

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

0.6/1(1.2)kV

XLPE Insulated PVC Inner Sheathed Steel Wire Armored

PVC Outer Sheathed Flame Retardant

with Protection Earthed Power Cable

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

BY



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CUSTOMER

Rev.	Date	Description
0	20/09/2019	Issued specification
1	26/01/2021	Cancel cable code "0010"
2	16/02/2021	Add size 3+PE x 120/120 mm ²
3	13/7/2021	Add size 4+PE x 185/70 mm ²
4	25/4/2023	Add size 4+PE x 25/25, 70/70 mm ²
5	5/2/2024	Update Table 1
6	6/3/2024	Add size 2+PE x 70/70, 95/95 mm ²
7	1/4/2024	Update marking
8	13/9/2024	Update Table 1
9	14/11/2024	Update Table 1
10	17/12/2024	Update conductor diameter

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 with protection earthed power cable.

The cable shall be in accordance with 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 in the outermost layer.

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 cable.

5. Core Identification

The cores shall be identified by color, as follows :

2-cores + PE : blue, brown + green/yellow

3-cores + PE : brown, black, grey + green/yellow

4-cores + PE : blue, brown, black, grey + green/yellow

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 "POWER 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 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-CV-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 $200\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ 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

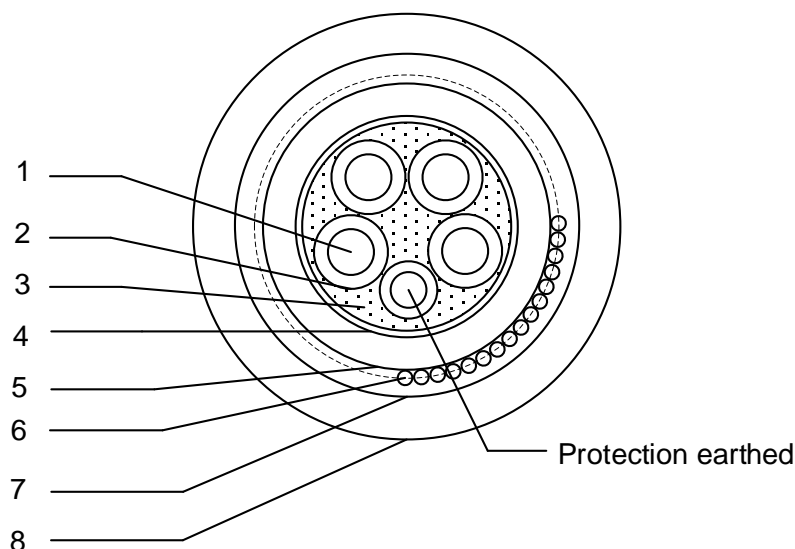
Routine tests: Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

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	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: 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 and size (core x 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)
2+PE x 1/1	7/Non-compacted	1.29	0.7	1.2	10.0	0.80	1.8	15.5	18.1	366	500
2+PE x 1.5/1.5	7/Non-compacted	1.59	0.7	1.2	10.5	0.80	1.8	16.0	12.1	404	500
2+PE x 2.5/2.5	7/Non-compacted	2.01	0.7	1.2	11.5	1.25	1.8	18.0	7.41	580	500
2+PE x 4/4	7/Non-compacted	2.55	0.7	1.2	12.5	1.25	1.8	19.5	4.61	675	500
2+PE x 6/6	7/Non-compacted	3.12	0.7	1.2	14.0	1.25	1.8	20.5	3.08	787	500
2+PE x 10/10	7/Compacted	3.70	0.7	1.2	15.0	1.25	1.8	21.5	1.83	946	500
2+PE x 16/16	7/Compacted	4.70	0.7	1.2	17.0	1.60	1.8	24.5	1.15	1349	500
2+PE x 25/16	7/Compacted	5.90	0.9	1.2	20.0	1.60	1.8	27.0	0.727	1640	500
2+PE x 35/16	7/Compacted	6.90	0.9	1.2	21.5	1.60	1.8	29.0	0.524	1923	500
2+PE x 50/25	19/Compacted	8.20	1.0	1.2	25.0	1.60	2.0	33.0	0.387	2445	500
2+PE x 70/35	19/Compacted	9.80	1.1	1.2	28.5	2.00	2.1	37.5	0.268	3380	500
2+PE x 95/50	19/Compacted	11.60	1.1	1.2	32.0	2.00	2.2	41.5	0.193	4229	500
2+PE x 120/70	37/Compacted	13.10	1.2	1.2	36.0	2.00	2.4	45.5	0.153	5167	500
2+PE x 150/95	37/Compacted	14.50	1.4	1.3	40.0	2.50	2.6	51.0	0.124	6711	500
2+PE x 185/95	37/Compacted	16.10	1.6	1.4	44.0	2.50	2.7	55.5	0.0991	7765	500
2+PE x 240/120	61/Compacted	18.60	1.7	1.5	50.0	2.50	2.9	61.5	0.0754	9668	300
2+PE x 300/150	61/Compacted	20.80	1.8	1.6	55.0	2.50	3.1	67.0	0.0601	11587	300
2+PE x 400/240	61/Compacted	23.40	2.0	1.7	62.0	3.15	3.4	76.5	0.0470	15679	200

Table 1(continued)

