



STANDARD FILED QUALITY PLAN
for
AC & HVDC Substation
Equipments



Power Grid Corporation of India Ltd.
Saudamini, Plot no.2, Sector-29, Gurgaon, Haryana 122 001
Standard Field Quality Plan for AC & HVDC Substation Equipment

प्रस्तावना

PREFACE

The Standard Field Quality Plans (SFQPs) for various erection activities during construction of Sub-stations were issued by Corporate QA&I department during 2011 and 2012. SFQPs are not available for HVDC and SVC/STATCOM installations.

After 2011, there have been various changes in equipment's manufacturing, evolvement of various design practice, technical specifications, General Technical Requirement, Indian & International standards, Contract conditions and feedback of the Sites/Region etc. Keeping in view of these changes, revision of the available SFQPs and preparation of new SFQPs (HVDC and SVC/STATCOM) have become inevitable for smooth execution of projects by executing agencies and site executives to execute the work with best quality standards with in the specified project timeline.

For the Updation of existing and preparation of new SFQPs, a committee consisting of following members was approved by the competent authority.

- i. **Sh. Mohd Mohsin, Sr. GM, FQA, CC**
- ii. Sh. Rajneesh Tiwari, Sr. GM, AM, WR-I
- iii. Sh. B. Sridhar, GM (Kolar), SR-II
- iv. Sh. R. P. S. Rana, GM, AM, CC
- v. Sh. Mahendra Singh Hada, DGM, CC-Engineering S/S
- vi. Sh. Narendra Kumar, DGM, CC-Engineering HVDC

The committee under valuable guidance of **Sh. P. Jayachandran, ED (Engg-HVDC, QA&I and FQA)** has discussed various checks and activities involved in receipt, storage, pre-erection & erection of equipments and pre-commissioning aspects related to Transformer and Reactors, GIS, Switchyard Erection and Station auxiliaries with respect to the latest technical specifications, Controlled documents vis-à-vis best engineering practice involving practical aspects of execution of the projects and reviewed before finalization of their recommendations on revision of existing and new SFQPs. The SFQPs have been approved by the Competent Authority for implementation. Copy of the Standard Field Quality Plans (SFQPs) have been uploaded on POWERGRID website <https://apps.powergrid.in/IMS/50-0001-002.aspx> for ready reference.



Standard Field Quality Plans of Sub-Stations (Erection)

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STANDARDISED FIELD QUALITY PLAN

Item	Transformers & Reactors (including converter/interface transformer)
Applicability	Projects
Date of Issue	14-09-2022

SFQP No.	DOC No.: C/FQA/SFQP/Transformer & Reactors
REV.	01

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.		Main Unit of Transformer & Reactor	Visual/Physical Check. Verification of Serial No w.r.t. dispatch documents	Technical specifications/ Manufacturer's manual/Pre-commissioning document	Contractor	100%	100%	Site Engineer
2.			Impact Recorder Analysis		-do-	-do-	-do-	-do-
3.			Verification of CIP/Factory Acceptance Test reports/ Dispatch documents		-do-	-do-	-do-	-do-
4.			Check the insulation between Core Clamp, Core Lamination & Ground (CC&CL)		-do-	-do-	-do-	-do-
5.			N2/Dry Air gas pressure & Dew Point reading in Main tank and Gas cylinder		-do-	-do-	-do-	-do-
6.		Bushings/ Bus Post Insulators / NGR/ NGR-Surge Arrestor/	Visual/Physical Check Verification of Serial No w.r.t. dispatch documents (if applicable)	-do-	-do-	-do-	-do-	-do-
7.		Turret/Tank CT & Terminal box/ Corona Rings/ Clamps & Connectors	Verification of CIP/FAT reports/ Dispatch documents		-do-	-do-	-do-	-do-
		Component & Accessories	Visual/Physical Check	Technical specifications/ Manufacturer's	-do-	-do-	-do-	-do-



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9.			Identification marking/ make to verify with ref. to CIP/FAT reports & Dispatch documents	manual/Pre-commissioning document	Contractor	100%	100%	Site Engineer
10.		Transformer oil	Visual/Physical Check	-do-	-do-	-do-	-do-	-do-
11.			Verification of CIP/FAT reports/ Dispatch documents	-do-	-do-	-do-	-do-	-do-
12.			Testing of oil	-do-	-do-	-do-	-do-	-do-
B	Storage/ Preservation							
1.		Main unit of Transformer & Reactors	Visual check for proper storage	Technical specifications / manufacturer's instruction manual	-do-	-do-	-do-	-do-
2.			Ensure readiness of Foundation prior to receipt of Main Unit	-do-	-do-	-do-	-do-	Site In-charge
3.			Storage and preservation to ensure for no damage	-do-	-do-	-do-	-do-	Site Engineer
4.		Component & Accessories	Visual check for proper storage	-do-	-do-	-do-	-do-	-do-
5.			Storage and preservation to ensure for no damage	-do-	-do-	-do-	-do-	-do-
6.		Transformer oil	No leakage/ damage of drums / flexi bag / tanker	-do-	Contractor	100%	100%	Site Engineer
7.			Intactness of sealing of drums	-do-	-do-	-do-	-do-	-do-



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8.			Check that drums are stored in protected area and their openings are horizontal to the ground	-do-	-do-	-do-	-do-	-do-
9.			Oil in container with flexi bags (if applicable) are to be stored on the levelled ground	-do-	-do-	-do-	-do-	-do-
10.		General checks	Check that bushings are stored in respective cases in protected area under shed. Bushing to be stored horizontal condition with oil level gauge facing Upwards or as per manufacturer's recommendations.	-do-	-do-	-do-	-do-	-do-
11.		RIP Bushing	Ensure positive dry air pressure if metal housing filled with dry air/N2 OR Check for oil leakage in case of oil filled metal housing	-do-	-do-	-do-	-do-	-do-
12.		Marshalling Box	Check that the marshalling boxes are Stored vertically in their respective cases in protected area without water logging	-do-	-do-	-do-	-do-	-do-
13.		Main Accessories temporary storage	Check that the support pipe & turrets are stored in respective cases where there is no water logging, also check pipes, turret, radiators etc. for tightness of their blanking plates	-do-	-do-	-do-	-do-	Site Engineer
14.			Visual check for proper storage	-do-	Contractor	100%	100%	Site Engineer



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15.		Bus post insulators/ NGR/ NGR-Surge Arrestor/ Turret/Tank mounted CT/ Corona Ring/ Clamps & Connectors	Storage and preservation to ensure for no damage	-do-	-do-	-do-	-do-	-do-
C	Pre-Erection Tests/Checks							
1.		Availability of approved drawings & Tech data (latest revision)/ Approved test procedure (if any)	Verifications of all the specified documents	Contract Documents and POWERGRID's issued documents	-do-	-do-	-do-	-do-
2.		Site Preparation	Completeness of site including unloading facilities for taking up erection work	Contract Agreement	-do-	-do-	-do-	-do-
3.		Oil Filtration Plant	Ensure suitable capacity of plant, cleanliness of filters, healthiness of Vacuum pump/heater circuit/hose pipes and sufficient size of power cable	Technical specifications	-do-	-do-	-do-	Site In-charge



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4.		Dry-Air Generator	Ensure availability of Dry Air Generator during internal inspection and other erection activities	Pre-commissioning documents / Manufacturer's manual	Contractor	100%	100%	Site In-charge
5.		Pre-Erection Survey	Check that the pre-erection survey is carried out to ensure that transformer/reactor bay is ready in all respect and verify the position of various equipment's to be connected as per drawing, level of plinth/rails, size position lay out of cable trenches etc.	Technical specifications/Approved drawing	-do-	-do-	-do-	-do-
6.		Joint internal inspection of main tank before erection	Internal inspection should be preferred in Dry and sunny weather in accordance with Manufacturer's instruction manual	Technical specifications/ approved drawing, manufacturer's manual and latest pre-commissioning documents	-do-	-do-	-do-	-do-
			Dry air should be continuously supplied into the transformer while the access cover is being removed, and whenever anyone is inside	-do-	-do-	-do-	-do-	-do-



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8.			Visual check of wedging of Core & Coils, Gaps between Core, body, frame etc. Check condition of Core & winding in general. Check presence of any foreign objects. Any other checks (if applicable)	-do-	Contractor	100%	100%	Site In-charge
9.		Availability of tools and plant	Check availability of tools and plants and valid test certificate	Technical specifications/Pre-commissioning documents/Manufacturer's manual	-do-	-do-	-do-	Site Engineer
10.		Insulating Oil (Before filtration)	<ul style="list-style-type: none"> • BDV & PPM • Tan Delta at 90 deg C • Any other test (if applicable) 	Technical specifications /FAT	-do-	-do-	-do-	-do-
11.		Main Equipment and Accessories	Check the availability of the gasket before erection	Technical specifications / Manufacturer's manual	-do-	-do-	-do-	-do-
12.			Check that the components to be mounted are cleaned with dry Cloth ensuring that no loose fibers are left.	-do-	-do-	-do-	-do-	-do-



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13.			Check that all the pipes/valves/pumps to be mounted are free from rust and dust.	-do-	Contractor	100%	100%	Site Engineer
14.		Oil Storage Tank	Ensure cleanliness and purging/breather arrangement (if applicable) of Storage Tank before pushing of oil	-do-	-do-	-do-	-do-	-do-
15.		Bushing	<ul style="list-style-type: none"> • Oil level check • Measurement of C & Tan Delta of Bushing prior to erection 	-do-	-do-	-do-	-do-	-do-
16.		Tank and Turret mounted CTs	<ul style="list-style-type: none"> • Insulation Resistance between secondary winding & earth and between windings • Secondary winding Resistance • Polarity • Ratio and Knee Point 	-do-	-do-	-do-	-do-	-do-
D Erection Tests/Checks								
1.		Main Unit of Transformer and Reactor	<p>All the checks as mentioned in the referred documents.</p> <p>Check all rollers are locked and tack welded with rails if unit is placed on roller, alternatively</p> <p>Check tightness of bolt if main unit placed directly on foundation and not on rollers</p>	Technical specifications / Manufacturer's manual/ Pre-commissioning documents	-do-	-do-	-do-	-do-



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2.		Components and accessories including Bushings, Body Protection, Conservator, Cooling system etc.	All the checks as mentioned in the referred documents	-do-	Contractor	100%	100%	Site Engineer
3.		Vacuum cycle/ Leak test	Procedure as per referred docs. (Vacuum gauge to be mounted at the top of the tank) & Vacuum shall be 1 Millibars or less	-do-	-do-	-do-	-do-	-do-
4.		Dry Air cycle	Procedure as per referred docs.	-do-	-do-	-do-	-do-	-do-
5.		Insulating Oil (After filtration in storage Tank)	<ul style="list-style-type: none"> • BDV & PPM • Tan Delta at 90 degC • Interfacial tension at 27 degC 	-do-	-do-	-do-	-do-	Site In-charge
6.		Oil filling under vacuum	Procedure as per referred documents	-do-	-do-	-do-	-do-	-do-
7.		Oil Leakage Checks	Visual Inspection	-do-	-do-	-do-	-do-	Site Engineer
8.		Particles in Oil	Particle analysis shall be carried out in oil sample taken after completion of oil purification at site.	-do-	-do-	-do-	-do-	Site Engineer



