

**PUNJAB STATE ELECTRICITY REGULATORY COMMISSION  
PLOT NO.3, MADHYA MARG, SECTOR 18-A, CHANDIGARH  
ORDER**

**DATE: 18.09.2020**

**In the matter of**

**Punjab State Electricity Regulatory Commission (Electricity Supply Code and Related Matters) (7<sup>th</sup> Amendment) Regulations, 2020**

**1. Introduction**

The Commission issued the draft notification regarding Punjab State Electricity Regulatory Commission (Electricity Supply Code and Related Matters) (7<sup>th</sup> Amendment) Regulations, 2020 along with Explanatory Memorandum seeking comments/objections/suggestions from the stakeholders by 22.04.2020 and Public hearing was fixed on 30.04.2020. The date for submitting objections/comments was extended to 06.05.2020. Due to COVID-19 pandemic, the date was further extended on the request of the stakeholders to 04.06.2020, subsequently to 06.05.2020 and then to 31.07.2020. Comments/Objections/suggestions from 16 stakeholders including PSPCL, meter manufacturer, power intensive category of industrial consumers and their Associations, were received.

The public hearing was deferred firstly to 18.06.2020 and then to 25.08.2020. The public hearing was attended by the officers of PSPCL and representative of Asian Power Quality Initiative (APQI). Oral submissions were made by the stakeholders and APQI also submitted written comments.

The comments received from the stakeholders on the draft regulations, the analysis and decisions of the Commission on these comments/suggestions along with reasons for the same are as under:-

**2. Amendments in Regulation 2 of the Principal Regulations-**

**(i) Clause (ra)**

PSPCL submitted that the definition of designated consumers may be amended to include the consumers utilizing variable frequency drives (VFD's), wherein AC to DC and DC to AC converters are employed

extensively to control the speed of induction motors, like textile industries, paper industries, chemical industries, printing industries and machine tool industries (where VFD load is more than 100 KVA). Further, the term billet heater and surface hardening machines may only be considered as induction billet heater and induction surface hardening machines, since resistive billet heaters and surface hardening machines are also being utilized by the industries, which may not be considered as designated consumers.

(ii) **Clause (zta)**

PSPCL submitted that the point of common coupling (PCC) for the commercial users (office parks, shopping malls etc) supplied at HT supply may be taken on HV side of the transformer. However, PCC for commercial users supplied at LT supply or supplied through common service transformer may be taken on LV side of the service transformer.

**Analysis and Decisions**

- (i) The definition of designated consumers covers all the existing PIU consumer categories as per Schedules of Tariff approved by the Commission. In addition, some large consumers, which are using non-linear loads, such as IT/ITES, Malls, Petro-Chemical units, Railways, Pharmaceuticals, have also been included in the category of designated consumers. While appreciating the concern of PSPCL, the Commission decides to retain the proposed categories in view of implementation issues and may expand the scope by declaring more categories of consumers as designated consumers in a phased manner.
- (ii) The definition of Point of Common Coupling (PCC) is strictly as per IEEE standards and Model Regulations on Power Quality (PQ) approved by Forum of Regulators (FoR). The consumers fed at 11 kV and above have been specified as designated consumers so consumers fed at LT are not covered in these Regulations. However, it has been mentioned that PCC will be on LV side if the consumer is fed from common service transformer.

### **3. Amendments in Regulation 24.1 of the Principal Regulations-**

Secure Meters submitted that BIS has already released a distribution system supply voltage quality standard IS 17036:2018 in Aug-2018 which is referring to EN50160. There are many other parameters required to monitor voltage supply quality i.e. flicker, unbalance, frequency etc. which are mentioned in this standard. Accordingly, the objector suggested that the limits for voltage harmonics in its electrical network shall be as per IS17036:2018 namely, distribution system supply voltage quality standards.

#### **Analysis and Decision**

As per clause (b) of section 73 of the Act, Central Electricity Authority (CEA) has been empowered to specify the technical standards for construction of electrical plant, electrical lines and connectivity to the grid. Accordingly, CEA notified the connectivity regulations both for voltage level of 33 kV & above and also for voltage level below 33 kV. In both these regulations, it has been provided that the limits of voltage harmonic by the distribution licensee in its electrical system, the limits of injection of current harmonics by bulk consumers/users, point of harmonic measurement etc. shall be in accordance with the IEEE: 519-2014 standards, as amended from time to time. The regulations notified by an Appropriate Authority under the powers vested in it by the Act are delegated legislation. The Commission decides to follow CEA regulations in the matter of Voltage and Current Harmonics.

