



## **NOTIFICATION**

**F. No. JERC-15/2010.** In exercise of the powers conferred on it by Section 181 (1) and 181 (2) read with Section 14 of the Electricity Act 2003, and all powers enabling it in that behalf, the Joint Electricity Regulatory Commission for the State of Goa and the Union Territories hereby makes the following Regulations to enforce standards with respect to Quality, Continuity and Reliability of service by the licensees.

### **Chapter 1: GENERAL**

#### **1.1 SHORT TITLES, COMMENCEMENT, EXTENT AND INTERPRETATION:**

- 1) These regulations may be called “Joint Electricity Regulatory Commission” (Distribution 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**

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:

- (a) “Act” means the Electricity Act, 2003 (Act no. 36 of 2003).
- (b) “Agreement” means an agreement entered into by the Distribution Licensee and the User.
- (c) “Apparatus” means electrical apparatus and includes all machines, fittings, accessories and appliances connected to the Electrical Distribution System
- (d) “CBIP” means Central Board of Irrigation and Power
- (e) “CEA” means Central Electricity Authority
- (f) “Circuit” means an arrangement of conductor(s) for the purpose of conveying electrical energy and forming a system or a branch of system.
- (g) “Commission” means Joint Electricity Regulatory Commission for the State of Goa & UTs
- (h) “Conductor” means any wire, cable, bar, tube, rail or plate used for conducting energy and electrically connected to the system.
- (i) “Connected Load” means aggregate of the manufacture’s rating of all energy consuming apparatus duly wired and connected to the power supply system of licensee including portable apparatus in the consumer’s premises. This shall not include the load of spare plug, sockets, load exclusively installed for firefighting purposes. The load of either water and room heating or room cooling apparatus, whichever is higher, shall be taken into account as per prevailing season (1st April to 30th September for cooling use and 1st October to 31st March for heating use). The definition of connected load shall be used only for the purpose of assessment in case of direct theft or dishonest abstraction of energy or unauthorized use of energy.
- (j) “Control Person” means a person identified as having technical capability and responsibility for cross boundary safety.
- (k) “DCR” means Distribution Code Review.
- (l) “DCRP” means Distribution Code Review Panel.
- (m) “Distribution Code” means the JERC (Distribution Code) Regulations, 2010 as enforced from time to time.
- (n) “Embedded” means having a direct electrical connection to an intra state electrical system.
- (o) “Extra High Tension (EHT)” means the voltage 33000 Volts and above under normal conditions subject to the percentage variation permissible under the Indian Electricity Rules 1956.
- (p) “GSS” means Grid Sub-station.

- (q) “High Tension (HT)” means the voltage between 650 volts and 33000 Volts under normal conditions subject to the percentage variation permissible under the Indian Electricity Rules 1956.
- (r) “Indian Standards ("IS")” means those Standards and specifications approved by the Bureau of Indian Standards.
- (s) “Interface Point” means a point at which a User’s electrical system is connected to the Licensee’s Distribution System.
- (t) “Low Tension (LT)” means the voltage of 230 volts between phase and neutral or 400 volts between any two phases under normal conditions subject to the percentage variation permissible under the Electricity Rules.
- (u) “Power Factor” means the ratio of Active Power (kW) to Apparent Power (KVA). (v) “PTW” means permit to work.
- (w) “REC” means Rural Electrification Corporation.
- (x) “Transmission System” means the system consisting of extra high voltage electric lines being operated at EHT (excluding generator interconnection facilities) owned and/or operated by the Transmission Licensee for the purposes of the transmission of electricity from one power station to a sub-station or to another power station or between sub-stations or to or from any external interconnection equipment up to the interconnection with the distribution system, any plant and apparatus and meters owned or used by the Transmission Licensee in connection with the transmission of electricity, but shall not include any part of the Licensee distribution system.
- (y) “User” means any person having electrical interface with, or using the Distribution System of the Distribution Licensee to whom this Code is applicable. Any other Distribution Licensee, Transmission Licensee and generating units connected to the Distribution system are also included in this term.

Words and expressions used and not defined in this Code but defined in the Acts shall have the meanings assigned to them in the said Acts. Expressions used herein but not specifically defined in these regulations or in the said Acts 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 Acts or any law passed by a competent legislature shall have the meaning as is generally assigned in the electricity industry.

### **1.3 ABBREVIATIONS:**

Abbreviations used in these regulations, are listed and explained in the list of abbreviations annexed to these regulations as Annexure 5.

#### **1.4 INTRODUCTION:**

- a) The Distribution Code deals with technical aspects of the supply of electricity, which have impact on the quality, continuity and reliability of service by licensees and the use of the Licensee's Distribution System for the distribution of electricity. It specifies the rights and obligations of the Distribution Licensee and the Users in system planning and operation.
- b) The Distribution Code is not exhaustive as to the requirements to be complied with by the Distribution Licensee and the Users connected or seeking connection to the Licensee's Distribution System. The Distribution Licensee and all Users/Consumers must also comply with the requirement as laid down in various codes, standard and regulations under relevant laws in force.

#### **1.5 OBJECTIVES:**

The main objectives of this Distribution Code are-

- a) To ensure the development and maintenance of an efficient, co-ordinated and economical distribution system and the distribution licensee and all distribution system participants comply with respective obligations as provided in the Act, and
- b) To bring together a set of rules, for using the distribution network and to provide-
  - (i) The technical aspects of working relationship between the licensee's distribution system and to those connected and seeking connection to it,
  - (ii) The facilitation of operation, maintenance, development and planning of economical and reliable power distribution network.

#### **1.6 APPLICABILITY:**

- 1) These Regulations shall apply to all distribution licensees and the consumers of electricity.
- 2) These regulations shall be interpreted and implemented in accordance with and not at variance from, the provisions of the Electricity Act, 2003 read with the Indian Electricity Rules, 1956 and any Central Electricity Authority regulations in this regard.

#### **1.7 IMPLEMENTATION:**

1. The distribution licensee shall be responsible for the implementation of the Distribution code
2. Nothing contained in this Code should be interpreted as imposing obligations / duties on Consumers / Distribution Licensees greater or more onerous than those mentioned in the Electricity Act, 2003 under relevant clauses.

3. The Distribution Code contains procedures for the management of day to day technical situations in the Distribution System, taking into account a wide range of operational conditions likely to be encountered under both normal and abnormal conditions. The Distribution Code cannot foresee all the possible operating conditions. Users must therefore understand and accept that the Distribution

Licensee, in such unforeseen circumstances, may be required to act decisively and with due expedition to discharge his obligations under the License. Users shall provide such reasonable co-operation and assistance as the Distribution Licensee may require in such circumstances. The concerned Distribution Licensee shall however refer all such cases for ratification in to the “Distribution Code Review Panel.”

## **1.8 CONFIDENTIALITY**

Under the terms of Distribution Code, the Distribution Licensee will receive information from Users relating to their business. The Distribution Licensee shall not, other than as required by Distribution Code, disclose such information to any other person without the prior written consent of such informant, unless required by Central/State government departments or any authority.

## **1.9 COMPLIANCE:**

Non compliance with any provision of the Distribution Code by the Distribution Licensee shall attract the consequences as provided in the Acts or in the License. However, in the event of non-compliance with the Distribution Code, the Distribution Licensee shall prepare and submit to Commission a plan of action for compliance with the Distribution Code. Commission may exempt the Licensee from compliance of any provisions for a particular period, if it is found that the compliance is not feasible for such period, considering the resources available and the circumstances prevailing.

## **1.10 PROCEDURES TO SETTLE DISPUTES:**

In the event of any dispute regarding interpretation of any regulations provided in the Distribution Code between any User and the Distribution Licensee, the matter shall be referred to Joint Electricity Regulatory Commission. Commission’s decision shall be final and binding on both the parties.

## Chapter - 2

### MANAGEMENT OF DISTRIBUTION CODE

#### 2.1 OBJECTIVE:

The chapter defines the method of managing Distribution Code, pursuing of any changes/ modifications required and the responsibilities of the Distribution Licensees and the Users/ Consumers in this regard. This section facilitates revisions taking into account the views of all parties in an equitable manner.

#### 2.2 DISTRIBUTION CODE REVIEW PANEL:

1. A standing body (Distribution Code Review Panel) shall be constituted by Commission comprising of the representatives of Distribution Licensee as well as the Users of the Distribution System in line with the provisions of Distribution Code.
2. The chairperson and members except the secretary shall be part time members of the panel. The review panel shall generally consist of the following members and having knowledge and practical experience of technical matters related to electricity supply by utilities. Commission shall nominate the chairperson and secretary of the Distribution Code Review Panel on rotation basis from among the members of the Distribution Licensees, but at no point of time the chairperson and secretary shall belong to the same Distribution Licensee. The secretary shall be a full time member of the review Panel. The members of the review panel shall be as follows:
  - (a) One senior technical officer from each Distribution Licensee not below the rank of Executive Engineer.
  - (b) One Member from Transmission Utility or SLDC.
  - (c) One Member from a Transmission Licensee to represent all Transmission Licensees. After the tenure over, such Member, the representative of a different Transmission Licensee will be a member of review panel.
  - (d) One Member from among Embedded Generator Captive Power Plants, co-generation units, conventional and non-conventional generating units, to represent all such users in State of Goa/ UT's.
  - (e) Open Access Customers connected to Distribution Systems.
  - (f) Such other member as the Commission may direct and find appropriate.
  - (g) Commission shall develop a list of potential candidates to serve on the Distribution Code Review Panel, which reflects a balance of the various interest groups in consultation with the Distribution Licensee.
3. The members of the Review Panel shall normally have tenure of two years unless he ceases for any reason to be member of the Review Panel. Chairperson of the

Review Panel with the approval of Commission shall jointly consider the replacement of such members.

4. The functioning of the panel shall be co-ordinated by the secretary of the Review Panel.
5. Commission shall publish the names of the members of Review Panel and also inform to each Distribution Licensee.
6. The model code of functioning of Review Panel shall be finalized at first meeting of Review Panel.

### **2.3 FUNCTIONS OF THE REVIEW PANEL:**

The functions of the Review Panel shall be:

- (a) Maintenance of the Distribution Code and its working under continuous scrutiny and review.
- (b) Consideration of all requests for review made by any User and publication of their recommendations for changes in the Distribution Code together with reasons for such changes.
- (c) Provide guidance on interpretation and implementation of the Distribution Code.
- (d) Examination of the problems raised by any User as well as resolution of the problems.
- (e) Ensuring that the changes/modifications proposed in the Distribution Code are consistent and compatible with standard technical manual or guidelines, codes, laws, acts, rules and regulations in force at that point of time.

