

TAMIL NADU ELECTRICITY REGULATORY COMMISSION
(Constituted under Section 82 (1) of the Electricity Act 2003
Central Act 36 of 2003)

PRESENT:-

Thiru.K.Venugopal **Member**
and

Thiru.S.Nagalsamy **Member**

M.P. No.22 of 2011

Steel Authority of India Ltd.
Salem Steel Plant
Rep. by its Deputy General Manager (Projects)
Salem – 636 013.

.. Petitioner
(Thiru A.Ilango ,
Advocate for Petitioner)

Vs

- 1) Tamil Nadu Generation and Distribution Corporation Ltd.
(TANGEDCO)
Rep. by its Chairman
NPKRR Maaligai, 144, Anna Salai
Chennai – 600 002.
- 2) The Chief Engineer (Commercial)
TANGEDCO
NPKRR Maaligai, 144, Anna Salai
Chennai – 600 002.
- 3) The Superintending Engineer
Salem Electricity Distribution Circle
TANGEDCO, Salem – 636 014.

....Respondent
(Thiru PH.Vinod Pandian,
Advocate for Respondents)

Dates of hearing : 12-09-2011 and 21-06-2012

Date of order : 28-09-2012

M.P.No.22 of 2011 came up before the Commission for final hearing on 21-06-2012. The Commission upon perusing the above petition and connected records and upon hearing both sides passes the following

ORDER

1. Prayer of the Petitioner in M.P.No.22 of 2011:-

The prayer of the Petitioner in M.P.No.22 of 2011 is to pass order waiving the extra charges of 15% being levied as additional energy charges for the Petitioner's electricity Service Connection HTSC 274 towards additional charges for harmonic creation.

2. Facts of the case:-

2.1. The Petitioner, Salem Steel Plant is a unit of Steel Authority of India which is receiving power from TANGEDCO (S.C.No.HTSC – 274) for its Electric Arc Furnace and Ladle Furnace at 230 KV. The power supply from TANGEDCO was taken on 13-07-2010 by the Petitioner. The Petitioner was charged under HT Tariff 1A as per clause 9.11.2 of Tariff Order No.3 of 2010 dated 31-07-2010. An additional energy charge of 15% on the HT IA Tariff is charged as per clause 9.11.2.4 of the above Tariff Order since the Petitioner is having an Electric Arc Furnace. The additional charge is on account of the Harmonics created by the Arc Furnaces. The remedial system was installed on 24-07-2010 and as such the Respondent had not charged 15% extra upto April 2011. But in April, all of a sudden the Respondent demanded 15% extra charges in one lump sum within seven days. The Petitioner in letters dated 27-04-2011, 29-04-2011 and 09-06-2011 have requested the Respondent to waive the extra 15% charges towards additional charges for the harmonic creation. The Respondent in letter dated 05-05-2011 requested the Petitioner to approach this Commission for necessary relief. Hence this petition has been filed by the Petitioner.

3. Contentions of the Petitioner in the Petition:-

3.1. The additional charge is on account of the Harmonics created by the Arc Furnaces and the extra charges of 15% should be levied only till such time as the harmonics are created by such industries. If suitable remedial measures are adopted by the industries, then this surcharge has to be reviewed.

3.2. The Petitioner has installed a dynamic static var compensation system through M/s.ABB, Sweden / India at a cost of around Rs.18 crores.

3.3. The compensation system is in operation since 24-07-2010 and the Harmonics are within limits and in conformity with the international and Indian Standard.

3.4. The Petitioner has ensured all the parameters for quality power at PCC and it is ensuring that the operation of Arc Furnaces does not affect the grid of TANGEDCO.

3.5. TANGEDCO officials visited the site for few hours and carried out some measurements at site. The equipment used by them does not conform to any international / Indian standard and also the measurement methods do not adhere to any standards.

3.6. The Respondent has no power or authority to levy extra 15% as additional charges since the remedial measures are adopted and harmonics are suppressed. So, the Respondent cannot levy 15% extra charge.

