

CENTRAL ELECTRICITY AUTHORITY (TECHNICAL STANDARDS FOR CONNECTIVITY TO THE GRID) REGULATIONS, 2007

M.) D. I—NJ Che Gazette of •tidia 58) I•XIRAORDNARY PART PUBLISHED BY e. 192B NEW FWDAY, MARCH 9, 2007NHA/GUNA 18. 1928 3i. 2005 3 3*ffrqq, 2003 (2003 36) (3) 2006 i 2003 + 177 (2) 7 aft 73 (1) 2007 (2) (3) (4) (5) 792 2003 (-V; \$ €. 36) (Titir) (1) 2 (6) (7) (8) (9) (10) (11) (17.) (13) (14) (15) (17) (18) (19) (20). (21) (22) (23) THE GA.ZETÆ OF INDLA-. EXTRAORDINARY [PART III—Sc. 41 qfi?T i; fũqr " -'41-" 3iasizh7 f«ta t; " frQo•r" figf@7 fig * fig gili t; (*qr\$3) i; fqfq#z Tfift-4fäza- (24) (25) Vzfr&r 33 i; (26) i Fei*ÜT fit'f•q fäk (27) 41 t--TT« : 3 (28) (29) (30) (31) (ütael) (32) (33) (34) 33 fug@ (35) 4. (1) Fl filg I (2) fiz qa-T€Ä fixz fire FAQ) O, ez fire fgtTf& t, I fifrqfnr, 4 THE GAZETTE OF INDIA : EXTRAORDINARY qieztr. ggi RTé, FTTër i fa«m fi-Ä qfk (TT) Zizi* fi-zrq III—ooz 41 1 (2) (Rug) (4) 177 73 2. gwr 1956 3410) 1 3. qtqrrr, I -Iqa 6 THE GAZEerrE OF INDIA III—sæ. 4] 3?rr fÄfiqq, 2006 (e) fqi ! 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OF INDIA ; EXTRAORDINARY OF JOWER (CENNAL No-rmc-V110N New Delhi, the 21st February. 2007 IPARVIII—SEC- 4] No. 12/wsrD the draft of the (Technical for Connecelivi{y to the Grid) Regulations, 2006 were published as required by Sub-section (2) of Section 177 of the Electricity Act, 2003 (36 of 2003) read with rule 3 of the Electricity (Procedure for previous Publication) Rules, 2005; Now, therefore, in exercise of powers conferred by Section 7 and clause (h) of Section 73 read with Sub•section (2) of Section 1 77 Of Electricity Act, 2003, the Central Eleczcricily ÅuLh01i1Y hereby IGakes the following Regulations for regulating the Lechnical standards for coonnectivity to the grid, namely :— L -Short title and commencement (1) frese Regulations may be called the Cen'.ral F.lcc!ricily Authority (Technical SI-andards for Connectivity to Ehe Grid) Regulations, 2007. (2) 'These Regulations shall come into force on the date Of their publication in the Official Gazette, 2. Definitions in these regulations, unless the context 01henvise requires.— The Electricity Acts 2003 (No. 36 Of 2003); "Appropriate Load Despatch Cunta" mvu.ns the National L oad Despatch Centre 81 DC), Regional Lad (2) Despatch Centre (kU)C) state nad Despatch Cenlrc (SLDC) or bad Despatch Centre. as the may he; "%Area Load Despatch Centre" means the centre as established by the stale for load dcspall.•h and control in (3) a particular arca of the state; 'Appropriate Transmission Utility" r•ncaTk (hc Central Tran\$mission Utility or State Transmission IJili(y as the case may be; "Automatic Gencradon Control" (AGC) 'Nans capability 10 regulate the power output of sclectable units in (S) response 20 total power plant output, tie-line power flow, and power system frequency; aAutomatic Voltage Regulator ' (AV R) means a continuously acting autorna:ic .excilLåtion control sysucm to regulate a generating unit I.erminal vottage•, "British Standards" BS) means those standuds and specifications approved by the British Standards Insti:ution; "Bulk consumer" means a consumer who avails supply at voltage of 33 kV or above; (8) "Ear!ll Fault Factor" at a location in a Ihree-phase system means the ratio Df • the highest root rmean square (9) (r.m.s.) phasc-to-carth power frrequency voltage on a sound phase during a [uull {o earth (affecting one or mote phases)' to •the t.m.s. phase-u-»-eanh power frrequency voltage which would be obtained at the sc:cc.ted location without the Fault'- € 'Earthing" means connection between conducting parts and general mass of earth by an earthing device; (10) 'CEncryy Managerncnl System" (EMS) means a complete system cornprising software for facilitating operation (11) of a power system, maintaining safely, reiiabi!ily econorr.y; *vent touing Facilities" means a device psovided TO record the chronological sequence of operations of (12) the relays and other equipment; 'Frequency" means khe r.umbet of alternating cycles pc,e second lcxpressed in Hertz (H.z); (13) Generatiog Unit" means an electrical Generator coupled to a prime mover within a Power Station togciher (14) V' vhlh all Plant and Appar2tus at {hat Power Station (up to the Connection Point) which relates exclusive3y 10 the operation of that generator: l'IEC Slandard" means a standard approved by the International Electrotechnical Com.nüssion; (1-5) Indian (IS) ocans standa.+ds specified by Bureau of Indian Staildards; (16) " "III!crc.onnccction poinl means a sub-station or switchyard at which point interconnection is established between the requester and the grid; Isolator" means a device for achieving

