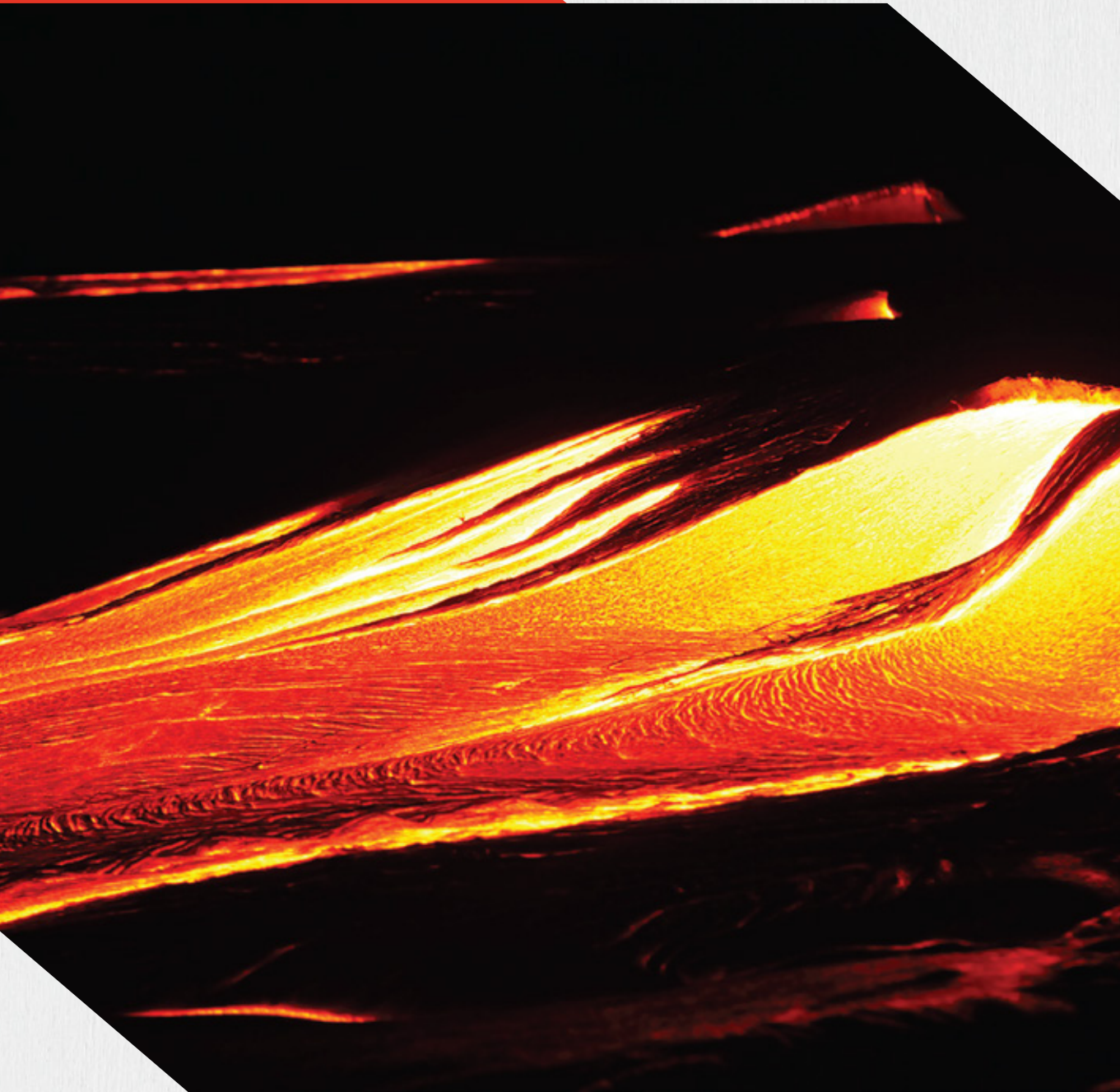


FLAME RETARDANT COMPOUNDS



Tisan

Plastics Engineer

FLAME RETARDANT COMPOUNDS

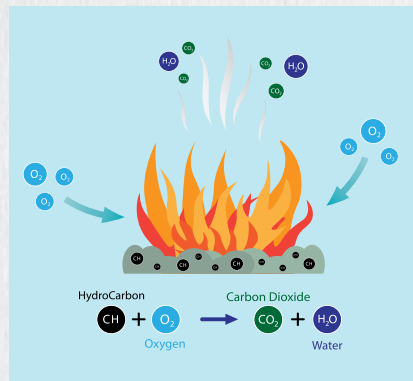
Self-extinguishing engineering plastics shows increasing trend in worldwide. Tisan Engineering Plastics has a leading expertise in compounding flame retardant grades with different polymer resins. Our engineers are qualified at developing the products with different flame retardant systems that our customer's requirements for different markets.

Trademarked products for your valuable applications



Thermoplastics undergo pyrolysis when exposed to heat or flame. This process results degradation of the polymer which releases gases and this becomes the source for combustion.

Flame retardant compounds are produced to disrupt one or more elements needed for combustion process. These compounds are used for delay ignition time and spread of flames to escape from fire. The material content is important for burning behavior of plastics however part design and thickness are the key factors for flammability.



Flame Retardant Additives

- Halogenated flame retardant additives are used for disrupt the production of free radicals in the vapor phase of combustion to shutting down the process.
- Phosphorous and nitrogen based halogen free flame retardant additives react to form char on the surface to slow pyrolysis and create a barrier to hinder the release of gases.
- Halogen, phosphorus and nitrogen free flame retardant additives are used to release water molecules during endothermic reactions in the fire. That water molecules cool the polymer and slow the combustion process.

Markets

- Automotive
- Electric & Electronics
- Home appliances
- Construction
- Industrial applications
- Defense industry
- Safety equipment
- Transportation
- Office Furniture
- Sports
- Energy
- Others



Our quality is **your** **guarantee**

Our product reach reliably the customer having passed all the quality tests in our T-LAB laboratory matching international standards.

1 Mechanical tests	2 Physical properties	3 Weathering and aging tests
4 Flammability tests	5 Color arrangement and measurements	6 Thermal and flow analysis
7 Heat deflection analysis	8 Electrical and chemical resistance	9 Dimensional tests

More than
40 years
experience

Tisan Engineering Plastics specialized on production of compounds used as raw materials more than 40 years experience. Tisan produces competitive and favorable solutions to customers based on their requirements. Our aim is to provide competitive solutions, qualified products, flexible production, high-speed service with strong technical infrastructure and human quality in both standard and exclusive products for all markets.

