SECTION – IIA

STANDARD TECHNICAL SPECIFICATION (MECHANICAL)

1.0 GENERAL:

1.1 This standard specification covers the design, manufacture and assembly, inspection and testing at the Vendor's and/or his sub-vendor's works, suitable painting and packing requirements for transportation, erection, commissioning and testing at site of all materials and equipments inclusive of complete electrical and civil works for the Natural Draft Cooling Tower complete with all accessories as specified hereinafter.

2.0 CODES AND STANDARD:

2.1 The design, manufacture, inspection and testing and performance of the Cooling Tower as specified hereinafter shall comply with the requirements of all applicable latest Indian/British/American Standards and Codes of practice. The latest editions of the following standards and publications shall be followed in particular.

a) Cooling Tower Institution of USA, Bulletin ATP-105: Acceptance Test Code for Industrial Water Cooling tower.

b) PTC-23: ASME Performance Test Code for Atmospheric Water Cooling equipment.

c) For Electrical, Civil Codes/ Standards refer respective Specification.

d) BS-4485 – Specification for Water Cooling Tower.

2.2 In case of any conflict between the above codes/ standards and this specification, the later shall prevail and in case any further conflict in the matter, the interpretation of the specification by the Engineer shall be final and binding.

3.0 DESIGN REQUIREMENTS:

3.1 The Cooling Tower shall be designed for continuous operation to cool not less than the design flow of water from specified inlet temperature to outlet temperature at a design ambient wet bulb temperature as indicated under Data Sheet-A enclosed to this specification.

3.2 All the components shall be capable of safe, proper and continuous operation at all cooling water flows up to and including those specified under Data Sheet-A and shall be designed with regard to ease of maintenance, repair, cleaning and inspection.

3.3 The cooling tower shall be Natural Draft cross flow/ counter flow type as per enclosed Data Sheet-A.

3.4 The vendor under this specification shall assume full responsibility in proper design and operation of each and every component of the cooling tower as well as the cooling tower as a whole unit.

3.5 The Cooling tower shall be suitable for handling the fluid as per Data Sheet-A and also for achieving the specified parameters in Data Sheet-A.

3.6 The Cooling tower shall be designed such that the drift losses and the evaporation losses are limited to the values as specified in Data Sheet-A.

3.7 The Cooling Tower structure shall be of adequate strength to withstand the wind load and the effect of earthquake on the structure. Design wind pressure and horizontal/vertical seismic coefficient shall be taken as mentioned in the specification for civil works enclosed to this specification.

4.0 CONSTRUCTIONAL FEATURES:

4.1 Casing and Louver (If required):

4.1.1 The Louvers shall be designed for air entry to the tower with low velocity for minimum pressure drop and less chance of recirculation of moist air. To eliminate splash out, louvers shall slope to shed water inwards.

4.1.2 The louvers and casing shall be made of material as specified in the Data Sheet-A.

4.2 Partitions:

4.2.1 Partitions shall be provided so that one section can be taken out of service without affecting the operation of capacity of other section.

4.3 Fill:

4.3.1 Cooling tower fills type and material shall be as specified in Data Sheet-A.

4.3.2 Design and arrangement of the fills shall be so as to expose high air/ water surface with minimum air pressure drop.

4.4 Fill Supports:

4.4.1 Fills shall be supported at frequent intervals, which shall minimise sag. Possibility of dislodgement and damage to fill materials as a consequence of induced vibration in the fill.

4.5 Drift Eliminations:

4.5.1 Multipass drift eliminators with minimum two-pass zig zag path type shall be provided so as to limit the drift loss to that specified in Data Sheet-A.

4.5.2 The eliminator frame shall be of rugged construction and shall be firmly secured to the structural

frame to arrest vibration. Suitable access to the eliminator frame work from the basin should be provided for any maintenance or physical replacement of eliminator blades etc., when the particular cell is taken out for maintenance.

4.6 Hot Water Distribution System:

4.6.1 Motorised/Manual valves (as indicated in Data sheet A) shall be provided in the hot water distribution piping such that each section can be isolated without affecting the operation of other section.

4.6.2 The pipes and valves in hot water distribution system shall be designed to take care of the possible thermal stresses due to temperature variation. This could be achieved by providing sliding supports for supporting all the pipes fabricated from carbon steel.

4.6.3 The hot water distribution piping and valves shall be designed for the design pressure as indicated in the Data Sheet-A.

4.7 Cold Water Basin:

4.7.1 The cooling tower basin shall be constructed in RCC (unless otherwise specified in Data Sheet-A). The capacity of the cooling tower basin shall be as indicated in Data Sheet-A.

4.7.2 The cold water basin shall be partitioned into two chambers or as specified in Data Sheet-A. The two sections of the Cooling Tower basin should be separate water tight compartments, which can be isolated one at a time for cleaning/maintenance purposes.

4.7.3 Sludge pits with isolating valves and spool pipe having flanged ends shall be provided for individual basin chamber for connection to drainage pipe.

4.7.4 For each basin chamber, there shall be a cold-water outlet channel. In the connection between basin chamber and cold water outlet channel there shall be a stationary coarse bar screen and gate in the absence of any specific preference under Data Sheet-A.

4.7.5 Each basin chamber shall have an overflow arrangement and scouring arrangement.

4.8 Submersible sludge Pumps:

4.8.1 The submersible type sludge pumps complete with electric motors, discharge side valves, piping, supports, hangers and clamps etc. shall be supplied at the option of the purchaser for each cooling tower for basin draining/ desludging. The quantity, design parameters and the materials of construction of the vertical sludge pumps shall be as per Data Sheet-A. Each pump shall be non-clog type, self water lubricated. The vertical sludge pumps shall be treated as an optional item and are to be offered if asked for in the Data Sheet-A enclosed to this specification.

4.9.0 Screens & Gates in Cold Water outlet Chamber:

4.9.1 The screens shall be vertical stationary type; the opening size and the mesh aperture shall be as per Data Sheet-A. The guides for the screens to be embedded in the concrete shall be of material as per Data Sheet-A.

Lifting lugs or eye bolts shall be provided on top of the screen frame for ease of handling.

4.9.2 For handling screens, one set of monorail with supporting structure and chain pulley hoist complete with lifting chain and trolley for mounting the hoist shall be furnished. The chain pulley hoist shall be manually operated and shall conform to IS-3832 class-II.

4.9.3 The gates fixed in vertical sections in cold water outlet chamber shall be as per standard practice and quality, material and type shall be as given in Data Sheet-A.

4.9.4 The isolating valves on the scour lines within the sludge pits shall conform to class I of IS-780 and shall be of reputed make.

4.10 Hardware:

4.10.1 All nails and fastening bolts, nuts and washers etc used in the cooling tower which are coming in direct contact with water or humid air shall be made of stainless steel 304, all others nuts & bolts etc. shall be made of HDG steel.

4.11.0 Access:

4.11.1 Two R.C.C. staircases for approach to the hot water distribution level

4.11.2 Doors for entrance into Cooling Tower Distribution level shall be provided as specified in Data Sheet -A.

4.11.3 Two external ladders for approach to top of cooling tower from water distribution level.

4.11.4 Access/platforms for inspection and maintenance of hot water distribution system along with spray nozzles.

4.11.5 Suitable arrangement for supporting walkways inside the cooling tower shall be made and loading of such arrangement shall be independent of the fill material.

4.11.6 Whether specifically mentioned in the data sheet or not, steel components and fittings used in walkways, handrails and access doors shall be hot dip galvanised after fabrication.

5.0 INSPECTION AND TESTING:

5.1 The inspection/ testing of cooling tower and its various components shall be as per the approved Quality Plans.

5.2 Hydrostatic test for the hot water distribution piping shall be conducted at site after complete erection. The test pressure and duration shall be as per Data Sheet-A.

6.0 TEST AT SITE:

6.1 The Cooling Tower as a whole shall be tested at site to check and ascertain that the performance meets the requirements of the specification. It is the responsibility of the vendor to conduct the performance test of the cooling tower and prove the specified parameters to the satisfaction of the purchaser. The test shall be witnessed by the purchaser/ customer's representative or both, for which 15 days clear notice will be given to purchaser by the vendor.

6.2 The performance test of the cooling tower shall be carried out in accordance with cooling tower Institute Bulletin No. ATP 105 Acceptance test for Industrial Cooling Tower.

The details of the proposed test procedure shall be submitted by the vendor sufficiently in advance of the commencement of test for the review and approval of the purchaser.

6.3 Necessary correction curves required for correcting the test results for any difference in test and guaranteed design condition shall be furnished by the supplier for approval along with the proposed test procedure.

6.4 All testing and calibrating instruments required for the site performance test shall be arranged by the cooling tower supplier without any extra cost. All instruments used by the supplier shall be duly calibrated from a recognised Institution and the same is to be arranged by the supplier.

7.0 PERFORMACNE GUARANGTEE, TOLERANCE & PENALTIES:

7.1 Each equipment shall be guaranteed to meet the performance requirement as specified.

7.2 The tests shall be conducted at the manufacturer's works/ site in accordance with this specification and rectification of all defects shall be satisfactory done without charging any extra amount to purchaser.

7.3 The performance test shall be carried out at site as specified and all defects shall be satisfactorily rectified within a time period decided by purchaser. No extra amount shall be charged to purchaser for such rectification. After rectification, retesting will be done by purchaser/ customer's representative without any extra cost to purchaser till satisfactory performance is achieved.

7.4 The vendor shall submit performance curves for the cooling tower showing variation in performance from the design duty point with change in approach to wet bulb temperature,

cooling range, water loading of the tower.

7.5 The vendor shall guarantee the performance of the whole cooling tower plant to meet the specifications when tested in accordance with cooling tower institute acceptance test code ATP-105, performance curves as per ATP-105 shall be furnished by the vendor.

7.6 If any defects are observed, the bidder shall rectify the same without extra cost to the purchaser. Even after rectification if the guaranteed performance is not achieved, then for every increase of 0.5 degree C or part thereof in the cold water temperature over design conditions, a sum as specified in data Sheet-A shall be paid by vendor to the purchaser for shortfall of guarantee, for the cooling tower.

7.6.1 In case the cold water temperature exceeds the acceptable limits of purchaser, the whole plant will be rejected and the vendor shall refund the entire money paid to him together with any penalty levied otherwise.

8.0 SPECIAL CLEANING PROTECTION & PAINTING:

8.1 All equipment shall be neatly finished. All exposed metal/ concrete/ wooden surface shall be smooth and free from burrs/ projections.