isolation of one part of an electrical system from the rest of the (19) "system: Maximum Continuous Rating" (MCR) means the maximum continuous output in MW at the generator terminals guaranteed by the manufacturer at rated parameters; (20) "Generating Unit" means a generating unit for which the requester is seeking connection to the grid; (21) "Power Factor" means the cosine of the electrical angle between the voltage and current complexors in an AC electrical circuit; (22) "Power System Stabiliser" (PSS) means controlling equipment which receives input signals of speed, frequency and power to control the excitation via the voltage regulator for damping power oscillations of a synchronous machine; "Protection System" means the equipment by which abnormal conditions in the grid are detected and fault (Z) clearance, actuating signals etc. indications are initiated without the intervention by the operator; "Reactive Power" means in relation to an AC electrical system, the product of root mean square (r.m.s.) voltage, root mean square (r.m.s.) current and the sine of the electrical phase angle between the voltage complexor and current complexor, measured in volt-amperes reactive (VAR); (25) "Requester" means a person such as a Generating Company including captive generating plant of Transmission Licensee (excluding Central Transmission Utility and State Transmission Utility) or Distribution Licensee or Bulk Consumer, who seeks connection of his new or expanded electrical plant to the Grid at voltage level 33 kV and above; "SCADA" means Supervisory Control and Data Acquisition System that acquires data from remote locations over communication links and processes it, a centralised control location for monitoring, supervision, control as well as decision support; "Site Common Drawing" means a drawing prepared for a connection site, which depicts layout of electrical equipment (27) site, electrical common protection and control drawings and services; "Site Responsibility Schedule" (SRS) means a Schedule for demarcating the ownership, responsibility for control, operation and maintenance of the equipment at the interconnection point; "System Protection Scheme" means a scheme designed to detect abnormal system conditions and take (29) pre-determined action to preserve system integrity and provide acceptable system performance; "Thermal Generating Unit" means a generating unit using fossil fuels such as coal, lignite, gaseous and liquid fuel; "Total Harmonic Distortion" means a measure of distortion of the voltage or current wave form (31) (which shall ideally be sinusoidal) and is the square root of the sum of squares of all voltage or current harmonics expressed as a percentage of the magnitude of the fundamental; "Transmission System" means a network of transmission lines and sub-stations; (32) "Under Frequency Relay" means a relay which operates when the system frequency falls below a pre-set (33) value; "User" means a person such as a Generating Company including captive generating plant or Transmission Licensee (other than the Central Transmission Utility and State Transmission Utility) or Distribution Licensee or Bulk Consumer, whose electrical plant is connected to the grid at voltage level 33 kV and above; and (3.5) "Voltage Unbalance" means the deviation between highest and lowest line voltage divided by Average Line Voltage of the three phases. Words and expressions used and not defined in these regulations but defined in the Act shall have the meanings assigned to them in the Act.

3. Applicability of the Regulations These regulations shall be applicable to all the users, requesters, Central Transmission Utility and State Transmission Utility.

