

7/8 - Electrical equipment: harmonic mitigation

How to achieve “harmonic mitigation” ?

Several different solutions are proposed for Harmonic mitigation. The right choice is always dependent on a variety of factors, such as the activity sector, the applicable standards, the power level Several solutions are relative to Variable Speed Drives, as this type of **electrical equipment** represents a large part of the installed power in industrial installations and the most significant **power harmonic** current generators.

- **AC-Line or DC-link chokes for Drives**
They are commonly used up to about 500kW unit power or 1,000kW total drives power. Depending on the transformer size and cabling, the resulting THDu will be ~ 5%, which is usually well accepted in industrial networks.
- **C-less technology Drives**
This technology applies to Variable Speed Drives and offers a reduced current distortion compared to traditional technology. Combined with an advanced control algorithm, this solution is suitable for applications with low over-torque requirements like centrifugal pumps, fans and HVAC machines.
- **Multi-pulse arrangement**
This solution includes a dedicated transformer directly supplied from the MV network. Standard is the use of a 3-winding transformer providing a 12-pulse supply for one or multiple rectifiers or drives. This limits the power harmonic emission considerably and usually no further mitigation is necessary. Besides, multi-pulse solutions are the most efficient in terms of power losses. This is usually used for drives above 400 kW, but could also be reasonable for smaller power ratings.
- **Active Front End (AFE)**
An Active Front End is a sophisticated electronic circuit connected on the supply side of a Variable Speed Drive. This is the best performing solution concerning harmonic mitigation, limiting the THDi below 5%. All the applicable standard requirements can be met. No detailed system evaluation is necessary, making this solution the easiest to implement.
- **Passive filter**
A passive filter consists of reactors and capacitors set up in a resonant circuit configuration, tuned to the frequency of the power harmonic order to be eliminated. A system may be composed of a number of filters to eliminate several harmonic orders.
- **Active filter**
An active filter is an electronic equipment which injects, in opposite phase, the same harmonic current as drawn by the load, such that the line current remains sinusoidal.

- **Hybrid filter**

A hybrid filter is a combination of a passive filter and an active filter in a single unit.

Source: <http://engineering.electrical-equipment.org/power-quality/7-8-harmonic-mitigation.html>