

**SPECIFICATION****For****FD-0.6/1KV-CCV**

0.6/1(1.2)kV

XLPE Insulated PVC Sheathed

Flame Retardant Control Cable

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

BY



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CUSTOMER

Rev.	Date	Description
0	27/04/2020	Issued specification
1	10/07/2020	Add size 19 x 2.5 mm <sup>2</sup>
2	15/01/2021	-Cancel cable code "0010" -Correct the table 1
3	26/04/2021	Add size 8 x 1.5 mm <sup>2</sup>
4	20/10/2021	Add size 18 x 2.5 mm <sup>2</sup>
5	7/11/2022	Add size 10 x 6, 14 x 1.5 mm <sup>2</sup>
6	15/03/2023	Add size 4 x 4 mm <sup>2</sup>
7	5/5/2023	Add size 3x4, 3x6, 5x4, 5x6, 9x1.5, 11x1.5 mm <sup>2</sup> and change color of core
8	27/6/2023	Add size 5x10, 16x4, 18x1.5 and 20x4 mm <sup>2</sup>
9	21/2/2025	Update specification

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 (XLPE) insulated polyvinyl chloride (PVC) sheathed flame retardant control cable.

The cable shall be based on IEC 60502-1 : 2021.

- Flame retardant test requirements per IEC 60332-1.
- Flame propagation test requirements per IEC 60332-3-24; Category C.

## 2. Conductor

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

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.

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

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.

## 3. Insulation

The insulation shall be cross-linked polyethylene (XLPE) compound meet the requirements of IEC 60502-1 : 2021.

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

The minimum thickness shall not fall below 90% of the nominal value in Table 1 by more than 0.1 mm.

## 4. 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.

## 5. 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.

## 6. Sheath

The outer sheath shall be sunlight resistant and flame retardant polyvinyl chloride (PVC/ST2) compound meet the requirements of IEC 60502-1 : 2021.

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

The minimum thickness shall not fall below 80% of the nominal value in Table 1 by more than 0.2 mm.

The color of the sheath shall be black.

## 7. Marking on Cable

The marking items shall be marked by printed at intervals not exceeding 1 meter 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 "0.6/1KV"

5. Type of conductor "CU"

6. Type of insulation and sheath "XLPE/PVC"

7. Type of cable "CONTROL CABLE"

8. Number of cores and size of conductor

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

## 8. Test and Properties

The cable shall meet the requirements in Test and Inspection and Table 1, when tested in accordance with IEC 60502-1 : 2021, IEC 60228 : 2004, IEC 60332-1 and IEC 60332-3-24 ; Category C.


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

## 9. 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-0.6/1KV-CCV"
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

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

### Definition concerning the tests

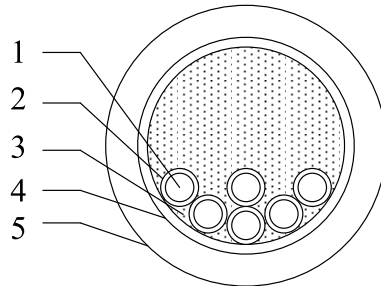
**Routine tests:** Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

**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	Stranded annealed copper
2	Insulation	Cross-linked polyethylene (XLPE) compound
3	Filler	Non-hygroscopic
4	Binder tape	Spun bond tape or suitable tape
5	Sheath	Flame retardant polyvinyl chloride (PVC/ST2) compound

