INSTRUMENTATION cables
The Mysore Unit of RPG Cables is the largest and most diversified cables manufacturing facility in the South of India. The unit manufactures:

- Jelly Filled Telecom Cables
- Optical Fibre Cables
- Low Tension Power & Control Cables
- Instrumentation Cables

Over the years, the cables manufactured at Mysore have been exported to over 25 countries. The plant is accredited to ISO 9001, ISO 14001 and ISO 18001 standards. It has won several quality and other Awards since inception.
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 RPG 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*.

THERMOCOUPLE EXTENSION & COMPENSATING CABLES

The construction of Thermocouple extension & compensating cables is identical to Instrumentation cables. These cables are used to pass the EMF signal from the thermocouple end to the control panel. The thermo-electric properties of the conductors used for these cables are the same as that of the thermocouple used for sensing the temperature.

Thermocouple extension & compensating cables are generally designed & manufactured based on BS EN 50288 (formerly BS 5308), EIL 6-52-45, ANSI MC 96.1, IEC 60584, IS 8784 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.
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. Thermocouple Extension cables are manufactured with Solid (16AWG, 18AWG, 20AWG) conductors depending on type of thermocouple i.e. K, E, T, J types as per ANSI MC 96.1, IEC 584 & IS 8784.

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) are offered.

INDIVIDUAL SCREEN
Twisted Pair or Triad are individually shielded with Aluminium-Mylar tape alongwith ATC Drain wire in continuous contact with Aluminium 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 / Multitriad are laid up together and are shielded with Aluminium-Mylar tape alongwith ATC Drain wire in continuous contact with Aluminium side of the tape. Shielding of Copper tape can also be provided to meet specific requirements.

INNERSHEATH
Extruded PVC / LSZH innersheath is applied as a protection over the laid up pairs / triads.

ARMOUR
Galvanized steel wire or strip are applied spirally over innersheath 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 750°C for 3 hours as per IEC 60331.
GENERAL PARAMETERS FOR INSTRUMENTATION CABLES

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNIT</th>
<th>0.5 mm²</th>
<th>0.75 mm²</th>
<th>1.0 mm²</th>
<th>1.5 mm²</th>
<th>2.5 mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum D.C. Resistance of plain copper conductor at 20°C</td>
<td>Ω/km</td>
<td>39.7</td>
<td>26.5</td>
<td>18.5</td>
<td>12.3</td>
<td>7.56</td>
</tr>
<tr>
<td>Maximum D.C. Resistance of Tinned copper conductor at 20°C</td>
<td>Ω/km</td>
<td>40.5</td>
<td>27.0</td>
<td>18.9</td>
<td>12.5</td>
<td>7.7</td>
</tr>
<tr>
<td>Maximum D.C. Resistance of 0.5mm² ATC Drain wire at 20°C</td>
<td>Ω/km</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Maximum mutual capacitance core to core (PVC insulated)</td>
<td>nF/km</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Maximum mutual capacitance core to core (PE, XLPE insulated)</td>
<td>nF/km</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
</tr>
<tr>
<td>L/R ratio maximum</td>
<td>μH/ohm</td>
<td>25</td>
<td>25</td>
<td>30</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>Electrostatic Noise Rejection Ratio as per IEEE Vol3 (minimum)</td>
<td>dB</td>
<td>76</td>
<td>76</td>
<td>76</td>
<td>76</td>
<td>76</td>
</tr>
<tr>
<td>Minimum Insulation Thickness</td>
<td>mm</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Minimum Insulation Resistance at 27°C (PVC insulated) at 500V</td>
<td>MΩ/km</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Minimum Insulation Resistance at 27°C (XLPE, PE insulated) at 500V</td>
<td>MΩ/km</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>High Voltage test</td>
<td>kV</td>
<td>1kV for 1 minute</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Instrumentation cables can be specially designed to meet specific requirements of Capacitance, L/R ratio etc.
### GENERAL DETAILS FOR THERMOCOUPLE EXTENSION & COMPENSATING CABLES

