

NEW HALOGEN-FREE FLAME RETARDANT COMPOUNDS



Contactore HSLa made of LATAMID 66 H2 G/25-V0HF1

The market of flame retardant compounds keeps a steady growth and a continuous renewal of requirements looking forward an always improved reliability of operating components. Increased safety limits, regulatory changes and environmental concerns influence composition and proposal of new materials and drive the design concept of modern devices.

The result is a series of directives that are fundamentally changing the manufacturing process, with the goal to "encourage the design and production of E&E which takes into full account and facilitates their repair, possible upgrading, reuse, disassembly and recycling" also "substitution by safe or safer materials".

RoHS and WEEE are example of these directives, applicable to household appliances as well IT equipment.

The regulation REACH also implies a big change in the Chemistry legislation where plastics are included as well.

LATI, a European leader in the production of special compounds, has always dedicated extra care to its traditional core business that is the flame retarding thermoplastics.

To meet its valuable Customers' new needs, LATI has developed a range of FR products that fulfils the widest range of requirements.

Both the E&E and home appliance sector can thus be supplied, respecting stringent parameters stated by the newest norm as, e.g., ISO/IEC 60335-1 (4th Edition).



In order to respect constant inquiries coming from the market and the current legislation, Lati is introducing the **HF1 range**, featuring **halogen and antimony free** FR materials, all rated **UL94 V0** and fulfilling RoHS restrictions.

LATAMID® and KELON - halogen and red phosphorous free reinforced PA6 and PA66

- **LATAMID 66 H2 G/25-V0HF1**
- **LATAMID 6 H2 G/30-V0HF1**
- **KELON B FR H2 CEG/500-V0CT3**

Being two of the most recent winning grades developed by LATI, LATAMID 66 H2 G/25-V0HF1 and LATAMID 6 H2 G/30-V0HF1 offer a very interesting compliance to IEC 60335 requirements and are totally halogen and red phosphorous free.

Outstanding FR performance is achieved by UL94-V0 rating, from 3 down to 0.75

Flammability	Standard	SI Units	
		LATAMID 6 H2 G/30-VOHF1	LATAMID 66 H2 G/25-VOHF1
Oxygen Index	ASTM D 2863	32 %	32 %
Flammability Rating			
3,00 mm thickness	UL 94	Class V-0	Class V-0
1,50 mm thickness	UL 94	Class V-0	Class V-0
0,75 mm thickness	UL 94	Class V-0	Class V-0
GWFI - Glow Wire Flammability Index			
1,00 mm thickness	IEC 695-2-12	GWFI: 960/1.0	GWFI: 850/1.0
2,00 mm thickness	IEC 695-2-12	GWFI: 960/2.0	GWFI: 960/2.0
GWIT - Glow Wire Ignition Test			
1,00 mm thickness	IEC 695-2-13	GWIT: 800/1.0	GWIT: 800/1.0
2,00 mm thickness	IEC 695-2-13	GWIT: 800/2.0	GWIT: 825/2.0
Status of U.L. approvals (file LATI: E 54080)			

Flammability values – comparison: LATAMID 66 H2 G/25-VOHF1 and LATAMID 6 H2 G/30-VOHF1

mm, GWIT 800°C at 1 mm and an outstanding GWFI exceeding IEC60335 specs.

Electrical performances are extremely good as well, with a CTI of 600V.

Nevertheless, mechanical performance of the described compounds is excellent despite the rich FR formulation and the fibre content allows PA to withstand up to 150 MPa as stress at break (tensile), an

elastic modulus close to 10000 MPa and a good elongation at break confirming the total lack of brittleness.

An overview of global performance indicates the VOHF1 grades as the perfect candidate for most of the typical E&E structural applications, as connectors, housings etc.

The choice between PA6 or PA66 is left to the Customer, on the basis of necessary thermal performances.

Mechanical Properties	Standard	SI Units	
		LATAMID 6 H2 G/30-VOHF1	LATAMID 66 H2 G/25-VOHF1
IZOD impact strength (sample 63.5x12.7x3.2 mm)			
Notched, at 23°C	ASTM D256-A	110 J/m	95 J/m
CHARPY impact strength (sample 80x10x4 mm)			
Unnotched, at 23°C	ISO 179-1eU	70 kJ/m ²	75 kJ/m ²
Notched, at 23°C	ISO 179-1eA	10 kJ/m ²	8 kJ/m ²
Tensile elongation (speed 5 mm/min)			
At break, 23°C	ISO 527 (1)	3 %	3 %
Tensile strength (speed 5 mm/min)			
At break, 23°C	ISO 527 (1)	145 MPa	150 MPa
Elastic modulus			
Tensile (speed 1 mm/min), 23°C	ISO 527 (1)	9800 MPa	9500 MPa

Mechanical properties – comparison: LATAMID 66 H2 G/25-VOHF1 and LATAMID 6 H2 G/30-VOHF1




When highest dimensional stability is required, mineral filled compounds must be taken into consideration.