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9.		Insulating Oil (After filtration in Main Tank)	<ul style="list-style-type: none"> • BDV & PPM • Tan Delta • Total Gas content • Resistivity • Interfacial tension • Oxidation stability • Total PCB (polychlorinated biphenyls) content (Separate oil sample shall be taken and test results shall be submitted within 45 days after commissioning) 	-do-	Contractor	100%	100%	Site In-charge
10.		Touch up paint	Touch up paint wherever required to be done before commissioning	-do-	-do-	-do-	-do-	Site Engineer
E	Pre-Commissioning Tests/ Checks							
	General							
1.			All pre-commissioning activities as per referred documents	Technical specification/ Manufacturer's manual/ Pre-commissioning documents	-do-	-do-	-do-	Site In-charge
2.			All valves as per schedule	-do-	-do-	-do-	-do-	Site Engineer
3.			Canopy on Buchholz, PRD, SPR etc.	-do-	-do-	-do-	-do-	Site In-charge
4.			Operation of Emulsifier system	Station auxiliary SFQP document	-do-	-do-	-do-	Site In-charge



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Checks/ Tests for other areas/ equipment's								
5.		Earth Resistance	Earth Resistance measurement	To ensure value of earth resistance below 1 ohm	Contractor	100%	100%	Site In-charge
6.		Neutral formation (in case of 1-phase units)	Check the formation of neutral as per approved drawing.	Technical specification/ Approved drawings	-do-	-do-	-do-	-do-
7.		Delta formation (in case of 1-phase units)	<ul style="list-style-type: none"> • Check the formation of Delta as per approved drawing. • Ensure application of Insulation sleeve on Delta Bus • Ensure application of Insulation tape on Jumper connection of Delta Bus. 	Technical specification/ Approved drawings	-do-	-do-	-do-	-do-

Notes:

1. This FQP shall be read in conjunction with respective contract technical specification. In case of any contradiction between this FQP and technical specification the later will prevail.
2. This standard Field Quality Plan is not to limit the supervisory checks which are otherwise required to be carried Out during execution of work as per drawings / technical specifications etc. Photo/Video of important parts/connections to be taken at the time of internal inspection of main tank of the transformer and Reactors and preserved for future reference. Circulation of dry air should be maintained during internal inspection.
3. Contractor shall be responsible for implementing/documenting the FQP. Documents shall be handed over by the contractor to POWERGRID after the completion of work.



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4. Storage at site should be as minimum as possible and to ensure this, the pre-erection activity should be completed in time i.e. transformer/ reactor foundation should be kept ready before the transformer tank is received so that it can directly be placed on the foundation without any intermediate stage.
5. Relevant Instruction Manual for specific manufacturer shall be referred, wherever manufacturer instruction manual is indicated in the Field Quality Plan.
6. All testing Instruments used shall be duly calibrated from NABL / BIS accredited Laboratory.
7. Transit damages, shortages and visual defects to be informed to supplier along with a copy to Corporate QA&I department.
8. In case of damaged packing/ open delivery, LR Should be suitably endorsed.
9. The filter machine of suitable capacity (preferably 10 KL), suitable for treatment of oil in EHV class Transformer/ Reactor should have a capacity of Vacuum as specified in the pre commissioning documents at rated flow and at final Stage. The processing temperature shall be automatically controlled.
10. After receiving the accessories at site, same should be inspected and kept ready for immediate action.
11. If the erection work cannot start immediately due to some reasons, then accessories should be packed into their own cases properly and packing list should be retained. Proper storage as per instructions of manufacturer to be ensured.
12. All packing should be kept above ground with suitable supports so as to allow free flow underneath. The storage space area should be such that it is accessible for inspection, water does not collect on or around the area and handling/transport should be easy. Immediately after receipt of the main unit and also the accessories, same should be inspected and if found satisfactory, the unit should be erected completely and filled with processed transformer oil as per guidelines given in the instruction manual.
13. Critical items like cooler bank control panel/RTCC/Buchholz relay/PRD etc. are to be stored in a closed shelter to protect them environmental effect on performance.
14. It is preferable to store the main unit on its own location/ foundation. If the foundation is not likely to be ready/not in position of erection and commissioning, for more than three months, Manufacturer's recommendation shall be followed, if not filled with oil.
15. For civil works, the latest SFQP for Switchyard civil works shall be followed.
16. In case of any conflict between Standard Field Quality Plan and Technical Specification, the provisions of Technical Specification shall prevail.



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Item	Sub-Station Switchyard Erection
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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.		Al 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/comple t 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.		All equipment's	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.			- 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:	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Isolators are stored on raised platform 	Instruction manual/ Technical specification	Contractor	100%	random	Site Engineer
11.		Lightning Arrestor	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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.		E/Wire, Cables, Conductors, OFC & OPGW	To be stored in a dry place.	-do-	-do-	-do-	-do-	-do-
17.		Aluminum Tubes	<ul style="list-style-type: none"> - Al 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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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
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



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
			(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/ Manufacturers 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.			<ul style="list-style-type: none"> - 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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			<ul style="list-style-type: none"> - 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	-do-	-do-	-do-	-do-	Site In-charge
			<ul style="list-style-type: none"> - Correctness of Phase Sequence. - Wire & Bus connections Cable terminations & electrical continuity. - Leakage test of SF6 gas. 	-do-	-do-	-do-	-do-	Site Engineer



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			- Check of Earthing connections.					
3.		Current Transformers:	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	-do-	-do-	-do-	-do-	Site In-charge
			<ul style="list-style-type: none"> - Check Erection of structure done as per approved drawing - Installation of base insulator support horizontality of flange. 	-do-	-do-	-do-	-do-	Site engineer



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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
			<ul style="list-style-type: none"> - 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:	<ul style="list-style-type: none"> - 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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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
			- Alignment check.					
7.		Aluminum Tube Welding & Bending:	<ul style="list-style-type: none"> - 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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Date of Issue	14-09-2022

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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
8.		Stringing	<ul style="list-style-type: none"> - 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)	<ul style="list-style-type: none"> - 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:	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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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			<ul style="list-style-type: none"> - 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 	Approved drawing				
12.		Switchyard Panel Room	<ul style="list-style-type: none"> - Ensure proper sealing of doors to avoid dust ingress & cooling loss - Ensure proper sealing of cable trench with covers 	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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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.



STANDARDISED FIELD QUALITY PLAN

Item	Gas Insulated Sub-Station (GIS)
Applicability	Projects
Date of Issue	14-09-2022

SFQP No.	DOC No.:
	C/FQA/SFQP/GIS
REV.	01

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	Site Check							
1.		Site Preparation	Site Foundation base - Check Difference part by part	Physical check	Contractor	100%	100%	Site Engineer
2.			Horizon and flatness of foundation base- As per Manufacturer recommendation	-do-	-do-	-do-	-do-	-do-
3.			Levelling of GIS Hall Finished floor level	-do-	-do-	-do-	-do-	-do-
4.			Completeness of all civil work for installation and removal of tools & fixtures	Approved Drawings/ Technical Specification/ Physical check	contractor	100%	100%	Site Engineer
5.			Check water seepage in GIS Hall	-do-	-do-	-do-	-do-	-do-
6.			Availability of EOT Crane facility	-do-	-do-	-do-	-do-	-do-
7.			Check Earthing Installation (GIS Main Earthing Grid and risers) as per earthing layout plan	-do-	-do-	-do-	-do-	-do-
8.			Sealing of Bus duct exits in the GIS hall's wall by suitable cover before/during installation of bus ducts	-do-	-do-	-do-	-do-	-do-
9.			Cable Trench fitted with appropriate covers.	-do-	-do-	-do-	-do-	-do-
10.			Completeness and installation of AHU and	-do-	-do-	-do-	-do-	Site In-charge



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Date of Issue	14-09-2022

SFQP No.	DOC No.:
	C/FQA/SFQP/GIS
REV.	01

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
			Ventilation system to ensure positive pressure and restrict dust.					
11.			Completeness of PEB (Pre-engineered building) /GIS Building as per drawings	-do-	-do-	-do-	-do-	Site In-charge
B Receipt								
1.			Checking of Material w.r.t. BOQ	BOQ/Packing list/CIP	Contractor	100%	100%	Site Engineer
2.			Visual check for transport damage, surface issues etc.	Physical check	Contractor	100%	100%	Site Engineer
3.			Availability of Manufacturer's Erection/ Installation Instructions manuals	-do-	-do-	-do-	-do-	-do-
4.			Availability of Factory Test Reports	-do-	-do-	-do-	-do-	-do-
5.			Check positive pressure of dry air, SF6 or N2 inside enclosure	-do-	-do-	-do-	-do-	-do-
C Unloading								
			Condition of Unloading rope	-do-	-do-	-do-	-do-	-do-
1.			Unloading hook for rope must be located at designated position	-do-	-do-	-do-	-do-	-do-
2.			Unloading in accordance with product docking & direction	-do-	-do-	-do-	-do-	-do-
D Storage/ Preservation								



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Date of Issue	14-09-2022

SFQP No.	DOC No.:
	C/FQA/SFQP/GIS
REV.	01

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
1.			Readiness of raised platform for storage of GIS material	Approved Drawings/ Technical Specification	Contractor	100%	100%	Site Engineer
2.			SF6 gas cylinder stored in provisional shed with adequate ventilation	Physical check/ Manufacturer's recommendation	Contractor	100%	100%	Site Engineer
3.			Protection covers for transportation not to be dismantled before assembly	Physical check	Contractor	100%	100%	Site Engineer
4.			Check positive pressure of SF6 or N2 gas inside enclosure.	Technical specifications/ Physical check/ Manufacturer's recommendation	Contractor	100%	100%	Site Engineer
5.			All GIS material to be suitably stored in such manner as to prevent damage by weather, corrosion, insects, vermin or fungal growth and to be kept on raised platform. Outdoor equipment shall be stored on open storage platform, properly covered with waterproof and dustproof covers to protect them from water seepage and moisture ingress. However, all indoor equipment's including control and protection	-do-	-do-	-do-	-do-	-do-



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SFQP No.	DOC No.:
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REV.	01

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
			panels, communication equipment's and operating mechanism boxes etc. of outdoor equipment's shall be stored indoor					
E	Pre-Erection Tests/ Checks							
1.			Maximum action distance of crane secured	Physical check	Contractor	100%	100%	Site Engineer
2.			Unpacking orders planned in the orders of installation and docking	-do-	-do-	-do-	-do-	-do-
3.			Availability of GIS drawings, consumable materials, gauges tools in good condition.	-do-	-do-	-do-	-do-	-do-
4.			Suitable preparation of installation site for rain and adverse weather conditions.	-do-	-do-	-do-	-do-	-do-
5.			GIS Hall must be sealed in all respect	-do-	-do-	-do-	-do-	Site In-charge
6.			GIS Hall must be compact/firm and Poly Urethane (PU) paint must be applied on floor	Physical check/ Technical specification/ Pre-commissioning document	Contractor	100%	100%	Site In-charge
7.			All transport packages containing critical unit viz. CB, VT shall be provided with sufficient number of impact recorders and Impact Recorders must be removed	Technical specifications/ Manufacturers data/ Pre-Commissioning documents	Contractor	100%	100%	Site Engineer



