

SPECIFICATION

For

FDLH-0.6/1KV-CE-SWA

0.6/1(1.2)kV Copper Conductor XLPE Insulated
Polyolefin Inner Sheathed Steel Wire Armored
Polyolefin Outer Sheathed Flame Retardant
with Low Smoke and Zero Halogen Power Cable
(0.6/1(1.2)kV, Cu/XLPE/FR-LSOH/SWA/FR-LSOH)

BY 

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Rev.	Date	Description
0	4/12/2019	Issued specification
1	11/5/2020	Correct the value in Table 1
2	22/3/2021	- Cancel cable code "0010" - Add 5-cores
3	26/08/2021	Update the test standard version
4	7/11/2022	Add size 5 x 1.5, 2.5, 70, 150, 240, 300 and 400 mm ²
5	13/2/2024	Update Table 1
6	1/4/2024	Update standard reference
7	3/5/2024	Update specification
8	19/11/2024	Update Table 1
9	19/12/2024	Update conductor diameter

APP. _____

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CUSTOMER

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 polyolefin inner sheathed steel wire armored polyolefin outer sheathed flame retardant with low smoke and zero halogen power cable.

The cable shall be based on IEC 60502-1 : 2021.

The maximum conductor temperature shall be 90°C.

- Flame retardant test requirements per IEC 60332-1.
- Flame propagation test requirements per IEC 60332-3-22; Category A, IEC 60332-3-23; Category B and IEC 60332-3-24; Category C.
- Low smoke test requirements per IEC 61034.
- Halogen gases determinations test requirements per IEC 60754-1 and IEC 60754-2.
- Extremely low toxicity gases test requirements per IEC 60684-2 and Defence Standard 02-713.

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 cabled core.

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

6. Inner Sheath

The inner sheath shall be low smoke and zero halogen flame retardant polyolefin 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, low smoke and zero halogen flame retardant polyolefin (ST8) 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 or orange.

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. Cable property code "FDLH"

4. Rated circuit voltage "0.6/1KV"

5. Type of conductor "CU"

6. Type of insulation and sheath "XLPE/LSOH"

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, IEC 60332-3-22; Category A, IEC 60332-3-23; Category B, IEC 60332-3-24; Category C, IEC 61034, IEC 60754-1, IEC 60754-2, IEC 60684-2 and Defence Standard 02-713.

Remark: Sunlight resistant test meet the requirement of TIS 293-2541.


Except black color sheath ; For longer life of cable should be avoid exposure to direct solar radiation it necessary, cover is required.

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 "FDLH-0.6/1KV-CE-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 60332-3-22; Category A or IEC 60332-3-23; Category B or IEC 60332-3-24; Category C.
- Smoke emission tested according to IEC 61034.
- Halogen gases tested according to IEC 60754-1 and IEC 60754-2.
- Extremely low toxicity gases test according to IEC 60684-2 and Defence Standard 02-713.

Definition concerning the tests

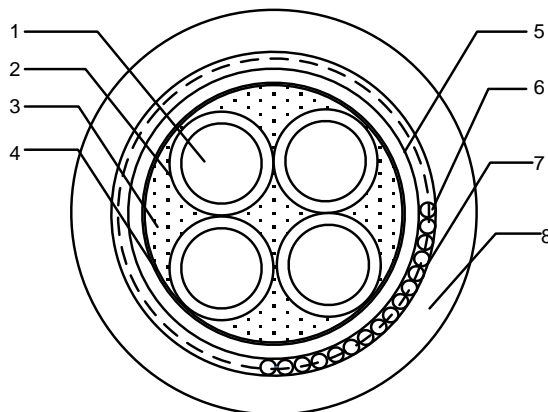
Routine tests: Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

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	PS tape or suitable tape
5	Inner sheath	Low smoke and Zero halogen flame retardant polyolefin compound
6	Aarmor	Galvanized steel wire
7	Binder tape	PS tape or suitable tape
8	Outer sheath	Low smoke and zero halogen flame retardant polyolefin (ST8) compound

Application: For installed into tray, conduit, underground duct trench or direct burial in ground which provide flame retardant, low smoke and non-toxic emission under fire. Maximum conductor temperature of 90 °C for normal operation and 250 °C for short circuit conditions.

Table 1

No. of cores	Size (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)
2	1.5	7/Non-compacted	1.59	0.7	1.2	9.5	0.80	1.8	15.5	12.1	360	500
2	2.5	7/Non-compacted	2.01	0.7	1.2	10.5	0.80	1.8	16.5	7.41	405	500
2	4	7/Non-compacted	2.55	0.7	1.2	11.5	1.25	1.8	18.0	4.61	588	500
2	6	7/Non-compacted	3.12	0.7	1.2	12.5	1.25	1.8	19.5	3.08	680	500
2	10	7/Compacted	3.70	0.7	1.2	13.5	1.25	1.8	20.5	1.83	799	500
2	16	7/Compacted	4.70	0.7	1.2	16.0	1.60	1.8	23.0	1.15	1130	500
2	25	7/Compacted	5.90	0.9	1.2	19.0	1.60	1.8	26.5	0.727	1485	500
2	35	7/Compacted	6.90	0.9	1.2	21.0	1.60	1.8	28.5	0.524	1767	500
2	50	19/Compacted	8.20	1.0	1.2	24.5	1.60	1.9	32.0	0.387	2194	500
2	70	19/Compacted	9.80	1.1	1.2	28.0	2.00	2.1	37.0	0.268	3069	500
2	95	19/Compacted	11.60	1.1	1.2	31.5	2.00	2.2	41.0	0.193	3833	500
2	120	37/Compacted	13.10	1.2	1.2	35.0	2.00	2.3	44.5	0.153	4579	500
2	150	37/Compacted	14.50	1.4	1.3	39.0	2.50	2.5	50.0	0.124	5859	500
2	185	37/Compacted	16.10	1.6	1.4	43.5	2.50	2.7	55.0	0.0991	7035	500
2	240	61/Compacted	18.60	1.7	1.5	49.5	2.50	2.9	61.0	0.0754	8722	500
2	300	61/Compacted	20.80	1.8	1.6	54.5	2.50	3.1	66.5	0.0601	10429	300
2	400	61/Compacted	23.40	2.0	1.7	61.0	2.50	3.3	73.5	0.0470	12688	300