### **2.4 REVIEW AND REVISIONS:**

1. The Users seeking any amendment to the Distribution Code shall send written requests to the secretary of the Review Panel with a copy to Commission. If the request is sent to Commission directly, the same shall be forwarded to the secretary of Review Panel who shall, in consultation with the concerned entities and such other persons as the Commission may direct, review the Distribution Code provisions. The secretary will circulate the proposed changes/modifications to all the panel members for their written comments within a reasonable time frame or the secretary may call for the Review Panel meeting in consultation with the chairperson. Based on this interaction/ discussion, the necessary amendments/ revisions may be incorporated in Distribution Code after the approval of the Commission.
2. The secretary shall send the following reports to the Commission at the conclusion of each review meeting of the panel:
  - (a) Reports on the outcome of such review.
  - (b) Any proposed revision to the Distribution Code and its rationale.
  - (c) All written representations and objections submitted by the Users at the time of review.

3. All revisions to the Distribution Code require the approval of Commission. The secretary shall publish revisions to the Distribution Code, after the approval of Commission. The Review Panel may also submit proposals for relaxation in such cases where Users / Distribution Licensees have difficulties in meeting the requirements of the Distribution Code.
4. Any change from the previous version shall be clearly marked in the margin. In addition, a revision sheet shall be placed at the front of the revised version, noting the number of every changed Sub-section, together with reasons for such change.
5. The secretary shall maintain copies of the Distribution Code incorporating the latest amendments and shall make it available at a reasonable cost to any person requiring it.
6. The Commission, may, on the application of the licensee or otherwise, call the emergency meeting of the review panel as and when the situation so dictates and make such alterations and amendments in the Distribution Code as it thinks fit.

### **Chapter - 3**

## **DISTRIBUTION PLANNING CODE**

### **3.1 OBJECTIVES**

1. The following are the objectives of the Distribution Planning Code:
  - (a) To enable the planning, design and construction of the Distribution System for a safe and economical operation with the specified degree of reliability conforming to the following standards:
    - (i) Distribution System Planning and Security Standard as mentioned under Attachment –1 of this code
    - (ii) Provisions applicable to Distribution System under Power System Management and Operating Standard and Power System Safety Standard as prescribed by authority under Electricity Act 2003.
    - (iii) Statutory Acts and Rules, which are in force,
    - (iv) Relevant Indian Standard Specifications, if applicable. The deviations may be permitted as per specified limit; however, in any case the security and safety shall not be hampered.
    - (v) REC (Rural Electrification Corporation) Construction Standards and manuals.
  - (b) To facilitate the use of the Distribution System by any User connected to or seeking connection with it,
  - (c) To prescribe the technical conditions to be followed by the respective Distribution Licensees and Users in meeting the standards for an efficient operation of the common electrical interface,
  - (d) To prescribe the procedure for the exchange of the system planning data between the Distribution Licensee and the Users,
  - (e) To provide the required information to the Users for connection, planning and



development of their own systems and make them compatible with the Distribution System,

- (f) To enable the Distribution Licensee to co-operate with the STU in furnishing the required data as detailed in the Central / State Grid Code as the case may be.

### **3.2 PLANNING POLICY**

1. The Distribution Planning Code specifies the technical & design criteria and procedures to be followed by the Distribution Licensee for a proper planning and development of the Distribution System. This Code is also applicable to the Users of the Distribution System for their planning and development in so far as they affect the Distribution System.
2. The requirement of the Users may necessitate extension or reinforcement of the Distribution System. In some cases the same may even require the Distribution Licensee to seek the extension or reinforcement to the capacity of the Transmission System at the Connection Point/ Interface Point. This may arise for a number of reasons mentioned below, but not limited to the same:
  - (a) A development by any User in his system already connected to the Distribution System;
  - (b) Introduction of a new Connection Point/ Interface Point between the User's System and the Licensee's System;
  - (c) To increase the capacity of the Distribution System for meeting the security standards, removal of constraints in operation etc., and accommodate a general increase in Demand.
3. The development of the Distribution System must be planned sufficiently in advance allowing adequate time to obtain the required statutory clearances, consents or way leaves, the detailed engineering, design and construction work to be carried out and completed. The suitable management techniques shall be implemented allowing for sufficient time for critical activities and to co-ordinate all the activities in an efficient manner. These shall be taken care of at the time of planning itself.

### **3.3 LOAD DATA**

- 1 The Distribution Licensee shall develop load curves for the area fed by the concerned substation of the Transmission Licensee from the metering data available at the Connection Point/ Interface Point. Such data shall be compiled for the entire Area of Supply combining the load curves of each substation feeding its Distribution System. The Distribution Licensees shall collect data and map the power factor of network (feeder wise as well as consumer category wise by installing meters on typical distribution transformers.)

- 2 The actual energy drawn by the Distribution System as recorded in the energy meters installed at Connection Points / Interface Points shall be reconciled with the actual energy sales in overall Area of Supply. The aggregate distribution losses computed from these data shall be furnished to the Commission every quarter.
- 3 All the Users with Demands of 1 MW and above seeking connection shall furnish their load data/characteristic of the load and other relevant details to the Distribution Licensee as detailed in Annexure 1.

The embedded generators connected with the Distribution System are seeking new connections shall furnish planning data in the format specified at Annexure 2.

The Distribution Licensee shall exercise special care to monitor the actual development of loads in respect of Consumers desiring to avail loads of 1 MW and above at a single point. The Distribution Licensee on his part shall furnish relevant data for designing and selecting the electrical equipment, details of metering and relay for purpose of protection and System data as detailed in Annexure 3, if required by the user seeking connection to his Distribution System. The Distribution Licensee shall update the system data regularly and at least once a year.

### **3.4 FORECAST METHODOLOGY**

- 1 The Distribution Licensee shall formulate a short-term demand forecast (to enable the State Transmission Utility (STU) or SLDC in drawing down the annual planning process corresponding to a 5 years forward annual plan for intra state transmission system). This shall be formulated after considering the previous financial year as base and projecting the demand for the succeeding 5 years, considering the overall development of various sectors in his Area of Supply in succeeding five years. He should follow prudent practices to arrive at load forecast for succeeding five years after considering all the aspects viz. government policy/ economic development etc. During this process he shall also review the status of loads materializing as per the previous load forecast. Further these forecasts shall be in line with the plan to be developed at national level by CEA. The variation to the forecast shall be incorporated by the Distribution Licensee, as and when it is known to Distribution Licensee and revise the forecast annually.
- 2 Energy sales in each tariff class shall be projected in the forecast period over the corresponding figures relating to the base year by adopting an appropriate statistical method.
- 3 The projections shall take into account the assumed normal growth for non-specific loads, specific and identified loads of 1 MW and above, and the effects of demand side management, if any, and energy conservation.

- 4 The peak load requirements at each Connection Point/ Interface Point shall be estimated. The peak load requirement at each Connection Point / Interface Point will essentially ensure that the Transmission Utility or SLDC may determine the corrective measures to be taken to maintain the capacity adequacy in the Transmission System up to the Connection Point /Interface Point. This will facilitate the Transmission Utility (STU) to develop the compatible Transmission System. However, if the Distribution Licensee receive power at a number of Connection Points / Interface Points in a compact area, which are interconnected in a ring, then such Distribution Licensee shall forward the overall short term Demand forecast at each Connection Point / Interface Point with the variation or tolerance as mutually discussed and agreed upon with the Transmission Utility.
  
- 5 The aggregate energy and peak load requirements for the Area of Supply shall be estimated. The Distribution Licensee shall forward the short term demand forecast or each Connection Point/ Interface Point for peak load requirement as well as aggregate energy and peak load demand for Area of Supply on annual basis to the Transmission Utility (STU) and Commission along with the following details on the basis of which the forecast is made:
  - (a) Data,
  - (b) Methodology,
  - (c) Assumptions.
  
- 6 It shall be the responsibility of all the Distribution Licensees to fully co-operate with the Transmission Licensees in preparation of demand forecasts for their area of supply. The Distribution Licensee shall furnish the necessary peak load and energy forecasts to Transmission Utility (STU) for a period succeeding 5 years and submit the same annually by 31<sup>st</sup> March to STU in order to enable Transmission Utility or SLDC in formulating the perspective plan, as detailed out in JERC (State Grid Code) Regulations, 2010.
  
- 7 The licensee shall supply whole system data to the transmission Utility (STU) and other distribution system participants on the formats as devised by the STU under the JERC (State Grid Code) Regulations, 2010.

### **3.5 TECHNICAL AND DESIGN CRITERIA:**

The Distribution Licensee shall plan and develop his Distribution System on the basis of the following technical and design criteria:

- 1 The load demand of all the existing Users connected to the Distribution Licensee's system and all Users seeking connection with the Distribution Licensee's system shall be taken into consideration. All the Apparatus and Circuits shall have adequate capacity to cater to their needs of electricity in a safe, economical and reliable manner.
- 2 The Distribution Licensee shall assess and forecast the load demand of each category of Consumers in his Area of Supply on annual basis or more frequently as decided by the Commission.
- 3 The Distribution Licensee shall have a thorough knowledge of the nature of electricity usage by the Consumers and the way they use electrical energy and other alternative sources of energy in his area. The load forecasting shall take into account all these along with other conservation programs and the demand side management or off-peak usage programs which the Licensee may sponsor, resulting in reduction of energy used and peak demand of the Consumers over the years.
- 4 The Distribution Licensee shall implement an appropriate load fore cast program for the systematic collection of data describing Consumers' energy usage patterns and analysis of these data for energy and demand forecast. For this purpose, the Consumers shall be divided into all the tariff classes and may be broadly in the following classes:
  - (a) Domestic sector,
  - (b) Commercial sector,
  - (c) Agricultural sector,
  - (d) Industrial sector

The pattern of energy consumed by each sector and the load demand, the period of peak demand etc., shall be determined on the basis of sample surveys taking representative samples from each sector for its different seasonal requirements.

A suitable questionnaire shall be prepared for these sample surveys and the data obtained shall be analyzed using suitable statistical models. Based on this, distribution licensee shall be implementing demand side management techniques to match the availability from time to time.

- 5 The load fore cast program shall assess the following:
  - (a) Demand at the time of system peak, daily, monthly, seasonal or annual,
  - (b) Hourly demand for the day of the system peak, monthly, seasonal or annual,
  - (c) Total energy consumption for each category by month, season or year.
- 6 Based on the results of the above analysis the load forecast shall be made using the appropriate modern forecasting tools wherever applicable.
- 7 The optimum Circuit loading and the maximum number of Circuits at any electrical interface between the Distribution and Transmission Systems shall conform to the Distribution System Planning and Security Standard as mentioned under Attachment –1 of this code, Distribution System under Power System Management and Operating Standard and Distribution System under Power System Safety Standard as prescribed by authority under Electricity Act 2003.
- 8 As far as practicable, separate Circuits shall be provided for the following:
  - (a) Urban non-industrial power supply,
  - (b) Urban industrial power supply,
  - (c) Rural supply -: (a) Agricultural Supply, (b) Non - Agricultural Supply
- 9 The loads shall be arranged as far as possible in discrete load blocks to facilitate load management during emergency operations.
- 10 Load flow and other system studies shall be conducted to locate the position of outlets from substations, capacitor installations, distribution transformers, and to contain voltage variation and energy losses within reasonable limits.
- 11 The following parameters of equipments and system designs shall be standardized to facilitate easy replacement and reduction of inventories of spares in stores:
  - (a) Capacities of power transformers,
  - (b) Capacities and designs of distribution transformers,
  - (c) Substation / Switching Station layouts,
  - (d) Pole mounted substations,
  - (e) Sizes of bus bars,
  - (f) Capacities and ratings of circuit breakers and instrument transformers,
  - (g) Earthing,
  - (h) Lightning arresters,
  - (i) Control panels,
  - (j) Station batteries,
  - (k) Fire extinguishers.
  - (l) Maintenance tools
  - (m) Safety equipments
  - (n) Energy meters
  - (o) Wires and accessories
  - (p) Insulators and accessories

- 12 The planning of the Distribution System shall always keep in view the cost effectiveness and reduction in energy losses without sacrificing the requirements of Security Standards and Safety Standards for the Distribution System.
- 13 The Distribution Licensee shall plan the Distribution System expansion and reinforcement keeping the following in view along with all other measures to accommodate the advancement in technology prevailing at the time:
  - (a) Economic ratio of HT and LT line lengths,
  - (b) Use of aerial bunched conductors,
  - (c) Underground cables,
  - (d) Optimizing the number of distribution transformers and their location at the electrical load centers.

