Comments of POWERGRID on Draft FTE&I Procedures

Section-1

Clause/Annex No & Page No	Existing Clause	Proposed Modification suggested by PGCIL	Remarks given by PGCIL	Reply by GRID-INDIA
Introduction (f).	Provides Real time SCADA data and telemetry at NLDC/RLDCs.	Provides Real time SCADA data and telemetry at RLDCs.	Site will ensure data up to RLDC only. Data Between RLDC & NLDC to be taken care byRLDC.	Real time SCADA data and telemetry to be provided at RLDCs and further to NLDC for system operation etc.
Introduction (h)	Dedicated Voice/Data communication from generating /substation in redundant and alternate path.	Dedicated Voice / Data communicationfrom generating /substation as plannedby CTU.	Alternate path may not be available in all cases	As per following clause of " Manual of communication planning in power system operation Central Electricity Authority dtd. 31.03.2022 user has to provide " : 4.1.2 To ensure redundancy with route diversity, each communication channel (working path) planned for the Users shall be provided with alternate channel (protection path) in different routes, i.e., the working path and protection path should be resource disjoint. 4.1.12 The requirements of the applicant(s) shall be examined by the concerned nodal agency before allowing the connectivity to the existing communication system. Any augmentation/expansion of the existing communication system shall be planned by the

				nodal agency to ensure redundancy with route diversity of the allocated communication system. However, in case of radial connectivity to the existing node, the applicant(s) shall develop their own redundant communication system up to the existing wideband node.
Section 1A Clause 5 (Pg 6)	All the Users intending to energize new power system elements falling under the scope of this procedure, shallintimate the concerned RLDC about the details as per the formats given below, at least (10) working days priorto the anticipated date of first tim e charging.	Proposed to be deleted	As per IEGC 2023, transmission licenseeshall give a notice of not less than seven days to the concerned RLDC. Hence intimation before 10 days may not berequired.	7 days advance notice is only w.r.t. commencement of trial operation.

First Time Energization is a distinct activity for which detailed checking is carried out at RLDCs for various compliances. Hence, the User is required to intimate the details as per format- A4-A5 to the concern RLDC, at least (10) working days prior to the anticipated date of the first-time charging. This is aligned with the current FTC procedure. Typically, the review of the multiple submitted documents takes two to three working days. Following the review and issuance of Format-II (acknowledgment) by the concerned RLDC, the user should submit intimation for the trial run using the defined formats (B1 to B5(a)), along with any pending compliance as indicated in Format-II (acknowledgement). The trail |

				run notice shall be submitted by the User to the concerned RLDC, not less than seven (7) working days (as per Clause 21 of IEGC 2023).
Section 1A Clause 6 (Pg 8)	The request for first time energization and integration of new power system element(s) and notice towards start of the trial run as per Format III shall be submitted by theUser to the concerned RLDC, not less than seven (7) working days (as per Clause 21 of IEGC 2023) from the proposed date of the trial run, which may be mentioned in the Format-III itself	The request for first time energization and integration of new power system element(s) and notice towards start of the trial run as per Format III shall be submitted by the User to the concernedRLDC, not less than seven (7) days (as per Clause 21 of IEGC 2023) from the proposed date of the trial run.	a) As per IEGC 2023, transmission licensee shall give a notice of not less than seven days to the concerned RLDC.	First time energization is a planned activity. Approval process involves checking multiple compliances (SCADA, SEM, Protection, and Statutory Approval) in coordination with multiple internal and external stakeholders in offline mode. In view of the above the procedure has considered 7 working days (and not 7 days)
Section 1A Clause 6 (Pg 8)	The User shall submit the following documents in this regard: ……… e) Annexure B5: Undertaking in respect of Statutory clearances, as per Format-III	The User shall submit the followingdocuments in this regard: ……… e) Annexure B5: Undertaking in respect of Statutory clearances, as per Format-III (Annexure B5 can be submitted in real-time while requesting for energization of new element)	As per Format-III Enclosure B5, CEA Safety Clearance is required. Sometimes CEAsafety clearance are issued few days before energization. It is requested that Annexure B5 may be allowed to be submit before energization in real time.	First time energization is a planned activity which requires coordination with multiple internal and external stakeholders in offline mode. Therefore, it is essential that documents are submitted for verification with sufficient lead time as mandated in IEGC-2023. .

Section 1B pt 1 Pg (11)	Charging/Energization of power system elements after continuous outage for more than 6 months.	Charging/Energization of power system elements after continuous outage for more than 6 months. (Except for already commissionedhot spare unit of Transformer/Reactor)	In various substations, single phase transformers/ reactors are supplied along with a hot spare. Hot spare can be charged in place of any in-service unit in case of failure/ violation/routine maintenance works etc. to ensure reliability and availability of the system. Further, Hot spare units are maintained and kept ready to be taken into service at any given point. Further, CEA vide minutes of meeting on 03.08.2023 clarified that "Any transformer bank/Reactor that is already energized can be switched on with a spare transformer without the consent of the electrical inspector and the requirement of CEA inspection in case of charging a hot spare transformer/ reactor unit may not be required."	It shall be facilitated as per clarifications/directions issued by CEA.

