Guideline for Preparation of Standard Performance Licensee

(Ref : *No. H. 11019/8/08-JERC: 25th June, 2010. JERC for Mizoram & Manipur)*

This guideline is prepared for improving the Correctness of Standard Performance of Licensee Report under Transmission Circle, P&E Deptt with reference to JERC for M&M Notification No: No.H.11019/8/08-JERC Dt 25th June, 2010.

Some of the original data were modified to suit the applicability, eg. 4830 Hour for Half Year instead of 8760 for a year. The format 1,2,3 are for Quarterly Submission whereas Format 4,5 are for Half Yearly. Out of these, Format 1, 2,4 are self explanatory, so it is not included in this guideline . Only The guideline for Format 3 and Format 5 are given with suitable examples. Though the given examples are taken only from monthly data. Practically, the Quarterly data (3 months) or the Half Yearly (6 months) data should be used for computation.

Format-3 (Quarterly)

Sl. No	Service area covered under this standard	Targeted Performance	Performance Achieved
1	Fuse off calls	95%	
2	Line Break Downs	95%	
3	Replacement of failed distribution transformers	95%	
4	Period of scheduled outages	95%	
5	Street light faults	90%	
6	Resolving Billing Mistakes	99%	
7	Replacing of Faulty Meters	95% (Urban) 90% (Rural)	
8	Reliability Indices		
	(a) SAIFI		
	(b) SAIDI		

1. Fuse-off calls: The Licensee shall ensure fuse off calls rectified within the time limits prescribed under Regulations-30 (1) of chapter-4. The licensee shall achieve the Standard of Performance in at least 95% of the cases.

2. Line Breakdowns: The Licensee shall ensure restoration of power supply within the time limits prescribed in Regulations-30 (2) of chapter - 4. The Licensee shall achieve this standard of performance in at least 95% of the cases

3. Distribution Transformer Failures: The Licensee shall maintain the percentage of distribution transformers replaced within the time limits prescribed in Regulations-30(4) of Chapter - 4 to the total distribution transformers failed not less than 95%.

4. Period of scheduled outages: As specified in the Regulations-30 (5) of chapter -4, interruption in power supply due to scheduled outages, other than the load shedding, has to be notified in advance and shall not exceed 12 hours in a day and in each such event, the licensee has to ensure that the supply is restored by 5:00 Pm. The licensee shall achieve both of these standards of performance in at least 95% of the cases

5. Street Light Faults: The licensee shall as soon as possible attend to complaints relating to non working of street lights or not operating properly to the extent the matter lies within the purview of the licensee. At least 90% of cases shall be complied within the prescribed time limit.

6. Billing mistakes: The Licensee shall maintain the percentage of bills requiring modifications following complaints to the total number of bills issued, not greater than 0.2%. At least 99% of the cases related to billing mistakes should be resolved within prescribed time limit.

7. Faulty meters: The Licensee shall maintain the percentage of defective meters to the total number of meters in service, at a value not greater than 3%. Atleast 95% cases in urban areas and 90% cases in rural areas should be resolved within prescribed time limit.

8. Service Reliability: *(Refer JERC Regulation for Standard Performance of Licensee 2010)*

(a) System Average Interruption Frequency Index (SAIFI):
This index gives number of interruptions in power supply to loads expressed as per year per EHV Sub-station for a voltage class.

SAIFI = R I / N

where, R I = Sum of number of interruptions exceeding 10 minutes at a time duration in the year for the given voltage class
N = Number of EHV (above 33kV) sub-stations in service at the beginning of year having that class of voltage supply

SAIFI shall be computed for each voltage class separately.

(b) System Average Interruption Duration Index (SAIDI):
This index gives weighted average interruptions in a year with reference to the total connected load on the system.

SAIDI = R D / N

where, R D = Sum of duration of all interruptions of exceeding 10 minutes at a time in the year for the given voltage class
N = Number of EHV (above 33kV) sub-stations in service at the beginning of year having that class of voltage supply

Example:
The required information for SAIFI and SAIDI can be acquired from FORMAT-D of Monthly Power Profile.

