



PRODUCT CATALOGUE

Control Cables

Energising Industries, Empowering Growth

IS 1554 (Part 1) : 1988

IS 7098 (Part 1) : 2025

Copper conductor 1.5 & 2.5 mm², 2 to 61 cores

PVC and XLPE insulated · 1.1 kV

Unarmoured · GS wire or GS strip armoured

FR / FRLS / ZHFR sheath options

Tamra Wires and Cables Private Limited

(Formerly: Tamra Dhatu Udyog Private Limited)

BIS Certified · ISO 9001 · ISO 14001 · ISO 45001 · NABL Accredited Laboratory



ABOUT US

Energising Industries, Empowering Growth

Tamra — the Sanskrit word for copper — has manufactured copper products since 2006. Today Tamra Wires and Cables Private Limited (Formerly: Tamra Dhatu Udyog Private Limited) makes conductors, power, control, instrumentation and special cables at its integrated plant in Bhiwadi, Rajasthan.

Control cables carry the commands and interlocks on which a plant depends — from the motor control centre to every valve, drive and switchgear panel. We draw our own copper, spark-test every insulation line and verify every drum in our own laboratory, so that each core does its job for the life of the plant.

Our control cables are made to IS 1554 (Part 1) and IS 7098 (Part 1) under BIS licence. They are supplied to power, steel, cement, water, oil & gas and process-industry projects, and to panel builders across India.

We value the confidence our customers place in us, and we work to deserve it with every drum: honest data, consistent quality and responsive service.



VISION

Energising Industries, Empowering Growth To energise industries and infrastructure by delivering innovative, high-quality electrical solutions built on advanced design and sustainable technology

MISSION

- To produce global quality conductors, cables, and allied electrical products
- Innovate continuously to meet evolving energy and infrastructure needs
- Create enduring value for customers, employees, and shareholders in a sustainable manner

2006

Established

~30,000 m²

Plant at Bhiwadi

Niehoff

German fine-wire drawing & bunching

250+

People

NABL

Accredited in-house laboratory

BIS • ISO

9001 • 14001 • 45001



Bunching machines



Insulation extrusion



Laying-up (drum twister)

INTEGRATED MANUFACTURING

From our own copper to your control panel

Conductors, insulation, laying-up, armouring and sheathing at our integrated plant in Bhiwadi, Rajasthan.



QUALITY ASSURANCE

Tested on every drum, before it leaves us

Every length is routine tested before dispatch. Type tests and special tests are carried out in our NABL-accredited laboratory or at independent laboratories on request.

BIS

IS 1554 (Part 1) : 1988

PVC insulated cables up to 1.1 kV
BIS Standard Mark (ISI)

BIS

IS 7098 (Part 1) : 2025

XLPE insulated cables up to 1.1 kV
BIS Standard Mark (ISI)

ISO

ISO 9001 · 14001 · 45001

Quality · environment · health & safety
Certified by TÜV India

Tests on control cables

Test	Type	Method
Conductor resistance	R · A · T	IS 10810 (Part 5)
High voltage test (3 kV PVC / 3.5 kV XLPE)	R · A · T	IS 10810 (Part 45)
Insulation & sheath thickness	A · T	IS 10810 (Part 6)
Tensile & elongation, before / after ageing	A · T	IS 10810 (Part 7, 11)
Insulation resistance (volume resistivity)	A · T	IS 10810 (Part 43)
Hot set (XLPE) · Hot deformation, heat shock, shrinkage (PVC)	T	IS 10810 (Part 30, 15, 14, 12)
Armour tests	T	IS 10810 (Part 36 – 42)
Flammability · FR / FRLS tests	T	IS 10810 (Part 53, 58 – 64)

R = routine, A = acceptance, S = sample, T = type test. Test reports and calibration records are available on request. Customer and third-party inspection at our works is welcome.

Checked on every drum

- Conductor resistance of every core against IS 8130
- High-voltage test: 3 kV a.c. (PVC) or 3.5 kV a.c. (XLPE) for 5 minutes
- On-line spark testing of insulation during extrusion
- Core identification, printing and sequential length marking
- Insulation and sheath thickness on every production lot

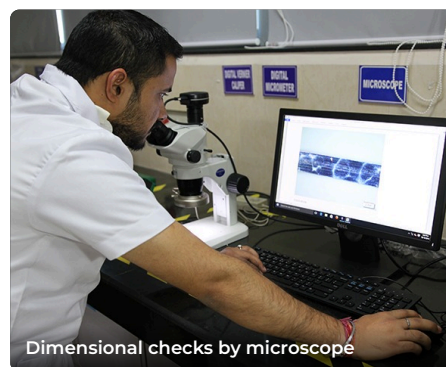
Acceptance tests are carried out in the presence of the customer or a third-party inspector on request.