| Section 1B pt 2(a) Pg (11) | Charging/Energization of transmission line/bay after alteration (including modification/ replacement/ upgradation) under Planned/Emergency/Forced outage:

a. Replacement and/or upgradation of substation equipment: CT/ PT/ CVT/ CB/ Isolator/ LA/ Bushing/Wave trap | CLAUSE 2(a) Proposed to be deleted as the same is being reviewed by CEAfor waiver of requirement of consent ofCEA for replacement of switchyard equipment. | a) As per clause 8(2) of IEGC-2023, NLDCshall prepare a detailed procedurecovering modalities for first time energization and integration of new ormodified power system element.Replacement of switchyard equipment is not a modified power system element.

b) The replacement of substation equipmentsuch as CB, CT, CVT, LA, isolator, etc. is done with equipment of similar technical specifications. Such replacement is generallycarried out due to their normal ageing /failure,without any alteration in the existing technical parameters/layout/connection arrangement.
c) Further, in order to ensure reliability,availability and security of the system,replacement of equipment is taken up on urgent basis even during odd hours i.e duringnight or holidays to minimize outage hours. Complete replacement activities are carried out by competent manpower adhering to standard pre-commissioning checks, testing requirement and safety procedures.
Requirements of intimation/FTC procedures will increase the outage time affecting availability and reliability of system. | It shall be facilitated as per clarifications/directions issued by CEA. |

Section 1B Pg 11 (Point 1)	The application for charging/energization of altered (including modified/replaced/ upgraded) power systemelements shall be submitted by user/asset owner to the concerned RLDC, at least three (03) working days prior to the date of charging/energization.	The application for charging/energization of altered (including modified/ replaced/ upgraded) power system elements shall be submitted by user/asset owner to the concerned RLDC, at least three (03) working days prior to the date of charging/ energization (except for works of emergency nature).	It is not possible to provide charging formats 3 days prior in case of works of emergency nature like equipment failure/ ERS restoration/ tower collapse. Hence this clause may please be modified	Already incorporated in the draft FTE&I procedure submitted to CERC.
Section 1B Pg. 11 (Point 5)	Charging/Energization after re-conductoring, re-bundling or similar other alterations involving change in nature of power flow in the line.	Charging/Energization after re-conductoring, re-bundling or similar other alterations involving change in nature of power flow in the line after completion of entire scope of work.	Such work is carried out progressively span by span on span basis to minimize outage of transmission line. Every time, keeping the line idle for 3 days shall not be beneficial. Charging of line after completion of span maybe allowed without requirement of submitting document prior to 3 days. However final charging clearance will be taken after completion of complete Reconductoring works as per procedurementioned.	Idle charging (for anti-theft) of a section or complete line length which is not terminated at both ends is also a planned activity. It requires verification of relay setting and also simulation studies to assess the voltage rise at the sending end and along the line. Therefore,sufficient lead time is required to facilitate the same.
Section 1B Pg12	2. Approval by RLDC/NLDC for charging / energization of altered (including modified/ replaced/ upgraded) power system elements: For alterations of emergency nature falling under S. No. 1, 2(a), 3 and 8(b),	2. Approval by RLDC/NLDC forcharging/ energization of altered (including modified/replaced/ upgraded) power system elements: For alterations of emergency nature falling under S.No. 1, 2(a), 3, 4 and8(b), *Following Sentence may be added:* After intimation to statutory authority of readiness, any further Delay shall notbe attributable to user/asset owner.	a) It is requested that documents in case of restoration through ERS shall also be submitted in real time. b) Sometimes, especially during oddhours/holidays Delays are observed in getting statutory approval from authority, which results in delayed energization of element even though the system is ready forenergization prior from time of statutory approval	Verification of safety clearance from CEA-Electrical inspector shall be as per the directions/clarifications issued by CEA.

Annexure A1, Format IA, Page-17	**Site/Substation Contact Details:** Site/Substation Incharge Name: Site/Substation Incharge Designation: Site/Substation Incharge Mobile Number: Site/Substation Incharge Email Id : Site/Substation Control Room Email Id: Site/Substation Control Room Hotline/VOIP/Orang Site/Substation Control Room Mobile Number: Site/Substation Control Room Landline Number:	Remote Control Centre details to be added in the format if element is operated from remote control centre.	As per IEGC 28(7) Alternatively, the same may be operated round the clock from a remotely located control room, subject to the condition that such remote operation does not result in a delay in the execution of any switching instructions and information flow:	The suggestion reqgarding remote control centre details is has been suitably incorporated
Annexure A5, Page-18/25	Type and Location of energy meters as per relevant CEAregulations	To be deleted.	To be removed from site scope. To beprovided by CTU'' GNA regulation 14.0	The responsibility of installation of meters shall be as per the extant regulations. In the application for first time energization, the asset owner is expected to furnish the location / details of the interface energy meters installed at site.
Annex-A2 II.c.13 Page-20	Reactor: Percentage Impedance data	To be deleted.	Not applicable for reactor	Suitably incorporated
Annexure A4, Page-24.	List of SCADA points to be made available to RLDC	To be deleted.	Resolution, PMU etc. to be added in common as given for RE generators in Page 221 and relevant Annexures.	SCADA integration is mandatory requirement for integration of any new element for which point-to-point telemetry checking is required at RLDC. Hence, this list of SCADA points has to be-provided compulsorily for all FTC. It is mandatory for trial operation certification also.

