

NOTIFICATION

No.: JERC-12/2010:- In exercise of the powers conferred by Sections 86 (1) (h) of Electricity Act, 2003 (36 of 2003) and all other powers enabling it in this behalf, the Joint Electricity Regulatory Commission for the State of Goa and Union Territories hereby makes the following State Electricity Grid Code, Regulations.

CHAPTER -1: GENERAL

1.1 Short Title, Extent and Commencement

(1) These Regulations may be called the "Joint Electricity Regulatory Commission (State Grid Code) Regulations, 2010".

(2) These Regulations shall come into force from the date of its publication in the official gazette.

(3) These Regulations shall extend to the whole State of Goa and Union Territories of Andaman & Nicobar Islands, Chandigarh, Dadra & Nagar Haveli, Daman & Diu, Puducherry and Lakshadweep.

1.2 Definitions

(1) In these Regulations the following words and expressions shall, unless the subject matter or context otherwise requires or is inconsistent therewith, bear the following meanings:

Act	The Electricity Act, 2003 (Act No. 36 of 2003) as amended from time to time
Accredited Test Laboratory	A test laboratory accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL);
Active Energy	The electrical energy produced, flowing or supplied by an electric circuit during a time interval, being the integral with respect to time of the instantaneous power, measured in units of watt-hours or standard multiples thereof,
Active Power	The product of voltage and the in-phase component of alternating current measured in units of watts and standard multiples thereof,
Apparatus	All the electrical apparatus like machines, fittings, accessories and appliances in which electrical conductors are used.
Apparent Power	The product of voltage and alternating current measured in unit of volt-amperes and standard multiples thereof,
Appropriate Transmission Utility	The "Central Transmission Utility" (CTU) or the "State Transmission Utility" (STU), as case may be
Area of Supply	Area within which a Distribution Licensee is authorized by his license to supply electricity.
Authority	Central Electricity Authority (CEA) referred to in sub-section (1) of Section 70 of the Act.
Automatic Voltage Regulator (AVR)	A continuously acting automatic excitation control system to control the voltage of a Generating Unit measured at the generator terminals.
Availability Based Tariff (ABT)	A tariff structure based on availability of generating units and having components, viz., Capacity Charges (CC), Energy Charges (EC) or Variable Charges (VC) and charges for Unscheduled Interchange (UI)
Bulk Consumer	A Consumer who avails supply at voltage of 33 kV or above.
Buyer	Any generating company or licensee or consumer whose system receives electricity from the system of generating company or licensee.
Captive Power Plant (CPP)	A Power Plant set up by any person to generate electricity for his own use and includes a power plant set up by any co-operative society or association of persons for generating electricity primarily for use of members of such co-operative society or association.
Central Commission	Central Electricity Regulatory Commission (CERC) referred to in sub-Section (1) of section 76 of the Act
Central	Any Government Company which the Central Government may notify

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Transmission Utility (CTU)	under sub section (1) of section 38 of the Act.
Check Meter	A meter, which shall be connected to the same core of the Current Transformer (CT) and Voltage Transformer (VT) to which main meter is connected and shall be used for accounting and billing of electricity in case of failure of main meter.
Commission	Joint Electricity Regulatory Commission for the State of Goa and Union Territories.
Connection	The electric power lines and electrical equipment used to effect a connection of a user's system to the Transmission System.
Connection conditions	Those conditions mentioned in Chapter 4 ("connection conditions") which have to be fulfilled before the User's System is connected to the Grid
Connection point	An electrical point of connection between the Transmission System and the User's System.
Consumer	Any person who is supplied with electricity for his own use by a licensee or the Government or by any other person engaged in the business of supplying electricity to public under the Act or any other law for the time being in force and includes any person whose premises are for the time being connected for the purpose of receiving electricity with the works of a licensee, the Government or such other person, as the case may be.
Control Area	A control area is an electrical system bounded by interconnections (tie lines) metering and telemetry which controls its generation and / or load to maintain its interchange schedule with other control areas whenever required to do so and contributes to frequency regulation of the synchronously operating system.
Demand	The demand of Active Power in MW and Reactive Power in MVAR of electricity unless otherwise stated.
Demand control	Any of the following methods of achieving a load reduction: (a) Consumer Load Management initiated by Users. (b) Consumer Load reduction by Disconnection initiated by Users (other than following an instruction from Load Despatch Centre). (c) Consumer Load reduction instructed by the Load Despatch Centre (d) Automatic under Frequency Load Disconnection (e) Emergency manual Load Disconnection
Distribution	The system of wires and associated facilities between the delivery points

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system	on the transmission lines or the generating station connection and the point of connection to the installation of the consumers.
Drawal	The import / export of electrical energy from / to the grid
Energy Accounting and Audit Meters	Meters used for accounting of the electricity to various segments of electrical system so as to carry out further analysis to determine the consumption and loss of energy therein over a specified time period;
Extra High Voltage (EHV)	Voltage exceeding 33000 volts under normal subject to the percentage variation allowed by the Authority
Forced Outage	Forced outage of a generating unit or a transmission facility due to a fault or other reason which has not been planned.
Generating company	Any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person, which owns or operates or maintains a generating station.
Generating station	Any station for generating electricity, including any building and plant with step-up transformer, switchyard, switch gear, cables or other appurtenant equipment, if any, used for that purpose and the site thereof, a site intended to be used for a generating station, and any building used for housing the operating staff of a generating station and where electricity is generated by water – power, includes, penstocks, head and tail works, main and regulatory reservoirs, dams and other hydraulic works, but does not in any case include any sub station.
Grid	High Voltage back bone system of inter-connected Transmission Lines, Sub Stations and Generating plants.
Grid Code	Indian Electricity Grid Code, (IEGC) specified by the Central Commission under clause (h) of sub section (1) of Section 79 of the Act.
Grid Standards	Grid Standards specified by the Central Electricity Authority under Clause (d) of section 73 of the Act.
High voltage or HV	Voltage greater than 400 V and does not exceed 33000 volts under normal conditions subject to the percentage variation allowed by the Authority.
Independent Power Producer	Power Station owned by a generator who is not a part of Power and Electricity Department.
Indian Standards	Those Standards and specifications approved by the Bureau of Indian Standards.
Instrument Transformer	The Current Transformer (CT), Voltage Transformer (VT) and Capacitor Voltage Transformer (CVT)

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Interconnecting Transformer	Transformer connecting EHV lines of different voltage systems.
Interface Meter	A meter used for accounting and billing of electricity, connected at the point of interconnection between electrical systems of generating company, licensee and consumers, directly connected to the Inter-State Transmission System or Intra –State Transmission system who have to be covered under ABT and have been permitted open access by the Appropriate Commission.
Inter-State Transmission System	Inter-State Transmission System includes: (i) Any system for the conveyance of electricity by means of a main Transmission Line from the territory of one State to another State; (ii) The conveyance of electricity across the territory of an intervening State as well as conveyance within a State, which is incidental to such inter-state transmission of electricity. (iii) The transmission of electricity within the territory of a State built, owned, operated maintained or controlled by the Central Transmission Utility.
Intra–State Transmission System	Any system for transmission of electricity other than an Inter - State Transmission System.
Isolation	The disconnection of EHV / HV Apparatus from the remainder of the System in which that EHV / HV Apparatus is situated.
Lean Period	That period in a day when the electrical power demand is lowest
License	A license granted under section 14 of the Act.
Licensee	Means a person who has been granted a license under section 14 of the Act.
Load	The Active, Reactive or Apparent power as the context requires, generated, transmitted or distributed.
Low Voltage or LV	Voltage not exceeding 440 volts
Main Meter	A meter which would primarily be used for accounting and billing of electricity
Main protection	Protection equipment or system expected to have priority in initiating either a fault clearance or an action to terminate an abnormal condition in a power system.
Open Access	The non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in

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	accordance with the regulations specified by the Appropriate Commission.
Operation	A scheduled or planned action relating to the operation of a system.
Operational procedure	Management instructions and procedures, both for the safety rules and for the local and remote operation of plant and apparatus, issued in connection with the actual operation of plant and/or apparatus at or from a connecting site.
Outage	A total or partial regulation in availability due to repair and maintenance of the Transmission or Distribution or Generation facility or defect in Auxiliary System.
Part Load	The condition of a generating station, which is loaded but is not running at its declared availability.
Partial shutdown	A shutdown of a part of the system resulting in failure of power supply, either from external connections or from the healthy part of the system.
Peak period	That period in a day when the electrical power demand is highest.
Person	Any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person.
Planned outage	An outage of generating plant or part of the Transmission system, or part of a User's System co-ordinated by SLDC.
Power factor	The ratio of Active Power (KW) to Apparent Power (KVA)
Power System	Power system means all aspects of generation, transmission, distribution and supply of electricity and includes one or more of the following namely: a) Generating Station b) Transmission or main transmission lines c) Sub-stations d) Tie-lines e) Load despatch activities f) Mains or distribution mains g) Electric supply lines h) Overhead lines i) Service lines j) Works
Protection	The scheme and apparatus for detecting abnormal conditions on a system and initiating fault clearance or actuating signals or indications.
Rated MW	The "Name plate" MW output of a Generating machine, being that output up to which the Generating machine is designed to operate.
Reactive Power	The product of voltage and current and the sine of the phase angle between them measured in units of volt-amperes reactive and standard multiples thereof;
Requester	A person such as Generating Company including captive generating

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	plant or Transmission Licensee (excluding State Transmission Utility) or Distribution Licensee or Bulk Consumer, who is seeking connection of his new or expanded electrical plant in the Grid at Voltage level exceeding 33 kV.
Safety Rules	The rules framed by the Users and the transmission licensee to ensure safety to persons working on plant / apparatus.
Start – Up	The action of bringing a generating unit from shutdown to synchronous speed.
State Generating Station	The generating plant that is required to be scheduled by SLDC in accordance with IEGC as issued by CERC from time to time.
State Grid Code	"Electricity Grid Code for state of Goa and Union Territories", a document describing the procedures and the responsibilities for planning and operation of the Grid of state of Goa and Union Territories specified by the Commission.
State Transmission Utility	Means the Board or the Government Company specified as such by the appropriate Government under sub-section (1) of section 39.
Sub station	Station for transforming or converting electricity for the transmission or distribution thereof and includes transformers, converters, switchgears, capacitors, synchronous condensers, structures, cable and other appurtenant equipment and any buildings used for that purpose and the site thereof.
Supervisory Control and Data Acquisition or (SCADA)	The communication links and data processing systems, which provide information to enable implementation of requisite supervisory and control actions.
Supplier	Any generating company or licensee from whose system electricity flows into the system of another generating company or licensee or consumer
Synchronized	Those conditions where an incoming generating unit or system is connected to the bus bars of another system so that the frequencies and phase relationships of that generating unit or system as the case may be, and the system to which it is connected are identical.
Transmission licensee	A licensee authorized to establish and operate transmission lines
Transmission lines	All high pressure cables and overhead lines (not being an essential part

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	of the distribution system of a licensee) transmitting electricity from a generating station to another generating station or a sub station, together with any step-up and step-down transformers, switch-gear and other works necessary to and used for the control of such cables or overhead lines, and such buildings or part thereof as may be required to accommodate such transformers, switch-gear and other works.
Transmission system	The system consisting of high pressure cables and overhead lines of transmission licensee including electrical sub-stations, for transmission of electrical power from the generating station upto connection point / interface point with the distribution system. This shall not include any part of the distribution system.
Under Frequency Relay	An electrical measuring relay intended to operate when its characteristic quantity reaches the relay settings by decrease in frequency.
User	A person such as a Generating Company including Captive Generating Plant or Transmission Licensee (other than STU) or Distribution Licensee or Bulk Consumer within the State, whose electrical plant is connected to the Intra-State Transmission system at voltage level exceeding 33 kV.

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(2) 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. Expressions used herein but not specifically defined in these Regulations or in the Act but defined under any law passed by a competent legislature and applicable to the electricity industry in the state shall have the meaning assigned to them in such law. Subject to the above, expressions used herein but not specifically defined in these Regulations or in the Act or any law passed by a competent legislature shall have the meaning as is generally assigned in the electricity industry.

(3) ABBREVIATIONS

ABT	Availability Based Tariff
BIS	Bureau of Indian Standards
BS	British Standards
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
CPP	Captive Power Plant
CT	Current Transformer
CTU	Central Transmission Utility

EHT	Extra High Tension
HT	High Tension
ICT	Inter Connecting Transformer
IEC	International Electro-Technical Commission Standards
IEGC	Indian Electricity Grid Code
IPP	Independent Power Producer
ISTS	Inter State Transmission System
KV	Kilo Volt
LCP	Line Clear Permit
NABL	National Accreditation Board of Testing and Calibration Laboratories
PGCIL	Power Grid Corporation of India Ltd.
PTW	Permit to Work
RLDC	Regional Load Despatch Centre
SCADA	Supervisory Central and Data Acquisition
SGC	State Grid Code
SGS	State Generating Station
SLDC	State Load Despatch Centre
STS	State Transmission System
STU	State Transmission Utility
VT	Voltage Transformer

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1.3 Introduction

(1) The State Electricity Grid Code lays down the rules, guidelines and standards to be followed by all Users of the State Transmission System, to operate and maintain an efficient and coordinated power system in the State of Goa and Union Territories of Andaman & Nicobar Islands, Chandigarh, Dadra & Nagar Haveli, Daman & Diu, Lakshadweep and Puducherry in coordination with the concerned Regional Grids as per the provisions of Indian Electricity Grid Code (IEGC) issued by Central Electricity Regulatory Commission (CERC) as amended from time to time and also in line with the National Electricity policy.

(2) State Transmission Utility: The State Government of Goa and the Appropriate Governments in respect of Union Territories of Andaman & Nicobar Islands, Chandigarh, Dadra & Nagar Haveli, Daman & Diu,

Lakshadweep and Puducherry shall notify their respective Electricity Departments which are deemed licensees in terms of section 14 of the Electricity Act 2003, to act as **State Transmission Utilities (STUs).** Provided they shall not engage in the business of trading in electricity.

The State Transmission Utilities shall discharge the functions as stipulated under Section 39 (2) of the Electricity Act, 2003.

(3) (a) Establishment of SLDC:

The State Government of Goa and the Appropriate Governments in respect of Union Territories of Andaman & Nicobar Islands, Chandigarh, Dadra & Nagar Haveli, Daman & Diu, Lakshadweep and Puducherry shall establish a centre to be known as the **State Load Despatch Centre (SLDC)** in the State of Goa and in the Union Territories**.** The State Load Despatch Centre shall be operated by a Government company or any Authority or Corporation established or constituted by or under any State Act, as may be notified by Appropriate Government.

Until a Government company or any authority or corporation is notified by the Appropriate Government, the State Transmission Utility shall operate the State Load Despatch Centre.

(b) Functions of SLDC:

State Load Despatch Centre shall discharge the functions as stipulated under Sections 32 (2) and 33 of the Act.

(c) Manning of SLDC:

i) SLDC shall be manned by qualified and experienced Engineers who are well acquainted with State Transmission System and grid operation.

ii) Periodical Training shall be imparted to the personnel of the State Load Despatch Centre to update their skills in order to enable them to discharge their functions stipulated under Section 32 (2) & 33 of the Act.

1.4 Objectives of State Grid Code

The principal objectives of the State Grid Code are:

(a) To provide clarity in the functions of the STU, State Generation Companies, Distribution Licensees, IPPs / CPPs and open access customers connected to the State Grid by specifying their respective

roles, responsibilities and obligations with respect to the operation of the State Grid.

(b) To improve the grid stability and achieve minimum standards of system performance.

(c) To specify the transmission connectivity requirement for new entrants i.e., future new generating companies, distribution/trading licensees, open access customers and consumers.

(d) To document the normal practices in grid operation for easy reference and for compliance.

(e) To elicit data from generators on the performance characteristics of their plant to meet the connectivity requirements.

(f) To provide a mechanism for clear and consistent disclosure of all information between the utilities concerned.

(g) To indicate how generation is to be scheduled and despatched.

(h) To actually enforce what is verbally agreed.

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1.5 Applicability

The State Grid Code shall be applicable to all Users, Requesters, State Transmission Utility and SLDC who are connected to the transmission network.

1.6 Implementation of the State Grid Code:

1. The State Transmission Utility shall be responsible for implementation of the State Grid Code. All the Users shall comply with the provisions of this State Grid Code and assist the State Transmission Utility in all aspects. The Users must provide all the required information required for implementation of the State Grid Code.
2. If any User has any difficulty in complying with or any of the provisions of the State Grid Code, he shall, without delay, inform the same to the State Transmission Utility for guidance in complying with the provision.
3. The operation of the State Grid shall be reviewed regularly by the State Grid Code Review Committee in accordance with the provisions of the relevant section of the State Grid Code.
4. Users shall provide such reasonable cooperation and assistance to STU / SLDC as may be sought for and required by them. The STU / SLDC shall however refer all such cases for ratification in the next meeting of the review panel.

1.7 Non - Compliance by User

1. If any User fails to comply with any provision of the State Grid Code, the STU shall inform the State Grid Code Review Committee without delay the reasons for its non-compliance and ensure its compliance promptly.
2. SLDC shall report to the State Grid Code Review Committee, instances of serious violation of any provisions of the SGC and incidences of persistent non-compliance of the directions of the SLDC issued in order to exercise supervision and control required for ensuring stability of grid operations.
3. Consistent failure to comply with the State Grid Code provisions may lead to disconnection of the User's plant and / or facilities from the grid. The responsibility for the consequences of disconnection including payment of damages and compensation to consumers rests with the User who consistently violates the State Grid Code.

