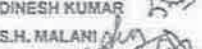


		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QF NO.: 0000-999- QOE-T-008 REV.NO. 00	REVIEWED BY <i>Ashish Senapati</i> ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU	APPROVED BY  APPROVED K. QJHA REMARKS, INDIA
SUB-SYSTEM OFFSITE PACKAGES (CHP, AHP, AWRS)		CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL				DATE:16-03-2016 PAGE: 4 OF 23 VALID UPTO:15-03-2019	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS
SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS
1	2	3	4	5	6	7	8	9	10
3.9		Earthing of Stator Frame & Terminal boxes	B	V	100%	Drawing	Drawing	Logbook	
3.10		Earth DE pedestal with base plate if both pedestals insulated	B	V	100%	Drawing	Drawing	Logbook	For Pedestal Mounted motors
3.11		Motor rotor freeness by manual rotation	B	V	100%	Free Rotation	Free Rotation	Logbook	
4.0	TESTS DURING ALIGNMENT & CLEARANCES								
4.1		IR & PI value of motor stator winding: A. Line to earth – 1KV Megger B. Line to line – 1KV Megger (wherever 6 terminals provided)	A	M	100%	Instruction Manual	Instruction Manual	Logbook	√ PI test only for HT motors
4.2		IR value (after 60 sec.) of: A. HT Power Cable (1KV Megger) B. Space heater & cable(100V Megger) C. RTDs & cable (100V Megger) D.NDE side bearing insulation (100V Megger)	A	M	100%	Instruction Manual	Instruction Manual	Logbook	√
4.3		Dry out of motor (if IR values less than required levels)	A	M	Once	Instruction Manual	Instruction Manual	Logbook	√
4.4		Winding resistance-	A	M	Once	Instruction	Instruction	Logbook	√

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		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00 DATE: 16-03-2016 PAGE: 5 OF 23 VALID UPTO: 15-03-2019	REVIEWED BY  ASHISH SENAPATI  DINESH KUMAR  S.H. MALANI  P.K. BASU	APPROVED BY  K.K. DHA  S.C. MISHRA	
SL NO	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		REMARKS
1	2	3	4	5	6	7	8	9	D*	10
		motor stator winding compared with shop test certificates – Micro ohmmeter				Manual	Manual			
4.5		After motor trial run, recheck alignment before coupling to driven side flange – Dial gauge/ Precision level	A	M	100%	Instruction Manual/Drawing	Instruction Manual/ Drawing			
4.6		Mounting of instruments	B	V	100%	Drawing	Drawing	Protocol		
4.7		Tightening, locking of fasteners	B	V	100%	Drawing	Drawing	Logbook		
C) LT BUSDUCT										
1.0	PRE – ERECTION									
1.1		Civil Foundation	C	Visual	100%	Contract drawings	Inspection record	Logbook		
1.2		Embedment level of channels/ plates/ bolts (Spirit level/ Water level)	C	Mech.	100%	Installation drgs. within specified tolerances	Inspection record, Approved Layout drawing	Logbook		Surveillance by NTPC erection
1.3		Transport sequence & transportability of section/panels	C	Visual	100%	Assy. Drgs. Packing slips	Inspection record	Logbook		
1.4		Tools & erection hardware	C	Visual	100%	O & M Manual	Inspection record	Logbook		
2.0	ERECTION									
2.1		Alignment and accuracy in placement	Major/B	Visual	100%	O & M Manual	Inspection record	Logbook		
2.2		Tightness of bolted joints, bus bar joints, other joints & enclosures' sealing	Critical/A	Mech.	100%	GA Drawing and O & M Manual	Inspection record	Logbook		
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FORMAT NO.: QS-01-QAI-P-10/F4-R1

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SL NO	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		REMARKS	
1	2	3	4	5	6	7	8	9	D*	10	
		(Torque wrench), putting of rain hood at joints									
2.3		Name plate, label, caution plate.	Major/B	Visual	100%	Approved drawings & O & M Manual	Inspection record	Logbook		10% sample check by NTPC Erection and 10% by FQA	
2.4		Align rubber mats & chequered plate to cover trench / openings	C	Visual	100%	Erection Specification	Inspection record	Logbook			
2.5		Correctness, tightness of bus duct entry connections	Major/B	Visual	100%	Approved Drawing and O & M Manual	Inspection record	Logbook			
2.6		Panel Earthing – Interconnections	Critical/A	Visual	100%	Approved Drawing/IS	Inspection record	Logbook			
2.7		IR test (Megger)	Critical/A	Elcc.	100%	O & M Manual / IS	Inspection record	Logbook			
D)	HT LT TERMINATION, JOINTING KITS, WELDING RECEPTACLES, SWITCH BOXES, TREFOIL, FAN										
1.0	PRE INSTALLATION										
1.1		Termination & connection according to termination kit manufacturer								Qualified personnel for IIT termination	
1.2		Layout and cable support	B	Visual	100%		Proper support for cable	Check List			
1.3		Feeder/Termination Joints	B	Visual	100%	-do-	As per cable schedule	Check List			
1.4		Phase marking	B	Visual	100%		Confirmation of phase	Check List			
2.0	ERECTION										
2.1		Continuity, IR value of cable & phase sequence	B	Electrical	100%	Approved procedure	As per IS confirmation of phase	Check List			
2.2		Fitting end & termination kit	B	Visual	100%	Manufacturer manual	Kit identification	Check List			

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		SUB-SYSTEM OFFSITE PACKAGES (CHP, AHP, AWRS)		CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL				DATE: 16-03-2016 PAGE: 7 OF 23 VALID UPTO: 15-03-2019		ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU		 APPROVED K. K. DHA	
SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		REMARKS			
1	2	3	4	5	6	7	8	9	D*	10			
2.3		Lug crimping with suitable die	B	Visual	100%	-do-	Suitable size of lug and die	Check List					
2.4		Proper dressing of cores to avoid tension at connection	B	Visual	100%		Proper clamping of cable	Check List					
2.5		Apply corrosion inhibition paint	B	Visual	100%	Manufacturer manual	Sufficient quantity of compound	Check List					
2.6		Core insulation damage after glanding	B	Visual	100%		Free from damage	Check List					
2.7		Contact of lugs with conductor	B	Visual	100%		Proper crimping	Check List					
2.8		Follow color coding for power cable termination/identification no. for control cable/ tagging/ ferruling of control cable	B	Visual	100%		Use of colour PVC adhesive tape/ ferrules	Check List					
2.9		Gasket fit	B	Visual	100%		Pasting of gasket properly	Check List					
2.10		IR test of cable after jointing/termination but before connection (Megger)	B	Electrical	100%	Approved procedure	As per IS	Check List					
E) HT & LT SWITCHGEAR ACDB, DCDB, MLDB, WDB, ACFB, DCFB, LPBS, EPBS, CONTROL DESK, PLC PANEL, LIGHTING PANEL, VFD PANEL, LOCAL STARTER, VMS PANEL, NON-PLC CONTROL PANEL, LOAD BREAK SWITCH PANEL													
1.0 PRE-ERECTION													
CIVIL WORKS & STRUCTURES													
1.1		Check that Centre lines of panels & connected equipments	C	Measure	100%	NTPC appd. drgs.	NTPC appd. drgs.	Logbook					