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Date of Issue	14-09-2022

SFQP No.	DOC No.:
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REV.	01

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
			and data must be reviewed for any abnormal shocks					
8.			Checking of pre-filled Dry Air/N2/SF6 gas positive pressure in GIS modules	-do-	-do-	-do-	-do-	-do-
9.			The GIS Hall needs to be in positive pressure	Technical specifications/ Pre-commissioning document	Contractor	100%	100%	Site Engineer
10.			Engineers and supervisors shall be certified/qualified to handle and supervise erection works of GIS	Pre-Commissioning documents	Contractor	100%	100%	Site Engineer
F Erection Tests/Checks								
1.			To be done as per installation manual/drawings	Approved drawings/Manufacturer's Installation Manual	Contractor	100%	100%	Site Engineer
2.			Check for pressure in gas compartment	Approved drawings	Contractor	100%	100%	Site Engineer
3.			Alignment checks for bus, GIB and structures and tightening of nuts & bolts.	Approved drawings/Manufacturer's Installation Manual	-do-	-do-	-do-	-do-
4.			All checks as per TS clause 24/as applicable for GIS	-do-	-do-	-do-	-do-	-do-
5.		Bus connection Installation	Check for pressure in gas compartment	Approved drawings/Manufacturer's Installation Manual	Contractor	100%	100%	Site Engineer
6.		Cabling	Check end to end continuity of pre-fabricated cable between Equipment to LCC.	-do-	-do-	-do-	-do-	-do-



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Date of Issue	14-09-2022

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REV.	01

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
7.			Check for installation of cable trays in different bays.	-do-	-do-	-do-	-do-	-do-
8.		Vacuum and Gas filling	Check required levels of vacuum and gas filling as specified	Pre-Commissioning documents/ Manufacturer's Installation Manual	Contractor	100%	100%	Site Engineer
9.			Verification of Pressure switch setting during SF6 Gas filling.	-do-	-do-	-do-	-do-	-do-
10.			Measurement of purity and moisture content inside the gas compartments under SF6-gas pressure	-do-	-do-	-do-	-do-	-do-
11.		Final Painting	Check anti-rust painting on welding part at site or damaged painting part	Manufacturer's Installation Manual	Contractor	100%	100%	Site Engineer
12.			Check final painting condition	-do-	-do-	-do-	-do-	-do-
13.			Check name plate, glass, earthing portion for any paint problem	-do-	-do-	-do-	-do-	-do-
14.		Earthing	Check Earthing Installation (including riser connection) as per earthing layout plan	Technical specifications/Approved drawings	Contractor	100%	100%	Site Engineer
15.			Earth Resistance Measurement	Technical specifications/Approved drawings/Pre-commissioning document	Contractor	100%	100%	Site Engineer



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Date of Issue	14-09-2022

SFQP No.	DOC No.:
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REV.	01

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
16.		Final Inspection	Check the connection state of main & middle earthing terminal	Approved drawing/ Technical specifications	Contractor	100%	100%	Site Engineer
17.			Check short connection state of space end and tank connection	-do-	-do-	-do-	-do-	-do-
18.			Check connection condition of cable of earthing terminal	-do-	-do-	-do-	-do-	-do-
19.			Check earthing state of local control panel	-do-	-do-	-do-	-do-	-do-
20.			Check connection state of cable earthing of main circuit	-do-	-do-	-do-	-do-	-do-
21.			Check removal status of CT 2 nd wiring common bar	-do-	-do-	-do-	-do-	-do-
22.		Locking device inspection	Check the smooth locking of lock pin of manual earthing switch	Physical check	Contractor	100%	100%	Site Engineer
23.		Valve Inspection	Check the close-open of gas valve according to drawing	-do-	-do-	-do-	-do-	-do-
24.			Check any SF6 Gas leakage	-do-	-do-	-do-	-do-	-do-
25.		Space Heater Inspection	Check for proper operation of space heater alongwith thermostat setting	-do-	-do-	-do-	-do-	-do-
26.		Miscellaneous	Check Maintenance ladder/Platform/walkaway	Physical check/m Approved drawing	Contractor	100%	100%	Site Engineer
27.			Check Phase Marking done properly or not	Physical check	Contractor	100%	100%	Site Engineer
28.			Check Illumination inside GIS Hall	Approved drawings	Contractor	100%	100%	Site Engineer



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Item	Gas Insulated Sub-Station (GIS)
Applicability	Projects
Date of Issue	14-09-2022

SFQP No.	DOC No.:
	C/FQA/SFQP/GIS
REV.	01

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
29.		Commissioning tests	Commissioning test as per referred documents	Pre-Commissioning documents/ Vendor commissioning formats approved by POWERGRID	Contractor	100%	100%	Site Engineer
30.	Handing over of Jointly signed Documents and reports to POWERGRID after final completion of commissioning procedure			Pre-commissioning documents/Technical specifications/Approved drawings etc.	Contractor	100%	100%	Site Engineer

Notes:

1. Ensure availability of CIP along with Test reports for all equipments/items received at site.
2. Ensure availability of Instruction Manuals of Manufacturer of equipments.
3. Ensure availability of approved Drawings released for the project.
4. Ensure usage of calibrated testing and measuring equipments. Records of each equipment shall be maintained.
5. Transit damages, Shortages and visual defects to be informed to supplier along with a copy to Corporate QA&I.
6. In case of damaged / open packing, delivery LR should be suitably endorsed.
7. Storage of material shall be done in accessible manner so that at any point of time physical verification/condition monitoring can be done before erection activities.
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.



STANDARDISED FIELD QUALITY PLAN

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

SFQP No.	DOC No:C/FQA/SFQP/AUXSS
REV.	Rev-01

S. No	Description of Activity	Items to be Checked	Tests/Checks to be done	Reference/Acceptance documents	Agency	Extent	Counter Check/Test by POWERGRID	Accepting authority in POWERGRID
A Receipt								
1		D.G Set along with Battery and Battery charger (Main + Standby)	Model, Type, quantity and CIP Check	Technical specifications/ approved BOQ/ CIP	Contractor	100%	100%	Site Engineer
2		LT Switchgear <ul style="list-style-type: none"> • LT Transformer • Main Switchboard • AC Distribution Board • DC Distribution Board 	Model, Type, quantity and CIP Check	-do-	-do-	-do-	-do-	-do-
3		Lighting System <ul style="list-style-type: none"> • Main Lighting Distribution Board • Emergency Lighting Distribution Board • Lighting Transformer • Lighting Fixture, Lighting panels and Lighting poles • Conduit, wires and cables 	Model, Type, quantity and CIP Check	-do-	-do-	-do-	-do-	-do-
4		Battery and Battery charger	Model, Type, quantity and CIP Check	-do-	-do-	-do-	-do-	-do-
5		Fire Protection	Model, Type, quantity	-do-	-do-	-do-	-do-	-do-



STANDARDISED FIELD QUALITY PLAN

Item	Sub-Station Auxiliary
Applicability	Projects
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		<ul style="list-style-type: none"> • Electric Motor Driven Fire water Pump • Diesel Engine Driven Standby Pump • Jockey Pump • Air vessel/Pneumatic Tank • Battery • Battery Charger • Control and Annunciation Panel • Extinguisher • Strainers • Heat/Smoke Detectors • Spray Nozzles • Instruments • Valves • Quartzoid bulbs • Wrapping and coating materials • Hose Pipes • Deluge valves • All other items 	and CIP Check					
6		MS/GI Pipe	OD, ID	-do-	-do-	-do-	-do-	Site Engineer



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S. No	Description of Activity	Items to be Checked	Tests/Checks to be done	Reference/ Acceptance documents	Agency	Extent	Counter Check/Test by POWERGRID	Accepting authority in POWERGRID
7		Air Conditioning system	Model, Type, quantity and CIP Check	-do-	-do-	-do-	-do-	-do-
8		Ventilation System <ul style="list-style-type: none"> • AHU Units • Compressor Units • Ducts • Pressure switches and Transducer • Control panels • Dampers and other items 	Model, Type, quantity and CIP Check	-do-	-do-	-do-	-do-	Site Engineer
B STORAGE/PRESERVATION								
1.		D.G. Set	To be stored on foundation/ platform.	Approved layout drawing/ Technical Specification/ Manufacturer's Instruction manual	-do-	-do-	-do-	Site Engineer
2.		LT Switchgear	To be stored in a closed and dry area.	Technical Specification/ Manufacturer's Instruction manual	-do-	-do-	-do-	-do-
3.		Lighting System	To be stored in a	Technical	Contractor	100%	random	Site Engineer



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			closed and dry area.	Specification/ Manufacturer's Instruction manual				
4.		Battery and Battery charger	To be stored in a closed and dry area and refresh charging of battery, if required for prolonged storage as per manufacturer's recommendation	Technical Specification/ Manufacturer's Instruction manual	Contractor	100%	100%	Site Engineer
5.		Fire Protection	To be stored in a closed and dry area.	Technical Specification/ Manufacturer's Instruction manual	Contractor	100%	random	Site Engineer
6.		Air Conditioning system	To be stored in a closed and dry area.	-do-	-do-	-do-	-do-	-do-
7.		Ventilation System	To be stored in a closed and dry area.	-do-	-do-	-do-	-do-	-do-
C Erection								
1.		D.G Set	<ul style="list-style-type: none"> • Foundation level check • Alignment check • Cabling interface 	Approved drawings/ Technical specifications/	Contractor	100%	100%	Site Engineer



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			with AMF panel, DG Incomer in LT switchgear, Battery <ul style="list-style-type: none"> • Continuity check • Specific gravity and voltage check of battery • IR test for Alternator • Load test • Fuel consumption check • Functional test • Vibration measurement • Noise level check 	Installation manual				
2.		DG Set Neutral – Earthing (02 Nos. treated earth pit)	Measurement of Earth Resistance	-do-	-do-	-do-	-do-	Site Engineer
3.		LT Switchgear						
4.		General	<ul style="list-style-type: none"> • Erection as per layout • Alignment and orientation • Sizing of bus bar and connections 	-do-	-do-	-do-	-do-	-do-



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			<ul style="list-style-type: none"> • Rating/Marking of different I/C and O/G feeders • Cabling and continuity check • IR measurement of Switchgear and equipment • Earth connection • Tightness of all bolts & clamp • Cleanliness of insulators & bushings • Lighting and heater circuit • Trip and annunciation checks • Plugging of spare holes • Covers for internal cable trench • Laying of Insulating mat 					
5.		Circuit Breaker	<ul style="list-style-type: none"> • Alignment 	-do-	-do-	-do-	-do-	Site Engineer



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			<ul style="list-style-type: none"> • Closing and opening operation (electrically & mechanically) • Interlocks • Limit switch checks • Contact resistance • All functional checks 					
6.		Current Transformer	<ul style="list-style-type: none"> • Polarity test • Ratio test 	-do-	-do-	-do-	-do-	-do-
7.		Voltage Transformer	<ul style="list-style-type: none"> • Polarity test • Ratio test 	-do-	-do-	-do-	-do-	Site Engineer
8.		Protective Relays	<ul style="list-style-type: none"> • Relay setting • Operating characteristic verification • Scheme checking 	-do-	-do-	-do-	-do-	-do-
9.		Meters	<ul style="list-style-type: none"> • Display verification through secondary injection 	-do-	-do-	-do-	-do-	-do-
10.		Automatic supply changeover	<ul style="list-style-type: none"> • Auto change-over between I/C-I, I/C-II & DG set in case of 	-do-	-do-	-do-	-do-	Site In-charge



