

# ZERO HALOGEN (ZH/0H) vs LOW SMOKE ZERO HALOGEN (LSZH/LS0H)



In critical applications such as Metro/Rail/Public Buildings/Mines/Hazardous Areas, the preferred option should be a label that is

- Zero Halogen **and**
- Flame retardant **and**
- Low Smoke

On occasions, we find misunderstandings that “Zero Halogen is the same as Low Smoke Zero Halogen”. It’s not! Further, when installing LS0H cables, there should be cable labels to match.

Hence this brief overview.

## **Background Information on LSZH**

Producing zero halogen label material, is relatively straightforward (and low cost), simply remove the halogens which are there to control flammability.

In turn, in a fire, the labels will burn (potentially aggressively). They may also emit burning particles and give off high levels of (zero halogen) smoke.

Where safety is an issue, this may not be the desired outcome.

To maintain the fire and smoke performance of label material other compounds need to be added. These compounds also need to be free of halogens.

## **Review**

To review the LS0H compliance of the Fox-Flo tie-on cable labels, we have independently tested for:

- Flammability
- Emission of burning particles
- Smoke
- Toxicity

## **Flammability**

The Flammability of label material is measured the checking either the Oxygen index (OI) or the Flame Temperature Index. We chose to measure the OI.

The OI is the concentration of oxygen in the air mix such that with a flame being applied to the material the material will self-extinguish.

The higher the Oxygen concentration, the better the flame retardancy of the product. As a guide, you would normally expect to achieve around 30% OI.

To measure the OI, Fox-Flo label material has been independently tested to EN ISO 4589-2.

LUL 1-085 requires the following Oxygen Index (OI) maximum values:

EN ISO 4589-2 Oxygen Index (OI)			
LUL 1-085	Class Ia	Class Ib	Class II
Interior minor use material of mass 100g to 500g	Min. 34%	Min. 34%	Min. 28%
Exterior minor use materials of mass 400g to 2000g	Min. 34%	Min. 34%	Min. 28%
Flammability and smoke emission requirements for non-listed items (Limited and dispersed usage)	LOI >30% or TI >300°C		

In independent tests performed, the OI value of Fox-Flo material was between 44.6% and 48% (depending on the colour\* – see below).

***Silver Fox Fox-Flo material meets the requirements of EN ISO 4589-2 and as such exceeds the requirements of LUL 1-085.***



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## Emission of Burning Particles

The emission of burning particles can be checked according to the International Standard UL 94, the most demanding level is the vertical test (V). V0 is the highest performing level where no burning particles are emitted.

Fox-Flo label material has been independently tested to the UL 94 Standard (various colours – see below).

**Silver Fox Fox-Flo material achieved a UL 94 rating of V0 – the highest rating.**

## Smoke

A number of different methodologies are available to measure smoke emissions.

We chose BS 6853:1999 Annex D.8.3 as recognised by London Underground.

In this test the label material is burned in a 3 metre steel cube that includes a light source across the top.

The loss of light across the top can then be used to measure the level of smoke emissions.

This test very effectively represents an actual fire situation.

<b>BS 6853:1999 Annex D.8.3 Smoke Emission (A0)</b>			
<b>LUL 1-085</b>	<b>Class Ia</b>	<b>Class Ib</b>	<b>Class II</b>
<b>Interior minor use material of mass 100g to 500g</b>	Max. 0.017	Max. 0.027	Max. 0.061
<b>Exterior minor use materials of mass 400g to 2000g</b>	Max. 0.029	Max. 0.046	No Criterion
<b>Flammability and smoke emission requirements for non-listed items (Limited and dispersed usage)</b>	A0 <0.02sq.m/g		

Fox-Flo material measured between 0.007 and 0.01 (depending on the colour\* – see below).

**Silver Fox Fox-Flo material meets the requirements of BS 6853:1999 Annex D.8.3 and as such exceeds the requirements of LUL 1-085.**

## Toxicity

To control flammability other compounds need to be added. These in turn need to be zero halogen. Fox-Flo label material has been independently tested to the recognised London Underground standard: BS 6853:1999 Annex B.1

LUL 1-085 requires the following Toxic Fume (R) maximum values:

<b>BS 6853:1999 Annex B.1 Toxic Fume (R)</b>			
<b>LUL 1-085</b>	<b>Class Ia</b>	<b>Class Ib</b>	<b>Class II</b>
<b>Interior minor use material of mass 100g to 500g</b>	Max. 1.0	Max. 1.6	Max. 3.6
<b>Exterior minor use materials of mass 400g to 2000g</b>	Max. 1.7	Max. 2.7	No Criterion

Independent tests produced a value for our Fox-Flo that were performed, the (R) value of the Fox-Flo material was between 0.368 and 0.40 (depending on the colour\* – see below).

**Silver Fox Fox-Flo material meets the requirements of BS 6853:1999 Annex B.1 and as such exceeds the requirements of LUL 1-085.**



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### Colours\*

Where material is tested the norm is to test only one colour – usually yellow. To be sure that we are able to offer a higher level of re-assurance to our users we tested 4 different colours; Yellow, White, Blue and Red. It can be seen from the Oxygen Index test that colour does affect the performance of material. We are pleased to report that all four of our colours passed all of the above tests.

### By way of a further note

The LUL 1-085 and the old BSI fire standards have a much higher requirement than the new IEC 45545 standard which was written to allow European metro systems to gain approval.

### *Silver Fox Fox-Flo material/labels meet the more demanding LUL standards*

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