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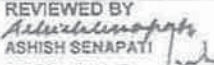
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		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00	REVIEWED BY <i>Ashish Senapati</i> ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU	APPROVED BY <i>K.K. Ojha</i> K. K. OJHA	
SL NO.	ACTIVITY AND OPERATION	SUB-SYSTEM OFFSITE PACKAGES (CHP, AHP, AWRS)	CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL				DATE: 16-03-2016 PAGE: 8 OF 23 VALID UPTO: 15-03-2019	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS
1	2	3	4	5	6	7	8	9	D*	10
		are clearly marked to give dimensions.								
1.2		Check that Openings, Cutouts, Embedments & Foundation bolts are as per layout drgs.	C	Measure	100%	NTPC appd. drgs.	NTPC appd. drgs.	Logbook		
1.3		Ensure no hindrance for panel erection/ Door operation	C	Measure	100%	NTPC appd. drgs.	NTPC appd. drgs.	Logbook		
1.4		Tag weld base-frame of panels & finish floor to right level.	C	Measure	100%	NTPC appd. drgs.	NTPC appd. drgs.	Logbook		Foundation base by Civil must be as per approved foundation drawings
TOOLS, TACKLES & PANEL TRANSPORTATION TO ERECTION SITE										
1.5		Ensure availability of tools, tackles, erection hardware & material handling equipment.	C	Visual	100%	Manufacturer instruction manual		Logbook		
1.6		Check Sequence of panel transport	C	Measure	100%	NTPC appd. drgs.	NTPC appd. drgs.	Logbook		
1.7		Ensure availability of Gaskets, busbar joining fishplates & hardware	C	Measure	100%	NTPC appd. drgs.	NTPC appd. drgs.	Logbook		
1.8		Unpack & verify completeness of supply/ availability of items, name plate, label, caution plate, paint finish, cleanliness of insulators, and physical damage to components /	C	Measure	100%	NTPC appd. drgs.	NTPC appd. drgs.	Erection Register		Format of erection register to be attached

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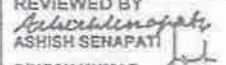
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		SYSTEM EQUIPMENT ELECTRICAL AND C&I		STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00 DATE:16-03-2016 PAGE: 9 OF 23 VALID UPTO:15-03-2019		REVIEWED BY  ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU		APPROVED BY 	
		SUB-SYSTEM OFFSITE PACKAGES (CHP, AHP, AWRS)		CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL				ACCEPTANCE NORMS		FORMAT OF RECORD		REMARKS	
SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT							
1	2	3	4	5	6	7	8	9	D*	10			
		equipment.											
2.0		ERECTION											
2.1		Properly roll panels onto foundation	C	Visual	100%	Manufacturer's instruction manual	Manufacturer's instruction manual	Erection Register					
F) CABLE TRAYS & SUPPORT SYSTEM													
1.0		PRE-ERECTION											
1.1		Drawing Layout	B	Visual	100%	Approved drawing & support		Logbook					
1.2		Qualified welder as per IS:9595 & WPS	C	Visual	100%	Erection report		Logbook					
1.3		Supports erection for straight runs	B	Visual	100%	---		Logbook					
2.0.		INSTALLATION											
2.1		Sharp corners, burns & edges	B	Visual	100%	Approved procedure	Free from burns & edges	Check List					
2.2		Tray installation	B	Visual	100%	Layout drawing/cable installation note	Proper alignment complete	Check List					
2.3		Alignment & tier spacing of trays & spacing between parallel routes of cable trays with Measurement Tape/ Spanners	B	Visual/ Measure ment	100%	Layout drawing/cable installation note	As per NTPC Specification	Check List					
2.4		Tightness of clamps, coupler/fish plates with Spanners	B	Visual	100%	Approved procedure	Complete tightness	Check List					
2.5		Tray earthing	C	Visual	100%	Approved	As per NTPC	Check List					
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SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS	
1	2	3	4	5	6	7	8	9	10	
						earthing procedure	Specifications			
2.6		Connection of earth clamps to earthing strips	B	Visual	100%	Approved earthing procedure	Proper surface contact and tightness	Check List		
2.7		Tray numbering & identification	B	Visual	100%	Layout drawing/ cable installation note	Sequence and visibility	Check List		
G) JUNCTION BOXES SUB SYSTEM										
1.0	PRE-INSTALLATION									
1.1		Area clearance for Junction box erection	C	Visual	100%	Approved drawings	As per Drawing	Check List		
2.0	INSTALLATION									
2.1		Alignment & installation of mounting supports & painting as per requirement.	B	Visual	100%	Approved procedure/As per drawing	Check for alignment	Check List		
2.2		Junction box installation & earthing	B	Visual	100%	As per drawing	As per job procedure	Check List		
2.3		Junction box alignment with Measurement Tape	B	Visual	100%	Layout drawing/cable installation note	Proper alignment	Check List		
2.4		Sealing of dummy plates	C	Visual	100%	Approved procedure	Complete sealing & tightness	Check List		
2.5		Tightness of bolt nuts with Spanners & earthing	B	Visual	100%	Approved procedure	Complete tightness	Check List		
2.6		Welding (if required)	C	Visual	100%	Approved	Approved	SRF/SER		
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SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		REMARKS	
1	2	3	4	5	6	7	8	9	D*	10	
2.7	Tagging of JB's for Identification		B	Visual	100%	procedure Approved procedure	procedure Arrangement for permanent marking	Check List			
II) BATTERY & BATTERY CHARGERS										10	
1.0 INSTALLATION											
INSTALLATION OF STAND											
1.1		Stand orientation & assembly with Measurement Tape	B	Visual	100%	Approved drawings	As per manufacturer manual	As per manufacturer manual		Battery manufacturer recommendation to be followed	
1.2		Alignment & leveling of stand with Water level	B	Visual	100%	Approved drawings	-do-				
INSTALLATION OF BATTERIES ON STAND											
1.3		Inspect cells for cracks	B	Visual	100%	-	Free from crack	Check List			
1.4		Place rubber spacers/separator between cells	C	Visual	100%	-	As per manufacturer manual	Check List			
1.5		Apply petroleum jelly on terminals, inter-cell, inter-row connectors & cable ends	B	Visual	100%	-	-do-	Check List			
1.6		Cell alignment, leveling & tightening fasteners of connectors to specified torque with Torque wrench	A	Visual	100%	Manufacturers instruction manual	-do-	Check List			
1.7		Apply petroleum jelly again on all terminals, inter-cell, inter-row connectors	B	Visual	100%	-do-	-do-	Check List			
1.8		Fix shrouds on inter-	B	Visual	100%	-do-	-do-	Check List			
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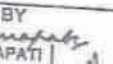
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1	2	3	4	5	6	7	8	9	10
		cell connectors & microporous ceramic vent plugs							
INSTALLATION OF CHARGER									
1.9		Alignment of charger with Water level	C	Visual	100%	Approved Drawings	Proper alignment	Check List	
1.10		Bolt tightness with Spanner/Torque wrench	B	Visual	100%	Approved Standards	Complete tightness	Check List	
1.11		Earth the charger	B	Visual	100%	Approved Drawings	As per NTPC Specs.	Check List	
INITIAL CHECKS									
1.13		Polarity check of cells with Cell tester	B	Electrical	100%	Manufacturers instruction manual	-do-	Check List	
1.14		Restoration of filling level after soaking period	B	Visual	100%	-do-	-do-	Check List	
1.15		Polarity check of battery bank to DCDB to battery charger connection with Volt Meter.	A	Electrical	100%	-do-	-do-	Check List	
I) POWER, CONTROL & INSTRUMENTATION CABLES & ACCESSORIES									
1.0 PRE-ERECTION & PRE-COMMISSIONING									
1.1		Identify markings on cable drum & IR measurement before laying	B	Visual	100%	As per IS 1255	Check for manufacturer name plate	Check List	
1.2		Cable pulling	B	Visual	100%	IS 1255	As per IS 1255	-do-	
1.3		Cable identification tag	B	Visual	100%	As per cable schedule	Cable tag	-do-	
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		SYSTEM EQUIPMENT ELECTRICAL AND C&I		STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00 DATE: 16-03-2016 PAGE: 13 OF 23 VALID UPTO: 15-03-2019		REVIEWED BY  ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU		APPROVED BY  K. K. OJHA REMARKS: C. INDIA	
SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD					
1.4		Maintain proper bending radius	B	Visual	100%	As per IS 1255	Manufacturers Spec.	-do-	D*	10			
1.5		Cable dressing on tray	B	Visual	100%	As per drawing	Cable ties	Check List					
1.6		Use correct size & gland type	B	Visual	100%	As per drawing		-do-					
1.7		Ferruling	B	Visual	100%	As per drawing	Inter connection details	-do-					
1.8		Core dressing	B	Visual	100%	As per drawing	Proper dressing	Check List					
1.9		Completeness of Cable laying & termination tightness	B	Visual	100%	As per drawing	As per drawing	-do-					
1.10		Tightness & sealing of gland plates	B	Visual	100%	As per drawing	Complete tightness	-do-					
1.11		Seal ends of conduit after cable laying	B	Visual	100%	As per drawing	As per NTPC specs.	-do-					
1.12		Clamp conduits used to carry cables vertically	B	Visual	100%	As per drawing	As per drawing	-do-					
1.13		Clean cable trench & position cable trench covers	C	Visual	100%	As per drawing	Complete cleaning	-do-					
1.14		Lay sand & brick/slab for cables buried	C	Visual	100%	As per drawing	As per NTPC Spec.	-do-					
1.15		IR test (Megger)	A	Electrical	100%	IS 1255	As per IS 1255	-do-					
1.16		IR before & after laying (Megger)	A	Electrical	100%	IS 1255	As per IS 1255	-do-					
1.17		HV Test for each phase (HV Test Kit)	A	Electrical	100%	As per drawing	As per IS 1255	-do-		For HT Cables			
1.18		Separate HT & LT cables	B	Visual	100%	As per NTPC Spec.	As per NTPC Spec. IS 1255	-do-		For HV Cables			

