

# SPECIFICATION

For

## FS/FDLH-0.6/1KV-CCE

0.6/1(1.2)kV Copper Conductor Mica fire-barrier

XLPE Insulated Polyolefin Sheathed

Fire Resistance and Flame Retardant

with Low Smoke and Zero Halogen Control Cable

(0.6/1(1.2)kV, Cu/Mica/XLPE/FR-LSOH)

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CUSTOMER

Rev.	Date	Description
0	4/6/2020	Issued specification
1	16/11/2020	Add size 2x4, 3x1.5, 5x2.5, 15x2.5, 25x2.5 mm <sup>2</sup>
2	15/01/2021	Cancel cable code "0010"

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 mica fire-barrier cross-linked polyethylene (XLPE) insulated polyolefin sheathed fire resistant and flame retardant with low smoke and zero halogen control cable.

The cable shall be based on IEC 60502-1 : 2004 and Amend. 1: 2009.

The maximum conductor temperature shall be 90°C.

The cable shall be fire resistant tested according to IEC 60331 and BS 6387 Category CWZ.

**Remark** : Resistance to fire with water (W) and with mechanical shock (Z) ; Not all sizes or types of cable with overall diameters greater than 20 mm. can be presently accommodated with in the standard and guidance on testing these cables should be sought from the manufacturer.

The finished cables shall meet the flame test requirements per IEC 60332-1 and IEC 60332-3-24; Category C.

Low smoke test requirements per IEC 61034 and halogen gases determinations test requirements per IEC 60754-1 and IEC 60754-2.

## 2. Conductor

The conductor shall be non-compacted concentric stranded uncoated annealed copper conductor in accordance with IEC 60228 : 2004, Class 2.

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

## 3. Fire Barrier Tape

The mica tape shall be longitudinally applied over the conductor

## 4. Insulation

The insulation shall be cross-linked polyethylene (XLPE) compound meet the requirements of IEC 60502-1 : 2004.

The average thickness of the insulation shall be not less than that given in Table 1.

The minimum thickness shall not fall below the value in Table 1 by more than 10% plus 0.1 mm.

## 5. Cabling

The individual insulated cores shall be cabled together with suitable non-hygroscopic filler to give the completed cable a substantially circular cross section.

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

A suitable binder tape shall be applied helically over the cabled core.

## 6. Core Identification

The cores shall be identified by colors or by numbers printed on the insulation, as follows :

2-cores : blue, brown

3-cores : brown, black, grey

4-cores : blue, brown, black, grey

For 5-cores to 30-cores :

The cores shall be identified by the arabic numerals printed longitudinally and continuously on the surface of white insulation.

(White color is natural color of XLPE insulation)

## 7. Sheath

The sheath shall be sunlight resistant, low smoke and zero halogen flame retardant polyolefin (ST8) compound meet the requirements of IEC 60502-1 : 2004.


The average thickness of the sheath shall be not less than that given in Table 1.

The minimum thickness shall not fall below the value in Table 1 by more than 20% plus 0.2 mm.

The color of the sheath shall be orange.

## 8. Marking on Cable

The marking items shall be marked with suitable means throughout the length of cable.

1. Manufacturer's name and/or trade mark "  YAZAKI..... : TYE"

2. Year of manufacture

3. Cable property cable "FS/FDLH"

4. Rated circuit voltage "0.6/1KV"

5. Type of insulation "XLPE"

6. Type of cable "CONTROL CABLE"

7. Number of cores and size of conductor

8. The continuous reel length marking (in figure) shall be made on the sheath at every 1 meter

## 9. Test and Properties

The cable shall be meet the requirements in Test and Inspection and Table 1, when tested in accordance with IEC 60502-1 : 2004 and Amend. 1 : 2009, IEC 60228 : 2004, IEC 60331, BS 6387 Category CWZ., IEC 60332-1, IEC 60332-3-24; Category C., IEC 61034, IEC 60754-1 and IEC 60754-2.

Remark: Sunlight resistant test meet the requirement of TIS 293-2541.


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

## 10. Packing

The cable shall be placed on non-returnable wooden reels.

The reels shall be covered with suitable covering to provide the cable with physical protection during transportation and during ordinary storage and handling operations.

Each reel shall be clearly marked as follows.

1. Designation "FS/FDLH-0.6/1KV-CCE"
2. Number of cores and size of conductor
3. Cable length
4. Net and gross weight
5. Manufacturer's name and/or trade mark "  **YAZAKI** "
6. Rolling direction of reel

## Test and Inspection

### Routine Tests

- Maximum conductor resistance, Ohm/km..... specified in Table 1
- AC test voltage for 5 minutes, kV..... 3.5

### Sample Tests

- Construction ..... specified in Table 1
- Hot set test at  $200\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$  for XLPE
  - Maximum elongation under load (%) ..... 175
  - Maximum permanent elongation after cooling (%)..... 15

### Type Tests

- Fire resistant tested according to IEC 60331 and BS 6387 Category CWZ.
- Flame retardant tested according to IEC 60332-1 and IEC 60332-3-24; Category C.
- Smoke emission tested according to IEC 61034.
- Halogen gases tested according to IEC 60754-1 and IEC 60754-2.

