

SPECIFICATION

For

YK FD-0.6/1KV-CV

0.6/1(1.2)kV Copper Conductor XLPE Insulated PVC Sheathed

Flame Retardant Super Soft Power Cable

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

BY



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MANAGER, Cable Design Section

APP. _____

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CUSTOMER

Rev.	Date	Description
0	16/09/2019	Issued specification
1	4/11/2020	Correct the electrical data
2	18/01/2021	Change marking on cable
3	24/1/2024	Update Table 1
4	8/3/2024	Update specification
5	28/11/2024	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) sheathed flame retardant super soft power cable.

The cable shall be in accordance with IEC 60502-1 : 2021.

(Comply with TIS 2143-2546)

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 $\leq 10 \text{ mm}^2$:

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 $\geq 16 \text{ mm}^2$:

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 (For multi-cores only)

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 color, as follows :

Single-core : white

2-cores : blue, brown

3-cores : brown, black, grey

4-cores : blue, brown, black, grey

(White color is natural color of XLPE insulation)

6. Sheath

The 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 sheath shall not be 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 sheath shall be black.

7. Marking on Cable

The marking items from 1 to 11 shall be marked 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 code "YK"

4. Flame retardant code "FD"

5. Rated circuit voltage "0.6/1KV"

6. Type of conductor "CU"

7. Type of insulation and sheath "XLPE/PVC"

8. Type of cable "POWER CABLE"

9. Number of cores and size of conductor

10. Flame retardant standard "IEC 60332-3 C"

11. TIS logo and standard number

12. The continuous reel length marking (in figure) by printed shall be made on the sheath at every 1 meter (For single-core size $\geq 10 \text{ mm}^2$)

8. Test and Properties

The cable shall be 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.

9. 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 "YK FD-0.6/1KV-CV"
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
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 and IEC 60332-3-24; Category C.

Definition concerning the tests

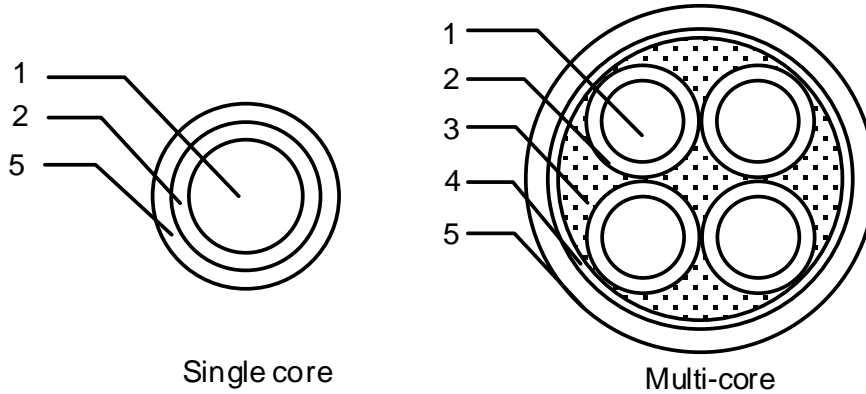
Routine tests: Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

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	Stranded annealed copper
2	Insulation	Cross-linked polyethylene (XLPE) compound
3	Filler	Non-hygroscopic
4	Binder Tape	Spun bond tape or suitable tape
5	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 core	Size (mm ²)	Conductor			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)	
		No. of wires (wires)	Type	Diameter approx. (mm)							
1	2.5	7	Non-compacted	2.01	0.7	1.4	7.0	7.41	65	1000	2000
1	4	7	Non-compacted	2.54	0.7	1.4	7.5	4.61	85	1000	2000
1	6	7	Non-compacted	3.05	0.7	1.4	8.5	3.08	110	1000	2000
1	10	7	Non-compacted	3.95	0.7	1.4	9.0	1.83	150	1000	2000
1	16	7	Compacted	4.70	0.7	1.4	10.0	1.15	210	1000	2000
1	25	7	Compacted	5.90	0.9	1.4	11.5	0.727	310	1000	2000
1	35	7	Compacted	6.90	0.9	1.4	12.5	0.524	400	1000	2000
1	50	7	Compacted	8.15	1.0	1.7	14.5	0.387	550	1000	2000
1	70	19	Compacted	9.75	1.1	1.4	16.0	0.268	720	1000	2000
1	95	19	Compacted	11.50	1.1	1.5	18.0	0.193	1250	1000	2000
1	120	19	Compacted	12.95	1.2	1.8	20.5	0.153	1200	1000	2000
1	150	37	Compacted	14.20	1.4	1.6	21.5	0.124	1490	1000	2000
1	185	37	Compacted	15.90	1.6	1.6	23.5	0.0991	1850	1000	2000
1	240	37	Compacted	18.20	1.7	1.7	26.5	0.0754	2390	1000	1500

