

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

0.6/1(1.2)kV XLPE Insulated

PVC Inner Sheathed Steel Tape Armored

PVC Outer Sheathed Flame Retardant

with Protection Earthed Power Cable

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

BY



(Wachara Sangsomritphon)

MANAGER, Cable Design Section

APP.



(Winai Ariyasakulsap)

MANAGER, Development Department

APP.

()

CUSTOMER

Rev.	Date	Description
0	7/7/2020	Issued specification
1	30/06/2021	Delete 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 cross-linked polyethylene (XLPE) insulated polyvinyl chloride (PVC) inner sheathed steel tape armored polyvinyl chloride (PVC) outer sheathed flame retardant with protection earthed power cable.

The cables shall be based on 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

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 : 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.

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 in the outer layer.

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

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 approximate thickness given in Table 1.

The color of the inner sheath shall be black

7. Steel Tape Armor

The armor shall be two galvanized flat steel tapes and shall be applied with left-hand (S) lay over the inner sheathed.

The outer tape shall be approximately centered over the spaces between the convolutions of the inner tape.

The maximum space between turns shall not exceed 50% of the width of the tape.

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 : 2004.


The average thickness of the outer 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 outer sheath shall be black.

9. 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 "0.6/1KV"
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 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 : 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.

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-STA"
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 and IEC 60332-3-24; Category C.

Definition concerning the tests

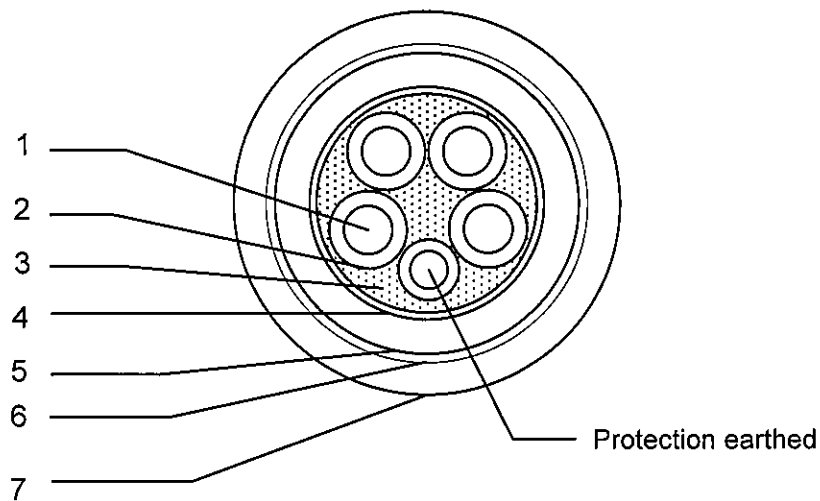
Routine tests: Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

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	Non-compacted & Compacted concentric stranded annealed copper
2	Insulation	Cross-Linked Polyethylene (XLPE)
3	Filler	PP Calcium Yarn (Non-hygrosopic)
4	Binder tape	Spun bond tape or suitable tape
5	Inner sheath	Polyvinyl Chloride (PVC)
6	Armor	Steel Tape Armored (2 layers)
7	Outer 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 cores and size (core x mm ²)	Conductor (wires/type)	Conductor diameter approx. (mm)	Insulation thickness nominal (mm)	Inner sheath thickness approx. (mm)	Dia. of inner sheath approx. (mm)	Armor thickness 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 2.5/2.5	7/Non-compacted	2.01	0.7	1.2	11.5	0.2	1.8	17.0	7.41	420	500
2+PE x 4/4	7/Non-compacted	2.55	0.7	1.2	12.5	0.2	1.8	18.0	4.61	500	500
2+PE x 6/6	7/Non-compacted	3.12	0.7	1.2	14.0	0.2	1.8	19.0	3.08	600	500
2+PE x 10/10	7/Compacted	3.80	0.7	1.2	15.0	0.2	1.8	20.5	1.83	750	500
2+PE x 16/16	7/Compacted	4.80	0.7	1.2	17.0	0.2	1.8	22.5	1.15	950	500
2+PE x 25/16	7/Compacted	6.00	0.9	1.2	20.0	0.2	1.8	25.0	0.727	1200	500
2+PE x 35/16	7/Compacted	7.10	0.9	1.2	22.0	0.2	1.8	27.0	0.524	1500	500
2+PE x 50/25	19/Compacted	8.30	1.0	1.2	25.0	0.2	1.9	30.5	0.387	1900	500
2+PE x 70/35	19/Compacted	9.90	1.1	1.2	28.5	0.2	2.0	34.0	0.268	2500	500
2+PE x 95/50	19/Compacted	11.70	1.1	1.2	32.0	0.5	2.2	39.0	0.193	3500	500
2+PE x 120/70	37/Compacted	13.20	1.2	1.2	36.0	0.5	2.3	43.0	0.153	4400	500
2+PE x 150/95	37/Compacted	14.60	1.4	1.3	40.0	0.5	2.4	47.0	0.124	5500	500
2+PE x 185/95	37/Compacted	16.30	1.6	1.3	44.0	0.5	2.6	51.5	0.0991	6500	500
2+PE x 240/120	61/Compacted	18.70	1.7	1.4	49.5	0.5	2.8	57.5	0.0754	8000	500
2+PE x 300/150	61/Compacted	20.90	1.8	1.5	54.5	0.5	2.9	63.0	0.0601	9500	300
2+PE x 400/240	61/Compacted	23.50	2.0	1.7	62.0	0.5	3.2	71.5	0.0470	13000	300

