

COMMENTS ON DRAFT IEGC-2022

Chapter 4

PROTECTION CODE

The “protection settings” was mentioned in different clauses of Draft IEGC, the same in respective clauses may pose constraints in management & timely implementation/ modification of relay settings.

- Modern numerical relays have hundreds of protection parameter settings
- Most of these parameters are IED specific and need to be optimized based on assessment of performance of the protection system in a specific network.
- these parameters will depend upon the IED and utilities.

*It is proposed that RPC may review **protection philosophy** in place of IED specific **protection settings** in line with Ramkrishna Task Force guidelines.*

Continued

Clause	Clause with modification proposed
14.(1) Page 34	“RPCs shall undertake review of the protection philosophy, assess the requirement of revisions in protection settings philosophy and revise protection settings philosophy in consultation with the stakeholders of the respective region, from time to time and at least once in a year. The necessary studies in this regard shall be carried out by the respective RPC”
14.(2)(b) Page 34	“Obtain approval of the concerned RPC for (i) any revision in settings protection philosophy , and (ii) implementation of new protection system;”
14.(2)(c) Page34	“Intimate to the concerned RPC about the changes implemented in protection system, due to change in protection settings philosophy , within a fortnight of such changes;”
14.(2)(d) Page34	“ensure correct and appropriate implementation of protection settings philosophy as specified by the concerned RPC.”

Protection Code:

It is proposed that the time period for different activities as follows:

Clause	Clause with modification proposed	Explanation
15. (1) Page35	“All users shall conduct internal audit of their protection systems in annually two years , and any shortcomings identified shall be rectified and informed to their respective RPC.”	In view of large number of substations, the internal audit may be carried out in two years.
15. (6) Page36	“Users shall submit the following protection performance indices of previous months to their respective RPC on monthly quarterly basis, which shall be reviewed by the RPC:”	Presently, protection performance indices are submitted on quarterly basis. Evaluation of performance indices required compilation of huge data which requires time. It is proposed that performance indices may be submitted on quarterly basis.

Protection Code:

It is proposed to have the following changes regarding Disturbance Recorder:

Clause	Clause with modification proposed	Explanation
17. (2) Page37	<p>“The disturbance recorders shall have time synchronization and a standard format for recording analogue and digital signals which shall be included in the guidelines issued by the respective RPCs include analogue & digital signals as specified by the respective RPCs. The sequence and naming of the signals may be decided by respective utilities.”</p>	<p>POWERGRID has already standardized analog and digital signals in DR. Revision in Naming and sequence of DR channels will requires involvement of OEM and is troublesome activity.</p> <p>It is proposed that details of analogue & digital signals need to be configured by utility may be specified by the respective RPCs. The sequence and naming of the signals may be decided by respective utilities.</p>

Chapter 5

COMMISSIONING AND COMMERCIAL OPERATION CODE

24. DOCUMENTS AND TEST REPORTS PRIOR TO DOCO

- This clause defines documents/ test reports need to submitted to RLDC for issuance of trial run certificate.
- Documents required for Transmission Line/ ICT/ Reactor not mentioned for issue of trial run certificates.

Proposed New Subclause:

Documents and Tests Required for Transmission lines/ICTs/ Reactors:

After successful trial operation of Transmission lines/ICTs, the transmission licensee shall submit the following documents to concerned RLDC:

- Values of the concerned line power flows and voltages during the trial run period.
- Special Energy meter (SEM) Reading corresponding to the trial run period (Not applicable for reactors).
- Event Loggers output during the trial run period.

24 (7). Documents and Tests Required for HVDC

Existing Clause	Proposed Modification
<p>Documents and Tests Required for HVDC</p> <p>..(b) The following tests shall be performed:</p> <ul style="list-style-type: none"> (i) Minimum load operation. (ii) Ramp rate. (iii) Overload capability. (iv) Black start capability in case of Voltage source convertor (VSC) HVDC 	<p>Documents and Tests Required for HVDC</p> <p>..(b) The following tests shall be performed:</p> <ul style="list-style-type: none"> (i) Minimum load operation. (ii) Ramp rate. (iii) Overload capability. (iv) Black start capability in case of Voltage source convertor (VSC) HVDC within design capability of the HVDC system.

Reason:

Black start of VSC HVDC is not similar to black start of Synchronous Generator. Black start of VSC shall be proposed within its design capability.