Annexure A5 Page No 25	Annexure A5 Note: NOC from local distribution licensee is to be submitted except when the drawl of power from tertiary of ICT by the licensee is in its capacity as a regional entity.	Annexure A5 Note: Details of meter installed and Initial Meter reading is to be submitted, except when the drawl of power from tertiary of ICT by the licensee is in its capacity as a regional entity.	This is new requirement which is not requiredas per IEGC-2023 and any other regulation. Further drawl from tertiary are done after loadassessment and final connection/ MoU with local distribution licensee. Bilateral agreement is being done with the distributionlicensee, which generally takes very longtime and accordingly it may unnecessarily delay the connection of primary equipment with the grid. Hence, NOC from local distribution licensee should not be made Mandatory.	NOC from local distribution licensee as well as installation of SEM for the case of drawal from tertiary of the ICT (owned by transmission licensee) is required before the FTC of such ICT for ensuring dispute-free and accurate energy accounting of tertiary drawal. In many cases where HV side of ICTs is not considered for the drawal of states for example at Bilaspur and Warora, the tertiary drawal point is added to the drawal computation of that state. As the drawal is billed by the state utility to the transmission licensee (owner of the ICT) hence the same has to be considered for computation of drawal of the state.
Annexure B2 Page 30	PRD/OSR/Bucholz relay setting to be submitted	To be removed	These are mechanical devices with NO/NC Contacts. There is no settable settings ascompare to numeric relays.	Suitably incorporated
Annexure B3, Format IIIB, Page-32.	It is also certified that the data provided to main and backup RLDCs are through redundant ports (RTU/Gateway and communication equipment) and through different physical path (wherever possible) toensure reliable and redundant data as per IEGC (as amended from time to time).	It is also certified that the data providedto main and backup RLDCs are through redundant ports RTU/Gateway and communication equipment) and path planned by CTU to ensure reliable and redundant data as per IEGC (as amended from time to time).	As telecom connectivity is planned by CTU.	The requirement is as per following clause of " Manual of communication planning in power system operation central electricity authority dtd 31.03.2022 user has to provide " : 4.1.2 To ensure redundancy with route diversity, each communication channel (working path) planned for the

			Users shall be provided with alternate channel (protection path) in different routes, i.e., the working path and protection path should be resource disjoint. 4.1.12 The requirements of the applicant(s) shall be examined by the concerned nodal agency before allowing the connectivity to the existing communication system. Any augmentation/expansion of the existing communication system shall be planned by the nodal agency to ensure redundancy with route diversity of the allocated communication system. However, in case of radial connectivity to the existing node, the applicant(s) shall develop their own redundant communication system up to the existing wideband node. & 4.4 Reliability Criteria:
Annexure B6 (a), Page-38.	1) Undertaking by the User for energization and integration of transmission line/bay after alteration (including modification/ replacement/ upgradation). 2. We have complied with CEA (Measures relating to Safety and Electric Supply) 2... all statutory clearances have been obtained for the said alteration. 2(a). CEA/State Electrical Inspector Safety Clearance dated......, as per Reg ... related to safety and electric supply) Regulations, 2023 and amendments the...	1) Undertaking by the User for energization and integration of transmission line/bay after modification. 2) To be removed.	As per IEGC applicable only for new integration of new element or modified powersystem element.	This is a general undertaking; The user/applicant may strike out which ever is not applicable in its case.

Annexure C1, Format-V, Point-1 & 4. Page-47.	1.The plots of active (MW) and reactive (MVAr) power flows and related voltages during the …..hours (as applicable) trial run based on the substation SCADA is enclosed as Annexure C2.	1. The plots of active (MW) and reactive(MVAr) power flows and related voltages during the …..hours (as applicable) trial run based on the Substation/remote control centre SCADA is enclosed as Annexure C2.	If power system element are operated from remote control centre then remote controlcenter to be mentioned in format. As per IEGC 28 (7)	Substation/remote control centre SCADA as the case may be (if operated remotely). Suitably incorporated.
Annexure B2, Format IIIA, Page-30. Note	The extracted settings from the following listed relay settings* along with the network data, as applicable needto be uploaded in the aforementioned databases and a copy of listed relay settings shall be enclosed along with Annexure-B2	The extracted settings from the following listed relay settings as applicable shall be enclosed along withAnnexure-B2	All network related data is to be provided byCTU for study.	These protection relay details would be available with the substation asset owner .
Annexure B2, Format IIIA, Page-30. Table: Transmission line , Transformers & Reactors	Sl No:1, Line /Bus data for updating network model Sl No:2, Transformer/Reactor data for updating networkmodel	To be deleted.	All network related data is to be provided byCTU for study.	The asset owner would be have the network details as implemented in site. Therefore submission of data for modelling / simulation studies is required to be furnished by the applicant. .
General comments	Wherever "altered" is mentioned in document "modified" is to be used as per IEGC			*"Alteration" word flows from the CEA Measures relating to safety and Electric supply Regulations 2023. Hence, it need not be replaced with the word "modified"*

