

**Explanatory note on Enhancement of Power Supply Capacity limits on 11 kV and 33 kV common feeders.**

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During tariff public hearings for FY2018-19, M/s. FICCI and others made a representation on enhancement of contracted demand limits on 11 kV and 33 kV common feeders.

2) The clause 3.2.2.1 of GTCS deals with threshold power supply capacities at different voltages and the same is extracted hereunder:

3.2.2.1 HT consumers intending to avail supply on common feeders, the following capacities are allowed on the common feeders.

<b>Contracted Demand</b>	<b>Voltage level</b>
Upto 1500 kVA	11 kV or 33 kV
1501 kVA to 5000 kVA	33 kV
Above 5000 kVA	132 kV or 220 kV as may be decided by the Company

3) The existing dog conductor (100 sqmm AAAC) can carry 283 amps at ambient temperature of 45°C and conductor temperature of 85°C which means it can transmit 16000 kVA power capacity at 33 kV level.

Thus, with the limit of 5000 kVA on 33 kV, the 33 kV service lines are grossly under loaded in most of the common feeders, leaving a huge spare capacity. Even though such substantial spare capacity margin is available on 33 kV lines, 33 kV consumers seeking additional demands over the threshold CMD, are required to go for dedicated lines or switch over to higher voltages at 132 kV supply which involves serious Right of Way problems and high capital investment.

Wolf and Panther Conductors can carry 388 A and 458 A at 33 kV level and the corresponding power translates into 21 MVA to 28 MVA respectively.

4) Similarly, 11 kV feeders erected with 'Racoon' or 'Dog' conductors which have the current carrying capacity around 239 amps and 283 amps respectively, can safely transmit power of 4325 kW to 5122 kW in common feeders subject to voltage regulation within the specified limits.

11 kV HT consumers are presently allowed supply upto 1500 kVA in common feeders. All these are mostly small and medium industries which are facing difficulty to take up marginal expansion of their industries due to the condition of switching over to 33 kV

supply, even for small additional demand over the threshold CMD. Though 'Right of Way' problem for 33 kV lines is not as critical as in 132 kV tower lines, establishment of 33 kV/11 kV substation of their own is an uphill task for these marginal industries, considering huge investment, maintenance cost, space constraints, and other related issues.

5) **Technical feasibility:**

The existing capacities for common feeder were determined fifty (50) years back. New conductors with higher current carrying capacities and supporting structure designs came into existence.

The current carrying capacities of different conductors for both ACSR & AAAC and corresponding kW capacities at 11 kV and 33 kV are given in the table- 1 & 2 below:

<b>Table-1</b>					
Sl.No	Conductor	Type	Current at 45 °C Ambient temp of 75°C MCT	Power at 45° C ambient temp & MCT of 75° C (0.95 PF) in kW	
				11 kV	33 kV
1	Rabbit (50 mm <sup>2</sup> )	ACSR	153	2770	8310
2	Raccoon (80 mm <sup>2</sup> )	ACSR	194	3510	10530
3	Dog (100 mm <sup>2</sup> )	ACSR	230	4160	12480
4	Wolf (150 mm <sup>2</sup> )	ACSR	315	5700	17000
5	Panther (200 mm <sup>2</sup> )	ACSR	369	---	20000
* MCT - Maximum Conductor Temperature					

<b>Table-2</b>					
Sl.No	Conductor	Type	Current at 45°C Ambient temp of 85°C MCT	Power at 45°C ambient temp & MCT of 85°C (0.95 PF) in kW	
				11 kV	33 kV
1	Rabbit (55 mm <sup>2</sup> )	AAAC	188	3400	10210
2	Raccoon (80 mm <sup>2</sup> )	AAAC	239	4325	12980
3	Dog (105 mm <sup>2</sup> )	AAAC	283	5122	15370
4	Wolf (158 mm <sup>2</sup> )	AAAC	388	7020	21070
5	Panther (212 mm <sup>2</sup> )	AAAC	458	--	24870
* MCT - Maximum Conductor Temperature					

6) **Scenario in other states:**

Details of power supply capacity on common feeders at 11 kV and 33 kV are given in the table below for different states.

	<b>11 kV</b>	<b>33 kV</b>
Karnataka	Upto 7500 kVA	2000 kVA to 10000 kVA
Maharashtra	3000 kVA	10000 kVA
Kerala	3000 kVA	12000 kVA
Orissa	Upto 1110 kVA	1110 kVA to 10000 kVA
Punjab	2500 kVA	20000 kVA
Madhya Pradesh	3000 kVA	10000 kVA

7) As mentioned in para 5 above, a 11 kV feeder can carry 2770 kW to 7020 kW and a 33 kV feeder can transmit 8310 kW to 24870 kW by using different types of conductors.

The data in tables 1 & 2 shows that it is technically feasible to extend power supply upto 7020 kW capacity at 11 kV level and upto 24000 kW capacity at 33 kV level. Considering the nature of common feeders, diversity factors of the consumers and substation capacities of 33/11 kV and 132/33 kV substations, the following power supply capacities are proposed in the common feeders at 11 kV and 33 kV level.

<b>Sl.No</b>	<b>Capacity</b>	<b>Supply Voltage</b>
1	Upto 2500 kVA	11 kV or 33 kV
2	2501 kVA to 5000 kVA	33 kV
3	5001 kVA to 10000 kVA	33 kV or above 132 kV*
4	Above 10000 kVA	132 kV or above, as may be decided by the Company

\* By standard, feeders of 132 kV and above are exclusive feeders

**Note:**

- i) While extending power supply at 33 kV for smaller demands, proper CT ratio has to be selected.
- ii) The DISCOMs will extend the above power supply capacities subject to technical feasibility.
- iii) The Licensee shall ensure adequate conductor capacity and if augmentation of conductor capacity is required, the necessary augmentation charges may be collected from the consumer.
- iv) The Licensee shall ensure voltage regulation within the specified limits.

8) **Commercial impact:** If the enhanced power supply capacities are approved, it results in higher energy sales, both in industrial and commercial sector. Presently, industry and commercial category sales are around 50% of the total energy sales and 70% of the revenue is coming from industrial and commercial sales.

The enhancement of CMD limits will lead to higher industrial growth and will attract investment from investors and this eventually improves the growth of the state at large. It also results in higher financial gains to the DISCOM, as the 11 kV and 33 kV tariffs are more vis- a- vis 33 kV and 132 kV tariffs.

9) Considering the above, the following amendment is proposed:

For clause 3.2.2.1, the following clause shall be substituted, namely:-

“3.2.2.1: HT consumers intending to avail supply on common feeders:

**For total Contracted Demand with the Company and all other sources**

Sl.No	Capacity	Supply Voltage
1	Upto 2500 kVA	11 kV or 33 kV
2	2501 kVA to 5000 kVA	33 kV
3	5001 kVA to 10000 kVA	33 kV or above 132 kV*
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- iii) The Licensee shall ensure adequate conductor capacity and if augmentation of conductor capacity is required, the necessary augmentation charges may be collected from the consumer.
- iv) The Licensee shall ensure voltage regulation within the specified limits.”

Joint Director (Engg.)