

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

0.6/1(1.2)kV XLPE Insulated

PVC Inner Sheathed Steel Wire Armored

PVC Outer Sheathed Flame Retardant Control Cable

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

BY 

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CUSTOMER

Rev.	Date	Description
0	18/5/2022	Issued specification
1	22/2/2023	Add size 8 x 2.5 mm ²
2	14/6/2023	Add size 24 x 1.5 mm ²
3	12/2/2024	Update version standard
4	7/5/2024	Update specification
5	25/10/2024	Add all size
6	20/2/2025	Update Table 1

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) inner sheathed steel wire armored polyvinyl chloride (PVC) outer sheathed flame retardant control cable.

The cables 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

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. 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 color or numerals 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. Inner Sheath

The inner sheath shall be polyvinyl chloride (PVC) compound applied over the binder tape.

The average thickness given in Table 1.

The color of the inner sheath shall be black.

7. Steel Wire Armor

The armor shall be galvanized round steel wire applied with a minimum gap between adjacent wires over the inner sheathed.

A separator tape may be applied helically over the armored core.

8. Outer 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 outer sheath shall be black.

9. 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 outer sheath at every 1 meter

10. 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 : 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.

11. 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-SWA "
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 °C \pm 3 °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

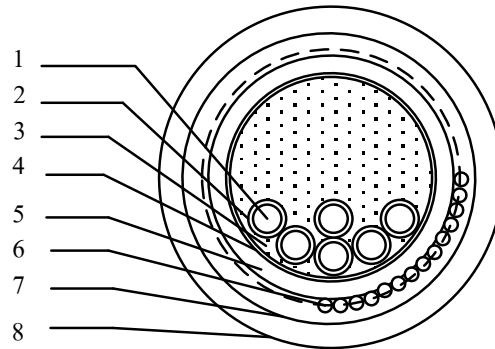
Routine tests: Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

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	Inner Sheath	Polyvinyl chloride (PVC) compound
6	Aarmor	Galvanized steel wire
7	Separator tape	PS tape or suitable tape
8	Outer Sheath	Flame retardant polyvinyl chloride (PVC/ST2) compound

Application: For supervisory electrical equipment, station control circuits, outdoor, suitable installation in the dry or wet cable trenches. Maximum conductor temperature of 90°C for normal operation and 250°C for short circuit condition

Table 1

No. of cores	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness nominal (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer 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	1.2	10.0	0.80	1.8	15.5	12.1	371	300
2	2.5	7/Non-compacted	2.01	0.7	1.2	11.0	1.25	1.8	17.5	7.41	536	300
2	4	7/Non-compacted	2.55	0.7	1.2	12.0	1.25	1.8	18.5	4.61	605	300
2	6	7/Non-compacted	3.12	0.7	1.2	13.0	1.25	1.8	20.0	3.08	697	300
3	1.5	7/Non-compacted	1.59	0.7	1.2	10.5	0.80	1.8	16.0	12.1	404	300
3	2.5	7/Non-compacted	2.01	0.7	1.2	11.5	1.25	1.8	18.0	7.41	580	300
3	4	7/Non-compacted	2.55	0.7	1.2	12.5	1.25	1.8	19.5	4.61	675	300
3	6	7/Non-compacted	3.12	0.7	1.2	14.0	1.25	1.8	20.5	3.08	787	300
4	1.5	7/Non-compacted	1.59	0.7	1.2	11.0	1.25	1.8	18.0	12.1	569	300
4	2.5	7/Non-compacted	2.01	0.7	1.2	12.5	1.25	1.8	19.0	7.41	642	300
4	4	7/Non-compacted	2.55	0.7	1.2	13.5	1.25	1.8	20.5	4.61	754	300
4	6	7/Non-compacted	3.12	0.7	1.2	15.0	1.25	1.8	22.0	3.08	901	300
5	1.5	7/Non-compacted	1.59	0.7	1.2	12.0	1.25	1.8	19.0	12.1	625	300
5	2.5	7/Non-compacted	2.01	0.7	1.2	13.5	1.25	1.8	20.0	7.41	720	300
5	4	7/Non-compacted	2.55	0.7	1.2	15.0	1.25	1.8	21.5	4.61	852	300
5	6	7/Non-compacted	3.12	0.7	1.2	16.5	1.60	1.8	24.0	3.08	1153	300

Table 1 (Continued)

