

# Fire Rated

## Fire Testing of Junction Boxes

When installing essential systems such as emergency lighting or fire safety controls, great emphasis is placed upon the fire survivability of the critical components such as fire dampers, actuators and cables that are contained in the area. Often the specification of the junction boxes is neglected with respect to fire survival. On the basis that any system is only as good as the weakest part, it is important that attention is paid to the junction boxes being utilised for essential systems. ABTECH have many years experience of ensuring the fire survival of junction boxes using both the SX and BPG ranges. We have supplied major projects worldwide with fire rated junction boxes including the Channel Tunnel, Dartford Tunnel and the Tengiz Oil Refinery in Kazakhstan to name but a few.

Since there are no recognised tests applicable to junction boxes, it was decided to test the enclosures to the same specification as the cable. At the time of the test (1990) the two main tests for electrical cables were IEC331/1970 and BS6387/1983.

In IEC331 a cable test is conducted in which the samples are subjected to flame at a temperature of 750°C (1382°F) for a period of 3 hours with the electrical system fully functional before, during, and after the test. This test was carried out on both the SX (stainless steel) and BPG (glass reinforced polyester) ranges containing nylon, melamine and ceramic terminals.



After the test it was found that the body of the nylon terminals had disappeared completely, the melamine body had taken on the appearance of biscuit (because the wood filling had burnt away) and only the ceramic bodied terminal appeared to be intact.

Without cleaning or disturbing the terminals in any way, a flash potential of 5kV was applied between the copper conductor and the terminal rail, which passed without break-down.

Since the IEC331 standard only partly dealt with the requirements of real-life situations, it was decided to conduct additional testing to an alternative standard – BS6387/1983.

This test is performed in a similar way to IEC331/1970 with the specimen under test being suspended 75mm (approximately 3") above a flame, the temperature of which is maintained at 950°C (1742°F) for 3 hours. During this period the cable and junction box is supplied with power. In order to pass the test, both components must be fully functioning after the period has elapsed.



On the successful conclusion of this test, which is designated "fire-alone" BS6387'C', the next test is to mount the sample (still powered-up) on a flat vertical surface and to apply flame at a temperature of 950°C (1742°F) (by means of a flame gun) whilst at the same time striking the board on which the sample is mounted with a 25mm (1") diameter iron bar every 30 seconds for a period of 15 minutes. This is designated the "impact test" BS6387 'Z'.

Finally, a "fire with water test" is applied but only at a temperature of 650°C (1202°F). The sample is subjected to flame at 650°C for 15 minutes after which a water spray is applied for 15 minutes and at the culmination of this test the system is required to be completely functional, this test being designated BS6387 'W'.

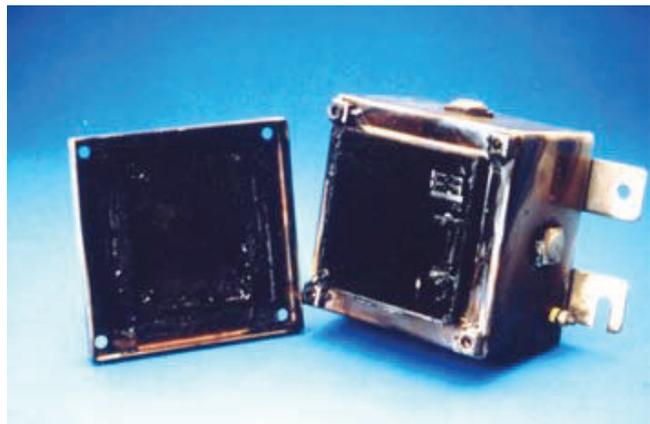
The SX range of enclosures passed all the tests applicable to BS6387 i.e. C, Z & W however, it was decided that the BPG range would only be submitted to the flame test 'C', which it passed.

In conclusion, the ABTECH SX and BPG ranges, when fitted with ceramic terminals, are suitable for use in areas which are designated to require fire resistant cables. The type of enclosure to be used will depend on the individual circumstances of the area and advice on the most suitable enclosure should be sought from the ABTECH Technical Department.

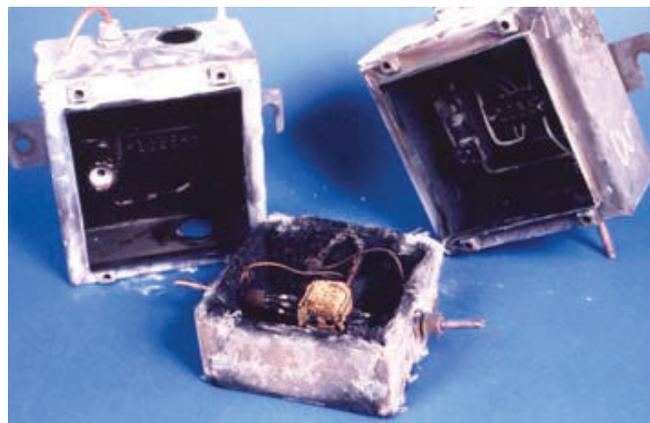
Enclosure Type	IEC 331 750°C (1382°F) for 3 hours (Flame Only)	BS6387 'C' 950°C (1742°F) for 3 hours (Flame Only)	BS6387 'Z' 950°C (1742°F) for 3 hours (External Impact)	BS6387 'W' 950°C (1742°F) for 3 hours (Water Spray)
SX Range	Pass	Pass	Pass	Pass
BPG Range	Pass	Pass	Not Tested	Not Tested



SX Range Enclosure and Cables after IEC331 Fire Testing



SX Range Enclosure after BS6387 Testing



SX and BPG Range Enclosures after BS6387 Testing