INSTRUMENT CABLE

BS5308 Part 1 / Type 1 (unarmored)

BS5308 Part 1 / Type 2 (armored)

BS5308 Part 1 / Type 3 (lead sheath)

BS5308 Part 2 / Type 1 (unarmored)

BS5308 Part 2 / Type 2 (armored)

Table of Contents

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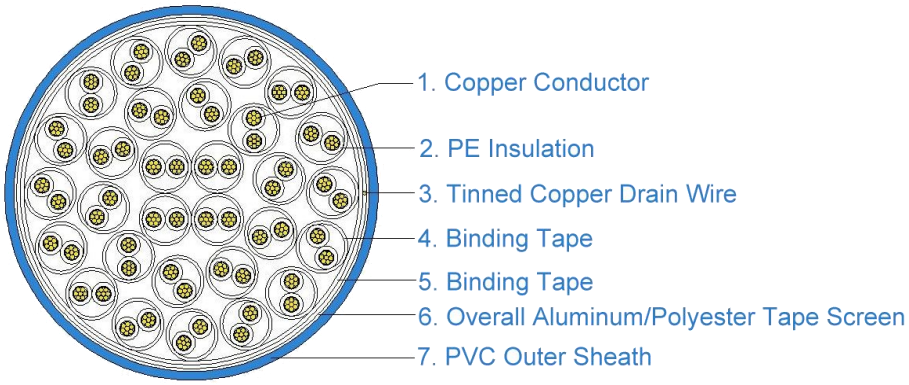
Tel.：0086-371-67829367 / Fax：0086-371-67828777

BS5308 Part 1 / Type 1 (unarmored)

Copper Conductor, PE Insulation, Overall Screen, PVC Sheath Instrumentation Cable

CU / PE / OS / PVC



Application

The unarmored versions (Part 1 Type 1) are generally use for indoor installation and suitable for wet and damp areas. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in petroleum industry.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi-stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm², multi-stranded(Class 2) to BS6360
Insulation	Polyethylene insulation
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Outer sheath	PVC Sheath
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C (fixed installation)
0˚C to +50˚C (during operation)
Minimum bending radius: 5 x OD

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two- pairs)		pF/m	115	115	115	115	120
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	85
Max. L/R Ratio for adjacent cores(Inductance/ Resistance)		μH/ohm	25	25	25	25	40
Test voltage	Core to core	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	kg/km
1	1/0.8	0.5	0.5	0.8	5.5	35
2	1/0.8	0.5	0.5	0.8	6.8	55
5	1/0.8	0.5	0.5	1.1	10.9	125
10	1/0.8	0.5	0.5	1.2	14.4	215
15	1/0.8	0.5	0.5	1.2	16.5	300
20	1/0.8	0.5	0.5	1.3	18.8	385
30	1/0.8	0.5	0.5	1.3	22.3	545
50	1/0.8	0.5	0.5	1.5	28.5	875
1	16/0.2	0.5	0.6	0.8	6.2	60
2	16/0.2	0.5	0.6	0.8	7.6	80

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No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	kg/km
5	16/0.2	0.5	0.6	1.1	12.4	210
10	16/0.2	0.5	0.6	1.2	16.5	340
15	16/0.2	0.5	0.6	1.3	19.2	440
20	16/0.2	0.5	0.6	1.3	21.7	570
30	16/0.2	0.5	0.6	1.5	26.4	780
50	16/0.2	0.5	0.6	1.7	33.4	1130
1	24/0.2	0.75	0.6	0.8	6.7	75
2	24/0.2	0.75	0.6	0.9	8.4	100
5	24/0.2	0.75	0.6	1.2	13.8	250
10	24/0.2	0.75	0.6	1.3	18.4	450
15	24/0.2	0.75	0.6	1.5	21.1	600
20	24/0.2	0.75	0.6	1.5	24.4	920
30	24/0.2	0.75	0.6	1.7	29.5	980
50	24/0.2	0.75	0.6	2	37.6	1690
1	1/1.13	1	0.6	0.8	6.6	85
2	1/1.13	1	0.6	0.8	8	115
5	1/1.13	1	0.6	1.2	13.5	290
10	1/1.13	1	0.6	1.2	17.7	500
15	1/1.13	1	0.6	1.3	20.6	670
20	1/1.13	1	0.6	1.5	23.8	950
30	1/1.13	1	0.6	1.5	28.4	1030
50	1/1.13	1	0.6	2	36.6	1750
1	7/0.53	1.5	0.6	0.8	7.5	100
2	7/0.53	1.5	0.6	0.9	9.3	150
5	7/0.53	1.5	0.6	1.2	15.6	360
10	7/0.53	1.5	0.6	1.3	20.9	690
15	7/0.53	1.5	0.6	1.5	24.6	880
20	7/0.53	1.5	0.6	1.5	27.8	1230
30	7/0.53	1.5	0.6	1.7	33.7	1560
50	7/0.53	1.5	0.6	2	43	2400

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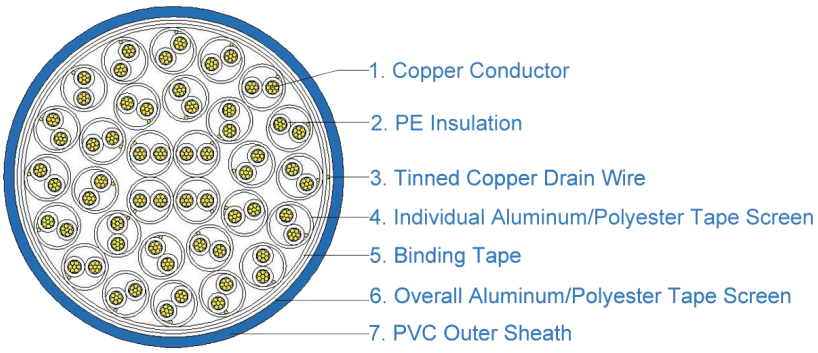
Copper Conductor, PE Insulation, Individual & Overall Screen, PVC Sheath Instrumentation Cable



CU / PE / IS / OS / PVC

Application

The unarmored versions (Part 1 Type 1) are generally use for indoor installation and suitable for wet and damp areas. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in petroleum industry.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi-stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm², multi-stranded(Class 2) to BS6360
Insulation	Polyethylene insulation
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Individual screen	Aluminum/polyester tape is applied over each pair metallic side down in contact with tinned copper drain wire, 0.5mm²
Binder tape	Polyester Tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Outer sheath	PVC Sheath
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C (fixed installation)

0˚C to +50˚C (during operation)

Minimum bending radius: 5 x OD

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two-pairs)		pF/m	115	115	115	115	120
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	85
Max. L/R Ratio for adjacent cores(Inductance/ Resistance)		μH/ohm	25	25	25	25	40
Test voltage	Core to core	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	kg/km
2	1/0.8	0.5	0.5	0.9	9.7	95
5	1/0.8	0.5	0.5	1.2	13	180
10	1/0.8	0.5	0.5	1.2	16.9	310
15	1/0.8	0.5	0.5	1.3	19.7	440
20	1/0.8	0.5	0.5	1.3	22.3	560
30	1/0.8	0.5	0.5	1.5	27.1	820
50	1/0.8	0.5	0.5	2	35	1370
2	16/0.2	0.5	0.6	1.1	11.2	110
5	16/0.2	0.5	0.6	1.2	14.5	250
10	16/0.2	0.5	0.6	1.3	19.3	480

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No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	kg/km
15	16/0.2	0.5	0.6	1.5	22.6	570
20	16/0.2	0.5	0.6	1.5	25.7	780
30	16/0.2	0.5	0.6	1.7	31	1020
50	16/0.2	0.5	0.6	2.2	39.9	1680
2	1/1.13	1	0.6	1.1	11.9	200
5	1/1.13	1	0.6	1.2	15.4	290
10	1/1.13	1	0.6	1.3	20.5	580
15	1/1.13	1	0.6	1.5	24.1	780
20	1/1.13	1	0.6	1.7	27.7	1010
30	1/1.13	1	0.6	2	33.7	1430
50	1/1.13	1	0.6	2.2	42.5	2360
2	7/0.53	1.5	0.6	1.2	13.6	250
5	7/0.53	1.5	0.6	1.3	17.7	460
10	7/0.53	1.5	0.6	1.5	23.9	760
15	7/0.53	1.5	0.6	1.7	28	1020
20	7/0.53	1.5	0.6	2	31.7	1350
30	7/0.53	1.5	0.6	2.2	38.6	1900
50	7/0.53	1.5	0.6	2.2	48.9	3060

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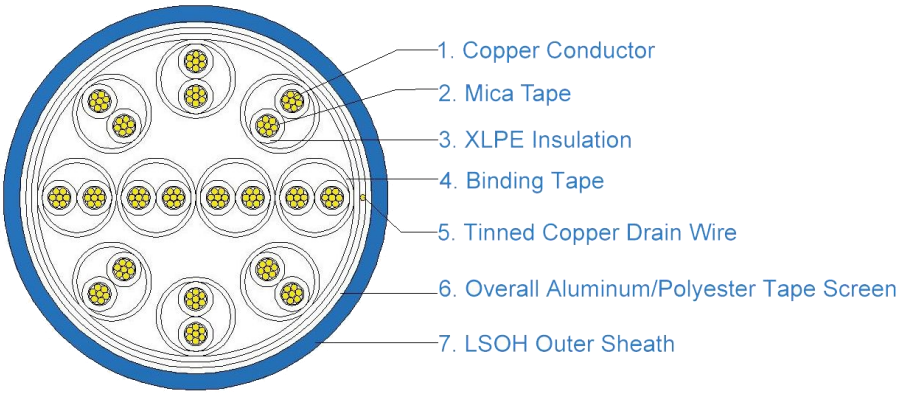
Copper Conductor, Mica Tape Wrapped, XLPE Insulation, Overall Screen, LSOH Sheath Instrumentation Cable



CU / MG / XLPE / OS / LSOH

Application

The unarmored fire resistant versions (Part 1 Type 1) are typically used in chemical and process industries where there is danger of fire.

Construction

Conductor	Annealed or tinned copper, Class 2
Insulation	Mica tape, XLPE (Cross Linked Polyethylene), or PE (optional)
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Outer sheath	LSOH(Low Smoke Zero Halogen) sheath Flame retardant to IEC60332-3-22 Fire resistant to IEC60331 Halogen free to IEC60754-1
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -20˚C up to + 90˚C (fixed installation)
0˚C to +50˚C (during operation)

Minimum bending radius: 5 x OD

Conductor Area Size		Mm²	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	7 x 0.3	7 x 0.37	7 x 0.44	7 x 0.53
Conductor resistance max		ohm/km	36	24.5	18.1	12.1
Insulation resistance min		Gohm/km	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250			
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two- pairs)		pF/m	115	115	115	115
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75
Max. L/R Ratio for adjacent cores(Inductance/ Resistance)		μH/ohm	25	25	25	40
Test voltage	Core to core	V	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500

Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	2	mm	mm	mm	kg/km
1	7/0.44	1	0.6	1.4	7.8	89
2	7/0.44	1	0.6	1.4	9.2	121
5	7/0.44	1	0.6	1.4	13.9	298

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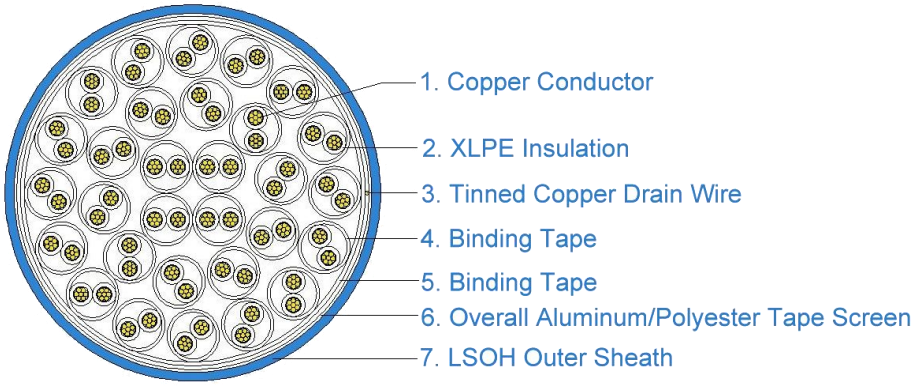
Copper Conductor, XLPE Insulation, Overall Screen, LSOH Sheath Instrumentation Cable