No. of cores	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness nominal (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer 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)
6	1.5	7/Non-compacted	1.59	0.7	1.2	13.0	1.25	1.8	20.0	12.1	682	300
6	2.5	7/Non-compacted	2.01	0.7	1.2	14.5	1.25	1.8	21.5	7.41	788	300
6	4	7/Non-compacted	2.55	0.7	1.2	16.0	1.60	1.8	23.5	4.61	1075	300
6	6	7/Non-compacted	3.12	0.7	1.2	18.0	1.60	1.8	25.5	3.08	1278	300
7	1.5	7/Non-compacted	1.59	0.7	1.2	13.0	1.25	1.8	20.0	12.1	697	300
7	2.5	7/Non-compacted	2.01	0.7	1.2	14.5	1.25	1.8	21.5	7.41	811	300
7	4	7/Non-compacted	2.55	0.7	1.2	16.0	1.60	1.8	23.5	4.61	1111	300
7	6	7/Non-compacted	3.12	0.7	1.2	18.0	1.60	1.8	25.5	3.08	1332	300
8	1.5	7/Non-compacted	1.59	0.7	1.2	14.0	1.25	1.8	21.0	12.1	771	300
8	2.5	7/Non-compacted	2.01	0.7	1.2	16.0	1.25	1.8	22.5	7.41	899	300
8	4	7/Non-compacted	2.55	0.7	1.2	17.5	1.60	1.8	25.0	4.61	1222	300
8	6	7/Non-compacted	3.12	0.7	1.2	19.5	1.60	1.8	27.0	3.08	1489	300
9	1.5	7/Non-compacted	1.59	0.7	1.2	15.0	1.25	1.8	22.0	12.1	821	300
9	2.5	7/Non-compacted	2.01	0.7	1.2	17.0	1.60	1.8	24.5	7.41	1109	300
9	4	7/Non-compacted	2.55	0.7	1.2	19.0	1.60	1.8	26.0	4.61	1342	300
9	6	7/Non-compacted	3.12	0.7	1.2	21.0	1.60	1.8	28.5	3.08	1632	300

Table 1 (Continued)

No. of cores	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness nominal (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer 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)
10	1.5	7/Non-compacted	1.59	0.7	1.2	16.0	1.60	1.8	23.5	12.1	1010	300
10	2.5	7/Non-compacted	2.01	0.7	1.2	18.0	1.60	1.8	25.5	7.41	1190	300
10	4	7/Non-compacted	2.55	0.7	1.2	20.0	1.60	1.8	27.5	4.61	1446	300
10	6	7/Non-compacted	3.12	0.7	1.2	22.5	1.60	1.9	30.5	3.08	1794	300
11	1.5	7/Non-compacted	1.59	0.7	1.2	16.0	1.60	1.8	23.5	12.1	1022	300
11	2.5	7/Non-compacted	2.01	0.7	1.2	18.0	1.60	1.8	25.5	7.41	1212	300
11	4	7/Non-compacted	2.55	0.7	1.2	20.0	1.60	1.8	27.5	4.61	1475	300
11	6	7/Non-compacted	3.12	0.7	1.2	22.5	1.60	1.9	30.5	3.08	1843	300
12	1.5	7/Non-compacted	1.59	0.7	1.2	17.0	1.60	1.8	24.0	12.1	1076	300
12	2.5	7/Non-compacted	2.01	0.7	1.2	19.0	1.60	1.8	26.5	7.41	1290	300
12	4	7/Non-compacted	2.55	0.7	1.2	21.0	1.60	1.8	28.5	4.61	1571	300
12	6	7/Non-compacted	3.12	0.7	1.2	23.5	1.60	1.9	31.0	3.08	1944	300
13	1.5	7/Non-compacted	1.59	0.7	1.2	17.5	1.60	1.8	25.0	12.1	1145	300
13	2.5	7/Non-compacted	2.01	0.7	1.2	20.0	1.60	1.8	27.5	7.41	1344	300
13	4	7/Non-compacted	2.55	0.7	1.2	22.0	1.60	1.8	29.5	4.61	1668	300
13	6	7/Non-compacted	3.12	0.7	1.2	25.0	1.60	1.9	32.5	3.08	2074	300

Table 1 (Continued)

