

Introduction to the main locking technologies used for cable ties

HellermannTyton offers a wide range of cable ties for use in different applications. By constantly refining our products and satisfying the ever-changing demands of the market, various locking technologies have been developed. Below you will find a brief overview of three most common locking technologies and their characteristics.

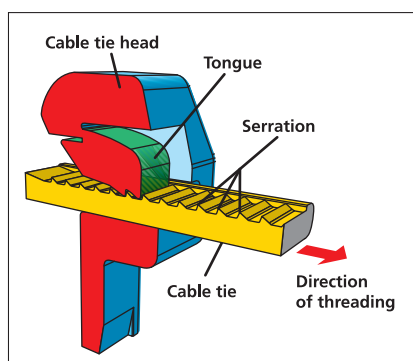
Cable ties with plastic pawls

This technology is used in 90% of all poly-amide (PA) cable ties applied by HellermannTyton. In order to cover a variety of applications, there are different variants of this system, for example: releasable versions, in-line versions, open head versions.

These are one-piece cable ties, that is the pawl is moulded as an integral part of the cable tie, thereby building in inherent strengths.

Locking technology

Positive locking is achieved by engaging the pawl with the strap serrations. This allows the cable tie to perform to the published minimum tensile strength, that is the loading that the cable tie can hold under application (see page 29).

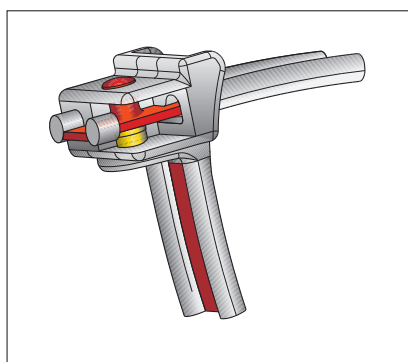
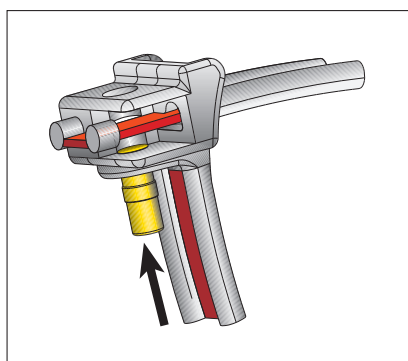


KR series cable ties

This cable tie is distinguished by its smooth strap and unique locking mechanism. With the KR series the chamfered head achieves an especially firm fit around the bundled material.

Locking technology

This patented lock technology takes advantage of the excellent deformation properties of polyamide (PA). Here, the glass fibre-reinforced (GRP) locking pin (yellow) is forced into the strap by the use of an application tool - either the KR6/8 or KR8PNSE (see page 416). The strap is deformed into the head of the tie by the application of the pin, thereby locking the cable tie in position and allowing for the bundling of heavy loads.



MBT series of cable ties

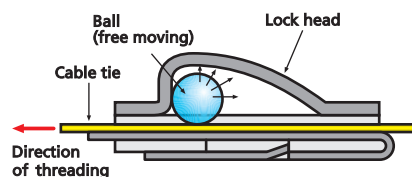
Made of stainless steel grades 304 or 316, the MBT range of cable ties have no serrations on the strap and are threaded parallel through the head, gliding under a metal ball-bearing locking mechanism. By using the MK9SST (see page 417) application tool the cable tie is tensioned and the strap cut to a flush finish.

Locking technology

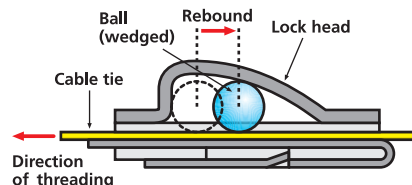
The strap is locked into the head by means of the small ball-bearing. The ball locks into the small end of the wedged shaped housing, forming a positive locking with the strap.

