALITY PLAN

Item /equipment : LT INDUCTION MOTORS (50KW TO 200 KW)
sub-system :
QP No.: NTPC-RQP 1
Rev. No.:'4'
Date:-
PAGE : Page 3 of 5
SIGN OF MANUFACTURER
MIQ

NTPC
QP No.: 0000-999-QVE-P-044
Rev. No.: 4
Date :-20-6-12
Valid upto:19-06-15

To be filled in by NTPC
Reviewed by: V SHRIVASTAV, RAJIV GARG, P K BASU
Approved By: AK GARG
अनुमोदित Approved

Sr. No.	ITEM	Characteristics	Class	Type of Check	Quantum of check M	Quantum of check C/N	Reference Documents	Acceptance Norms	Format of Record	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
13	STATOR CORE PACK	1.Dimn. Conformity (core length. & Dia.)	MA	Measurement	1 Sample / lot	--	MSA-060-02R0	MSA-060-02R0	Inspn. Report		P	--	--	
		2.Alignment of slot	MA	Visual	-do-	--	-do-	-do-	-do-		P	--	--	
		3.Deburring and cleanliness	MA	Visual	-do-	--	-do-	-do-	-do-		P	--	--	
14	SLOT INSULATION (Class 'F')	1.Tensile Strength	MA	Mechanical	1 Sample/lot	--	MSA-088-09R0	MSA-088-09R0	Supp.TC		V	--	--	
		2.Elongation at break	MA	-do-	-do-	--	-do-	-do-	-do-		V	--	--	
		3.BDV as recd. & after ageing	CR	Electrical	-do-	1 Sample / lot	-do-	-do-	-do-		V	V	--	
		4.IR Value	MA	Electrical	-do-	--	-do-	-do-	-do-		V	--	--	
15	VARNISH FG SLEEVE (Class 'F')	1.Dimn. - Bore dia Thickness	MA	Measurement	1 Sample/lot	--	MSA-088-07R0	MSA-088-07R0	Supp.TC		P	--	--	
		2.BDV as recd. &after ageing	CR	Electrical	-do-		-do-	-do-	-do-		P	--	--	
		3.IRValue	MA	-do-	-do-		-do-	-do-	-do-		P	--	--	
		4. Glass content conformity	MA	Chemical	1 Sample/lot	--	MSA-088-07R0	MSA-088-07R0	Supp. TC		V	--	--	
		5. Varnish compatibility	MA	Chemical	-do-	--	-do-	-do-	-do-		V	--	--	
		6. Bending before and after aging	MA	Mechanical	-do-	--	-do-	-do-	-do-		V	--	--	
		7. Voltage proof test in air at room temp & at 150C	MA	Electrical	-do-	--	-do-	-do-	-do-		V	--	--	
		8. Stability of coating	MA	Chemical	-do-	--	-do-	-do-	-do-		V	--	--	
		9. Self extinguishing	MA	Chemical	-do-	--	-do-	-do-	-do-		V	--	--	
16	GASKET	1.Shore hardness	MA	Mechanical	1 Sample/lot	--	MSA 162-01R0	MSA 162-01R0	Inspn Record		P	--	--	
		2.Ageing test	MA	Thermal	-do-	--	-do-	-do-	Supp.TC		V	--	--	
		3.Flame test	MA	Chemical	-do-	1 Sample / lot	-do-	-do-	-do-		V	V	V	
		4.Neoprene conformity	MA	Chemical	-do-	-do-	-do-	-do-	-do-		V	V	V	
		5.Dimn.	MA	Mechanical	1 Sample /lot	--	Gasket Drg	Gasket Drg	Inspn Record		P	--	--	

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Note:# NTPC Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection

Smart solutions. Strong relationships.

MANUFACTURER'S NAME & ADDRESS
CROMPTON GREAVES LTD
LT MOTORS DIVISION
A-6/2, MIDC
AHMEDNAGAR – 414111
MAHARASHTRA

REFERENCE QUALITY PLAN

Item /equipment : LT INDUCTION MOTORS (50KW TO 200 KW)
sub-system :

QP No.: NTPC-RQP 1
Rev. No.:'4'
Date:-
PAGE : Page 4 of 5

SIGN OF MANUFACTURER
MiQ

NTPC

To be filled in by NTPC

QP No.: 0000-999-QVE-P-044
Rev. No.: 4
Date :-20-6-12

Reviewed by:
V SHRIVASTAV
RAJIV GARG
P K BASU

Approved By:
AK GARG

Valid upto:19-06-15

Sr. No.	ITEM	Characteristics	Class	Type of Check	Quantum Of check M	Quantum Of check C/N	Reference Documents	Acceptance Norms	Format of Record	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9	10				11
B	IN PROCESS INSPN. :													
1	MACHINED CASTINGS (BODY, END SHIELDS, T.BOX, BEARING Covers	1.Dimn.	CR	Measurement	100%		Comp.Drg.	Comp.Drg.	Inspn Record		P	--	--	No blow -holes on machined surface of castings & no welding on casting permitted
		2.Concentricity/ Perpendicularity of machined surface	MA	Mechanical	10%		-do-	-do-	-do-		P	--	--	
		3.Blow holes	MA	Visual	100%	--	No blow hole	No blowhole	-do-		P	--	--	
		4 .Pressure testing [4] (For Flameproof Motors only)	MA	Mechanical	100%	100%	MSA-02-02R0	MSA-02-02R0	Inspn Record		P	V	V	
2	COIL FORMING	1. Conductor dia	MA	Measurement	100%	--	Winding MO.	Winding MO.	-do-		P	--	--	
		2. No. of turns	MA	Visual	100%		-do-	-do-	-do-		P			
3	WOUND STATOR	1.Resistance	MA	Electrical	100%	--	-do-	-do-	-do-		P	--	--	
		2.HV Test	MA	-do-	-do-	--	-do-	-do-	-do-		P	--	--	
		3.Interturn (Surge Test)	MA	-do-	-do-	--	-do-	-do-	-do-		P	--	--	
		4.Polarity	MA	-do-	-do-	--	-do-	-do-	-do-		P	--	--	
		5. Impregnation : VPI	MA	Mechanical	100%	1/RATING/LOT	SP05	SP05	Inspn. Record		P	V	V	
		6.Workmanship (joints, Slot Wedges, tightness & connections)	MA	Visual	100%	--	-do-	-do-	-do-		P	--	--	
4	MACHINED SHAFT	1.Dimn.Conformity	CR	Mechanical	100%	--	Shaft Drg.	Shaft Drg.	Inspn. Record		P		--	
		2.Concentricity of Shaft	MA	-do-	-do-	--	-do-	-do-	-do-		P	--	--	
		3.Micing finish, radius, chamfer	MA	Visual	-do-	--	-do-	-do-	-do-		P	--	--	
5	DIE CAST ROTOR	1. Core length	MA	Measurement	100%	--	M.O.	M.O.	Inspn. Record		P		--	
		2.Free from blow-holes, cracks	MA	Visual	100%	--	-do-	-do-	-do-		p	--	--	
6	MACHINED ROTOR	1.Dimn. - OD	CR	Measurement	100%	1 Sample / lot	-do-	-do-	Inspn. Record		P	--	--	
		2.Concentricity w.r.t. Bearing seat	MA	Mechanical	10%	-do-	-do-	-do-	-do-		P	--	--	
7	ROTOR	Dynamic balancing of Rotors at rated speed . [4]	MA	Mechanical	100%	100 %	A18 R0 & TS A16 R1	ISO: 1940 Grade- G 2.5	Inspn. Record	√	P	V	V	
8	FAN	Fan Balancing	MA	Mechanical	100%	100%	TS-A19-R0	ISO: 1940 Grade -G2.5	Inspn.Record	√	P	V	V	
9	ASSEMBLED MOTOR	Name Plate data, T. box location,	MA	Visual	100%	1 Sample / lot	TS: A20R5	TS: A20 R5	Inspn. Record		P	V	V	
		Flame path joint Gap for Flame proof motors [4]	MA	Mechanical	100%	100%	IS2148	IS2148	Inspn. Record		P	V	V	

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AS APPROPRIATE CHP: NTPC SHALL BE INDICATED IN COLUMN 'N' AS 'W'

Note:# NTPC Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection

MANUFACTURER'S NAME & ADDRESS	REFERENCE QUALITY PLAN			To be filled in by NTPC		
CROMPTON GREAVES LTD LT MOTORS DIVISION A-6/2, MIDC AHMEDNAGAR – 414111 MAHARASHTRA	Item /equipment : LT INDUCTION MOTORS (50KW TO 200 KW) sub-system :	QP No.: NTPC-RQP 1 Rev. No.:'4' Date:- PAGE : Page 5 of 5	SIGN OF MANUFACTURER MIQ	QP No.: 0000-999-QVE-P-044 Rev. No.: 4 Date :-20-6-12 Valid upto:19-06-15	Reviewed by: V SHRIVASTAV RAJIV GARG P K BASU	Approved By: AK GARG

Sr. No.	ITEM	Characteristics	Class	Type of Check	Quantum of check		Reference Documents	Acceptance Norms	Format of Record	Agency				Remarks
					M	C/N				D*	M	C	N	
1	2	3	4	5	6		7	8	9	10				11
		VERIFICATION OF TYPE TEST CLEARANCE FROM NTPC ENGG												
C.	FINAL INSPECTION:	1. Marking on the Name Plate	MA	Visual	100%	100%	IS:325/ NTPC Specn/	IS:325/ NTPC Specn/	TC	√	P	W	W	
	ROUTINE TEST	2. a) Paint Shade	MA	Mechanical	-do-	-do-	Appd D/S,&Drg	Appd D/S,&Drg	TC	√	P	W	W	
		b) Paint Thickness (On casting surface)	MA	Mechanical	1 sample /Lot	1 sample /Lot	-do-	Min 100 microns	TC	√	P	W	W	
		c) Scratch Test	MA	Mechanical	-do-	-do-	-do-	No Peel-off						
		3.Location of T.Box.	MA	Visual	100%	100%	Appd D/S	Appd D/S	TC	√	P	W	W	
		4. R test before & after HV on Main wdg. & Sp.Heater.	MA	Electrical	-do-	-do-	IS-325	IS-325	TC	√	P	W	W	
		5.HV on Main Wdg. & Space Heaters	MA	-do-	-do-	-do-	-do-	-do-	TC	√	P	W	W	
		6.Measurement of Wdg. Res.	MA	-do-	-do-	-do-	-do-	CGL-TS-35	TC	√	P	W	W	
		7.No Load Test	MA	-do-	-do-	-do-	-do-	Appd D/S,&Drg	TC	√	P	W	W	
		8.Locked Rotor Test at reduced voltage	MA	-do-	-do-	-do-	-do-	CGL-TS-35	TC	√	P	W	W	
		9.Reduced voltage running in both directions (1/^3 Un)	MA	-do-	-do-	-do-	-do-	IS325	TC	√	P	W	W	
		10.Overspeed test (120% of rated speed) for 2 min.	MA	Mechanical	-do-	-do-	-do-	-do-	TC	√	P	W	W	
		11. Vibration Test at rated speed & voltage	MA	Mechanical	-do-	-do-	IS12075	IS12075	TC	√	P	W	W	
		12.Degree of Protection By insertion of 1 mm thick wire	MA	Mechanical	-do-	-do-	-do-	IS:325/IS:4029	TC	√	P	W	W	
		13.Mounting & overall dimension	MA	Measurement	-do-	1Sample/rating/Lot	-do-	As per D/S & Drg	TC	√	P	W	W	
D.	DISPATCH INSPECTIONS	Case Marking.	MA	Visual	100%	--	Manufacturing Order	Manufacturing Order	Manufacturing Order		P	--	--	

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Note:# NTPC Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection

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												

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.

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
	CUSTOMER:		QP NO.: PE-QP-999-509-E001, R3	DATE:
	PROJECT:		PO NO.:	DATE:
	ITEM: ABOVE GROUND EARTHING MATERIALS	SYSTEM: EARTHING		SHEET 1 OF 2

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**			REMARKS
					M	B				D	M	B	C	
1	2	3	4	5	6		7	8	9					
1.0	**RAW MATERIAL:**													
1.1	MILD STEEL (FLATS & RODS) AS PER SPECIFICATION	1.CHEMICAL & PHYSICAL PROPERTIES	MA	VERIFICATION OF TC'S	100%	-	IS 2062	IS 2062	MILL TC	✓	P	V	-	REFER REMARKS AT SL. NO. 3.1
		2. DIMENSIONS	MA	MEASUREMENT	100%	-	IS 1730	IS 1730	QC RECORD	✓	P		-	
		3.SURFACE FINISH	MA	VISUAL	100%	-	IS 1079	IS 1079	QC RECORD	✓	P		-	
1.2	ZINC	1.CHEMICAL COMP.	MA	CHEM. TEST	SAMPLE	-	IS 209	IS 209	QC RECORD	✓	P	V	-	
2.0	**IN PROCESS:**													
2.1	CUTTING, DRILLING	1.DIMENSIONS	MA	MEASUREMENT	100%	-	IS 1730	IS 1730	QC RECORD	✓	P	V	-	
2.2	SURFACE PREPARATION	1. CLEANING, PICKLING, RINSING & FLUXING	MA	VISUAL	100%	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	
		2. SURFACE FINISH	MA	VISUAL	100%	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	
2.3	GALVANISING	1.TEMPERATURE OF BATH	MA	MEASUREMENT	CONTINUOUS	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	GALVANIZATION IS TO BE DONE AT GALVANIZATION PLANT LISTED IN ANNEXURE-1 TO QUALITY PLAN.
		2. DROSS	MA	VISUAL	PERIODIC	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	
		3.RATE OF IMMERSION	MA	VISUAL/ MEASUREMENT	100%	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	
		4. SURFACE FINISH	MA	VISUAL	100%	-	IS 2629	FREE FROM BURRS, ROUGHNESS, SLAG, FLUX, STAIN	QC RECORD	✓	P	-	-	
3.0	**FINISHED ITEMS:**													
3.1	MS FLATS	1. CHEMICAL COMP.	MA	CHEM. TEST	1 No./LOT/SIZE	-	IS 2026	IS 2026	LAB TC	✓	P	V	-	NOTE: SAMPLE FOR CHEMICAL TEST SHALL BE SELECTED BY BHEL& TESTING SHALL BE DONE AT NABL/ GOVT. APPD. LAB
		2. DIMENSIONS	MA	MEASUREMENT	IS 2500 (PART 1) LEVEL S-4	IS 2500 (PART 1) LEVEL S-4	IS 1730	IS 1730	INSPECTION REPORT	✓	P	W		

