

A Power Quality Standard

How do we assess the quality of our electricity supply?

There is a standard: **BS EN 50160:2000 Voltage characteristics of electricity supplied by public distribution systems** that provides the limits and tolerances of various phenomena that can occur on the mains. Below is a summary of the criteria for the low-voltage side of the supply network:-

Supply voltage phenomenon	Acceptable limits	Measurement Interval	Monitoring Period	Acceptance Percentage
Grid frequency	49.5Hz to 50.5Hz 47Hz to 52Hz	10 s	1 Week	95% 100%
Slow voltage changes	230V \pm 10%	10 min	1 Week	95%
Voltage Sags or Dips (\leq 1min)	10 to 1000 times per year (under 85% of nominal)	10 ms	1 Year	100%
Short Interruptions (\leq 3min)	10 to 100 times per year (under 1% of nominal)	10 ms	1 Year	100%
Accidental, long interruptions (> 3min)	10 to 50 times per year (under 1% of nominal)	10 ms	1 Year	100%
Temporary over-voltages (line-to-ground)	Mostly < 1.5 kV	10 ms	N/A	100%
Transient over-voltages (line-to-ground)	Mostly < 6kV	N/A	N/A	100%
Voltage unbalance	Mostly 2% but occasionally 3%	10 min	1 Week	95%
Harmonic Voltages	8% Total Harmonic Distortion (THD)	10 min	1 Week	95%

What practical conclusions can be made from this data?

- 1) The limits are wide, perhaps more than one would expect.
- 2) It is important to check that safety interlocks and relays can reset after a sag or dip because such incidents can occur quite frequently.
- 3) Control and process equipment that is voltage sensitive should be applied with caution because the allowable voltage tolerance is very wide and can drift outside $\pm 10\%$ for 5% of the time.
- 4) The transient tolerances are high and so the use of surge-protection devices should be carefully considered, especially where manufacturing of high-cost components or processes involving lengthy and expensive restart times are concerned.



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