3.7. The reports given by the technical expert also established that the harmonic generations are within limits and as such the Petitioner is eligible to get waiver of 15% of additional energy charges. Harmonic are suppressed in the Petitioner's industry and the said harmonic are within limit. The Petitioner is entitled for waiver of 15% of extra charges as additional energy charges being levied. The Respondents are not entitled for 15% extra charges as the harmonics are within limit.

4. Contentions of the Respondent as set out in the Counter:-

4.1. The Commission has directed the Tamil Nadu Electricity Board in the letter No. TNERC/D(E)/DD(E)/AD/SA/F.Harmonics/D.No.1171/2007, dated 27-11-2007 and Letter No.TNERC/D(E)/AD/SA/F.Harmonics/D.No.584/2008, dated 08-05-2008 to follow the CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007.

4.2. The voltage and current harmonics as per the above CEA Regulations are as follows:-

- (i) The total harmonic distortion for voltage at the connection point shall not exceed 5% with no individual harmonic higher than 3%.
- (ii) The total harmonic distortion for current drawn from the transmission system at the connection point shall not exceed 8%.
- (iii) The limits prescribed in (i) and (ii) above shall be implemented in a phased manner so as to achieve complete compliance not later than five years from the date of publication of these regulations in the official gazette.

There are no Indian standards pertaining to these aspects.

4.3. The Petitioner has given the test results conducted by M/s.ABB, Sweden conducted during February, 2011. In order to ascertain the same, especially related

with voltage and current harmonics measurements were done by TANGEDCO on 07-07-2011 at the point of common coupling at Salem Steel Plant with the following instrument:-

Make : Fluke
Mode : 434
Sl.No. : DM9200023

The voltage harmonics measured were found to be from 0.65% to 0.85% and found to be within the CEA limits.

The current harmonics and THD measured during the test period was found to be from 4.68% to 232% which exceeded the CEA limit.

4.4. The Petitioner had agreed to conduct one more test at the PCC focusing on the three major aspects:-

- * Instrumentation to be used and its compliance to international standards.
- * Measurement procedures / methods as per international standards mutually agreed upon.
- * Compliance to the limit values as per the existing CEA Regulations / International standards subject to approval of the Commission.

4.5. But without conducting the above test, the Petitioner has filed an appeal before the Commission requesting for waiver of additional energy charge of 15% on the HT IA Tariff for Arc Furnace prospectively.

4.6. Even though the Reactive Power Compensation Equipments have been fixed by the Petitioner, it is not meeting the compliance limits as per the standards directed by the Commission and it could as well be seen that the installation is still polluting

the grid and hence imposition of 15% extra energy would be still applicable for the Petitioner's HT S.C. No.274/Salem Electricity Distribution Circle under HT Tariff I-A.

4.7. Even though the Reactive Power Compensation System has been installed, any decision on waiver of 15% surcharge could be considered only after ascertaining the systems compatibility of meeting the compliance levels. This could be assessed only after an agreed joint testing by TANGEDCO and the Petitioner.

4.8. An exemption for waiver of additional energy charge of 15% on the HT Tariff IA for the Petitioner's HT S.C. No.274/Salem Electricity Distribution Circle could not be given as one time offer, as the continued functionality and the performance of Static Var Compensator needs continuous observation.

4.9. The Harmonic measurements including inter harmonics may be conducted periodically (monthly) by TANGEDCO by adoption of correct instrumentation, correct measurement procedures and compliance to the necessary standards to be directed by the Commission for waiver of 15% surcharge of Harmonics and based upon the results of the measurements, exemption may be given on a monthly basis by TANGEDCO.

5. Contentions of the Petitioner in the Rejoinder Affidavit:-

5.1. The Respondents have acknowledged the fact there are no Indian standards for measurement techniques of Harmonics in a highly fluctuating load like Arc Furnace. They have also stated that they have conducted the harmonic measurements and only the current harmonic distortion is more, voltage distortion is normal. It is not understood, what standard and methodology was adopted for their

measurements. They are very silent about the international standards, which were used by the Petitioner for measurements.

