Tribological dry coatings
Integrated security of installation
“Process-capable screw installation requires a constant and low friction-value deviation. Tribological dry coatings ensure integrated security of installation.”
BOSSARD COATINGS

Tribological dry coatings

Increase process reliability while lowering total costs of fastening with coating solutions from Bossard.

Today, industrial screw installation makes increasingly higher demands of process reliability:

- Short assembly time
- Shorter cycle times
- Increasing level of automation
- More exacting installation parameters

With the increasing requirements for economic production and fastening quality, the subject of coating is gaining in importance.

Your competent partner

Bossard is your competent partner for individual system solutions for the surface coating of the most varied mechanically loaded fastening elements. The surface systems are used to optimize the coefficient of friction and improve protection against corrosion. They consist of compositions such as organic solid lubricants and fluoropolymers and can be designed according your requirements.
Good frictional characteristics and high adhesive strength are characteristics which play an increasingly important role in the improvement of performance and the development of new coating solutions in many areas of mechanical engineering and vehicle manufacturing.

Converting your ideas into economic solutions stands or falls with the right mix of coating technology. Here, the technical solution can be crucially influenced by friction ratios, contact surfaces and lubricants. This is precisely where Bossard Coatings comes in – the integrated lubrication solution in fastening technology for defined friction ratios.

Enhanced tribological knowledge results in considerable savings in the use of energy and materials, production and maintenance. Energy and raw material resources are conserved, environmental damage avoided and work safety improved.
Positioning and principal characteristics

**Bossard Coatings**

<table>
<thead>
<tr>
<th>Product</th>
<th>Focus</th>
<th>simple</th>
<th>clean</th>
<th>secure</th>
<th>economical</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecosyn®-lubric Black</td>
<td>Industrial assembly</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>ecosyn®-lubric Silver</td>
<td>Industrial assembly</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>CD 586 ColorDesign 'Black'</td>
<td>Decorative requirement</td>
<td>▲</td>
<td>▲</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>AF 573 AntiFriction &quot;MoS₂&quot;</td>
<td>High pressure resistance</td>
<td>▲</td>
<td>○</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>AF 559 AntiFriction &quot;Synthetic&quot;</td>
<td>Good wear resistance</td>
<td>▲</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>TC 588 TopCoat &quot;Wax&quot;</td>
<td>Problem-free application for small screws</td>
<td>▲</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Spec Specification</td>
<td>Customer-related focus for engineered parts</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Application-specific characteristics (not exhaustive)**

- **Economic solution** with set friction windows in assembly, maintenance and servicing
- **Black color** with demands for a surface design in the furniture industry, measuring equipment and precision equipment
- **Good sliding properties and high surface loading with appropriate corrosion protection for problem-free disassembly with necessary electrostatic conductivities in the building of power stations and heavy engineering
- **Good sliding properties with high abrasion resistance for self-tapping screws in the design and manufacture of apparatus and fixtures
- **Good alternative for initial assembly, protection against corrosion, suitable for products with polyamide inserts, self-tapping fasteners with self-tapping screws in general machine and apparatus construction

**Composition of the bonded coating**

- **Bonded coating**
- **Production additives**
- **Solid lubricants**
- **Bonding medium**
- **bare steel**
- **brass**
- **stainless steel**
- **aluminum alloy**
- **zinc flakes**

**Application-specific solutions with defined coating characteristics**

▲ optimal solution  ● good solution  ○ conditional solution
TRIBOLOGICAL DRY COATING

ecosyn®-lubric Black/Silver

ecosyn®-lubric is a high-performance dry lubrication and the simple, clean, secure and economic solution for efficient installation.

Characteristics

- Outstanding friction characteristics, low deviation
- Clean, environmentally friendly coating
- Easy handling for cost reduction
- High assembly security in production and maintenance

Area of use

- Rail equipment
- Vehicle work
- Machine and apparatus construction
- Pressure devices
- Flanged fittings
- Plant engineering
- Packaging industry

<table>
<thead>
<tr>
<th>Use/characteristics</th>
<th>Coarse thread</th>
<th>Nuts</th>
<th>Washers</th>
<th>Sharp thread</th>
<th>Parts with plastic</th>
<th>Cylindrical pins with fit tolerance</th>
<th>Color</th>
<th>Solid lubricants</th>
<th>Lowest coefficient of friction ( \mu_{il} ) (initial assembly)*</th>
<th>Friction value deviation (multiple assembly ( x5 ))^*</th>
<th>Multiple assembly</th>
<th>Corrosion protection</th>
<th>Temperature range for use min.</th>
<th>Application method</th>
<th>Declarations of conformity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
<td>●</td>
<td>▼</td>
<td></td>
<td>black/silver</td>
<td>PTFE</td>
<td>0.09 (Black)</td>
<td>small</td>
<td>Friction tests recommended</td>
<td>&gt; 200 h (blue galvanized)</td>
<td>Rack goods spraying</td>
<td>RoHS, REACH</td>
<td></td>
</tr>
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<td></td>
<td>0.12 (Silver)</td>
<td></td>
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</tr>
</tbody>
</table>

*Frictional coefficient testing with Y2B M12 screws as per ISO 16047 under laboratory conditions. Friction coefficient measurements are recommended for specific application.

