Volume 3, Issue 1

RPG CABLES
(A Division of KEC International Limited)
Your Vital Link

C2C
CABLES TO CUSTOMERS

www.rpgcables.com

September 2010

INSIDE

Growth is our new mantra. Coming out of a testing restructuring, we are bullish about the future. So much so, that we are making significant investments in Greenfield capacities in Gujarat for manufacturing cables up to 220kv.

50th Anniversary

Today, we are 50 years young. With the ambition and zeal of an energetic youth, we are looking forward to the next 50 years of unparalleled growth that New India represents.

FROM THE ED's DESK

My dear friends,

RPG Group have recently launched "Mission 2x2x3" - its goal: to achieve 2 times the turnover and profits in 3 years. At RPG Cables too, growth is the new mantra: in revenues, profits, plant capacities & people. Having completed a difficult financial restructuring, we are now poised for growth.

We have recently acquired a large plot of land in Gujarat, where a new facility will be constructed over the next 12 - 15 months to manufacture Cables up to 220 kv. Our team will be in touch with you to explain the benefits arising out of this state-of-the-art facility.

Quality & timely deliveries remain our forte; from Kaizens & TQM, to CFTs & 5S, we are looking at continuous improvements that will not only improve product quality, but also productivity, which, we expect, will benefit our customers.

We are also seeing a renewed interest in our Telecom products - both copper & fibre, both in India & outside. There is life in this business, still.

The festive Season is upon us. Best Wishes to all our readers!

Sincerely,

Nikhil Gupta

KEC RPG

CABLE TESTING METHODS

Cables are usually buried underground and are designed to have a long life to avoid digging for replacement of these cables. Accordingly, it is critical to ensure quality in all aspects of cable manufacturing. The finished cable is subjected to various tests, both at our factory and in independent laboratories to ensure highest standards of quality.

Testing of cable is primarily aimed at two aspects:

(a) whether the design of cable will perform satisfactorily over its life-time and

(b) whether the cables are manufactured to meet relevant specification requirements for quality.

The tests to be carried out on each type of cable are included in the respective IS, IEC or BS standards. For some tests complete details are given in the cable standard, but in some cases it is very important to note, many cross-references are required to be made to separate standards for tests, often for details of the method of testing and sometimes also for the requirements to be met.

All national and inter national standards for testing can be categorized in four parts:

(a) ROUTINE TESTS - By the manufacturer on every finished length of cable to ensure compliance with construction requirements and demonstrate the integrity of the cable;

(b) ACCEPTANCE TESTS - Which are not practicable on every complete length of cable; they are made on samples of cable to represent production batches and provide a periodic check on manufacturing consistency;

(c) TYPE TESTES - To be carried out during the development of a new grade of insulation or cable design to establish performance characteristics; they are not repeated unless changes are made which could alter these characteristics;

(d) SITE TESTS - After installation made to demonstrate the integrity of the cable and its accessories as installed.

Additionally, tests on materials used in the cable manufacturing can be demanded by the user of cable and included in the Type Tests. There are standard methods of tests for the purchased materials by the cable manufacturer.

IMPORTANCE OF SOME INDIVIDUAL TESTS FOR CABLES

DIMENSIONS

Accurate dimensions are critical for the long term performance of cable. Dimensions of all materials used in manufacturing of cable should be maintained with great care as it indicates the technique and equipment used in manufacturing to get the highest desired quality of cable.

INSULATION RESISTANCE (IR) AND CAPACITANCE

Numerical values for Insulation Resistance and Capacitance gives exact guidance on the quality of cables because they are predominantly related to the dielectric strength and purity of insulating material used and the processing conditions. These tests results are good indications of consistency and precautions taken in process of manufacture.

HIGH VOLTAGE TESTS (HV)

Application of a high voltage provides the most searching test for any defects. The measurement of partial discharge during the HV test is more significant. The test voltage levels for the testing of respective voltage class are specified in corresponding standards. The applied voltage level and repeated voltage application always poses a problem because

(a) if voltage is too high it could cause incipient damage which might affect subsequent service life and

(b) breakdown under high voltage is time dependent.

