Eight Decades of Trust & Innovation

INSTRUMENTATION CABLES

ABOUT US

- Nicco Cables is a 80 year old brand based in India
- Nicco specializes in manufacturing wide range of Wires and Cables
- Nicco has an in-house R&D facility
- Nicco specializes in Compound manufacturing and has a dedicated team for Compounds
- Nicco is the first Company in India to install a 3 MeV Electron Beam Plant form USA for manufacturing irradiated cables
- The manufacturing plant covers an area of 450,000 sq.ft.
- Nicco has National Accreditation Board for Testing and Calibration Laboratories **(NABL)** accredited Testing laboratory

NICCO PRODUCES A WIDE RANGE OF CABLES

- Elastomeric & Silicon Cables (Upto 15 kv) for various application
- Flexible Trailing Cables - H07-RNF
- LT & HT Power & Control Cables (Upto 66 kv)
- Fire Survival Cables (For Nuclear Reactor)
- Ship Building Cables
- Medium Voltage Covered Conductors (MVCC)
- Automotive Cables
- Cable Harnessing
- Overhead transmission Conductors (AAAC, ACSR, AAC, ACAR , AL-59)
- Pressure Tight Cables
- PTFE, ETFE & FEP Cables
- Solar & Windmill Cables
- Hybrid / Composite and Underwater Cables
- TREE WIRE / SPACER Cables - 3 layer Track Resistant (upto 35kv)
- Rolling Stock Cables
- Ethernet Polyurethane Cables
- Ethernet Cables (Cat-5e, Cat-6a, Cat-7)

INSTRUMENTATION CABLES

Instrumentation cables are multiple conductor cables that convey low energy electrical signals used for monitoring or controlling electrical power systems and their associated processes. These cables are used in diverse applications within industrial process manufacturing plant for control, communication, data (analog/digital) and voice transmission signals, industrial signaling and process control circuit required typically in process industries, oil, gas & petrochemical industry, fertilizers, cement, steel etc. For Instrumentation cables screening plays a vital role; the Al-Mylar screen of the Instrumentation cables, designed and manufactured by Nicco Cables, captures the external noise pickups. Also, the ATC drain wire earths the noise pickups which would otherwise cause interference in the low level signals passed between the measuring end and display units. These cables are designed with a minimum overlap of 25% of the shield that ensures 100% coverage even when the cable is flexed. The carefully produced stranded copper conductors used in the cable maintain high system accuracy and sensitivity. Maximum rejection of electro magnetic noise is achieved by twisting the insulated conductors. Twisting causes the noise to be cancelled in adjacent sections of the wire. Instrumentation cables are generally designed & manufactured based on BS EN 50288 (formerly BS 5308), EIL 6-52-46 and generally as per IS 1554-1, IS 7098-1, IEC 60502-1

