

STANDARDISED FIELD QUALITY PLAN

Item	Sub-Station Switchyard Erection
Applicability	Projects
Date of Issue	14-09-2022

SFQP No.	DOC No.: C/FQA/SFQP/Switchyard Erection
REV.	02

S. No.	Description of Activity	Items to be Checked	Tests/Checks to be done	Reference/ Acceptance documents	Agency	Extent	Counter check by POWERGRID	Accepting authority in POWERGRID
A	Receipt							
1.		All Equipment and material	- Completeness of Material to be checked as per CIP - Physical/ visual check for transport damage or any other surface issues.	Technical specification / approved BOQ/ CIP in, Packing List	Contractor	100%	100%	Site Engineer
2.		AI Tube, Conductor	Dimensional Check & Visual check for any deformation/ blackness	Technical specification / approved BOQ/CIP	Contractor	100%	random	Site Engineer
3.		Circuit breaker	Ensure Positive pressure	-do-	Contractor	100%	100%	Site Engineer
4.		Current Transformer	Oil Level check/oil leakage check/SF6 pressure, if applicable	At oil level indicator/ complete CT/ SF6 gauge, if applicable	Contractor	100%	100%	Site Engineer
5.		Capacitive Voltage transformer/HT Capacitors	Oil Level check/oil leakage check	At oil level indicator/complect e CVT or HT Capacitors	Contractor	100%	100%	Site Engineer
6.		Cables and Conductors	Sealing check, End cap in cables	CIP	Contractor	100%	random	Site Engineer



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B	Storage/ Preservation							
	General							
1.			Any special condition for storage in equipment manual to be ensured.	Instruction manual/ Technical specification	Contractor	100%	random	Site Engineer
2.			All fragile items are kept in container to avoid any damage	-do-	-do-	-do-	-do-	-do-
3.		All equipment's	- Outdoor equipments shall be covered with waterproof and dustproof covers to protect them from water seepage and moisture ingress. - All indoor equipments including control & protection panels, Communication equipments and operating mechanism boxes, current carrying parts (Finger contacts) of isolators etc. of outdoor equipments shall be stored indoors	Instruction manual/ Technical specification	Contractor	100%	100%	Site Engineer



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			- Further, all equipments with polymer insulators/ housings, shall be provided with rodent proof arrangement (Preferably covered with stainless steel mesh)					
4.		Handling in storage:						
5.		Name & Rating plates	Identification marks or tags should be intact.	Instruction manual/ Technical specification	Contractor	100%	random	Site Engineer
6.			Systematic storing to facilitate easy removal and proper handling. Heavy items are not stored one above the other	-do-	-do-	-do-	-do-	-do-
7.	Equipment Specific							
8.		Main/ Auxiliary Structure:	- Structures are not laid directly on the ground. - They are stacked to avoid direct contact with soil or water. - Galvanizing. is not damaged during storing. - Hardware's are stored indoor.	-do-	-do-	-do-	-do-	-do-



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9.		Current Transformer and Capacitor Voltage Transformer	- CTs & CVTs are stored on raised platform as per Manufacturer's recommendation preferably in vertical condition - CTs & CVTs are under suitable packing.	Instruction manual/ Technical specification	Contractor	100%	100%	Site In-charge
10.		Isolators	Isolators are stored on raised platform	Instruction manual/ Technical specification	Contractor	100%	random	Site Engineer
11.		Lightning Arrestor	- Arrestors are stored properly to prevent the wood or cases getting damaged by rain or sun. - Storage of SA should be in vertical condition. - Counters and Corona rings & supports are safely stored indoor.	-do-	-do-	-do-	-do-	-do-
12.		Marshalling Box/ Junction Box	To be kept vertically. Stored in covered shed protected from sun, rain, dust and fire. Panels are not in direct touch with ground.	-do-	-do-	-do-	-do-	-do-
13.		Clamps and Connectors	Clamps & connectors are to be stored in a dry place	-do-	-do-	-do-	-do-	-do-



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14.		Battery and Battery Charger	- Batteries and accessories are to be stored indoor. - Each cell to be packed & stored in a dry & covered place - Battery should be stored as per OEM manual. Prolonged storage of VRLA battery without trickle charge should be avoided. On receipt if Bulge in battery is observed, same shall be reported to OEM.	-do-	-do-	-do-	-do-	Site In-charge
15.		Insulators and Hardware's including Bus Post Insulator	To be stored in a dry place	-do-	-do-	-do-	-do-	Site Engineer
16.		EWire, Cables, Conductors, OFC & OPGW	To be stored in a dry place.	-do-	-do-	-do-	-do-	-do-
17.		Aluminum Tubes	AI IPS tube shall be stored above ground in dry area to avoid blackening of the same.	-do-	-do-	-do-	-do-	-do-
18.		Circuit Breakers	To be stored outdoor area on raised platform	-do-	-do-	-do-	-do-	-do-



