

SPECIFICATION**For****FD-12/20KV-CV-CWS (6680)**

12/20(24)kV XLPE Insulated

Copper Wire Screened PVC Sheathed

Flame Retardant Power Cable

(12/20(24)kV, Cu/XLPE/CWS/FR-PVC)

BY



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CUSTOMER

Rev.	Date	Description
0	2/09/2020	Issued specification

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.

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1. Scope

This specification covers 22000V copper conductor cross-linked polyethylene (XLPE) insulated copper wire screened polyvinyl chloride (PVC) sheathed flame retardant power cable.

The cable shall be in accordance with TIS 2143-2546. (Same IEC 60502-2) and MEA's specification No. 418 (04-2018).

The finished cables shall meet the vertical tray flame test requirements per IEC 60332-3-22 ; Category A.

2. Conductor

The conductor shall be compacted concentric stranded uncoated annealed copper conductor in accordance with TIS 2427-2552, Class 2. (Same IEC 60228 : 2004, Class 2)

The direction of lay shall be left-hand (S) lay in the outermost layer.

3. Conductor Shield

The conductor shield shall be a semi-conducting nylon tape and shall be applied helically with a wrap over the conductor and a layer of extruded semi-conducting compound.

Size $\leq 150 \text{ mm}^2$: Applied extruded semi-conducting compound

Size $\geq 185 \text{ mm}^2$: Applied semi-conducting nylon tape and extruded semi-conducting compound

The thickness of the conductor shield shall be minimum 0.0635 mm.

4. Insulation

The insulation shall be cross-linked polyethylene (XLPE) compound meet the requirements of TIS 2143-2546. (Same IEC 60502-2)

The average thickness of the insulation shall be not less than that given in Table 2.

The minimum thickness shall be not less than 90% of the value in Table 2.

The thickness of insulation shall not be included that of conductor shield.

5. Insulation Shield

The insulation shield shall be a layer of extruded semi-conducting compound and shall be free stripping.

The thickness of the insulation shield shall be minimum 0.0635 mm.

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6. Copper Wire Screen

The copper wire screened shall consist of plain annealed round copper wires applied helically over the insulation shield.

The contact tape shall be an uncoated annealed copper tape and shall be applied helically over the copper wire screened.

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

A suitable separator tape shall be applied helically over the contacted tape.

7. Sheath

The sheath shall be flame retardant polyvinyl chloride (PVC/ST2) compound meet the requirements of TIS 2143-2546 (Same IEC 60502-2).

The average thickness of the sheath shall be not less than that given in Table 2.

The minimum thickness shall not be less than 80% of the value in Table 2.

The color of the sheath shall be black.

8. Marking on Cable

The surface of the sheath shall be marked legibly and durably in THAI language, at the interval of not more than 50 cm., as follow

“การไฟฟ้านครหลวง สายใต้ดินประเภทหม่องไฟสำหรับใช้กับระบบ A เควี ขนาด B ตร.มม., สัญญาเลขที่ C : D”

Where

A : 24 for 12/20 kV cable

B : The nominal cross-sectional area of conductor

C : The purchase contract number

D : Manufacturer's name or trade mark

The color of marking shall be yellow

The continuous reel length marking (in figure) shall be made on the sheath at every 1 meter starting from "0"

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9. Test and Properties


The cable shall meet the requirements in Table 1 and Table 2, when tested in accordance with TIS 2143-2546, TIS 2427-2552 (Same IEC 60502-2 and IEC 60228 : 2004), IEC 60332-3-22 ; Category A and MEA's specification No. 418 (04-2018).

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-12/20KV-CV-CWS (6680)"
2. Type of conductor "CU"
3. Type of insulation and sheath "XLPE/PVC"
4. Number of core and size of conductor
5. Cable length
6. Net and gross weight
7. Year of manufacture
8. Manufacturer's name and/or trade mark "  **YAZAKI** "
9. Rolling direction of reel and cable end position
10. Drum number

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Table 1

Routine Test

- Maximum conductor resistance, Ohm/km specified in Table 2
- AC test voltage for 5 minutes, kV..... 42
- # Maximum partial discharge level 10 pC or better, at 20.76 kV
- Electrical test on over sheath..... No breakdown
- The number of length to be tested shall be decided by agreement between the purchasers (or its representative) and the manufacturer or shall be 10% of the number of lengths in the contract.
- # The partial discharge level shall be no detectable discharge exceeding the declared sensitivity.

Sample Test

- * Constructionspecified in Table 2
- ** AC test voltage for 4 hours, kV.....48
- ** Hot set test at $200^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for XLPE
- Maximum elongation under load (%)175
- Maximum permanent elongation after cooling (%)..... 15
- * The test shall be made on one length from each manufacturing series of the same size of cable, but shall be limited to not more than 10% of the number of lengths in the contract, as specified in TIS 2143-2546.
- ** The test shall be made on samples taken from cables manufactured for the contract, on the following basis, as specified in TIS 2143-2546.

Cable Length		Number of samples
Above (km)	Up to and including (km)	
4	20	1
20	40	2
40	60	3
etc.		etc.

Type Test

- This cable shall be tested as followed :
- Flame retardant tested according to IEC 60332-3-22; Category A.

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Table 1 (continued)

Properties of Conductor Shield

Maximum volume resistivity at room temperature and at 90 °C
Ohm-m..... 1000

Properties of Insulation Shield

Maximum volume resistivity at room temperature and at 90 °C
Ohm-m..... 500

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No. of core	Size (mm ²)	Conductor (wires/type)	Conductor diameter (mm)	Insulation thickness nominal (mm)	Copper wire area (mm ²)	Sheath thickness nominal (mm)	Overall diameter (mm)	Conductor resistance at 20 °C maximum (Ohm/km)	Weight of cable approx. (kg/km)	Standard packing length (m)
1	70/10	19/Compacted	9.73±1%	5.5	10	1.8	28.0 - 30.0	0.268	1400	500
1	240/25	61/Compacted	18.47±1%	5.5	25	2.1	39.0 - 42.2	0.0754	3400	500
1	400/25	61/Compacted	23.39±1%	5.5	25	2.3	44.5 - 48.0	0.0470	4900	500
1	800/25	61/Compacted	34.00±1%	5.5	25	2.6	57.5 - 61.0	0.0221	9000	500

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