SPECIAL APPLICATION CABLES - FIRE SURVIVAL CABLES

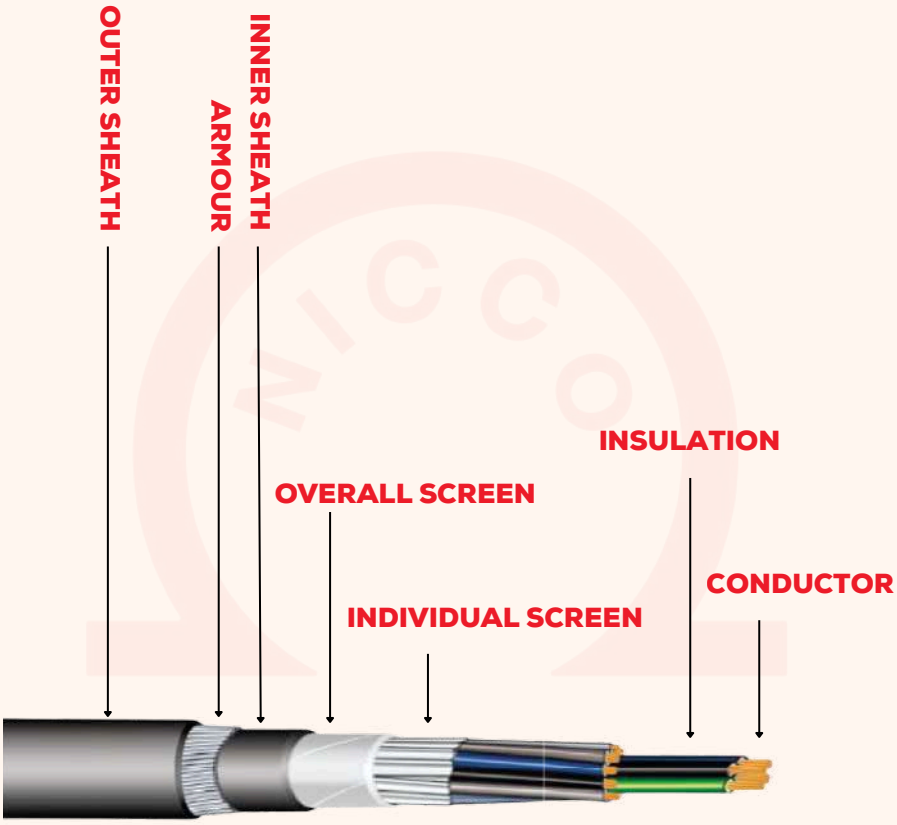
Fire Survival Cables are manufactured with Glass Backed Mica Tape applied over conductor and are used where the applications require circuit integrity during a fire mainly in Fire Alarm systems, sprinkler systems in schools, hospitals, shopping malls, cinemas etc. The circuit integrity is maintained for 3 hours at 750°C.

CONSTRUCTION

• CONDUCTOR	• Instrumentation cables are manufactured with Electrolytic Copper (Plain or Tinned) conductor in form of Solid (class 1), Stranded Circular (class 2) or Flexible (class 5) as per IS 8130, IEC 60228 & BS EN 60228.
• INSULATION	• Based on rated conductor temperature & electrical characteristics insulation materials such as PVC • (70°C), HR PVC (85°C), XLPE (90°C) or Polyethylene (70°C) and EPR are offered.
• INDIVIDUAL SCREEN	• Twisted Pair or Triad are individually shielded with Aluminum-Mylar tape along with ATC Drain wire in continuous contact with Aluminum side of the tape. Shielding of Copper tape can also be provided to meet specific requirements.
• PAIR/TRIAD IDENTIFICATION	• Pair or Triad identification can be done by numbered polyester tape applied over each pair / triad or by number printing on core of each pair / triad or by different colour coding.
• OVERALL SCREEN	• Multipair / Multi triad are laid up together and are shielded with Aluminum-Mylar tape along with ATC Drain wire in continuous contact with Aluminum side of the tape. Shielding of Copper tape can also be provided to meet specific requirements.
• INNERSHEATH	• Extruded PVC / LSZH inner sheath is applied as a protection over the laid up pairs / triads.
• ARMOUR	• Galvanized steel wire or strip are applied spirally over inner sheath as a mechanical protection for cable.
• OUTERSHEATH	• Extruded sheath is provided depending on the application requirements such as temperature, flame retardancy (FR), reduced smoke & acid gas emission (FRLS), Halogen free (LSZH / ZHFR).

- SPECIAL APPLICATION FIRE SURVIVAL CABLE

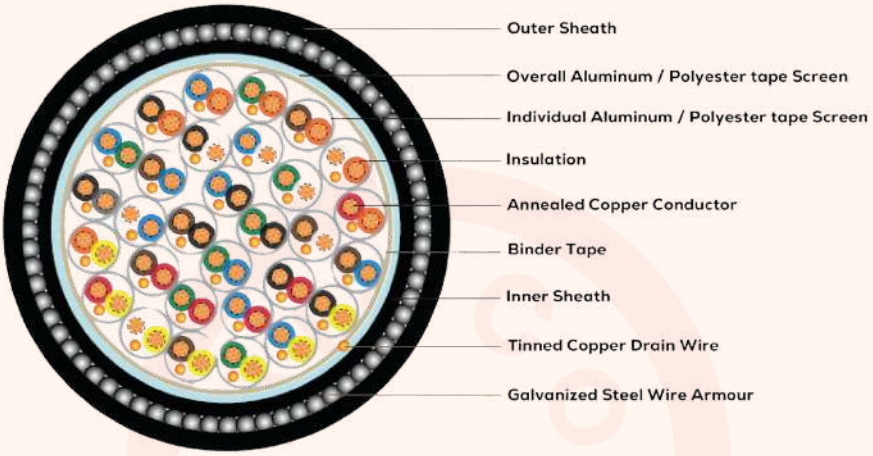
- Heat Barrier Glass Backed Mica Tape applied over conductor to meet the test requirements of 750oC for 3 hours as per IEC 60331.