CU / XLPE / OS / LSOH



Application

The unarmored LSOH versions (Part 1 Type 1) are generally use for indoor installation and suitable for wet and damp areas. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, also used for the interconnection of electrical equipment and instruments, the LSOH sheath can reduce toxic smoke and fume emission.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm², multi stranded(Class 2) to BS6360
Insulation	XLPE (Cross Linked Polyethylene), or PE (optional)
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Outer sheath	LSOH(Low Smoke Zero Halogen) sheath Flame retardant to IEC60332-3-22 Halogen free to IEC60754-1 Low smoke emission to IEC61034-1-2
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -20˚C up to + 90˚C (fixed installation)
0˚C to +50˚C (during operation)

Minimum bending radius: 5 x OD

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two- pairs)		pF/m	115	115	115	115	115
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	75
Max. L/R Ratio for adjacent cores(Inductance/Resistance)		μH/ohm	25	25	25	25	40
Test voltage	Core to core	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

Parameter

Number of Pairs	Number and Diameter of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Diameter of Cable	Approx. Weight
	no./mm	Mm²	mm	mm	mm	kg/km
1	1/0.80	0.5	0.5	0.8	5.5	35
2	1/0.80	0.5	0.5	0.8	6.8	55
5	1/0.80	0.5	0.5	1.1	10.9	125
10	1/0.80	0.5	0.5	1.2	14.4	215
15	1/0.80	0.5	0.5	1.2	16.5	300
20	1/0.80	0.5	0.5	1.3	18.8	385
30	1/0.80	0.5	0.5	1.3	22.3	545
50	1/0.80	0.5	0.5	1.5	28.5	875
1	16/0.20	0.5	0.6	0.8	6.2	60
2	16/0.20	0.5	0.6	0.8	7.6	80

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Number of Pairs	Number and Diameter of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Diameter of Cable	Approx. Weight
	no./mm	Mm²	mm	mm	mm	kg/km
5	16/0.20	0.5	0.6	1.1	12.4	210
10	16/0.20	0.5	0.6	1.2	16.5	340
15	16/0.20	0.5	0.6	1.3	19.2	440
20	16/0.20	0.5	0.6	1.3	21.7	570
30	16/0.20	0.5	0.6	1.5	26.4	780
50	16/0.20	0.5	0.6	1.7	33.4	1130
1	24/0.2	0.75	0.6	0.8	6.7	75
2	24/0.2	0.75	0.6	0.9	8.4	100
5	24/0.2	0.75	0.6	1.2	13.8	250
10	24/0.2	0.75	0.6	1.3	18.4	450
15	24/0.2	0.75	0.6	1.5	21.1	600
20	24/0.2	0.75	0.6	1.5	24.4	920
30	24/0.2	0.75	0.6	1.7	29.5	980
50	24/0.2	0.75	0.6	2	37.6	1690
1	1/1.13	1	0.6	0.8	6.6	85
2	1/1.13	1	0.6	0.8	8	115
5	1/1.13	1	0.6	1.2	13.5	290
10	1/1.13	1	0.6	1.2	17.7	500
15	1/1.13	1	0.6	1.3	20.6	670
20	1/1.13	1	0.6	1.5	23.8	950
30	1/1.13	1	0.6	1.5	28.4	1030
50	1/1.13	1	0.6	2	36.6	1750
1	7/0.53	1.5	0.6	0.8	7.5	100
2	7/0.53	1.5	0.6	0.9	9.3	150
5	7/0.53	1.5	0.6	1.2	15.6	360
10	7/0.53	1.5	0.6	1.3	20.9	690
15	7/0.53	1.5	0.6	1.5	24.6	880
20	7/0.53	1.5	0.6	1.5	27.8	1230
30	7/0.53	1.5	0.6	1.7	33.7	1560
50	7/0.53	1.5	0.6	2	43	2400

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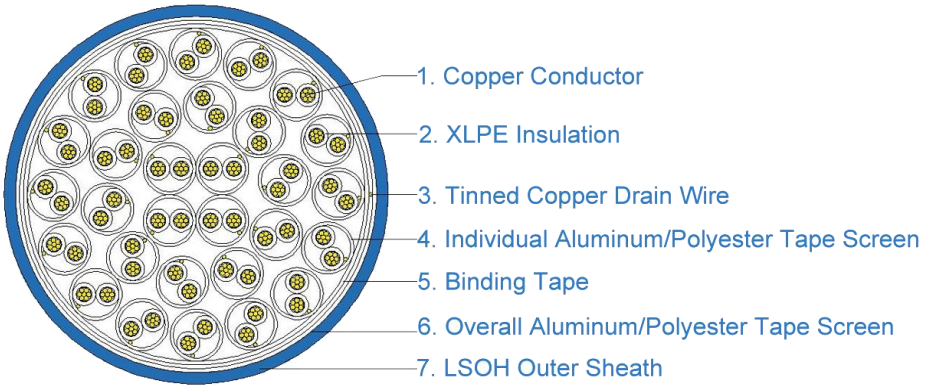

CU / XLPE / IS / OS / LSOH

Application

The unarmored LSOH versions (Part 1 Type 1) are generally use for indoor installation and suitable for wet and damp areas. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, also used for the interconnection of electrical equipment and instruments, the LSOH sheath can reduce toxic smoke and fume emission.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm², multi stranded(Class 2) to BS6360
Insulation	XLPE (Cross Linked Polyethylene), or PE (optional)
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Individual screen	Aluminum/polyester tape is applied over each pair metallic side down in contact with tinned copper drain wire, 0.5mm²
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Outer sheath	LSOH(Low Smoke Zero Halogen) sheath Flame retardant to IEC60332-3-22 Halogen free to IEC60754-1 Low smoke emission to IEC61034-1-2
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -20˚C up to + 90˚C (fixed installation)

0˚C to +50˚C (during operation)

Minimum bending radius: 5 x overall diameter

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two-pairs)		pF/m	115	115	115	115	115
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	75
Max. L/R Ratio for adjacent cores(Inductance/Resistance)		μH/ohm	25	25	25	25	40
Test voltage	Core to core	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

Parameter

Number of Pairs	Number and Diameter of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Diameter of Cable	Approx. Weight
	no./mm	Mm²	mm	mm	mm	kg/km
2	1/0.8	0.5	0.5	0.9	9.7	95
5	1/0.8	0.5	0.5	1.2	13	180
10	1/0.8	0.5	0.5	1.2	16.9	310
15	1/0.8	0.5	0.5	1.3	19.7	440
20	1/0.8	0.5	0.5	1.3	22.3	560
30	1/0.8	0.5	0.5	1.5	27.1	820
50	1/0.8	0.5	0.5	2	35	1370
2	16/0.2	0.5	0.6	1.1	11.2	110
5	16/0.2	0.5	0.6	1.2	14.5	250
10	16/0.2	0.5	0.6	1.3	19.3	480

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Number of Pairs	Number and Diameter of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Diameter of Cable	Approx. Weight
	no./mm	Mm²	mm	mm	mm	kg/km
15	16/0.2	0.5	0.6	1.5	22.6	570
20	16/0.2	0.5	0.6	1.5	25.7	780
30	16/0.2	0.5	0.6	1.7	31	1020
50	16/0.2	0.5	0.6	2.2	39.9	1680
2	1/1.13	1	0.6	1.1	11.9	200
5	1/1.13	1	0.6	1.2	15.4	290
10	1/1.13	1	0.6	1.3	20.5	580
15	1/1.13	1	0.6	1.5	24.1	780
20	1/1.13	1	0.6	1.7	27.7	1010
30	1/1.13	1	0.6	2	33.7	1430
50	1/1.13	1	0.6	2.2	42.5	2360
2	7/0.53	1.5	0.6	1.2	13.6	250
5	7/0.53	1.5	0.6	1.3	17.7	460
10	7/0.53	1.5	0.6	1.5	23.9	760
15	7/0.53	1.5	0.6	1.7	28	1020
20	7/0.53	1.5	0.6	2	31.7	1350
30	7/0.53	1.5	0.6	2.2	38.6	1900
50	7/0.53	1.5	0.6	2.2	48.9	3060

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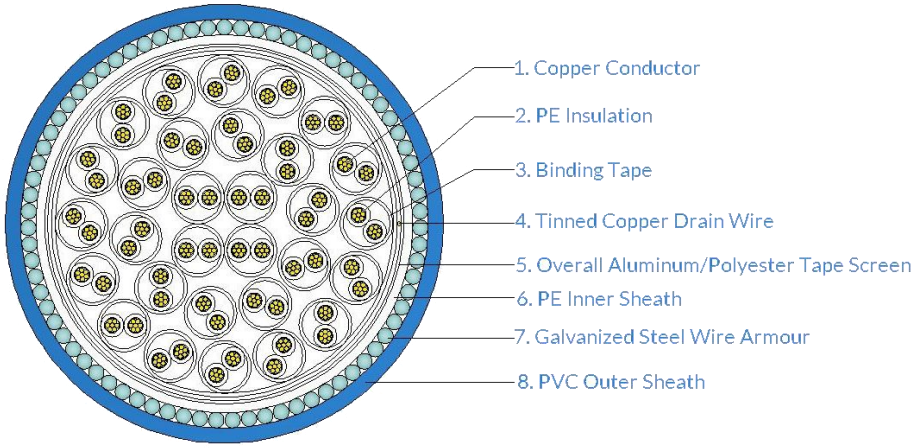
BS5308 Part 1 / Type 2 (armored)

Copper Conductor, PE Insulation, Overall Screen, PE Bedding, Galvanized Steel Wire Armoring, PVC Sheath Instrumentation Cable



CU / PE / OS / PE / SWA / PVC

Application

The armored versions (Part 1 Type 2) are generally used when the risk of mechanical damage is increased. The galvanized steel wire armor provides excellent protection. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in petroleum industry. The armored versions are generally use for outdoor installation for direct burial or installed in the duct and suitable for wet and damp areas.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm², multi stranded(Class 2) to BS6360
Insulation	PE (Polyethylene) type 03 to BS6234
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Inner Sheath	PE (Polyethylene) type 2C or type 03 to BS6234

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Amour	Galvanized steel wire armor
Outer sheath	PVC Sheath, type TM 1 to BS 6746
Sheath color	Black or blue

Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C (fixed installation)

0˚C to +50˚C (during operation)

Minimum bending radius: 6 x overall diameter

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two-pairs)		pF/m	115	115	115	115	120
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	85
Max. L/R Ratio for adjacent cores(Inductance/ Resistance)		μH/ohm	25	25	25	25	40
Test voltage	**Core to core**	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional	Nominal Thick- ness of	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
1	1/0.8	0.5	0.5	0.8	5.5	0.9	1.3	9.9	200
2	1/0.8	0.5	0.5	0.8	6.8	0.9	1.3	11.2	260
5	1/0.8	0.5	0.5	1.1	10.9	0.9	1.4	15.5	460
10	1/0.8	0.5	0.5	1.2	14.4	1.25	1.6	20.1	790
15	1/0.8	0.5	0.5	1.2	16.5	1.25	1.6	22.2	1100
20	1/0.8	0.5	0.5	1.3	18.8	1.6	1.7	25.4	1280
30	1/0.8	0.5	0.5	1.3	22.3	1.6	1.8	29.1	1520
50	1/0.8	0.5	0.5	1.5	28.5	1.6	2	35.7	2100

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1	16/0.2	0.5	0.6	0.8	6.2	0.9	1.3	10.6	250
2	16/0.2	0.5	0.6	0.8	7.6	0.9	1.3	12	300