4. Objectives (1) The aim of these regulations is to ensure the safe operation, integrity and reliability of the grid. (2) The new connection shall not cause any adverse effect on the grid. The grid shall continue to perform with specified reliability, security and quality as per the Central Electricity Regulatory Commission (Grid Standards for Operation and Maintenance of Transmission Lines) Regulations, as and when they come into force. However, these regulations are not to be relied upon to protect the plant and equipment of the requester or user. Requester is required to be aware in advance of the standards and conditions his system has to meet for being integrated into the grid. Standards The equipment shall meet the requirements in accordance with the provisions of Technical Standards for Connectivity to the Grid as given in the Schedule of these regulations and Central Electricity Authority (Grid Standards for Operation and Maintenance of Transmission Lines) Regulations as and when they come into force, and Grid Code and the State Grid Code(s) as specified by the appropriate Commission.

6. Connectivity THE GAZETTE OF INDIA : EXTRAORDINARY [PART II—Section 3, 4]

(1) requester shall be responsible for the planning, design, construction, reliability, protection and safe operation of its own equipment subject to regulations for construction, operation and maintenance and connectivity and other provisions. (2) The requester and user shall furnish data as required by the appropriate Transmission Utility or by the licensee or station with whose system the interconnection is proposed, for permitting inter-connection to the grid. (3) The requester and user provide necessary facilities

for voice and data communication and transfer of on-line operational data, such as voltage, frequency, line flows, and status of breaker and isolator position and other parameters as prescribed by the Appropriate Load Dispatch Centre. (4) The requester and user shall comply with the Regional Power Committee, and Appropriate Load Dispatch Centre in respect of the matters listed below, but not limited to (a) protection coordination and settings of ILS protection accordingly; (b) agree to maintain meters and communication system in its jurisdiction in good condition; (c) participate in contingency operations such as load shedding, increasing or reducing generation, islanding, black starting power and restoration as per the procedure decided by the Appropriate Load Centre; (d) furnish data as required by Appropriate Transmission Utility or Transmission Licensee, Appropriate Load Dispatch Centre, Appropriate Regional Power Committee, and any committee constituted by the Authority or appropriate Government for system studies or for feasibility analysis of tripping or disturbance in power system; (e) carry out modifications to his equipment respect to short-circuit level, protection coordination and other technical reasons considered necessary due to operational requirements; (f) abide by the coordinated OOLage plan of the State and region in respect of generating units and transmission lines as approved by the Regional Power Committee; and (g) the Regional Power Committee for tuning of Power System Stabilizer provided in the excitation system of the generating unit. (5) The requester and user shall make arrangements for integration of the controls and tele-metering features of his system into the Generation Control, Automatic Load Shedding, Special Protection System, Energy Management and Supervisory Control and Data Acquisition System or the respective state or region. (6) For inter-connection studies the requester shall make a request for connection in the planning stage to the Appropriate Transmission utility. In case a requester is seeking inter-connection to a distribution system, such a request will be made to the distribution licensee. The Appropriate Transmission Utility or distribution licensee shall carry out the inter-connection study to determine the point of inter-connection, required inter-connections and modifications required on the existing grids, if any, to accommodate the inter-connection. The study may also address the transmission system capability, transient stability, voltage stability, losses, voltage regulation, harmonics, voltage flicker, transients, machine dynamics, ferro resonance, metering requirements, protective relaying, sub-station grounding and fault duties, as the case may be. (1) Every connection of a requester's system to the grid shall be covered by a connection agreement between the requester and (a) Appropriate Transmission Utility in case of connection to inter-state transmission system or intra-state transmission system as the case may be; (b) Distribution licensee in case of inter-connection to distribution licensee's system; and (c) Transmission licensee and Appropriate Transmission Utility, in case of inter-connection to a transmission licensee (bilateral agreement). (2) The connection agreement shall contain general and specific technical conditions, applicable to that connection.

7. Site Responsibility Schedule (1) A Site Responsibility Schedule (SRS) for every connection shall be prepared by the owner of the sub-station where connection is taking place. (2) Following information shall be in the Site Responsibility Schedule, namely— (a) Schedule of electrical apparatus, services and supplies; (b) Schedule of telecommunications and measurement apparatus; and (c) Safety rules applicable to each plant and apparatus. (3) Following information shall also be furnished in the Site Responsibility Schedule for each item of equipment at connection namely (a) the ownership of equipment; (b) the responsibility for control of equipment; (c) the responsibility for maintenance of equipment; (d) the responsibility for operation of equipment; (e) the location of the site; (f) the responsibility for all matters relating to safety of persons at site; and (g) the responsibility for all matters relating to equipment at site. (4) Access at Connection Site The requester or user, as the case may be, owning the electrical plant shall provide reasonable access and other facilities to the licensee or Appropriate Transmission Utility or Appropriate Load Dispatch Centre, whose equipment is installed or proposed to be installed at the Connection Site for installation, operation and maintenance, etc. of the equipment.