<table>
<thead>
<tr>
<th>TYPE</th>
<th>CONDUCTOR COMBINATIONS</th>
<th>ANSI MC 96.1</th>
<th>IS 8784</th>
<th>IEC 60584-3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>COLOUR CODE</td>
<td>EMF TOLERANCE ± °C</td>
<td>COLOUR CODE</td>
</tr>
<tr>
<td></td>
<td>+VE</td>
<td>-VE</td>
<td>+VE</td>
<td>-VE</td>
</tr>
<tr>
<td>Kx</td>
<td>Nickel-Chromium (Chromel)</td>
<td>Yellow</td>
<td>Red</td>
<td>2.2</td>
</tr>
<tr>
<td>Ex</td>
<td>Nickel-Chromium (Chromel)</td>
<td>Purple</td>
<td>Red</td>
<td>1.7</td>
</tr>
<tr>
<td>Tx</td>
<td>Copper</td>
<td>Copper-Nickel (Constantan)</td>
<td>Blue</td>
<td>Red</td>
</tr>
<tr>
<td>Jx</td>
<td>Iron</td>
<td>Copper-Nickel (Constantan)</td>
<td>White</td>
<td>Red</td>
</tr>
<tr>
<td>Vx (KxA)</td>
<td>Copper</td>
<td>Copper-Nickel (Constantan)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rxa / Sxa</td>
<td>Copper</td>
<td>Copper-Nickel (Constantan)</td>
<td>Black</td>
<td>Red</td>
</tr>
</tbody>
</table>

### MAXIMUM D.C LOOP RESISTANCE FOR THERMOCOUPLE CONDUCTORS AT 20°C Ω/KM

<table>
<thead>
<tr>
<th>CONDUCTOR SIZE</th>
<th>Kx</th>
<th>Ex</th>
<th>Tx</th>
<th>Jx</th>
<th>Vx (KxA)</th>
<th>Rxa / Sxa</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 AWG (1.29mm)</td>
<td>746</td>
<td>905</td>
<td>385</td>
<td>475</td>
<td>385</td>
<td>110</td>
</tr>
<tr>
<td>18 AWG (1.02mm)</td>
<td>1210</td>
<td>1470</td>
<td>623</td>
<td>770</td>
<td>623</td>
<td>175</td>
</tr>
<tr>
<td>20 AWG (0.81mm)</td>
<td>1910</td>
<td>2311</td>
<td>980</td>
<td>1212</td>
<td>980</td>
<td>280</td>
</tr>
</tbody>
</table>
QUALITY, ENVIRONMENTAL & SAFETY SYSTEMS

BUREAU VERITAS Certification

KEC INTERNATIONAL LIMITED
RPG CABLES, MYSORE
349 / 350, HEBBAL INDUSTRIAL AREA, BELAVADI POST, HOOTAGALLI, MYSORE – 570 018, KARNATAKA, INDIA.

Bureau Veritas Certification certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below.

Standards


Scope of certification

1) DESIGN, DEVELOPMENT AND MANUFACTURE OF POLYETHYLENE INSULATED JELLY FILLED CABLES (PUF) AND OPTICAL FIBRE CABLES (OFC) FOR TELECOMMUNICATION AND INDUSTRIAL APPLICATIONS.

2) DESIGN, DEVELOPMENT AND MANUFACTURE OF POLY VINYL CHLORIDE (PVC) AND CROSS LINKED POLYETHYLENE (XLPE) INSULATED ALUMINIUM AND COPPER CABLES FOR CONTROL, LT POWER TRANSMISSION AND DISTRIBUTION APPLICATIONS.

3) DESIGN, DEVELOPMENT AND MANUFACTURE OF POLY VINYL CHLORIDE (PVC), CROSS LINKED POLYETHYLENE (XLPE) AND POLYETHYLENE (PE) INSULATED COPPER CABLES FOR INSTRUMENTATION, TRANSMISSION AND SIGNALLING APPLICATIONS.

