HIMACHAL PRADESH ELECTRICITY REGULATORY COMMISSION

NOTIFICATION

Shimla 1st January 2009

No. HPERC/ Reg/ No. 392.- In exercise of the powers conferred by section 181, read with sub-section (1) of section 42 and clauses (c), (e) and (i) of sub-section (1) of section 86 of the Electricity Act, 2003 (36 of 2003) and all other powers enabling it in this behalf, the Himachal Pradesh Electricity Regulatory Commission hereby makes the following Code namely :-

THE HIMACHAL PRADESH ELECTRICITY DISTRIBUTION CODE, 2009.

CHAPTER- 1

GENERAL

1.1 Short title, applicability extent and commencement.-

(1) This Code may be called the Himachal Pradesh Electricity Distribution Code, 2009.

(2) This Code shall be applicable to all distribution system participants, including-

(a) the distribution licensees, including deemed distribution licensee under section 14 ;

(b) all other persons who are exempted, under section 13 to hold a distribution licence under section 12;

(c) embedded/captive generators;

(d) large consumers, having connected load of more than 500 kW; and

(e) Open Access customers connected to the distribution system.

(3) This Code extends to the whole of the State of Himachal Pradesh.

(4) This Code shall come into force from the date of its publication in the Rajpatra, Himachal Pradesh.

1.2 Definitions .-

In this Code, unless it is repugnant to the context, -

1.2.1 "Act" means the Electricity Act 2003 (Central Act No. 36 of 2003);

1.2.2 "agreement" means, with its grammatical variations and cognate expressions, an agreement entered into by the licensee and the User;

1.2.3 "annexure" means annexure annexed to this Code;

1.2.4 “apparatus” means electrical equipment and includes all machines, fittings, accessories and appliances in which electrical conductors are used;

1.2.5 “area of supply” means the geographical area within which a distribution licensee is authorised by his licence to supply electricity;

1.2.6 “bare conductor” means the conductor not covered with insulation;

1.2.7 “captive generating plant” means a power plant set up by any person to generate electricity for his use and includes a power plant set up by any co-operative society or association of persons for generating electricity primarily for use of members of such co-operative society or association;

1.2.8 “circuit” means any arrangement of conductor(s) for the purpose of conveying electrical energy and forming a system or a branch of system;

1.2.9 “Code” or “Distribution Code” means the Himachal Pradesh Electricity Distribution Code, as in force from time to time;

1.2.10 “Commission” means the Himachal Pradesh Electricity Regulatory Commission;

1.2.11 “conductor” means any wire, cable, bar, tube, rail or plate used for conducting electrical energy and so arranged as to be electrically connected to the system;

1.2.12 “connected load”, expressed in kW, means aggregate of the manufacturer’s rated capacities of all energy consuming devices or apparatus, connected with the distribution licensee’s service line, on the consumer’s premises, which can be simultaneously used;

1.2.13 “connection point / interface point/ inter connection point” means a point at which the User’s plant or apparatus or the User’s installation is connected to the licensee’s distribution system;

1.2.14 “consumer” means any person who is supplied with electricity for his own use by a licensee or by the Government or by any other person engaged in the business of supplying electricity to the public under the Act or any other law for the time being in force and includes bulk supply consumer and any person whose premises are for the time being connected for the purpose of receiving electricity with the works of a licensee, the Government or such other person, as the case may be and shall also include-

(a) the consumer whose installation has been temporarily disconnected,

(b) prospective consumer i.e. any person who has applied for an electricity connection and whose supply has not commenced, and

(c) in case of death of a consumer, his legal heirs or representatives;

1.2.15 “contract demand” means maximum demand in kVA contracted by the consumer in the agreement with the licensee and in absence of such contract, the contract demand shall be determined in accordance with the Tariff Order;

1.2.15 “control person” means a person identified by the concerned party and having technical capability and responsibility for cross boundary safety;

1.2.16 “distribution Code review panel” or “review panel” means the Electricity Distribution Code Review Panel constituted by the Commission under this Code;

1.2.17 “distribution system” means the system of wires and associated facilities between the delivery points on the transmission lines or the generating station connection and the point of connection to the installation of the consumers;

1.2.18 “electricity rules” means the Indian Electricity Rules, 1956 to the extent saved by the Act and the rules made under the Act thereafter;

1.2.19 “embedded” means having a direct electrical connection to a distribution system or the system of other Users to which consumers and/ or power stations are connected but with no other connection to the Grid;

1.2.20 “embedded generator” means a person or entity who generates electricity and whose generating units are directly connected to a distribution system;

1.2.21 "extra high voltage" or "EHV" means a voltage which exceeds 33,000 volts under normal conditions;

1.2.22 "generating company" means any company or body corporate or associations or body of individuals, whether incorporated or not or artificial juridical person, which owns or operates or maintains a generating station;

1.2.23 "Grid Code" means the Himachal Pradesh Electricity Grid Code;

1.2.24 "high voltage" or "HV" means a voltage which is higher than 400 volts but does not exceed 33,000 volts under normal conditions;

1.2.25 "Indian Standards" (IS) means the standards and specifications approved by the Bureau of Indian Standards;

1.2.26 "licensee" means any person who has been granted a distribution licence or is exempted under section 13 or is a deemed licensee under the First or Fifth proviso of section 14 of the Act;

1.2.27 "low tension or (LT)" means a voltage, not exceeding 230 volts between phase and neutral and 400 volts between phases under normal conditions;

1.2.28 "operational metering" means monitoring of energy and power supplied to the distribution licensee from a transmission sub-station

1.2.29 "power factor" means the ratio of Active Power (kW) to Apparent Power (kVA) for a period as may be relevant ;

1.2.30 "transmission licensee" means any person who has been granted transmission licence or is a deemed licensee under section 14 of the Act;

1.2.31 "transmission system" means the system consisting of extra high voltage electric lines being operated at EHV (excluding generating stations 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 upto 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's distribution system;

1.2.32 "User" means any person having electrical interface with, or using the distribution system of the distribution licensee to whom this Code is applicable and includes any other distribution licensee, transmission licensee, generating units, large consumers with connected load of more than 500 kW, connected to the distribution system and the person availing Open Access in transmission or distribution system are also included in this term.

1.3 Interpretation .-

1.3.1 Unless the context otherwise requires, the words or expressions used and not defined in this Code but defined in the Act shall have the meanings as assigned to them in the Act. Other expressions used in this Code, but not specifically defined in the Act shall have the meanings as are generally understood in the electricity supply industry.

1.3.2 The words used in the singular shall also be deemed to include the plural and vice-versa.

1.3.3 The General Clauses Act, 1897 (10 of 1897) shall apply to the interpretation of this Code.

1.3 **Abbreviations**.-

Abbreviations used in this Code, are listed and explained in the list of abbreviations annexed to this Code

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 Requirement of the Distribution Code.-

1.6.1 Sub-section(1) of section 42 of the Act provides that it shall be the duty of a licensee to develop and maintain an efficient coordinated and economical distribution system in his area of supply and to supply electricity in accordance with the provisions contained in the Act and the Distribution Licensee's Standards of Performance specified by the Commission.

1.6.2 This Distribution Code is specified by the Commission to ensure that the licensee complies with the requirement of sub-section(1) of section 42, read with clauses (c),(e), and (i) of sub-section (1) of section 86 of the Act.

1.7 Scope of the Distribution Code.-

1.7.1 This 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 licensee and the users in system planning and operation.

1.7.2. This Distribution Code is not exhaustive as to the requirements to be complied with by the licensee and the users connected to or seeking connection to the licensee's distribution system. The distribution licensee and all users/consumers must also comply with the requirements as laid down in various Codes, standards and regulations under relevant laws in force.

1.7.3 This Distribution Code also deals in terms of distribution management in the event of outages and shortages of electricity supply and distribution thereof amongst all the categories of consumers as per the system network requirement. However, consumers having captive generating plants shall come to the rescue of the licensee

as first priority in the event of outages and shortages and they shall resort to load shedding immediately in the event of his drawing power from the distribution system, on instructions from the licensee in contingency or emergent conditions.

1.8 Implementation and operation of the Distribution Code.-

1.8.1 The licensees shall be responsible for the implementation of the provisions contained in this Code within their respective area of supply and the Users shall comply with the provisions of this Code.

1.8.2 If any User has any difficulty in complying with any of the provisions of this Distribution Code, he shall immediately, without delay, inform the licensee and/ or the Commission, as the case may be.

1.8.3 Non-compliance with any provisions of the Distribution Code by the licensee shall attract the consequences as provided in the Act or in the licence. However, in the event of non-compliance with this Distribution Code, the licensee shall prepare and submit to the Commission a plan of action for compliance with this Distribution Code. The Commission may, considering the resources available and the circumstances prevailing, 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.

1.8.4 Any continued non-compliance, without reasonable grounds, shall constitute a deviation under the Act, and may lead to disconnection of the User's plant or apparatus, in line with the provisions of the Act, from the licensee's distribution system. The responsibility for the consequences of disconnection, including payment of damages, rests with the User who consistently violates the Distribution Code.

1.9 Limitations of the Distribution Code.-

1.9.1 Nothing contained in this Code will abridge or prejudice the rights of the licensee and the consumer under the Act or any Rules or Regulations made there under.

1.9.2. This 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. This Distribution Code cannot force all the possible operating conditions. The users must, therefore, understand and accept that the licensee, in such unforeseen circumstances, may be required to act decisively and with due expedition to discharge his obligations under the licence. The users shall provide such reasonable co-operation and assistance as the distribution licensee may require in such circumstances. The concerned licensee shall however refer all such cases for ratification to the review panel.

