

TECH TALK

Product: Sintra® / e-pvc™ **Date:** November 30, 2015

Subject: Fire Characteristics

Number: D19 **Pages:** 4

Fire Characteristics of Sintra / e-pvc Materials

Sometimes it is necessary to know the fire characteristics of materials that are used in the production of certain signage, graphics, exhibits or displays. These characteristics become important when the materials are used in applications where there may be stringent rules on how the materials behave when exposed to sources of combustion.

The following sections discuss the fire characteristics of Sintra and e-pvc materials, the standards to which they have been tested, and where applicable their classifications under these standards.

Relative Flammability Comparisons to Other Materials

In addition to their unique balance of performance properties, Sintra and e-pvc materials have the following advantages as fire-retardant materials:

1. Self-Extinguishing — remove the flame source and the burning stops.
2. Relatively High Ignition Resistance—the heat content of Sintra and e-pvc materials is approx. 8,600 BTU/LB. Heat produced by a flame from Sintra or e-pvc materials is not sufficient to produce the necessary vapors which combine with atmospheric oxygen to create a combustible mixture. Because of its low heat of combustion, Sintra and e-pvc materials will not support combustion.

3. High Oxygen Index — ASTM D-2863 measures the percent of oxygen in an oxygen/nitrogen mixture which barely supports burning. The oxygen content of the earth's atmosphere is about 21%. Materials with oxygen index values of approximately 26 and above should not continue burning after the flame source is removed because the normal atmospheric oxygen content is insufficient to support combustion. The oxygen index values of Sintra and e-pvc materials range from 46–49%.
4. No "Flaming Drip" — some burning polymers produce molten flaming drips which contribute to flame spread. Sintra and e-pvc materials produce a form-retaining carbonaceous char that does not drip.

UL 94

Standard for Flammability of Plastic Materials for Parts in Devices and Appliances

The test method is intended to characterize flame propagation of a material and its tendency to char. The test also indicates the tendency of the material to produce flaming particles which could ignite a cotton indicator located below the sample. It is used to determine a material's tendency either to extinguish or to spread the flame once the specimen has been ignited.

There are various flame classifications specified in UL 94 that are assigned to materials based on the results of these bench top tests. The classifications are used to distinguish a material's burning characteristics.

UL-94 Classification	Sintra Gauges	e-pvc Gauges
V-0	2-6 mm	3-6 mm

These classifications show that the material was tested in a vertical position and self-extinguished within a specified time after the ignition source was removed. These classifications also indicate that the materials dripped no flaming particle that ignited a cotton indicator located below the sample.

**ASTM E-84 (UL Steiner Tunnel Test)
Standard Test Method for Surface Burning Characteristics of Building Materials**

The test method uses a sample of material 20-24" wide by 24' long that fits under the roof of a 25' long tunnel forming the ceiling of the tunnel. Gas burners on one end of the tunnel impinge a flame on 7 square feet of the test specimen. The progression of the flame is observed and smoke development is measured by a photometer.

The flame propagation is plotted as distance vs. time. The photometer data is plotted as percent of absorption vs. time. The flame spread and smoke development indexes are then calculated and reported.

Sintra Material Performance - ASTM E-84

Thickness	Flame Spread	Smoke Development
1mm	15	175
2mm	20	350
3mm	25	400
6mm	n/a	>450

e-pvc Material Performance - ASTM E-84

Thickness	Flame Spread	Smoke Development
3mm	20	300
4mm	20	400
5mm	20	450
6mm	n/a	>450

Based on the above test results for ASTM E84; gauges of Sintra of 3mm and less, and e-pvc in gauges of 5mm and less, meet the requirements to be Class A Materials based on their Flame Spread and Smoke Development indices when tested to ASTM E84.