

# 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 Power Cable

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

BY   
(Wachara Sangsomritphon)  
MANAGER, Cable Design Section

APP. \_\_\_\_\_  
( )  
CUSTOMER

Rev.	Date	Description
0	25/09/2019	Issued specification
1	21/12/2020	Change marking on cable
2	31/1/2024	Update Table 1
3	11/3/2024	Update specification
4	20/5/2024	Update specification
5	17/6/2024	Change thickness outer sheath
6	16/12/2024	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 power cable.

The cable shall be in accordance with IEC 60502-1 : 2021. (Comply with TIS 2143-2546)

- 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 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 colors, as follows :

2-cores : blue, brown

3-cores : brown, black, grey

4-cores : blue, brown, black, grey

5-cores : 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. TIS logo and standard number (For 2-core to 4-cores)

10. 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 (Comply with TIS 2143-2546), 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 "  "
6. Rolling direction of reel
7. TIS logo and standard number

## 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

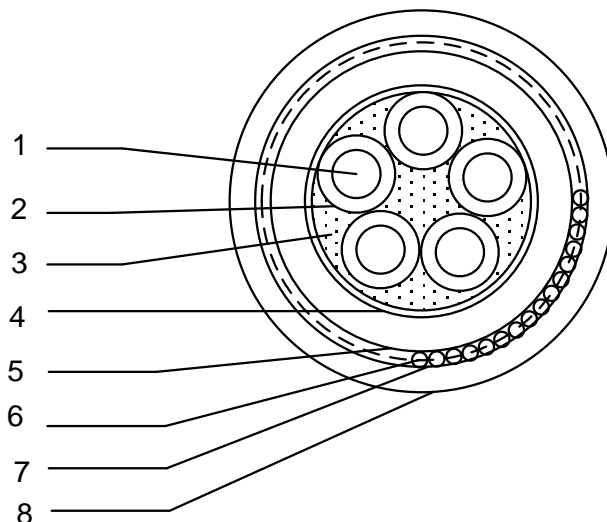
**Routine tests:** Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

**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	Armor	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	Size  (mm <sup>2</sup> )	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	1.5	7/Non-compacted	1.59	0.7	1.2	10.0	0.80	1.8	15.5	12.1	371	500
2	2.5	7/Non-compacted	2.01	0.7	1.2	11.0	1.25	1.8	17.5	7.41	536	500
2	4	7/Non-compacted	2.55	0.7	1.2	12.0	1.25	1.8	18.5	4.61	605	500
2	6	7/Non-compacted	3.12	0.7	1.2	13.0	1.25	1.8	20.0	3.08	697	500
2	10	7/Compacted	3.70	0.7	1.2	14.0	1.25	1.8	21.0	1.83	817	500
2	16	7/Compacted	4.70	0.7	1.2	16.0	1.60	1.8	23.5	1.15	1155	500
2	25	7/Compacted	5.90	0.9	1.2	19.5	1.60	1.8	27.0	0.727	1509	500
2	35	7/Compacted	6.90	0.9	1.2	21.5	1.60	1.8	29.0	0.524	1797	500
2	50	19/Compacted	8.20	1.0	1.2	24.5	1.60	2.0	32.5	0.387	2218	500
2	70	19/Compacted	9.80	1.1	1.2	28.5	2.00	2.1	37.5	0.268	3105	500
2	95	19/Compacted	11.60	1.1	1.2	32.0	2.00	2.2	41.0	0.193	3844	500
2	120	37/Compacted	13.10	1.2	1.2	35.5	2.00	2.4	45.0	0.153	4638	500
2	150	37/Compacted	14.50	1.4	1.3	39.0	2.50	2.5	50.0	0.124	5913	500
2	185	37/Compacted	16.10	1.6	1.4	44.0	2.50	2.7	55.0	0.0991	7050	500
2	240	61/Compacted	18.60	1.7	1.5	49.5	2.50	2.9	61.5	0.0754	8739	500
2	300	61/Compacted	20.80	1.8	1.6	54.5	2.50	3.1	67.0	0.0601	10448	300
2	400	61/Compacted	23.40	2.0	1.7	61.0	2.50	3.3	74.0	0.0470	12748	300

**Table 1 (continued)**

No. of cores	Size  (mm <sup>2</sup> )	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)
3	1.5	7/Non-compacted	1.59	0.7	1.2	10.5	0.80	1.8	16.0	12.1	404	500
3	2.5	7/Non-compacted	2.01	0.7	1.2	11.5	1.25	1.8	18.0	7.41	580	500
3	4	7/Non-compacted	2.55	0.7	1.2	12.5	1.25	1.8	19.5	4.61	675	500
3	6	7/Non-compacted	3.12	0.7	1.2	14.0	1.25	1.8	20.5	3.08	787	500
3	10	7/Compacted	3.70	0.7	1.2	15.0	1.25	1.8	21.5	1.83	943	500
3	16	7/Compacted	4.70	0.7	1.2	17.0	1.60	1.8	24.5	1.15	1349	500
3	25	7/Compacted	5.90	0.9	1.2	21.0	1.60	1.8	28.5	0.727	1772	500
3	35	7/Compacted	6.90	0.9	1.2	23.0	1.60	1.9	31.0	0.524	2171	500
3	50	19/Compacted	8.20	1.0	1.2	26.5	2.00	2.0	35.0	0.387	2958	500
3	70	19/Compacted	9.80	1.1	1.2	30.5	2.00	2.2	39.5	0.268	3824	500
3	95	19/Compacted	11.60	1.1	1.2	34.0	2.00	2.3	43.5	0.193	4833	500
3	120	37/Compacted	13.10	1.2	1.3	38.0	2.50	2.5	49.0	0.153	6280	500
3	150	37/Compacted	14.50	1.4	1.4	42.0	2.50	2.6	53.5	0.124	7446	500
3	185	37/Compacted	16.10	1.6	1.5	47.5	2.50	2.8	59.0	0.0991	8970	300
3	240	61/Compacted	18.60	1.7	1.6	53.5	2.50	3.0	65.5	0.0754	11245	300
3	300	61/Compacted	20.80	1.8	1.7	59.0	2.50	3.2	71.5	0.0601	13504	300
3	400	61/Compacted	23.40	2.0	1.8	66.0	3.15	3.5	80.5	0.0470	17500	200