Section 4: HVDC

Clause/Annex No & Page No	Existing Clause	Proposed Modification	Remarks	GRID-INDIA REMARKS
1.a). Page no 308	Following technical data/models/reports shall be provided by the owners of HVDC before first time charging:	Following technical data/models/reports, **as applicable** shall be provided by the owners of HVDC before first time charging:	Some data mentioned in this section depends on project design/specifications	As Applicable is considered for the entire section. Hence need not be written exclusively
1.a).v, Page no 308	Frequency controller study report	Frequency controller study report- as applicable	Frequency controller study may change on project-to-project basis.	As Applicable is considered for the entire section. Hence need not be written exclusively
1.a).vii, Page no 308	Power order compensation details and study report	Power compensation details ~~and study report~~	There is no separate report for power compensation, these details are covered in Main circuit parameter design report/Control strategy document	The basis for design of reactive compensation report may be shared . The Details of reactive compensation is available , However the basis for determining the reactive compnesation if available would be useful
1.a).xvi, Page no 308	Power Oscillation Damping (POD) Status along with the document on tuning	Power Oscillation Damping (POD) study report, as applicable.	The study report has both HVDC performance with POD and without POD.	Power Oscillation Damping (POD) study report with status required to be submitted
1.a).xx, Page no 309	Sub synchronous resonance study report	Sub synchronous resonance study report, as applicable	The requirements of SSDC (Sub synchronous damping controller) in HVDC are not always envisaged. This requirement changes from project-to- project based on network conditions.	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.a).xxiii, Page no 309	Any other information as required by RLDC	Any other information as required by RLDC- As per RfP document of the project	The various study requirement needs to be mentioned specifically in the RFP document as it has commercial implications.	As HVDC is a growing Technology , new study reports if required the same would be asked
1.b) Data Telemetry Requirements, Page 309	Following SCADA points shall be made available to the NLDC/RLDC control room:	Following SCADA points, as applicable shall be made available to the NLDC/RLDC control room:	Some signals mentioned in the list are specific to project requirements.	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Analog Signal vi. Page 309	Individual and cumulative Filter MVAR	Individual and cumulative Filter MVAR as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Analog Signal vii. Page 309	Firing Angle-Alpha	Firing Angle-Alpha as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1. b) Analog Signal viii. Page 309	Extinction angle- Gamma, etc.	Extinction angle- Gamma, etc. as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Digital Signal i. Page 309	Individual Filter Status	Individual Filter Status, as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Digital Signal ii. Page 309	HVDC Mode (Metallic return / Ground return)	HVDC Mode (Metallic return / Ground return), as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Digital Signal vi. Page 309	POD Status	POD Status, as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Digital Signal vii. Page 309	SSDC Status	SSDC Status, as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Digital Signal ix. Page 309	DMRs	DMRs, as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Digital Signal x. Page 309	MRTB Status	MRTB Status, as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Digital Signal xi. Page 309	GRTB Status	GRTB Status, as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively
1.b) Digital Signal xiii. Page 309	Any other relevant signal sought by RLDC	Deleted	This is an open-ended ambiguous requirement	This clause maybe kept considering future requirement
1. b) Protection Signal iii. Page 310	POD Status (Operated or not)	POD Status (Operated or not), as applicable	This signal depends on project requirements	As Applicable for the entire section. Hence Considered. Need not be written exclusively

