

## Explanatory Memorandum

A Task Force headed by the Chief (Engg.), CERC was formed by the Commission to evolve the standards of performance of Inter-State Transmission Licensees with POWERGRID, CEA and Powerlinks as members, and representatives of NLDC and RLDCs as special invitees. The Committee had also called other Private Inter-State Transmission Licensees as special invitees. The Task Force held three meetings. It was decided in the Task Force that the main standard of performance that could be specified and which was verifiable, was the Transmission availability. Besides, the other standards of performance that could be specified were the restoration time of transmission lines, ICTs etc. It was also thought that the CEA (Grid Standards) Regulations also contained some Standards of Performance of transmission licensees, in the line of best practices that should be followed by the Inter-State Transmission Licensees.

Data for the Transmission availability and restoration time of transmission lines, ICTs was sought from CTU. The summary of the data received from CTU is reproduced at Annexure – I and Annexure - II. Based on the data received from CTU, draft standards of performance of transmission licensees have been formulated. The data of CTU for restoration of transmission line due to insulator failure is for the period 2005-2009 and for restoration of transmission line due to tower failure is for the year 1999-2010. The Regulation regarding restoration of the ICT proposes timeline for restoration of the faulty transformer by diverting transformer from other site of the faulty transformer as 120 days in case spare transformer is available. However, the transmission licensees may approach the Commission for relaxation in the timeline till the time they build up sufficient inventory with the approval of the Commission. It is mentioned that any such spare inventory should duly take into account the design redundancy in the system.

**Summary of Insulator Failures**

<b>Region</b>	<b>Average Restoration Time (Days)</b>	<b>No. of Events</b>
NR1	0.96	21
NR2	1.00	1
WR	1.99	42
SR	0.458	14
ER	0.96	30
NER	1.48	204
<b>Average</b>	<b>1.41</b>	<b>312</b>

**Summary of Tower Collapse**

<b>Region</b>	<b>Average Restoration (Days)</b>	<b>Average Normal Restoration (Days)</b>	<b>No. of Events</b>
NR1	8	59	18
NR2	6	34	8
WR	13	39	13
SR	5	10	47
ER	16	40	29
NER	12	51	17
<b>Average</b>	<b>12</b>	<b>45</b>	<b>132</b>

## Indicative Restoration time of Transformers in POWERGRID

The failures of transformer are due to various reasons. There can be winding failures, core failures, OLTC failures, bushing failures etc. which leads to major breakdown. The failure of each transformer is unique and needs thorough analysis before deciding the repair. It takes considerable time to bring the transformer back into service in case of major failure. The following few typical cases and their breakup of time taken on major activities are indicated.

### 1. Factory repair of Transformer

#### (A) Restoration after repair of the failed transformer

- Investigation of failure and decision for Factory repair by OEM – 15 days
  - Transportation to factory - approx 30 days (May be even more due to non availability of Trailer at remote places)
  - Factory repair time (winding/ core replacement) - 6 months to 1 year
  - Transportation back to site - approx 30 days
  - Erection, oil circulation, testing and commissioning – 30 days.
- **Total repair time: 350 to 450 days** (e.g. Vizag: 435 days, Bahadurgarh: 367 days, Baripada: 430 days)

#### (B) Restoration by diverting transformer from other site ( if possible)

- Investigation of failure and decision for Factory repair by OEM – 15 days
  - Transporting of the transformer to site (depending on distance, decision time, dismantling etc.) - 30 days
  - Ordering of trailer, contracting time, bringing trailer to site, etc. - 30 days
  - Erection and commissioning including matching with the existing foundation/ making necessary modifications, modification for using the existing cooler banks, oil circulation, testing etc. Approx 45 days
- **Total restoration time: Approx: 120 days**

### 2. Site Repair (involving bushings/ OLTC/ Core earthing) of the failed transformer

- Investigation of failure – 15 Days

- Availability of required spare components at site: 1.5 to 6 months
- Repair time: 1.5 to 3 months
- **Total restoration time: 75 to 300 days** (Depends on type of repair and availability of ready spares)  
(e.g. Mandola ICT-I: 73 days, Patna ICT-I: 167 days, Maithon ICT-I: 286 days)

### **3. Restoration through procurement of new transformer**

In case the failed transformer is beyond repairable condition and no diversion from other site is possible, then restoration is to be done by procuring new transformer. The lead time of procurement of new transformer and its commissioning is around 2 years.