

SPECIFICATION

For

KTVV-SLA

500V Copper Conductor PVC Insulated
PVC Sheathed Shielded Instrument Cable
(500V, Cu/PVC/OS/PVC)

BY 

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| Rev. | Date | Description |
|------|-----------|----------------------|
| 0 | 30/8/2024 | Issued specification |
| 1 | 17/3/2025 | Update specification |
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CUSTOMER

| Customer Document | Rev. |
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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 500V copper conductor polyvinyl chloride (PVC) insulated polyvinyl chloride (PVC) sheathed shielded instrument cable.

The cable shall be based on BS EN 50288-7 : 2005.

The finished cables shall meet the flame test requirements per BS 4066-1.

(Comply with IEC 60332-1).

2. Conductor

For size $\leq 0.75 \text{ mm}^2$:

The conductor shall be flexible stranded uncoated annealed copper conductor accordance with BS EN 60228 : 2005, Class 5.

The direction of lay shall be left-hand (S) lay.

For size $\geq 1 \text{ mm}^2$:

The conductor shall be non-compacted concentric stranded uncoated annealed copper conductor accordance with BS EN 60228 : 2005, Class 2.

The direction of lay shall be left-hand (S) lay.

3. Insulation

The insulation shall be polyvinyl chloride (PVC) compound meet the requirements of BS EN 50290-2-21 : 2002.

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 1 by more than 10% plus 0.1 mm.

4. Twisting

Three insulated conductor, uniformly twisted together to form a triple.

For 1-triple : Three insulated conductor, uniformly twisted together to form a triple with suitable non-hygroscopic filler ;if necessary; to give the completed assembly 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 twisted core.

5. Assembling (For multi-triples only)

The twisted triples shall be assembled together with suitable length of lay or non-hygrosopic filler ;if necessary; to give the completed assembly a substantially circular cross section.

The direction of lay shall be left-hand (S) lay.

A suitable binder may shall be applied helically over the assembled core.

6. Triple Identification

The triple shall be identified by colors or numerals printed on the insulation, as follow :

For 1-triple : black, white, red

For multi-triples : black and white and red insulation mark numbering with (1.....n)

*Remark : “n” is number of triples

7. Metallic Shield

The metallic shield shall be an aluminium foil tape coated with polyethylene and applied helically with a lap over the binder tape.

The thickness of the tape shall be approx. 0.04 mm.

One annealed bare copper drain wire 0.5 mm² (7/0.3 mm.) shall be tin-coated high conductivity and shall be provided beneath the aluminium foil tape for grounding continuity.

A suitable separator tape may be applied helically over the shielded for multi triples only.

8. Sheath

The sheath shall be sunlight resistant polyvinyl chloride (PVC) compound meet the requirements of BS EN 50290-2-22 : 2002.


The average thickness of the sheath shall be not less than that given in Table 1.

The minimum thickness shall not fall below the value in Table 1 by more than 15% plus 0.1 mm.

The color of the 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. Rated circuit voltage "500V"
4. Type of conductor "CU"
5. Type of insulation and sheath "PVC/PVC"
6. Type of cable "INSTRUMENT CABLE"
7. Number of triples and size of conductor
8. The continuous reel length marking (in figure) shall be made on the sheath at every 1 meter
Except size 1T x 0.5 mm²

10. Test and Properties

The cable shall be meet the requirements in Test and Inspection and Table 1, when tested in accordance with BS EN 50288-7, BS EN 60228 and BS 4066-1 (Comply with IEC 60332-1).


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 "KTVV-SLA"
2. Number of triples 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 Test

1. Conductor resistance at 20 °C, maximum, Ohm/km..... specified in Table 1
2. A.C. test voltage for 1 minutes, kV2
3. Insulation resistance at 20 °C, minimum, MOhm-km.....10
4. Mutual capacitance at 1 kHz, less than, nF/km.....250
5. Inductance to resistance ratio (L/R), $\mu\text{H}/\text{Ohm}$

| Size of Conductor (mm ²) | Inductance to resistance ratio (L/R) ($\mu\text{H}/\text{Ohm}$) |
|---|---|
| Up to 1 | < 25 |
| 1.5 | < 40 |
| 2.5 | < 60 |

Type Test

- Flame retardant tested according to BS 4066-1 (Comply with IEC 60332-1).