No. of cores	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness nominal (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer 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)
14	1.5	7/Non-compacted	1.59	0.7	1.2	17.5	1.60	1.8	25.0	12.1	1146	300
14	2.5	7/Non-compacted	2.01	0.7	1.2	20.0	1.60	1.8	27.5	7.41	1365	300
14	4	7/Non-compacted	2.55	0.7	1.2	22.0	1.60	1.8	29.5	4.61	1695	300
14	6	7/Non-compacted	3.12	0.7	1.2	25.0	1.60	1.9	32.5	3.08	2111	300
15	1.5	7/Non-compacted	1.59	0.7	1.2	18.0	1.60	1.8	25.5	12.1	1195	300
15	2.5	7/Non-compacted	2.01	0.7	1.2	20.5	1.60	1.8	28.0	7.41	1445	300
15	4	7/Non-compacted	2.55	0.7	1.2	23.0	1.60	1.9	30.5	4.61	1793	300
15	6	7/Non-compacted	3.12	0.7	1.2	25.5	1.60	2.0	33.5	3.08	2237	300
16	1.5	7/Non-compacted	1.59	0.7	1.2	18.5	1.60	1.8	26.0	12.1	1233	300
16	2.5	7/Non-compacted	2.01	0.7	1.2	21.0	1.60	1.8	28.5	7.41	1474	300
16	4	7/Non-compacted	2.55	0.7	1.2	23.5	1.60	1.9	31.0	4.61	1852	300
16	6	7/Non-compacted	3.12	0.7	1.2	26.0	1.60	2.0	34.0	3.08	2313	300
17	1.5	7/Non-compacted	1.59	0.7	1.2	19.5	1.60	1.8	27.0	12.1	1297	300
17	2.5	7/Non-compacted	2.01	0.7	1.2	22.0	1.60	1.8	29.5	7.41	1566	300
17	4	7/Non-compacted	2.55	0.7	1.2	24.5	1.60	1.9	32.5	4.61	1975	300
17	6	7/Non-compacted	3.12	0.7	1.2	27.5	2.00	2.1	36.5	3.08	2743	300

Table 1 (Continued)

No. of cores	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness nominal (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer 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)
18	1.5	7/Non-compacted	1.59	0.7	1.2	19.5	1.60	1.8	27.0	12.1	1305	300
18	2.5	7/Non-compacted	2.01	0.7	1.2	22.0	1.60	1.8	29.5	7.41	1572	300
18	4	7/Non-compacted	2.55	0.7	1.2	24.5	1.60	1.9	32.5	4.61	1985	300
18	6	7/Non-compacted	3.12	0.7	1.2	27.5	2.00	2.1	36.5	3.08	2772	300
19	1.5	7/Non-compacted	1.59	0.7	1.2	19.5	1.60	1.8	27.0	12.1	1320	300
19	2.5	7/Non-compacted	2.01	0.7	1.2	22.0	1.60	1.8	29.5	7.41	1595	300
19	4	7/Non-compacted	2.55	0.7	1.2	24.5	1.60	1.9	32.5	4.61	2021	300
19	6	7/Non-compacted	3.12	0.7	1.2	27.5	2.00	2.1	36.5	3.08	2825	300
20	1.5	7/Non-compacted	1.59	0.7	1.2	20.0	1.60	1.8	27.5	12.1	1369	300
20	2.5	7/Non-compacted	2.01	0.7	1.2	22.5	1.60	1.9	30.5	7.41	1674	300
20	4	7/Non-compacted	2.55	0.7	1.2	25.0	1.60	2.0	33.0	4.61	2112	300
20	6	7/Non-compacted	3.12	0.7	1.2	28.5	2.00	2.1	37.5	3.08	2938	300
21	1.5	7/Non-compacted	1.59	0.7	1.2	20.5	1.60	1.8	28.0	12.1	1410	300
21	2.5	7/Non-compacted	2.01	0.7	1.2	23.0	1.60	1.9	31.0	7.41	1725	300
21	4	7/Non-compacted	2.55	0.7	1.2	26.0	1.60	2.0	34.0	4.61	2211	300
21	6	7/Non-compacted	3.12	0.7	1.2	29.0	2.00	2.1	38.0	3.08	3078	300

Table 1 (Continued)