BIDDER/SUPPLIER	
Sign &Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Checked by:		MANOJ MEENA	Checked by:		Suman
Reviewed by:		Sandeep Seth	Reviewed by:	22-2-24	Hari

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

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
	CUSTOMER:		QP NO.: PE-QP-999-509-E001, R3	DATE:
	PROJECT:		PO NO.:	DATE:
	ITEM: ABOVE GROUND EARTHING MATERIALS	SYSTEM: EARTHING		SHEET 2 OF 2

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					6						**			
1	2	3	4	5	M	B	7	8	9	D	M	B	C	
		3. SURFACE FINISH	MA	VISUAL	IS 2500 (PART 1) LEVEL S-4	IS 2500 (PART 1) LEVEL S-4	-	FREE FROM BURRS, ROUGHNESS, SLAG, FLUX, STAIN ETC.	QC RECORD	✓	P	W		
		4.MASS OF ZINC COATING	MA	CHEM. TEST	IS 4759	IS 4759	IS-6745	FLATS 5 MM THICK AND OVER 610 GM/SQ.M. FLATS UNDER 5 MM, BUT NOT LESS 2 MM 450 GM/SQ.M.	INSP. REPORT	✓	P	W	-	
		5.UNIFORMITY OF ZINC COATING	MA	CHEM. TEST	IS-4759	IS-4759	IS-2633	IS-2633	INSP. REPORT	✓	P	W	-	
		6. THICKNESS OF ZINC COATING	MA	MEASUREMENT	IS-4759	IS-4759	IS-4759	FLATS 5 MM THICK AND OVER=AVG 86 MICRON AND MINIMUM 75 MICRON. FLATS UNDER 5 MM THICK, BUT NOT LESS 2 MM =AVG 65 MICRON	INSP. REPORT	✓	P	W	-	
		7. ADHESION	MA	MECH. TEST	IS-4759	IS-4759	IS 2629	IS 2629	INSP. REPORT	✓	P	W	-	
	NOTE: ITEMS LIKE PIPES/ FLEXIBLE COPPER BRAID/ GI WIRE/ GS ROD/ SHIELDING MAST/ TEST LINK WILL BE CLEARED BASED ON COC (CERTIFICATE OF COMPLIANCE)													
4.0	PACKING	SURFACE FINISH & COMPLETENESS	MA	VISUAL	100%	100%	BHEL APPROVED DOC	BHEL APPROVED DOC	INSPC. REPORT	✓	P	V	-	

NOTES:

1 LATEST REVISION/ YEAR OF ISSUE OF ALL THE STANDARDS (IS/ASME/IEC ETC.) INDICATED IN QP SHALL BE REFERRED.

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(V) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION, **D**: DOCUMENTATION

** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: BHEL/ THIRD PARTY INSPECTION AGENCY, **C**: CUSTOMER, **P**: PERFORM, **W**: WITNESS, **V**: VERIFICATION, AS APPROPRIATE **MA**: MAJOR, **MI**: MINOR, **CR**: CRITICAL

BIDDER/SUPPLIER	
Sign &Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Checked by:		MANOJ MEENA	Checked by:		Suman
Reviewed by:		Sandeep Wadhwa	Reviewed by:	22.12.24	Harish

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

ANNEXURE – 1

INSTRUCTIONS FOR FILLING QUALITY PLAN

The Quality Plan shall include all the Quality Control Measures and Checks adopted by the Vendor to ensure that the material/component/assembly/services supplied by him meet/will meet the requirements as per specifications and good practices. They shall include all stages of operation such as materials, processes, manufacture, assembly, packing and despatch. The following guide lines may be noted:

Column 1- Serial Number

Column 2- Component/Operation- The component and/or operation being checked shall be given here.

Column 3- Characteristics check- The characteristics being checked shall be given here, e.g., chemical composition, mechanical properties, leak tightness, surface defects etc..

Column 4- Category -'CR' stands for critical characteristic - affecting safety of equipment and personnel
'MA' stands for major Characteristic - affecting safety of equipment and personnel
'MI' stands for minor characteristic - affecting appearance etc.

Column 5- Type/Method of check e.g. chemical analysis tensile testing, hydraulic test, visual examination radiography etc.

Column 6- Extent of check, such as, 100, 10, 1 percent etc.

Column 7- Reference Documents - Documents, such as technical specification, drawings, standard specifications (IS, BS ETC.) procedure, etc. according to which check is done.

Column 8- Acceptance Norms - Standards etc. according to which acceptability or otherwise of the characteristics being checked is decided.

Column 9- Format of Record - Formats, log shets, reports, etc. in which the observations are recorded. Standard log sheets, reports, formats etc. of the Vendors shall be numbered and such reference numbers shall be included here.

Column 10- Agency - The agency which performs the test/instruction shall be written in sub-column 'W'
The agency which verifies test certificates/inspection records and carries out audit check of the components/operation shall be written in sub-column 'V'

The agencies are codified as 1,2 & 3

'1' stands for (BHEL)

'1' * means the operation shall be cleared by BHEL before the start of the next operation.

'2' Stands for Vendor

'3' stands for sub-Vendor of the Vendor and so on.

Example :

Entry '3' in column 'P' means test./inspection to be performed by sub-Vendor's QC

Entry '2' in column 'W' means test./inspection to be witnessed by Vendor's QC

Entry '1' in column 'V' means verification shall be done by BHEL and next stage to be started only after the hold point is cleared by BHEL

Column11l- Remarks - Any special remarks shall be given here.

NOTES :

1. In absence of correlation with the test certificate(s) (e.g. material identification) samples shall be drawn bgy BHEL and all tests as per relevent specifications shall be carried out in their presence or in recognized Government Laboratory.
2. When materials and components are initially identified and stamped by BHEL QS engineer, the identification marks shall be presserved till despatch. Wherever this is not possible, the identification mark shall be transferred to the components in the presence of BHEL QS Engineer unless other wise agreed.
3. For castings and forgings integral test specimens shall be provided, When this is not possible for casting, they shall be poured in the presence of BHEL QS Engineer unless otherwise, If witnessing of test by BHEL is called for.
4. When welders qualified by reputed Inspection agencies or statutory bodies are not available, qualification tests shall be conducted in the presence of BHEL QS Engineer.
5. This Quality Plan is liable to be modified as per the requirements of approved drawings and changes in technical specifications/drawings. If there are contradictions in respect of column 7 & 8 between this Quality Plan and the approved drawings specifications, the latter shall prevail.
6. Wherever inspection by BHELs Purchaser/Third Party/Statutory authoritics are mandatory, this shall be compiled with.
7. Inspection reports, log sheets, test reports/certificate. etc. shall be furnished to BHEL at the approproate stages or at the time of final inspection, as required.
8. This Quality Plan is also applicable to spares, if any, under scope of supply of Vendor.
9. The quality plan shall be submitted in minimum 4 copies with a soft copy of the same or in line with contract requirements.

LIST OF GALVANIZERS IS ATTACHED SEPARATELY.

CAT-I

ENDORSEMENT SHEET FOR QP

~~REFERENCE~~ / *STANDARD* / ~~FIELD~~ QUALITY PLAN (RQP / SQP/*~~RFQP/SFQP~~*)

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION		To be filled in by NTPC
PROJECT NAME	3x800 MW NTPC PATRATU STPP EXPANSION, PHASE-1	*2REVIEW & ENDORSEMENT BY NTPC* PROJECT SPECIFIC QP NUMBER ALLOTTED QP NO: 9585-001-215-QVE-Q-024 REV. NO.: 01 DT : 24.11.2021
CONTRACT NO.:	434	
MAIN SUPPLIER	M/S. BHARAT HEAVY ELECTRICALS LTD., PEM, NOIDA	
MANUFACTURER WORKS & ADDRESS	M/S INDUSTRIAL PERFORATION (INDIA) PVT LTD , 327, R .N. GUHA ROAD DUM DUM , KOLKATTA-700028	
GALVANIZER WORKS & ADDRESS	M/S INDUSTRIAL PERFORATION (INDIA) PVT LTD , KATAKHAL GANGANAGAR 24-PGS NORTH KOLATA-700132	
ITEM /EQUIPMENT / SYSTEM/ SUB-SYSTEM DETAILS i.e. MODEL TYPE/SIZE/RATING etc.	CABLE TRAY & ITS ACCESSORIES (LADDER & PERFORATED TYPE)	
APPROVED QP NO.: ~~RQP~~/SQP/~~RFQP/SFQP~~	0000-999-QOE-S-021 , T01 DATED 06.02.04	

Confirmation by Main Supplier (TICK WHICHEVER APPLICABLE)	*(TICK APPLICABLE)*
I. That the item/ component is identical to that considered for QP approval. √	The QP is endorsed for this project without any change
~~*II. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same do not affect the contents of QP.*~~	
~~*III. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same affect the QP slightly, as indicated below / in attached sheet.*~~	The QP is endorsed for this project with changes as indicated.

NOTES:
1. Kindly refer Annexure-A for NTPC approved galvanizer list.
2. Kindly refer Annexure-B for additional Notes.

SIGN.: (Main Supplier) *DATE :*	*SIGN.: (Manufacturer)* *DATE:*	NTPC (Reviewed /Approved by/ Date & Seal)

	ITEM:(MATERIAL,CLASS,GRADE,RATING, SIZE ETC.) GALVANIZED CABLE TRAYS (Perforated & Ladder type) & ACCESSORIES	STANDARD QUALITY PLAN CONFORMING TO CODE :	QP NO. 0000-999-QOE-S-021 REV.: 1 DATE: 06.02.04 PAGE : 1 OF 1 VALID UPTO :05.02.07	REVIEWED BY A.K. Sharma Rang Vohra O.P. Niranjan	APPROVED BY ANIL GUPTA

SL. NO.	COMPONENT & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M	QUANTUM OF CHECK C/N	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY M	AGENCY C	AGENCY N	REMARKS
1	2	3	4	5	6		7	8	9		**	10		11
	FINISHED CABLE TRAYS & ACCESSORIES	1 **In Black Condition**												A)The cable trays shall be galvanised at NTPC approved sources only.
		a) Weld Quality	Major	Visual	100%	Random	Manufacturer's Plant Std	Manufacturer's Plant Std	Inspection report		P		-	
		b) Burs	Major	Visual	Random		-	No Burs	-do-		P		-	B) The supplier to ensure procurement of steel from main producers like SAIL/TISCO,Rastriya Ispat/Ispat Ind. Jindal/Esser/Lloyds/IIS Co. and Zinc from Hindustan Zinc Ltd.
		2 **After Galvanising**												
		2.1 General Physical inspection including Galvanising Quality/ Defects, Dicromating, White rusting etc.	Major	Visual	IS-4759 -1996	5 sample/lot	IS-2629-1985 IS-4759-1996	IS-2629-1985 IS-4759-1996	-do-		P	W	W	C)Welding shall be done by qualified welders as per supplier system.
		2.2 Dimensional check & Sheet Thickness	Major	Measur ement	-do-	-do-	NTPC/Main Supplier Approved Drawing	NTPC/Main Supplier Approved Drawing	-do-		P	W	W	D)Pre-tretment of fabricated cable trays shall be carried out in seven tank process as per IS 2629.All the process parameters e.g. Concentration, temperature, density etc. to be maintained and recorded by the Galvaniser
		2.3 Galvanising tests												
		a) Coating thickness measurement survey by Elcometer	Critical	Measure ment	-do-	-do-	IS-4759-1996 IS-3203-1982	IS-4759-1996 Table-I	-do-		P	W	W	
		b) Mass of zinc coating	Critical	Measur ment	-do-	1 coupon sample of each thickness	IS-6745-1972 IS-2633-1986	IS-4759-1996 Table - I	-do-		P	W	W	E)The process of pretreatment shall be varified by NTPC on surveillance basis during Inspection of cable trays
		c) Uniformity of zinc coating/dip test	Critical	Measur ment	-do-	-do- -do-	IS-2629-1985 IS-2633-1986 IS-4759-1996	IS-4759-1996 cl. 9.3	-do-		P	W	W	
		d) Adhesion test	Critical	Visual	-do-	-do-	IS-2629-1985	IS-2629-1985	-do-		P	W	W	*F* One piece each of 2.5 meter length size of cable tray of 300 mm & above shall be taken as sample from each offered lot for inspection. It shall be supported at both ends & loaded with uniformly distributed load of 76kg/ meter along the length of cable tray. The maximum deflection at mid span of each sample shall not exceed 7mm.
		2.4 Deflection Test	Critical	Measu rement	1 sample from each size type/ lot	1 sample from each size type/ lot	*F*	*F*	-do-		P	W	W	

LEGEND: RECORDS IDENTIFIED IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY THE CONTRACTOR IN QA DOCUMENTATION
** M: MANUFACTURER/SUB-SUPPLIER, C:CONTRACTOR/NOMINATED INSPECTION AGENCY. N: NTPC. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE
"CHP" BY NTPC SHALL BE IDENTIFIED IN COLUMN "N" AS "W".

LIST OF CUSTOMER APPROVED GALVANIZERS IS ATTACHED SEPARATELY

CAT-I

ENDORSEMENT SHEET FOR QP

~~REFERENCE~~ / *STANDARD* / ~~FIELD~~ QUALITY PLAN (RQP / SQP/*~~RFQP/SFQP~~*)

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION		To be filled in by NTPC
PROJECT NAME	3x800 MW NTPC PATRATU STPP EXPANSION, PHASE-1	*2REVIEW & ENDORSEMENT BY NTPC* PROJECT SPECIFIC QP NUMBER ALLOTTED QP NO: 9585-001-215-QVE-Q-009 REV. NO.: 01 DT : 24.11.2021
CONTRACT NO.:		
MAIN SUPPLIER	M/S. BHARAT HEAVY ELECTRICALS LTD., PEM, NOIDA	
MANUFACTURER WORKS & ADDRESS	M/S INDUSTRIAL PERFORATION (INDIA) PVT LTD , 327, R .N. GUHA ROAD DUM DUM , KOLKATTA-700028	
GALVANIZER WORKS & ADDRESS	M/S INDUSTRIAL PERFORATION (INDIA) PVT LTD , KATAKHAL GANGANAGAR 24-PGS NORTH KOLATA-700132	
ITEM /EQUIPMENT / SYSTEM/ SUB-SYSTEM DETAILS i.e. MODEL TYPE/SIZE/RATING etc.	CABLE TRAY SUPPORT SYSTEM – BOLTABLE	
APPROVED QP NO.: ~~RQP~~/SQP/~~RFQP/SFQP~~	3120-104A-01-QVE-007 REV. NO: 00 DATED : 14.01.2019	

Confirmation by Main Supplier (TICK WHICHEVER APPLICABLE)	*(TICK APPLICABLE)*
I. That the item/ component is identical to that considered for QP approval. √	The QP is endorsed for this project without any change
~~*II. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same do not affect the contents of QP.*~~	
~~*III. That there are minor changes in the item/ component with respect to that considered for QP approval, however the same affect the QP slightly, as indicated below / in attached sheet.*~~	The QP is endorsed for this project with changes as indicated.