Section 4: HVDC

Clause/Annex No & Page No	Existing Clause	Proposed Modification	Remarks	GRID-INDIA REMARKS
1.c).e.(iv), Page no 310	Black start capability in the case of Voltage source convertor (VSC) HVDC wherever feasible wherever feasible	Black start capability in the case of Voltage source convertor (VSC) HVDC wherever feasible based on protection readiness of network involved in the black start demonstration.	Since black start of network using VSC is not comparable with black start of network using Conventional generation in terms of fault feed during demonstration, the protection system of the network elements involved in the demonstration may be required to be modified to perform safe demonstration.	Protection settings of the radial grid fed from VSC shall be coodianted during the time of Blakc Start exercise.
3.c), Page no 311	During the trial operation minimum load operation, ramp rate, overload capability (subject to grid condition) and black start capability in case of Voltage source convertor (VSC) HVDC station, Dynamic Reactive Power Support (in the case of VSC based HVDC), reversal of power (maximum/minimum power order) shall be demonstrated as desired by NLDC/RLDCs.	During the trial operation minimum load operation, ramp rate, overload capability (subject to grid condition) and black start capability in case of Voltage source convertor (VSC) HVDC station, ~~Dynamic Reactive Power Support (in the case of VSC based HVDC), reversal of power (maximum/minimum power order) shall be demonstrated as desired by NLDC/RLDCs,.~~	Since demonstration of this feature will require creation of faults in the network, validation of this functionality cannot be performed in the field. Since due to grid constraints in some instances 24 hrs time may not be sufficient for performing all the proposed tests, hence number of tests required to be performed within this 24 hrs shall be deliberated during start of trial operation.	Dynamic Reactive Power Capacilbity could also be be tested by varying the reference AC voltage in voltage control mode in consultation with OEM.The actual fault will be created based on grid condition in consultation with OEM.
4.e), Page no 312	**Submission of final as-built validated model:** Within 03 months of the issuance of successful trial run certificate, asset owner shall submit a final as built validated simulation model (both EMT and RMS) along-with model validation report of the HVDC for both steady state (both voltage and Q-control) and transient conditions. For steady state validation, real-time PMU data shall be used. For transient condition validation, disturbance recorder data shall be used……………………..	Complete 4.e) section to be removed/modified	Validation of HVDC models on basis of field test results would require that the PSS/E network data files provided to the Developer have been independently validated with corresponding field test results. In other words, the PSS/E files provided at the start of the project should have been validated against field test results. Hence, a procedure should be framed for validation of the network data handed over to HVDC OEM, based on field test results. It may be noted that defects/errors in the network data files will not be corrected by the developer	The submission of final as-built validated model is to be provided in case of change in HVDC parameters during commissioning of the HVDC. If so the simulation model needs to be revised . Additionally, the submitted HVDC models needs to be revised as per the performance of HVDC in response to events observed within 3 months. The initially submitted model may be used for validation and then submitted
4.b., Page no 313	Final simulation model parameters of STATCOM/SVC.	Final simulation model parameters of HVDC	Typo Error	Suggestion incorporated
6, Page no 314	Grid-India (Regional and National Load Despatch Centres) shall preserve the confidentiality of the information and data related with mathematical models (user defined model, source code etc.) and certification reports submitted to them in fulfillment of the obligations under this procedure and shall use them exclusively for the purpose they have been submitted, notably to verify the compliance of requirements set forth in extant regulations in Indian power system. The data may also be used for the purpose of system studies required for reliable and secure operation of the grid as per the Electricity Act and CEA/CERC regulations.	Grid-India (Regional and National Load Despatch Centres) shall preserve the confidentiality of the information and data related with mathematical models (user defined model, etc.) submitted to them in fulfillment of the obligations under this procedure and shall be used by GRID- INDIA only them exclusively for the purpose they have been submitted, notably to verify the compliance of requirements set forth in extant regulations in Indian power system. The data may also be used for the purpose of system studies required for reliable and secure operation of the grid as per the Electricity Act and CEA/CERC regulations.	Source code and certification report is not clear. The models which are likely to be shared are black box models and they are not certified by any third party because they are intellectual property. GRID-INDIA to safeguard confidentiality of all technical info submitted in case it is handed over to other parties e.g. CTUIL, CEA, etc. This shall be ensured by signing of mutually acceptable, project specific non-disclosure agreement (NDA) by the recipient parties beforehand.	The major issue with the UDM's(.dll files) provided by the majority of the developers are not compatible for the higher versions of the PSS/E. In order to make them compatible, the source code shall be compiled with the Compiler and then shall be used as .dll files for higher versions of the PSS/E. In this regard it is requested to share the source codes & compilation procedure of the UDM's. GRID – INDIA will maintain the confidentiality obligation as mentioned in the FTC procedure document & CEA meeting held on 21.07.23.