The **KELON B FR H2 CEG/500-VOCT3** is a 50% mineral filled PA6 offering not only an excellent respect of dimensional tolerances and moulding ease, but even a vastly reduced smoke emission in case of

level, as in any application dedicated to public use. Its formulation is completely halogen and red phosphorous free and overall fire performances can suit the IEC norm as well.

LARAMID - Halogen and Red Phosphorous Free reinforced PPA

Flammability	Standard	SI Units
KELON B FR CEG/500-VOCT3		
Oxygen Index	ASTM D 2863	42 %
Flammability Rating		
3,00 mm thickness	UL 94	Class V-0
1,50 mm thickness	UL 94	Class V-0
0,75 mm thickness	UL 94	Class V-1
GWFI - Glow Wire Flammability Index		
1,00 mm thickness	IEC 695-2-12	GWFI: 960/1.0
2,00 mm thickness	IEC 695-2-12	GWFI: 960/2.0
GWIT - Glow Wire Ignition Test		
1,00 mm thickness	IEC 695-2-13	GWIT: 775/1.0
Status of U.L. approvals (file LATI: E 54080)		

Flammability values - KELON B FR CEG/500-VOCT3

accidental fire. These features guarantee the KELON to be among the best product to be used also when risks related to fire hazards must be reduced to minimum

- **LARAMID G/35-VOHF1**
In order to offer a complete range of halogen free polyamide based

Properties	Standard	SI Units
LARAMID G/35-VOHF1 - PPA GLASS REINFORCED		
Density	ISO 1183	1,5 g/cm ³
Elastic Modulus	ISO 527	12500 MPa
Tensile Strength	ISO 527	145 MPa
Tensile Elongation	ISO 527	1,3 %
Notched Charpy	ISO 179	6 KJ/m ²
Unnotched Charpy	ISO 179	30 KJ/m ²
UL94 class 1.5 mm	UL94	V0
UL94 class 0,75 mm	UL94	V0
GWIT 1mm	IEC 60695	775 °C
GWIT 2mm	IEC 60695	775 °C
GWFI 1mm	IEC 60695	960 °C
GWFI 2mm	IEC 60695	960 °C
CTI	IEC 112	600 V

Main properties of LARAMID G/35-VOHF1 (PPA based compound: UL V0, Halogen Free, glass reinforced)



compounds, LATI is fine tuning LARAMID G/35-V0HF1.

This grade guarantees high-end thermal performances of the semi-aromatic polymer PPA and the structural reinforcement offered by 35% glass fibre.

Flame retardancy features a V0 performance at 0.75 mm, GWIT, GWFI and CTI are ok for IEC 60335.

The material is actually undergoing the approval and certification process.

LATER® - Halogen and Red Phosphorous Free reinforced PBT

- **LATER 4 G/30-V0HF1**
- **LATER 4-V0HF1**

The same considerations apply to the equivalent PBT formulation where the

LATER 4 G/30-V0HF1 and LATER 4-V0HF1 guarantee a complete reply to all market requirements, providing a solution even where natural moisture absorption of PAs can be an issue.

New halogen free PBT formulations are available in both reinforced and unreinforced versions.

LATEST NEWS

- **LATAMID 66 H2 G/25-V0KB4**

LATAMID 66 H2 G/25-V0KB4 is the latest success of the red phosphorous based FR formulations.

The KB4 compound offers a complete compliance to IEC 60335 requirements: UL94-V0 down to 0.75 mm, GWIT=775°C and GWFI=960°C both at 1 mm, CTI=500V.