1.6 Confidentiality.-

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

Government Department or any other authority or under any provisions of the Right to Information Act, 2005 (22 of 2005).

1.7 Procedures to settle disputes.-

In the event of any dispute regarding interpretation of any provisions provided in this Distribution Code between any User and the licensee, the matter shall be referred to the review panel, which after due examination, will make its recommendations to the Commission. The decision of the Commission thereon shall be final and binding on both the parties.

CHAPTER-2

MECHANISM FOR REVIEW OF THE DISTRIBUTION CODE

2. Objective.-

This Chapter defines the method of managing the Distribution Code, pursuing of any changes/ modifications required in the Code and facilitates revisions taking into account the views of all parties in an equitable manner.

2.2 Distribution Code Review Panel.-

2.2.1 A standing body "Distribution Code Review Panel" shall be constituted by the Commission comprising of the representatives of the Commission, licensees as well as the Users of the distribution system in line with the provisions of this Code.

2.2.2. No change in this Distribution Code, however, small or big, shall be made without being deliberated upon and recommended by the Distribution Code Review Panel and thereafter approved by the Commission. The Distribution Code Review Panel shall submit its recommendations to the Commission within a period of 45 days from the date the case is referred for review. However, in an unusual situation where normal day-to-day operation is not possible without revision of some clauses of the Distribution Code, a provisional revision may be implemented before the approval of the Commission is received, but only after discussion at a Special Review Panel meeting convened on an emergency basis. The Commission should promptly be intimated about the provisional revision. The Commission may issue directions required to revise the Distribution Code accordingly as may be provided in those directions and the distribution licensee shall promptly comply with such directions.

2.2.3 The Distribution Code Review Panel shall comprise of the following: -

(a) one member, who shall be a senior technical officer, not below the rank of the Chief Engineer or its equivalent, from each of the distribution licensee in the State;

(b) one member, who shall not be below the rank of the Chief Engineer or its equivalent, from the State Transmission Utility (STU);

(c) one member nominated by the Commission, who shall also be the convener of the review panel;

(d) one member representing embedded generators connected to the distribution system;

(e) one member representing open access consumers;

(f) one member representing industrial consumers;

(g) one member representing commercial consumers;

(h) one member representing domestic consumer groups;

(i) one member representing bulk consumer groups; and

(j) such other members as the Commission may direct and find appropriate.

2.2.4. The Chairperson of the Review Panel shall be from amongst the Technical Members/Directors of the distribution licensee and shall be nominated by the Commission for two years term on rotation basis. The quorum of the meeting of the Review Panel shall not be less than 50 percent of its total members and wherever it is expedient to do so the Commission may by an order, permit the review panel members to draw such remunerations, as it deems fit, for attending the meetings of the review panel.

2.2.5 Term of Office .-

The Distribution Code Review Panel shall be perpetual under the Distribution Code. All Members of the Distribution Code Review Panel shall hold office by virtue of the position held by them in their respective organisation until changed/replaced by the respective organization/consumer group.

2.3 Functions of the Review Panel.-

2.3.1 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) rendering guidance on interpretation and implementation of the Distribution Code;

(d) examination of the problems put forth by any User as well as resolution of the said 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;

(f) constitution of a sub-committee for detailed study of various matters pertaining to the Distribution Code and circulation of the findings and recommendations to the Review Panel Members and the entities concerned; and

(f) making arrangements for deliberation of the issues (regarding sub-committee findings and recommendations) in the review panel meetings in the time frame, as provided by the sub-committee.

2.3.2 The review panel shall, for transaction of its business, meet once in every six months or at such intervals as may be decided by the Chairperson of the review panel.

2.4 Review and revisions .-

2.4.1. The Users seeking any amendment to the Distribution Code shall send written requests to the Convener of the Review Panel, with a copy to the Commission. If the request is sent to the Commission directly, the same shall be forwarded to the Convener of the Review Panel, who shall forward/circulate the request requiring changes/modifications in the Code to all the review panel members for their written

comments within a reasonable time frame or the Convener 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 the Distribution Code after the approval of the Commission and be published by the Secretary of the Commission.

2.4.2 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 provision, together with reasons for such change.

2.4.3 The Convener shall maintain copies of the Code incorporating the latest amendments and shall be posted at the website of licensees as well as of the Commission. The licensee shall also make available the copies of the same at a reasonable cost to any person requiring it.

2.4.4 The Commission, may, on the application of the licensee or otherwise, call the emergent meeting of the review panel as and when the situation so dictates and based on its recommendations make such alterations and amendments in the Distribution Code as it thinks fit.

CHAPTER-3

DISTRIBUTION SYSTEM PLANNING AND STANDARDS

3.1 Objectives .-

3.1.1 The main objectives of the Distribution System Planning are-

(a) to enable the planning, design and construction of the Distribution System for a safe, reliable and economical operation confirming to the statutory Acts, rules, regulations and Codes, which are in force,

(b) to facilitate the use of the Distribution System by any User connected to or seeking connection with it,

(c) to specify 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 licensee and the Users,

(e) to provide the required information to the Users for connection, planning and development of their own systems and to make them compatible with the distribution system,

(f) to enable the licensee in furnishing the required data as per the provisions of in the Grid Code.

3.1.2 These planning provisions cover the individual sub-stations, system planning, analysis and the techno-economical aspects in the field of distribution systems. These provisions will apply to all the consumers, already connected or awaiting or seeking connection to the distribution system, the licensees and the State Transmission Utility (STU), wherever it is applicable.

3.2. Distribution Planning Framework.-

The Distribution Planning Framework relating to network extension planning, network component design and solutions for operational problems, shall be as detailed in Annexure-1.

3.3. Distribution System Planning Standards.-

The Distribution System Planning Standards specify the guidelines for planning of the distribution system. The scope of these standards 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 sub-station layouts,

(i) Reactive compensation,

(j) Service mains,

(k) Metering cubicles,

(l) Security standards.

3.4 Development of Distribution Planning Procedures (DPP).-

3.4.1 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. The consumers shall extend full support to the licensee to enable the licensee to ensure quality supply of electricity. The distribution system shall conform to the statutory requirements of all the relevant laws, Acts, Codes, Standards, rules and regulations, in force.

3.4.2 Well-documented procedures are essential for adopting orderly and consistent approach in planning and development of the distribution system on a long-term basis. Adherence to these procedures will enable the licensee to produce a long-term plan of five years to develop and maintain an efficient co-ordinated and economical distribution system to satisfy requirements of future demand.

3.4.3 The licensee shall develop and maintain the Distribution Planning Procedures in respect of following:-

(a) Database Management,

(b) Load Data Research,

(c) Load Forecast,

(d) Opportunity Statement.

3.4.4 The licensee shall furnish the copy of the Distribution Planning Procedures for the approval to the Commission.

3.5 Database Management.-

3.5.1 The availability of accurate and reliable data is essential for planning and development of the distribution system on long-term basis. The database management system facilitates storage, retrieval and updating of data for complying with the requirements of the Distribution Code and for other purposes like power system studies.

3.5.2 (a) The large consumers connected to HV or EHV having connected load of 500 kW and above shall furnish annually to the licensee, planning data in the format specified at Annexure-2.

(b) The embedded generators connected with distribution system or seeking new connections shall furnish planning data in the format specified at Annexure-3.

(c) The licensee, shall supply annually the system data, to the Users, wherever required for their planning purpose as per format at Annexure-4.

(d) The licensee shall supply whole system data including the information detailed in Annexure-5, to the transmission licensee and other distribution system participants on the formats as devised by the STU under the Grid Code.

3.5.3 A well-maintained database management system would facilitate exchange of data between the Users and the licensee required for long-term planning and distribution operation in an accurate and reliable manner. This will also help the Users, to have access to data, which they may require for their planning purpose.

3.6 Load Data Research.-

3.6.1. From the metering data collected at each connection point with the transmission system, the licensee shall develop load curves for the area fed and also the system load curve for the area of supply by applying a suitable diversity factor. By reconciling the figure for actual energy sales with the drawal based on the metering data compiled, approximate voltage wise losses in the system may be arrived at for any period.

3.6.2. The Users with connected load of 500 kW and above seeking connection shall furnish their load data/characteristic of the load and other relevant details to the licensee as detailed in Annexure-2. The licensee shall exercise special care to monitor the actual development of loads in respect of consumers desiring to avail loads of 500 kW and above at a single point.

3.6.3 The licensee shall implement the load research programme as detailed in Annexure-6.

3.7 Load Forecast.-

3.7.1 The licensee shall formulate a short-term demand forecast (to enable the STU in drawing up the annual planning process corresponding to a 5 years forward annual plan for transmission system).

3.7.2. 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.

3.7.3. This shall be formulated after considering the previous financial year as base and projecting the over all demand for the succeeding 5 years – by adopting suitable

methodology, such as considering the trend for previous five years and considering the expected economic and social development of various sectors in his area of supply in succeeding five years.

3.7.4. During this process the licensee shall also review the status of loads materialising as per the previous load forecast. Further these forecasts shall be in line with the plan to be developed at national level by the CEA. The licensee shall incorporate the variation to the forecast, as and when licensee revises the forecast annually.

3.7.5. The projections shall take into account the assumed normal growth for non-specific loads, specific and identified loads of 500 kW and above, and the effects of demand side management, if any, and energy conservation.