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FORMAT NO.: QS-01-QAI-P-10/F4-R1
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		SYSTEM EQUIPMENT ELECTRICAL AND C&I		STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999-QOE-T-008 REV.NO. 00 DATE: 16-03-2016 PAGE: 14 OF 23 VALID UPTO: 15-03-2019		REVIEWED BY  ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU		APPROVED BY  K.K. OJHA APPROVED	
		SUB-SYSTEM OFFSITE PACKAGES (CHP, AHP, AWRS)		CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL				ACCEPTANCE NORMS		FORMAT OF RECORD		REMARKS	
SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT							
1	2	3	4	5	6	7	8	9	D*	10			
J) OVERHEAD LINE (11KV) SUB-SYSTEM													
1.0 PRE ERECTION													
1.1		Brackets (Measurement Tape)	B	Measure-Ment	100%	NTPC Approved Drawing	NTPC Approved Drawing	Site Log Book					
1.2		AC Switches (IR Value)	B	Measure-ment	100%	NTPC Approved Drawing	NTPC Approved Drawing	Site Log Book			IR Value > 23 Ohm at 2.5KV Megger		
1.3		Conductor dia, continuity (Continuity tester)	B	Measure-ment	100%	As per Standard	As per Standard	Site Log Book					
1.4		Pole (Surface Finishing)	B	Visual	100%	As per specification	As per specification	Site Log Book					
1.5		Pole Earthing & Concreting	A	Aggregat e & Concrete check	100%	Approved layout	Approved layout	Site Log Book					
2.0 ERECTION													
2.1		Brackets Fabrication	B	Visual	100%	Tech. Spec. & CPWD Approved Drawing	Tech. Spec. & CPWD Approved Drawing	Erection Protocol			No Gas Cutting is allowed		
2.2		Insulators	B	Visual	100%	Tech. Spec. & CPWD Approved Drawing	Tech. Spec. & CPWD Approved Drawing	Erection Protocol					
2.3		AC Switches	B	Visual	100%	Tech. Spec. & CPWD Approved Drawing	Tech. Spec. & CPWD Approved Drawing	Erection Protocol					
2.4		Conductor	B	Tightning of	100%	Tech. Spec. & CPWD	Tech. Spec. & CPWD Approved	Erection Protocol					
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FORMAT NO.: QS-01-QAI-P-10/T-4-R1

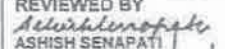
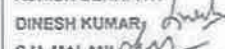
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		SYSTEM EQUIPMENT ELECTRICAL AND C&I		STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999-QOE-T-008 REV.NO. 00 DATE: 18-03-2018 PAGE: 15 OF 23 VALID UPTO: 15-03-2019		REVIEWED BY ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU		APPROVED BY 	
SUB-SYSTEM OFFSITE PACKAGES (CHP, AHP, AWRs)		CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL											
SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		REMARKS			
1	2	3	4	5	6	7	8	9	D*	10			
				conductor & Sag Measurement		Approved Drawing	Drawing						
2.5		Pole (Plumb)	B	Alignment Check & Verticality	100%	Tech. Spec. & CPWD Approved Drawing	Tech. Spec. & CPWD Approved Drawing	Erection Protocol					
2.6		Pole Earthing	B	Visual/Measurement	100%	Tech. Spec. & CPWD Approved Drawing	Tech. Spec. & CPWD Approved Drawing	Erection Protocol					
2.7		Paint (Thickness/No Cost)	B	Measurement	100%	Tech. Spec./do	Tech. Spec./IS 3043	Protocol					
TESTING (WITHOUT ENERGIZING THE PANEL)													
2.8		Brackets	B	Tightening of Nuts & Bolts	100%	Approved Drawing/ Tech. Spec.	No Loosing	Testing Protocol					
2.9		Insulators	B	Tightening of conductor with insulator	100%	Approved Drawing/ Tech. Spec.	No Loosing	Testing Protocol					
2.10		AC Switches	B	Functional Test	100%	Approved Drawing/ Tech. Spec.	Functionally OK	Testing Protocol					
2.11		Conductor	B	Creepage Distance among Conduct	100%	Approved Drawing/ Tech. Spec.	Approved Drawing	Testing Protocol		IR Value > 23M Ohm at 2.5KV Megger			

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FORMAT NO.: QS-01-QAI-P-10/F4-R1

