

# SPECIFICATION

## For

### FD-1.8/3KV-CV

1.8/3(3.6)kV

XLPE Insulated PVC Sheathed

Flame Retardant Power Cable

(1.8/3(3.6)kV, Cu/XLPE/CTS/FR-PVC)

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0	7/7/2020	Issued 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 3300V copper conductor cross-linked polyethylene (XLPE) insulated polyvinyl chloride (PVC) sheathed flame retardant power cable.

The cable shall be in accordance with IEC 60502-1 : 2004 and Amend.1 : 2009.

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

## **2. Conductor**

The conductor shall be 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 in the outermost layer.

## **3. Tape on Conductor**

The plastic tape as a separator 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 (For multi-cores only)**

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.

## **6. Core Identification**

The cores shall be identified by colors of identification tape, placed longitudinally applied over the insulation, as follow :

Single-core : Natural (Translucent)

3-cores : white, red, blue

## **7. Insulation Shield**

The insulation shield shall be semi-conducting tape and shall be applied helically over the cable core.

## 8. Metallic Shield

The metallic shield shall be an uncoated annealed copper tape and shall be applied helically with a gap over the insulation shield.

The thickness of the copper tape shall be approximate 0.1 mm.

A suitable separator tape shall be applied helically over the shielded core.

## 9. Sheath

The sheath shall be sunlight resistant, flame retardant polyvinyl chloride (PVC/ST2) compound meet the requirements of IEC 60502-1 : 2004.


The average thickness of the sheath shall not be 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 black.

## 10. 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. Flame retardant "FD"
4. Rated circuit voltage "1.8/3(3.6)KV"
5. Type of insulation "XLPE"
6. Type of cable "POWER 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

## 11. Test and Properties

The cable shall 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 60332-1 and IEC 60332-3-24; Category C.


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

## 12. 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 "FD-1.8/3KV-CV"
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..... 6.5

### 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

- Flame retardant tested according to IEC 60332-1 and IEC 60332-3-24; Category C.

### Definition concerning the tests

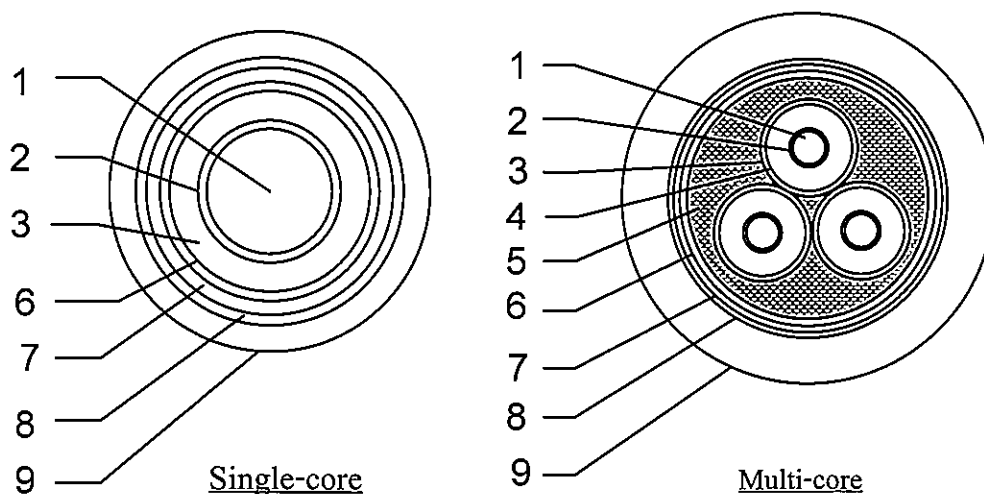
**Routine tests:** Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

**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	Compacted concentric stranded annealed copper
2	Separator tape	PS tape or suitable tape
3	Insulation	Cross-linked polyethylene (XLPE)
4	Binder tape	Spun bond tape or suitable tape
5	Filler	Non-hygroscopic
6	Insulation shield	Semi-conducting tape
7	Metallic shield	Copper tape
8	Separator tape	Spun bond tape or suitable tape
9	Sheath	Flame retardant Polyvinyl chloride (PVC/ST2)

**Application:** Use for installation in open tray, conduit, underground duct trench or direct burial in ground, at wet or dry location. Maximum conductor temperature of 90°C for normal operation and 250°C for short circuit conditions.

**Table 1**

No. of core	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)
1	10	7/Compacted	3.80	2.0	1.4	12.5	1.83	220	500
1	16	7/Compacted	4.80	2.0	1.4	13.5	1.15	290	500
1	25	7/Compacted	6.00	2.0	1.4	15.0	0.727	390	500
1	35	7/Compacted	7.10	2.0	1.4	16.0	0.524	500	500
1	50	19/Compacted	8.30	2.0	1.4	17.0	0.387	650	500
1	70	19/Compacted	9.90	2.0	1.5	19.0	0.268	850	500
1	95	19/Compacted	11.70	2.0	1.5	21.0	0.193	1100	500
1	120	37/Compacted	13.20	2.0	1.6	22.5	0.153	1400	500
1	150	37/Compacted	14.60	2.0	1.6	24.0	0.124	1700	500
1	185	37/Compacted	16.30	2.0	1.7	26.0	0.0991	2000	500
1	240	61/Compacted	18.70	2.0	1.8	28.5	0.0754	2600	500
1	300	61/Compacted	20.90	2.0	1.8	31.0	0.0601	3200	500
1	400	61/Compacted	23.50	2.0	2.0	34.0	0.0470	4000	500

**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)
3	10	7/Compacted	3.80	2.0	1.8	24.5	1.83	700	500
3	16	7/Compacted	4.80	2.0	1.8	27.0	1.15	900	500
3	25	7/Compacted	6.00	2.0	1.8	29.5	0.727	1200	500
3	35	7/Compacted	7.10	2.0	1.9	32.0	0.524	1500	500
3	50	19/Compacted	8.30	2.0	2.0	35.0	0.387	2000	500
3	70	19/Compacted	9.90	2.0	2.1	38.5	0.268	2600	500
3	95	19/Compacted	11.70	2.0	2.2	43.0	0.193	3500	500
3	120	37/Compacted	13.20	2.0	2.3	46.5	0.153	4300	500
3	150	37/Compacted	14.60	2.0	2.4	49.5	0.124	5000	500
3	185	37/Compacted	16.30	2.0	2.5	53.5	0.0991	6500	500
3	240	61/Compacted	18.70	2.0	2.7	59.0	0.0754	8000	500
3	300	61/Compacted	20.90	2.0	2.9	64.5	0.0601	10000	300
3	400	61/Compacted	23.50	2.0	3.1	70.5	0.0470	12500	300