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1.8 Code Responsibilities

In discharging its duties under the State Grid Code, STU has to rely on information, which Users shall supply regarding their requirements and intentions.

STU shall exercise strict supervision over the Users to ensure compliance with the instructions issued by SLDC for efficient discharge of the grid operations.

1.9 Confidentiality

1. Under the terms of the State Grid Code, STU will receive information from Users relating to their intentions in respect of their Generation or Supply businesses.
2. STU shall not, other than as required by the State Grid Code, disclose such information to any person other than Central or State Government without the prior written consent of the provider of the information.

1.10 Directives

The appropriate Government may issue policy directives in any matter to STU or SLDC as the case may be, to take such measures as may be necessary

for maintaining smooth and stable transmission and supply of electricity to any region of State as per section 37 of the Electricity Act 2003. STU shall promptly inform the Commission and all Users of the requirement of such directives. The Users, subject to the relevant sections of the Act, shall comply with all such directives.

1.11 Compatibility with Indian Electricity Grid Code

This State Grid Code shall be consistent / compatible with the IEGC. However, in matters relating to inter-State transmission, if any provisions of the State Grid Code are inconsistent with the provisions of the IEGC, then the provisions of IEGC as approved by CERC shall prevail.

1.12 The Power Department functioning as integrated Utility

The functions of STU, SLDC, generating stations, Distribution Licensees shall be performed by the concerned officers authorized by the Electricity Department as long as it continues to function as an integrated Utility.

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CHAPTER –2 MANAGEMENT OF GRID CODE

2.1 Objective

The State Transmission Utility (STU) is required to implement and comply with the State Grid Code and to carry out periodic review and amendments of the same with the approval of the Commission. A State Grid Code Review Committee shall be constituted by STU, as required in this Chapter, comprising of the representatives of the Users of the Transmission System.

2.2 State Grid Code Review Committee

1) State Grid Code Review Committee shall be established separately by each STU.
2) The Chairperson of the State Grid Code Review Committee shall be an Engineer of the STU not below the rank of Executive Engineer. The Member Secretary of the Review Committee shall also be nominated by STU. The Review Committee shall consist of the following members as recommended by the heads of the respective organizations:
   (a) One engineering representative at executive level from Transmission Licensee.
   (b) One representative at executive level from the concerned Regional Load Despatch Centre
   (c) One representative at executive level from the State Load Despatch Centre.
   (d) One representative at executive level from Distribution Licensee of the State.
   (e) One representative at executive level from each of the generating companies feeding not less than 30 MW to the State Grid.
   (f) One representative from small generating stations of less than 30 MW capacity on rotation basis.
   (g) One member from the State Government connected with Electricity Affairs of the State.
   (h) Any other member co-opted / nominated by the Commission.
3) The Member Secretary nominated by STU shall be the convener and he shall coordinate the functioning of the committee.
4) STU shall inform all the Users, the names and addresses of the Review Committee Chairperson and the Member Secretary. Any subsequent changes shall also be informed to all the Users by STU. Similarly, each

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User shall inform the names and designations of their representatives to the Member Secretary of the Review Committee.

2.3 Functions of the State Grid Code Review Committee

The functions of the Review Committee are as follows:

(a) Implementation of the State Grid Code, and continuous scrutiny and review.

(b) Consideration of all requests for review proposed by any User and publication of the recommendations for changes in the State Grid Code together with reasons for such changes.

(c) Consideration of the problems raised by any User as well as resolution of the problems.

(d) Ensuring that the changes / modifications proposed in the State Grid Code are consistent and compatible with Indian Electricity Grid Code (IEGC).

(e) Constitute a sub committee (Protection Coordination Committee) with engineers having adequate experience in Power Transmission System Protection from STU, Generating companies and Distribution Licensees. The Protection Coordination Committee shall also responsible for all the protection coordination functions specified in this State Grid Code.

(f) Such other matters as may be directed by the Commission from time to time.

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The State Grid Code Review Committee may hold any number of meetings as required subject to the condition that at least one meeting shall be held once every twelve (12) months. Sub-meetings may be held by STU with the Users to discuss individual requirements to prepare proposals for Review Committees consideration.

2.4 Functions of the Protection Coordination Committee

The main functions, of the Protection Coordination Committee (PCC) are as follows:

(i) Create awareness about various issues related to protection requirements for any equipment connected to the State Transmission System.

(ii) Review and specify the minimum protection requirements for the User's system connected to the State Transmission System.

(iii) Deliberate and decide in various settings, testing procedure and periodicity of testing of the protection relays.

(iv) Deliberate and decide regarding up gradation of protection schemes and switchgear equipment.

(v) Review and analyze the reasons for failure of protection system in case of any grid disturbances and recommend methods for improvement.

(vi) Investigate into any malfunctions of protection equipment or other unsatisfactory protection issues.

(vii) Consider the requests of Users for amendment to any protective conditions specified in the State Grid Code.

The protection Co-ordination Committee shall whenever requested by STU or at least meet once in every three months and shall give their recommendations, if any, to the State Grid Code Review Committee.

2.5 Review and Revisions

1) State Grid Code shall be reviewed by the State Grid Code Review Committee at least once in every twelve (12) months.
2) No change in the State Grid Code, shall be made without being deliberated and agreed by the State Grid Code Review Committee and approved by the Commission.
3) The Users seeking any amendment to the State Grid Code shall send written requests to the Member Secretary of the State Grid Code Review Committee.
4) The Member Secretary shall place all the proposed revisions for the State Grid Code to the Review Committee for its consideration.
5) After discussion in the review meeting, the State Grid Code Review Committee shall send a report to the STU / Commission, providing information regarding:
   (j) Outcome of the review;
   (ii) Any proposed revisions to the State Grid Code; and
   (iii) All written representations submitted by the Users;
6) The STU shall send the report along with its recommendations regarding the proposed modification(s) / amendment(s) along with all the related correspondence to the Commission for approval.
7) Amendments to the State Grid Code shall be finalized and notified by the Commission duly adopting the prescribed procedure followed for regulations issued by the Commission.

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8) After the approval by the Commission, the STU shall publish revisions to the State Grid Code and forward copies of approved amendments to all Users.

9) STU shall maintain copies of the State Grid Code with the latest amendments and shall make them available at a reasonable cost to any person requiring it. This may also be made available on the website as soon as feasible. The STU shall keep an upto date list of recipients of all the copies of the State Grid Code, to ensure that the latest version of State Grid Code reaches to all concerned.

10) The Commission, may, on the application by the User or otherwise, call the emergency meeting of the Grid Code Review Committee as and when required and make such alterations or amendments in the State Grid Code as it thinks fit.

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CHAPTER -3: SYSTEM PLANNING

3.1 Objective

This Chapter formulates the procedures for the 'System Planning' to enable STU in consultation with the Users, to ensure an efficient, coordinated, secure and economical State Transmission System to satisfy requirements of future demand.

3.2 Development of State Transmission System

1. Reinforcement or extension of the State Transmission system arises due to many reasons of which a few are mentioned below:
   i) Developments / changes occurring on a User's system already connected to the State Transmission System.
   ii) Introduction of a new connection point between the User's system and the State Transmission System.
   iii) System of evacuation of power from generating stations within or outside the State
   iv) Reactive power compensation.
   v) Need to increase system capacity, to remove operational constraints and to maintain standards of security to accommodate a general increase in the demand.
   vi) Transient and steady state stability considerations.
   vii) Cumulative effect of any combination of the above.
   viii) Any other need to effect changes in the State Transmission System.

   The reinforcement or extension of the State Transmission System may involve work at an entry or exit point (connection point) of a User to the State Transmission System.
2. Development of State Transmission system must be planned well in advance to ensure consents and way leaves to be obtained and detailed engineering design / construction work to be completed. To this effect, the planning code imposes time lines for exchange of necessary information between STU and Users.

3.3 Planning Policy

1. STU would develop a perspective transmission plan for next 5 years for the State Transmission System. These perspective transmission plans shall be updated every year to take care of any revisions / modifications in

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load projections, generation capacity additions etc. The perspective plans shall be submitted to the Commission for approval.

2. STU shall carryout network studies and review fault levels to plan strengthening and augmentation of the State Transmission System.
3. STU shall follow the following steps in planning:
   i) Forecast the demand for power within the area of supply based on the load forecasts provided by Distribution Licensees. These shall include details of demand forecasts, data methodology and assumptions on which forecasts are based. These forecasts would be annually reviewed and updated, and also whenever major changes are required in the existing system.
   ii) Prepare a transmission plan for the State Transmission System compatible with the above load forecast and generation plan, Reactive Power (VAR) compensation needed etc.
   iii) To prepare and submit a long term (10 years) plan to the Commission for State Transmission System expansion to fully meet both energy and peak demand.
   iv) To extend full support to CTU to finalize the annual planning. Corresponding to a 5 year forward term for identification of major inter-state transmission system including inter - regional schemes which shall fit in with the long term plan developed by CEA.
4. All Users shall supply to STU the planning data prescribed as in **Appendix A** and **Appendix B** of Data Registration Chapter within 3 months from the date of notification of the Grid Code and thereafter such data shall be furnished by 31st March every year to enable STU to formulate and finalize the updated plan by 30th September each year for the next 5 years.

3.4 Planning Criterion

1) The planning criterion shall be based on the security philosophy on which both Inter State Transmission System (ISTS) and the State Transmission System (STS). The security philosophy shall be as per the Transmission Planning criteria and other guidelines laid down by CEA.

   The STU shall carry out appropriate system studies while developing the transmission system plan.

2) The State Transmission System, as a general rule, shall be capable of withstanding and be secured against the following contingency outages

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without necessitating load shedding or rescheduling of generation during steady state operations:

(a) Outage of a D/C line of voltage above 66 kV, below 400 kV

(b) Outage of S/C line of voltage of 400 kV and above or,

(c) Outage of a single Inter Connecting Transformer.

The above contingencies shall be considered assuming a pre – contingency system depletion (Planned outage) of another 220 KV D/c line or 400 KV S/c line in another corridor and not emanating from same sub-station.

3) All the generating Units may operate within their reactive capability curves and the network voltage profile shall also be maintained within voltage limits specified.

4) The State Transmission System (STS) shall be capable of withstanding the loss of most severe single system in feed without loss of stability.

5) Any one of the events defined in sub para 3.4 (2) above shall not cause:

(i) Loss of supply;

(ii) Prolonged operation of the system frequency below and above specified limits;

(iii) Unacceptable high or low voltage;

(iv) System instability;

(v) Unacceptable overloading of ISTS / STS elements

6) In all extra high voltage sub-stations suitable number (at least two) and appropriate capacity transformers shall be provided to have reliability.

7) STU shall carry out planning studies for Reactive Power compensation of State Transmission System including reactive power consumption requirement at the State Generating Stations switchyard.

3.5 Planning responsibility

1. The primary responsibility of load forecasting within distribution licensee's area of supply rests with the respective Distribution Licensees. The Distribution Licensee shall determine peak load and energy forecast of their areas for each category of loads for each of the succeeding 5 years and submit the same annually by 31st March to STU along with details of demand forecasts, data, methodology and assumptions on which forecasts are based along with their proposals for transmission system augmentation. The load forecasts shall be made for each of the prevalent

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as well as proposed inter connection points between STU and Distribution Licensees and shall include annual peak load and energy projections.

2. Generating stations shall provide their generation capacity to STU for evacuating power from their power stations for each of the succeeding 5 years along with their proposals for augmentation of transmission proposals and submit the same annually by 31st March to STU.
3. The planning for strengthening the State Transmission System for evacuation of power from outside state stations shall be initiated by STU.

3.6 Planning data

(1) State Generating Companies / IPPs / licensees shall supply following types of data to STU for the purpose of developing transmission plan:

(i) Standard Planning Data

(ii) Detailed Planning Data

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Standard Planning Data:-

i) Standard Planning data shall consist of details which are expected to be normally sufficient for the STU to investigate the impact on the State Transmission System (STS) due to User / Transmission Licensee development.

ii) The Users and Transmission Licensee shall provide the following data to STU from time to time (a) preliminary project planning data, (b) committed project planning data and (c) connected planning data.

Detailed Planning data:-

Detailed Planning data shall consist of detailed data required by STU to asses the impact of User / Transmission Licensee development on the State Transmission System.

The detailed planning data shall be furnished by the Users and Transmission Licensees as and when requested by STU.

Formats:

The formats for submission of the above data are given in Appendices in the Data Registration Chapter - 17

(2) The one time data shall be submitted by all the Users and Transmission Licensees to STU within six (6) months from the date of notification of this State Grid Code.

(3) STU shall also furnish to all the Users, the Annual Transmission Planning Report, Grid Map and any other information as the Commission may specify.

3.7 Implementation of Transmission Plan

The actual programme of implementation of State transmission lines, inter – connecting transformers, reactors/capacitors and other transmission elements will be determined by STU in consultation with the concerned agencies. The completion of these works within time frame shall be ensured by STU through the concerned agencies.

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CHAPTER – 4: CONNECTION CONDITIONS

4.1 Objective

The objective of this Chapter is to ensure the following:

1. All Users and prospective users are to be treated equally.
2. Any new or modified connection when established shall not impose any adverse effect on the existing Users and new connections shall not suffer adversely due to existing user connection.
3. A system of acceptable quality is ensured by specifying minimum design and operational criteria, to assist the Users in their requirement to comply with the license obligations.
4. The ownership and responsibility for all equipment is clearly specified in a schedule "(Site Responsibility Schedule)" for every site, where a Connection is made.

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4.2 Procedure for connection to State Transmission System

1) Application for new or modification of existing arrangement of connection to the STS shall be submitted by the concerned User to the State Transmission Utility.

   The format for application shall be developed by State Transmission Utility and shall be made available at its office and in its website within two (2) months of notification of this State Grid Code.

2) The above application shall be submitted along with the following details:

   (i) Purpose of the proposed connection or modification, transmission licensee to whose system connection is proposed, connection point, description of apparatus to be connected or modification of the apparatus already connected and beneficiaries of the proposed connection;

   (ii) Construction schedule including completion date, and

   (iii) Confirmation that the User shall abide by the provisions of State Grid Code.

3) The STU shall forward a copy of the application to the Transmission Licensee in whose system the connection is being sought and to the State Load Despatch Centre for their comments.

4) The Transmission licensee, in whose system the connection is being sought, may carry out the power system studies as considered appropriate before allowing any new connection.

5) The STU shall, within thirty (30) days, from the receipt of an application and after considering all suggestions and comments received from the parties identified under para (3) above accept the application with such modification or such conditions as may be specified by the STU.

6) On acceptance of an application, the STU shall make a formal offer to the applicant for consent, specifying any works required for the extension or reinforcement of the State Transmission System necessitated by the applicant's proposal.

   A copy of the offer shall be forwarded to the concerned Transmission Licensee.

7) The STU shall, upon compliance of the required conditions by the User, shall notify the concerned User, that it can be connected to the STS.

8) The applicant and the concerned Transmission Licensee or STU, in whose system the connection is being sought, shall finalize a Connection Agreement on acceptance of the offer by the applicant. A copy of the Connection Agreement shall be provided to the STU and SLDC.

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4.3 Rejection of application

(1) STU shall be entitled to reject any application for connection to the State Transmission System for reasons, to be recorded in writing, if such application is not in accordance with the provisions of the State Grid Code.

(2) In the event of any dispute with regard to rejection of application by STU, the User may approach the Commission

4.4 Connection Agreement

(1) All Users connected to or seeking connections to the STU shall enter into connection agreement with the STU.

A connection agreement, shall include within its terms and conditions, the following:

(i) A condition requiring both parties to comply with the provisions of the State Grid Code.

(ii) Details of connection, technical requirements and commercial arrangements.

(iii) Details of any capital related expenditure arising from reinforcement or extension of the system, data communication etc, and demarcation of the same between the concerned parties.

(iv) Details of Plants and equipments to be connected.

(v) A Site Responsibility Schedule.

(vi) Any other information considered appropriate by the STU.

4.5 Site Responsibility Schedule

1. For every connection to the State Transmission System for which a connection agreement is required, the User shall prepare a schedule called 'Site Responsibility Schedule' indicating the following for each item of equipment installed at the connection site.
   i) Ownership of the equipment
   ii) Responsibility for control of equipment
   iii) Responsibility for maintenance of equipment
   iv) Responsibility for operation of equipment
   v) Responsibility for all matters relating to safety of any person at the connection / interface site.
   vi) Management of the Connection / Interface site.
2. The format to be used in the preparation of Site Responsibility Schedule is given in Appendix – C in the Data Registration Chapter.

4.6 System Performance

1. The Design and Construction of all the equipment connected to the State Transmission System shall satisfy the relevant Indian Standard Specifications. In case of equipment for which Indian Standard Specifications do not exist, the appropriate IEC, or IEEE or other International Standards shall apply.
2. Installation of all electrical equipment shall comply with IE Rules, 1956 which are in force for time being or as replaced by new rules made under Electricity Act, 2003.
3. For every new / modified connection sought the STU shall specify the connection point, technical requirements and the voltage to be used, along with protection and metering requirements as specified in the Protection Code (Chapter-7) and Metering Code (Chapter-17).