The metal surfaces to be painted should be accessible, suitable for priming and affording maximum protection throughout the life of the plant. The surface preparation shall be done either mechanically or chemically by one or more of the methods as given in IS-1477 (Part-I) and shall include the following:

a) Removal of oil, grease, dirt and swarf etc., as per Section 6.1 of IS-1477 (Part-I).

b) Removal of rust and scale etc., as per Section 6.2 of IS-1477 (Part-I).

c) Sand blasting/ shot blasting as per Section 6.2.4 of IS-1477 (Part-I) or wire brushing and picking as specified in Data Sheet-A.

8.2 INSIDE SURFACE OF PIPING & VALVES IN HOT WATER RISERS:

8.2.1 The inside surfaces of the piping and the valves which are in contact with water and which are not made of stainless steel or other corrosion resistant materials shall be painted with coal tar based epoxy paint of approved make and quality over a coat of Zinc Chromate Primer. The thickness of cured coating shall be as specified in Data Sheet-A.

8.3 Outside Surface of Piping (Buried):

8.3.1 Surface treatment as specified in Data Sheet-A.

8.3.2 Coating/ wrapping/ concrete lining as specified in Data Sheet-A.

8.4 Outside Surface or Piping (Exposed):

8.4.1 Surface treatment as specified in Data Sheet-A.

8.4.2 One coat of red oxide primer.

8.4.3 Synthetic enamel paint of approved shade, make and quality. The thickness of cured coating shall be as specified in Data Sheet-A.

8.5 All steel parts used for cooling tower construction shall be hot dip galvanised as per IS-4736 after shop fabrication. The external surfaces of the flow regulating valves access platform, access door and also the hoisting derrick subjected to hot water fumes shall also be thoroughly cleaned and treated and shall be coated with rust preventing paints.

8.6 All parts shall be properly boxed, crated or otherwise protected for transportation. Exposed metal finished surfaces shall be thoroughly greased before transportation.

8.7 The external and internal surfaces of the tower shall also be painted.

9.0 DRAWING AND DATA AFTER AWARD OF CONTRACT:

The vendor shall furnish drawings and other technical documents as given in Data Sheet-C, enclosed with the specification.

10.0 SPECIAL TOOLS & TACKLES:

Special tools & tackles, if any, shall be included in scope of supply by the vendor. A list giving description of such tools & tackles shall be furnished by vendor.

DATA / DOCUMENTS TO BE FURNISHED BY VENDOR AFTER AWARD OF CONTRACT

1. General Arrangement drawing of complete cooling tower (showing plan, front elevation and side elevation) incorporating principal dimensions limits of scope of supply of piping, limits of civil works included, showing extent of platforms, walk ways, handrails, access doors staircase, end wall derrick etc. and the limits of scope of supply of electrical works.

2. General Arrangement drawing of Cooling Tower basin indicating overflow and desludging arrangement.

3. General Arrangement and Sectional Assembly drawings pertaining to the following components of the Cooling Tower.

   a) Tower fill with supporting arrangement.

   b) Drift eliminator installation and details.

   c) Complete hot water distribution system including flow regulating valves, distribution basin/ pipes and nozzles etc.

4. Arrangement drawing of the cold water outlet chambers and sludge pits incorporating also the arrangement of screens, gates, valves and piping terminal details.

5. Cooling tower performance curves showing wet bulb temperature V/s. cold water temperature for design cooling range, 90% cooling range and 110% cooling range at 90% ,100% and 110% of design flow.

6. Detailed GA and sectional assembly drawing of BF valves in hot water risers indicating materials of construction of various components.

7. General Arrangement and cross-sectional assembly drawings of sludge pumps and motor drives along with their performance curves.

8. Electrical drawings and data.

   i) Cable Schedule
   ii) Cable tray and trench layout.
   iii) Drawing on illumination system of cooling tower structure including wiring diagram showing conductor and conduct sizes and design calculation.
   iv) Drawing on Aviation Obstruction Lighting System.
   v) Drawing on grounding system inclusive of lighting protection system.

vi) Drawing of lighting sub-distribution board & junction boxes.

10. Drawings, data and calculation on civil works :

I) Design calculations for strength and suitability showing justification for size of members chosen for all structural components of cooling towers inclusive of prestressed concrete fill where applicable. All civil and structural design calculations shall be furnished by the supplier for approval of the purchaser.

ii) Load drawings setting out clearly and concisely the various loads taken into consideration for design.

iii) Civil drawings for cold water basin, sludge sumps, connecting channels, partitions, louvers, end walls, longitudinal beams, hot water distribution basin, its covering, staircase, platforms, cable trenches, etc. all complete.

iv) Bar bending details for all reinforced concrete structures.

v) Insert details, anchor bolt details.

vi) Final painting schedule.

vii) Other drawings & data as necessary.

11. Test procedure along with details of tests to be conducted for the offered cooling tower.

12 Quality Plan along with complete details of the testing and inspection requirements of mechanical and electrical items of the cooling tower in BHEL format.

13. Operation and Maintenance Manuals

14. Field Quality Plan for site activities – viz. Civil works & Erection.

15. Cooling tower performance test procedure.

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.	

	QUALITY PLAN	CUSTOMER:	PROJECT:		SPEC. NO :
		BIDDER/VENDOR	QP NO.PE-QP-999-100-M004	REV. 00 DT.31.03.99	SPEC. TITLE
	SHEET 1 OF 3	SYSTEM **POWER CYCLE/ LP VALVES**	ITEM: GATE/ GLOBE VALVE		SECTION VOLUME

S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE-GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1.0	**MATERIALS**											
1.1	BODY,BONNET, YOKE,WEDGE/DISC, SPINDLE, BODY SEAT, BACK SEAT, THRUST PLATE	1. PHYS,CHEM,PROPS	MA	PHYS,CHEM. TESTS	ONE/HEAT	APPD. DRG./ TECH.SPEC.	APPD. DRG./ TECH.SPEC.	TEST CERT.	3/2	2	1	CORRELATION REQD. FOR BODY BONNET, SPINDLE - FOR GREY C.I. ONLY PHYS. TEST.
		2. HEAT TREATMENT	MA	REVIEW OF H.T. CHART	100%	-DO-	-DO-	H.T. CHART	3/2	2	1	
		3. SURFACE DEFECTS	MA	VISUAL	100%	MSS-SP-55	MSS-SP-55	INSPN. REPORT	3/2	2	1	
1.2	BODY & BONNET FOR RATING 900 & ABOVE (ALSO FOR LOWER RATING IF REQUIRED IN SPEC.)	1. SURFACE DEFECTS	CR	PT/MT	100%	ANSI B16.34 AND TECH. SPEC.	ANSI B16.34 AND TECH. SPEC.	-DO-	3/2	2,1	-	
		2. SUB-SURFACE DEFECTS	CR	RT/UT	100%	ANSI B16.34 AND TECH. SPEC.	ANSI B16.34 AND TECH. SPEC.	-DO-	3/2	-	2,1	FILM REVIEW BY BHEL
1.3	ACTUATORS 1. ELECTRIC ACTUATORS	1. TORQUE TESTING & SETTING OF TORQUE SWITCH	MA	MECH., ELEC. TESTS	100%	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	APPD. DRG./ DATA SHEET./ IS:9334	INSPN. REPORT	3	2,1	1 *	*BHEL TO WITNESS IF QTY. MORE THAN 10/ TYPE
		2. TRAVEL/STROKE	MA									
		3. TRAVEL TIME	MA									
		4. OPERATION OF LIMIT SWITCH	MA									
		5. MANUAL OPERATION THROUGH HAND WHEEL	MA									
		6. OPERATION TEST WITH POWER SUPPLY VARIATION ENERGISES TO OPEN/CLOSE	MA									
		7. IR,HV,IR	MA									
		8.DEGREE OF PROTECTION	MA	WATER, DUST TEST	1/TYPE	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	APPD. DRG./ DATA SHEET/ IS:9334	3RD PARTY TEST CERT.	3	-	2,1	

BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/ VENDOR'S COMPANY SEAL

	QUALITY PLAN	CUSTOMER:	PROJECT:		SPEC. NO :
		BIDDER/VENDOR	QP NO.PE-QP-999-100-M004	REV. 00 DT.31.03.99	SPEC. TITLE
	SHEET 2 OF 3	SYSTEM **POWER CYCLE/ LP VALVES**	ITEM: GATE/ GLOBE VALVE		SECTION VOLUME

S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE-GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
	2. PNEUMATIC ACTUATORS	1. LEAK TIGHTNESS	CR	PNEUMATIC TEST AT 1.2 X DESIGN	100%	APPD. DATA SHEET/MFG. STD.	NO LEAKAGE	INSPN. REPORT	3	2,1	1*	*BHEL TO WITNESS IF QTY. MORE THAN 10/ TYPE
		2. ACCURACY	CR	CALIBRATION	100%	-DO-	APPD. DATA SHEET/MFG. STD.	CALIBRATION REPORT	3	2,1	1*	
		3. SIMULATION (OPERATION, AIR TO OPEN/CLOSE)	CR	OPERATION AT RATED PRESSURE	100%	-DO-	-DO-	INSPN. REPORT	3	2,1	1*	
2.0	SS/STELLITE DEPOSIT ON DISC / BODY SEAT/BACK SEAT	1. SURFACE DEFECTS	CR	P.T	100%	ASTME:165 & TECH.SPEC.	ANSI B16.34 & TECH.SPEC.	-DO-	3/2	2,1	2,1	FOR 900 CLASS & ABOVE TO BE WITNESSED BY BHEL
3.O	IN-PROCESS INSPECTION											
3.1	MACHINING OF ALL COMPONENTS	1. DIMENSIONS, WORKMANSHIP AND FINISH	MA	MEAS.,VISUAL	100%	MFG.DRG.	MFG.DRG.	LOG BOOK	3/2	-	-	
3.2	WEDGE/DISC, BODY SEAT RING, BACK SEAT, SPINDLE, THRUST PLATE	1. HARDNESS	MA	TESTING	100%	APP.DRG.	APP. DRG./ ANSI B16.34	TEST CERT.	3/2	-	2,1	
3.3	SPINDLE, BODY SEAT RING, WEDGE/DISC, BACK SEAT	1. SURFACE DEFECTS	CR	P.T.	100%	ANSI B16.34 AND TECH. SPEC./	ANSI B16.34 AND TECH. SPEC.	-DO-	3/2	-	2,1	
3.4	WEDGE/DISC & SEAT RING, SPINDLE AND BACK SEAT	1. LAPPING	CR	BLUE MATCHING	100%	UNIFORM METAL TO METAL CONTACT		INSPN. REPORT	3/2	-	2,1	
4.0	ASSEMBLY	1. DIMENSIONS	MA	MEAS.	100%	APPD.DRG.	APPD.DRG.	-DO-	3/2	2,1	-	
		2. WEAR TRAVEL	MA	MEAS.	100%	-DO-	-DO-	-DO-	3/2	2,1	-	FOR GATE VALVES ONLY
		3. VALVE LIFT	MA	MEAS.	100%	-DO-	-DO-	-DO-	3/2	2,1	-	
5.0	TESTING											
5.1	BODY, SEAT, BACK SEAT	1. LEAK TIGHTNESS OF BODY	CR	HYDRAULIC TEST	100%	APPD. DRG./ TECH. SPEC.	NO LEAKAGE	I.R./ IBRTC (IF REQD)	3/2	2,1	-	
		2. LEAK TIGHTNESS OF BACK SEAT AND SEAT	CR	-DO-	100%	-DO	-DO-	-DO-	3/2	2.1	-	
		3. LEAK TIGHTNESS OF SEAT	CR	PNEUMATIC TEST	100%	-DO	-DO-	-DO-	3/2	2.1	-	

BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/ VENDOR'S COMPANY SEAL

	QUALITY PLAN	CUSTOMER:	PROJECT:		SPEC. NO :
		BIDDER/VENDOR	QP NO.PE-QP-999-100-M004	REV. 00 DT.31.03.99	SPEC. TITLE
	SHEET 3 OF 3	SYSTEM **POWER CYCLE/ LP VALVES**	ITEM: GATE/ GLOBE VALVE		SECTION VOLUME

S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE-GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
5.2	SEAT & BACK SEAT FOR MOTORISED/ PNEU. VALVES WITH ACTUATOR	1. LEAK TIGHTNESS OF SEAT	CR	HYDRUALIC TEST	100%	APPD. DRG./ TECH. SPEC.	NO LEAKAGE	I.R./ IBRTC (IF REQD)	3/2	2.1	-	
5.3	OPERATION AL TESTING											
	1. MANUALLY OPERATED VALVES	1. SMOOTH & FULL OPENING AND CLOSING	CR	MANUAL	100%	TECH. SPEC.	SMOOTH OPERATION OF VALVES & CLEAR BORE	INSPN. REPORT	3/2	2,1	-	
	2.MOTOR /PNEU OPERATED VALVES	1. ASCENDING& DESCENDING LIFT CHARACTERISTIC	CR	ELEC.	100%	APP. DRG./ TECH. SPEC./ IS:9334	APP. DRG./ TECH. SPEC./ IS:9334	INSPN. REPORT	3/2	2,1	-	
		2. LIMIT/TORQUE SWITCH SETTING FOR OPENING AND CLOSING TIME	CR	ELEC.	100%	APP. DRG./ TECH. SPEC./ IS:9334	TECH. SPEC./ APPD.DRG	INSP. REPORT	3/2	2,1	-	
6.0	COMPLETE VALVES	1. OVERALL DIMENSION	MA	MEAS	SAMPLE	APPD.DRG	APP.DRG.	-DO-	3/2	2,1	-	
7.0	END CONNECTION DETAILS	1. DIMENSIONS	MA	MEAS.	100%	APPD. DRG. / RELV.STD	APPD. DRG. / RELV.STD	-DO-	3/2	2,1	-	
		2. SURFACE DEFECTS FOR B.W. ENDS	CR	PT	100%	ASTME:165	NO DEFECTS	TEST CERT.	3/2	2	1	
8.0	FINAL INSPECTION	1. CLEANLINESS & COMPLETENESS	MA	VISUAL	100%	APPD. DRG./ TECH. SPEC.	APPD. DRG./ TECH. SPEC	INSPN. REPORT	3/2	-	2,1	
9.0	PAINTING	1. SURFACE PREPARATION	MI	VISUAL	100%	TECH. SPEC.	TECH. SPEC.	INSPN. REPORT	3/2	-	2,1	
		2. UNIFORMITY & THICKNESS	MI	MEASUREMENT	100%	-DO-	-DO-	-DO-	3/2	2	1	
10.0	PACKING	AS PER BHEL TECH. SPEC	MA	VISUAL	100%	AS PER BHEL TECH. SPEC.	AS PER BHEL TECH. SPEC	-DO-	3/2	-	2,1	

ABBREVIATIONS

CR = CRITICAL CHARACTERISTIC **P = PERFORMED BY** **W = WITNESSED BY** **V = VERIFIED BY**

MA =MAJOR CHARACTERISTIC **1 = PURCHASER (BHEL)** **2 = VENDOR** **3 = SUB VENDOR OF THE VENDOR**

MI = MINOR CHARACTERISTIC

BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/ VENDOR'S COMPANY SEAL

OUALITY PLAN SHEET 1 OF 3	CUSTOMER :	PROJECT :	SPEC. NO
	BIDDER/VENDOR	QP NO.PE-QP-999-100-MO41 REV.00 DT. 31.03.99	VOLUME: II-B
	SYSTEM:	ITEM: PIPES & FITTINGS	SECTION D

S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1.0.0	MATERIAL CONTROL											
1.1.0	PIPES (MILL MADE)	1. PHY., CHEM. PROPS, DIMENSIONS, SURFACE FINISH, HEAT TREATMENT (IF APPLICABLE), LEAK TIGHTNESS	MA	PHY, CHEM . TESTS MEASUREMENTS, VISUAL EXAM, VERI. OF HT CHART HYDRO TEST	TECH. SPEC., IS:4711	APPD. DATA SHEET/ TECH. SPEC.	APPD. DATA SHEET/ TECH. SPEC.	MFR.TC/ LAB REPORT	3	-	2,1	SAMPLE IDENTIFICATION BY BHEL
1.2.0	FITTINGS	1. PHY, CHEM. PROP.,	MA	PHY., CHEM. TESTS	1/HEAT	-DO-	-DO-	-DO-	3/2	-	2,1	-DO-
		2. DIMNS., SURFACE FINISH, HEAT TREATMENT (IF APPLICABLE)	MA	MEASUREMENTS, VISUAL EXAM, VERI. OF HT CHART	100%	-DO-	-DO-	-DO-	3/2	-	2,1	
1.3.0	PLATE FOR FLANGES, FABRICATED PIPING AND FORGINGS FOR FLANGES	1. PHY. CHEM. PROP.,	MA	PHY., CHEM. TESTS	1/CAST	-DO-	-DO-	-DO-	3	-	2,1	-DO-
		2. DIMNS., SURFACE FINISH, HEAT TREATMENT (IF APPLICABLE)	MA	MEASUREMENTS, VISUAL EXAM VERI. OF HT CHART	100%	-DO-	-DO-	-DO-	3	-	2,1	
2.0.0	IN PROCESS CONTROL											
2.1.0	PIPES, FITTINGS, FLANGES - MACHINING, BENDING	1. DIMNS. INCLUDING THINNING, OVALITY, FINISH, WRINKLES ETC.	MA	MEASUREMENTS, VISUAL EXAM.	100%	MANUFAC-TURING DRG.	MANUFAC-TURING DRG.	I. R	3/2	-	2,1	
2.2.0	WELDING PROCEDURE SPECIFICATION	1. CORRECTNESS	MA	EXAM	100%	IS:7307/ ASME - IX	IS:7307/ ASME - IX	FORMAT OF IS:7307/ ASME - IX	3/2	-	2,1	
2.3.0	PROCEDURE QUALIFICATION AND WELDER'S QUALIFICATION	1. WELD SOUNDNESS	MA	PHY. TESTS	ASME IX IS:7310 IS:7307	IS:7310/ ASME - IX	IS:7310/ ASME - IX	FORMAT OF IS:7310/ ASME - IX	3/2	2,1	-	
2.4.0	WELD FIT-UPS	1. DIMNS.,	MA	MEASUREMENT,	100 %	W.P.S,	W.P.S,	I.R	3/2	2	1	

BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/ VENDOR'S COMPANY SEAL

S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
		ALIGNMENT, ORIENTATION		VISUAL		APPD. DRGS.	APPD. DRGS.					
2.5.0	**WELDS**											
	A) BUTT WELDS WITH JOINT EFFICIENCY OF 1.0 & 0.9											
	I) ROOT RUN	I) WELD DEFECTS	MA	PENETRANT TEST	100%	IS:3658/ ASTM E 165	ASME VIII DIV.I ASME B 31.1	INSPN. REPORT	3/2	2	1	
	ii) FINAL RUN	I) WELD DEFECTS	MA	-DO-	100%	-DO-	-DO-	-DO-	3/2	2/1	-	
				RADIOGRAPHY TEST	100% FOR JT. EFF. 1.0 & 10% FOR JT. EFF. 0.9	ASME B 31.1	ASME B 31.1	-DO-	3/2	-	2/1	FILMS TO BE SHOWN TO BHEL FOR APPROVAL
	B) OTHER BUTT WELDS WITH JOINT EFF. LESS THAN 0.9	1. WELD DEFECTS (FOR ROOT RUN & FINAL RUN)	MA	PENETRANT TEST	100%	IS:3658/ ASTM E 165	ASME B 31.1	INSPN. REPORT	3/2	2,1	-	
3.0.0	COMPLETE PIPE WORK & PIPES INCLUDING GALVANIZED/ RUBBER LINED PIPING (BEFORE GALVANIZING/ RUBBER LINING)	1. WORKMANSHIP AND FINISH, DIMNS., ORIENTATION, LEAK TIGHTNESS	CR	MEAS, VISUAL, HYDRO TEST AT 1.5 X DESIGN PRESS.	100%	APPD. DRGS.	APPD. DRGS., NO LEAKAGE	I.R.	3/2	2,1	-	
3.1.0	COMPLETE PIPE WORK (DULY GALVANIZED AS APPLICABLE)	1. FREEDOM FROM SURFACE DEFECTS	MA	VISUAL	100%	IS:4736/ IS 2629 & TECH. SPECN.	IS:4736/ IS 2629 & TECH. SPECN.	INSPN. REPORT	3/2	2,1	-	
		2. UNIFORMITY OF COATING	MA	DIP TEST	SAMPLING AS PER IS	IS 2633 & TECH. SPECN.	IS 2633 & TECH. SPECN.	-DO-	3/2	2,1	-	

BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/ VENDOR'S COMPANY SEAL

OUALITY PLAN SHEET 3 OF 3	CUSTOMER :	PROJECT :		SPEC. NO
	BIDDER/VENDOR	QP NO.PE-QP-999-100-MO41	REV.00 DT. 31.03.99	VOLUME: II-B
	SYSTEM:	ITEM: PIPES & FITTINGS		SECTION D

S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
		3. MASS OF ZINC COATING	MA	STRIP TEST	-DO-	IS 4736/ IS 6745 & TECH. SPECN.	IS 4736 & TECH. SPECN.	-DO-	3/2	2,1	-	
		5. ADHESION	MA	ADHESION TEST	-DO-	IS-2629/ IS 4736 & TECH. SPECN.	IS-2629/ IS 4736 & TECH. SPECN.	-DO-	3/2	2,1	-	
3.2.0	COMPLETE PIPE WORK (RUBBER LINING AS APPLICABLE)	---------- AS PER QUALITY PLAN FOR RUBBER LINING----------										
4.0.0	PAINTING AND PACKING	1. SURFACE PREPARATION, DFT, NO. OF COATS, SOUNDNESS OF PACKING, MARKING ETC.	MA	VISUAL EXAM, MEASUREMENT	100%	APPD. PROCEDURE	APPD. PROCEDURE	I.R, MFRS CHECK LIST	3/2	-	2,1	

BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/ VENDOR'S COMPANY SEAL

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-XXX-100-N002	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-100-N005, Rev-02	DATE: 6-May-2020
	PROJECT:		PO NO.:	DATE:
	ITEM: Sump Pump/Submersible Pump	SYSTEM: Plant Water/Common	SECTION: II	SHEET Page 1 of 3

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	*	**			
					M	C/ N				D	M	C	N	
1.0 RAW MATERIAL														
1.1a	Pump Casing	Mechanical and Chemical properties	CR	Mechanical and Chemical Analysis	1 / Heat / Batch	1 / Heat / Batch	Approved Drawing/ Data sheet	Relevant Material specification	Lab Report/ MTC	√	P	V	V	
1.1b	Impeller	Mechanical and Chemical properties	CR	Mechanical and Chemical Analysis	1 / Heat / Batch	1 / Heat / Batch	Approved Drawing/ Data sheet	Relevant Material specification	Lab Report/ MTC	√	P	V	V	
1.2	Heat treatment of Stainless Steel Castings	Heat Cycle	MA	Verification of HT chart	All Batches	All Batches	Relevant Material specification	Relevant Material specification	Correlated HT charts	√	P	V	V	
1.3	Bars / forgings for pump and motor shafts	Mechanical and Chemical Properties	CR	Mechanical and Chemical Analysis	1 / Bar	1 / Bar	Approved Drawing/ Data sheet	Relevant Material specification	Lab Report/ MTC	√	P	V	V	
		Dimensions	MA	Measurement	100%	100%	Manufacturers Drawing	Manufacturers Drawing	IR	√	P	V	V	
		Internal defects for 40 mm and above diameter	CR	UT	100%	100%	ASTM A-388	Refer Note 2	IR	√	P	V	V	
1.4	Cable Type: PVC insulated, multi core, copper conductor	Routine TC and acceptance TC as per IS 694/Is1554, Length and size	MA	Measurement	100%	100%	Approved Datasheet / IS 694/IS1554	Approved Datasheet / IS 694/IS1555	IR & TC	√	P	V	V	Compliance certificate to be submitted by Vendor
1.5	Bearings	Make, Bearing No., Surface finish	MA	Visual Examination	100%	100%	Manufacturers Std	Manufacturers Std	IR	√	P	V	-	
2.0 INPROCESS CONTROL														
2.1	All Components	Visual Defects	MA	Visual	100%	100%	Manufacturers Drawing	No harmful defects	Log book / IR	√	P	V	V	
		Dimensions	MA	Measurement	100%	100%	Manufacturers Drawing	Manufacturers Drawing	Log book / IR	√	P	V	V	
2.2	Pump discharge casing	Leak tightness	CR	Hydro test (Duration 30 minutes min.)	100%	100%	Refer Remark.	No leakage	IR	√	P	W	V	Test Pressure=2 times duty point pressure OR 1.5 times pump shut off head, whichever is higher

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	4/9/2020	Girish Chandra	Checked by:	04.09.2020	Mohit Kumar
Reviewed by:	4/9/2020	Vishal Kumar Yadav	Reviewed by:	04/9/2020	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 : PE-TS-XXX-100-N002	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-100-N005, Rev-02	DATE: 6-May-2020
	PROJECT:		PO NO.:	DATE:
	ITEM: Sump Pump/Submersible Pump	SYSTEM: Plant Water/Common	SECTION: II	SHEET Page 2 of 3

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	*	**		
					M	C/ N				D	M	C	N
	Motor Housing	Leak tightness	CR	Air test (Duration 30 Minutes min)	100%	100%	Air test at 0.5 kg/cm2 (gauge pressure)	No leakage	IR	√	P	V	V	
2.3	Casing & Impeller (machined surfaces)	Surface Defects	CR	DPT	100%	100%	ASTME:165	Appendix 8 of ASME Sec.VIII, Div.1	IR	√	P	V	V	On machined surface only
2.4	Impeller	Static & Dynamic residual unbalance	CR	Static, Dynamic balancing	100%	100%	ISO : 1940	ISO 1940 Gr. 6.3	IR	√	P	V	V	
2.5	Pump Motor Shaft	Internal Defects	CR	UT	100%	100%	ASTME:388	ASTME:388, Refer note 2	IR	√	P	V	V	On machined surface only
		Surface Defects	CR	DPT	100%	100%	ASTME:165	Appendix 8 of ASME Sec.VIII, Div.1	IR	√	P	V	V	On machined surface only
3.0 SUB-ASSEMBLY, ASSEMBLY CONTROL														
3.1	Pump, Motor, Rotor	Eccentricity	MA	Measurement	100%	100%	Manufacturers Drawing	Manufacturers Drawing	Log book / IR	√	P	V	V	
3.2	Pump and Motor assembly	Completeness, correctness	MA	Visual Examination	100%	100%	Manufacturers Drawing	Manufacturers Drawing	IR	√	P	V	V	
4.0 FINAL INSPECTION, PAINTING & PACKING														
4.1	Pump set (Pump+ Motor)	Q Vs Head, Q Vs Power, Q Vs Efficiency	CR	Performance test	100%	100%	Tech. Spec., Appd. Data Sheet, Appd. Curves, HIS, Test procedure	Tech. Spec., Appd. Data Sheet, Appd. Curves, HIS	Performance test record, Plotted Curves	√	P	W	V	
4.2	Routine Test on motor	HV, IR, Locked Rotor, No Load, Make type, Rating	CR	Electrical tests	100%	100%	IS 325	Approved Data Sheet	IR	√	P	V	V	Winding resistance Degree of protection shall be IP 68, HV at 2.5 KV AC for 1 Minute.
4.3	Strip down after Performance test	Undue wear, tear and breakages	CR	Visual examination of Casing & Impeller after stripping	100%	100%	Undue wer, tear and breakages	No undue wear, tear and breakages	IR	√	P	W	V	Witnessing one no. of each type
4.4	Complete Pump	Completeness, Correctness,	MA	Visual examination	100%	100%	Approved GA Drg	Approved GA Drg	IR	√	P	V	V	Compliance report for accessories will be submitted.

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	Girish Chandra 4/9/2020	Girish Chandra	Checked by:	04.09.2020	Mohit Kumar			Reviewed by:			
Reviewed by:	4/9/2020	Vishal Kumar Yadav	Reviewed by:	04/9/2020	Ritesh Kumar Jaiswal			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO : PE-TS-XXX-100-N002	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-100-N005, Rev-02	DATE: 6-May-2020
	PROJECT:		PO NO.:	DATE:
	ITEM: Sump Pump/Submersible Pump	SYSTEM: Plant Water/Common	SECTION: II	SHEET Page 3 of 3

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								
		Workmanship and finish, overall dimensions												
4.5	Painting	Surface finish, DFT, Markings etc.	MA	Visual Exam. Measurement, Aesthetic	100%	100%	Approved Drg/Docs	Approved Drg/Docs	IR	√	P	V	V	Compliance report by Manufacturer
4.6	Packing, Marking	Soundness of packing	MI	Visual Aesthetic	100%	100%	Technical Specification / Approved procedure	Technical Specification / Approved procedure	IR	√	P	V	-	Photograph of packed material to be verified by BHEL before issuing MDCC.

NOTES:

1. For accessories and bought out items, Manufacturer will submit Compliance for review.
2. For UT test on shaft, defect echo < 20 % full screen height when back wall echo set @ 100 % screen height. Reduction in back wall echo to be <20%. Defect height > 20% of FSH is not acceptable, also loss in backwall echo>20 % not acceptable.
3. IP 68 protection certificate for test conducted on similar motor shall be submitted for review.
4. Compliance for provision of thermic switch for over heating protection of winding, reverse rotation protection device shall be submitted by Manufacurer.
5. For control panel separate QAP is applicable.
6. Before sending the documents for approval, supplier to ensure that "Reference documents" & "acceptance Norms" does contain data required for the Characteristic to be checked" as indicated in QP.
7. BHEL reserves the right for conducting repeat test, if required.
8. Photographs of packed material to be submitted to BHEL before issuing MDCC.
9. Project specific QP to be developed based on customer requirement.