3.7.6. The peak load requirements at each Connection Point/ Interface Point shall be estimated by the distribution licensee. The peak load requirement at each Connection Point / Interface Point will essentially ensure that the STU/SLDC may determine the corrective measures to be taken to maintain the capacity adequacy in the transmission system upto the Connection Point /Interface Point. This will facilitate the transmission licensee to develop the compatible transmission system. However, if the licensee receives power at a number of Connection Points / Interface Points in a compact area, which are interconnected in a ring, then such 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 STU/SLDC.

3.7.7. The aggregate energy and peak load requirements for the area of supply shall be estimated by the licensee and the licensee shall forward the short term demand forecast for each Connection Point/ Interface Point for peak load requirement as well as aggregate energy and peak load demand for the area of supply on annual basis in the month of December of every year, to the STU/SLDC, transmission licensee and Commission, alongwith the details on the basis of which the forecast is made.

3.7.8. It shall be the responsibility of all the licensees to fully co-operate with the STU in preparation of demand forecasts for the entire State. The licensee shall furnish the necessary peak load and energy forecasts to the STU for a period of 5 years in order to enable the STU in formulating the perspective plan.

3.7.9. The licensee shall create a database of loads for each consumer category and for each distribution sub-station and update it annually.

3.7.10. The 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 year.

3.7.11. The methodology of the load estimation/ assessment shall be as mentioned in Annexure-7.

3.7.12. The licensee shall workout the diversity factor of each category of consumers fed with in the area of supply. A record of such data shall be maintained and continuously updated.

3.8. Opportunity Statement.-

3.8.1. This statement provides the potential users with future power scenario for five years in distribution system. Opportunity statement helps in deciding potential for connection to the system, creation of new generation capacities and load on system. This statement serves as the basis for the selection of the best place to connect new load or a new generator. The licensee shall prepare an opportunity statement as a part of its Annual Report and the same shall be submitted to the Commission and the STU.

3.9 Security Standards.-

The distribution system shall be planned and maintained so as to fulfil the following security standards except under Force Majeure conditions, beyond the reasonable control of the licensee -

(a) The feeders, either HT or LT, feeding important loads such as hospitals, airports, railway stations, Telecommunication Exchanges, TV/AIR Stations, water pumping 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.

(b) The feeders connected to important continuous process 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. As far as possible the Industrial feeders will be independent.

(c) Loading in any current carrying component of the distribution system (e.g. conductors, transformers, switchgear, cables and other apparatus) shall not exceed the limits specified in the respective ISS, BIS, IEEE standard.

(d) The rupturing capacity of the switchgear employed in the system shall be as per the relevant ISS, BIS or IEEE standard considering the anticipated future development of the system.

(e) In case outages for every H.T. feeder efforts shall be made to manually switch over immediately to a healthy feeder of the same voltage class available in the vicinity for a short duration. 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.

(f) In case of single contingency, failure of any sub-station equipment controlling any outgoing 11 kV or 22 kV or 33 kV feeders, the load interrupted shall not generally exceed 50% of the total demand on the sub-station..

(g) In case of breakdown of any distribution transformer, failure of 11 kV or 22 kV or 33 kV feeders including terminal equipment, 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 in Standards of Performance of the licensee .

3.10 System Adequacy and Redundancy.-

3.10.1 The licensee, shall, while planning distribution system, take into consideration the adequacy and redundancy of system capacity and capability to allow for long term load growth based on perspective plan, open access and maintaining supply to consumers in the event of forced or planned outage of lines and transformers. The system shall have built in redundancy (through alternative circuit arrangements) so that consumers face no interruption in power supply to the extent possible.

3.10.2 The Distribution Sub-Station design should allow taking out any transformer for maintenance without affecting supply to any area even during peak hours. More than one transformer with smaller capacity may be employed rather than employing one transformer of large capacity to meet n-1 planning criteria. Alternative circuits should be planned for important loads. As far as possible, redundancy should be kept in the system to meet the emergencies and system adequacies shall be taken care of at planning stage of new sub-station(s).

3.10.3 For the old distribution network, the distribution licensee, to the extent possible, shall carry out necessary works to create requisite system adequacy and redundancy in a phased manner.

3.11 Power System Studies and Network Expansion Plan.-

3.11.1 The licensee shall carry out the power system studies before undertaking major distribution expansion plan on long term time scale. The system studies include the following:-

(a) Load Flow Analysis
(b) Short circuit studies
(c) Stability studies

3.11.2 The licensee shall employ the software tools for distribution network analysis for-

(a) Optimum 33kV and 11 kV distribution transformer location;

(b) Optimum network of sub-transmission system, primary distribution, LT feeders and sub-station location and feeder development;

(c) Optimum distribution feeder voltages and conductor sizes; and

(c) Optimum reactive compensation.

3.12 Energy Audit.-

3.12.1 The licensee shall establish and maintain a system for segregation of voltage wise technical and commercial losses through energy audits within six months from the commencement of this Code. Interface meters capable of data retaining capacity of at least 70 days shall be installed for all the incoming/outgoing feeders. Cent percent energy audit at four monthly interval and declaration of its results at each

sub-division, division and circle levels shall be mandatory for the licensee not later than 6 months from the commencement of this Code.

3.12.2 The energy audit for total system shall be carried out by compiling the data and analysis carried out in each responsibility centre as specified in HPERC (Distribution Licensee Standards of Performance) Regulations, 2005. The energy received from each sub-station shall be measured at the 11 kV / 22kV/ 33kV terminal switchgear of all the outgoing feeders installed with appropriate energy meters so 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 licensee has adopted ring main system at 11kV/22 kV/33 kV and there is difficulty in determining the distribution losses for each feeder, then the licensee shall work out distribution losses for the overall area of supply.

3.12.3 An action plan for reduction of the losses with adequate investments and suitable improvements in governance should be drawn up and shall be submitted to the Commission annually, alongwith Annual Revenue Requirement Filing.

3.13 Service area of a distribution network.-

3.13.1 The service area of a distribution network is an area in which the load is supplied from a sub-station by one or more number of feeders, as required. The distribution network fed from the distribution transformers and the sub-stations from which the 11 kV/ 22 kV/33kV 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 sub-stations 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.

3.13.2 The licensee shall take suitable measures, sufficiently in advance, to augment the capacity of the feeders in the event the voltage regulation limit is exceeded.

3.13.3 Appropriate software to compute the design of the distribution network shall be used to obtain the lowest possible energy losses for different loading conditions for-

(i) location and the capacity of the distribution transformers;

(ii) routing of LV and HV networks;

(iii) sizes of conductors; and

(iv) voltage regulation limits for all loading conditions.

3.13.4 The ratio of the lengths of HT and LT distribution lines for the new lines planned shall be 1:1 by adopting measures such as High Voltage Distribution System and the existing distribution system shall be modified in a phased manner to reduce the distribution losses.

3.14 Standing Committee for Design, Construction and Maintenance Practices.-

3.14.1 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.

3.14.2 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 33kV, 11 kV and LT Lines, 33/ 11 kV Sub-stations, 11 kV Pole mounted and other plinth mounted sub-stations etc;
(d) to recommend and suggest the latest technology upgradation 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.

3.15 Design Criteria for Distribution Lines.-

3.15.1 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. The HT and LT distribution lines shall according to the necessity in the required area, be of the following types: -

(a) over-head line with bare conductors;

(b) over-head line with aerial bunched cables;

(c) under-ground cables.

3.15.2 All H.V. and L.V lines should be provided with an earth wire and no H.V/L.V line shall be energised without an earth wire.

3.15.3 In thickly populated cities/towns and in areas having heavy traffic densities, under ground 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-head lines with aerial bunched cables shall be adopted. In other places over-head lines with bare conductors shall be adopted.

3.15.4 The following standards shall be adopted for planning and design purposes:-

(a) the design and construction of over-head lines with bare conductors shall be generally in accordance with IS 5613 Part I, sections 1 and 2 and the technical standards specified by the Authority under section 73 of the Act;

(b) to prevent accidental short circuit due to galloping of conductors, vertical configuration of conductors for LT distribution lines, 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 that a safe and quality power may be delivered;

(d) the design and construction of over-head lines with aerial bunched cables shall be generally in accordance with REC Specifications 32 and IS 14255 and the technical standards specified by the Authority under section 73 of the Act;

(e) the design and construction of under-ground cables shall be generally in accordance with IS 1255 and the technical standards specified by the Authority under section 73 of the Act;

(f) in towns and industrial areas Conductor of size not less than 0.1 sq. inch shall be used on main LT lines. The licensee shall endeavour to gradually replace the existing AAC Conductor with All Aluminium Alloy Conductor or ACSR Conductor in time bound manner. All line fittings of Conductor shall be of Aluminium Alloy Metal;

(g) length of LT feeder in towns shall normally be restricted to 150 metres. In villages the distribution licensee shall ensure that the length of LT lines do not exceed 500 metres in atleast 80% villages;

(h) the line supports can be of steel or PCC. The PCC poles are preferred over the steel pole considering their cost. The choice of the size of conductor for a line shall be based on-

(1) the 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;

(2) length of Line;

(3) line Voltage;

(4) permissible Voltage regulation; and

(5) mechanical strength.

(i) to address corridor constraints, including right of way problem, multiple voltage and multiple circuit lines shall be laid.

3.16 Standardization of Sizes and Ratings.-

3.16.1 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.

3.16.2 In case of distribution transformers, 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 shall be evolved based on the performance of these transformers. These shall be adopted for future procurement. This will also ensure the inter-changeability of components of similar transformers manufactured by any manufacturer.

3.16.3 A good quality assurance plan shall be adopted for-

(a) the best quality of raw materials;

(b) quality control during manufacturing and routine tests;

(c) acceptance tests at the time of taking delivery; and

(d) ISO/IST certification,

3.16.4 Best quality of material shall be used for conductors and distribution transformers to reduce losses and all necessary tests shall be conducted as per the relevant standards at the time of procurement.