Properties	Standard	SI Units	
		LATER 4 G/30-V0HF1 PBT Glass reinforced	LATER 4-V0HF1 PBT Unreinforced
Density	ISO 1183	1,56 g/cm ³	1,33 g/cm ³
Elastic Modulus	ISO 527	10000 MPa	3050 MPa
Tensile Strength	ISO 527	140 MPa	40 MPa
Tensile Elongation	ISO 527	1,8 %	2 %
Notched Charpy	ISO 179	5,2 KJ/m ²	1,5 KJ/m ²
Unnotched Charpy	ISO 179	35 KJ/m ²	15 KJ/m ²
UL94 class 1.5 mm	UL94	V0	V0
UL94 class 0,75 mm	UL94	V0	V0
GWIT 1mm	IEC 60695		
GWIT 2mm	IEC 60695	775 °C	
GWFI 1mm	IEC 60695	960 °C	960 °C
GWFI 2mm	IEC 60695	960 °C	960 °C
CTI	IEC 112	575 V	350 V

Main properties – comparison: LATER 4 G/30-V0HF1 and LATER 4-V0HF1

same flame performances of the foretold PA grades are achieved on a PBT based halogen free formulation.

This said, the KB4 shows up as one of the best candidates for typical E&E application as switches, fuses boards, housings etc.

• **NANOFILLERS**

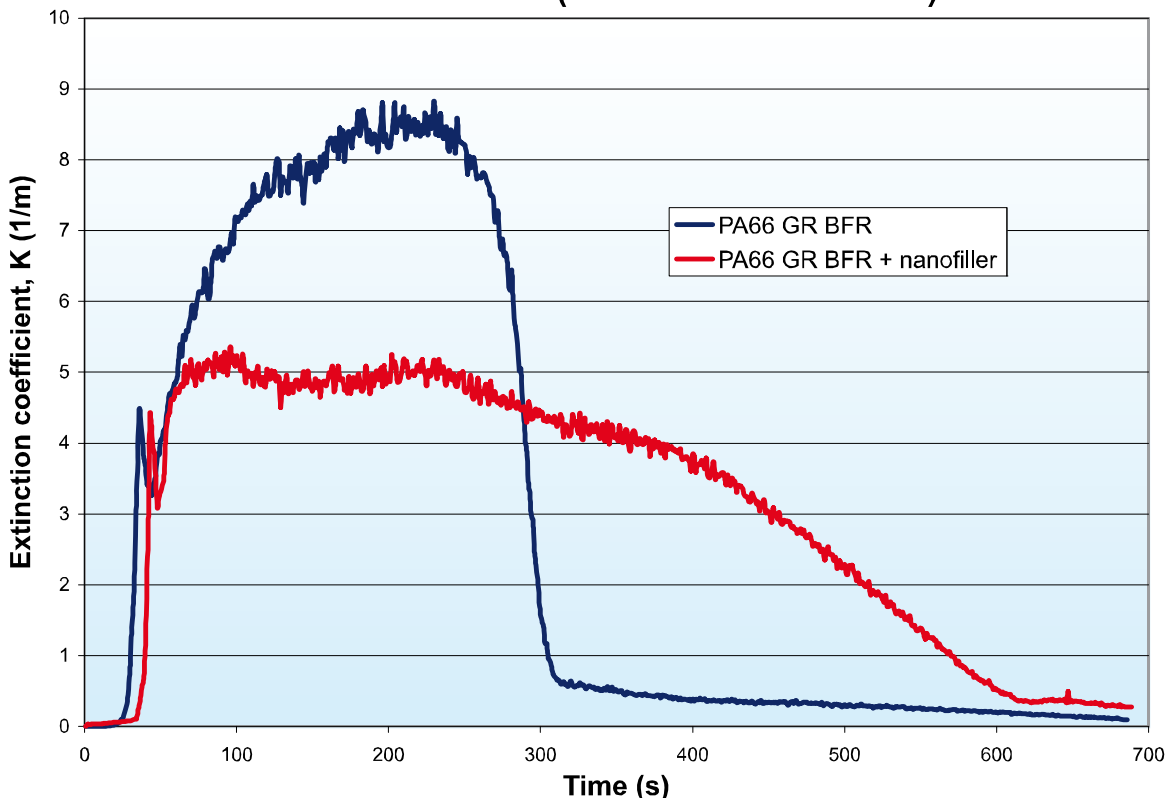
Compounds featuring a reduced content of flame retardants additives have been obtained by LATI R&D taking advantage of nano-composite technology.

The product range is still under development but results already show much better flame resistance properties, with a faster and more efficient self-extinguishing mechanism and a remarkably reduced smoke emission.

Environmental advantages are evident and for this reason LATI keeps on studying this particular range:

the mission of LATI must be fully respectful of environment and human health, taking care of eco-sustainability as well.

Smoke evolution (irradiance: 50 kW/m²)



Smoke evolution of a PA66 FR/reinforced + nanofillers compared with the same PA66 without nanofillers