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S. No	Description of Activity	Items to be Checked	Tests/Checks to be done	Reference/ Acceptance documents	Agency	Extent	Counter Check/Test by POWERGRID	Accepting authority in POWERGRID
			failure of supply					
11.		Lighting System	<ul style="list-style-type: none"> • No and position of lighting fixture/Exit sign. • Verification of Emergency and DC lighting 	-do-	-do-	-do-	-do-	Site Engineer
12.		Lighting System	<ul style="list-style-type: none"> • Conduit layout (at the time of slab cast) • Alignment and orientation • Sizing of bus bar and connections • Rating/Marking of different I/C and O/G feeders • Cabling and continuity check • IR measurement • Lighting distribution (Main/Emergency/ DC) 	-do-	-do-	-do-	-do-	-do-
13.		Battery and Battery charger						Site Engineer



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14.		General	<ul style="list-style-type: none"> • Air conditioning of battery room (if applicable) • Connection arrangement of battery cells • Battery and charger connections • Availability of trench/PVC pipe/tray in battery room • Sealing of Internal cable trench • Proper Torque application to cell inter-connections • Suitable Insulation between metallic stand/frame and ground to avoid grounding • IR measurement 	-do-	-do-	-do-	-do-	Site Engineer
15.		Battery	8 Hrs. Charge and 15 min discharge test at	Technical specifications	Contractor	100%	100%	Site In-charge



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			full rated load					
16.		Battery Charger	<ul style="list-style-type: none"> • Continuous rating verification • Ripple content • Voltage regulation and load limiting characteristic • Temperature compensation • Checking of annunciation system 	-do-	-do-	-do-	-do-	Site Engineer
17.		Fire Protection						
18.		a) Pumps and Motors	<ul style="list-style-type: none"> • Alignment check • Cable termination with suitable size lugs 	Approved drawings/ Technical specifications/ Installation manual	Contractor	100%	100%	Site Engineer
19.		b) Pneumatic Tank (if applicable)	<ul style="list-style-type: none"> • Level check • Cable termination of associated compressor 	-do-	-do-	-do-	-do-	-do-
20.		c) Pipeline	<ul style="list-style-type: none"> • Pipe line as per approved layout on 	-do-	-do-	-do-	-do-	Site Engineer



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			Pedestal and should not touch the ground • Checking of painting					
21.		d) Heat/Smoke Detectors	• Location/ fixing check • Cabling as per layout	-do-	-do-	-do-	-do-	-do-
22.		e) Fire Extinguishers	• Location • Type of Extinguishers • Year of Manufacturing/Name of Manufacturer/Date of expiry	-do-	-do-	-do-	-do-	-do-
23.		d) Instruments (Pressure gauge/switch etc.)	Check for damage/ installation at appropriate location with proper mounting	-do-	-do-	-do-	-do-	-do-
24.		MS/GI Fittings	Check for absence of foreign bodies inside, alignment & dimensions of trenches, depth of pipe	-do-	-do-	-do-	-do-	-do-



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S. No	Description of Activity	Items to be Checked	Tests/Checks to be done	Reference/ Acceptance documents	Agency	Extent	Counter Check/Test by POWERGRID	Accepting authority in POWERGRID
			laying, location of valves etc.					
25.			Welding procedure and Welder's qualification	Technical specifications/ Manufacturers Manual/ Relevant IS	Contractor	100%	100%	Site In-charge
26.			Visual inspection of welding for above the ground pipe	Technical specifications	Contractor	100%	100%	Site Engineer
27.			Radiography for buried Pipes (Sample size as per TS)	-do-	-do-	-do-	-do-	-do-
28.			Welding Electrode size shall not exceed 10 SWG. (3.25 mm)	-do-	-do-	-do-	-do-	-do-
29.		General	Hydraulic test at a pressure of 16kg/cm ² for a period of 30 minutes	Technical specifications/ Approved drawing	Contractor	100%	100%	Site In-charge
30.		Pumps (Electric motor driven, Diesel Engine & Jockey)	Running of pumps from shut off to valve wide open condition	Technical specifications	Contractor	100%	100%	Site Engineer
31.		Electric motors	IR measurement	-do-	-do-	-do-	-do-	-do-
32.		Diesel Engines	• Fixing of exhaust	-do-	-do-	-do-	-do-	-do-



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			pipe • Vibration measurement • Noise level measurement					
33.		Battery and battery charger	• Functional check	-do-	-do-	-do-	-do-	-do-
34.		Control & Annunciation panel – FFPH and Control Room	• IR measurement • Functional testing	Technical specifications / Manufacturers Manual/ Approved drawing	Contractor	100%	100%	Site Engineer
35.		Smoke and Heat detectors	Functional testing	-do-	-do-	-do-	-do-	-do-
36.		Valves Strainers/hose pipes/Hose Boxes						
37.		Over Head	• Cleaning & surface finish • Primer application workmanship • Enamel Application, uniformity of coats	Technical specifications / Manufacturers Manual/ Approved drawing	Contractor	100%	random	Site Engineer
38.		Buried	Cleaning & surface finish	-do-	-do-	-do-	-do-	-do-



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39.			<ul style="list-style-type: none"> Application & Thickness of coatings and wrappings etc. Fiber glass tissue application with proper tension & overlapping Alternatively, corrosion resistant tapes Holiday Detection by equipment with a positive signaling device 	Technical specifications / Manufacturers Manual/ Approved drawing	Contractor	100%	100%	Site Engineer
40.		Air-Conditioning System	Check for proper ducting for split AC and location	Technical specifications / Manufacturers Manual/ Approved drawing	Contractor	100%	random	Site Engineer
41.		Ventilation System	<ul style="list-style-type: none"> To be done as per installation drawings Correct position of filters Check of supple 	-do-	-do-	-do-	-do-	-do-



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			duct and return ducts • Approach for opening of ducts					
D	Complete HVW Sprinkler and hydrant system							
1.		Performance test	Automatic starting of all the fire pumps by operating the test valves	Technical specifications/ manufacturers Manual/ Approved drawing	Contractor	100%	100%	Site In-charge
2.			Automatic operation of the jockey pump	-do-	-do-	-do-	-do-	Site Engineer
3.			Operation of the Deluge valve by breaking a detector as well as manual and remote operation	-do-	-do-	-do-	-do-	Site Engineer
4.			Performance demonstration of Fire extinguishers	-do-	-do-	-do-	-do-	-do-



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5.			Operation of the entire annunciation system	-do-	-do-	-do-	-do-	-do-
6.		AC & Ventilation	Performance test as per controlled documents	Performance Guarantee test procedure of POWERGRID	Contractor	100%	100%	Site In-charge

Notes:

1. Ensure availability of CIP along with Test reports for all equipments/items received at site.
2. Ensure availability of Instruction Manuals of Manufacturer of equipments.
3. Ensure availability of approved Drawings released for the project.
4. Ensure usage of calibrated testing and measuring equipments. Records of each equipment shall be maintained.
5. Transit damages, Shortages and visual defects to be informed to supplier along with a copy to Corporate QA&I.
6. In case of damaged / open packing, delivery LR should be suitably endorsed.
7. Storage of material shall be done in accessible manner so that at any point of time physical verification/condition monitoring can be done before erection activities.
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.



STANDARDISED FIELD QUALITY PLAN

Item	HVDC LCC & VSC Equipments
Applicability	HVDC Projects
Date of Issue	14-09-2022

SFQP No.	DOC No.: C/FQA/SFQP/HVDC
REV.	00

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	VALVE HALL (VH)							
1.		Structures/ Sheets material of VH	Pre-Engineering Building Structures & Sheeting material for Valve Hall in line with approved drawings - Check of CIPs	Approved Drawings / Technical Specification	Contractor	100%	100%	Site Engineer
2.		Screening	Completion of RFI screening in line with approved drawing	-do-	-do-	-do-	-do-	-do-
3.		Grounding	Check of Earthing Installation (Valve Hall Main Earthing Grid, Valve Hall roof and risers) as per approved earthing layout plan	-do-	-do-	-do-	-do-	-do-
4.		Nut & Bolts	Check of tightness of VH Structures (nut/bolts)	-do-	-do-	-do-	-do-	-do-
5.		Load plate on VH walls	Check for installation of load bearing plate mounted on wall of VH for conductor termination in line with approved drawing	-do-	-do-	-do-	-do-	-do-
6.		Rain water pipes	Check for installation gutter and down pipe for rain water collection	-do-	-do-	-do-	-do-	-do-
7.		Floor	- Levelling of Valve Hall (VH) Finished floor level - Valve Hall must be compact/firm and Epoxy paint must be applied on floor	-do-	-do-	-do-	-do-	Site In-charge



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			Thickness of Epoxy paint shall be verified after final coat. Initial coat of paint shall be applied before installation & final coat shall be applied after installation work inside VH					
8.		Cladding	Completion of cladding - Fixing of complete screwing - Sealing of overlapping areas	-do-	-do-	-do-	-do-	Site Engineer
9.		General	Dust proof Cleaning & Vacuuming of floor, walls & sealings	-do-	-do-	-do-	-do-	Site In-charge
10.		General	Ensure Touch up painting (wherever required)	-do-	-do-	-do-	-do-	Site Engineer
11.		Dampers	Installation & Completeness of Fire and pressure relief dampers (if applicable)	-do-	-do-	-do-	-do-	-do-
12.		Assembly	Installation & Completeness of catwalk (If applicable)	-do-	-do-	-do-	-do-	-do-



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13.		Doors	Installation & check of VH Main door/ other doors for proper closing and sealing Fire Rating of these doors to be verified through documents	-do-	-do-	-do-	-do-	Site Engineer
14.		Sealing	Sealing of openings including Converter Transformer Bushing & DC Bushing exits in the Valve hall's by suitable arrangement.	-do-	-do-	-do-	-do-	Site In-Charge
15.		Fire Detection	Installation of VESDA (very early smoke detection system) Pipes, Arc detection system	-do-	-do-	-do-	-do-	Site Engineer
16.		Cable Trays	Installation of fiber/cable tray in line with approved drawing	-do-	-do-	-do-	-do-	-do-
17.		Cable Trench	Cable Trench/ Tray fitted with appropriate covers.	-do-	-do-	-do-	-do-	Site Engineer
18.		Ventilation System	Ventilation Building & Valve Hall ventilation system in ready to operation condition for maintaining positive pressure.	-do-	-do-	-do-	-do-	Site In-charge
19.		Cooling Room	Readiness of Valve cooling system Room	-do-	-do-	-do-	-do-	-do-



STANDARDISED FIELD QUALITY PLAN

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20.		Illumination	Valve Hall Illumination System in ready to operation condition	-do-	-do-	-do-	-do-	Site Engineer
21.		Roof	Check of Water proofing of the roofs of valve hall	-do-	-do-	-do-	-do-	Site In-Charge
22.		Faraday Cage	Faraday Cage Arrangement (If applicable)	-do-	-do-	-do-	-do-	Site Engineer
23.		General	Check of VH w.r.t approved drawing	-do-	-do-	-do-	-do-	Site Engineer
24.			Completeness of all civil work for installation of Thyristor valves/ other Equipments	-do-	-do-	-do-	-do-	Site In-Charge
25.			Availability of Valve Hall service platform	-do-	-do-	-do-	-do-	Site Engineer
26.			Availability of adequate Hoist & lifting arrangement, Special tools/ tackles etc.	-do-	-do-	-do-	-do-	-do-
B	RECEIPT							
1.		Thyristor Valve Modules, structures, Insulators, corona shields, accessories & associated materials for interconnection	<ul style="list-style-type: none"> - Completeness of Material to be checked as per CIP - Visual check for transport damage/ rusting or any other surface issues/ damage. 	Approved BOQ/Packing list/CIP Documents/ Technical Specification	Contractor	100%	100%	-do-