HALOJEN

Tislamid A 10D03 F01 R01 PA6, 10% glass fiber reinforced, flame retardant-halogen	Tisoplen C 10D01 F01 K01 K03 R01 PPH, 10% talc filled, flame retardant-halogen, UV stabilized, anti-static	Tisarbon H UNR F01 R01 PC, unreinforced, flame retardant-halogen	Tisren K 10D03 F01 K02 R01 PS, 10% glass fiber reinforced, flame retardant-halogen, heat stabilized
Tislamid A 10D11 F01 K03 K01 R02 PA6, 10% carbon fiber reinforced, flame retardant-halogen, UV stabilized, anti-static	Tisoplen C 10D03 F01 R01 PPH, 10% glass fiber reinforced, flame retardant-halogen	Tisester F 25D03 F01 K02 K02 R01 PBT, 25% glass fiber reinforced, flame retardant-halogen, heat stabilized	Tisren K 15D03 F01 K02 R01 PS, 15% glass fiber reinforced, flame retardant-halogen, heat stabilized
Tislamid A 30D03D01 F01 R01 PA6, 30% glass fiber reinforced and talc filled, flame retardant-halogen	Tisoplen C 30D03D01 F01 R01 PPH, 30% glass fiber reinforced and talc filled, flame retardant-halogen	Tisester F 30D03 F01 K04 R01 PBT, 30% glass fiber reinforced, flame retardant-halogen, impact modified	Tisren K 20D03 F01 K02 R01 PS, 20% glass fiber reinforced, flame retardant-halogen, heat stabilized
Tislamid A 15D03 F01 K04 R01 PA6, 15% glass fiber reinforced, flame retardant-halogen, impact modified	Tisoplen C 30D01 F01 R01 PPH, 30% talc filled, flame-retardant-halogen	Tisester F 35D03 F01 R01 PBT, 35% glass fiber reinforced, flame retardant-halogen	Tisren K 25D03 F01 K02 R01 PS, 25% glass fiber reinforced, flame retardant-halogen, heat stabilized
Tislamid A 25D03 F01 R01 PA6, 25% glass fiber reinforced, flame retardant-halogen	Tisoplen C 30D03 F01 R01 PPH, 30% glass fiber reinforced, flame retardant-halogen	Tisester F UNR F01 K02 R01 PBT, unreinforced, flame retardant-halogen, heat stabilized	Tisren K UNR F01 K04 K02 R01 PS, unreinforced, flame retardant-halogen, impact modified, heat stabilized
Tislamid A 30D01 F01 K02 R01 PA6, 30% talc filled, flame retardant-halogen, heat stabilized	Tisoplen C UNR F01 K01 K03 R01 PPH, unreinforced, flame retardant-halogen, anti-static, UV stabilized	Tisester F UNR F01 K04 K02 R01 PBT, unreinforced, flame retardant-halogen, impact modified	Tisblend AI UNR F01 R01 PA/ABS, unreinforced, flame retardant-halogen
Tislamid A 30D01D14 F01 R02 PA6, 30% glass fiber and graphite reinforced, flame retardant-halogen	Tisoplen D 5D01 F01 K01 R01 PPC, 5% talc filled, flame retardant-halogen, anti-static	Tisapet L 15D03 F01 R01 PET, 15% glass fiber reinforced, flame retardant-halogen	Tisblend FH 30D03 F01 R01 PBT/PC, 30% glass fiber reinforced, flame retardant-halogen
