

MoM of the Meeting to finalize Declared Supply Voltage held vide VC on 13.01.2022

A meeting to discuss and finalize the Standardization of Declared Supply Voltage at the point of commencement of supply at consumer end, i.e. 1-ph voltage 230/240V and 3-ph voltage 400/415V and associated permissible variations across the country, was held with DISCOMS and Regulatory Commissions vide VC on 13.01.2022 under the Chairmanship of Member (GO&D), CEA. Representatives from those states where 240 Volts as Declared Supply Voltage is being utilized, were invited for discussion.

Member (GO&D), CEA welcomed the participants and stressed on the need for Standardization of the Declared Supply Voltage.

Director (DP&R) briefed the Members on the course of events so far, by explaining that the Hon'ble Minister in a meeting indicated the need for standardization of Declared Supply Voltage, i.e. 1-ph voltage 230/240V and 3-ph voltage 400/415V and associated permissible variations at consumer end. She stated that as per the latest amendment in IS 12360 (Voltage Bands for Electrical Installations Including Preferred Voltages and Frequency), the changeover of system voltage from 240/415 Volts to 230/400 Volts has been kept in abeyance. As per the discussions held in the ETD-01 Sectional committee of BIS dtd. **17.05.2019**, it was decided that the issue of 230/240 Volts shall be discussed with CEA so as to revise the standard voltage levels.

She further briefed the Members about the developments on the matter by sharing a Gist of the various Meetings held so far:

- i. The first meeting of the Working Group was held on 24.07.2019. It was found that around **138 countries** are following 230V standard, **68 countries** are following 220V standard and **18 countries** are following 240V standard.

ii. Another meeting was held under the Convenorship of Chief Engineer (DP&R), CEA vide video conferencing on 13.07.2021. It was found/decided that:

- a) There was no major difference in the design of the equipment for 230V or 240V.
- b) Some time-window for transition should be given to the stakeholders for any changeover in Declared Supply Voltage.
- c) Considering that globally, a voltage level of 230 Volts for the consumer end is the preferred norm, pan-India uniformity in the supply voltage at the point of commencement of supply, will remove international trade barriers.
- d) There are no major implications on efficiency, as loads are moving to non-linearity or are inverter-based loads.

iii. Another meeting was held under the Convenorship of Chief Engineer (DP&R), CEA on 25.08.2021. It was communicated that DISCOMs maintain short lines to control the voltage.

iv. Second meeting of the Panel Members was held on 30.09.2021 under the Convenorship of Chief Engineer (DP&R), CEA, wherein the following was noted:

- a) Manufacturers have expressed that the design parameters of most appliances are so decided that the appliances comply with both 230 V and 240 V.
- b) Majority of the State Electricity Regulatory Commissions have already specified the supply voltage as 230V in their Supply Codes.
- c) Members of the panel have decided in favor of changing rated voltage level from 240V/415V to 230V/400V with a tolerance band of $\pm 10\%$ while providing transition time for switchover to 230V. Tolerance band shall further be reduced to $\pm 6\%$ in due course of time

It was also informed that based on the information provided by the States/ UTs, a list of State-wise operating voltage level was prepared and shared with the Members in the Meeting (Annexure-1)

Member (GO&D) observed that 23 of the states/UTs already operate at 230 V level and unless there is any technical detriment, we shall arrive at 230 V/400V as a common Declared Supply Voltage.

CE(DP&R) pointed out that based on the data submitted by the states, only five states, i.e. Sikkim, Kerala, Tamil Nadu, Telagana and Andhra Pradesh, are using 240 V level while Maharashtra is using both 230V and 240V. On this note, she invited Maharashtra to share any constraints they may face in switching to 230 V as Declared Supply Voltage.

Sh. Patil from MERC (Maharashtra) informed that they have four major Distribution utilities out of which three utilities operate at 240 V level. Hence, MERC in its Regulations has recognized both the voltage levels i.e. 230 V and 240 V. Further, Regulations permits voltage variation of +10% / -15% at point of supply. Considering such permissible voltage variation, without requiring changes in Distribution Transformer, uniform voltage standards can be adopted. However, consequences in terms of increased losses due to fixing 230 V as Declared Supply Voltage will have to be weighed against benefit which can be accrued by standardizing supply voltage. .

Chief Engineer (Testing), MSEDCL (Maharashtra) informed that they are following 240 V supply voltage. They have a Transformer fleet of nearly 8L DTs. No tap-changing facility is available at DT level, though it is available at higher level. He further informed that the secondary side voltage of Distribution Transformers in Maharashtra is 433V / 250 V. In case 230 V Declared Supply Voltage is to be adopted, then all DTs needs to be changed which will have huge financial implications.

Member (GO&D) suggested that BIS may be requested to specify 11/0.4 kV voltage levels in their relevant Standards which would help in naturally arriving at a Declared Supply Voltage of 230 V. He further asked IEEMA to check and furnish

the details of the cost implications from the point of view of reduced insulation etc. by fixing Declared Supply Voltage as 230 V.

CE (R&D) also agreed to the suggestion and pointed out that specifying 11/0.4 kV as a standard secondary voltage, would help in coming to a common Declared Supply Voltage.