9. Site Common Drawings Site Common Drawings shall be prepared for each connection point by the owner of the sub-station where connection is taking place. (See Regulation No- 5) Standards for Connection to the Grid Part General 1. Standards (1) The requester shall follow the industry best practices and applicable industry standards in respect of the equipment installation and its operation and maintenance. (2) The equipment including overhead lines and cables shall comply with the relevant Indian Standard or British Standard (BS), Electrotechnical Commission (IEC) Standard, or American National

(ANSI) or any other equivalent International Standard : Provided that whenever an International Standard or International Electrotechnical Commission Standard is allowed, necessary corrections or modifications shall be made for nominal system frequency, nominal system voltage, ambient temperature, humidity and other conditions prevailing in India before actual adoption of the said Standard. (3) The effects of wind, storms, floods, lightning, elevation, temperature extremes, icing, contamination, pollution and earthquakes must be considered in the design and operation of the connected facilities. (4) Installation, uprating and maintenance of the equipment by the requester shall conform to the relevant standards specified by the Authority under Section 177, and Section 73 of the Act, as and when they come into force. 2. safety The requester shall comply with the Indian Electricity Rules, 1956 till such Central Electricity Authority (Safety and Electric Supply) Regulations come into force.

3. Sub-station Grounding Each transmission sub-station must have a ground mat solidly connected all metal structures and other non-energised metallic equipment. The mat shall limit the ground potential gradients to such voltage and current levels that will not endanger the safety of people or damage equipment which are in, or immediately adjacent to, the station under normal and fault conditions. The ground mat size and type shall be based on local soil conditions and available electrical fault current magnitudes. In areas where ground mat voltage rises would not be within acceptable and safe limits (for example due to high soil resistivity or limited sub-station space), grounding rods and ground wells may be used to reduce the ground yield resistance to acceptable levels. Sub-station grounding shall be done in accordance with the norms of the Institute of Electrical and Electronics Engineers.

4. Metering Meters shall be provided as specified in the Central Electricity Authority (Installation and Operation of Meters) Regulations.

5. Level and Co-ordination (1) Basic Insulation Level (BIL) of various items of equipment and ratings of surge arresters for generating stations, lines and sub-stations shall be decided on the following order of priority, namely :— (a) ensure safety to public and operating personnel; (b) avoid permanent damage to plant; (c) prevent failure of costly equipment; (d) minimise circuit interruptions; and (e) minimise interruptions of power supply to consumers. Insulation co-ordination of equipment and lines on both sides of a connection point belonging to the requester and the grid shall be accomplished and the co-ordination be done by the Appropriate Transmission Utility.

6. Protection System and Co-ordination Protection system shall be designed to reliably detect faults on various abnormal conditions and provide an appropriate means and location to isolate the equipment or system automatically. The protection system must be able to detect power system faults within the protection zone, protection system should also detect abnormal operating conditions such as equipment failures or open phase conditions. (2) Every element of the power system shall be protected by a standard protection system having the required reliability, selectivity, speed, discrimination and sensitivity. Where failure of a protective relay in the system has substantial impact on the grid, it shall conned on additional protection as back up protection besides the main protection. (3) The protection systems provided in the requester and user shall provide requisite protections for safeguarding his system from the originating in the Grid. (4) Bus Bar Protection and Breaker Fail Protection Of Breaker Back Up Protection shall be provided wherever stipulated in the regulations. (5) Protection Scheme such as under frequency relay for load shedding, voltage instability, angular instability, generation backing down or Islanding Schemes may also be required be provided to avert system disturbances, (6) Protection co-ordination issues shall be finalized by the Regional Power Committee. The requester and user shall develop protection manuals conforming to various standards for the reference and use of personnel.

7. Disturbance Recording and Event Facilities Every generating station and sub-station connected to the grid at 220 kV or above shall be provided with disturbance recording and event logging facilities. All such equipment shall be provided with time synchronization facility for global reference. 8. Schematic Diagrams requester and user shall prepare single line schematic diagrams in respect of its system facility and make the same available to the Appropriate Transmission Utility or Licensee through which his system is connected and the Appropriate Load Despatch Centre.