Testing laboratory



Mechanical testing



Dimensional checks by microscope

PRODUCT RANGE

Control cables at a glance

Family	Standard	Conductor	Insulation	Elements	Screen	Armour	Voltage
Control	IS 1554 (Part 1)	Cu Class 2	PVC Type A	2 – 61 cores	Unscreened (screened on request)	Unarmoured GS wire / strip	1.1 kV
	IS 7098 (Part 1)	1.5 & 2.5 mm ²	XLPE				

Core counts not listed, 4 and 6 mm² sizes, overall screened control cables, tinned conductors and FR / FRLS / ZHFR / UV-resistant sheaths are available on request.

Construction abbreviations

Cu	Plain annealed copper conductor (TCu = tinned)
PVC / XLPE	Insulation material
SWA	Galvanised steel wire armour (W)
F	Galvanised steel strip armour
Y / 2X	IS codes: PVC / XLPE insulation; last Y = PVC sheath

EXAMPLES

YFY 12C × 1.5 mm² — PVC insulated, steel-strip armoured, PVC sheathed control cable, IS 1554 (Part 1).

2XWY 19C × 2.5 mm² — XLPE insulated, steel-wire armoured, PVC sheathed control cable, IS 7098 (Part 1).

Core & element identification

Control 2 – 5 C  Red, black, yellow, blue, grey (as per IS)

Control 6 C + Grey cores with printed numbers, or two adjacent cores in each layer blue & yellow

Others Customer colour codes or numbering schemes on request

MADE TO SPECIFICATION

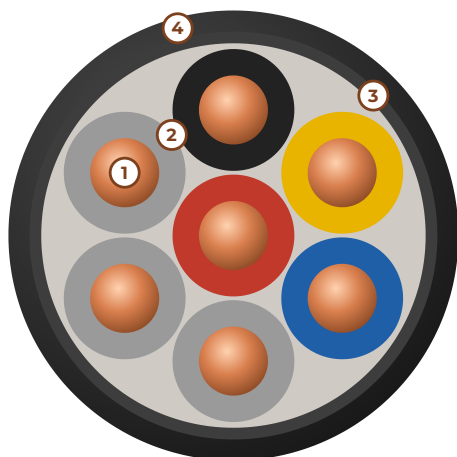
Not in the table? We build to order.

Core counts not listed, 4 and 6 mm² sizes, screened control cables, tinned conductors and FR / FRLS / ZHFR sheaths are available on request.

sales@tamracables.com · www.tamracables.com

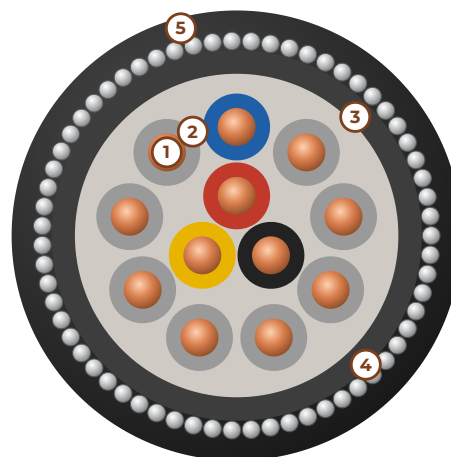
CONSTRUCTION

What goes into a Tamra control cable



UNARMoured · 7 CORE

- ① Plain annealed copper conductor, Class 2
- ② PVC or XLPE insulation, cores numbered or colour-coded
- ③ Inner sheath: extruded PVC
- ④ Outer sheath: PVC (FR / FRLS / ZHFR on request)



ARMoured · 12 CORE

- ① Plain annealed copper conductor, Class 2
- ② PVC or XLPE insulation
- ③ Inner sheath: extruded PVC
- ④ Armour: galvanised steel round wire or flat strip
- ⑤ Outer sheath: PVC ST-1 / ST-2

Conductor	Plain annealed copper, Class 2 stranded to IS 8130, 1.5 mm ² and 2.5 mm ² ; tinned copper on request.
Insulation	PVC Type A to IS 5831 for 70 °C (IS 1554 Part 1), or XLPE for 90 °C (IS 7098 Part 1).
Core identification	Up to 5 cores by colour; 6 cores and above grey cores with printed numbers, or a blue and a yellow core adjacent in each layer.
Laying-up	Cores laid up in concentric layers with alternate lay direction; fillers where needed for a circular shape.
Inner sheath	Extruded PVC over the laid-up cores, providing a firm bedding for the armour.
Armour	Galvanised steel round wire where the calculated diameter under armour is up to 13 mm; galvanised steel flat strip 4.0 × 0.8 mm above 13 mm (IS 3975). Round wire for all sizes on request.
Outer sheath	PVC ST-1 (PVC cables) or ST-2 (XLPE cables), black as standard. FR, FRLS, ZHFR, UV-resistant and anti-termite compounds on request.

ARMOUR

Round wire or flat strip

Galvanised steel round wire up to 13 mm calculated diameter under armour, flat strip above — as specified by the IS.



SELECTION

Choosing the right control cable

Property	PVC · IS 1554 (Part 1)	XLPE · IS 7098 (Part 1)
Max. conductor temperature	70 °C	90 °C
Short-circuit temperature	160 °C	250 °C
Insulation resistance	Good	Very high
Overall diameter	Standard	Slimmer (thinner insulation)
Typical use	General control, MCC and panel wiring, building services	Power plants, steel, cement and high-ambient areas

Armoured or unarmoured?