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2.		IGBT (Insulated Gate Bipolar Transistor) Valve Modules, Structures, tower, insulators, corona shields, accessories & associated material for interconnection	-do-	-do-	-do-	-do-	-do-	Site Engineer
3.		HVDC C&P Cubicles/ Interface cubicles/ VBE (valve base electronics) cubicles/ Communication cubicles etc.	-do-	-do-	-do-	-do-	-do-	-do-
4.		DC Disconnectors/ Grounding Switches	-do-	-do-	-do-	-do-	-do-	-do-
5.		AC & DC Surge Arrestors	-do-	-do-	-do-	-do-	-do-	-do-
6.		Wall Bushings/ Other Bushings	-do-	-do-	-do-	-do-	-do-	-do-
7.		DC CT/ Zero Flux CT	-do-	-do-	-do-	-do-	-do-	-do-



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8.		AC Current Transformer	<ul style="list-style-type: none"> - Completeness of Material to be checked as per CIP - Visual check for transport damage/ rusting or any other surface issues/ damage. - Oil Level check/oil leakage check 	-do-	-do-	-do-	-do-	Site Engineer
9.		DC Voltage Divider	<ul style="list-style-type: none"> - Completeness of Material to be checked as per CIP - Physical/ visual check for transport damage/ rusting or any other surface issues/ damage. 	-do-	-do-	-do-	-do-	-do-
10.		High Speed Switch (HSS)/ Neutral Bus Switch (NBS)/ Neutral Bus Grounding Switch (NBGS)/Metallic Return Transfer Breaker (MRTB)/ Ground Return Transfer Switch (GRTS)/ Back up CB/ By pass CB	<ul style="list-style-type: none"> - Completeness of Material to be checked as per CIP - Physical/ visual check for transport damage/ rusting or any other surface issues/ damage. - Check for Positive pressure (as per Manufacturer's practice) 	-do-	-do-	-do-	-do-	-do-



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11.		AC/ DC Filter Capacitors/ PLC Capacitor/ RI Capacitor/ Surge capacitor/ Neutral Bus Capacitor/ Blocking filter capacitor	<ul style="list-style-type: none"> - Completeness of Material to be checked as per CIP - Visual check for transport damage/ rusting or any other surface issues/ damage 	-do-	-do-	-do-	-do-	Site Engineer
12.		AC/ DC Filter Reactors/ PLC Reactors/ Smoothing Reactor/ Blocking Filter Reactor/ High Impedance Grounding Reactor/ Phase Reactor	-do-	-do-	-do-	-do-	-do-	-do-
13.		AC/ DC Filter Resistors/ Blocking Filter Resistor/ High Impedance Grounding Resistor	-do-	-do-	-do-	-do-	-do-	-do-
14.		Valve cooling System (Skid, pump, piping arrangements etc.)	-do-	-do-	-do-	-do-	-do-	-do-
15.		Battery for Valve Cooling System	-do-	-do-	-do-	-do-	-do-	-do-



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16.		UPS/ UMD (Un-interrupted Motor Drive) of Valve Cooling System	-do-	-do-	-do-	-do-	-do-	Site Engineer
17.		VH Ventilation System (AHU etc.)	-do-	-do-	-do-	-do-	-do-	-do-
18.		Clamp & Connectors, Bus Post Insulators, Switchyard Structures	-do-	-do-	-do-	-do-	-do-	-do-
19.		Al Tube, Conductor	- Dimensional Check & Visual check for any deformation/ blackness	-do-	-do-	-do-	-do-	-do-
20.		Other Equipments (cooling tubes, fibre optics etc.)	- Checking of Material for completeness - Physical/ visual check for transport damage or any other surface issues.	-do-	-do-	-do-	-do-	-do-
21.		Smoke Detectors/ VESDA (very early smoke detection system)	-do-	-do-	-do-	-do-	-do-	-do-
22.			All equipments shall be unloaded in accordance with product docking & direction	Technical Specification/ Manufacturer's recommendation	Contractor	100%	100%	Site Engineer



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C	STORAGE/PRESERVATION							
1.	General	All Equipments	<ul style="list-style-type: none"> - Any special condition for storage in equipment manual to be taken care of. - All fragile items are kept in container to avoid any damage - Protection covers for transportation not to be dismantled before assembly - Good air circulation & ventilation for Valves to be ensured - Indoor Storage area is free from dirt, dust, ingress of moisture and away from inflammable material. - Outdoor equipments shall be covered with waterproof and dustproof covers to protect them from water seepage and moisture ingress. Further, all equipments with polymer insulators/ housings, shall be 	As per Technical specifications/ Manufacturer's recommendation	Contractor	100%	100%	Site Engineer



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			provided with rodent proof arrangement (Preferably covered with stainless steel mesh)					
2.		Thyristor Valve Modules, structures, Insulators, corona shields, accessories & associated materials for interconnection	Valves to be stored indoor	As per Technical specifications/ Manufacturer's recommendation	Contractor	100%	100%	Site In-Charge
3.		IGBT (Insulated Gate Bipolar Transistor) Valve Modules, Structures, tower, insulators, corona shields, accessories & associated material for interconnection	-do-	-do-	-do-	-do-	-do-	-do-



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4.		HVDC C&P Cubicles/ Interface/ VBE (valve base electronics) cubicles/ Communication cubicles	<ul style="list-style-type: none"> - Cubicles shall be stored indoor - Loose C&P/ Electronic/ Telecom cards/ PCBs to be stored in indoor area with proper sealing arrangement to avoid humidity 	-do-	-do-	-do-	-do-	Site Engineer
5.		DC Disconnectors & Grounding Switches	<ul style="list-style-type: none"> - Disconnectors are stored in a covered and dry area. - Operating mechanism to be stored to protect ingress of moisture. 	-do-	-do-	-do-	-do-	-do-
6.		Surge Arrester	<ul style="list-style-type: none"> - Arresters 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-



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7.		Wall Bushings/ Bushings	<ul style="list-style-type: none"> - To be stored on raised platform - Wall bushing (if with polymer insulator) are stored with rodent proof arrangement (Preferably covered with stainless steel mesh) - Protection covers for transportation not to be dismantled before assembly 	-do-	-do-	-do-	-do-	Site Engineer
8.		DC CT/ Zero Flux CT & DC Voltage Divider	<ul style="list-style-type: none"> - To be stored in indoor - For long term storage i.e. more than three months), check Silica Gel conditions 	-do-	-do-	-do-	-do-	-do-
9.		High Speed Switch (HSS)/ Neutral Bus Switch (NBS)/ Neutral Bus Grounding Switch(NBGS)/Metallc Return Transfer Breaker (MRTB)/ Ground Return Transfer Switch (GRTS)/	<ul style="list-style-type: none"> - To be stored on raised platform - Marshalling box to be kept vertically & to be stored in covered shed protected from sun, rain, dust and fire. Panels should not be in direct touch with ground. 	-do-	-do-	-do-	-do-	-do-



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		Back up CB/ By pass CB						
10.		AC/ DC Filter Capacitors/ PLC Capacitor/ RI Capacitor/Surge capacitor/Neutral Bus Capacitor/Blocking filter capacitor	Shall be stored on an even and well-drained platform	-do-	-do-	-do-	-do-	Site Engineer
11.		AC/ DC Filter Reactors/ PLC Reactors/ Smoothing Reactor/ Blocking Filter Reactor/ High Impedance Grounding Reactor/ Phase Reactor	-do-	-do-	-do-	-do-	-do-	-do-
12.		AC/ DC Filter Resistors/ Blocking Filter Resistor/ High Impedance Grounding Resistor	-do-	-do-	-do-	-do-	-do-	-do-
13.		Valve cooling System (Skid, pump, piping etc.)	To be stored indoor	-do-	-do-	-do-	-do-	-do-



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14.		Battery for Valve Cooling System	- Batteries and accessories are to be stored indoor - Each cell to be packed & stored in a dry & covered place	-do-	-do-	-do-	-do-	Site Engineer
15.		UPS/ UMD of Valve Cooling System	UPS/ UMD and accessories are to be stored indoor.	-do-	-do-	-do-	-do-	-do-
16.		Bus Post Insulators	To be stored in a dry place	-do-	-do-	-do-	random	-do-
17.		Clamp & Connectors	To be stored in a dry place	-do-	-do-	-do-	random	-do-
18.		VH Ventilation System (AHU etc.)	To be stored indoor	-do-	-do-	-do-	-do-	-do-
19.		AI Tube, Conductor	To be stored at raised platform	-do-	-do-	-do-	random	-do-
20.		Other Equipments (cooling tubes, fibre optics etc.)	Shall be stored indoor dry area with rodent proof arrangement	-do-	-do-	-do-	100%	-do-
21.		Switchyard Structures	To be stored at raised platform	-do-	-do-	-do-	random	-do-
22.		Smoke Detectors/ VESDA	To be stored indoor	-do-	-do-	-do-	100%	-do-



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23.	General	All Equipments	Identification marks or tags should be intact.	Instruction manual/ Technical specification	Contractor	100%	random	Site Engineer
24.	General	All Equipments	Systematic storing to facilitate easy removal and proper handling. Heavy items are not stored one above the other	-do-	-do-	-do-	-do-	-do-
25.	General	All Equipments	<ul style="list-style-type: none"> - Unpacking should preferably be carried out in presence of OEM - Unpacking should start just before installation of equipment - Suitable/special tools to be used during unpacking - For thyristor valves/ C&P cubicles/ other electronic cards, unpacking shall take place in area not exposed to moisture, pollution, strong sunlight or other harmful effects 	As per Technical specifications/ Manufacturer's recommendation	Contractor	100%	random	Site Engineer



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26.	SHIFTING OF EQUIPMENTS		Shifting of equipments shall take place in line with Manufacturer's recommendation using suitable/special tools/ tackles/ equipments	-do-	-do-	-do-	-do-	Site Engineer
D ERECTION/ INSTALLATION								
1.	General	Supervisor Certification/ Qualification	Qualified Engineers and supervisors shall be certified by the agency to handle and supervise erection works of Valve Hall and other equipments	As per Technical specifications/ Manufacturer's recommendation	Contractor	100%	100%	Site In Charge
2.		Tools & Plants	All T&P equipments including man lifts shall have valid third party inspection/calibration (if applicable) certificate	POWERGRID Spec/ manufacturers Manual/ Approved drawing	-do-	-do-	-do-	Site Engineer
3.		Documents	<ul style="list-style-type: none"> - Ensure Availability of Manufacturer's recommended Erection/ Installation Instructions manuals - HVDC Equipments shall be installed in line with installation manual/ 	POWERGRID Spec/ manufacturers Manual/ Approved drawing	-do-	-do-	-do-	-do-



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			recommendation of OEM - Availability of Factory Test Reports/ approved drawings (latest revision)					
4.		Softwares	- Ensure availability of latest data base versions for server, HMI - Ensure availability of latest relay project file	POWERGRID Spec/ manufacturers Manual/ Approved drawing	-do-	-do-	-do-	Site Engineer
5.		Checks for the Equipment's:	- Completeness of individual assemblies. - Ensure Cleanliness of equipment before & after assembly - Ensure cleanliness of terminals/ AI tubes/earthing conductors/Clamps & Connectors etc.	-do-	-do-	-do-	-do-	-do-
6.		Pre-Installation Tests/ Checks	- Pre-Installation tests of all equipments to be done as per OEM recommendation	-do-	-do-	-do-	-do-	-do-