Table 1 (continued)

No. of cores	Size (mm ²)	Conductor			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)	
		No. of wires (wires)	Type	Diameter approx. (mm)							
2	2.5	7	Non-compacted	2.01	0.7	1.8	13.0	7.41	180	1000	2000
2	4	7	Non-compacted	2.54	0.7	1.8	14.0	4.61	220	1000	2000
2	6	7	Non-compacted	3.05	0.7	1.8	14.5	3.08	260	1000	2000
2	10	7	Non-compacted	3.95	0.7	1.8	16.5	1.83	370	1000	2000
2	16	7	Compacted	4.70	0.7	1.8	18.5	1.15	510	1000	2000
2	25	7	Compacted	5.95	0.9	1.8	22.0	0.727	740	1000	2000
2	35	7	Compacted	6.95	0.9	1.8	24.0	0.524	950	1000	2000
2	50	7	Compacted	8.15	1.0	2.0	27.0	0.387	1260	1000	2000
2	70	19	Compacted	9.75	1.1	2.0	31.0	0.268	1730	1000	

Table 1 (continued)

No. of cores	Size (mm ²)	Conductor			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)	
		No. of wires (wires)	Type	Diameter approx. (mm)							
3	2.5	7	Non-compacted	2.01	0.7	1.8	13.0	7.41	200	1000	2000
3	4	7	Non-compacted	2.54	0.7	1.8	14.5	4.61	270	1000	2000
3	6	7	Non-compacted	3.09	0.7	1.8	16.0	3.08	340	1000	2000
3	10	7	Non-compacted	3.99	0.7	1.8	17.5	1.83	480	1000	2000
3	16	7	Compacted	4.70	0.7	1.8	19.5	1.15	660	1000	2000
3	25	7	Compacted	5.95	0.9	1.8	23.0	0.727	970	1000	2000
3	35	7	Compacted	6.95	0.9	1.8	25.5	0.524	1270	1000	2000
3	50	7	Compacted	8.15	1.0	2.0	29.0	0.387	1690	1000	
3	70	19	Compacted	9.75	1.1	2.0	33.0	0.268	2340	1000	

Table 1 (continued)

No. of cores	Size (mm ²)	Conductor			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)	
		No. of wires (wires)	Type	Diameter approx. (mm)							
4	2.5	7	Non-compacted	2.01	0.7	1.8	14.0	7.41	230	1000	2000
4	4	7	Non-compacted	2.54	0.7	1.8	16.0	4.61	330	1000	2000
4	6	7	Non-compacted	3.09	0.7	1.8	17.5	3.08	420	1000	2000
4	10	7	Non-compacted	3.99	0.7	1.8	19.0	1.83	590	1000	2000
4	16	7	Compacted	4.70	0.7	1.8	21.0	1.15	830	1000	2000
4	25	7	Compacted	5.95	0.9	1.8	25.0	0.727	1240	1000	2000
4	35	7	Compacted	6.95	0.9	1.8	27.5	0.524	1610	1000	1500
4	50	7	Compacted	8.15	1.0	2.0	31.5	0.387	2170	1000	
4	70	19	Compacted	9.75	1.1	2.0	36.0	0.268	3000	1000	

Table 2

No. of core	Size (mm ²)	A.C. resistance R (Ohm/km)	Inductance L (mH/km)	Reactance XL (Ohm/km)	Impedance Z (Ohm/km)	Bending radius minimum (mm)	Pulling tension maximum (kgf)	Short circuit 1 sec at conductor maximum (kA)	Insulation resistance at 20°C minimum (MOhm-km)	Current rating in free air at 40°C maximum (A)
1	2.5	9.4485	0.6314	0.1984	9.4506	56	17.5	0.354	2100	42
1	4	5.8782	0.5988	0.1881	5.8813	60	28	0.567	1700	54
1	6	3.9273	0.5754	0.1808	3.9315	65	42	0.851	1450	68
1	10	2.3335	0.5459	0.1715	2.3398	72	70	1.42	1250	90
1	16	1.4664	0.5284	0.1660	1.4758	78	112	2.27	1000	124
1	25	0.9271	0.5159	0.1621	0.9412	90	175	3.55	1050	166
1	35	0.6683	0.5017	0.1576	0.6866	98	245	4.97	900	206
1	50	0.4937	0.4913	0.1544	0.5172	116	350	7.10	850	250
1	70	0.3420	0.4716	0.1482	0.3727	125	490	9.94	800	321
1	95	0.2465	0.4651	0.1461	0.2865	142	665	13.5	650	391
1	120	0.1956	0.4587	0.1441	0.2429	161	840	17.0	650	455
1	150	0.1587	0.4555	0.1431	0.2137	170	1050	21.3	700	525
1	185	0.1271	0.4536	0.1425	0.1910	188	1295	26.3	700	602
1	240	0.0972	0.4484	0.1409	0.1711	210	1680	34.1	650	711