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		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00 DATE:16-03-2016 PAGE: 16 OF 23 VALID UPTO:15-03-2019	REVIEWED BY  ASHISH SENAPATI DINESH KUMAR  S.H. MALANI P.K. BASU 	APPROVED BY  K. K. OJHA
SL. NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS
1	2	3	4	5	6	7	8	9	10
				ors, Sag Test					
2.12		Completeness as per drawing	A	All above Tests, IR & Pole Earthing	Sample	NTPC Approved Drawing/IS 3043	NTPC Approved Drawing	Testing Protocol	
	VERIFICATION								
2.13		Welder Qualification	A	ASME-SEC-IX	-	-	-	-	
2.14		Verification of Verticality	B	Mech.	100%	Approved GA Drg./Layout	As per NTPC Spec.		Load Break Switches
2.15		Cleanliness of insulator & base	C	Visual	100%	Cleanliness			Load Break Switches
2.16		Lubrication of operating mechanism & bearing	B	Mech.	100%				Load Break Switches
2.17		Smooth operation, contact making	B	Visual conductivity	100%	Smooth operation & proper contact			Load Break Switches
2.18		Double earthing	B	Visual continuity	100%				Load Break Switches
K) EARTHING SYSTEM									
1.0	PRE-ERECTION								
1.1		Approved drawings	B	Visual	100%		-	Check List	
1.2		Burial depth of Earth Mat	B	Visual	100%	Approved drg./ spec.	As per drawing/ spec.	Check List	
1.3		Over lap of Joints	B	Visual	100%	-do-	-do-	Check List	
1.4		Usage of Proper	B	Visual	100%	-do-	As per NTPC	Check List	
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		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999-QOE-T-008 REV.NO. 00 DATE: 15-03-2016 PAGE: 17 OF 23 VALID UPTO: 15-03-2019	REVIEWED BY  ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU	APPROVED BY  K. K. OJHA
SL. NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS
1	2	3	4	5	6	7	8	9	10
		welding Electrodes					spec.		
1.5		Apply protective paint	B	Visual	100%	-do-	-do-	Check List	
1.6		At roads, trenches, buried pipe crossings etc. the earthing rod/strip shall be taken below the crossing	B	Visual	100%	-do-	As per drawing/spec	Check List	
1.7		Prepare earth pits for Electrodes	B	Visual	100%	Approved drg./ spec.	As per NTPC Spec.	Check List	
1.8		Earthing of equipment, fence & rail tracks	B	Visual	100%	-do-	As per drawing/spec.	-do-	
1.9		Clamping	B	Visual	100%	-do-	-do-	-do-	
1.10		Earth support for slats	B	Visual	100%	-do-	As per NTPC spec.	-do-	
1.11		Connecting of equipment/panel inside building to earthing materials	B	Visual	100%	-do-	-do-	-do-	
2.0	PRE-COMMISSIONING								
2.1		Earth continuity (Megger)	B	Electrical	100%	-do-	As per IS:3043	Logbook	
2.2		Weld Joint & application of Zinc rich paint on galvanized surface, Bituminous coating & U/G M.S. Earth Mat	B	Electrical	100%	-do-	As per NTPC Spec.	Logbook	
2.3		Check for earth resistance of complete system (Megger)	A	Electrical	100%	-do-	As per IS:3043	Logbook	
2.4		Final document review	B	Visual	100%	As per NTPC Spec.	-do-	Logbook	

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		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00	REVIEWED BY <i>Ashish Senapati</i> ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU	APPROVED BY 	
		SUB-SYSTEM OFFSITE PACKAGES (CHP, AHP, AWRS)	CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL				DATE: 16-03-2018 PAGE: 18 OF 23 VALID UPTO: 16-03-2019	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS
SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT				
1	2	3	4	5	6	7	8	9	D*	10
L) LT TRANSFORMERS DRY & OIL FILLED										
1.0 PRE-INSTALLATION										
1.1		Drawings, shipping list & shop protocols	C	Record Verification	Once before erection	Instruction Manual	MDR in case of damage	Logbook		
1.2		Tools, tackles including jacking pad	C	Visual	During erection	Instruction Manual		Logbook		
1.3		Grease rollers before assembly with transformer	C	Visual	100%		Free movement of rollers	Logbook		
1.4		Adequacy of oil filtration plant capacity. Use new filters in machine	B	Visual	Once before erection	Instruction Manual	Instruction Manual	Logbook		For Oil filled T/F
1.5		Oil flush pipes if not rust/dust free	B	Physical	100%		Freeness from dust & rust	Protocol		
1.6		Bushings for oil leakage & fill oil level up to mark	C	Visual	100%	Drawing	Oil level up to mark			Oil filled Transformer
1.7		All condenser bushings: IR value, capacitance & tan δ test	A	Measure	100%		IR > 5000m OHMS TAN DELTA < 0.007	Logbook	✓	IR & capacitance/Tan Delta results to be given to NTPC for further reference.
1.8		Visual check for clamping of Core & Coil through inspection cover	A	Physical	Once before erection		No looseness	Logbook	✓	For ST & UT, if any Looseness is observed same has to be attended and informed to manufacturer to analysis & avoid further occurrence
1.9		Touch up paint	C	Physical	Once			Logbook		

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FORMAT NO.: QS-01-QA1-P-10/F4-R1

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		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00	REVIEWED BY <i>Ashish Senapati</i> ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU	APPROVED BY <i>K. K. OJHA</i> K. K. OJHA
SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS
1	2	3	4	5	6	7	8	9	10
		wherever necessary			before erection				
1.10		Use new gaskets during final erection of turrets, bushings, piping	B	Physical	Once before erection			Logbook	
2.0	INSTALLATION								
2.1		Foundation readiness as per layout drawing – Measuring Tape	B	Measure	100%	Drawing		Logbook	
2.2		Continuity & IR value of internal cables to marshalling box before laying – 500 V Megger	C	Test	100%	Drawing/Wiring diagram	IR > 1 Mega Ohm	Logbook	
2.3		Ferruling of cable cores at both ends	C	Physical	100%	Drawing/Wiring Diagram	Drawing/Wiring Diagram	Logbook	
2.4		Earthing of Transformer	B	Visual	100%	Drawing	Drawing	Logbook	
2.5		Winding lead connection with bushing from inside	A	Visual	100%	GA Drawing	GA Drawing	Logbook	In case of condenser bushing
2.6		Set tan δ tap back to normal earthed position	C	Visual	100%	Instruction Manual	Instruction Manual	Logbook	
2.7		Core earthing tightness after IR value test between core & earth	A	Measure	100%	Instruction Manual	Instruction Manual	Logbook	
2.8		BDV test	A	Test	Simple/Transformer	Instruction Manual	Instruction Manual	Logbook	
2.9		Oil leakage check	C	Visual	100%	Instruction	No Leakage	Logbook	

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		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00	REVIEWED BY <i>Ashish Senapati</i> ASHISH SENAPATI DINESH KUMAR S.H. MALANIKAR P.K. BASU	APPROVED BY  K. K. GUHA	
		SUB-SYSTEM OFFSITE PACKAGES (CHP, ANP, AWRS)	CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL				DATE: 16-03-2016 PAGE: 20 OF 23 VALID UPTO: 15-03-2019	FORMAT OF RECORD		REMARKS
SL. NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS			
1	2	3	4	5	6	7	8	9	D*	10
						Manual				
2.10		IR value between terminal & flange of bushing – 1/2.5 K.V. Megger	B	Measure	Once	Instruction Manual	Minimum IR value is (kV+1)M Ohms	Logbook		
2.11		Oil level in main tank & bushings – Oil gauge	C	Visual	100%	Instruction Manual	No leakage	Logbook		
2.12		Leakage test on bushing before erection	C	Visual	100%	Instruction Manual	No leakage	Logbook		
2.13		Insulation resistance: HV-E, LV-E and HV-LV windings – 1/2.5KV Megger	A	Test	100%	Instruction Manual	Minimum IR value is (kV+1) M Ohms	Logbook	✓	
2.14		Transformer Oil Dielectric strength	A	Measure	100%	Instruction Manual	Instruction Manual	Logbook	✓	PPM & other oil tests as per specs. will be tested, if BDV value is not improved even after filtration of oil
2.15		CT polarity	B	Measure	100%	Instruction Manual		Logbook		
2.16		Hand operate air release valve functioning	C	Physical	100%	Instruction Manual		Logbook		If available
2.17		Lubricate tap changer, cooler fan, oil pump bearings	C	Physical	100%	Instruction Manual		Logbook		
2.18		Power supply phase sequence at Marshalling kiosk, control supply check-Phase sequence meter	B	Measure	100%	Schematic Drawing	Schematic Drawing	Logbook		