### **3.6 ENERGY AUDIT**

1. The Distribution Licensee shall create responsibility centers for energy audit. Load survey meters with a data retaining capacity of at least 45 days shall be installed for all the incoming/outgoing feeders in the area identified for each such responsibility centre.
2. The Distribution Licensee shall carry out energy audit of his total system compiling the data and analysis carried out in each responsibility centre in the best possible manner. The energy received from each substation shall be measured at the 11 KV terminal switchgear of all the outgoing feeders installed with appropriate energy meters such that the energy supplied to the each feeder is accurately available. It shall be compared with the corresponding figures of monthly energy sales and the distribution loss for each feeder shall be worked out. In case the Distribution Licensee has adopted ring main system at 11KV and there is difficulty in determining the distribution losses for each feeder, then the Distribution Licensee shall work out distribution losses for the overall Area of Supply.
3. An action plan for reduction of losses with adequate investments and suitable improvements in governance shall be drawn up and shall be submitted to the Commission Annually

## Chapter - 4

### CONNECTIVITY CONDITIONS

#### 4.1 OBJECTIVES

The Connectivity Conditions are provided to ensure that:

- a) The basic rules for connections are complied by all agencies. This will help to treat all agencies in a non-discriminatory manner.
- b) Any new or modified connection, when established, shall not suffer unacceptable effects due to its connection to the Distribution System nor produce unacceptable effects on the system or any other connected agency.
- c) The ownership and responsibility for all the equipments shall be clearly specified in a schedule (site responsibility schedule) for every site, where a connection is made.

The Connectivity Conditions specify the minimum technical and design criteria, which shall be complied by any agency connected to, or seeking connection to the Distribution System. The Distribution Licensee shall ensure compliance of the above criteria by any agency as a pre-requisite for the establishment of an agreed connection. The connectivity conditions should fulfill the requirement stipulated in section 50 and 53 of the Electricity Act, 2003.

#### 4.2 OPERATIONAL LABELING

The Licensee and the Consumers shall be responsible for the provision and maintenance of clear, unambiguous signs and labels indicating the numbering and / or name of the equipment / apparatus and circuit at the substations and connection sites. The equipment installed shall conform to its relevant I.S specification and the ratings and salient specification shall be maintained on the equipment's nameplate. No electrical equipment shall be used without its manufacturers nameplate permanently affixed to it. In the event of such discrepancies observed, the same shall be treated as per pertinent section of Electricity Act, 2003.

#### 4.3 SYSTEM PERFORMANCE:

1. The design and construction of all the equipment connected to the Distribution System shall satisfy the relevant Indian Standard Specifications. In case of equipment for which the 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 rules and code of practice in force.
3. For every new connection sought, the Distribution Licensee shall specify the Connection Point/ Interface Point and the supply voltage, along with the metering

and protection requirements as specified in the "Metering and Protection code" under **section – 7** of this code.

4. The operation of the Distribution System shall be in accordance with the "Distribution System Operating Standard" under Power System Management & Operation Standard as prescribed by authority under Electricity Act 2003. The User shall however be subject to the distribution discipline prescribed by the SLDC/Distribution Licensee.
5. The insulation co-ordination of the Users' equipment shall conform to the applicable Indian Standards/Code of practices. The rupturing capacity of the switchgear shall not be less than that notified by the Distribution Licensee.

#### **4.4 CONNECTION POINT/ INTERFACE POINT:**

1. Connection to Transmission System shall be governed by the relevant clauses of Central / State Grid Code as the case may be.
2. Connection of Small Generators (not below 1MW to Distribution Systems:- Bus bars may be provided at the Generating station. All generating units shall inject the output into the bus bars via the synchronizing breaker. The isolator between the synchronizing breaker and the bus bars is the boundary between the Generator and the Distribution Licensee. The current transformers for the metering shall be connected near the synchronizing breaker. The voltage transformers (including the standby set) of the metering shall be connected to the bus-bars. However, the small generators based on non-conventional source of energy will be allowed for the connection with Distribution System/ Transmission System as feasible and decided by the Commission on case to case basis.
3. EHT/HT Consumers: The supply voltage may be 220kV, 132kV, 66kV, 33 kV, 22 kV or 11 kV or voltage as agreed by the Distribution Licensee. The substations shall be owned by the Users. The boundary shall be the feeder entry in the premises of the Users or when so provided it shall be the busbar between breakers of the Distribution Licensee and the EHT/ HT Consumers.
4. Low voltage and Medium Voltage Consumers: The incoming terminal of the cut out circuit breaker installed by the Consumer is the boundary of low voltage and medium voltage Consumers. The metering shall be provided before a fuse unit / circuit breaker of the Consumer. The metering equipment shall be provided at the entry point of Consumer Premises in a safe location, preferably at the entry of the Premises or in a common passage on ground floor for easy access for the purpose of meter reading, maintenance, repairs, inspection, etc. The metering equipment shall be provided inside a box sealed by the Distribution Licensee and the User/Consumer shall not disturb the seal metering equipment and shall take reasonable care for protecting the meter and equipment.



#### **4.5 PROCEDURE FOR APPLICATIONS FOR CONNECTIONS TO THE SYSTEM:**

Any User seeking use of Distribution System may submit an application for connection to the Licensee as per the procedures and formats prescribed under JERC (Electricity Supply Code) Regulations 2010 or in a format specially developed by Licensees for specific users. Prospective large customers may enclose information as per Annexure – 1.

#### **4.6 ACCEPTANCE OR REJECTION OF APPLICATION FOR CONNECTION:**

The acceptance or rejection of Consumer's application for supply connection shall be as per JERC (Electricity Supply Code) Regulations, 2010.

#### **4.7 CONNECTION AGREEMENTS:**

A connection Agreement of Consumer shall be as per JERC (Electricity Supply Code) Regulations, 2010.

### **Chapter – 5**

#### **OPERATION CODE**

##### **5.1 OBJECTIVES:**

1. This Chapter contains the procedures and practices to be followed for a safe and efficient operation of the Distribution System by the Distribution Licensee and by the Users of the Distribution System of their electrical plant and lines which are connected to the Distribution Licensee's system. This shall also apply to any electrical interface between two Distribution Licensee's for a safe and efficient operation of interface.
2. The following aspects of operation are covered in this section:
  - (a) Demand Estimation
  - (b) Outage Planning
  - (c) Contingency Planning
  - (d) Demand Side Management and Load Shedding
  - (e) Interface with Small Generating Plant including CPPs
  - (f) Communication

- (g) Monitoring and Control of voltage, frequency and power factor.
- (h) Safety Co-ordination.
- (i) Maintenance and testing
- (j) Tools and spares
- (k) Training

## **5.2 DEMAND ESTIMATION:**

1. The Distribution Licensee shall estimate his hourly and daily Demand for his Area of Supply on the basis of relevant load curves drawn on day ahead basis subject to modifications depending upon the communication received from any specific User or caused by any contingency. This may be given to SLDC as may be required.
2. For this purpose, the concerned major Users identified by the Distribution Licensee shall furnish the required data pertaining to their demands of their installation to him.

## **5.3 OUTAGE PLANNING:**

1. The Distribution Licensee shall furnish his proposed outage programs to the SLDC on a month ahead basis.
2. The outage program shall contain identification of lines and equipment of the Distribution System proposed by Licensee.
3. The outage plan proposed by the Licensee shall come into effect only after the SLDC releases the finally agreed outage plan.
4. However at the time the line or equipment is taken out of service, the Distribution Licensee shall intimate the Transmission Licensee to facilitate in accommodating their maintenance work, if possible, even though the same is not already included in the approved plan.
5. The above procedure shall not apply under the following circumstances:
  - a) 'Emergency situations' to save plant and machinery;
  - b) In case of the unforeseen emergency situations requiring isolation of lines or equipment to save human life,
  - c) Where disconnection is to be effected on any User installation due to breach of Agreement. In this case the SLDC shall be informed wherever the load to the extent of 1 MW or more is affected.

6. Planned outages of Power System for the duration as specified in Standard of Performance for Licensee for maintenance purposes shall be intimated to the public through media including publishing in at least two largely circulated Newspapers (one in English and one in local language) of that area, two days in advance.

#### **5.4 CONTINGENCY PLANNING:**

1. A contingency situation may arise in the event of a total or partial blackout in the Transmission System. A contingency may also arise on a part of the Distribution System due to local breakdowns in the Distribution System itself. It may also arise due to a breakdown in the Apparatus of the Transmission Licensee at the point of interconnection.
2. Transmission System Failure:
  - a) In case of a total blackout at any point in the Area of Supply of Distribution Licensee, the Distribution Licensee shall follow the black start procedures framed by the Transmission Utility (STU)/SLDC.
  - b) The Distribution Licensee shall sectionalize the Distribution System into discrete blocks of demand. The Licensee shall advise and co-operate with the SLDC for the amount of MW load likely to be picked up on switching each demand block.
  - c) The Distribution Licensee shall prepare a schedule of essential and non-essential loads in order of priority at each connection to be picked up during the restoration process.
  - d) The Distribution Licensee shall ensure and maintain the load generation balance under the direction of the SLDC.
  - e) The Distribution Licensee shall maintain direct communication links with the SLDC.
  - f) The Distribution Licensee shall furnish the names and designations of the person(s) with their telephone numbers and stations, authorized to deal with contingency operations, to the SLDC, who shall co-ordinate for restoration process as per State/ Central Grid Code/ Regulations as the case may be.
3. Distribution System Failure:
  - a) Interruptions to power supply in any part of the Distribution System lasting for the period as specified in JERC (Standard of Performance) Regulations 2009 for Licensee due to breakdown in any part of the Distribution System may be termed as a Distribution System Failure.

- b) The Distribution Licensee shall evolve a restoration process for such a Distribution System Failure.