**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 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	11.5	12.1	128	300
2	2.5	7/Non-compacted	2.01	0.7	1.8	12.5	7.41	156	300
2	4	7/Non-compacted	2.55	0.7	1.8	13.5	4.61	199	300
2	6	7/Non-compacted	3.12	0.7	1.8	14.5	3.08	254	300
3	1.5	7/Non-compacted	1.59	0.7	1.8	12.0	12.1	150	300
3	2.5	7/Non-compacted	2.01	0.7	1.8	13.0	7.41	187	300
3	4	7/Non-compacted	2.55	0.7	1.8	14.0	4.61	245	300
3	6	7/Non-compacted	3.12	0.7	1.8	15.5	3.08	319	300
4	1.5	7/Non-compacted	1.59	0.7	1.8	12.5	12.1	176	300
4	2.5	7/Non-compacted	2.01	0.7	1.8	14.0	7.41	223	300
4	4	7/Non-compacted	2.55	0.7	1.8	15.0	4.61	298	300
4	6	7/Non-compacted	3.12	0.7	1.8	16.5	3.08	396	300
5	1.5	7/Non-compacted	1.59	0.7	1.8	13.5	12.1	206	300
5	2.5	7/Non-compacted	2.01	0.7	1.8	15.0	7.41	265	300
5	4	7/Non-compacted	2.55	0.7	1.8	16.5	4.61	358	300
5	6	7/Non-compacted	3.12	0.7	1.8	18.0	3.08	474	300
6	1.5	7/Non-compacted	1.59	0.7	1.8	14.5	12.1	239	300
6	2.5	7/Non-compacted	2.01	0.7	1.8	16.0	7.41	308	300
6	4	7/Non-compacted	2.55	0.7	1.8	17.5	4.61	414	300
6	6	7/Non-compacted	3.12	0.7	1.8	19.5	3.08	558	300
7	1.5	7/Non-compacted	1.59	0.7	1.8	14.5	12.1	253	300
7	2.5	7/Non-compacted	2.01	0.7	1.8	16.0	7.41	331	300
7	4	7/Non-compacted	2.55	0.7	1.8	17.5	4.61	450	300
7	6	7/Non-compacted	3.12	0.7	1.8	19.5	3.08	611	300
8	1.5	7/Non-compacted	1.59	0.7	1.8	15.5	12.1	291	300
8	2.5	7/Non-compacted	2.01	0.7	1.8	17.0	7.41	381	300
8	4	7/Non-compacted	2.55	0.7	1.8	19.0	4.61	522	300
8	6	7/Non-compacted	3.12	0.7	1.8	21.0	3.08	711	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)
9	1.5	7/Non-compacted	1.59	0.7	1.8	16.5	12.1	316	300
9	2.5	7/Non-compacted	2.01	0.7	1.8	18.5	7.41	428	300
9	4	7/Non-compacted	2.55	0.7	1.8	20.0	4.61	584	300
9	6	7/Non-compacted	3.12	0.7	1.8	22.5	3.08	797	300
10	1.5	7/Non-compacted	1.59	0.7	1.8	17.5	12.1	348	300
10	2.5	7/Non-compacted	2.01	0.7	1.8	19.5	7.41	470	300
10	4	7/Non-compacted	2.55	0.7	1.8	21.5	4.61	648	300
10	6	7/Non-compacted	3.12	0.7	1.8	24.0	3.08	881	300
11	1.5	7/Non-compacted	1.59	0.7	1.8	17.5	12.1	360	300
11	2.5	7/Non-compacted	2.01	0.7	1.8	19.5	7.41	492	300
11	4	7/Non-compacted	2.55	0.7	1.8	21.5	4.61	677	300
11	6	7/Non-compacted	3.12	0.7	1.8	24.0	3.08	930	300
12	1.5	7/Non-compacted	1.59	0.7	1.8	18.0	12.1	394	300
12	2.5	7/Non-compacted	2.01	0.7	1.8	20.5	7.41	533	300
12	4	7/Non-compacted	2.55	0.7	1.8	22.5	4.61	735	300
12	6	7/Non-compacted	3.12	0.7	1.8	25.0	3.08	1008	300
13	1.5	7/Non-compacted	1.59	0.7	1.8	19.0	12.1	425	300
13	2.5	7/Non-compacted	2.01	0.7	1.8	21.5	7.41	565	300
13	4	7/Non-compacted	2.55	0.7	1.8	23.5	4.61	789	300
13	6	7/Non-compacted	3.12	0.7	1.8	26.0	3.08	1082	300
14	1.5	7/Non-compacted	1.59	0.7	1.8	19.0	12.1	427	300
14	2.5	7/Non-compacted	2.01	0.7	1.8	21.5	7.41	586	300
14	4	7/Non-compacted	2.55	0.7	1.8	23.5	4.61	816	300
14	6	7/Non-compacted	3.12	0.7	1.8	26.0	3.08	1119	300
15	1.5	7/Non-compacted	1.59	0.7	1.8	19.5	12.1	456	300
15	2.5	7/Non-compacted	2.01	0.7	1.8	22.0	7.41	629	300
15	4	7/Non-compacted	2.55	0.7	1.8	24.0	4.61	879	300
15	6	7/Non-compacted	3.12	0.7	1.8	27.0	3.08	1208	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)