Unarmoured	Indoor runs on cable trays, in ducts and within panels
GS wire / strip armoured	Direct burial, cable trenches, outdoor trays and areas exposed to mechanical damage
Screened (on request)	Control circuits run close to drives or switchgear with high electrical noise

Good practice

- Allow spare cores in every multicore run for future changes.
- Keep at least 0.2 m clearance from power cables (IS 1255).
- Use the next larger size where long runs would cause excessive voltage drop — see page 14.

Sheath options

Option	Key property
PVC ST-1 / ST-2	Standard, flame retardant to IEC 60332-1
FR	Flame retardant, bunched-cable test IEC 60332-3 / IS 10810-62
FRLS	Low smoke, low acid gas (HCl ≤ 20 %), OI ≥ 29 %
ZHFR / LSZH	Halogen free, low smoke (IEC 60754, IEC 61034)
UV / termite resistant	For outdoor and buried installations

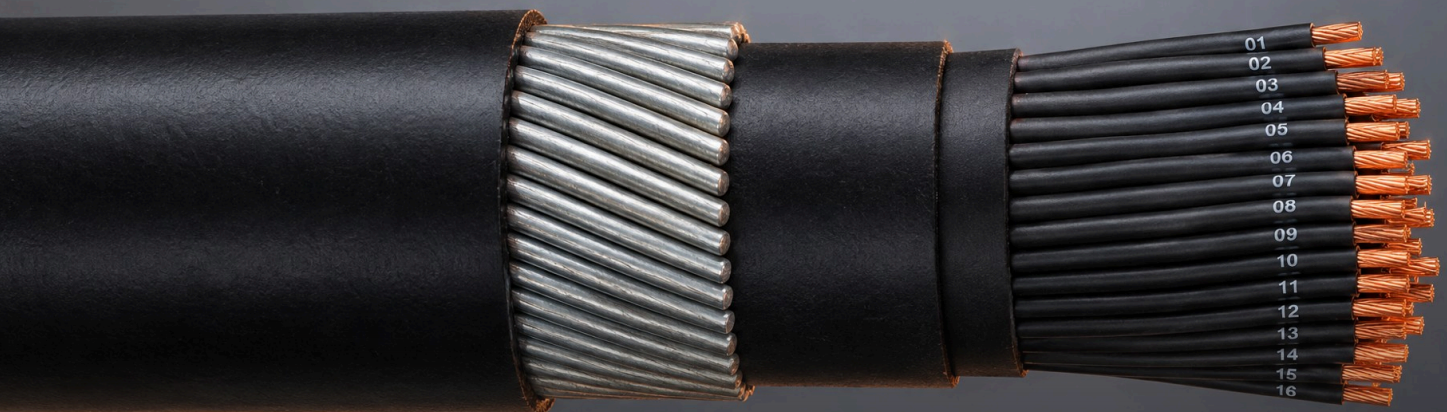


FIRE PERFORMANCE

FR · FRLS · ZHFR sheaths

For cable galleries, control rooms and buildings where smoke and acid gas must be limited.





SECTION

IS 1554 (Part 1) • IS 7098 (Part 1)

Control Cables

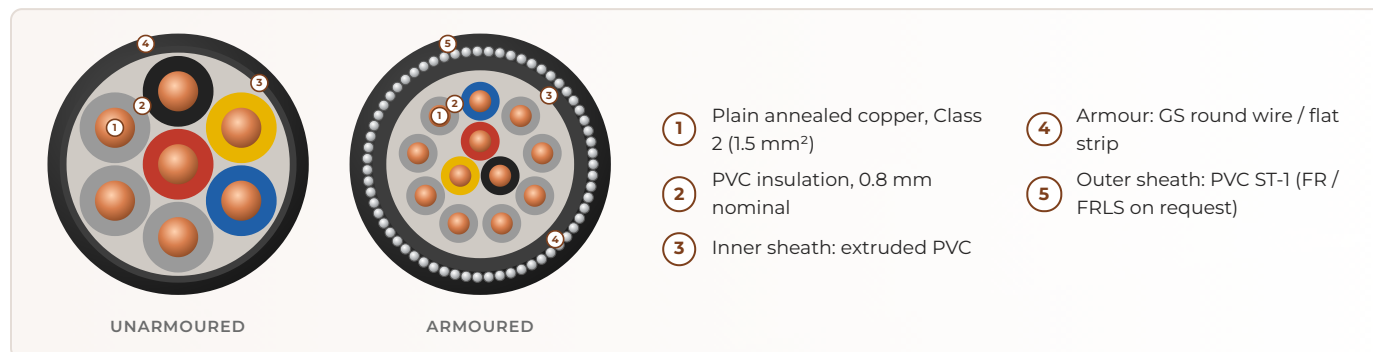
Tamra multicore control cables carry command and interlock circuits for motors, valves, switchgear and automation systems. Made with Class 2 stranded copper and PVC or XLPE insulation to the Indian Standards, they are available from 2 to 61 cores, unarmoured or armoured.