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional	Nominal Thick- ness of	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
5	16/0.2	0.5	0.6	1.1	12.4	0.9	1.5	17.2	560
10	16/0.2	0.5	0.6	1.2	16.5	1.25	1.6	22.2	970
15	16/0.2	0.5	0.6	1.3	19.2	1.6	1.7	25.8	1240
20	16/0.2	0.5	0.6	1.3	21.7	1.6	1.8	28.5	1640
30	16/0.2	0.5	0.6	1.5	26.4	1.6	1.9	33.4	1770
50	16/0.2	0.5	0.6	1.7	33.4	2	2.1	41.6	2770
1	24/0.2	0.75	0.6	0.8	6.7	0.9	1.4	10.9	280
2	24/0.2	0.75	0.6	0.9	8.4	0.9	1.4	12.8	330
5	24/0.2	0.75	0.6	1.2	13.8	1.25	1.6	19.3	750
10	24/0.2	0.75	0.6	1.3	18.4	1.6	1.8	24.3	1260
15	24/0.2	0.75	0.6	1.3	21.1	1.6	1.9	27	1480
20	24/0.2	0.75	0.6	1.5	24.4	1.6	2	31.4	1890
30	24/0.2	0.75	0.6	1.7	29.5	2	2.1	37	2440
50	24/0.2	0.75	0.6	2	37.6	2.5	2.4	47.3	3210
1	1/1.13	1	0.6	0.8	6.6	0.9	1.3	11	290
2	1/1.13	1	0.6	0.8	8	0.9	1.4	12.6	345
5	1/1.13	1	0.6	1.2	13.5	1.25	1.5	19	790
10	1/1.13	1	0.6	1.2	17.7	1.25	1.7	23.6	1310
15	1/1.13	1	0.6	1.3	20.6	1.6	1.8	27.4	1740
20	1/1.13	1	0.6	1.5	23.8	1.6	1.8	30.6	2040
30	1/1.13	1	0.6	1.5	28.4	1.6	2	35.6	2180
50	1/1.13	1	0.6	2	36.6	2	2.2	45	3500
1	7/0.53	1.5	0.6	0.8	7.5	0.9	1.4	11.9	320
2	7/0.53	1.5	0.6	0.9	9.3	0.9	1.5	14.1	420
5	7/0.53	1.5	0.6	1.2	15.6	1.25	1.6	21.6	940
10	7/0.53	1.5	0.6	1.3	20.9	1.6	1.8	27.4	1500
15	7/0.53	1.5	0.6	1.5	24.6	1.6	1.9	31.2	1970
20	7/0.53	1.5	0.6	1.5	27.8	1.6	2	35.8	2400
30	7/0.53	1.5	0.6	1.7	33.7	2	2.2	42.3	3170
50	7/0.53	1.5	0.6	2	43	2.5	2.5	53.2	5020

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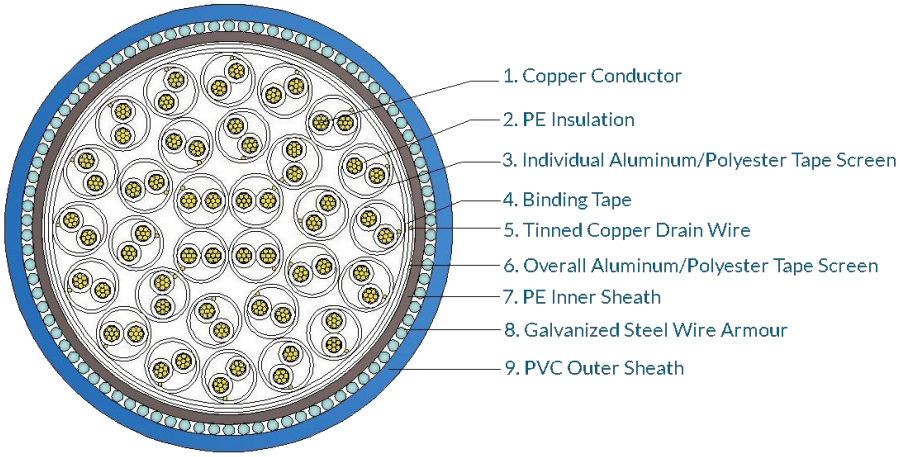
Copper Conductor, PE Insulation, Individual & Overall Screen, PE Bedding, Galvanized Steel Wire Armoring, PVC Sheath Instrumentation Cable



CU / PE / IS / OS / PE / SWA / PVC

Application

The armored versions (Part 1 Type 2) are generally used when the risk of mechanical damage is increased. The galvanized steel wire armor provides excellent protection. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in petroleum industry. The armored versions are generally use for outdoor installation for direct burial or installed in the duct and suitable for wet and damp areas.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm², multi stranded(Class 2) to BS6360
Insulation	PE (Polyethylene) type 03 to BS6234
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Individual screen	Aluminum/polyester tape is applied over each pair metallic side down in contact with tinned copper drain wire, 0.5mm²
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Inner Sheath	PE (Polyethylene) type 2C or type 03 to BS6234
Amour	Galvanized steel wire armor
Outer sheath	PVC Sheath, type TM 1 to BS 6746
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C (fixed installation)

0˚C to +50˚C (during operation)

Minimum bending radius: 6 x OD

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two- pairs)		pF/m	115	115	115	115	120
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	85
Max. L/R Ratio for adjacent cores(Inductance/ Resistance)		μH/ohm	25	25	25	25	40
Test voltage	Core to core	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick- ness of Insulation	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
2	1/0.8	0.5	0.5	0.9	9.7	0.9	1.4	14.3	380
5	1/0.8	0.5	0.5	1.2	13	1.25	1.5	18.5	640
10	1/0.8	0.5	0.5	1.2	16.9	1.25	1.7	22.8	890
15	1/0.8	0.5	0.5	1.3	19.7	1.6	1.7	26.3	1350
20	1/0.8	0.5	0.5	1.3	22.3	1.6	1.8	29.1	1470
30	1/0.8	0.5	0.5	1.5	27.1	1.6	1.9	34.1	1870
50	1/0.8	0.5	0.5	2	35	2	2.2	43.4	3000
2	16/0.2	0.5	0.6	1.1	11.2	0.9	1.5	16	460
5	16/0.2	0.5	0.6	1.2	14.5	1.25	1.6	20.2	760
10	16/0.2	0.5	0.6	1.3	19.3	1.6	1.8	26.1	1300

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No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick- ness of Insulation	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
15	16/0.2	0.5	0.6	1.5	22.6	1.6	1.8	29.4	1440
20	16/0.2	0.5	0.6	1.5	25.7	1.6	1.9	32.7	1870
30	16/0.2	0.5	0.6	1.7	31	2	2.1	39.2	2400
50	16/0.2	0.5	0.6	2.2	39.9	2.5	2.4	49.7	3930
2	24/0.2	0.75	0.6	1.1	12.1	0.9	1.5	16.9	500
5	24/0.2	0.75	0.6	1.2	15.7	1.25	1.6	21.4	920
10	24/0.2	0.75	0.6	1.3	20.9	1.6	1.7	27.5	1610
15	24/0.2	0.75	0.6	1.5	24.6	1.6	1.9	31.6	1960
20	24/0.2	0.75	0.6	1.5	27.9	1.6	1.9	34.9	2420
30	24/0.2	0.75	0.6	2	34.4	2	2.2	42.8	3180
50	24/0.2	0.75	0.6	2.2	43.5	2.5	2.5	53.5	4506
2	1/1.13	1	0.6	1.1	11.9	0.9	1.5	16.7	515
5	1/1.13	1	0.6	1.2	15.4	1.25	1.6	21.1	950
10	1/1.13	1	0.6	1.3	20.5	1.6	1.8	27.3	1330
15	1/1.13	1	0.6	1.5	24.1	1.6	1.9	31.1	1680
20	1/1.13	1	0.6	1.7	27.7	2	2	35.7	2540
30	1/1.13	1	0.6	2	33.7	2	2.2	42.1	2900
50	1/1.13	1	0.6	2.2	42.5	2.5	2.5	52.5	4800
2	7/0.53	1.5	0.6	1.2	13.6	1.25	1.6	19.3	730
5	7/0.53	1.5	0.6	1.3	17.7	1.6	1.7	24.3	1180
10	7/0.53	1.5	0.6	1.5	23.9	1.6	1.9	30.9	1820
15	7/0.53	1.5	0.6	1.7	28	2	2	36	2350
20	7/0.53	1.5	0.6	1.7	31.7	2	2.1	39.9	3030
30	7/0.53	1.5	0.6	2	38.6	2	2.5	48.6	4050
50	7/0.53	1.5	0.6	2.2	48.9	2	2.7	59.3	5960

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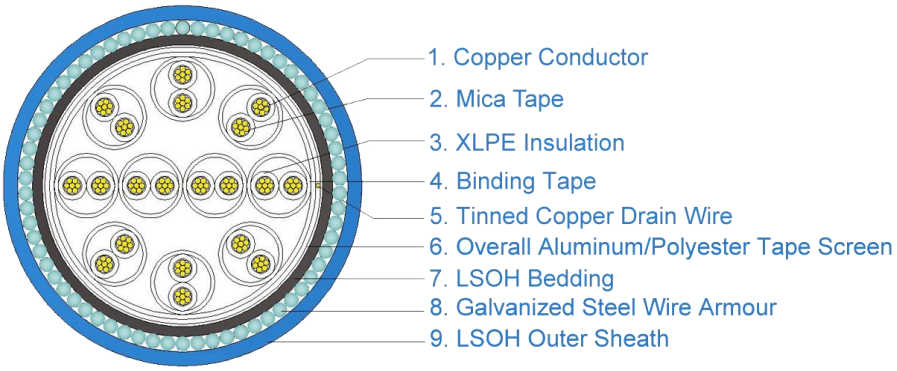
Copper Conductor, Mica Tape Wrapped, XLPE Insulation, Overall Screen, LSOH Bedding, Galvanized Steel Wire Armoring, LSOH Sheath Instrumentation Cable



CU / MG / XLPE / OS / LSOH / SWA / LSOH

Application

The armored fire resistant versions (Part 1 Type 2) are typically used in chemical and process Industries where there is danger of fire. The galvanized steel wire armor provides excellent protection.

Construction

Conductor	Annealed or tinned copper, Class 2
Insulation	Mica glass tape, XLPE (Cross Linked Polyethylene),, or PE (optional)
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Inner Sheath	LSOH(Low Smoke Zero Halogen) sheath
Amour	Galvanized steel wire armor
Outer sheath	LSOH(Low Smoke Zero Halogen) sheath Flame retardant to IEC60332-3-22 Fire resistant to IEC60331 Halogen free to IEC60754-1
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -20˚C up to + 90˚C (fixed installation)

0˚C to +50˚C (during operation)

Minimum bending radius: 6 x overall diameter

Conductor Area Size		Mm²	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	7 x 0.3	7 x 0.37	7 x 0.44	7 x 0.53
Conductor resistance max		ohm/km	36	24.5	18.1	12.1
Insulation resistance min		Gohm/km	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250			
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two- pairs)		pF/m	115	115	115	115
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75
Max. L/R Ratio for adjacent cores(Inductance/Resistance)		μH/ohm	25	25	25	40
Test voltage	Core to core	V	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500

Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick- ness of Insulation	Nominal Thick- ness of bedding	Nominal Dia. over Bedding	Nominal Thick- ness of Armour	Nominal Thick- ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
1	7/0.44	1	0.6	0.8	7.0	0.9	1.4	11.6	340
2	7/0.44	1	0.6	0.8	8.4	0.9	1.4	13.0	350
5	7/0.44	1	0.6	0.8	12.3	0.9	1.4	16.9	740
10	7/0.44	1	0.6	0.8	16.5	0.9	1.4	21.1	1150
20	7/0.44	1	0.6	0.8	21.4	0.9	1.4	26.0	1840
1	7/0.53	1.5	0.6	0.8	7.5	0.9	1.4	11.9	320
2	7/0.53	1.5	0.6	0.8	9.1	0.9	1.4	13.7	410
5	7/0.53	1.5	0.6	0.8	14.8	0.9	1.4	21.1	910

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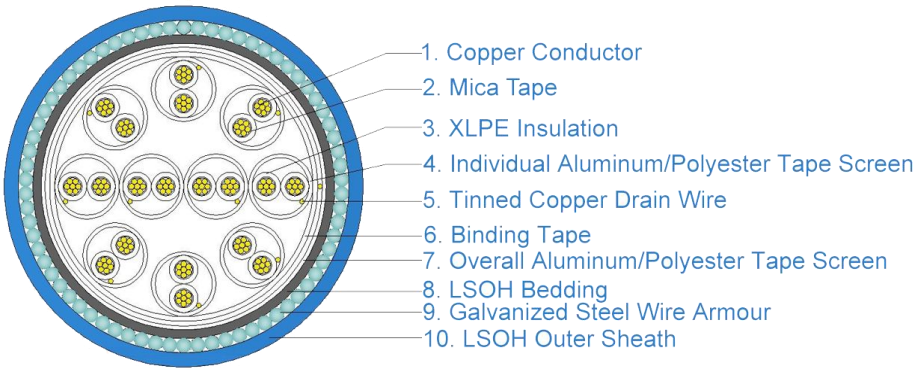
Copper Conductor, Mica Tape Wrapped, XLPE Insulation, Individual & Overall Screen, LSOH Bedding, Galvanized Steel Wire Armoring, LSOH Sheath Instrumentation Cable



CU / MG / XLPE / IS / OS / LSOH / SWA / LSOH

Application

The armored fire resistant versions (Part 1Type 2) are typically used in chemical and process Industries where there is danger of fire. The galvanized steel wire armor provides excellent protection.