This cable tie is not suitable for rigid objects. Retraction of the ball-bearing (see drawing) is required into the small end of the wedged shaped housing to allow for a positive locking of the strap and also to make a flush cut of the end of the strap. Retraction, therefore, cannot take place with the bundling of inflexible materials. To bundle rigid objects LFPC channel (see page 90) should be laid as buffer between strap and bundled material to compensate for this retraction. This locking technology allows for minimum tensile strengths of up to 2225 Newton (500 LBS).

1. Initial position



2. Ball locks cable tie by wedging.



Determination of minimum tensile strength

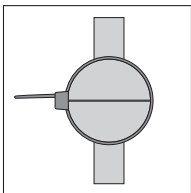
Determination of minimum tensile strength

The minimum tensile strength is a critical selection criteria for cable ties. It expresses how much loading a cable tie can bear. This minimum tensile strength is determined in

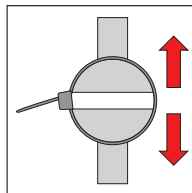
accordance with the Military Specification and Standards of the USA. Test conditions being laid down precisely in MIL-S-23190E:

- Conditioning of the test pieces
- Construction of the test apparatus
- Application of the tie on a split test probe
- Test speed

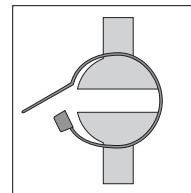
The test procedure to determine minimum tensile strength



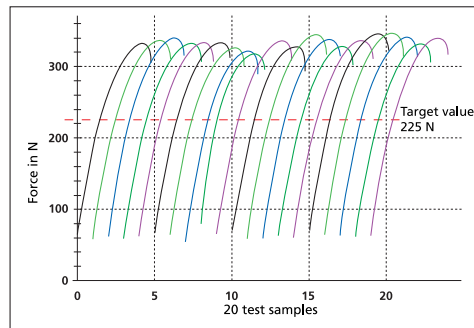
The cable tie is fixed onto a split mandrel test probe with the suitable cable tie application tool.



The mandrel is opened at a defined speed.



The loading at which the cable tie fails is determined. This value is stated in Newtons (N) and is recorded through a computer programme reading the tests. This programme produces graphs as outlined below.



Typical measurement protocol of a T50R made of PA66 with a minimum tensile strength of 225 N.

Explanation of minimum tensile strengths

What does a minimum tensile strength of 225 N (50LBS) mean?

To explain what this value means, the mass with which the tie can be loaded is calculated. The unit of measurement of the mass is stated in kg. To do so, the unit Newton (N) is shown in the following way:

$$[N] = [kg * m/s^2]$$

The formula for calculating the mass is:

$$\text{Mass} = \frac{\text{minimum tensile strength/}}{\text{acceleration due to gravity}}$$

The acceleration due to gravity is 9.81 m/s²:

$$\text{Mass} = \frac{\text{minimum tensile strength/}}{[kg * m/s^2] / 9.81 [m/s^2]}$$

At a minimum tensile strength of 225 N (50LBS) the mass is:

$$\text{Mass} = 225 [kg * m/s^2] / 9.81 [m/s^2]$$

The units m/s² cancel each other out, leaving the unit [kg] for the mass. Thus:

$$\text{Mass} = 225/9.81 \text{ kg} = 22.9 \text{ kg}$$

Therefore, a T50R cable tie with a minimum tensile strength of 225 N (50LBS) can be loaded with 22.9 kg.