- 1.5 mm² and 2.5 mm² copper, 2 to 61 cores
- PVC (70 °C) to IS 1554 (Part 1) or XLPE (90 °C) to IS 7098 (Part 1)
- Numbered or colour-coded cores
- Unarmoured, GS wire or GS strip armoured
- BIS Standard Mark (ISI) to IS 1554 (Part 1) & IS 7098 (Part 1)

IS 1554 (PART 1) : 1988 · COPPER CONDUCTOR · 1.1 KV

PVC Insulated Control Cables · 1.5 mm²

YY YWY YFY



Physical parameters

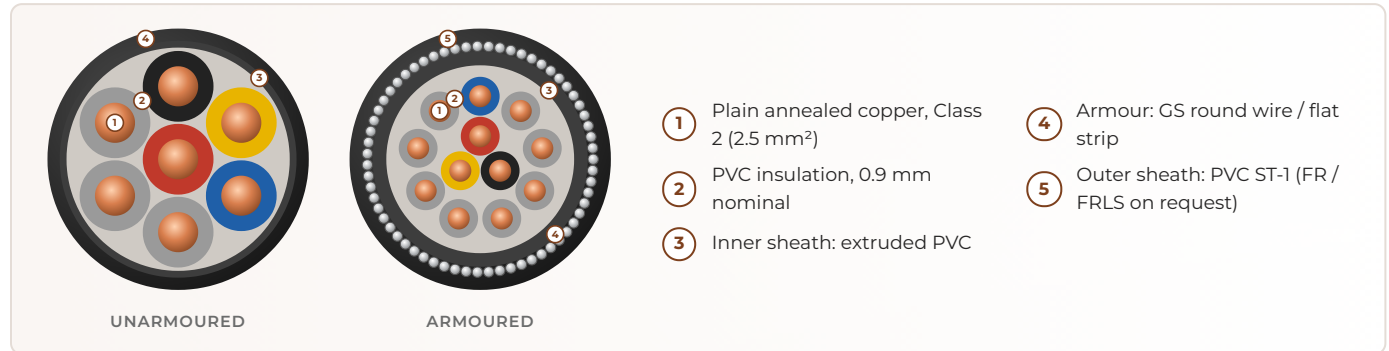
No. of cores	Inner sheath (min) mm	Unarmoured			Armoured			
		Outer sheath (nom) mm	Approx. OD mm	Approx. wt kg/km	Armour wire Ø / strip mm	Outer sheath (min) mm	Approx. OD mm	Approx. wt kg/km
2	0.3	1.8	11.0	150	1.40 W	1.24	13.0	375
3	0.3	1.8	11.5	175	1.40 W	1.24	13.5	410
4	0.3	1.8	12.0	210	1.40 W	1.24	14.0	465
5	0.3	1.8	13.0	240	1.40 W	1.24	15.0	505
6	0.3	1.8	14.0	275	1.40 W	1.24	16.0	565
7	0.3	1.8	14.0	290	1.40 W	1.24	16.0	585
8	0.3	1.8	15.5	340	1.40 W	1.24	17.5	665
10	0.3	1.8	17.0	415	1.40 W	1.40	19.5	805
12	0.3	1.8	17.5	460	4.0×0.8 F	1.24	18.5	725
14	0.3	1.8	18.5	515	4.0×0.8 F	1.40	19.5	820
16	0.3	1.8	19.5	575	4.0×0.8 F	1.40	20.5	875
19	0.3	2.0	21.0	660	4.0×0.8 F	1.40	21.5	965
24	0.3	2.0	24.0	830	4.0×0.8 F	1.40	25.0	1,180
27	0.3	2.0	24.5	900	4.0×0.8 F	1.40	25.5	1,280
30	0.3	2.0	25.5	980	4.0×0.8 F	1.40	26.0	1,350
37	0.3	2.0	27.0	1,160	4.0×0.8 F	1.40	28.0	1,560
44	0.3	2.0	30.5	1,390	4.0×0.8 F	1.56	31.5	1,880
52	0.4	2.2	33.0	1,650	4.0×0.8 F	1.56	34.0	2,140
61	0.4	2.2	34.0	1,850	4.0×0.8 F	1.56	35.0	2,360

- Dimensions and weights are approximate and are given for guidance.
- Armour: W = galvanised steel round wire (calculated diameter under armour ≤ 13 mm); F = galvanised steel flat strip 4.0 × 0.8 mm (above 13 mm). Round wire armour for all sizes on request.
- Where the calculated diameter under armour passes 13 mm the armour changes from round wire to flat strip, so an armoured cable can be lighter and slimmer than the next smaller core count. This is as specified by the IS.
- Core counts not listed (e.g. 9, 20, 21, 48 cores) and 4, 6 mm² control cables are available on request.