PARTIAL DISCHARGE TESTS (PD)

Partial discharges in a cable are caused by the breakdown of the gas contained within voids in the insulation. The voids may be either dielectric bounded or at the interface between dielectric and semi-conducting screens. The stress in the void is directly proportional to the relative permittivity of the insulation and, because the breakdown strength of a gas is much less than for solid insulation, the void can break down, causing discharges at voltages

much lower than the operating stress of the cable. All national and international specifications for cables recommends measurement of partial discharge and define the maximum level of discharge acceptable at particular test voltages.

IMPULSE VOLTAGE TESTS

Switching operations or lightning may cause high transient or surge voltages to appear occasionally on cable systems and the ability to accommodate them has become a normal part of type test procedures.

BENDING TEST

The ability of cables to bend during drumming and installation, without undue distortion or damage to any of the components, is an important requirement for any cable.

TESTS UNDER FIRE CONDITIONS

The tests, which relate to flame propagation on a single vertical cable, may be required on cables having appropriate types of outer sheath compounds. Flame propagation in cable installations depends upon the amount of cable in the location and the distance of the cables with respect to each other, as well as on the properties of the component materials. These tests also measure the amount of hydrochloric acid gas evolved during combustion of component materials.

LONG DURATION TESTS

Number of long duration tests are specified and designed, not only to predict life-time but to evaluate the long term performance of cables and enable discrimination between good and bad cable designs.

RECOMMENDED ROUTINE TESTS ON CABLES

1. Tests during manufacture In-process quality checks procedures
2. Conductor Resistance test
3. High Voltage test
4. Partial Discharge test for medium, high and extra high voltage cables

IMPORTANT ACCEPTANE TESTS

1. Measurements of Dimension - Measurement of dimensions, sincluding insulation, metallic and non-metallic sheaths and armour and Overall Diameter
2. Hot Set test - A test to check that the Insulation material has been properly cured to give the required thermal properties.

IMPORTANT TYPE TESTS

Electical Tests

(a) partial discharge test
(b) bending test
(c) impulse test

Non-electrical tests

(a) measurement of dimensions
(b) measurement of mechanical properties of the insulation and sheath materials before and after ageing
(c) ageing tests on complete cable samples to test compatibility between materials
(d) specific tests for the insulation material
(e) specific tests for the sheath material
(f) semiconducting screen strippability test
(g) water penetration test for longitudinally water blocked designs
(h) the amount of contamination in the insulation and for measurement of void content.

CONCLUSION

It is strongly recommended to conduct the above tests on the cable before it is put into operation, primarily to confirm that the cable Is manufactured with quality raw materials; is manufactured under consistent processing methods; is manufactured to meet relevant specified requirement of quality; and will perform satisfactorily for the specified life-time.

Ref : Electric Cables Handbook BICC Cables

CABLES DESIGN FUNDAMENTALS

In all engineering products, economical, technical, commercial and practical aspects are taken into consideration to establish the optimum solution or design. For the transmission, distribution and utilisation of electrical power, the choice normally lies between the use of overhead lines and underground cables.

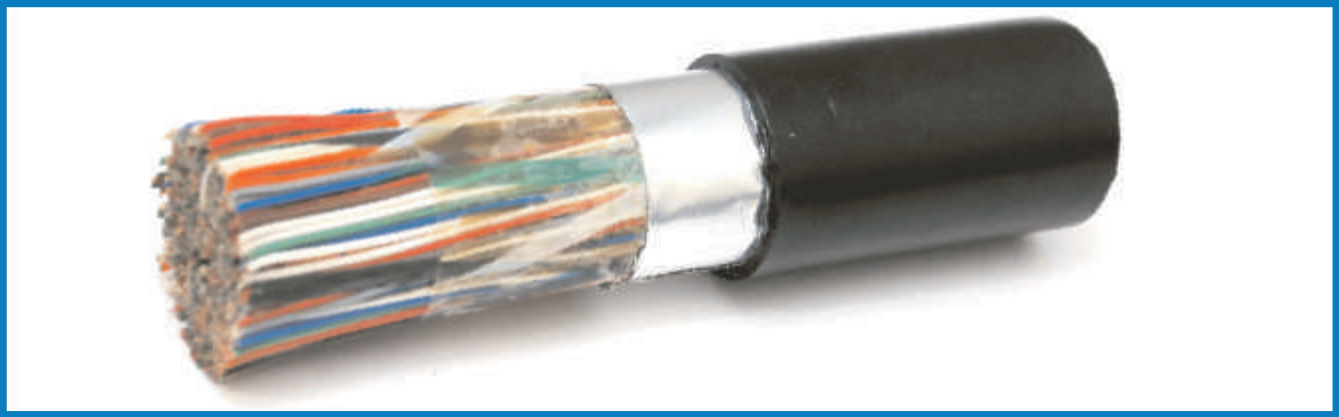
For economic reasons, overhead lines are used extensively for the transmission and distribution of electricity in rural areas whereas, in urban areas it is more usual to install underground cables for safety and aesthetic considerations. The utilization of electricity in various manufacturing units, factories, power plants, railways premises, airports, domestic premises and many other locations is also mainly by cables as they provide the most practical means of conveying electrical power. Cable design varies enormously to meet the diverse requirements based on its utilization, but there are certain components which are common to all cables.

