



## ANDHRA PRADESH ELECTRICITY REGULATORY COMMISSION

Vidyut Nyantrana Bhavan, Adjacent to 220/132/33 KV AP Carbides SS,  
Dinnedevarapadu Road, Kurnool - 518 002, Andhra Pradesh.  
Phones: 08518 - 294823,24,25,26 website [www.aperc.gov.in](http://www.aperc.gov.in)

### ABSTRACT

APERC - GTCS - EHT voltage-wise, conductor-wise maximum permissible length and loadability - Amendment to GTCS- Proposal of APTransco - Orders - Issued.  
=====

**Proceedings/Engg/F.No. E-223/AD(Tr.)/02/2026**

**Date: 22-04-2026**

Read the following:

### ORDER:

By Lr.No.CGM/Comml.&Co/GM/Comml/DGM/Comml/F-APERC/ D.No. 16 /26, dt: 06 January 2026, AP Transco has submitted that, while the Commission previously approved the maximum permissible distance and load capacity (in MVA) for 33 kV and 11 kV lines, such specifications have not been stipulated for EHT lines (132 kV, 220 kV, and 400 kV). Furthermore, AP TRANSCO has stated that, in accordance with the Retail Supply Tariff Orders issued by the Commission, the licensee is obliged to ensure that:

- The receiving-end voltage remains within the specified limits.
- Adequate conductor capacity is maintained, and augmentation charges, wherever applicable, may be recovered from the consumer; and
- Supply at 132 kV and above shall be through a dedicated feeder or LILO arrangement as decided by APTRANSCO.

2. In view of the above provisions and in alignment with the CEA Transmission Planning Criteria, 2023, APTRANSCO has determined the voltage-wise and conductor-wise maximum permissible length of EHT transmission lines, along with the permissible maximum loadability (in MVA), while maintaining voltage regulation within limits at the receiving end. The detailed table indicating conductor type, tower configuration, permissible ampacity, maximum permissible length, and corresponding MVA loadability for 132 kV, 220 kV, and 400 kV lines has been furnished.

4. APTRANSCO has also proposed a generalised formula to determine the maximum permissible length of EHT lines, corresponding to the maximum loadability for different conductors under various loading conditions, within voltage regulation limits.

5. After detailed examination of the APTRANSCO proposal, the Commission is of the view that the proposal would help reduce transmission losses, which would ultimately benefit end consumers. Hence, the Commission is

inclined to approve the proposal in toto. Accordingly, it decides to amend the GTCS as follows.

- The following shall be inserted at the end of Clause 3.2.2.2 of the GTCS:

**“ Provisions applicable to EHT Consumers**

**Table 3**

Sl. No	Type of conductor	Configuration of Tower	Voltage in KV	Permissible temperatures in centigrade	Max Permissible Ampacity	Max Permissible Length of line	Max Permissible MVA
1	ACSR Panther	D/C Vertical	132	75	374 A	36 KM	81.25
2	ACSR Lynx	D/C Vertical	132	75	350 A	34 KM	76.09
3	ACSS Panther	D/C Vertical	132	106	600 A	20 KM	130.46
4	ACSS Lynx	D/C Vertical	132	115	600 A	19 KM	130.38
5	ACSR Zebra	D/C Vertical	132	75	546 A	33 KM	118.78
6	ACSR Zebra	D/C Vertical	220	75	546 A	84 KM	191.58
7	ACSR Single Moose	D /C Vertical	220	75	614 A	80 KM	215.41
8	ACSR Twin Moose	D/C Vertical	220	75	1228 A	60 KM	431.02
9	ACSS Zebra	D/C Vertical	220	115	1000 A	45 KM	350.81
10	ACSS Moose	D /C Vertical	220	128	1262 A	36 KM	442.88
11	ACSS Twin Moose	D /C Vertical	220	128	2524 A	28 KM	887.3
12	ACSR Twin Moose	D /C Vertical	400	75	1228 A	42 KM	828.88
13	ACSR Quad Moose	D/C Vertical	400	75	2456 A	27 KM	1651.76
14	ACSS Twin Moose	D/C Vertical	400	128	2524 A	21 KM	1696.75