IS 1554 (PART 1) : 1988 · COPPER CONDUCTOR · 1.1 KV

PVC Insulated Control Cables · 2.5 mm²

YY YWY YFY



Physical parameters

No. of cores	Inner sheath (min) mm	Unarmoured			Armoured			
		Outer sheath (nom) mm	Approx. OD mm	Approx. wt kg/km	Armour wire Ø / strip mm	Outer sheath (min) mm	Approx. OD mm	Approx. wt kg/km
2	0.3	1.8	12.0	195	1.40 W	1.24	14.0	455
3	0.3	1.8	12.5	230	1.40 W	1.24	15.0	500
4	0.3	1.8	13.5	280	1.40 W	1.24	16.0	570
5	0.3	1.8	15.0	325	1.40 W	1.24	17.0	640
6	0.3	1.8	16.0	375	1.40 W	1.24	18.0	715
7	0.3	1.8	16.0	400	1.40 W	1.24	18.0	740
8	0.3	1.8	17.5	470	4.0×0.8 F	1.24	18.5	735
10	0.3	1.8	20.0	580	4.0×0.8 F	1.40	21.0	905
12	0.3	2.0	21.0	670	4.0×0.8 F	1.40	21.5	975
14	0.3	2.0	22.0	750	4.0×0.8 F	1.40	22.5	1,080
16	0.3	2.0	23.0	840	4.0×0.8 F	1.40	23.5	1,170
19	0.3	2.0	24.0	940	4.0×0.8 F	1.40	25.0	1,290
24	0.3	2.0	28.0	1,190	4.0×0.8 F	1.40	29.0	1,610
27	0.3	2.0	28.5	1,290	4.0×0.8 F	1.40	29.5	1,710
30	0.3	2.0	29.5	1,410	4.0×0.8 F	1.56	30.5	1,880
37	0.4	2.2	32.5	1,730	4.0×0.8 F	1.56	33.0	2,210
44	0.4	2.2	36.5	2,070	4.0×0.8 F	1.56	37.0	2,620
52	0.4	2.2	39.0	2,400	4.0×0.8 F	1.56	39.5	3,000
61	0.4	2.2	40.0	2,700	4.0×0.8 F	1.56	41.0	3,300

- Dimensions and weights are approximate and are given for guidance.
- Armour: W = galvanised steel round wire (calculated diameter under armour ≤ 13 mm); F = galvanised steel flat strip 4.0 × 0.8 mm (above 13 mm). Round wire armour for all sizes on request.
- Where the calculated diameter under armour passes 13 mm the armour changes from round wire to flat strip, so an armoured cable can be lighter and slimmer than the next smaller core count. This is as specified by the IS.
- Core counts not listed (e.g. 9, 20, 21, 48 cores) and 4, 6 mm² control cables are available on request.

IS 1554 (PART 1) : 1988 · ELECTRICAL CHARACTERISTICS

PVC Insulated Control Cables · Electrical Data

Conductor & insulation

Conductor	Plain annealed copper, Class 2, IS 8130
Max. DC resistance at 20 °C	1.5 mm ² : 12.1 Ω/km · 2.5 mm ² : 7.41 Ω/km
Approx. resistance at 70 °C	1.5 mm ² : 14.48 Ω/km · 2.5 mm ² : 8.87 Ω/km
Insulation	PVC Type A, IS 5831 — 0.8 / 0.9 mm nominal
Max. conductor temperature	70 °C continuous · 160 °C short circuit
High voltage test	3 kV a.c. for 5 minutes
Rated voltage	1.1 kV (U _o /U 0.65/1.1 kV)

Minimum bending radius

12 × overall diameter for unarmoured and armoured cables.

Rating basis

Current ratings for one multicore cable laid singly, all cores loaded. Ground temperature 30 °C, ambient air 40 °C, soil thermal resistivity 150 °C·cm/W, depth 75 cm (IS 3961). For other conditions apply the rating factors of the Tamra LT power cable catalogue.

Continuous current rating · Amps

No. of cores	1.5 mm ²		2.5 mm ²	
	In ground	In air	In ground	In air
2	23	20	32	27
3	21	17	27	24
4	21	17	27	24
5	16	14	23	19
6	15	13	21	18
7	14	13	20	17
8	14	12	19	16
10	13	11	18	15
12	12	10	17	14
14	11	10	16	14
16	11	9	15	13
19	10	9	14	12
24	9	8	13	11
27	9	8	12	10
30	9	7	12	10
37	8	7	11	9
44	7	6	10	9
52	7	6	10	8
61	6	6	9	8

CORE IDENTIFICATION

Numbered or colour-coded cores

Control cable cores are supplied numbered or colour-coded to suit your wiring schedule.