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		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00 DATE: 16-03-2016 PAGE: 21 OF 23 VALID UPTO: 15-03-2019		REVIEWED BY  ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU		APPROVED BY 	
		SUB-SYSTEM OFFSITE PACKAGES (CHP, AHP, AWRS)	CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL									
SL. NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS			
1	2	3	4	5	6	7	8	9	D*	10		
2.19		Direction of rotation of pump-motors & fans	B	Visual	100%	Instruction Manual	Instruction Manual					
2.20		Functioning of tap changer manually	A	Physical	100%	Schematic Drawing		Logbook				
2.21		Functioning of oil pump from manual, local & remote controls	B	Physical	100%	Schematic Drawing		Logbook				
2.22		Sequential operation of cooling system on auto operation	B	Physical	100%	Schematic Drawing		Logbook				
2.23		Record of tap changer — (Multimeter/Stopwatch a) motor current, b) operating time, c) control voltage	B	Measure	100%	Instruction Manual	Instruction Manual	Logbook				
2.24		Continuity test between HV windings & neutral, while OLTC in operation – Multimeter	A	Measure	100%	Instruction Manual	Continuity should not break, while OLTC in operation	Logbook				
M) CONVEYOR SWITCHES (BSS & PCS), MEASURING INSTRUMENTS, ANEMOMETER, PA SYSTEM, CCTV, PC, PRINTER, COMPONENTS SUSPENDED MAGNETS, LINEAR ACTUATOR, MAGNETIC SEPARATORS (ILMS & SM), METAL DETECTOR, CABLE REELING DRUM, FESTOON TROLLEY, LIGHT FITTINGS & ACCESSORIES, LUMINARIES & EMERGENCY LIGHT												
1.0 ERECTION												
1.1		Check availability of all items, as per rating/size.	C	Verify	100%	GA drg/BOQ	GA drg/BOQ	Logbook				
1.2		Availability of layout drgs., tools & tackles, test equipment, if any.	C	Verify	100%	GA drg/BOQ	GA drg/BOQ	Logbook				
1.3		Erection as per	B	Verify	100%	GA	GA drg/manual/	Logbook				
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		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999-QQE-T-008 REV.NO. 00 DATE: 16-03-2016 PAGE: 22 OF 23 VALID UPTO: 15-03-2019	REVIEWED BY <i>Ashish Senapati</i> ASHISH SENAPATI DINESH KUMAR S.H. MALANIO P.K. BASU	APPROVED BY  REMARKS	
SL NO	ACTIVITY AND OPERATION	CHARACTERISTICS/INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		
1	2	3	4	5	6	7	8	9	D*	10
		drgs/specs/manufacturer's recommendations				drg/manual/catalog	catalog			
1.4		Check for cable entry, termination, connections & checks for switches	B	Visual, Meas.	100%	GA drg/manual/catalog	GA drg/manual/catalog	Logbook		
1.5		Check for mounting, alignment & calibration	A	Meas.	100%	GA drg/manual/catalog	GA drg/manual/catalog	Logbook	✓	
1.6		Oil level check & IR test for magnets	B	Visual, Meas.	100%	GA drg/datasheet	GA drg/datasheet	Logbook		
1.7		Check for IR value & function of switches, control gear (light fitting & accessories)	A	Visual, meas.	100%	GA drg/datasheet	GA drg/datasheet	Logbook		
1.8		Verification of calibration certificate for measuring instruments by NTPC FQA.	A	Verify	100%	GA drg/datasheet	GA drg/datasheet	Logbook	✓	
N) LIGHTNING ARRESTORS, INSULATORS, LIGHTING MAST, EM & EHT BRAKES										
1.0	ERECTION									
1.1		Check availability of all items, as per rating/size.	C	Verify	100%	GA drg/BOQ	GA drg/BOQ	Logbook		
1.2		Availability of layout drgs., tools & tackles, test equipment, if any.	C	Verify	100%	GA drg/BOQ	GA drg/BOQ	Logbook		
1.3		Erection as per drgs/specs/	B	Verify	100%	GA drg/manual/catalog	GA drg/manual/catalog	Logbook		
LEGEND: *RECORDS IDENTIFIED WITH "TICK" (□) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. LEGEND TO BE USED: CLASS # : A = CRITICAL, B=MAJOR, C=MINOR; 'A' SHALL BE WITNESSED BY FQA ENGINEER IN ASSOCIATION WITH EXECUTING ENGINEER, 'B' SHALL BE WITNESSED BY EXECUTING ENGINEER AND 'C' SHALL BE WITNESSED BY CONTRACTOR'S QUALITY ENGINEER AND NTPC EXECUTING ENGINEER (A & B CHECK SHALL BE NTPC CHP STAGE)										

FORMAT NO.: QS-01-QAI-P-10/F4-R1

ENGG.DIV/QA&I

		SYSTEM EQUIPMENT ELECTRICAL AND C&I	STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999- QOE-T-008 REV.NO. 00	REVIEWED BY ASHISH SENAPATI DINESH KUMAR S.H. MALANI P.K. BASU		APPROVED BY K. COHA
		SUB-SYSTEM OFFSITE PACKAGES (CHP, AHP, AWRS)	CONFORMING TO CODE: NTPC APPROVED DOCUMENTS, O&M AND MANUFACTURER MANUAL				DATE: 16-03-2016 PAGE: 23 OF 23 VALID UPTO: 15-03-2019	ACCEPTANCE NORMS		FORMAT OF RECORD
SL NO.	ACTIVITY AND OPERATION	CHARACTERISTICS/ INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	8	9	D*	10
1	2	3	4	5	6	7				
		manufacturer's recommendations				catalog				
1.4		Check for cable entry, termination & connections	B	Visual, Meas.	100%	GA drg/manual/ catalog	GA drg/manual/ catalog	Logbook		
1.5		Check for mounting & alignment.	A	Meas.	100%	GA drg/manual/ catalog	GA drg/manual/ catalog	Logbook	✓	
1.6		IR test	B	Meas.	100%	GA drg/manual/ catalog	GA drg/manual/ catalog	Logbook		

LEGEND: *RECORDS, IDENTIFIED WITH "TICK" (☑) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
LEGEND TO BE USED: CLASS #: A = CRITICAL, B=MAJOR, C=MINOR; 'A' SHALL BE WITNESSED BY FQA ENGINEER IN ASSOCIATION WITH EXECUTING ENGINEER, 'B' SHALL BE WITNESSED BY EXECUTING ENGINEER AND 'C' SHALL BE WITNESSED BY CONTRACTOR'S QUALITY ENGINEER AND NTPC EXECUTING ENGINEER (A & B CHECK SHALL BE NTPC CHP STAGE)