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION, **D**: DOCUMENTATION
** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **N**: CUSTOMER,
P: PERFORM, **W**: WITNESS, **V**: VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR, **CR**: CRITICAL, MTC: MILL TEST CERTIFICATE. **IR**: INSPECTION REPORT **GA DRG**: GENERAL ARRANGMENT DRAWING

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:	4/9/2020	Girish Chandra	Checked by:	04.09.2020	Mohit Kumar		
Reviewed by:	4/9/2020	Vishal Kumar Yadav	Reviewed by:	04/9/2020	Ritesh Kumar Jaiswal		

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

	MANUFACTURERS NAME & ADDRESS	STANDARD QUALITY PLAN		PROJECT
	(AS PER BHEL APPROVED VENDOR LIST)	ITEM: Chain Pulley Block With Trolley	QP NO REV 0 DATE 20.02.2001 PAGE 1 of 3	PACKAGE PROJECT No CONTRACTOR

Sl. No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	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
1	**RAW MATERIAL & B/OUT ITEMS:**												
1.1	HOOKS	DIMENSIONS	MA	MEASUREMENT		IS 8610 GR M/P	IS 8610 GR M/P	T.C.		P	-	-	
		CHEMICAL COMPOSITION	MI	LAB ANALYSER									
		IDENTIFICATION & CORELATION WITH TC	MA	VERIFICATION		DRAWING	DRAWING & SPECIFCATION						
1.2	LOAD CHAIN	DIMENSIONS		MEASUREMENT	100%	IS 6216	IS 6216	MFR'S TC		P	-	-	
		BREAKING STRENGTH		TENSILE TEST									
1.3	RAW MATL FOR GEAR/RATCHET	CHEMICAL COMPOSITION	MA	LAB ANALYSIS	ONE SAMPLE	SPECS AS PER	RELEVANT	TC					
	PAWL/RATCHET WHEEL				PER LOT	APPD. DRG.	STANDARD			P			
1.4	LOAD CHAIN WHEELS	TENSILE STRENGTH	MA	TENSILE TEST	ONE SAMPLE PER LOT	SPECS AS PER APPD. DRG.	RELEVANT STANDARD	TC		P			

LEGNDS

* RECORDS INDENTIFIED WITH 'TICK'( ) SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION

** M: MANUFACTURER/SUBCONTRACTOR
C: CONTRACTOR NOMINATED INSPECTION AGENCY(BHEL)
N: CUSTOMER
INDICATE 'P' PERFORM"W" WITNESS AND "V" VERIFICATION AS APPROPRIATE " CHP" CUSTOMER SHALL IDENTIFY IN COLUMN"N"

MANUFACTURER/ SUB CONTRACTOR	CONTRACTOR	REVIEWED BY	
SIGNATURE			NAME & SIGN OF APPROVING AUTHORITY &SEAL

	MANUFACTURERS NAME & ADDRESS	**STANDARD QUALITY PLAN**		PROJECT
	(AS PER BHEL APPROVED VENDOR LIST)	ITEM: Chain Pulley Block With Trolley	QP NO	PACKAGE
			REV 0	PROJECT No
			DATE 20.02.2001	CONTRACTOR
			PAGE 2 of 3	

Sl. No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	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
2	PROCESS												
2.1	HOOKS	PROOF LOAD	MA	LOAD TEST	100%	IS 8610	IS 8610	IR		P	W		
		DPT AFTER PROOF LOAD	MA		100%	ASTM 709	ASTM 709	IR		P	W		
2.2	RACHET PAWL/RACHET WHEEL	HARDNESS	MA	HARDNESS TESTER	100%	IS :1832	IS : 3832	IR		P	W		
		SURFACE CRACKES	MA	DPT	100%	ASTME				P	W		
2.3	LOAD CHAINS	PROOF - LOAD	MA	LOAD TEST	100%	IS : 6216	IS:6216	MFR'S		P			
3	FINAL INSPECTION												
3.1	COMPLETE ASSEMBLY	PROOF LOAD TEST	CR	LOAD TEST	100%	IS: 3832	IS: 3832	IR		P	W	W	
		OPERATIONAL EFFORT	MA	LOAD TEST	RANDOM	IS: 3832	IS: 3832	IR		P	W	W	
		HEIGHT OF LIFT	MA	MEASUREMENT	100%	IS: 3832	IS: 3832	IR		P	W	W	
		SWIVELLING OF HOOK	MA	VISUAL	100%	IS: 3832	IS: 3832	IR		P	W	W	

LEGNDS

* RECORDS INDENTIFIED WITH 'TICK'( ) SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION

** M: MANUFACTURER/SUBCONTRACTOR

C: CONTRACTOR NOMINATED INSPECTION AGENCY(BHEL)

N: CUSTOMER

INDICATE 'P' PERFORM"W" WITNESS AND "V" VERIFICATION AS APPROPRIATE " CHP" CUSTOMER SHALL IDENTIFY IN COLUMN"N"

MANUFACTURER/ SUB CONTRACTOR	CONTRACTOR	REVIEWED BY	
SIGNATURE			NAME & SIGN OF APPROVING AUTHORITY &SEAL

	MANUFACTURERS NAME & ADDRESS	**STANDARD QUALITY PLAN**		PROJECT
	(AS PER BHEL APPROVED VENDOR LIST)	ITEM: Chain Pulley Block With Trolley	QP NO	PACKAGE
			REV 0	PROJECT No
			DATE 20.02.2001	CONTRACTOR
			PAGE 3 of 3	

Sl. No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	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
3.2	PAINTING	CLEANED	MA	VISUAL	AT RANDOM	SPEC.	PE	IR		P	-	-	
		SHADE OF PAINT GOLDEN YELLOW	MA	VISUAL	AT RANDOM	SPEC.	PE	IR		P	W	W	
3.3	NAME PLATE	VERIFICATION	MI	VISUAL	100%	PR	PR	IR		P	W	-	
3.4	PACKING	VERIFICATION	MI	VISUAL	100%	PR	PR	IR		P	W	-	

LEGNDS

* RECORDS INDENTIFIED WITH 'TICK'( ) SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION

** M: MANUFACTURER/SUBCONTRACTOR

C: CONTRACTOR NOMINATED INSPECTION AGENCY(BHEL) N: INDICATE 'P' PERFORM"W" WITNESS AND "V" VERIFICATION AS APPROPRIATE " CHP" NTPC SHALL IDENTIFY IN COLUMN"N"

MANUFACTURER/ SUB CONTRACTOR	CONTRACTOR	REVIEWED BY	NAME & SIGN OF APPROVING AUTHORITY &SEAL
SIGNATURE			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANARD QUALITY PLAN		SPEC. NO: PE-SS-999-100-M008	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-100-M020	DATE: 05.10.2020
	PROJECT:		PO NO.:	DATE:
	ITEM: BUTTEFLY VALVES (WS)	SYSTEM: WATER SYSTEM	SECTION:	SHEET 1 OF 4

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS CATEGORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					6					*	**			
1	2	3	4	5	M	C/ N	7	8	9	D	M	C	N	
1.0	**MATERIALS**													
1.1	BODY & DISC CASTING	1. PHYSICAL	MA	PHYSICAL TEST	ONE TEST BAR / HEAT	ONE TEST BAR / HEAT	Relevant material. Specification	Relevant material specification Specification	Material Test Certificate	√	P/ W	V	V	CORRELATION REQUIRED FOR BODY AND COVER WITH MILL TEST CERTIFICATE
		2. CHEMICAL	MA	CHEMICAL TEST	ONE TEST BAR / HEAT	ONE TEST BAR / HEAT	Relevant material. Specification	Relevant material specification	Material Test Certificate	√	P/ W	V	V	
		3. VISUAL	MA	VISUAL	100%	-	MSS - SP- 55	No Defects	Inspection Report	√	P/ W	V	V	
		4. SURFACE DEFECTS	MA	VISUAL	100%	-	Approved Procedure	Approved Procedure	Test Cert.	√	P/ W	V	V	
			CR	MPI	100%	-	ASTM-E-709	Approved Procedure	Test Cert.	√	P/ W	V	V	
			CR	DPT	100%	-	Approved Procedure	Approved Procedure	Test Cert.	√	P/ W	V	V	
1.2	SHAFT	1. PHYSICAL	MA	PHYSICAL TEST	ONE TEST BAR / HEAT	-	Relevant material specification	Relevant material specification	Material Test Certificate	√	P/ W	V	V	
		2. CHEMICAL	MA	CHEMICAL TEST	ONE TEST BAR / HEAT	-	Relevant material specification	Relevant material specification	Material Test Certificate	√	P/ W	V	V	
		3. VISUAL	MA	VISUAL	100%	-	MSS - SP- 55	No Defects	Inspection report	√	P/ W	V	V	
		4. SURFACE DEFECTS	MA	VISUAL	100%	-	MSS - SP- 55	Approved Procedure	Test Cert.	√	P/ W	V	V	
			CR	MPI	100%	-	ASTM-E-709	Approved Procedure	Test Cert.	√	P/ W	V	V	
			CR	DPT	100%	-	ASTM-E-165	Approved Procedure	Test Cert.	√	P/ W	V	V	
		5. U.T.(FOR SHAFT DIA >30mm)	MA	UTE	100%	-	Approved Procedure	Approved Procedure	Test report	√	P/ W	V	V	
		6. IGC TEST ON S.S MATERIAL	MA	IGC	100%	-	Approved Procedure	AS PER ASTM A262 PR A/E	Test report	√	P/ W	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	05/10/2020	Prabhjyot Singh	Checked by:		K. K. Yadav			Reviewed by:			
Reviewed by:	05/10/20	Sanjay Kumar	Reviewed by:	05/10/2020	RK Jaiswal			Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANARD QUALITY PLAN		SPEC. NO: PE-SS-999-100-M008	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-100-M020	DATE: 05.10.2020
		PROJECT:		PO NO.:	DATE:
		ITEM: BUTTEFLY VALVES (WS)	SYSTEM: WATER SYSTEM	SECTION:	SHEET 2 OF 4