9. Inspection, Test, Calibration and prior to connection Before connecting, the requester shall complete all inspections and tests finalised in consultation with the Appropriate Transmission Utility or licensee or generating station which his equipment is connected. The requester shall make available all specifications and test records of the project equipment pertaining to integral condition to the

Appropriate Transmission Utility or generating station as the case may be. Part II Grid Connectivity Standards applicable to the Generating Units. The units at a generating station proposed to be connected to the grid shall comply with the following requirements besides the general connectivity conditions given in the regulations and general requirements given in Part I of the Schedule 1. New Generating Units (1) The excitation system for every generating unit :— (a) shall have state of the art excitation system; (b) shall have Automatic Voltage Regulator (AVR). Generators of 100 MW rating and above shall have Automatic Voltage Regulator with digital control and separate channels having independent inputs and automatic changeover; and (c) The Automatic Voltage Regulator of generator of 100 MW and above shall include Power System Stabilizer (PSS). 15 (2) The Short-Circuit MVA (SCMVA) for generators shall be as per IEC-34, (3) The generator transformer windings shall have delta connection on low voltage side and star connection on high voltage side. Star point of high voltage side shall be effectively (solidly) earthed so as to achieve the Earth Fault Factor of 1.4 or less. (4) All generating machines irrespective of capacity shall have electronically controlled governing system with appropriate speed/load characteristics to regulate frequency. The governors of thermal generating units shall have a droop of 3 to 6% and of hydro generating units 0 to 10%, (5) The project of the requester shall not cause voltage and current harmonics on the grid which exceed the limits specified in Institute of Electrical and Electronics Engineers (IEEE) Standard 519. (6) Generating Unit located near load centre, shall be capable of operating at rated output for power factor varying between 0.85 lagging (over-excited) to 0.95 leading (under-excited) and Generating far from load centres shall be capable of operating at rated output for power factor varying between 0.9 lagging (over-excited) to 0.95 leading (under-excited). Above performance shall also be achieved with voltage variation of $\pm$ 5% or nominal, frequency variation of +3% and -5% and combined voltage and frequency variation of 1% however, for gas turbines, the performance shall be achieved for voltage variation of (7) The coal and lignite based thermal generating units shall be capable of generating up to 105% of Maximum Continuous Rating (subject to maximum load capability under Valve Wide Open Condition) for short duration to provide the frequency response. (8) The hydro generating units shall be capable of generating up to 110% of rated capacity (subject to rated head being available) on continuous basis- (9) Every generating unit shall have standard protections to protect the units not only from faults within the units (10) (11) (12) (13) (14) (IS) units and within the station but also from faults in lines. For generating units having rated capacity greater than 100 MW, two sets of protections consisting on two independent sets of trip coils fed from independent Direct Current (DC) supplies shall be provided. The protections shall include but not be limited to the Local Breaker Back-up protection. Hydro generating units having rated capacity of 50 MW and above shall be capable of operation in synchronous condenser mode, wherever feasible. Bar protection shall be provided at the of generating station. Automatic synchronisation facilities shall be provided at the requester's Project. The station auxiliary requirement including voltage and reactive shall not impose operating restrictions on the grid beyond those specified in the Grid Code or state Grid Code as the case may be. In the case of hydro generating units, self-starting facility may be provided. The hydro generating station may also have a small diesel generator for meeting the station auxiliary requirements for black start. The standards in respect of the sub-stations associated with the generating stations shall be in accordance with the provisions specified in respect of 'Sub-stations' under Part II of these Standards, 2. Existing Units For thermal generating units having rated capacity of 200 MW and above and hydro units having rated capacity of 100 MW and above, the following facilities would be provided at the time of renovation and modernization. (1) Every generating unit shall have Automatic Voltage Regulator. Generators having rated capacity of 100 MW and above shall have Automatic Voltage Regulator with two separate channels having independent inputs and automatic changeover. (2) Every generating unit of capacity having rated capacity higher than 100 MW shall have Power System Stabilizer. (3) All generating units shall have standard protections to protect the units not only from faults within the units and within the station but from faults in transmission lines. The protections shall include but not limited to the Local Breaker Back-up (1.13B) protection. 1.11 Grid Connectivity Standards applicable to the Transmission Line and Sub-station The transmission lines and sub-stations connected to the grid shall comply with the following additional requirements besides the general connectivity conditions under these regulations and General Standards for Connectivity to the Grid as specified in Part I of the Schedule, (1) Bus bar protection shall be provided on all substations at and above 220 kV levels for all new sub-stations. For existing substations, this shall be implemented in a

reasonable time frame. (2) Local Breaker Back-up (LBB) protection shall be provided all sub-stations of 220kV and above. (3) main gurnetical Dislane Protection shall be provided OT' aji the lines Of 2m kV and above for all new sub-stations. For existing Nib-stations, this be implemented in a reasonahle lirne frame.