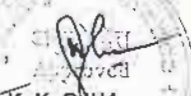
FORMAT NO.: QS-01-QAI-P-10/F4-R1

ENGG.DIV/QA&I

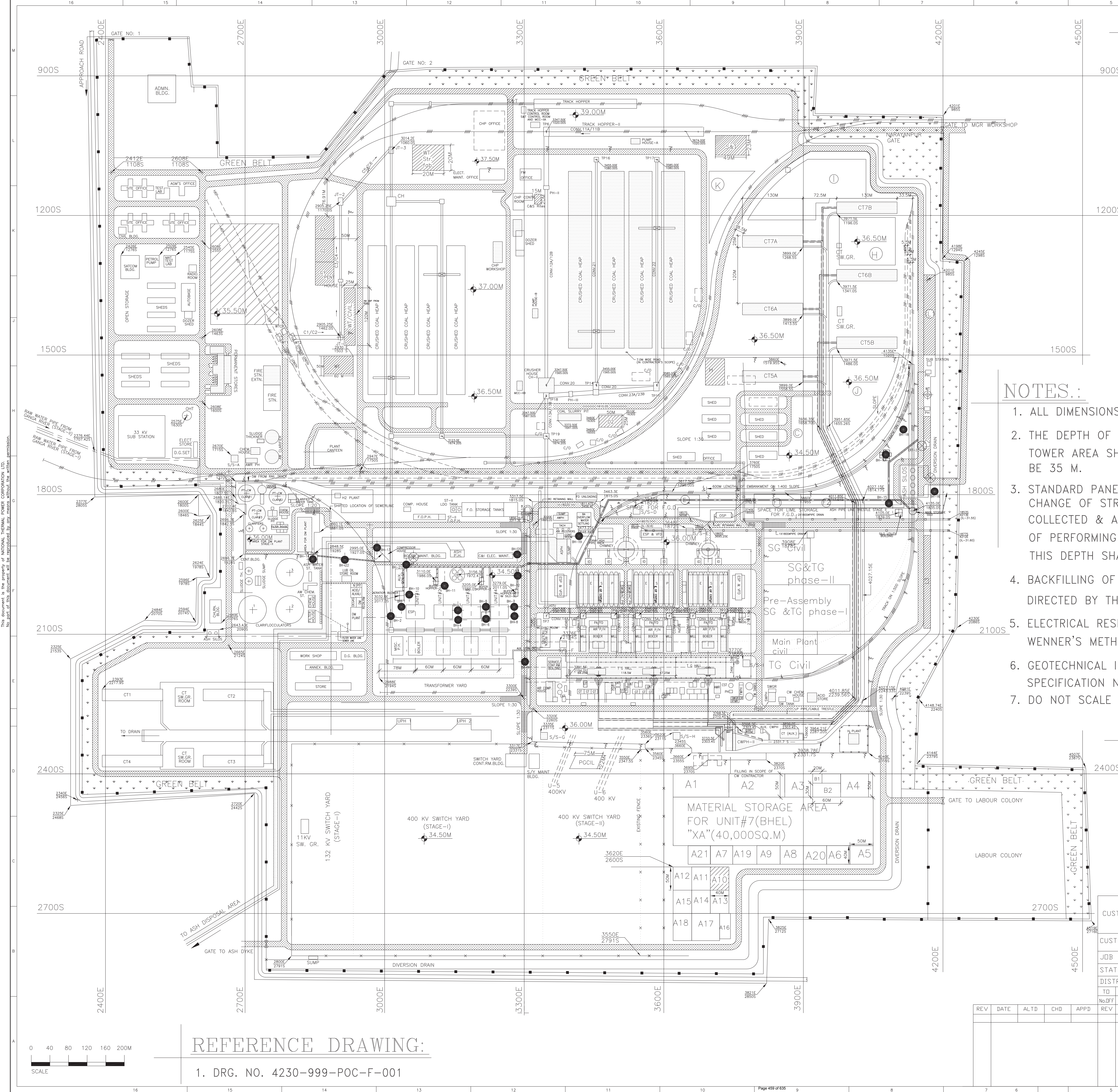
	ITEM : MATERIAL RECEIPT, STORAGE & PRESERVATION	STANDARD FIELD QUALITY PLAN					QP NO.: 0000-999-QOM-T-023 REV. NO: 00 DATE : 22.03.2016 PAGE 1 OF 2		REVIEWED BY: N. H.S. SHARMA SOMNATH DAS RAJEEV KUMAR		APPROVED BY:  K. K. OJHA	
							VALID UPTO : 21.03.2019					
Sl No	Activity & Operation	Characteristics	Class of Check	Type of Check	Quantum of Check	Reference Document	Acceptance Norms	Format of Record	D*	Remarks		
1.	2.	3.	4.	5.	6.	7.	8.	9.		10		

Storage: Instructions & Facilities										
1	Availability of Storage/ Preservation Instructions/ Procedure for Material at site.	Verification	A	Verify	100%	Storage & Preservation Instruction/ Procedure/ Recommendation of Manufacturer/ NTPC	Site Register/Log Book			
2	Site Preparation for Storage e.g. Leveling, Raised platform/ availability of wooden planks/ suitable supports, preparation of Covered Shed/ Storage	Visual	A	Physical	100%	Storage & Preservation Instruction/ Procedure/ Recommendation of Manufacturer/ NTPC	Site Register/Log Book			Refer Note 1
Material Receipt:										
3	Check for the availability of documents :- Shipping List/ Packing list / Loading Advice Slip / Delivery Challan/ LR/ RR / MDCC/ CHP	Record Verification	B	Review of Records	100%	Packing Slip, Delivery Challan, Approved BBU/ CHP/ MDCC/ LR/ RR	Site Register/Log Book			Refer Note 2
4	Verify the Packing & Material received against the following:- a) Project/ Package No. b) Work order no. / BBU No. c) Item no./ Part No./DU No. etc. d) Identification of Material	Visual/ Record Verification	B	Visual, Review of Records	100%	Packing Slip, Delivery Challan, Approved BBU/ CHP/ MDCC/ LR/ RR	Should be properly correlated	Site Register/Log Book		
5	Check the Material / Item on receipt for the following - a) Packing condition b) Physical damage c) Quantity of components/ Any Shortage or Excess of quantity d) Correlation with identification as per CHP/ MDCC, if any e) Painting condition (as applicable)	Visual/ Record Verification	B	Visual, Review of Records	100%	Packing Slip, Delivery Challan, Approved BBU, CHP/MDCC/ LR/ RR	No Damage & Shortage of Quantity as per challan / CHP report/ MDCC	Site Register/Log Book	✓	Refer Note 3

LEGEND: D* RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
 CLASS OF CHECK 'A' SHALL BE WITNESSED BY NTPC FQA ENGINEER IN ASSOCIATION WITH EXECUTING ENGINEER & SURVEILLANCE BY HEAD FQA. CLASS 'B' SHALL BE WITNESSED BY NTPC ERECTION ENGINEER & SURVEILLANCE BY FQA.