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4. Insulation coordination of the User's equipment shall conform to those applicable as per Indian Standards. Rupturing capacity of the switchgear shall not be less than that specified as per Indian Standards.
5. Protection schemes and metering schemes shall be as detailed in the Protection Code and Metering Code Chapter.
6. The State Transmission System rated frequency shall be 50.00 Hz and shall normally be controlled within the limits as per Regulations issued by the Authority.
7. The User shall be subject to the Grid discipline prescribed by SLDC and RLDC.
8. In the event of Grid disturbances in the Regional Grid, SLDC shall not be liable to maintain system parameters within the normal range of voltage and frequency.

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4.7 Connection Points / Interface points

1. State Generating Station (SGS) / IPPs / CPPs:
   - The voltage at the Connection point / Interface point with the State Transmission System may be 220/132/110/66 KV or as agreed with STU.
   - Unless specifically agreed with STU, the Connection point with generating station shall be the terminal isolator provided just before the outgoing gantry of the feeders.
   - SGS shall operate and maintain all terminals, communication and protection equipments provided within the generating station.
   - The provisions for the metering between generating station and STU system shall be as per the Metering Code.
   - Respective Users shall maintain their equipment from the going out feeders' gantry onwards emanating from generating station
2. Distribution Licensee:
   - The voltage at the Connection Point / Interface Point to State Transmission System may be as specified by the Distribution Licensee or as agreed with STU.
   - Unless specifically agreed with Distribution Licensee, the Connection point with STU shall be the outgoing feeder gantry, from STU sub-station.

- STU shall operate and maintain all terminals, communication and protection equipments provided within its sub-station.
- The provisions for the metering between Distribution Licensee and STU systems shall be as per the Metering Code.
- Respective Users shall maintain their equipment beyond the out going gantry of feeders emanating from STU sub-station onwards.

3. Regional Transmission System:

- The Connection, protection scheme, metering scheme and the voltage shall be in accordance with the provisions of IEGC.

4. EHV Consumers and Open Access Customers:

- The voltage may be 220/132/110/66 KV or as agreed with STU.
- The Connection point shall be just before the feeder gantry in their premises. The metering point shall be Connection point / Interface Point with their system.

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4.8 Connectivity of renewable energy generating station to the grid

General Conditions for Connectivity of Renewables

It shall be decided by the Commission on case to case basis.

4.9 Data Requirements:

- Users shall provide STU with data as specified in the Data Registration Chapter.
- Unless otherwise agreed in Connection Agreement, the equipment for data transmission and communication shall be operational and maintained by the User in whose premises it is installed irrespective of its ownership.

CHAPTER – 5: SYSTEM SECURITY ASPECTS

5.1 Objective

All Users shall endeavor to operate their respective power systems and generating stations in synchronism with each other at all times, such that the State Grid operates as synchronized system and integrated part of Concerned Regional Grid. The STU shall endeavor to operate the inter state links in such a way that transfer of power can be achieved smoothly when required. Security of the power system and safety of power equipment shall enjoy priority over economically optimal operations.

5.2 Scope

The System Security relates to entire inter–connected power system including that of Users. The operation of the State Transmission System will be supervised and regulated by SLDC as per directions and instructions of RLDC.

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5.3 System Security

1. All switching operations, whether affected manually or automatic, will be based on policy guidelines of:
   i) IEGC
   ii) RLDC's instructions/guidelines
   iii) State Grid Code
2. No part of the State Transmission System shall be deliberately isolated from the integrated grid except under the following conditions;
   (i) Under emergency conditions in which such isolation would prevent a total grid collapse and / or would enable early restoration of power supply
   (ii) When serious damage to a costly equipment is imminent and such isolation would prevent it and
   (iii) When such isolation is specifically instructed by SLDC.
3. In case of isolating of any important element of the STS under an emergency situation, the same shall be intimated to SLDC at the earliest possible time after the event.
4. Complete synchronization of grid shall be restored as soon as the conditions permit it. The restoration process shall be supervised by SLDC.
5. Any tripping, whether manual or automatic of transmission lines of 66 KV and above or power transformers of 66 KV shall be promptly reported to the SLDC at the earliest along with the reasons for such tripping and the likely time

required for restoration. While restoring the tripped equipment / line, SLDC shall be informed and get the clearance.

6. Each User and Transmission Licensee shall provide adequate and reliable communication facility internally and with State Load Despatch Centre, other Users and other Transmission Licensees to ensure exchange of data/information necessary to maintain reliability and security of the grid.
7. User and State Transmission Utility shall send the requested information/data including disturbance recorder/sequential event recorder output etc to State Load Despatch Centre for purpose of analysis of any grid disturbance/event.

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Chapter -6: Frequency and Voltage Management

6.1 Objective

The objectives of this chapter are as follows:

(1) To define the responsibilities of all Users in contributing to frequency and voltage management.

(2) To define actions required to enable SLDC and STU to maintain the State Transmission System voltages and frequency within acceptable levels in accordance with IEGC guidelines as well as Planning and Security Standards for the Inter State Transmission System specified by the Central Commission, if any.

6.2 Frequency Management

1) The rated frequency of the system shall be 50 Hz and shall normally be controlled within the limits specified by the Central Electricity Authority or CERC. STU and SLDC shall make all possible efforts to ensure that grid frequency remains within 49.5 – 50.2 Hz. Frequency band is tightened in the IEGC (effective from 1-4-2010) from 49.2 – 50.3 Hz to 49.5 – 50.2 Hz in view of the anticipated additional generating capacity coming up in future.

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2) Falling frequency

Under falling frequency conditions, SLDC shall take appropriate action to issue instructions, in co-ordination with RLDC to arrest the falling frequency and restore frequency within permissible range. Such instructions may include despatch instruction to SGS to increase generation and/or instruction to Distribution Licensees and Open Access Customers to reduce load demand by appropriate manual and/or automatic load shedding.

3) Rising Frequency

Under rising frequency conditions, SLDC shall take appropriate action to issue instructions to SGS in co-ordination with RLDC to arrest the rising frequency and restore frequency within permissible range. SLDC shall also issue instructions to Distribution Licensees and Open Access Customers in coordination with RLDC to lift Load shedding (if exists) in order to take additional load. In case of Load Crash, SLDC shall take steps as per Para 8.4 of this Code.

6.3 Voltage Management

1) Users using the State Transmission System and STU shall make all possible efforts to ensure that the grid voltage always remains within the limits specified in IEGC at clause 5.2 (r).

Voltage (KV rms)		
Nominal	Maximum	Minimum
400	420	380
220	245	198
132	145	122

The Minimum voltages are revised from 360 to 380 kV for 400 kV, 200 to 198 kV for 220 kV and 120 to 122 kV for 132 kV in the latest IEGC.
Similarly, considering the same percentage voltage variations as above, the maximum and minimum limits of 110 kV and 66 kV voltages will be as given below.

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Nominal	Maximum	Minimum
110	121	102
66	72	61

2) STU and/or SLDC shall carry out load flow studies based on operational data from time to time to predict where voltage problems may be encountered and to identify appropriate measures to ensure that voltages remain within the defined limits. On the basis of these studies, SLDC shall instruct SGS to maintain specified voltage level at interconnecting points.

SLDC shall continuously monitor 220 KV, 132 KV, 110 KV and 66 KV voltage levels at strategic sub-stations.

3) SLDC shall take appropriate measures to control State Transmission System Voltages, which may include transformer tap changing, capacitor / reactor switching and capacitor switching by Distribution Licensees at 110 KV, 66 kV or 33 KV substations, and use of MVAr reserves with SGS within technical limits agreed to between STU and Generators. Generators shall inform SLDC of their reactive reserve capability promptly on request.

4) SLDC will ensure that there is minimum reactive power flow on transmission network. Reactive energy demand would be met by installation of capacitor banks at suitable sub-stations as per load flow study.

5) Distribution Licensees and Open Access Customers shall participate in voltage management by providing Local VAR compensation (as far as possible in low voltage system close to load points) such that they do not depend upon EHV grid for reactive support.

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Chapter –7: Protection

7.1 Objective

1. The objective of this Chapter is to define the minimum protection requirements for any equipment connected to the State Transmission System to safe guard from faults and thereby minimize any disruption due to faults.
2. Minimum protection requirements are prescribed because inadequate protection or mal-operation of protection system of any entity may result in far reaching consequences, disturbances and even damages to the system of other entities.

7.2 General Principles

1. No item of electrical equipment shall be allowed to remain connected to the State Transmission System unless it is covered by minimum specified protection relay settings aimed at reliability, selectivity, speed, stability and sensitivity.
2. All Users shall co-operate with STU to ensure correct and appropriate settings of protection to achieve effective, discriminatory removal of faulty equipment within the target clearance time specified in this section.
3. Protective Relay settings shall not be altered, or protection relays bypassed and/or disconnected without consultation and agreement between all affected Users. In a case where protection is bypassed and/or disconnected by an agreement, then the cause must be rectified and the protection restored to normal condition as quickly as possible. If agreement has not been reached, that electrical equipment not having protection shall be removed from service forthwith.

7.3 Protection Coordination

The settings of protective relays starting from the generating unit upto the remote end of 110 KV or 66 KV lines shall be such that only the faulty section is isolated under all circumstances. The STU shall notify the initial settings and any subsequent changes approved by the Protection Coordination Committee to the Users from time to time. Periodical testing of all the protective relays shall be conducted once in six months.

Malfunctioning of any protective relay shall be intimated to the Protection Coordination Committee immediately for analyzing and to recommend necessary corrective actions.

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A separate cell headed by an engineer of executive level, having experience in protection of system and consisting of necessary supporting technical and no-technical staff shall be established by the STU, for testing and maintenance of protection relays, meters and other connected instruments.

At all places where protection schemes are installed, they have to be exhibited in single line diagram. Copies of the specifications of all the protection relays installed shall be provided at all places where such relays are installed.

7.4 Fault Clearance Times

(1) The fault clearance time when all equipment operate correctly, for a three phase fault (close to the bus bars) on user equipment directly connected to State Transmission System and for a three phase fault (close to bus bars) on State Transmission Connected to the users equipment, shall not be more than;

a) 100 milliseconds for 400 kV class of voltage

b) 160 milliseconds for 220 kV, 132 kV and 110 kV class of voltage

c) 300 milliseconds for 66 kV class of voltage

(2) Lesser fault clearance time than the above are preferable.

(3) Lower fault clearance times for faults on a Users system may be agreed to but only if, in STU's opinion, system conditions allow this. STU shall specify the required opening time and rupturing capacity of the circuit breakers at various locations for STU and Distribution Licensees / Open Access Customers directly connected to Transmission System. At generating stations, line faults should be cleared at the generation station end within the critical clearing time so that the generators remain in synchronism.

7.5 Generator Requirements

All Generating Units and all associated electrical equipment of the Generating Units connected to the State Transmission System shall have adequate protection and backup protection system approved by the Protection Coordination Committee so that the State Transmission System does not suffer due to any disturbances originating from the Generation units.

The guidelines mentioned in the Manual on protection of generators, Generator Transformers etc. vide publications No. 274 of CBIP shall also be kept in view.

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7.6 Transmission Line Requirements

(1) General

Every EHT line taking off from a Generating Station or a sub-station or a switching station shall have adequate protection and back up protection approved by the Protection Coordination Committee. Switchgear equipment and Relay Panels for the protection of lines of STU taking off from a Generating Station shall be owned and maintained by the Generator. 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. Carrier cabinets / equipment, Line matching units including wave traps and communication cable shall be owned and maintained by STU. All Generators shall provide space, connection facility, and access to STU for such purpose.

The guidelines mentioned in the Manual on protection of 220 kV and 400 kV network etc. vide publication No. 274 of CBIP shall also be kept in view.

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(2) 220 KV Transmission Lines

All 220 KV transmission lines owned by STU shall have two fast acting protection schemes.

Main 1 protection scheme shall be numeric, three zone, non-switched fast acting distance protection scheme with permissible inter-trip at remote end (in case of zone-2 fault). The scheme shall have power swing blocking, location of fault recording, disturbance recording, event logger, communication port, single and three shot auto reclosing as well as Local Breaker Backup (LBB).

Main 2 protection scheme shall be static/ numeric, three zone, switched/ non-switched fast acting distance protection scheme having all features as in Main- 1 except auto reclosing and Local Breaker Backup (LBB).

For back-up protection, three directional IDMTL over current relays and unidirectional earth fault relay shall be provided.

(3) 132 KV/110 KV/66 KV Lines

A single scheme three zone, non-switched numeric distance protection with standard built in features like single and three phase tripping, carrier inter-tripping, IDMT over current and earth fault, power swing blocking and LBB protection shall be provided as main protection.

The backup protection shall be at least two directional IDMTL over current relays and one directional earth fault relay.

For short transmission radial lines, appropriate alternative protection schemes may be adopted.

7.7 Transformer Requirements

(1) The protection of Power Transformers shall be as approved by the Protection Coordination Committee. The guidelines mentioned in the manual on transformers published by Central Board of Irrigation and Power (CBIP) Publication No. 275 shall also be kept view.

The following minimum protections shall be ensured for transformers:

(i) All 220 KV class power transformers shall be provided with numeric fast acting differential, REF, open delta (Neutral Displacement Relay) and over-fluxing relays. In addition, there shall be back up IDMTL over current and earth fault protection. For parallel operation, such back up protection shall have inter-tripping of both HV and LV breakers. For protection against heavy short circuits, the over current relays should incorporate a high set instantaneous element. 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.

(ii) For 132 KV, 110 KV and 66 KV class power transformers of capacity of 10 MVA and above; the protection shall be same as mentioned in 7.7 (1) (i) above except over-fluxing, REF and PRV relays.

(iii) For 132 KV, 110 KV and 66 KV class power transformers of capacity less than 10 MVA, over-current with high set instantaneous element along with auxiliary relays for transformer trip and alarm functions as per transformer requirements, shall be provided.

(2) In addition to electrical protection, gas operated relays, winding temperature protection and oil temperature protection shall be provided.

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7.8 Sub-Station Fire Protection

Adequate precautions shall be taken and protection shall be provided against fire hazards to all apparatus and other assets confirming to relevant Indian Standard Specification and provisions in I.E. Rules. The fire fighting equipment installed shall be maintained in good working condition and shall be inspected daily and recorded in the maintenance logbook by the concerned in charge person. The single line schematic diagram of the five protection arrangement shall be displayed in the sub-station control room.

7.9 Calibration and Testing

The protection scheme shall be tested at each 220 KV, 132 KV, 110 KV, 66 KV sub-station by STU and Users once in six months or immediately after any major fault, which ever is earlier. Testing and calibration of all protection schemes pertaining to generating units/stations shall be the responsibility of respective SGS.

7.10 Data Requirements:

Users shall provide to the STU and SLDC with data as specified in Appendix-D in the Data Registration Chapter.

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Chapter –8: Operation Planning

8.1 Objective

This Chapter describes the process by which the SLDC carries out the operational planning and demand control procedures.

The detailed procedure is required to enable SLDC to reduce overloading to avoid operating problems on all parts of the State Transmission System. SLDC will utilize demand control in a manner, which does not unduly indiscriminate against any one or group of consumers.

8.2 Demand Estimation

1. The long term demand estimation and load forecast (for more than 1 year) shall be done by STU. SLDC shall be provided with a copy of the same as and when it is finalized.
2. It shall be the responsibility of all Distribution Licensees to fully cooperate with STU in preparation of demand estimation and load forecast for the entire state.
3. The Distribution Licensees shall provide to the STU their estimates of demand for the year ahead on month-basis at each inter connection point for the next financial year by 31st January of each year. Distribution Licensees shall also provide daily demand on the month ahead at each inter connection point by 25th for the next month.
4. Based on the data furnished by the Distribution Licensees, STU shall make monthly peak and lean period demand estimates for year ahead and daily peak and lean period demand estimates for the month ahead and furnish the same to SLDC.
5. The Distribution Licensee shall provide to SLDC estimates of loads that may be shed when required, in discreet blocks with details of arrangements of such load shedding.
6. Distribution Licensees shall also furnish realistic category wise demand along with details of essential loads, supply lines to be maintained in rural areas, details of power cuts imposed or to be imposed etc to STU and SLDC.
7. The SLDC would upto date the demand forecast (in MW as well as KWh) on quarterly, monthly, weekly and ultimately on daily basis which would be used in the day – ahead scheduling.

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8.3 Demand Control

1. Automatic load shedding shall be resorted to by means of installation of the Under Frequency Relays at the sub stations of the STU as per the directions of the SLDC to preserve the overall integrity of the power system. The number and size of the discrete blocks using Automatic under Frequency Relays for Load Shedding shall be determined on rotational basis in consultation with every Distribution Licensee. The frequency settings of these relays shall be coordinated in consultation with the RLDC.
2. Whenever restoration of large portions of the total demand disconnection effected by the automatic load shedding is not possible within a reasonable time, the SLDC shall implement additional disconnection manually, to restore an equivalent amount of demand disconnected.

   Each Distribution Licensee shall help the SLDC in identifying such load blocks. Load shed by the operation of automatic load shedding devices shall not be restored without specific directions from the SLDC.
3. Planned manual load shedding shall be implemented by the SLDC when there is a shortfall in generation, or constraints in Transmission System, or reduction of imports through external connection etc., requiring demand control to control the over-drawl of power from ISGS. In such cases a rotational load shedding scheme shall be adopted to ensure equitable treatment for all consumers as far as practicable.
4. Emergency manual load shedding to deal with unacceptable voltage and frequency levels etc. shall be implemented by the SLDC when loss of generation, mismatch of generation with the demand, constraints in the transmission system, over-drawal from the grid in excess of respective schedule affecting the frequency of the regional grid below 49 Hz, requiring load shedding at short notice or no notice, to maintain a regulating margin.
5. These control measures shall not be withdrawn till the system frequency improves and when the SLDC issues such instructions after review of the situation.