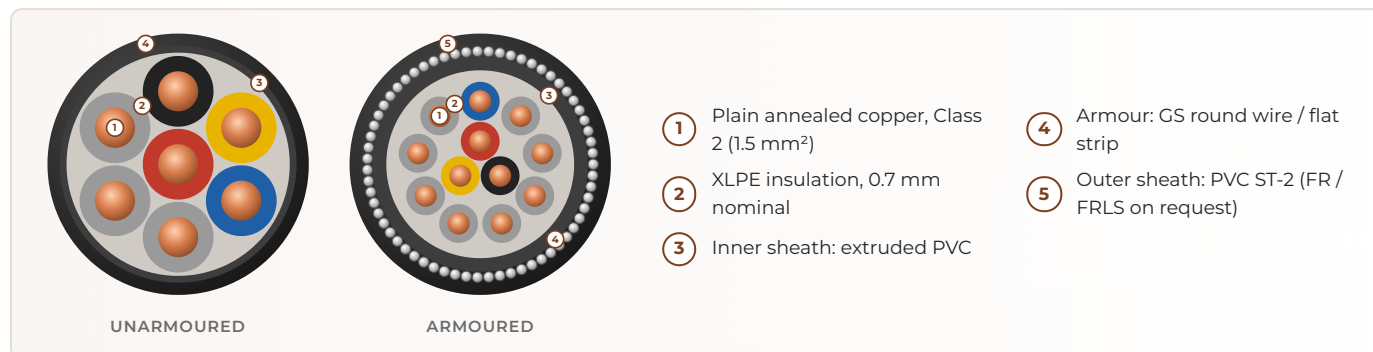
- 1.5 mm² and 2.5 mm² copper
- 2 to 61 cores



IS 7098 (PART 1) : 2025 · COPPER CONDUCTOR · 1.1 KV

XLPE Insulated Control Cables · 1.5 mm²

2XY 2XWY 2XFY



Physical parameters

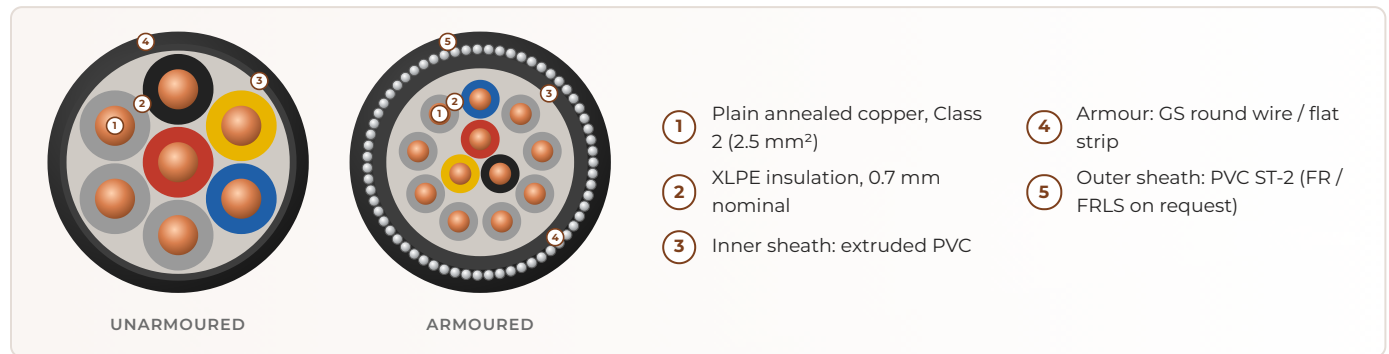
No. of cores	Inner sheath (min) mm	Unarmoured			Armoured			
		Outer sheath (nom) mm	Approx. OD mm	Approx. wt kg/km	Armour wire Ø / strip mm	Outer sheath (min) mm	Approx. OD mm	Approx. wt kg/km
2	0.3	1.8	10.5	135	1.40 W	1.24	12.5	345
3	0.3	1.8	11.0	155	1.40 W	1.24	13.0	380
4	0.3	1.8	11.5	185	1.40 W	1.24	13.5	430
5	0.3	1.8	12.5	210	1.40 W	1.24	14.5	470
6	0.3	1.8	13.5	240	1.40 W	1.24	15.5	520
7	0.3	1.8	13.5	255	1.40 W	1.24	15.5	535
8	0.3	1.8	14.5	295	1.40 W	1.24	17.0	610
10	0.3	1.8	16.5	360	1.40 W	1.24	18.5	710
12	0.3	1.8	17.0	400	1.40 W	1.40	19.5	775
14	0.3	1.8	17.5	445	1.40 W	1.40	20.0	845
16	0.3	1.8	18.5	495	4.0×0.8 F	1.40	19.5	795
19	0.3	1.8	19.5	550	4.0×0.8 F	1.40	20.5	850
24	0.3	2.0	23.0	715	4.0×0.8 F	1.40	23.5	1,040
27	0.3	2.0	23.0	770	4.0×0.8 F	1.40	24.0	1,120
30	0.3	2.0	24.0	835	4.0×0.8 F	1.40	25.0	1,190
37	0.3	2.0	26.0	985	4.0×0.8 F	1.40	26.5	1,360
44	0.3	2.0	29.0	1,180	4.0×0.8 F	1.40	29.5	1,620
52	0.3	2.0	31.0	1,360	4.0×0.8 F	1.56	32.0	1,850
61	0.4	2.2	32.5	1,570	4.0×0.8 F	1.56	33.0	2,050

- Dimensions and weights are approximate and are given for guidance.
- Armour: W = galvanised steel round wire (calculated diameter under armour ≤ 13 mm); F = galvanised steel flat strip 4.0 × 0.8 mm (above 13 mm). Round wire armour for all sizes on request.
- Where the calculated diameter under armour passes 13 mm the armour changes from round wire to flat strip, so an armoured cable can be lighter and slimmer than the next smaller core count. This is as specified by the IS.
- Core counts not listed (e.g. 9, 20, 21, 48 cores) and 4, 6 mm² control cables are available on request.