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS CATEGORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					6					*	**			
1	2	3	4	5	M	C/ N	7	8	9	D	M	C	N	
1.3	BODY SEAT RING & CLAMPING RING	1. PHYSICAL	MA	PHYSICAL TEST	ONE TEST BAR / HEAT	-	Relevant material specification	Relevant material specification	Material Test Certificate	√	P/ W	V	V	
		2. CHEMICAL	MA	CHEMICAL TEST	ONE TEST BAR / HEAT	-	Relevant material specification	Relevant material specification	Material Test Certificate	√	P/ W	V	V	
		3. VISUAL	MA	VISUAL	100%	-	MSS - SP- 55	MSS - SP- 55	Inspection report	√	P/ W	V	V	
1.4	GEAR BOX AND ACTUATOR	1. MATERIAL CONFORMANCE	MA	VERIFICATION OF TC	100%	-	As per Drawing / Rel. Standard	As per Drawing / Rel. Standard	Test certificate	√	P/ W	V	V	
		2. GEAR BOX POD (LIFE CYCLE TEST)	MA	LIFE CYCLE TEST	ONE / TYPE/ SIZE/ RATED TORQUE	Refer Note: 16	Approved procedure / AWWA C504 Cl.4.5.8.5.9	Approved procedure / AWWA C504 Cl.4.5.8.5.9	Test Certificate	√	P/ W	V	V	
1.5	FASTENERS	1. PHYSICAL	MA	PHYSICAL TEST	ONE TEST BAR / HEAT	ONE TEST BAR / HEAT	Relevant material specification	Relevant material specification	Material Test Certificate	√	P/ W	V	V	
		2. CHEMICAL	MA	CHEMICAL TEST	ONE TEST/ HEAT/SIZE /LOT	-	Relevant material specification	Relevant material specification	Material Test Certificate	√	P/ W	V	V	
		3. VISUAL & DIMENSIONS	MA	VISUAL & MEASUREMENT	RANDOM	-	As per Drawing	As per Drawing	Inspection report	√	P/ W	V	V	
1.6	GASKETS	1. MATERIAL CONFORMANCE & VISUAL INSPECTION	MA	VISUAL	100%	-	As per Drawing / Rel. Standard	As per Drawing / Rel. Standard	Inspection report	√	P/ W	V	V	
2.0														
2.1	BODY, DISC, SHAFT MACHINING	1. DIMENSIONS	MA	MEASUREMENT	100%	-	Manufacturing drawing	Manufacturing drawing	Log book / register	√	P/ W	V	V	
2.2	SHAFT	1. SURFACE DEFECTS	MA	D. P. TEST	100%	-	ASTM-E-165	Approved Procedure	Test Report	√	P/ W	V	V	
2.3	SEAT RING & DISC	1. HARDNESS	MA	HARDNESS	ONE TEST BAR / HEAT	-	As per drawing / Rel. Standard	As per drawing / Rel. Standard	Test Certificate /Lab report	√	P/ W	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	05/10/2020	Prabhjyot Singh	Checked by:		K. K. Yadav 05/10/2020			Reviewed by:			
Reviewed by:	05/10/20	Sanjay Kumar	Reviewed by:		RK Jaiswal 05/10/2020			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANARD QUALITY PLAN		SPEC. NO: PE-SS-999-100-M008	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-100-M020	DATE: 05.10.2020
	PROJECT:		PO NO.:	DATE:
	ITEM: BUTTEFLY VALVES (WS)	SYSTEM: WATER SYSTEM	SECTION:	SHEET 3 OF 4

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS CATEGORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					6					*	**			
1	2	3	4	5	M	C/ N	7	8	9	D	M	C	N	
2.4	VULCANIZING	TEMP, PRESSURE & TIME	MA	MEASUREMENT	REGULAR INTERVALS	-	Mfg. Procedure	Mfg. Procedure	Process records	√	P/ W	V	V	
2.5	VULCANIZED AND RUBBER LINED ITEMS	ADHESION, DEFECTS, THICKNESS	MA	VISUAL TEST, MEASUREMENT	1 / BATCH	-	IS 4682 Pt.1 and Approved GA	IS 4682 Pt.1 and Approved GA	Inspection report	√	P/ W	V	V	TO BE DONE ON A MOCKUP PIECE ON SAME MATERIAL TOGETHER WITH VULANIZED JOB
		HARDNESS		SHORE 'A'	100%	-	IS 4682 Pt.1 and Approved GA	IS 4682 Pt.1 and Approved GA	Inspection report	√	P/ W	V	V	
3.0														
3.1	PROOF OF DESIGN	1. DISC STRENGTH TEST	MA	HYDRO TEST	ONE / TYPE/ SIZE/ CLASS	-	AWWA C504 CL5.1.4	AWWA C504 CL5.1.4 / ASME B 16.34	Test certificate	√	P/ W	V	V	Refer Note 5
		2. LIFE CYCLE TESTING	MA	HYDRO TEST	ONE / TYPE/ CLASS/ SIZE GROUP		AWWA C504 CL5.1.4	AWWA C504 CL5.1.4 / ASME B 16.34	Test certificate	√	P/ W	V	V	
3.2	SEISMIC TEST	1. ANALYSIS	MA	CALCULATION / FEM	ONE / TYPE/ CLASS/ SIZE GROUP	-	Procedure as per Annex.III(5)	Procedure as per Annex. III(5)	Test Report	√	P/ W	V	V	
		2. EXPERIMENT	MA	SHAKE TABLE TEST			Procedure as per Annex. III(5)	Procedure as per Annex. III(5)	Test Report	√	P/ W	V	V	
4.0														
4.1	FINAL INSPECTION	1. BODY HYDROSTATIC TEST	MA	INTEGRITY	100%	Refer Note 3	API-598	API-598	Test Report	√	P	W	V	
4.2		2.SEAT HYDROSTATIC TEST	MA	INTEGRITY	100%		API-598	API-598	Test Report	√	P	W	V	
4.3		3. SEAT AIR TEST	MA	INTEGRITY	100%		API-598	API-598	Test Report	√	P	W	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	05/10/2020	Prabhjyot Singh	Checked by:		K. K. Yadav			Reviewed by:			
Reviewed by:	05/10/20	Sanjay Kumar	Reviewed by:	07/10/2020	RK Jaiswal			Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANARD QUALITY PLAN		SPEC. NO: PE-SS-999-100-M008	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-100-M020	DATE: 05.10.2020
		PROJECT:		PO NO.:	DATE:
		ITEM: BUTTEFLY VALVES (WS)	SYSTEM: WATER SYSTEM	SECTION:	SHEET 4 OF 4

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS CATEGORY	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					6					*	**			
1	2	3	4	5	M	C/ N	7	8	9	D	M	C	N	
4.4	FINAL INSPECTION (contd.)	4. DIMENSIONAL & VISUAL INSPECTION	MA	Overall dimensions	100%	Refer Note 3	Approved drawing	As per approved drawing	Test Report	√	P	W	V	
4.5		5. PAINTING & CORROSION PROTECTIION, ADHESION TEST	MA	Visual & paint thickness	100%		Approved drawing / Rel. Standard	Approved drawing / Rel. Standard	Test Report	√	P	W	V	
4.6		6 PACKING (WITH END PROTECTION)	MA	Visual	100%		Manufacturer's standard	Manufacturer's standard	Packing list	√	P	W	V	
4.7		7. DOCUMENTATION	MA	Review	100%	-	Approved drawing / Quality Plan	Approved drawing / Quality Plan	History documents & instruction manual	√	P	V	V	

NOTES:

1. In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier's TPI.
2. Calibrated instruments shall be used during inspection, examination and testing.
3. 10% or min. 2 nos. at random by BHEL/Customer & 100% by supplier for each type, size & rating.
4. Following to be noted for packing:
   a. Material shall be packed suitably in order to avoid damage of paint and valve during transit and also during storage at site in tropical climate conditions for a period of 15-18 months.
   b. Photographs of the packing just before dispatch for information of PEM.
5. POD (Life Cycle test): Verification of Test Report On Gear Box Earlier Carried Out for NTPC Project / Reputed Customer.
   Verification of test reports of pod test on same model/type/size/rating carried out earlier for any BHEL/NTPC/reputed customer project within the last 5 years from the date of bid submission date as mentioned in NIT.
6. The latest revisions/year of issue of all the standard indicated in the QP shall be referred.
7. BHEL reserves the right for conducting repeat test, if required.

LEGENDS:

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

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	Prabhjyot Singh 05/10/20	Prabhjyot Singh	Checked by:	05/10/2020	K. K. Yadav			Reviewed by:			
Reviewed by:	05/10/20	Sanjay Kumar	Reviewed by:	05/10/2020	RK Jaiswal			Approved by:			

SECTION – IIB

STANDARD TECHNICAL SPECIFICATION (ELECTRICAL)

	MANUFACTURER'S NAME & ADDRESS	REFERENCE QUALITY PLAN				To be filled in by NTPC
Smart solutions. Strong relationships.	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 1 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 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*

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 2 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:
Approved
A.K.GARG

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 Index	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.Burr 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 " 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

	MANUFACTURER'S NAME & ADDRESS	REFERENCE QUALITY PLAN			NTPC	To be filled in by NTPC	
Small solutions. Strong relationships.	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 3 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 अनुमोदित Approved

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
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	--	--	

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

	MANUFACTURER'S NAME & ADDRESS	REFERENCE QUALITY PLAN				To be filled in by NTPC		
Smart solutions. Strong relationships.	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 4 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 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.M/cing 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	

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

Smart solutions. Strong relationships.

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

REFERENCE QUALITY PLAN

NTPC

To be filled in by NTPC

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
Approved Dt.

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
		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.IR 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 INSPECT-IONS**	Case Marking.	MA	Visual	100%	--	Manufacturing Order	Manufacturing Order	Manufacturing Order		P	--	--	

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

SUB-SECTION–E-42

MOTORS

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 starts, pull out torque, starting 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 review of Routine Test inspection 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 starts, pull out torque, starting 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.

	QUALITY PLAN	CUSTOMER : BHEL	PROJECT TITLE : 2X500MW NTPL TUTICORIN FGD	SPECIFICATION NO. : PE-RC-999-509-E003 REV-02
	SHEET 1 OF 2	BIDDER/ VENDOR : M/S NAMDHARI INDUSTRIAL TRADERS PVT LTD.	STANDARD QP NO. : PE-QP-999-509-E001, REV. 01	SPECIFICATION TITLE: EARTHING & LIGHTNING PROTECTION MATERIALS
		SYSTEM EARTHING	ITEM : EARTHING & LIGHTNING PROTECTION MATERIALS	DOC. NO. :

SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
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	3	-	1/2	Refer note in Remark at Sl. No.3
		2.DIMENSIONS	MA	MEASUREMENT	100%	IS - 1730	IS - 1730	QC RECORD	3/2	-	-	
		3.SURFACE FINISH	MA	VISUAL	100%	IS : 1079	IS : 1079	QC RECORD	3/2	-	-	
1.2	ZINC	1.CHEM.COMP.	MA	CHEM.TEST	SAMPLE	IS - 209	IS - 209	QC RECORD	3/2	-	1/2	
2.0	**IN-PROCESS**											
2.1	CUTTING, DRILLING	1.DIMENSIONS	MA	MEASUREMENT	100%	APP. DATA SHEET/ APP. DRAWING	APP. DATA SHEET/ APP. DRAWING	QC RECORD	2	-	1	
		2.SURFACE FINISH	MA	VISUAL	100%	FREE FROM DEFECTS & SLAG	FREE FROM DEFECTS & SLAG	QC RECORD	2	-	1	
2.2	SURFACE PREPARATION	1.CLEANING PICKLING, RINSING, & FLUXING	MA	VISUAL	PERIODIC IN EACH SHIFT	IS:2629	IS:2629	QC RECORD	2	-	-	
		2.SURFACE QUALITY	MA	VISUAL	100%	IS:2629	IS:2629	QC RECORD	2			

BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/VENDORS COMPANY SEAL

LEGEND : 1 - BHEL/ CUSTOMER 2 - VENDOR 3 - SUB- VENDOR P - PERFORM W - WITNESS V - VERIFICATION

	QUALITY PLAN	CUSTOMER : BHEL	PROJECT TITLE : 2X500MW NTPL TUTICORIN FGD	SPECIFICATION NO. : PE-RC-999-509-E003 REV-02
	SHEET 2 OF 2	BIDDER/ VENDOR : M/S NAMDHARI INDUSTRIAL TRADERS PVT LTD.	STANDARD QP NO. : PE-QP-999-509-E001 REV. 01	SPECIFICATION TITLE: EARTHING & LIGHTNING PROTECTION MATERIALS
		SYSTEM : EARTHING	ITEM : EARTHING & LIGHTNING PROTECTION MATERIALS	DOC. NO. :

SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
2.3	GALVANISING	1.TEMPERATURE OF BATH	MA	TEMPERATURE INDICATOR	CONTINUOUS	IS - 2629	IS - 2629	QC RECORD	3/2	-	-	Galvanization is to be done at galvanisation plant listed in annexure-2 to quality plan.
		2. DROSS	MA	VISUAL	PERIODIC	IS - 2629	IS - 2629	QC RECORD	3/2	-	-	
		3. RATE OF IMMERSION	MA	VISUAL/ MEASUREMENT	100%	IS - 2629/ MFRS PRACTICE	IS - 2629/ MFRS PRACTICE	QC RECORD	3/2	-	2	
		4.SURFACE QUALITY	MA	VISUAL	100%	IS - 2629	FREE FROM BURRS, ROUGHNESS, SLAG, FLUX, STAIN ETC.	QC RECORD	3/2	-	-	
3.0	FINISHED ITEMS											
3.1	MS FLATS	1. CHEMICAL	MA	CHEMICAL	1 No./LOT/SIZE	IS-2062	IS-2062	LAB TC	2	-	1	Note: sample for chemical test shall be selected by BHEL& testing shall be done at NABL/ govt. approved
		2.DIMENSIONS	MA	MEASUREMENT	IS 2500 (PART 1 LEVEL S-4	APP. DATA SHEET/ APP. DRAWING	APP. DATA SHEET/ APP. DRAWING	INSP. REPORT	2	1	-	Sampling plan for galvanization test: Inspection shall be as per table 2 of IS 4759 and same is mentioned below:-
		3.SURFACE FINISH	MA	VISUAL	IS 2500 (PART 1 LEVEL S-4	FREE FROM BURRS, SLAG, ROUGHNESS, FLUX, STAIN, ETC.	FREE FROM BURRS, SLAG, ROUGHNESS, FLUX, STAIN, ETC.	INSP. REPORT	2	1	-	
		4.MASS OF ZINC COATING	MA	CHEM. TEST.	Refer Remarks	IS-6745 / APP. DATA SHEET	APP. DATA SHEET	INSP. REPORT	2	1	-	
		5.UNIFORMITY OF ZINC COATING	MA	CHEM. TEST	Refer Remarks	IS-2633	IS-2633	INSP. REPORT	2	1	-	
		6.THICKNESS OF ZINC COATING	MA	ELCOMETER	Refer Remarks	APP. DATA SHEET	APP. DATA SHEET	INSP. REPORT	2	1		
		7.ADHESION	MA	MECH.TEST	Refer Remarks	IS-2629	IS-2629	INSP. REPORT	2	1		

No. of units in a	No. of units to be selected in a sample	Acceptance No.
(1)	(2)	(3)
Upto 25	3	0
26-100	5	0
101-150	8	1
151-500	13	1
501-1000	20	2
1001-10000	32	3
10001 and above	50	5

Note:-
If the number of defective units in a lot exceeds the acceptance number as specified in col (3) of the table, the lot shall be rejected, else accepted

Note: Items like Pipes/ Flexible Copper Braid/ GI wire/ GS Rod/ Shielding Mast/ Test link will be cleared based on COC (certificate of Compliance)

BHEL	PARTICULARS	BIDDER/VENDOR
	NAME	
	SIGNATURE	
	DATE	

BIDDER'S/VENDORS COMPANY SEAL

LEGEND : 1 - BHEL/ CUSTOMER 2 - VENDOR 3 - SUB- VENDOR P - PERFORM W - WITNESS V - VERIFICATION

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 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 authorities 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.

ANNEXURE-2 to Quality Plan

(LIST OF BHEL- PEM APPROVED GALVANIZERS)

SL. NO.	ITEM	VENDOR NAME	ADDRESS
1	Galvanising	Jenco Industrial Corporation	Chincholi Bunder Khkar Road Near Link Road Devruwadi Malad (W) Mumbai 400064
2	Galvanising	National Galvanizing Company	66, Barrackpore Kamarhatt Trunck Road Calcutta-700058
3	Galvanising	Sigma Galvanising Pvt. Ltd.	Plot No.C-169, TTC, MIDC Ind Area Navin Mumbai-400705
4	Galvanising	B.P. Projects PVT LTD	167A, Vivekananda Road Kolkata-700006
5	Galvanising	Standard Galvanisers	Makardah Road, Kabar Para, Bankra, Howarah -711403
6	Galvanising	Steel Products	National Highway No. 6, Chamrail, Kona, Howrah-711114
7	Galvanising	Unitech Fabricators & Engineers Pvt. Ltd.	Village- Ajab Nagar, P.O. -Molla Simlla, P.S. - Singur, Dist - Hoogly, Pin-712223
8	Galvanising	Shivam Engineers & Fabricators	A0-282-284, Industrial Area, South Side of G.T. Road, Ghaziabad, U.P.
9	Galvanising	B.G. Shirke Construction Technology Pvt. Ltd	72-76, Mundhawa, Pune - 401 036
10	Galvanising	Galbro Ispat Galvanizers Pvt. Ltd.	GUT 11 AND 12, OPP. KUDUS STEEL ROLLING MILL, WADA, THANE , MUMBAI
11	Galvanising	Eros Metals	G-97, MIDC, Bhutibori , Nagpur
12	Galvanising	Industrial Perforation (India) Pvt. Ltd.	Ganganagar,Katakhal,Kolkata-700132
13	Galvanising	Indmark Formtech Pvt. Ltd.	Phase - 3, E - 11 / 1, M. I. D. C., Chakan, Pune - 410 501, Maharashtra, India.
14	Galvanising	Namdhari Industrial Traders Pvt. Ltd.	Village Latton Dana, Chandigarh Road, Ludhiana
15	Galvanising	Neha Galvaniser	Jalan Industrial Estate, Gate No-1, 1st Right Choise Lane, Near N.G-6, Jangalpur, PO Domjur Howrah - 700071,
16	Galvanising	Patny Systems (P) Ltd.	Unit-IV, Sy No. -228/9, Plot No. 6, IP Kuchavaram, Toopran(M) Dist.- Medak, Telegana - 502336
17	Galvanising	Parmar Metal Company	Survey No.207,Veraval (Shapar) Dist. Rajkot, India.
18	Galvanising	Passive Infra Projects Pvt.Ltd.	8th KM Stone Sampla Kharkhoda Road Hassangarh,Rohtak,Haryana
19	Galvanising	Rukmani Electrical & Fabricators Pvt, Ltd.	Urla Industrial Area, Urla Sarora Road, Raipur– 493 221 (Chhattisgarh)
20	Galvanising	DMP Projects Pvt.Ltd.	Dulagarh Industrial Park , PS-Sankrail , Howrah -711302
21	Galvanising	Vinfab Engineers India Private Limited	Gut no. 224/1 &2 Bhiwandi Wada State Highway, Village khupri, Dist. Thane, Maharashtra -421303
22	Galvanising	Saral Projects & Processors	B-1, Industrial Area, Site-II, Amawan Road Rae Bareli
23	Galvanising	Brahampuri Steels Limited.	172 (F) Industrial Area, Jhotwara,Jaipur-302013
24	Galvanising	India Gratings Pvt. Ltd.	F-S,MIDC Jejuri,Pune-412303
25	Galvanising	M/s AVAIDS TECHNOVATORS PVT LTD	131,MATSYA INDUSTRIAL AREA,ALWAR RAJASTHAN

NOTES:

1. ANY CHANGE IN THE ABOVE LIST SHALL BE INFORMED AT THE TIME OF SPECIFIC PROJECT REQUIREMENT AND NO COMMERCIAL IMPLICATION SHALL BE ALLOWED ON THIS ACCOUNT.
2. IT SHALL BE THE RESPONSIBILITY OF THE VENDOR TO GET THE MATERIAL GALVANIZED FROM THE ABOVE LIST WITHOUT ANY COMMERCIAL IMPLICATION TO BHEL.

NTPC	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 Rana Vohra O.P. Niranjan	APPROVED BY ANIL GUPTA

SL. NO.	COMPONENT & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY			REMARKS
					M	C/N					M	C	N	
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. 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. C)Welding shall be done by qualified welders as per supplier system. 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 Galvanizer E)The process of pretreatment shall be varified by NTPC on surveillance basis during Inspection of cable trays *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.
		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		-	
		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	
		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	
		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	
		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	
		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".

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 Std	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 I.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"

SUB-SECTION–E-29

CABLING, EARTHING
&
LIGHTING PROTECTION

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	Galvanise 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 (Galvanise & 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	QP.NO:0000-999-QOE-S-062	REVIEWED BY	APPROVED BY
		CONFORMING TO CODE : As applicable	Rev No.: 00	SWAPNESWAR MISHRA	R.M.Jan
			Date: 02/11/18	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
						6M	6N					M	C	N	
1	2		3	4	5			7	8	9	D*	**	10		11
	Note: 1): Lighting fixtures supplier to ensure that constructional features of the lighting 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 not.														
	Conventional type Lighting Fixture														
A	**Bought out items / in-process checks**														
1	Lamps		Make, rating & type	Major	Vistal	1 sample per type	1 sample per ype	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	Vistal	-	-	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	Electrical	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	Vistal	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 fabrication		Freedom from defects	Major	Vistal	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	Vistal, chemical & mech	Mnfr std.	-	Mafr standard , NTPC specificatior 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, INDENTIFIEDWITH "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 "N" AS 'W'.