8.4 Load Crash

(1) In the event of load crash in the system due to weather disturbance or any other reasons, the situation would be controlled by SLDC by the following methods in descending priorities:

   i. Lifting of the load restrictions, if any

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ii. Exporting the power to neighboring regions/ states

iii. Backing down of thermal stations with a time lag of 5-10 minutes for short period in merit order.

iv. Closing down of hydel units (subject to non spilling of water and effect on irrigation) keeping in view the inflow of water into canals and safety of canals/hydel channels.

The above methodology shall be reviewed from time to time.

(2) While implementing the above, the system security aspects should not be violated as per provisions in para 5.3 in Chapter 5 of their State Grid Code.

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Chapter –9: Monitoring of Generation and Drawal

9.1 Objective

The objective of this chapter is to define the responsibilities of all State Generation Stations (SGS) in monitoring of Generating Unit reliability and performance, and STU's / Users compliance with the scheduled drawal to assist SLDC in managing voltage and frequency and in improving system performance and Grid discipline.

9.2 Monitoring of Generation

(1) For effective operation of the State Transmission System, it is important that a SGS's declared availability is realistic and that any departures from the availability are invariably reported to the SLDC.

(2) The SLDC shall continuously monitor Generating Unit outputs and Bus voltages. More stringent monitoring may be performed at any time when there is reason to believe that a SGS's declared availability may not match the actual availability or declared output does not match the actual output.

(3) SLDC will ensure that all thermal units with capacity 200 MW & above within the State are operated with free governor made of operation.

(4) SLDC can ask for putting a generating station to demonstrate the declared availability by instructing the generating station to come up to the declared availability within time specified by generators.

(5) SLDC shall inform a SGS, in writing, if the continual monitoring demonstrates an apparent persistent or material mismatch between the despatch instructions and the Generating Unit output or breach of the Connection Conditions. Continued discrepancies shall be resolved by the State Grid Code Review Committee with a view to either improve performance in future, providing more realistic declarations or initiate appropriate action for any breach of Connectivity Conditions. Continued default by the generating stations entails penalty as may be determined by the Commission.

(6) SGS (excluding CPPs) shall provide to SLDC 15-minute block-wise generation summation outputs where no automatically transmitted metering or SCADA/RTU equipment exists.

CPPs shall provide to SLDC 15-minute block-wise export / import (MW and MVAr).

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(7) The SGS shall provide any other logged readings that SLDC may reasonably require, for monitoring purposes where SCADA data is not available.

9.3 Monitoring of Drawal

(1) SLDC shall continuously monitor actual drawal by Distribution Licensees and other Users against their schedules through use of SCADA equipment wherever available, or otherwise using available metering. SLDC shall request RLDC and adjacent States as appropriate, to provide any additional data required to enable this monitoring to be carried out.

(2) SLDC shall continuously monitor the actual MVAR import / Export, voltage management in the State Transmission System.

9.4 Generating Unit Trippings

(1) SGS shall promptly inform SLDC of the tripping of a Generating Unit, with reasons, SLDC shall intimate RLDC about the trippings and their revival. SLDC shall keep a written log of all such trippings, including the reasons with a view to demonstrating the effect on system performance and identifying the need for remedial measures.

(2) SGS shall submit a more detailed monthly report of tripping of their Generating Units to SLDC.

9.5 Data Requirement

SGS shall submit data to SLDC as listed in Appendix-E (E-5) of Data Registration Chapter-17.

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Chapter –10: Outage Planning

10.1 Objective

The objective of this Chapter is to define the process, which will allow STU to optimize the planned Transmission Outages in State Generating Stations and Distribution Licensee's outages while maintaining system security to the extent possible.

10.2 Outage Planning Process

(1) Each User shall provide their outage programme for ensuing financial year to the SLDC for preparing an overall outage plan for the State Transmission System as a whole. SLDC shall be responsible for analyzing the outage schedules of all Users including SGS, Distribution Licensees, and STU schedules for outage of Transmission network and preparing a draft annual Outage Plan for the State Transmission System in coordination with the Outage Plan prepared for the region by RLDC. The Users shall furnish the information to SLDC as listed in Appendix-E of Data Registration Chapter-16.

(2) However, SLDC is authorized to defer the planned outage in case of any of the following events:

- Major grid disturbance
- System Isolation
- Black out in the State
- Any other event in the system that may have an adverse impact on system security by the proposed outage

10.3 Annual Outage Planning

1. Scheduled outage of power stations of capacity 10 MW & above and EHV lines as notified by SLDC from time to time, will be subject to annual planning.
2. SGS and CPPs connected to the State Grid shall furnish their proposed Outage programme for the next financial year in writing by 15th November each year.
3. SGS outage programme shall contain details like identification of unit, reason for outage, generation availability affected due to such outage, outage start date and duration of outage. SLDC shall review the outage programme received from SGS on monthly basis to chalk out the outage of the State Transmission System.

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4. SLDC shall also obtain from STU the proposed outage programme for Transmission lines, equipments and sub-stations etc. for next financial year by 15th November each year. STU outage programme shall contain identification of lines/ substations, reasons for outage, outage start date and duration of outage.
5. Scheduled outage of power stations and EHV transmission lines affecting regional power system shall be affected only with the approval of RLDC in co-ordination with SLDC.
6. Scheduled outage of power stations of capacity 10 MW and above, of all EHV lines and HV lines forming interconnection between two EHV substations (and these notified as such by SLDC) shall be approved by SLDC, 24 hours in advance based on prevalent operating conditions.
7. In respect of scheduled outage referred in this section a calendar shall be formulated in respect of annual outage planning for the ensuing financial year.
8. SLDC would ensure that State's generating units are taken out for annual maintenance during the low power demand period of the year.

10.4 Availing of shutdowns schedule

1. SLDC would review on daily basis proposed the outage schedule for the next two days and in case of any contingency or conditions such as grid disturbances, system isolation, partial black out or any other event in the system that may have an adverse impact as the system security by the proposed outage, it may defer any planned outage stating the reasons thereof. The revised dates in such cases would be finalized in consultation with the User.
2. STU and User shall obtain approval of SLDC prior to availing the outage.
3. Where interruption of power supply is caused to Consumers due to availing the planned outage, the Distribution Licensee shall obtain the prior approval of the Commission and also give prior information to the consumers by publishing in the daily newspaper regarding the interruption of supply timings.

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Chapter – 11: Contingency Planning

11.1 Objective

The objective of this chapter is to define the responsibilities of all Users to achieve the fastest possible recovery in the event of the State Transmission System or Regional System blackout, taking into account essential loads, generating stations capabilities and operational constraints of the State Transmission System.

11.2 Contingency Planning Procedure

1. SLDC shall efficiently handle the following types of contingencies and restoration of system back to normal:
    - Partial system blackout in the state due to multiple tripping of the Transmission lines emanating from power stations/sub-stations
    - Total black out in the state/region
    - System islands / System split
2. Diesel generating (DG) sets of sufficient capacity shall be provided at each power station to meet the start-up power.
3. Synchronizing facility shall be available at all power stations and 220 KV, 132 KV, 110 K and 66 KV sub-stations having inter-connection with Inter State Transmission System.
4. In case of partial blackout in the system/state, priority is to be given for early restoration of power station units, which have tripped.
5. In case of total regional blackout, SLDC shall co-ordinate and follow the instructions of Regional Load Despatch Centre (RLDC) for early restoration of the entire grid.
6. For safe and fast restoration of supply, SLDC shall formulate the proper sequence of operations for major generating units, lines, transformers and load within the state. The sequence of operations shall include opening, closing/tripping of circuit breakers, isolators, on-load tap-changers etc.

11.3 Restoration Procedure

(1) Detailed and procedure for restoration of the State Grid under partial / total blackout shall be developed by SLDC in consultation with RLDC and all Users and shall be reviewed / updated annually.

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(2) Detailed procedures for restoration under partial / total blackout of each User's system within the State will be finalized by the concerned User in co-ordination with SLDC.

(3) List of generating stations with black start facility, inter-state / inter regional ties, synchronizing points and essential loads to be restored on priority, shall be available with SLDC.

(4) All communication channels required for restoration process shall be used for operational communication only till grid normalcy is restored.

11.4 Special Considerations applicable to contingency planning

(1) During the process of restoration of the State Transmission System or Regional System blackout conditions, the normal standards of voltage and frequency need not be insisted and may left to the discretion of the SLDC.

(2) Distribution Licensees shall separately identify non-essential loads, which may be kept off during system contingent conditions. They shall also draw up an appropriate schedule with corresponding load blocks in each case. The non-essential loads can be put on only when system normalcy is restored or as advised by SLDC.

(3) All Users shall pay special attention in carrying out the procedures to prevent secondary collapse of the system due to undue haste or inappropriate loading operation of conditions.

(4) Despite the urgency of the situation, prompt and complete logging of all operations and operational messages shall be ensured by all Users to facilitate subsequent investigation into the incident and reviewing of the efficiency of the restoration process. Such investigation shall be conducted after the incident, and placed before the Grid Code Review Committee in its next meeting.

11.5 Post Disturbance Analysis.

SLDC as per guidelines and instructions from RLDC shall carry out the post-analysis of disturbance occurrence of all major grid disturbances resulting into total or partial system blackout and out of synchronization of any part of the state grid. All users shall enable SLDC, analyze the system disturbance and furnish report to RLDC.

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Chapter – 12: Inter User Boundary Safety

12.1 Objective

The objective of this chapter is to achieve an agreement and consistency on the principles of safety as prescribed in the Indian Electricity Rules 1956 which are in force for the time being and will be replaced by the rules made under Electricity Act, 2003 when working across the inter user boundary (cross boundary) between one User and another User.

12.2 Designated Persons

STU and all Users shall nominate and notify authorized persons to be responsible for the co-ordination of safety across their boundary. These persons shall be referred to as Designated persons.

12.3 Procedure to work on Inter User Boundary Circuits

(1) STU shall issue a list of Designated persons names, designations and telephone numbers to all Users who have a direct inter user boundary with him. This list shall be updated promptly, whenever there is a change of name, designation or telephone number of any designated persons named in the list.

(2) All Users with a direct inter user boundary with STU shall issue a similar list of their Designated persons to STU. This list shall be updated promptly whenever there is any change of name etc in the list.

(3) Whenever any work across an inter-user boundary is to be carried out by the User or the STU, the Designated persons of the User or STU as the case may be, wishing for Line Clear Permit / Permit to Work (PTW) shall personally contact the other relevant Designated person. If the Permit to Work cannot be obtained personally, the Designated persons shall contact through telephone and exchange Code word or secrete code to ensure correct identification of both agencies.

(4) If the work extends beyond than one shift, the Designated Person shall ensure that the Relieving Designated Person is fully briefed on the nature of the work and the code words in operation.

(5) The Designated Person (s) shall co-operate to establish and maintain the precautions necessary for the required work to be carried out in a safe manner. Both the established isolation and the established earth shall be kept in locked position with “Men Working” tag, where such facilities exist, and shall be clearly identified.

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(6) Work shall not commence until the Designated Person in charge of the work of the User including, wishing to carry out, is satisfied that all the safety precautions have been established. This Designated Person shall issue approved safety documentation and work permit (PTW) to the working party to allow work to commence. The Permit to Work in respect of specified EHV lines and other interconnections shall be issued with the consent of SLDC.

(7) When work is completed and safety precautions are no longer required, the Designated Person who has been responsible for the work being carried out shall make direct contact with the other Designated Person to return the Permit to Work and removal of those safety precautions. Return of Permit to Work in respect of specified EHV lines and interconnections shall be informed to SLDC.

(8) The equipment shall only be considered as suitable for connecting back to service when all safety measures are confirmed as removed, by direct communication using code word contact between the two Designated Persons, and after ensuring that the return of Permit to Work from the working party has taken place.

(9) STU shall develop an agreed written procedure for inter-user boundary safety and continuously update it.

(10) Any dispute concerning inter-user boundary safety shall be resolved at the level of STU, if STU is not a party. In case STU is a party, the dispute shall be referred to the Grid Code Review Committee for resolving the dispute.

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12.4 Special Consideration

(1) For inter-user boundary between STU and other User's circuits, all Users shall comply with the approved safety rules, which must be in accordance with IE Rules.

(2) Each Designated Person shall maintain a legibly written safety log, in chronological order, of all operations and messages relating to safety co-ordination sent and received by him. All safety logs shall be retained for a period of not less than 10 years.

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Chapter -13: Operational Event Information Reporting

13.1 Objective

This Chapter defines the incidents to be reported, the reporting route to be followed and the information to be supplied to ensure a consistent approach to the reporting of incidents / events.

13.2 Reportable Events

1. All events in the State Transmission System having an operational effect on the User's system shall be reported by the STU to SLDC and to Users whose systems are affected.
2. All events in the User's system having an operational effect on the State Transmission System shall be reported by the User to the STU and SLDC and who in turn shall intimate the other Users on whose system the event may have an operational effect.
3. Any of the following incidents events that could affect the State Transmission System requires reporting:
    a. Exceptionally high / low system voltage or frequency.
    b. Serious equipment problem relating to major circuit breaker, transformer or bus bar.
    c. Failure of major Generating Unit.
    d. System split, State Transmission System breakaway or Black Start.
    e. Tripping of transmission Line, ICT (Inter connecting transformer) and capacitor banks.
    f. Major fire incidents.
    g. Major failure of protection equipment.
    h. Equipment and Transmission Line overload.
    i. Accidents-Fatal and Non-Fatal.
    j. Load Crash / Loss of Load
    k. Excessive drawal deviations.
    l. Minor equipment alarms.

The last two reportable incidents which are of lesser consequence, but which still have affect on the State Transmission System and can be reasonably classed as minor. They require prompt corrective action.

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13.3 Reporting Procedure

1) All incidents occurring on lines and equipment above 33 kV and all the lines on which there is the inter user flow affecting the State Transmission System shall immediately be reported orally on telephone or through power line carrier communication etc by the User or STU whose equipment has experienced the incident to SLDC. The reporting User or STU shall submit a confirmation report by Telephone message / Fax / E-mail to SLDC within one hour of such oral report.

   The reporting User shall submit a written report within 2 (two) days of occurrences of the incident to the SLDC by e-mail or by courier or by certified post.

2) SLDC shall suo moto call for a report from any User on any incident affecting other Users or STU. However, this shall not relieve any User from the obligation to report events in accordance with provisions of the State Grid Code to SLDC / STU.

3) A written report containing the following details confirming the oral report, shall be sent to SLDC by the User or STU.

   (i) Location of incident.
   (ii) Time and date of incident.
   (iii) Plant and equipment directly involved.
   (iv) Details of relay indications with nature of fault implications.
   (v) Demand / Transmission or Generation (in MV) interrupted and duration of interruption.
   (vi) Brief description and cause of incident / event.
   (vii) Estimated time to return to service.
   (viii) Possibility of alternate arrangement made for restoration of supply
   (ix) Any other relevant information

13.4 Reporting Form

The standard reporting form, other than for accidents, shall be as approved from time to time by the Grid Code Review Committee. The standard reporting form shall be made available in the website of STU and SLDC. A typical form is attached (APPENDIX-F) in the Data Registration Chapter-17.

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13.5 Major Failure

Whenever a major failure such as tripping of generating unit or EHV transmission line, System frequency or Voltage outside statutory limits, system overload, accidents takes place, the User shall inquire and establish the cause of such failure to STU / SLDC / Commission. The STU shall submit the report to State Grid Code Review Committee within one month for further analysis.

On demand by the Commission a detailed report on major failures shall be submitted to the Commission.

13.6 Accident Reporting

If any accident occurs in connection with the Generation, Transmission, Distribution of supply or use of electricity or in connection with any part of electric lines or electrical plant of any person and the accident results or is likely to have resulted in loss of human or animal life or any injury to human being or an animal, the same shall be dealt with in accordance with Section 161 of the Electricity Act, 2003.

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Chapter – 14: Scheduling and Load Despatch

14.1 Objective

This Chapter details the actions and responsibilities of SLDC in preparing and issuing a daily schedule of generation and the responsibilities of Users to supply the necessary data and to comply with the schedules.

14.2 General

SLDCs shall have the total responsibility for

(i) Scheduling / despatching generation of State Generating Stations (including generation of their embedded licensees),

(ii) Regulating the demand in its control area,

(iii) Scheduling their drawal from the ISGS (within their share in the respective plant's expected capability)

(iv) Permitting long term, medium term and short term open access transactions for embedded generators / consumers, in accordance with the contracts, and

(v) Regulating the net drawal in their control area from the regional grid in accordance with the respective Regulations of the CERC.

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The following specific points shall be taken into consideration while preparing and finalizing the schedules:

1. SLDC will issue despatch instructions required to regulate all generation and imports according to the 15-minute day ahead generation schedule. In the absence of any despatch instruction by SLDC, SGS can generate/ export according to the day- ahead generation schedule and intimate the same to the SLDC to regulate the supply for the needy Users.
2. The SLDC shall regulate the overall state generation in such a manner that generation from following types of power stations having energy potential, if unutilized, goes waste shall not be curtailed.
    i) Run of river (without storage) or canal based hydro stations.
    ii) Run of river with pondage and storage type hydro-stations when water level is at peak reservoir level or expected to touch peak reservoir level as per inflows.
    iii) Wind and Solar based generating sources.
3. Despatch instructions to SGS shall be communicated in standard format by SLDC.