5.2. Even after handing over copies of the standards adopted by the Petitioner in the Regulation, it is very surprising that TANGEDCO is closing its eyes to these international standards.

5.3. It is pertinent to submit that the Central Grid Regulation has fixed the value not only for Arc Furnace owners but also for all bulk consumers. The methods for measurements (for power quality measurement methods for high fluctuating loads) is not indicated by CEA. There are no Indian standards for measurements as on date. This has been admitted by TANGEDCO also. CEA standards also recommend usage of relevant Indian / BS IEC/ IEEE / ANSI standards. When Indian Standards are not available, the Petitioner need to employ other standards as per CEA guidelines for meters. The Petitioner has used for measurement IEC – 61000-4-30 (Power Quality Measurement Methods) and IEC–61000-3-6 (Assessment of emission limits for the connection of distortion limits to MV, HV, and EHV power system). They are the most authenticated standards as on date. This method is used by ABB Sweden for all their installations throughout the world.

5.4. The allegation in para 7C of the counter that the current harmonics was from 4.68% to 232% is denied. The Petitioner does not agree to this measurement. The current harmonics is within the limit. This error is purely due to the very wrong technique of measurement and methods. Ordinary harmonic meters express the current harmonic distortion as a percentage of instantaneous current not the full load current. Harmonic distortion should be expressed as a percentage of full load

current or full demand current. A wrong measurement will un-necessarily penalize a customer.

5.5. The Respondents, TANGEDCO have not used any approved / authenticated methods for harmonic measurement. For a fluctuating load like Arc Furnace etc. an universally accepted technical methods has to be followed. In India, as admitted, there are no standards for measurement as on date.

5.6. The instrument used by the Respondents does not conform to IEC – 61000-4-30. As per standards, the Petitioner has to conduct long time based measurements (minimum 24 hours) but TANGEDCO spent hardly few hours at site. TANGEDCO have not considered any full load or demand current for current harmonic distortion calculation. As per IEC, the Petitioner must consider the current, corresponding to the agreed power for harmonic distortion calculation and express in terms of percentage of the current, corresponding to agreed power. In the case of the Petitioner, it corresponds to the current for 39 MVA.

5.7. The Respondents have not given any report to the Petitioner so far for the measurement taken by them. The Respondents have not explained as to which method they used, either approved by any Indian Standard or international standard.

5.8. The Petitioner have conducted measurements twice through imported equipment, each time on 24 hours basis, using international measuring methods as given by IEC-61000-4-30 and IEC-61000-3-6 and the values are well within limits (compared to grid regulation 2007). These reports have already been submitted to this Commission.

5.9. Nowhere systems are monitored every month. The Petitioner has a similar system in their sister plant at Durgapur and the supply authorities never monitor this. For a system well designed, based on the full load capacity and harmonic generation, there is no need to check every month as stated in the counter affidavit.

5.10. The allegation that the Petitioner is polluting the grid is vehemently denied. The Petitioner is not polluting the grid as alleged. The Respondents are to see the figures for PCC before making the allegation.

5.11. The Respondents TANGEDCO have not conducted any such measurement for Harmonics for highly fluctuating loads like Arc Furnace so for anywhere in Tamil Nadu and they do not have experience like ABB, Sweden and TANGEDCO do not seem to have proper instruments and proper methods for measurement. This is obvious because TANGEDCO, though talks about the Grid Regulation 2007, it is silent about the other parameter such as voltage unbalance and voltage fluctuation because of the non-availability of proper instruments and proper methods with them to measure this, whereas the Petitioner measured all the parameters as per relevant standards with the help of ABB, SWEDEN.