			ITEM : LIGHTING FIXTURES (Conventional and LED type)		STANDARD QUALITY PLAN				QP.NO:000-999-QO S-S-062	REVIEWED BY				APPROVED BY
					CONFORMING TO CODE : As applicable				Rev No: 00	SWAPNESWAR MISHRA				
									Date: 02/11/15	VIKRAM TALWAR				
									VALID UPTO: 01/11/18	SUNIL MALAN				
SI 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					M	C N	
	2		3	4	5			7	8	9	D*	**	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	1 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	
		d	Electronic Ballast (if applicable for offered lighting fixtures) THD and pf check	Major	Electrical	1 sample 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	1 sample 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 approved 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 1610) 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, INDENTIFIED 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 (Conventional and LED type)	STANDARD QUALITY PLAN				QP.NO:0000399-QOE-S-#62	REVIEWED BY	APPROVED BY	
			CONFORMING TO CODE : As applicable				Rev No.: 01	SWAPNESWAR MISHRA	K.M.JHA	
							Date: 02/11/5	VIKRAM TALWAR		
							VALID UPTO: 01/11/18	SUNIL MALANI		

Sr	COMPONENT & OPERATIONS		CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD					REMARKS
						CM	GC/N					M	C	N	
2			3	4	5			7	8	9	D*	*	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 metal 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, INDENTIFIED WITH "TICK" (V) 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 (Conventional and LED type)		STANDARD QUALITY PLAN CONFORMING TO CODE : As applicable				QP.NO:000-999-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				
SI 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					M	C	N	
1	2		3	4	5			7	8	9	6*	**	10		11
B	**Acceptance 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	1 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	1 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

LEGEND: * RECORDS, INDENTIFIED 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 (Conventional and LED type)	STANDARD QUALITY PLAN	QP.NO:0000-999-QOE-S-062	REVIEWED BY	APPROVED BY
NTPC		CONFORMING TO CODE : As applicable	Rev No.: 00	SWAPNESWAR MISHRA	K.M.Jain
			Date: 01/11/15	VIKRAM TALWAR	
			VALID UPTO: 01/11 18	SUNIL MALANI	

SI No	COMPONENT & OPERATIONS		CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK 6 M	QUANTUM OF CHECK 6 C/N	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	**	M	C	N	REMARKS
1	2		3	4	5	6		7	8	9			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	Certificate of compliance			V	V	V	

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

LEGEND: * RECORDS, INDENTIFIED 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'.

Format No.: QS-01-QAI-P-10/F3-R0 Engg. Div./QA&I

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.

SUB-SECTION–E-44

STATION LIGHTING

STATION LIGHTING

Item Components / Sub System / Assembly — Attributes / Characteristics	Make, Type , Rating/ TC	Dimension	Pre-Treatment of sheat	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 & Galvanised 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.

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 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		Reference Document	Acceptance Norms	Record Format	Agency				Remarks
					M	C/ N				D*	M	C	N	
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 Mafr 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

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-QAI-P-10/F3-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		Reference Document	Acceptance Norms	Record Format	Agency				Remarks
					M	C/ N				D*	M	C	N	
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 for drum mat
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 loaded in to extruder by suction method

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"

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

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 3 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	D*	Agency M	Agency C	Agency 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-	--do--	--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--	--do--	--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	--	--	

GOVIND CAB-L-E INDUSTRIES, 73/1, Cotton Street, KOLKATA-7

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-QAI-P-10/F3-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 4 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	D*	Agency C	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 amour wires / formed wires shall not exceed one amour wire/ formed wire space & there shall be no cross over/ over riding of amour wire / formed wire. Zn rich paint shall be applied on amour joint surface of G.S. Wire /formed wire. The breaking load of amour wire joint shall not be less than 95% of that amour 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		

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"

APPROVED
Checked and Approved.
Date: 17-Dec-2018
*Approval doesn't absolve the EPC contractor of its 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 5 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		Reference Document	Acceptance Norms	Record Format	Agency				Remarks
					M	C/ N				D*	M	C	N	
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	[illegible]	
		3. Tensile test	CR	Mech	--do--		--do-	--do--	--do--	✓	P	W	[illegible]	
		4. Elongation test	CR	Mech	--do--		--do--	--do--	--do--	✓	P	W	[illegible]	
		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	

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-QAI-P-10/F3-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 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		Reference Document	Acceptance Norms	Record Format	Agency				Remarks
					M	C/N				D*	M	C	N	
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--		--dc--	--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] mand[illegible] to be reviewed as per Sl. No. 2.01 for Tensile test & wrapping test (for Aluminum) 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--

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-QAI-P-10/F3-R1

एनटीपीसी 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 7 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG		APPROVED BY अनुमोदित A.K. Garg				
Sl. No	Component & Operations	Characteristics	Class	Type of check	Quantum of check M	C/N	Reference Document	Acceptance Norms	Record Format	Agency 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 I)/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 I)/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 3 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 1) & 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 1) & 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	

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-QAI-P-10/F3-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- COE- 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.

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 A.D.S	--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-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. (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/ over 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	

GOVIND CABLE INDUSTRIES * 1961, 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"

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

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
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 &11of 11 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**												

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"

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

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

Sampling & Acceptance Criteria

Criteria	Manufacturer 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 Manufacturers/ Supplier who have supplied cables in the past through Corporate Centre / Regional offices	In case of sizes/ 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.**	

GOVIND CABLE INDUSTRIES 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-QAI-P-10/F3-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 11 of 11 VALID UP TO: 02-02-15	REVIEWED BY INDERJIT SINGH VIKRAM TALWAR RAJEEV GARG	APPROVED BY Approved D.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
				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**			----				

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"

SUB-SECTION–E-40

L.T. POWER CABLE
&
CONTROL CABLE

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														
Armouring		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.

SECTION – IIC

STANDARD TECHNICAL SPECIFICATION (C&I)

MEASURING INSTRUMENTS **Page- 1/2**

Item Components Sub System Assembly	Attributes Characteristics								
	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 ®
1. PR Gauge (IS-3624)	Y	Y	Y	Y	Y				
2. Temp. Gauge (BS-5235)	Y	Y	Y	Y	Y				
3. Pr./D.P.Switch(BS-6134)	Y	Y	Y	Y	Y	Y			
4. Electronic Transmitter(IEC-60770)	Y	Y	Y	Y	Y	Y			
5. Temp. Switch	Y	Y	Y	Y	Y	Y			
6. Electrical Metering Instrument (IS-1248)	Y	Y	Y	Y	Y	Y			
7. Transducer (IS-14570)	Y	Y	Y	Y	Y	Y			
8. Thermocouples (IEC – 584 / ANSI-MC-96.1)	Y	Y	Y	Y	Y	Y			
9. RTD(IS-2848)	Y	Y	Y	Y	Y	Y			
10. Thermowell	Y		Y				Y	Y	Y

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

Note: **1)** This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted along with relevant supporting documents.

MEASURING INSTRUMENTS **Page- 2/2**

Item Components Sub System Assembly	Attributes Characteristics												
	GA, Dimensions, Paint Thickness (R)	Make, Model, Type, Rating ,BOM(R)	Process / Electrical connection (R)	Calibration/Functional (R)	Requirement as per standard (R)	WPS approval (A)	Non-destructive testing (R)	Calculation for accuracy (R)	HV/ IR Test (R)	IBR Certification as applicable (R)	Hydro test (R)	Material test certificate (A)	Integral Testing of complete System
11. Orifice plate(BS-1042)	Y	Y	Y	Y*	Y	Y**	Y**			Y	Y**	Y	
12. Flow nozzle(BS-1042)	Y	Y	Y	Y*	Y	Y	Y			Y	Y	Y	
13. Impact head type element	Y	Y	Y					Y				Y	
14. Electronics Water Level Indicator (EWLI)	Y	Y	Y		Y		Y		Y	Y	Y	Y	Y
15. Flue Gas & Ambient Air Analysers	Y	Y	Y	Y					Y				Y
16- SWAS System with Analyser & Chiller#	Y	Y	Y	Y			Y		Y	Y	Y	Y	Y

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

*Calibration to be carried out on one flow element of each type and size if calibration carried out as type test same shall not be repeated.
** As applicable
#Vaccuminasation test of chiller assembly

Note: 1) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted along with relevant supporting documents.

ELECTRICAL ACTUATOR WITH INTEGRAL STARTER

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

Note: 1) This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the practices and procedure adopted along with relevant supporting documents.

- SIL 2 certificate if applicable

® - Routine Test (A) - Acceptance Test Y - Test applicable

Process, Connection & piping FOR C&I SYSTEMS

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
Local Instrument enclosure	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y			
Local instruments racks	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y			
Junction Box	Y	Y*		Y		Y	Y							
Gauge Board	Y	Y		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		
Copper tubings ASTM B75	Y					Y								Y

*-applicable for painted junction boxes.

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

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.

SECTION – IIIA

GUARANTEE SCHEDULE

1.	Total CW Pumping head permissible viz. static head excluding frictional losses. Static lift from FGL up to the centre line elevation of hot water distribution header at Cooling Tower	
2.	Guaranteed Cold water temperature at design capacity & parameters	Deg. C

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE				
NAME	**DESIGNATION**	**SIGNATURE**	**DATE**	**COMPANY SEAL**

SECTION – IIIB

COMPLIANCE CERTIFICATE

COMPLIANCE CERTIFICATE

The bidder shall give his acceptance to the following by signing and stamping this compliance certificate and furnish the same with his offer.

a) The scope of supply, technical details, construction features, design parameters etc. are as per technical specification and there are no exclusions with regard to the same.

b) There are no deviations w.r.t. specification other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations.'

c) We will submit QPs in the event of order based on the guidelines given in the specification & those enclosed therein. QPs will be subject to BHEL/CUSTOMER approval & customer hold points for inspection/testing will be marked in the QPs at the contract stage. BHEL/CUSTOMER will witness inspection/testing as per details in QPs apart from review of various test certificates/ Inspection records etc.

d) All drawings, data sheets, calculations etc., if any submitted along with the offer are for reference and the same will be subject to BHEL/ CUSTOMER approval in the event of order.

e) The offered materials will be either equivalent or superior to those specified in the specification.

For components where materials are not specified, same will be suitable for intended duty and subject to approval in the event of order.

f) We will supply commissioning spares on 'As Required Basis' & prices for same are included in the base price. Prices for special tools & tackles, if any, are also included in the base price.

g) All sub vendors are subject to BHEL/ CUSTOMER approval in the event of order.

h) The Performance guarantees stand valid until at least eighteen (18) months after full load commissioning of CT or as per commercial terms and conditions, whichever is later.

i) Specific compliance to Cl. Nos. 6.0 and 11.0 and their sub clauses of Sec. **IA** of Technical Specification is given.

j) We will carry out hydrostatic testing of piping as per specifications, i.e. at 1.5 times the design pressure.

Bidder's Authorized Signatory

Company Seal