### **4. Amendments in Regulation 24.2 of the Principal Regulations-**

- (i) Secure meters submitted that the measurements to determine compliance shall be carried out in accordance with IEC 61000-4-7 and IEC 61000-4-30. The continuous measurement of harmonics should be undertaken with permanent Power Quality meters complying with the IEC 61000-4-30 (Edition 3) Class-A meters. In IEC 61000-4-30, class A and S meters are mentioned. Class B meters are obsolete.
- (ii) PSPCL proposed that following may please be added in clause (2):

*Cost of such permanent power quality meters provided by the approved vendors of PSPCL, be borne by the designated consumers (as mentioned in Reg. 2 of the Principal Regulations), including cost of testing from NABL lab, if required.*

### **Analysis and Decisions**

- (i) As per CEA regulations, measuring and metering of harmonics shall be a continuous process with meters complying with provisions of IEC 61000-4-30 Class A. However keeping in view the operational constraints, it has been recommended in para 9.5 of the FoR report that in case of existing consumers where CT/PTs are of lower accuracy, class B meters may be used. However, there may be existing installations where CTs/PTs of the higher accuracy class, compatible with Class A meters, have been installed. Accordingly, the Commission decides to insert a proviso that in case of existing installations where CTs/PTs are of lower accuracy class than required for installation of Class A meters, class B meters may be installed as an interim measure.
- (ii) Reg 24.4 provides that designated consumers shall install PQ meters. The procurement of PQ meters from the vendors approved by PSPCL will be considered as and when PSPCL approves the list of such vendors. The designated consumer can get the PQ meter tested from any NABL accredited lab at its own cost.

### **5. Amendments in Regulation 24.3 of the Principal Regulations-**

PSPCL submitted that the power quality data measured and metered as mentioned in regulation 24.2 with regard to the harmonics, may be provided to the consumer on his demand.

### **Analysis and Decision**

Since data from PQ meter has to be downloaded by the distribution licensee so the data shall have to be shared by PSPCL with consumers regularly since it may have financial implications.

## **6. Amendments in Regulation 24.4 of the Principal Regulations-**

- (i) PSPCL submitted that Power quality data of such designated consumers may be retrieved by the PSPCL itself on monthly basis instead of weekly basis, as weekly processing/analysis of power quality data may be tedious and time consuming job.
- (ii) APQI suggested that the frequency of reporting may be kept to a quarter since weekly reporting will be too stringent on the consumers and will also require advanced analysis. Harmonics being a steady state phenomenon, the characteristics at consumer premises are not expected to change drastically from week to week. The consumers may not be required to install costly PQ meters at the initial stage and compliance can be assessed using one time measurements. Investment in monitoring equipment will also reduce.
- (iii) Power Intensive category of Industrial consumers and their Associations have submitted that the entire Industry is under shut down since 22.3.2020 due to Janta Curfew and Curfew / Lock Down imposed by GOP/GOI. Due to these proposed amendments, the PIU Industry will have to incur huge expenditure as they will have to install Harmonics Filters & other allied equipment to check the injection of Harmonics. The revival of the manufacturing activity of the industry will take many months and the distress conditions will continue till economy of the country revives. Under such circumstances when the survival of the industry is at stake, the Industry cannot think of investing on Harmonic Filters and allied equipment. Even PSPCL will also be under immense pressure to meet the requisite normal expenditure due to decreased demand for next 3 to 6 months and resultant shortfall in revenues. Under such conditions, purchase of special meters for measurement of Harmonics will also not be feasible and it will not be in the interest of both PSPCL as well as the consumers to proceed with the proposed amendment to the Supply Code 2014.

Further, no study has been conducted to ascertain the overall impact of Harmonics generation on DISCOM system. Huge investment is required to

control harmonics with no return on investment. To encourage industry to install harmonics control equipment suitable incentive in the form of general industry tariff may be provided to consumers to install equipment to control Harmonics. Penalty may be imposed only in case of significant breach of harmonics limits and after giving reasonable time to the consumer to contain harmonics.

The consumers suggested that the proposed staff paper/proposal for amendments in Supply Code, 2014 may be withdrawn for the time being and may be considered for implementation in the next year i.e. 2021-22.