6. Finding of the Commission:-

6.1. Prayer in this petition is that the Commission may be pleased to pass Order waiving the extra charges of 15% being levied as additional energy charges for the petitioner's electricity service connection HTSC 274 towards additional charges for harmonic creation.

6.2. The petitioner is operating 55 Tonne Electric Arc Furnace and 60 Tonne Ladle Furnace. The power supply is at 230 KV and the supply was effected on 13-7-2010. The petitioner further states that the Reactive Power Compensation Equipment with harmonic filter were commissioned on 24-7-2010. The petitioner also states that upto April 2011 i.e. for a period of 9 months TNEB was charging under normal tariff and 15% extra charges were not levied. On 23-4-2011, the TNEB raised a bill for Rs.1.18 crores as 15% extra charges for Arc Furnace Appliance with retrospective effect from 13-7-2010 and since SAIL has installed world class harmonic equipment they have been representing for waiver of 15% charges from 24-7-2010 i.e. the date on which Compensating Equipment were commissioned. Based on the suggestion of TNEB to approach TNERC in May 2011, the petitioner has filed petition on 26-8-2011. Joint inspection was carried out on 8-7-2011 but the results of the same were contested by the Petitioner. Consequently, the petitioner had arranged a joint measurement through ABB, Sweden who is the supplier of the equipment. TNEB (R&D officials) participated in the testing on 10-11-2011 and 11-11-2011 and they signed a joint inspection report.

6.3. In this connection, it is necessary to examine the provisions with regard to surcharge for Arc Furnace. This issue was debated in the tariff order dated 16-3-2003 of this Commission. Para 7.13 of this Order is extracted below:-

“7.13 Surcharge for Arc Furnaces

In the existing tariff schedule, High Tension industries under Tariff I-A having arc furnaces are being charged 25% extra to the High Tension Tariff I-A for the electricity consumption. This additional charge is on account of the harmonics created by the rectifiers used by the arc furnaces. The Commission has modified this clause in the Tariff Schedule and these arc furnaces will now have to pay additional energy charges of 15%, on the base HT I-A tariffs. Further, the Commission is of the opinion that this extra charges should be levied only till such time as the harmonics are created by such

industries. These industries and TNEB would be well advised to study remedial measures available to rectify the situation. If such remedial measures are adopted by the industries / TNEB then this surcharge has to be reviewed”.

6.4. Relevant portion of this Order states that the extra charges of 15% should be levied only till such time as the harmonics are created by such industries. The Commission had also advised these industries and TNEB to study remedial measures available to rectify the situation. The tariff order further states that if such remedial measures are adopted by the industries / TNEB, then this surcharge has to be reviewed. The provision regarding harmonics is contained in the CEA (Technical standards for connectivity to the grid) Regulations, 2007.

6.5. It is observed that the petitioner in this case has taken decision to install the Static Var Compensator along with harmonic control in the year 2010. It is not in dispute that the equipment is functioning, controlling the harmonics to the level specified by the Regulations of CEA but dispute between the parties is with regard to joint inspection. TNEB in its BP dated 14-12-2009, while approving the extension of 230 KV supply to the petitioner has stated that adequate precautionary measures like installation of Static / Dynamic Compensators and filters, etc shall be taken by the applicant to avoid problems of undue voltage fluctuations and harmonic arising out of the loads of the company in the grid. The petitioner has informed Superintending Engineer, Salem Electricity Distribution Circle, Salem vide his letter dated 24-7-2010 that they have commissioned the reactive power compensation equipment with harmonic filters on 24-7-2010. The approval of the Statutory Inspector Viz., Superintending Engineer, Central Electricity Authority, Regional Inspector Organization, Chennai – 6 for energizing Static Var Compensator including the harmonic filters, etc was conveyed on 20-4-2010. This approval called for the

statement of test particulars after energisation of the installation. We have examined the typeset of documents containing the SVC commissioning test report dated 3-2-2011 as well as SVC performance test report dated 4-2-2011. These results are also extracted by the petitioner in para 9 of the petition which is reproduced for ease of reference.