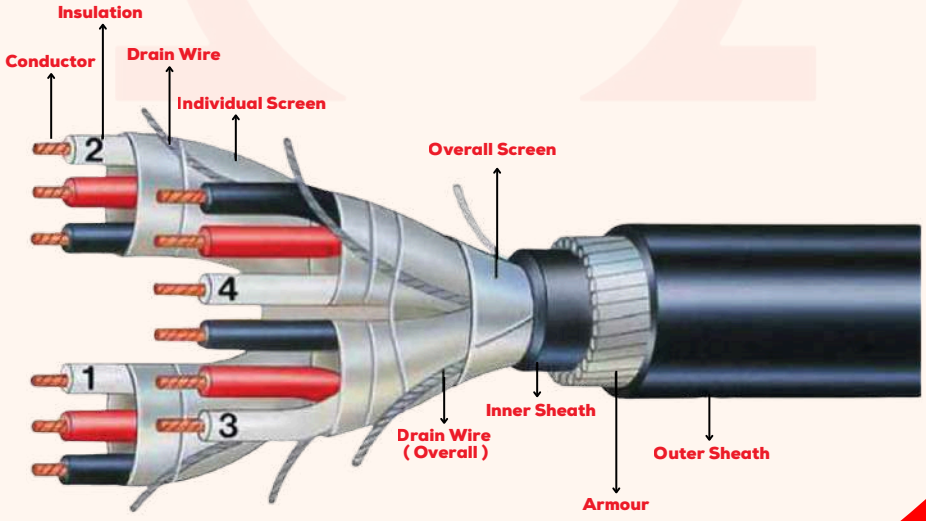


GENERAL PARAMETERS FOR INSTRUMENTATION CABLES

PARAMETER	UNIT	CONDUCTOR AREA				
		0.5 mm^2	0.75 mm^2	1.0 mm^2	1.5 mm^2	2.5 mm^2
Maximum D.C. Resistance of plain copper conductor at 20°C	Ω/km	39.7	26.5	18.5	12.3	7.56
Maximum D.C. Resistance of Tinned copper conductor at 20°C	Ω/km	40.5	27.0	18.9	12.5	7.7
Maximum D.C. Resistance of 0.5mm^2 ATC Drain wire at 20°C	Ω/km	30	30	30	30	30
Maximum mutual capacitance core to core (PVC insulated)	nF/km	250	250	250	250	250
Maximum mutual capacitance core to core (PE, XLPE insulated)	nF/km	115	115	115	115	115
L/R ratio maximum	µH/ohm	25	25	30	40	70
Electrostatic Noise Rejection Ratio as per IEEE Vol3 (minimum)	dB	76	76	76	76	76
Minimum Insulation Thickness	mm	0.5	0.5	0.5	0.5	0.5
Minimum Insulation Resistance at 27°C (PVC insulated) at 500V	MΩ/km	10	10	10	10	10
Minimum Insulation Resistance at 27°C (XLPE, PE insulated) at 500V	MΩ/km	100	100	100	100	100
High Voltage test	kV	1kV for 1 minute				

Instrumentation cables can be specially designed to meet specific requirements of Capacitance, L/R ratio etc





