Fastening technology for metals and plastics
Thread forming screws

**for metals**

**TAPTITE 2000®**
(M1–approx. M10)

The TAPTITE 2000® allows chipless thread forming during the fastening process. It is characterized by low insertion torque and high pretensioning strength. The cone shaped thread tip optimises the setting of the screw.

- TRILOBULAR® thread profile
- savings due to optimised processes
- safe and reliable fastening

**Radius Profile™**

Both TAPTITE 2000® and EXTRUDE-TITE® 2000™ have an optimised Radius Profile™ at their thread flanks. This results in multiple advantages:

- higher pre-tensioning strength with very little scatter
- low insertion torque
- optimised thread forming

**Special designs**

Centring point (CA point)
- for easy location of the borehole
- for centring offset boreholes

Loss protection (Captive Point)
- mechanical loss prevention (e.g. during shipping)
  - D₁ > d > D₂

The captive point secures the screw mechanically against loss after thread forming. Removal is only possible by destroying the internal thread.

**for plastics**

**REFORM® II™**
(∅0.5 – ∅8)

- for direct fastening in thermoplastics
- no threaded inserts necessary
- excellent fastening values

**EXTRUDE-TITE ® 2000™**

- permits easy centring and forming of the through-hole in a single operation.
- no need for prior forming of extruded hole in a stamped part
- high load-bearing capacity of the thread
- low space requirements due to short centring point

**for light-gauge sheets**

**EXTRUDE-TITE® 2000™**
(M2–approx. M8)

EXTRUDE-TITE® 2000™ permits easy centring and forming of the through-hole in a single operation.

- TRILOBULAR® thread profile
- savings due to optimised processes
- safe and reliable fastening

**for metals and plastics**

**REFORM® II™ “F”**
(∅1.4 – ∅8)

- fastening in materials with low ductility (magnesium, zinc and aluminium alloys)
- for highly reinforced thermoplastics
- low deformation
- good fastening values
- low chip/sliver formation

**REFORM® II™ “HS”**
(∅2 – ∅8)

- optimised for direct fastening in reinforced and highly reinforced thermoplastics

**PUSHTITE® II™**
(∅1 – ∅6)

- hammer in the fastener – it holds!
- fast and secure installation
- can be unscrewed for servicing and recycling

**Range of application**

- very suitable
- limited suitability

- thermoplastics
- reinforced thermoplastics
- highly reinforced thermoplastics
- thin-gauge sheets
- thin-gauge sheets
- steel
- die-cast magnesium
- die-cast zinc
- die-cast aluminium
Options

Stop teeth
- Increases over-tightening torque (see page 7)
- Robust fastening
- Especially suitable for light-gauge sheets or other low-strength materials

Cup point
- Electrical contact
- No subsequent shifting of the components
- Splash-proof connection
- Can be combined with fins to exploit the advantages of stop teeth at the same time

100% inspection of attributes
- Max. defect rate reduced from <150 ppm to 0–3 ppm
- Reduced downtimes of cost-intensive assembly lines
- Higher productivity
- Higher functional reliability of the finished product

Power drives
- TORX PLUS® drive system
- TORX® cross slot
- Camera cross recess
- One-way and safety drives
- Combinations of different drives

Pre-assembled auxiliary elements
- Captive washers
- Parts ready for installation
- No additional operations
- Suitable for automated assembly
- E.g. also for terminal screws

Coloured fastener heads
- Powder or spray coating according to colour specification
- PVD coating

Special materials
- Stainless steel materials (A2/A4)
- Light/non-ferrous alloys, nickel plated, copper-plated, tin-plated, alkali blacked or painted

Sophisticated screw geometry
- Screws with double threads
- Shoulder screws
- Special heads
- Integration of additional functions into the fastener

Resistance against loosening

mechanical
- Internal thread

mechanically reactive (adhesive)
- POWERLOK®
  - Attached 30° point
  - Used in tapped threads
  - Functions irrespective of temperature
  - TRILOBULAR® thread cross section
- spedcaps®
  - High loosening resistance
  - Micro-encapsulated, 2-component liquid adhesive
  - Applied ready for insertion
  - Good seal up to 400 bar
  - Complies with DIN 267, Part 27
- TAPTITE 2000®
  - Fits free of play in female thread
  - TRILOBULAR® thread cross section creates easy positive lock
- TAPTITE 2000® + spedcaps®
  - Combines the advantages of thread rolling and high loosening resistance

chemically non-reactive (clamping)
- spedlack®
- Adhesive
- Loss-proof pre-assembly
- For multiple re-use

spedlack®
- High loosening resistance
- Micro-encapsulated, 2-component liquid adhesive
- Applied ready for insertion
- Good seal up to 400 bar
- Complies with DIN 267, Part 27

Comparative loosening resistance

Tested on the SFS intec transverse load test device (test with M5 screw size)
Fastener materials & surface finish

Material properties of the fasteners

**Case hardening steel**
- min. surface hardness 450 HV
- core hardness 300–350 HV

The tensile strength of these fasteners is at least 900 N/mm², i.e. it corresponds at least to a 9.8 screw.