All types of transmission and distribution electric cables consist essentially of a low resistance conductor to carry the current and insulation to isolate the conductors from each other and from their surroundings. In several types, such as single-core cables, the two components form the finished cable, but generally as the voltage increases the construction becomes much more complex. Other main components may include screening to obtain a radial electrostatic field, a metal sheath to keep out moisture or to contain a pressurizing medium, armouring for mechanical protection, corrosion protection for the metallic components and a variety of additions extending, for example, to internal and external pipes to remove the heat generated in the cable.

Generally, following points are considered in the basics of designing of cables:

- ✓ **VOLTAGE GRADE**
- ✓ **CONDUCTOR RESISTANCE**
  - D.C. resistance
  - A.C. resistance
- ✓ **INDUCTANCE**
- ✓ **REACTANCE**
- ✓ **IMPEDANCE**
- ✓ **INSULATION RESISTANCE**
- ✓ **CAPACITANCE**
  - Single-core cables
  - Three-core cables
- ✓ **DIELECTRIC POWER FACTOR (DIELECTRIC LOSS ANGLE)**
- ✓ **ELECTRICAL STRESS DISTRIBUTION AND CALCULATION**
  - A.C. stress distribution in single-core and screened multicore cables
  - Stress at conductor and insulation
  - D.C. stress distribution
- ✓ **FIELD CONTROL**
- ✓ **SOURCES OF ELECTRICAL LOSSES**
  - Conductor losses
  - Dielectric losses
  - Sheath losses
  - Sheath eddy current loss
  - Sheath circuit loss
- ✓ **BREAKDOWN VOLTAGE INSULATION**
- ✓ **ELECTROMAGNETIC FIELDS**

Each of the above has a bearing on the constitution and design of the Cables you buy. These will be covered in the next edition of C2C. Watch this space!



FOAM SKIN INSULATED COPPER TELECOMMUNICATION CABLES

While solid skin insulation is more common in India, Foam Skin is generally used as insulation for copper telecom cables in most of the Asian, African and European countries. These cables are designed to be used in both trunk and local access network from exchange to subscriber area. They are suitable for installation in ducts, direct burial (armoured cables) and aerial deployment with integral suspension strand (Figure.1) construction.

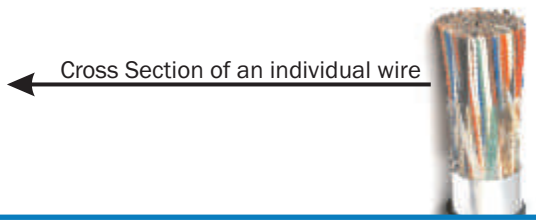
The typical construction of these cables include twisted pairs, with varying lay lengths, to minimize cross talk, assembled in 10, 20 or 25 pairs units as per customer specific requirements, identified by color coded binders. The core interstices are filled with purified and homogeneous Petroleum Jelly for water resistance and are wrapped with non hygroscopic polyester tape helically or horizontally with an overlap. The core wrapping provides dielectric protection between conductors and the poly - aluminum laminate that is applied longitudinally over the wrapped core. The Poly - aluminum laminate provides electrical shielding and also acts as a moisture barrier.

