

## Fire Performance Tests

### Flame Propagation Tests

#### IEC 60332-1

##### Part 1 - Test on a single vertical insulated wire or cable

This is a relatively simple method for providing adequate indication of the flame-retardant characteristics of a single cable.

A 600 mm long cable sample is vertically suspended, placed in the middle of a three-sided metal screen.

This is subjected to the regulated flame of one (up to a cable diameter of 50 mm) or two (above 50 mm diameter) gas burners at an angle of 45° to the cable. The flame is applied for a continuous time calculated according to an increasing with the cable weight (from around 1-minute for a small control cable to about 7 minutes for a 4 core 300 mm<sup>2</sup> power cable). The test is passed if the cable has self-extinguished and the charred or flame affected portion of the cable has not reached the top of the sample.

#### IEC 60332-3

##### Part 3 - Test on bunched wire or cables

This test was developed to obtain a method to determine the flame propagation characteristics of bunched cables.

It can not be assumed that because a single vertical cable complies with the requirements of IEC 60332 part 1 it will also behave in a similar manner when bunched with others cables.

The propagation of a flame along a bunch of cables depends on a number of features, such as :

- The volume of combustible material exposed to the fire
- The geometrical configuration of the cables
- The temperature at which it is possible to ignite any gases emitted from the cables
- The quantity of combustible gas released from the cables
- The volume of air passing through the cable installation

The test consists of a vertical chamber, 1 x 2 x 4 m. Openings air inlet and outlet are provided in the base and the top of the test chamber for a controlled air flow rate during the test. The cable samples to be tested are 3.5 m long and fixed to a steel ladder mounted 150 mm from the rear wall vertically with the test chamber. The number of lengths of cables in the test depends on the test category based on the volume of combustible material.

Test Category	Volume of combustible material	Time of flame application
A	7 litres / m	40 Minutes
B	3.5 litres / m	40 Minutes
C	1.5 litres / m	20 Minutes

A ribbon gas burner of a set size and heat flow rate, operating at 800°C is mounted horizontally in front of the cable samples at a set distance and height. The test is passed if the charred or affected portion of the samples have not reached a height exceeding 2.5 m above the bottom edge of the burner.

#### IEC 60331 - 21 (1999)

##### Fire resisting characteristics of electric cables Circuit Integrity Test

This test determines the circuit integrity of a cable during and after a prolonged fire :

A horizontally suspended sample 1200 mm long is placed 75 mm above a 610 mm long ribbon type gas burner, the flame temperature of which is regulated to 750°C. The conductors of the sample are connected to an AC voltage source, at the operating voltage, via fuses. The flame and test voltage shall be applied continuously for a period of 90 min. 12 hours after the flame has been extinguished the cable is energised again.

The test is passed if no failure of any of the fuses occurs.