Section 4: HVDC

Clause/Annex No & Page No	Existing Clause	Proposed Modification	Remarks	GRID-INDIA REMARKS
Annexure-I, 1.i., Page no 316	RMS and EMT models of the HVDC shall be submitted. The model shall include auxiliary models also (Frequency Controller Model, POD controller Model, Sub synchronous damping controller model, Voltage controller model etc., as applicable).	Encrypted RMS and EMT models of the HVDC shall be submitted. The model shall include auxiliary models also (Frequency Controller Model, POD controller Model Sub synchronous damping controller model, Voltage controller model etc., as applicable).	The HVDC models will be encrypted.	Black boxing can be used to ptotect proprietary information of OEM.RMS Model maybe submitted as either Generic or UDM (if UDM submitted , Fortran Code with compilation procedure to be submitted for future simulation software comptability)
Annexure-I, 1.ii.a), Page no 316	RMS models shall be compatible with PSS/E version 35 and above. Provided that the concerned RLDC may accept the model compatible with version 34 also under special circumstances. The decision in this regard will be at the discretion of the concerned RLDC only. Both generic and user defined (UDM) RMS models are required to be submitted. The response of the generic model shall be benchmarked against the UDM response for both steady state and transient conditions. Further, the generic model shall not contain any encrypted or compiled parts, as the system operator must be able to maintain the same without the restrictions of software updates etc. In case of submission of User Defined Models (UDMs), the submission of the source code and compiling procedure along with the model is mandatory.	RMS models shall be compatible with PSS/E version 35 and above. Provided that the concerned RLDC may accept the model compatible with version 34 also under special circumstances. The decision in this regard will be at the discretion of the concerned RLDC only. Further, the generic model shall not contain any encrypted or compiled parts, as the system operator must be able to maintain the same without the restrictions of software updates etc. In case of submission of User Defined Models (UDMs),the submission of the source code and compiling procedure along with the model is mandatory.	Backward compatibility of future PSS/E versions cannot be assured, as this is beyond the control of Developer / HVDC OEM. The intention of this clause is not understood. No acceptance criteria have been specified for the benchmarking. Furthermore, depending on the intended use of the model, it may not always be possible to match the performance of the generic model with the UDM. The HVDC models will be encrypted. Source code will not be provided being an intellectual property of the HVDC OEM.	The RMS model compatible with PSS/E version 35 and above will be considered RMS Model maybe submitted as either Generic or UDM (if UDM submitted , Fortran Code with compilation procedure to be submitted for future simulation software comptability) If generic RMS models is submitted , then the response of the generic model shall be benchmarked against the UDM response for both steady state and transient conditions to demonstrate the performance of submitted Generic Model.
Annexure-I, 1.ii.b), Page no 316	EMT models shall be compatible with PSCAD version 4.6.3 and above with the following – i. Intel 15 Update 5 and newer (32-bit) and Visual Studio 2015 and newer ii. Intel 15 Update 5 and newer (64- bit) and Visual Studio 2015 and newer iii. Model works across a range of time steps and does not require a specific time step These models must not be dependent on a specific Intel Visual FORTRAN version and should not have dependencies on additional external commercial software.	EMT models shall be PSCAD version 4.6.3 an following –and above with the following – i. Intel 15 Update 5 and newer (32-bit) and Visual Studio 2015 and newer ii. Intel 15 Update 5 and newer (64-bit) and Visual Studio 2015 and neweriii. Model works across a range of time steps and does not require a specific time step These models must not be dependent on a specific Intel Visual FORTRAN version and should not have dependencies on additional external commercial software.	Backward compatibility of future PSCAD versions cannot be assured, as this is beyond the control of HVDC OEM.	The EMT model compatible with for PSCADA version 4.6.3 and above will be considered.
Annexure-I, 1.iii, Page no 317	Full section	-	The requirements mentioned in this section can be fulfilled as much as permitted by HVDC OEM based on their Intellectual Property restrictions.	Black boxing can be used to ptotect proprietary information of OEM
Annexure-I, 1.iii, Page no 317	EMT model shall not contain any dependent libraries. The submitted workspace file (.pswx) must not load any PSCAD library (.pslx) files apart from the PSCAD master library. The model shall be capable of running with no extra steps aside from clicking "Run" option in PSCAD.	Proposed to be removed	This may not be possible with EMT UDM models.	For EMT Black-Box or UDM model , if libraries are to loaded, the detailed procedure of running to be included as a apart of the simulation report
Annexure-I(a).1., Page no 318	-		Symmetrical monopolar configuration is available for VSC case	As applicable will be accepted

SECTION 5 - STATCOM

Clause/Annex No & Page No	Existing Clause	Proposed Modification	Remarks	GRID- INDIA REMARKS
1.	**Pre-Charging Activities**			
a) Pg 342	**Data Submission**			
v	MSR and MSC design parameters	Rating of MSC & MSR branch	*Requirement of design parameters are not mentioned in IEGC 2023.It is not required to be shared and is a proprietary data of OEM*	Suitably incorporated as "Rating of MSR and MSC parameters, and coordinated control philosophy"
x	Coupling Transformer Rating /Impedance and other technical details	Coupling Transformer Rating/Impedance	As per IEGC only Coupling Transformer Rating is required. what other technical details is required to be mention here itself	Guranated Technical parameters Document to be shared as a apart of technical details
xi	Power Oscillating Damper (POD) – Study Report along with status of POD (If not in service, then reasons for the same). The results of an offline simulation-based study to validate the performance of POD.	Power Oscillating Damper (POD) – Study Report along with status of POD (If not in service, then reasons for the same) **based on details of tuning frequency given by GRID-INDIA.** The results of an offline simulation-based study to validate the performance of POD.	*POD status shall be provided however POD frequencies to be tuned shall be provided by GRID-INDIA.* **The result of Offline simulation can be shared with grid India after post charging, subject to confidentiality.**	Power Oscillating Damper (POD) – Study Report along with status of POD (If not in service, then reasons for the same) based on details of tuning frequency given by GRID-INDIA/CTUIL. The results of an offline simulation-based study to validate the performance of POD.
xii	Any other information as required	*To be deleted*	*All the relevant data is already being shared through SCADA as per this document which ascertains and demonstrate that STATCOM is operating effectively. Hence GRID-INDIA shall clearly mention it here as it is not possible to add any additional data sets if asked at later stage during charging.*	As per requirement of specific project
b) Pg 343	**Data Telemetry Requirements**			
a.	Following SCADA points shall be made available to the NLDC/RLDC control Room.			
iv	QTra: Reactive power through the coupling transformer	*Q STATOM Station: Total Reactive Power exchange at PCC*	*This value is not metered directly and the Reactive power through coupling transformer measured from HV and MV side of coupling transformer will be different. Alternatively, instead of this value the Q total at PCC is sent through SCADA*	QTra: Reactive power through the coupling transformer (LV & HV side Value)
v	Paux & Qaux : Active and reactive power through the auxiliary supply	*To be deleted*	*No metering is envisaged for auxiliary supply system*	The Telemetry of Auxilliary consumption of STATCOM to be telemetered
vii	Tap position of coupling transformer	*To be deleted*	*Not Applicable in STATCOM STATION*	Tap position of coupling transformer is required(as applicable)
viii	POD enabled/disabled status along-with setting parameters	POD enabled/disabled status	*May be sent via SCADA. The setting of POD should be provided by GRID-INDIA for the POD frequencies.*	The POD would be tuned and implemented based on POD frequencies. The Present frequency settings of POD implemented to be telemetered through SCADA
c.	**Other Pre-charging Activities**			

