

*My project calls for a coating with UL94 V-1 rating. Can I use a coating that is rated UL94 V-0?*

The answer to that question is, Yes. Here is why.

UL 94 is a standard for safety of flammability of plastic material for parts in devices and appliances testing. There are two types of characteristics that are generally tested. The first determines the materials tendency either to extinguish or to spread the flame once the specimen has been ignited. The first program is described in UL 94. The second program measures ignition resistance—which we will not discuss in this article.

There are 12 UL 94 flame classifications that are assigned to materials based on the results of these small-scale flame tests. For this article, we will mainly focus on the differences between 5VA, 5VB, V-0, V-1, V-2 and HB.

### Horizontal versus Vertical Positioning

\*Source: UL

Specimens molded from the plastic material are oriented in either a horizontal or vertical position depending on the specifications of the relevant test method, and they are subjected to a defined flame ignition source for a specified period of time. In some tests, the test flame is only applied once as is the case of the horizontal burning (HB) test, while in other tests the flame is applied at least twice.

An HB flame rating indicates that the material was tested in a horizontal position and found to burn at a rate less than a specified maximum. See Diagram 1.

The three vertical ratings, V2, V1 and V0 indicate that the material was tested in a vertical position and self-extinguished within a specified time after the ignition source was removed. The vertical ratings also indicate whether the test specimen dripped flaming particles that ignited a cotton indicator located below the sample. UL 94 also describes a method in which the test flame is applied for up to five applications in testing for a 5VA or 5VB classification. These small-scale tests measure the propensity of a material to extinguish or spread flames once it becomes ignited. See Diagram 2.

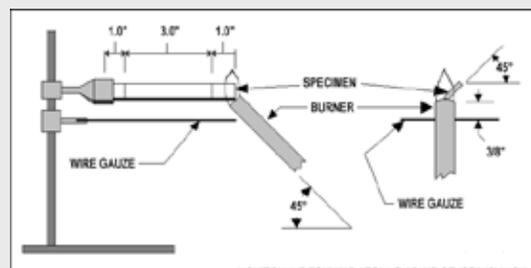


Diagram 1

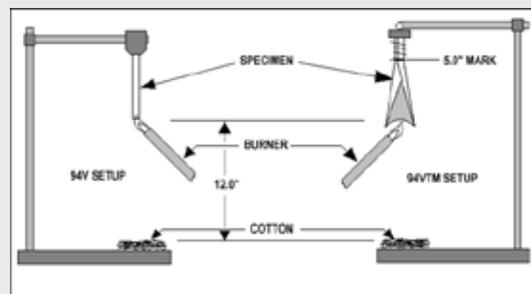


Diagram 2

### Difference in test methods and criteria

When looking at the flame ratings for plastic materials commonly molded to fabricate enclosures, structural parts and insulators found in consumer electronic products (5VA, 5VB, V-0, V-1, V-2 and HB), a material classified as 5VA or 5VB is subjected to a flame ignition source that is approximately five times more severe than that used in the V-0, V-1, V-2 and HB tests. Also, the specimens may not drip any flaming particles. The three remaining six classifications specified in UL 94 relate to low-density foam materials commonly used in fabricating speaker grills and sound-deadening material (HF-1, HF-2, HBF).

Being that UL 94 V-0 is most difficult to pass when compared to V2 and V1. All applications that require their coating to meet either the V-2 and V-1 can safely use a coating recognized by V-0.



<b>HB</b>	slow burning on a horizontal specimen; burning rate < 76 mm/min for thickness < 3 mm.
<b>V2</b>	burning stops within 30 seconds on a vertical specimen; drips of flaming particles are allowed.
<b>V1</b>	burning stops within 30 seconds on a vertical specimen; drips of particles allowed as long as they are not inflamed.
<b>V0</b>	burning stops within 10 seconds on a vertical specimen; drips of particles allowed as long as they are not inflamed.
<b>5VB</b>	burning stops within 60 seconds on a vertical specimen; no drips allowed; plaque specimens may develop a hole.
<b>5VA</b>	burning stops within 60 seconds on a vertical specimen; no drips allowed; plaque specimens may not develop a hole