

Cables & Wires Catalogue



- Thermocouple Extension & Compensating Cables
- RTD Cables
- Instrumentation Signal Cables
- Low Voltage Control & Power Cables
- High Temperature Cables
- Heat Resistance Power Cables
- PVC Lead Wires/Hook up Wires
- Special Cables (Composite Cable, Load Cell Cables, RS-485 etc.)
- Sleeves
- Mineral Insulated Metal Sheathed Cables



TEMPESENS

www.tempsens.com

ABOUT THE COMPANY



Tempsens Instruments U# II - Cables & Wires

TEMPESENS Instruments (I) Pvt. Ltd is a part of Pyrotech group which was established by four technocrats in 1976 at Udaipur, with its first product as Thermocouples and RTDs.

Today Tempsens is one of the largest Thermal and Cable solution provider having world class manufacturing facilities, Operations in India, Germany and Indonesia.

Tempsens is a TUV certified ISO 9001:2008 certified company with NABL Accredited Laboratories.

The company is involved into manufacturing of Thermocouples, RTDs, Thermowells, Cables, Non contact Pyrometers, Heaters and Calibration Equipments, Furnaces etc. with Covered Area of 2,70,000 Sq. Ft.

Tempsens is proud of its technical solution, quick delivery, high technical standards and outstanding quality which have been appreciated and highly valued by its customers worldwide.

Tempsens exports to more than 70 countries, World wide.

Tempsens success is driven by its people and their unrelenting focus on delivering results the right way - by operating responsibly, executing with excellence, applying innovative technologies and capturing new opportunities for profitable growth.

Milestones

- 1976 • Pyrotech international Established.
- 1985 • Established Tempsens as separate Unit.
- 1994 • Started Export. Awarded ISO 9002.
- 2003 • Manufacturing of Temperature Calibration Equipments.
- 2004 • Setup Calibration laboratory (NABL Accrediated).
- 2006 • Rajeev Gandhi National Quality Award.
- 2008 • Installing Fixed Point Calibration (Primary Standard) Setup for TPW, Ga, Sn, Zn & Al points, first time in the country in Private Lab.
- 2009 • New facilities started - Tempsens Unit #II for manufacturing cables. Joint venture with Marathon heater Inc, USA for Industrial Heaters and AST.
- 2011 • Awarded with prestigious MSME Award 2010.
- 2012 • Multilocal manufacturing facilities - India, Germany and China.
- 2013 • Pyrometer & Industrial Heater shifted to new building. MI Cable Plant started.
- 2014 • Joint venture with Linn High Therm, Germany for industrial furnaces.
 - Tempsens Lab(West) at Vadodara was NABL Accredited.
- 2015 • Expansion of Cable Plant.
 - Rajasthan Export Award for the year 2012-13.
 - Tempsens Lab(South) at Bangalore was NABL Accredited.
- 2016 • Star Performer conferred by EEPC India
 - Udaipur Business excellence Award 2016 – by FORTI & Pantomath
 - NABL Accreditation to Tempsens Testing Centre in Electrical Discipline for Cables & wires testing.
 - BIS license for IS 694 : 2010(PVC insulated cables upto 1.1 KV).



CML No. - 8400077612



FACILITIES FOR CABLES

MANUFACTURING FACILITIES

PVC Cable Plant

- Wire Drawing Machine
- High Speed Bunchers
- PVC/XLPE Extruders
- Laying Machine
- Vertical Almylar Tapping Machine
- High Speed Metal Braiding Machine
- Armouring Machine
- Tinning Machine
- NABL Lab for Calibration & Testing

High Temperature Cable Plant

- High Speed Bunchers
- Teflon Tape Plant
- Silicon Extruder
- Fluoro Polymer Extruders
- Laying Machine
- Vertical Tapping Machine
- Horizontal Tapping Machines
- Horizontal Fibre Lapping Machines
- Fibre Braiding Machines
- Metal Braiding Machines
- Varnish / Sintering / Horizontal Dry Oven
- NABL Lab for Calibration & Testing