▲ very suitable  ● suitable  ▼ unsuitable
TRIBOLOGICAL DRY COATING
Bossard Coating CD 586

ColorDesign – the right choice for a decorative appearance with visual requirements of a black coloration. Careful processing and packaging count to make sure that black remains black.

Characteristics
- Black coloration
- Suitable treatment method for decorative requirements
- Specific handling in supply
- Suitable pre-packaging

Area of use
- Construction of machines
- Construction of devices
- Furniture industry
- Consumer electronics

<table>
<thead>
<tr>
<th>Use/characteristics</th>
<th>Coarse thread</th>
<th>Nuts</th>
<th>Washers</th>
<th>Sharp thread</th>
<th>Parts with plastic</th>
<th>Cylindrical pins with fit tolerance</th>
<th>Color</th>
<th>Solid lubricants</th>
<th>Lowest coefficient of friction $\mu_{\text{ui}}$ (initial assembly)*</th>
<th>Friction-value deviation (multiple assembly $\pm 5%$)*</th>
<th>Multiple assembly</th>
<th>Corrosion protection</th>
<th>Temperature range for use</th>
<th>Application method</th>
<th>Declaration of conformity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▲</td>
<td>▲</td>
<td>▲</td>
<td>●</td>
<td>▼</td>
<td>▼</td>
<td>▲</td>
<td>PTFE</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>&gt; 24 h (bare)</td>
<td>&gt; 1000 h (stainless steel)</td>
<td>Rack goods</td>
<td>RoHS, REACH</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Friction tests recommended</td>
<td></td>
<td></td>
<td>min. -180°C max. 250°C</td>
<td>sprays, dip spinning, drum spraying</td>
<td>Bulk products</td>
<td></td>
</tr>
</tbody>
</table>

*Frictional coefficient testing with VZB M12 screws as per ISO 16047 under laboratory conditions. Friction coefficient measurements are recommended for specific application.

▲ very suitable     ● suitable    ▼ unsuitable
TRIBOLOGICAL DRY COATING

Bossard Coating AF 573

AntiFriction – for demanding, friction-reducing conditions at high pressure loads, proven slide function using MoS₂ and high temperature resistance.

Characteristics

- High pressure resistance
- High temperature resistance
- Suitable for small and large dimensions
- Very good sliding properties

Area of use

- Power station maintenance/servicing
- Pressure devices
- Pump construction
- Energy technology
- Steel construction
- Infrastructure

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<th>Nuts</th>
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<th>Sharp thread</th>
<th>Parts with plastic</th>
<th>Cylindrical pins with fit tolerance</th>
<th>Color</th>
<th>Solid lubricants</th>
<th>Lowest coefficient of friction μ₁₁ (initial assembly)*</th>
<th>Friction value deviation (multiple assembly ≥5)*</th>
<th>Multiple assembly Friction tests recommended</th>
<th>Corrosion protection</th>
<th>Temperature range for use</th>
<th>Application method</th>
<th>Declarations of conformity</th>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td>MoS₂</td>
<td>0.08</td>
<td>small</td>
<td>&gt; 24 h (bare)</td>
<td>&gt; 1000 h (stainless steel)</td>
<td>min. -180°C max. 430°C</td>
<td>Rack goods spraying</td>
<td>RoHS, REACH</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>Bulk products dip spinning, drum spraying</td>
<td></td>
</tr>
</tbody>
</table>

*Frictional coefficient testing with VZB M12 screws as per ISO 16047 under laboratory conditions. Friction coefficient measurements are recommended for specific application.

▲ very suitable  ● suitable  ▼ unsuitable
TRIBOLOGICAL DRY COATING

Bossard Coating AF 559

AntiFriction – for demanding, abrasion-resistant requirements for process-secure self-tapping screws in aluminum using synthetic solid lubricants.

Characteristics
- Good sliding properties
- High abrasion resistance
- Seizure-free assembly in aluminium possible

Area of use
- Energy technology maintenance/servicing
- Vehicle work
- Machine and apparatus construction
- Plant engineering
- Clean room technology

<table>
<thead>
<tr>
<th>Use/characteristics</th>
<th>Coarse thread</th>
<th>Nuts</th>
<th>Washers</th>
<th>Sharp thread</th>
<th>Parts with plastic</th>
<th>Cylindrical pins with fit tolerance</th>
<th>Color</th>
<th>Solid lubricants</th>
<th>Lowest coefficient of friction $\mu_{ui}$ (initial assembly)*</th>
<th>Friction value deviation (multiple assembly ≤5)*</th>
<th>Multiple assembly</th>
<th>Corrosion protection</th>
<th>Temperature range for use</th>
<th>Application method</th>
<th>Declarations of conformity</th>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>synthetic solid lubricants</td>
<td>0.10</td>
<td>small</td>
<td></td>
<td>&gt; 24 h (bare)</td>
<td>min. -70°C max. 200°C</td>
<td>Rack goods spraying</td>
<td>RoHS, REACH</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Bulk products dip spinning, drum spraying</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Frictional coefficient testing with VZB M12 screws as per ISO 16047 under laboratory conditions. Friction coefficient measurements are recommended for specific application.