4. Failure of the Apparatus of the Transmission Licensee:

- a) The Distribution Licensee shall immediately contact the authorized person at the substation of the Transmission Licensee, and assess the probable period of restoration and the probable restriction of load drawl from the affected substation.
- b) The Distribution Licensee shall affect the demand management plan accordingly.

**5.5 DEMAND MANAGEMENT AND LOAD SHEDDING:**

1. Temporary Load Shedding may be resorted to for maintaining the load generation balance as instructed by the SLDC. This may also be necessary due to loss of any circuit or equipment or any other operational contingency.
2. The Distribution Licensee shall estimate loads that may be shed in discrete blocks at each Connection Point / Interface Point or in overall Area of Supply in consultation with the Users supplied through independent circuits as required. Such Users shall co-operate with the Licensee in this regard. The Distribution Licensee shall work out the sequence of load shedding operations and the detailed procedure shall be furnished to the person's in-charge of substations concerned where such load shedding has to be carried out. In case of automatic load shedding through under frequency relays, the circuits and the amount of load to be interrupted with corresponding relay settings shall be co-ordinated with the SLDC and persons in charge of the substations of the Distribution Licensee as necessary.
3. If the duration of unplanned load shedding to any part of the Distribution System exceeds 60 minutes, the affected Consumers having contract demand of 1MW and above may be suitably intimated. The essential services such as public hospital, public water works, sewage works, etc. shall be intimated over the telephone wherever possible.

**5.6 INTERFACES WITH SMALL GENERATING UNITS INCLUDING CPPS**

If the Distribution Licensee has an interface with any generating unit including CPP and an Agreement for this purpose exists, the Distribution Licensee and the concerned owner of the generating unit shall abide by the following provisions in addition to the provisions contained in this Code as applicable to all the Users:

- a) The owner shall provide suitable protection at the interface to protect his system from any damage due to normal and abnormal conditions in the Distribution System.

- b) In case of induction generator, the owner shall take adequate precautions to limit the system disturbances, when the induction generator is synchronized in consent with the Distribution Licensee. Induction generators shall be installed with adequate capacitors to compensate the reactive power drawl. Also whenever the power factor is found very low during starting period and causes voltage dip in the Licensee's system the Licensee may advise the owner to install capacitors and the owner shall comply. Failure to comply entails penalty and/or disconnection from the system as per provision of rules and Acts.
- c) The owner shall comply with the provisions of the (State / Central) Grid Code / Regulations as the case may be.

#### **5.7 COMMUNICATION:**

Reliable communication links viz telephone, fax, teleprinter, etc. shall be established for exchange of data, information and operating instructions between the Licensee, Consumer with a demand of 1 MW and above and the SLDC. Each constituent shall ensure installation and maintenance of proper communication infrastructure at his end.

#### **5.8 MONITORING AND CONTROL OF VOLTAGE, FREQUENCY AND POWER FACTOR:**

1. The Distribution Licensee shall monitor the voltage, frequency and power factors in the Distribution System at different points at peak and off-peak hours and take reasonable measures for improvement of the same in co-ordination with the Users with demand of 1 MW and above, and the Transmission Licensee.
2. The Distribution Licensee shall take power factor improvement measures at strategic points in the Distribution System by carrying out system studies and installing the required reactive compensation equipment.
3. The voltage in the Distribution System may vary depending upon the available generation, system demand, and the configuration of Transmission and Distribution Systems at any time. Under normal operating conditions the Licensee shall exercise proper voltage management in the Distribution System beyond the point of connection with the Transmission System to maintain voltage at all levels according to the quality of supply mentioned in the Distribution System Planning and Security Standard as mentioned under Attachment –1 of this code. The capacitors, wherever available in the Grid substations shall be operated to maintain reactive compensation to be within acceptable limits of power factor of at least 0.9 keeping the bus voltage in view.
4. Users having loads with high harmonic content, low Power Factor and fluctuations shall install appropriate correction equipment.

5. The Distribution Licensee shall abide by the instructions issued by the SLDC from time to time on load management for maintaining the frequency of supply within the specified limits.

## **5.9 SAFETY CO-ORDINATION**

1. The Distribution Licensee and the Users and any other Distribution Licensee having common electrical interface with the Licensee shall designate suitable persons to be responsible for safety co-ordination. These persons shall be referred to as Control Persons. Their designations and telephone numbers shall be exchanged between all the concerned persons. Any change in the list shall be notified promptly to all the concerned.
2. The Distribution Licensee and such Users shall prepare safety manuals incorporating all the safety precautions to be taken for each component of the Distribution System. All the safety rules and precautions shall be observed when work is to be carried out on any line or apparatus, switchgear or circuits in any part of the Distribution System or in any part of the User System. The safety manuals thus prepared shall be issued to all the control persons and such Users for compliance.
3. There shall be co-ordination between persons of the Distribution Licensee and the Users, between persons of two Distribution Licensees having electrical interfaces, for carrying out the work on any apparatus or lines etc., belonging to either party at the point of interconnection.
4. The provisions of the (State / Central) Grid Code / Regulation (as the case may be) shall be followed at Connection Points/ Interface Points in co-ordination with the Transmission Licensee.
5. The disconnecting device(s) at each electrical interface, which shall be capable of effectively disconnecting the system of the Distribution Licensee and the other Users, and the grounding devices of the respective systems at the control boundary shall be identified and marked by the Licensee and the respective Users. These shall be maintained in good condition at all times. To prevent inadvertent switching operations by unauthorized persons, such disconnecting devices shall be provided with interlocks.
6. Wherever any Consumer has installed an emergency power supply system, either an electronic system with storage batteries or with generators, the arrangement shall be such that the same cannot be operated without clearly isolating the system from the supply mains. The responsibility of making the required arrangement for isolation from supply mains shall be of the User and this shall be part of the electrical layout submitted to Electrical Inspector for his approval. The possibility of a feedback from these devices to the Distribution System from any of the conductors, including the neutral conductor shall be clearly ruled out.

7. The appropriate Control Person at the electrical interface shall issue written permission to his counterpart for carrying out the work on any apparatus, switchgear or lines beyond the electrical interface. Such permissions shall be termed as "Permit to Work" (PTW). The format for PTW shall be standardized by the Distribution Licensee and shall be used by all concerned.
8. The Distribution Licensee in consultation with the concerned User shall frame checklist of operations to be carried out and the procedures for safety coordination for each electrical interface, before issue and return of PTWs. Such procedures and checklists shall be issued to all the concerned by the Licensee for implementation.

#### **5.10 MAINTENANCE AND TESTING**

1. The Distribution Licensee shall prepare maintenance schedules for lines and equipment to meet the level of maintenance as required in the "Distribution System under Power System Management and Operating Standard" and "Distribution System under Power System Safety Standard".
2. Regular testing of all the equipments, such as transformers, switchgear, protective relays etc., should be carried out as recommended by the manufacturers and the relevant code of practices issued by the Bureau of Indian Standards and CBIP. These shall be carried out at the prescribed intervals and the test results shall be recorded in the maintenance registers. Wherever the test results indicate a decline in the insulation resistance and/or deterioration of the equipment, preventive maintenance shall be carried out to ensure serviceability, safety and efficiency.
3. The Distribution Licensee shall maintain well trained hot-line personnel, and all the required tools in good condition, and conduct the maintenance work by using hot-line technique, wherever possible, to reduce the period of interruption.
4. The Users shall maintain their Apparatus and Power Lines at all times conforming to I.E. Rules 1956 which are in force for time being and will be replaced by new rules made under Electricity Act, 2003 and shall be suitable for being connected to the Distribution System in a safe and reliable manner.

#### **5.11 TOOLS AND SPARES**

1. The Distribution Licensee shall ensure availability of proper tools and tackles at all work places for carrying out the maintenance. The tools and tackles shall be checked from time to time and their serviceability shall be ensured.
2. The Distribution Licensee shall maintain an inventory of spares required for maintenance and replacement purposes at suitable locations according to a clear policy to be laid down by the Licensee.

#### **5.12 TRAINING**

The Distribution Licensee shall make appropriate arrangements for imparting training to his workmen and supervisory staff, incorporating up-to-date techniques of Distribution System design, construction and maintenance, safety, consumer services etc. He shall frame a suitable syllabus for this purpose.

## Chapter – 6

### METERING AND PROTECTION CODE

#### 6.1 OBJECTIVES:

The Chapter specifies the procedure for metering in Distribution System with respect to operational metering as well as tariff and commercial metering. This section also specifies the general guidelines for protection of Distribution system. Provided that the regulations on Installation and Operation of Meters made by Central Electricity Authority, if any, shall prevail over provisions 7.2 to 7.4 of this Distribution Code.

#### 6.2 OPERATIONAL METERING:

The minimum requirement of operational metering at Distribution System substations shall be as follows:

##### (a) Grid substation

- 66 / 33 kV bus voltage
- 33 / 22 / 11 kV bus voltage
- 66 / 33 / 22 / 11 kV incoming / outgoing current in each phase and each circuit
- Power transformer primary and secondary currents in each phase of every transformer.
- HT outgoing feeder current in each phase for each feeder.
- Power factor in each HT feeder.
- Load survey meters having memory duration of at least 45 days for all the incoming and outgoing feeders.
- Facility to record energy in MWH and frequency at interval of 15 minutes at point of connection with Transmission Licensee.

##### (b) User's System with Demand of 1 MW and above

- Voltage
- Current
- Load
- Power Factor
- Energy

#### 6.3 TARIFF AND COMMERCIAL METERING:

1. Tariff metering shall be provided at each point of interconnection between the Distribution and Transmission Systems in accordance with the Central / State Grid Code as the case may be and the Transmission Services Agreement thereof.



2. Tariff metering shall be provided at the Connection Points/ Interface Points between the User's system and the Distribution System and shall be governed by the provision in the Distribution Services Agreement.
3. All the meters, instrument transformers (CT/PT), metering cubicles and testing procedures shall conform to the relevant Indian Standard Specification and relevant provision made under the Electricity Act, 2003.
4. The CT/PT deployed for metering of energy supplied to the Consumers shall be of class 0.2 accuracy. However, in case of rating of instrument transformers in service, which are of 0.5 class, which may continue to be used. These shall also conform to relevant IEC or IS specifications. On failure, the same shall be replaced by suitable CT/PT of 0.2 class accuracy after exhausting the CT/PT of 0.5 class accuracy (as available in their inventory). It is desirable that the Distribution Licensee shall purchase new CT/PT of 0.2 class accuracy.
5. The open access consumer, Generating company, Distribution licensee and traders shall provide Meters, as may be specified by the Commission for such consumer based on voltage, point and period of supply and tariff category (as also incorporated in JERC (State Grid Code) Regulations 2010).

#### **6.4 MEASUREMENT OF ENERGY IMPORT/ EXPORT:**

1. The Distribution Licensees shall install the following meters for all of their sub-transmission lines connecting the generating stations, and substations for the measurement of energy import/export from each Connection Point/ Interface Point, energy generated in generating units and energy consumed in power stations and substations:
  - (a) Active energy import.
  - (b) Active energy export.
  - (c) Reactive energy import.
  - (d) Reactive energy export.

