

ChamFlex® Fire-Retardant Hose Assemblies

Specification Comparison of UL 94-V0 and ASTM E-84 Ratings

UL 94 V-0

Chamberlin Rubber Company's ChamFlex® fire-retardant hose assemblies have a tube compound that is recognized and certified by Underwriters Laboratories to flammability specification UL 94 V-0 under yellow card listing number QMFZ2.E80017. The UL 94 is a vertical burn test that is used widely for rubber and plastic materials that are used mostly in electrical/electronic devices. In this test – five vertically mounted samples are exposed to two successive ten-second bottom ignitions from a 3/4" Bunsen flame. Flame resistance is then classified according to:

- 1) The time for the flame to self-extinguish, and
- 2) The duration of the afterglow

The V-0 rating of our tube compound is the highest rating under the UL 94 test which means that:

- a) The extinguishment time (for each sample) was 0-10 seconds
- b) The total combustion time (for all five samples) fell between 0-50 seconds
- c) The afterglow time was 0-30 seconds per sample
- d) There were no flaming drips
- e) No burning occurred up to the holding clamps

(Chamberlin's tube compound also has an Oxygen Index of 25 when tested in accordance with ASTM D 2863 and a Flame Spread Index of 17 when tested in accordance with ASTM E162)

ASTM E84

Chamberlin's competitors also offer fire retardant hose assemblies. These competitors normally publish fire retardant ratings to an ASTM E84 testing method. This method employs the use of a Steiner Tunnel and is similar to UL 723, NFPA 255, UBC 42-1, CAN/ULC S-102 and ANSI 2.5. The purpose of this tunnel test method is to determine the relative burning behavior of materials by observing the flame spread along the surface of the specimen. It is intended to provide only comparative measurements of the surface flame spread and smoke development measurements of building materials with that of select grade red oak flooring and inorganic reinforced cement board surfaces under specific fire exposure conditions. This test method is intended for the testing of flat building material specimens and not piping or hose products.

The ASTM E84 test requires that a nominal twenty-four foot long by eighteen inch wide area is covered by the test specimen material and is tested over 10-minute duration while flame spread over its surface and development of the resulting smoke are measured and recorded. The test results are computed relative to a red oak specimen (which has a rating of 100) and inorganic reinforced cement board (which has a 0 rating) with the results expressed as "Flame Spread" and "Smoke-Developed" indices. Although not a requirement of the current ASTM E84 test, "Fuel Contribution" (as calculated in accordance with ASTM E84 – 1975) may also be one of the expressed results.



In 1978, the "Fuel Contribution: index was deleted from the method since it was recognized that the value did not provide a valid measurement of fuel contribution.

Materials are not approved or classified as a result of this test. However, building codes, such as the Uniform Building Code, have requirements dependent on building types, occupancy, etc. The building code having jurisdiction in the location that a tested material is to be used will determine the compliance of the test results. It is our understanding that some of these codes require:

- A flame spread rating of 25 or less
- A fuel contribution rating of 25 or less (if an old code)
- A smoke density rating of 50 or less

Because the ASTM E84 test is intended for flat specimens (and not hose products) – most of Chamberlin's competitors have published their product's fire retardant ratings based upon a **modified** ASTM E84 testing procedure. **(Note: In order to verify this, Chamberlin recommends that you request a copy of the test report along with the results from the manufacturer.)**

Based upon the competitor's test reports that we have seen – these modifications to the ASTM E84 test compromised the test by:

- Not testing a "homogenous" specimen (a metal braid over a rubber or thermoplastic tube with couplings attached).
- Not testing product covering the required test area (a nominal length of twenty-four feet and a width of twenty inches).
- Conducting the test with water flowing through the hose prior to and during the test.

The following statements were also observed in the competitor's test reports that we have seen:

"This was an experimental test in that the water flow through the armored (braided) hose was maintained during the test and the ASTM E84 test method does not address such an arrangement."

"The braided hose (specimen tested) would be expected to perform differently at less than full water flow during the test."

Summary

Rather than having a "modified" ASTM E84 test performed on its ChamFlex® hose assemblies – Chamberlin feels that the UL 94 test (and V-0 rating!) is currently more readily acceptable and gives a better indication of a fire retardant product.

What kind of results would Chamberlin's competitors have received if they didn't run a modified ASTM E84 test? (Probably not very good!)



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