*Note: The tabulated values shall not be construed as an automatic entitlement for connectivity or load sanction without technical feasibility clearance by APTRANSCO*

Further, the generalised formula for computation of the maximum permissible length of EHT lines, within permissible voltage regulation limits corresponding to the maximum loadability for different conductors under various loading conditions, is as follows.

$$V_{rn} = \frac{-B_n + \sqrt{B_n^2 - 4Cn}}{2}$$

Where  $B = 2 * I * (R * \cos(\phi R) + X * \sin(\phi R))$

$$C = I^2 * (R^2 + X^2) - V_s^2$$

Where:  $V_r$  = Receiving-end voltage

$V_s$  = Sending voltage

$I$  = Line current

$R$  = Resistance per phase

X = Reactance per phase

$\phi_R$  = Receiving end Power factor angle”

8. The above amendment shall be prospective from the date of these Orders, and is not applicable to the existing consumers.

**(By Order of the Hon'ble Commission)**

  
Commission Secretary i/c

Encl: Letter from APTransco 06.01.2026.

To

The Chairman & Managing Director/APTransco/Vijayawada.

Copy to

The Special Chief Secretary, Energy, Vijayawada

The Chairman & Managing Director/APEPDCL/Visakhapatnam.

The Chairman & Managing Director/APSPDCL/Tirupati.

The Chairman & Managing Director/APCPDCL/Vijayawada.



## **TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED**

(A Government of Andhra Pradesh Undertaking & An ISO 27001-2022 Certified Company)

CIN: U31909AP1998SGC107226 Website: [www.aptransco.gov.in](http://www.aptransco.gov.in)

From:

The Chief General Manager,  
Commercial & Co-ordination,  
APTRANSCO,  
VidyutSoudha,  
Vijayawada.

To:

The Secretary,  
APERC,  
Vidyut Niyrantra Bhavan,  
Adjacent to 220KV AP Carbides SS,  
Dinnedevaram Road,  
Kurnool-518002.  
Andhra Pradesh.

**Lr.No.CGM/Comml.&Co/GM/Comml/DGM/Comml/F-APERC/D.No.16/26,Dt:06.01.2026.**

Sub: APTRANSCO - Request for Amendment to Clause 3.2.2.2 of the GTCS – Incorporation of Maximum Allowable Distance for Various type of Conductors in Extra High Tension (EHT) Transmission Lines operating at 132 kV, 220 kV and 400 kV Voltage levels – Issuance of Guidelines for Uniform EHT Supply to Consumers – Requested- Reg.

\*\*\*\*\*

Respected Sir,

It is respectfully submitted that, APTRANSCO / DISCOM's are receiving substantial number of applications from EHT consumers for enhancement of existing CMD as well as fresh applications for drawal of power at 132 kV and above voltages.

Honorable, APERC promulgated the general terms and conditions of supply of distribution and retail supply licensees vide proceeding no. secy/01/2006 dt 06.01.2006. The extract of clause 3.2.2.2 is as follows.

HT consumers seeking to avail supply through independent (Dedicated) feeders from the substations where transformation to required voltage takes place shall be:

For total contracted Demand with the licensees and all other sources

Capacity	Supply Voltage
Upto 3000 kVA	11 kV or 33 kV
3001 kVA to 5000 kVA	33 kV
5001 kVA to 20000 kVA	33 kV or 132 kV
Above 20000 kVA	132kV or 220 kV

While extending the power supply, the details mentioned in the following Table-1 and Table-2 shall be used as a guideline.