Construction

Conductor	Annealed or tinned copper, Class 2
Insulation	Mica glass tape, XLPE (Cross Linked Polyethylene), or PE (optional)
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Individual screen	Aluminum/polyester tape is applied over each pair metallic side down in contact with tinned copper drain wire. 0.5mm²
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire. 0.5mm²
Inner Sheath	LSOH(Low Smoke Zero Halogen) sheath
Amour	Galvanized steel wire armor
Outer sheath	LSOH(Low Smoke Zero Halogen) sheath Flame retardant to IEC60332-3-22 Fire resistant to IEC60331 Halogen free to IEC60754-1
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -20˚C up to + 90˚C (fixed installation)

0˚C to +50˚C (during operation)

Minimum bending radius: 6 x OD

Conductor Area Size		Mm²	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	7 x 0.3	7 x 0.37	7 x 0.44	7 x 0.53
Conductor resistance max		ohm/km	36	24.5	18.1	12.1
Insulation resistance min		Gohm/km	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250			
Max. Mutual Capacitance @ 1 kHz for Non OS or OS cables (except one-pair and two- pairs)		pF/m	115	115	115	115
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75
Max. L/R Ratio for adjacent cores(Inductance/Resistance)		μH/ohm	25	25	25	40
Test voltage	Core to core	V	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500

Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick- ness of Insulation	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
5	7/0.37	0.75	0.6	0.8	15.0	0.9	1.4	20.3	870
10	7/0.37	0.75	0.6	0.8	19.8	0.9	1.4	25.9	1480
5	7/0.44	1	0.6	0.8	14.8	0.9	1.4	20.0	890

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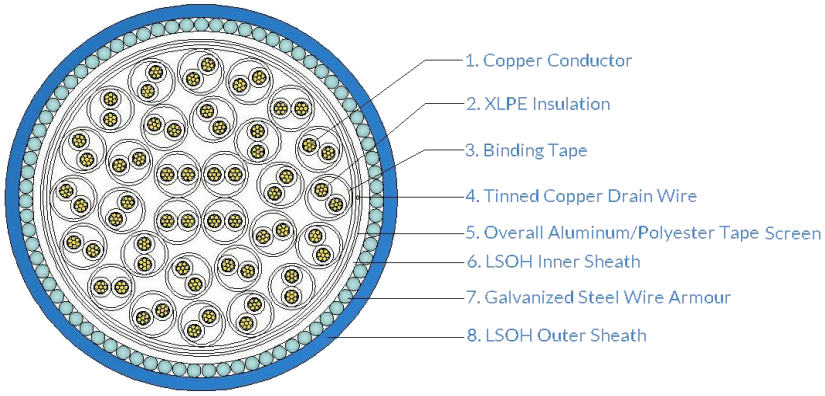
Copper Conductor, XLPE Insulation, Overall Screen, LSOH Bedding, Galvanized Steel Wire Armoring, LSOH Sheath Instrumentation Cable



CU / XLPE / OS / LSOH / SWA / LSOH

Application

The armored LSOH versions (Part 1 Type 2) are generally used when the risk of mechanical damage is increased. The galvanized steel wire armor provides excellent protection. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, also used for the interconnection of electrical equipment and instruments, the LSOH sheath can reduce toxic smoke and fume emission.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm² multi stranded(Class 2) to BS6360
Insulation	XLPE (Cross Linked Polyethylene), or PE (optional)
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Inner Sheath	LSOH(Low Smoke Zero Halogen) sheath
Amour	Galvanized steel wire armour
Outer sheath	LSOH(Low Smoke Zero Halogen) sheath Flame retardant to IEC60332-3-22 Halogen free to IEC60754-1 Low smoke emission to IEC61034-1-2
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -20˚C up to + 90˚C (fixed installation)
0˚C to +50˚C (during operation)
Minimum bending radius: 6 x overall diameter

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two- pairs)		pF/m	115	115	115	115	120
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	85
Max. L/R Ratio for adjacent cores(Inductance/ Resistance)		μH/ohm	25	25	25	25	40
Test voltage	**Core to core**	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick- ness of Insulation	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
1	1/0.80	0.5	0.5	0.8	5.5	0.9	1.3	9.9	200
2	1/0.80	0.5	0.5	0.8	6.8	0.9	1.3	11.2	260
5	1/0.80	0.5	0.5	1.1	10.9	0.9	1.4	15.5	460
10	1/0.80	0.5	0.5	1.2	14.4	1.25	1.6	20.1	790
15	1/0.80	0.5	0.5	1.2	16.5	1.25	1.6	22.2	1100
20	1/0.80	0.5	0.5	1.3	18.8	1.6	1.7	25.4	1280
30	1/0.80	0.5	0.5	1.3	22.3	1.6	1.8	29.1	1520
50	1/0.80	0.5	0.5	1.5	28.5	1.6	2	35.7	2100
1	16/0.2	0.5	0.6	0.8	6.2	0.9	1.3	10.6	250
2	16/0.2	0.5	0.6	0.8	7.6	0.9	1.3	12	300

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No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick- ness of Insulation	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
5	16/0.2	0.5	0.6	1.1	12.4	0.9	1.5	17.2	560
10	16/0.2	0.5	0.6	1.2	16.5	1.25	1.6	22.2	970
15	16/0.2	0.5	0.6	1.3	19.2	1.6	1.7	25.8	1240
20	16/0.2	0.5	0.6	1.3	21.7	1.6	1.8	28.5	1640
30	16/0.2	0.5	0.6	1.5	26.4	1.6	1.9	33.4	1770
50	16/0.2	0.5	0.6	1.7	33.4	2	2.1	41.6	2770
1	24/0.2	0.75	0.6	0.8	6.7	0.9	1.4	10.9	280
2	24/0.2	0.75	0.6	0.9	8.4	0.9	1.4	12.8	330
5	24/0.2	0.75	0.6	1.2	13.8	1.25	1.6	19.3	750
10	24/0.2	0.75	0.6	1.3	18.4	1.6	1.8	24.3	1260
15	24/0.2	0.75	0.6	1.3	21.1	1.6	1.9	27	1480
20	24/0.2	0.75	0.6	1.5	24.4	1.6	2	31.4	1890
30	24/0.2	0.75	0.6	1.7	29.5	2	2.1	37	2440
50	24/0.2	0.75	0.6	2	37.6	2.5	2.4	47.3	3210
1	1/1.13	1	0.6	0.8	6.6	0.9	1.3	11	290
2	1/1.13	1	0.6	0.8	8	0.9	1.4	12.6	345
5	1/1.13	1	0.6	1.2	13.5	1.25	1.5	19	790
10	1/1.13	1	0.6	1.2	17.7	1.25	1.7	23.6	1310
15	1/1.13	1	0.6	1.3	20.6	1.6	1.8	27.4	1740
20	1/1.13	1	0.6	1.5	23.8	1.6	1.8	30.6	2040
30	1/1.13	1	0.6	1.5	28.4	1.6	2	35.6	2180
50	1/1.13	1	0.6	2	36.6	2	2.2	45	3500
1	7/0.53	1.5	0.6	0.8	7.5	0.9	1.4	11.9	320
2	7/0.53	1.5	0.6	0.9	9.3	0.9	1.5	14.1	420
5	7/0.53	1.5	0.6	1.2	15.6	1.25	1.6	21.6	940
10	7/0.53	1.5	0.6	1.3	20.9	1.6	1.8	27.4	1500
15	7/0.53	1.5	0.6	1.5	24.6	1.6	1.9	31.2	1970
20	7/0.53	1.5	0.6	1.5	27.8	1.6	2	35.8	2400
30	7/0.53	1.5	0.6	1.7	33.7	2	2.2	42.3	3170
50	7/0.53	1.5	0.6	2	43	2.5	2.5	53.2	5020

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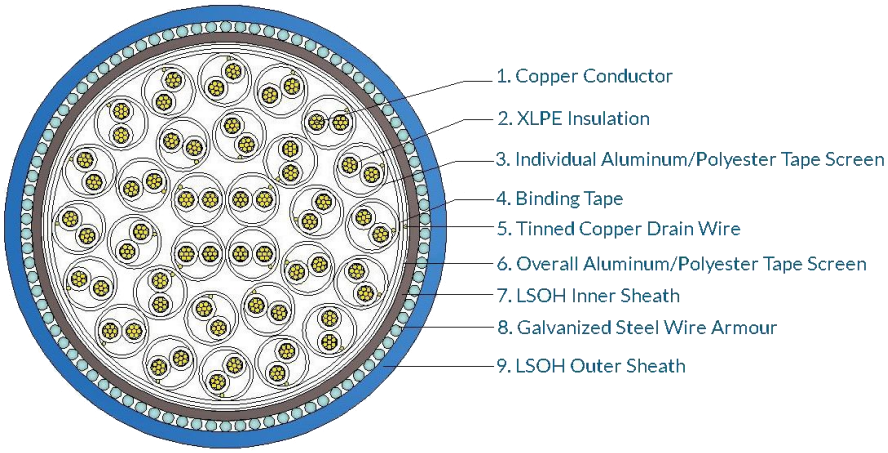
Copper Conductor, XLPE Insulation, Individual & Overall Screen, LSOH Bedding, Galvanized Steel Wire Armoring, LSOH Sheath Instrumentation Cable



CU / XLPE / IS / OS / LSOH / SWA / LSOH

Application

The armored LSOH versions (Part 1 Type 2) are generally used when the risk of mechanical damage is increased. The galvanized steel wire armor provides excellent protection. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, the LSOH sheath can reduce toxic smoke and fume emission.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm², multi stranded(Class 2) to BS6360
Insulation	XLPE (Cross Linked Polyethylene), or PE (optional)
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Individual screen	Aluminum/polyester tape is applied over each pair metallic side down in contact with tinned copper drain wire. 0.5mm²
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire. 0.5mm²
Inner Sheath	LSOH(Low Smoke Zero Halogen) sheath
Amour	Galvanized steel wire armor

Outer Sheath	LSOH(Low Smoke Zero Halogen) sheath
Sheath color	Black or blue

Mechanical and Electrical Properties

Operating temperature: -20˚C up to + 90˚C (fixed installation)

0˚C to +50˚C (during operation)

Minimum bending radius: 6 x OD

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two- pairs)		pF/m	115	115	115	115	120
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	85
Max. L/R Ratio for adjacent cores(Inductance/Resistance)		μH/ohm	25	25	25	25	40
Test voltage	**Core to core**	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

Parameter

No.of Pairs	**No.and Dia. of Wires**	**Nominal Conductor Cross-Sectional Area**	**Nominal Thick- ness of Insulation**	**Nominal Thick-ness of bedding**	**Nominal Dia. over Bedding**	**Nominal Thick-ness of Armour**	**Nominal Thick-ness of Sheath**	**Nominal Dia. of Cable**	**Approx. Weight**
	no./mm	**mm^2**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**kg/km**
2	1/0.80	0.5	0.5	0.9	9.7	0.9	1.4	14.3	380
5	1/0.80	0.5	0.5	1.2	13	1.25	1.5	18.5	640
10	1/0.80	0.5	0.5	1.2	16.9	1.25	1.7	22.8	890
15	1/0.80	0.5	0.5	1.3	19.7	1.6	1.7	26.3	1350
20	1/0.80	0.5	0.5	1.3	22.3	1.6	1.8	29.1	1470
30	1/0.80	0.5	0.5	1.5	27.1	1.6	1.9	34.1	1870