•r•HF GAZEITE OF INDIA : FXIRAORDINARY Ill—sec. 41 (4) (5) (6) (7) Circuit breakcrg, iscdatots and aJI ottrr current carrying equipment shall bc capable of carrying normat and emergency load cunents without éatnage, 'The equipment shall 110t become a limiting facu-)r on Lhe ability of transfer of power on the inter-state and {titra-state tcansmis;ion system. All circuit breakers and other fault interrupting devices shall be capable of safely interrupting fault currents any faun that lthey are required to interrupt. Circuit Breaker Shall have this capability without the use of inteniional time delay in clearing the Minimum fault Interrupting requirement need be specifieu by the Appropriate Transmission Utility. The Circuit Breaker shall be capable of performing all other requited switching duties such as, but not limited to, capacitive current sw*tching, load current switching ansi out-of- s;ep switching- The Circuit Breaker shan perjOrm.all required duties without creating transient over-voltages that could damage lthe equipment provided elsewhere in the grid. The short circuit capacity of the circuit breaker bc based on short-term perspective transmission plan.s as finalized by the Authority- Power Supply w Sub-Sktion Auxiliaries, *hall: (a) {or alternating cGrrent (AC) supply (Applicable {c ocw sub-stations} : 220 kV and above: Two high tension (HT) supplies shall be arranged from independent sources. One of the two high tension supplies shali bc standby to the other. In addition, an cmergency smpply from diesel generating (DG) source of suitable eapaeiry shall also be provided. 66 kV and below 220 kV.' There slull be onc HT soppyy gnd onc diese! generating source- 33 kV and below 66 kV There shall be one HT supply: (b) for direct current (DC) Supply (Applicable new sub-stations): Sub-stations of transmission sys!em for 132 kV and amve and sub-stations of all generating stations: liere shall be two sets of batteries, each equipped with charger. Por sub-stations below 132 kV: thete shall, be one set of battery and cbarger. Easth Fault Factor for an effeciively earthed sybtem shan be not more than I .4. Grid Connectivity Standards appEcaNe 10 ibe Distribution Systems and Bulk Consurrers The iOllowing additional requirements shall be with, besides the connectiv.ity conditions in these rcgulations and general Standards for Connectivity to the Grid given in Part-I and those applicable to transmission lines and sub-stations in Pat-I -III. 1. UDdcrrcquency/dŪdt Relays Under frequency and df/dt (rate of change of with time) relays shall be employed for automatic load control in a contingency to cnsure grid security under conditions of fallihg grid frequency in accordance with lthe decision taken in the Regional Power Committee 2. Reactive Puwer The dis•ribmion licensees sbal} provide adequate reactive compensation to compensate the inductive reactive power requitement in their system so that they do •not depend uroo the grid for reactive power support. The power factor of the distribution syseern Rod bulk consumer shall not bc less than 0.95, 3. Voltage and Current Harmonis (1) •j he total harmonic d_ist0Tlion for voltage al the connection Tk)inl shall exceed 5% with no individual harmonic higher than (2) The totai banmnic distortion for current drawn from the transmissjan system at the connection point shall not excccd (3) The limits prescribdsin (1) and (2) shau be implemented in a phase.d manner so as to achieve complete compliance not later Lhan five years from the date of publication of these regulations jn the official Gazette

4. Voltage he Voltage Unbalance at 33 kV and above shad not excoed 3.0%. S. Voltage Fluctuations (i) The permissible limit of voltage fluctuation for step changes may occur repetitively is 1.5%, (2) For occasional fluctuations olher lban s.lcp changes lhc maximum permissible limit is G) limiLs prescribed (1) and (2) above shall come into force not latu than five years from the date of pubhcation of these regulations ih the Official Ga.7Btte- 6. Back-energization The Shall not energize transmtxsion Ot distribution system by injecting supply frotn his geocraæars or any other sour.cce either by automatic controls or manually unles spcif.ieaây requested by (he Transmission or Licensee. BUOY MISRA secy- Printed by the Manager. Govt. o! radia PTEß. Ring Road, Mayuputi, New and Published Coot:nner of Publications, 10054.