FORMAT-D: Outage of Sub-Station (33kV & Above)

Sl.No	Name of Sub-Station	Outage		Restore		Remarks/Reason
		Date	Time	Date	Time	
1	132kV S/S, Bukpui	24.11.12	9:10:00	24.11.12	15:35:00	Earthfault
		9.12.12	15:15:00	9.12.12	15:20:00	Tripped at 6.3 MVA
		11.12.12	19:20:00	11.12.12	20:50:00	Tripped at 12.5MVA
		13.12.12	9:00:00	13.12.12	20:31:00	Shutdown

From the above, each outage duration can be calculated excluding shutdown (also excluding load shedding, interruption due to natural calamity, etc.) remarks.

Sl.No	Name of Sub-Station	Outage		Restore		Outage Duration
		Date	Time	Date	Time	
1	132kV S/S, Bukpui	24.11.12	9:10:00	24.11.12	15:35:00	06:25 hr
		9.12.12	15:15:00	9.12.12	15:20:00	00:05 hr *(excluded in total as the time is less than 10 minutes)*
		11.12.12	19:20:00	11.12.12	20:50:00	01:30 hr
					Total	07:55 hr

(a) SAIFI

Here, RI = 2 nos (6:25Hr, 1:30Hr, Neglect 00:05 Hr since it is not exceeding 10 mins)
N = 1 nos (132kv S/S Bukpui)

Then, SAIFI = R I / N
= 2/1
= <u>2 nos</u>

(b) SAIDI

Here, RD = 7:55hr = 475 minutes
N = 1 no. (132 kV S/S Bukpui)

Then, SAIDI = R D / N
= 475/1
= <u>475 minutes</u>

<u>Format-5 (Half Yearly)</u>

Sl. No	Category of Standard	Implementing Stage/ Level	Performance Standard (s)	Measurable Parameter	Value of Measurable Parameter specified by Commission		Actual Achievement for half year
					Name of the parameter	Value specified	
1	System availability a) Feeder availability b) Sub Station availability	a) 132kV b) 33kV a) 132kV b) 33kV	95% 95%				
2	Voltage unbalance	132kV level		Voltage			

1. **System Availability:**

(a) Feeder Availability:

(i) The feeder availability gives the percentage of time during which the feeder remained available for transmission. Feeder availability shall be calculated based on the following formula:

$$\% \text{ Availability of Feeder} = \frac{(\text{No. of feeders} \times 4380 - \text{outages in all feeder-hours}) \times 100}{\text{No. of Feeders} \times 4380}$$

Here, total availability in hours is equal to the number of hours in a half year i.e., 4380 (Non leap year)

(ii) The State Transmission Utility shall achieve 95% feeder availability from the preliminary stage itself.

Example: The required information for calculating Feeder Availability can be obtained from FORMAT-C of Monthly Power Profile (or Interruption Log Book at Sub Station).

FORMAT-C: Outage of Transmission/Sub-Transmission Lines (33kV & Above)

Sl.No	Name of line/feeder	Outage		Restore		Remarks/Reason
		Date	Time	Date	Time	
1	*2*	*3*	*4*	*5*	*6*	*7*
1	E.Lungdar	23.11.12	7:15:00	23.11.12	7:40:00	Emergency Cut
2	Chhingchhip	24.11.12	7:30:00	24.11.12	8:00:00	Earth Fault
3	Hnahthial	24.11.12	6:30:00	24.11.12	8:30:00	Tripped
4	Thenhlum	24.11.12	7:30:00	24.11.12	8:00:00	Shutdown
		24.11.12	7:30:00	24.11.12	8:15:00	Tripped
		24.11.12	7:30:00	24.11.12	8:00:00	Earth Fault

From the above table, the total Outages duration is as below:

33kV (4 Feeders)	Outage Duration (hr)		Remarks
(1) E.Lungdar	Outage Duration	0	Emergency cut, Shutdown, Power Restriction not included
(2) Chhingchhip	Outage Duration	00:30	
(3) Hnathial	Outage Duration	2:00	
(4) Thenhlum	Outage Duration	1:15	
	Total outage duration	3:45	

No. of feeders = 4 nos

Outage Duration = 3:45 hr = 3.75 hr (Converting 3hrs and 45min to Decimal format)

Outage feeders = 3 nos (Excluding E.lungdar as Outage was due to Emergency cut)

$$\% \text{ Availability of Feeder} = \frac{(\text{No. of feeders} \times 4380 - \text{outages in all feeder-hours}) \times 100}{\text{No. of Feeders} \times 4380}$$

$$= \frac{(4 \times 4380 - 3 \times 3.75) \times 100}{4 \times 4380}$$

$$= \frac{(17520 - 11.25) \times 100}{17520}$$

$$= 99.94\ \%$$

(b) Sub-Station Availability:

(i) The sub-station availability expressed in percentage is the measure of the extent the power transmission capacity remained available from a substation. Sub-station availability shall be calculated based on following formula:

$$\% \text{ Availability of SS} = \frac{(\text{Installed capacity in MVA} \times 4380 - \text{Outages in MVA} \times \text{Hours}) \times 100}{\text{Installed capacity in MVA} \times 4380}$$

(ii) The State Transmission Utility shall achieve 95% Substation availability from the preliminary stage itself.

