

AWARENESS ON HARMONICS
(For HT consumers)

In recent years, there has been an increased emphasis on and concern for the quality of power delivered to the electricity customers such as factories, commercial establishments etc. The objective of MSEDCL is to deliver quality power with sinusoidal voltage at fairly constant magnitude throughout the system. The major challenge in meeting this objective is harmonic currents, produced due to non-linear load put on the system by the consumers. These currents result in distorted voltages and currents which adversely affect the system performance in different ways.

The non-linear loads like Frequency Converters, Devices which includes semi-conductor elements, Generators, Motors, Transformers, Lightning equipments working by gas discharge principle, Photovoltaic systems, Electronic ballasts, Uninterruptable power supplies, Switching power supplies, Welding machines, Control circuits, Static VAR compensators, Arc furnaces, Computers, fax machines, photocopier, Lighting dimmers and electronic ballasts for high efficiency lighting, Single phase AC DC drives, Electrical Communication systems, Variable speed AC & DC drives, UPS systems, Battery chargers etc. are harmonic-generating equipments. Harmonics are thus injected into other linear loads connected in the same bus besides Harmonics injected into the network flow towards other users connected to the network and ultimately contribute to the pollution in the power system.

“Harmonics” means a component of a periodic wave having frequency that is an integral multiple of the fundamental power line frequency of 50 Hz causing distortion to pure sinusoidal waveform of voltage or current, and as governed by IEEE STD 519-1992(now amended as IEEE STD 519-2014) and corresponding standard as may be specified in accordance with clause (c) of subsection (2) of section 185 of the Act.

Harmonic pollution at the installation can be quantified by a measure known as Total Harmonic Distortion (THD) when expressed as percentage of fundamental and as Total Demand Distortion (TDD) when expressed as percentage of Maximum Demand Current. High harmonic distortion not only has negative impact on your system but it also affects MSEDCL’s electric distribution system. The some of the ill-effects of the harmonics pollution are Capacitor banks Overheating/failure , Insulation failure, Failure of internal fuses, Motors Overheating, Increased noise level, Additional vibrations, Transformers Overheating, Possible resonance between transformer winding and line capacitance, Insulation stress, Reactors Overheating, Nuisance tripping of Protection equipment, No tripping when required, Telephones Noise at respective frequencies, Causing electromagnetic interference (EMI) to sensitive signals, Measuring devices Wrong measurement, Lines Overheating, Electronic devices Wrong pulse on data transmission , Over/under voltage Flickering of screen, Incandescent lamps Reduced life time, Flicker, Cables, bus bar, neutrals Overheating etc.

The Permissible Limits of Current and Voltage Harmonics as per IEEE STD 519-1992/2014 are as below:-

Current Harmonics				Voltage Harmonics		
Isc/IL	%TDD		Isc/IL	%TDD	Bus voltage V at PCC	%THD
	upto 69KV	above 69KV to 161KV				
<20	5	2.5	<25	1.5	1 kV < V ≤ 69 kV	5
20<50	8	4	25<50	2.5	69 kV < V ≤ 161 kV	2.5
50<100	12	6	>50	3.75	161 kV < V	1.5
100<1000	15	7.5				
>1000	20	10				

Isc = Maximum short-circuit current at PCC(point of common coupling)

IL = Maximum demand load current (fundamental frequency component)at the PCC under normal load operating conditions

As per provisions of “MERC (SOP of Distribution Licensees, Period of giving Supply & Determination of Compensation) Regulation, 2005 & 2014” it shall be obligatory to control harmonics as prescribed by the IEEE STD 519-1992(now amended as IEEE STD 519-2014).

In case, if harmonics generated exceeds the said permissible limits, then effective measures like installation of harmonic filters to control and limit the harmonics generated needs to be taken by the consumer.

Please note that this letter is to create awareness among consumers about power quality and negative impact of harmonics on power quality.

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MSEDCL