3.17 Standardization of sub-station layouts.-

3.17.1.The licensee shall develop standard layouts following in accordance with the relevant standards, manuals and provisions of the Act. The licensee shall also adopt the latest technology based on the feedback from the experience gained.

3.17.2 The licensee shall**,** wherever possible, plan its new 33 kV sub-stations to be in the un-manned mode.

3.17.3 The licensee should make endeavour for conversion of manned sub-stations to unmanned sub-stations in a time bound manner and shall prepare a time bound program regarding this initiative and seek approval of the Commission in its Capital Investment Plans.

3.17.4 Normally not more than 2 outgoing LT feeders from 25 kVA transformer and 3 outgoing LT feeders from 63 kVA transformer shall be taken out. In case of 100 kVA and above transformer 4 outgoing feeders shall be permitted.

3.18 Standardisation of Nomenclature and Identification Coding.-

The licensee shall prepare nomenclature and identification of equipment for uniquely identifying various equipments in distribution system. The nomenclature scheme shall be consistent with the provisions in the Grid Code for the intra -State transmission system.

3.19 Reactive compensation.-

3.19.1 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 software, with reliable field data. Suitable precautionary measures, such as automatic switching etc., shall be considered to avoid over voltages during the light load periods.

3.19.2 Optimisation studies of shunt compensation shall be conducted by the licensee to determine the most appropriate sizes and locations for shunt capacitor installations.

3.20 Service mains.-

3.20.1 The service mains to consumers shall be laid in accordance with relevant REC/ other Standards for 230 V single phase and 415 V three phase supply and shall conform to the provisions of relevant rules under the Act. Preferably each LT connection shall be provided with direct service main from L.T line pole. In case it is not possible to provide connection from service main emanating from LT Line Pole, the service main may be extended by maximum 2 sub-mains. PVC cable of not less than 10 sq.mm size shall be used for service main and sub-main may be of size 6 sq. mm PVC wire.

3.20.2 The length of L.T service main shall, normally, not exceed 30 metres from the L.T. line pole.

3.21 Metering Cubicles.-

3.21.1 The H.V. consumers should be provided with a tamper-proof meter box in the safe location to avoid any chance of pilferage. 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.

3.21.2 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.

4.21.3 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 snow bound 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.

3.21.4 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 up to the metering panel. There shall be no joints in the conduit pipes. The meters shall be as close to the instrument transformer, as far as possible and in no case shall exceed Thirty (30) metres. The metering panel shall be housed in a weatherproof and tamperproof box duly sealed.

CHAPTER-4

CONNECTIVITY CONDITIONS

4.1 Connectivity conditions .-

4.1.1 The connectivity conditions lay down the minimum technical and design criteria, which shall be complied by any User connected to, or seeking connection to the distribution system. The licensee shall ensure compliance of the such criteria by any User as a pre-requisite for the establishment of an agreed connection. The connectivity conditions shall fulfil the requirements stipulated in sections 50, 53 and 73 of the Act

4.1.2 The connectivity conditions are provided to ensure that -

(a) the basic rules for connections are complied with by all Users This will help to treat all Users 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 of any other connected User;

(c) the ownership and responsibility for all the equipments shall be clearly specified in a Site Responsibility Schedule as per Format specified in Annexure-8 indicating following for each item of equipment installed at the connection .-

(i) the ownership of equipment;

(ii) the responsibility for control of equipment;

(iii) the responsibility for maintenance of equipment;

(iv) the responsibility for operation of equipment;

(v) the co-ordinator at the site;

(vi) the responsibility for all matters relating to safety of persons at site.

4.2 4.2 Operational Labelling .-

4.2.1 The licensee and the User 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 sub-stations and connection sites.

4.2.2 The equipment installed shall conform to its relevant I.S specifications and the ratings and salient specifications shall be maintained on the equipment's nameplate. No electrical equipment shall be used without its manufacturers nameplate permanently affixed to it.

4.3 System Performance.-

4.3.1 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.

4.3.2 Installation of all electrical equipment shall comply with the rules and the Code of Practices in force.

4.3.3 For every new connection sought, the licensee shall specify the Connection Point/ Interface Point and the supply voltage, alongwith the metering and protection requirements as specified in this Code.

4.3.4 The operation of the distribution system shall be in accordance with the "Distribution System Operating Standard" under Power System Management and Operation Standard to be developed by the licensee. The Users shall however be subject to the distribution discipline laid down by the SLDC/ Sub-SLDC and licensee.

4.3.5 The insulation co-ordination of the Users' equipment shall conform to the applicable Indian Standards/Code of Practices.

4.4 Connection point/ Interface Point.-

4.4.1 Connection to transmission system shall be governed by the relevant clauses of the Grid Code.

4.4.2 The inter connection point of all generating plants shall be as per the relevant agreements.

4.4.3 EHV/HV open Access Consumers.- The supply voltage may be 220kV/ 132kV/ 66kV/33kV/ 22 kV or 11 kV as per the standard voltage laid down in the Supply Code notified under section 50 of the Act. In respect of the sub-stations owned by the Users, the boundary shall be the licensee's cut off point/isolators. When any existing or new EHV/HV/open access consumer is fed from a dedicated feeder the boundary point shall be the line isolator at the sub-station of the licensee.

4.4.4 Low Tension Consumers.- The incoming terminal of the cut out/ MCB/ circuit breaker installed by the consumer is the boundary of low tension consumers. The metering shall be provided before a fuse unit / MCB/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 boundary of the premises or in a common passage on ground floor or near by safe location for easy access for the purpose of meter reading, maintenance, repairs, inspection, etc. The metering equipment shall be sealed by the licensee and the User/consumer shall not disturb the seal of the metering equipment and shall take reasonable care for protecting the meter and equipment.

4.5 Procedure for application for connection to the System .-

Any User seeking use of the distribution system is required to submit application for connection to the licensee as per the procedures and on the formats as may be evolved by the licensee indicating interalia technical data, purpose of the proposed connection, connection point, description of the apparatus to be connected , construction schedule and target completion date.

4.6 Connection Agreement .-

4.6.1 The connection agreement between licensee and user, except transmission licensee, shall be in accordance with this Code, and shall contain the terms and conditions for connection to and use of the distribution system. The connection agreement between the distribution licensee and transmission licensee shall be as per terms and conditions mutually agreed to.

4.6.2 The connection agreement shall include, as appropriate, the following terms and conditions:-

(a) a condition requiring both the parties to comply with this Code and other relevant Codes, rules and regulations framed under the Act;

(b) details of connection, technical requirements and commercial arrangements;

(c) details of any capital expenditure arising from necessary reinforcement or extension of the system and demarcation of the same between the concerned parties;

(d) site operational procedures and break down rectification obligations;

(e) minimum requirement on protection ; and

(f) any other requirements identified by the licensee.

CHAPTER-5

DISTRIBUTION OPERATION CODE

5.1 Introduction .-

This Chapter contains the procedures and practices to be followed for safe and efficient operation of the distribution system by the licensee and the Users, and shall include the following aspects of operation : -

(a) demand and availability estimation;
(b) outage planning;
(c) crisis management and contingency planning;
(d) demand management and load shedding;
(e) interface with generating plant, including CPPs/IPP/ embedded generator;
(f) monitoring and control of voltage, frequency, power factor and harmonics;
(g) safety Co-ordination;
(h) operational communication;
(i) consumer call centers;
(h) unmanned sub-stations;
(i) packaged sub-stations;
(j) mobile break down vans;
(k) reserve and standby;
(l) construction practices;
(m) preventive maintenance schedule and inspection manual;
(p) maintenance records;
(q) energy conservation;
(r) tools and spares;
(s) human resource development and training; and
(t) GIS/GPS based information system

5.2 Demand and Availability Estimation .-

5.2.1 The licensee shall estimate and prepare hourly and daily demand and availaibility for his area of supply on the basis of relevant load curves and availability schedules drawn on day ahead basis subject to modifications depending upon the availability schedules/ communications received from any specific User or caused by any contingency.

5.2.2 For the purpose of demand estimation, the concerned major Users, identified by the licensee shall furnish the required data pertaining to the demands of the installation to the licensee.

5.3 Outage Planning .-

5.3.1 The licensee and user shall furnish his proposed outage plan to the transmission licensee and the SLDC on a month ahead basis. The outage plan shall contain

identification of lines and equipment of the distribution system proposed by the licensee.

5.3.2. The outage plan proposed by the licensee shall come into effect only after the transmission licensee releases the finally agreed transmission outage plan.

5.3.3 At the time the line or equipment is taken out of service, the licensee shall intimate the transmission licensee to facilitate in accommodating their maintenance work, if possible, even though the same is already included in the approved plan.

5.3.4 In case of lines and equipment of 66 kV and above, the specific concurrence of the SLDC shall also be obtained.

5.4 Crisis Management and Contingency Planning .-

5.4.1 A contingency situation may arise in the event of a total or partial blackout in the transmission system. A contingency may also arise in 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 or before the point of interconnection.

5.4.2 Contingency and crisis management procedure shall be prepared by the licensee in consultation with the STU unambiguously to achieve the restoration of the total system and associated demand, and re-synchronization of parts of the total system, which have become out of synchronism with each other, at the shortest possible time.

5.4.3 Transmission system failure .-

(1) In case of a total blackout at any point of inter-connection, the licensee shall follow the step-by-step instructions of the SLDC on system restoration, prioritizing essential and non-essential loads and black start procedures of embedded generators, as required in the Grid Code.