MI Cable Plant

- Draw Bench 50 meters
- Horizontal Reducers
- Annealing Furnaces
- MI Polishing Machines
- MgO Sintering Furnace
- MgO Plant

TESTING & CALIBRATION

NABL Accredited Testing Laboratory

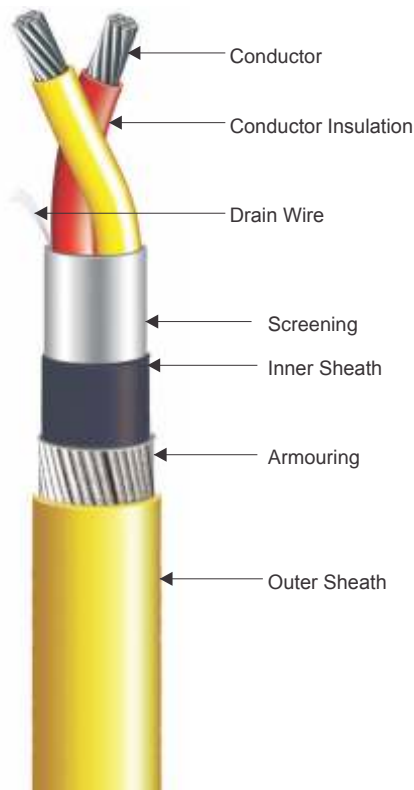
- Routine, Acceptance and Type Tests for Cables and Wires as per IS 1554, IS 7098, JSS 51034, JSS 51038, MIL 16878, IEC 60332, IEC 754, ASTM D 2863, ASTM D 2843, IS 10810, IEC 60502, BS EN 50228 etc.



NABL T-4096



BASICS OF CABLES & WIRES



INSULATION

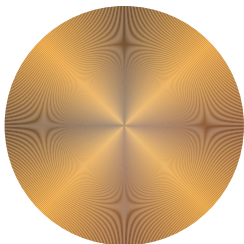
Insulation refers to the layer of plastic, polymer or high temperature compound that is applied directly over the conductor. Tempsens provide variety of insulations along with wide temperature range from -260°C to 1200°C.

Insulation Type

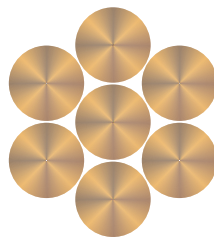
Temperature range for various insulations are listed below :

Alumina Fibre	-73°C	1200°C
Ceramic Fibre/Silica	-73°C	800°C
Fibre Glass	-73°C	550°C
Polyimide	-267°C	310°C
PTFE/PFA	-267°C	260°C
PEEK	-60°C	250°C
FEP	-200°C	200°C
SILICON	-40°C	180°C
ETFE	-185°C	150°C
PVC	-30°C	105°C
XLPE	-50°C	90°C
HDPE	-50°C	80°C
LDPE	-50°C	70°C

CONDUCTOR



Solid



Stranded

The center component of any cable is the conductor which carries the signal or power through that cable. For signal & power transmission copper is the most commonly used conductor.

Copper Conductors

Annealed Bare Copper(ABC), Tinned Plated Copper(TPC), Nickel Plated Copper(NPC), Silver Plated Copper(SPC)

Thermocouple Conductors

- Thermocouple grade conductor(TC)
- Extension grade conductor(EX)
- Compensating grade conductor (C)

Other Conductors

Pure Nickel Conductor (Ni) etc.

SCREENING

Screening is applied for magnetic and electrical protection. Generally two types of Screening are available :

- Aluminum Foil Type : - Screening is done by helically applied aluminum foil along with copper drain wire with 100 % coverage.
- Mesh Braided Type :- Screening is done by Copper wire (Bare Copper, Tinned Copper, Nickel Plated Copper, Silver Plated Copper). It is in mesh braided form with 70 % to 95% coverage area.