NOTES:
1. Kindly refer Annexure-A for list of NTPC approved galvanizers.
2. Kindly refer Annexure-B for additional Notes.

SIGN.: (Main Supplier) DATE :	*SIGN.: (Manufacturer) DATE:*	NTPC (Reviewed /Approved by/ Date & Seal)

एनटीपीसी NTPC	ITEM: (MATERIAL, CLASS, GRADE, RATING, SIZE ETC.) GALVANISED FLEXIBLE CABLE TRAYS SUPPORT SYSTEM	STANDARD QUALITY PLAN CONFORMING TO CODE: Design as per NTPC Specification	QP NO. 0000-999-QOE-S-38 REV.:00 DATE : 01.09.04 PAGE 1 OF 2 VALID UPTO:31.08.07	REVIEWED BY S.D.SINGH O.P.NIRANJAN I.J.SINGH	APPROVED BY ANIL GUPTA

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1.	2.	3.	4.	5.	6.		7	8	9	D*	**	10		11
	Flexible cable trays Support Structure	1. In Black Condition a) Weld Quality	Major	Visual	100%	Random	Manufacturer's Plant Std	Manufacturer's Plant Stc	Inspection Report		P	V	V	o
		b) Burs	Major	Visual	Rando m	-	No Burs	No Burs	-do-		P		-	
2.	Finished Galvanized	2. After Galvanising												
		2.1 General physical inspection including Galvanizing Quality/Defects, Dicromating, White Rusting etc.	Major	Visual	100%	5 Sample/L ot	IS-2629-1985 IS-4759-1996	IS-2629-1985 IS-4759-1996	-do-		P	W	W	
		2.2 Dimensional Check & Thickness Check	Major	Measurem ent	-do-	-do-	NTPC/Main Supplier Approved Drg.	NTPC/Main Supplier Approved Drg.	-do-		P	W	W	
		2.3 Galvanizing Tests												
		a) Coating thickness measurement survey by Elcometer	Critical	Measurem ent	IS-4759-1996	-do-	IS-4759-1996 IS-3203-1982	IS-4759-1996 IS-3203-1982	-do-		P	W	W	
		b) Mass of zinc coating	Critical	Measurem ent	-do-	1 coupon sample of each thickness	IS-6745-1972 IS-4759-1996	IS-6745-1972 IS-4759-1996	-do-		P	W	W	
		c) Uniformity of zinc coating/dip test	Critical	Measurem ent	-do-	-do-	IS-2633-1986 IS-4759-1996	IS-2633-1986 IS-4759-1996	-do-		P	W	W	
		d) Adhesion Test	Critical	Visual	-do-	-do-	IS-2629-1985	IS-2629-1985	-do-		P	W	W	

LEGEND: RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY THE CONTRACTOR IN QA DOCUMENTATION

M: MANUFACTURER/SUB-SUPPLIER, C: **Main Supplier: NTPC, N: NTPC. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE

"CHP" BY NTPC SHALL BE IDENTIFIED IN COLUMN "N" AS "W"

एनटीपीसी NTPC	ITEM: (MATERIAL, CLASS, GRADE, RATING, SIZE ETC.)	STANDARD QUALITY PLAN CONFORMING TO CODE: Design as per NTPC Specification	QP NO. 0000-999-QOE-S-38 REV.:00 DATE : 01.09.04 PAGE 2 OF 2 VALID UPTO: 31.08.07	REVIEWED BY S.D.SINGH O.P.NIRANJAN L.J.SINGH	APPROVED BY ANIL GUPTA QUALITY ASSURANCE APPROVED NTPC, New Delhi

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY		
					M	C/N					M	C	N
1.	2.	3.	4.	5.	6.		7	8	9	D*	**	10	
		Proof Load Test as per note 6 Followed by Die Penetration Test (For 600 mm and above cable tray support system)	A	Meas/Visual	One Sample from each offered lot	One Sample from each offered lot	NTPC Technical Specification/ No visible cracks should develop on the weld part	NTPC Technical Specification/ No visible cracks should develop on the weld part	Inspection Report		P	W	W

Note :

1. The supplier to ensure procurement of steel from main producers like SAIL/TISCO, Rastriya Ispat/Ispat Ind. Jindal/Esser/Lloyds/IIS Co. and Zinc from Hindustan Zinc Ltd.
2. Welding shall be done by qualified welders as per supplier system.
3. Material shall be galvanized at NTPC approved sources only.
4. Pre-treatment of cable trays support system shall be carried out in seven tank process as per IS-2629. All the process parameters e.g. Concentration, temperature, density etc. to be maintained and recorded by the galvaniser.
5. The process of pre-treatment shall be verified by NTPC on surveillance basis during inspection of Galvanised Flexible Cable Trays support system.
6. (i) Test on Main support Channel shall be done if only CI channel are in scope of supply and cantilever arms shall be fitted on one side. This test shall be same as test 4 of type test as per tech. Spec.

   (ii) Test on Main Support Channel shall be done with C2 Channel and cantilever arms fitted on both sides, if C2 channels are in scope of supply. This test shall be same as test 2 A of type tests. Then test at (i) above shall not be repeated.

   (iii) Nut slip characteristic test (It shall support minimum load of 350 Kg. Before Nut Slips with bolt torque of 65 NM). This test shall be same as test 5 B of type tests.

   (iv) The procedure for carrying out above test shall be as per details given in Type Tests Specification.

LEGEND: RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY THE CONTRACTOR IN QA DOCUMENTATION
M: MANUFACTURER/SUB-SUPPLIER, C: **Main Supplier, N: NTPC. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE
"CHP" BY NTPC SHALL BE IDENTIFIED IN COLUMN "N" AS "W"

LIST OF CUSTOMER APPROVED GALVANIZERS IS ATTACHED SEPARATELY

CABLING, EARTHING, LIGHTNING PROTECTION

ATTRIBUTES / CHARACTERISTICS / ITEMS/COMPONENTS / SUB SYSTEMS	Dimension	Paint shade, paint thickness, adhesion	Pre-treatment of sheet	IP protection	Proof load*	Surface finish	Deflection test*	HV & IR	Galvanize Test (If Applicable)	Functional	Bought out items/Bill of material	Routine tests as per relevant standard & specification	Acceptance tests as per relevant standard & specification	Constructional feature as per NTPC Specification
Wall Mounted-Lighting Panel (IS-513, IS:5, IS:2629, 2633, 6745)	Y	Y	Y	Y		Y		Y		Y	Y	Y	Y	Y
Switch box/junction box/ Receptacles Panel (IS-513, IS:5, IS:2629, 2633, 6745)	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y
Cable glands (BS-6121)	Y													Y
Cable lug	Y													Y
Lighting wire (IS-694)	Y											Y		
Flexible conduits	Y											Y		Y
Conduits (Galvanize & Epoxy) IS-9537 & IS-2629, 2633, 6745	Y		Y						Y			Y		Y
RCC Hume Pipe (IS-458)												Y		
Cable termination & straight through joint (IS 13573)	Y											Y		Y
Cable Trays, bends, tees, crosses, Flexible supports system & accessories IS-513, 2629,2633,6745	Y		Y		Y	Y	Y		Y			Y	Y	Y
Trefoil clamp	Y													Y
GI flats for earthing & lighting protection (IS 2062, 2629, 6745,2633)	Y		Y						Y			Y		Y
GI wire (IS-280)	Y											Y		
Fire Sealing System (BS –476)												Y	Y	Y

Note:
1. This is an indicative list of tests /checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2.* Deflection Test on cable trays and Proof Load test on cable trays support system will be as per details given in the NTPC technical specification & approved MQP. The above acceptance tests shall be done only on one sample from each size of offered lot. This test is not applicable on bends, tees & crosses.
3. Make of all items will be subject to NTPC approval.

एनटीपीसी NTPC	ITEM : LIGHTING FIXTURES (Conventional and LED type)	STANDARD QUALITY PLAN CONFORMING TO CODE : As applicable	QP.NO:0000-J99-QOE-S-C62 Rev No.: 00 Date: 02/11/18 VALID UPTO: 01/11/18	REVIEWED BY SWAPNESWAR MISHRA VIKRAM TALWAR SUNIL MALANI	APPROVED BY R.M.Jain

Sl No	COMPONENT & OPERATIONS		CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK 6M	QUANTUM OF CHECK 6/2N	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	R	C	N	REMARKS
1	2		3	4	5			7	8	9	10			11
	Note: 1): Lighting fixtures supplier to ensure that constructional features of thelighting fixture (conventional & LED type) are as per NTPC specification requirements 2): Lighting fixture supplier to maintain all quality control records identified in this QP whether it is identified for NTPC verification or witness or no.													
	Conventional type Lighting Fixture													
A	**Bought out items / in-process checks**													
1	Lamps		Make, rating & type	Major	Visual	1 sample per type	1 sample per type	NTPC specification requirements for rating & type, Make to be BIS approved with CML number	NTPC specification requirements for rating & type, Make to be BIS approved with CML number		V	-	-	
1.1	Electronic Ballast (if applicable)	a	Certificate of compliance	Major	Visual	-	-	NTPC specification requirements	Certificate of compliance by ballast manufacturer / lighting fixture supplier that ballst meets all NTPC specification requirements	Certificate of compliance	V	-	-	
		b	THD and pf check	Major	Elecrical	Mnfr std.	-	NTPC specification requirements	THD <=10% , pf >= 0.9 for FH type and pf >= 0.95 for other type of floresscent lighting Fixtures	Inspection report	P/V *	-	-	P/V * - means test will be performed either by lighting fi supplier or their sub-vendor at Verified by lighting fixture sup
1.2	Castings		Freedom from defects	Major	Visual	Mnfr std.	-	NTPC specification requirements	Castings shall be free from any defects such as blow holes, surface blisters, cracks and cavities etc.	Inspection report	P/V *	-	-	P/V * - means test will be performed either by lighting fi supplier or their sub-vendor at Verified by lighting fixture sup
1.3	Sheet metal Forming and fibrication		Freedom from defects	Major	Visual	Mnfr std.	-	NTPC specification requirements	sheet metal fabrication / forming etc should be as per manufacturer drgs	Inspection report	P/V *	-	-	P/V * - means test will be performed either by lighting fi supplier or their sub-vendor at Verified by lighting fixture sup
1.4	Pre-treatment and powder coating		Pre-treatment process checks, Powder coating finish, thickness, uniformity of coating and adhesion	major	Visual, chemical & mech	Mnfr std.	-	Mafr standard , NTPC specification requirements	Nominal coating thickness 50 microns or more	Inspection report	P/V *	-	-	P/V * - means test will be performed either by lighting fi supplier or their sub-vendor at Verified by lighting fixture sup

LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER / SUB-SUPPLIER: C: MAIN SUPPLIER, N: NT
P: PERFORM W: WITNESS AND V: VERIFICATION. CHP: CUSTOMER HOLD POINT BY NTPC SHALL BE IDENTIFIED UNDER AGENCY COLUMN "V" AS 'W'.

NTPC	ITEM : LIGHTING FIXTURES (Conventional and LED type)			STANDARD QUALITY PLAN				QP.NO:000-999-QO S-062	REVIEWED BY	APPROVED BY			
				CONFORMING TO CODE : As applicable				Rev No: 00	SWAPNESWAR MISHRA	K.M.Jain			
								Date: 02/11/15	VIKRAM TALWAR				
								VALID UPTO: 01/11/18	SUNIL MALANI				

Sl No	COMPONENT & OPERATIONS		CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD					REMARKS
						6 M	6 C/N				D	M	C	N	
	2		3	4	5			7	8	9		10			11
3	Acceptance Tests on conventional Lighting fixture	a	Details of lot offered and Certificate of compliance that lighting fixture supplier has inspected the offered lot as per their own standard	Major	Visual	-	-	lighting fixture supplier to submit the details of lot offered for NTPC inspection (Type of lighting fixtures, their batch number, sub-vendor name, quantity)	COC	List		P	V	V	The list may be used by NTPC for sample selection
		b	Lamp make	Major	Visual	100%	100%	Make to be BIS approved with CML number	Make to be BIS approved with CML number	Certificate of compliance		V	V	V	
		c	Constructional features including: Internal wiring, terminal block, earthing terminal, safety chain (if applicable)	Major	Visual	1sample per type	1 sample per type	NTPC specification and NTPC approved data sheet/drg.	NTPC specification and approved data sheet/drg.	Inspection report		P	W	W	
		d	Electronic Ballast (if applicable for offered lighting fixtures) THD and pf check	Major	Electrical	1sample per type	1 sample per type	NTPC specification	THD <=10% , pf >= 0.9 for FH type and pf >= 0.95 for other type of florescent lighting fixtures	Inspection report		P	W	W	At lighting fixture supplier test Lab
		e	Resistance to moisture test in case of lighting fixtures having IP X4 and above rating	Major	Mechanical	1sample per type	1 sample per type	NTPC approved data Sheet	IS 10322 Part 1	Inspection report		P	W	W	
		f	Resistance to dust (applicable if IP5X and above)	Major	Optical	Mnfr std.	Mnfr std	NTPC aproved Data sheet and accepted type test reports	Certificate of compliance	Certificate of compliance		P/V *	V	V	P/V * - means tes will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier
		f	Photometry check	Major	Optical	Mnfr std.	Mnfr std	NTPC accepted type test reports	Certificate of compliance for the batch : that offered lighting fixture LOR is not be less than 90% (refer IS 16107) with reference to type test reports	Certificate of compliance		P/V *	V	V	P/V * - means tes will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier
		g	Dimensions	Major	Visual	1sample per type	1 sample per type	NTPC specification and approved data sheet/drg.	NTPC specification and approved data sheet/drg.	Inspection report		P	W	W	
		h	HV & IR test	Major	Visual	#	#	IS 10322 part 1	IS 10322 part 1	Inspection report		P	W	W	# As per Table 1 (inspection Level S2) and Table 2 CAQL 2.5 of IS 2500

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/ SUB-SUPPLIER: C: MAIN SUPPLIER, N: NTPC
P: PERFORM W: WITNESS AND V: VERIFICATION. CHP: CUSTOMER HOLD POINT BY NTPC SHALL BE IDENTIFIED UNDER AGENCY COLUMN "N" AS 'W'.

