Comments of In-Sdes on proposed Kerala Grid Code

Additions / Corrections are Shown highlighted in Yellow and deletions are shown in red.

<table>
<tr><th>Clause No.</th><th>Clause</th><th>Remarks/Addition/deletion/correction proposed</th></tr>
<tr><td>Definitions</td><td>74) “Medium Term Open Access” means the right to use intra- State transmission and distribution system from any generating station for a period equal to or exceeding three months but not exceeding five years;</td><td>74) “Medium Term Open Access” means the right to use intra- State transmission and distribution system from any generating station for a period equal to or exceeding three months but not exceeding SEVEN years;</td></tr>
<tr><td>135</td><td>General Principles.-
(9)
If, it is felt by STU that user’s protection system does not comply with the norms, user is bound to get his protection system checked/ tested/ inspected by STU and, if required, replaced by new ones after its inspection and testing, so that there is no adverse impact on state grid or STU’s system.</td><td>General Principles.-
(9) If, it is felt by STU that user’s protection system does not comply with the norms, user is bound to get his protection system checked/ tested/ inspected by STU and, if required, user shall replace the same by new ones after its inspection and testing, so that there is no adverse impact on state grid or STU’s system.</td></tr>
<tr><td>136</td><td>(1)From stability consideration, the minimum short circuit current rating and time for switchgear and the maximum fault clearance time for faults on any User's system directly connected to the State Transmission System, or any faults on the State Transmission System itself, are as follows:-

<table>
<tr><th>Nominal Voltage</th><th>Minimum Short Circuit current rating and duration for Switchgear</th><th colspan="2">Target Fault clearance Time</th></tr>
<tr><th>kV</th><th>kA (rms)</th><th>Seconds</th><th>milli second</th></tr>
<tr><td>400</td><td>40</td><td>1</td><td>100</td></tr>
<tr><td>220</td><td>40</td><td>1</td><td>100</td></tr>
<tr><td>110</td><td>40</td><td>1</td><td>160</td></tr>
</table></td><td>(1)From stability consideration, the minimum short circuit current rating and time for switchgear and the maximum fault clearance time for faults on any User's system directly connected to the State Transmission System, or any faults on the State Transmission System itself, are as follows:-

<table>
<tr><th>Nominal Voltage</th><th colspan="2">Minimum Short Circuit current rating and duration for Switchgear</th><th>Target Fault clearance Time</th></tr>
<tr><th>kV</th><th>kA (rms)</th><th>Seconds</th><th>milli second</th></tr>
<tr><td>400</td><td>50</td><td>1</td><td>100</td></tr>
<tr><td>220</td><td>40</td><td>1</td><td>100</td></tr>
<tr><td>110</td><td>40</td><td>1</td><td>160</td></tr>
<tr><td>66</td><td>25</td><td>1</td><td>300</td></tr>
</table></td></tr>
</table>

	66 25 1 300	
138	Transmission Line Requirements.- (1)Every EHV line taking off from a Power Station or a substation shall have protection and back up protection as mentioned below:- a) STU shall notify Users of any changes in its policy on protection. b) Switchgear equipment and Relay Panels for the protection of lines of STU taking off from a Power Station shall be owned and maintained by the Generator. c) Any transmission line related relay settings or any change in relay settings will be carried out by the Generator in close co-ordination and consultation with STU. d) All such issues shall be put up in the next meeting of Protection Coordination Committee for ratification. e) Carrier cabinets/ equipment, Line matching units including Wave traps and communication cable shall be owned and maintained by STU. f) All Generators shall provide space, connection facility, and access to STU for such purpose.	Transmission Line Requirements.- Every EHV line shall have main protection and back up protection as mentioned below:- (1) For every EHV line taking off from a Power Station : a) STU shall notify Users of any changes in its policy on protection. b) Switchgear equipment and Relay Panels for the protection of lines of STU taking off from a Power Station shall be owned and maintained by the Generator as per the requirement of STU. Transmission line including wave trap/ground wire or OPGW up to the switchyard Gantry shall be owned and maintained by the STU. c) Any transmission line related relay settings or any change in relay settings will be carried out by the STU in close co-ordination and consultation with Generator. d) All such issues shall be put up in the next meeting of Protection Coordination Committee for ratification. e) Carrier cabinets/ equipment, Line matching units including Coupling capacitor or CVT as applicable and communication cable shall be owned and maintained by Generator as per the requirement of STU. Or Joint Box, Fibre Optic approach cable,FODP, Communication equipment, associated power supply etc required for the case of Fibre Optic connectivity shall be owned and maintained by Generator as per the requirement of STU. f) All Generators shall provide space, connection facility, and access to STU for such purpose.
138	(2) 400 kV and 220 kV Transmission Lines,- a) All 400 kV and 220 kV transmission lines owned by STU shall have two (Main I and Main II) fast acting distance protection schemes. b) These protection schemes shall be numeric, four independent zones	(2) a)All 400 kV and 220 kV transmission lines owned by STU shall have two (Main I and Main II) fast acting distance protection schemes or shall have two (Main I and Main II) Numeric Current Differential Protection schemes with redundant fibre optic communication between local end and remote end main-1 and main-2 protection