Each metering point associated with the determination of energy exported or imported, between the Generating Companies, Transmission Licensees and Distribution Licensees shall be provided with both main and check meters. The minimum standard of accuracy of these meters shall be of accuracy class 0.2. These meters shall conform to the relevant IEC or IS specifications. However, the Distribution Licensee shall continue to use the available meters, until not exhausted in their inventory. However, the meter purchased after implementation of this code, the Distribution Licensee shall purchase the meter of 0.2 class accuracy.

2. All the instrument transformers used in conjunction with commercial (tariff) metering shall also be of accuracy class 0.2 and conform to the relevant IEC or IS specifications. The rating shall be suitable for catering the burdens of lead wires and metering. However, in case of rating of instrument transformers in service,

which are of 0.5 class, which may continue to be used. These shall also conform to relevant IEC or IS specifications. On failure, the same shall be replaced by suitable CT/PT of 0.2 class accuracy after exhausting the CT/PT of 0.5 class accuracy (as available in their inventory). It is desirable that the Distribution Licensee shall purchase new CT/PT of 0.2 class accuracy.

3. Data collection shall be used to integrate impulses from meters over each integration period as per agreement, store values, and to transmit the same to the data collection system of the Distribution Licensee. Data shall be collected from both the main and check metering schemes.
4. Voltage failure relays shall be provided to initiate alarm on loss of one or more phases of the voltage supply to the meter.
5. Main and check meters shall be provided at all Connection Points/ Interface Points. All the meters shall be tested and calibrated according to the guidelines provided in the relevant IEC/IS specifications at least once a year and also whenever the difference in readings between the main and check meters exceed 0.5%.
6. Records of these calibrations and tests shall be maintained for reference.
7. The Generating Companies, Transmission Licensees and Distribution Licensees shall formulate and agree upon a procedure covering summation, collection and processing of tariff meter readings at various interconnection sites of their area. Whenever necessary, these procedures can be revised.
8. The ownership, responsibility of maintenance and testing of these meters shall be as mutually agreed to between the Users and the concerned Licensees.
9. The term 'Meter' shall include Current transformers, voltage/potential transformers, wiring between them and meter box/panel.

#### **6.5 PROTECTION SYSTEM:**

1. No item of electrical equipment shall be allowed to remain connected to the system unless it is covered by the appropriate protection aimed at reliability, selectivity, speed and sensitivity. The Distribution Licensees shall cooperate with the Transmission Licensee to ensure correct and appropriate settings of protection to achieve effective, discriminatory isolation of faulty line/equipment within the time target clearance specified by the Transmission Licensee.
2. Protection settings shall not be altered, or protection bypassed and/or disconnected without consultation and agreement of all the affected Users. In case the protection has been bypassed and/or disconnected by agreement due to any cause, the same should be rectified and protection restored to normal condition as quickly as possible. If agreement has not been reached, the electrical equipments shall be isolated forthwith.

3. The settings of protective relays for 33 kV, 22 kV and 11 kV lines shall be such that a fault in any section does not affect the section between the generating unit and the faulty section under all conditions. The Transmission Licensee shall notify the initial settings and any subsequent changes to the Users from time to time. Routine checks on the performance of the protective relays shall be conducted and any malfunction shall be noted and corrected as soon as possible. Short circuit studies required for deciding the relay settings shall be conducted by the Licensee with the data collected from the Transmission Licensee and the Users. Representatives of the Generating Companies, Transmission Licensees and Distribution Licensees shall meet periodically to discuss such malfunctions, changes in the system configuration, if any, and possible revised settings of relays.
4. The Transmission Licensee shall be responsible for arranging periodical meetings between the Generating Companies and the Distribution Licensees to discuss coordination of protection. The Transmission Licensee shall investigate any malfunction of protection or other unsatisfactory protection issues. The concerned Licensees shall take prompt action to correct any protection malfunction or other unsatisfactory protection issue as discussed and agreed to in these periodical meetings.
5. All generating units and all associated electrical equipment of the Generating Company connected to the Distribution System shall be protected by adequate protection, as per CBIP manual, so that the system does not suffer due to any disturbances originating at the generating unit.
6. Distribution System:- For Power Transformers of HV class in the Distribution System, differential protection shall be provided for 10 MVA and above along with backup time lag over current and earth fault protection with directional feature for parallel operation. Transformers of 1 MVA and above but less than 10 MVA shall be protected by time lag over current and earth fault. . In addition, all power transformers shall be provided with gas operated relays, winding and oil temperature alarm and protection.
7. Distribution lines: - All the 33 kV, 22 kV and 11 kV lines at Connection Points / Interface Points shall be provided with a minimum of over current and earth fault relays as follows:
  - a) Plain radial feeders: Non-directional time lag over current and earth fault relays with suitable settings to obtain discrimination between adjacent relay settings.
  - b) Parallel/ring feeders: Directional time lag over current and earth fault relay.

#### **6.6 FIRE PROTECTION:**

All adequate precaution shall be taken and protection shall be provided against fire hazards to all apparatus in the System conforming to the relevant Indian Standard Specifications and/or provisions of under other relevant rules as amended from time to time.

## Chapter - 7

### CROSS BOUNDARY SAFETY CODE

#### 7.1 OBJECTIVE:

The objective of this section is to achieve an agreement on the principles of safety when working across a control boundary between the Distribution Licensee and the Users.

This chapter specifies the requirements for safe working practices for maintenance of equipment associated with cross boundary operations and lays down the procedure to be followed when the work is carried out on electrical equipment connected to another User's System. User may mean another Licensee so that this Code applies for safety across the boundary between two Licensees also, by substituting "another Licensee" for User.

#### 7.2 CONTROL PERSONS AND THEIR RESPONSIBILITY:

The Distribution Licensee and all the Users (comprising Generation Companies, Transmission Licensees and consumers having load above 1MW or dedicated line) shall nominate suitably authorized and technically qualified persons to be responsible for the co-ordination of safety across their boundary. These persons shall be referred to as "Control Persons".

#### 7.3 PROCEDURE:

1. The Distribution Licensee shall issue a list of Control Persons with their names, designations, addresses and telephone numbers, to all the Users having direct control boundary with him. This list shall be updated promptly whenever there is any change of name, designation or telephone number of any Control Person named in the list.
2. All the Users such as mentioned in 8.3.1 having a direct control boundary with the Distribution Licensee shall issue a similar list of their Control Persons to the Licensee. This list shall be updated promptly whenever there is any change of name, designation or telephone number of any Control Person named in the list.
3. Whenever any work across a cross boundary is to be carried out by the User or the Distribution Licensee, the Control Person of the User or the Licensee as the case may be, who has to carry out the work, shall directly contact his counterpart. Code words shall be agreed to at the time of work to ensure correct identification of both the parties. Contact between Control Persons shall normally be made by direct telephone.
4. If the work extends beyond one shift, the Control Person shall hand over charge to

the relief Control Person and fully brief him on the nature of work and the code words in the operation.

5. The Control Persons shall co-operate to establish and maintain the precautions necessary to be taken for carrying out the required work in a safe manner. Both the established isolation and the established earth shall be kept in the locked positions wherever such facilities exist, and these shall be clearly identified.
6. The Control Person in charge of the work shall satisfy himself that all the safety precautions to be taken are established before commencing the work. He should issue the safety documentation to the working party to allow the work to commence.
7. After the completion of the work, the Control Person in charge of the work being carried out should satisfy himself that the safety precautions taken are no longer required, and shall make a direct contact with his counterpart Control Person and request removal of the safety precautions. The equipment shall be declared as suitable for return to service only after confirmation of removal of all the safety precautions, by direct communication, using the code word contact between the two Control Persons, and the return of agreed safety documentation from the working party.
8. The Distribution Licensee shall develop an agreed written procedure for Cross Boundary Safety and continuously update the same.
9. Any dispute concerning Cross Boundary Safety shall be resolved at the level of transmission licensee, if transmission licensee is not a party. In case where transmission licensee is a party, the dispute shall be referred to the Commission for resolution of the dispute.

#### **7.4 SPECIAL CONSIDERATIONS:**

1. All the equipment on Cross Boundary Circuits, which may be used for the purpose of safety co-ordination and establishment of isolation and earthing, shall be permanently and clearly marked with an identification number or name being unique to the particular sub-station. These equipments shall be regularly inspected and maintained in accordance with the manufacturer's specifications.
2. Each Control Person shall maintain a legibly written safety log, in chronological order, of all operations and messages relating to the safety co-ordination sent and received by him. All these safety logs shall be retained for a period of not less than ten years.
3. As far as possible each of the Distribution Licensees shall maintain an updated map of his system pertaining to the area fed by each substation. Otherwise the schematic diagram of the system for 11kV and above shall be maintained and exhibited in the concerned area offices of the Distribution Licensee.

## Chapter - 8

### INCIDENT/ACCIDENT REPORTING

#### 8.1 OBJECTIVE

This Chapter covers procedure of major incident / accident reporting (which occur in Distribution System) by User to Licensee and Licensee to User and Commission.

#### 8.2 MAJOR INCIDENT OR ACCIDENT REPORTING:

1. The Distribution Licensee shall send a preliminary report to Commission all the significant Incidents in the Licensee's Area of Supply, which results in interruption to service, substantial damage to equipment or loss of life or significant injury to human beings within one week of its occurrence followed by a detailed report within one month.
2. The Distribution Licensee and the Users shall establish a format and procedure for exchange of information.
3. The Users shall furnish information to the Distribution Licensee regarding any major incident occurring in their Systems promptly.

#### 8.3 REPORTING PROCEDURE

1. All reportable incidents occurring in the lines and equipments of 11 kV and above substations shall be promptly reported orally by the Licensee whose equipment has experienced the incident, to all other significantly affected Users identified by the Distribution Licensee and the Transmission Licensee. The reporting Distribution Licensee should submit a written report to the Transmission Licensee within one hour of such oral report. If the reporting incident is of major nature, the written report shall be submitted within two hours duly followed by a comprehensive report within 48 hours of the submission of the initial written report. In other cases, the reporting Distribution Licensee shall submit a report within five working days to the Transmission Licensee.
2. The Transmission Licensee shall call for a report from any Distribution Licensee on any reportable incident affecting other Users and particularly in case such User whose equipment might have been a source of the reportable incident does not report the same. However this shall not relieve any User from the obligation to report Events in accordance with Rules framed under relevant provision made under Electricity Act, 2003. The format for such a report shall be as per the approval of the Distribution Code Review Panel and shall typically contain the following:
  - a) Location of the incident,
  - b) Date and time of the incident,
  - c) Plant or Equipment involved,

- d) Supplies interrupted and the duration wherever applicable,
  - e) Amount of Generation lost, wherever applicable,
  - f) System Parameters before and after the incident, (Voltage, Frequency, Load, Generation, etc.)
  - g) Network configuration before the incident,
  - h) Relay indications and performance of protection,
  - i) Brief description of the incident,
  - j) Estimated time of return to service,
  - k) Any other relevant information,
  - l) Recommendations for future improvement,
  - m) Name and designation of the reporting person.
3. The report shall contain sufficient detail to describe the event to enable the recipient to assess the implications and risks arising out of the same. The recipient may ask for clarifications and additional information wherever necessary and it is obligatory that the reporting User shall put his best efforts and provide all the necessary and reasonable information.
  4. In case of a request by either party, the oral report shall be written down by the sender and dictated by way of a telephone message or sent by Fax/e-mail to the recipient. In case of an emergency the report can be given only orally and followed by written confirmation.
  5. Reporting of accidents shall be in accordance with the rules framed under relevant provision made under Electricity Act, 2003 or other applicable rules. Till such rules are made, the Distribution Licensee shall follow reporting of accidents as mentioned in Power System Safety Standard (Indian Electricity Rule 1956) as per Annexure 4 to these regulations.