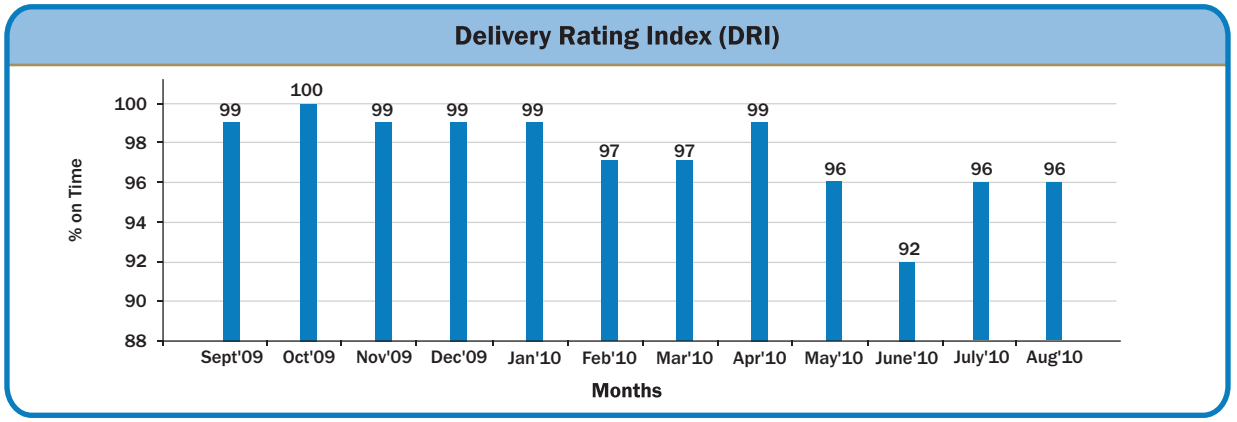
At its Mysore plant, RPG Cables has facilities for making Foam skin insulated cables with conductor diameter of 0.4 to 0.9 mm. Foam Skin insulation is essentially an inner cellular layer and an outer solid skin conforming to ASTM D 1248/IEC 60708.

We also have facilities for application of corrugated Poly aluminium laminate as per REA PE -89 specs as well as normal longitudinal application as stipulated in Indian specs GR C-CUG 01/03 August 2003. Direct burial cables can be armoured either with Corrugated co-polymer coated steel tape of 0.15 m thickness or galvanized steel tapes of varying thickness as per customer specification.

Development of all these facilities and capabilities to manufacture cables to international specifications has lead to us exporting copper telecom cables to UAE, Oman, Afghanistan, Philippines, South Africa, Sri Lanka etc.

Fig 1. Foam/Skin Construction





An organization's ability to learn, and translate that learning into action rapidly, is the ultimate competitive advantage.

Giving people self-confidence is by far the most important thing that I can do. Because then they will act.

- Jack Welch

FROM THE NEWS DESK

SAE ACQUISITION

KEC international has signed a definitive agreement to acquire 100% of SAE Towers Holdings LLC (SAE Towers) a U.S. based company. Major highlights of the acquisitions are as follows -

- Builds a strong presence in North America & Latin America
- Acquires the largest lattice tower manufacturing company in these markets
- Becomes the largest lattice tower manufacturing company operating globally
- Purchase consideration on cash free, debt free basis is US$ 95 million

Headquartered in Houston, Texas, SAE Towers is the leading manufacturer of steel lattice transmission towers in the Americas with an annual production capacity of 100,000 metric tons. (Monterrey, Mexico - 35,000 MT & Belo Horizonte, Brazil - 65,000 MT). The Company also manufactures steel poles for electrical transmission as well as related hardware. SAE Towers currently has over 750 employees.

"This acquisition will strengthen KEC's global leadership position in the large and growing markets of North America and Latin America. SAE Towers has a significant presence in geographic areas which are of substantial interest to KEC. Going forward, we expect to leverage SAE Towers' existing customer relations for KEC's other business segments as well", said Mr Ramesh Chandak, Managing Director, KEC International Limited.

We look forward to working with SAE, its talented management team, employees and its respected customers. We are very proud to become the largest international tower manufacturing company in the world.

GREENFIELD FACILITY IN GUJARAT

We are pleased to inform our readers that our plans for setting up a Greenfield facility for manufacture of cables up to 220KV and expansion of our capacities recently got a boost with the acquisition of a large plot of land near Vadodra, in Gujarat.

Work on the project has started on an aggressive note and we expect to have the facility fully functional by September 2011.

This State-of-the-Art facility will not only result in better quality of products, but should also reduce costs for our customers and investors.

For additional information/details/queries and to subscribe to C2C please write to:
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