INNER SHEATH

PVC, Silicon, Teflon, Polyimide, Fibre Glass, Alumina Fibre etc. (as listed in insulation)

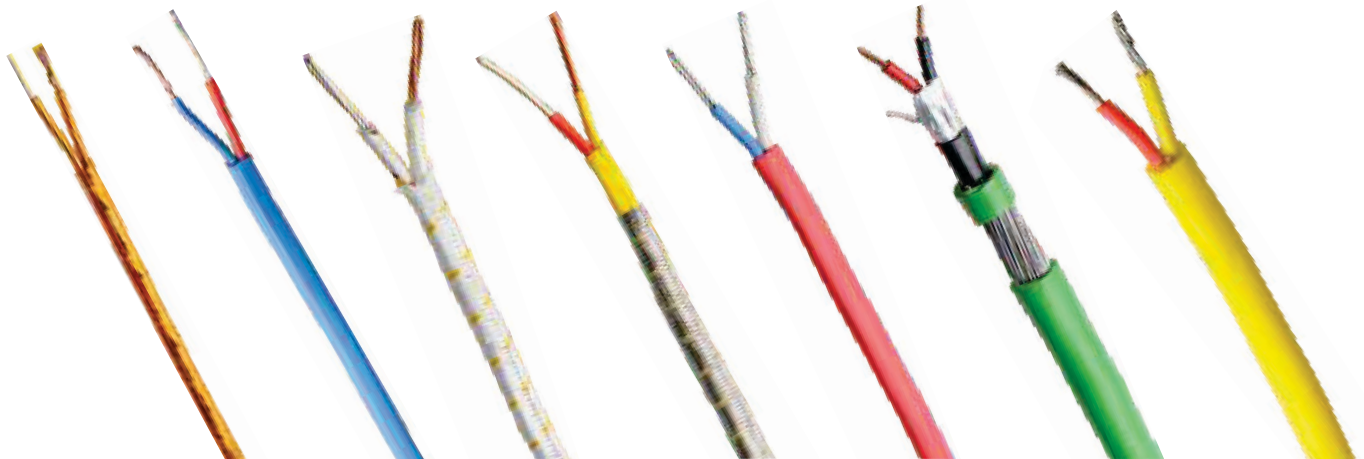
MECHANICAL PROTECTION

- G.I. Armouring (Round wire / Flat strip as per IS 3975:99)
- Wire Braiding (More Flexible)

OUTER SHEATH

PVC, Silicon, Teflon, Polyimide, Fibre Glass, Alumina Fibre etc. (as listed in insulation).

THERMOCOUPLE CABLES



Thermocouple Cables are used to measure the temperature directly. Extension & Compensating wires are used to extend a thermocouple signal from a sensor to instrument for readings.

TECHNICAL SPECIFICATION

Construction	: Single or Multi pair
Voltage Grade	: Up to 1.1 KV
Conductor	: TC, EX, C (Refer Table No.- 1)
Type of Conductor	: K, T, J, E, N, R, S, B, D, C
Conductor Size	: AWG 12 to AWG 32 upto 48 pair
Conductor Stranding	: Solid or Multi strand
Core Insulation	: PVC, PTFE, FEP, PFA, Silicon, Polyimide, Fibre Glass, Ceramic Fibre etc.
Screening	: Aluminum Foil with drain wire / Mesh Braided
Inner/Outer Sheath	: PVC, Teflon, Polyimide, Fibre Glass, Ceramic Fibre etc.
Rip Cord	: For easy removal of sheath
Armouring	: G.I. Round Wire/Flat Strip Armouring/Wire Braiding
Color Code	: Refer Table No. 1
Standards	: ANSI MC 96.1, IEC 584.3, IS 8784, IEC 60584.3

FEATURES

- ✓ Available in Thermocouple extension and compensating grades.
- ✓ Available with special limit of tolerance as per ANSI MC 96.1/ IEC 60584.3
- ✓ Available in all colour codes.
- ✓ Complying with IS 8784, IEC 60584 & ANSI 96.1
- ✓ Flame retardant
- ✓ Fire Resist option available
- ✓ Available with Chemical resist, Water resist, Abrasion resist & Heat resist option
- ✓ Optional NABL Calibration report

