

Fire Tests



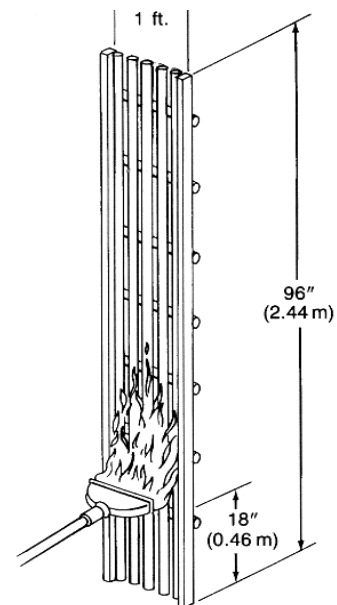
Fire safety is more important than ever. Every manufacturer, distributor and end user of wire and cable needs to be aware of the latest regulations and the products that will meet those safety standards. Many tests have been developed to measure the flame retardancy of wire and cable products. The

flame retardancy of a cable is often defined as the ability of a cable to cease burning once the source of heat is removed. Below is an overview of a few of the most widely used North American fire tests and ratings. For additional information on fire tests, including plenum and riser ratings, please refer to Anixter's *Wire & Cable Technical Information Handbook* (item # 104113), sections 11.2 and 17.4.

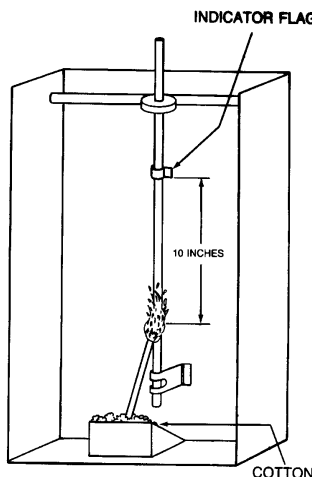
Fire Tests and Ratings

- **UL Vertical Tray Flame Test (UL 1581)**

This test is conducted on cables lashed to a vertical metal ladder tray 8 feet in height. The combustion source is a ribbon burner with a flame temperature of approximately 1500°F and which supplies 70,000 BTUs of heat per hour. The flame application time is 20 minutes. This rating requires the cable to self-extinguish prior to reaching the top of the tray. A "tray rated" cable must meet this test. The IEEE 383 test is very similar.



UL 1581 Vertical Tray Flame Test



UL 1581 VW-1 Flame Test

- **UL VW-1 Vertical-Wire Flame Test (UL 1581)**

This is a small-scale test conducted on a single 24-inch length of wire. The flame source is a Tirrill burner (similar to a Bunsen burner) with a heat output of approximately 3,000 BTU/hour. The flame is applied for 15 seconds and is then reapplied 4 more times each time the wire ceases to burn. If the sample burns longer than 60 seconds after any application, or if the indicator flag or cotton batting is ignited during the test, the cable fails the test. The CSA (Canadian Standards Association) FT-1 test is very similar.

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(F-3 continued)

- **ICEA 210,000 BTU Vertical Tray Flame Test (ICEA T-29-520)**

Though not a UL test, this test is similar to the 70,000 BTU/hour UL 1581 vertical tray test but with the heat source increased to 210,000 BTU/hour. This rating is not required by the NEC (National Electrical Code) or the CEC (Canadian Electrical Code), but is sometimes required by end users.

- **MSHA Flame Test (U.S. Code of Federal Regulations 30 CFR Parts 7.407 and 18.64)**

This test is required by MSHA (Mine Safety and Health Administration) to ensure adequate fire resistance for cables used in the mining industry. In this test, a 3-foot length of cable is mounted horizontally. During the test, all power conductors are connected to a current source to raise the conductor temperature to 400°F (204°C) to simulate overload conditions. A flame source consisting of a Tirrill burner with a heat output of approximately 3,000 BTU/hour is applied to the center of the cable for 60 seconds and then removed. Each of three test specimens must meet the following criteria: 1) the duration of burning must not exceed 240 seconds and 2) the length of the burned (charred) area must not exceed 6 inches. Cables that meet this test requirement are printed with an MSHA acceptance number such as “MSHA P-123” (see Wire Wisdom P-1 for additional information on “P-numbers”). The CSA FT-5 test is very similar.

- **CSA FT-4 Vertical Tray Flame Test (CSA C22.2 No. 0.3, Section 4.11)**

This is a CSA flame test in which cables are mounted in a vertical tray and exposed for 20 minutes to a 70,000 BTU/hour flame. To pass the test, the resulting char distance must not be greater than 1.5 meters (59 inches) from the point of flame application. This test is very similar to the IEEE 1202 flame test. It is also similar to, but slightly more severe than the UL Vertical Tray Flame Test.

- **CSA FT-1 Vertical Flame Test (CSA C22.2 No. 0.3, Section 4.11)**

In this test, cables are subjected to five 15-second duration applications of a 500-watt (3000 BTU/hour) flame. For the cable to pass the test, burning must cease within 60 seconds after removal of the flame source, and not more than 25% of the indicator flag can be burned. This test is similar to the UL VW-1 test.

- **CSA FT-2 Horizontal Flame Test (CSA C22.2 No. 0.3, Section 4.11)**

In this test, cables are subjected to a 30-second application of flame from a 500-watt source. The cable must self-extinguish after removal of the flame source and must not ignite cotton batting placed under the cable.