Definition concerning the tests

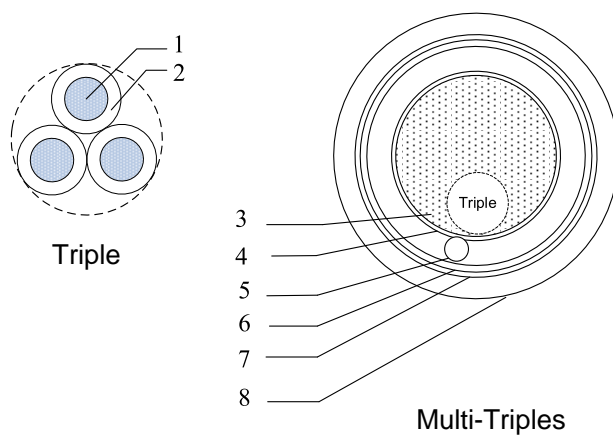
Routine tests: Tests made by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements.

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 | Annealed copper |
| 2 | Insulation | Polyvinyl chloride (PVC) compound |
| 3 | Filler | Non-hygroscopic |
| 4 | Binder tape | PS tape or suitable tape |
| 5 | Drain wire | Tin-coated copper drain wire |
| 6 | Metallic shield | Aluminium foil tape |
| 7 | Separator tape | PS tape or suitable tape (For multi-triples only) |
| 8 | Sheath | Polyvinyl chloride (PVC) compound |

Application: For supervisory electrical equipment, station control circuits, outdoor, suitable installation in the dry or wet cable trenches. Maximum conductor temperature of 70 °C for normal operation and 160 °C for short circuit conditions.

Table 1

| No. of triples | 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) |
|-------------------|--------------------------------|-------------------------------|--|--|--|--|--|---|--------------------------------------|
| 1T | 0.5 | Flexible | 0.95 | 0.6 | 1.0 | 8.0 | 39.0 | 68 | 300 |
| 1T | 0.75 | Flexible | 1.15 | 0.6 | 1.0 | 8.5 | 26.0 | 79 | 300 |
| 1T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.0 | 8.5 | 18.1 | 92 | 300 |
| 1T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.0 | 9.5 | 12.1 | 114 | 300 |
| 1T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.0 | 10.5 | 7.41 | 151 | 300 |
| | | | | | | | | | |
| 2T | 0.5 | Flexible | 0.95 | 0.6 | 1.1 | 13.0 | 39.8 | 145 | 300 |
| 2T | 0.75 | Flexible | 1.15 | 0.6 | 1.1 | 13.5 | 26.5 | 166 | 300 |
| 2T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.1 | 14.0 | 18.5 | 202 | 300 |
| 2T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.2 | 15.5 | 12.3 | 252 | 300 |
| 2T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.2 | 17.5 | 7.56 | 343 | 300 |
| | | | | | | | | | |
| 3T | 0.5 | Flexible | 0.95 | 0.6 | 1.1 | 13.5 | 39.8 | 170 | 300 |
| 3T | 0.75 | Flexible | 1.15 | 0.6 | 1.1 | 14.0 | 26.5 | 202 | 300 |
| 3T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.2 | 15.0 | 18.5 | 247 | 300 |
| 3T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.2 | 16.0 | 12.3 | 317 | 300 |
| 3T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.3 | 18.5 | 7.56 | 432 | 300 |
| | | | | | | | | | |
| 4T | 0.5 | Flexible | 0.95 | 0.6 | 1.1 | 14.5 | 39.8 | 205 | 300 |
| 4T | 0.75 | Flexible | 1.15 | 0.6 | 1.2 | 16.0 | 26.5 | 257 | 300 |
| 4T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.2 | 16.5 | 18.5 | 309 | 300 |
| 4T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.3 | 18.0 | 12.3 | 403 | 300 |
| 4T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.3 | 20.5 | 7.56 | 546 | 300 |

