



# UL 94 certified masterbatches

Fact sheet for the assessment and classification of the flammability of plastics

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## ASSESSMENT AND CLASSIFICATION OF THE FLAMMABILITY OF PLASTICS BY UNDERWRITERS LABORATORIES (UL)\*\*

In 2001 Treffert proposed its first UL-certified Masterbatch for Ultramid A3K coloration. Since then many other Treffert products have been certified according to UL 94 Standard.

It is now possible to choose masterbatches suitable for the polymer classes PA6, PA66, PET, PC, PVC and POM (see Treffert File E221522 or tables 2 – 3).

The independent American organisation Underwriters Laboratories (UL) assesses and certifies products and materials regarding their mechanical and electrical properties. For plastic materials and plastic parts, UL established the UL 94 standard as a classification according to their flammability. Burning tests are performed through different methods such as:

- › Horizontal burning HB,
- › Vertical burning V.

In both methods, the specimens are subjected to a specified flame in defined intervals and subsequent burning times are measured.

HB stands for the lowest ignition resistance classification and the material is tested horizontally (in the clamping device's direction).

For a V-rating, the material is tested in a vertical position. This test allows to specify the material among the three following categories: V-0 (highest classification), V-1 (medium classification) and V-2 (lowest classification). Several criteria have to be taken into account, among which are after flame times and dripping of the burning material.

Flame tests can be conducted on standard bar specimens or sometimes on final parts.

Color is beside wall thickness an important factor in certifying plastics. This leads polymer producers to have an "all colors" listing which allows them to offer their certified products in any desired color. When customer specific masterbatches are used to tinge uncolored material, both the masterbatch (category QMQS2) and the base resin (category QMFZ2) need their own UL certification.

To comply with the V Category the masterbatch has to be certified for the use in a specific material (manufacturer, flame class).

The HB Category only requires the compliance with the polymer type and not the specific recognized grade. UL 94 certified masterbatches According to UL standard 746D V-listed masterbatches are allowed to use for HB-materials coloration, provided that polymer class as well as minimal thickness and maximal let down ratio are respected. Consequently, Treffert offers masterbatches adapted to HB-certification for PA 6, PA 66, PET, PC, PVC and POM. Informations on minimal thicknesses and maximal let down ratios are available in table 4.

**Table 1:**  
**UL 94 test criteria for V-certification**

Tested Criteria	V-0	V-1	V-2
Afterflame time for each individual specimen t1 or t2	≤ 10 s	≤ 30 s	≤ 30 s
Total afterflame time for any condition set (t1 plus t2 for the 5 specimens)	≤ 50 s	≤ 250 s	≤ 250 s
Afterflame plus afterglow time each individual specimen after the second flame application (t2+t3)	≤ 30 s	≤ 60 s	≤ 60 s
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

**Table 2:**  
**Overview of the UL 94 certified materials – File Treffert – QMQS2.E221522 – part 1**  
V classified color concentrates in pellets form for “specific recognised” materials

Polymer class	Concentrate designation	Polymer producer	Material designation	Let down color	Minimum thickness [mm]	Maximum let down ratio	UL-94 Class
PA66	HT-MAB PAFT*	BASF	Ultramid A3K	all	0,41	1:20	V-2
		Polyone	Bergamid A700	all	0,40	1:20	V-2
PA6	HT-MAB PAFT*	Schulman	Schulamid 6 MV 14 FR4 K1681	all	0,40	1:20	V-2
PET	HT-MAB PETF*	DSM	Arnite AV2 365 SN	all	0,40	1:20	V-0
PC	HT-MAB PCFT*	Bayer Material Science	Makrolon 9415	all	0,80	1:20	V-2
					1,50	1:20	V-0
	HT-MAB PCFT*	Bayer Material Science	Makrolon 2805	all	0,80 – 2,40	1:20	V-2

\* four- or five- numbered code for color description

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**Table 3:****Overview of the UL 94 certified materials****– File Treffert-QMQS2.E221522 – part 2**

HB classified color concentrates in pellet form  
for “recognised” materials

Polymer class	Concentrate designation	Let down color	Minimum thickness [mm]	Maximum let down ratio
PVC	HT-MAB PVCF*	all	0,80	1:20
PC	HT-MAB PCFT*	all	2,50	1:20
POM	HT-(X) POMF*	all	0,75	1:20

**Table 4:****Extended list of HB classified products****QMQS2.E221522 according to UL Standard 746D**

Polymer class	Concentrate designation	Let down color	Minimum thickness [mm]	Maximum let down ratio
PA66	HT-MAB PAFT*	all	0,40	1:20
PA6	HT-MAB PAFT*	all	0,40	1:20
PET	HT-MAB PETF*	all	0,40	1:20
PC	HT-MAB PCFT*	all	0,80	1:20
PVC	HT-MAB PVCF*	all	0,80	1:20
POM	HT-(X) POMF*	all	0,75	1:20

\* four- or five- numbered code for color description

**GERMANY**

Treffert GmbH & Co. KG  
In der Weide 17  
D-55411 Bingen

Phone: + 49 (0) 67 21 403-0  
Fax: + 49 (0) 67 21 403-27  
E-mail: [info@treffert.eu](mailto:info@treffert.eu)

**FRANCE**

Treffert S.A.S.  
Z.I. Rue de la Jontière  
F-57255 Ste-Marie-aux-Chênes

Phone: + 33 (0) 3 87 31 84 84  
Fax: + 33 (0) 3 87 31 84 85  
E-mail: [info@treffert.fr](mailto:info@treffert.fr)



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