Tislamid A 35D03 F01 K03 R01 PA6, 35% glass fiber reinforced, flame retardant-halogen, UV stabilized	Tisoplen D 15D01 F01 K03 R01 PPC, 15% talc filled, flame retardant-halogen, UV stabilized, anti-static	Tisapet L 30D03 F01 R01 PET, 30% glass fiber reinforced, flame retardant-halogen	Tisblend FH UNR F01 K04 R01 PBT/PC, unreinforced, flame retardant-halogen, impact modified
Tislamid A UNR F01 K04 R01 PA6, unreinforced, flame retardant-halogen, impact modified	Tisoplen D 20D01 F01 K02 K02 R01 PPC, 20% talc filled, flame retardant-halogen, heat stabilized	Tisapet L 35D03 F01 R01 PET, 35% glass fiber reinforced, flame retardant-halogen	Tisblend FL 15D03 F01 R01 PBT/PET, 15% glass fiber reinforced, flame retardant-halogen
Tislamid B 10D11 F01 K02 R01 PA6.6, 10% carbon fiber reinforced, flame retardant-halogen, heat stabilized	Tisoplen D 20D03 F01 K02 K02 R01 PPC, 20% glass fiber reinforced, flame retardant-halogen, heat stabilized	Tisapet L UNR F01 R01 PET, unreinforced, flame retardant-halogen	Tisblend FL 30D03 F01 R01 PBT/PET, 30% glass fiber reinforced, flame retardant-halogen
Tislamid B 15D03 K02 F01 R01 PA6.6, 15% glass fiber reinforced, flame retardant-halogen, heat stabilized	Tisoplen D 30D01 F01 R01 PPC, 30% talc filled, flame retardant-halogen	Tisakril I 10D03 F01 R01 ABS, 10% glass fiber reinforced, flame retardant-halogen	Tisblend FT 30D03 F01 R01 PBT/ASA, 30% glass fiber reinforced, flame retardant-halogen
Tislamid B 20D03 10D01 F01 R01 PA6.6, 20% glass fiber reinforced and 10% talc filled, flame retardant-halogen	Tisoplen D UNR F01 K01 K03 R01 PPC, unreinforced, flame retardant-halogen, UV stabilized, anti-static	Tisakril I 10D11 F01 R02 ABS, 10% carbon fiber reinforced, flame retardant-halogen	Tisblend HI UNR F01 R01 PC/ABS, unreinforced, flame retardant-halogen
Tislamid B 30D03D11 F01 R01 PA6.6, 30% glass fiber and carbon fiber reinforced, flame retardant-halogen	Tisarbon H 5D03 F01 R01 PC, 5% glass fiber reinforced, flame retardant-halogen	Tisakril I 15D05 F01 K02 R01 ABS, 15% glass bead reinforced, flame retardant-halogen, heat stabilized	Tisblend IH UNR F01 R01 ABS/PC, unreinforced, flame retardant-halogen
Tislamid B 30D03 F01 K03 K01 R01 PA6.6, 30% glass fiber reinforced, flame retardant-halogen, UV stabilized, anti-static	Tisarbon H 10D03 F01 K03 R01 PC, 10% glass fiber reinforced, flame retardant-halogen, UV stabilized	Tisakril I 25D03 F01 R01 ABS, 25% glass fiber reinforced, flame retardant-halogen	ECOSTAR A 20D03 F01 R02 PA6, 20% glass fiber reinforced, flame retardant-halogen
Tislamid B UNR F01 K04 R01 PA6, unreinforced, flame retardant-halogen, impact modified	Tisarbon H UNR F01 K04 K02 R01 PC, unreinforced, flame retardant-halogen, impact modified, heat stabilized	Tisakril I UNR F01 K04K02 R01 ABS, unreinforced, flame retardant-halogen, impact modified, heat stabilized	ECOSTAR A 30D03 F01 R02 PA6, 30% glass fiber reinforced, flame retardant-halogen

