

**SPECIFICATION****For****0.6/1KV-FRLH-IE**

0.6/1kV Copper Conductor XLPE Insulated Flame Retardant  
with Low Smoke and Zero Halogen Single Core Cable  
(0.6/1(1.2)kV, Cu/FR-LSOH-XLPE)

BY



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Rev.	Date	Description
0	24/11/2020	Issued specification
1	8/03/2021	Add length mark
2	22/04/2021	Update the standard reference
3	28/6/2021	Change making detail
4	20/12/2022	Add color of insulation
5	20/12/2022	Change packing size 1.5 to 6 mm <sup>2</sup>
6	23/1/2024	Update Table 2
7	21/5/2024	Add red color of insulation
8	19/11/2024	Update Table 2
9	29/11/2024	Update conductor diameter
10	19/5/2025	Update specification

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CUSTOMER

Customer Document	Rev.

**Remark:**

This document is based on the Customer Document for the structure and properties of electric wire and cable only. If there are different points, will be shown in deviation table.

## 1. Scope

This specification covers 1000V copper conductor cross-linked polyethylene (FR-LSOH-XLPE) insulated flame retardant with low smoke and zero halogen single core cable.

The cable shall comply with the following standards :

- The cable shall be in accordance with BS EN 50525-3-41 : 2011.
- Flame retardant test requirements per BS EN 60332-1-2 : 2004,
- Flame propagation test requirement per BS EN IEC 60332-3-24 : 2018 and BS EN IEC 60332-3-22 : 2018.
- The cables shall have limited evolution of smoke when assessed under the fire conditions as specified in BS EN 61034-2 : 2005.
- The corrosive and acid gas emission when assessed under the fire conditions as specified in BS EN 60754-1 : 2014 and BS EN 60754-2 : 2014.
- Non toxic gases test requirement per Defence Standard 02-713 : 2012.

## 2. Conductor

For size  $\leq 6 \text{ mm}^2$  :

The conductor shall be non-compacted concentric stranded uncoated annealed copper conductor in accordance with BS EN 60228, Class 2.

The direction of lay shall be left-hand (S) lay.

For size  $\geq 10 \text{ mm}^2$  :

The conductor shall be compacted concentric stranded uncoated annealed copper conductor in accordance with BS EN 60228, Class 2.

The direction of lay shall be left-hand (S) lay in the outermost layer.

## 3. Insulation

The insulation shall be flame retardant, low smoke and zero halogen cross-linked polyethylene (FR-LSOH-XLPE) compound type EI5 meet the requirements of BS EN 50363-5.

The average thickness of the insulation shall be not less than that given in Table 2.


The minimum thickness shall not fall below the value given in Table 2 by more than 10 plus 0.1 mm.

The color of the insulation shall be orange or black or green/yellow or green or blue or brown or grey or red.

The insulation shall be corrosive and acid gas emission meeting the requirements in BS EN 50525-3-41 : 2011 a test method specified in BS EN 60754-1 : 2014 and BS EN 60754-2 : 2014.

#### 4. Marking on Cable

The marking items shall be printed with suitable means throughout the length of wire.

"  YAZAKI (Year) H07Z-R (Core x Size) SQ.MM. 0.6/1KV-FRLH-IE : BS EN 60332-1, BS EN 60754-1, BS EN 60754-2, BS EN 61034-2, BS EN IEC 60332-3-22 : TYE"

The continuous reel length marking (in figure) shall be made on the insulation at every 1 meter (For size  $\geq 25 \text{ mm}^2$  )

#### 5. Test and Properties

The cable shall be meet the requirements in Table 1 and Table 2 when tested in accordance with BS EN 50525-3-41 : 2011, BS EN 61034-2 : 2005, BS EN 60754-1 : 2014, BS EN 60754-2 : 2014, BS EN 60228, BS EN 60332-1-2 : 2004, BS EN IEC 60332-3-24 : 2018, BS EN IEC 60332-3-22 : 2018 and Defence standard 02-713 : 2012.


Remark: For longer life of cable should be avoid exposure to direct solar radiation it necessary, cover is required.

#### 6. Packing

The finished wire shall be placed on the non-returnable wooden reels or shall be coiled and wrapped with plastic which shall be overlapped and secured.

The reels shall be lagged to provide the cable with physical protection during transportation and during ordinary storage and handling operation.

Each package shall be clearly marked as follows.