14.3 Generation Scheduling

1. The procedure for scheduling of ISGS and SGS/IPP/CPP shall be as described below:
   i. By 9 AM every day each, SGS shall intimate the SLDC the station wise ex- power plant MW and MWh capabilities foreseen for the next day i.e. between 00.00 to 24.00 hrs of the following day.
   ii. By 9 AM every day each Distribution Licensee shall intimate SLDC the overall requirement in MW and MWh for the next day i.e., between 00.00 to 24.00 hours of the following day.
   iii. The above information along with the entitlements of the State in various Inter State Generating stations given by RLDC, the SLDC shall compile the aggregate generating capability of SGS, entitlement from ISGS bilateral interchange, if any, vis-à-vis the Distribution Licensee requirement.
   iv. By 3 PM, SLDC shall finalize generation schedule of SGS and drawal schedule of each Distribution Licensees, convey to RLDC the net drawal schedule from each of the ISGS along with the bilateral exchanges agreed or intended to be had with the other state / states and the estimates of demand / availability in the state and additional power required to be obtained.
   v. By 6 PM, RLDC shall convey to SLDC the drawal schedule for the State from each of the ISGS
   vi. By 7 PM, SLDC shall convey,
      a) The ex-power plant despatch schedule to each of SGS, in MW for different hours, for the next day
      b) The “net drawal schedule” to the distribution licensee in MW for different hours, for next day.
   vii. SGS and Distribution Licensees shall inform any modifications / changes, if any, to be made, in the above station wise drawal schedule to SLDC by 9 PM or preferably earlier.
   viii. SLDC after considering the same shall convey revised schedule to RLDC by 10 PM.
2. SLDC may also give the required data to the RLDC such that the RLDC itself may decide the best drawal schedules for the State.
3. SLDC shall prepare the day ahead generation schedule keeping in view the followings

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i) Transmission System constraints from time to time.
ii) 15 minute load requirements as estimated by SLDC.
iii) The need to provide operating margins / reserves required to be maintained.
iv) The availability of generation from SGS, Central Sector Generators and others together with any constraint in each case.

4. During the day of operation, the generation schedule may be revised under following conditions:
   i. In case of forced outage of a unit of any SGS, SLDC may revise the generation schedule on the basis of revised declared capability by the affected SGS.
   ii. RLDC may revise the schedule of drawal based on the availability of supply and the SLDC shall enforce the revisions within State.

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14.4 Drawal Scheduling

SLDC is responsible for collection, examination and compilation of drawal Schedule for each Distribution Licensees at the prescribed time. Each Distribution Licensee shall supply to SLDC 15-minute average demand estimates in MW for the day ahead.

14.5 Generation Despatch

1. SGS shall comply promptly with a despatch instructions issued by SLDC. SGS shall promptly inform SLDC in the event of any unforeseen difficulties in carrying out an instruction.
2. Despatch instructions shall be issued by E-Mail /Fax/ telephone, confirmed by exchange of name of operators sending and receiving the same and logging the same at each end. All oral instructions shall be complied forthwith and written confirmation shall be issued promptly by FAX, tele-printer or otherwise

14.6 Responsibilities

1. SLDC shall monitor actual power drawal against the demand for scheduled power and internal generation. SLDC shall also monitor reactive power drawal and availability of capacitor banks.
2. Generating Stations within state shall follow the despatch instructions issued by SLDC.

3. Distribution Licensees and Open Access Customers shall comply with the instructions of SLDC for managing load & reactive power drawal as per system requirement.

14.7 Data Requirement

Users shall provide SLDC with data as specified in Appendix – E2, Generation Scheduling Data in the Data Registration Chapter –17.

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Chapter -15: Metering

15.1 Objective

This Chapter defines minimum acceptable standards of metering equipment which shall provide proper metering of the various operating system parameters for the purpose of accounting, commercial billing and settlement of electrical energy and to provide information which shall enable to operate the system in economic manner.

15.2 Scope

1. This Metering covers the practices that shall be employed and the facilities that shall be provided for the measurement and recording of various parameters like active/reactive/apparent power/energy, power factor, voltage, frequency etc.
2. This Metering sets out or refers to the requirements of metering at generating stations, sub-stations and interfaces for tariff and operational metering.
3. This Metering also specifies the requirement for calibration, testing and commissioning of metering equipments viz. energy meters with associated accessories, current transformers and voltage transformers. The Metering broadly indicates the technical features of various elements of the metering, data communication and testing system.

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15.3 Applicability

This Metering shall be applicable to meters installed and to be installed by all:

1. STU/Transmission Licensees,
2. Generating Stations connected to State Transmission System,
3. Distribution Licensees connected to State Transmission System,
4. EHV Consumers of Distribution Licensee(s) directly connected to State Transmission System,
5. Open Access Customers availing Open Access on State Transmission system, and
6. Captive Generators connected to State Transmission System

15.4 Type of meters

(1) All interface meters, User meters and energy accounting and audit meters shall be of static type.

(2) The meters not complying with the specified type shall be replaced by the STU on his own or on request of the User.

15.5 Standards. -

All interface meters, and energy accounting and audit meters shall:

(a) Comply with the relevant standards of Bureau of Indian Standards (BIS). If BIS Standards are not available for a particular equipment or material, the relevant British Standards (BS), International Electro-technical Commission (IEC) Standards, or any other equivalent Standard shall be followed:

(b) Conform to the standards on 'Installation and Operation of Meters' as specified in Schedule annexed to Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 and as amended from time to time.

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15.6. Ownership of meters

(1) Interface meters

a) All interface meters installed at the points of interconnection with Inter-State Transmission System (ISTS) for the purpose of electricity accounting and billing shall be owned by CTU.

b) All interface meters installed at the points of interconnection with State Transmission System excluding the system covered under sub-clause (a) above for the purpose of electricity accounting and billing shall be owned by STU.

c) All interface meters installed at the points of inter connection between the two licensees excluding those covered under sub-clauses (a) and (b) above for the purpose of electricity accounting and billing shall be owned by respective licensee of each end.

d) All interface meters installed at the points of inter connection for the purpose of electricity accounting and billing not covered under sub-clauses (a), (b) and (c) above shall be owned by supplier of electricity.

(2) Energy accounting and audit meters

Energy accounting and audit meters shall be owned by the generating company or STU, as the case may be.

15.7 Locations of meters.-

1) The location of interface meters, and energy accounting and audit meters shall be as per the Table given below:

Table

Sl. No	Stages	Main meter	Check meter	Standby meter
A.	**Generating Station**	On all outgoing feeders.	On all outgoing feeders.	i) High Voltage (HV) side of Generator Transformers ii) High Voltage (HV) side of all Station Auxiliary Transformers
(Explanation: The location of main, check and standby meters installed at the existing generating stations shall not be changed unless permitted by the Authority)				
B.	**Transmission and Distribution System**	At one end of the line between the sub-stations of the same licensee, and at both ends of the line between sub-stations of two different licensees. Meters at both ends shall be considered as main meters for respective licensees.	-	There shall be no separate standby meter. Meter installed at other end of the line in case of two different licensees shall work as standby meter.
C.	**Inter-Connecting Transformer (ICT)**	High Voltage (HV) side of ICT.	-	Low Voltage (LV) side of ICT.

2) The generating companies or licensees may install meters at additional locations in their systems depending upon the requirement.

3) Interface Meters

i) Users who have interconnection with the Inter-State Transmission System or State Transmission System and have been permitted open access by the Commission shall be provided with interface meters.

ii) For Users connected to distribution system and permitted open access, by provision of interface meters may be made as per the regulations or of the Commission shall be provided with interface meters.

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4) Energy accounting and audit meters

Energy accounting and audit meters shall be installed at such locations so as to facilitate accounting for the energy generated, transmitted, distributed in the various segments of the power system and the energy loss. The location of these meters shall be as under:

(i) Generating Stations

1) at the stator terminal of the generator;
2) on HV and LV sides of the station and the unit auxiliary transformers;
3) on feeders to various auxiliaries.

(ii) Transmission System

All incoming and out going feeders (If the interface meters do not exist).

(iii) Distribution System

1) all incoming feeders (11 kV and above);
2) all outgoing feeders (11 kV and above);

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15.8 Accuracy Class of meters

Every meter shall meet the requirement of accuracy class as specified in the standards given in the Schedule annexed to Central Electricity Authority "Installation and Operation of Meters" Regulations, 2006 (Annexure).

15.9 Installation of meter

1) Generating company or STU, as the case may be, shall examine, test and regulate all meters before installation and only correct meters shall be installed.
2) The meter shall be installed at locations, which are easily accessible for installation, testing, commissioning, reading, recording and maintenance.
3) In case CTs and VTs form part of the meters, the meter shall be installed as near the instrument transformers as possible to reduce the potential drop in the secondary leads.

15.10 Operation, Testing and Maintenance of meters

The operation, testing and maintenance of all types of meters shall be carried out by the generating company or the STU, as the case may be.

15.11 Access to meter

The owner of the premises where, the meter is installed shall provide access to the authorized representative(s) of the STU for installation, testing, commissioning, reading and recording and maintenance of meters.

15.12 Sealing of meters

1) Sealing Arrangements

a) All meters shall be sealed by the manufacturer at its works. In addition to the seal provided by the manufacturer at its works, the sealing of all meters shall be done as follows at various sealing points as per the standards given in the Schedule annexed to Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006

b) Sealing of interface meters, shall also be done by both the supplier and the buyer.

   i) Sealing of User meters shall be done by the STU.

   ii) Sealing of energy accounting and audit meters shall be done by the STU or generating company as the case may be.

c) Seal shall be unique for each utility and name or logo of the utility shall be clearly visible on the seals.

d) Only the patented seals (seal from the manufacturer who has official right to manufacture the seal) shall be used.

e) Polycarbonate or acrylic seals or plastic seals or holographic seals or any other superior seal shall be used.

f) Lead seals shall not be used in the new meters. Old lead seals shall be replaced by new seals in a phased manner and the time frame of the same shall be submitted by the STU to the Commission for approval.

(2) Removal of seals from meters

(a) Interface meters

Whenever seals of the interface meters have to be removed for any reason, advance notice shall be given to other party for witnessing the removal of seals and resealing of the interface meter. The breaking and re-sealing of the meters shall be recorded by the party, who

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carries out the work, in the meter register, mentioning the date of removal and resealing, serial numbers of the broken and new seals and the reason for removal of seals.

(b) Energy accounting and audit meters

Seal of the energy accounting and audit meter shall be removed only by the generating company or the STU who owns the meter

15.13 Safety of meters

1) The supplier or buyer in whose premises the interface meters are installed shall be responsible for their safety.
2) The User shall, as far as circumstances permit, take precautions for the safety of the meter installed in his premises belonging to the STU or Distribution licensee.
3) The generating company or the STU who owns the energy accounting and audit meters shall be responsible for its safety.

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15.14 Meter reading and recording

1) Interface meters

It shall be the responsibility of the Appropriate Transmission Utility or Distribution licensee to take down the meter reading and record the metered data, maintain database of all the information associated with the interface meters and verify the correctness of metered data and furnish the same to various agencies.

2) Energy accounting and audit meters

It shall be the responsibility of the generating company or STU to record the metered data, maintain database of all the information associated with the energy accounting and audit meters and verify the correctness of metered data. Each generating company or STU shall prepare quarterly, half-yearly and yearly energy account for its system for taking appropriate action for efficient operation and system development.

15.15 Meter failure or discrepancies

1) Interface meters

a) Whenever the difference between the readings of the Main meter and the Check meter for any month is more than 0.5%, the following steps shall be taken:
   i) Checking of CT and VT connections;

ii) Testing of accuracy of interface meter at site with reference standard meter of accuracy class higher than the meter under test.

If the difference exists even after such checking or testing, then the defective meter shall be replaced with a correct meter.

b) In case of conspicuous failures like burning of meter and erratic display of metered parameters and when the error found in testing of meter is beyond the permissible limit of error provided in the relevant standard, the meter shall be immediately replaced with a correct meter.

c) In case where both the Main meter and Check meter fail, at least one of the meters shall be immediately replaced by a correct meter.

d) Billing for the failure period:

i) The SLDC / STU shall develop a procedure for assessment of consumption of defective meter during the failure period of the meter and submit the same to the Commission for its approval. The billing for the failure period of the meter shall be done as per this approved procedure.

ii) Readings recorded by Main, Check and Standby meters for every time slot shall be analyzed, crosschecked and validated by the SLDC. The discrepancies, if any, noticed in the readings shall be informed by SLDC in writing to the energy accounting agency for proper accounting of energy. SLDC shall also intimate the discrepancies to the State Transmission Utility or the User, who shall take further necessary action regarding testing, calibration or replacement of the faulty meters in accordance with the provisions laid down.

e) The defective meter shall be immediately tested and calibrated.

2) Energy accounting and audit meters

Energy accounting and audit meters shall be rectified or replaced by the generating company or licensee immediately after notice of any of the following abnormalities:

a) the errors in the meter readings are beyond the limits prescribed for the specified Accuracy Class;

b) meter readings are not in accordance with the normal pattern of the load demand;

c) meter tampering, or erratic display or damage.

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15.16 Anti-tampering features of meters

The meters shall be provided with such anti-tampering features as per the Standards on Installation and Operation of Meters given in the Schedule annexed to Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006

15.17 Quality assurance of meters

1) The STU shall set up appropriate number of accredited testing units or utilize the services of other accredited testing laboratories. The STU shall take immediate action to get the accreditations of their existing meter testing laboratories from NABL, if not already done.
2) The generating company or STU shall ensure that all type, routine and acceptance tests are carried out by the manufacturer complying with the requirement of the relevant BIS or BS or IEC as the case may be.

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15.18 Calibration and periodical testing of meters. –

1) Interface meter

a) At the time of commissioning, each interface meter shall be tested by the STU at site for accuracy using standard reference meter of better accuracy class than the meter under test.
b) All interface meters shall be tested at least once in five years. These meters shall also be tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters. Whenever there is unreasonable difference between the quantity recorded by interface meter and the corresponding value monitored at the billing center via communication network, the communication system and terminal equipment shall be tested and rectified. The meters may be tested using NABL accredited mobile laboratory or at any accredited laboratory and recalibrated if required at manufacturer's works.
c) Testing and calibration of interface meters may be carried out in the presence of the representatives of the supplier and buyer by giving due notice of testing in advance.

2) Energy accounting and audit meters

Energy accounting and audit meters shall be tested at site at least once in five years or whenever the accuracy is doubtful or whenever the readings are inconsistent with the readings of other meters, e.g., check meters, standby meters. The testing must be carried out without removing the CTs and VTs connection. Testing may be carried out through NABL accredited mobile laboratory using secondary injection kit, measuring unit and phantom loading or at any accredited test laboratory and recalibrated if required at manufacturer's works.

15.19 Data Requirements

State Generating Station (SGS) and State Transmission Utility (STU) shall provide data to each other and SLDC as specified in Appendix – G of Data Registration Chapter –17.

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CHAPTER – 16: SAFETY AND LINE CLEAR PERMITS

16.1 This Chapter deals with safety to the working personnel of STU / Distribution Licensee and the Users and maintenance of proper records for the issue of Line Clear Permits for allowing the working personnel to carryout the works.

16.2 Safety Standards:

(1) STUs shall prepare their own "Safety Manual" for the maintenance of Transmission Lines, and Substations and got vetted by an accredited agency. Copies of this safety manual shall be provided at all the sub-stations, concerned departments of STU and Users. For the guidance of the Shift Operators, "Operation and Maintenance Manuals" for each Sub-station shall be prepared by the STU and Users containing all the maintenance and operation schedules based on the recommendations of the manufacturers of the various equipments installed in the Substation. These manuals shall be periodically reviewed based on the experience gained and replacement of equipments. A maintenance register for all the equipments including the station batteries shall be maintained at the respective Substations. These shall be updated as and when the maintenance work is carried out and shall be periodically reviewed by the Commission. Similar registers shall be maintained for the Transmission and Sub-Transmission Lines.

(2) The 'Operation and Maintenance Manual' shall clearly specify the details of isolation and earthing to be provided for allowing work on the equipments. The 'Single Line Diagram' of the Substation indicating the positions of various isolating devices shall be prominently displayed in the station. Charts showing the clearances from live parts (section clearance) for working on the isolated equipments where workmen are allowed to work shall be displayed prominently at each Substation.

(3) STUs and Users shall affix the "Danger" boards (of a design as per relevant ISS No. 2551) prominently displayed at a conspicuous place at all the locations as required in the IE Rules.

(4) All the equipment including the system batteries in the receiving stations and Substations shall be maintained in good condition as per the manufacturers' manuals and also as per relevant Indian and / or

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International standards. The DC system provided in all these stations shall be properly maintained with no appreciable leakage current. On-line monitoring system for monitoring of leakage and detection of ground faults shall be adopted.

16.3 Line Clear Permit (LCP):

The formats enclosed shall be used while issuing and returning line clear permit. The Format - I designated as "Requisition for Line Clear Permit" shall be used by the requesting Safety Coordinator who is an authorized person. The Format - 2 designated as "Line Clear Permit" shall be used at the time of issue of Line Clear Permit. The Format -3 designated as "Line Clear Return" shall be used for the return of the Line Clear Permit after the work is completed for which the Line Clear Permit is taken.

