Product Testing

Caledonian has made major investment in the testing facilities for its MV cables factory. We have equipped ourselves with the latest and most advanced cable testing facility available in the world.
Our major testing facilities include:
a) DC withstand voltage test system from Hipotronics USA.
b) Partial discharge test system from Haefely, Switzerland.
c) HV test system from Haefely, Switzerland.
d) On line conductor resistance meter from Aesa, Switzerland
Effective quality assurance procedures are essential to ensure the consistency and long term reliability and performance of all products. Caledonian always recognises the importance of quality assurance and this commitment is reflected in the company achievement of ISO 9001 certification. The design validation for our MV Cables has been done at recognized international laboratories.
With the above state of the art Testing Facility, we can conduct all Type, Routine as well as Special Tests mentioned in IEC 60502 Part 2, BS 6622 & other international specifications, in-house. While 100% of the cables are tested for Routine Tests prior to dispatch, however upon customers' request, other Type/Special Tests can be carried out in house or by any third party laboratory.

The tests can be divided into different categories:

Type Tests
The type test is conducted by KEMA, Netherlands to validate a special cable design type. Electrical type tests include the following:
-Partial discharge test (IEC 60502 clause 18.1.3)
-Bending test (IEC 60502 clause18.1.4)
-Tan measurement (IEC 60502 clause 18.1.5)
-Heating cycle test (IEC 60502 clause 18.1.6)
-Impulse withstand test followed by a.c. voltage test (IEC 60502 18.1.7)
-High voltage test for 4 hours (IEC 60502 clause 18.1.8)
-Resistivity of semi-conducting screens (IEC 60502 clause 18.1.9)
Non-electrical type tests include the following:
-All non-electrical type tests as required by IEC 60502

Routine Tests
Routine tests are carried out on each finished length of cable to control the overall quality of the cable. They comprise:
-Measurement of dimensions.
-Measurement of conductor resistance: the D.C. resistance of each conductor, when corrected to 20°C and 1 Km, shall not exceed the appropriate maximum value specified in IEC 60228 respectively.
-Measurement of screen resistance.

-High voltage test: an a.c. voltage of 3.5 Uo shall be applied for 5 min between each conductor and metallic screen. No breakdown shall occur.
-Partial discharge test: the magnitude of discharge at 1.73 Uo shall not exceed 10pC.
-Measurement of dielectric losses and capacity.

Special Tests

Special tests are carried out on 10% of the lengths for each production lot, in any case on one length. They are carried out if major changes in design are introduced.
They comprise:
-Measurement of dimensions
-Checking sheath identification
-Testing shrinkage of PE sheath
-Conductor examination
-Carrying out Voltage test
-Carrying out hot set test for XLPE insulation

At Caledonian, quality assurance is an integrated part of the production process and maintained from order entry and manufacture through to testing, packaging and shipping. All quality assurance procedures are regularly audited by recognised quality organisations and all routine voltage testing is carried to more stringent levels than that required by international standards.

Specification for testing is designed in accordance to the following international standards:

-IEC 60502
-IEC 60811
-BS 5368
-DIN 56283/VDE 0273
-EDF HN 33-S-23
-AS&JIS
-ASTM
-etc.

We have also installed many in line devices/facilities for checking the product quality during the manufacturing process like the X-ray machine installed in the CCV line, Curing Optimization Software, etc, to avoid any risk or failure & to ensure a long service life for our products. With these modern equipment & facilities, we ensure to maintain close manufacturing tolerances, high accuracy to customer specifications as well as effective monitoring of the entire manufacturing process to offer a world class product.

The following In-Process Testing is conducted during the cable manufacturing :

- **Tandem Line**
  - Visual and physical tests
  - Electrical tests
  - Resistance & resistance unbalance tests
  - Open & short circuit test

- **High Voltage Test**
  - Group Twinner
    - Visual & physical tests
    - Electrical tests
  - Resistance & resistance unbalance tests
  - Mutual capacitance test
  - Open & short circuit test
  - Insulation resistance test

- **Sheathing**
  - Dimensional test
  - Water penetration test
  - Spark test
  - Overlaps & seal bonding inspection

- **Armoring**
  - Dimensional test
  - Visual inspection

- **Jacketing**
  - Dimensional test
  - Overlap inspection
  - Spark test

- **Final Testing**
  - Routine testing
  - Resistance & resistance unbalance tests
  - Mutual capacitance test
  - Transmission test
  - Capacitance & capacitance unbalance tests (pair to pair and pair to ground)
  - Attenuation & cross talk tests.