ELAND® CABLES

Cheat Sheet: Coil End Leads

INTRODUCTION

Coil End Leads are designed as power leads for permanent connection to the electromagnetic coils of motors, generators, transformers circuit breakers, and actuators. They're used extensively for trailing and flexible supply leads, as well as Generator Leads, in renewable energy and other heavy duty flexing applications. Manufactured to BS 6195 Type 4 with voltage categories A, C, D, E and F. The cables are ideal for installations that require a resistance to oil and heat, and offer resistance to high temperature, flame propagation, varnish and solvents. Type 4C is the most commonly specified.

CONSTRUCTION

- Class 5 flexible tinned copper conductor
- Insulation: 4A, 4C: EPR Type FR1
- Insulation: 4D, 4E, 4F: EPR Type FR2
- If required, a tape or tapes shall be applied over the conductor.
- Sheath: CPE (Chlorinated Polyethylene) rubber compound.

In the case of voltage categories E and F, if a tape is used it shall be a semi-conducting tape consisting of a textile fabric proofed with a suitable semi-conducting compound. The colour of the inner layer for Type 4 cable shall be of a contrasting colour to that of the outer layer. The sheath colour is black.

Temperature Rating

- Fixed: -40°C to +90°C
- Flexed: -30°C to +80°C

Voltage Rating

- Type 4A: 300/500V
- Type 4C: 600/1000V
- Type 4D: 1.9/3.3kV
- Type 4E: 3.8/6.6kV
- Type 4F: 6.35/11kV

WHERE TO USE COIL END LEAD CABLES

- Panel Wiring
- Switchgear
- Battery System
- Cable Harness / Cable Preparation
- Electrical Machinery
- Power Leads for Permanent Connection
- Wind Generator Systems

Despite being flexible, Coil End Lead to BS 6195 also provide positional stability. They are suitable for electrical machinery and panel wiring. They can be used as alternative to Tri-Rated and Bi-rated cables in some applications.

FREQUENTLY ASKED QUESTIONS

Why are there different voltage categories?

The cables are divided into the voltage categories, which are defined by the appropriate maximum voltage between conductors, or between conductor and earth, to which the cable is liable to be subjected during a 1 min test of the equipment to which it is connected.

- Type 4A does not exceed 2.5kV
- Type 4C does not exceed 4kV
- Type 4D does not exceed 9.5kV
- Type 4E does not exceed 17kV
- Type 4 F does not exceed 27kV

What is the purpose of the tape?

A tape may be included for Type 4A, 4C & 4D for separation purposes. Type 4E & 4F are for high voltage applications and a semi conductive tape is required. Their primary function is to equalise the field current around the conductor and to ensure electrical contact with the earthing system. This reduces the electrical stress on the insulation material and enhances performance.

Why are Coil End Leads varnish resistant?

Insulating varnishes are used to ensure electrical devices, including motors, generators, transformers, sensors and other devices that function by electromagnetic induction, have the necessary electrical insulation and structural integrity for operation. When used in coil windings, the coil end lead cables are exposed to insulating varnishes and therefore need to be varnish resistant.

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FREQUENTLY ASKED QUESTIONS

How do we know it is varnish resistant?
BS 6195 contains a test for varnish resistance. The sample is heated at 150°C for 24 hours, immersed in varnish for 1 hour and then heated at 150°C for 1 hour. The insulation shall show no signs of swelling, cracks or other deterioration after the bending, and no breakdown of the insulation after the application of a test voltage.

What is a trailing lead cable?
A 'trailing lead' simply refers to the cable that is attached to some piece of equipment. Usually, this means that the lead / cable is permanently attached to the equipment imagine you are carrying the piece of equipment around, and the lead 'trails behind'!

What is the difference between FR1 & FR2 insulations?
FR1 and FR2 are both flame retardant cross-linked insulation materials. Both Materials have a designated maximum operating temperature of 90°C. The difference between the materials is that FR2 is subjected to Ozone resistance.

What is Ozone Resistance?
Concentrations of ozone, that are reached in our natural environment, are able to cause deep cracks in elastomeric materials, that normally lead to a failure of a component. Ozone testing is a method used to determine a rubber or elastomer's resistance to ozone degradation. The elastomer samples are placed in a special chamber that exposes them to ozone at concentration and duration specified by a testing specification or standard. A sample that does not stand up to the effects of ozone exposure will crack at the surface and sometimes break in two.

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