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FORMAT – 1

Serial No. xxxxxxx

REQUISITION FOR LINE CLEAR PERMIT

Date …… Time ……

I Shri/Shrimati ---------- request Line Clear Permit on the following EHT / HT Line/Equipment.

EHT / HT Apparatus/Line Identification:

Details of works to be carried out:

Estimated time required for completion:

Name and Signature ……..

……

(Person Requesting Line Clear Permit) (Incharge of the Crew)

Designation…… ……

Date…… ……

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(FOR USE IN SUBSTATION FROM WHERE LINE CLEAR PERMIT WILL BE ISSUED)

(a) Line Clear Permit issued : Yes/No

(b) Number and Date of Issue (Code No.):

(c) Time of Issue:

(d) Date & Time of Return:

(e) Remarks: See Check List LCP - F

RECEIPT OF LCP

I have received confirmation from …….. (Name of Issuing Safety Coordinator) at …….(location) that the safety precautions have been established and the instructions will not be issued at his location for their removal until his LCP is cancelled.

Name and Signature……

(Person Requesting Line Clear Permit)

In charge of the Crew at …….. (Time) on ……(Date)

FORMAT – 2

Serial No. xxxxxx

LINE CLEAR PERMIT

LCP Number…….

Dated……Time.....

CHECK LIST OF THE LINE CLEAR PERMIT:

(a) Name of location for which line clear is issued.

(b) Reference and Authority requisitioning line clear: (Indicate serial number of LCP requisition).

(c) Identity of HV Apparatus.

(d) Sources from which the Line/Equipment is charged.

(e) No./name of Circuit Breaker/Isolating Switch open at each of above sources.

(f) Whether confirmed that the Line is disconnected at both ends.

(g) Whether line is Earthed at both ends.

(h) Whether the Circuit Breaker truck removed in case of indoor switchgear controlling the Feeder/Equipment for which line clear is given.

(i) Whether Isolating Switches controlling the feeder/equipment for which line clear is given are locked and kept in safe custody.

(j) Time of issue of Line Clear Permit and LCP No.

(k) Name of requesting Safety Coordinator on whom LCP is issued.

(l) Approximate Time for returning LCP as ascertained from the Requesting Coordinator.

Name and Signature……..

(Issuing Safety Coordinator)

Designation…….

LINE CLEAR PERMIT

LCP No…….

I Sri/Srimati ---------- (Issuing Safety Coordinator) do hereby issue permission to Sri/Srimati---------- (Requesting Safety Coordinator) for carrying out works as per requisition No……..date……..Time .....

The EHT/ HT Line/equipment herein described is declared safe. The permission is subject to the conditions given on backside of this Permit.

Name and Signature……..

(Person issuing Line Clear Permit)

Designation…….

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(To be printed on the reverse of LCP: Format-2)

CONDITIONS:

(a) This permit is valid only for working on the Feeder/Equipment mentioned herein and not in any other Feeder/Equipment.

(b) Only authorized persons are allowed to work on Feeder / Equipment for which the permit has been issued.

(c) Works as per requisition only should be carried out.

(d) Before touching any part of the Feeder / Equipment it should be ensured that earthing at two points on either side through standard discharge rods connected with good Earths. Temporary Earths may be removed after completion of all works and after all the men have come down from the Feeder/Equipment.

(e) Work should be so planned that the Line Clear is returned before or at the time indicated. If unavoidable delay is anticipated advance information should be given to the location from where the Line Clear is issued.

(f) Before return of the Line Clear, it should be ensured that all the men, materials, tools/tackles etc. on line have returned and reported that all temporary earths are removed. There should also be a check on the material, Tools and Plant issued for the work to ensure that nothing is left behind on the Line or Equipment.

(g) Only authorized persons should return Line Clear.

(h) In case the Line Clear cannot be returned in person, the same may be returned to the Line Clear Issuing Authority over Telephone by naming the Code Words assigned and the telephone number which is used for naming the Code Words assigned. In case two or more different Code Words are issued to the two or more persons in whose favour the permit is given, those persons must jointly return the Line Clear by naming their own Code Words. The Line Clear Return will not be accepted unless returned by all these persons.

(i) The Line Clear issuing authority should go through the checklist of Line Clear Return before accepting it.

(j) If Line Clear is returned over telephone, the Line Clear Return Form duly filled and signed should be sent to the Line Clear Issuing Authority by post immediately for record.

(k) Control persons should keep all the required data of LCP issued & LCR received. He should monitor and keep specific note in log sheet when more than one LCP are issued on same line/ equipment / bay along with code words.

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FORMAT – 3

Serial No. xxxxxxxxx

LINE CLEAR RETURN

LCP Number…….

Date …….Time.....

I Shri/Shrimati ---------- hereby return the LCP no -----at (time) ------- issued for the following HT/EHT Line/Apparatus. I declare that all the crew who were sent on work have been withdrawn, temporary earth(s) removed, all repair tools and materials checked and the Feeders/Equipments mentioned below are safe to be energized.

(a) EHT / HT Apparatus/Line Identification:

(b) Safety Precaution no longer required:

(c) Isolation [State locations and each point of Isolation indicating means by which Isolation was achieved.]

(d) Earthing [State location at which Earthing was established and identify each point of Earthing means, which achieved Earthing.]

(e) Details of work done

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CHECK LIST TO BE TICKED OFF:

(a) Whether all men withdrawn: Yes ☐

(b) Whether all temporary Earth removed: Yes ☐

(c) Whether materials, Tools and Plant used in the work have been checked: Yes ☐

(d) Code Number (If used when Line Clear is returned over phone) ----------

Name and Signature…….

(Person Requesting Line Clear Permit)

Designation……

Incharge of the Crew ----------

(Designation)

CHAPTER -17: Data Registration

17.1 This Chapter deals with listing out all the data required to be provided by Users to STU and vice versa, in accordance with the provisions of the State Grid Code.

17.2 Responsibility

1. All Users are responsible for submitting the required up-to-date data to STU/ SLDC in accordance with the provisions of the State Grid Code.
2. All Users shall provide STU and SLDC, the names, addresses and telephone numbers of the persons responsible for sending the data.
3. Responsibility for the correctness of the data rests with the concerned User providing the data.
4. STU shall inform all Users and SLDC, the names, addresses, and telephone numbers of the persons responsible for receiving data.
5. STU shall provide up-to-date data to Users as provided in the relevant Chapters of this State Grid Code.

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17.3 Data to be registered

Data required to be registered/exchanged has been listed in the Appendices to this chapter under various categories. The data so far applicable to the particular User need only to be registered and exchanged with STU or SLDC.3

17.4 Changes in User's Data

Whenever any User becomes aware of a change to any items of data that is registered with STU, the User must promptly notify the STU of the changes. STU on receipt of intimation of the changes shall promptly correct the database accordingly. This shall also apply to any data compiled by STU regarding its own system.

17.5 Method of Submitting Data

1. The data shall be furnished in the standard formats for data submission and such formats must be used for the written submission of data to SLDC and STU. Where standard formats are not enclosed they would be developed by SLDC or STU in consultation with Users.

2. All data to be submitted under the Schedule(s) must be submitted to SLDC / STU or to such other department and/or entity as STU may from time to time notify to Users. The name of the person who is submitting each schedule of data shall be indicated.
3. Where a computer data link exists between a User and SLDC/ STU, data may be submitted via this link. The data shall be in the same format as specified for paper transmission. The User shall specify the method to be used in consultation with the SLDC/ STU and resolve issues such as protocols, transmission speeds etc. at the time of transmission.

17.6 Data not supplied

All Users are obliged to supply data as referred to in the individual Chapters of this State Grid Code and listed out in this Data Registration Chapter Appendices. In case any data is not supplied by any User or is not available, STU or SLDC may, acting reasonably, if and when necessary, estimate such data depending upon the urgency of the situation. Similarly, in case any data is not supplied by STU, the concerned User may, acting reasonably, if and when necessary, estimate such data depending upon urgency of the situation. Such estimates will in each case, be based upon corresponding data for similar Plant or Apparatus or upon such other information, the User or STU or SLDC, as the case may be, deems appropriate.

17.7 Special Considerations

SLDC and any other User may at any time make reasonable request to STU for extra data as necessary. STU shall supply data, required/requested.

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Chapter – 18 : MISCELLANEOUS

18.1 Dispute Redressal:

Any dispute regarding interpretation of any provision of the State Grid Code, shall be addressed to Secretary to the Commission. The decision of the Commission shall be taken as final and binding on all concerned.

18.2 Power to Remove Difficulties:

If any difficulty arises in giving effect to any of the provisions of the Gird Code, the Commission may, by general or specific order, make such provisions not inconsistent with the provisions of the Act, as may appear to be necessary for removing the difficulty.

18.3 Power to Relax

The Commission may by general or special order, for reasons to be recorded in writing and after giving an opportunity of hearing to the parties likely to be effected by grant of relaxation, may relax any of the provisions of the Grid Code on its own motion or on an application made before it by an interested person.

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18.4 Power to Amend

The Commission may, at any time, vary, alter, modify or amend any provision of Grid Code.

sd/-

(J.S. SEHRAWAT)
SECRETARY

APPENDIX A : STANDARD PLANNING DATA

(Reference to: Chapter 3 para 3.3 (4), para 3.6 (1,2,3) and Chapter 4 para 4.2 (6))

A-1 STANDARD PLANNING DATA (GENERATION)

For SGS – Thermal

A.1.1 THERMAL (COAL / GAS/FUEL LINKED)

(1) GENERAL

i	Site	Furnish location map to scale showing roads, railway lines, Transmission lines, canals, pondage and reservoirs if any.
ii	Coal linkage/ Fuel (Like Liquefied Natural Gas, Naphtha etc.) linkage	Give information on means of coal transport / carriage. In case of other fuels, give details of source of fuel and their transport.
iii	Water Sources	Give information on availability of water for operation of the Power Station.
iv	Environmental	State whether forest or other land areas are affected.
v	Site Map (To Scale)	Showing area required for Power Station coal linkage, coal yard, water pipe lines, ash disposal area, colony etc.
vi	Approximate period of construction	

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(2) CONNECTION

I	Point of Connection	Furnish single line diagram of the proposed Connection with the system.
ii	Step up voltage for Connection (kV)	

(3) STATION CAPACITY

i	Total Generating Station capacity (MW)	State whether development will be carried out in phases and if so, furnish details.
ii	No. of units & unit size (MW)	

(4) GENERATING UNIT DATA

i	Steam Generating Unit	State type, capacity, steam pressure, stream temperature etc.
ii	Steam turbine	State type, capacity.
iii	Generator	Type Rating (MW) Speed (RPM) Terminal voltage (KV) Rated Power Factor Reactive Power Capability (MVAr) in the range 0.95 of leading and 0.85 lagging Short Circuit Ratio Direct axis (saturated) transient reactance (% on MVA rating) Direct axis (saturated) sub-transient reactance (% on MVA

		rating) Auxiliary Power Requirement MW and MVAr Capability curve Ramp-up and ramp-down rate Generator Characteristic curve
iv	Generator Transformer	Make Phases Type Rated capacity (MVA) Voltage Ratio (HV/LV) Tap change Range (+ % to - %) Percentage Impedance (Positive Sequence at Full load)

A.1.2 HYDRO ELECTRIC (For SGS)

(1) GENERAL

i	Site	Give location map to scale showing roads, railway lines, and transmission lines.
ii	Site map (To scale)	Showing proposed canal, reservoir area, water conductor system, fore-bay, power house etc.
iii	Submerged Area	Give information on area submerged, villages submerged, submerged forest land, agricultural land etc
iv	Whether storage type or run of river type	
v	Whether catchment receiving discharges from other reservoir or power plant.	
vi	Full reservoir level	
vii	Minimum draw down level.	
viii	Tail race level	
ix	Design Head	
x	Reservoir level v/s energy potential curve	
xi	Restraint, if any, in water discharges	
xii	Approximate period of construction.	

(2) CONNECTION

i	Point of Connection	Give single line diagram proposed Connection with the Transmission System.
ii	Step up voltage for Connection (KV)	

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(3) STATION CAPACITY

i	Total Power Station capacity (MW)	State whether development is carried out in phases and if so furnish details.
ii	No. of units & unit size (MW)	

(4) GENERATING UNIT DATA

I	Operating Head (in Meters)	a. Maximum b. Minimum c. Average
	Hydro Unit	Capability to operate as synchronous condenser. Water head versus discharges curve (at full and part load) Power requirement or water discharge while operating as synchronous condenser
I	Turbine	State Type and capacity
iii	Generator	Type Rating (MVA) Speed (RPM) Terminal voltage (KV) Rated Power Factor Reactive Power Capability (MVAr) in the range 0.95 of leading and 0.85 of lagging MW & MVAr capability curve of generating unit Short Circuit Ratio Direct axis transient (saturated) reactance (% on rated MVA) Direct axis sub-transient (saturated) reactance (% on rated MVA) Auxiliary Power Requirement (MW)
iv	Generator-Transformer	a. Type b. Make c. Phases d. Rated Capacity (MVA) e. Voltage Ratio HV/LV f. Tap change Range (+% to -%) g. Percentage Impedance (Positive Sequence at Full Load).

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A.2 STANDARD PLANNING DATA (TRANSMISSION)

For STU and Transmission Licensees

STU shall make arrangements for getting the required data from different Departments of STU/other transmission licensees (if any) to update its Standard Planning Data in the format given below:

i.	Name of line (Indicating Power Stations and substations connected).
ii.	Voltage of line (KV).
iii.	No. of circuits.
iv.	Route length (Km).
v.	Conductor sizes.
vi.	Line parameters (PU values).
	(a) Resistance/Km
	(b) Inductance/Km
	(c) Susceptance/ Km
vii.	Approximate power flow expected- MW & MVAr.
viii.	Terrain of the route- Give information regarding nature of terrain i.e. forest land, fallow land, agricultural and river basin, hill slope etc.
ix.	Route map (to scale) - Furnish topographical map showing the route showing existing power lines and telecommunication lines.
x.	Purpose of Connection- Reference to Scheme, wheeling to other States etc.
xi.	Approximate period of Construction.

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A.3. STANDARD PLANNING DATA (DISTRIBUTION)

For Distribution licensees

(1) GENERAL

i	Area Map (to scale)	Furnish map of Manipur/Mizoram duly marked with the area of supply relevant for the Distribution License.
ii	Consumer Data	Furnish categories of consumers, their numbers and connected loads.
iii	Reference to Electrical Divisions presently in charge of the Distribution.	

(2) CONNECTION

I	Points of Connection	Furnish single line diagram showing points of Connection
ii	Voltage of supply at points of Connection	
iii	Names of Grid Sub-Station feeding the points of Connection	

(3) LINES AND SUBSTATIONS

I	Line Data	Furnish lengths of line and voltages within the Area.
ii	Sub-station Data	Furnish details of 132/33 KV sub-stations, 33/11 KV sub-station etc

(4) LOADS

I	Loads drawn at points of Connection.
ii	Details of loads fed at EHV, if any. Give name of consumer, voltage of supply, contract demand/load and name of Grid Sub-station from which line is drawn, length of EHV line from Grid Sub-station to consumer's premises.
iii	Reactive Power compensation installed

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(5) DEMAND DATA (FOR ALL LOADS 1 MW AND ABOVE)

i	Type of load	State whether furnace loads, rolling mills, traction loads, other industrial loads, pumping loads etc.
ii	Rated voltage and phase	
iii	Electrical loading of equipment	State number and size of motors, types of drive and control arrangements.
iv	Sensitivity of load to voltage and frequency of supply.	
v	Maximum Harmonic content of load.	
vi	Average and maximum phase unbalance of load.	
vii	Nearest sub-station from which load is to be fed.	
viii	Location map to scale	Showing location of load with reference to lines and sub-stations in the vicinity.

(**6) LOAD FORECAST DATA**

I	Peak load and energy forecast for each category of loads for each of the succeeding 5 years.
ii	Details of methodology and assumptions on which forecasts are based.
iii	Details of loads 1 MW and above. a. Name of prospective consumer. b. Location and nature of load. c. Sub-Station from which to be fed. d. Voltage of supply. e. Phasing of load.

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APPENDIX B : DETAILED PLANNING DATA

(Reference to: Chapter 3 para 3.3 (4), para 3.6 (1,2,3)and Chapter 4 para 4.2 (6))

B.1 DETAILED PLANNING DATA (GENERATION)

B.1.1 THERMAL POWER STATIONS (For SGS)

(1) GENERAL

i. Name of Power Station.

ii. Number and capacity of Generating Units (MW).

iii. Ratings of all major equipments (Boilers and major accessories, Turbines, Alternators, Generator Unit Transformers etc).

iv. Single line Diagram of Power Station and switchyard.

v. Relaying and metering diagram.

vi. Neutral Grounding of Generating Units.

vii. Excitation control- (What type is used?) e.g. Thyristor, Fast Brushless Exciters)

viii. Earthing arrangements with earth resistance values.

(2) PROTECTION AND METERING

i. Full description including settings for all relays and protection systems installed on the Generating Unit, Generator unit Transformer, Auxiliary Transformer and electrical motor of major equipments etc.

ii. Full description including settings for all relays installed on all outgoing feeders from Power Station switchyard, Tie circuit breakers, and incoming circuit breakers.

iii. Full description of inter-tripping of circuit breakers at the point or points of Connection with the Transmission System.

iv. Most probable fault clearance time for electrical faults on the User's System.

v. Full description of operational and commercial metering schemes.