Table 1 (continued)

| No. of triples | 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) |
|-------------------|----------------------------|---------------------------|--|--|--|--|--|---|--------------------------------------|
| 5T | 0.5 | Flexible | 0.95 | 0.6 | 1.2 | 16.5 | 39.8 | 255 | 300 |
| 5T | 0.75 | Flexible | 1.15 | 0.6 | 1.2 | 17.5 | 26.5 | 307 | 300 |
| 5T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.3 | 18.5 | 18.5 | 381 | 300 |
| 5T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.3 | 20.0 | 12.3 | 488 | 300 |
| 5T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.4 | 23.0 | 7.56 | 678 | 300 |
| | | | | | | | | | |
| 6T | 0.5 | Flexible | 0.95 | 0.6 | 1.2 | 18.0 | 39.8 | 293 | 300 |
| 6T | 0.75 | Flexible | 1.15 | 0.6 | 1.3 | 19.0 | 26.5 | 372 | 300 |
| 6T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.3 | 20.0 | 18.5 | 443 | 300 |
| 6T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.4 | 22.0 | 12.3 | 585 | 300 |
| 6T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.5 | 25.5 | 7.56 | 821 | 300 |
| | | | | | | | | | |
| 7T | 0.5 | Flexible | 0.95 | 0.6 | 1.2 | 18.0 | 39.8 | 311 | 300 |
| 7T | 0.75 | Flexible | 1.15 | 0.6 | 1.3 | 19.0 | 26.5 | 394 | 300 |
| 7T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.3 | 20.0 | 18.5 | 475 | 300 |
| 7T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.4 | 22.0 | 12.3 | 630 | 300 |
| 7T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.5 | 25.5 | 7.56 | 886 | 300 |
| | | | | | | | | | |
| 8T | 0.5 | Flexible | 0.95 | 0.6 | 1.3 | 19.5 | 39.8 | 380 | 300 |
| 8T | 0.75 | Flexible | 1.15 | 0.6 | 1.3 | 20.5 | 26.5 | 463 | 300 |
| 8T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.4 | 22.0 | 18.5 | 572 | 300 |
| 8T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.5 | 24.0 | 12.3 | 764 | 300 |
| 8T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.6 | 27.5 | 7.56 | 1055 | 300 |

Table 1 (continued)

| No. of triples | 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) |
|-------------------|----------------------------|---------------------------|--|--|--|--|--|---|--------------------------------------|
| 9T | 0.5 | Flexible | 0.95 | 0.6 | 1.3 | 19.5 | 39.8 | 421 | 300 |
| 9T | 0.75 | Flexible | 1.15 | 0.6 | 1.3 | 21.0 | 26.5 | 513 | 300 |
| 9T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.4 | 22.0 | 18.5 | 639 | 300 |
| 9T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.5 | 24.0 | 12.3 | 847 | 300 |
| 9T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.6 | 28.0 | 7.56 | 1182 | 300 |
| | | | | | | | | | |
| 10T | 0.5 | Flexible | 0.95 | 0.6 | 1.4 | 23.0 | 39.8 | 482 | 300 |
| 10T | 0.75 | Flexible | 1.15 | 0.6 | 1.5 | 24.5 | 26.5 | 606 | 300 |
| 10T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.5 | 26.0 | 18.5 | 731 | 300 |
| 10T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.6 | 28.5 | 12.3 | 961 | 300 |
| 10T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.8 | 32.5 | 7.56 | 1351 | 300 |
| | | | | | | | | | |
| 11T | 0.5 | Flexible | 0.95 | 0.6 | 1.4 | 23.0 | 39.8 | 495 | 300 |
| 11T | 0.75 | Flexible | 1.15 | 0.6 | 1.5 | 24.5 | 26.5 | 621 | 300 |
| 11T | 1.0 | 7/Non-compacted | 1.29 | 0.6 | 1.5 | 26.0 | 18.5 | 757 | 300 |
| 11T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.6 | 28.5 | 12.3 | 997 | 300 |
| 11T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.8 | 32.5 | 7.56 | 1411 | 300 |
| | | | | | | | | | |
| 12T | 0.5 | Flexible | 0.95 | 0.6 | 1.4 | 23.5 | 39.8 | 536 | 300 |
| 12T | 0.75 | Flexible | 1.15 | 0.6 | 1.5 | 25.5 | 26.5 | 678 | 300 |
| 12T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.6 | 27.0 | 18.5 | 840 | 300 |
| 12T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.7 | 29.5 | 12.3 | 1106 | 300 |
| 12T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.8 | 34.0 | 7.56 | 1535 | 300 |

