AUDIO TECHNOLOGIES®

BENEFITS OF LOW SMOKE ZERO HALOGEN CABLING

Plastics emit toxic fumes and smoke which are hazardous to humans and can obstruct visibility in a fire, leading to injury or death. In 1987, King's Cross Street subway station in London had a fire that killed 31 people and injured 120. This tragedy led the U.K. to develop more rigorous fire safety standards across the board. One such standard was developed to prevent deaths related to toxic fumes emitted from burning cables. One of the outcomes of this work was the formulation of Low Smoke, Zero Halogen jacketing types. Before diving into the benefits of LSZH materials, it's important to understand the world of standards compliance in today's communications industry by looking at some commonly used terms.

Common Acronyms

The communications industry commonly uses acronyms to describe material performance, applications, and use cases of many cabling products. These acronyms are developed by groups like IEC (International Electrotechnical Commission), UL (Underwriter's Laboratory), and national standards which certify the safety and performance of products. A few of these acronyms tend to be used interchangeably, while not technically carrying the same meaning. See below for the most common terminology:

- **CM:** CM Cable is compliant with the NEC (National Electrical Code). It shall be used for low voltage signal transmission but is restricted to be used only on one floor.
- **CMR:** CMR Cable is "Riser Rated." A CMR rated cable shall be used in preventing fires from spreading between floors. This cable shall be installed vertically through shafts and vertical risers.
- **CMP:** CMP Cable is "Plenum-Rated." CMP rated cables are designed to be installed in plenum areas, above drop ceilings or through air duct plenums. These cables can restrict flame propagation to five feet or less while also limiting the amount of smoke during a fire.
- **PVC:** (Polyvinyl Chloride) The most commonly used jacketing material for CM and CMR rated cable.
- **FEP:** (fluorinated ethylene polymer) The most commonly used jacketing material used in CMP rated cable.
- **LSZH, LSOH, LSHF, LSNH:** Low-Smoke, Zero Halogen rated cable indicates that the materials used in producing the cable are free of halogens and also exude low amounts of smoke when burned.
- **FRLS:** Fire Retardant, Low-Smoke rated cables are typically made using a flame retardant PVC compound that ensures low smoke release compared to regular PVC coatings.

As is evident from the multitude of options, it is critical that system design engineers select the proper cable for their specific use case and properly weigh the cost of higher rated cables against the benefits.

Overview of PVC

Polyvinyl Chloride (PVC) has been the most widely used jacketing material for decades for many reasons. It is inexpensive to manufacture, provides excellent flexibility and performance, carries inherent flame resistant properties, and is mostly recyclable.

PVC jacketing carries flame resistant properties due to the Halogens it contains. Halogens are elements in Group 17 of the periodic table. This group of elements, which includes fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At), are naturally toxic to the human body in large quantities. These materials have been used in the manufacturing process for PVC jacketing for decades because they are naturally flame retardant. However, it has some major drawbacks when ignited. Most importantly, it produces noxious chemicals like Hydrochloric acid which can cause permanent internal and external damage to a person's eyes, skin, throat, and lungs. Secondarily, burning PVC produces large amounts of dense smoke that can completely obscure a person's vision within 30 minutes, making it impossible for them to escape a burning building. Manufacturers have combated these safety issues by introducing additional additives to the compound to limit smoke propagation. These additives, however, do not address the safety concerns of burning halogens in enclosed areas.

Overview of LSZH Cabling

Low Smoke, Zero Halogen (LSZH) cable insulation and jacket materials have been designed to avoid discharging toxic fumes when burned due to the absence of halogens.

LSZH certification is broken up into two testing criteria: In order to be classified as “Zero Halogen”, the material must have less than 0.2% of halogens by weight, and to be classified as “Low Smoke,” the material must comply with the IEC 61034-2 standard and may also be tested against military specification MIL-C-24643. Full compliance with the standard, however, depends on a myriad of other tests as well, including testing for halogen content, acid gas testing to establish a pH level under 3, and smoke release and acid-gas equivalence.

Applications of LSZH

Currently, LSZH cabling has found a niche in applications where safety is a priority. These include applications where humans may be in close proximity to cabling and other electronics and where insulation with low toxicity is required. Examples include:

- Mass transit
- Aviation
- Industrial environments
- Subways
- Buildings
- Nuclear/Military use
- Shipping

Global Standards

The European and North American approaches to safety standards in cabling are centered around two different mindsets. The European safety standards have a strong emphasis on low smoke and zero Halogen cable, while the North American safety standards concentrate more on flame retardancy and controlling flame propagation. It is readily apparent that with such opposing approaches to safety in fire situations, there is a glaring call for a global standard in flame ratings.

The IEC 60754-1/-2 standard outlines the permissible values for halogen acid gas as well as the permissible pH and conductivity levels allowed in LSZH applications. These standards also caused the UL to create its own version of a low smoke, Halogen free (LSHF) standard, which was derived from the same testing method of the IEC standards mentioned above. While North America is slow to alter and adopt LSZH standards, most installations in Europe are required to comply with the current IEC standard.

Summary

While the flame retardant properties of PVC will ensure that it remains a popular solution for years to come, the improved safety, lower Halogen content, and stringent standardization of LSZH cable guarantees that this PVC replacement will continue to gain traction globally. For information about the LSZH cable offering at Io Audio Technologies, visit ioaudiotech.com. Io Audio Technologies IO-E4231S-6LZH-1000B cable meets IEC 60754-1/-2, IEC 61034-1/-2, and IEC 60754-2 standards.