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 approx. (mm)	Dia. of inner sheath approx. (mm)	Armor thickness 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 2.5/2.5	7/Non-compacted	2.01	0.7	1.2	12.5	0.2	1.8	18.0	7.41	480	500
3+PE x 4/4	7/Non-compacted	2.55	0.7	1.2	13.5	0.2	1.8	19.0	4.61	650	500
3+PE x 6/6	7/Non-compacted	3.12	0.7	1.2	15.0	0.2	1.8	20.5	3.08	700	500
3+PE x 10/10	7/Compacted	3.80	0.7	1.2	16.5	0.2	1.8	21.5	1.83	900	500
3+PE x 16/16	7/Compacted	4.80	0.7	1.2	19.0	0.2	1.8	24.0	1.15	1200	500
3+PE x 25/16	7/Compacted	6.00	0.9	1.2	22.0	0.2	1.8	27.5	0.727	1500	500
3+PE x 35/16	7/Compacted	7.10	0.9	1.2	24.0	0.2	1.9	29.5	0.524	1900	500
3+PE x 50/25	19/Compacted	8.30	1.0	1.2	27.5	0.2	2.0	33.5	0.387	2500	500
3+PE x 70/35	19/Compacted	9.90	1.1	1.2	31.5	0.5	2.1	38.5	0.268	3500	500
3+PE x 95/50	19/Compacted	11.70	1.1	1.2	36.0	0.5	2.3	43.0	0.193	4600	500
3+PE x 120/70	37/Compacted	13.20	1.2	1.3	40.0	0.5	2.4	47.5	0.153	5500	500
3+PE x 150/95	37/Compacted	14.60	1.4	1.4	45.0	0.5	2.6	52.5	0.124	7000	500
3+PE x 185/95	37/Compacted	16.30	1.6	1.4	49.0	0.5	2.8	57.5	0.0991	8500	500
3+PE x 240/120	61/Compacted	18.70	1.7	1.5	55.5	0.5	3.0	64.0	0.0754	10500	300
3+PE x 300/150	61/Compacted	20.90	1.8	1.6	61.0	0.5	3.2	70.5	0.0601	13000	300
3+PE x 400/240	61/Compacted	23.50	2.0	1.7	70.0	0.5	3.5	79.5	0.0470	17000	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 approx. (mm)	Dia. of inner sheath approx. (mm)	Armor thickness 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 2.5/2.5	7/Non-compacted	2.01	0.7	1.2	13.5	0.2	1.8	19.0	7.41	550	500
4+PE x 4/4	7/Non-compacted	2.55	0.7	1.2	15.0	0.2	1.8	20.0	4.61	650	500
4+PE x 6/6	7/Non-compacted	3.12	0.7	1.2	16.5	0.2	1.8	22.0	3.08	800	500
4+PE x 10/10	7/Compacted	3.80	0.7	1.2	18.0	0.2	1.8	23.0	1.83	1000	500
4+PE x 16/16	7/Compacted	4.80	0.7	1.2	20.5	0.2	1.8	26.0	1.15	1400	500
4+PE x 25/16	7/Compacted	6.00	0.9	1.2	25.0	0.2	1.9	30.5	0.727	1900	500
4+PE x 35/16	7/Compacted	7.10	0.9	1.2	27.5	0.2	2.0	33.5	0.524	2400	500
4+PE x 50/25	19/Compacted	8.30	1.0	1.2	31.5	0.5	2.1	38.5	0.387	3300	500
4+PE x 70/35	19/Compacted	9.90	1.1	1.2	36.0	0.5	2.3	43.5	0.268	4400	500
4+PE x 95/50	19/Compacted	11.70	1.1	1.3	41.5	0.5	2.5	49.0	0.193	5500	500
4+PE x 120/70	37/Compacted	13.20	1.2	1.4	46.5	0.5	2.7	54.5	0.153	7000	500
4+PE x 150/95	37/Compacted	14.60	1.4	1.5	52.0	0.5	2.8	60.0	0.124	9000	500
4+PE x 185/95	37/Compacted	16.30	1.6	1.5	57.0	0.5	3.0	65.5	0.0991	10500	300
4+PE x 240/120	61/Compacted	18.70	1.7	1.7	64.0	0.5	3.3	73.5	0.0754	13500	300
4+PE x 300/150	61/Compacted	20.90	1.8	1.8	71.0	0.5	3.5	80.5	0.0601	16500	200
4+PE x 400/240	61/Compacted	23.50	2.0	2.0	81.0	0.5	3.8	91.5	0.0470	21500	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	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	3.80	0.7	1.83
1	16	7/Compacted	4.80	0.7	1.15
1	25	7/Compacted	6.00	0.9	0.727
1	35	7/Compacted	7.10	0.9	0.524
1	50	19/Compacted	8.30	1.0	0.387
1	70	19/Compacted	9.90	1.1	0.268
1	95	19/Compacted	11.70	1.1	0.193
1	120	37/Compacted	13.20	1.2	0.153
1	150	37/Compacted	14.60	1.4	0.124
1	240	61/Compacted	18.70	1.7	0.0754