Cheat Sheet:
Low Smoke Zero Halogen Cables

INTRODUCTION

Low Smoke Zero Halogen (LSZH) cables are designed to for use in applications and installations where smoke emissions and toxic fumes could pose a risk to human life and sensitive equipment in the event of a fire. cable materials must pass two tests; the first is a smoke cube test (BS/EN 61034-1/2) and the second is the corrosive and acid gas test (BS EN/ IEC 60754-1/2). Unlike PVC cables which produce vast amounts of dense black smoke, toxic fumes and acid gas when exposed to fire, LSZH cables produce very low levels of smoke and toxic fumes and no acid gases.

Whilst we generally refer to this cable insulation and sheathing compound as LSZH, other references include LSHF (Low Smoke Halogen Free), 0HLS / ZHLS (Zero Halogen Low Smoke), and HFFR (Halogen Free Flame Retardant). cables which often have flame retardant properties, making them flame retardant low smoke (FR-LS) cables.

Note: LSZH cables are generally flame retardant to IEC 60332 (just as PVC compounds mostly are) but this does not offer circuit integrity - for applications requiring such continuity a specific fire performance cable should be specified.

CONSTRUCTION (examples)

BS7835 SWA/AWA LSZH Power Cable | Single & Three Core
- For mains electricity distribution including direct burial - an alternative to BS6622
- Class 1 solid and Class 2 stranded Copper conductors
- Cross-linked polyethylene (XLPE) insulation
- Copper tape screen
- Aluminium Wire (Single) or Steel Wire (Multicore) Armour
- LSZH sheath
- Voltage Rating: 3.6/6.6kV to 19/33kV

2491B / H05Z-K & H07Z-K Cable
- For Equipment and Panel Wiring - an alternative to Tri-Rated cable
- Class 5 Flexible Stranded Copper conductor
- LSZH (Low Smoke Zero Halogen) insulation
- Voltage Rating: 450/750V

N2XCH Cable
- Fixed installation low voltage wiring - an alternative to N2XCY
- Class 2 Stranded Copper conductor
- XLPE (Cross-Linked Polyethylene) insulation
- LSZH inner sheath
- Copper wires & tape concentric conductor
- LSZH outer sheath
- Voltage Rating: 0.6/1kV

BS EN 50288-7 - RE-2X(st)H (PiMF) Cable
- For connecting electrical instrument circuits and providing communication services - an alternative to RE-2X(st)Y
- Class 2 (stranded) and 5 (flexible) Copper conductors
- XLPE (Cross-Linked Polyethylene) insulation
- Al/PET (Aluminium/Polyester Tape) collective screen and/or Individual screen (PiMF) with tinned copper drain wire
- LSZH sheath
- Voltage Rating: 300V - 90V and 500V available on request

FAQs

How do Low Smoke Zero Halogen materials work?
In a fire, the materials' flame retardants begin to decompose. The primary decomposition absorbs the energy from the flame then the secondary decomposition is where the release of water reduces the fire intensity. This dilutes the fire gases and causes a charring, which acts as a fire barrier.

What is the BS EN/IEC 61034 (smoke density) test?
This test has been designed to measure the amount of smoke generated by burning cables. The test is performed inside a chamber measuring 3x3x3 meters so it's often referred to as the three meter cube test. The duration of the test is 40 minutes. The test is performed by monitoring the transmittance of a beam of white light through the chamber and must achieve in excess of 60% light visibility through the smoke.

ELAND® CABLES

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What is the BS 50267 & BS EN/IEC 60754 (acid gas emissions) test?
This is the test method for determining the levels of acid gases evolved during the combustion of cable materials. 1g+/-0.005g of insulation material is placed in a tube furnace and heated to 935°C for 30 minutes. The gases produced are absorbed into a catch solution, which is then made up into a litre of liquid. The pH of the solution and conductivity values are then tested. Low Smoke Zero Halogen materials are defined as having a pH no less than 4.3 and a conductivity not exceeding 10µS/mm.

Why are all cables not LSZH?
Certain applications don't require LSZH cables such as when buried underground, submersible cables and where there is no risk to life or damage to equipment. Other attributing factors can be a lack of regulation pertaining to the use of LSZH cables, and lack of knowledge and information for specifiers. Historically PVC cables were generally cheaper than LSZH variants which may have influenced specification and procurement - that cost difference has now largely been removed as compound materials have evolved.

Are all LSZH cables fire resistant?
No, LSZH cables are designed to ensure that they don't hinder the safe evacuation or compound damage to sensitive equipment by means of smoke and toxic fumes. They are flame retardant but not necessarily fire resistant - they do not offer circuit integrity unless specifically for fire performance.

What's the difference between LSZH and PVC cables?
PVC is made up of a significant number of halogens which are normally very stable but, when burnt, separate and give off toxic gases - in particular hydrogen chloride (HCl). Ordinary PVC emits approximately 28% hydrogen chloride when burned, though there is no specific standard in existence for the emissions of PVC. When this hydrogen chloride combines with water (whether from fire suppression sprinkler systems or the moisture in eyes, nose and throat) it changes to hydrochloric acid. Comparably, LSZH cables are those that, when exposed to fire, emit no more than 0.5% hydrogen chloride and so present much less risk in the event of fire.

What's the difference between LSZH and LSF?
Low Smoke and Fume (LSF) are reduced emission PVC cables that can still emit as much as 22% hydrogen chloride when burned. There is no specific standard dictating the reduction in emissions for a cable to be termed LSF-PVC. LSF are not alternatives to LSZH, there is a significant difference between the two products and are not comparable.

Are all cables with a CPR classification of Dca or above automatically LSZH?
No. Whilst the requirements for cables holding a Euroclassification of Dca and above do have sub-classifications for smoke emissions, acidity, and flaming droplets, with the first two being tested against IEC 61034 and IEC 60754, it does not necessarily follow that the cables are LSZH. For LSZH cables look for smoke emissions meeting the requirements of S1a (80% light transmittance) or S1b (60% light transmittance) and acidity of a1.