**Table 1 (continued)**

No. of cores	Size  (mm <sup>2</sup> )	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)
4	1.5	7/Non-compacted	1.59	0.7	1.2	11.0	1.25	1.8	18.0	12.1	569	500
4	2.5	7/Non-compacted	2.01	0.7	1.2	12.5	1.25	1.8	19.0	7.41	642	500
4	4	7/Non-compacted	2.55	0.7	1.2	13.5	1.25	1.8	20.5	4.61	754	500
4	6	7/Non-compacted	3.12	0.7	1.2	15.0	1.25	1.8	22.0	3.08	901	500
4	10	7/Compacted	3.70	0.7	1.2	16.5	1.60	1.8	24.0	1.83	1232	500
4	16	7/Compacted	4.70	0.7	1.2	19.0	1.60	1.8	26.0	1.15	1579	500
4	25	7/Compacted	5.90	0.9	1.2	23.0	1.60	1.9	30.5	0.727	2143	500
4	35	7/Compacted	6.90	0.9	1.2	25.5	1.60	2.0	33.5	0.524	2638	500
4	50	19/Compacted	8.20	1.0	1.2	29.0	2.00	2.1	38.0	0.387	3578	500
4	70	19/Compacted	9.80	1.1	1.2	33.5	2.00	2.3	43.0	0.268	4672	500
4	95	19/Compacted	11.60	1.1	1.3	38.0	2.50	2.5	49.0	0.193	6404	500
4	120	37/Compacted	13.10	1.2	1.4	42.5	2.50	2.6	53.5	0.153	7789	500
4	150	37/Compacted	14.50	1.4	1.5	47.0	2.50	2.8	59.0	0.124	9280	300
4	185	37/Compacted	16.10	1.6	1.6	53.0	2.50	3.0	65.0	0.0991	11228	300
4	240	61/Compacted	18.60	1.7	1.7	59.5	2.50	3.2	72.0	0.0754	14070	300
4	300	61/Compacted	20.80	1.8	1.8	65.5	3.15	3.5	80.0	0.0601	17934	200
4	400	61/Compacted	23.40	2.0	2.0	73.5	3.15	3.8	89.0	0.0470	22103	200

**Table 1 (continued)**

No. of cores	Size  (mm <sup>2</sup> )	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)
5	1.5	7/Non-compacted	1.59	0.7	1.2	12.0	1.25	1.8	19.0	12.1	625	500
5	2.5	7/Non-compacted	2.01	0.7	1.2	13.5	1.25	1.8	20.0	7.41	720	500
5	4	7/Non-compacted	2.55	0.7	1.2	15.0	1.25	1.8	21.5	4.61	852	500
5	6	7/Non-compacted	3.12	0.7	1.2	16.5	1.60	1.8	24.0	3.08	1153	500
5	10	7/Compacted	3.70	0.7	1.2	18.0	1.60	1.8	25.5	1.83	1405	500
5	16	7/Compacted	4.70	0.7	1.2	20.5	1.60	1.8	28.0	1.15	1816	500
5	25	7/Compacted	5.90	0.9	1.2	25.5	1.60	2.0	33.5	0.727	2514	500
5	35	7/Compacted	6.90	0.9	1.2	28.0	2.00	2.1	37.0	0.524	3374	500
5	50	19/Compacted	8.20	1.0	1.2	32.0	2.00	2.2	41.5	0.387	4209	500
5	70	19/Compacted	9.80	1.1	1.3	37.0	2.50	2.5	48.0	0.268	6028	500
5	95	19/Compacted	11.60	1.1	1.4	42.5	2.50	2.6	53.5	0.193	7654	500
5	120	37/Compacted	13.10	1.2	1.5	47.5	2.50	2.8	59.0	0.153	9336	300
5	150	37/Compacted	14.50	1.4	1.6	52.5	2.50	3.0	64.5	0.124	11223	300
5	185	37/Compacted	16.10	1.6	1.7	58.5	2.50	3.2	71.5	0.0991	13568	300
5	240	61/Compacted	18.60	1.7	1.8	66.5	3.15	3.5	81.0	0.0754	18021	200
5	300	61/Compacted	20.80	1.8	2.0	73.5	3.15	3.8	88.5	0.0601	21748	200