## **DISTRIBUTION SYSTEM PLANNING AND SECURITY STANDARD**

### **1. OBJECTIVE**

- 1 The Distribution System Planning and Security Standard specifies the guidelines for planning methodology of the Distribution System. The scope of this standard covers:
  - (a) Quality of power supply
  - (b) Load forecast
  - (c) Planning procedure.
  - (d) Service area of a distribution network.
  - (e) Planning standards.
  - (f) Reliability analysis.
  - (g) Standardisation of design of distribution transformer
  - (h) Standardisation of substation layouts
  - (i) Reactive Compensation
  - (j) Service Mains
  - (k) Metering Cubicles
  - (l) Security Standards

### **2. QUALITY OF POWER SUPPLY**

1. Frequency: The rated frequency shall be 50 Hz. All the constituents of the Power System shall make all possible efforts to ensure that the grid frequency remains within the bandwidth of 49.0 -50.5 Hz.
2. Voltage: - The voltage at any point of the system under normal operating conditions shall not depart from the declared voltage by more than the values specified under IS Specification.
3. Harmonic content: - As per IEEE recommendations, the total harmonic content in the supply voltage for sensitive loads shall not exceed 5 percent, with any single harmonic content not exceeding 3 percent. The respective User responsible for generating harmonics and affect the distribution system shall be responsible for corrective action.

### **3. LOAD FORECAST:**

- 1 The Distribution Licensee shall prepare a rolling short - term load forecast annually for a period of five years in his Area of Supply duly estimating the probable load growth and the consumption pattern of the Consumers. The forecast thus made shall be updated every year depending on the actual load that has come in that year and the changes in assumption, if any, required for the next years.
- 2 Preliminary Load Estimation/Assessment:
  1. Domestic and Commercial Loads: The consumption in domestic and commercial sectors shall be estimated on the basis of the number of Consumers and their



specific consumption. The past growth rate in the number of Consumers in the area shall be studied. In cases where power shortages have been experienced in the recent past, the growth rate to be adopted shall take into consideration the appropriate demand making due allowance in the growth rate to account for increased tempo of household electrification envisaged in the future. The higher level of electrification planned in the area should be kept in view. Energy consumption per Consumer shall be estimated after studying the past trends and taking into account the anticipated improvements in the standard of living.

- (a) Public Lighting and Water Works: The estimates of electricity consumption in public lighting and water works shall be based on the average consumption per kilowatt of connected load, projected on the basis of trends, keeping in mind the likely increase in public lighting and water supply facilities. The number of hours of operation shall be estimated taking into account the past trends and the power cuts if any effected in the area.
- (b) Agricultural Loads: The power requirement for irrigation pump sets shall be based on the program of energisation of pump sets in the plan period, available resources and the ultimate ground water potential. The average capacity of pump sets shall be worked out considering the mid-year figures for connected load and the number of pump sets. The consumption per IP set per year shall be estimated by means of representative sample studies till all the IP sets are metered.
- (c) Industrial Loads: The power requirements for industrial sector shall be estimated under following three categories, viz.
  - (a) L.T. Industries;
  - (b) H.T. Industries with a demand of less than 1 MW;
  - (c) H.T. Industries with a demand of 1 MW & above.

The consumption in category (a) & (b) shall be on the basis of historical data duly considering the developments in future. In case of category (c), projection shall be made separately for each industrial unit on the basis of the information furnished by the industrialists and the Department of Industries.

- 3 Non-industrial Bulk Supply: The available data regarding the consumption of bulk supply to non-industrial Consumers such as research establishments, port trusts, military engineering services, supply to power projects etc., and the probable future developments in these areas, shall be considered for the forecast.
- 4. Other Loads: For other loads, the projections shall be based on the best Judgment.

#### **4. LOAD FORECAST PROCEDURE**

- 1. Load forecasting methods using the above data and relevant indices by adopting one of the suitable methods applicable to specific locations and prevailing conditions shall be adopted.

2. In addition to the above, the effects of demand side management, requirement of power for pending applications, the increase in demand due to improvement in the operating frequency close to 50 Hz shall also be estimated. The Distribution Licensee shall work out Peak Demand for each of the succeeding five years relating to Connection Point/ Interface Point with the Transmission System as well as the annual Energy Demand and Peak Demand for each of the succeeding five years for overall Area of Supply on the basis of Load forecast. However, if the Distribution Licensee receive power at a number of Connection Points / Interface Points in a compact area, which are interconnected in a ring, then such Distribution Licensee shall forward the overall short term Demand forecast at each Connection Point / Interface Point with the variation or tolerance as mutually discussed and agreed upon with the Transmission Utility or SLDC.
3. The diversity factor of each category of Consumers fed in the Area of Supply shall be worked out by installation of load survey meters at selected typical locations. A record of such data shall be maintained and continuously updated. The short-term load forecast for a period of five years, based on these data shall be prepared.

## **5. PLANNING PROCEDURE**

The Distribution System shall be planned and developed in such a way that the system should be capable of catering the requirement of all categories of Consumers with a safe, reliable, economical and quality supply of electricity as indicated in clause 2.0 of this section. However the Consumer shall extend full support to the Distribution Licensee to enable the Distribution Licensee for quality supply of electricity. The Distribution System shall conform to the statutory requirements of all the relevant code, standards and acts in force.

## **6. PLANNING STANDARDS**

- 6.1 Standardization of Sizes and Ratings: Adequate provision for future load development shall be made while selecting the sizes of power conductors and rating of distribution transformers. The sizes of power conductors, insulators, lightning arresters, transformers, switchgear, etc. used in the Distribution System shall be standardized with the objective of reducing inventory and standard specifications shall be prepared.

### Design Criteria for Distribution Lines

1. Radial system of distribution can be adopted in rural areas and as far as possible loop system with provision for feeding from at least one alternate source shall be adopted in urban areas.
2. The HT and LT distribution lines shall be any of the following types according to the necessity at the required area.
  - (a) Over-head line with bare conductors;
  - (b) Over-head line with Aerial Bunched Cables;
  - (c) Under-ground Cables.

3. In thickly populated cities, in areas having heavy traffic densities, underground cable installation shall be considered to the extent possible. Wherever a number of trees are encountered, either in residential locations or in gardens and forests, over-headlines with aerial bunched cables shall be adopted. In other places over-headlines with bare conductors shall be adopted. The following standards shall be adopted for planning and design purposes:
  - (a) The design and construction of over-headlines with bare conductors shall be generally in accordance with IS 5613 Part I, sections 1 and 2.
  - (b) Vertical configuration of conductors for LT distribution lines, to prevent accidental short circuit due to galloping of conductors, shall preferably be adopted in rural areas since the spans are large in such areas.
  - (c) The maximum length of LT and HT lines shall be maintained within the prescribed limit so as a safe and quality power may be delivered.
  - (d) The design and construction of over-headlines with aerial bunched cables shall be generally in accordance with REC Specifications 32 and IS 14255.
  - (e) The design and construction of under-ground cables shall be generally in accordance with IS 1255.
4. The line supports can be of steel, wood, RCC or PCC. The RCC and PCC poles are preferred over the other two considering their cost and longer life. The choice of the size of conductor for a line shall be made based on the following criteria:
  - (a) Power to be transmitted and the techno-economic studies conducted for selecting the size of conductor according to the cost of loss of power and the interest and depreciation charges on the cost of the conductor thus selected;
  - (b) Length of Line;
  - (c) Line Voltage;
  - (d) Permissible voltage regulation;
  - (e) Mechanical strength;
  - (f) In coastal areas and other areas where severe corrosion is expected due to heavy rainfall and/or salinity in atmosphere and theft prone areas, appropriate conductors only shall be used.

## 6.2 Standardisation of Design and Rating of Distribution Transformers

1. The design and rating of distribution transformers shall be standardised. As an initial step, the various technical parameters required for the design shall be incorporated in the specifications based on the experience on performance gained among the various designs so far adopted. Later, standard designs of the transformers and their detailed construction drawings shall be evolved based on the performance of these transformers. These shall be adopted for future procurement. This also ensures the inter-changeability of components of similar transformers manufactured by any manufacturer.
2. A good quality assurance plan shall be aimed at the following:

- (a) Good quality of raw materials;
- (b) Quality control during manufacturing and routine tests;
- (c) Acceptance tests at the time of taking delivery;
- (d) Inspection and tests on transformers received at stores on random sampling;
- (e) Thorough test on one transformer in a lot selected at random. The transformer should be completely dismantled. The qualities of core, coil, insulation etc are physically inspected and samples of insulation and other components used etc., are tested.
- (f) Ensuring performance guarantee for all distribution transformers for a minimum period of 3 years.

### 6.3 Standardisation of Sub-Station Layouts

The Distribution Licensee shall develop standard layouts following relevant standards, manuals and provisions of Electricity Act, 2003. The Licensee shall also adopt latest technology as well as feedback from the experience gained.

### 6.4 Reactive Compensation

- 1 Shunt capacitors un-switched/switched type, shall be installed at the appropriate places in the Distribution System for power factor improvement, maintaining satisfactory voltage profile and reduction of sub-transmission and Distribution losses. The size and location of the capacitor installations shall be determined using an appropriate program, with reliable field data. Suitable precautionary measures, such as automatic switching etc., shall be adopted to avoid over voltages at light load periods.
- 2 Optimization studies of shunt compensation shall be conducted by the Distribution Licensee to determine the most appropriate sizes and locations for shunt capacitor installations.

### 6.5 Service Area of a Distribution Network

1. The service area of a distribution network is an area in which the load is supplied by a substation by one or more number of feeders, as required. The distribution network fed from the distribution transformers and the substations from which the 11 kV feeders emanate shall be initially planned as independent networks within their respective service area. Further, wherever possible, provision shall be made for interconnection with adjacent networks and/or substations for an alternate supply in case of failure. The design of distribution lines shall incorporate features to enable their augmentation in future, with minimum interruption to power supply. The existing right of way shall be fully exploited.
2. The Distribution Licensee shall take suitable measures, sufficiently in advance, to augment the capacity of the feeders in the event the voltage regulation limit is exceeded within the area.
3. Appropriate software to compute the design of the distribution network shall be

used to obtain lowest possible energy losses for different loading conditions for the following:

- (a) The location and the capacity of the distribution transformers;
- (b) Routing of LV and HV networks;
- (c) The sizes of conductors;
- (d) The ratio of the lengths of HT and LT distribution lines for the new lines planned shall be optimized and the existing Distribution System shall be modified in a phased manner to reduce the distribution losses.
- (e) The voltage regulation limits for all loading conditions.