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19.		Control and Relay Panel PLCC, LT Switchgear	Stored in covered shed protected from sun, rain, dust and fire. Panels are not in direct touch with ground.	-do-	-do-	-do-	-do-	Site Engineer
20.		Coupling Device	Couplings are stored in a dry place accessible for handling.	-do-	-do-	-do-	-do-	-do-
21.		Telephone Sets	Telephone sets are stored in a dry & covered place in packed condition.	-do-	-do-	-do-	-do-	-do-
22.		Coaxial Cable	Cables are stored in a dry area and accessible for handling.	-do-	-do-	-do-	-do-	-do-
23.		Wave Trap	WTs stored in a dry area properly	-do-	-do-	-do-	-do-	-do-
24.		Consumable items like transformer oil, SF6 gas	Stored in a dry area with oil drums in horizontal position/ SF6 gas cylinders shall be preferably stored indoor in dry area.	-do-	-do-	-do-	-do-	-do-
C	Pre-Erection							
1.		Documents:	Check the availability of following documents: - Erection Manuals of equipments/ Erection Key diagram / BOM/ Packing List/ Appd layout drawing/ DSLP	Technical Specifications/ Manufacturers Manual/ Approved drawing	Contractor	100%	100%	Site In-charge



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			(Direct stroke lightning protection) Layout - GA drawing/ Earthing scheme/ Factory test certificates for all equipments, cable schedule					
2.		Checks for the Equipment's:	- Completeness of individual assemblies. - Physical condition of equipment's. Cleanliness of equipment before & after assembly. - Cleanliness of terminals/ Al tubes/earthing conductors/ clamps and connectors. - Structure erection as per approved Layout	-do-	-do-	-do-	-do-	Site Engineer
3.		Welding of Al tube:	- Ensure conformity of electrode as per Tech. Specification. - Ensure that Welder qualification test for welding & bending procedure is done and approved before actual welding & bending work is taken up for Aluminum Tube.	-do-	-do-	-do-	-do-	-do-



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4.		Testing kits/ Instruments	Availability of relevant testing kits/Instruments needed for various Equipments and its valid calibration Certificate	Technical Specification/ Manufacturer's Manual/ Approved drawing/Pre-commissioning procedure	Contractor	100%	100%	Site Engineer
5.		Structure	Availability of reqd. H/W, foundation Bolts, earthing strips/flats/Rods etc. prior to erection.	Technical Specification / Manufacturer's Manual/ Approved drawing	Contractor	100%	100%	-do-
D	ERECTION							
		General Check						
1.			- Documentation regarding carrying out of Pre-layout survey, various connected levels, position of equipments. - Proper availability of required tools & tackles, assemblies & components.	-do-	-do-	-do-	-do-	-do-



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			- All T&P equipments including man lifts shall have valid third-party inspection certificate - Alignment of structures, grouting on bolts & nuts, Positioning of associated equipments. - Ensure handling of Equipment as per instruction manual. - Check of Clearance between phases and phase to earth w.r.t design value. - Erection of equipments strictly as per approved drawing. - Earthing scheme and earthing of various equipments.					
2.		Circuit Breaker	- Check Erection of breaker under supervision of OEM & tightening of bolts for CB & structure - Correctness of Phase Sequence. - Wire & Bus connections Cable terminations & electrical continuity. - Leakage test of SF6 gas.	-do-	-do-	-do-	-do-	Site In-charge
				-do-	-do-	-do-	-do-	Site Engineer



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3.		Current Transformers:	- Check of Earthing connections. - Before erection, the foundation/ structure level of the CT needs to be adjusted properly w r t corresponding equipment height, so as to avoid stress on CT primary terminal, which often result in leakage - Check any defect in primary & secondary terminals. - Ensure erection of CTs as per instruction manual. - Tightening of bolts & nuts as well as earthing connections with earth mat. - Correctness of polarity & level w.r.t. Al tube Connection - Selection of proper ratio. - Check oil level/ SF6 Gas Pressure - Physically open the bellow cover and check the oil in bellow (if applicable) - Ensure single point earthing of neutral for all secondary cores.	Technical Specification / Manufacturer's Manual/ Approved drawing	Contractor	100%	random	Site Engineer



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4.		Capacitor Voltage Transformer	- Ensure Erection as per Instruction Manual. - Check orientation of base with support structure - Verify SI No of each stack in same phase - Check wiring of secondary terminal & earthing of terminal - Ensure base wire removed from primary and HF terminals of tank. - Check oil level in tank. - Alignment check after assembly of stacks. - Ensure single point earthing of neutral for all secondary cores	Technical Specification / Manufacturer's Manual/ Approved drawing	Contractor	100%	100%	Site engineer
5.		Isolators	- All Erection activities under supervision of OEM - Check Erection of structure done as per approved drawing - Installation of base insulator support horizontality of flange.	-do-	-do-	-do-	-do-	Site In-charge
				-do-	-do-	-do-	-do-	Site engineer