GENERAL PARAMETERS FOR INSTRUMENTATION CABLES

TYPE	CONDUCTOR COMBINATIONS		ANSI MC 96.1			IS 8784			IEC 60584-3		
			COLOUR CODE		EMF TOLERANCE	COLOUR CODE		EMF TOLERANCE	COLOUR CODE		EMF TOLERANCE
	+VE	-VE	+VE	-VE	± °C	+VE	-VE	± °C	+VE	-VE	± °C
Kx	Nickel-Chromium (Chromel)	Nickel-Aluminium (Alumel)	Yellow	Red	2.2	Red	Green	2.2	Green	White	2.5
Ex	Nickel-Chromium (Chromel)	Copper-Nickel (Constantan)	Purple	Red	1.7	Red	Violet	1.7	Violet	White	2.5
Tx	Copper	Copper-Nickel (Constantan)	Blue	Red	1.0	Red	Black	1.0	Brown	White	1.0
Jx	Iron	Copper-Nickel (Constantan)	White	Red	2.2	Red	Blue	2.2	Black	White	2.5
Vx (KxA)	Copper	Copper-Nickel (Constantan)	-	-	-	-	-	-	Brown	White	2.5
Rxa / Sxa	Copper	Copper-Nickel (Constantan)	Black	Red	1.5	Red	White	1.5		White	2.5

GENERAL PARAMETERS FOR INSTRUMENTATION CABLES

CONDUCTOR SIZE	Kx	Ex	Tx	Jx	Vx (KxA)	Rx / Sx
16 AWG (1.29mm)	746	905	385	475	385	110
18 AWG (1.02mm)	1210	1470	623	770	623	175
20 AWG (0.81mm)	1910	2311	980	1212	980	280

BRIEF INSTRUMENTATION CABLE CODES

Instrumentation cable construction codes are part of broad national and international standards (like IEC, BS EN, UL, IS) rather than a single universal system. The specific codes used on the cable sheath typically use letters to denote the materials and protective layers, which can vary by standard.

COMMON CONSTRUCTION CODES AND ABBREVIATIONS

Here are some common codes and what they represent, often seen in standards like BS EN 50288-7 and others:

CODE	DESCRIPTION	PURPOSE/MATERIAL
Y	PVC (Polyvinyl Chloride)	Common insulation/sheath material
2Y	PE (Polyethylene)	Insulation/sheath for moisture resistance
2X	XLPE (Cross-linked Polyethylene)	Insulation for high - temperature resistance (up to 90°C)
H	LSZH (Low Smoke Zero Halogen)	Sheath for fire safety, low smoke/acid gas emission
HFFR	Halogen Free Flame Retardant	Similar to LSZH for fire safety
FR or FRLS	Flame Retardant (Low Smoke)	Sheath property to inhibit flame spread
(st)	Overall Screen (Collective)	Metallic foil/tape shield over all cores/pairs/triads
PIMF or PSCR	Pairs in Metal Foil (Individual Screen)	Each pair/triad is individually shielded to prevent crosstalk
OSCR	Overall Screen	The entire core assembly is screened
C	Copper wire braid	Type of armoring/screening

CODE	DESCRIPTION	PURPOSE/MATERIAL
SWA	Steel Wire Armour	Mechanical protection against crushing forces (for multicore cables)
AWA	Aluminum Wire Armour	Mechanical protection (for single core AC cables, as it's non-magnetic)
B	Flat steel tape armour	Type of armoring
RE	Designation for instrumentation cables	A general prefix indicating the cable type
CI or (fl)	Circuit Integrity / Increased fire resistance	Indicates fire survival properties, often uses mica glass tape

- 2X: XLPE (Cross-linked Polyethylene) insulation.
- (St): Collective/Overall Screen, which consists of an Aluminum/PET tape with a tinned copper drain wire.
- Y: PVC (Polyvinyl Chloride) inner sheath (bedding).
- SWA: Steel Wire Armour for mechanical protection.
- Y: PVC outer sheath.

For a Low Smoke Zero Halogen (LSZH) version, the code would be

RE-2X(St)HSWAH, with 'H' replacing 'Y' for the sheath materials.

EXISTING CERTIFICATIONS

ISO 9001 / 14001 / 45001

Directorate of Quality Assurance (Navy) [DQAN] Registration Certificate

Defense Research and Development Laboratory (DRDL) Registration Certificate

Integrated Headquarters of Ministry of Defence (IHQ/DEE/MOD)

Research Designs and Standards Organization (RDSO)

American Bureau of Shipping (ABS)

Indian Register of Shipping (IRS)

Underwriters Laboratories (UL)

Central Power Research Institute (CPRI)

Bureau of Indian Standards (BIS)

International Railway Industry Standard (IRIS)

National Accreditation Board for Testing and Calibration Laboratories (NABL)

Det Norske Veritas (DNV)

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