

Contributions of Cables to EMC

While Electromagnetic Compatibility (EMC) is recognized for the protection of radio communications, of the mains network and for electronic equipment/system immunity, the cables that connect electronic equipment together can contribute in a positive or negative way to the overall EMC situation.

The electromagnetic compatibility (EMC) principle of cables is that communication signals should be kept inside the cables, and outside electromagnetic fields should not disturb the data transmission inside the cable.

The transmission of signals can be affected because the electromagnetic and mechanical screenings of the cables suffer, especially at low frequencies, because of the manufacturers' pressure to save material and costs.

Field tests have shown that for COAXIAL CABLES designed for Broadcast and Communications Technology (BCT) a transfer impedance of less than 5 mΩ/m is needed between 5 and 30 MHz, and the screening attenuation should be 85 dB from 30 to 1000 MHz (Screening Class A, in IEC 61196-6) to avoid interference problems.

A vast majority of residential coaxial cables or drop cables now on the market do not fulfill these levels. Twenty times higher transfer impedances have been measured, leading to serious mechanical and electromagnetic compatibility (EMC) weaknesses. This also means 20 times higher disturbing voltages will be present inside the cable, which can be fatal for the data transmission of the return channel (5 – 55 MHz). It will at least considerably slow down the data transmission speed.

Not only is the disturbing voltage 20 times higher than with standardized Class A cables, but also the overvoltage caused e.g. by lightning currents becomes 20 times higher, which can easily destroy electronic terminal equipment connected to the cables. Thus a poorly screened cable can affect the immunity of equipment.

The goal is also to be able to use BALANCED CABLES for Broadcast and Communication Technology (BCT). The problem is that these cables should also meet the relevant screening effectiveness standard of the BCT systems. The usually selected balanced cable (Cat 7A) has at 1000 MHz a 20 dB lower screening effectiveness limit than the coaxial cable, which will allow higher levels of disturbance voltages for data transmission. It is possible that this reduction can be tolerated, however, more evaluations are needed to be sure.

The strong belief that a liberalized world market will regulate itself to the benefit of the end user and that there will be no place for bad products has been shown to be unrealistic. Hidden properties which are difficult and expensive to achieve and cannot be directly seen are easily forgotten, e.g. EMC. Also there is a tendency that suppliers will certify their cable products when only a part of the relevant standard is met. To keep this under control, some regulation and control are badly needed for the benefit of all parties.

All of the players should cooperate in standards development and then the competition should be "inside" the standards, not "outside". IEC TC 46 is always interested in

working with industry and system TCs to provide higher quality, cost-efficient cables for our customers to be used in a given application.