No. of cores	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness nominal (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer 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	1.2	21.5	1.60	1.8	29.0	12.1	1486	300
22	2.5	7/Non-compacted	2.01	0.7	1.2	24.5	1.60	1.9	32.0	7.41	1834	300
22	4	7/Non-compacted	2.55	0.7	1.2	27.0	2.00	2.1	36.5	4.61	2566	300
22	6	7/Non-compacted	3.12	0.7	1.2	30.5	2.00	2.2	40.0	3.08	3214	300
23	1.5	7/Non-compacted	1.59	0.7	1.2	21.5	1.60	1.8	29.0	12.1	1500	300
23	2.5	7/Non-compacted	2.01	0.7	1.2	24.5	1.60	1.9	32.0	7.41	1904	300
23	4	7/Non-compacted	2.55	0.7	1.2	27.0	2.00	2.1	36.5	4.61	2662	300
23	6	7/Non-compacted	3.12	0.7	1.2	30.5	2.00	2.2	40.0	3.08	3347	300
24	1.5	7/Non-compacted	1.59	0.7	1.2	22.5	1.60	1.9	30.5	12.1	1590	300
24	2.5	7/Non-compacted	2.01	0.7	1.2	25.5	1.60	2.0	33.5	7.41	1954	300
24	4	7/Non-compacted	2.55	0.7	1.2	28.5	2.00	2.1	37.5	4.61	2722	300
24	6	7/Non-compacted	3.12	0.7	1.2	32.0	2.00	2.2	41.5	3.08	3438	300
25	1.5	7/Non-compacted	1.59	0.7	1.2	22.5	1.60	1.9	30.5	12.1	1609	300
25	2.5	7/Non-compacted	2.01	0.7	1.2	25.5	1.60	2.0	33.5	7.41	1982	300
25	4	7/Non-compacted	2.55	0.7	1.2	28.5	2.00	2.1	37.5	4.61	2765	300
25	6	7/Non-compacted	3.12	0.7	1.2	32.0	2.00	2.2	41.5	3.08	3500	300

Table 1 (Continued)

No. of cores	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness nominal (mm)	Dia. of inner sheath approx. (mm)	Armor wire dia. nominal (mm)	Outer 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)
26	1.5	7/Non-compacted	1.59	0.7	1.2	22.5	1.60	1.9	30.5	12.1	1629	300
26	2.5	7/Non-compacted	2.01	0.7	1.2	25.5	1.60	2.0	33.5	7.41	2011	300
26	4	7/Non-compacted	2.55	0.7	1.2	28.5	2.00	2.1	37.5	4.61	2809	300
26	6	7/Non-compacted	3.12	0.7	1.2	32.0	2.00	2.2	41.5	3.08	3564	300
27	1.5	7/Non-compacted	1.59	0.7	1.2	23.0	1.60	1.9	31.0	12.1	1666	300
27	2.5	7/Non-compacted	2.01	0.7	1.2	26.5	1.60	2.0	34.5	7.41	2058	300
27	4	7/Non-compacted	2.55	0.7	1.2	29.5	2.00	2.1	38.5	4.61	2880	300
27	6	7/Non-compacted	3.12	0.7	1.2	33.0	2.00	2.3	42.5	3.08	3671	300
28	1.5	7/Non-compacted	1.59	0.7	1.2	24.0	1.60	1.9	31.5	12.1	1754	300
28	2.5	7/Non-compacted	2.01	0.7	1.2	27.5	2.00	2.0	36.0	7.41	2403	300
28	4	7/Non-compacted	2.55	0.7	1.2	30.5	2.00	2.2	40.0	4.61	3048	300
28	6	7/Non-compacted	3.12	0.7	1.2	34.5	2.00	2.3	44.0	3.08	3857	300
29	1.5	7/Non-compacted	1.59	0.7	1.2	24.0	1.60	1.9	31.5	12.1	1752	300
29	2.5	7/Non-compacted	2.01	0.7	1.2	27.5	2.00	2.0	36.0	7.41	2404	300
29	4	7/Non-compacted	2.55	0.7	1.2	30.5	2.00	2.2	40.0	4.61	3055	300
29	6	7/Non-compacted	3.12	0.7	1.2	34.5	2.00	2.3	44.0	3.08	3873	300

Table 1 (Continued)

No. of cores	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness nominal (mm)	Dia. of inner sheath approx. (mm)	Aarmor wire dia. nominal (mm)	Outer 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)
30	1.5	7/Non-compacted	1.59	0.7	1.2	24.0	1.60	1.9	31.5	12.1	1771	300
30	2.5	7/Non-compacted	2.01	0.7	1.2	27.5	2.00	2.0	36.0	7.41	2433	300
30	4	7/Non-compacted	2.55	0.7	1.2	30.5	2.00	2.2	40.0	4.61	3099	300
30	6	7/Non-compacted	3.12	0.7	1.2	34.5	2.00	2.3	44.0	3.08	3937	300