(2) The licensee shall sectionalize the distribution system into discrete blocks of demand and shall inform the SLDC/STU the extent of load in MW likely to be picked up on switching each demand block.

(3) The licensee shall prepare a schedule of essential and non-essential load in the order of priority, as per format at Annexure-9, at each interconnection to be picked up during the restoration process and the same shall be intimated to the SLDC/STU.

(4) The licensee shall in accordance with the Grid Code, ensure and maintain load generation balance under the direction of the SLDC.

(5) The licensee shall in accordance with the Grid Code maintain direct communication links with the SLDC.

(6) The licensee shall in accordance with the Grid Code furnish the names, designations of the person(s) and their telephone numbers and stations, authorized to deal with contingency operations, to the SLDC/STU.

5.4.4 Distribution System Failure .-

(1) Interruption of power supply in any part of the distribution system, lasting for the period, as specified in the HPERC (Distribution licensees Standards of Performance) Regulations, 2005, due to breakdown in any part of the distribution system may be termed as a distribution system failure.

(2) The licensee shall, in accordance with the Grid Code, co-ordinate with the SLDC/STU / transmission licensee for restoration process.

(3) the licensee shall, designate nodal officers to co-ordinate with the SLDC/STU/Transmission Licensee for transmission system restoration process.

5.4.5 Failure of the apparatus of the transmission licensee .-

The licensee shall immediately contact the authorized person at the Grid Sub-station of the transmission licensee and assess the probable period of restoration and the probable restriction of load drawl from the affected Sub-station. The licensee shall implement the demand management plan accordingly.

5.5 Demand Management and Load Shedding .-

5.5.5 Temporary load shedding may be resorted to for maintaining the load generation balance as instructed by the SLDC/Licensee. This may also be necessary due to loss of any circuit or equipment or any other operational contingency.

5.5.6 The licensee shall, as may be necessary, 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. Such Users shall co-operate with the licensee in this regard. The licensee shall work out the sequence of load shedding operations and the detailed procedure shall be furnished to the persons in-charge of sub-station 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 as may be necessary, be co-ordinated with the SLDC and persons in charge of the sub-station of the licensee.

5.5.7 If the duration of unplanned load shedding to any part of the distribution system likely to exceed 60 minutes, the affected consumers having contract demand of 5MVA and above may be suitably intimated. The essential services such as public hospital, public water works, AIR/T.V Centres, Communication Centres, Telephone Exchanges etc. shall be intimated over the telephone wherever possible.

5.5.8 The licensee shall submit quarterly report on load shedding to the Commission.

5.6 Interface with generating plant including CPP/IPP/ embedded generator .-

5.6.1 If the licensee has an interface with any generating plant including CPP/ IPP/ embedded generator and an agreement for this purpose exists, the licensee and the concerned owner of the generating plant shall abide by the following provisions in addition to the provisions contained in this Code, as applicable to all the Users, and power purchase agreement: -

(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) if the generating unit is an induction generator, the owner shall take adequate precautions to limit the system disturbances, when the induction generator is synchronised with the consent of the licensee. The generating plants having 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 CPP/IPP/embedded generator shall comply accordingly. Non-compliance shall entail penalties/ as leviable under the law and/or disconnection from the system by the licensee.

5.7 Monitoring and Control of Voltage, Frequency, Power Factor and Harmonics .-

5.7.1 The licensee shall monitor the voltage, frequency, harmonics and power factors in the distribution system at different grid points at peak and off-peak hours and take reasonable measures for improvement of the same in co-ordination with the Users and the transmission licensee.

5.7.2 The 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.

5.7.3 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 mentioned in the relevant Distribution System Planning Standards and Security Standards. The capacitors, wherever available in the 33/22/11 kV system, shall be operated to maintain reactive compensation to be within acceptable limits of power factor of at least 0.95.

5.7.4 Users having loads with high harmonic content, low power factor and fluctuations shall install appropriate correction equipment and failing which they shall be liable for disconnection.

5.7.5 The 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.

5.8 Safety co-ordination .-

5.8.1 The licensee and the Users (comprising Generating Companies, Transmission Licensee and Consumers having connected load above 1 MW or dedicated lines) and any other 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 Safety Officers. 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.

5.8.2 The licensee and 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 issued by the authority 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 manual thus prepared shall be issued to all the Safety Officers and such Users for compliance.

5.8.3 There shall be co-ordination between persons of the licensee and the Users and between persons of two licensees having electrical interfaces, for carrying out the work on any apparatus or lines etc., belonging to either party, at the point of interconnection.

5.8.4 The provisions of the Grid Code shall be followed at Connection Points/ Interface Points in co-ordination with the transmission licensee.

5.8.5 The disconnecting device(s) at each electrical interface, which shall be capable of effectively disconnecting the system of the 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 unauthorised persons, such disconnecting devices shall be provided with interlocks.

5.8.6 Wherever any consumer has installed an emergency power supply system, either an electronic system with storage batteries or with own generating units, 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 the Electrical Inspector for his approval. A copy of the approved layout shall be provided to the licensee. The possibility of a feed back from these devices to the distribution system from any of the conductors, including the neutral conductor shall be clearly ruled out.

5.8.7 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 standardised by the licensee and shall be used by all concerned.

5.8.8 All maintenance work upto the interface point shall be duly authorised by the designated officer of the licensee The system of PTW shall be observed for carrying out any maintenance work. The line should not be energised back without the cancellation of PTW after completion of maintenance work.

5.8.9 The 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 cancellation of PTW. Such procedures and check-lists shall be issued to all concerned by the licensee for implementation.

5.8.10 The licensee and the Users shall also comply with the "safety requirement for construction, operation and maintenance of electric plants and lines" regulations issued by the Authority under sections 53 and 73 of the Act and also the electricity rules in force.

5.9 Operational Communication .-

5.9.1 Reliable communication links such as fax, telephones, wireless, e-mails etc. shall be established for exchange of data, information and operating instructions between the SLDC and the licensee, and the Users.

5.9.2 The licensee and the Users shall designate officers and agree on communication channels for the exchange of information. The communication shall, as much as possible, be direct between the User and the operator of the distribution system to which that User is connected.

5.9.3 List of telephone numbers, call signs and e-mail I.D.s shall be exchanged by the licensee and the Users to enable control activities to be efficiently coordinated.

5.10 Consumer Call Centres .-

5.10.1 The licensee shall set up Consumer Call Centres across its area of supply to address the consumer complaints and grievances in accordance with the HPERC (Distribution Licensee Standards of Performance) Regulations, 2005.

5.10.2 The functions of Consumer Call Centres shall include, but not limited to the following:-

(a) Receiving and registering complaints. – The complaints may range from supply related, new service requests, meter related, billing related, disconnection related, or even general queries;

(b) Despatch of the complaints to relevant licensee offices. – The complaints should be despatched through emails, telephone, SMS or even through wireless to Mobile Breakdown Vans, Section Offices or Field Personnel;

(c) Tracking and Monitoring of the Complaints. – The call centre should keep a track of the registered complaints and ensure closure of the same within the stipulated time lines set by the specified standards;

5.11 Unmanned sub-stations .-

The licensee shall explore the possibility to fully automate the operation of 33 kV sub-stations. The operation of such auto-controlled sub-stations shall be unmanned. All circuit breakers at auto controlled sub-station shall be auto-reclose type on temporary faults with pre-set time delay as per the IEC and will give alarm on sustained faults at control centre. The auto-control sub-station shall be fully equipped with the SCADA and preferably put on auto-control mode. The load management shall be preferably SCADA driven by central control centre.

5.12 Packaged sub-stations .-

The licensee shall provide Packaged Sub-Station at such location where the space for conventional standard sub-stations is inadequate or approach for operation and maintenance is difficult. The Congested areas and multi-storied commercial complexes are required to be provided with Packaged Sub-Stations. The licensee shall prepare the design and standard layout of compact sub-stations. Multi-storied buildings may have their sub-station located in basement or underground. All Packaged Sub-Stations shall be designed and provided with adequate and safe clearances for all live parts. Exit and fire protection way shall be universally provided on such sub-stations

5.13 Mobile Breakdown Vans .-

The licensee shall provide Mobile Breakdown Vans for attending line and transformer faults and consumers' complaints. The Mobile Breakdown Vans will be equipped with required tools and plants and consumable at all times on duty. The Breakdown Vans shall be fitted with wireless phone, telescoping ladder etc. The Mobile Breakdown Vans shall be provided with cable jointing kits and tools and plants. All spares necessary for maintenance work shall be provided in such breakdown van and inventory of spares shall be replenished from time to time.

5.14 Reserves and standbys .-

5.14.1 The licensee at all times must have adequate spare transformers, isolators, circuit breakers, CTs, PTs , insulators, hardwares, cable and cable boxes etc. for attending emergency.

5.14.2 The licensee shall have minimum maintenance and live wire maintenance gangs available at important locations which can be called and deployed on maintenance work of emergent nature.

5.15 Construction Practices .-

5.15.1 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.

5.15.2 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.

5.15.3 The licensee and the User shall prepare and observe the Construction and Maintenance Manuals for various equipment/works like 33 kV Lines, 22 kV Lines, 11 kV Lines, LT Lines, 33 kV sub-stations, 22 kV sub-stations and 11 kV 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 Act;

(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.

5.15.4 The standard tables for conductor size, fuse size, wire gauge, electrical clearance, ground wire size, insulation resistance and earth resistively 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.

