

# A brief guide to plastic conduit and fire safety

This article considers the product properties of different plastic conduit systems for electrical installations specifically relating to safety and protection in the event of a fire.



Safety should be the main concern when approaching an electrical installation. Product specification - ensuring the correct solution is selected to suited to the application at hand - is a key element of this responsibility. This brief guide provides an overview of the product properties of different types of plastic conduit including Poly Vinyl Chloride (PVC), Low Smoke Fume (PVC LSF), Low Smoke Fume Zero Halogen (LSFOH).

## Danger of smoke inhalation

The fire at King's Cross Underground station in 1987 killed 31 when a stray match started a fire underneath a wooden escalator. Thick smoke made it harder for passengers to evacuate and made life extremely difficult for the emergency services. Unfortunately, subsequent tragedies have followed. The need to reduce smoke coupled with less toxic materials is overwhelming, especially in enclosed spaces and public areas.

In the UK, low fire hazard cables are used widely, even though there are few statutory requirements for their use. One important regulation comes from the Construction Products Regulation, introduced last year. From the 1st of July 2017, all cables that are intended for permanent installation in buildings must be accompanied by a Declaration of Performance (relating to the cable's fire resistance) and have a CE marking.

These factors must be considered by building specifiers, who will factor the cable's properties into any risk assessments they carry out. When cables need to have additional protection, conduits using smoke and halogen minimising properties should be given the same safety consideration as cables.

The most important thing to bear in mind when you are specifying or purchasing PVC, PVC/LSF or LSF-0H conduits that you know what specifications you are trying to meet. By understanding these properties, precaution can be taken against fires and consequential damages, leading to higher safety for human lives, better protection of valuable assets and safeguarding the continuity of operations.

## What is PVC?

The main cause of death in a building fire is smoke inhalation, not the flames themselves. Toxic smoke containing halogens is particularly dangerous.

PVC is a good flame retarder, which also means that a high temperature is required for it to start burning, however as PVC is heated, it gives off more than half of its weight as fumes.

The hydrogen chloride released into the atmosphere is not only harmful to humans but it is also corrosive and can damage electrical equipment.

Halogens such as dioxins, can cause more 'slow burning' health problems, with the effects staying with victims much longer.

Aside from the health effects, the thick acrid smoke that is released by burning PVC can reduce visibility in emergency situations.

## What is PVC/LSF?

Low Smoke Fume (PVC LSF) offers lower emissions than standard PVC hence PVC LSF lies somewhere between that of PVC and LSFOH.

PVC LSF contains halogens which are released at a slower rate than that of standard PVC.

PVC LSF products are designed to reduce the spread of fire and smoke. PVC LSF products are usually manufactured from flame retardant PVC blended with HCL additive. These materials help improve the fire performance of LSF products with negligible cost implications.

## What is LSFOH?



Low Smoke Fume Zero Halogen (LSFOH) conduits are not only characterised by the fire-retardant performance but also by the halogen-free properties, thus offering low corrosive and toxic emissions. During a fire, LSFOH conduits will emit less smoke and acid gases which may affect human health and damage expensive communications equipment.

Compared with normal PVC conduits, PVC LSF and LSFOH conduits outperform PVC conduits by providing lower smoke emission properties.

## What are halogens?

Halogens are a group of elements that can be found in the periodic table consisting of five chemically related elements, fluorine, chlorine, bromine, iodine and astatine.

The name “halogen” means “salt producing”.

All halogens form acids when bonded to hydrogen. The middle halogens - chlorine, bromine and iodine - are often used as disinfectants.

Organobromides are the most important class of flame retardants.

Displayed in yellow on the below periodic table elemental halogens are dangerous and can potentially be lethally toxic.

Group →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
↓ Period																		
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba		72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus	118 Uuo
Lanthanides	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu			
Actinides	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr			

With its **HFT® (LSFOH)** range of halogen-free products, Univolt is committed to bringing enhanced safety cable management products to the market.