1. Designation "0.6/1KV-FRLH-IE"
2. Number of core and size of conductor
3. Cable length in a reel or coil
4. Net and gross weight
5. Manufacturer's name and/or trade mark "  YAZAKI
6. Rolling direction of reel (only for reel package)

**Table 1 Test and Inspection**

Test	Standard	Requirements
<b>Routine Tests</b>		
- Absence of faults on insulation	BS EN 50525-3-41 : 2011	No Breakdown
<b>Sample Tests</b>		
- Max. Conductor resistance, Ohm/km	BS EN 60228	Specified in Table 2
- AC test voltage for 5 minutes	IEC 60502-1 : 2004	3.5kV
- Construction test	BS EN 50525-3-41 : 2011	
<b>- Type Tests</b>		
- Corrosive and acid gas of insulation		
Acid gas emission test	BS EN 60754-1 : 2014	
- Bromine and chlorine content (HCl)		$\leq 0.5\%$
pH and conductivity test	BS EN 60754-2 : 2014	
- pH		$\geq 4.3$
- Conductivity		$\leq 10 \mu\text{S/mm}$
- Insulation resistance $90 \pm 2^\circ\text{C}$	BS EN 50525-3-41 : 2011	Table B.1;
- Material of insulation	BS EN 50363-5 : 2005	Table 2 ; EI 5
- Shrinkage test at $130 \pm 2^\circ\text{C}$ for 1 h	BS EN. 60811-1-3	$\leq 4 \%$
- Fire test on multiple cable	BS EN IEC 60332-3-24 : 2018 and BS EN IEC 60332-3-22 : 2018	Charred portion $\leq 2.5 \text{ m.}$
- Fire test on single core	BS EN 60332-1-2 : 2004	$> 50 \text{ mm.}$
- Smoke emission	BS EN 61034-2 : 2005	Light transmittance $\geq 60 \%$

**Definition concerning the tests**

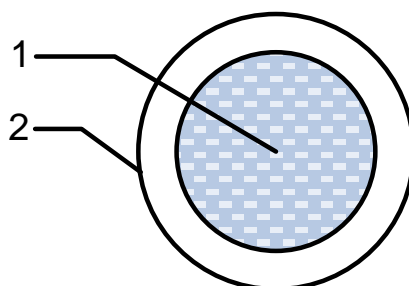
**Routine tests:** Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

**Sample tests:** Tests made by the manufacturer on samples of completed cable or components taken from a completed cable, at a specified frequency, so as to verify that the finished product meets the specified requirements.

**Type tests:** Tests made before supplying, on a general commercial basis, a type of cable covered by this standard, in order to demonstrate satisfactory performance characteristics to meet the intended application.

### Cable structure

Cross-sectional (Not scale)



No.	Structure	Material
1	Conductor	Stranded annealed copper
2	Insulation	Flame retardant, Low smoke and Zero Halogen Cross-linked Polyethylene (FR-LSOH-XLPE) compound

**Application:** For fixed installation in electrical cabinet, conduit and wire way which provide flame retardant, low smoke and non toxic emission under fire. Maximum conductor temperature of 90°C for normal operation and 250°C for short circuit conditions.

**Table 2**

Size (mm <sup>2</sup> )	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Overall diameter approx. (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Weight of wire approx. (kg/km)	Standard length	
							m/coil	m/drum
1.5	7/Non-compacted	1.59	0.7	3.5	12.1	22	100	1000
2.5	7/Non-compacted	2.01	0.8	4.0	7.41	34	100	1000
4	7/Non-compacted	2.55	0.8	4.5	4.61	50	100	3000
6	7/Non-compacted	3.12	0.8	5.5	3.08	71	100	3000
10	7/Compacted	3.70	1.0	6.0	1.83	110	-	3000
16	7/Compacted	4.70	1.0	7.0	1.15	167	-	1000
25	7/Compacted	5.90	1.2	9.0	0.727	262	-	300
35	7/Compacted	6.90	1.2	10.0	0.524	352	-	300
50	19/Compacted	8.20	1.4	11.5	0.387	478	-	300
70	19/Compacted	9.80	1.4	13.0	0.268	673	-	300
95	19/Compacted	11.60	1.6	15.5	0.193	935	-	300
120	37/Compacted	13.10	1.6	17.0	0.153	1180	-	300
150	37/Compacted	14.50	1.8	19.0	0.124	1455	-	300
185	37/Compacted	16.10	2.0	21.0	0.0991	1785	-	300
240	61/Compacted	18.60	2.2	24.0	0.0754	2385	-	300
300	61/Compacted	20.80	2.4	26.5	0.0601	2955	-	300
400	61/Compacted	23.40	2.6	29.5	0.0470	3788	-	300
500	61/Compacted	26.60	2.8	33.0	0.0366	4850	-	300
630	61/Compacted	30.20	2.8	36.5	0.0283	6189	-	300