PLASKOLITE

UL 94 FLAME RATINGS

BACKGROUND

UL 94 describes and measures the flammability properties of polymeric materials used in *devices and appliances* when exposed to a small open flame under controlled laboratory conditions. The test describes and measures the flammability of plastic materials in response to heat and flame and is not intended to reflect the hazards of a material under actual fire conditions. UL's testing method documents the ease of ignition, burning rate, flame spread and intensity of burning materials.

It's important to remember this standard does **not** cover polymeric materials when used in building construction applications (ASTM E84 or UL723). For example, finishing material used in wall and floor coverings, furnishings, canopies, awning, skylights, signs or decorative objects and their like.

DIFFERENCE IN TEST METHODS AND CRITERIA

UL 94 groups materials into broad categories based on their flammability. UL 94 covers two types of testing criteria: **H**orizontal **B**urn and **V**ertical **B**urn.

Flame ratings of HB, V-2, V-1, and V-0, are used when looking at the flame ratings for plastic materials commonly fabricated into enclosures, structural parts and insulators found in consumer electronic products.

Materials classified into 5VA or 5VB are subjected to a repeat flame ignition source that is more severe than what is used in the HB, V-2, V-1, and V-0 tests. The 5VA and 5 VB specimens are not allowed to drip flaming particles during testing. 5VA is the highest (most flame retardant) UL94 rating.

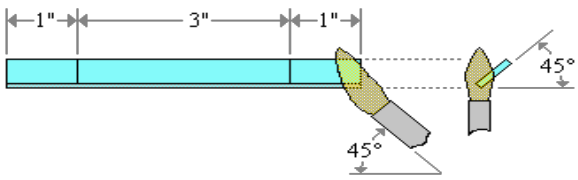
YELLOW CARDS

The UL 94 product datasheets display a flame rating data derived from UL's internal testing. Often referred to as a "UL Yellow Card", these listings detail flame product information. Numerous TUFFAK product's Yellow Cards can be found in the UL 94 database.

HORIZONTAL TESTING (HB)

HB testing is generally considered the easiest flammability test to pass and is the lowest and least flame-retardant UL 94 rating. A UL 94 HB rating would typically be acceptable for portable, attended, intermittent-duty, household-use appliance enclosures (e.g. hair dryers).

Slow horizontal burning on a 3mm thick specimen with a burning rate is less than 3"/min or stops burning before the 5" mark. H-B rated materials are considered "self-extinguishing".



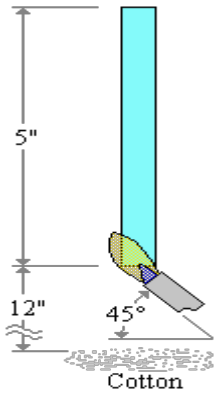
HORIZONTAL TESTING (HB) cont.

Flammability rating UL 94		
Test criteria	Burn rate	Flamability rating
Test specimen thickness 3-13 mm, 30 sec exposure	≤40 mm/min over 75mm span	HB
Test specimen thickness <3 mm, 30 sec exposure	≤75 mm/min over 75mm span	HB
Flame is extinguished before 100 mm mark	= 0 mm/min	HB

VERTICAL TESTING (V-0, V-1, V-2) [Highest to lowest]

This test includes three classifications for assessing self-extinguished material: UL 94 V-0, V-1 and V-2, and would typically be acceptable for portable, unattended, intermittent-duty, household-use appliances (e.g. coffee makers).

A specimen is supported in a vertical position and a flame is applied to the bottom of the specimen. The flame is applied for ten seconds and then removed until material self-extinguishes at which time the flame is reapplied for another ten seconds and then removed. Two sets of five specimens are tested.

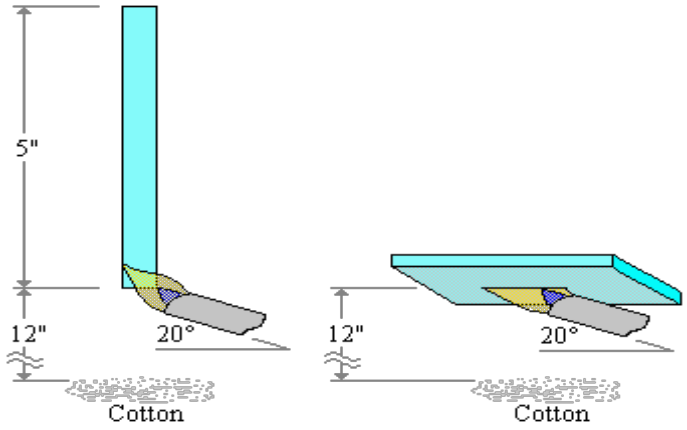


Flammability rating UL 94 V			
Test criteria	V-0	V-1	V-2
Burning time of each individual test specimen (s) [after first and second flame applications]	≤10	≤30	≤30
Total burning time (s) [10 flame applications]	≤50	≤250	≤250
Burning and afterglow times after second flame application (s)	≤30	≤60	≤60
Dripping of burning specimens [ignition of cotton batting]	no	no	yes
Combustion up to holding clamp [specimens completely burned]	no	no	no

VERTICAL TESTING (5VA, 5VB)

This is the highest and most flame retardant level of the UL 94 ratings. UL 94-5V is a test standard for materials which are already classified as UL 94 V-0. It is a more stringent test than UL 94 V-0 in several ways. The testing is conducted on bar and plaque specimens using a larger flame height than in vertical testing (125mm vs 20mm). The rating is particularly useful for materials used in enclosures of fixed electrical equipment.

A bar specimen is supported in a vertical position and a flame is applied to one of the lower corners of the specimen at a 20° angle. The flame is applied for 5 seconds and is removed for 5 seconds. The flame application and removal is repeated five times. The procedure for plaques is similar as the bars with the exception the plaque specimen is mounted horizontally and a flame is applied to the center of the lower surface of the plaque.



Flammability rating UL 94		
Test criteria	5 VA	5 VB
Burning and afterglow times of specimens after fifth flame application (s)	≤60	≤60
Dripping of burning specimens	no	no
Hole formation	no	yes

DISCLAIMER:

These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use are beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale.