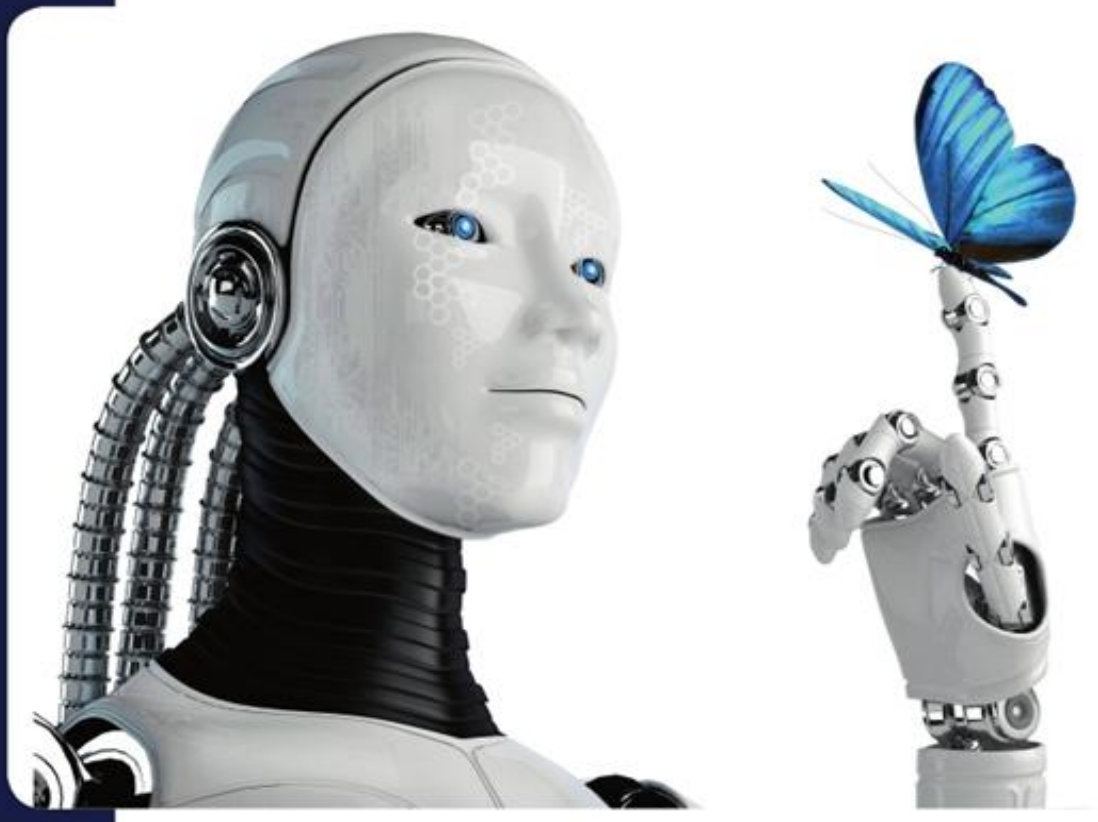
Newsletter
April, 2026

ICR



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Hot Issue

1. IEEE Std 519TM-2014

IEEE Standard for Harmonic Control in Electric Power Systems

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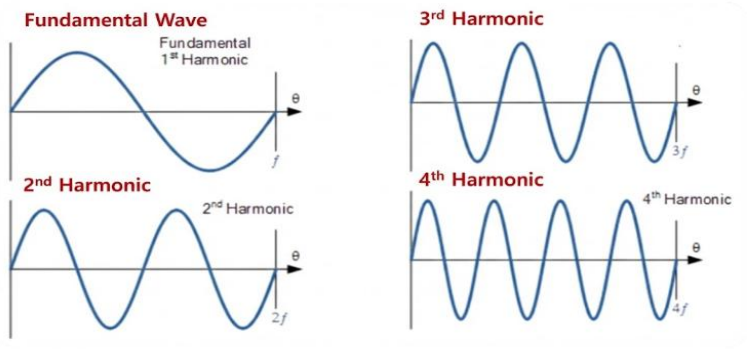
IEEE Std 519™-2014
IEEE Standard for Harmonic Control in Electric Power Systems

▣ IEEE Std 519™

IEEE 519 is a **system-oriented recommended standard that manages the harmonic impact of entire facilities,** such as factories and buildings, on the public power grid. Since harmonics can degrade power quality and cause equipment to overheat or malfunction, the standard's objective is to limit the harmonic distortion at the Point of Common Coupling (PCC) the boundary between the power provider and the user to within specified levels.