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UL 94 VERTICAL BURNING

This standard is used to determine V-0, V-1 and V-2 vertical flammability ratings. The thickness of the sample is based on the application area of the product. The test evaluates both the burning and afterglow times and dripping of the burning test specimen. The flame is applied for 10 seconds in both applications.

Test Criteria	V-0	V-1	V-2
Burning time of each individual test specimen (s) (after first and second flame applications, t1 or t2)	≤10	≤30	≤30
Burning and afterglow times after second flame application (s) (t2+t3)	≤30	≤60	≤60
Total burning time (s) (5 specimens, t1+t2)	≤50	≤250	≤250
Dripping of burning specimens (ignition of cotton batting)	No	No	Yes

t1: Afterflame time after first flame application

t2: Afterflame time after second flame application

t3: Afterglow time after second flame application



UL 94 HORIZONTAL BURNING (HB)

The horizontal burning test is used to determine the flammability rating of a material at horizontal position (HB).

The flammability rating is calculated for a test specimen as a function of the burning rate and taking account of the material thickness.

Test criteria	Burning rate in v	Flammability rating
Test specimen thickness; 3 - 13 mm	≤ 40 mm/min	HB
Test specimen thickness < 3 mm	≤ 75 mm/min	HB
Flame is extinguished before first mark	= 0 mm/min	HB
Flame application time		30 s
If the flame front reaches the first mark within 30 s, flame application is discontinued.		

ECE R 118 ANNEX 6-7-8

This standard is used to determine flame behavior of the material for automotive market.

ANNEX	TEST
6	Determine the horizontal burning rate of materials
7	Determine the melting behavior of materials
8	Determine the vertical burning rate of materials

UL 94 5V

This method is used to determine the UL 94-5VA and -5VB flammability ratings.

The test evaluates both the flammability of the test specimen and any holes that are formed in sheets. The flame is applied for 5 times and each application takes 5 seconds.

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

GLOW WIRE (IEC 60695-2-10)

The purpose of the standard is to determine the flame resistant properties of plastic materials used in electric and electronic markets. Glow wire testing evaluates the resistivity of the material to overheating to protect against the fire risk by simulating overheated part contacts to plastic material.