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50	1/0.80	0.5	0.5	2	35	2	2.2	43.4	3000
2	16/0.2	0.5	0.6	1.1	11.2	0.9	1.5	16	460
5	16/0.2	0.5	0.6	1.2	14.5	1.25	1.6	20.2	760
10	16/0.2	0.5	0.6	1.3	19.3	1.6	1.8	26.1	1300
15	16/0.2	0.5	0.6	1.5	22.6	1.6	1.8	29.4	1440
20	16/0.2	0.5	0.6	1.5	25.7	1.6	1.9	32.7	1870
30	16/0.2	0.5	0.6	1.7	31	2	2.1	39.2	2400
50	16/0.2	0.5	0.6	2.2	39.9	2.5	2.4	49.7	3930
2	24/0.2	0.75	0.6	1.1	12.1	0.9	1.5	16.9	500
5	24/0.2	0.75	0.6	1.2	15.7	1.25	1.6	21.4	920
10	24/0.2	0.75	0.6	1.3	20.9	1.6	1.7	27.5	1610
15	24/0.2	0.75	0.6	1.5	24.6	1.6	1.9	31.6	1960
20	24/0.2	0.75	0.6	1.5	27.9	1.6	1.9	34.9	2420
30	24/0.2	0.75	0.6	2	34.4	2	2.2	42.8	3180
50	24/0.2	0.75	0.6	2.2	43.5	2.5	2.5	53.5	4506
2	1/1.13	1	0.6	1.1	11.9	0.9	1.5	16.7	515
5	1/1.13	1	0.6	1.2	15.4	1.25	1.6	21.1	950
10	1/1.13	1	0.6	1.3	20.5	1.6	1.8	27.3	1330
15	1/1.13	1	0.6	1.5	24.1	1.6	1.9	31.1	1680
20	1/1.13	1	0.6	1.7	27.7	2	2	35.7	2540
30	1/1.13	1	0.6	2	33.7	2	2.2	42.1	2900
50	1/1.13	1	0.6	2.2	42.5	2.5	2.5	52.5	4800
2	7/0.53	1.5	0.6	1.2	13.6	1.25	1.6	19.3	730
5	7/0.53	1.5	0.6	1.3	17.7	1.6	1.7	24.3	1180
10	7/0.53	1.5	0.6	1.5	23.9	1.6	1.9	30.9	1820
15	7/0.53	1.5	0.6	1.7	28	2	2	36	2350
20	7/0.53	1.5	0.6	1.7	31.7	2	2.1	39.9	3030
30	7/0.53	1.5	0.6	2	38.6	2	2.5	48.6	4050
50	7/0.53	1.5	0.6	2.2	48.9	2	2.7	59.3	5960

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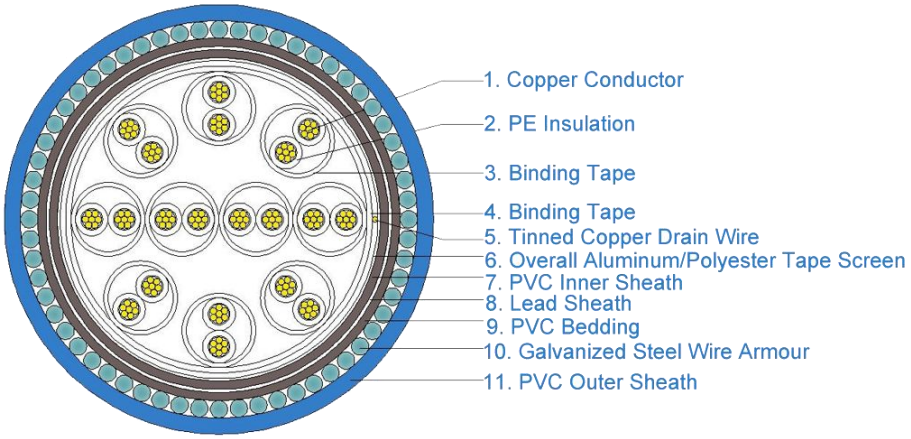
BS5308 Part 1 / Type 3 (lead sheath)

Copper Conductor, PE Insulation, Overall Screen, PVC Inner Sheath, Lead Sheath, PVC Bedding, Galvanized Steel Wire Armoring, PVC Outer Sheath Instrumentation Cable



CU / PE / OS / PVC / Lead / PVC / SWA / PVC

Application

The armored versions (Part 1 Type 3) are generally used when the risk of mechanical damage is increased. The galvanized steel wire armor provides excellent protection. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in petroleum industry. They are well adapted to underground use in industrial applications, in moist areas, where chemical and mechanical protections are needed. The lead sheath brings an enhanced resistance to aromatic hydrocarbons.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm², multi stranded(Class 2) to BS6360
Insulation	PE (Polyethylene) type 03 to BS6234
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Binder tape	Polyester tape

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Collective	Aluminum/polyester tape is applied over the laid up pairs metallic side down in
Inner Sheath	PVC (polyvinyl chloride), type TM 1 or type 6 to BS 6746
Lead Sheath	Lead Alloy
Bedding	PVC (polyvinyl chloride), TM 1 to BS 6746
Amour	Galvanized steel wire armor
Outer sheath	PVC Sheath, type TM 1 or type 6 to BS 6746
Sheath color	Black or blue

Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C (fixed installation)
0˚C to +50˚C (during operation)

Minimum bending radius: 15 x OD

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two-pairs)		pF/m	115	115	115	115	120
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	85
Max. L/R Ratio for adjacent cores(Inductance/ Resistance)		μH/ohm	25	25	25	25	40
Test voltage	**Core to core**	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

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Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Dia. over Bedding	Nominal Thickness of Armour	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	kg/km
1	1/0.80	0.5	0.5	6.3	0.9	10.7	200
2	1/0.80	0.5	0.5	7.1	0.9	11.5	260
5	1/0.80	0.5	0.5	11.6	0.9	16.2	460
10	1/0.80	0.5	0.5	15	1.25	20.7	790
15	1/0.80	0.5	0.5	17.1	1.25	22.8	1100
20	1/0.80	0.5	0.5	19.4	1.6	26	1280
30	1/0.80	0.5	0.5	23	1.6	29.8	1520
50	1/0.80	0.5	0.5	28.9	1.6	26.1	2100
1	16/0.20	0.5	0.6	7	0.9	11.4	250
2	16/0.20	0.5	0.6	7.9	0.9	12.3	300
5	16/0.20	0.5	0.6	13.1	0.9	17.9	560
10	16/0.20	0.5	0.6	17.2	1.25	22.9	970
15	16/0.20	0.5	0.6	19.8	1.6	26.4	1240
20	16/0.20	0.5	0.6	22.3	1.6	29.1	1640
30	16/0.20	0.5	0.6	26.9	1.6	33.9	1770
50	16/0.20	0.5	0.6	33.9	2	42.1	2770
1	1/1.13	1	0.6	7.4	0.9	11.8	290
2	1/1.13	1	0.6	8.4	0.9	13	345
5	1/1.13	1	0.6	14.2	1.25	19.7	790
10	1/1.13	1	0.6	17.4	1.25	24.3	1310
15	1/1.13	1	0.6	21.3	1.6	28.1	1740
20	1/1.13	1	0.6	24.4	1.6	31.2	2040
30	1/1.13	1	0.6	29	1.6	36.2	2180
50	1/1.13	1	0.6	37.3	2	45.7	3500
1	7/0.53	1.5	0.6	8.3	0.9	12.9	320
2	7/0.53	1.5	0.6	9.7	0.9	14.3	420
5	7/0.53	1.5	0.6	16.4	1.25	22.1	940
10	7/0.53	1.5	0.6	21.6	1.6	28.4	1500
15	7/0.53	1.5	0.6	25.2	1.6	32.2	1970
20	7/0.53	1.5	0.6	28.5	2	36.5	2400
30	7/0.53	1.5	0.6	34.3	2	42.5	3170
50	7/0.53	1.5	0.6	43.6	2.5	53.4	5020

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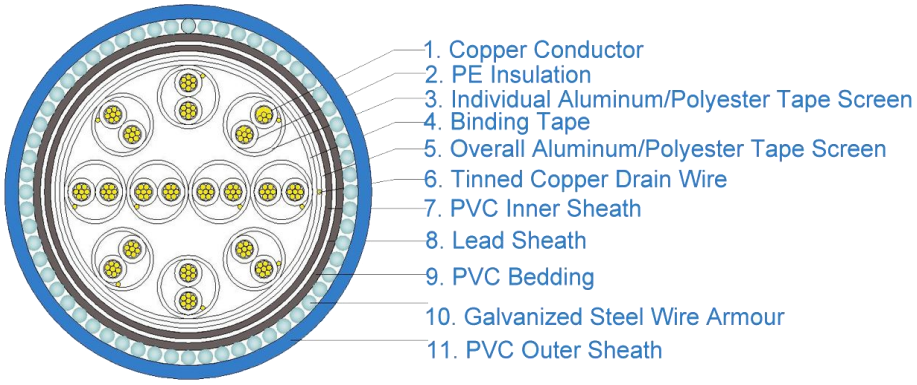
Copper Conductor, PE Insulation, Individual & Overall Screen, PVC Inner Sheath, Lead Sheath, PVC Bedding, Galvanized Steel Wire Armoring, PVC Outer Sheath Instrumentation Cable



CU / PE / IS / OS / PVC / Lead / PVC / SWA / PVC

Application

The armored versions (Part 1 Type 3) are generally used when the risk of mechanical damage is increased. The galvanized steel wire armor provides excellent protection. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in petroleum industry. They are well adapted to underground use in industrial applications, in moist areas, where chemical and mechanical protections are needed. The lead sheath brings an enhanced resistance to aromatic hydrocarbons.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 0.5 mm², 1.0 mm² solid(Class 1), 1.5mm² or 2.5mm², multi stranded(Class 2) to BS6360
Insulation	PE (Polyethylene) type 03 to BS6234
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Individual screen	Aluminum/polyester tape is applied over each pair metallic side down in contact with tinned copper drain wire, 0.5mm²
Binder tape	Polyester tape
Collective	Aluminum/polyester tape is applied over the laid up pairs metallic side down in
Inner Sheath	PVC (polyvinyl chloride), type TM 1 or type 6 to BS 6746
Lead Sheath	Lead Alloy
Bedding	PVC (polyvinyl chloride),type TM 1 to BS 6746

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Amour	Galvanized steel wire armor
Outer sheath	PVC Sheath, type TM 1 or type 6 to BS 6746
Sheath color	Black or blue

Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C (fixed installation)

0˚C to +50˚C (during operation)

Minimum bending radius: 15 x OD

Conductor Area Size		Mm²	0.5	0.5	0.75	1.0	1.5
Conductor Stranding		No. x mm	1 x 0.8	16 x 0.2	24 x 0.2	1 x 1.13	7 x 0.53
Conductor resistance max		ohm/km	36.8	39.7	26.5	18.2	12.3
Insulation resistance min		Gohm/km	5	5	5	5	5
Capacitance unbalance at 1 kHz(pair to pair screen)		pF/250m	250				
Max. Mutual Capacitance @ 1 kHz forNon OS or OS cables (except one-pair and two- pairs)		pF/m	115	115	115	115	120
Max. Mutual Capacitance @ 1 kHz IS/OS cables (include 1 pair and 2 pair)		pF/m	75	75	75	75	85
Max. L/R Ratio for adjacent cores(Inductance/ Resistance)		μH/ohm	25	25	25	25	40
Test voltage	**Core to core**	V	1000	1000	1000	1000	1000
	Core to screen	V	1000	1000	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500	300/500	300/500

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Parameter

No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Dia. over Bedding	Nominal Thickness of Armour	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	kg/km
2	1/0.8	0.5	0.5	10.3	0.9	14.9	380
5	1/0.8	0.5	0.5	13.5	1.25	19	640
10	1/0.8	0.5	0.5	18.3	1.25	24.2	890
15	1/0.8	0.5	0.5	21.2	1.6	27.7	1350
20	1/0.8	0.5	0.5	23.5	1.6	30.3	1470
30	1/0.8	0.5	0.5	27.9	1.6	34.9	1870
50	1/0.8	0.5	0.5	36.1	2	44.5	3000
2	16/0.2	0.5	0.6	12	0.9	16.8	460
5	16/0.2	0.5	0.6	15.2	1.25	20.9	760
10	16/0.2	0.5	0.6	21.1	1.6	27.9	1300
15	16/0.2	0.5	0.6	24.5	1.6	31.3	1440
20	16/0.2	0.5	0.6	27.3	1.6	34.3	1870
30	16/0.2	0.5	0.6	32.3	2	40.5	2400
50	16/0.2	0.5	0.6	41.7	2.5	51.5	3930
2	1/1.13	1	0.6	12.8	0.9	17.6	515
5	1/1.13	1	0.6	16.2	1.25	21.9	950
10	1/1.13	1	0.6	22.6	1.6	29.4	1330
15	1/1.13	1	0.6	26.2	1.6	33.2	1680
20	1/1.13	1	0.6	29.8	2	37.8	2540
30	1/1.13	1	0.6	35.4	2	43.8	2900
50	1/1.13	1	0.6	44.9	2.5	54.9	4800
2	7/0.53	1.5	0.6	14.7	1.25	20.4	730
5	7/0.53	1.5	0.6	18.8	1.6	25.4	1180
10	7/0.53	1.5	0.6	26.5	1.6	33.5	1820
15	7/0.53	1.5	0.6	30.8	1.6	38.8	2350
20	7/0.53	1.5	0.6	34.4	2	42.6	3030
30	7/0.53	1.5	0.6	41	2.5	50.8	4050
50	7/0.53	1.5	0.6	52.2	2.5	62.6	5960