▣ Harmonic

Harmonics refer to physical electrical quantities that correspond to integer multiples of the fundamental frequency, such as 2, 3, or 4 times the base frequency. It generally encompass up to the 50th order any components beyond that are classified as high frequency or noise.



The fundamental wave represents our standard operating frequency of 60 Hz. Under this 60 Hz baseline, the 2nd harmonic corresponds to 120 Hz, the 3rd harmonic to 180 Hz, and the 4th harmonic to 240 Hz.

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▣ The causes of harmonic

Even when voltage is supplied in the form of a fundamental wave, the waveform becomes distorted as current is consumed discontinuously. This distorted waveform represents a state where harmonics of various orders are mixed together.

▣ The problems caused by harmonic

❖ **Degradation of power quality:**

Harmonics interfere with the clean fundamental wave and degrade the overall power quality.

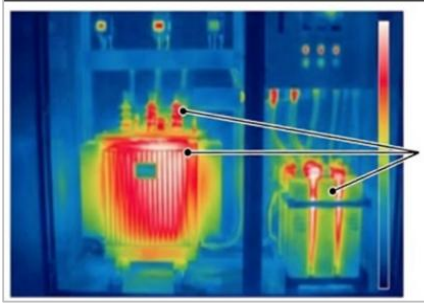
❖ **Overheating and losses:**

Harmonics generate excessive heat in equipment such as transformers or capacitors, which shortens their lifespan.

❖ **Occurrence of abnormal states:**

Harmonics can cause issues across the entire system by triggering malfunctions in precision instruments or creating noise in communi-cation lines.

Equipment Overheating



Equipment Malfunction

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▣ The harmonic distortion limit

1. Harmonic current distortion limit

Individual harmonic order (odd harmonics)

Short-circuit ratio (I_{SC}/I_L)	$3 \leq h < 11$	$11 \leq h < 17$	$17 \leq h < 23$	$23 \leq h < 35$	$35 \leq h \leq 50$	TDD
< 20	4.0%	2.0%	1.5%	0.6%	0.3%	**5.0%**
$20 < 50$	7.0%	3.5%	2.5%	1.0%	0.5%	**8.0%**
$50 < 100$	10.0%	4.5%	4.0%	1.5%	0.7%	**12.0%**
$100 < 1000$	12.0%	5.5%	5.0%	2.0%	1.0%	**15.0%**
> 1000	15.0%	7.0%	6.0%	2.5%	1.4%	**20.0%**

Even harmonics are limited to 25 % of the odd harmonic limits above.

***I_{SC}**: Short-circuit current at the PCC

***I_L**: Maximum demand load current

***TDD**: Total Demand Distortion

2. Harmonic voltage distortion limit

Bus Voltage (at PCC)	Individual Harmonic Limit (%)	Total Voltage Distortion V_{THD} (%)
$V \leq 1.0kV$	5.0%	**8.0%**
$1.0kV < V \leq 69kV$	3.0%	**5.0%**
$69kV < V \leq 161kV$	1.5%	**2.5%**
$161kV < V$	1.0%	**1.5%**

***PCC:** Point of common coupling

***V_{THD}**: Total harmonic distortion of voltage

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▣ Equipment and testing photo

<Harmonic measuring equipment>

<Testing photo>

▣ ICR has IEEE Std 519™ standard testing equipment.

ICR possesses test equipment capable of precise measurement up to the **50th order** as required by the **IEEE Std 519™ standard**, and **testing services are available.**

☎ Inquiries

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