		ITEM : LIGHTING FIXTURES (Convertional and LED type)		STANDARD QUALITY PLAN				QP.NO:0000-999-QOE-S-462	REVIEWED BY	APPROVED BY				
				CONFORMING TO CODE : As applicable				Rev No.: 01	SWAPNESWAR MISHRA					
								Date: 02/11/5	VIKRAM TALWAR					
								VALID UPTO: 01/11/18	SUNIL MALANI					
SI no	COMPONENT & OPERATIONS	CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD					REMARKS
					CM	CC/N				D*	I	C	N	
2		3	4	5			7	8	9			10		11
	LED type Lighting fixture													
	Bought out items / in-process checks													
	LED Chip	LED chip efficacy	Major	Visual	Mnfr Std	Mnfr Std	NTPC Spec. Appd. Data sheet/ LM 80 report	NTPC Spec/ Appd Data sheet	LM 80 report		V	V	V	At the time of final inspection
		LED chip CRI and CCT	Major	Visual	Mnfr Std	Mnfr Std	NTPC Spec. Appd. Data sheet/ LM 80 report	NTPC Spec/ Appd Data sheet	LM 80 report		V	V	V	At the time of final inspection
		Reported TM21 (L80) lifetime of LED chip	Major	Visual	Mnfr Std	Mnfr Std.	NTPC Spec. Appd. Data sheet/ LM 80 report	NTPC Spec/ Appd Data sheet	LM 80 report		V	V	V	At the time of final inspection
.1	LED Driver	a Compatibility with LED module/chip, controls & protection features as per NTPC spec	Major	Visual	-	-	NTPC spec requirements	Certificate of compliance by LED driver manufacturer / lighting fixture supplier that driver meets all NTPC specification requirements	Certificate of compliance		V	V	V	
		b THD and pf check	Major	Electrical	Mnfr std.	-	NTPC specification	THD < 10% and pf >= 0.9	Inspection report		P/V *	-	-	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier
	Castings	Freedom from defects	Major	Visual	Mnfr std.		NTPC specification requirements	Castings shall be free from any defects such as blow holes, surface blisters, cracks and cavities etc.	Inspection report		P/V *	-	-	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier
	Sheet metal forming and fabrication	Freedom from defects	Major	Visual	Mnfr std.	-	NTPC specification requirements	sheet mtal fabrication / forming etc should be as per manufacturer standards and good engg practices	Inspection report		P/V *	-	-	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier
	Pre-treatment and powder coating	Pre-treatment process checks, Powder coating finish, thickness, uniformity of coating and adhesion	major	Visual, chemical & mech	Mnfr std.	-	Mnfr standard , NTPC specification requirements	Nominal coating thickness 50 microns or more	Inspection report		P/V *	-	-	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier

LEGEND: * RECORDS, INCENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.** M: MANUFACTURER / SUB-SUPPLIER: C: MAIN SUPPLIER, N: NTPC
P: PERFORM W: WITNESS AND V: VERIFICATION. CHP: CUSTOMER HOLD POINT BY NTPC SHALL BE IDINTIFIED UNDER AGENCY COLUMN "N" AS 'W'.

NTPC			ITEM : LIGHTING FIXTURES (Conventional and LED type)		STANDARD QUALITY PLAN CONFORMING TO CODE : As applicable				QP.NO:9000-999-QCE-S-062 Rev No.: 00 Date: 01/11/15 VALID UPTO: 01/11.18	REVIEWED BY SWAPNESWAR MISHRA VIKRAM TALWAR SUNIL MALANI	APPROVED BY KM Jain				
Sl No	COMPONENT & OPERATIONS		CHARACTERISTICS / INSTRUMENT	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS				
						M	C/N					M	C	N	
1	2		3	4	5	6		7	8	9	10*	**	10		11
B	Accep ance Tests on LED Lighting fixture	a	Details of lot offered and Certificate of compliance that lighting fixture supplier has inspected the offered lot as per their own standard	Major	Visual		-	lighting fixture supplier to submit the details of lot offered for NTPC inspection (Type of lighting fixtures, their batch number, sub-vendor name, quantity)	-	List		P	V	V	The list may be used by NTPC for sample selection
		b	LED chip make	Major	Visual		-	NTPC accepted type test reports (LM80/LM79) report	Certificate of compliance	Certificate of compliance		V	V	V	
		c	Constructional features including: Internal wiring, terminal block, earthing terminal, safety chain (if applicable)	Major	Visual	sample per type	1 sample per type	NTPC specification and NTPC approved data sheet/drg.	NTPC specification and approved data sheet/drg.	Inspection report		P	W	W	
		e	Resistance to moisture test in case of lighting fixtures having IP X4 and above rating	Major	Mechanical	sample per type	1 sample per type	NTPC approved data Sheet	IS 10322 Part I	Inspection report		P	W	W	
		f	Resistance to dust (applicable if IP5X and above)	Major	Optical	Mnfr std.	Mnfr std	NTPC accepted type test reports	Certificate of compliance	Certificate of compliance		P/V *	V	V	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier
		f	Photometry check	Major	Optical	Mnfr std.	Mnfr std	NTPC accepted type test reports, LM 79, IS 16106, IS 16107	Certificate of compliance for the batch that offered lighting fixture LOR and lighting fixture efficacy is not be less than 90% (refer IS 16107) with reference to type test reports	Certificate of compliance		P/V *	V	V	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier

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NTPC	ITEM : LIGHTING FIXTURES (Conventional and LED type)	STANDARD QUALITY PLAN	QP.NO:000-999-QOE-S-062	REVIEWED BY	APPROVED BY
	CONFORMING TO CODE : As-applicable	Rev No.: 00	SWAINESWAR MISHRA	
		Date: 01/11/15	VIKRAM TALWAR	
		VALID UPTO: 01/1118	SUNIL MALANI	

SI No	COMPONENT & OPERATIONS		CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD					
						6 M	6 C/N					M	C	N	
1	2		3	4	5			7	8	9	10*	**	10		11
		g	Dimensions	Major	Visual	1 sample per type	1 sample per type	NTPC specification and approved data sheet/drg.	NTPC specification and approved data sheet/drg.	Inspection report		P	W	W	
		i	LED driver: THD and pf check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	THD < 10% and pf >= 0.9	Inspection report		P	W	W	At lighting fixture supplier test lab
		j	LED driver: Precision current control check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report		P	W	W	
		k	LED driver: Open circuit protection simulation check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report		P	W	W	
		l	LED driver: Short circuit protection simulation check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report		P	W	W	
		m	LED driver: Over temperature protection simulation check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report		P	W	W	
		n	LED driver: Overload protection simulation check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report		P	W	W	
		o	LED driver: Surge protection compliance check	Major	Electrical	-	-	NTPC specification	Certificate of compliance that surge protection is provided	Cerificate of compliance		V	V	V	

Note: Packing shall be witnessed as per Annexure-I to Quality Plan

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PACKING SPECIFICATIONS- LIGHTING FIXTURES, LAMPS & MISC. ITEMS
ANNEXURE-I

PACKING

1. The material shall be packed to ensure protection against damage during transit, storage for prolonged periods and handling.

2. Lighting Fixtures, Lamps, Receptacles, Switchboards, 24V Supply modules, 24V sockets, Junction Boxes, Exit signs shall be clean and dry prior to packaging.

3. All items specified at sl. No.2 above shall be supplied in packed cartons. The tapes used for packing shall not bleed, leave residue, or damage the item when removed.

4. Fixtures & other lighting material shall be wrapped in weather proof material such as polythene sheets, air bubble sheets/ thermocol etc. The lighting fixtures shall be placed in a corrugated paperboard/ fibreboard container/ mono carton.

5. The mono cartons shall be wrapped or bagged or tied in place in master cartons. The master carton shall be taped and then wrapped with cushioning material.

6. The dimensions of cartons shall be as per manufacturer's recommendations.

7. For items like step ladder, wheel mounted ladder and flexible conduits, packing shall be as per manufacturer standard.

Note: In case Manufacturer has a different packing standard which is equivalent or better same to be submitted for approval during contract stage.

STATION LIGHTING

Item Components / Sub System / Assembly — Attributes / Characteristics	Make, Type, Rating/ TC	Dimension	Pre-Treatment of sheet	Paint Shade Thickness Adhesion & Finish	Galvanization Tests	IP Test	Bought Out Items/ Bill of Material	HV & IR	Functional Check as per spec.	Constructional Feature as per NTPC spec.	Routine Test as per relevant std and spec	Acceptance Test as per relevant std and spec	Item to conform to relevant standard
Luminaries (IS-10322 Part-5 Sec.1 (non –LED type)	Y					Y		Y			Y	Y	Y
Electronic Ballast	Y										Y	Y	Y
Lighting Wire (IS-694)	Y										Y		
Fans (IS-374)	Y										Y		
Pole (IS-2713)	Y			Y						Y	Y	Y	
Lamps (IS-9800, IS-9974)	Y										Y	Y	
Lighting Mast (with raise & lower lantern type)	Y	Y			Y					Y	Y	Y	
Wall Mounted Lighting Panel (IS-513, IS-5)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Switch Box/ Junction Box/Receptacles/ Local Push Button Station / Lighting Panel (IS-513, 2629, 2633, 4759, 6745)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Cable Gland (BS-6121)	Y	Y									Y		
Cable Lug (IS-8309)	Y	Y									Y		
Flexible Conduit	Y										Y		
Lighting Transformer (IS-11171)	Y									Y	Y		
Epoxy & Galvanized Conduit (IS-9537, 2629, 2633, 4759, 6745)	Y	Y									Y		Y

LED Luminaire quality requirements:

1) **LED modules to conform to IS: 16103 part 2. Manufacturer to issue a certificate of compliance for the same.**
2) **Control gear to conform to IS 15885-part 2 section 13. Manufacturer to issue a certificate of compliance for the same.**
3) **LED luminaire to conform to IS 16107-part 2 section 1. Manufacturer to issue a certificate of compliance for the same.**
4) **LED luminaire marking to be as per IS 16107-part 2 section 1. Manufacturer to issue a certificate of compliance for the same.**
5) **Acceptance tests as per IS 16107-part 2 section 1 to be carried out on LED luminaire except long duration tests i.e. a) Chromaticity coordinates & correlated color temperature (CCT); b) Color rendering index (CRI). Manufacturer will submit a COC for above tests i.e. CCT & CRI**
6) **LED driver make, model, type & rating may be as per recommendations of LED module manufacturer**.

Notes:
1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Make of all major Bought Out Items will be subject to NTPC approval.

CAT-I

ENDORSEMENT SHEET FOR Q.P.

REFERENCE / STANDARD / FIELD QUALITY PLAN (RQP / SQP/ *RFQP* / *SFQP*)

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION		**NTPC** **To be filled in by NTPC**
PROJECT NAME	3X660 MW NORTH KARANPURA TPS	*REVIEW & ENDORSEMENT BY NTPC*
CONTRACT No.	405	PROJECT SPECIFIC Q.P. NUMBER ALLOTTED
MAIN SUPPLIER	BHEL	Q.P. No.: 4410-001-213-QVE-Q-002
MANUFACTURER WORKS & ADDRESS	M/S GOVIND CABLE INDUSTRIES (7/36-37, SITE-IV, SAHIBABAD INDUSTRIAL AREA GAZIABAD)	
ITEM/ EQUIPMENT/ SYSTEM/ SUB-SYSTEM DETAILS i.e. MODEL TYPE/ SIZE/ RATING etc	LT XLPE POWER CABLE	REV. No.:00 DATE: 04.07.2016
APPROVED Q.P. No.: RQP/SQP/RFQP/SFQP	0000-999-QOE-S-0041 REV. No.: 00 DATE: 03/02/2012	
Confirmation by Main Supplier (TICK WHICHEVER APPLICABLE)		*(TICK APPLICABLE)*
I. That the item/ component is identical to that considered for Q.P. approval. OR		√ The Q.P. is enclosed for this project without any change.
II. That there are minor changes in the item/ component with respect to that considered for Q.P. approval, however the same do not affect the contents of Q.P. OR		
III. That there are minor changes in the item/ component with respect to that considered for Q.P. approval, however the same affect the Q.P. slightly, as indicated below/ in attached sheet.		The Q.P. is enclosed for this project with changes as indicated.
		DISTRIBUTION OF ENDORSEMENT OF A) RQP/SQP: *1. MAIN SUPPLIER (with a copy of Q.P.)* *2. MANUFACTURER* *3. RIO* *4. CQA-SPL* *5. CQA-O/C* B) RFQP/SFQP: *1. MAIN SUPPLIER (with a copy of Q.P.)* *2. MANUFACTURER* *3. NTPC FQA (with a copy of Q.P.)* *4. NTPC Erection (with a copy of Q.P.)* *5. CQA-SPL* *6. CQA-O/C*
SIGN.: (Main Supplier) *DATE:*	*SIGN.: (Manufacturer)* *DATE:*	NTPC (Reviewed / Approved by / Date & Seal)

APPROVED
Checked and Approved.
Date: 17-Dec-2018
*Approval doesn't absolve the EPC contractor of it's responsibility as specified in the Contract.