Example: The required information for calculating Sub-Station Availability can be obtained from FORMAT-D of Monthly Power Profile (or Sub Station Log Book).

FORMAT-D: Outage of Sub-Station (33kV & Above)

Sl.No	Name of Sub-Station	Outage		Restore		Duration taken for calculation (hr)	Remarks/Reason
		Date	Time	Date	Time		
1	132kV S/S, Bukpui (1x6.3MVA, 1x12.5MVA)	24.11.12	9:10:00	24.11.12	15:35:00		Shutdown (excluded)
		9.12.12	15:15:00	9.12.12	15:27:00		Emergency cut due to power restriction (excluded)
		11.12.12	19:20:00	11.12.12	20:50:00	1:30	Tripped at 12.5MVA
		13.12.12	9:00:00	13.12.12	20:31:00		Shutdown (excluded)

From the above table,

The total Outages duration = 1:30 hr = 1.5 hr (converting into Decimal Format)

Installed Capacity in MVA = 12.5 MVA + 6.3 MVA

= 18.8 MVA

Outages MVA = 12.5 MVA (Refer. Table remarks)

$$\% \text{ Availability of SS} = \frac{(\text{Installed capacity in MVA} \times 4380 - \text{outages in MVA} \times \text{Hours}) \times 100}{\text{Installed capacity in MVA} \times 4380}$$

$$= \frac{(18.8 \times 4380 - 12.5 \times 1.5) \times 100}{18.8 \times 4380}$$

$$= \frac{(82344 - 18.75) \times 100}{82344}$$

$$= 99.98\ \%$$

2. Voltage Unbalance:

Voltage Unbalance is defined as the maximum deviation in voltage between two phases divided by the average of the phase voltages of all three phases, expressed in terms of percent:

$$\text{Voltage Unbalance} = \frac{\text{Deviation between highest and lowest phase voltage X 100}}{\text{Average voltage of three phases}}$$

Voltage Level	Limit of Voltage unbalance

220 KV	2%
132 KV	3%

The Voltage unbalance shall be measured from hourly Log Sheet Data reordered at substations. Voltmeter having accuracy class not more than 1% shall be preferably used for recording hourly readings.

Example: The 132kV Unbalance Voltage can be calculated from the hourly/daily voltage reading of each phases (i.e. R-Y, Y-B, R-B) recorded in the Sub Station Log Book. The same should be shown separately for different 132kV Sub Station in this report.

Example : 132kV Sub Station, Bukpui (Serchhip)

Sl.No	Date	Phase Voltage (kV)			Average Voltage	Voltage Unbalance (%)
		R-Y	Y-B	R-B		
1	*2*	*3*	*4*	*5*	*6*	*7*
1	21.12.2012	132	133	128	131	3.8%
2	22.12.2012	130	129	132	130	2.3%
3	23.12.2012	134	132	130	132	3.03%
4	24.12.2012	133	134	127	131	5.34%
				Overall Voltage Unbalance		**3.74%**

From the above table (Sl. No. 1)

Highest Phase Voltage (kV) = 133 kV (Column 4)

Lowest Phase Voltage (kV) = 128 kV (Column 5)

Average Voltage of Three Phases = 131 kV (Column 6)

Voltage Unbalance = $\frac{\text{Deviation between highest and lowest phase voltage X 100}}{\text{Average voltage of three phases}}$

= $\frac{(133 - 128) \times 100}{131}$

= 3.8%

Then, Overall Voltage Unbalance for Sl. No. 1 to Sl. No. 4 is calculated as 3.74% which is the figure to be shown in the '**Format 5'** against the 132kV Bukpui Sub Station. For other 132kV Sub Station similar calculation should be done and shown separately in the same **'Format 5'**.