Colour Code & Accuracy of Thermocouple, Extension & Compensating Cables (Table No. 1)

T/CTYPE	CONDUCTOR		CONDUCTOR COMBINATIONS		COLOR CODE		TOLERANCE CLASS AS PER IEC 584.3		CABLE TEMP. RANGE °C
	EXTENSION CABLE	COMPENSATING CABLE	+LEG	-LEG	IEC 5843:1989	ANSI/MC96.1	CLASS 1	CLASS 2	
K			CHROMEL	ALUMEL			±1.5°C or 0.4% of T	±2.5°C or 0.75% of T	0°C TO +1100°C
	KX		CHROMEL	ALUMEL			±1.5°C	±2.5°C	-25°C TO +200°C
		KCA	IRON	CONSTANTAN			-	±2.5°C	0°C TO +150°C
		KCB	COPPER	CONSTANTAN			-	±2.5°C	0°C TO +100°C
T			COPPER	CONSTANTAN			±0.5°C or 0.4% of T	±1.0°C or 0.75% of T	-185°C TO +300°C
	TX		COPPER	CONSTANTAN			±0.5°C	±1.0°C	-25°C TO +100°C
J			IRON	CONSTANTAN			±1.5°C or 0.4% of T	±2.5°C or 0.75% of T	+20°C TO +700°C
	JX		IRON	CONSTANTAN			±1.5°C	±2.5°C	-25°C TO +200°C
N			NICROSIL	NISIL			±1.5°C or 0.4% of T	±2.5°C or 0.75% of T	0°C TO +1100°C
	NX		NICROSIL	NISIL			±1.5°C	±2.5°C	-25°C TO +200°C
E			CHROMEL	CONSTANTAN			±1.5°C or 0.4% of T	±2.5°C or 0.75% of T	0°C TO +800°C
	EX		CHROMEL	CONSTANTAN			±1.5°C	±2.5°C	-25°C TO +200°C
R		RCA	COPPER	COPPER LOW VALUE NICKEL			-	±2.5°C	0°C TO +100°C
		RCB	COPPER	COPPER NICKEL MO			-	±5.0°C	0°C TO +200°C
S		SCA	COPPER	COPPER LOW VALUE NICKEL			-	±2.5°C	0°C TO +100°C
		SCB	COPPER	COPPER NICKEL MO			-	±5.0°C	0°C TO +200°C
B		BC	COPPER	COPPER			-	-	0°C TO +100°C
D		DC	ALLOY 203*	ALLOY 225*			-	±4.5°C	0°C TO +100°C
C		CC	ALLOY 405*	ALLOY 426*			-	±4.4°C	0°C TO +100°C

INSTRUMENTATION SIGNAL CABLES



Instrumentation Signal Cables minimize external interference during transmitting signals, deliver clear signals, in harsh environments and general manufacturing operations. These cables are specially designed for use in communication and instrumentation systems.

TECHNICAL SPECIFICATION

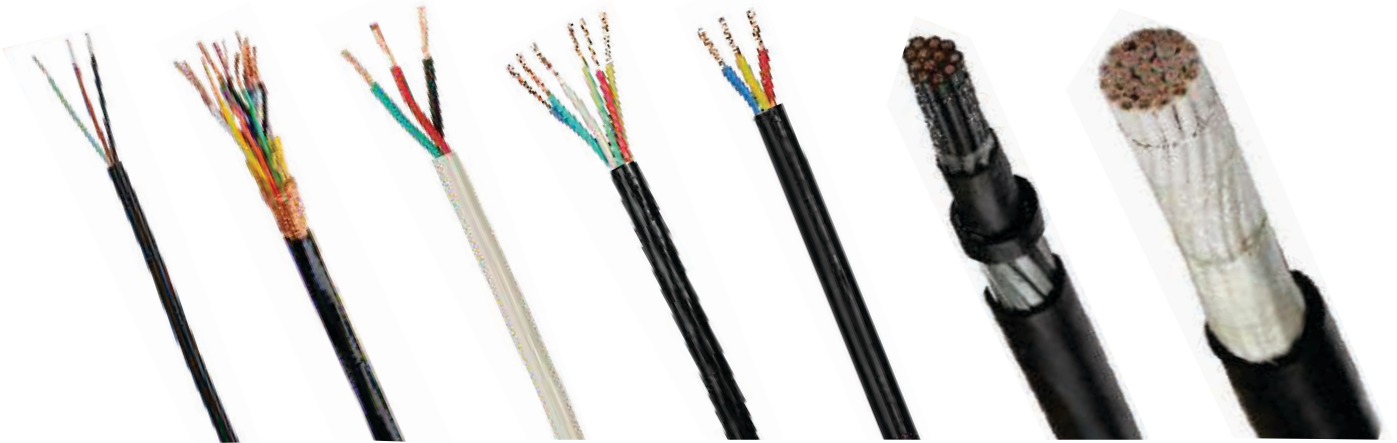
Construction	: Single / Multi, Pair / Triads
Voltage Grade	: Upto 1.1 KV
Conductor	: Electrolytic Grade Bare Copper/Tinned Copper
Conductor Size	: 0.50, 0.75, 1.0, 1.5, 2.5 Sq. mm upto 48 pair
Conductor Stranding	: Solid or Multi Strand
Core Insulation	: PVC/HR PVC/PE/XLPE/LSZH PVC/FR/FRLS PVC
Screening Method	: Individual and / or Overall
Screening	: Aluminum Foil with Drain Wire/Mesh Braided
Inner/Outer Sheath	: PVC/HR PVC/PE/LSZH/FR PVC/FRLS PVC
Rip Cord	: For easy removal of sheath
Armouring	: G.I. Round Wire / Flat Strip Armouring
Standards	: As per BS 5308 Part 1 and Part 2, IS 8130, IEC 60228, IS 1554, EN 50228-7, IS 7098

FEATURES

- ✓ Flexible & Versatile
- ✓ Flame Retardant & Low smoke availability
- ✓ High Temperature option also available
- ✓ Resist to Oil, Corrosion & Moisture
- ✓ High mechanical strength
- ✓ Superior low temperature Properties
- ✓ Screened/Unscreened
- ✓ High Insulation resistance
- ✓ Low dielectric Losses
- ✓ Armoured/Unarmoured
- ✓ Fire resist option available



LV CONTROL & POWER CABLES



Control Cable used to transmission of low voltage signal data that have to control equipment whereas power cable transfer high array signal from the source to the equipments.

TECHNICAL SPECIFICATION

Construction	: Single Core / Multi Core
Voltage Grade	: Upto 1.1 KV
Conductor	: Electrolytic Grade Bare Copper/Tinned Copper
Conductor Size	: 0.50, 0.75, 1.0, 1.5, 2.5, 4.0, 6.0, 10.0, 16.0, 25.0, 35.0 upto 240 Sq. mm
Conductor Stranding	: Solid or Multi Strand
Core Insulation	: PVC/HR PVC/PE/XLPE/LSZH PVC/FR PVC/FRLS PVC
Core Identification	: Upto 5 cores by Different Colours Above 5 cores by Number Printing
Inner/Outer Sheath	: PVC/HR PVC/PE/LSZH/FR PVC/FRLS PVC
Armouring	: G.I. Round Wire / Flat Strip Armouring(As per IS 3975 : 99) / Wire Braiding
Standards	: As per IS 694, IS 1554, IS 7098, IEC 60227, IEC 60502



FEATURES

- ✓ Max. Temperature range up to 90°C
- ✓ High temperature also available
- ✓ Flame Retardant & Low smoke availability
- ✓ Fire Resist option available
- ✓ Heat resist
- ✓ Halogen free Low smoke availability
- ✓ Resist to oil, moisture, chemical, whether etc.
- ✓ Armoured / Un-Armoured option available
- ✓ Screened control Cable option available
- ✓ Available with different voltage cable up to 1.1 kv



HIGH TEMPERATURE CABLES



High temperature cables are used in areas where both working temperature and ambient temperature are too high. We offer a variety of high temperature insulation such as alumina yarn, ceramic yarn, Fibre glass insulation, fluoroplastic polymers and elastomer insulation to perform in continuous temperature up to 1200°C.

TECHNICAL SPECIFICATION

Construction	: Single / Multi Cores, Single / Multi Pairs.
Voltage Grade	: 250/600/1100 V
Conductor Type	: Annealed Bare Copper/Tinned Copper, Silver Plated Copper, Nickel Plated Copper, Pure Nickel
Conductor Size	: From 0.22 Sq. mm to 240 Sq. mm
Heat Barrier Tape (Optional)	: Mica Tape
Core Insulation	: FEP, PTFE, Silicon, Polyimide, Fibre Glass, Ceramic Fibre, Alumina Fibre, PEEK
Screening Method	: Individual and/ or Overall
Screening	: Aluminum mylar with drain wire / Mesh Braided
Inner Sheath	: FEP, PTFE, ETFE, PFA, Silicon Polyimide, Fibre Glass, Ceramic Fibre
Outer Sheath	: FEP PTFE, ETFE, PFA, Silicon, Polyimide, Fibre Glass, Ceramic Fibre, Alumina Fibre
Armouring	: Stainless Steel Wire Braiding
Generally Confirm to	: JSS 51034, JSS 51038, VDE 207 Part 6, MIL-DTL-27500H, MIL 16878, JSS 51037, ASTM B298, ASTM B355, IS 9968

FEATURES

- ✓ Available in multiple insulations having different properties.
- ✓ Suitable up to 1200°C.
- ✓ Low Di-electric Constant.
- ✓ Excellent Flame Retardant & Heat Resist Properties.
- ✓ Halogen Free Insulation available with Silicon, FEP, PTFE, ETFE & PFA materials
- ✓ Excellent Flexibility
- ✓ High Thermal Stability.
- ✓ Resist to Chemical, Acid, Weather etc.
- ✓ Radiation Resistant

Insulation	Temperature Range	Characteristics
Alumina Fibre	-73°C to 1200°C	Excellent Temperature Resistance
Ceramic Fibre	-73°C to 800°C	Excellent Temperature Resistance
Fibre Glass	-73°C to 550°C	High Temperature Resistance
Polyimide	-267°C to 310°C	Thin insulation, Flame retardant
PFA	-260°C to 260°C	Chemical Resistance, High Dielectric strength, Thin Insulation
PTFE	-267°C to 260°C	Excellent chemical resistance
PEEK	-60°C to 250°C	High Mechanical Strength, Radiation resistance
FEP	-200°C to 200°C	Chemical Resistance, High Dielectric strength, Thin Insulation
ETFE	-185°C to 150°C	Good Mechanical Strength
Silicon Rubber	-40°C to 180°C	Flexible, Abrasion & Radiation resistance

HEAT RESISTANCE POWER CABLES



We provide a range of single & multi core heat resistance cable for temperature range upto 800°C. Our Heat Resistance Power Cables are suitable to resist in chemical, fire and flame atmosphere.

TECHNICAL SPECIFICATION

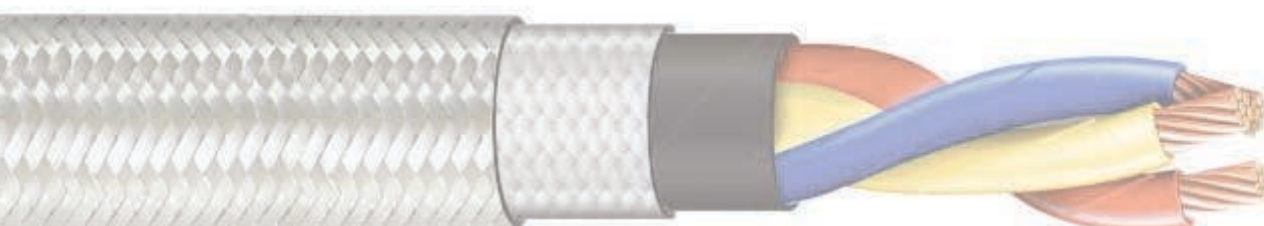
Construction	: Single / Multi Cores
Voltage Grade	: Up to 1.1 KV Grade
Conductor	: ABC, NPC
Conductor Size	: 1.5, 2.5, 4.0, 6.0, 10.0, 16.0, 25.0, 35.0 Sq mm upto 240 sq. mm
Conductor Stranding	: Multistrand as per IS 8130:84/IEC60228
Core Insulation	: PTFE, FEP, PFA, Silicon, Fibre Glass, Ceramic Fibre etc.
Isolator	: Polyimide, Sintered PTFE Foil
Fire Barrier Tape	: Glass Mica Tape
Screening	: Mesh Braided(Overall)
Inner/Outer Sheath	: Teflon, Fibre Glass, Ceramic Fibre etc.
Armouring	: SS Braiding
Standards	: As per IS 8130:84, JSS 51038, JSS 51037

FEATURES

- ✓ Max. Temp. Up to 800°C
- ✓ Excellent Heat Resistant
- ✓ Excellent Abrasion Resistance
- ✓ Excellent Flame Retardant
- ✓ Good Thermal Stability
- ✓ Good Chemical Resistivity

APPLICATIONS

- ✓ Steel
- ✓ Glass
- ✓ Ceramic Metal Industries
- ✓ Chemical & Fertilizers
- ✓ Refractories
- ✓ Power
- ✓ Oil & Gas
- ✓ Cement




PVC LEAD WIRES



Tempens provide wide range of Lead wire or Hook up wires with different PVC insulations

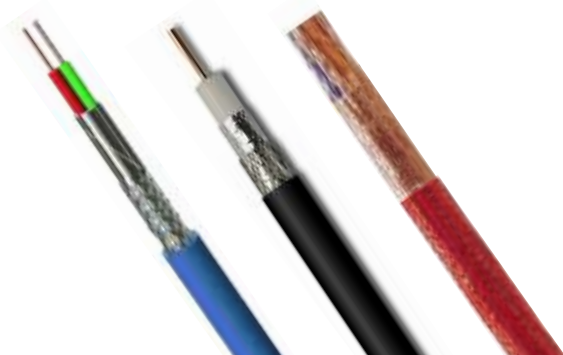
TECHNICAL SPECIFICATION

Conductor	: Electrolytic Grade Bare Copper, TPC
Conductor Size	: 0.20, 0.5, 1.0, 1.5, 2.5 upto 240 sq. mm
Conductor Stranding	: Solid or Multistrand
Voltage Rating	: Up to 1.1 KV
Insulation	: PVC, HR PVC, FR PVC, FRLS PVC, LSZH PVC, HFFR PVC
Temp. Rating	: Type A - 70°C Type C - 90°C
Standards	: IS 694, IS 8130, IS 5831 : 84 

FEATURES

- ✓ Max. Temp. Up to 90°C
- ✓ Good Flexibility
- ✓ Excellent Resist to Oil, Moist, Fluids and Chemicals
- ✓ Excellent Di-electric Properties
- ✓ Excellent Flame Retardant, Low smoke
- ✓ Halogen free
- ✓ Color Availability

SPECIAL CABLES



- ✓ Solar Photovoltaic Cables
- ✓ RS-485 Cable
- ✓ Lance Cable
- ✓ Load Cell Cable
- ✓ Composite Cable
- ✓ Co-axial Cable
- ✓ Cat 5 & Cat 6 Cable

SLEEVES



Tempens offer variety of sleeves suitable for wide temperature range with various insulation such as PTFE, FEP, Silicon, Fibre Glass, S.S. braided, Polyimide & PVC.