Table 1 (continued)

| No. of triples | 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) |
|-------------------|--------------------------------|-------------------------------|--|--|--|--|--|---|--|
| 13T | 0.5 | Flexible | 0.95 | 0.6 | 1.5 | 25.5 | 39.8 | 593 | 300 |
| 13T | 0.75 | Flexible | 1.15 | 0.6 | 1.5 | 27.0 | 26.5 | 730 | 300 |
| 13T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.6 | 28.5 | 18.5 | 901 | 300 |
| 13T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.7 | 31.0 | 12.3 | 1191 | 300 |
| 13T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.9 | 36.0 | 7.56 | 1655 | 300 |
| | | | | | | | | | |
| 14T | 0.5 | Flexible | 0.95 | 0.6 | 1.5 | 25.5 | 39.8 | 596 | 300 |
| 14T | 0.75 | Flexible | 1.15 | 0.6 | 1.5 | 27.0 | 26.5 | 733 | 300 |
| 14T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.6 | 28.5 | 18.5 | 905 | 300 |
| 14T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.7 | 31.0 | 12.3 | 1205 | 300 |
| 14T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.9 | 36.0 | 7.56 | 1699 | 300 |
| | | | | | | | | | |
| 15T | 0.5 | Flexible | 0.95 | 0.6 | 1.5 | 26.0 | 39.8 | 647 | 300 |
| 15T | 0.75 | Flexible | 1.15 | 0.6 | 1.6 | 28.0 | 26.5 | 809 | 300 |
| 15T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.6 | 29.5 | 18.5 | 985 | 300 |
| 15T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.8 | 32.5 | 12.3 | 1322 | 300 |
| 15T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.9 | 37.0 | 7.56 | 1847 | 300 |
| | | | | | | | | | |
| 16T | 0.5 | Flexible | 0.95 | 0.6 | 1.5 | 27.0 | 39.8 | 669 | 300 |
| 16T | 0.75 | Flexible | 1.15 | 0.6 | 1.6 | 28.5 | 26.5 | 839 | 300 |
| 16T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.7 | 30.0 | 18.5 | 1034 | 300 |
| 16T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.8 | 33.0 | 12.3 | 1375 | 300 |
| 16T | 2.5 | 7/Non-compacted | 2.01 | 0.6 | 1.9 | 38.0 | 7.56 | 1922 | 300 |

Table 1 (continued)

| No. of triples | 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) |
|-------------------|--------------------------------|-------------------------------|--|--|--|--|--|---|--|
| 17T | 0.5 | Flexible | 0.95 | 0.6 | 1.6 | 28.5 | 39.8 | 746 | 300 |
| 17T | 0.75 | Flexible | 1.15 | 0.6 | 1.7 | 30.5 | 26.5 | 940 | 300 |
| 17T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.7 | 32.0 | 18.5 | 1147 | 300 |
| 17T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.9 | 35.0 | 12.3 | 1528 | 300 |
| | | | | | | | | | |
| 18T | 0.5 | Flexible | 0.95 | 0.6 | 1.6 | 28.5 | 39.8 | 730 | 300 |
| 18T | 0.75 | Flexible | 1.15 | 0.6 | 1.7 | 30.5 | 26.5 | 921 | 300 |
| 18T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.7 | 32.0 | 18.5 | 1127 | 300 |
| 18T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.9 | 35.0 | 12.3 | 1515 | 300 |
| | | | | | | | | | |
| 19T | 0.5 | Flexible | 0.95 | 0.6 | 1.6 | 28.5 | 39.8 | 747 | 300 |
| 19T | 0.75 | Flexible | 1.15 | 0.6 | 1.7 | 30.5 | 26.5 | 942 | 300 |
| 19T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.7 | 32.0 | 18.5 | 1158 | 300 |
| 19T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.9 | 35.0 | 12.3 | 1559 | 300 |
| | | | | | | | | | |
| 20T | 0.5 | Flexible | 0.95 | 0.6 | 1.6 | 29.0 | 39.8 | 793 | 300 |
| 20T | 0.75 | Flexible | 1.15 | 0.6 | 1.7 | 31.0 | 26.5 | 1004 | 300 |
| 20T | 1 | 7/Non-compacted | 1.29 | 0.6 | 1.8 | 33.0 | 18.5 | 1245 | 300 |
| 20T | 1.5 | 7/Non-compacted | 1.59 | 0.6 | 1.9 | 36.0 | 12.3 | 1656 | 300 |