FOR REFERENCE ONLY

NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 08-02-12 Page 1 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg

Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/W	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9	10				11
Instructions: 1) Cable manufacturer to maintain records to show co- relation of raw materials to finished cables i.e raw material batch/ lot no. should be traceable to the cable drum. 2) Cable manufacturer to maintain all quality control records identified as per all QP stages enumerated below whether it is identified for NTPC verification or witness or not.														
A	Raw material/ Brought out Items													
1.01	Aluminum	1.Make	MA	Verify	100%	--	MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	QCR		V	--	--	
		2. Resistivity	MA	Elect	As per Cable Mnfr Std.	--	IS5082	IS5082	-do--		P	--	--	
1.02	PVC / XLPE/compound for insulation	1. Make	MA	Verify	--do--	100%	MANUFACTURER APPROVED SOURCES	MANUFACTURER APPROVED SOURCES	--do--		V	V	--	
		2. Type/ Grade	MA	Verify	100%	100%	NTPC ADS	NTPC ADS	--do--		V	V	V	
		3. All acceptance test as per manufacturer norms including thermal stability test for PVC insulation	MA	Verify	As per manufacturer norms	As per manufacturer norms	NTPC ADS	NTPC ADS	--do--		V	V	V	Refer note 1
1.03	PVC Compound for Inner sheath	1. Make	MA	Verify	--do--	--do--	MANUFACTURER APPROVED sources	MANUFACTURER APPROVED sources	--do--		V	V	V	
		2. Type/ Grade	MA	Verify	--do--	--do--	NTPC ADS	NTPC ADS	--do--		V	V	V	
1.04	Steel wire / formed Wire (As applicable)	1. Make	MA	Verify	--do--	--do--	MANUFACTURER APPROVED sources	MANUFACTURER APPROVED sources	--do--		V	V	V	
		2. Dimension	MA	Meas	1 sample from each size / lot	--	NTPC APPROVED DATA SHEET & IS 3975	NTPC APPROVED DATA SHEET & IS 3975	--do--		P	--	--	
		3. All acceptance tests as per IS 3975	MA	Verify	As per IS 3975	--	IS 3975	IS 3975	Supplier TC		V	V	--	
1.05	PVC compound for Sheath	1. Make	MA	Verfy	As per manufacturer norms	100%	MANUFACTURER APPROVED sources	MANUFACTURER APPROVED sources	QCR		V	V	--	
		2. Type / Grade	MA	Verify	100%	100%	NTPC ADS	NTPC ADS	QCR		V	V	V	
		3. All acceptance test as per manufacturer norms	MA	Verify	As per manufacturer norms	As per manufacturer norms	NTPC ADS	NTPC ADS	QCR		V	V	V	Refer note 1

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FORMAT NO:QS-01-QAI-P-10/4/3-R1

NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 2 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg

Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/N	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
		4. Thermal Stability	MA	Chem	One sample / Batch	--	NTPC ADS	NTPC ADS	QCR		P	--	--	
		5. Oxygen Index	MA	Chem	--do--	--	NTPC ADS/ IS 10810 Part 58	NTPC ADS/ IS 10810 Part 58	--do--		P	--	--	
		6. Acid Gas Emission	MA	Chem	One sample / Batch	--	NTPC ADS /IEC60754	NTPC ADS / IEC60754	QCR		P	--	--	
1.06	Wooden Drum	1. Dimension	MI	Meas	Manuf. Std.	--	IS 10418	IS10418	--do--		P	--	--	
		2. Anti termite treatment	MI	Chem	Cable manuf. std	--	CABLE MANUF. STD	CABLE MANUF. STD.	COC		V	V	V	COC from drum m
1.07	Steel Drum	1. Dimension	MI	Meas	--do--	--	--do--	--do--	QCR		P	--	--	
		2. Surface finish	MI	Meas	--do--	--	--do--	--do--	--do-		P	--	--	
B	Process & Stage Inspection													
2.01	Wire Drawing	1.Surface finish	MA	Visual	One sample/Setting of each size	--	SHOULD BE SMOOTH & FREE FROM SCRATCHES	SHOULD BE SMOOTH & FREE FROM SCRATCHES	QCR		P	--	--	
		2. Wire Diameter	MA	Meas	--do--	--	NTPC ADS	NTPC ADS	--do-		P	--	--	
		3. Tensile test	CR	Mech	--do--	--do--	--do--	--do--	--do--		P	V	V	Refer Sl. No.3.03(iii)
		4. Wrapping test	CR	Mech	--do--	--do--	--do--	--do--	--do--		P	V	V	--do--
2.02	Bunching / stranding	1. No. of wires	MA	Meas	--do--	--	NTPC ADS	NTPC ADS	--do-		P	--	--	
		2.Dia of wire	MA	Meas	-do--	--	--do--	--do--	--do--		P	--	--	
		3. Dimension of Conductor	MA	Meas	--do--		--do--	--do--	--do--		P	--	--	
		4.Direction of lay	MA	Visual	--do--	--	--do-	--do--	--do--		P	--	--	
		5.Records of strand breakage / welding during conductor stranding	MA	Verify	--do--	--	IS 8130	IS8130	--do--		P	--	--	
		6.Surface finish	MA	Visual	--do--	-	--do--	--do--	--do--		P.	--	--	
		7. DC Resistance	CR	Meas	--do--	-	IS8130/NTPC ADS	IS8130/ NTPC ADS	--do--		P	--	--	
2.03	Insulation extrusion	1. Surface finish	MA	Visual	One sample/Setting of each size	-	NTPC spec	SHOULD BE SMOOTH. NO POROSITY IS PERMITTED.	QCR		P	--	--	XLPE/ PVC compound shall be preferably feaded in to extruder by suction method

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FORMAT NO:QS-01-QAI-P-10/F3-R1

Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables

STANDARD QUALITY PLAN

(CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)

QP. NO. 0000-999- QOE- S-041
REV-00 DATE : 03-02-12

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VALID UP TO: 02-02-15

REVIEWED BY
INDERJIT SINGH
VIKRAM TALWAR
RAJEEV GARG

APPROVED BY
A.K. Garg
DE

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/ W	Reference Document	Acceptance Norms	Record Format	Agencies D*	Agencies M	Agencies C	Agencies N	Remarks
1	2	3	4	5	6		7	8	9		10			11
		2.Colour of cores	MA	Visual	One sample/Setting of each size	-	NTPC ADS	NTPC ADS	QCR		P	--	--	
		3.Thickness	CR	Meas	--do--	--	NTPC ADS	NTPC ADS	--do--		P	--	--	
		4.Spark Test	CR	Elect	100%	100%	CABLE MANUF. STD.	No FAILURE	--do --		P	V	V	1.Spark test failure record is to be verified. 2.Core repairing not permitted
		5. Hot Set	CR	Mech	One sample/Setting of each size	--	IS 7098- Part I	IS 7098- Part I	--do--		P	--	--	Sample is to be taken from both top & bottom end
2.04	Laying up	1. Core sequence	MA	Visual	--do--	--	IS 1554 (Part I) & IS 7098- Part I	IS 1554 (Part I) & IS 7098- Part I	--do--		P	--	--	
		2. Direction of lay	MA	Visual	--do--	--	-do-	--co--	--do--		P	--	--	
		3. Dia over laid up core	MA	Meas	--do--	--	NTPC ADS	NTPC ADS	--do--		P	--	--	
2.05	Inner Sheath	1.Colour	MA	Visual	-do--	-	--do--	--co--	--do--		P	--	--	
		2. Surface Finish	MA	Visual	100%	-	NTPC SPECIFICATION	FISH EYE, BLOW HOLE NOT PERMITTED	--do--		P	--	-	
		3.Thickness	MA	Meas	One sample/Setting of each size	-	NTPC ADS	NTPC ADS	--do--		P	--	-	
		4.Dia over inner sheath	MI	Meas	--do--	-	--do--	--do--	--do--		P	--	--	
2.06	Armouring (As Applicable)	1.Dimension	MA	Meas	--do--	-	--do--	--do--	--do--		P	--	--	
		2.No. of wires / strip	MA	Meas.	--do--	-	--do--	--do--	--do--		P	--	--	
		3. Direction of lay	MA	Visual	--do--	--	IS 1554 (Part 1) & IS 7098- Part I	IS 1554 (Part 1) & IS 7098- Part I	QCR		P	--	--	

CABLE INDUSTRIES * GOVIND * KOLKATA

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Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables

STANDARD QUALITY PLAN
(CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)

QP. NO. 0000-999- QOE- S-041
REV.00 DATE : 03-02-12
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VALID UP TO: 02-02-15

REVIEWED BY
INDERJIT SINGH
VIKRAM TALWAR
RAJEEV GARG

APPROVED BY
A.K. Garg
DGM

Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/N	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
		4.Coverage & Quality of armouring	MA	Meas.	100%	-	Min. area of coverage of armouring shall be 90%. The gap between armour wires / formed wires shall not exceed one armour wire/ formed wire space & there shall be no cross over/ over riding of armour wire / formed wire. Zn rich paint shall be applied on armour joint surface of G.S. Wire /formed wire. The breaking load of armour wire joint shall not be less than 95% of that armour wire / formed wire. (As per NTPC specification)		QCR		P	--	--	
		5 Dia over armouring	MA	Meas.	One sample/Setting of each size	-	NTPC ADS		--do--		P	--	--	--
2.07	Outer Sheath	1. Surface finish	MA	Visual	100%	-	Pimple, Fish Eye, Burnt particles, Blow Hole not permitted. Repairing on outer sheath not permitted. (As per NTPC specification)		--do--		P	--	--	PVC FRLS compound shall be preferably loaded in to extruder by suction method
		2.Colour of sheath	MA	Visual	One sample/Setting of each size	-	NTPC ADS	NTPC ADS	--do--		P	--	--	
		3. Dia over outer sheath	MA	Meas	--do--	-	NTPC ADS	NTPC ADS	--do--		P	--	--	
		4.Thickness of outer sheath	CR	Meas	--do--	-	--do--	--do--	--do--		P	--	--	
		5. Embossing quality	MA	Visual	100%	-	Drum no., IS1554-I / IS7098-I,Cable size, Voltage grade & Words "FRLS" at every 5 meter is to be embossed. Embossing shall be automatic, in line & marking shall be legible & indelible. (As per NTPC specification)		--do--		P	--	--	Drum no. on cable may be embossed/printed
		6. Sequencial marking	MA	Visual	Full length	-	Sequencial marking of length of cable in meter at every one meter is to be embossed / printed. Embossing / printing shall be progressive automatic, in line & marking shall be legible & indelible. (As per NTPC specification)		--do--		P	--	--	
C	Finished Cables													
3.01	Type test reports clearance from NTPC Engineering	All type tests as per NTPC specification	CR	Doc.	100%	100%	NTPC SPECIFICATION / NTPC ADS/ IS 1554 (Part1) & IS 7098- Part1	NTPC SPECIFICATION / NTPC ADS / IS 1554 (Part1) & IS 7098- Part 1	--do--	✓	P	V	V	

GOVIND CABLE INDUSTRIES * T&T, Cotton Street, KOLKATA

LEGEND:- *RECORDS, IDENTIFIED WITH "TICK" UNDER COLUMN "D" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
-M:MANUFACTURER/SUPPLIER, C:MAIN SUPPLIER, N:NTPC, P:PERFORM W:WITNESS,V:VERFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"
FORMAT NO:QS-01-QA1-P-10/F3-E1

NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 5 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY [stamp: Approved A.K. Garg N.T.P.C. NOIDA]

Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/N	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
3.02	Routine Tests	1.High Voltage test at room temperature	CR	Elect	100%	100%	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	Test certificate	✓	P	W	W	Refer note 2
		2.Conductor Resistance	CR	Elect	100%	100%	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	Test certificate	✓	P	W	W	Refer note 2
3.03	Acceptance Tests													
3.03 (i)	Construction of finished Cable	1. OD of Cable	MA	Meas.	Each type & size of cables as per sampling plan of IS 1554 (Part I) & IS 7098- Part I		NTPC ADS	NTPC ADS	--do--	✓	P	W	W	
		2. Laying of core	CR	Visual	--do--		NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	NTPC ADS / IS 1554 (Part I) & IS 7098- Part I	--do--	✓	P	W	W	
		3. Core identification	CR	Visual	--do--		--do--	--do--	--do--	✓	P	W	W	
		4. Colour of outer sheath	MA	Visual	--do--		NTPC ADS	NTPC ADS	--do--	✓	P	W	W	
		5. Inner sheath thickness	CR	Meas	- do -		--do--	--do--	--do--	✓	P	W	W	
		6. Inner sheath colour	MA	Visual	- do -		- do -	- do -	--do--	✓	P	W	W	
3.03 (ii)	Armour wires/ Formed wires (if applicable)	1.Dimensions	CR	Meas	--do--		NTPC ADS /IS1554(PartI)/IS3975	NTPC ADS /IS1554(PartI) /IS3975	--do--	✓	P	W	W	
		2. No. of wires/ formed wire	CR	Mech	-- do --		--do--	--do--	--do--	✓	P	W		
		3. Tensile test	CR	Mech	--do--		--do--	--do--	--do--	✓	P	W		
		4. Elongation test	CR	Mech	--do--		--do--	--do--	--do--	✓	P	W		
		5.Torsion test (for round wires only)	CR	Mech	--do--		--do--	--do--	--do--	✓	P	W	W	
		6. Wrapping test	CR	Mech	--do--		--do--	--do--	--do--	✓	P	W	W	
		7. Resistance test	CR	Mech	--do--		--do--	--do--	--do--	✓	P	W	W	

GOVIND CABLE INDUSTRIES 73/1, Cotton Street KOLKATA-7

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FORMAT NO:QS-01-QAI-P-10/F3-R1

APPROVED
Checked and Approved.

Date: 17-Dec-2018

*Approval doesn t absolve the EPC contractor of it s responsibility as specified in the Contract.

FOR REFERENCE ONLY

NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1, IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 6 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg

Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/√	Reference Document	Acceptance Norms	Record Format	D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9		10			11
		8.Mass of Zinc coating	CR	Meas	Each type & size of cables as per sampling plan of IS 1554 (Part 1) & IS 7098-Part I		NTPC ADS /IS1554(PartI)/IS3975	NTPC ADS /IS1554(PartI) /IS3975	Test certificate	✓	P	W	W	
		9. Uniformity of Zinc Coating	CR	Chem.	--do-		--do--	--do-	-do-	✓	P	W	W	
		10.Adhesion test	CR	Mech	--do--		--do--	-do-	-do--	✓	P	W	W	
		11.Freedom from defects	CR	Visual	--do--		--do--	--do--	--do--	✓	P	W	W	
3.03 (iii)	Conductor													
		1.Resistance Test	CR	Elect	--do--		--do--	--do--	--do--	✓	P	W	W	
		2.Tensile test (For aluminum conductor only)	CR	Mech	Each type & size of cables as per sampling plan of IS IS 1554 (Part I)/7098(Part-1)		NTPC ADS/IS 8130	NTPC ADS/ IS 8130	--do--	✓	P	W	W	[illegible] man[illegible] to be reviewed as per Sl. No. 2.01 for Tensile test & wrapping test (for Aluminium) in case this test is not applicable for cable under inspection as per IS 8130 cl. 6.2
		3.Wrapping test (For aluminum conductor only)	CR	Mech	--do--		--do--	--do--	-do--	√	P	P	W	--do--

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FORMAT NO:QS-01-QAI-P-10/F3-R1

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Sl No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/N	Reference Document	Acceptance Norms	Record Format	Agencies D*	M	C	N	Remarks
1	2	3	4	5	6		7	8	9	10				11
3.03 (IV)	PVC/XLPE/ insulation & PVC Sheath	1. Thickness of insulation & PVC Sheath	CR	Meas	Each type & size of cables as per sampling plan of IS IS 1554 (Part 1)/IS7098(Part-1)		NTPC ADS/ IS 1554(PartI) & IS 7098 Part I	NTPC ADS/ IS 1554(PartI) & IS 7098 Part I	Test Certificate	√	P	W	W	
		2.Tensile strength & elongation at break of insulation & outer sheath (before ageing)	CR	Mech	Each type & size of cables as per sampling plan of IS IS 1554 (Part 1)/IS7098(Part-1)		NTPC ADS/ IS 1554(PartI) & IS 7098 Part I	NTPC ADS/ IS 1554(PartI) & IS 7098 Part I	Test Certificate	✓	P	W	W	Refer Note 2 Also
		3.Tensile strength & elongation at break of insulation & outer sheath (after Ageing)	CR	Mech	Refer Note 3		--do--	--do--	--do--	✓	P	W	W	Refer Note 3 ath)
		4 Insulation resistance (Volume resistivity method)	CR	Elect	Each type & size of cables as per sampling plan of IS 1554 (Part I) & IS 7098-Part I		--do--	--do--	--do--	✓	P	W	W	
		5.High voltage test at room temperature	CR	Elect	Each type & size of cables as per sampling plan of IS 1554 (Part I) & IS 7098-Part I		--do--	--do--	--do--	✓	P	W	W	
		6.Hot Set test (for XLPE insulation only)	CR	Phy	--do--		--do--	-do--	--do-	√	P	W	W	
		7.Thermal stability on PVC Insulation and outer sheath	CR	Chem	One sample of each offered lot of all offered sizes		-do--	--do--	--do--	✓	P	W	W	

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NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP NO 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 8 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg Approved. Dt.

Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	Quantum of check C/N	Reference Document	Acceptance Norms	Record Format	Agency D*	Agency M	Agency C	Agency N	Remarks
1	2	3	4	5	6		7	8	9	10				11
		8.Oxygen index Test on outer sheath	CR	Chem	One sample of each offered lot of all offered sizes		NTPC ADS / IS10810 Part 58	NTPC ADS	--do-	✓	P	W	W	
		9.Smoke density rating test on outer sheath	CR	Chem	One sample of each offered lot of all offered sizes		NTPC ADS & ASTMD2843	NTPC ADS	-do--	✓	P	W	W	
		10.Acid gas generation test on outer sheath	CR	Chem	One sample of each offered lot of all offered sizes		NTPC ADS & IEC 60754-1	NTPC ADS	Test Certificate	✓	P	W	W	
		11.Flammability test on completed cable	CR	Chem	Refer Note 4	Refer Note 4	NTPC ADS & IEC 60332 Part-3 (Category-B)	NTPC ADS	--do--	✓	P	W	W	
		12.Surface finish & length measurement.	CR	Visual & Meas	One length of each size	One length of each size	(1) Drum no. (2) IS1554-1 /IS7098-1,Cable size, Voltage grade & Words " FRLS" at every 5 meter is to be embossed Embossing shall be automatic, in line & marking shall be legible & indelible. (3) Sequential marking of length of cable in meter at every one meter is to be embossed / printed. Embossing / printing shall be progressive, automatic, in line & marking shall be legible & indelible	--do--	✓	P	W	W	Pimple, Fish Eye, Burnt particles, Blow Hole etc. not permitted. Repairing on outer sheath not permitted.
		13. Sequence of cores armour coverage, gap between two consecutive armour/ formed wire	CR	Visual & Meas	One length of each size	One length of each size	Min. area of coverage of armouring shall be 90%. The gap between armour wires / formed wires shall not exceed one armour wire/ formed wire space & there shall be no cross over/ ove riding of armour wire / formed wire. Zn rich paint shall be applied on armour joint surface of G.S. Wire /formed wire	--do-	√	P	W	W	
4	Packing	1 Sealing	MA	Visual	100%	100%	(1)IS1554(Part-I) & IS 7098-Part I (2) The surface of the drum and the outer most cable layer shall be covered with water proof cover. (3) Both the ends of cables shall be properly sealed with heat shrinkable PVC/ rubber caps secured by "U" nails.	QCR	✓	P	--	--	
4.01	identification	NTPC Sealing	MA	Visual	100%	100%	Sealing shall be visible	QCR	√	P	V	V	

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NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 9 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg

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1	2	3	4	5	6		7	8	9	10				11

Notes:

1)	If the compound manufacturer is carrying out Ageing test , test report of compound manufacturer is to be reviewed. If the compound manufacturer is not carrying out ageing test, then cable manufacturer is to carry out ageing test & test report is to be reviewed (quantum of ageing test sample shall be one sample /batch)
2)	(a) **In case of manufacturers / supplier who have supplied cables in the past through Corporate Centre/ Regional Offices** :- Routine Test of manufacturer internal test report are to be verified by NTPC at the time of final inspection. 2(b) **In case of manufacturers / supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre/ Regional Offices,**:- Routine Test are to be witnessed by Main Contractor & NTPC. This is in addition to manufacturer internal test report to be verified by NTPC at the time of final inspection.
3)	**Refer table on page 10 &11of11 for Sampling & Acceptance criteria.**
4)	For PVC insulated LT power cable :- For cables with OD less than equal to 30 mm, any size of cable may be clubbed together. For cables where OD is more than 30 mm, clubbing to be done for cables having similar ODs. For XLPE insulated LT Power cable: Clubbing to be done for cables having similar ODs.
LEGEND:	**NTPC ADS: NTPC approved data sheet, QCR: quality control records of cable manufacturer, CABLE MANUF STD- cable manufacturer's internal plant standard, MI: minor, MA: major, CR: critical, COC- certificate of conformance**

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NTPC	Item: 1.1 KV Power (XLPE & PVC) Insulated FRLS cables	STANDARD QUALITY PLAN (CONFORMING TO CODE: IS 1554 PART 1 , IS 7098 Part-I AND NTPC TECHNICAL SPECIFICATION)	QP. NO. 0000-999- QOE- S-041 REV-00 DATE : 03-02-12 Page 10 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY A.K. Garg

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1	2	3	4	5	6		7	8	9	10				11

Sampling & Acceptance Criteria

Criteria	Manufactuer experience prerequisite	Condition	Testing procedure	Remarks
Samples as per relevant IS from every size/ type of cable in the offered lot shall be tested for Tensile Strength & Elongation (before ageing). The values will be compared with corresponding values mentioned in the Type Test report accepted by NTPC. These values of Tensile Strength & Elongation (before ageing) should be within +/ - 15% tolerance (final values should be more than the minimum values indicated in relevant standard) of the Type Test report	In case of Manufactuers/ Supplier who have supplied cables in the past through Corporate Centre / Regional offices	In case of size/ type which meet the criteria	1 Sample of PVC insulation & outer sheath per type of cables offered which have met the criteria, will be put on accelerated ageing test (refer IRS specification no. IRS: S-63/2007 Rev 3.0). The samples shall be aged in air oven at temperature of 130°c+/- 2°c for 5 hours. 1 Sample of XLPE insulation per type of cables offered which have met the criteria, will be put on ageing test as per IS 7098. After wards the samples shall be tested for Tensile Strength & Elongation. Acceptance norms shall be as per relevant IS. **This test shall be witnessed by NTPC.**	In case the samples do not meet the requirement in accelerated ageing test **then 1 sample of that size/ type will be put on ageing test as per IS.**
		In case of size /type which do not meet the criteria	Particular size/ type will be put on ageing test as per IS. **This test shall be witnessed by NTPC.**	

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1	2	3	4	5	6		7	8	9	10				11
				In case of Manufacturers/ Supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre / Regional offices		In case of size /type which meet the criteria	1 Sample per type out of all sizes which have met the criteria, will be put on aging test and **witnessed by NTPC as per relevant IS**				----			
						In case of size/ type which do not meet the criteria	Particular size / type will be put on ageing test as per IS. **This test shall be witnessed by NTPC**				----			

GOVIND CABLE INDUSTRIES * Kolkata * 1/1, Cotton Street

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LT Power Cables & Control Cables

Attributes / Characteristics / Item / Components / Sub System Assembly	Make, Type & T.C as per relevant standard	Dimension/surface finish	Mechanical properties	Chemical Composition	Spark Test(as applicable)	Electrical properties	Hot Set Test/ Eccentricity & Ovality	Lay length & Sequence	Armour coverage, cross over, looseness, gap between two	Sequential marking/ Batch marking/ surface finish/ cable length	T.S & elongation before & after ageing on outer sheath & insulation	Thermal stability	Anti termite coating on wooden	Constructional requirements feature as per specification	Routine & Acceptance Tests as per relevant standard & specification	FRLS Tests
Aluminum (IEC 60228)	Y	Y	Y	Y		Y										
Copper (IEC 60228)	Y	Y	Y	Y		Y										
XLPE Compound (IEC 60502-2 (2005))	Y		Y			Y	Y				Y					
PVC insulation Compound (IEC 60502)	Y		Y			Y					Y	Y				
FRLS PVC Compound (IEC-60754 Part-1)	Y		Y								Y	Y				Y
Extrusion & curing /Manufacturing of Core (PVC / XLPE)		Y			Y		Y					Y				
Core Laying								Y								
Armour wire/strip	Y	Y	Y													
Inner sheath	Y	Y														
Armoring		Y							Y							
Outer Sheathing		Y								Y						
Finished Cable (IEC-60754 Part-1, IEC 60332 part III cat B/relevant standard)								Y	Y	Y	Y	Y		Y	Y	Y
Wooden drum(relevant standard) /Steel Drum		Y											Y	Y		

Notes:

1. This is an indicative list of tests / checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2. Make of all major Bought out items will be subject to Owner's approval.

ROUTINE TESTS	**Following routine tests shall be carried out on each drum of finished cables for all types (PVC / XLPE insulated) & sizes.**	
1)	Conductor Resistance test	
2)	High voltage test	
ACCEPTANCE TESTS	**Following Acceptance tests shall be carried out on each size of each type (PVC / XLPE insulated) of cables, in the offered lot.**	
A) For Conductor (as per sampling plan mentioned in IEC Pub 502 (1983)/ BS 6346:1969/ IEC 60502-2 (2005))		
	1)	Annealing test (Copper)
	2)	Tensile Test (Aluminum)
	3)	Wrapping Test (Aluminum)
	4)	Resistance test
B) For Armour Wires / Formed Wires (If applicable) (as per sampling plan mentioned in IEC Pub 502 (1983)/ BS 6346:1969/ IEC 60502-2 (2005))		
	1.	Measurement of Dimensions
	2.	Tensile Tests
	3.	Elongation Test
	4.	Torsion Test For Round wires only
	5.	Wrapping Test
	6.	Resistance Test
	7.	Mass of Zinc coating test For G S wires / Formed wires only
	8.	Uniformity of Zinc coating For G S wires / Formed wires only
	9.	Adhesion test For G S wires / Formed wires only
	10.	Freedom from surface defects
C) For PVC / XLPE insulation & PVC Sheath (as per sampling plan mentioned in IEC Pub 502 (1983)/ BS 6346:1969/ IEC 60502-2 (2005))		
	1)	Test for thickness
	2)	Tensile strength & Elongation before ageing(for tests after ageing see “D”)
	3)	Hot set test (For XLPE insulation)
D) Ageing test:		
If the compound manufacturer is carrying out Ageing test, test report of compound manufacturer is to be reviewed. If the compound manufacturer is not carrying out ageing test, then cable manufacturer will carry out ageing test & the test report will be reviewed by owner (quantum of ageing test sample shall be one sample /batch)		
E) Following tests will be carried out on completed cables as per relevant standard on each size of each type (PVC / XLPE insulated)		

	1)	Insulation resistance test (Volume resistivity method)
	2)	High voltage test
F) Following tests shall be carried out on only one size of offered lot (comprising of all sizes & types)		
	1)	Thermal stability test on PVC insulation and outer sheath
	2)	Oxygen index test on outer sheath
	3)	Smoke density rating test on outer sheath
	4)	Acid gas generation test on outer sheath
G) Flammability test as per IEC 60332 - Part- 3 (Category- B) on completed cables as per following sampling plan:		
		This test will be carried out using composite sampling i.e. irrespective of size; cables of one particular type (i.e. armoured PVC insulated, unarmoured PVC insulated, armoured XLPE insulated, unarmoured XLPE insulated) will be bunched together, as per calculations in line with the IEC. All sizes of PVC & XLPE insulated, armoured & unarmoured cables shall be covered. For one particular type, cables with OD less than or equal to 30 mm shall be clubbed together in touching formation while cables with OD greater than 30 mm shall be clubbed together leaving a gap equal to OD of cable having least diameter. Cable OD shall be taken as nominal overall diameter as per approved datasheet.
H) Following tests shall be carried on one length of each size of each type (PVC / XLPE insulated) of offered lot:		
	1)	Constructional / dimensional check, surface finish, length measurement, sequence of cores, armour coverage, Gap between two consecutive armour wires / formed wires, Sequential marking, drum / Batch (outer sheath extrusion batch)number marking on sheath
	2)	Measurement of Eccentricity & Ovality
GENERAL NOTE:		
(a) In case of manufacturers / supplier who have supplied cables in the past through Corporate Centre:- Routine Test of manufacturer internal test report are to be verified by owner and Main Contractor at the time of final inspection. Owner and Main Contractor will also witness routine tests on cables on 10% sample basis. (b) In case of manufacturers / supplier WHO HAVE NOT SUPPLIED cables in the past through Corporate Centre:- Routine Test of manufacturer internal test report are to be verified by Owner at the time of final inspection. Owner will witness routine tests on cables for the first order on 10% sample basis and Main Contractor will witness routine tests on cables for the first order on 100% basis.		
1. For Smoke Density rating test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 2. For Acid Gas Generation test: if the test result without conditioning is within (-)10% of the maximum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 3. For Oxygen Index test: if the test result without conditioning is within (+)7% of the minimum specified value, then, retesting is to be carried out with conditioning of samples as per standard and the test results after conditioning shall be final for acceptance/rejection. 4. In case the test results without conditioning do not meet the maximum/minimum specified value, the manufacturer may exercise the option of retesting the samples after conditioning as per standard.		

