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

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Whereas the draft of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2006 were published as required by Subjection (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;

1. Short title and commencement :-

(1) These Regulations may be called the Central Electricity Authority (technical Standards for Connectivity of the Grid) Regulation, 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 otherwise requires,

(1) "Act" means The Electricity Act, 2003 (No. 36 of 2003);

(2) "Appropriate Load Despatch Centre" means the National Load Despatch Centre (NLDC), Regional Load Despatch Centre(RLDC) or

State Load Despatch Centre (SLDC) or Area Load Despatch Centre as the case may be;

(3) "Area Load Despatch Centre" means the centre as established by the state for load despatch and control in a particular area of the state;

(4) "Appropriate Transmission Utility" means the Central Transmission Utility or State Transmission Utility as the case may be;

(5) "Automatic Generation Control" (AGC) means capability to regulate the power output of selectable units in response to total power plant output, tie-line power flow, and power system frequency;

(6) "Automatic Voltage Regulator" (AVR) means a continuously acting automatic excitation control system to regulate a generating unit terminal voltage;

(7) "British Standards" (BS) means those standards and specifications approved by the British Standards Institution;

(8) "Bulk consumer" means a consumer who avails supply at voltage of 33 kV or. above;

(9) "Earth Fault Factor" at a location in a three-phase system means the ratio of 'the highest root mean square (r.m.s.) phase-to-earth power frequency voltage on a sound phase during a fault to earth (affecting one or more phases)' to 'the r.m.s. phase-to-earth power frequency voltage which would be obtained at the selected location without the fault';

(10) "Earthing" means connection between conducting parts and general mass of earth by an earthing device;

(11) "Energy Management System" (EMS) means a complete system comprising software for facilitating operation of a power system, maintaining safety, reliability and economy;

(12) "Event Logging Facilities" means a device provided to record the chronological sequence of operations of the relays and other equipment;

(13) "Frequency" means the number of alternating cycles per second [expressed in Hertz (Hz)];

(14) "Generating Unit" means an electrical Generator coupled to a prime mover within a Power Station together with all Plant and Apparatus at that Power Station (up to the Connection Point) which relates exclusively to the operation of that generator;

(15) "IEC Standard" means a standard approved by the International Electro technical Commission;

(16) "Indian Standards" (IS) means standards specified by Bureau of Indian Standards;

(17) " Interconnection point" means a sub-station or switchyard at which point the interconnection is established between the requester and the grid;

(18) "Isolator" means a device for achieving isolation of one part of an electrical system from the rest of the system;

(19) "Maximum Continuous Rating" (MCR) of a generating unit means the maximum continuous output in MW at the generator terminals guaranteed by the manufacturer at rated parameters;

(20) "New 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 Stabilizer" (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;

(23) "Protection System" means the equipment by which abnormal conditions in the grid are detected and fault clearance, actuating signals or indications are initiated without the intervention by the operator;

(24) "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 or Transmission Licensee

(excluding Central Transmission Utility and State Transmission Utility) or Distribution Licensee or Bulk Consumer, who is seeking connection of his new or expanded electrical plant to the Grid at voltage level 33 kV and above;

(26) "SCADA" means Supervisory Control and Data Acquisition System that acquires data from remote locations over communication links and processes it at centralised control location for monitoring, supervision, control as well as decision support;

(27) "Site Common Drawing" means a drawing prepared for a connection site, which depicts layout of connection site, electrical layout, common protection and control drawings and common services;

(28) "Site Responsibility Schedule" (SRS) means a Schedule for demarcating the ownership, responsibility for control, operation and maintenance of the equipment at the interconnection point;

(29) "System Protection Scheme" means a scheme designed to detect abnormal system conditions and take predetermined, corrective action to preserve system integrity and provide acceptable system performance;

(30) "Thermal Generating Unit" means a generating unit using fossil fuels such as coal, lignite, gaseous and liquid fuel;

(31) "Total Harmonic Distortion" (THD) means a measure of distortion of the voltage or current wave form (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;

(32) "Transmission System" means a network of transmission lines and sub-stations;

(33) "Under Frequency Relay" means a relay which operates when the system frequency falls below a pre-set value;

(34) "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

(35) "Voltage Unbalance" means the deviation between highest and

lowest line voltage divided by Average Line Voltage of the three phases. The 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 Authority (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.

(3) A requester is required to be aware, in advance, of the standards and conditions his system has to meet for being integrated into the grid.

5. 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 Sandards 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. General Connectivity Conditions :-

(1) The requester shall be responsible for the planning, design, construction, Reliability, protection and safe operation of its own equipment subject to the regulations for construction operation and maintenance and connectivity and other statutory provisions.

(2) The requester and user shall furnish data as required by the Appropriate Transmission Utility or by the licensee or generating station with whose system the inter-connection is proposed, for

permitting interconnection with the grid.

(3) The requester and user shall 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 Despatch Centre.

(4) The requester and user shall cooperate with the Regional Power Committee, and Appropriate Load Despatch Centres in respect of the matters listed below, but not limited to:

(a) protection coordination and settings of its protective relays 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, is landing, black start, providing start-up power and restoration as per the procedure decided by the Appropriate Load Despatch Centre;

(d) furnish data as required by Appropriate Transmission Utility or Transmission Licensee, Appropriate Load Despatch Centre, Appropriate Regional Power Committee, and any committee constituted by the Authority or appropriate Government for system studies or for facilitating analysis of tripping or disturbance in power system;

(e) carryout modifications in his equipment with respect to short circuit level, protection coordination and other technical reasons considered necessary due to operational requirements;

(f) abide by the coordinated outage plan of the state and region in respect of generating units and transmission lines as approved by the Regional Power Committee; and

(g) cooperate with 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 Automatic Generation Control, Automatic Load Shedding, Special Protection System, Energy Management Systems and Supervisory

Control and Data Acquisition System of 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 interconnection facilities and modifications required on the existing grids, if any, to accommodate the interconnection. The study may also address the transmission system capability, transient stability, voltage stability, losses, voltage regulation, harmonics, voltage flicker, electromagnetic transients, machine dynamics, ferro resonance, metering requirements, protective relaying, sub-station grounding and fault duties, as the case may be.

(7)

(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 (tri-partite 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) forevery connection point shall be prepared by the owner of the substation where connection is taking place.

(2) Following information shall be included 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 installed at the connection site, 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 manager 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 safety of equipment at site.

8. Access at Connection Site :-

The requester or user, as the case may be, owning the electrical plant shall provide reasonable access and other required facilities to the licensee or Appropriate Transmission Utility or Appropriate Load Despatch 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.

SCHEDULE 1

Standards for Connectivity to the Grid