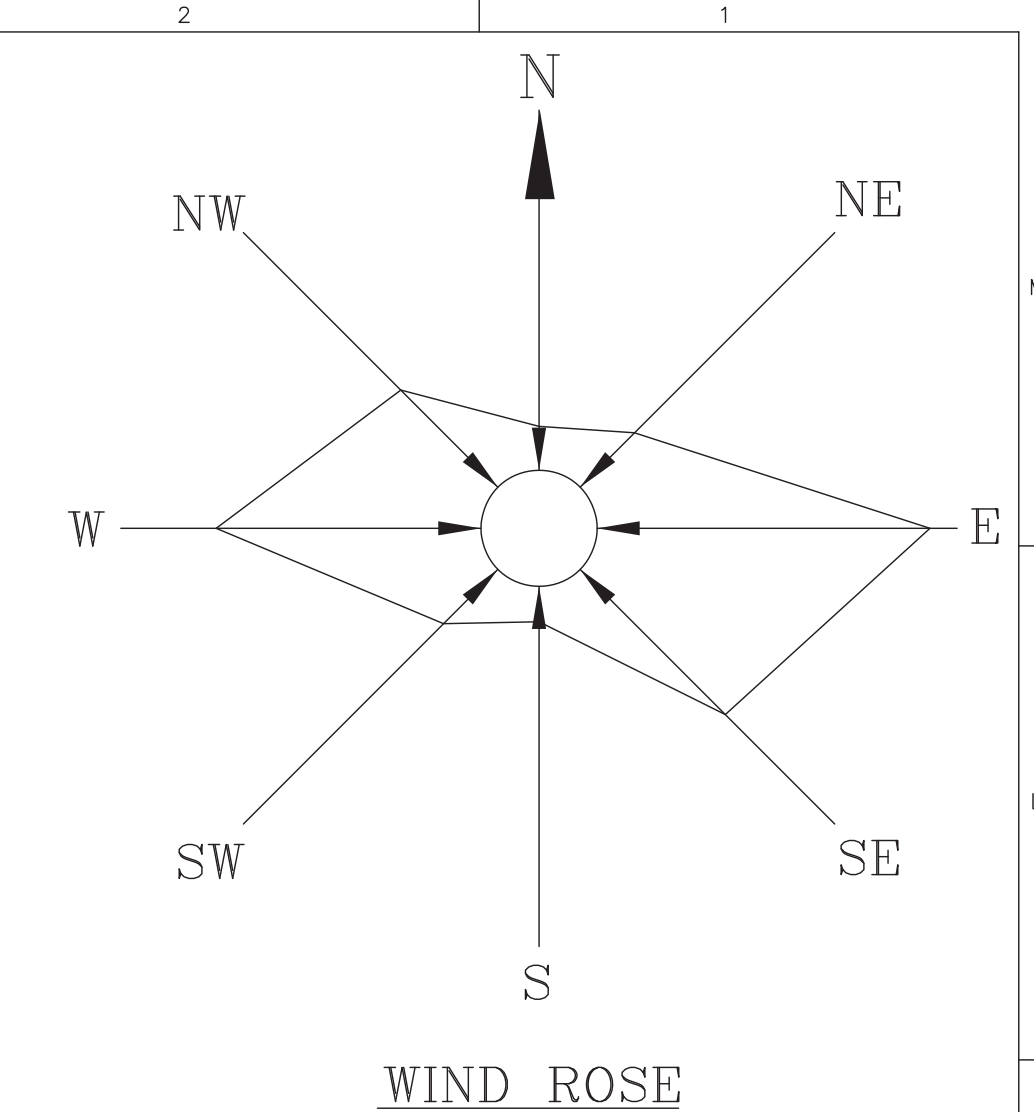
	ITEM : MATERIAL RECEIPT, STORAGE & PRESERVATION		STANDARD FIELD QUALITY PLAN				QP NO.: 0000-999-QOM-T-023 REV. NO: 00 DATE : 22.03.2016 PAGE 2 OF 2		REVIEWED BY: N. H.S. SHARMA SOMNATH DAS RAJEEV KRISHNAN		APPROVED BY:  K. K. OJHA	
							VALID UPTO : 21.03.2019					
Sl No	Activity & Operation	Characteristics	Class of Check	Type of Check	Quantum of Check	Reference Document	Acceptance Norms	Format of Record	D*	Remarks		
1.	2.	3.	4.	5.	6.	7.	8.	9.		10		
6	Ensure non-conforming/ Damaged & rejected components are identified & stored separately and reported to Main Contractor/ Manufacturer.	Visual/ Record Verification	A	Visual, Review of Records	100%	Storage & Preservation Instruction/ Procedure, CHP/MDCC	Storage & Preservation Instruction/ Procedure,	Site Register/Log Book	✓	Refer Note 4		
7	Issuing of Material Receipt Certificate (MRC)	Record Verification	B	Review of Records	100%	Packing Slip, Delivery challan, Approved BBU, CHP/MDCC/ SL/ RR/ LR	Packing Slip, Delivery challan, Approved BBU/CHP/MDCC	MRC	✓	Refer Note 5		
Storage												
8	Material storage & Preservation: Check for proper Storage, Shelf life, Preservation etc.	Visual/ Record Verification	A	Verify	100%	As per storage instructions Point No. 1 above		Site Register/Log Book		Refer to supplier's recommendation for long storage.		
9	Periodic Inspection of Stored Items for their condition & Preservation	Visual	B	Verify	100%	As per storage instructions Point No. 1 above		Site Register/Log Book	✓	Surveillance by NTPC FQA		
Notes: - Prior to despatch of first lot of Materials, confirmation regarding availability of storage facility as per Storage Instruction/ Procedure shall be obtained through NTPC site FQA. - All items identified in Contract shall be received with proper dispatch clearance i.e. either with MDCC, in case of BBU or with CHP clearing despatch. - Correlation will be established between received Materials & MDCC/ CHP/ MTC/ HEAT No etc., as applicable. - Dispositioning of Non-conforming /Rejected materials shall be done with intimation to NTPC FQA. - Before release of any Material Receipt Certificate (MRC), FQA clearance shall be obtained w.r.t. proper Storage & Preservation of Materials as per Manufacturer recommendations.												

LEGEND: D* RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
CLASS OF CHECK 'A' SHALL BE WITNESSED BY NTPC FQA ENGINEER IN ASSOCIATION WITH EXECUTING ENGINEER & SURVEILLANCE BY HEAD FQA. CLASS 'B' SHALL BE WITNESSED BY NTPC ERECTION ENGINEER & SURVEILLANCE BY FQA.



FIELD TESTS

BORE HOLE (BH)			DEPTH (M)
MARKING	CO—ORDINATES		
BH-1	3036.2 E	2041 S	REF. NOTE-2
BH-2	3013.2 E	2061S	
BH-3	3157.5 E	2048.5 S	
BH-4	3158 E	2069.1 S	
BH-5	3217.55E	2041 S	
BH-6	3218 E	2066.9 S	
BH-7	3278.5 E	2041 S	
BH-8	3279 E	2061 S	
BH-9	3301.6 E	2159 S	
BH-10	3053 E	2014.8 S	
BH-11	3129 E	1995.7 S	
BH-12	3286 E	1974.2 S	
BH-13	2983.5 E	1914 S	
BH-14	2846 E	1939 S	
BH-15	4083.8 E	1818.7 S	
BH-16	4182 E	1793.1 S	
BH-17	4077.1 E	1713.8 S	
BH-18	4115 E	1660 S	
BH-19	3417.85E	1889 S	
BH-20	3285 E	1928.48S	
BH-21	3046.5 E	1950.3 S	
BH-22	2914.4 E	1939.8 S	



ELECTRICAL RESISTIVITY TEST (ERT)		
MARKING	CO-ORDINATES	
ERT-1	3062 E	1934.55S
ERT-2	4154.62E	1695 S
REFER NOTE-5		

NOTES.:

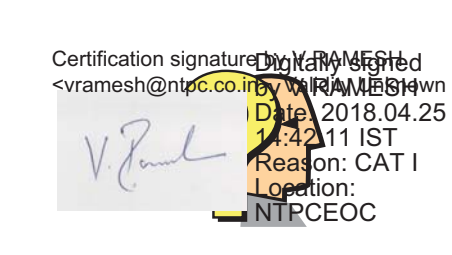
1. ALL DIMENSIONS ARE IN METER UNLESS NOTED OTHERWISE.
2. THE DEPTH OF BORE HOLE IN ESP, ASH SILO AREA AND BUFFER HOPPER TOWER AREA SHALL BE 35-40 M AND IN THE OTHER AREA SHALL BE 35 M.
3. STANDARD PANETRATION TEST (SPT) SHALL BE CONDUCTED AT 3M INTERVALS, AT EVERY CHANGE OF STRATA, AT DEPTH WHEREVER UNDISTURBED SOIL SAMPLES COULD NOT BE COLLECTED & AS PER THE DIRECTION OF ENGINEER-IN-CHARGE. THE STARTING DEPTH OF PERFORMING SPT SHALL BE EITHER 1M OR 2.0M DEPTH BELOW GROUND LEVEL. THIS DEPTH SHALL BE STAGGERED IN ALTERNATE BOREHOLES.
4. BACKFILLING OF BORE HOLES AND PITS SHALL BE AS PER SPECIFICATION AND AS DIRECTED BY THE ENGINEER-IN-CHARGE.
5. ELECTRICAL RESISTIVITY TEST SHALL BE CARRIED OUT AT FINISHED GROUND LEVEL BY WENNER'S METHOD.
6. GEOTECHNICAL INVESTIGATION SHALL BE CARRIED OUT AS PER SPECIFICATION NO. PE-TS-E61-602-002
7. DO NOT SCALE THIS DRAWING.