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7.		Welding/Bending of Al tube:	- Ensure deployment of qualified welder duly approved	-do-	-do-	-do-	-do-	Site-In Charge
			- Welding and bending procedure shall be done in line with approved drawings	-do-	-do-	-do-	-do-	Site Engineer
8.		Testing kits/ Instruments	Ensure availability of relevant testing kits/Instruments with valid calibration certificate	POWERGRID Spec/ manufacturers Manual/ Approved drawing	-do-	-do-	-do-	-do-
9.	Equipments	Thyristor Valve Modules, structures, Insulators, corona shields, accessories & associated materials for interconnection	<ul style="list-style-type: none"> - Ensure erection under supervision of OEM in line with installation manual/drawings - Each module is fitted at the correct position & sequencing with recommended tightness torque - Check of component completeness in line with assembly drawings 	-do-	-do-	-do-	-do-	-do-



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			- check for clearances as per approved drawing after installation					
10.		IGBT (Insulated Gate Bipolar Transistor) Valve Modules, Structures, tower, insulators, corona shields, accessories & associated material for interconnection	-do-	-do-	-do-	-do-	-do-	Site Engineer
11.		HVDC C&P Cubicles/ Interface/ VBE(valve base electronics) cubicles	<ul style="list-style-type: none"> - Ensure cubicles are installed as per installation layout/ drawing - Ensure proper horizontal level after installation - Ensure grounding of cubicles in line with approved drawing - Ensure grounding (earthing) connection with station ground - Check wiring and cabling for proper routing and dressing 	-do-	-do-	-do-	-do-	-do-



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12.		DC Disconnectors & Grounding Switches	<ul style="list-style-type: none"> - Erection of structure to be done as per approved drawing - Ensure installation of base insulator support horizontal of flange - Correct assembling of operating mechanism - Correctness of phase sequence (for AC application) & connections of isolators - Alignment Check - All Erection activities shall be carried out under supervision of OEM 	POWERGRID Spec/ manufacturers Manual/ Approved drawing	-do-	-do-	-do-	Site Engineer
13.		DC CT/ Zero Flux CT	<ul style="list-style-type: none"> - Erection activities shall be carried out preferably under supervision of OEM. - To be done as per installation manual/drawings - Check any defect in primary & secondary terminals. - Tightening of bolts & nuts as well as earthing connections with earth mat. 	-do-	-do-	-do-	-do-	-do-



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			- Laying/ Connection/ continuity of cables/ fibers from secondary box to control room					
14.		Wall Bushings/ Bushings	<ul style="list-style-type: none"> - To be done as per installation manual/drawings - Cleaning of bushing & connection - Apply specified Torque with torque wrench - Check wall sealing and Earthing - Check Bushing Frame Earthing - Check electrical clearances after installation - Vacuuming & Gas filling up to rated pressure in line with installation manual 	-do-	-do-	-do-	-do-	Site Engineer
15.		AC & DC Surge Arrestors	<ul style="list-style-type: none"> - Ensure Cleanliness - Ensure erection done as per instruction manual. - Ensure erection of surge monitor done as per approved 	-do-	-do-	-do-	-do-	-do-



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			drawing - Ensure proper care has been taken to avoid Corona rings striking the porcelain/polymer. - Ensure orientation of explosion vent away from the equipment. - Ensure all stacks are of same sl. No. in phase - Alignment check.					
16.		High Speed Switch (HSS)/ Neutral Bus Switch (NBS)/ Neutral Bus Grounding Switch(NBGS)/Metallic Return Transfer Breaker (MRTB)/ Ground Return Transfer Switch (GRTS)/ Back up CB/ By pass CB	- Ensure Erection is carried out under supervision of OEM - Ensure tightening of nuts and bolts. - Ensure proper wire & Bus connections, Cable terminations & electrical continuity. - Leakage test of SF6 gas. - Check of earthing connections with main earth mat - SF6 Gas dew point measurements	-do-	-do-	-do-	-do-	Site Engineer



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17.		AC/ DC Filter Capacitors/ PLC Capacitor/ RI Capacitor/Surge capacitor/Neutral Bus Capacitor/Blocking filter capacitor	<ul style="list-style-type: none"> - Placement of Capacitors as per the assembly drawing/ chart - The capacitors should not be lifted by holding the bushings - Tightening torque shall be applied as per manufacturer's recommendation - All additional materials, such as bolts, insulators, busbars and sleeves shall be erected in line with assembly drawing - Rack shorting must be done as per GA drawing to achieve defined potential to rack 	-do-	-do-	-do-	-do-	Site Engineer
18.		AC/ DC Filter Reactors/ PLC Reactors/ Smoothing Reactor/ Blocking Filter Reactor/ High Impedance Grounding Reactor/ Phase Reactor	<ul style="list-style-type: none"> - Place the reactor in the right position on the base foundation - Ensure that all the post insulators are mounted in line with drawing - Tightening torque as per manufacturer's recommendation - Grounding/ Earthing shall be in line with approved drawing 	-do-	-do-	-do-	-do-	-do-



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19.		AC/ DC Filter Resistors/ Blocking Filter Resistor/ High Impedance Grounding Resistor	<ul style="list-style-type: none"> - Place the resistor modules & insulators in the right position on the base/ intermediate in line with drawing - Grounding/ Earthing shall be in line with approved drawing 	-do-	-do-	-do-	-do-	Site Engineer
20.		DC Voltage Divider	<ul style="list-style-type: none"> - To be done as per installation manual/drawings - Ensure installation of Divider along with it's associated divider box & cable (as applicable) - Connect the SF6-Gas monitoring device by means of the defined cables (if applicable) - Laying/ Connection/ continuity of cables/ fibers from secondary box to control room 	-do-	-do-	-do-	-do-	-do-
21.		Fiber optic cable	<ul style="list-style-type: none"> - To be done as per installation manual/drawings 	-do-	-do-	-do-	-do-	-do-



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22.		Valve cooling System (Skid, pump, piping & Coolers etc.)	<ul style="list-style-type: none"> - Ensure use of ring or socket spanners and torque wrenches on all nuts and bolts as per manufacturer's practice - Universal spanners shall NOT be used for installation purpose - Placement of pumps, skids & coolers shall be done in line with approved layout drawing - End cap of pipes must be removed before commencement of installation - Installation of pipe system & pipe supports. Pipe installation should start from cooling skid side generally - Flanges should not be tightened and pipe supports should not be fixed until the entire pipe system has been erected - Accurate alignment of pumps, motors & couplings prior to the fastening of flanged joints and pipe supports - Installation checks of various Transducers & wirings - Handling of ion exchange resin 	-do-	-do-	-do-	-do-	Site Engineer



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			as per manufacturer's practice - Proper Cable terminations - Proper O-ring installations - Earthing of cooling skid, pipes in line with approved drawing - Installation of coolers & interconnection of pipes					
23.		Battery for Valve Cooling System	Shall be done in line with approved drawing	-do-	-do-	-do-	-do-	Site Engineer
24.		UPS/ UMD of Valve Cooling System	- Shall be done in line with approved drawing - Air-conditioning of room to be ensured before commissioning	-do-	-do-	-do-	-do-	-do-
25.		Bus Post Insulators, Clamp & Connectors	Shall be done in line with approved drawing	-do-	-do-	-do-	-do-	-do-
26.		AL tube, Conductor	- Check 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 safety of porcelain	-do-	-do-	-do-	-do-	-do-



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			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. - Apply specified Torque with torque wrench - Check for proper Alignment/ Level					
27.		Valve Hall Ventilation System (with air conditioning, if applicable)	- To be done as per installation manual/drawings - Check for correct positioning of Pre, Fine & HEPA Filter - Checks of supply ducts & return ducts - MCC (Motorized control center) of Ventilation System in line with approved drawing - Damper installation in line with approved drawing - Access for dampers inside concealed areas/ false ceiling	-do-	-do-	-do-	-do-	Site Engineer



STANDARDISED FIELD QUALITY PLAN

Item	HVDC LCC & VSC Equipments
Applicability	HVDC Projects
Date of Issue	14-09-2022

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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
28.		Cable Laying	<ul style="list-style-type: none"> - Check for cable Trays/support. and route. - Check IR value before laying. - Check availability of drum jack. - Rollers are used so that there is no damage to cable - Check for absence of sharp objects 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. 	-do-	-do-	-do-	-do-	Site Engineer
29.		Interconnection of various equipment	<ul style="list-style-type: none"> - Checking of connection as per assembly drawings 	-do-	-do-	-do-	-do-	-do-



STANDARDISED FIELD QUALITY PLAN

Item	HVDC LCC & VSC Equipments
Applicability	HVDC Projects
Date of Issue	14-09-2022

SFQP No.	DOC No.: C/FQA/SFQP/HVDC
REV.	00

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
30.		Electrical Interlocking	- Electrical interlocking of Valve Hall, AC & DC Filter & other areas (as applicable) to be ensured in line with approved drawing	-do-	-do-	-do-	-do-	Site Engineer
31.		Smoke Detector/ VESDA	- Check the layout/ piping in line with approved drawing - Check proper wrapping of VESDA pipe/other mean to avoid condensation inside pipes/ VESDA detectors - Check proper sealing of pipes entering into VESDA units	-do-	-do-	-do-	-do-	-do-

NOTES:

1. For AC Switchyard equipments, which are not specified/ covered above, please refer Filed Quality plan of Switchyard Erection SFQP No. C/FQA/SFQP/Switchyard Erection Rev-as applicable.
2. For Converter Transformers & Interface Transformers, please refer Filed Quality plan Transformer & Reactor SFQA No. C/FQA/SFQP/TFR & Reactors Rev-as applicable.
3. For Auxiliary System equipments, please refer Filed Quality plan Substation Auxiliary System C/FQA/SFQP/AUXSS Rev-as applicable.
4. For pre-commissioning tests/ Sub-system/ System Tests, please refer CC-AM deptt document/ approved project specific test plan document.
5. Ensure availability of CIP along with Test reports for all equipment's/items received at site.



STANDARDISED FIELD QUALITY PLAN

Item	HVDC LCC & VSC Equipments
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6. Ensure availability of O&M manuals/ Instruction Manuals of Manufacturer of equipment's.
7. Ensure availability of latest version of Drawings.
8. Ensure usage of calibrated testing and measuring equipment's
9. Transit damages, Shortages and visual defects to be informed to supplier along with a copy to Corporate QA&I.
10. In case of damaged packing/ open delivery, LR should be suitably endorsed.
11. While storing the material in the stores care to be taken for easy accessibility
12. For civil works, the latest SFQP for Switchyard civil works shall be followed.
13. In case of any conflict between Standard Field Quality Plan and Technical Specification, the provisions of Technical Specification shall prevail.