Certification cycle start date: 14 December 2013
Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on: 13 December 2016
Original certification date: 14 December 2013

Certification Authority
R. K. Sharma - Director

Certification body address:
Brindon House, 180 Borough High Street, London SE1 1LB, United Kingdom

Local office: “Manavam Centre” 8th Floor, Krishna, Manav Mang, Opp. Asia Industrial Estate, Off Salt Lake Road, Andheri (East), Mumbai – 400 072, India.

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization.
To check the certificate validity please call +91 22 6696 9300.
### HEAD OFFICE:

**Mumbai**  
6th floor, RPG House,  
463, Dr. Annie Besant Road,  
Worli, Mumbai - 400030  
+91 22 66670300  
powercables@kecrpg.com

### MANUFACTURING UNITS:

**Vadodara**  
Plot No. 803, Samlaya Savli Road,  
Village Godampura, Taluka- Savli,  
Vadodara, Gujarat - 391520  
+91 267 6398529

**Silvassa**  
273/4, Demni Road,  
Silvassa - 396 193 (D&NH).  
+91 260 6618500/2668518

**Mysore**  
349, Hebbal Industrial Area,  
Hootagalli, Belavadi Post,  
Mysore - 570 018  
+91 821 6559938/6553375

### SALES OFFICES:

**New Delhi**  
8th Floor, Building 9A,  
DLF Phase-III, sector-25,  
Gurgaon-122002, Haryana, India  
+91 0124 6757735  
newdelhicables@kecrpg.com

**Kolkata**  
12, Park Street, Queens Mansion,  
1st Floor, Flat No. 22E, Gate No.3,  
Kolkata - 700 017  
+91 33 64590652/54  
kolkatakables@kecrpg.com

**Chennai**  
No.27, Sudharshan Building,  
6th Floor, Whites Road,  
Chennai - 600 014  
+91 44 42089317/318  
chennaicables@kecrpg.com

**Bengaluru**  
No 37/7, Namdev garnet,  
Ground Floor, Aga Abbas Ali Road,  
Off Halasur Road,  
Bangalore - 560 042  
+91 80 40670 6623/24  
bengalurucables@kecrpg.com

**Vadodara**  
307, B, Atlantis, Besides  
Central Square, Sarabhai Main  
Road, Vadodara - 390 007  
+91 265 231 1011  
vadodaracables@kecrpg.com

**Pune**  
Flat No.9, "KSHITIJ ", 1st Floor,  
769/6, Lane No.7, Prabhat Road,  
Deccan Gymkhana, Pune - 411 004.  
+91 20 25650414  
punecables@kecrpg.com

**Hyderabad**  
103, 1st Floor, Shagrilta Plaza,  
Plot No. 14 Road No. 2, Banjara Hills  
Hyderabad - 500 033.  
+91 40 2355 2959  
hyderabadcables@kecrpg.com

**Mumbai**  
Spencer's building, Old J & J office  
Forjett Street, Near Bhatia hospital,  
Tardeo, Mumbai - 400036.  
+91 22 66406430/67180000  
mumbaicables@kecrpg.com

**Exports**  
6th Floor, RPG house,  
463, Dr. Annie Basant Road,  
Worli, Mumbai - 400030.  
+91 22 666 0300  
exportscables@kecrpg.com

### RESIDENT REPRESENTATIVES:

**Dehradun**  
dehraduncables@kecrpg.com

**Rajasthan**  
rajasthancables@kecrpg.com

**Ranchi**  
ranchicables@kecrpg.com

**Bhopal**  
bhopalcables@kecrpg.com

**Bhubaneswar**  
bhubaneswarcables@kecrpg.com

**Ahmedabad**  
ahmedabadvicables@kecrpg.com

**Nagpur**  
nagpurcables@kecrpg.com

**Visakhapatnam**  
visakhpaticables@kecrpg.com

**Coimbatore**  
coimbatorecables@kecrpg.com

**Cochin**  
cochincables@kecrpg.com