### Definition concerning the tests

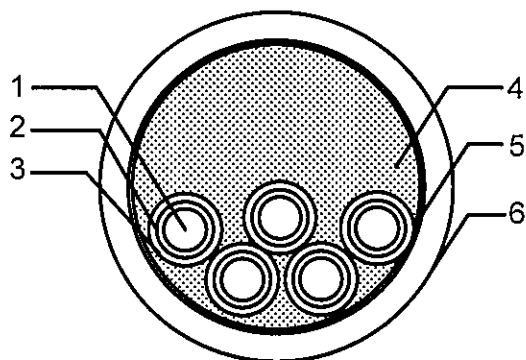
**Routine tests:** Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

**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	Non-Compacted concentric stranded annealed copper
2	Fire Barrier	Mica tape
3	Insulation	Cross-Linked Polyethylene (XLPE)
4	Filler	PP Calcium Yarn (Non-hygrosopic)
5	Binder Tape	PS tape or Suitable tape
6	Sheath	Low smoke and Zero halogen Flame retardant Polyolefin (ST8)

**Application:** For installation into open tray, conduit, underground duct trench or direct burial in ground which provide flame retardant, low smoke and maintain circuit integrity in case of fire. Maximum conductor temperature of 90°C for normal operation and 250°C for short circuit conditions.

**Table 1**

No. of cores	Size  (mm <sup>2</sup> )	Conductor  (wires/type)	Conductor diameter approx.  (mm)	Insulation thickness nominal  (mm)	Sheath thickness nominal  (mm)	Overall diameter approx.  (mm)	Conductor resistance at 20°C maximum (Ohm/km)	Weight of cable approx. (kg/km)	Standard packing length (m)
2	1.5	7/Non-compacted	1.59	0.7	1.8	12.5	12.1	150	300
2	2.5	7/Non-compacted	2.01	0.7	1.8	13.5	7.41	180	300
2	4	7/Non-compacted	2.55	0.7	1.8	14.5	4.61	230	300
3	1.5	7/Non-compacted	1.59	0.7	1.8	13.5	12.1	180	300
4	1.5	7/Non-compacted	1.59	0.7	1.8	14.5	12.1	210	300
4	2.5	7/Non-compacted	2.01	0.7	1.8	15.5	7.41	270	300
5	2.5	7/Non-compacted	2.01	0.7	1.8	16.5	7.41	310	300
6	1.5	7/Non-compacted	1.59	0.7	1.8	16.5	12.1	270	300
6	2.5	7/Non-compacted	2.01	0.7	1.8	17.5	7.41	340	300
8	1.5	7/Non-compacted	1.59	0.7	1.8	17.5	12.1	320	300
8	2.5	7/Non-compacted	2.01	0.7	1.8	19.0	7.41	420	300
10	1.5	7/Non-compacted	1.59	0.7	1.8	20.0	12.1	410	300
10	2.5	7/Non-compacted	2.01	0.7	1.8	22.0	7.41	550	300
12	1.5	7/Non-compacted	1.59	0.7	1.8	21.0	12.1	460	300
12	2.5	7/Non-compacted	2.01	0.7	1.8	23.0	7.41	600	300
14	1.5	7/Non-compacted	1.59	0.7	1.8	22.0	12.1	490	300
14	2.5	7/Non-compacted	2.01	0.7	1.8	24.0	7.41	650	300
15	2.5	7/Non-compacted	2.01	0.7	1.8	25.0	7.41	750	300
16	1.5	7/Non-compacted	1.59	0.7	1.8	23.0	12.1	550	300
16	2.5	7/Non-compacted	2.01	0.7	1.8	25.0	7.41	700	300
18	1.5	7/Non-compacted	1.59	0.7	1.8	24.0	12.1	600	300
18	2.5	7/Non-compacted	2.01	0.7	1.8	26.0	7.41	800	300
20	1.5	7/Non-compacted	1.59	0.7	1.8	25.0	12.1	650	300
20	2.5	7/Non-compacted	2.01	0.7	1.8	27.0	7.41	850	300

**Table 1 (continued)**

No. of cores	Size  (mm <sup>2</sup> )	Conductor  (wires/type)	Conductor diameter approx.  (mm)	Insulation thickness nominal  (mm)	Sheath thickness nominal  (mm)	Overall diameter approx.  (mm)	Conductor resistance at 20°C maximum (Ohm/km)	Weight of cable approx. (kg/km)	Standard packing length  (m)
22	1.5	7/Non-compacted	1.59	0.7	1.8	27.0	12.1	700	300
22	2.5	7/Non-compacted	2.01	0.7	1.9	29.0	7.41	950	300
24	1.5	7/Non-compacted	1.59	0.7	1.8	28.0	12.1	750	300
24	2.5	7/Non-compacted	2.01	0.7	1.9	31.0	7.41	1000	300
25	2.5	7/Non-compacted	2.01	0.7	1.9	31.0	7.41	1100	300
26	1.5	7/Non-compacted	1.59	0.7	1.8	28.0	12.1	800	300
26	2.5	7/Non-compacted	2.01	0.7	1.9	31.0	7.41	1100	300
28	1.5	7/Non-compacted	1.59	0.7	1.9	30.0	12.1	900	300
28	2.5	7/Non-compacted	2.01	0.7	2.0	33.0	7.41	1200	300
30	1.5	7/Non-compacted	1.59	0.7	1.9	30.0	12.1	900	300
30	2.5	7/Non-compacted	2.01	0.7	2.0	33.0	7.41	1200	300