5.16 Preventive Maintenance Schedule and Inspection Manual . -

5.16.1 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. The Preventive Maintenance Schedule and Inspection Manual shall include the following important equipment :-

(a) Power Transformers and Distribution Transformers installed indoor;

(b) Power Transformers and Distribution Transformers installed outdoor;

(c) 11 kV, 22kV and 33 kV Circuit Breakers and control panels;

(d) 11 kV, 22 kV and 33 kV overhead lines including G.O. Switches and Drop Out Fuses;

(e) 11 kV, 22 kV and 33 kV Cable and Cable Boxes/ CTs/PTs/ lightening arresters, battery and battery charger connection equipment, fire fighting equipment.

(f) LT Lines; and

(g) Service Connection.

5.16.2 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.

5.16.3 The inspection schedule and preventive maintenance schedule shall have daily, weekly, monthly, quarterly and annual periodic activity, to be carried out for various equipment.

5.17 Maintenance Records .-

5.17.1 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. Records shall be maintained in respect of following amongst others:-

a) (a) Power Transformers and Distribution Transformers;

b) (b) 11 kV, 22 kV and 33 kV Circuit Breakers;

(c) 11 kV, 22 kV and 33 kV Lines;

(d) Protection and metering equipment; and

(e) Any other component of the distribution system.

5.17.2 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.

5.17.3 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.

6.18.3 5.17.4 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.

5.18 Energy Conservation .-

5.18.1 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.

5.18.2 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.

5.18.3 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.

6.20 5.19 Tools and Spares.-

5.19.1 The licensee shall maintain adequate reserves and standby emergency equipment for attending forced outage conditions of lines and transformers. These include oil filtration sets, cable jointing and maintenance kits, mobile cranes, for chain-pulley, lifter and tools and plants. The tools and tackles shall be checked/inspected once in a quarter of the year by an officer not below the rank of Assistant Engineer and their serviceability shall be ensured.

5.19.2 The 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.

5.20 HR Development and Training .-

5.20.1 The licensee and the User shall impart necessary training to its officers/staff at each level in distribution system operation and maintenance practices as well as knowledge of manuals, codes and procedures so as to implement the provisions of this Code. The licensee shall make appropriate arrangements for imparting training in both cold line and hot-line work to workmen and supervisory staff, incorporating up-to-date techniques and safety measures of the distribution system design, construction and maintenance. Suitable syllabus shall be framed for this purpose. For the upkeep of the distribution system staff with adequate minimum qualification shall be recruited to incorporate and deal with advance technology.

5.21 GIS/ GPS based information system .-

The licensee shall employ GIS/GPS based Geographical Facilities Information System for planning operation and maintenance of the distribution system. The Geographical Information System shall be utilized for mapping all important elements of the distribution system which include lines, transformers, sub-stations, generating stations, unit locations and shall eventually cover all consumers. The GIS shall be linked to active Relational Database Management System (RDBMS) and Global Positioning System shall be utilized for time synchronization.

CHAPTER-6

DISTRIBUTION PROTECTION REQUIREMENT

6.1 Objectives .-

In order to safeguard the distribution system and prevent faults travelling into the transmission system, it is essential that certain minimum standards for protection be specified for the distribution licensee and the Users connected to the distribution system. This Chapter describes these minimum standards, so that faulty distribution section can be isolated from rest of power system and thereby minimum disruption, is caused due to faults.

6.2 General Principles .-

6.2.1 No item of electrical equipment shall be allowed to remain connected to the distribution system, unless it is covered by appropriate protection aimed at reliability, selectivity, speed and sensitivity of protective relays/devices. The licensee and the Users shall co-operate with the transmission licensee /STU to ensure correct and appropriate settings of protection to achieve effective, discriminatory removal of faulty equipment within the target clearance time specified in the Grid Code.

6.2.2 Protective relay settings shall not be altered or protection bypassed and/or disconnected without consultation with the concerned distribution licensee. In case the protection has been bypassed and/or disconnected by mutual consent, the same shall be rectified and protection restored to normal condition as quickly as possible. If no consensus is reached, all the electrical equipments shall be isolated forthwith.

6.3 Protection Manual .-

Licensee shall, within six months from the commencement of this Code, prepare and enforce standard manual of protection indicating minimum protection requirement within the distribution system and connected Users' system. The Protection Manual shall cover protection of supply lines and power and distribution transformers through which supply is provided to the consumers. The Protection Manual shall be prepared taking into consideration the Grid Code Protection requirement on Distribution /User System and shall contain relevant data on fault levels at various places, guidelines for setting standard relays for over current and earth faults, fuse rating selection criteria etc. A copy of the Protection Manual prepared by the licensee shall be furnished to the Commission.

6.4 Protection at inter-connection point of EHV/ Sub- Stations .-

All 33 kV, 22 kV and 11 kV lines emanating from EHV Sub-Station shall be provided with a minimum of over current and earth fault protection with or without directional features alongwith high set element. Co-ordination with the originating EHV sub-station should be ensured to avoid major sub-station equipment / EHV transmission lines from tripping through faults due to delayed fault clearance in the distribution feeders. Protection on 33 kV, 22 kV and 11 kV transformers and lines (or their sectionalising points) of HV System of the Distribution licensee shall be co-ordinated with settings of protection provided on 33 kV, 22 kV and 11 kV feeders at EHV sub-stations.

6.5 33 kV, 22kV and 11 kV line protection .-

6.5.1 The settings of protective relays for 33 kV, 22 kV and 11 kV lines from the feeding sub-stations shall be such that a fault in any section does not affect the upstream section under all conditions. 33 kV radial lines shall have two over current and one earth fault non-directional IDMT relay protection at feeding station. The relays shall also have instantaneous over current element. Where 33 kV line is an interconnection between two sub-stations or a generatimg plant and the sub-station, these relays shall have directional feature. The protection scheme of 33 kV, 22 kV and 11 KV lines shall have the provision of auto reclosure.

6.5.2 All 33 kV, 22kV and 11 kV lines at connection points shall be provided with a minimum of over current and earth fault relays as follows:-

1	Radial feeders	Non-directional time lag over current and earth fault relays with suitable settings to obtain discrimination between adjacent relays settings.
2	Parallel/ring feeders and inter-connected feeders	Directional time lag over current and earth fault relays.
3	Long feeders/transformer feeders	These feeders shall incorporate a high set instantaneous element.

6.6 Transformer Protection .-

6.6.1 Subject to the provisions in the Electricity Rules, the minimum protection requirements of transformers installed in distribution system shall be as under.-

On primary side of transformers:

(a) A gang operated link switch of such capacity as to carry the full load current and to break only the magnetising current of transformer provided the capacity of the transformer does not exceed 1000 kVA;

(b) Circuit breaker of adequate capacity for transformers having capacity above 1000 kVA.

On secondary side of transformers:

(a) All the transformers of capacity 630 kVA and above transforming HV to LV a circuit breaker of adequate rating shall be provided;

(b) In respect of transformers of capacity upto 630 kVA a link switch with fuse or circuit breaker of adequate rating shall be provided.

6.6.2 All Users having connected load above 500 k.W. shall install appropriate circuit breaker on its transformers to avoid unnecessary interruptions to other consumers on the feeder.

6.6.3 In addition to protection provided in para 6.6.1, the transformers having High or Extra High Voltage on any side shall be provided with following protection:-

(a) Gas pressure type Boucholz relay and winding and oil temperature protection to give alarm and tripping on all transformers of rating 1000 kVA and above;

(b) Transformers of capacity 5 MVA and above shall be protected against incipient faults by differential protection or restricted earth fault protection.

(c) The provisions of CBIP manual for transformer shall be complied with for protection etc.

6.7 Generator Protection .-

All generators with rating of 100 kVA and above shall be protected against earth fault/leakage. All generators of rating 1000 kVA and above shall be protected against faults within the generator winding using restricted earth fault protection or differential protection or both as per provisions under the Electricity Rules. The protection at inter-connection point with the State Transmission/Power Grid and the licensee shall be in accordance with the Grid Code requirements and connectivity criteria.

6.8 Protection Co-ordination .-

6.8.1 The transmission licensee shall notify the initial relay settings and any subsequent changes to the licensee and the Users from time to time. Routine checks on the performance of protective relays shall be conducted and any malfunction shall be noted and corrected as soon as possible. The routine checks shall be conducted by the protection unit of the licensee and no changes in PSM/TMS security be allowed without the approval of protection unit**.** The licensee shall decide the relay settings with the data collected from the transmission licensee and the Users on Fault Levels at various EHV Sub-Stations. 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.

6.8.2 The transmission licensee shall be responsible for arranging periodical meetings between the generating companies, transmission licensee and the distribution licensees to discuss co-ordination of protection as per the Grid Code requirement. The transmission licensee shall investigate any malfunction of protection or other unsatisfactory protection issues. The distribution licensees shall take prompt action to correct any protection malfunction or activity in the distribution system as discussed and agreed to in the periodical meetings.

CHAPTER-7

CROSS BOUNDARY SAFETY CODE

7.1. Objective .-

To achieve an agreement on the principles of safety when working across a control boundary between the 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.

7.2 Control Persons and their responsibility .-

7.2.1 The licensee and all the Users shall nominate suitably authorised 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".

7.2.2 The 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.

7.2.3 All the Users having a direct control boundary with the 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.

7.2.4 Whenever any work across boundary is to be carried out by the User or the licensee, the Control Person of the User or the licensee, as the case may be, who has to carryout the work, shall directly contact his counter part. 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.

7.2.5 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.

7.2.6 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.

7.2.7 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 and shall issue the safety documentation to the working party to allow the work to commence.

7.2.8 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.

7.2.9 The licensee shall develop an agreed written procedure for cross boundary safety and shall continuously update the same.