IS 7098 (PART 1) : 2025 · COPPER CONDUCTOR · 1.1 KV

XLPE Insulated Control Cables · 2.5 mm²

2XY 2XWY 2XFY



Physical parameters

No. of cores	Inner sheath (min) mm	Unarmoured			Armoured			
		Outer sheath (nom) mm	Approx. OD mm	Approx. wt kg/km	Armour wire Ø / strip mm	Outer sheath (min) mm	Approx. OD mm	Approx. wt kg/km
2	0.3	1.8	11.5	170	1.40 W	1.24	13.5	405
3	0.3	1.8	12.0	200	1.40 W	1.24	14.0	445
4	0.3	1.8	13.0	240	1.40 W	1.24	15.0	505
5	0.3	1.8	13.5	275	1.40 W	1.24	16.0	565
6	0.3	1.8	15.0	320	1.40 W	1.24	17.0	635
7	0.3	1.8	15.0	340	1.40 W	1.24	17.0	655
8	0.3	1.8	16.5	395	1.40 W	1.24	18.5	745
10	0.3	1.8	18.0	485	4.0×0.8 F	1.24	19.0	750
12	0.3	1.8	19.0	545	4.0×0.8 F	1.40	20.0	845
14	0.3	1.8	19.5	610	4.0×0.8 F	1.40	21.0	910
16	0.3	2.0	21.0	700	4.0×0.8 F	1.40	22.0	1,010
19	0.3	2.0	22.0	780	4.0×0.8 F	1.40	23.0	1,110
24	0.3	2.0	25.5	990	4.0×0.8 F	1.40	26.5	1,360
27	0.3	2.0	26.0	1,070	4.0×0.8 F	1.40	27.0	1,470
30	0.3	2.0	27.0	1,170	4.0×0.8 F	1.40	28.0	1,570
37	0.3	2.0	29.0	1,390	4.0×0.8 F	1.40	30.0	1,840
44	0.4	2.2	33.0	1,710	4.0×0.8 F	1.56	34.0	2,190
52	0.4	2.2	35.5	1,980	4.0×0.8 F	1.56	36.0	2,510
61	0.4	2.2	36.5	2,230	4.0×0.8 F	1.56	37.5	2,780

- Dimensions and weights are approximate and are given for guidance.
- Armour: W = galvanised steel round wire (calculated diameter under armour ≤ 13 mm); F = galvanised steel flat strip 4.0 × 0.8 mm (above 13 mm). Round wire armour for all sizes on request.
- Where the calculated diameter under armour passes 13 mm the armour changes from round wire to flat strip, so an armoured cable can be lighter and slimmer than the next smaller core count. This is as specified by the IS.
- Core counts not listed (e.g. 9, 20, 21, 48 cores) and 4, 6 mm² control cables are available on request.

IS 7098 (PART 1) : 2025 · ELECTRICAL CHARACTERISTICS

XLPE Insulated Control Cables · Electrical Data

Conductor & insulation

Conductor	Plain annealed copper, Class 2, IS 8130
Max. DC resistance at 20 °C	1.5 mm ² : 12.1 Ω/km · 2.5 mm ² : 7.41 Ω/km
Approx. resistance at 90 °C	1.5 mm ² : 15.43 Ω/km · 2.5 mm ² : 9.45 Ω/km
Insulation	XLPE, IS 7098 (Part 1) — 0.7 mm nominal
Max. conductor temperature	90 °C continuous · 250 °C short circuit
High voltage test	3.5 kV a.c. for 5 minutes
Rated voltage	1.1 kV (U ₀ /U 0.65/1.1 kV)

Minimum bending radius

12 × overall diameter for unarmoured and armoured cables.

Rating basis

Current ratings for one multicore cable laid singly, all cores loaded. Ground temperature 30 °C, ambient air 40 °C, soil thermal resistivity 150 °C·cm/W, depth 75 cm (IS 3961). For other conditions apply the rating factors of the Tamra LT power cable catalogue. XLPE ratings are indicative values derived from the IS 3961 PVC data; detailed ratings on request.

Continuous current rating · Amps

No. of cores	1.5 mm ²		2.5 mm ²	
	In ground	In air	In ground	In air
2	27	25	38	34
3	25	21	32	30
4	25	21	32	30
5	19	18	27	24
6	18	16	25	22
7	17	16	24	21
8	17	15	23	20
10	15	14	21	19
12	14	12	20	18
14	13	12	19	18
16	13	11	18	16
19	12	11	17	15
24	11	10	15	14
27	11	10	14	12
30	11	9	14	12
37	10	9	13	11
44	8	8	12	11
52	8	8	12	10
61	7	7	11	10

ARMOUR OPTIONS

Protection to suit the route

Control cables are available unarmoured, galvanised steel wire armoured or galvanised steel strip armoured.