In this standard, there are four parts covering different aspects of the glow wire testing which are;

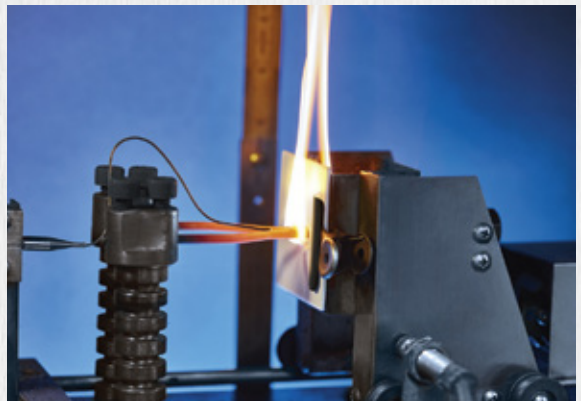
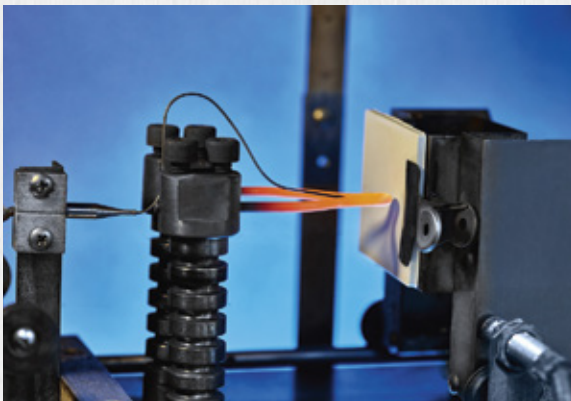
IEC 60695-2-10: Glow-wire apparatus and common test procedure

IEC 60695-2-11: Glow-wire flammability test method for end products (GWEPT)

IEC 60695-2-12: Glow-wire flammability index (GWFI) test method for materials

IEC 60695-2-13: Glow-wire ignition temperature (GWIT) test method for materials

The Glow Wire Flammability Index (GWFI) is the highest temperature at which the material does not ignite or self-extinguishes within 30 seconds after removal of the heated element after 30 seconds exposure. Also, the sample may not ignite the tissue paper if drips occur. The result of the glow wire testing will be either pass or fail at a given temperature and thickness. Glow wire ignition temperature (GWIT) is the maximum temperature at which the material does not ignite or self-extinguishes within 5 seconds when conducting with the heated glow wire.