	(three forward and one reverse), non-switched (with separate measurement for all phase to phase and phase to ground faults) fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault). c) The scheme shall have inbuilt features of power swing blocking, fault recorder, disturbance recorder, event logger, relevant communication ports, single and three phase auto reclosing (with deadline charging and synchro- check facility), Local Breaker Backup (LBB), VT fail and broken conductor alarm/ trip and sufficient LEDs to display the faulty phases and zones. d) Maximum operating time of relay on fault should not exceed 50 ms. e) Directional earth protection shall be provided in the numerical feeder management relay. Back-up protection, shall also be provided. f) Additional, two stages over voltage protection is required for 400 kV lines. However, in case of short lines, utility is at discretion to provide this protection. g) Each transmission line shall have carrier inter-tripping through PLCC equipment for fast clearing of Zone 2 Faults.	relays. Numerical current differential relays (both main-1 and Main-2) shall be preferably from two different Manufacturers b) These distance protection schemes as the case may be shall be numeric, four independent zones (three forward and one reverse), non-switched (with separate measurement for all phase to phase and phase to ground faults) fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault). c) The scheme shall have inbuilt features of power swing blocking, fault recorder, disturbance recorder, event logger, relevant communication ports, single and three phase auto reclosing (with deadline charging and synchro- check facility), Local Breaker Backup (LBB), VT fail and broken conductor alarm/ trip and sufficient LEDs to display the faulty phases and zones. In the case of Numeric Current Differential Protection schemes ,both Main-1 & Main-2 feeder protection shall have current differential as main functions and distance protection function(F21) as back up with Aided schemes selectable. Back up Zones like Z2, Z3 etc shall be active always. Z1 shall be getting activated only on FO communication failure on both FO ports. F21 function shall be set in plain mode with all features as explained above. g)Where ever numeric distance protection scheme is applicable ,Each transmission line shall have carrier inter-tripping through PLCC equipment or through fibre optic communication for fast clearing of Zone 2 Faults. Note : Protections for Transmission Lines using Under Ground Cables may also be specified
138	(3) 110 kV and 66 kV Lines.- a) A single distance protection scheme, which shall be numeric, with four independent zones (three forward and one reverse), non-switched (with separate measurement for all phase to phase and phase to ground faults) fast acting distance protection scheme with permissible inter-trip at remote end (in case of Zone 2 fault).	(3) 110kV and 66kV lines a)Minimum requirement shall be a single distance protection scheme, which shall be numeric, with four independent zones (three forward and one reverse), non-switched (with separate measurement for all phase to phase and phase to ground faults) fast acting distance protection scheme with permissible inter-trip at remote end (in case of Zone 2 fault) Note : Protections for Transmission Lines using Under Ground Cables may also be specified
139	1(i)	1

	All the 400kV and 220kV class Power transformers shall be provided,- a) With numeric fast acting differential, REF, open delta for tertiary winding (Neutral Displacement Relay) and Over-fluxing relays; b) In addition, there shall be back up IDMTL over current and earth fault protection;	(i) All the 400kV,220kV class Power transformers shall be provided,- a) with Main 1 and Main 2,Low Impedance biased Transformer differential protection relays preferably from two different Manufacturer having Low impedance biased differential protection 87T and associated features like I2/I1 & I5/I1 restraint, zero sequence elimination, Over fluxing (V/F),O/C, and low impedance REF suitable for Two winding /Autotransformer . Wherever Tertiary delta winding is available,Neutral Voltage Displacement Relay for tertiary winding protection shall also be provided.
139	1(ii)All the 110 kV, 66 kV and 33 kV class transformers,- a) Of capacity above 5 MVA, the protection shall be the same as mentioned in sub regulation (1) (i) above, except Over fluxing and PRV relays. b) REF shall also be provided for transformers of capacity equal to or more than 20 MVA.	1 (ii) All the 110kV, 66kV and 33kV class Power transformers shall be provided,- a) Of capacity above 5 MVA, the protection shall be provided-with minimum one Low Impedance biased Transformer differential protection relay as a main protection having low impedance biased differential protection 87T with associated features like I2/I1 & I5/I1 restraint, zero sequence elimination, O/C, and low impedance REF suitable for Two winding transformer. b) In addition, there shall be back up IDMTL over current and earth fault protection; c) For parallel operation, such back up protection shall have inter-tripping of both HV and LV breakers; d) LBB protection; e) For protection against heavy short circuits, the over current relays may incorporate a high set instantaneous element; f) In addition to electrical protection, transformer own protection viz. buchholz, OLTC oil surge, gas operated relays, winding temperature protection, oil temperature protection, PRV relay shall be provided for alarm and trip functions.
141	**(2)** **Bus Bar Protection,-** Numerical protection scheme shall be provided, at all 400 kV, 220 kV, substations and generating station switchyards (220 kV and above), for	**(2)** **Bus Bar Protection,-** Numerical protection scheme shall be provided, at all 400 kV, 220 kV, major 110kV substations and generating station switchyards (110 kV