24 (7). Documents and Tests Required for SVC/STATCOM

Existing Clause

(a) The transmission licensee shall submit technical particulars including operating guidelines such as number of blocks and rating of each block, single line diagram, V/I characteristics, rating of coupling transformer, MSR/MSC design parameters, different operating modes, IEEE standard Model, Power Oscillation Damping (POD) enabled and tuned (if not then reasons for same) and the results of Offline simulation-based study to validate the performance of POD.

Proposed Modification

(a) The transmission licensee shall submit technical particulars including operating guidelines such as number of blocks and rating of each block, single line diagram, V/I characteristics, rating of coupling transformer, ~~MSR/MSC design parameters~~, different operating modes, ~~IEEE standard Model~~, Power Oscillation Damping (POD) enabled and tuned (if not then reasons for same) and the results of Offline simulation-based study to validate the performance of POD

24 (7). Documents and Tests Required for SVC/STATCOM

Existing Clause

(b) The following tests shall be performed to validate full reactive power capability of SVC and STATCOM in both the directions i.e. absorption as well as injection mode:

- (i) POD performance test.
- (ii) dynamic performance testing.

Proposed Modification

*b) The following ~~tests~~ **Offline simulation-based study report** shall be performed to validate full reactive power capability of SVC and STATCOM in both the directions i.e. absorption as well as injection mode:*

- (i) POD performance test.*
- (ii) dynamic performance testing.*

Justification:

- ❖ **Number and blocks and rating of each block, MSR and MSC design parameters:** Being proprietary design data, requirement of same may be deleted. However, rating of each VSC, MSR and MSC branch shall be communicated along with SLD.
- ❖ **IEEE standard model:** Type of Standard model needs to be mentioned. As per industry practice, OEM's give a user defined model and sharing the same shall generally require signing of Non-disclosure agreement with the OEM.
- ❖ **Power Oscillation Damping (POD):** POD status can be provided however POD frequencies for tuning shall be provided by Grid Operator.
- ❖ **Full reactive power capability of SVC and STATCOM** in both the directions can be demonstrated in field in Fixes Reactive power mode. If same cannot be performed due to system constraint, charging/trial operation should not be delayed. Further POD test cannot be performed during field testing.

Chapter 5

OPERATING CODE

Existing Clause	Proposed Modification
29 (2) (d) .. The reasons for such switching off or tripping to the extent determined and the likely time of restoration shall also be intimated within half an hour...	29 (2) (d) .. The reasons for such switching off or tripping to the extent determined and the likely time of restoration shall also be intimated within half an hour one hour ...

Justification:

- ❖ In case of switching off or tripping of any of important regional grid element under emergency condition (Blast or sparking), physical inspection of element and switchyard will be required thoroughly to check the actual damage
- ❖ Outage may occur in Odd-Hours.
- ❖ Ascertaining actual reason and action plan for restoration may take some time.

Existing Clause	Proposed Modification
<p>29 (15): NLDC, RLDCs, SLDCs, CTU, STUs and users shall operate in a manner to ensure that the steady state grid voltage as per the Central Electricity Authority (Grid Standards) Regulations, 2010 remains within the following operating range</p>	<p>29 (15): <i>NLDC, RLDCs, SLDCs, CTU and STUs and users shall operate in a manner to ensure that the steady state grid voltage as per the Central Electricity Authority (Grid Standards) Regulations, 2010 remains within the following operating range:</i></p>

Justification:

- ❖ “Users” may be deleted as voltage maintenance is the under the control of NLDC, RLDC and SLDCs. Users are not having any control in maintaining voltage.

32. OUTAGE PLANNING

Existing Clause	Proposed Modification
<p>32(3)(e):</p> <p>The annual outage plan shall be reviewed by RPC on monthly and quarterly basis in coordination with all the parties concerned, and adjustments shall be made wherever necessary.</p>	<p>32(3)(e):</p> <p>The annual outage plan shall be reviewed by RPC on monthly and quarterly basis in coordination with all the parties concerned, and adjustments shall be made wherever necessary. Further in case of shutdown for Bay maintenance where ever power flow is not affected, outage of bays shall be concurred on D-1 basis by concerned RLDC.</p>

Justification:

- ❖ It is proposed that outage for bay maintenance activity may be concurred in D-1 basis wherever power flow is not affected.