### **Analysis and Decisions**

- (i),(ii) The Commission appreciates the concern expressed by PSPCL & APQI regarding weekly retrieving and reporting of the data. Accordingly, the Commission decides that the data may be retrieved/processed and reports generated by PSPCL on monthly basis. The clause (3) and (4) of Regulations 24 have been amended.
- (iii) The Commission appreciates the concerns of the industrial consumers and their Associations. Power quality has assumed significance since devices and equipments used presently in industrial, commercial and domestic sector are very sensitive to supply variations. However the meteoric rise of non-linear loads are posing serious challenges regarding the quality of power leading to premature failure or reduced/degraded performance of equipment and increased system losses. The current harmonics are like pollutants which contaminate the electrical network of the distribution licensee. It has to be controlled like any other pollutants vitiating our environment. Worldwide studies have established that current harmonics generated by one consumer may affect the normal operation of another nearby consumer. Voltage harmonics are mostly caused by current harmonics. So there is urgent need to control harmonic injection by specifying the harmonic limits, method of its measurement and penalties for its violation. It is beneficial for the consumer using non-linear loads as well to other consumers of the utility.

In the on-line interactive session arranged by the Commission with an agency dealing with Power Quality measurement & solutions on 8<sup>th</sup> September, 2020, which was attended by some representative of industrial consumers and PSPCL, it was brought out that permanent power quality analysers costs between Rs. 90K to Rs. 2.5 lac. However, in view of the difficulties expressed by the consumers due COVID-19 and PSPCL's submission that extensive training will be required for officers/officials for use of PQ meters/analysers, reading and analysis of PQ data retrieved, the Commission decides to provide more time both to the designated consumers and PSPCL for installation of PQ meters. The designated consumers shall install PQ meters by 1<sup>st</sup> October, 2021. Meanwhile a sample study shall be conducted to capture the baseline PQ parameters prevalent at PCC of some identified designated consumers and utility substations.

Accordingly, sub-regulation 24.4 has been amended to give more time to designated consumers and PSPCL to install PQ meters.

#### **7. Amendments in Regulation 24.5 of the Principal Regulations-**

PSPCL submitted that for covering of 33% of 66KV feeders and the selected 11KV feeders of PSPCL under power quality measurements, approximately 3740 power quality meters are required to be installed at feeder substations in the next three years. This would require extra budget of approx. Rs. 150 crore or Rs. 50 crore per year (for the period of the next 3 years) for procuring and installation of such power quality meters. (Cost of one PQ meter is approx. 4 lac). PSPCL proposed that instead of covering 33% of 66KV feeders and selected 11KV feeders of PSPCL in first year, only 20% may be allowed. Similarly in the next two years, 40% feeders in each year may be allowed to be covered under power quality measurements.

To reduce the huge burden of procuring power quality meters, it is hereby submitted that instead of installation of permanent power quality meters at 66KV/11KV feeders, power quality analyzers complying with the

specifications of IEC 61000-4-30 Class A, may be procured at circle levels. The Substation/Feeder in question may only be tested for power quality, when supply of poor power quality is claimed by a specific designated or non-designated consumer.

PSPCL also submitted that for tendering and procuring of Power Quality Analyzers/Meters, extra nine months may be provided after commencement of the above Regulations.

### **Analysis and Decisions**

The Commission acknowledges that the installation of large number of PQ meters at identified locations needs financial resources, for which necessary approvals are required. Also time is required for carrying out the tendering process. The locations are required to be identified depending on PQ parameters including but not limited to harmonics prevailing in the electrical system of the distribution licensee. In view the above, the Commission decides that a reasonable time period may be allowed to PSPCL to identify the locations on the basis of some sample study, get it approved from the Commission, start the procurement process and training of its personnel for data processing. PSPCL shall install power quality meters within three years starting from 1<sup>st</sup> October, 2021 in a phased manner covering at least 20% of the total identified locations on 11/33/66 kV feeders as may be approved by the Commission, in the first year and 40% each in subsequent two years. The clause (5) of Regulation 24 is amended accordingly.

### **8. Amendments in Sub-regulation 24.6.1(a) of the Principal Regulations-**

PSPCL pointed out that the formula for voltage harmonics distortions seems, not to be co-related with its definition or the definition provided under this clause. As per the definition of Total Voltage Harmonics Distortions, it may be written as:



$$THD_v = \frac{\sqrt{V_2^2 + V_3^2 + \dots}}{V_1}$$

or

$$\frac{1}{V_1} \sqrt{\sum_{h=2}^N V_h^2}$$

### Analysis and Decisions

In the regulations,  $V_h$  has been defined as percent r.m.s value of  $h^{\text{th}}$  harmonic voltage and the equation is strictly as per the definition. Accordingly, no change is required.