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f. **Pg 344**	The auxiliary consumption of STATCOM is generally drawn from the tertiary of the 400/220/33 kV transformer at the substation. The meter reading of this transformer would include the auxiliary consumption of STATCOM as well. Therefore, a **No Objection Certificate (NOC)** from the local DISCOM and SLDC shall be provided by the owner of the STATCOM.	The auxiliary consumption of STATCOM is generally drawn from the tertiary of the 400/220/33 kV transformer at the substation. The meter reading of this transformer would include the auxiliary consumption of STATCOM as well.Details of meter installed and Initial Meter reading is to be submitted.	NOC should not be made mandatory for first charging as it will delay the charging of STATCOM. Sometimes the auxiliary consumption of STATCOM is generally drawn from the separate tertiary of the 400/220/33 kV transformer at the substation.NOC is not provided by some of the DISCOMs like MSEDCL denied NOC for Solapur STATCOM by stating "more than one connection in same premises & for the same purpose cannot be released. Also reference-3 guidelines, Two connection in one premises for same purpose is not allowed". POWERGRID is still taking up the matter with MSEDCL (copy of MSEDCL letter is attached herewith for reference). Also, no such requirement is mentioned in IEGC 2023 & any other regulation.	NOC from local distribution licensee as well as installation of SEM for the case of drawal from tertiary of the ICT (owned by transmission licensee) is required before the FTC of such ICT for ensuring dispute free and accurate energy accounting of tertiary drawal. In many cases where HV side of ICTs is not considered for the drawal of states for example at Bilaspur and Warora, the tertiary drawal point is added to the drawal computation of that state. As the drawal is billed by the state utility to the transmission licensee (owner of the ICT) hence the same has to be considered for computation of drawal of the state.
g.	Special Energy meter shall be installed by CTU at Coupling Transformer as well as in consultation of RLDC. The dummy meter reading shall be sent to RLDC along with B type formats.	*To be deleted*	*Scope of CTU.*	The SEM data is requested to be provided in the B type formats.
3. Pg 345	**Trial Run Operation of STATCOM/ SVC**			
c	The trial operation for the purpose of STATCOM/SVC shall be continuous operation for 72 hrs. During the trial operation, performance of MSR and MSC and STATCOM shall be verified. Hence, MSR and MSC shall be operated continuously for 24 hours one by one:	The trial operation for the purpose of STATCOM/SVC shall be continuous operation for **24 hrs.**	*As per IEGC 2023 clause 23, Trial run of a transmission system or an element thereof shall mean successful energization of the transmission system or the element thereof at its nominal system voltage through interconnection with the grid for a continuous twenty-four (24) hours flow of power.* The operating mode for this duration shall be specified by GRID-INDIA. If the trial operation is done in voltage control mode the switching of MSR and MSC is controlled by the close loop control system, so switching of MSR and MSC shall be totally dependent on the, Voltage at PCC, SCL of the network. However, this can only be demonstrated in Manual Mode as per instruction of GRID- INDIA (Please note that in Manual Mode, voltage at HV Bus cannot be controlled through STATCOM).	The Trial operation is mentioned as 72 Hours considering 24 hours for MSC, MSR & MSC.
d	The continuous operation of MSR, MSC and operating range test of STATCOM shall be demonstrated during trial operation	The continuous operation of MSR, MSC and operating range test of STATCOM shall be demonstrated **in Manual Mode** during trial operation	*This can only be demonstrated if the STATCOM is in Manual Mode.*	The details of trial testing will be discussed before commencement of tests.
4. (pg 345)	**Post Charging activities**			
b	**Following data shall be provided by the owner of STATCOM post successful trial operation for issuance of successful trial operation**			
vii	Any other data as required by RLDC to ascertain effective operation of STATCOM:	To be deleted	All the relevant data is already being shared through SCADA as per this document which ascertains and demonstrate that STATCOM is operating effectively. Hence GRID-INDIA shall clearly mention it here as it is not possible to add any additional data sets if asked at later stage during charging	As per requirement of specific project

