

Testing for Flame Resistance of Electrical Cables

By Harold Gjerner – Agency Compliance Engineer

The National Fire Protection Agency (NFPA) publishes flame-resistance standards through its published National Electrical Code (NEC). Other agencies, such as UL and CSA also publish standards and define certain tests to determine flame resistance (or lack thereof). Flame resistance requirements are for the most part governed by local and national codes which define the various levels of flame hazard, plus the severity of the fires to which cables may be exposed. The important considerations are propagation of flame, support of further combustion, generation and propagation of smoke. The NEC deals primarily with fire hazards in buildings, whereas UL and CSA deal with requirements based on use.



Where Are Flame Tests Applicable?

Small Scale Flame Tests

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| FT2 (8*) | CSA – Minimum mandatory horizontal flame test for Flexible Cord (Finished Cable). (1700 BTU – 500W) A burner flame is applied to a horizontal sample for five 15 second applications and must not exceed 100 mm from end to end. There should also be no type of flame particles falling from the sample. |
| FT1 (7*) | CSA – Vertical flame test performed only on the finished cable. Primarily used in the Equipment Wire or Appliance Wire (AWM) categories. (1700 BTU – 500W) A burner flame is applied to a vertical sample for five 15 second applications and must increase within 60 seconds of removal of the burner, with no more than 25% of a paper indicator burnt. |
| VW-1 (6*) | UL and CSA – 1700 BTU – 500W Vertical flame test performed on the finished cable and also the insulated single conductors within that cable in flexible cords only. A VW-1 rating can be declared on AWMs for the single conductors only if the reel tag so specifies. |
| UL 1061 (5*) | UL Vertical Flame test (1700 BTU – 500W) for any Appliance Wire that is use as an external interconnection application. |



Large Scale Flame Testing

- UL Vertical Tray (4*) Minimum requirement for cables used in trays, (70,000 BTU) Power Limited Circuit Cable (CL2, CL3) and Communication Cable (CM, CMG, PLTC) (*Similar to FT4 but not quite as stringent*).
- FT4 (3*) CSA – 70,000 BTU flame test for cables used in trays should burn the cables for 20 minutes and not exceed 1.5 meters after the test is finished. The FT4 test is used on cables intended for tray or shaft applications.
- UL 1666 (2*) UL-Riser Cable (495,000 BTU) is required where cables are used in vertical runs in a shaft that may penetrate more than one floor. (CL2R, CL3R, CMR) (*Similar to FT4 but more stringent*)
- NFPA 262/FT6 (1*) UL-Plenum Cable (300,000 BTU) is installed in plenums, ducts and other spaces used for environmental air (CL2P, CL3P, CMP) (formerly UL 910, now referred to as “Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces”). FT6 cables should be burned for 20 minutes and should not have flame spread exceeding 1.5 meters.

*(*Number designations) – The lower the number, the more severe the flame test.*

North America/
International Headquarters
110 Prospect Way
Osceola, Wisconsin 54020
USA
1.800.468.1516
+1 715.294.2121

Central/South America
11 Earhardt Way
Santa Terese, New Mexico
88008
USA
+1 575.874.2000