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				

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

PROCESS CONNECTION AND PIPING

Tests / Items	Visual & Dimensions ®	GA, BOM, Layout of component & construction feature, Paint Shade/thickness ®	Flattening,flaring,hydrotest,hardness check as per ASTM standard (A)	Component Ratings ®	Wiring ®	Make, Model, Type, Rating®	IR & HV ®	Review of TC for instrument/devices (R)	Accessability of TBs/Devices Illumination,grounding ®	Tubing ®	Leak/Hydro test(A)	Chemical/physical properties of material (A)	Proof pressure test,Dismantling & reassembly test,Hydrulic impulse and vibration test (R)	Tests as per standards & specification
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

	TECHNICAL SPECIFICATION NATURAL DRAFT COOLING TOWER 2 X 660 MW CSPGCL HTPS KORBA WEST TPP	PE-TS-530-165-W001 Rev. No. 00 Date : 22.05.2025

PAINTING REQUIREMENT

Sl no	Condition	Surface Preparation	Primer Coat	No. of Coats	DFT (Microns)	Intermediate Coat	No. of Coats	DFT (Microns)	Final Coat	No. of Coats	DFT (Microns)	Total DFT
EXTERNAL SURFACE - OVER GROUND PIPING												
1	Clarified Water	Shot blasting/ Abrasive blasting or Power tool cleaning.	Zinc Chrome Primer Alkyd base) by Brush/ spray to IS 104 OR Red Oxide Zinc Phosphate primer (Alkyd Base) to IS 12744	2	25	Synthetic Enamel (Long Oil Alkyd) to IS 2932	1	30	Synthetic Enamel (Long Oil Alkyd) to IS 2932	2	35	150
INTERNAL SURFACE (FOR PIPE 1000 NB AND ABOVE)												
2	Clarified Water	Shot blasting/ Abrasive blasting or Power tool cleaning.	Epoxy based Zinc rich primer	1	50	-	-	-	Hot Coal-Tar Enamel OR Coal Tar Epoxy	2	75	200
BURRIED CW PIPING (CONCRETE ENCASED)												
3	CW Pipe in Bidder's scope shall be Concrete encased steel lined ducts. Concrete Encasement shall be min 500mm thick with square shape outside. M20 Grade PCC encasement shall be provided other than locations of Duct crossing Road, Rail or any other facility where RCC encasement of Grade M25 shall be adopted. Top of CW Duct encasement shall be min 1.5M below FGL.											
STRUCTURAL STEEL												
4	Clarified Water	Shot blasting/ Abrasive blasting or Power tool cleaning.	Sealed Zinc spray as per BS 5493.	1	250	zinc Phosphate Epoxy	1	30	coal tar Epoxy paint	3	75	505
CIVIL STRUCTURES												
5	REFER CIVIL SPECIFICATION (BOOK 2 OF 2)											

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID

Sl. No.	DOCUMENT TITLE
1	PQR CREDENTIALS (PROVENNESS DOCUMENTS)
2	COMPLIANCE SHEET (DULY SIGNED AND STAMPED)
7	SCHEDULE OF PERFORMANCE GUARANTEE (DULY SIGNED AND STAMPED)
3	GENERAL ARRANGEMENT DRAWING FOR COOLING TOWER, INCORPORATING ALL RELEVANT DIMENSIONS, COLD WATER CHANNELS / SLUDGE CHAMBER/ SCREENS/ GATES IN THE COLD WATER CHANNEL, STAIRCASE ETC.
4	PUMPING HEAD CALCULATIONS
5	THERMAL DESIGN CALCULATIONS
6	TOWER PERFORMANCE CURVES
8	TECHNICAL DEVIATION SCHEDULE (IF ANY)
9	UNPRICED COPY OF THE PRICE SCHEDULE (INDICATING “QUOTED” FOR THE LISTED ITEMS).
	Notes -
i	Along with the thermal design calculations as specified above, bidder has to submit the calculations for: • Total height of Natural Draft Cooling Tower • Basin sizing • Height of the hot water distribution header • Drift Eliminator sizing • Inlet Louver Sizing • Sludge pit sizing
ii	The GA drawing/ calculations shall be only for reference purpose, same shall not be reviewed/commented by purchaser at this stage and shall be subject to approval only during contract). However, diameter and height of CT during contract stage shall not be less than the proposal dimensions as offered in the bid.
iii	Apart from above no other drgs./docs./data sheets etc. are required to be submitted at bid stage and even if furnished shall not be taken cognizance of.

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE

Sl. No.	DOCUMENT TITLE	SUBMISSION SCHEDULE
	BASIC DRAWINGS / DOCUMENTS	
1	GENERAL ARRANGEMENT OF NATURAL DRAUGHT COOLING TOWER	6 WEEKS FROM LOI
2	GA OF C.W. BASIN OF COOLING TOWER	6 WEEKS FROM LOI
3	THERMAL DESIGN & FRICTION LOSS CALCULATIONS AND CHARACTERISTIC & PERFORMANCE CURVES FOR NDCT	6 WEEKS FROM LOI
4	CIVIL DESIGN BASIS OF NDCT	8 WEEKS FROM LOI
5	METHODOLOGY STATEMENT FOR PILING WORKS (IF APPLICABLE)	12 WEEKS FROM LOI

6	STRUCTURAL DESIGN OF XXX MM DIA. BORED CAST IN-SITU TEST PILES FOR COOLING TOWERS PACKAGE (IF APPLICABLE)	12 WEEKS FROM LOI
7	LOCATION OF BORED CAST IN SITU TEST PILES FOR COOLING TOWERS (IF APPLICABLE)	12 WEEKS FROM LOI
8	NUMERATION AND RC DETAILS OF TEST PILE (IF APPLICABLE)	12 WEEKS FROM LOI
9	ANALYSIS AND DESIGN OF FOUNDATION, PEDESTAL & RAKER COLUMN OF NDCT	15 WEEKS FROM LOI
10	ANALYSIS & DESIGN OF POND WALL, POND FLOOR	15 WEEKS FROM LOI
11	ANALYSIS & DESIGN OF NDCT SHELL	16 WEEKS FROM LOI
12	LAYOUT AND DETAILS OF POND FLOOR AND GRILLAGE COLUMN FOOTINGS	16 WEEKS FROM LOI
13	R.C. DETAILS OF PILECAP/FOUNDATION, POND WALL AND PEDESTAL	16 WEEKS FROM LOI
14	GA OF SHELL FOUNDATION AND PEDESTAL OF NDCT	16 WEEKS FROM LOI
15	SHELL PROFILE AND THICKNESS.	16 WEEKS FROM LOI
16	GA & RC OF RAKER COLUMNS OF NDCT	16 WEEKS FROM LOI
17	WIND TUNNEL TESTING : METHODOLOGY AND REPORT	25 WEEKS FROM LOI

Note:

1	Complete MDL for NDCT covering all aspects of Mechanical, Electrical, C&I and CIVIL etc. shall be finalized after award of contract.
2	BHEL / Customer comments on drgs/docs shall be furnished within 14 days of submission date. However, drgs/docs submitted shall be complete in all respects with revised drawing submitted incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays 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.
3	Bidder to ensure first submission of basic drawing/documents as per above drawing/document schedule & subsequent submission shall be within 10 days of from the date of comments.
4	All design calculations, drawings, BOI Documents etc shall be furnished by the supplier for approval of the purchaser.

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT

Sl. No.	DOCUMENT TITLE
1	APPROVED DOCUMENTS
2	CALIBRATION CERTIFICATES
3	O&M MANUAL
4	ALL TEST CERTIFICATES

PRE QUALIFICATION REQUIREMENT (TECHNICAL)

	PRE-QUALIFYING REQUIREMENTS (TECHNICAL) NATURAL DRAFT COOLING TOWER (NDCT)	DOC NO: PE-TS-530-165-W001
		REV NO: 00 DATE: 15.05.2025
		SHEET: 1 of 1

ENQUIRY NO.:

PROJECT: 2 X 660 MW CSPGCL KORBA WEST TPP

1.0 to 4.2 BLANK

4.3 Natural Draught Cooling Tower

4.3.1 Bidder should have designed, constructed and commissioned of at least one (1) number Natural Draught Cooling Tower in RCC Construction of capacity not less than 30,000 m3/hr which has been in successful operation for at least one (1) year as on 03.04.2025.

In case the reference cooling tower has been designed by a party other than the Bidder, the Bidder shall employ a Design Agency, who has independently designed a Natural Draught Cooling Tower of capacity not less than 30,000 Cu.M/Hr in RCC construction and which has been in successful operation for at least one (1) year as on 03.04.2025. In such a case, Bidder shall be required to furnish a letter of support from the Design Agency for successful performance of Natural Draught Cooling Tower as per the format enclosed in the bidding document.

OR

4.3.2 Bidder who does not meet the requirements under clause 4.3.1, can also participate in collaboration/association with a firm who fully meets the requirements at clause 4.3.1, provided the Bidder has executed projects involving RCC works of tall structures of minimum height of 100m using slip/jump form shuttering as on 03.04.2025.

In such a case, the Bidder shall be required to furnish a Deed of Joint Undertaking executed by the Bidder and its Collaborator/Associate for the successful performance of Cooling Tower, as per the format enclosed with the bidding documents. The Deed of Joint Undertaking (DJU) shall be submitted along with the bid/offer. In case of award, Bidder and Collaborator/Associate shall each be required to furnish an on-demand bank guarantee for INR 65 million (Sixty Five Million only) in addition to the contract performance security to be furnished by the bidder.

General notes of the PQR are as under:

1. Bidder to submit supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.

2. Notwithstanding anything stated above, BHEL/Customer reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in overall interest of BHEL/Customer.

3. Consideration of offer shall be subject to customer's approval of bidder.

4. After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all other terms of the tender.

PREPARED BY:	REVIEWED BY:	APPROVED BY:
NAME: DESIGNATION / DEPT.:	NAME: DESIGNATION / DEPT.:	NAME: DESIGNATION / DEPT.:

IN ATTACHMENT-3K, Bidder may please be read as EPC Contractor i.e. BHEL and Bidder's Sub-Vendor may please be read as NDCT Bidder.

FORM OF DEED OF JOINT UNDERTAKING

(ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

DEED OF JOINT UNDERTAKING TO BE EXECUTED BY THE COLLABORATOR / ASSOCIATE ALONG WITH THE CONTRACTOR FOR NATURAL DRAUGHT COOLING TOWER FOR FORM OF JOINT DEED OF UNDERTAKING

(ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

DEED OF JOINT UNDERTAKING TO BE EXECUTED BY THE ASSOCIATE/COLLABORATOR ALONG WITH THE BIDDER AND SUBVENDOR FOR PERFORMANCE OF NATURAL DRAUGHT COOLING TOWER OF EPC PACKAGE FOR SUPER CRITICAL THERMAL POWER PROJECT, HTPS, KORBA WEST STPP STAGE-IV (2X660 MW) (AS PER CLAUSE 4.3 OF BDS)

This DEED of UNDERTAKING executed this..... day of .....Two thousand ..... by M/s .....a Company incorporated under ..... having its Registered Office at ..... (hereinafter called the ''Collaborator"/"Associate'', which expression shall include its successors, administrators, executors and permitted assigns) and M/s..... a company registered under the ..... having its registered office at ..... (hereinafter called the Bidder's Subvendor, which expression shall include its successors, administrators, executors and permitted assigns) and M/s..... a company registered under the ..... having its registered office at ..... (hereinafter called the Bidder, which expression shall include its successors, administrators, executors and permitted assigns)

in favour of ……., having its Registered Office at NTPC Bhawan, Scope Complex, 7, Institutional Area, Lodhi Road, New Delhi-110003 INDIA ("Employer" which expression shall include its successors, administrators, executors and assigns).

WHEREAS, the Employer invited Bids for design, engineering, manufacture, supply, transportation to site, construction, installation, testing, commissioning and conductance of guarantee tests for the EPC Package for **SUPER CRITICAL THERMAL POWER PROJECT, HTPS, KORBA WEST STPP STAGE-IV (2x660MW)** (hereinafter referred to as "Plant") vide its Bidding Document No. : **CS-03-05 / 2x660 MW / T-13 / 2023**

And whereas WHEREAS M/s ..... (Bidder) is submitting its proposal in response to the aforesaid Invitation for Bid by the Employer bearing proposal No..... dated ..... for EPC Package for **SUPER CRITICAL THERMAL POWER PROJECT, HTPS, KORBA WEST STPP STAGE-IV (2x660MW**) against the Employer's Bidding Documents No. **CS-03-05 / 2x660 MW / T-13 / 2023** including design, engineering, manufacture, supply, transportation to site, installation, testing and commissioning (including trial operation and Performance & Guarantee tests) of the Natural Draught Cooling Tower.

AND WHEREAS Clause 4.3.2 of Sub-Section-IA, Part-A, Section-VI of Bidding Document stipulates that bidding is open to a Bidder/Bidder's Sub-Vendor who do not meet the requirements stipulated in Clause

4.3.1 of Sub-Section-IA, Part-A, Section-VI and collaborates/associates with a firm who in turn fully meets the stipulated requirements as per Clause 4.3.1 provided the bidder/its sub-vendor has executed projects involving RCC works of tall structures of minimum height of 100m using slip/jump form shuttering

AND WHEREAS M/s..... (Bidder/Bidder's Subvendor) himself does not meet the requirements of clause no. 4.3.1 of Sub-Section-IA, Part-A, Section-VI of Bidding Documents but has executed projects involving RCC works of tall structures of minimum height of 100m using slip/jump form shuttering and hence desires to Collaborate/Associate with M/s.....…….. (hereinafter referred to as Collaborate/Associate) who have designed, constructed and commissioned of at least one(1) number Natural Draught Cooling Tower in RCC Construction of capacity not less than 30,000 m3/hr which has been in successful operation for at least one(1) year and as a pre-condition for submitting the bid, the Bidder/Bidder's sub-vendor and the Collaborate/Associate are required to jointly execute and furnish at the time of placement of order on approved sub vendor, an irrevocable Deed of Joint Undertaking that they shall be held jointly and severally responsible and bound unto the Employer for successful performance of the relevant system (i.e. **Natural Draught Cooling Tower**) to be designed, manufactured, supplied and installed under the EPC Package for **SUPER CRITICAL THERMAL POWER PROJECT, HTPS, KORBA WEST STPP STAGE-IV (2x660MW**) fully meeting the parameters guaranteed as per the Bidding Documents, in the event the Bid is accepted by the Employer resulting in a Contract (hereinafter called the "Contract").

W

NOW THEREFORE, THIS UNDERTAKING WITNESSETH AS UNDER :

1. That in consideration of the Award of the Contract by the Employer to the Bidder, we, the aforesaid Collaborate/Associate, Bidder and Bidder's Subvendor, do hereby declare and undertake that we shall be jointly and severally responsible to the Employer for the successful performance of the **Natural Draught Cooling Tower** and perform all the contractual obligations including the technical guarantees for the **Natural Draught Cooling Tower**.