16	1.5	7/Non-compacted	1.59	0.7	1.8	20.0	12.1	475	300
16	2.5	7/Non-compacted	2.01	0.7	1.8	22.5	7.41	656	300
16	4	7/Non-compacted	2.55	0.7	1.8	24.5	4.61	919	300
16	6	7/Non-compacted	3.12	0.7	1.8	27.5	3.08	1264	300
17	1.5	7/Non-compacted	1.59	0.7	1.8	21.0	12.1	518	300
17	2.5	7/Non-compacted	2.01	0.7	1.8	23.5	7.41	709	300
17	4	7/Non-compacted	2.55	0.7	1.8	26.0	4.61	1001	300
17	6	7/Non-compacted	3.12	0.7	1.8	29.0	3.08	1369	300
18	1.5	7/Non-compacted	1.59	0.7	1.8	21.0	12.1	526	300
18	2.5	7/Non-compacted	2.01	0.7	1.8	23.5	7.41	716	300
18	4	7/Non-compacted	2.55	0.7	1.8	26.0	4.61	1012	300
18	6	7/Non-compacted	3.12	0.7	1.8	29.0	3.08	1399	300
19	1.5	7/Non-compacted	1.59	0.7	1.8	21.0	12.1	541	300
19	2.5	7/Non-compacted	2.01	0.7	1.8	23.5	7.41	738	300
19	4	7/Non-compacted	2.55	0.7	1.8	26.0	4.61	1047	300
19	6	7/Non-compacted	3.12	0.7	1.8	29.0	3.08	1451	300
20	1.5	7/Non-compacted	1.59	0.7	1.8	21.5	12.1	571	300
20	2.5	7/Non-compacted	2.01	0.7	1.8	24.0	7.41	779	300
20	4	7/Non-compacted	2.55	0.7	1.8	26.5	4.61	1102	300
20	6	7/Non-compacted	3.12	0.7	1.9	30.0	3.08	1547	300
21	1.5	7/Non-compacted	1.59	0.7	1.8	22.0	12.1	592	300
21	2.5	7/Non-compacted	2.01	0.7	1.8	24.5	7.41	810	300
21	4	7/Non-compacted	2.55	0.7	1.8	27.5	4.61	1181	300
21	6	7/Non-compacted	3.12	0.7	1.9	30.5	3.08	1656	300
22	1.5	7/Non-compacted	1.59	0.7	1.8	23.0	12.1	630	300
22	2.5	7/Non-compacted	2.01	0.7	1.8	26.0	7.41	862	300
22	4	7/Non-compacted	2.55	0.7	1.8	28.5	4.61	1222	300
22	6	7/Non-compacted	3.12	0.7	1.9	32.0	3.08	1712	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)
23	1.5	7/Non-compacted	1.59	0.7	1.8	23.0	12.1	643	300
23	2.5	7/Non-compacted	2.01	0.7	1.8	26.0	7.41	932	300
23	4	7/Non-compacted	2.55	0.7	1.8	28.5	4.61	1318	300
23	6	7/Non-compacted	3.12	0.7	1.9	32.0	3.08	1845	300
24	1.5	7/Non-compacted	1.59	0.7	1.8	24.0	12.1	676	300
24	2.5	7/Non-compacted	2.01	0.7	1.8	27.0	7.41	927	300
24	4	7/Non-compacted	2.55	0.7	1.9	30.0	4.61	1330	300
24	6	7/Non-compacted	3.12	0.7	2.0	34.0	3.08	1863	300
25	1.5	7/Non-compacted	1.59	0.7	1.8	24.0	12.1	695	300
25	2.5	7/Non-compacted	2.01	0.7	1.8	27.0	7.41	955	300
25	4	7/Non-compacted	2.55	0.7	1.9	30.0	4.61	1373	300
25	6	7/Non-compacted	3.12	0.7	2.0	34.0	3.08	1925	300
26	1.5	7/Non-compacted	1.59	0.7	1.8	24.0	12.1	714	300
26	2.5	7/Non-compacted	2.01	0.7	1.8	27.0	7.41	984	300
26	4	7/Non-compacted	2.55	0.7	1.9	30.0	4.61	1417	300
26	6	7/Non-compacted	3.12	0.7	2.0	34.0	3.08	1989	300
27	1.5	7/Non-compacted	1.59	0.7	1.8	24.5	12.1	731	300
27	2.5	7/Non-compacted	2.01	0.7	1.8	27.5	7.41	1010	300
27	4	7/Non-compacted	2.55	0.7	1.9	31.0	4.61	1457	300
27	6	7/Non-compacted	3.12	0.7	2.0	35.0	3.08	2044	300
28	1.5	7/Non-compacted	1.59	0.7	1.8	25.5	12.1	782	300
28	2.5	7/Non-compacted	2.01	0.7	1.8	28.5	7.41	1077	300
28	4	7/Non-compacted	2.55	0.7	1.9	32.0	4.61	1550	300
29	1.5	7/Non-compacted	1.59	0.7	1.8	25.5	12.1	779	300
29	2.5	7/Non-compacted	2.01	0.7	1.8	28.5	7.41	1077	300
29	4	7/Non-compacted	2.55	0.7	1.9	32.0	4.61	1556	300
30	1.5	7/Non-compacted	1.59	0.7	1.8	25.5	12.1	799	300
30	2.5	7/Non-compacted	2.01	0.7	1.8	28.5	7.41	1106	300
30	4	7/Non-compacted	2.55	0.7	1.9	32.0	4.61	1600	300