

BASICS OF FLAME RETARDANT CABLE DESIGNS

THE OXYGEN INDEX TEST

A key design feature for cable constructions judged to be flame retardant is the oxygen index characteristic.

Cable constructions used in exposed areas must not be capable of transmitting flame throughout the facility. Cable industry flame qualification procedures test cable samples to a variety of flame exposure scenarios. One of the cable construction variables that must be identified for the cable design engineer is the oxygen index of each of the cable components.

The Oxygen Index Test (OI) is a precise laboratory test procedure to evaluate insulation and jacket materials by determining the minimum oxygen concentration required to support flaming combustion. Testing is performed in accordance with the procedures of ASTM D2863-97; this standard addresses plastic materials, but is certainly useful for the evaluation of all types of insulation and jacket materials that are subject to fire hazard criteria.

The Oxygen Index is determined by igniting a defined insulation or jacket specimen in a known oxygen/nitrogen atmosphere and observing whether flaming combustion can be sustained. Tests are repeated adjusting the oxygen content until the threshold of sustained combustion is attained. At this condition the oxygen index (oxygen concentration) is calculated as the per cent oxygen content of the oxygen/nitrogen atmosphere. The higher the OI value the more resistant to burning the material is in this OI defined test protocol.

Typical values for thermoset halogenated jacketing materials, such as Okolon, that exhibit good performance in vertical tray flame tests are in the 30 to 35% ranges. Flame retardant Okoseal (PVC) jackets have oxygen indices in the upper 20's to lower 30's. Flame retardant non-halogenated Okoclear jackets (LSZH) have OI's in the upper 30's to lower 40's.

A high oxygen index does not guarantee the best end use fire performance. The oxygen index is a property that is determined under controlled laboratory conditions, it should not be used to describe fire hazard or fire risk of materials in general. It provides the opportunity to quantify a characteristic. It is most effective

when evaluating materials of similar types i.e. Hypalon to Hypalon, PVC to PVC, Neoprene to Neoprene, etc.

An effective flame retardant construction begins with the knowledge of the Oxygen Index characteristic leading to the best selection of cable components and the flame retardant cable construction.

George Dobrowolski
Manager - Low Voltage Engineering Lab

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An oxygen index test being conducted in Okonite's Materials Laboratory. This test, in conjunction with other evaluation data, enables the proper selection of insulating/jacketing materials for use in areas where a potential fire risk exists.