Table 1 (continued)

No. of cores	Size (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)
3	1.5	7/Non-compacted	1.59	0.7	1.2	10.0	0.80	1.8	16.0	12.1	393	500
3	2.5	7/Non-compacted	2.01	0.7	1.2	11.0	1.25	1.8	18.0	7.41	563	500
3	4	7/Non-compacted	2.55	0.7	1.2	12.0	1.25	1.8	19.0	4.61	657	500
3	6	7/Non-compacted	3.12	0.7	1.2	13.5	1.25	1.8	20.0	3.08	769	500
3	10	7/Compacted	3.70	0.7	1.2	14.5	1.25	1.8	21.5	1.83	926	500
3	16	7/Compacted	4.70	0.7	1.2	17.0	1.60	1.8	24.0	1.15	1325	500
3	25	7/Compacted	5.90	0.9	1.2	20.5	1.60	1.8	28.0	0.727	1748	500
3	35	7/Compacted	6.90	0.9	1.2	22.5	1.60	1.9	30.5	0.524	2145	500
3	50	19/Compacted	8.20	1.0	1.2	26.0	2.00	2.0	35.0	0.387	2922	500
3	70	19/Compacted	9.80	1.1	1.2	30.0	2.00	2.2	39.0	0.268	3788	500
3	95	19/Compacted	11.60	1.1	1.2	34.0	2.00	2.3	43.5	0.193	4796	500
3	120	37/Compacted	13.10	1.2	1.3	37.5	2.50	2.5	48.5	0.153	6267	500
3	150	37/Compacted	14.50	1.4	1.4	42.0	2.50	2.6	53.0	0.124	7432	500
3	185	37/Compacted	16.10	1.6	1.5	47.0	2.50	2.8	58.5	0.0991	8953	500
3	240	61/Compacted	18.60	1.7	1.6	53.0	2.50	3.0	65.5	0.0754	11187	300
3	300	61/Compacted	20.80	1.8	1.7	58.5	2.50	3.2	71.0	0.0601	13484	300
3	400	61/Compacted	23.40	2.0	1.8	65.5	3.15	3.5	80.0	0.0470	17477	200

Table 1 (continued)

No. of cores	Size (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	1.5	7/Non-compacted	1.59	0.7	1.2	11.0	1.25	1.8	17.5	12.1	552	500
4	2.5	7/Non-compacted	2.01	0.7	1.2	12.0	1.25	1.8	19.0	7.41	625	500
4	4	7/Non-compacted	2.55	0.7	1.2	13.5	1.25	1.8	20.0	4.61	736	500
4	6	7/Non-compacted	3.12	0.7	1.2	15.0	1.25	1.8	21.5	3.08	883	500
4	10	7/Compacted	3.70	0.7	1.2	16.0	1.60	1.8	23.5	1.83	1208	500
4	16	7/Compacted	4.70	0.7	1.2	18.5	1.60	1.8	26.0	1.15	1555	500
4	25	7/Compacted	5.90	0.9	1.2	22.5	1.60	1.9	30.5	0.727	2118	500
4	35	7/Compacted	6.90	0.9	1.2	25.0	1.60	2.0	33.0	0.524	2612	500
4	50	19/Compacted	8.20	1.0	1.2	28.5	2.00	2.1	38.0	0.387	3542	500
4	70	19/Compacted	9.80	1.1	1.2	33.0	2.00	2.3	42.5	0.268	4634	500
4	95	19/Compacted	11.60	1.1	1.3	37.5	2.50	2.5	48.5	0.193	6391	500
4	120	37/Compacted	13.10	1.2	1.4	42.0	2.50	2.6	53.0	0.153	7735	500
4	150	37/Compacted	14.50	1.4	1.5	47.0	2.50	2.8	58.5	0.124	9264	300
4	185	37/Compacted	16.10	1.6	1.6	52.5	2.50	3.0	64.5	0.0991	11170	300
4	240	61/Compacted	18.60	1.7	1.7	59.0	2.50	3.2	71.5	0.0754	14011	300
4	300	61/Compacted	20.80	1.8	1.8	65.0	3.15	3.5	79.5	0.0601	17911	200
4	400	61/Compacted	23.40	2.0	2.0	73.5	3.15	3.7	88.0	0.0470	21973	200