CE (DP&R) pointed out that this will eventually help the labs as well, as they will not have to procure and maintain two sets of testing equipment.

Director (DP&T) opined that earlier 433 kV level was maintained to address the low voltage issue at the consumer end. However, now-a-days, this voltage drop correction is not needed anymore due to shorter lines at LT level.

TANGEDCO informed that their secondary side voltage at DT level is 240V/415 V and have a fleet of over 3.2 L DTs with off-load tap changing facility for DTs above 100 kVA. Further, they do not have any tap-changing facility for DTs at 100 kVA and below. They allow a permissible voltage range of +6% and - 10%.

Sh. J. Prabhakaran from TNERC explained that they can only change taps on HT side in the steps of 10%. This means that at 11 kV side, they can come down by 1.1kV in one step which would reflect as a drop of nearly 30 V in the secondary side. Using this method, they can bring the consumer end voltage to 210 V from 240V, but will not be able to arrive at 230V. Apart from this operational constraint, they have long LT lines running for miles in their rural areas, and coming down to 230 V would lead to further drop at remote consumer end, bringing the consumer end voltage to 190V or 180V.

Director (DP&T) shared that although line length depends on the load, as a thumb-rule, LT lines should not be longer than 500-600 mts. Further, to address the drop in consumer end voltage, shunt capacitors may be used.

Member (GO&D) stated that it is high time that Tamil Nadu shall improve their Distribution System by reducing the LT Line lengths.

To address another concern raised by TNERC that the reduction in voltage may affect the overall Grid due to higher current injection, **CE (DP&R)** shared that considering most loads are non-linear and that normally LT lines are of shorter length, so no significant damage would happen to the Grid.

TNERC also expressed concern over the fact that they may have to double their entire fleet, which cannot happen overnight. **Member (GO&D)** stressed that we should try to arrive at a common voltage for the entire nation. Increasing the size of the fleet should be carried out in a phased manner.

Sh. H.C. Sharma, TPDDL opined that voltage range shall be aligned with IEC which is $\pm 10\%$. He shared that not all old transformers have tap changers, especially at 250 and lower kVA ratings, which makes it difficult to control the voltage at LV side. He further stated that in winters, they encounter high voltage problem which can also not be tackled at LV end. Both these factors, make it difficult to control the voltage. Hence, the range shall not be reduced below $\pm 10\%$.

Sh. M.D. Manohar Raju from Telangana Regulatory Commission stated that almost all southern states use 240/415V level. He stated that they have only now been able to address the low voltage problem in their regions and mandating 230 V as Declared Supply Voltage will cause us to take up the entire correction work again.

He concluded by saying that the switchover to the proposed standardization of Declared Supply Voltage by the Discom is feasible with infrastructural changes and associated cost implications, if it is carried out in a phased manner with a tolerance of $230 \pm 10\%V$

CE (R&D) said that fixing a common Declared Supply Voltage is a policy matter. SERCs can specify a common Declared Supply Voltage and voltage band. This can also be put in Regulation and debated by way of public comments. He further stated that voltage can be maintained by way of levying penalty on SLDCs in case of deviation. The matter of losses and efficiency etc. of equipment is based more on design and

less on voltage level. Losses in lines will definitely increase, but since LT lines are smaller, the impact will be very small. It shall be considered that fixing a common Declared Supply Voltage is a win-win for manufacturers as well as consumers.

CE (DP&R) stated that BIS, after their panel discussions, has already concluded to set 230 V as a standard Declared Supply Voltage, and that we shall move ahead in endorsing it as a common voltage for pan-India. She further stated that the benefits of standardization of Declared Supply Voltage shall far outweigh any drawbacks due to nominal increase in losses.

Member (GO&D) in his concluding remark again emphasized that standardization of Declared Supply Voltage is a must and that we shall try to arrive at a common Declared Supply Voltage of $230 \pm 10\%V$ level in the initial phase and it shall be gradually reduced to $230 \pm 6\%V$ level. The only five states/UTs that are using 240V shall switch to $230V \pm 10\%$ in a phased manner.

No representatives from Sikkim, Kerala or Andhra Pradesh were present in the meeting to voice their opinion on the matter. All five states were requested to share the details on the matter within a week's time. Further, IEEMA was also requested to furnish the requested details within a week's time.

The meeting ended with a vote of thanks to the Chair.

Annexure-1

S.n o.	230 Volts	240 Volts	230/240 Volts
1.	West Bengal	Sikkim	Maharashtra
2.	Arunachal Pradesh	Telangana	
3.	Assam	Andhra Pradesh	
4.	Bihar	Kerala	
5.	Chhattisgarh	Tamil Nadu	
6.	Goa and UTs		
7.	Gujarat		
8.	Haryana		
9.	Himachal Pradesh		
10.	Jharkhand		
11.	Karnataka		
12.	Madhya Pradesh		
13.	Manipur		
14.	Meghalaya		
15.	Mizoram		
16.	Nagaland		
17.	Odisha		
18.	Punjab		
19.	Rajasthan		
20.	Tripura		
21.	Uttarakhand		
22.	Uttar Pradesh		
23.	Delhi		