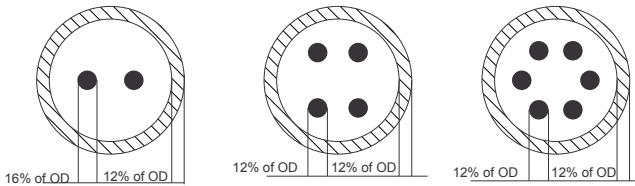
Inner Diameter	: 0.50 mm to 10 mm or as per requirement
Color	: As per Customer requirement

FEATURES

- ✓ Max. Temp. Up to 500°C
- ✓ Excellent Heat Resistant
- ✓ Excellent Dielectric Strength
- ✓ Excellent Chemical Resistant
- ✓ Non Stick Property
- ✓ Weather Resistant
- ✓ Flame Retardant
- ✓ Good Thermal Stability

MINERAL INSULATED METAL SHEATHED CABLES

Mineral insulated cables are designed for high-temperature applications and particularly strict requirements with regard to mechanical, chemical and electrical stability.



MINERAL INSULATED THERMOCOUPLE CABLES

Mineral insulated thermocouple cables have inner conductors of Thermocouple base material as per standard ASTM E 585/585M and ASTM E 839.

OD (MM)	TYPE	SHEATH	MGO GRADE	ACCURACY	
1.5	K - Simplex	304 - SS304L 310 - SS310 316 - SS316L 321 - SS321 600 - INCONEL 600	STANDARD (≥ 96% PURE)	CLASS 1	
2.0	KK - Duplex				
2.2	J - Simplex			CLASS 2	
3.0	JJ - Duplex				
4.5	E - Simplex			HIGH PURITY (≥ 99.4% PURE)	As per IEC 584-2 or ANSI MC 96.1
5.0	EE - Duplex				
6.0	N - Simplex				
8.0	NN - Duplex				
9.5	T - Simplex				
10.0	TT - Duplex				
12.7	R - Simplex	Note:- Diagonal Element Supplied Unless Specified			
	RR - Duplex				
	S - Simplex				
	SS - Duplex				

MINERAL INSULATED RTD CABLES

Mineral insulated cables for RTDs have inner conductors of copper, copper-nickel alloys, nickel etc. metals.

OD (MM)	NO. OF CONDUCTOR	CONDUCTOR MATERIAL	SHEATH	MGO GRADE
1.5	3 4 6 8	Ni - Nickel Cu - Copper NiCu - Constantan	304 - SS304L 316 - SS316L 321 - SS321 600 - INC 600	STANDARD (≥96% PURE)
2.0				
2.2				HIGH PURITY (≥ 99.4% PURE)
3.0				
4.5				
5.0				
4.8				
6.0				
8.0				
9.5				

OTHER SPECIAL TYPE OF MI CABLES

Mineral Insulated Heating Cables

Mineral Insulated Heating Cables are constructed with a solid resistor element embedded in highly compacted mineral insulation. MI cables are built to handle high temperature, high wattage applications.

Mineral Insulated Copper Cables (MI Power Cables)

Mineral Insulated Copper cable is used as an electric cable for critical areas of plant and follows standard of IEC/EN 60702 Part 1. It has two voltage grade 500V & 750V

Coaxial Cables/Triaxial Cables



Triaxial cable is a type of electrical cable similar to coaxial cable, but with the addition of an extra layer of insulation and a second conducting sheath. It provides greater bandwidth and rejection of interference than coaxial cable.

SPNDS



Self-Powered Neutron Detectors are in-core flux monitors in nuclear power reactors. The typical SPND is a coaxial cable consisting of an inner electrode (the emitter), surrounded by insulation and an outer electrode (the collector).

CERTIFICATES



THERMAL & CABLE SOLUTIONS



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