2. In case of any breach of the Contract committed by the Bidder/Bidder's Subvendor, we, the Collaborate/Associate, do hereby undertake, declare and confirm that we shall be fully responsible for the successful performance of the **Natural Draught Cooling Tower** and undertake to carry out all the obligations and responsibilities under the contract in order to discharge the Bidder's/Subvendor/s obligations and responsibilities stipulated in the Contract. Further if the Employer sustains any loss or damage on account of any breach of the Contract, we, the Collaborate/Associate and Contractor, jointly and severally undertake to promptly indemnify, and pay such losses/damages caused to the Employer on its written demand without any demur, reservation, contest or protest in any manner whatsoever.

   This is without prejudice to any rights of the Employer against the Bidder under the Contract and/or guarantees. It shall not be necessary or obligatory for the Employer to first proceed against the Contractor before proceeding against the Collaborator/Associate, nor any extension of time or any relaxation given by the Employer to the Contractor would prejudice to any rights of the Employer under this Deed of Joint Undertaking to proceed against the Associate/Collaborator. The liability of the contractor, his sub-vendor and the associate/collaborator shall be limited to and amount equal to 100% of the value of the contract** between the contractor and the sub supplier for the equipments/systems.

3. Without prejudice to the generality of the undertaking in paragraph 1 above, the manner of achieving the objectives set forth in paragraph 1 above shall be as follows :

(a) The Collaborator/Associate will be fully responsible for design, manufacture, supply, erection, putting into satisfactory operation, commissioning and carrying out the guarantee tests as well as meeting all stipulated technical requirements and guaranteed parameters for **Natural Draught Cooling Tower** to the satisfaction of the Employer.

Further, the Collaborator/Associate shall depute their technical experts from time to time to the Bidder's/Subvendor's works/Employer's project site as required by Employer and agreed to by the Contractor/Associate to facilitate the successful performance of the **Natural Draught Cooling Tower** as stipulated in the aforesaid Contract.

Further the Collaborator/Associate shall ensure proper design, manufacture, supply erection, testing and successful performance of the **Natural Draught Cooling Tower** in accordance with the specifications and stipulations of the Bidding Documents and if necessary the Collaborator/Associate shall advise the Bidder/Bidder's Sub-vendor suitable modifications of design and implement necessary corrective measures to discharge the obligations under the Contract.

(b) In the event the Collaborator/Associate and Bidder/ Bidder's Subvendor fail to demonstrate successful performance of the **Natural Draught Cooling Tower** as set forth in paragraph 1 above, the Collaborator/Associate and the Contractor shall promptly carry out all the measures at their own expense and shall promptly provide corrected designs to the Employer.

(c) Implementation of the corrected designs and all other necessary repairs, replacements, rectifications or modifications to the **Natural Draught Cooling Tower** and payments of financial liabilities, penalties and fulfillment of all other obligations as provided under the Contract shall be the joint and several responsibilities of the Contractor and Collaborator/Associate.

4. We, the Bidder/ Bidder's Subvendor and Collaborator/Associate do hereby undertake and confirm that the Undertaking shall be irrevocable and shall not be revoked till the expiry of defect liability period of the Plant under the Contract and further stipulate that the Undertaking herein contained shall terminate after 90 days of satisfactory completion of such defect liability period. In case of delay in completion of defect liability period, the validity of this Deed of Joint Undertaking shall be extended by such period of delay. We further agree that this undertaking shall be without any prejudice to the various liabilities of the Bidder, including the Contract Performance Security as well as other obligations of the Bidder in terms of the Contract.

5. The Bidder/Subvendor and Collaborator/Associate will be fully responsible for the quality of all equipment/main assemblies/components manufactured at their works or at their Vendor's works or fabricated/constructed at site, and their repairs or replacement, if necessary, for incorporation in the **Natural Draught Cooling Tower** and timely delivery thereof to meet the work schedule under the Contract.

6. In case of Award, in addition to the Contract Performance Security furnished by the Bidder, the Bidder's Sub-vendor and Collaborator/Associate shall each furnish "as Security" an on demand Performance Bank Guarantee in favour of the Employer in a form acceptable to Employer as per provisions of the Bidding Documents. The value of such Bank Guarantee shall be equal to INR 65 million (Rupees Sixty million only) and it shall be guarantee towards the faithful performance/compliance of this Deed of Joint Undertaking in accordance with the terms and conditions specified herein. The Bank Guarantee shall be unconditional, irrevocable and valid for entire period of Contract, i.e. till ninety (90) days beyond the end of the Defect Liability period of

the EPC Package Contract. In case of delay in completion of the defect liability period, the validity of this Bank Guarantee shall be extended by the period of such delay. The Bank Guarantee amount shall be promptly paid to the Employer on demand without any demur, reservation, protest or contest.

7. Any dispute that may arise in connection with this Deed of Joint Undertaking shall be settled as per arbitration procedure/rules mentioned in the Contract Document. This Deed of Undertaking shall be construed and interpreted in accordance with the Laws of India and the Courts of Delhi shall have exclusive jurisdiction.

8. We, the Collaborator/Associate, Bidder and Bidder's Subvendor agree that this Undertaking shall be irrevocable and shall form an integral part of the Contracts. We further agree that this Undertaking shall continue to be enforceable till the successful completion of Contract and till the Employer discharge it.

9. That this Deed shall be operative from the effective date of the Contract.

IN WITNESS WHEREOF, the Collaborator/Associate, Bidder and Bidder's Subvendor, through their authorised representatives, have executed these present and affixed common seals of their respective companies on the Day, Month and Year first mentioned above.

FOR M/S .....…

(COLLABORATOR/ASSOCIATE)

WITNESS :

1. ....

(SIGNATURES) (SIGNATURE OF THE AUTHORISED

REPRESENTATIVE)

..... NAME : .....

(NAME & OFFICIAL ADDRESS)

DESIGNATION :.....

COMMON SEAL OF THE COMPANY

.....

FOR M/S.....

(SUBVENDOR)

WITNESS :

1. ....

Signature of authorized signatory.....

(SIGNATURES)

(SIGNATURE OF THE AUTHORISED

REPRESENTATIVE)

..... NAME : .....

(NAME & OFFICIAL ADDRESS)

DESIGNATION :.....

COMMON SEAL OF THE COMPANY

FOR M/S.....….....

(BIDDER)

1. ....

(SIGNATURES)

(SIGNATURE OF THE AUTHORISED

REPRESENTATIVE)

..... NAME : .....

(NAME & OFFICIAL ADDRESS)

DESIGNATION :.....

COMMON SEAL OF THE COMPANY

Note : * Bidder/Bidder's Subvendor and his Collaborator/Associate to strike out whichever is not applicable.

** Copy of priced purchase order for the equipment shall be furnished by Bidder.

PROVENNESS OF NATURAL DRAFT COOLING TOWER

I. (D) Details of RCC Natural draught Cooling Towers (as per clause 4.3 of Sub-Section-IA, Part-A, Section-VI of Bidding Documents

In support of Sub-Qualifying Requirements of Clause 4.3 of Sub-Section-IA, Part-A, Section-VI of Bidding Document, we confirm that We/our Sub-vendor have designed, constructed and commissioned at least one(1) number Natural draught cooling tower in RCC Construction of capacity not less than 30,000 m3/hr which has been in successful operation for at least one(1) year..

We/our Sub-vendor furnish a letter of technical support from the Design Agency for successful performance of natural draft Cooling Tower.The details of the reference cooling tower is furnished below:

Sl. No.	Description/Details	Plant
1.	Description of Work and Name of Client	.....
2.	Location/Address of the Plant/works	.....
3.	Address of the Client (including Contact Person Name, TelephoneNo, e-mail etc.)	.....
4.	No. of Cooling Towers/Chimney	.....
5.	Capacity of each Cooling Tower (Cu.M/hr.)/ height of chimney	.....
6.	Type of Fill (splash/modular/trickletype)	.....
7.	Type of Construction	.....
8.	Whether scope of works included	
	(a) Construction of Cooling Towers/chimney By Bidder/its Sub-vendor	YES*/NO*
	Name of the construction agency	.....
	(b) Construction of cooling towers/ Chimney by Bidder/its Sub-vendor	YES*/NO*
	(c) Commissioning of cooling towers/ chimney	YES*/NO*
9.	Date of Commissioning of the Cooling tower/Chimney	
10.	Certificate from client to	

Signature of authorized signatory.....

		YES*/NO
	*substantiate Bidder's QR data is enclosed at Annexure ..... to this Attachment-3K	
11.	Whether the reference cooling tower/Chimney	
		YES*/NO
	*at sl. No. 1 is constructed by the bidder/ sub vendor	
12.	Whether the reference cooling tower/Chimney	
		YES*/NO
	*at sl. No. 1 is constructed by Sub-vendor's own engineers	
13.	Whether Documentary evidence/ No*certificate(s) from client enclosed for the above data	Yes* /

- * Strike off whichever is not applicable.

Date :

Place :

(Signature).....

(Printed Name).....

(Designation).....

(Common Seal).....

(Designation).....

(Common Seal).....

(Bidder / Sub vendor / Designer / Construction Agency)

Signature of authorized signatory.....

Sub :Provenness Criteria for Civil Works

FORMAT FOR FILLING THE DETAILS OF PROVENNESS
LETTER OF SUPPORT FOR SATISFACTORY PERFORMANCE OF
(EQUIPMENT/SYSTEM NAME) FOR
SUPER CRITICAL THERMAL POWER PROJECT
HTPS, KORBA WEST (2X660 MW) , EPC PACKAGE

TO
[EMPLOYER'S NAME & ADDRESS]
Sub: Letter of Technical Support submitted From ……. (name of the Design Agency*/Associate*/ Collaborator*/ Technology provider* / Licensor* / Holding Company*) undertaking the responsibility for satisfactory performance of ……(Name of the equipment/system*).

Dear Sirs,

1. In accordance with the Award of the Contract by ……. (Name of the Contractor) to M/s. ……. (Name of the sub-vendor), we, the aforesaid Design Agency*/Associate*/Collaborator*/Technology provider*/Licensor*/Holding Company, (M/s …….) shall be fully responsible for the satisfactory performance of the …….(Name of the equipment/system*).

2. Further, the manner of achieving the objective set forth in point 1 above shall be as follows
For ……. (Name of the equipment/system*):
(a) We shall be fully responsible for design, engineering & commissioning and extending all necessary support for putting in to satisfactory operation and carrying out the Guarantee Tests for ……..(Name of the equipment/system*) to the satisfaction of the Employer.

(b) We shall depute technical experts to Bidder's/sub-vendor's works for supervision during manufacturing, assembly, inspection, as and when required by Employer. We shall participate in site erection, commissioning and final testing (as and when necessary) of the…….(Name of the equipment/system*).

(c) We shall participate in Technical Co-ordination meetings (TCMs) from time to time, as and when required by Employer.

(d) We shall promptly carry out all the corrective measures and shall promptly provide corrected design and shall undertake replacements, rectifications or modifications to the equipment/system* as and when required by Employer in case the equipment/system* fails to demonstrate successful performance as per contract at site.

3. We, the Design Agency*/Associate*/Collaborator*/Technology provider*/Licensor*/Holding company* do
hereby undertake and confirm that this Letter of Technical Support shall be valid for a

Signature of authorized signatory.....

period of seven (7) years or up to the end of defect liability period of the contract, whichever is later.

Signature of the Authorised Representative:……..…
For M/s ……..
(Design Agency*/Associate*/Collaborator*/Technology provider*/Licensor*/Holding company)
Name ……
Designation ……..
Date:……
Common Seal of the Company

***: Strike off whichever is not applicable.**

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

i.	***Item/Scope of Sub-contracting***	
ii.	***Address of the registered office***	***Details of Contact Person (Name, Designation, Mobile, Email)***
iii.	***Name and Address of the proposed Sub-vendor's works where item is being manufactured***	***Details of Contact Person: (Name, Designation, Mobile, Email)***
iv.	***Annual Production Capacity for proposed item/scope of sub-contracting***	
v.	***Annual production for last 3 years for proposed item/scope of sub-contracting***	
vi.	***Details of proposed works***	
1.	***Year of establishment of present works***	
2.	***Year of commencement of manufacturing at above works***	
3.	***Details of change in Works address in past (if any)***	
4.	***Total Area***	
	Covered Area	
5.	***Factory Registration Certificate***	***Details attached at Annexure – F2.1***
6.	***Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)***	***Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design) Details attached at Annexure – F2.2 (if applicable)***
7.	***Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)***	***Details attached at Annexure – F2.3***
8.	***After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)***	***Applicable / Not applicable Details attached at Annexure – F2.4***
9.	***Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any***	***Details attached at Annexure – F2.5***
10.	***Sources of Raw Material/Major Bought Out Item***	***Details attached at Annexure – F2.6***
11.	***Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing***	***Details attached at Annexure – F2.7***

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

12.	***Manufacturing facilities*** ***(List of machines, special process facilities, material handling etc.)***	***Details attached at Annexure – F2.8***
13.	***Testing facilities*** ***(List of testing equipment)***	***Details attached at Annexure – F2.9***
14.	***If manufacturing process involves fabrication then-***	***Applicable / Not applicable***
	List of qualified Welders	***Details attached at Annexure – F2.10***
	List of qualified NDT personnel with area of specialization	***(if applicable)***
15.	***List of out-sourced manufacturing processes with Sub-Vendors' names & addresses***	***Applicable / Not applicable*** ***Details attached at Annexure. –F2.11*** ***(if applicable)***
16.	***Supply reference list including recent supplies***	***Details attached at Annexure – F2.12*** ***(as per format given below)***

Project/ package	*Customer Name*	*Supplied Item (Type/Rating/Model /Capacity/Size etc)*	*PO ref no/date*	*Supplied Quantity*	*Date of Supply*

17.	***Product satisfactory performance feedback letter/certificates/End User Feedback***	***Attached at annexure - F2.13***
18.	***Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product*** ***(similar or higher rating)*** ***Note:- Reports need not to be submitted***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.14*** ***(if applicable)***
19.	***Statutory / mandatory certification for the proposed product***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.15*** ***(if applicable)***
20.	***Copy of ISO 9001 certificate*** ***(if available)***	***Attached at Annexure – F2.16***
21.	***Product technical catalogues for proposed item (if available)***	***Details attached at Annexure – F2.17***

Name:		***Desig:***		***Sign:***		***Date:***	

Company's Seal/Stamp:-

COMPLIANCE CERTIFICATE

1	It is hereby confirmed that the technical specification (Book 1 and 2) has been read and understood. We confirm compliance to the tender specification including any prebid clarification and amendments issued prior to techno-commercial bid opening without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked by BHEL in NIT shall not to be considered as part of bid and shall not be evaluated by BHEL.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date