### 9. Amendments in Sub-regulation 24.6.1(b) of the Principal Regulations-

- (i) PSPCL and Secure meters pointed out that in the table depicting voltage distortion limits, the two ranges  $1KV < V < 161KV$  and  $69KV < V < 161KV$  are overlapping, instead of these, it must have been  $1KV < V < 69KV$  and  $69KV < V < 161KV$ .
- (ii) Secure meters suggested that for statistical evaluation, voltage harmonics shall be assessed for the period of not less than 7 continuous days. The short time 10 min values are accumulated over periods of one week and the 95th percentile values (i.e. those values that are exceeded for 5% of the measurement period) are calculated for each 7-day period for comparison with the recommended limits (given in table). Similarly, as mentioned in IEEE 519, very short time 3 seconds values are accumulated over period of one week and the 99<sup>th</sup> percentile values are calculated for each 7 days period for comparison with recommended limits (1.5 times the values given in table). The values are measured at PCC in normal operating condition.

### Analysis and Decisions

- (i) The typographic error has been corrected.

- (ii) In IEEE 519-2014, measurement of very short time (3 sec), 99<sup>th</sup> percentile value accumulated over a period of each 24 hours (not accumulated over a week as mentioned by the objector) has been recommended. However, keeping in view the practical aspects of measurement and to reduce the monitoring cost, these values have not been recommended in the Model Regulations approved by FOR. The Commission agrees with the provisions of the Model Regulations. The very short time measurement may be introduced at an appropriate time.

**10. Amendments in Sub-regulation 24.6.2(c) of the Principal Regulations-**

Secure meters suggested that in the proviso to regulation 24.6.2(c), the weekly 99<sup>th</sup> percentile very short time 3 seconds harmonic current values, which should be less than 2 times the value given in above table, may be specified.

**Analysis and Decisions**

The issue has already been discussed in para 9(ii) above.

**11. Amendments in Sub-regulation 24.7 of the Principal Regulations-**

- (i) The industrial consumers and their Associations have submitted that provision relating to imposition of penalty be postponed for next 3 years (FY 2023-24) till COVID-19 related business problems are resolved.
- (ii) PSPCL proposed that the following clause may be added:

*Licensee may also be provided authority to check and test power quality indices of any non- designated consumers with the help of Power Quality Analyzer, so that all the doubtful consumers may be checked/tested, who are prone to generate and inject excess harmonics or poor power quality indices in the distribution system. In such cases, if any consumer is found contributing harmonic distortion in excess of specified limits shall be served with a notice by the licensee to rectify the violation within 3 months failing which consumer shall be liable to pay penalty as approved by the commission.*

## Analysis and Decisions

- (i) As discussed in para 6(iii) above, appreciating the concern of the industrial consumers due to COVID-19, sufficient time has been allowed to the designated consumers to install PQ meters. The Commission will separately decide the penalty for not installing PQ meters by the designated consumers within the time stipulated in clause (4) of Regulation 24 of these regulations. For injecting current harmonics above the specified limits, the Commission decides that in view of the prevailing situation, the time, the rate and the manner of imposing penalty shall be decided after examination of all relevant issues at an appropriate time.

## 12. Amendments in Sub-regulation 24.8 of the Principal Regulations-

- (i) Secure Meters submitted that in case the voltage harmonics in the distribution system exceeds the limits specified in Regulation IS 17036: 2018 (distribution system supply voltage quality), the distribution licensee shall be liable to compensate the affected consumers of the feeders at the rate and in the manner as may be approved by the Commission from time to time..
- (ii) PSPCL suggested that following may be added:

*In case the voltage harmonics in distribution system exceeds the limits specified in Reg. 24.6.1, the distribution licensee shall be liable to compensate to those affected designated or non-designated consumers, who claim for it, on the basis of having suffered the loss and at the rate and manner as may be approved by the Commission from time to time.*

## Analysis and Decisions

- (i) The issue has been discussed in para 4(i) above.
- (ii) The proposal of PSPCL that only affected consumers who lodge claim and have suffered losses shall be eligible to get compensation is not acceptable. The procedure for this would be approved by the Commission separately.

The Commission approves the Punjab State Electricity Regulatory Commission (Electricity Supply Code and Related Matters) (7<sup>th</sup> Amendment) Regulations, 2020 with modifications as discussed above.

Sd/-

**(Anjali Chandra)**  
Member

Chandigarh

Dated: 18.09.2020

Sd/-

**(S.S. Sarna)**  
Member

Sd/-

**(Kusumjit Sidhu)**  
Chairperson