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			- Installation of lever Plates Coupling cross tandem assembly - Correct assembling of operating mechanism - Check for interlock with earth switch - Correctness of phase sequence & connections of isolators - Alignment Check of Isolator arms, male and female contacts - Check of arm rotation in line with approved drawing					
6.		Lightning Arrestor:	- Check Cleanliness of arrestor. - Ensure erection done as per instruction manual. - Ensure erection of surge monitor done as per approved drawing - Ensure proper care has been taken to avoid Corona rings striking the porcelain/ polymer. - Ensure orientation of explosion vent away from the equipment - Verify Sl. No. of each stack in same phase.	-do-	-do-	-do-	-do-	Site engineer



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			- Alignment check.					
7.		Aluminum Tube Welding & Bending:	- Measure ID & OD of the Aluminum tube to ensure minimum thickness as per specification - Alignment of Al tube before welding. - Ensure Bending of Aluminum Tube is done as per approved and manufacturer recommended procedure. - Ensure adequate electric clearance after erection of Al Tube - Ensure safety of porcelain items before & after welding - Dye Penetration test, MV drop test, Radiography test of weld joints. - Use proper bending arrangement to avoid crack in Al tube.	-do-	-do-	-do-	-do-	Site engineer



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8.		Stringing	- Check Insulator strings & hardware. - Check tension/ Sag of spans - Clamping of conductors & tightening of clamps. - In case of polymer insulator verify end sealing.	Technical Specification / Manufacturer's Manual/ Approved drawing	Contractor	100%	random	Site engineer
9.		Control and Relay Panel/PLCC and BMK (Bay Marshalling Kiosk)	- Foundation & level check - Erection of Panel as per approved layout. - Alignment of Panel - Ensure that BMK Foundation should not fall with cable trench	-do-	-do-	-do-	-do-	-do-
10.		Support Insulators:	- Check that installations of insulator stacks over columns and the bolts are tightened properly. - Alignment check.	Technical Specification / Manufacturer's Manual/ Approved drawing	Contractor	100%	100%	-do-
11.		Cable Laying	- Check for cable Trays/support and routing - Check IR value before laying. - Check availability of drum jack.	Technical Specification / Manufacturer's Manual/	Contractor	100%	random	-do-



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			- Rollers are used so that there is no damage to cable - Check for absence of sharp objects/bends in the route. - Check the bend radius & provision of extra length of cable. - Check for difference in IR values before and after laying. - Check for Cable tags at appropriate distances/ before & after entry points and outside & inside panels. - Ensure that power and control cable should be laid on different tier/rack. Power cables shall be laid on top tier/rack of cable trench - Fibre cable shall be laid in GI pipe. At bending points, flexible GI pipe shall be installed - Ensure proper sealing of doors to avoid dust ingress & cooling loss - Ensure proper sealing of cable trench with covers	Approved drawing				
12.		Switchyard Panel Room		Technical Specification / Manufacturer's Manual/	Contractor	100%	100%	Site In-charge



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			- Ensure laying of insulating mat at all side of panel openings as per specification	Approved drawing				
13.		Earthing	- Earthing of Control Room, Switchyard panel room, Cable trench, fencing & other switchyard equipments to be ensured in line with approved drawing	-do-	-do-	-do-	-do-	Site engineer
14.		Bay Marking	- Bay marking to be done in line with approved drawing - Earthing of bay marking board to be ensured	-do-	-do-	-do-	-do-	-do-
15.		Earth mat Fabrication and laying	Dimensions and Welding	Approved Procedure & recommended welding electrode and Approved earthing drawing.	Contractor	100%	random	-do-

Notes:

1. Ensure availability of CIP along with Test reports for all equipment's/items received at site.
2. Ensure availability of Instruction Manuals of equipment's.



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REV.	02	

3. Ensure availability of latest versions of approved Drawings.
4. Ensure usage of calibrated testing and measuring equipment's
5. Transit damages, Shortages and visual defects to be informed to supplier along with a copy to Corporate QA&I. In case of damage OEM needs to be contacted and No rework is permitted on polymer if damage is from at core
6. In case of damaged packing/ open delivery, LR should be suitably endorsed.
7. While storing the material in the stores care to be taken for easy accessibility
8. For civil works, the latest SFQP for Switchyard civil works shall be followed.
9. In case of any conflict between Standard Field Quality Plan and Technical Specification, the provisions of Technical Specification shall prevail.