Conversely, with the required loading capacity the minimum tensile strength can be calculated by a mass:

$$\text{Min. tensile strength} = \text{mass} * 9.81[m/s^2]$$

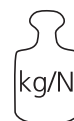
If the tie is to be loaded with, for example, 53 kg this produces:

$$\text{Minimum tensile strength} = [53 \text{ kg}] * 9.81 [m/s^2] = 520 \text{ N}$$

In order to withstand a load of 53 kg, the tie must therefore have a minimum tensile strength of 520 N. In this case, select our T120R with a minimum tensile strength of 535 N (120LBS).



$$225 \text{ N}/9.81 = 22,9 \text{ kg}$$



$$53 \text{ kg} * 9.81 = 520 \text{ N}$$



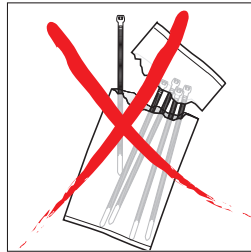
Optimum storage conditions for cable ties made of polyamide (PA)

HellermannTyton cable ties, fastenings and fixings are manufactured from high-quality polyamide (PA). This industrial synthetic material is mainly processed using injection moulding, but can also be extruded.

Polyamide is a hygroscopic material. This means that the material absorbs and loses moisture. For optimum handling of cable ties it is important that the material is in a condition of equilibrium with a water content of approximately 2.5%.

The packaging used by HellermannTyton ensures that the water content in the material remains constant. Therefore, it is important to store the products in their original packaging to preserve the quality of the ties.

Always store ties in the sealed plastic bag made of polyethylene!



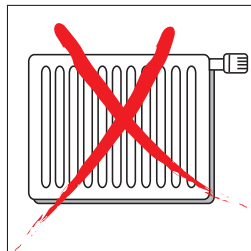
Once opened you should use the ties as quickly as possible!

Do not expose the product to direct sunlight!



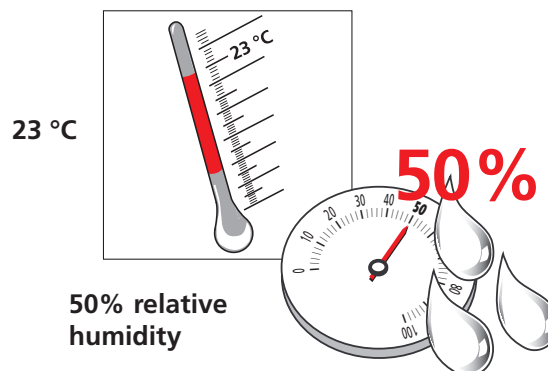
Do not store the product in sunlight; for example, on the windowsill!

Store the product away from direct sources of heat!



Avoid contact with heat: for example, do not place on the radiators!

The ideal storage conditions are those of the central European standard climate:



HellermannTyton cable ties conform to DIN EN 50146 standard

HellermannTyton cable ties conform to DIN EN 50146 standard

HellermannTyton are a supplier of high-quality solutions for the routing, organising and securing of cables, hoses and pipes. The level of quality has been inspected by the VDE (Verband der Elektrotechnik, Elektronik, Informationstechnik e.V) [German Association for Electrical, Electronic and Information Technologies].

Cable ties from the inside-serrated T-Series and the outside-serrated OS-Series have been tested in accordance to the cable tie standard DIN EN 50146 (VDE 0604 PART 201):2000-12; EN 50146:1999-08. The result of this independent testing is complete compliance:



These cable ties therefore qualify to bear the VDE symbol.

In addition to cable ties made of the standard material polyamide 6.6 (PA66), ties made from heat-stabilised (PA66H) and UV-stabilised polyamide 6.6 (PA66W) have been successfully tested and approved.

HellermannTyton is the only manufacturer to offer cable ties with inside and outside serration with DIN approval. So all current applications in the field of electrical installation are covered.

The standard includes the following tests:

- Test of minimum installation temperature
- Test of minimum application temperature
- Minimum tensile strength (in the standard this is described as the looping test)
- Load test and heat ageing test
- Temperature cycle test
- Contribution to the spread of fire
- Corrosion resistance

The following HellermannTyton cable ties have been tested and certified:

T-Series inside-serrated cable ties

(see page 43-54) in the qualities:

| | | |
|---|-----------------------|------------------|
| Polyamide 6.6 (all colours) | 38 types x 11 colours | = 418 cable ties |
| Polyamide 6.6 heat-stabilised (all colours) | 38 types x 11 colours | = 418 cable ties |
| Polyamide 6.6 UV-stabilised (black) | 38 types in black | = 38 cable ties |

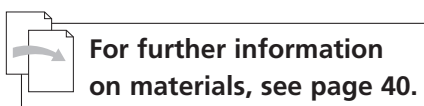
Total number of cable ties in T-Series to DIN standard 874 cable ties

OS-series outside-serrated cable ties

(see page 60)

| | | |
|---|----------------------|-----------------|
| Polyamide 6.6 heat-stabilised (all colours) | 7 types x 11 colours | = 77 cable ties |
| Total number of cable ties in OS series to DIN standard | | 77 cable ties |

Total number of HellermannTyton cable ties to DIN standard 951 cable ties



- suitable
- of limited suitability
- ▣ partly suitable
- ++ very good
- + good
- o limited

These details are only rough guide values. They should be regarded as a material specification and are no substitute for a suitability test. Please see our datasheets for further details.

| Typ | Page | Material | Operating Temperature [°C] |
|------------------------------------|------|------------|---|
| Inside Serrated Cable Ties | | | |
| T Series | 43 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| T Series | 47 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| T Series | 49 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| T Series | 51 | PA66V0 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| T Series | 51 | PA66HIR | -40 °C to +80 °C Continuous, (+105 °C for 500 h) |
| T Series | 51 | PA66HSW | -40 °C to +105 °C continuous |
| T Series | 52 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| T Series | 52 | E / TFE | -80 °C to +150 °C continuous |
| T Series | 53 | PA66HIR(S) | -40 °C to +80 °C Continuous, (+105 °C for 500 h) |
| T Series | 53 | PP | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LK Series | 55 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LK Series | 55 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LK Series | 55 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| LK Series | 55 | PA66HIR(S) | -40 °C to +80 °C Continuous, (+105 °C for 500 h) |
| WS Series | 56 | PA66HIRHS | -40 °C to +110 °C continuous |
| CTT Series, HRT, HT | 57 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| CTT Series, HRT, HT | 57 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| CTT Series, HRT, HT | 57 | PA66HSW | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| DH Series | 58 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| DH Series | 58 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| DH Series | 58 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| DH Series | 58 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| Outside Serrated Cable Ties | | | |
| RPE, PE Series | 62 | PA66HSW | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| RPE, PE Series | 62 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LPH Series | 63 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LPH Series | 63 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| OS Series | 60 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| OS Series | 60 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| OS Series | 60 | PA66V0 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| OS Series | 60 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| Releasable Cable Ties | | | |
| RT 100, 140, 250 Series | 64 | PA12 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| RT, RELK, RLT Series | 65 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| RT, RELK, RLT Series | 65 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| RT, RELK, RLT Series | 65 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LRT, RT250 Series | 66 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LRT, RT250 Series | 66 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| REL Series | 67 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| REL Series | 67 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LR55 Series | 68 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LR55 Series | 68 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| SOFTFIX®/SRT Series | 69 | TPU | -40 °C to +85 °C |
| REZ Series | 70 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| RS1 Series | 70 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |

- suitable
- of limited suitability
- ▣ partly suitable
- ++ very good
- + good
- o limited

These details are only rough guide values. They should be regarded as a material specification and are no substitute for a suitability test. Please see our datasheets for further details.

| Typ | Page | Material | Operating Temperature [°C] |
|---|------|----------------------|---|
| Fixing Ties | | | |
| With Arrowhead (with Wings) | 94 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Arrowhead (with Wings) | 94 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Arrowhead (with Wings) | 94 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| With Arrowhead (with Wings) | 94 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| With Arrowhead and Disc | 98 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Arrowhead and Disc | 98 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| With Arrowhead and Disc | 98 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| With Arrowhead in the Strap | 97 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| With Arrowhead in the Strap | 97 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| With Arrowhead and Disc in the Strap | 98 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Arrowhead and Disc in the Strap | 98 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| Arrowhead Mount Assemblies | 99 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| with turnaround clip | 113 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| With Arrowhead | 93 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Arrowhead | 93 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| With Fir Tree Mount | 101 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Fir Tree Mount Assemblies | 102 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| Fir Tree Mount Assemblies | 102 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| Fir Tree Mount Assemblies | 102 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Rivet | 100 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Rivet | 100 | PA12 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Stud Fixing | 107 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Stud Fixing | 107 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| With Stud Fixing | 107 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| With Stud Fixing in the Strap | 110 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Weld Stud Fixing Assemblies | 111 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| Double Mounting Base for Weld Studs | 112 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| MR range of Mounting Head Ties | 118 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| MR range of Mounting Head Ties | 118 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| WPT | 119 | PA66HIR | -40 °C to +80 °C Continuous, (+105 °C for 500 h) |
| Self Adhesive Fixing Tie T18RSA | 119 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Edge Clip Family | 114 | PA66HS, PA66HIRHS | -40 °C to +105 °C |
| TAS Aerial Support Tie | 80 | PA66HIR | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| CT and BHT Series of Chassis Ties | 82 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| Fixing Ties for Cable Tray CTF | 81 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |

| Resistant properties | | | | | | Possible applications | | | | | | | | Sample applications | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------------------|-------------|------------------|----------------------|----------------------|--------------------|----------------------|-------------------|----------------------------|------------------|-----------------------|------------------------------|-------------------|--------------------------|------------------------------|-------------------------------|------------------------|--------------------------------|----------------------------|--------------------------|----------------------|-------------------|----------------|-----------------------------|---------------------|--------------------------------|----------------|-----------------------------|--------------------|--|--|--|
| UV light/ozone* | UV light/ozone* | UV light/ozone* | UV light/ozone* | UV light/ozone* | UV light/ozone* | Switch cabinets | Electronics | Railway vehicles | Aerospace industries | Turbines and engines | Telecommunications | Ship-building/Marine | Military industry | Harnessmakers | Public buildings | Automotive industries | Bundling of cables and wires | Bundling of hoses | Welded or threaded studs | Drilled holes in sheet metal | Edge Fastening on steel plate | Blind hole with thread | Fixing with self adhesive base | Bundling of optical cables | Fastening optical cables | For restricted space | Fastening bellows | Parallel Wires | Post-installation fastening | Temporary fastening | For thin, sensitive insulation | Underwater use | Identification of packaging | Securing packaging | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ++ | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | ++ | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | ++ | + | o | + | + | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

*Only valid for Central European climate.

- suitable
- of limited suitability
- ▣ partly suitable
- ++ very good
- + good
- o limited

These details are only rough guide values. They should be regarded as a material specification and are no substitute for a suitability test. Please see our datasheets for further details.

| Type | Page | Material | Operating Temperature [°C] |
|---------------------------------|------|------------|---|
| Special Cable Ties | | | |
| PEEK | 71 | PEEK | -55 °C to +260 °C |
| SpeedyTie® | 72 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| SpeedyTie® | 72 | PA66HIR(S) | -40 °C to +80 °C Continuous, (+105 °C for 500 h) |
| MCT-Series | 73 | PA66MP | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| KR Series | 74 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| KR Series | 74 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| KR Series | 74 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| KR Series | 75 | PA12 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| KR Series | 75 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| EL, TY Series | 77 | POM | -40 °C to +85 °C |
| TEXTIES® | 78 | PA, PE | -20 °C to +75 °C |
| TPT300 | 79 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| M Series | 86 | SS304 | -80 °C to +538 °C |
| M Series | 86 | SS316 | -80 °C to +538 °C |
| Protection Profile LFPC Series | 90 | PO | -40 °C to +90 °C Continuous, (+160 °C for 200 h) |
| AMTS System | 84 | SS316 | -80 °C to +538 °C |
| Mounts for Cable Ties | | | |
| Self Adhesive / Screw Fixing MB | 122 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Self Adhesive / Screw Fixing TY | 123 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Self Adhesive / Screw Fixing TY | 123 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Screw Fixing KR, LKC, NY | 124 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Screw Fixing KR | 125 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| Screw Fixing KR | 125 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Screw Fixing KR | 125 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Screw Fixing CTAM, MB, TY, CTAP | 126 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Screw Fixing CL8, FH, LKM, LKM | 128 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Screw Fixing CL8 | 128 | PA66W | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Screw Fixing MP, MSMP | 129 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| With Arrowhead TM15F | 129 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| SFC Arrowhead Cradle | 130 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| TapeClip TC and CH Series | 131 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| TapeClip TC and CH Series | 131 | PA66HIRHS | -40 °C to +105 °C |
| StandOff Clip with fir tree | 132 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| StandOff Clip with fir tree | 132 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| EdgeClip EC | 133 | PA66HIRHS | -40 °C to +105 °C |
| TY Plastic Rivets | 155 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |

- suitable
- of limited suitability
- ▣ partly suitable
- ++ very good
- + good
- o limited

These details are only rough guide values. They should be regarded as a material specification and are no substitute for a suitability test. Please see our datasheets for further details.

| Typ | Page | Shortcut | Operating Temperature [°C] |
|---|------|-----------|---|
| Mounts for Cables and Wires | | | |
| Self Adhesive / Screw Fixing TY8H1S, RA, RB | 143 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Self Adhesive 130100 | 144 | PVC | -25 °C to +65 °C |
| Self Adhesive SAC | 144 | ST | -40 °C to +70 °C |
| Self Adhesive RA, RB | 143 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| FKH Series | 145 | PA66HIR | -40 °C to +80 °C |
| With Arrowhead WPC | 146 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Screw Mount D-Clip | 147 | POM | -40 °C to +90 °C Continuous, (+110 °C for 500 h) |
| PC Series | 149 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| PC Series | 149 | PA46 | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) |
| Clips and Snappers | | | |
| CTC Series | 148 | PA66HIRHS | -40 °C to +105 °C |
| Metal P-Clips | 156 | ALU | -40 °C to +180 °C |
| Metal P-Clips ALU with a Chloroprene Insert | 156 | ALU, CR | -20 °C to +80 °C |
| Plastic P-Clips HP | 158 | PA66HS | -40 °C to +105 °C Continuous, (+145 °C for 500 h) |
| Plastic P-Clips HP | 158 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Cradle Clips | 162 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| KlamKlips | 163 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Snapper SNP | 160 | POM | -40 °C to +85 °C |
| Snapper SNP (E) | 160 | PA66GF13 | -40 °C to +105 °C |
| Mounts for Special Requirements | | | |
| Mounts with Stud Fixings SBH, SBF, CTMS | 154 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Automatic Harness Clips | 151 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| LOK01 Fixing Base | 153 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| KM Series | 164 | PA66HIRHS | -40 °C to +105 °C |
| KM Series | 164 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |
| Plastic Rivets TY, R4, R6 | 155 | PA66 | -40 °C to +85 °C Continuous, (+105 °C for 500 h) |

| Resistant properties | | Possible applications | | | | | | | | | | Sample applications | | | | | | | | | | | | | | | | | | | | |
|----------------------|----|-----------------------|-------------|------------------|----------------------|----------------------|--------------------|----------------------|-------------------|---------------|------------------|-----------------------|------------------------------|-------------------|--------------------------|------------------------------|-------------------------------|------------------------|--------------------------------|----------------------------|--------------------------|----------------------|-------------------|----------------|-----------------------------|---------------------|--------------------------------|----------------|-----------------------------|--------------------|--------------------|--|
| UV light/ozone* | | Switch cabinets | Electronics | Railway vehicles | Aerospace industries | Turbines and engines | Telecommunications | Ship-building/Marine | Military industry | Harnessmakers | Public buildings | Automotive industries | Bundling of cables and wires | Bundling of hoses | Welded or threaded studs | Drilled holes in sheet metal | Edge Fastening on steel plate | Blind hole with thread | Fixing with self adhesive base | Bundling of optical cables | Fastening optical cables | For restricted space | Fastening bellows | Parallel Wires | Post-installation fastening | Temporary fastening | For thin, sensitive insulation | Underwater use | Identification of packaging | Securing packaging | Securing packaging | |
| Oils and greases | ++ | ■ | ■ | ■ | ■ | | ■ | ■ | | | ■ | ■ | □ | □ | | ■ | | | | □ | □ | □ | □ | □ | | | | | | | | |
| Solvents | + | ■ | ■ | ■ | ■ | | ■ | ■ | | | ■ | ■ | □ | □ | | ■ | | | | □ | □ | □ | □ | □ | | | | | | | | |
| Petrol | ++ | ■ | ■ | ■ | ■ | | ■ | ■ | | | ■ | ■ | □ | □ | | ■ | | | | □ | □ | □ | □ | □ | | | | | | | | |
| Flammability | + | ■ | ■ | ■ | ■ | | ■ | ■ | | | ■ | ■ | □ | □ | | ■ | | | | □ | □ | □ | □ | □ | | | | | | | | |
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*Only valid for Central European climate.

Material specifications



| Material | Operating Temperature | Colour | Flammability | Chem. Material Properties* |
|---|--|--------------|--------------|---|
| Ethylentetrafluorine-ethylene – Tefzel (E/TFE) | -80 °C to +150 °C continuous | Blue (BU) | UL94 V0 | <ul style="list-style-type: none"> Resistance to radioactivity UV- resistant, not moisture sensitive Good chemical resistance to: acids, bases, oxidizing agents |
| Polyamide 6.6 High Impact Modified (PA66HIR) | -40 °C to +80 °C Continuous, (+105 °C for 500 h) | Black (BK) | UL94 HB | <ul style="list-style-type: none"> Limited brittleness sensitivity Good at low temperature |
| Polyamide 6.6 High Impact Modified, Heat Stabilised (PA66HIRHS) | -40 °C to +105 °C | Black (BK) | UL94 HB | <ul style="list-style-type: none"> Limited brittleness sensitivity Good at low temperature Modified elevated max. temperature |
| Polyacetal (POM) | -40 °C to +90 °C Continuous, (+110 °C for 500 h) | Natural (NA) | UL94 HB | <ul style="list-style-type: none"> Limited brittleness sensitivity Flexible at low temperature Not moisture sensitive Robust on impacts |
| Stainless Steel Type SS304, Type SS316 | -80 °C to +538 °C | Metal (ML) | – | <ul style="list-style-type: none"> A distinctive feature of this material is its corrosion resistance, it is non rusting and antimagnetic. |

Material specifications, Halogen Free



| Material | Operating Temperature | Colour | Flammability | Chem. Material Properties* |
|--|---|----------------------------|--------------|--|
| Polyamide 12 (PA12) | -40 °C to +85 °C Continuous, (+105 °C for 500 h) | Black (BK) | UL94 HB | <ul style="list-style-type: none"> Good chemical resistance to: acids, bases, oxidizing agents UV- resistant |
| Polyamide 6.6 (PA66) | -40 °C to +85 °C Continuous, (+105 °C for 500 h) | Natural (NA), Black (BK)** | UL94 V2 | <ul style="list-style-type: none"> High yield strength |
| Polyamide 6.6 Heat Stabilised (PA66HS) | -40 °C to +105 °C Continuous, (+145 °C for 500 h) | Natural (NA), Black (BK)** | UL94 V2 | <ul style="list-style-type: none"> High yield strength Modified elevated max. temperature |
| Polyamide 6.6 UV Resistant (PA66W) | -40 °C to +85 °C Continuous, (+105 °C for 500 h) | Black (BK) | UL94 V2 | <ul style="list-style-type: none"> This material has been rendered weather resistant by the use of additives. It is particularly suitable for outdoor use, i.e. in direct sunlight. |
| Polypropylene (PP) | -20 °C to +85 °C | Natural (NA), Black (BK)** | UL94 HB | <ul style="list-style-type: none"> Good chemical resistance to: organic acids Floats in water, moderate yield strength |
| Thermoplastic Polyurethane (TPU) | -40 °C to +85 °C | Black (BK) | UL94 HB | <ul style="list-style-type: none"> Thermoplastic polypropylene is highly elastic and resistant to UV light. It has good chemical resistance to acids, bases and oxidizing agents. |
| Polyamide 6.6 with metal particles | -40 °C to +85 °C Continuous, (+105 °C for 500 h) | Blue (BU) | UL94 HB | <ul style="list-style-type: none"> High yield strength |

Material specifications, Limited Fire Hazard



| Material | Operating Temperature | Colour | Flammability | Chem. Material Properties* |
|---------------------------|---|---------------------------|--------------|---|
| Polyamide 4.6 (PA46) | -40 °C to +150 °C for 5000 h, (+195 °C for 500 h) | Natural (NA), Grey (GY)** | UL94 V2 | <ul style="list-style-type: none"> Polyamide 4.6 withstands high temperatures. The combustion performance of this plastic meets UL94 V2. It is also halogen free and, in the event of a fire, is characterised by its minimal generation of smoke, toxic fumes and corrosive acids. |
| Polyamide 6.6 V0 (PA66V0) | -40 °C to +85 °C continuous | White (WH) | UL94 V0 | <ul style="list-style-type: none"> High yield strength, low smoke emissions |
| Polyolefin | -40 °C to +90 °C | Black (BK) | UL94 V0 | <ul style="list-style-type: none"> Polyolefins also have flame propagation characteristics in compliance with UL94 V0. They are halogen free, self extinguishing and, in the event of a fire, are characterised by their minimal generation of smoke, toxic fumes and corrosive acids. They are stable in water, salt solutions, acids and oxidizing agents. |

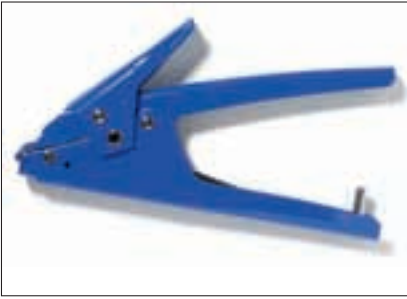
Material specifications, Halogen Free and Limited Fire Hazard



| Material | Operating Temperature | Colour | Flammability | Chem. Material Properties* |
|-----------------------------|-----------------------|-----------|--------------|---|
| Polyetheretherketone (PEEK) | -55 °C to +260 °C | Grey (GY) | UL94 V0 | <ul style="list-style-type: none"> Resistance to radioactivity UV- resistant Good chemical resistance to: acids, bases, oxidizing agents Not moisture sensitive |

* These details are only rough guide values. They should be regarded as a material specification and are no substitute for a suitability test. Please see our datasheets for further details.

** Other colours on request. Tefzel® is a registered trademark of DuPont.



MK10-SB
see page 410.



MK20, MK21
see page 410.



MK3SP
see page 411.



MK7
see page 411.



MK7HT
see page 411.



MK6
see page 412.



MK9
see page 412.



MK9HT
see page 412.



MK9SST
see page 417.



MK3PNSP2
see page 413.



MK7P
see page 414.



MK9P
see page 415.



KR6/8
see page 416.



KR8PNSE
see page 416.

For detailed information on application tooling please refer to chapter 6.2.