34. SYSTEM RESTORATION

Existing Clause	Proposed Modification
<p>34(3) The user shall carry out mock trial run of the procedure for different sub-systems including black-start of generating units along with grid forming capability of inverter based generating station, VSC based HVDC black-start support at least once in a year under intimation to the concerned SLDC and RLDC</p>	<p>34(3) The user shall carry out mock trial run of the procedure for different sub-systems including black-start of generating units along with grid forming capability of inverter based generating station, VSC based HVDC black-start support at least once in a five year under intimation to the concerned SLDC and RLDC</p>

Justification:

- ❖ Since VSC HVDC works on Power electronic based converters, annual mock drill of black-start scenario is not envisaged as once the VSC black-start feature has been tested during commissioning the performance does not alter/ drift over time unlike synchronous generators which have a mechanical parts involved

34. SYSTEM RESTORATION

Existing Clause	Proposed Modification
<p>34(4) Simulation studies shall be carried out by each user in coordination with RLDC for preparing, reviewing and updating the restoration procedures considering the following: -----</p>	<p>34(4) Simulation studies shall be carried out by each user in coordination with RLDC/ NLDC for preparing, reviewing and updating the restoration procedures considering the following: -----</p>

Justification:

- ❖ “each user in coordination with RLDC” may be replaced by “RLDC/ NLDC” as Simulation study facility is generally available with RLDCs/ NLDC and not to the transmission licensee.

35. REAL TIME OPERATION

Existing Clause	Proposed Modification
<p>(5) Operation Coordination (b) Any planned operation activity in ISTS system [such as transmission element opening or closing (including breakers), protection system outage, SPS outage and testing etc.] shall be done by taking operational code from RLDC or NLDC, as the case may be. The operational code shall have validity period of thirty (30) minutes from the time of issue...</p>	<p>(5) Operation Coordination (b) Any planned operation activity in ISTS system [such as transmission element opening or closing (including breakers), protection system outage, SPS outage and testing etc.] shall be done by taking operational code from RLDC or NLDC, as the case may be. The operational code shall have validity period of thirty (30) Sixty (60) minutes from the time of issue...</p>

Justification:

- ❖ In winter, lot of Lines/ Reactors are switched ON/OFF on voltage regulation. It involves operation of many CBs/ Isolators. In such cases, 30min deadline is hard to meet to restore/ isolate elements simultaneously.

39. REACTIVE POWER MANAGEMENT

Existing Clause	Proposed Modification
<p>39(11) If voltages are outside the limit as specified in clause (15) of Regulation 29 of these regulations and the means of voltage control set out in Clause (6) of this Regulation are exhausted, in that event SLDCs, RLDCs or NLDC shall take all reasonable actions necessary to restore the voltages so as to be within the relevant limits including opening of lines considering security of system.</p>	<p>39(11) If voltages are outside the limit as specified in clause (15) of Regulation 29 of these regulations and the means of voltage control set out in Clause (6) of this Regulation are exhausted, in that event SLDCs, RLDCs or NLDC shall take all reasonable actions necessary to restore the voltages so as to be within the relevant limits including opening of lines considering security of system.</p>

Justification:

- ❖ It has been observed that transmission lines are switched ON/OFF frequently on voltage regulation. It is to mention that none of the equipment like CT, CB, LA, etc are type tested for electrical endurance like switching of transmission lines.
- ❖ **Various failures of LA, CB, GIS modules has been observed in recent past due to frequent switching of lines during high voltage condition.**
- ❖ Switching of transmission lines for voltage control may be avoided.

40. FIELD TESTING FOR MODEL VALIDATION

40 (3) Following test included in Draft IEGC for HVDC/ FACTS:

- 1) Damping capability of HVDC/FACTS Controller- **May be deleted**
- 2) Frequency Controller Capability of HVDC Controller- **May be deleted**
- 3) Reactive Power Controller (RPC) Capability for HVDC/FACTS
- 4) Validation of voltage dependent current order limiter (VDCOL) characteristic for ensuring proper validation of HVDC performance - **May be deleted**
- 5) Filter bank adequacy assessment based on present grid condition- **May be deleted**
- 6) Validation of response by FACTS devices as per settings

Justification:

- As per OEM recommendation, Field testing of Damping capability, Frequency controller, VDCOL and filter bank adequacy based in present grid condition is not possible at site. Study report can be submitted.
- Above mentioned tests required creation of faults in AC & DC lines, oscillations, etc which is not possible in live conditions.
- Outage requirement if any may be considered as deemed available.

Thank You!