	high speed clearance of busbar faults by tripping all circuit breakers connected to the faulty bus. All 220 kV substations except that are radially fed shall be provided with bus bar protection. It should comply with the requirements/ standards provided in *Section 6 of CBIP Manual (Pub. No 274)*, and the recommendations of SRPC, PCC.	and above), for high speed clearance of busbar faults by tripping all circuit breakers connected to the faulty bus. All 220 kV substations except that are radially fed shall be provided with bus bar protection. It should comply with the requirements/ standards provided in *Section 6 of CBIP Manual (Pub. No 274)*, and the recommendations of SRPC, PCC.
141	(4) In case of 400 kV system, 'Reactors' are to be used, to limit over voltages due to Capacitive VAR generation in long transmission lines, shall have numeric reactor differential protection, reactor REF protection, back-up protection (over current and earth fault) and other protections to monitor reactor such as bucholz, winding temperature, oil temperature, pressure release valve (PRV), oil level monitors, fire protection etc. It should comply with the requirements in *Section 5 of CBIP Manual (Pub. No 274).*	(4) In case of 400 kV system, 'Reactors' are to be used, to limit over voltages due to Capacitive VAR generation in long transmission lines, shall have numeric reactor differential protection, reactor REF protection, back-up protection (over current and earth fault) and other protections to monitor reactor such as bucholz, winding temperature, oil temperature, pressure release valve (PRV), oil level monitors, fire protection etc. Protection requirement shall be similar to the auto transformer protection as explained in section 139/1(i).
143	(1) A dedicated group is required to be constituted and trained by STU, Transmission licensee (s) and all Users to carry out computer aided studies for relay settings. It is also recommended that for settings of critical transmission lines and corridors, the relay setting calculations be validated by simulations on the Real Time Digital Simulator (RTDS) available with CPRI and PGCIL.	(1) A dedicated group is required to be constituted and trained by STU, Transmission licensee (s) and all Users to carry out computer aided studies for relay settings. It is also recommended that for settings of critical transmission lines and corridors, the relay setting calculations be validated by simulations on the Real Time Digital Simulator (RTDS) available with STU, CPRI and PGCIL.
143	(2) STU may appoint a reputed Consultant to carry out studies (in which manpower from STU will also involve and get trained) to determine the relay settings for the complete network and also carry out the settings at site in coordination with CTU and STU with time bound target for one time and thereafter the same shall be continued in house by STU.	(2) STU may appoint an inhouse expert team to carry out studies to determi ne the relay settings for the complete network and also carry out the settings at site in coordination with CTU and STU with time bound target for one time and thereafter the same shall be continued if necessary
148.	Standards for Metering Equipment.- (2) All the instrument transformers used in conjunction with the operational metering system shall be of accuracy class 0.2. The existing systems with inferior accuracy class may be continued till the SGCRC decides on the replacement time frame. These shall be of suitable rating to meet the burden of lead wires and meters and shall conform to the relevant IEGC/ CEA/ IS Standards.	Standards for Metering Equipment.- (2) All the instrument transformers used in conjunction with the operational metering system shall be of accuracy class 0.2S. The existing systems with inferior accuracy class may be continued till the SGCRC decides on the replacement time frame. These shall be of suitable rating to meet the burden of lead wires and meters and shall conform to the relevant IEGC/ CEA/ IS Standards.

150.	Meter Reading, Data Collection and Data Downloading.- (1) The STU and the concerned User shall jointly read the meters through their authorized representatives on the 1 st of every month at 00.00 hrs/ retrieve meter reading data using CMRI/ Tele metering.	The meter should be programmed to record the reading at 0:00 Hrs on first day of every month and the clock of meter should be corrected to GPS time regularly,
159	Technical Specifications/ General Guidelines of Interface Energy Meters under SAMAST. (33) The Contractor shall provide the necessary software which would enable a local IBM- Compatible PC to,-	Technical Specifications/ General Guidelines of Interface Energy Meters under SAMAST. (33)Necessary software shall be provided which would enable a local IBM- Compatible PC to,-
APPENDIX		A separate Appendix may be added regarding generator relay settings.