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ENGINEERING DATA

Designing reliable control circuits

A control circuit must deliver enough voltage at the far end for every contactor, relay and solenoid to operate reliably. The guidance below helps select the right size and route for each circuit.

Voltage drop in control circuits

The voltage drop is carried by both the outgoing and the return core, so the loop length is twice the route length.

$$\Delta V (V) = 2 \times I (A) \times R (\Omega/km) \times L (m) / 1000$$

$$L_{max} (m) = \Delta V_{allowed} \times 1000 / (2 \times I \times R)$$

R at 70 °C: 1.5 mm² = 14.48 Ω/km · 2.5 mm² = 8.87 Ω/km (from 12.1 and 7.41 Ω/km at 20 °C, IS 8130). Reactance is negligible for control circuits of this size.

Operating limits of control devices

Contactor coils	Close reliably between 85 % and 110 % of rated control voltage (IEC 60947-4-1)
AC coil inrush	Several times the holding current at closing — check the voltage drop at inrush on long runs
Long AC runs	Capacitance between cores can hold a relay in after it is switched off; use DC control or interposing relays for very long runs

Spare cores & routing

- Allow spare cores in each multicore cable for future modifications — most project specifications call for 10 – 20 %.
- Keep at least 0.2 m clearance from power cables, and 0.3 m from telecommunication cables (IS 1255).
- Run control cables in their own tray tier, below power cables.

Maximum route length for 5 % voltage drop

Size mm ²	Control voltage	5 % drop	Max. route length, m		
			0.5 A	1 A	2 A
1.5	24 V DC	1.2 V	80	40	20
1.5	110 V AC	5.5 V	370	180	90
1.5	230 V AC	11.5 V	790	390	190
2.5	24 V DC	1.2 V	130	60	30
2.5	110 V AC	5.5 V	620	310	150
2.5	230 V AC	11.5 V	1,290	640	320

Conductor at 70 °C, loads at steady current. Lengths rounded down to the nearest 10 m. For other drops or currents, scale in direct proportion.

Example: a 230 V AC contactor coil drawing 0.5 A, 600 m from the MCC.

1.5 mm²: $\Delta V = 2 \times 0.5 \times 14.48 \times 600 / 1000 = 8.7 \text{ V (3.8 \%)} \checkmark$ within 5 %.

At the same distance a 24 V DC circuit would need a much larger size — consider interposing relays.



Send your control cable schedule to sales@tamracables.com — our engineers will check sizes and core counts. More at www.tamracables.com.

INSTALLATION, PACKING & ORDERING

From our drum to your control panel

Installation guidance

Bending radius	12 × overall diameter
Laying temperature	Not below 0 °C (PVC) without pre-warming the drum
Pulling	Pull by cable stocking; do not exceed 50 N/mm ² of total conductor area
Clearance	At least 0.2 m from power cables (IS 1255); cross at right angles
Armour	Earth the armour at both ends through the cable glands
Cable ends	Keep sealed with end caps until termination

Packing & marking

- Wooden drums to IS 10418, standard length 500 m or 1000 m (± 5 %); other lengths on request.
- Both ends sealed; drum marked with cable description, length, gross/net weight, drum number and year.
- Outer sheath printed with manufacturer's name, cable description, standard, year and sequential length marking.

TAMRA · CONTROL CABLE · YWY · 12C × 1.5 mm² · 1100 V · IS 1554 (Part 1) · 2026 · 0250 m



Enquiry checklist

Standard	IS 1554 (Part 1) — PVC / IS 7098 (Part 1) — XLPE
Conductor	1.5 / 2.5 mm ² · plain / tinned copper
Cores	Number of cores · numbered or colour-coded
Insulation	PVC / XLPE
Screening	Unscreened / overall screened on request
Armour	Unarmoured / GS round wire / GS flat strip
Sheath	PVC ST-1 / ST-2 / FR / FRLS / ZHFR · colour
Quantity	Total length and drum lengths

Send your control cable schedule, enquiry or data sheet to sales@tamracables.com — our engineers will reply with a compliant offer, GTP and drawings. More at www.tamracables.com.

TALK TO US

Your control room, our engineering

Write to us or visit our website — our engineers respond with a compliant offer, GTP and drawings.

sales@tamracables.com · www.tamracables.com





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www.tamracables.com

REGISTERED OFFICE

2, N. C. Dutta Sarani (Clive Ghat Street)
Sagar Estate, 7th Floor, Suite 709
Kolkata, West Bengal – 700 001
info@tamradhatu.com

FACTORY

SP2-873, RIICO Industrial Area
Pathredi, Bhiwadi, Dist. Alwar
Rajasthan – 301 019
gmplant@tamradhatu.com

MARKETING OFFICE · GURUGRAM

Suite No. 402, Vipul Trade Centre
Sector 48, Sohna Road
Gurugram, Haryana – 122 018
sales@tamracables.com

MARKETING OFFICE · MUMBAI

205, Midas, Sahar Plaza, J. B. Nagar
Andheri Kurla Road, Andheri East
Mumbai, Maharashtra – 400 059
sales@tamracables.com



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