## 6.6 Service Mains

The service mains to Consumers shall be laid in accordance with relevant REC

Construction Standards for 230 V single phase and 400 V three phase supply and shall conform to the provisions of Relevant Rules under Electricity Act, 2003.

## 6.7 Metering Cubicles

1. The metering for 230 V single-phase supply shall be provided on a suitable board, located in such a place protected from sun and rain and shall be in a convenient position for taking readings. The terminals of the meter shall be made tamper-proof and sealed. For 400 Volts three phase supply, the meters and associated metering equipment including connections shall be enclosed in a suitable tamper-proof box. The tamper-proof box shall be of sufficient strength and design with locking and sealing devices and shall have adequate provision for heat dissipation with the required electrical clearances. The design shall permit readings to be taken without access to the meter or its connections.
2. For HT Consumers the meters, maximum demand indicators, and secondary connections, shall be housed in a separate compartment and other secondary apparatus such as instrument transformers and connections required shall be housed in a separate metering compartment, which shall be locked / sealed to prevent tampering.
3. The HT metering cubicle shall be suitable for cable entry on both sides or at least on one side. No fuses are permitted in the secondary circuits of the instrument transformers. The metering cubicle shall be painted with suitable epoxy paint for installation in coastal areas and other areas experiencing heavy rainfall. The instrument transformers shall be of fixed ratio and shall not have any taps. The primary current rating of the current transformers shall match with the normal full load current and the saturation point of the core shall be higher than the maximum current that may occur due to simultaneous full load operation of all the connected equipment and machinery.

4. For EHT Consumers, the secondary terminals of the instrument transformers shall be locked and sealed and the secondary wires brought out in a suitable GI conduit pipe upto the metering panel. There shall be no joints in the conduit pipes. The meters shall be as close to the instrument transformers as possible and in no case shall exceed ten (10) meters. The metering panel shall be housed in a weatherproof and tamperproof box and sealed.

## **7. RELIABILITY ANALYSIS**

1. The planning of the extension and improvement to a Distribution System shall also take into consideration the improvement in reliability of power supply to Consumers. The appropriate reliability indices of power supply in the area fed by the Distribution System before and after the implementation of the extension and improvement program shall be estimated. The planning of the distribution system shall also take into consideration the improvement in reliability and efforts should be made to collect the data in this regard.
2. The following factors, which affect reliability indices, shall be considered subject to availability of data:
  - (a) Momentary incoming supply failures
  - (b) Momentary interruptions on 22 and 11 kV feeders
  - (c) Breakdown on LT feeders
  - (d) Prearranged shutdowns on lines and feeders
  - (e) Blowing out of distribution transformer fuses
  - (f) Individual fuse off calls

## **8. STANDING COMMITTEE FOR DESIGN, CONSTRUCTION AND MAINTENANCE PRACTICES.-**

1. Standing Committee for design, construction and maintenance practices shall under the chairmanship of the technical Member/Director of the licensee be constituted by the licensee, within one month w.e.f. the commencement of this Code and shall comprise of-
  - (a) the senior most Engineer (Planning) of the licensee
  - (b) the senior most Engineer (Materials Management) of the licensee
  - (c) the senior most Engineer (Design and Planning) of the STU ; and
  - (d) any other person as the licensee may deem appropriate.
2. The Standing Committee shall be an advisory body having perpetual term and shall hold its meeting at least once in each quarter. The Standing Committee shall suggest and make recommendations to the licensee on matters amongst others in the following areas:-
  - (a) to review and suggest the latest practices on design and technical specifications of line materials, meters and metering equipment, service line

materials, sub-station equipments like transformers, circuit breakers, CT/PT sets etc;

- (b) to suggest vendor selection and short listing procedures for various equipments and materials being used in bulk;
- (c) to suggest best industry practices and innovative techniques for construction, operation, maintenance of HT / LT lines and Grid Sub-stations, Pole mounted and other plinth mounted sub-stations etc;
- (d) to recommend and suggest the latest technology up gradation and process such as IT tools and SCADA and other Control System;
- (e) to recommend embargo and restrictions on dangerous, unhygienic practices and material from point of view of safety, environmental up-keep and pollution norms.

## **9. SECURITY STANDARDS**

1. The Distribution System shall be planned and maintained so as to fulfill the following security standards except under Force Majeure conditions beyond the reasonable control of the Distribution Licensee.
2. The feeders, either HT or LT, feeding important loads such as hospitals, crematoria, airports, railway stations, and the like shall be planned to have a selective switching system, so that selective switching can be operated to transfer the load on to an alternate healthy feeder. Appropriate safety precautions shall invariably be taken in this regard. In case of failure of the feeder, these switches shall be operated immediately either manually or automatically depending on the importance of the load.
3. The feeders connected to important industries which are very sensitive to interruption of even short duration shall be planned to have automatic switchover to an alternate healthy feeder in case of failure of supply.
4. Loading in any current carrying component of the Distribution System (e.g. Conductors, joints, transformers, switchgear, cables and other apparatus) shall not exceed 75% of their respective thermal limit.
5. The rupturing capacity of the switchgear employed in the system shall have at least 25% more capacity than the short circuit level computed even considering the anticipated future development of the system.
6. Provision shall be made for every HT feeder, either primary or secondary, to manually switch over to the immediately available HT feeder of the same voltage class available in the vicinity. Provision shall be made in the design itself for any HT feeder to share at least 50% of the loads in the adjacent feeder during emergencies.
7. In case of single contingency; failure of any substation equipment controlling any outgoing 11 kV feeder, the load interrupted shall not generally exceed 50% of the total demand on the substation. The Distribution Licensee has to bring it down to 20% within a period of three years.

8. There shall be adequate stand by capacity in the system.
9. The design of the Distribution System shall accommodate the arrangements in such a way that the electricity supply need not be interrupted for more than the specified duration as per JERC (Standard of Performance) Regulations 2009 of Licensee in case of breakdown of any distribution transformer. Similarly in case of failure of 11 kV feeders including terminal equipment, the design shall accommodate an arrangement for the power supply not to be interrupted to the extent possible.

#### **10. CONSTRUCTION PRACTICES .-**

1. All electric supply lines and apparatus shall be of sufficient ratings for power, insulation and estimated fault current and of sufficient mechanical strength, for the duty, which may be required to be performed under the environmental conditions of installation, and shall be constructed, installed, protected, worked and maintained in such a manner as to ensure safety of human beings, animals and property.
2. The relevant Code of Practices of the Bureau of Indian Standards, REC Standard, including National Electrical Code, if any, may be followed. The material and apparatus used shall conform to the relevant specification of the Bureau of Indian Standards where such specifications have been already laid.
3. The licensee and the User shall prepare and observe the Construction and Maintenance Manuals for various equipment/works for HT / LT Lines and Grid / Switching sub-stations. The Construction and Maintenance Manual shall be prepared taking into consideration the following:-
  - (a) Technical Standards for construction of electrical plants, electric lines and connectivity to the grid specified by the Central Electricity Authority under Clause (b) of section 73 of the Electricity Act 2003;
  - (b) Safety requirements for construction, operation and maintenance of electrical plants and electric lines specified by the Central Electricity Authority under Clause (c) of section 73 of the Act ;
  - (c) REC Construction Standards and Standard Design Layouts;
  - (d) CBIP Publications on Code of Practices;
  - (e) Code of Practices issued by the Bureau of Indian Standards for various equipment and maintenance practices; and
  - (f) Instruction Manuals for installation, operation and maintenance issued by standard equipments manufacturer concerned.
4. The standard tables for conductor size, fuse size, wire gauge, electrical clearance, ground wire size, insulation resistance and earth resistivity etc. shall be included in the Construction and Maintenance Manuals. The licensee shall ensure that its construction and maintenance staff strictly observe these Manuals. The copy of Construction and Maintenance Manuals shall be furnished to the Commission.



## **11. PREVENTIVE MAINTENANCE SCHEDULE AND INSPECTION MANUAL . -**

1. The licensee and the User shall prepare a Preventative Maintenance Schedule and Inspection Manual for various line and sub-station equipment installed in distribution system.
2. The Preventive Maintenance Schedule and Inspection Manual shall cover the following:-
  - (a) Recommended Schedule for inspection;
  - (b) Recommended Schedule for preventive maintenance; and
  - (c) Recommended Schedule for overhauling.
3. The inspection schedule and preventive maintenance schedule shall have daily, weekly, monthly, quarterly and annual periodic activity, to be carried out for various equipment.

## **12. MAINTENANCE RECORDS .-**

1. The licensee as User shall maintain records of periodic inspections carried out in the standard formats prescribed in the Preventive Maintenance Schedule and Inspection Manual.
2. Periodic testing of all the equipments such as transformers, switchgear, protective relays, etc., should be carried out as recommended by the manufacturer and the relevant Code of Practices issued by the Bureau of Indian Standards and the CBIP. These shall be carried out at the fixed intervals and the test results shall be recorded in the maintenance registers. Wherever the test results indicate a decline in the insulation resistance and/or deterioration of the equipment, preventive maintenance shall be carried out to ensure serviceability, safety and efficiency.
3. The licensee shall maintain well trained hot-line maintenance personnel with all the required tools in good condition and conduct maintenance work by using hot-line technique, wherever possible, to reduce period of interruption.
4. The consumers shall maintain their apparatus and power lines at all times conforming to the Electricity Rules, and these shall be suitable for connection to distribution system in a safe and reliable manner.

## **13. ENERGY CONSERVATION .-**

1. The licensee, in order to minimize the overall requirement, energy conservation and Demand Side Management (DSM), shall accord high priority to ensure compliance of the Energy Conservation Act, 2001 and shall adhere to the guidelines of the Bureau of Energy Efficiency.
2. The licensee shall ensure that the periodic energy audits, wherever made compulsory for power intensive industries under the Energy Conservation Act, 2001 are complied with by its consumers. Other industrial consumers may also be encouraged to adopt energy audits and energy conservation measures.

3. In the agriculture sector the licensee shall promote the pump sets and the water delivery system engineered for high efficiency. In the industrial sector, the licensee shall take action for promoting energy efficient technologies as energy conservation measures. Motors and drive system are the major source of high consumption in agricultural and industrial sector. The licensee shall encourage that the consumers use high efficiency motors in agricultural and industrial sector. The licensee shall take effective steps so that energy efficient lighting technologies are adopted in industries, commercial and domestic establishments.

SANDESH KUMAR SHARMA, Secy. JERC  
[ADVT III/4/218-I/11/Exty.]