Remark :

Laying type : Spacing

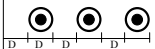


Table 2 (continued)

No. of cores	Size (mm ²)	A.C. resistance R (Ohm/km)	Inductance L (mH/km)	Reactance XL (Ohm/km)	Impedance Z (Ohm/km)	Bending radius minimum (mm)	Pulling tension maximum (kgf)	Short circuit 1 sec at conductor maximum (kA)	Insulation resistance at 20°C minimum (MOhm-km)	Current rating in free air at 40°C maximum (A)
2	2.5	9.4485	0.3210	0.1009	9.4490	74	35	0.354	2100	36
2	4	5.8782	0.3010	0.0946	5.8790	80	56	0.567	1700	47
2	6	3.9273	0.2871	0.0902	3.9284	87	84	0.851	1450	60
2	10	2.3335	0.2710	0.0851	2.3351	98	140	1.42	1250	81
2	16	1.4665	0.2624	0.0824	1.4688	110	224	2.27	1000	107
2	25	0.9272	0.2645	0.0831	0.9309	129	350	3.55	1050	143
2	35	0.6684	0.2569	0.0807	0.6733	141	490	4.97	900	175
2	50	0.4938	0.2536	0.0797	0.5002	162	700	7.10	850	214
2	70	0.3422	0.2421	0.0761	0.3506	185	980	9.94	800	270

Table 2(continued)

No. of cores	Size (mm ²)	A.C. resistance R (Ohm/km)	Inductance L (mH/km)	Reactance XL (Ohm/km)	Impedance Z (Ohm/km)	Bending radius minimum (mm)	Pulling tension maximum (kgf)	Short circuit 1 sec at conductor maximum (kA)	Insulation resistance at 20°C minimum (MOhm-km)	Current rating in free air at 40°C maximum (A)
3	2.5	9.4485	0.3210	0.1009	9.4490	77	52.5	0.354	2100	29
3	4	5.8782	0.3010	0.0946	5.8790	85	84	0.567	1700	38
3	6	3.9274	0.2871	0.0902	3.9284	92	126	0.851	1450	49
3	10	2.3335	0.2710	0.0851	2.3351	104	210	1.42	1250	68
3	16	1.4665	0.2624	0.0824	1.4688	116	336	2.27	1000	91
3	25	0.9272	0.2645	0.0831	0.9309	137	525	3.55	1050	116
3	35	0.6685	0.2569	0.0807	0.6733	150	735	4.97	900	144
3	50	0.4939	0.2536	0.0797	0.5003	172	1050	7.10	850	175
3	70	0.3424	0.2421	0.0761	0.3507	197	1470	9.94	800	224

Table 2 (continued)

No. of cores	Size (mm ²)	A.C. resistance R (Ohm/km)	Inductance L (mH/km)	Reactance XL (Ohm/km)	Impedance Z (Ohm/km)	Bending radius minimum (mm)	Pulling tension maximum (kgf)	Short circuit 1 sec at conductor maximum (kA)	Insulation resistance at 20°C minimum (MOhm-km)	Current rating in free air at 40°C maximum (A)
4	2.5	9.4485	0.3210	0.1009	9.4490	83	70	0.354	2100	29
4	4	5.8782	0.3010	0.0946	5.8790	92	112	0.567	1700	38
4	6	3.9274	0.2871	0.0902	3.9284	100	168	0.851	1450	49
4	10	2.3335	0.2710	0.0851	2.3351	113	280	1.42	1250	68
4	16	1.4665	0.2624	0.0824	1.4688	126	448	2.27	1000	91
4	25	0.9272	0.2645	0.0831	0.9309	149	700	3.55	1050	116
4	35	0.6685	0.2569	0.0807	0.6733	164	980	4.97	900	144
4	50	0.4939	0.2536	0.0797	0.5003	188	1400	7.10	850	175
4	70	0.3424	0.2421	0.0761	0.3507	216	1960	9.94	800	224