

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

0.6/1(1.2)kV

XLPE Insulated PVC Sheathed

Flame Retardant Shielded Power Cable

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

BY Wachara

(Wachara Sangsomritphon)

MANAGER, Cable Design Section

APP. Winai Ariyasakulsap

(Winai Ariyasakulsap)

MANAGER, Development Department

APP. _____

()

CUSTOMER

Rev.	Date	Description
0	13/11/2019	Issued specification
1	14/01/2020	Adjust thickness sheath for single core
2	25/3/2021	Add length mark

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 shielded 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

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 2 by more than 10 % plus 0.1 mm.

A suitable binder tape shall be applied helically over the insulation for single-core only.

4. Cabling (For multi-cores only)

The individual insulated cores shall be cabled together with 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 of, as follows :

Single-core : white

2-cores : blue, brown

3-cores : brown, black, grey

4-cores : blue, brown, black, grey

5-cores : blue, brown, black, grey, green/yellow

(White color is natural color of XLPE insulation)

6. Metallic Shield

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

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

A suitable separator tape shall be applied helically over the metallic shield.

7. Sheath

The 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 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.

8. 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 "SHIELD 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 (Except single-core size $< 10 \text{ mm}^2$)

9. 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.

10. 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-S"
2. Number of cores and size of cable
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

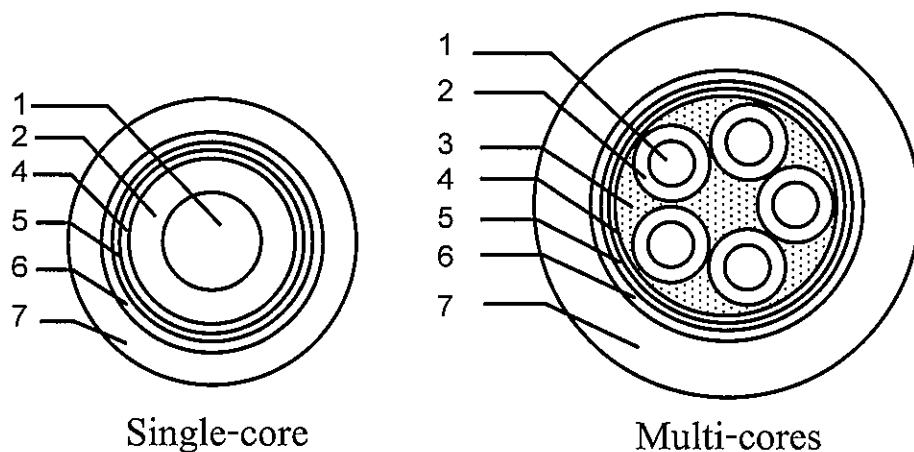
Routine tests: Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

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-hygroscopic)
4	Binder Tape	Spun bond tape or suitable tape
5	Metallic shield	Copper tape
6	Separator tape	Spun bond tape or suitable tape
7	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 ²)	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	1.5	7/Non-compacted	1.59	0.7	1.8	8.5	12.1	100	500
1	2.5	7/Non-compacted	2.01	0.7	1.8	9.0	7.41	120	500
1	4	7/Non-compacted	2.55	0.7	1.8	9.5	4.61	140	500
1	6	7/Non-compacted	3.12	0.7	1.8	10.0	3.08	150	500
1	10	7/Compacted	3.80	0.7	1.8	10.5	1.83	190	500
1	16	7/Compacted	4.80	0.7	1.8	11.5	1.15	260	500
1	25	7/Compacted	6.00	0.9	1.8	13.5	0.727	370	500
1	35	7/Compacted	7.10	0.9	1.8	14.5	0.524	470	500
1	50	19/Compacted	8.30	1.0	1.8	16.0	0.387	600	500
1	70	19/Compacted	9.90	1.1	1.8	17.5	0.268	800	500
1	95	19/Compacted	11.70	1.1	1.8	19.5	0.193	1100	500
1	120	37/Compacted	13.20	1.2	1.8	21.0	0.153	1300	500
1	150	37/Compacted	14.60	1.4	1.8	23.0	0.124	1600	500
1	185	37/Compacted	16.30	1.6	1.8	25.5	0.0991	2000	500
1	240	61/Compacted	18.70	1.7	1.8	28.0	0.0754	2600	500
1	300	61/Compacted	20.90	1.8	1.8	30.5	0.0601	3200	500
1	400	61/Compacted	23.50	2.0	1.9	33.5	0.0470	4000	500
1	500	61/Compacted	26.70	2.2	2.0	37.5	0.0366	5000	500
1	630	61/Compacted	30.30	2.4	2.2	42.0	0.0283	6500	500
1	800	61/Compacted	34.10	2.6	2.3	46.5	0.0221	8000	500
1	1000	127/Compacted	39.50	2.8	2.6	52.5	0.0176	10500	500

Table 1 (Continued)

No. of cores	Size (mm ²)	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	12.0	12.1	160	500
2	2.5	7/Non-compacted	2.01	0.7	1.8	13.0	7.41	190	500
2	4	7/Non-compacted	2.55	0.7	1.8	14.0	4.61	230	500
2	6	7/Non-compacted	3.12	0.7	1.8	15.0	3.08	290	500
2	10	7/Compacted	3.80	0.7	1.8	16.0	1.83	380	500
2	16	7/Compacted	4.80	0.7	1.8	18.0	1.15	550	500
2	25	7/Compacted	6.00	0.9	1.8	21.5	0.727	750	500
2	35	7/Compacted	7.10	0.9	1.8	23.5	0.524	1000	500
2	50	19/Compacted	8.30	1.0	1.8	26.5	0.387	1300	500
2	70	19/Compacted	9.90	1.1	1.8	30.0	0.268	1700	500
2	95	19/Compacted	11.70	1.1	1.9	33.5	0.193	2300	500
2	120	37/Compacted	13.20	1.2	2.0	37.5	0.153	2900	500
2	150	37/Compacted	14.60	1.4	2.2	41.0	0.124	3600	500
2	185	37/Compacted	16.30	1.6	2.3	46.0	0.0991	4400	500
2	240	61/Compacted	18.70	1.7	2.5	51.5	0.0754	5500	500
2	300	61/Compacted	20.90	1.8	2.6	56.5	0.0601	7000	500
2	400	61/Compacted	23.50	2.0	2.9	63.0	0.0470	9000	300

