Materials

HellermannTyton has worked very closely with its material suppliers to develop resins that are specifically formulated for fastener and cable tie production. HellermannTyton has spearheaded material advancements in component manufacturing to assure its customers of the finest quality products. Environmental factors can have an adverse effect on fasteners. It is very important to use the most suitable material for each application. HellermannTyton fasteners are available in a variety of materials ranging from polyamides (nylon) to fluoropolymers.

Polyamide 6.6 – General Purpose

General purpose polyamide 6.6 features light weight, high strength and a wide temperature range. Polyamide 6.6 is hygroscopic, and therefore, absorbs or releases moisture depending on its environment. Thus, the moisture level of the material will affect tensile strength, stiffness and elongation of the product.

Polyamide 6.6 – Heat Stabilized

With similar properties and benefits as polyamide 6.6, products manufactured with heat stabilized polyamide 6.6 material have a chemical stabilizer added for higher continuous temperature applications.

Polyamide 6.6 – UV Resistant

Chemical inhibitors are used to give polyamide 6.6 material added properties to fight against premature aging of products due to the effects of ultraviolet rays.

Polyamide 6.6 – UV Resistant (2% Carbon for Military Specification)

The physical properties of this material include carbon, which acts as a UV stabilizer, prolonging the life of the product under ultraviolet conditions. It also allows HellermannTyton's black cable ties to meet the particular military specification for cable ties.

Polyamide 6.6 – V0 Flame Retardant

This material meets UL 94V-0 flammability requirements. Flame retardant additives generally reduce tensile strength when compared to general purpose polyamide 6.6, but this resin has been formulated to minimize such effects.

Polyamide 6.6 – Impact Modified, Heat Stabilized and UV Resistant

Impact modified polyamide 6.6 offers the increased flexibility, heat resistance and UV resistance of the high impact material with the added feature of greater resistance to vibration, heat and sunlight for mobile applications.

Polyamide 6.6 – High Impact

Impact modifiers are added to increase flexibility. High impact polyamide 6.6 has stable tensile strength due to its reduced influence from moisture. It is excellent for high vibration applications, as within the aircraft and automobile industries and performs better than polyamide 6.6 against ultraviolet rays. Good for outdoor use.

For more information on RoHS/WEEE Compliance, go online to: http://www.hellermann.tyton.com/rohs.asp

Polyamide 4.6

Polyamide 4.6, like polyamide 6.6, offers light weight and high strength benefits, but offers an even wider temperature range.This material can be used at a higher continuous operating temperature than polyamide 6.6 - heat stabilized. In addition to having excellent heat resistance, polyamide 4.6 has low creep effects and retention of stiffness at elevated temperatures.

Polypropylene

Polypropylene is used in environments where chemical effects on polyamide are a concern. It is not affected by inorganic acids (hydrochloric), polyhydric alcohols (ethyleneglycol), neutral salts (sodium chloride) and basic salts (sodium bicarbonate). Polypropylene also resists a number of other chemicals with good results, although it has lower tensile strength than polyamide 6.6 (about half). Polypropylene has good UV resistance.

Polyamide 12

Although not as strong as polyamide 6.6 (about half), polyamide 12 is extremely flexible, absorbs little moisture, ages better and has better chemical and UV resistance than general purpose polyamide 6.6. Polyamide 12 is good for applications where products are exposed to metal oxides.

Ethylenterafluorineethylene - Tefzel

Although about two-thirds the strength of polyamide 6.6, Tefzel is resistant to a wide range of chemicals, such as concentrated hydrofluoric and sulfuric acids. It is also a low water absorbing material, therefore, is not adversely affected by water. Tefzel is radiation resistant up to 200 megarads and meets the fire and smoke requirements of IEEE 383. Tefzel also withstands high temperatures and ultraviolet light exposure. Products made from Tefzel material also have non-outgassing properties for zero gravity applications.

Polyacetal

Polyacetal has excellent dielectric properties, UV and chemical resistance, and a UL94-HB flame rating.
It has been tested for excellent weatherability against moisture, sunlight, and other environmental conditions.

Halar

Halar is similar to Tefzel in performance and benefits. Halar is recognized for its low smoke density attribute when burned. This makes products made out of Halar more desirable for use in areas where smoke generation is a concern,as when bundling wire and cable in air handling spaces. * Halar is a registered trademark of Solvay S.A.

Material Specifications

MATERIAL	CONTINUOUS OPERATING TEMPERATURE MAX.	CONTINUOUS OPERATING TEMPERATURE MIN.	TENSILE STRENGTH AT 73°F DRY AS MOLDED ASTM D-638 (PSI)	UL FLAME RATING	OXYGEN INDEX %	GAMMA RADIATION RESISTANCE	UV RESISTANCE	MILITARY, FEDERAL, ASTM AND FDA SPECIFICATIONS
Polyamide 6.6- General Purpose (PA66)	185°F 85°C	-40°F -40°C	12,000	94V-2	28	1 x 10^5 Rads	Poor	ASTM D-4066PA0111 FDA CFR177.1500
Polyamide 6.6- Heat Stabilized (PA66HS)	221°F 105°C	-40°F -40°C	12,000	94V-2	26	1 x 10^5 Rads	Poor	ASTM D-4066PA0121
Polyamide 6.6- UV resistant (PA66UV)	185°F 85°C	-40°F -40°C	12,000	94V-2	26	1 x 10^5 Rads	Good	-
Polyamide 6.6-2% Carbon UV resistant	185°F 85°C	-40°F -40°C	12,000	94V-2	26	1 x 10^5 Rads	Good	ASTM D-4066PA0181 MS3367/8
Polyamide 6.6-Flame Retardant (PA66VO)	185°F 85°C	-40°F -40°C	10,800	94V-0	34	1 x 10^5 Rads	Poor	ASTM D-4066PA0110
Polyamide 6.6-Impact Mod. Heat Stabilized, UV Resistant (PA66HIRHS)	230°F 110°C	-40°F -40°C	9,500	94-HB	N/A	N/A	Very Good	ASTM D-4066PA0161
Polyamide 6.6- High Impact (PA66HIR)	230°F 110°C	-40°F -40°C	8,800	94-HB	19	1 x 10^5 Rads	Good	ASTM D-4066PA0151
Polyamide 4.6- Heat Stabilized (PA46)	275°F 135°C	-40°F -40°C	14,400	94V-2	27	9 x 10^6 Rads	Poor	ASTM D-4066PA0922
Polypropylene- Chemical Resistant (PP)	239°F 115°C	-40°F -40°C	3,400	94-HB	N/A	1 x 10^5 Rads	Good	ASTM D-4101PP0327
Polyamide 12- UV resistant (UV)	176°F 80°C	-40°F -40°C	5,800	94-HB	N/A	1 x 10^5 Rads	Good	ASTM D-4066PA411
Ethlenterafluorineethylene Tefzel® (E/TFE)	302°F 150°C	-112°F -80°C	5,800	94V-0	30	2 x 10^8 Rads	Excellent	UL2043 ASTM D-3159 Type 1 Grade 1
Polyacetal (POM)	185°F 85°C	-40°F -40°C	6,500	94-HB	N/A	N/A	Excellent	-
Halar® (PA66HL)	300°F 150°C	-104°F -76°C	6,100	94V-0	52	2 x 108Rads	Excellent	ASTM D-3275 Type CFDA CFR177.1380

Material Performance Guide

ATTRIBUTE	POLYAMIDE 6.6 GENERAL PURPOSE	POLYAMIDE 6.6 HEAT STABILIZED	POLYAMIDE 6.6 UV RESISTANT	POLYAMIDE 6.6 - 2% CARBON UV RESISTANT	POLYAMIDE 6.6 FLAME RETARDANT V0	POLYAMIDE 6.6 IMPACT MODIFIED , HEAT STABILIZED UV RESISTANT	POLYAMIDE 6.6 HIGH IMPACT	POLYAMIDE 4.6 HEAT STABILIZED	POLYPROPYLENE	POLYAMIDE 12 UV RESISTANT	ETHLENTERAFLUORINE-ETHYLENE — TEFZEL®	POLYACTAL	HALAR®
Tensile Strength	8	8	8	9	7	8	7	10	2	4	5	5	5
High Temperature	2	3	2	2	2	3	2	9	2	1	10	3	10
Flammability	5	5	5	5	10	2	2	5	2	2	10	2	10
UV Resistance	1	1	5	8	1	8	2	1	5	3	10	10	10
Radiation	3	3	3	3	3	3	3	3	6	3	10	3	10
Chemical Resistance	6	6	6	6	6	6	6	6	8	8	10	-	10
- Hydrocarbons	8	8	8	8	8	8	8	8	6	8	10	8	10
- Chlorinated Hydrocarbons	6	6	6	6	6	6	6	6	3	8	10	5	5
- Acids	2	2	2	2	2	2	2	2	8	5	10	8	10
- Bases	8	6	6	6	6	6	6	6	8	6	10	8	10
- Salts	3	3	3	3	3	3	3	3	10	8	10	8	10
Relative Cost	Low	Low	Med.	Med.	Med.	Med.	Med.	Med.	Med.	Med.	High	Med.	High

10 = Most Recommended 1= Least Recommended