Yield strength is approx. 90% of tensile strength. Elongation at break is in the range of 10.8 to 12.9 screws.

Threads can be generated in base materials up to 150 HB (500 N/mm²).

**Heat-treatable steel**
- 8.8, 9.8, 10.9 and 12.9 qualities

Used in applications with dynamic loads combining tensile stress and bending stress.

Threads can be generated in base materials up to 120 HB (400 N/mm²) (possibly higher if special steps are taken).

**Stainless materials**
- A2-70/A4-70

Thread forming for base materials up to 300 N/mm² (possibly higher if special steps are taken).

**Aluminium/Titanium**
- for special applications

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Fitting recommendation

**recommendations**

- **max. tightening torque**
  - min. 30% less than failing torque (slightly less than max. clamping force)
  - max. 90% utilisation of yield point

- **to increase failing torque**
  - stop teeth (greater difference between insertion TI and failing torque TF ⇒ fitting security)

- **insertion speed for plastic**
  - approx. 500 to 700 rpm (melting may occur at higher speeds)

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Corrosion resistance after salt spray testing

<table>
<thead>
<tr>
<th>Electroplated surfaces</th>
<th>Zinc corrosion [h]</th>
<th>Base metal corrosion [h] (with a layer thickness of 5 μm)</th>
<th>Base metal corrosion [h] (with a layer thickness of 8 μm)</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc and blue passivation</td>
<td>8</td>
<td>48</td>
<td>72</td>
<td>iridescent blue</td>
</tr>
<tr>
<td>Zinc and thick film passivation</td>
<td>96</td>
<td>168</td>
<td>264</td>
<td>iridescent</td>
</tr>
<tr>
<td>Zinc and blue passivation with spedacor®</td>
<td>240</td>
<td>360</td>
<td>480</td>
<td>silver</td>
</tr>
<tr>
<td>Zinc and thick film passivation with spedacor®</td>
<td>&gt; 240</td>
<td>&gt; 360</td>
<td>&gt; 480</td>
<td>iridescent silver</td>
</tr>
<tr>
<td>Zinc-iron black passivation and sealing</td>
<td>72</td>
<td>240</td>
<td>360</td>
<td>black</td>
</tr>
<tr>
<td>Zinc-iron and thick film passivation</td>
<td>120</td>
<td>360</td>
<td>480</td>
<td>highly iridescent</td>
</tr>
<tr>
<td>Zinc-nickel and thick film passivation</td>
<td>&gt; 120</td>
<td>&gt; 480</td>
<td>&gt; 600</td>
<td>iridescent</td>
</tr>
<tr>
<td>Zinc-nickel, thick film passivation and spedacor®</td>
<td>300</td>
<td>600</td>
<td>720</td>
<td>titanium silver</td>
</tr>
<tr>
<td>Zinc-nickel, black passivation and sealing</td>
<td>240</td>
<td>&gt; 600</td>
<td>720</td>
<td>black</td>
</tr>
</tbody>
</table>

**Non-electrolytically deposited surface systems (3 layer)**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>480</th>
<th>720</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc flake systems</td>
<td>black</td>
<td>silver grey</td>
</tr>
</tbody>
</table>

The values in the tables above are established guideline values for an M6x25 fastener with a 5 μm or 8 μm thick anti-corrosion coating. Corrosion resistance varies with component size and geometry.

Salt spray testing to DIN EN ISO 9227

Salt spray tests are performed inhouse in our DIN EN ISO 17025 accredited laboratory. Excellent results have been obtained with zinc, zinc alloy and zinc flake systems. An additional sealing coat such as spedacor® can further extend the corrosion resistance where necessary.

Testing serviceability in the SFS intec laboratory

Thread forming, failing and loosening torque, as well as friction behaviour or initial stressing and pull-out forces are measured based on requirements. On the basis of the results, we make appropriate recommendations for optimum use. The tests are preferably performed with original components from customers.
Cross location expertise

Flexibility and economy are our bywords at SFS intec, throughout our international network of facilities. We manufacture our products in various plants across three continents.

We maintain a continuous knowledge exchange process beyond company boundaries and national frontiers. It is the merging and ongoing development of technological know-how which creates the critical synergy. That’s why we are always able to communicate and convey a state-of-the-art knowledge base in our technologies.

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SFS intec has over 50 years of experience in fastening technology. We will be glad to offer you a solution that meets your demands. See our extensive brochures for further information. You can request them if you need more details.

Feel free to contact us anytime. We will be pleased to assist you.