## ANNEXURE 1

### LOAD DATA FOR DEMANDS FOR OF 1 MW AND ABOVE

1. Type of Load: (E.g. Furnace loads, rolling mills, traction loads, pumping loads, industrial loads etc.)
  2. Maximum Demand (KVA)
  3. Year(s) by which full/part load supply is required:  
(Phasing of loads shall be furnished)
  4. Location of load with a location map drawn to scale:
  5. Rated voltage, frequency and number of phases at which supply is required:
  6. Description of equipment:
    - a) Motors: (State the purpose and number of installations, voltage and KW rating, method of starting, starting current and duration, type of motors, types of drives and control equipments etc.)
    - b) Heating: (Type and KW rating)
    - c) Furnace: (Type, Furnace Transformer capacity and voltage ratio)
    - d) Electrolysis: (Purpose and KVA capacity)
    - e) Lighting: KW Demand.
    - f) Any other loads with particulars:
  7. Sensitivity of Demand to fluctuations in voltage and frequency of supply at the time of peak load: (Give details).
  8. Phase unbalance imposed on the System:  
Maximum:  
Average:
-

9. Maximum harmonic content imposed on the System:  
(Furnish details of devices proposed for the suppression of harmonics).
10. Details of the loads likely to cause demand fluctuations greater than 10 MW at the point of connection including voltage dips (percentage) lasting for 5 seconds or more.

**EMBEDDED GENERATOR UNIT-WISE DATA**

ANNEXURE 2

1.	Name and address of Generating Company:	
2.	Location of Generating Plants (s):	
3.	Generation Volts (kV);	
4.	Rated kVA/kW	
5.	Maximum and minimum Active Power sent out (kW) Reactive Power capability (kVAr), if any;	
6.	Type of Generating Plant—synchronous, asynchronous, etc.;	
7.	Method of voltage control;	
8.	Generator transformer details, if applicable;	
9.	Requirements for Top-up supplies and/or standby supplies;	
10.	Generator kW/kVAr capability chart (at lower voltage terminals);	
11.	Type of excitation system;	
12.	Inertia constant kW secs/kVA;	
13.	Stator Resistance;	
14.	Direct-Axis Reactance (Sub-transient, Transient and Synchronous);	
15.	Quadrature-Axis Reactance (Sub-transient and Synchronous);	
16.	Zero Sequence (Resistance and Reactance);	
17.	Negative Sequence (Resistance and Reactance);	
18.	Generator Transformer (Resistance, Reactance, kVA Rating, Tap Arrangement, Vector Group, Grounding, Connection and % Impedance);	

19.	Automatic Voltage Regulator block diagram, including the data on the gains (forward and feedback), time constants, and voltage control limits;	
20.	Speed governor block diagram detailing the governor fly-ball, if applicable, and control system and Prime Mover time constants, together with the turbine rating and maximum power	
21.	Standby requirements:	
I.	Rated Capacity and Minimum Generation of each Generating Unit and Power Station in kW for standby capacity requirements.	
II.	Generating Unit and Power Station auxiliary Demand (Active Power and Reactive Power) in kW and kVAr, at rated capacity conditions.	
III.	Interface Arrangements the means of synchronization between the distributors and User;	
IV.	Details of arrangements for connecting to ground that part of the Generator's System directly connected to the distribution system;	
V.	The means of connection and disconnection which are to be employed	
VI.	Precautions to be taken to ensure the continuance of safe conditions should any grounded neutral point of the Generating unit become disconnected from ground.	
VII.	Details of Protection System of the Generating Unit	

**SYSTEM DATA**

The Distribution Licensee shall provide only relevant details out of the following details as required by Consumer for designing and selecting electrical equipment:

1. Topological map of area of supply by licensee marking boundaries.
2. Distribution map of the Distribution Licensee drawn to scale of at least 1 cm to 2.5 KM showing the existing HT/EHT lines and substations within the Area of Supply of the Licensee. Lines and substations under construction or planned for the next five years shall be shown in dotted lines.
3. Single line diagram of the Distribution System showing line length, conductor sizes, substation capacity, capacitor sizes with locations, auto-reclosures etc.
4. Details of Metering and Relaying at substations.
5. Details of Grid substations at the point of interconnections as follows:
  - i. MVA Capacity and voltage,
  - ii. Number of transformers, capacity of each transformer, voltage ratios, Ranges of taps  
Impedance
  - iii. Fault level at substation busbars, both three phase and single line to ground fault
  - iv. Bus impedance,
  - v. Substation layout diagram.
6. Drawl at Connection Points / Interface Point: Maximum and Minimum MW drawl from each connection with the Transmission System or with other Distribution Licensees during last six months.

**RULE NO. 44 A OF THE INDIAN ELECTRICITY RULES, 1956****Rule no. 44 A – Intimation of Accident**

If any accident occurs in connection with the generation, transmission, supply or use of energy in or in connection with any part of electric supply lines or other works of any person and the accident results in or is likely to have resulted in loss of human or animal life or in any injury to a human being or an animal, such person or any authorized person of the distribution licensee not below the rank of Junior Engineer or equivalent shall send to the Inspector a telegraphic report within 24 hours of the knowledge of the occurrence of the fatal accident and a written report in a form set out in Annexure XIII within 48 hours of the knowledge of the occurrence of the fatal accident and all other accidents. Where practicable a telephonic message should also be given to the Inspector immediately the accident comes to the knowledge of authorized officer of distribution licensee or other person concerned.

**The Indian Electricity Rules, 1956****[ANNEXURE  
XIII]****FORM FOR REPORTING ELECTRICAL****ACCIDENTS (See Rule 44-A)**

1	Date and Time of accident	
2	Place of accident (Village/Town, Tehsil /Thana, District and State)	
3	System and voltage of supply (Whether EHV/HV/LV line, sub-station/generating station/consumer's installations/service lines/other installations)	
4	Designation of the Officer-in-charge (in whose jurisdiction the accident occurred)	
5	Name of owner/user of energy in whose premises the accident occurred.	

6 Details of victim(s)						
(a) Human						
S.No.	Name	Father's Name	Sex of victim	Full Postal Address	Approx. Age	Fatal / Non-Fatal
(b) Animal						
S.No.	Description of Animals	Number(s)	Name(s) of Owner(s)	Address (es) of owner(s)	Fatal / Non-Fatal	
7	<p>In case the victim(s) is /are employee(s):</p> <p>(a) designation of such person(s)</p> <p>(b) brief description of the job undertaken, if any.</p> <p>(c) Whether such person/persons was/were allowed to work on the job.</p>					
8	<p>In case the victim(s) is/are employee(s) of a licensed contractor</p> <p>(a) Did the victim(s) possess any electric workman's permits(s), supervisor's certificate of competency issued under Rule 45? If yes give number and date of issue and the name of issuing authority.</p> <p>(b) Name and designation of the person who assigned the duties of the victim(s)</p>					

9	In case of accident in the Distribution licensee system, was the Permit To Work (PTW) taken?	
10	Describe fully the nature and extent of injuries, e.g. fatal /disablement (permanent or temporary) of any portion of the body or burns or other injuries.  In case of fatal accident, was the post mortem performed?	
11	Detailed causes leading to the accident  (To be given in a separate sheet annexed to this form)	
12	Action taken regarding first-aid, medical attendance etc. immediately after the occurrence of the accident (give details)	
13	Whether the District Magistrate and Police Station concerned have been notified of the accident (if so, give details)	
14	Steps taken to preserve the evidence in connection with accident to the extent possible.	
15	Names and designation(s) of the person(s) assisting, supervising the person(s) killed or injured.	
16	What safety equipments were given to and used by the person(s) who met with this accident (e.g. rubber gloves, rubber mats, safety belts and ladders etc.)?	
17	Whether isolating switches and other sectionalizing devices were employed to deaden the section for working on the same? Whether working section was earthed at the site of work?	
18	Whether the work on live lines was undertaken by authorized person(s)?  If so, the name and the designation of such person(s) may be given.	
19	Whether the artificial resuscitation treatment work on live lines was undertaken by authorised person(s)?  If yes, how long was it continued before its abandonment?	



20	Names and designations of persons present at and witnessed the accident.	
21	Any other information / remarks.	
Place		
Time		
Date		

Signature Name

Designation

Address of the person reporting

#### ANNEXURE 5

#### LIST OF ABBREVIATIONS

1	<b>AAC</b>	All Aluminium Conductor
2	<b>AAAC</b>	All Aluminium Alloy Conductor
3	<b>ACSR</b>	Aluminium Conductor Steel Reinforced
4	<b>BIS</b>	The Bureau of Indian Standards
5	<b>Board</b>	The HP State Electricity Board
6	<b>CAIDI</b>	Customer Average Interruption Duration Index
7	<b>CAIFI</b>	Customer Average Interruption Frequency Index
8	<b>CBIP</b>	The Central Board of Irrigation and Power
9	<b>CEA</b>	Central Electricity Authority
10	<b>CEI</b>	Chief Electrical Inspector
11	<b>CT</b>	Current Transformer

12	<b>DCR</b>	Distribution Code Review
13	<b>DCRP</b>	Distribution Code Review Panel
14	<b>EHV</b> <b>EHT</b>	Extra High Voltage Extra High Tension
15	<b>GI</b>	Galvanized Iron
16	<b>GSS</b>	Gas Sub-station
17	<b>HV</b>	High Voltage/
18	<b>HT</b>	High Tension
19	<b>Hz</b>	Hertz (cycles per seconds)
20	<b>IDMT</b>	Inverse Definite Minimum Time
21	<b>IEEE</b>	Institute of Electrical and Electronics Engineers
22	<b>IEC</b>	International Electro Technical Commission
23	<b>IEGC</b>	Indian Electrical Grid Code
24	<b>IS</b>	Indian Standards
25	<b>IP</b>	Irrigation Pump
26	<b>kA</b>	Kilo Ampere
27	<b>kW</b>	Kilo Watt
28	<b>kWh</b>	Kilo Watt hour
29	<b>kVA</b>	Kilo Volt Ampere
30	<b>LT</b>	Low Tension
31	<b>LV</b>	Low Voltage
32	<b>MCB</b>	Miniature Circuit Breaker
33	<b>MVA</b>	Mega Volt Ampere
34	<b>MW</b>	Megawatt
35	<b>PAP</b>	Project affected person

36	<b>PCC</b>	Prestressed Cement Concrete
37	<b>PT</b>	Potential transformer
38	<b>PTW</b>	Permit to work
39	<b>RCC</b>	Reinforced Cement Concrete
40	<b>REC</b>	Rural Electrification Corporation
41	<b>R&amp;R</b>	Rehabilitation and Resettlement
42	<b>SAIDI</b>	System Average Interruption Duration Index
43	<b>SAIFI</b>	System Average Interruption Frequency Index
44	<b>SCADA</b>	Supervisory Control and Data Acquisition
45	<b>SLDC</b>	State Load Despatch Centre
46	<b>STU</b>	State Transmission Utility