HALOGEN FREE

Tislamid A UNR F02 K12 K02 R03 PA6, unreinforced, flame retardant halogen-red phosphorus free, laser markable	Tislamid B 30D03 F02 K02 R01 PA6.6, 30% glass fiber reinforced, flame retardant-halogen & red phosphorus free, heat stabilized	Tisoplen C UNR F02 K02 R01 PPH, unreinforced, low smoke density, flame retardant-halogen free, heat stabilized	Tisapet L 30D03 F02 R01 PET, 30% glass fiber reinforced, flame retardant-halogen free
Tislamid A UNR F03 K02 R01 PA6, unreinforced, flame retardant-low halogen content	Tislamid B 25D03 F02 K02 R01 PA6.6, 25% glass fiber reinforced, flame retardant-halogen free, heat stabilized	Tisoplen C 8D01 F02 R01 PPH, 8% talc filled, flame retardant-halogen free	Tisapet L 30D03 F02 K02 R01 PET, 30% glass fiber reinforced, flame retardant-halogen free, heat stabilized
Tislamid A UNR F02 R01 PA6, unreinforced flame retardant-halogen free, extrusion, high viscosity	Tislamid B 20D03 F02 K02 R01 PA6.6, 20% glass fiber reinforced, flame retardant-halogen & red phosphorus free, heat stabilized	Tisoplen C 25D01 F02 R01 PPH, 25% glass fiber reinforced, flame-retardant halogen free	Tisakril I UNR F02 R01 ABS, unreinforced, flame retardant-halogen free
Tislamid A 30D03 F02 K02 R01 PA6, 30% glass fiber reinforced, flame retardant-halogen free, heat stabilized	Tislamid B 20D01 F02 R01 PA6.6, 20% talc filled, flame retardant-halogen & red phosphorus free	Tisoplen C 10D01 F02 R01 PPH, 10% talc filled, flame retardant-halogen free	Tisblend HI UNR F02 R01 PC/ABS, unreinforced, flame retardant-halogen free
Tislamid A 25D03 F02 R01 PA6, 25% glass fiber reinforced, flame retardant-halogen free	Tislamid B 15D03 K02 F02 R01 PA6.6, 15% glass fiber reinforced, flame retardant-halogen & red phosphorus free, heat stabilized	Tisester F 30D03 F02 R01 PBT, 30% glass fiber reinforced, flame retardant-halogen free	Tisblend HI UNR F02 K03 R01 PC/ABS, unreinforced, flame retardant-halogen free, UV stabilized
Tislamid A 25D01 F02 R01 PA6, 25% talc filled, flame retardant-halogen free	Tislamid B 10D03 F02 R01 PA6.6, 10% glass fiber reinforced, flame retardant-halogen free	Tisester F 25D03 F02 R01 PBT, 25% glass fiber reinforced, flame retardant-halogen free	Tisblend HI 15D03 F02 R01 PC/ABS, 15% glass fiber reinforced, flame retardant-halogen free
Tislamid A 20D03 F02 K02 R01 PA6, 20% glass fiber reinforced, flame retardant-halogen & red phosphorus free, heat stabilized	Tisoplen D UNR F03 K02 R01 PPC, unreinforced, flame retardant-low halogen content, heat stabilized	Tisester F 15D03 F02 R01 PBT, 15% glass fiber reinforced, flame retardant-halogen free	Tisblend HF 30D03 F02 R01 PC/PBT, 30% glass fiber reinforced, flame retardant-halogen free
Tislamid A 20D01 F02 R01 PA6, 20% talc filled, flame retardant-halogen & red phosphorus free	Tisoplen D UNR F02 R01 PPC, unreinforced, flame retardant-halogen free	Tisarbon H UNR F02 R01 PC, unreinforced, flame retardant-halogen free	ECOSTAR B 30D03 F02 R02 PA6.6, 30% glass fiber reinforced, flame retardant-halogen & red phosphorus free
Tislamid A 15D03 F02 K02 R01 PA6, 15% glass fiber reinforced, flame retardant-halogen & red phosphorus free, heat stabilized	Tisoplen D 20D03 F02 R01 PPC, 20% glass fiber reinforced, flame retardant-halogen free	Tisarbon H 40D03 F02 R01 PC, 40% glass fiber reinforced, flame retardant-halogen free	ECOSTAR B 25D03 F02 R02 PA6.6, 25% glass fiber reinforced, flame retardant-halogen free
Tislamid B UNR F02 K12 R03 PA6.6, unreinforced, flame retardant-halogen & red phosphorus free, laser markable	Tisoplen D 20D01 K02 R01 PPC, 20% talc filled, flame retardant-halogen, heat stabilized	Tisarbon H 20D03 F02 R01 PC, 20% glass fiber reinforced, flame retardant-halogen free	ECOSTAR A 30D03 F02 R02 PA6, 30% glass fiber reinforced, flame retardant-halogen & red phosphorus free
Tislamid B UNR F03 R01 PA6.6, unreinforced, flame retardant-low halogen content	Tisoplen D 20D01 F02 R01 PPC, 20% talc filled, flame retardant-halogen free	Tisarbon H 20D03 F02 K03 R01 PC, 20% glass fiber reinforced, flame retardant-halogen free, UV stabilized	ECOSTAR A 20D03 F02 R02 PA6, 20% glass fiber reinforced, flame retardant-halogen & red phosphorus free
Tislamid B UNR F02 R01 PA6.6, unreinforced flame retardant-halogen free, high viscosity, extrusion	Tisoplen D 15D01 F02 R01 PPC, 15% talc filled, flame retardant-halogen free	Tisarbon H 10D03 F02 R01 PC, 10% glass fiber reinforced, flame retardant-halogen free	Tisarbon H 40D03 F02 K03 R01 PC, 40% glass fiber reinforced, flame retardant-halogen free, UV stabilized
Tislamid B UNR F02 K03 R01 PA6.6, unreinforced, flame retardant-halogen free, UV stabilized	Tisoplen C UNR F03 K02 R01 PPH, unreinforced, flame retardant-low halogen content, heat stabilized	Tisapet L 33D03 F02 R01 PET, 33% glass fiber reinforced, flame retardant-halogen free	Tisarbon H 30D03 F02 R01 PC, 30% glass fiber reinforced, flame retardant-halogen free,

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