Table -1: Voltage of supply – 33kV				
Conductor	Continuous current rating at 45 <sup>0</sup> C Amb.Temp (in Amps)	Maximum allowable distance		
		10 MVA	15 MVA	20 MVA
Dog (105 Sq.mm)	283	20 km	14 km	----
Wolf (158 Sq.mm)	336.7	----	20 km	15 km
Panther (212 Sq.mm)	405.3	----	25 km	20 km

Table - 2: Voltage of supply – 11kV			
Conductor	Continuous current rating at 45 <sup>0</sup> C Amb.Temp (in Amps)	Maximum allowable distance	
		2500 kVA	3000 MVA
Rabbit (52.9 Sq.mm)	178	5.00 km	4.00 km
Dog (105 Sq.mm)	283	10.00 km	8.00 km

As can be seen, Hon'ble APERC accorded approval for maximum allowable distance with respect to maximum loadability in MVA against each type of conductor for 33 kV and 11 Kv to be implemented in DISCOM's/APTRANSCO. **However no such data was specified for EHT Lines.**

It is to submit that the Hon'ble commission, APERC approved retail supply tariff order FY 25-26, and pronounced that the licensee shall ensure the receiving end voltage shall be within specified limit and also to ensure adequacy of conductor capacity. The extract of RST chapter XI, clause 6 of general conditions for HT supply is here with reproduced.

- 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.
- The licensee shall ensure voltage regulation within the specified limits.
- Power supply at 132 kV and above shall be through an independent (Dedicated) feeder or through Loop in Loop out (LILO) arrangement as decided by APTRANSCO.

Therefore, keeping in view of above statutory regulations, APTRANSCO on detailed examination, worked out the EHT voltage wise, conductor wise maximum length of Transmission line with respect to maximum loadability in MVA duly limiting the approved voltage regulations at receiver end (Consumer end) which is as follows.

Sl.No	Type of conductor	Configuration of Tower	Voltage in KV	R	jx	Permissible temperatures	Max Permissible Ampacity	Max Permissible Length of line	Max Permissible MVA
1	ACSR Panther	D/C Vertical	132	0.15422	0.40136	75	374 A	36 KM	81.25
2	ACSR Lynx	D/C Vertical	132	0.17758	0.43456	75	350 A	34 KM	76.09
3	ACSS Panther	D/C Vertical	132	0.18700	0.40136	106	600 A	20 KM	130.46
4	ACSS Lynx	D/C Vertical	132	0.20671	0.40755	115	600 A	19 KM	130.38
5	ACSR Zebra	D/C Vertical	132	0.07615	0.38192	75	546 A	33 KM	118.78
6	ACSR Zebra	D/C Vertical	220	0.07615	0.3998	75	546 A	84 KM	191.58
7	ACSR Single Moose	D/C Vertical	220	0.06112	0.39294	75	614 A	80 KM	215.41
8	ACSR Twin Moose	D/C Vertical	220	0.03089	0.28007	75	1228 A	60 KM	431.02
9	ACSS Zebra	D/C Vertical	220	0.0955	0.3684	115	1000 A	45 KM	350.81
10	ACSS Moose	D/C Vertical	220	0.0805	0.39294	128	1262 A	36 KM	442.88
11	ACSS Twin Moose	D/C Vertical	220	0.04025	0.27000	128	2524 A	28 KM	887.30
12	ACSR Twin Moose	D/C Vertical	400	0.03089	0.29879	75	1228 A	42 KM	828.88
13	ACSR Quad Moose	D/C Vertical	400	0.0152	0.2544	75	2456 A	27 KM	1651.76
14	ACSS Twin Moose	D/C Vertical	400	0.04025	0.27000	128	2524 A	21 KM	1696.75

(While preparing the above, the technical parameters considered are as in the separate enclosure.)

Under the explained circumstances, the Hon'ble commission, APERC to incorporate the table mentioned above into Clause 3.2.2.2 of the GTCS and issue the corresponding amendment to Clause 3.2.2.2 of the GTCS. This will ensure the provision of EHT supply to consumers without any discrimination

Also requested to approve the above **generalized formula** that was computed to determine the maximum length of line with respect to maximum loadability in MVA for all other cases of different loading on different type of conductors to arrive the maximum allowable length of EHT lines duly limiting to maximum voltage regulation as per the CEA Transmission planning criteria 2023.

