

UL94 Flammability Testing Description

TECH BRIEF: 5006
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Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

These requirements cover tests for flammability of polymeric materials used for parts in devices and appliances. They are intended to serve as a preliminary indication of their acceptability with respect to flammability for a particular application.

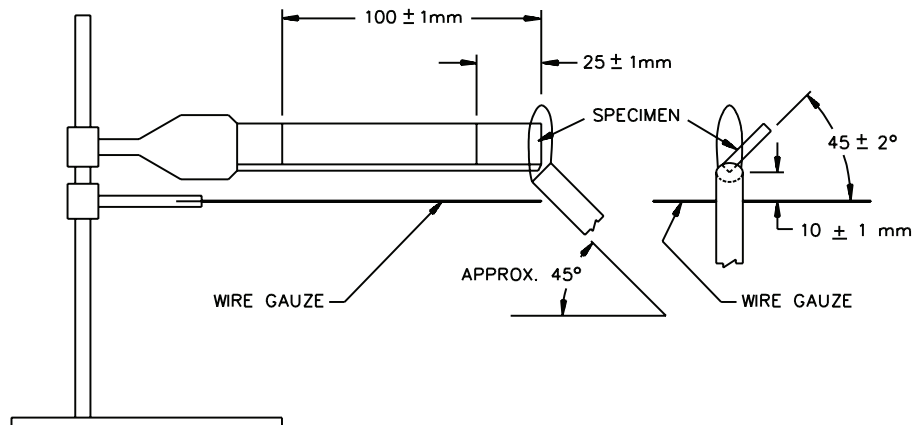
The final acceptance of the material is dependent upon its use in complete equipment that conforms with the standards applicable to such equipment. The flammability classification required of a material is dependent upon the equipment or device involved and the particular use of the material. These tests are not applicable to the evaluation of parts where the thickness exceeds 13.0 mm or where the surface area exceeds 1 m². These requirements do not cover polymeric materials when used for building construction, finishing, or contents such as wall and floor coverings, furnishings, decorative objects and so forth.

Test Method Summary

Horizontal Burn Test: HB

Three bar specimens, 125mm long and 13mm wide are to be tested. The abbreviated test procedure includes applying the flame to the specimens in a horizontal position with a specified Bunsen burner while holding the specimen at a 45° angle and measure the burning rate and distance. See Fig. 1 below for test set-up reference.

Figure 1



Material Classifications:

- Not have a burning rate exceeding 40 mm per minute over a 75 mm span for specimens having a thickness of 3.0 to 13 mm, or
- Not have a burning rate exceeding 75 mm per minute over a 75 mm span for specimens having a thickness less than 3.0 mm, or
- Cease to burn before the 100 mm reference mark.

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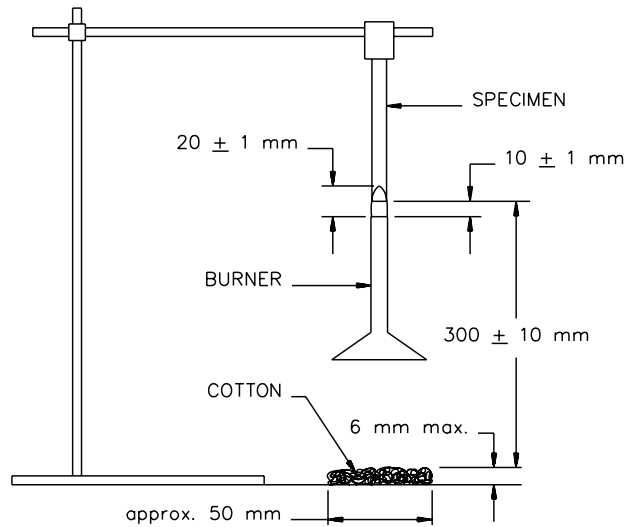
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20mm (50W) Vertical Burning Test: V-0, V-1, V-2

Three bar specimens, 125mm long and 13mm wide are to be tested and provided in the minimum and maximum thicknesses. The minimum thickness must not be less than .025mm and the maximum thickness must not exceed 13mm. The abbreviated test procedure includes burning the specimens in the vertical position with a specified Bunsen burner while holding the specimen above the flame and measure the burning rate, distance and time of burn. See Fig. 2. below for test set up reference.