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BS5308 Part 2 / Type 1 (unarmored)

Copper Conductor, PVC Insulation, Overall Screen, PVC Sheath Instrumentation Cable

CU / PVC / OS / PVC

Application

The unarmored versions (Part 2 Type 1) are generally use for indoor installation and suitable for wet and damp areas. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in chemical or petrochemical industry.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 1.5mm² multi stranded(Class 2) to BS6360
Insulation	PVC (polyvinyl chloride), type TI1 to BS 6746
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Multicore cables: up to 40 cores yellow with black numbers, 41 - 80 cores black with yellow numbers. Multi pair cables: Refer to technical information
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Outer sheath	PVC Sheath, type TM 1 or type 6 to BS 6746
Sheath color	Black or blue

Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C(fixed installation)

0˚C to +50˚C(during operation)

Minimum bending radius: 5 x OD

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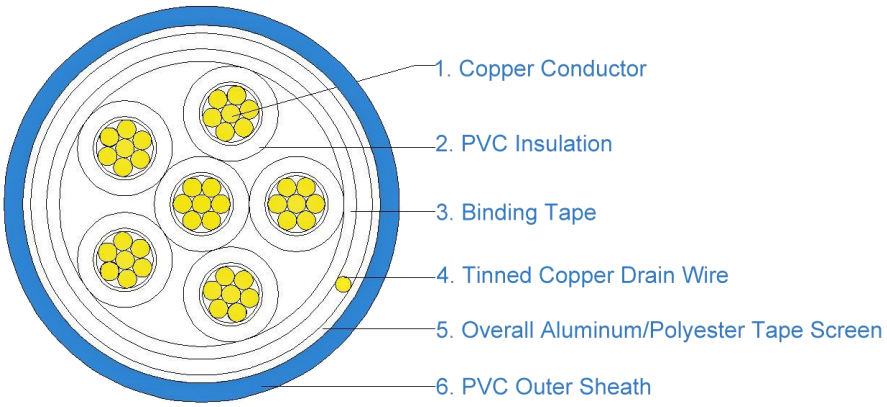
Conductor Area Size		Mm²	0.5	0.75	1.5
Conductor Stranding		No. x mm	16 x 0.2	24 x 0.2	7 x 0.53
Conductor resistance max		ohm/km	39.7	26.5	12.3
Insulation resistance min		Mohm/km	25	25	25
Max. Mutual Capacitance: pair or adjacent cores		pF/m	250	250	250
Capacitance between any core or screen max.		pF/m	400	400	400
Max. L/R Ratio for adjacent cores(Inductance/Resistance)		μH/ohm	25	25	40
Test voltage	Core to core	V	1000	1000	1000
	Core to screen	V	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500

Parameter

Multicore



No.of Cores	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	kg/km
2	16/0.2	0.5	0.6	0.8	6.2	60
3	16/0.2	0.5	0.6	0.8	6.6	75
4	16/0.2	0.5	0.6	0.8	7.2	80
6	16/0.2	0.5	0.6	0.9	8.6	110
10	16/0.2	0.5	0.6	1.1	11.2	180
20	16/0.2	0.5	0.6	1.2	14.2	310
40	16/0.2	0.5	0.6	1.3	18.7	570

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No.of Cores	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	kg/km
80	16/0.2	0.5	0.6	1.5	26.5	1080
2	24/0.2	0.75	0.6	0.8	6.7	75
3	24/0.2	0.75	0.6	0.8	7.2	90
4	24/0.2	0.75	0.6	0.8	7.8	100
6	24/0.2	0.75	0.6	0.9	9.4	140
10	24/0.2	0.75	0.6	1.1	12.2	220
20	24/0.2	0.75	0.6	1.2	15.6	390
40	24/0.2	0.75	0.6	1.3	20.6	710
80	24/0.2	0.75	0.6	1.5	28.5	1350
2	7/0.53	1.5	0.6	0.8	8	105
3	7/0.53	1.5	0.6	0.9	8.2	135
4	7/0.53	1.5	0.6	0.9	9	150
6	7/0.53	1.5	0.6	1.1	11	205
10	7/0.53	1.5	0.6	1.2	14	330
20	7/0.53	1.5	0.6	1.3	17.9	580
40	7/0.53	1.5	0.6	1.5	24	1065
80	7/0.53	1.5	0.6	1.7	32.9	2025

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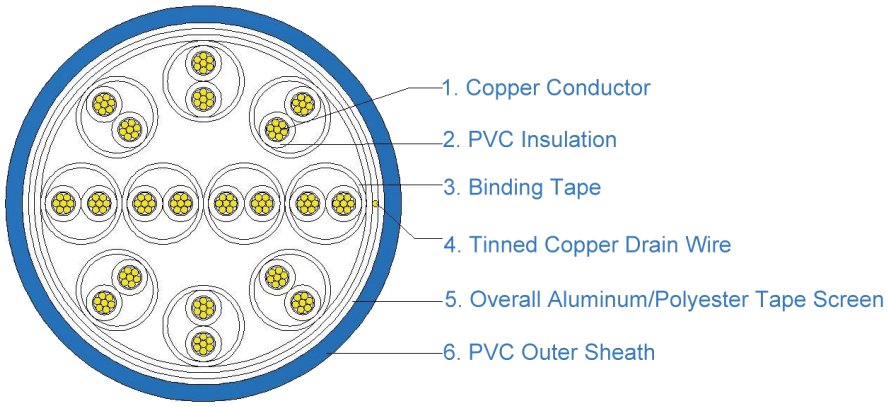
Multipair



No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	kg/km
1	16/0.2	0.5	0.6	0.8	6.2	60
2	16/0.2	0.5	0.6	0.8	7.6	80
5	16/0.2	0.5	0.6	1.1	12.4	200
10	16/0.2	0.5	0.6	1.2	16.5	340
15	16/0.2	0.5	0.6	1.3	19.2	480
20	16/0.2	0.5	0.6	1.3	21.7	570
30	16/0.2	0.5	0.6	1.5	26.4	880
50	16/0.2	0.5	0.6	1.7	33.4	1310
1	24/0.2	0.75	0.6	0.8	6.7	75
2	24/0.2	0.75	0.6	0.8	8.2	100
5	24/0.2	0.75	0.6	1.2	13.8	250
10	24/0.2	0.75	0.6	1.3	18.4	450
15	24/0.2	0.75	0.6	1.3	21.1	600
20	24/0.2	0.75	0.6	1.5	24.4	800
30	24/0.2	0.75	0.6	1.7	29.5	1080
50	24/0.2	0.75	0.6	2	37.6	1860
1	7/0.53	1.5	0.6	0.8	7.5	100
2	7/0.53	1.5	0.6	0.9	9.3	150
5	7/0.53	1.5	0.6	1.2	15.6	360
10	7/0.53	1.5	0.6	1.3	20.9	670
15	7/0.53	1.5	0.6	1.5	24.6	970
20	7/0.53	1.5	0.6	1.5	27.8	1230
30	7/0.53	1.5	0.6	1.7	33.7	1730
50	7/0.53	1.5	0.6	2	43	2740

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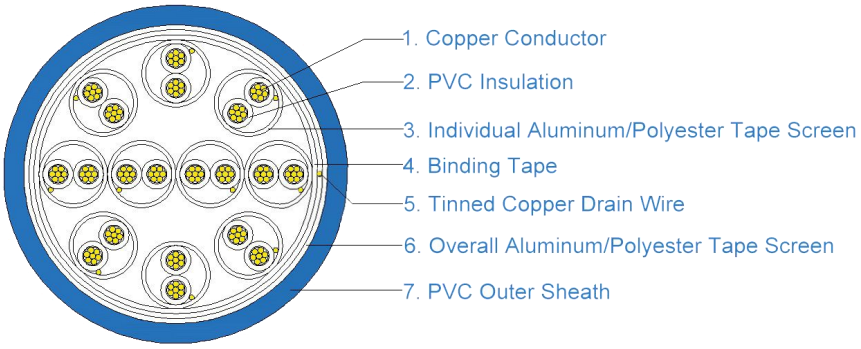
Copper Conductor, PVC Insulation, Individual & Overall Screen, PVC Sheath Instrumentation Cable



CU / PVC / IS / OS / PVC

Application

The unarmored versions (Part 2 Type 1) are generally use for indoor installation and suitable for wet and damp areas. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in chemical or petrochemical industry.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 1.5mm² multi stranded(Class 2) to BS6360
Insulation	PVC (polyvinyl chloride), type TI1 to BS 6746
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Refer to technical information
Individual screen	Aluminum/polyester tape is applied over each pair metallic side down in contact with tinned copper drain wire, 0.5mm²
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Outer sheath	PVC Sheath, type TM 1 or type 6 to BS 6746
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C (fixed installation)
0˚C to +50˚C (during operation)

Minimum bending radius: 5 x overall diameter

Conductor Area Size		Mm²	0.5	0.75	1.5
Conductor Stranding		No. x mm	16 x 0.2	24 x 0.2	7 x 0.53
Conductor resistance max		ohm/km	39.7	26.5	12.3
Insulation resistance min		Mohm/km	25	25	25
Max. Mutual Capacitance: pair or adjacent cores		pF/m	250	250	250
Capacitance between any core or screen max.		pF/m	400	400	400
Max. L/R Ratio for adjacent cores(Inductance/Resistance)		μH/ohm	25	25	40
Test voltage	**Core to core**	V	1000	1000	1000
	Core to screen	V	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500

Parameter

No.of Pairs	**No.and Dia. of Wires**	**Nominal Conductor Cross-Sectional Area**	**Nominal Thickness of Insulation**	**Nominal Thickness of Sheath**	**Nominal Dia. of Cable**	**Approx. Weight**
	no./mm	**mm^2**	**mm**	**mm**	**mm**	**kg/km**
2	16/0.2	0.5	0.6	1.1	11.2	170
5	16/0.2	0.5	0.6	1.2	14.6	270
10	16/0.2	0.5	0.6	1.3	19.4	520
15	16/0.2	0.5	0.6	15	22.7	650
20	16/0.2	0.5	0.6	1.5	25.9	860
30	16/0.2	0.5	0.6	1.7	31.2	1130
50	16/0.2	0.5	0.6	2.2	40.1	1880
2	24/0.2	0.75	0.6	1.1	12.2	200
5	24/0.2	0.75	0.6	1.2	15.8	355
10	24/0.2	0.75	0.6	1.3	21.1	560
15	24/0.2	0.75	0.6	1.5	24.9	770
20	24/0.2	0.75	0.6	1.7	28.6	990
30	24/0.2	0.75	0.6	2	34.7	1380

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No.of Pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	kg/km
50	24/0.2	0.75	0.6	2.2	43.9	2225
2	7/0.53	1.5	0.6	1.2	13.6	265
5	7/0.53	1.5	0.6	1.3	147.8	490
10	7/0.53	1.5	0.6	1.5	24.1	820
15	7/0.53	1.5	0.6	1.7	28.2	1110
20	7/0.53	1.5	0.6	1.7	31.9	1470
30	7/0.53	1.5	0.6	2	38.8	2070
50	7/0.53	1.5	0.6	2.2	49.1	3340

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BS5308 Part 2 / Type 2 (armored)

Copper Conductor, PVC Insulation, Overall Screen, PVC Inner Sheath, Galvanized Steel Wire Armoring, PVC Sheath Instrumentation Cable

CU / PVC / OS / PVC / SWA / PVC

Application

The armored versions (Part 2 Type 2) are generally used when the risk of mechanical damage is increased. The galvanized steel wire armor provides excellent protection. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in chemical or petrochemical industry. The armored versions are generally use for outdoor installation for direct burial or installed in the duct and suitable for wet and damp areas.

Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 1.5mm² multi stranded(Class 2) to BS6360
Insulation	PVC (polyvinyl chloride), type TI1 to BS 6746
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Multicore cables: up to 40 cores yellow with black numbers, 41 - 80 cores black with yellow numbers. Multi pair cables: Refer to technical information
Binder tape	Polyester tape
Collective screen	Aluminum/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Inner Sheath	PVC (polyvinyl chloride), type TM 1 to BS 6746
Amour	Galvanized steel wire armor
Outer sheath	PVC Sheath, type TM 1 or type 6 to BS 6746
Sheath color	Black or blue

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Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C (fixed installation)

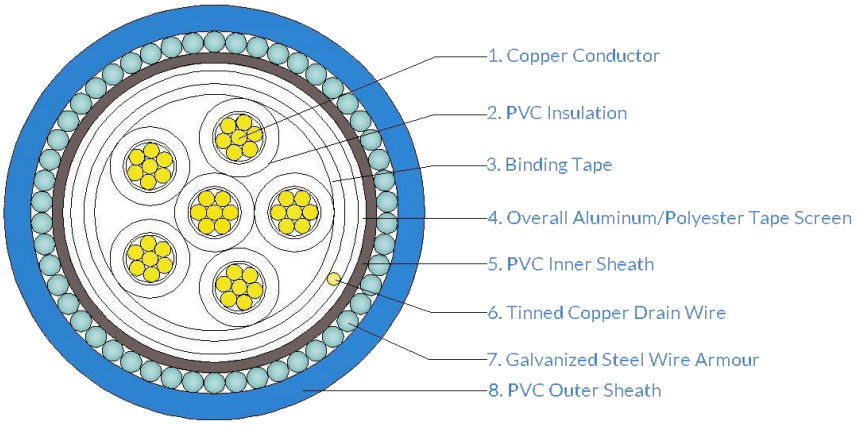
0˚C to +50˚C (during operation)

Minimum bending radius: 6 x OD

Conductor Area Size		Mm²	0.5	0.75	1.5
Conductor Stranding		No. x mm	16 x 0.2	24 x 0.2	7 x 0.53
Conductor resistance max		ohm/km	39.7	26.5	12.3
Insulation resistance min		Mohm/km	25	25	25
Max. Mutual Capacitance: pair or adjacent cores		pF/m	250	250	250
Capacitance between any core or screen max.		pF/m	400	400	400
Max. L/R Ratio for adjacent cores(Inductance/Resistance)		μH/ohm	25	25	40
Test voltage	Core to core	V	1000	1000	1000
	Core to screen	V	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500

Parameter

Multicore



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No.of Cores	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thickness of Insulation	Nominal Thickness of Bedding	Nominal Dia. Over Bedding	Nominal Thick-ness of Armour	Nominal Thickness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm2	mm	mm	mm	mm	mm	mm	kg/km
2	16/0.2	0.5	0.6	0.8	6.7	0.9	1.3	11.1	255
3	16/0.2	0.5	0.6	0.8	6.6	0.9	1.3	11.3	280
4	16/0.2	0.5	0.6	0.8	7.2	0.9	1.3	11.6	305
6	16/0.2	0.5	0.6	0.9	8.6	0.9	1.4	13.2	360
10	16/0.2	0.5	0.6	1.1	11.2	0.9	1.5	16	510
20	16/0.2	0.5	0.6	1.2	14.2	1.25	1.6	19.9	960
40	16/0.2	0.5	0.6	1.3	18.7	1.6	1.7	25.3	1440
80	16/0.2	0.5	0.6	1.5	25.8	1.6	1.9	32.8	2200

No.of Cores	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick-ness of Insulation	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
2	24/0.2	0.75	0.6	0.8	7.2	0.9	1.3	11.2	280
3	24/0.2	0.75	0.6	0.8	7.2	0.9	1.3	11.6	305
4	24/0.2	0.75	0.6	0.8	7.8	0.9	1.3	12.4	335
6	24/0.2	0.75	0.6	0.9	9.4	0.9	1.4	14	400
10	24/0.2	0.75	0.6	1.1	12.2	0.9	1.5	17	565
20	24/0.2	0.75	0.6	1.2	15.6	1.25	1.6	21.3	950
40	24/0.2	0.75	0.6	1.3	20.6	1.6	1.7	27.4	1590
80	24/0.2	0.75	0.6	1.5	28.5	1.6	1.9	35.7	2450
2	7/0.53	1.5	0.6	0.8	8	0.9	1.4	12.6	330
3	7/0.53	1.5	0.6	0.9	8.2	0.9	1.4	12.8	380
4	7/0.53	1.5	0.6	0.9	9	0.9	1.4	13.6	420
6	7/0.53	1.5	0.6	1.1	11	0.9	1.4	15.6	540
10	7/0.53	1.5	0.6	1.2	14	1.25	1.6	19.7	750
20	7/0.53	1.5	0.6	1.3	17.9	1.6	1.7	24.5	1260
40	7/0.53	1.5	0.6	1.5	24	1.6	1.9	31	2140
80	7/0.53	1.5	0.6	1.7	32.9	2	2.1	41.1	3300

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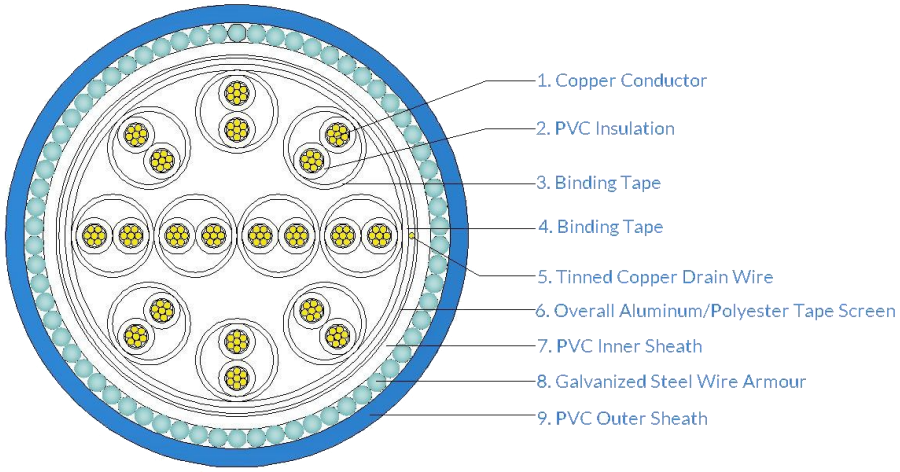
Multipair



No.of pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick-ness of Insulation	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
1	16/0.2	0.5	0.6	0.8	6.2	0.9	1.3	10.6	260
2	16/0.2	0.5	0.6	0.8	7.1	0.9	1.3	11.5	305
5	16/0.2	0.5	0.6	1.1	12.4	0.9	1.5	17.2	610
10	16/0.2	0.5	0.6	1.2	16.5	1.25	1.6	22.2	1060
15	16/0.2	0.5	0.6	1.3	19.2	1.6	1.7	25.8	1330
20	16/0.2	0.5	0.6	1.3	21.7	1.6	1.8	28.5	1800
30	16/0.2	0.5	0.6	1.5	26.4	1.6	1.9	33.4	1980
50	16/0.2	0.5	0.6	1.7	33.4	2	2.1	41.6	3070
1	24/0.2	0.75	0.6	0.8	6.7	0.9	1.3	11.1	305
2	24/0.2	0.75	0.6	0.8	7.7	0.9	1.4	12.3	360
5	24/0.2	0.75	0.6	1.2	13.8	1.25	1.5	19.3	820
10	24/0.2	0.75	0.6	1.3	18.4	1.6	1.7	25	1250
15	24/0.2	0.75	0.6	1.3	21.1	1.6	1.8	27.9	1600
20	24/0.2	0.75	0.6	1.5	24.4	1.6	1.8	31.2	1800
30	24/0.2	0.75	0.6	1.7	29.6	2	2	37.6	2570
50	24/0.2	0.75	0.6	2	37.4	2.5	2.3	47.3	3800
1	7/0.53	1.5	0.6	0.8	7.5	0.9	1.4	12.1	360
2	7/0.53	1.5	0.6	0.9	8.8	0.9	1.4	13.4	460
5	7/0.53	1.5	0.6	1.2	15.6	1.25	1.6	21.3	1040
10	7/0.53	1.5	0.6	1.3	20.9	1.6	1.8	27.7	1610
15	7/0.53	1.5	0.6	1.5	24.6	1.6	1.9	31.6	2060
20	7/0.53	1.5	0.6	1.5	27.8	1.6	2	35	2630
30	7/0.53	1.5	0.6	1.7	33.7	2	2.1	41.9	3460
50	7/0.53	1.5	0.6	2	43	2.5	2.4	52.8	5520

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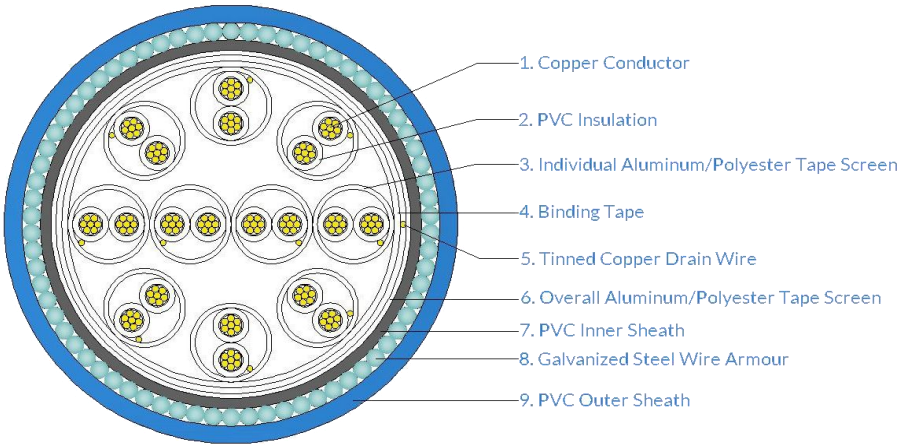
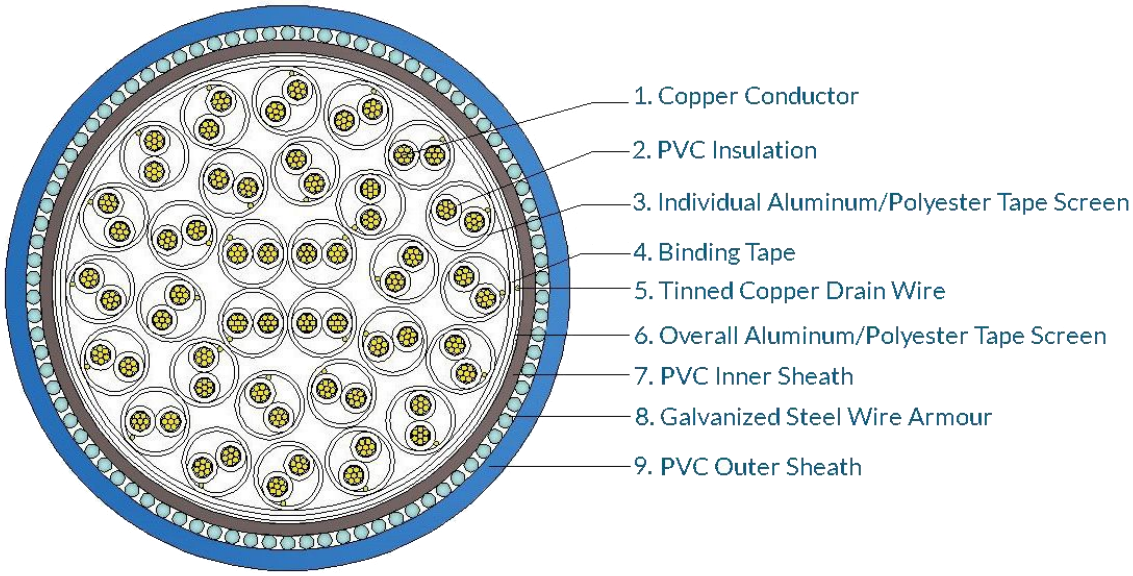
Copper Conductor, PVC Insulation, Individual & Overall Screen, PVC Inner Sheath, Galvanized Steel Wire Armoring, PVC Sheath Instrumentation Cable



CU / PVC / IS / OS / PVC / SWA / PVC



Application

The armored versions (Part 2 Type 2) are generally used when the risk of mechanical damage is increased. The galvanized steel wire armor provides excellent protection. Generally used within industrial process manufacturing plants for communication, data and voice transmission signals and services, Also used for the interconnection of electrical equipment and instruments, typically in chemical or petrochemical industry. The armored versions are generally use for outdoor installation for direct burial or installed in the duct and suitable for wet and damp areas.

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Construction

Conductor	Annealed or tinned copper, sizes: 0.5mm² and 0.75mm² multi stranded(Class 5), 1.5mm² multi stranded(Class 2) to BS6360
Insulation	PVC (polyvinyl chloride),type TI1 to BS 6746
Pairing	Two insulated conductors uniformly twisted together with a lay not exceeding 100mm
Color code	Multi pair cables: Refer to technical information
Individual screen	Aluminum/polyester tape is applied over each pair metallic side down in contact with tinned copper drain wire, 0.5mm²
Binder tape	Polyester tape
Collective screen	Aluminium/polyester tape is applied over the laid up pairs metallic side down in contact with tinned copper drain wire, 0.5mm²
Inner Sheath	PVC (polyvinyl chloride), type TM 1 to BS 6746
Amour	Galvanized steel wire armour
Outer sheath	PVC Sheath, type TM 1 or type 6 to BS 6746
Sheath colour	Black or blue

Mechanical and Electrical Properties

Operating temperature: -40˚C up to + 70˚C (fixed installation)

0˚C to +50˚C (during operation)

Minimum bending radius: 6 x OD

Conductor Area Size		Mm²	0.5	0.75	1.5
Conductor Stranding		No. x mm	16 x 0.2	24 x 0.2	7 x 0.53
Conductor resistance max		ohm/km	39.7	26.5	12.3
Insulation resistance min		Mohm/km	25	25	25
Max. Mutual Capacitance: pair or adjacent cores		pF/m	250	250	250
Capacitance between any core or screen max.		pF/m	400	400	400
Max. L/R Ratio for adjacent cores(Inductance/Resistance)		μH/ohm	25	25	40
Test voltage	**Core to core**	V	1000	1000	1000
	Core to screen	V	1000	1000	1000
Rated voltage max		V	300/500	300/500	300/500

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Parameter

No.of pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick-ness of Insulation	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
2	16/0.2	0.5	0.6	0.8	10.6	0.9	1.3	15	505
5	16/0.2	0.5	0.6	1.1	14.3	0.9	1.5	19.1	830
10	16/0.2	0.5	0.6	1.2	19.1	1.25	1.6	24.8	1420
15	16/0.2	0.5	0.6	1.3	22.2	1.6	1.7	28.8	1570

No.of pairs	No.and Dia. of Wires	Nominal Conductor Cross-Sectional Area	Nominal Thick-ness of Insulation	Nominal Thick-ness of bedding	Nominal Dia. over Bedding	Nominal Thick-ness of Armour	Nominal Thick-ness of Sheath	Nominal Dia. of Cable	Approx. Weight
	no./mm	mm^2	mm	mm	mm	mm	mm	mm	kg/km
20	16/0.2	0.5	0.6	1.3	25.3	1.6	1.8	32.1	2040
30	16/0.2	0.5	0.6	1.5	30.6	1.6	1.9	37.6	2610
50	16/0.2	0.5	0.6	1.7	38.9	2	2.1	47.1	4270
2	24/0.2	0.75	0.6	0.8	11.5	0.9	1.4	16.1	545
5	24/0.2	0.75	0.6	1.2	15.7	1.25	1.5	21.2	1005
10	24/0.2	0.75	0.6	1.3	20.9	1.6	1.7	27.5	1400
15	24/0.2	0.75	0.6	1.3	24.2	1.6	1.8	31	1750
20	24/0.2	0.75	0.6	1.5	27.9	1.6	1.8	34.7	2300
30	24/0.2	0.75	0.6	1.7	33.8	2	2	41.8	2460
50	24/0.2	0.75	0.6	2	43.1	2.5	2.3	52.7	4800
2	7/0.53	1.5	0.6	0.9	13	0.9	1.4	17.6	800
5	7/0.53	1.5	0.6	1.2	17.5	1.25	1.6	23.2	1290
10	7/0.53	1.5	0.6	1.3	23.5	1.6	1.8	30.3	1990
15	7/0.53	1.5	0.6	1.5	27.6	1.6	1.9	34.6	2590
20	7/0.53	1.5	0.6	1.5	31.3	1.6	2	38.5	3310
30	7/0.53	1.5	0.6	1.7	38	2	2.1	46.2	4380
50	7/0.53	1.5	0.6	2	48.5	2.5	2.4	58.3	6260

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Technical Reference

BS5308 Cable Part 1 Reference

Instrument Cables BS 5308 Part 1 Color code

BS 5308 Part 1 Color Identification

Pair No.	a-wire	b-wire		Pair No.		a-wire	b-wire
1	Black	Blue		26		White	Yellow
2	Black	Green		27		Red	Yellow
3	Blue	Green		28		Orange	Yellow
4	Black	Brown		29		Black	Grey
5	Blue	Brown		30		Blue	Grey
6	Green	Brown		31		Green	Grey
7	Black	White		32		Brown	Grey
8	Blue	White		33		White	Grey
9	Green	White		34		Red	Grey
10	Brown	White		35		Orange	Grey
11	Black	Red		36		Yellow	Grey
12	Blue	Red		37		Black	Violet
13	Green	Red		38		Blue	Violet
14	Brown	Red		39		Green	Violet
15	White	Red		40		Brown	Violet
16	Black	Orange		41		White	Violet
17	Blue	Orange		42		Red	Violet
18	Green	Orange		43		Orange	Violet
19	Brown	Orange		44		Yellow	Violet
20	White	Orange		45		Grey	Violet
21	Red	Orange		46		Black	Turquoise
22	Black	Yellow		47		Blue	Turquoise
23	Blue	Yellow		48		Green	Turquoise
24	Green	Yellow		49		Brown	Turquoise
25	Brown	Yellow		50		White	Turquoise

Single Quad (2 pair) are color coded in clockwise order of rotation: Black, Blue, Green and Brown Individually screened pairs can also be identified by means of a polyester tape over blue and black pairs For cables in triple configuration please request color code at time of enquiry.

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Ordering Options:

1) **Conductor**: Bare or Tinned Copper

2) **Conductor Size**: BS 6360/EN 60228

Size	Class 1	Class 2	Class 5	Class 6
0.5mm^2		7/0.3mm	16/0.2mm	28/0.15mm
0.75mm^2	1/0.8mm	7/0.37mm	24/0.2mm	42/0.15mm
1.0mm^2		7/0.44mm	32/0.2mm	56/0.15mm
1.5mm^2	1/1.13mm	7/0.53mm	30/0.25mm	84/0.15mm
2.5mm^2		7/0.67mm	50/0.25mm	140/0.15mm

3) Conductor Resistance: BS 6360/EN 60228

Nominal cross-section area	Plain copper conductor wires (Ohm/km)		Tinned copper conductor wires (Ohm/km)	
mm^2	class 1 and 2	Class 5 and 6	class 1 and 2	Class 5 and 6
0.5mm^2	36	39	36.7	40.1
0.75mm^2	24.5	26	24.8	26.7
1.0mm^2	18.1	19.5	18.2	20
1.5mm^2	12.1	13.3	12.2	13.7
2.5mm^2	7.41	7.98	7.56	8.21

4) Insulation: PE/XLPE/LSF/LSOH

5) Screening: Aluminum Tape/Copper Braid

6) Cabling: Multicore/Multi pair/Multi triple

7) Bedding/Sheath Material: PE /PVC/LSF/LSOH

8) Armoring: Steel Tape Amour/Steel Wire Amour

9) Fire Performance:

IEC 60332-1(for Flame Retardant PVC Sheath)

IEC 60332-3C (for Flame Retardant PVC/LSOH Sheath) IEC 61034 Part 1&Part 2 (LSOH Sheath) IEC 60754 Part 1&Part 2 (5%-15%LSF Sheath & 0.5%LSOH Sheath) Oxygen Index (32%-40% depending on different LSOH compound) Temperature Index (250˚C-300˚C, depending on different LSOH compound) IEC 60331 (for Fire Resistant Type)

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BS5308 Cable Part 2 Reference

Instrument Cables BS 5308 Part 2 Color code

BS 5308 Part 2 Color Identification

Pair No.	a-wire	b-wire	Pair No.	a-wire	b-wire
1	White	Blue	26	Red Blue	Blue
2	White	Orange	27	Red Blue	Orange
3	White	Green	28	Red Blue	Green
4	White	Brown	29	Red Blue	Brown
5	White	Grey	30	Red Blue	Grey
6	Red	Blue	31	Blue Black	Blue
7	Red	Orange	32	Blue Black	Orange
8	Red	Green	33	Blue Black	Green
9	Red	Brown	34	Blue Black	Brown
10	Red	Grey	35	Blue Black	Grey
11	Black	Blue	36	Yellow Blue	Blue
12	Black	Orange	37	Yellow Blue	Orange
13	Black	Green	38	Yellow Blue	Green
14	Black	Brown	39	Yellow Blue	Brown
15	Black	Grey	40	Yellow Blue	Grey
16	Yellow	Blue	41	White Orange	Blue
17	Yellow	Orange	42	White Orange	Orange
18	Yellow	Green	43	White Orange	Green
19	Yellow	Brown	44	White Orange	Brown
20	Yellow	Grey	45	White Orange	Grey
21	White Blue	Blue	46	Orange Red	Blue
22	White Blue	Orange	47	Orange Red	Orange
23	White Blue	Green	48	Orange Red	Green
24	White Blue	Brown	49	Orange Red	Brown
25	White Blue	Grey	50	Orange Red	Grey

*For bi- colored cores the first color is the base color

Single Quad (2 pair) are color coded in clockwise order of rotation: Black, Blue, Green and Brown Individually screened pairs can also be identified by means of a polyester tape over blue and black pairs For cables in triple configuration please request color code at time of enquiry.

Ordering Options:

1) **Conductor**: Bare or Tinned Copper

2) **Conductor Size**: BS 6360/EN 60228

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Size	Class 1	Class 2	Class 5	Class 6
0.5mm²	1/0.8mm	7/0.3mm	16/0.2mm	28/0.15mm
0.75mm²		7/0.37mm	24/0.2mm	42/0.15mm
1.0mm²		7/0.44mm	32/0.2mm	56/0.15mm
1.5mm²	1/1.13mm	7/0.53mm	30/0.25mm	84/0.15mm
2.5mm²		7/0.67mm	50/0.25mm	140/0.15mm

3) Conductor Resistance: BS 6360/EN 60228

Nominal cross-section area	Plain copper conductor wires (Ohm/km)		Tinned copper conductor wires (Ohm/km)	
mm²	class 1 and 2	Class 5 and 6	class 1 and 2	Class 5 and 6
0.5mm²	36	39	36.7	40.1
0.75mm²	24.5	26	24.8	26.7
1.0mm²	18.1	19.5	18.2	20
1.5mm²	12.1	13.3	12.2	13.7
2.5mm²	7.41	7.98	7.56	8.21

4) Insulation: PVC/XLPE/PE/LSOH

5) Screening: Aluminum Tape/Copper Braid

6) Cabling: Multicore/Multi pair/Multi triple

7) Bedding/Sheath Material: PVC/LSF/LSOH (PVC/LSF/LSHF)

8) Armoring: Steel Tape Amour/Steel Wire Amour

9) Fire Performance:

IEC 60332-1 (for Flame Retardant PVC)

IEC 60332-3C (for Flame Retardant PVC/LSOH Sheath) IEC 61034 Part 1&Part 2 (for LSOH Sheath) IEC 60754 Part 1&Part 2 (5%-15%LSF Sheath & 0.5%LSOH Sheath) Oxygen Index (32%-40% depending on different LSOH compound) Temperature Index (250˚C-300˚C, depending on different LSOH compound) IEC 60331 (for Fire Resistant Type)

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