STANDARDISED FIELD QUALITY PLAN

Item	STATCOM & SVC Equipment
Applicability	STATCOM & SVC Projects
Date of Issue	14-09-2022

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REV.	00

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. VALVE HALL (VH)								
1.		Valve Hall Erection material	Building Structures & other construction material for Valve Hall in line with approved drawings	Approved Drawings / Technical Specification	Contractor	100%	100%	Site Engineer
2.		Grounding	Check of Earthing Installation (Valve Hall Main Earthing Grid, Valve Hall roof and risers) as per approved earthing layout plan	-do-	-do-	-do-	-do-	-do-
3.		General	<ul style="list-style-type: none"> • Ensure waterproofing of Valve Hall roof and effective sealing near wall bushing to avoid water ingress • Cleaning & Vacuuming of floor, walls & sealings • Epoxy paint must be applied on floor. Thickness of Epoxy paint shall be verified after final coat. 	-do-	-do-	-do-	-do-	Site In-Charge
			Ensure Touch up painting (wherever required)	-do-	-do-	-do-	-do-	Site Engineer
4.		Dampers	Installation & Completeness of Fire and pressure relief dampers (if applicable)	-do-	-do-	-do-	-do-	-do-



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5.		Doors	<ul style="list-style-type: none"> Installation & check of VH Main door/ other doors for proper closing and sealing Fire Rating of these doors to be verified through documents 	-do-	-do-	-do-	-do-	Site Engineer
6.		Fire Detection	Installation of fire detection system inside valve hall.	-do-	-do-	-do-	-do-	-do-
7.		Cable Trays	Installation of fiber/cable tray in line with approved drawing	-do-	-do-	-do-	-do-	-do-
8.		Cable Trench	Cable Trench/ Tray fitted with appropriate covers.	-do-	-do-	-do-	-do-	-do-
9.		Ventilation System	Ventilation Building & Valve Hall ventilation system in ready to operation condition for maintaining positive pressure and temperature (if applicable).	-do-	-do-	-do-	-do-	Site In-Charge
10.		Cooling Room	Readiness of Valve cooling system Room	-do-	-do-	-do-	-do-	-do-
11.		Illumination	Valve Hall Illumination System in ready to operation condition	-do-	-do-	-do-	-do-	Site Engineer
12.		Faraday Cage	Faraday Cage Arrangement (If applicable)	-do-	-do-	-do-	-do-	-do-
13.		General	Completeness of all civil work for installation of IGBT modules/ Thyristor modules	-do-	-do-	-do-	-do-	Site In-Charge



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			Check of VH w.r.t approved drawing	-do-	-do-	-do-	-do-	Site Engineer
			<ul style="list-style-type: none"> Availability of adequate Hoist & lifting arrangement, Special tools/ tackles etc. Load testing of EOT (if applicable) 	-do-	-do-	-do-	-do-	-do-
B	RECEIPT							
1.		Thyristor Valve Modules (for SVC)/ IGBT (Insulated Gate Bipolar Transistor) Valve Modules (For STATCOM) alongwith structures, Insulators, corona shields, accessories & associated materials for interconnection	<ul style="list-style-type: none"> Completeness of Material to be checked as per CIP Visual check for transport damage/ rusting or any other surface issues/ damage. 	Approved BOQ/Packing list/CIP Documents/ Technical Specification	Contractor	100%	100%	Site Engineer
2.		STATCOM/SVC C&P Cubicles/	-do-	-do-	-do-	-do-	-do-	-do-



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		Interface cubicles/ VBE (valve base electronics) cubicles/ Communication cubicles etc.						
3.		Disconnectors/ Grounding Switches	-do-	-do-	-do-	-do-	-do-	Site Engineer
4.		AC Surge Arrestors	-do-	-do-	-do-	-do-	-do-	-do-
5.		Wall Bushings/ Other Bushings	-do-	-do-	-do-	-do-	-do-	-do-
6.		Wall Bushing CT	-do-	-do-	-do-	-do-	-do-	-do-
7.		AC Current Transformer	<ul style="list-style-type: none"> • Completeness of Material to be checked as per CIP • Visual check for transport damage/ rusting or any other surface issues/ damage. • Oil Level check/oil leakage check 	-do-	-do-	-do-	-do-	-do-



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8.		AC Potential transformers	<ul style="list-style-type: none"> Completeness of Material to be checked as per CIP Visual check for transport damage/ rusting or any other surface issues/ damage. Oil Level check/oil leakage check 	-do-	-do-	-do-	-do-	-do-
9.		VSC charging resistor bypass breaker/ disconnecter for STATCOM	<ul style="list-style-type: none"> Completeness of Material to be checked as per CIP Physical/ visual check for transport damage/ rusting or any other surface issues/ damage. Check for Positive pressure (as per Manufacturer's practice) 	-do-	-do-	-do-	-do-	Site Engineer
10.		Circuit breakers for VSC, MSC, MSR, Auxiliary branches in STATCOM and CB for Auxiliary branches, Filter branches (if applicable) in SVC.	-do-	-do-	-do-	-do-	-do-	-do-



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11.		Capacitors for MSC/TSC branches, Surge capacitors, filter capacitors.	<ul style="list-style-type: none"> Completeness of Material to be checked as per CIP Visual check for transport damage/ rusting or any other surface issues/ damage 	-do-	-do-	-do-	-do-	-do-
12.		Air core reactors for MSR branches, Current Limiting reactors for VSC branch, MSC branch, Auxiliary Transformer & Grounding transformer (wherever applicable)	-do-	-do-	-do-	-do-	-do-	-do-
13.		VSC branch charging resistor (STATCOM) / High Impedance Grounding Resistor/ MSC branch current limiting resistor and Filter resistor	-do-	-do-	-do-	-do-	-do-	Site Engineer



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		(wherever applicable)						
14.		Valve cooling System (Skid, pump, piping arrangements etc.)	-do-	-do-	-do-	-do-	-do-	-do-
15.		Battery for UPS (Valve Cooling System)	-do-	-do-	-do-	-do-	-do-	-do-
16.		UPS/ UMD (Un-interrupted Motor Drive) of Valve Cooling System	-do-	-do-	-do-	-do-	-do-	-do-
17.		AVR for MV Auxiliary Supply	-do-	-do-	-do-	-do-	-do-	-do-
18.		VH Ventilation System (AHU etc.)	-do-	-do-	-do-	-do-	-do-	Site Engineer
19.		Clamp & Connectors, Bus Post Insulators, Switchyard Structures	-do-	-do-	-do-	-do-	-do-	-do-



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20.		Al Tube, Conductor	Dimensional Check & Visual check for any deformation/ blackness	-do-	-do-	-do-	-do-	-do-
21.		Other Equipments (cooling tubes, fibre optics etc.)	<ul style="list-style-type: none"> • Checking of Material for completeness • Physical/ visual check for transport damage or any other surface issues. 	-do-	-do-	-do-	-do-	-do-
22.		Smoke Detectors/ Arc Detectors (if applicable)	-do-	-do-	-do-	-do-	-do-	-do-
23.	Unloading		All equipment shall be unloaded in accordance with product docking & direction	Technical Specification/ Manufacturer's recommendation	Contractor	100%	100%	-do-
C	STORAGE/PRESERVATION							
1.	General	All Equipments	<ul style="list-style-type: none"> • Any special condition for storage in equipment manual to be taken care of. 	As per Technical specifications/ Manufacturer's	Contractor	100%	100%	Site Engineer



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			<ul style="list-style-type: none"> • All fragile items are kept in container to avoid any damage • Protection covers for transportation not to be dismantled before assembly • Good air circulation & ventilation for Valves to be ensured • Indoor Storage area should be free from dirt, dust, ingress of moisture and away from inflammable material. • Outdoor equipments shall be covered with water/dust proof covers. Further, all equipments with polymer insulators/ housings, shall be provided with rodent proof arrangement (Preferably covered with stainless steel mesh) 	recommendation				
2.		Thyristor Valve / Modules (for SVC) and IGBT (for STATCOM)	Valves/IGBT to be stored indoor	As per Technical specifications/ Manufacturer's recommendation	Contractor	100%	100%	Site In-Charge



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3.		STATCOM/SVC C&P Cubicles/ Interface/ VBE (valve base electronics) cubicles/ Communication cubicles	<ul style="list-style-type: none"> Cubicles shall be stored indoor Loose C&P/ Electronic/ Telcom cards/ PCBs to be stored in indoor area with proper sealing arrangement to avoid humidity 	-do-	-do-	-do-	-do-	Site Engineer
4.		Disconnectors & Grounding Switches	<ul style="list-style-type: none"> Disconnectors are stored in a covered and dry area. Operating mechanism to be stored to protect ingress of moisture. 	-do-	-do-	-do-	-do-	-do-
5.		Surge Arrester	<ul style="list-style-type: none"> Arresters 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-
6.		Wall Bushings/ Bushings	<ul style="list-style-type: none"> To be stored on raised platform Wall bushing (if with polymer insulator) are stored with rodent 	-do-	-do-	-do-	-do-	Site Engineer



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			proof arrangement (Preferably covered with stainless steel mesh) <ul style="list-style-type: none"> Protection covers for transportation not to be dismantled before assembly 					
7.		Wall Bushing CT	<ul style="list-style-type: none"> To be stored in indoor For long term storage i.e. more than three months), check Silica Gel conditions 	-do-	-do-	-do-	-do-	-do-
8.		AC Current Transformer	<ul style="list-style-type: none"> Shall be stored on an even and well-drained platform 	-do-	-do-	-do-	-do-	-do-
9.		AC Potential transformers	-do-	-do-	-do-	-do-	-do-	-do-
10.		VSC charging resistor bypass breaker/ disconnecter for STATCOM	<ul style="list-style-type: none"> To be stored on raised platform Marshalling box to be kept vertically & to be stored in covered shed protected from sun, rain, dust and fire. Panels should not be in direct touch with ground. 	-do-	-do-	-do-	-do-	Site Engineer



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11.		Circuit breakers for VSC, MSC, MSR, Auxiliary branches in STATCOM and CB for Auxiliary branches, Filter branches (if applicable) in SVC.	<ul style="list-style-type: none"> • To be stored on raised platform • Marshalling box to be kept vertically & to be stored in covered shed protected from sun, rain, dust and fire. Panels should not be in direct touch with ground. 	-do-	-do-	-do-	-do-	-do-
12.		Capacitors for MSC/TSC branches, Surge capacitors, filter capacitors.	Shall be stored on an even and well-drained platform	-do-	-do-	-do-	-do-	-do-
13.		Air core reactors for MSR branches, Current Limiting reactors for VSC branch, MSC branch, Auxiliary Transformer & Grounding transformer (wherever applicable)	-do-	-do-	-do-	-do-	-do-	-do-



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14.		VSC branch charging resistor (STATCOM)/ High Impedance Grounding Resistor/ MSC branch current limiting resistor/Filter resistor (wherever applicable)	-do-	-do-	-do-	-do-	-do-	Site Engineer
15.		Valve cooling System (Skid, pump, piping etc.)	To be stored indoor	-do-	-do-	-do-	-do-	-do-
16.		Battery for UPS (Valve Cooling System)	<ul style="list-style-type: none"> Batteries and accessories are to be stored indoor Each cell to be packed & stored in a dry & covered place 	-do-	-do-	-do-	-do-	-do-
17.		UPS/ UMD of Valve Cooling System	To be stored indoor	-do-	-do-	-do-	-do-	-do-
18.		AVR for MV Auxiliary Supply	To be stored at raised platform	-do-	-do-	-do-	-do-	-do-
19.		Bus Post Insulators, Clamp & Connectors, Al Tube, Conductor,	-do-	-do-	-do-	-do-	Random	-do-