GEOTECH. INVESTIGATION LEGENDS:

1. BOREHOLE (BH) ●
2. ELECTRICAL RESISTIVITY TEST (ERT) ⊗

0 40 80 120 160 200M
SCALE

REFERENCE DRAWING:
1. DRG. NO.4230-999-POC-F-001



CUSTOMER		एन टी पी सी NTPC		नैशनल थर्मल पावर कारपोरेशन लिमिटेड <i>National Thermal Power Corporation Ltd.</i> (A GOVERNMENT OF INDIA ENTERPRISE)	
CUSTOMER's DRG. NO.		4210-104-PVC-G-025			
JOB No. 4210		4X210 MW KAHALGAON R & M UNITS # 1, 2, 3 & 4			
STATUS CONTRACT DISTRIBUTION		भारत भारी इलेक्ट्रिकल्स लिमिटेड BHARAT HEAVY ELECTRICALS LTD POWER SECTOR RMSG BHOPAL		DEPT CODE C	
TO		REV		NAME DRN NAYAK DESN CP CHD MP APPD PIM	
No OFF		DATE		SIGN -Sd- -Sd- -Sd- -Sd-	
ALTD		CHD		DATE 16.12.2017 17.12.2017 21.12.2017 22.12.2017	
APPD		CHD		DATE	
TITLE GEOTECHNICAL INVESTIGATION LAYOUT					
MPL		C		DEPT. SCALE -	
MSE		I		SIGN	
MAX		E		DRAWING No.	
DATE		DATE		1-726-25-56-025	
SHEET 1 OF 1		REV 02			



Report on
Geotechnical Investigation pertaining to associated civil
works for retrofitting of ESPs
for
ESP R & M 4X210MW (U#1,2,3&4)
at
Kahalgaon STPP, NTPC, Bhagalpur, Bihar

Document No:- 4210-104-PVC-G-026 (Rev-2)

Document Title:- Geotechnical Investigation Report

Client
Bharat Heavy Electricals Limited
Power Sector Eastern Region
DJ-9/1, Salt Lake City
Kolkata – 700 091

Certification signature by V. RAMESH
<vramesh@ntpc.co.in> Digitally signed by V. RAMESH
Date: 2018.06.18
16:44:09 IST
Reason: CAT II
Location:
NTPCEOC

Geotechnical Consultant
Centre for Advanced Engineering.
59/2, Bangur Avenue, Block-C, Kolkata-700 055
PH. No. : 033-2574 2130, email: cae.india2@gmail.com



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Report on
Geotechnical Investigation pertaining to associated civil works for
retrofitting of ESPs
for
ESP R & M 4X210MW (U#1,2,3&4)
at
Kahalgaon STPP, NTPC, Bhagalpur, Bihar

Document No. : 4210-104-PVC-G-026 (Rev-2)

Client: **Bharat Heavy Electricals Limited**

A. 📖 Introduction:

It has been proposed by NTPC Limited, to retrofit of ESPs for ESP R & M 4X210MW (U#1,2,3&4) at Kahalgaon STPP, Bhagalpur, Bihar. NTPC Limited has entrusted **M/s Bharat Heavy Electricals Limited, Power Sector Eastern Region, DJ-9/1, Salt Lake City, Kolkata – 700 091** for execution of the project. A detailed geotechnical investigation was needed for this purpose and M/s Bharat Heavy Electricals Limited has entrusted M/s **Centre for Advanced Engineering of 59/2, Bangur Avenue, Block-C, Kolkata – 700055** as Geotechnical Consultant for carrying out Geotechnical Investigation and to provide recommendation for foundation system.

Location:

The proposed site is located at **Kahalgaon STPP, NTPC, Bhagalpur, Bihar.**

B 📖 Scope of Investigation:

B1. Field Investigation:

Scope of field investigation work was indicated by **Bharat Heavy Electricals Limited** vide LOI No. : PSER:SCT:KGN-C1874:18:LOI:6521 dated: 16-02-2018. It consists of sinking of twenty two (22) boreholes and two (2) Electrical Resistivity Tests.

B2. Laboratory Test:

Scope of laboratory test consists of determination of Bulk Density, Dry Density, Moisture Content, Sieve Analysis, Hydrometer Analysis, Liquid Limit & Plastic Limit, Shrinkage Limit, Specific Gravity, Swell Pressure and Free Swell Index, Relative density, Unconfined



Compressive Strength, Direct Shear Test, Triaxial Shear Test – (UU, CU,CD), Consolidation Test, Standard Proctor Compaction Test, Chemical Test on Soil Sample and Chemical Test on Water Sample.

B3. Recommendation of Foundation System:

Scope of work consists of analysis of soil characteristics based on result obtained from field exploration and laboratory test, recommendation of suitable foundation system.

C. Description of Subsoil:

The location of boreholes is shown in the enclosed sketch no: **1-726-25-56-025 (Rev.01)**. The bore-log indicates the sub-soil condition encountered during field investigation considering laboratory test results on disturbed and undisturbed soil samples as well as soil samples obtained from split spoon of the Standard Penetration Test (SPT) apparatus. The SPT values (N Values) are indicated in the corresponding bore-log.

Sub- soil profile of the site

The entire area is divided into 3 zones as follows:-

1. Zone 1 – Ash Silo:-

Total four boreholes were sunk in this area, viz borehole marked BH-15, BH-16, BH-17 & BH-18. The sub-soil profile up to explored depth is shown in Sketches No SK/BHEL-NTPC-KAHALGAON/ASH SILO/1582/02/1 of 2 and SK/ BHEL – NTPC - KAHALGAON/ ASH SILO/1582/02/2 of 2. This sketch shows the subsoil profile through BH-15, BH-17, BH-18 and BH-17, BH-18 respectively.

The summary of subsoil profile as encountered during field exploration is indicated below:-

Stratum	Description	Range of Thickness (Mtr)	Range of N-Value
	Filled up soil	0.0 to 1.50	---
I	Medium to stiff brownish grey clayey silt/ silty clay	11.0 to 18.5	6 to 16
II	Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.	19.0 to 24.5	17 to 52
III	Dense to very dense yellowish grey silty sand.	1.0 to 7.5	40 to 55



2. Zone 2 – ESP Unit Area:-

Total fourteen (14) boreholes were sunk in this area, viz borehole marked BH-1, BH-2, BH-3 BH-4, BH-5, BH-6, BH-7, BH-8, BH-9, BH-13, BH-14, BH-19, BH-20 & BH-22. The sub-soil profile up to explored depth is shown in Sketches No SK/BHEL-NTPC-KAHALGAON/ESP UNIT AREA/1582/02/1 of 5 to SK/BHEL-NTPC-KAHALGAON/ESP UNIT AREA/1582/02/5 of 5.

The summary of subsoil profile as encountered during field exploration is indicated below:-

Stratum	Description	Range of Thickness (Mtr)	Range of N-Value
	Filled up soil	0.0 to 1.50	---
I	Medium to stiff brownish grey clayey silt/ silty clay	10.0 to 18.5	4 to 16
II	Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.	22.50 to 29.0	14 to 68
III	Dense to very dense yellowish grey silty sand.	1.0	51 to 56

3. Zone 3 – Chimney Area:-

Total four (4) boreholes were sunk in this area, viz borehole marked BH-10, BH-11, BH-12 & BH-21. The sub-soil profile up to explored depth is shown in Sketches No SK/BHEL-NTPC-KAHALGAON/CHIMNEY AREA/1582/02/1 of 2 to SK/BHEL-NTPC-KAHALGAON/CHIMNEY AREA/1582/02/2 of 2.

The summary of subsoil profile as encountered during field exploration is indicated below:-

Stratum	Description	Range of Thickness (Mtr)	Range of N-Value
	Filled up soil	0.0 to 1.50	---
I	Soft brownish grey clayey silt/ silty clay	2.50 to 4.50	3
II	Medium to stiff brownish grey clayey silt/ silty clay with traces of kankar.	8.50 to 13.50	4 to 15
III	Very stiff to hard brownish grey clayey silt/ silty clay with traces of kankar.	22.50 to 26.00	16 to 70