7.3 Special Considerations .-

7.3.1 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.

7.3.2 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.

7.3.3 As far as possible each of the licensees shall maintain an updated map of his system pertaining to the area fed by each sub-station. Otherwise the schematic diagram of the system for 11kV/22kV/33kV and above shall be maintained and exhibited in the concerned area offices/feeding sub-stations of the distribution licensee.

CHAPTER- 8

INCIDENT/ACCIDENT REPORTING

8.1 Objective .-

8.1 This Chapter covers procedure of major incident / accident reporting (which occur in distribution system) by the Users to the licensee and the licensee to the Chief Electrical Inspector.

8.2 Major Incident or Accident Reporting .-

8.2.1 Any of the following events that could affect the distribution system requires reporting:-

(a) Major blackout in power supply;
(b) Failure of Power Transformer affecting power supply in large area;
(c) Accidents-fatal and non-fatal;
(d) Major fire incidents;
(e) Major failure of protection;
(f) Major breakdowns in the distribution system;
(g) Loss of major generating unit;
(h) Major break down in sub-transmission line;
(i) Serious equipment problem i.e. major circuit breaker, transformer or bus bar etc.;
(j) any other incident which the licensee or the User may consider worth reporting in view of its repercussions on the safe and reliable operation of the distribution system;
(k) Major breakdowns of the equipment supplying power to the User's System.

8.2.2 The licensee shall report to the Chief Electrical Inspector the occurrence of any of the above incident on the prescribed time and on the specified format, under intimation to the Commission.

8.2.3. The distribution licensee and the Users shall establish a format and procedures for exchange of information with respect to any of the above incidents.

8.2.4 The Users may furnish information to the Chief Electrical Inspector directly with intimation to distribution licensee regarding any major reportable incidents occurring in their system promptly.

8.3 Reporting Procedure .-

All reportable incidents occurring in lines and equipment of 11 kV and above at the 33 kV sub-stations shall be reported within 15 minutes of the incident telephonically by the licensee whose equipment has experienced the incident, to all other significantly affected Users identified by the licensee and the SLDC/transmission licensee. The reporting licensee shall submit a report in writing to the SLDC/transmission licensee within one hour of such telephonic report. This report shall be duly followed by a comprehensive report within 48 hours of the incident. In

other cases, the reporting licensee shall submit a report within five working days to the SLDC/transmission licensee. The SLDC/ transmission licensee shall call for a report from any licensee on any reportable incident affecting other consumers in case a consumer whose equipment might have been a source of the reportable incident does not report the same. However, this shall not absolve any User from obligation to report events in accordance with the rules.

8.4 Reporting Form .-

8.4.1 All reportable incidents, except the accident cases, shall be reported in standard format attached at Annexure-10.

8.4.2 The Distribution Review Panel Committee shall review any new requirement of reporting an incident and shall review the format as the need arises.

8.5 Accident Reporting .-

Reporting of accident shall be in accordance with section 161 of the Act read, with rule 44A of the Indian Electricity Rules, 1956 as reproduced at Annexure-12. If an accident occurs in the distribution system resulting in or likely to have resulted in loss or injury to human or animal life, the distribution licensee shall send a telegraphic report to the Electrical Inspector within 24 hours of the knowledge of such occurrence. This shall be followed by a report in writing in the form set out in Annexure XIII to the Indian Electricity Rules, 1956, within 48 hours of the knowledge of occurrence of fatal and other accidents. However, incidents shall be reported to the Commission by the respective Chief Engineer or equivalent under whose jurisdiction the incident has occurred.

By order of the Commission

Secretary.

Annexure-1
(see para 3.2)

Distribution Planning Framework

1. The main areas, which require a careful network planning, and analysis are :-

(a) Network extension planning – newly built networks or extension of already existing network or configuration of the existing network to meet the changed load or feeder situation or operational exigency;

(b) Network component design; and

(c) Providing solutions for operational problems like low voltage and short circuit withstand capability, power swings and protection selectivity errors.

2. Networks are generally extended over several stages. The operational conditions are then simulated for this future load forecast. This step will facilitate the fulfilling of all the operational conditions after Commissioning of the new extension stage. A careful network analysis provides the decision aids for selecting the most reliable and cost effective solution from among several configurations. To dimension the individual components like transformer, cables and switchgear and to provide an optimal solution for the total system, an extensive analysis of the network is often necessary.

3. The System Planning Wing,-

(a) examines the operational behaviour of electrical systems both in normal operation and under fault condition,

(b) proposes remedial measures, if the operational conditions do not conform to the requirements for quality supply,

(c) promotes the development of components by examining operational conditions and equipment requirements,

(d) advises in system configuration, system structuring and component design questions, and

(e) plans the extension of already existing systems as well as the new construction of supply systems within the framework of the total system.

4. Intensive sessions are required to be held to clarify the task situation and it may be processed in direct contact with the customer also the distribution network are cost intensive and hence they require long term planning. The location and nature of the connected loads on the quality and reliability of the power requirement determine the structure of the distribution network.

5. The system planning is also necessary in the cases that include

(a) network modernization and upgrading;

(b) changes in operational and protection philosophy or neutral grounding.

6. The tasks, problems and activities related to network expansion planning, component design and operational problems are brought out as follows.

Sl. No.	Description	Tasks and problems	Activities
1	Expansion planning	Load increase New transformer, sub-stations Integration of peripheral networks Cable relaying Modernization of sub-stations Network coupling Power station extension High voltage level	Network documentation Geographic Information System/ Global Positioning System/Network calculations for load flow and short-circuit. Dynamic network Calculations.
2	Component design	Circuit-breaker stress Cable cross section Transformer size Neutral earthing resistor	Stability Fault analysis Relay coordination studies
3	Operational problems	Sub-station faults Voltage quality Harmonics Earthing problems Motor starting Power swings Frequency of occurrence of faults Fault tripping Overloads Over voltages Under Voltage	Harmonics analysis Harmonics filter design Earthing measurement Network configuration Sub-station design Economic analysis Relay selection Handling of neutral point Insulation coordination

7. Stages involved in network expansion planning:-

(a) Defining the task

(b) Commencement the planning task which consists of:-

(i) recording of the status of the existing distribution network and analysis of its operational situation,

(ii) load forecast and analysis – Compilation of data on the characteristic features of the loads that will be incident in the near future and that of the existing loads,

(iii) estimation of load development,

(iv) examination of the alternative options,

(v) checking the issues involved in the above options and also the feasibility of introducing a new transformer, enhancement of existing transformer capacity etc.

(vi) establishment of site location and new sub-station design,

(vii) modification /Redesign of sub-transmission and distribution networks and its protective arrangement including protective relay setting and coordination.

(viii) study on alternatives for least cost investment and also on environmental impact,

(ix) assessment of operational advantages and disadvantages and anticipated supply reliability levels of various options.

(x) investment planning, and

(xi) procurement of the required network components.

Annexure-2

(See para 3.5.2(a) and 3.6.2)

LOAD DATA FOR DEMANDS OF 500 KW AND ABOVE TO BE FURNISHED BY THE USER/CONSUMER

Name and Address of User/Consumer:

S No	Description	Details
1	Type of Load	(State whether: - steel melting furnace loads, rolling mills, traction loads, other industrial loads, pumping loads, etc.)
2	Maximum Demand (kVA) and Annual Energy Requirement in kWh	
3	Year/Years by which full/part Supply is required	
4	Location of Load	(Furnish location map to scale, indicate details of Consumer category/capacity, nearest Railway Station, and nearest EHV sub-station)
5	Rated Voltage at which supply is required. Whether Single phase or Three-phase supply required	
6	Type of supply	Normal/Alternate/Dedicated (specify details)
7	Description of Equipment	
A	Motors State purpose and number of installations, voltage and kW rating, starting current, type of motors, types of drives and control arrangements	
B	Heating Type and kW Rating	
C	Furnace Type of Furnace, Furnace Transformer details Capacity and Voltage Ratio	
D	Electrolysis Purpose, kVA capacity	
E	Lighting	

S No	Description	Details
	kW Demand	
8	Sensitivity of demand to fluctuations in voltage and frequency of supply at the time of Peak Demand (Give details)	
9	Voltage sensitivity	MVAr/kV
10	Frequency sensitivity	MW/Hz MVAr/Hz
11	Phase unbalance imposed on system Maximum (%) Average (%)	
12	Maximum harmonic content imposed (Furnish details of devices included with the system for the suppression of harmonics, also furnish the harmonic currents of different orders drawn by each device without filters)	
13	Details of any loads, which may cause Demand fluctuations of greater than 500kW at the point of connection, including Voltage Dips (percentage) lasting for 5 seconds and more. (Give details)	

Annexure 3
(See para 3.5.2.(b))

EMBEDDED GENERATOR UNIT-WISE DATA

Name and address of Generating Company:	
Location of Generating Plants (s):	
Generation Volts (kV);	
Rated kVA/kW	
Maximum and minimum Active Power sent out (kW) Reactive Power capability (kVAr), if any;	
Type of Generating Plant—synchronous, asynchronous, etc.;	
Method of voltage control;	
Generator transformer details, if applicable;	
Requirements for Top-up supplies and/or standby supplies;	
Generator kW/kVAr capability chart (at lower voltage terminals);	
Type of excitation system;	
Inertia constant kW secs/kVA;	
Stator Resistance;	
Direct-Axis Reactance (Sub-transient, Transient and Synchronous);	
Quadrature-Axis Reactance (Sub-transient and Synchronous);	
Zero Sequence (Resistance and Reactance);	
Negative Sequence (Resistance and Reactance);	
Generator Transformer (Resistance, Reactance, kVA Rating, Tap Arrangement, Vector Group, Grounding, Connection and % Impedance);	
Automatic Voltage Regulator block diagram, including the data on the gains (forward and feedback), time constants, and voltage control	

limits;	
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	
Standby requirements:	
Rated Capacity and Minimum Generation of each Generating Unit and Power Station in kW for standby capacity requirements.	
Generating Unit and Power Station auxiliary Demand (Active Power and Reactive Power) in kW and kVAr, at rated capacity conditions.	
Interface Arrangements the means of synchronization between the distributors and User;	
Details of arrangements for connecting to ground that part of the Generator's System directly connected to the distribution system;	
The means of connection and disconnection which are to be employed	
Precautions to be taken to ensure the continuance of safe conditions should any grounded neutral point of the Generating unit become disconnected from ground.	
Details of Protection System of the Generating Unit	

Annexure-4
(See para 3.5.2(c))

SYSTEM DATA TO BE PROVIDED BY LICENSEES TO THE INTENDING USERS

1) 33 kV and above distribution line data relevant to the location where connection has been applied/feasible to provide.