"Sl. No	Parameters	As per actual measurement		Allowable as per Grid Regulation – 2007 of Central Electricity Authority
		From 31 st Jan 2011 to 2 nd Feb 2011 (24 hours)	From 3 rd Feb 2011 to 4 th Feb 2011 (24 hours)	
1)	Power factors	0.997	0.999	0.95
2)	Total harmonic distortion voltage	1.083%	1.007%	3%
3)	Total Harmonic distortion current	5.3%	5.3%	8%
4)	Voltage unbalance	0.142%	0.140%	3%
5)	Voltage fluctuation	0.326%	0.361%	1.5%
6)	Voltage flicker (pst)	0.382Pu	0.33Pu	Not specified in Indian Standard"

6.6. The bone of contention between TNEB / TANGEDCO and the petitioner is the joint inspection. This is in view of the fact that the petitioner has contested the method of testing resorted to by the Engineers of TNEB. Ultimately a joint inspection was carried out on 10-11-2011 and 11-11-2011, the test being carried out by the original equipment supplier Viz., M/s. ABB. The measured values of power quality parameters as accepted by the parties is extracted below:-

"3. Measured Values of Power Quality Parameters

Sl.No	Description	Values
1.	Total Voltage Harmonic Distortion	0.80%
2.	Total Current Harmonic Distortion	4.6%
3.	Flicker	0.357 PU
4.	Voltage Unbalance	0.150%
5.	PF	0.99

- *All the values other than PF include background values also*
- *All the measurements (18 pages) are annexed*

CONCLUSION

From the measurement it has been observed that all the power quality parameters are well within the limits of CEA norms given in the Technical Standards for Connectivity to the Grid Regulations – 2007”.

6.7. The joint test report brings out clearly that all the power quality parameters are well within the limits of CEA norms given in the Technical Standards of Connectivity to the Grid Regulation, 2007. Even the performance test report dated 4-2-2011 indicates that the measured values are well within the parameters specified in the CEA Regulations. The petitioner has stated that the compensator equipment were commissioned on 24-7-2010 but the commissioning test report and the performance test report are dated 3rd February 2011 and 4th February 2011 respectively. In view of this, performance of the equipment could be reliably known only after conducting the performance test which was conducted on 4-2-2011. The Commission is, therefore, of the considered view that the benefit of review of levy of 15% extra energy charges would arise when the remedial measure is adopted by the petitioner. This is clearly established only after the test is carried out by the petitioner on 4th February 2011. In view of this, the Commission orders that the levy of 15% additional charge shall stop from the date the test is conducted and results are accepted i.e. 4th February 2011. In the light of the para 7.13 of tariff order dated 16-3-2003, the Commission comes to the above conclusion. The tariff order does not stipulate any joint inspection of the equipment. The results of joint inspection is not very much different from the results of the test conducted on 4-2-2011. The Commission is not in a position to waive the additional charges w.e.f 24-7-2010, when the equipment is claimed to have been put in place.

6.8. It is necessary to ensure that equipment once installed, continues to be performing satisfactorily and serves the purpose for which it was installed. While power factor could be easily observed by the conventional metering of the licensee TANGEDCO on a monthly basis, measurement of the current and voltage harmonics needs to be checked at periodical intervals. Testing by the OEM Viz., ABB would involve additional cost. The licensee should evolve procedure for testing harmonics atleast once in a year, duly complying with the acceptable standards. This mechanism shall be instituted by the TANGEDCO and the action taken shall be reported to the Commission within a period of 6 months from the date of this Order.

7. Appeal:-

An appeal under section 111 of the Electricity Act, 2003 against this order shall lie to the Appellate Tribunal for Electricity within a period of 45 days.

(Sd.....)
(S.Nagalsamy)
Member

(Sd.....)
(K.Venugopal)
Member

/ True Copy /

Secretary
Tamil Nadu Electricity
Regulatory Commission