Table 1 (Continued)

No. of cores	Size (mm ²)	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	1.5	7/Non-compacted	1.59	0.7	1.8	12.0	12.1	180	500
3	2.5	7/Non-compacted	2.01	0.7	1.8	13.5	7.41	220	500
3	4	7/Non-compacted	2.55	0.7	1.8	14.5	4.61	280	500
3	6	7/Non-compacted	3.12	0.7	1.8	15.5	3.08	360	500
3	10	7/Compacted	3.80	0.7	1.8	17.0	1.83	490	500
3	16	7/Compacted	4.80	0.7	1.8	19.0	1.15	700	500
3	25	7/Compacted	6.00	0.9	1.8	22.5	0.727	1000	500
3	35	7/Compacted	7.10	0.9	1.8	25.0	0.524	1300	500
3	50	19/Compacted	8.30	1.0	1.8	28.0	0.387	1700	500
3	70	19/Compacted	9.90	1.1	1.9	32.0	0.268	2400	500
3	95	19/Compacted	11.70	1.1	2.0	36.0	0.193	3200	500
3	120	37/Compacted	13.20	1.2	2.1	40.0	0.153	4000	500
3	150	37/Compacted	14.60	1.4	2.3	44.0	0.124	5000	500
3	185	37/Compacted	16.30	1.6	2.4	49.5	0.0991	6000	500
3	240	61/Compacted	18.70	1.7	2.6	55.0	0.0754	8000	500
3	300	61/Compacted	20.90	1.8	2.8	60.5	0.0601	10000	300
3	400	61/Compacted	23.50	2.0	3.0	68.0	0.0470	12500	300

Table 1 (Continued)

No. of cores	Size (mm ²)	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)
4	1.5	7/Non-compacted	1.59	0.7	1.8	13.0	12.1	210	500
4	2.5	7/Non-compacted	2.01	0.7	1.8	14.5	7.41	260	500
4	4	7/Non-compacted	2.55	0.7	1.8	15.5	4.61	340	500
4	6	7/Non-compacted	3.12	0.7	1.8	17.0	3.08	440	500
4	10	7/Compacted	3.80	0.7	1.8	18.0	1.83	600	500
4	16	7/Compacted	4.80	0.7	1.8	20.5	1.15	850	500
4	25	7/Compacted	6.00	0.9	1.8	24.5	0.727	1300	500
4	35	7/Compacted	7.10	0.9	1.8	27.0	0.524	1700	500
4	50	19/Compacted	8.30	1.0	1.9	31.0	0.387	2200	500
4	70	19/Compacted	9.90	1.1	2.0	35.5	0.268	3100	500
4	95	19/Compacted	11.70	1.1	2.1	40.0	0.193	4200	500
4	120	37/Compacted	13.20	1.2	2.3	44.5	0.153	5500	500
4	150	37/Compacted	14.60	1.4	2.4	49.0	0.124	6500	500
4	185	37/Compacted	16.30	1.6	2.6	55.0	0.0991	8000	500
4	240	61/Compacted	18.70	1.7	2.8	61.5	0.0754	10500	300
4	300	61/Compacted	20.90	1.8	3.0	67.5	0.0601	13000	300
4	400	61/Compacted	23.50	2.0	3.3	76.0	0.0470	16500	200

Table 1 (Continued)

No. of cores	Size (mm ²)	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)
5	1.5	7/Non-compacted	1.59	0.7	1.8	14.0	12.1	240	500
5	2.5	7/Non-compacted	2.01	0.7	1.8	15.5	7.41	300	500
5	4	7/Non-compacted	2.55	0.7	1.8	16.5	4.61	400	500
5	6	7/Non-compacted	3.12	0.7	1.8	18.5	3.08	500	500
5	10	7/Compacted	3.80	0.7	1.8	19.5	1.83	700	500
5	16	7/Compacted	4.80	0.7	1.8	22.0	1.15	1100	500
5	25	7/Compacted	6.00	0.9	1.8	27.0	0.727	1600	500
5	35	7/Compacted	7.10	0.9	1.9	30.0	0.524	2100	500
5	50	19/Compacted	8.30	1.0	2.0	34.0	0.387	2700	500
5	70	19/Compacted	9.90	1.1	2.2	39.5	0.268	3800	500
5	95	19/Compacted	11.70	1.1	2.4	44.5	0.193	5000	500
5	120	37/Compacted	13.20	1.2	2.5	49.5	0.153	6500	500
5	150	37/Compacted	14.60	1.4	2.7	54.5	0.124	8000	500
5	185	37/Compacted	16.30	1.6	2.9	61.0	0.0991	10000	300
5	240	61/Compacted	18.70	1.7	3.2	69.0	0.0754	13000	300
5	300	61/Compacted	20.90	1.8	3.4	75.5	0.0601	16000	200
5	400	61/Compacted	23.50	2.0	3.7	84.5	0.0470	20500	200