

## *Fire classification in accordance with British Standards*

The British Standard which deals with thermal insulation materials is BS 5422:1990. (in the temperature range -40 °C to +700 °C )”.

For domestic applications the Standard recommends that:-

1. All Materials shall be tested in accordance with the relevant sections of BS 476: Part 12.
2. When tested in accordance with BS 476: Part 7 the complete assembly of materials as installed shall achieve a Class 1 spread of flame.

The BS 476 Part 5 is now obsolete and has been withdrawn although it is still quoted in BS 5422.

BS 476 Part 12 : 1991. “Method of test for ignitability of products by direct flame impingement”. The test specifies seven ignition sources and flame application times from 1 to 180 seconds.

The BS 476 Part 7 test measures the lateral spread of flame along the surface of the specimen in the vertical position. The classification system is based on the rate and extent of flame spread. The levels of irradiance are specified in the Standard, e.g. 32.5 kW/m<sup>2</sup> at 75 mm measured along the sample which is placed at right angles to the radiant heat source.

To achieve a Class 1 classification the flame spread after 1.5 and 10 minutes must be less than 165 mm.

The main materials used are nitrile elastomerics, which achieve the Class 1 classification of BS 476: Part 7, and Polyethylene's, which meet the appropriate sections of BS 476: Part 12.

In terms of the severity of the above tests, the Part 12 test is the minimum requirement that should be met by all materials while the Part 7 test requires a higher standard in terms of material specification.

Where even higher standards of fire performance may be required, i.e. hospitals, schools, old peoples' homes, etc., the fire performance requirement should meet the Class O classification of the Building Regulations.

To satisfy the Class 'O' classification the material, in addition to meeting the Class 1 of BS 476 Part 7, must meet certain performance criteria of the BS 476 Part 6 test.

The BS 467 part 6 test indicates the performance of a material in the early stages of a fire and the test result is a Fire Propagation Index which is dependent on the ignition characteristics, the amount and rate of heat release and the ability of a material to accelerate fire growth. The lower the Index then the better the resistance of a material to fire growth.

The sample, size 225 x 225 mm is mounted vertically and held so that a row of small gas jets is held 3 – 4 mm away from the surface. Two electrical resistance heaters, each 1500 watts are situated above and behind the gas burners. The gas is ignited for 2 3/4 minutes before the electric heaters are switched on. The test is run for 20 minutes. The test measures the temperature of the exhaust gases under defined conditions. The apparatus is calibrated to give a standard time/temperature curve then, after cooling, the sample is tested.

Fuel from the sample gives another time/temperature curve where the increase in temperature with time will be greater. A calculation is carried out so that the mean temperature readings between the material and calibration curves is calculated at ½ minute intervals up to 3 minutes, at 1 minute intervals from 4 to 10 minutes , and at 2 minute intervals from 10 to 20 minutes. This gives greater weight to the heat given off by the sample burning in the earlier stages of the test. For the 3 stages the value of sub-index,  $i$ , is calculated and the sum of the three  $i$  values gives  $I$ , the Fire Propagation Index.

To achieve the class O classification requires:-

- AND
1. BS 476 Part 7 (Surface spread of flame) Class 1.
  2. BS 476 Part 6 (Fire propagation).

Total index of performance ( $i^1$ ) to be less than 6.

Class 'O' Cablelay achieves this Standard.