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d) Pg 346	**Submission of final as-built validated model** Within 03 months of the issuance of successful trial run certificate, the asset owner shall submit a final as built validated simulation model (both EMT and RMS) along- with model validation report of the STATCOM/SVC for steady state (both voltage and Q- control) and transient conditions. **For steady-state validation, real-time PMU data may be used. For transient condition validation, disturbance recorder data may be used.**	Within 03 months of the issuance of successful trial run certificate, the asset owner shall submit a final as built validated simulation model (both EMT and RMS) along-with model validation report of the STATCOM/SVC for steady state (both voltage and Q-control) and transient conditions. **For both steady- state & transient condition validation, Result of Factory Performance Test (FPT) and Dynamic Performance Test (DPT) data may be used.**	**Variation w.r.t tolerance from site measurement to study measurement to be provided by GRID-India. We understand that this validation report is only for reference purpose.** **This is not a requirement of IEGC-2023**	The Submission of Final as-built validated model is to be done using the steady-state validation, real-time PMU & DR data may be used.
d. pg 347	Comparison of **on-site test measurement** with simulation results shall be provided as per the format shown below	Comparison of **Factory System Test & Dynamic Performance Test result** with simulation results shall be provided as per the format shown below:	**This not a requirement of IEGC-2023**	This is for validation of the As-Built Model, the final submitted as built model vs Real time measurement
e. pg 347	Along with graphical comparison of **field test measurement** with simulation results, time series measurements/data of field test and simulation response (of same time resolution) shall also be provided in suitable format (preferably .csv file).	Along with graphical comparison of **FPT & DPT result** with simulation results, time series measurements/data of field test and simulation response (of same time resolution) shall also be provided in suitable format (preferably .csv file).	**This not a requirement of IEGC-2023**	This is required for checking the accuracy of the submitted as built nodel with the field test measurment
5 (Pg 348)	**Periodic Testing;** Periodic Testing shall be carried out as per regulation (40) of the IEGC, 2023 and amendments thereof. It is desirable to submit report of such test carried out (at the time of First Time Energization & Integration) while applying for trial run certificates. c. Within 03 months of completion of the periodic tests, the owner of the STATCOM/SVC shall submit the final validated model comparing the results of the periodic tests against the model response as specified in section-4 (d) above. The models shall be submitted as per the model compatibility guidelines specified at Annexure-I	Periodic Testing Periodic Testing shall be carried out as per regulation (40) of the IEGC, 2023 and amendments thereof.	*No such requirement of testing during first charging in IEGC. This test is envisaging testing after 5 years or major retro fitment.* *Test to be carried during first time energization is already mentioned in clause24 of IEGC. Same will be submitted at the time of first time energization.*	The procedure mentions that it is "desirable" and not mandatory to submit such reports.
Annex-I 1 (a) Pg 349	In case of submission of User Defined Models (UDMs), the submission of the **source code and compiling procedure** along with the model is mandatory.	In case of submission of User Defined Models (UDMs), the submission of the **procedure for loading, compiling and simulating UDM** along with the model is mandatory.		This refers to using of the UDM for future releases of the RMS simulation software. Hence the source code and compiling procedure along with the model is mandatory.The major issue with the UDM's(.dll files) provided by the majority of the developers are not compatible for the higher versions of the PSS/E. In order to make them compatible, the source code shall be compiled with the Compiler and then shall be used as .dll files for higher versions of the PSS/E. In this regard it is requested to share the source codes & compilation procedure of the UDM's. GRID – INDIA will maintain the confidentiality obligation as mentioned in the FTC procedure document & CEA meeting held on 21.07.23.
Annex-I 1 (b) Pg 349	b) EMT models shall be compatible with PSCAD version 4.6.3 and above with the following – i. Intel 15 Update 5 and newer (32-bit) and Visual Studio 2015 and newer ii. Intel 15 Update 5 and newer (64-bit) and Visual Studio 2015 and newer iii. Model works across a range of time steps and does not require a specific time step These models must not be dependent on a specific Intel Visual FORTRAN version and should not have dependencies on additional external commercial software.	EMT models shall be compatible with PSCAD version 4.6.3 and above **with 50 microseconds or below time step.**		Suitably incorporated as "EMT models shall be compatible with PSCAD version 4.6.3 & above with 50 microseconds or below time step and with the following. i. Intel 15 Update 5 and newer (32-bit) and Visual Studio 2015 and newer ii. Intel 15 Update 5 and newer (64-bit) and Visual Studio 2015 and newer iii. Model works across a range of time steps and does not require a specific time step These models must not be dependent on a specific Intel Visual FORTRAN version and should not have dependencies on additional external commercial software.

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Annex-I (a) 2 B. Pg 352	**B. Transient simulation model (Dynamics):** For representation of the RMS behavior of STATCOMs, **two standard generic models** are available in the PSS/E library, namely SVSMO3T2 and CSTCNT. Details for SVSMO3T2 and CSTCNT models are given below. The SVSMO3T2 has been described as STATCOM based SVC with logic to trip mechanically switched shunts (MSS).	For representation of the RMS behavior of STATCOMs, **standard generic models** are available in the PSS/E library, namely SVSMO3T2 and CSTCNT **or any other equivalent model. Details for SVSMO3T2 and CSTCNT models are given below. The SVSMO3T2 has been described as STATCOM based SVC with logic to trip mechanically switched shunts (MSS).**		Equivavalent Model is not understood. If the model mentioned is not available then the UDM along-with the Source Code & compiling procedure to be provided