No. of cores and size (core x 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)
3+PE x 1/1	7/Non-compacted	1.29	0.7	1.2	10.5	0.80	1.8	16.5	18.1	405	500
3+PE x 1.5/1.5	7/Non-compacted	1.59	0.7	1.2	11.0	1.25	1.8	18.0	12.1	569	500
3+PE x 2.5/2.5	7/Non-compacted	2.01	0.7	1.2	12.5	1.25	1.8	19.0	7.41	646	500
3+PE x 4/4	7/Non-compacted	2.55	0.7	1.2	13.5	1.25	1.8	20.5	4.61	754	500
3+PE x 6/6	7/Non-compacted	3.12	0.7	1.2	15.0	1.25	1.8	22.0	3.08	901	500
3+PE x 10/10	7/Compacted	3.70	0.7	1.2	16.5	1.60	1.8	24.0	1.83	1232	500
3+PE x 16/16	7/Compacted	4.70	0.7	1.2	19.0	1.60	1.8	26.0	1.15	1580	500
3+PE x 25/16	7/Compacted	5.90	0.9	1.2	22.0	1.60	1.9	29.5	0.727	2002	500
3+PE x 35/16	7/Compacted	6.90	0.9	1.2	24.0	1.60	1.9	31.5	0.524	2380	500
3+PE x 35/25	7/Compacted	6.90	0.9	1.2	25.0	1.60	2.0	33.0	0.524	2513	500
3+PE x 50/25	19/Compacted	8.20	1.0	1.2	27.5	2.00	2.1	36.5	0.387	3305	500
3+PE x 70/35	19/Compacted	9.80	1.1	1.2	31.5	2.00	2.2	41.0	0.268	4228	500
3+PE x 95/50	19/Compacted	11.60	1.1	1.2	36.0	2.00	2.4	45.5	0.193	5366	500
3+PE x 120/70	37/Compacted	13.10	1.2	1.3	40.0	2.50	2.6	51.5	0.153	7070	500
3+PE x 150/95	37/Compacted	14.50	1.4	1.4	45.0	2.50	2.7	56.0	0.124	8488	500
3+PE x 185/95	37/Compacted	16.10	1.6	1.5	49.5	2.50	2.9	61.0	0.0991	10003	300
3+PE x 240/120	61/Compacted	18.60	1.7	1.6	55.5	2.50	3.1	68.0	0.0754	12453	300
3+PE x 300/150	61/Compacted	20.80	1.8	1.7	61.5	3.15	3.3	75.5	0.0601	15901	200
3+PE x 400/240	61/Compacted	23.40	2.0	1.9	70.0	3.15	3.6	85.0	0.0470	20163	200

Table 1(continued)

No. of cores and size (core x 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)
4+PE x 1/1	7/Non-compacted	1.29	0.7	1.2	11.5	1.25	1.8	18.0	18.1	565	500
4+PE x 1.5/1.5	7/Non-compacted	1.59	0.7	1.2	12.0	1.25	1.8	19.0	12.1	625	500
4+PE x 2.5/2.5	7/Non-compacted	2.01	0.7	1.2	13.5	1.25	1.8	20.0	7.41	720	500
4+PE x 4/4	7/Non-compacted	2.55	0.7	1.2	15.0	1.25	1.8	21.5	4.61	852	500
4+PE x 6/6	7/Non-compacted	3.12	0.7	1.2	16.5	1.60	1.8	24.0	3.08	1153	500
4+PE x 10/10	7/Compacted	3.70	0.7	1.2	18.0	1.60	1.8	25.5	1.83	1403	500
4+PE x 16/16	7/Compacted	4.70	0.7	1.2	20.5	1.60	1.8	28.0	1.15	1815	500
4+PE x 25/16	7/Compacted	5.90	0.9	1.2	25.0	1.60	2.0	33.0	0.727	2416	500
4+PE x 35/16	7/Compacted	6.90	0.9	1.2	27.0	2.00	2.1	36.5	0.524	3165	500
4+PE x 50/25	19/Compacted	8.20	1.0	1.2	31.5	2.00	2.2	41.0	0.387	3993	500
4+PE x 70/35	19/Compacted	9.80	1.1	1.3	36.5	2.50	2.4	47.0	0.268	5591	500
4+PE x 95/50	19/Compacted	11.60	1.1	1.4	41.5	2.50	2.6	52.5	0.193	7173	500
4+PE x 120/70	37/Compacted	13.10	1.2	1.4	46.5	2.50	2.8	58.0	0.153	8748	500
4+PE x 150/95	37/Compacted	14.50	1.4	1.6	52.0	2.50	3.0	64.0	0.124	10670	300
4+PE x 185/95	37/Compacted	16.10	1.6	1.6	57.0	2.50	3.1	69.5	0.0991	12472	300
4+PE x 240/120	61/Compacted	18.60	1.7	1.8	64.5	3.15	3.4	78.5	0.0754	16615	200
4+PE x 300/150	61/Compacted	20.80	1.8	1.9	71.0	3.15	3.7	86.0	0.0601	19917	200
4+PE x 400/240	61/Compacted	23.40	2.0	2.1	81.0	3.15	4.0	97.0	0.0470	25317	100

Table 1 (continued)

FOR PROTECTION EARTHED CONDUCTOR

No. of core	Size (mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Conductor resistance at 20 °C maximum (Ohm/km)
1	1	7/Non-compacted	1.29	0.7	18.1
1	1.5	7/Non-compacted	1.59	0.7	12.1
1	2.5	7/Non-compacted	2.01	0.7	7.41
1	4	7/Non-compacted	2.55	0.7	4.61
1	6	7/Non-compacted	3.12	0.7	3.08
1	10	7/Compacted	3.70	0.7	1.83
1	16	7/Compacted	4.70	0.7	1.15
1	25	7/Compacted	5.90	0.9	0.727
1	35	7/Compacted	6.90	0.9	0.524
1	50	19/Compacted	8.20	1.0	0.387
1	70	19/Compacted	9.80	1.1	0.268
1	95	19/Compacted	11.60	1.1	0.193
1	120	37/Compacted	13.10	1.2	0.153
1	150	37/Compacted	14.50	1.4	0.124
1	240	61/Compacted	18.60	1.7	0.0754