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		Channel, Switchyard Structures etc.						
20.		VH Ventilation System (AHU etc.)	To be stored indoor	-do-	-do-	-do-	-do-	Site Engineer
21.		Other equipment (cooling tubes, fiber optics etc.)	Shall be stored indoor dry area with rodent proof arrangement	-do-	-do-	-do-	100%	-do-
22.		Smoke Detectors /Arc Detectors (if applicable)	To be stored indoor	-do-	-do-	-do-	100%	-do-
23.	General	All Equipment's	<ul style="list-style-type: none"> • Identification marks or tags should be intact. • Systematic storing to facilitate easy removal and proper handling. Heavy items are not stored one above the other 	Instruction manual/ Technical specification	Contractor	100%	random	Site Engineer
24.	General	All Equipment's	<ul style="list-style-type: none"> • Unpacking should preferably be carried out in presence of OEM • Unpacking should start just before installation of equipment • Suitable/special tools to be used during unpacking 	As per Technical specifications/ Manufacturer's recommendation	Contractor	100%	random	Site Engineer



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			<ul style="list-style-type: none"> For thyristor valves/ C&P cubicles/ other electronic cards, unpacking shall take place in area not exposed to moisture, pollution, strong sunlight or other harmful effects 					
25.	Shifting of Equipments		Shifting of equipments shall take place in line with Manufacturer's recommendation using suitable/special tools/ tackles/ equipments	-do-	-do-	-do-	-do-	Site Engineer
D	ERECTION/ INSTALLATION							
1.	General	Supervisor Certification/ Qualification	Qualified Engineers and supervisors shall be certified by the agency to handle and supervise erection works of Valve Hall and other equipments	Technical specifications/ Manufacturer's recommendation	Contractor	100%	100%	Site In-Charge
2.		Tools & Plants	All T&P equipments including man lifts shall have valid third-party inspection/calibration (if applicable) certificate	Technical specifications / manufacturers Manual/ Approved drawing	Contractor	100%	100%	Site Engineer



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3.		Documentation	<ul style="list-style-type: none"> Ensure Availability of Manufacturer's recommended Erection/ Installation Instructions manuals STATCOM/SVC Equipments shall be installed in line with installation manual/ recommendation of OEM Availability of Factory Test Reports/ approved drawings (latest revision) 	-do-	-do-	-do-	-do-	Site Engineer
4.		Software	<ul style="list-style-type: none"> Ensure availability of latest data base versions for server, HMI Ensure availability of latest relay project file 	-do-	-do-	-do-	-do-	Site Engineer
5.		Checks for the Equipment's	<ul style="list-style-type: none"> Completeness of individual assemblies. Ensure Cleanliness of equipment before & after assembly Ensure cleanliness of terminals/ AI tubes/earthing conductors etc. 	-do-	-do-	-do-	-do-	-do-



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6.		Pre-Installation Tests/ Checks	Pre-Installation tests of all equipments to be done as per OEM recommendation	-do-	-do-	-do-	-do-	-do-
7.		Welding of Al tube:	Ensure deployment of qualified welder duly approved	-do-	-do-	-do-	-do-	Site In-Charge
			Welding and bending procedure shall be done in line with approved drawings	-do-	-do-	-do-	-do-	Site Engineer
8.		Testing kits/ Instruments	Ensure availability of relevant testing kits/Instruments with valid calibration certificate	-do-	-do-	-do-	-do-	-do-
9.	Equipments	Thyristor Valve Modules (for SVC)/ IGBT (for STATCOM) alongwith structures, Insulators, corona shields, accessories & associated materials for interconnection	<ul style="list-style-type: none"> • Ensure erection under supervision of OEM in line with installation manual/drawings • Each module is fitted at the correct position & sequencing with recommended tightness torque • Check of component completeness in line with assembly drawings • check for clearances as per approved drawing after installation 	-do-	-do-	-do-	-do-	-do-



STANDARDISED FIELD QUALITY PLAN

Item	STATCOM & SVC Equipment
Applicability	STATCOM & SVC Projects
Date of Issue	14-09-2022

SFQP No.	DOC No.: C/FQA/SFQP/SHUNT_COMP
REV.	00

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
10.		STATCOM/ SVC C&P Cubicles/ Interface/ VBE (valve base electronics) cubicles	<ul style="list-style-type: none"> • Ensure cubicles are installed as per installation layout/ drawing • Ensure proper horizontal level after installation • Ensure grounding of cubicles in line with approved drawing • Ensure grounding (earthing) connection with station ground • Check wiring and cabling for proper routing and dressing 	-do-	-do-	-do-	-do-	Site Engineer
11.		Disconnectors & Grounding Switches	<ul style="list-style-type: none"> • All Erection activities shall be carried out under supervision of OEM • Erection of structure to be done as per approved drawing • Ensure installation of base insulator support horizontal of flange • Correct assembling of operating mechanism • Correctness of phase sequence (for AC application) & connections of isolators • Alignment Check 	Approved drawings/Installation Manual/ Manufacturer's recommendation	-do-	-do-	-do-	Site Engineer



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12.		Wall Bushing CT	<ul style="list-style-type: none"> To be done as per installation manual/drawings Check any defect in primary wall bushing & secondary terminals. 	-do-	-do-	-do-	-do-	Site Engineer
13.		Wall Bushings/ Bushings	<ul style="list-style-type: none"> To be done as per installation manual/drawings Cleaning of bushing & connection Apply specified Torque with torque wrench Check wall sealing and Earthing Check Bushing Frame Earthing Check electrical clearances after installation Vacuuming & Gas filling up to rated pressure in line with installation manual 	-do-	-do-	-do-	-do-	-do-
14.		Circuit breakers (CB) for VSC, MSC, MSR, Auxiliary branches in STATCOM and CB for Auxiliary branches, Filter	<ul style="list-style-type: none"> Ensure Erection is carried out under supervision of OEM Ensure tightening of nuts and bolts. 	-do-	-do-	-do-	-do-	-do-



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		branches (if applicable) in SVC.	<ul style="list-style-type: none"> • Ensure proper wire & Bus connections, Cable terminations & electrical continuity. • Leakage test of SF6 gas. • Check of earthing connections with main earth mat. • SF6 Gas dew point measurements 					
15.		VSC charging resistor bypass breaker/ disconnector for STATCOM	<ul style="list-style-type: none"> • Ensure Erection is carried out under supervision of OEM • Ensure tightening of nuts and bolts. • Ensure proper wire & Bus connections, Cable terminations & electrical continuity. 	-do-	-do-	-do-	-do-	-do-



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16.		Capacitors for MSC/TSC branches, Surge capacitors, filter capacitors.	<ul style="list-style-type: none"> • Placement of Capacitors as per the assembly drawing/ chart • The capacitors should not be lifted by holding the bushings • Tightening torque shall be applied as per manufacturer's recommendation • All additional materials, such as bolts, insulators, busbars and sleeves shall be erected in line with assembly drawing • Rack shorting must be done as per GA drawing to achieve defined potential to rack 	-do-	-do-	-do-	-do-	Site Engineer
17.		Air core reactors for MSR branches, Current Limiting reactors for VSC branch, MSC branch, Auxiliary Transformer & Grounding transformer	<ul style="list-style-type: none"> • Reactor to be lifted as per instructions given in manufacturer manual • Place the reactor in the right position on the base foundation • Ensure that all the post insulators are mounted in line with drawing 	-do-	-do-	-do-	-do-	-do-



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		(wherever applicable)	<ul style="list-style-type: none"> Tightening torque as per manufacturer's recommendation Grounding/ Earthing shall be in line with approved drawing. 					
18.		VSC branch charging resistor (STATCOM)/ High Impedance Grounding Resistor/ MSC branch current limiting resistor/Filter Resistor (If applicable)	<ul style="list-style-type: none"> Place the resistor modules & insulators in the right position on the base/ intermediate in line with drawing Grounding/ Earthing shall be in line with approved drawing 	-do-	-do-	-do-	-do-	Site Engineer
19.		Fiber optic cable	To be done as per installation manual/drawings	-do-	-do-	-do-	-do-	-do-
20.		Valve cooling System (Skid, pump, piping & Coolers etc.)	<ul style="list-style-type: none"> Ensure use of ring or socket spanners and torque wrenches on all nuts and bolts as per manufacturer's practice Universal spanners shall NOT be used for installation purpose 	-do-	-do-	-do-	-do-	-do-



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			<ul style="list-style-type: none"> • Placement of pumps, skids & coolers shall be done in line with approved layout drawing • End cap of pipes must be removed before commencement of installation • Installation of pipe system & pipe supports. Pipe installation should start from cooling skid side generally • Flanges should not be tightened and pipe supports should not be fixed until the entire pipe system has been erected • Accurate alignment of pumps, motors & couplings prior to the fastening of flanged joints and pipe supports • Installation checks of various Transducers & wirings • Handling of ion exchange resin as per manufacturer's practice • Proper Cable terminations • Proper O-ring installations 					



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			<ul style="list-style-type: none"> Earthing of cooling skid, pipes in line with approved drawing Installation of coolers & interconnection of pipes 					
21.		Battery for UPS (Valve Cooling System)	Shall be done in line with approved drawing	-do-	-do-	-do-	-do-	Site Engineer
22.		UPS/ UMD of Valve Cooling System	<ul style="list-style-type: none"> Shall be done in line with approved drawing Healthiness Air-conditioning of room to be ensured before commissioning. 	-do-	-do-	-do-	-do-	-do-
23.		AVR for MV Auxiliary Supply	Shall be done in line with approved drawing	-do-	-do-	-do-	-do-	-do-
24.		Valve Hall Ventilation System (with air conditioning, if applicable)	<ul style="list-style-type: none"> To be done as per installation manual/drawings Check for correct positioning of Pre, Fine & HEPA Filter Checks of supply ducts & return ducts MCC (Motorized control center) of Ventilation System in line with approved drawing 	-do-	-do-	-do-	-do-	-do-



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			- Damper installation in line with approved drawing - Access for dampers inside concealed areas/ false ceiling					
25.		Interconnection of various equipment	Checking of connection as per assembly drawings	-do-	-do-	-do-	-do-	Site Engineer
26.		Interlocking	Electrical and mechanical interlocking between Isolator & Earth Switch, and Castle key interlocking of Valve Hall, STATCOM/SVC Yard & other areas (as applicable) to be ensured in line with approved drawing	-do-	-do-	-do-	-do-	-do-
27.		Smoke Detector /Arc Detector (If applicable)	Check the layout/ piping in line with approved drawing	-do-	-do-	-do-	-do-	-do-

NOTES:

1. For AC Switchyard equipments, which are not specified/ covered above, please refer Filed Quality plan of Switchyard Erection SFQP No. C/FQA/SFQP/Switchyard Erection Rev-as applicable.
2. For Coupling Transformer, Auxiliary transformer and Neutral grounding transformer, please refer Filed Quality plan Transformer & Reactor SFQA No. C/FQA/SFQP/TFR & Reactors Rev-as applicable.
3. For Auxiliary System equipments, please refer Filed Quality plan Substation Auxiliary System C/FQA/SFQP/AUXSS Rev-as applicable.



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4. For pre-commissioning tests/ Sub-system/ System Tests, please refer CC-AM deptt document/ approved project specific test plan document.
5. Ensure availability of CIP along with Test reports for all equipment's/items received at site.
6. Ensure availability of O&M manuals/ Instruction Manuals of Manufacturer of equipment's.
7. Ensure availability of latest version of Drawings.
8. Ensure usage of calibrated testing and measuring equipment's
9. Transit damages, Shortages and visual defects to be informed to supplier along with a copy to Corporate QA&I.
10. In case of damaged packing/ open delivery, LR should be suitably endorsed.
11. While storing the material in the stores care to be taken for easy accessibility
12. For civil works, the latest SFQP for Switchyard civil works shall be followed.
13. In case of any conflict between Standard Field Quality Plan and Technical Specification, the provisions of Technical Specification shall prevail.