Figure 2

Vertical Burning Test for V-0, V-1, V-2 Classification



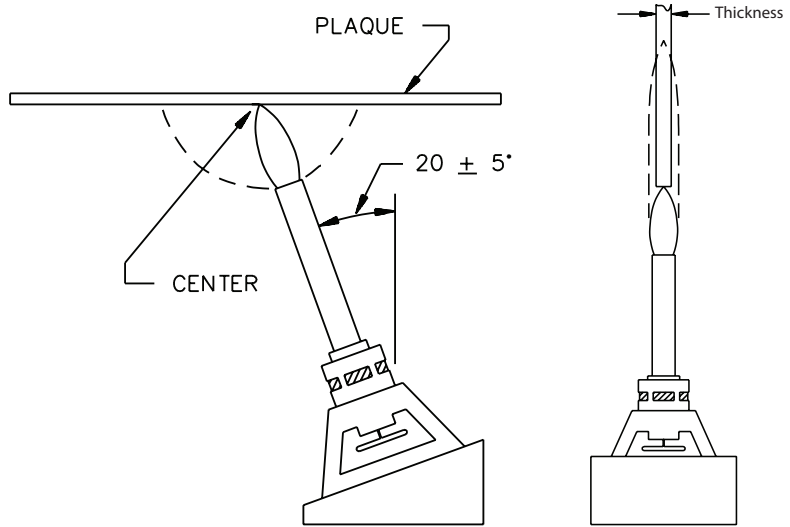
Material Classifications

Criteria Conditions	V-0	V-1	V-2
Afterflame time for each individual specimen t_1 or t_2	≤10s	≤30s	≤30s
Total afterflame time for any condition set (t_1 plus t_2 for the 5 specimens)	≤50s	≤250s	≤250s
Afterflame plus afterglow time for each individual specimen after the second flame application ($t_2 + t_3$)	≤30s	≤60s	≤60s
Afterflame or afterglow of any specimen up to the holding clamp	No	No	No
Cotton indicator ignited by flaming particles or drops	No	No	Yes

Horizontal Burn (500W) Test: 5VA, 5VB

Five bar specimens, 125mm long and 13mm wide and three plaque specimens 150mm by 150mm are to be tested and provided in the minimum and maximum thicknesses. The minimum thickness must not be less than .025mm and the maximum thickness must not exceed 13mm. The abbreviated test procedure includes burning the bar specimens in a similar manner as described in the Vertical Burning section of this document. The plaque specimens shall be burned in the center of the specimen in the horizontal position measuring burn through only. See Fig. 3. below for test set up reference. For 5VA and 5VB ratings the flame ignition source is approximately five times as severe as that used to achieve HB or V-0 ratings.

Figure 3



Material Classifications

Criteria Conditions	94-5VA	94-5VB
Afterflame time plus afterglow time after fifth flame application for each individual bar specimen	≤60s	≤60s
Cotton indicator ignited by flaming particles or drops from any bar specimen	No	No
Burn-through (hole) of any plaque specimen	No	Yes



UL 94 Test Methods / Ratings

Material	Product	Vertical Burn Test				Horizontal Burn Test	
		HB	V-2	V-1	V-0	5VB	5VA
PC	Palsun All Colors		1mm - 6mm**		8mm or thicker*		
	Palsun Basic Clear	1.5mm - 6mm**					
	Palsun Basic FR				2mm - 3mm**		
	Palsun FR Clear				1.5mm - 2.99mm**		3mm*
	Palsun FR All Colors				3mm - 6mm**		
PVC	Palclear				≥ 1mm*		
	Palopaque				≥ 1mm*		

* As tested by a third party accredited laboratory

** UL Listed - File number QMFZ2.E221255

The following assumptions can be made:

- With regards to the vertical test ratings only, the ratings are listed least severe to most severe from left to right.
 - Typically, if a product has a rating to the right, it will meet all other ratings listed to the left.
- Based on laboratory testing, there is no correlation between horizontal and vertical burn test ratings.

Note: For the most up-to-date UL product certifications, product code and regulatory compliance certifications, visit palram.com/us.