(3) SWITCHYARD

i. In relation to interconnecting transformers:

1. Rated MVA.
2. Voltage Ratio.
3. Vector Group.
4. Positive sequence reactance for maximum, minimum, normal Tap. (% on MVA).
5. Positive sequence resistance for maximum, minimum, normal Tap. (% on MVA).
6. Zero sequence reactance (% on MVA).

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7. Tap changer Range (+% to -%) and steps.
8. Type of Tap changer. (off/on load).

ii. In relation to switchgear including circuit breakers, isolators on all circuits connected to the points of Connection:

1. Rated voltage (KV).
2. Type of circuit breaker (MOCB/ABCB/SF6).
3. Rated short circuit breaking current (KA) 3 phase.
4. Rated short circuit breaking current (KA) 1 phase.
5. Rated short circuit making current (KA) 3 phase.
6. Rated short circuit making current (KA) 1-phase.
7. Provisions of auto reclosing with details.

iii. In relation to the Lightning Arresters -

Technical data

iv. In relation to the Communication –

Details of communication equipment installed at points of connections.

v. In relation to the Basic Insulation Level (KV) -

1. Bus bar.
2. Switchgear.
3. Transformer bushings.
4. Transformer windings.

(4) PARAMETERS OF GENERATING UNITS

i. Rated terminal voltage (KV).
ii. Rated MVA.
iii. Rated MW.
iv. Speed (rpm) or number of poles.
v. Inertia constant H (MW Sec./MVA).
vi. Short circuit ratio.
vii. Direct axis synchronous reactance (% on MVA) Xd.
viii. Direct axis (saturated) transient reactance (% on MVA) Xd'.
ix. Direct axis (saturated) sub-transient reactance (% on MVA) Xd".
x. Quadrature axis synchronous reactance (% on MVA) Xq .
xi. Quadrature axis (saturated) transient reactance (% on MVA) Xq'.
xii. Quadrature axis (saturated) sub-transient reactance (% on MVA) Xq".
xiii. Direct axis transient open circuit time constant (Sec) T'do.
xiv. Direct axis sub-transient open circuit time constant (See) T"do.
xv. Quadrature axis transient open circuit time constant (Sec) T’qo.
xvi. Quadrature axis sub-transient open circuit time constant (Sec) T’'qo.

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xvii. Stator Resistance (ohm)Ra.

xviii. Neutral grounding details.

xix. Stator leakage reactance (ohm) X1.

xx. Stator time constant (Sec).

xxi. Rated Field current (A).

xxii. Open Circuit saturation characteristic for various terminal Voltages giving the compounding current to achieve the same.

xxiii. MW and MVAr Capability curve

(5) PARAMETERS OF EXCITATION CONTROL SYSTEM:

i. Type of Excitation.

ii. Maximum Field Voltage.

iii. Minimum Field Voltage.

iv. Rated Field Voltage.

v. Details of excitation loop in block diagrams showing transfer functions of individual elements using I.E.E.E. symbols.

vi. Dynamic characteristics of over - excitation limiter.

vii. Dynamic characteristics of under-excitation limiter.

(6) PARAMETERS OF GOVERNOR:

i. Governor average gain (MW/Hz).

ii. Speeder motor setting range.

iii. Time constant of steam or fuel Governor valve.

iv. Governor valve opening limits.

v. Governor valve rate limits.

vi. Time constant of Turbine.

vii. Governor block diagram showing transfer functions of individual elements using I.E.E.E. symbols.

(7) OPERATIONAL PARAMETERS:

Minimum notice required to synchronize a Generating Unit from de- synchronization.

i. Minimum time between synchronizing different Generating Units in a Power Station.

ii. The minimum block load requirements on synchronizing.

iii. Time required for synchronizing a Generating Unit for the following conditions:
    1. Hot
    2. Warm
    3. Cold

iv. Maximum Generating Unit loading rates for the following conditions:
    1. Hot

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2. Warm
3. Cold

v. (v) Minimum load without oil support (MW).

(8) GENERAL STATUS

i. Detailed Project report.
ii. Status Report
    1. Land
    2. Coal
    3. Water
    4. Environmental clearance
    5. Rehabilitation of displaced persons
iii. Techno-economic approval by Central Electricity Authority (CEA).
iv. Approval of State Government/Government of India.
v. Financial Tie-up.

(9) CONNECTION

i. Reports of Studies for parallel operation with the State Transmission System.
ii. Short Circuit studies
iii. Stability Studies.
iv. Load Flow Studies.
v. Proposed Connection with the State Transmission System.
    a. Voltage
    b. No. of circuits
    c. Point of Connection.

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B.1.2 HYDRO - ELECTRIC STATIONS (For SGS)

(1) GENERAL

i. Name of Power Station.
ii. No and capacity of units. (MVA)
iii. Ratings of all major equipment.
    a. Turbines (HP)
    b. Generators (MVA)
    c. Generator Transformers (MVA)
    d. Auxiliary Transformers (MVA)
iv. Single line diagram of Power Station and switchyard.
v. Relaying and metering diagram.
vi. Neutral grounding of Generator.
vii. Excitation control.
viii. Earthing arrangements with earth resistance values.

ix. Reservoir Data.

a. Salient features
b. Type of Reservoir
c. Multipurpose
d. For Power
e. Operating Table with
    1. Area capacity curves and
    2. Unit capability at different net heads

(2) PROTECTION

i. Full description including settings for all relays and protection systems installed on the Generating Unit, Generator transformer, auxiliary transformer and electrical motor of major equipment included etc.

ii. Full description including settings for all relays installed on all outgoing feeders from Power Station switchyard, tiebreakers, and incoming breakers.

iii. Full description of inter-tripping of breakers at the point or points of Connection with the Transmission System.

iv. Most Probable fault clearance time for electrical faults on the User's System.

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(3) SWITCHYARD

i. Interconnecting transformers:

1. Rated MVA
2. Voltage Ratio
3. Vector Group
4. Positive sequence reactance for maximum, minimum and normal Tap.(% on MVA).
5. Positive sequence resistance for maximum, minimum and normal Tap.(% on MVA).
6. Zero sequence reactance (% on MVA)
7. Tap changer range (+% to -%) and steps.
8. Type of Tap changer (off/on load).
9. Neutral grounding details.

ii. Switchgear (including circuit breakers, Isolators on all circuits connected to the points of Connection).

1. Rated voltage (KV).
2. Type of Breaker (MOCB/ABCB/SF6).
3. Rated short circuit breaking current (KA) 3 phase.
4. Rated short circuit breaking current (KA) 1 phase.
5. Rated short circuit making current (KA) 3 phase.
6. Rated short circuit making current (KA) 1 phase.
7. Provisions of auto reclosing with details.

iii. Lightning Arresters

Technical data

iv. Communications

Details of Communications equipment installed at points of connections.

v. Basic Insulation Level (KV)

1. Bus bar.
2. Switchgear.
3. Transformer Bushings
4. Transformer windings.

(4) GENERATING UNITS

i. Parameters of Generator

1. Rated terminal voltage (KV).
2. Rated MVA.
3. Rated MW
4. Speed (rpm) or number of poles.
5. Inertia constant H (MW sec./MVA).
6. Short circuit ratio.
7. Direct axis synchronous reactance Xd (% on MVA).
8. Direct axis (saturated) transient reactance (% on MVA) X'd.
9. Direct axis (saturated) sub-transient reactance (% on MVA) X"d.
10. Quadrature axis synchronous reactance (% on MVA) Xq.
11. Quadrature axis (saturated) transient reactance (% on MVA) X'q.
12. Quadrature axis (saturated) sub-transient reactance (% on MVA) X"q.
13. Direct axis transient open circuit time constant (sec) T'do.
14. Direct axis sub-transient open circuit time constant (sec) T"do.
15. Quadrature axis transient open circuit time content (sec) T'qo.
16. Quadrature axis transient open circuit time constant (sec) T"qo.
17. Stator Resistance (ohm) Ra.
18. Stator leakage reactance (ohm) X1.
19. Stator time constant (sec).

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20. Rated Field current (A).
21. Neutral grounding details.
22. Open Circuit saturation characteristics of the Generator for various terminal voltages giving the compounding current to achieve this.
23. Type of Turbine.
24. Operating Head (meters)
25. Discharge with full gate opening (cumecs)
26. Speed Rise on total Load throw off(%).
27. MW and MVAr Capability curve

ii. Parameters of excitation control system:

iii. Parameters of governor:

iv. Operational parameter:

1. Minimum notice required to Synchronise a Generating Unit from de-synchronisation.
2. Minimum time between Synchronising different Generating Units in a Power Station.
3. Minimum block load requirements on Synchronising.

(5) GENERAL STATUS

i. Detailed Project Report.

ii. Status Report.

1. Topographical survey
2. Geological survey
3. Land
4. Environmental Clearance
5. Rehabilitation of displaced persons.

iii. Techno-economic approval by Central Electricity Authority.

iv. Approval of State Government/Government of India.

v. Financial Tie-up.

(6) CONNECTION

i. Reports of Studies for parallel operation with the State Transmission System.

1. Short Circuit studies
2. Stability Studies.
3. Load Flow Studies.

ii. Proposed Connection with the State Transmission System.

1. Voltage
2. No. of circuits

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3. Point of Connection.

(7) RESERVOIR DATA

i. Dead Capacity

ii. Live Capacity

B.1.3 GAS POWER STATIONS (For SGS Gas)

(1) GENERAL

(i) Name of Power Station

(ii) Number and capacity of Generating Units (MVA).

(iii) Ratings of all major equipments (Turbines, Alternators, Heat Recovery Boiler, Generator Unit Transformer etc).

(iv) Single line Diagram of Power Station and switchyard.

(v) Relaying and metering diagram.

(vi) Neutral Grounding of Generating Units.

(vii) Excitation control-(What type is used?) E.g. Thyristor, Fast Brushless Exciters)

(viii) Earthing arrangements with earth resistance values.

(ix) Start up Engine

(x) Turbine Details

(2) PROTECTION AND METERING

(i) Full description including settings for all relays and protection systems installed on the Generating Units, Generator Unit Transformer, Auxiliary Transformer and Electrical motor of major equipments.

(ii) Full description including settings for all relays installed on all outgoing feeders from Power Station switchyard, Tie circuit breakers, and incoming circuit breakers.

(iii) Full description of inter – tripping of circuit breakers at the point or points of Connection with the Transmission System.

(iv) Most probable fault clearance time for electrical faults on the User's system.

(v) Full description of operational and commercial metering schemes.

(3) SWITCHYARD

In relation to interconnecting transformers:

(i) Rated MVA.

(ii) Voltage Ratio

(iii) Vector Group

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(iv) Positive sequence reactance for maximum, minimum, normal Tap. (% on MVA)

(v) Positive sequence resistance for maximum, minimum, normal Tap. (% on MVA).

(vi) Zero sequence reactance (% on MVA).

(vii) Tap changer Range (=% to -%) and steps.

(viii) Type of Tap changer. (off/on load).

In relation to switchgear including circuit breakers, isolators on all circuits connected to the points of connection:

(i) Rated Voltage (KV)

(ii) Type of circuit breaker (MOCB/ABCB/SF6).

(iii) Rated short circuit breaking current (KA) 3 phase

(iv) Rated short circuit breaking current (KA) 1 phase.

(v) Rated short circuit making current (KA) 3 phase.

(vi) Rated short circuit making current (KA) 1-phase.

(vii) Provisions of auto reclosing with details.

Lightning Arresters –

Technical data

Communication –

Details of communication equipment installed at points of connections.

Basic Insulation Level (kV) –

(i) Bus bar.

(ii) Switchgear

(iii) Transformer bushings

(iv) Transformer windings

(4) GENERATING UNITS

(a) Parameters of Generating Units:

(i) Rated terminal voltage (kV)

(ii) Rated MVA

(iii) Rated MW

(iv) Speed (rpm) or number of poles

(v) Inertia constant H (MW Sec./MVA)

(vi) Short circuit ratio.

(vii) Direct axis synchronous reactance (% on MVA) Xd.

(viii) Direct axis (saturated) transient reactance (% on MVA) Xd'.

(ix) Direct axis (saturated) sub-transient reactance (% on MVA) Xd".

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(x) Quadrature axis synchronous reactance (% on MVA) Xq

(xi) Quadrature axis (saturated) transient reactance (% on MVA) Xq'

(xii) Quadrature axis (saturated) sub-transient reactance (% on MVA) Xq".

(xiii) Direct axis transient open circuit time constant (Sec) Td_o.

(xiv) Direct axis sub-transient open circuit time constant (Sec) $T"d_o$.

(xv) Quadrature axis transient open circuit time constant (Sec) $T'q_o$.

(xvi) Quadrature axis sub-transient open circuit time constant (Sec) $T"q_o$.

(xvii) Stator Resistance (ohm) R_a.

(xviii) Neutral grounding details.

(xix) Stator leakage reactance (ohm) X_1.

(xx) Stator time constant (sec).

(xxi) Rated Field current (A).

(xxii) Open Circuit saturation characteristic for various terminal Voltages giving the compounding current to achieve the same.

(xxiii) MW and MVAr Capability curve.

(b) Parameters of excitation control system:

(i) Type of Excitation.

(ii) Maximum Field Voltage.

(iii) Minimum Field Voltage.

(iv) Rated Field Voltage.

(v) Details of excitation loop in block diagrams showing transfer functions of individual elements using I.E.E.E symbols.

(vi) Dynamic characteristics of over – excitation limiter.

(vii) Dynamic characteristics of under – excitation limiter.

(c) Parameter of governor:

(i) Governor average gain (MW/Hz)

(ii) Speeder motor setting range.

(iii) Time constant of steam or fuel Governor valve.

(iv) Governor valve opening limits.

(v) Governor valve rate limits.

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(vi) Time constant of Turbine.

(vii) Governor block diagram showing transfer functions of individual elements using I.E.E.E symbols.

(d) Operational parameters:

(i) Minimum notice required synchronising a Generating unit from desynchronization.

(ii) Minimum time between synchronizing different Generating

Units in a Power Station.

(iii) The minimum block load requirements on synchronizing.

(iv) Time required for synchronizing a Generating unit for the following conditions:

(a) Hot

(b) Warm

(c) Cold

(v) Maximum Generating unit loading rates for the following conditions:

(a) Hot

(b) Warm

(c) Cold

(vi) Minimum load without oil support (MW).

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(5) GENERAL STATUS

(i) Detailed project report

(ii) Status Report

(a) Land

(b) Gas/Liquid Fuel

(c) Water

(d) Environmental Clearance

(e) Rehabilitation of displaced persons

(iii) Approval of **State** Government/ Government of India.

(iv) Financial Tie – up.

(6) CONNECTION

(i) Reports of Studies for parallel operation with State Grid.

(a) Short Circuit Studies

(b) Stability Studies

(c) Load Flow Studies

(ii) Proposed Connection with the State Grid.

(a) Voltage
(b) No. of circuits
(c) Point of Connection.

B.2 DETAILED SYSTEM DATA – TRANSMISSION

For STU and Transmission Licensees

(1) GENERAL

i. Single line diagram of the Transmission System down to 66KV,33KV bus at Grid Sub-station detailing:

1. Name of Sub-station.
2. Power Station connected.
3. Number and length of circuits.
4. Interconnecting transformers.
5. Sub-station bus layouts.
6. Power transformers.
7. Reactive compensation equipment.

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ii. Sub-station layout diagrams showing:

1. Bus bar layouts.
2. Electrical circuitry, lines, cables, transformers, switchgear etc.
3. Phasing arrangements.
4. Earthing arrangements.
5. Switching facilities and interlocking arrangements.
6. Operating voltages.
7. Numbering and nomenclature:
8. Transformers.
9. Circuits.
10. Circuit breakers.
11. Isolating switches.

(2) LINE PARAMETERS (for all circuits)

i. Designation of Line.

1. Length of line (Km).
2. Number of circuits Per Circuit values.
3. Operating voltage (KV).
4. Positive Phase sequence reactance (pu on 100 MVA) X1

5. Positive Phase sequence resistance (pu on 100 MVA) R1
6. Positive Phase sequence susceptance (pu on 100 MVA) B1
7. Zero Phase sequence reactance (pu on 100 MVA) X0
8. Zero Phase sequence resistance (pu on 100 MVA) R0
9. Zero Phase sequence susceptance (pu on 100 MVA) B0

(3) TRANSFORMER PARAMETERS (For all transformers)

i. Rated MVA
ii. Voltage Ratio
iii. Vector Group
iv. Positive sequence reactance, maximum, minimum and normal (pu on 100 MVA) X1
v. Positive sequence resistance, maximum, minimum and normal (pu on 100 MVA) R1
vi. Zero sequence reactance (pu on 100 MVA).
vii. Tap change range (+% to -%) and steps.
viii. Details of Tap changer. (Off/On load).

(4) EQUIPMENT DETAILS (For all substations)

i. Circuit Breakers
ii. Isolating switches
iii. Current Transformers
iv. Potential Transformers /CVTs

(5) RELAYING AND METERING

i. Protection relays installed for all transformers and feeders along with their settings and level of co-ordination with other Users.

ii. Metering Details.

(6) SYSTEM STUDIES

i. Load Flow studies (Peak and lean load for maximum hydro and maximum thermal generation).

ii. Transient stability studies for three-phase fault in critical lines.

iii. Dynamic Stability Studies

iv. Short circuit studies (three-phase and single phase to earth)

v. Transmission and Distribution Losses in the Transmission System.

(7) DEMAND DATA (For all substations)

Demand Profile (Peak and lean load) for next 5 years.

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(8) REACTIVE COMPENSATION EQUIPMENT

i. Type of equipment (fixed or variable).

ii. Capacities and/or Inductive rating or its operating range in MVAr.

iii. Details of control.

iv. Point of Connection to the System.

B.3 DETAILED PLANNING DATA (DISTRIBUTION)

For Distribution Licensees

(1) **GENERAL**

i. Distribution map (To scale). Showing all lines up to 11KV and sub-stations belonging to the Supplier.

ii. Single line diagram of Distribution System (showing distribution lines from points of Connection with the Transmission System, 132/33 KV sub stations, 33/11KV 110/22-11 KV substations, and consumer bus in case of consumers fed directly from the Transmission System).

iii. Numbering and nomenclature of lines and sub-stations (Identified with feeding Grid sub-stations of the Transmission and concerned 220/132/33/11KV, 132/33/11KV, and 33/11KV 110/22-11 KV sub-stations of Licensee).

(2) CONNECTION

i. Points of Connection (Furnish details of existing arrangement of Connection).

ii. Details of metering at points of Connection.

(3) LOADS

i. Details of major loads of 1 MW and above to be contracted for next 5 years.

ii. Demand profile of Distribution System (Current & forecast)

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APPENDIX C : SITE RESPONSIBILITY SCHEDULE

(Reference to: Chapter 4 para 4.5 (2))

Name of Power Station / Sub – Station:

Site Owner:

Site Manager:

Tel. Number:

Fax Number:

Item of Plant / Apparatus	Plant Owner	Safety responsibility	Control responsibility	Operation responsibility	Maintenance responsibility	remarks
_____KV Switchyard						
All equipment including bus bars						
Feeders						
Generating units						

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APPENDIX D : PROTECTION DATA

(Reference to: Chapter 7)

PROTECTION:

Item	Due date/Time
a) Generators/CPPs/IPPs shall submit details of protection requirement and schemes installed by them as referred to in B-1. Detailed planning Data under sub-section "Protection and Metering"	As applicable to Detailed Planning Data
b) The STU shall submit details of protection equipment and schemes installed by them as referred to in B-2. Detailed system Data, Transmission under sub-section "Relaying and Metering" in relation to Connection with any User.	As applicable to Detailed Planning Data

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APPENDIX E : OPERATIONAL PLANNING DATA

(Reference to: chapter 10 para 10.3 (1))

E.1 OUTAGE PLANNING DATA

1 Demand Estimates

(For Distribution Licensees)

Item	Due date/ Time
a) Estimated aggregate month-wise annual sales of Energy in Million Units and peak and lean demand in MW & MVAr at each Connection point for the next financial year.	15th November of current year
b) Estimated aggregate day-wise monthly sales of Energy in million Units and peak and lean demand in MW & MVAr at each Connection point for the next month.	25th of current month
c) 15 Minute block-wise demand estimates for the day ahead.	09.00 Hours every day.

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(2) Estimates of Load Shedding for Distribution Licensee

Item	Due date / Time
a) Details of discrete load blocks that may be shed to comply with instructions issued by SLDC when required, from each connection point.	Soon after connection is made.

(3) Year ahead outage programme (For the financial year)

(i) Generator outage programme for (SGS)

Item	Due date / Time
a) Identification of Generating Unit.	15^{th} November each year
b) MW, Which will not be available as a result of Outage.	
c) Preferred start date and start-time or ranges of start dates and start times and period of outage.	
d) If outages are required to meet statutory requirement, then the latest – date by which outage must be taken.	

(ii) Affecting Intra – State Transmission System

Item	Due date / Time
a) MW, which will not be available as a result of Outage from Imports through external connections.	15th November each year
b) Start date and start time and period of Outage.	

(iii) Year ahead CPP's outage progamme (Affecting Intra – State Transmission System)

Item	Due date / Time
a) MW, which will not be available as a result of Outage from Imports through external connections.	15th November each year
b) Start date and start time and period of Outage.	

(iv) Year ahead Distribution Licensees outage progamme

Item	Due date / Time
a) Loads in MW not available from any connection point. Identification of connection point.	15th November each year
b) Period of suspension of drawal with start date and start time.	

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(v) STU's Overall outage progamme

Item	Due date / Time
a) Report on proposed outage programme	15th February each year
b) Release of finally agreed outage plan	15th February each year

E-2. GENERATION SCHEDULING DATA

(Reference to: Chapter 14)

SCHEDULE AND DESPATCH (For SGS, IPPs and CPPs)

Item	Due date/ Time
Day ahead 15 Minute block-wise MW/MVAr availability (00.00 - 24.00 Hours).	**09.00 hrs**
a) Status of Generating Unit Excitation AVR in service (Yes/No).	09.00 hrs
b) Status of Generating Unit Speed Control System. Governor in service (Yes/No).	09.00 hrs
c) Spinning reserve capability (MW).	09.00 hrs
d) Backing down capability with/without oil support (MW).	09.00 hrs
Hydro reservoir levels and restrictions.	**09.00 hrs**
a)Generating Units 15 Minute block-wise summation outputs (MW).	09.00 hrs
b) Day ahead 15 Minute block-wise MW entitlements from Central Sector Generation Power Stations.	09.00 hrs

E-3 CAPABILITY DATA

(Reference to: Chapter 9)

For SGS

Item	
a) Generators and IPPs shall submit to STU up-to-date capability curves for all Generating Unit.	On receipt of request from STU / SLDC.
b) CPPs shall submit to STU net return capability that shall be available for export /import from Transmission System	On receipt of request from STU / SLDC.

E-4 RESPONSE TO FREQUENCY CHANGE

(Reference to: Chapter 9)

For SGS

Item	
a) Primary Response in MW at different levels of loads ranging from minimum generation to registered capacity for frequency changes resulting in fully opening of governor valve.	On receipt of request from STU / SLDC.
b) Secondary response in MW to frequency changes	On receipt of request from STU / SLDC.

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E-5 MONITORING OF GENERATION

(Reference to: Chapter 9)

For (SLDC)

MONITIRING OF GENERATION AND DRAWAL (For SGS)

Item	
a) SGS shall provide 15-minute block-wise generation summation to SLDC. b) CPPs shall provide 15-minute block-wise export / import MW to SLDC. c) Logged readings of Generators to SLDC. d) Detailed report of generating unit tripping on monthly basis.	Real time basis Real time basis As required In the first week of the succeeding month

E-6 ESSENTIAL AND NON ESSENTIAL LOAD DATA

(Reference to: Chapter 11)

For SGS

CONTINGENCY PLANNING (For SLDC)

Item	**Due date/ Time**
Schedule of essential and non-essential loads on each discrete load block for purposes of load shedding.	As soon as possible after connection

APPENDIX - F : INCIDENT REPORTING (OTHER THAN ACCIDENTS)

(Reference to: Chapter 13 para 13.4)

First report

Date:_____

Time:_____

S.N	Item	Details
1	Date and time of incident	
2	Location of incident	
3	Type of incident	
4	System parameters before the incident (voltage, frequency, flows, generation etc.)	
5	Relay indications received and performance of protection	
6	Damage to equipment	
7	Supplies interrupted and duration, if applicable	
8	Amount of generation lost, if applicable	
9	Possibility of alternate supply arrangement	
10	Estimate of time to return to service	
11	Cause of incident	
12	Any other relevant information and remedial action taken	
13	Recommendations for future improvement / repeat incident	
14	Name of the organization	

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APPENDIX – G : METERING DATA

(Reference to: Chapter 15)

1 METERING

Item	Due date/ Time
a) SGS shall submit details of metering equipment and schemes installed by them as referred in B-1. Detailed Planning Data under sub-section "Protection and Metering"	As applicable to Detailed Planning Data
b) STU s shall submit details of metering equipment and schemes installed by them as referred in B-2. Detailed System Data, Transmission under sub-section "Relaying and Metering" in relation to connection with any User.	As applicable to Detailed Planning Data.

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Annexure

Standards of Meters

Part I Standards Common To All Type of Meters

(1) These standards provide for specification of meters, immunity to external factors, sealing points and functional requirements that are required from regulatory perspective. Detailed technical specification shall be prepared by the purchaser of the meter.

(2) **Specifications of meters**

<table>
<tr><td>Standard Reference Voltage</td><td>As per IS</td></tr>
<tr><td>Voltage Range</td><td>As per IS</td></tr>
<tr><td>Standard Frequency</td><td>As per IS</td></tr>
<tr><td>Standard Basic Current</td><td>As per IS

(Current range of consumer meters shall be so chosen as to record the load current corresponding to the sanctioned load)</td></tr>
<tr><td>Accuracy Class</td><td>Meters shall meet the following requirements of Accuracy Class:

<table>
<tr><td>Interface meters</td><td>0.2S</td></tr>
<tr><td colspan="2">Consumer meters</td></tr>
<tr><td>Up to 650 volts</td><td>1.0 or better</td></tr>
<tr><td>Above 650 volts and up to 33 kilo volts</td><td>0.5S or better</td></tr>
<tr><td>Above 33 kilo volts</td><td>0.2S</td></tr>
<tr><td colspan="2">Energy accounting and audit meters

The accuracy class of meters in generation and transmission system shall not be inferior to that of 0.2S Accuracy Class. The accuracy class of meters in distribution system shall not be inferior to that of 0.5S Accuracy Class</td></tr>
</table>
</td></tr>
</table>

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Starting Current and Maximum Current	As per IS
Power Factor Range	As per IS
Power Frequency Withstand Voltage	As per IS
Impulse Voltage Withstand Test for 1.2/50 micro sec	As per IS
Power Consumption	As per IS

(3) Meter shall have downloading facilities of metered data through Meter Reading Instrument (MRI).

(4) **Immunity to External Factors**

The meter shall be immune to external influences like magnetic induction, vibration, electrostatic discharge, switching transients, surge voltages, oblique suspension and harmonics and necessary tests shall be carried out in accordance with relevant standard.

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(5) **Sealing Points**

Sealing shall be done at the following points (as applicable):

(a) Meter body or cover

(b) Meter terminal cover

(c) Meter test terminal block

(d) Meter cabinet

(6) The accuracy class of Current transformers (CTs) and Voltage transformers (VTs) shall not be inferior to that of associated meters. The existing CTs and VTs not complying with these regulations shall be replaced by new CTs and VTs, if found defective, non-functional or as per the directions of the Appropriate Commission. In case the CTs and VTs of the same Accuracy Class as that of meters can not be accommodated in the metering cubicle or panel due to space constraints, the CTs and VTs of the next lower Accuracy Class can be installed.

(7) The Voltage Transformers shall be electromagnetic VT or Capacitive Voltage Transformer (CVT).

Part II Standards for interface meters

(1) **Functional Requirements:**

(a) The Interface meters suitable for ABT shall be static type, composite meters , as self –contained devices for measurement of active and reactive energy, and certain other parameters as described in the following paragraphs. The meters shall be suitable for being connected directly to voltage transformers (VTs) having a rated secondary line-to-line voltage of 110 V, and to current transformers (CTs) having a rated secondary current of IA (Model-A :3 element 4 wire or Model C: 2 element , 3 wire) or 5A (model-B: 3 element , 4 wire or Model D: 2 element 3 wire). The reference frequency shall be 50Hz.

(b) The meters shall have a non-volatile memory in which the following shall be automatically stored:

i) Average frequency for each successive 15-minute block, as a two digit code (00 to 99 for frequency from 49.0 to 51.0Hz).

ii) Net Wh transmittal during each successive 15-minute block, upto second decimal, with plus/minus sign.

iii) Cumulative Wh transmittal at each midnight, in six digits including one decimal.

iv) Cumulative VArh transmittal for voltage high condition, at each midnight, in six digits including one decimal.

v) Cumulative VArh transmittal for voltage low condition, at each midnight, in six digits including one decimal.

vi) Date and time blocks of failure of VT supply on any phase, as a star(*) mark.

(c) The meters shall store all the above listed data in their memories for a period of at least ten days. The data older than ten days shall get erased automatically. Each meter shall have an optical port on its front for tapping all data stored in its memory using a hand held data collection device. The meter shall be suitable for transmitting the data to remote location using appropriate communication medium.

(d) The active energy (Wh) measurement shall be carried out on 3-phase, 4-wire principle, with an accuracy as per class 0.2 S of IEC-

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687/IEC-62053-22. In model-A and C, the energy shall be computed directly in CT and VT secondary quantities, and indicated in watt-hours. In model-B and Model D , the energy display and recording shall be one fifth of the Wh computed in CT and VT secondary quantities.

(e) The Var and reactive energy measurement shall also be on 3-phase, 4-wire principle, with an accuracy as per class 2 of IEC-62053-23 or better. In model-A or Model C, the Var and VArh computation shall be directly in CT and VT secondary quantities. In model-B or Model D, the above quantities shall be displayed and recorded as one-fifth of those computed in CT and VT secondary quantities. There shall be two reactive energy registers, one for the period when average RMS voltage is above 103% and the other for the period the voltage is below 97%.

(f) The 15-minute Wh shall have a +ve sign when there is a net Wh export from substation busbars, and a –ve sign when there is a net Wh import. The integrating (cumulative) registers for Wh and Varh shall move forward when there is Wh/Varh export from substation busbars, and backward when there is an import.

(g) The meters shall also display (on demand), by turn, the following parameters :

(i) Unique identification number of the meter
(ii) Date
(iii) Time
(iv) Cumulative Wh register reading
(v) Average frequency of the previous 15-minute block
(vi) Net Wh transmittal in the previous 15-minute block, with +/- sign
(vii) Average percentage voltage
(viii) Reactive power with +/- sign
(ix) Voltage-high VArh register reading
(x) Voltage-low VArh register reading.

(h) The three line-to-neutral voltages shall be continuously monitored, and in case any of these falls below 70%, the condition shall be

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suitably indicated and recorded. The meters shall operate with the power drawn from the VT secondary circuits, without the need for any auxiliary power supply. Each meter shall have a built-in calendar and clock, having an accuracy of 30 seconds per month or better.

(i) The meters shall be totally sealed and tamper-proof, with no possibility of any adjustment at site, except for a restricted clock correction. The harmonics shall be filtered out while measuring Wh, Var and VArh, and only fundamental frequency quantities shall be measured/computed.

(j) The Main meter and the Check meter shall be connected to same core of CTs and VTs.

Part III Standards for consumers meters

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(1) **Measuring Parameters**

(a) The consumer meter shall be suitable for measurement of cumulative active energy utilized by the consumer.

(b) The consumer meter may have the facilities to measure, record and display one or more of the following parameters depending upon the tariff requirement for various categories of consumers. All parameters excluding instantaneous electrical parameters shall also be stored in memory.

(i) Cumulative reactive energy

(ii) Average power factor

(iii) Time of use of energy

.(iv) Apparent power

(v) Maximum demand

(vi) Phase voltage and line currents

(2) All the three phase meters shall have data storage capacity for at least 35 days in a non-volatile memory.

(3) **Anti-Tampering Features**

(a) The meter shall not get damaged or rendered non-functional even if any phase and neutral are interchanged.

(b) The meter shall register energy even when the return path of the load current is not terminated back at the meter and in such a case the circuit shall be completed through the earth. In case of metallic bodies, the earth terminal shall be brought out and provided on the outside of the case.

(c) The meter shall work correctly irrespective of the phase sequence of supply (only for poly phase).

(d) In the case of 3 phase, 3 wire meter even if reference Y phase is removed, the meter shall continue to work. In the case of 3 phase, 4 wire system, the meter shall keep working even in the presence of any two wires i.e., even in the absence of neutral and any one phase or any two phases.

(e) In case of whole current meters and LV CT operated meter, the meter shall be capable of recording energy correctly even if input and output terminals are interchanged.

(f) The registration must occur whether input phase or neutral wires are connected properly or they are interchanged at the input terminals.

(g) The meter shall be factory calibrated and shall be sealed suitably before despatch.

(h) The meter shall be capable of recording occurrences of a missing potential (only for VT operated meters) and its restoration with date and time of first such occurrence and last restoration along with total number and duration of such occurrences during the above period for all phases.

(i) Additional anti-tampering features including logging of tampers such as current circuit reversal, current circuit short or open and presence of abnormal magnetic field may be provided as per the regulations or directions of the Appropriate Commission or pursuant to the reforms programme of the Appropriate Government.

Part IV Standards for energy accounting and audit meters

(1)The energy accounting and audit meters shall be suitable for measurement, recording and display of cumulative active energy with date and time.

(2) The energy accounting and audit meters may also have the facility to measure, record and display one or more of the following parameters depending upon the energy accounting and audit requirement. All parameters excluding instantaneous electrical parameters shall also be stored in memory.

(a) Apparent power

(b) Phase wise kilowatt at peak KVA

(c) Phase wise KVA(reactive) at peak KVA

(d) Phase wise voltage at peak KVA

(e) Power down time

(f) Average power factor

(g) Line currents

(h) Phase voltages

(i) Date and time

(j) Tamper events

(3) The energy accounting and audit meter shall have data storage capacity for at least 35 days in a non-volatile memory.

(4) Energy accounting and audit meters shall have facility to download the parameters through meter reading instruments as well as remote transmission of data over communication network.

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