2) Details of metering system and protection system proposed .

3) Fault levels at which the consumer should design his equipment.

4) Fault clearance time for consumer's switch gear and

5) Sub-station fault level.

Annexure- 5
(See para 3.5.2(d))

SYSTEM DATA OF WHOLE LICENSEE SYSTEM

1. Topological map of Himachal Pradesh marking boundaries of area of supply of the licensee.

2. Distribution map of the licensee drawn to scale of not less than 1 Cm to 2.5 Km showing the existing 11 kV and 33 kV lines and sub-stations within the area of supply. Lines and sub-stations 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, sub-station capacity, capacitor sizes with locations of auto-reclosures/Kiosks/Breakers etc.

4. Details of Metering and relaying at 33/11, 22/0.4,11/0.4 kV sub-stations.

5. Details of Grid sub-stations at the point of interconnections as follows:

   i) MVA Capacity and voltage.

   ii) Number of transformers, capacity of each transformer, voltage ranges of taps.

   iii) Fault level at sub-station bus bars,

   iv) Bus impendence

   v) Sub-station layout diagram.

6. Drawl at interconnection points: Maximum and Minimum MW drawn during last six months from each interconnection with the transmission system or with other distribution licensees.

Annexure-6

(see para 3.6.3)

LOAD RESEARCH PROGRAM

1. The licensee shall implement an appropriate load research program for the systematic collection of data describing consumers' energy usage patterns and analysis of the data for energy and demand forecast.

2. 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 the sample surveys and the data obtained shall be analysed using suitable statistical models. Based on this, load profiles shall be drawn implementing demand side management techniques to match the availability from time to time.

3. The load research 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, seasonally or annually,

   (c) hourly end use demand for the average day of the system peak, monthly, seasonal or annually;

   (d) total energy consumption for each category by month, season or year.

   (e) category wise diverse or coincidence factors and load factors

   (f) category wise non-coincident peak demands.

4. Based on the results of the above analysis, the load forecast shall be made using the appropriate modern forecasting tools wherever applicable.

5. 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 Standards.

6. The loads shall be arranged as far as possible in discrete load blocks to facilitate load management during emergency operations.

7. Load flow and other system studies shall be conducted to locate the position of outlets from sub-stations, capacitor installations, distribution transformers, and to contain voltage variation and energy losses within reasonable limits.

8. The following parameters of equipments and system designs shall be standardised 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)	33kV/22kV/ 11kV sub-station layout.	(d)	Pole mounted sub-stations,
(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 cables	(p)	Clamps and connectors

9. 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.

10. The distribution licensee shall plan the distribution system expansion and reinforcement keeping the following in view alongwith all other measures to accommodate the advancement in technology prevailing at the time:-

(a) Optimising the ratio of single, two and three phase LT Lines.

(b) Optimising the ratio of single to three phase transformers;

(c) Economic ratio of HT and LT line lengths,

(d) Use of aerial bunched conductors,

(e) Underground cables,

(f) Optimizing the number of distribution transformers and their location at the electrical load centres,

(g) Replacement of long PVC lines wiith conductors/ 3 phase service line.

Annexure-7

(see para 3.7.11)

METHODOLOGY OF 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.

2 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.

3 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 numbers of pump sets.

4 Industrial Loads: The power requirements for industrial sector shall be estimated under following three categories, namely:-

(a) L.T. Industries ;

(b) H.T. Industries with a demand of less than 5 MW;

(c) H.T. Industries with a demand of 5 MW and above.

(d) EHT Industries

The consumption in category (a) and (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 of the State Government.

5. Non-industrial Bulk Supply: The available data regarding the consumption of bulk supply to non-industrial consumers such as research establishments, military engineering services, supply to power projects etc., and the probable future developments in these areas, shall be considered for the forecast.

6. Other Loads: For other loads, the projections shall be based on the best judgement.

Annexure- 8
(See para 4.1.2(c))

SITE RESPONSIBILITY SCHEDULE

Name of Sub-station/Location
Site Owner
Name of co-ordination officer of site
Telephone No.
Fax No.:

Item of Plant/ Apparatus	Plant Owner	Safety Responsibility	Control Responsibility	Operation Responsibility	Maintenance Responsibility	Remarks
……kV Switchyard						
All equipment including bus-bars						
Feeders						
Generating Units						
Other (to be specified)						

	Signatures
Plant Owner	
Safety Responsibility Officer	
Control Responsibility Officer	
Operation Responsibility Officer	
Maintenance Responsibility Officer	

Annexure-9

(See para 5.4.3.(3))

ESSENTIAL LOADS AND PRIORITY OF RESTORATION

Priority	Type of Load	Name of the Sub-station feeding such loads
1.	Hospitals, Water Works,	
2.	Defence Establishments	
3.	Radio, Television Stations and telecommunication Exchanges/Stations	
4.	Air Port	
5.	Important cities	
6.	Police Stations	
7.	Fire Stations	
8.	Process Industries and Mining	

Annexure –10

(See para 8.4)

OPERATIONAL EVENT REPORTING

Name of the reporting Organization
Date and Time of reporting the /event incident

1	Date and time of incident	
2	Location of incident (Name of Sub-station/Line etc.)	
3	Description of incident	
4	System parameters before the incident (voltage, frequency, flows, generation, etc.)	
5	Failure of protection at EHV GSS if any and relay indications.	
6	Damage to equipment	
7	Supplies interrupted and duration, if applicable	
8	Amount of generation lost, if applicable	
9	Possibility of alternate supply arrangement	
10	Estimate of time to return service	
11	Cause of incident	
12	Any other relevant information and remedial action taken	
13	Recommendations for future improvement/repeat incident	

Annexure-11
(See para 8.5)

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	In case the victim(s) is /are employee(s): (a)designation of such person(s) (b) brief description of the job undertaken, if any. (c) Whether such person/persons was/were allowed to work on the job.	
8	In case the victim(s) is/are employee(s) of a licensed contractor (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. (b) Name and designation of the person who assigned the duties of the victim(s)	
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

Annexure13
(See para 1.3)

LIST OF ABBREWATIONS

1	**AAC**	All Aluminium Conductor
2	**AAAC**	All Aluminium Alloy Conductor
3	**ACSR**	Aluminium Conductor Steel Reinforced
4	**BIS**	The Bureau of Indian Standards
5	**Board**	The HP State Electricity Board
6	**CAIDI**	Customer Average Interruption Duration Index
7	**CAIFI**	Customer Average Interruption Frequency Index
8	**CBIP**	The Central Board of Irrigation and Power
9	**CEA**	Central Electricity Authority
10	**CEI**	Chief Electrical Inspector
11	**CT**	Current Transformer
12	**DCR**	Distribution Code Review
13	**DCRP**	Distribution Code Review Panel
14	**EHV** **EHT**	Extra High Voltage Extra High Tension
15	**GI**	Galvanized Iron
16	**GSS**	Gas Sub-station
17	**HPERC**	The Himachal Pradesh Electricity Regulatory Commission
18	**HV/** **HT**	High Voltage/ High Tension
19	**Hz**	Hertz (cycles per seconds)
20	**IDMT**	Inverse Definite_Minimum Time
21	**IEEE**	Institute of Electrical and Electronics Engineers
22	**IEC**	International Electro Technical Commission
23	**IEGC**	Indian Electrical Grid Code
24	**IS**	Indian Standards
25	**IP**	Irrigation Pump
26	**kA**	Kilo Ampere
27	**kW**	Kilo Watt
28	**kWh**	Kilo Watt hour
29	**kVA**	Kilo Volt Ampere
30	**LT**	Low Tension
31	**LV**	Low Voltage
32	**MAIDI**	Momentary Average Interruption Duration Index

33	**MAIFI**	Momentary Average Interruption Frequency Index
34	**MCB**	Miniature Circuit Breaker
35	**MVA**	Mega Volt Ampere
36	**MW**	Megawatt
37	**PAP**	Project affected person
38	**PCC**	Prestressed Cement Concrete
39	**PT**	Potential transformer
40	**PTW**	Permit to work
41	**RCC**	Reinforced Cement Concrete
42	**REC**	Rural Electrification Corporation
43	**R&R**	Rehabilitation and Resettlement
44	**SAIDI**	System Average Interruption Duration Index
45	**SAIFI**	System Average Interruption Frequency Index
46	**SCADA**	Supervisory Control and Data Acquisition
47	**SLDC**	State Load Despatch Centre
48	**STU**	State Transmission Utility