Submitted for issue of suitable amendments in this regard please

**Attached:** Technical Parameters

Yours Sincerely

  
Chief General Manager  
Commercial & Co-ordination

**Copy to**

PS to Director/Grid & Transmission Management/APTRANSCO

## Technical Parameters

1. Voltage limits as per the CEA, manual on Transmission planning criteria 2023. The same is reproduced as follows.

At the planning stage, a margin of about  $\pm 2\%$  may be kept in the voltage limits. And thus, the voltages under load flow studies (for 'N-0' and 'N-1' steady-state Conditions only) may be maintained within the limits given below.

<b>Voltage (kV<sub>rms</sub>) (after planning margins)</b>		
<b>Nominal</b>	<b>Maximum</b>	<b>Minimum</b>
765	785 (1.03 pu)	745 (0.97 pu)
400	412 (1.03 pu)	388 (0.97 pu)
230	240 (1.04 pu)	212 (0.92 pu)
220	240 (1.09 pu)	203 (0.92 pu)
132	142 (1.08 pu)	125 (0.95 pu)
110	119 (1.08 pu)	102 (0.93 pu)
66	70 (1.06 pu)	62 (0.94 pu)

2. Thermal loading limits of transmission lines with ambient temperature of 45°C as per CEA manual on Transmission planning criteria 2023. The extract of above is as follows.

Actual system data, wherever available, should be used. In cases where data is not available standard data given below can be assumed. Data for some new conductors which are equivalent to ACSR Zebra/Bersimis/Moose/Panther/ Snowbird/Lapwing are also given in following tables:

### Thermal Loading Limits for ACSR Zebra equivalent Conductors:

<b>Name of Conductor</b>	<b>Stranding/wire diameter (mm)</b>		<b>Ambient Temperature (°C)</b>	<b>Ampacity for Maximum Conductor Temperature (°C)</b>			
	<b>Al/Al alloy wire</b>	<b>steel wire</b>		<b>65°C</b>	<b>75°C</b>	<b>85°C</b>	<b>95°C</b>
ACSR Zebra	54/3.18	7/3.18	40	451	626	756	NA
			45	328	546	694	NA
			48	222	492	654	NA
			50	103	453	625	NA
AAAC	61/3.19	NA	40	461	642	776	887
			45	335	560	713	834
			48	227	505	671	800
			50	104	464	642	776
AL59	61/3.08	NA	40	469	649	783	894
			45	343	567	719	840
			48	237	512	678	806
			50	123	471	648	782

Thermal Loading Limits for ACSR Bersimis equivalent Conductors:

Name of Conductor	Stranding/wire diameter (mm)		Ambient Temperature (°C)	Ampacity for Maximum Conductor Temperature (°C)			
	Al/Al alloy wire	steel wire		65°C	75°C	85°C	95°C
ACSR Bersimis	42/4.57	7/2.54	40	569	816	997	NA
			45	389	706	912	NA
			48	217	630	856	NA
			50	NA	574	817	NA
AAAC	61/4.0	NA	40	573	827	1013	1166
			45	387	714	926	1093
			48	206	637	870	1047
			50	NA	580	830	1015
AL59	61/4.02	NA	40	604	872	1069	1229
			45	408	754	977	1153
			48	215	672	917	1104
			50	NA	611	875	1070

Thermal Loading Limits for ACSR Moose equivalent Conductors:

Name of Conductor	Stranding/wire diameter (mm)		Ambient Temperature (°C)	Ampacity for Maximum Conductor Temperature (°C)			
	Al/Al alloy wire	steel wire		65°C	75°C	85°C	95°C
ACSR Moose	54/3.53	7/3.53	40	501	707	858	NA
			45	354	614	787	NA
			48	222	551	740	NA
			50	NA	504	707	NA
AAAC	61/3.55	NA	40	512	724	881	1010
			45	361	629	808	948
			48	225	565	760	909
			50	NA	517	726	882
AL59	61/3.52	NA	40	534	754	916	1049
			45	377	655	840	985
			48	237	588	790	944
			50	NA	538	755	916
AL59	61/3.31	NA	40	503	703	852	975
			45	362	613	782	916
			48	239	552	736	878
			50	88	507	704	852

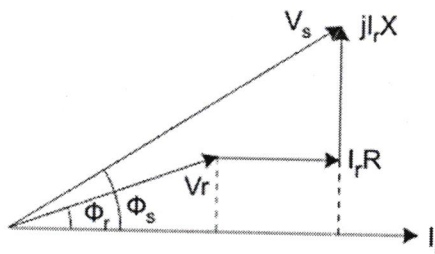
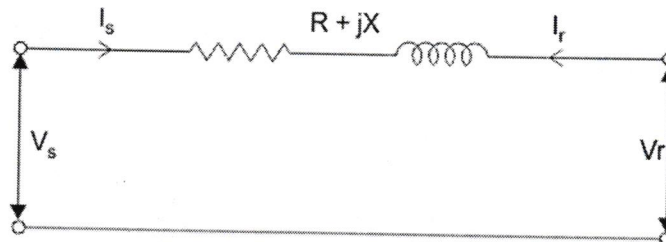
Thermal Loading Limits for ACSR Panther equivalent Conductors:

Name of Conductor	Stranding/wire diameter (mm)		Ambient Temperature (°C)	Ampacity for Maximum Conductor Temperature (°C)			
	Al/Al alloy wire	steel wire		65°C	75°C	85°C	95°C
ACSR Panther	30/3.0	7/3.0	40	317	424	505	NA
			45	244	374	465	NA
			48	187	341	440	NA
			50	136	317	422	NA
AAAC	37/3.15	NA	40	352	474	566	643
			45	269	418	522	605
			48	204	380	493	582
			50	144	353	473	565

The Thermal loading limits of conductors for which the ampacity is not available in planning criteria are incorporated from technical specifications of APTRANSCO / actual system data.

3. Impedance parameter of lines was obtained from APTRANSCO planning & power systems that follows for system protection.
4. The equivalent circuit and vector diagram for determination of formula for receiving end voltage ( $V_r$ ) with respect to sending voltage ( $V_s$ ) was adopted from the text book "Electrical power systems" by C.L.Wadhwa. The formula is as follows.

### Calculation of Voltage Regulation



$$V_s \cos(\Phi_s) = V_r \cos(\Phi_r) + I R$$

$$V_s \sin(\Phi_s) = V_r \sin(\Phi_r) + I X$$

Squaring and adding above two equations

$$V_s^2 = V_r^2 + 2IR \cos(\Phi_r) + 2IX \sin(\Phi_r) + I^2(R^2 + X^2)$$

$$V_r^2 + 2IR \cos(\Phi_r) + 2IX \sin(\Phi_r) + I^2(R^2 + X^2) - V_s^2 = 0$$

$$V_r^2 + V_r \cdot 2I(R \cos(\Phi_r) + X \sin(\Phi_r)) + I^2(R^2 + X^2) - V_s^2 = 0 \quad \text{---(1)}$$

Let us say

$$2I(R \cos(\Phi_r) + X \sin(\Phi_r)) = B$$

$$I^2(R^2 + X^2) - V_s^2 = C$$

Hence, equation (1) can be written as  $V_r^2 + V_r \cdot B + C = 0$  -----(2)

From the above quadratic equation

$$V_r = \frac{-B + \sqrt{B^2 - 4C}}{2}$$

The generalized formula for  $n^{\text{th}}$  distance in KM is  $V_{r_n} = \frac{-B_n + \sqrt{B_n^2 - 4C_n}}{2}$