▲ very suitable       ▷ suitable       ▽ unsuitable
TRIBOLOGICAL DRY COATING

Bossard Coating TC 588

TopCoat – a thin wax coating layer for good sliding properties for self-tapping screws and small stainless steel screws without risk of pitting. When coat is applied at room temperature, it can also be used for nuts with polyamide insert.

**Characteristics**

- No pitting or cold welding
- Process-secure initial assembly
- Setting at room temperature
- Assembly directly possible with self-tapping screws

**Area of use**

- Machine- and apparatus construction
- Conveyor equipment
- White goods
- Vehicle assembly interior finishing
- Infrastructure
- Consumer electronics
- Furniture industry

<table>
<thead>
<tr>
<th>Use/characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse thread</td>
<td>▲</td>
</tr>
<tr>
<td>Nuts</td>
<td>▲</td>
</tr>
<tr>
<td>Washers</td>
<td>▲</td>
</tr>
<tr>
<td>Sharp thread</td>
<td>▲</td>
</tr>
<tr>
<td>Parts with plastic</td>
<td>▲</td>
</tr>
<tr>
<td>Cylindrical pins with fit tolerance</td>
<td>▲</td>
</tr>
<tr>
<td>Color</td>
<td>Transparent</td>
</tr>
<tr>
<td>Solid lubricants</td>
<td>none</td>
</tr>
<tr>
<td>Lowest coefficient of friction $\mu_{i}$ (initial assembly)*</td>
<td>0.10</td>
</tr>
<tr>
<td>Friction-value deviation (multiple assembly ≥5)*</td>
<td>-</td>
</tr>
<tr>
<td>Multiple assembly</td>
<td>Friction tests recommended</td>
</tr>
<tr>
<td>Corrosion protection</td>
<td>&gt; 24 h (bare)</td>
</tr>
<tr>
<td></td>
<td>&gt; 1000 h (stainless steel)</td>
</tr>
<tr>
<td>Temperature range for use</td>
<td>min. -60°C max. 120°C</td>
</tr>
<tr>
<td>Application method</td>
<td>Rack goods spraying</td>
</tr>
<tr>
<td></td>
<td>Bulk products dip spinning, drum spraying</td>
</tr>
<tr>
<td>Declarations of Conformity</td>
<td>RoHS, REACH</td>
</tr>
</tbody>
</table>

*Frictional coefficient testing with YZB M12 screws as per ISO 16047 under laboratory conditions. Friction coefficient measurements are recommended for specific application.

▲ very suitable    ● suitable    ▼ unsuitable
TRIBOLOGICAL DRY COATING

Technical characteristics

Technical data
The different characteristics of Bossard Coatings support most requirements for mechanical screw fastenings. The table shows the broad range of characteristics of Bossard Coatings.

Layer thickness
Due to the surface coating and the additional tribological coating, the thread pairing of fasteners may tend to seize. The smaller the dimension is (<M5), the more effect the thickness of the coating has on thread play.

<table>
<thead>
<tr>
<th>Bossard Coatings</th>
<th>Basis</th>
<th>Temperature</th>
<th>Application temperature</th>
<th>Manufacturing temperature</th>
<th>Corrosion protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>min. [°C]</td>
<td>max. [°C]</td>
<td>burning in [°C]</td>
</tr>
<tr>
<td>ecosyn®-lubric Black</td>
<td>●</td>
<td>PTFE</td>
<td>black</td>
<td>-180°</td>
<td>250°</td>
</tr>
<tr>
<td>ecosyn®-lubric Silver</td>
<td>●</td>
<td>PTFE</td>
<td>silver</td>
<td>-60°</td>
<td>250°</td>
</tr>
<tr>
<td>Coating CD 586 ColorDesign “Black”</td>
<td>●</td>
<td>PTFE</td>
<td>black</td>
<td>-180°</td>
<td>250°</td>
</tr>
<tr>
<td>AF 573 AntiFriction “MoS2”</td>
<td>●</td>
<td>MoS2</td>
<td>anthracite</td>
<td>-180°</td>
<td>430°</td>
</tr>
<tr>
<td>AF 559 AntiFriction “Synthetic”</td>
<td>●</td>
<td>synthetic</td>
<td>olive-gray</td>
<td>-70°</td>
<td>200°</td>
</tr>
<tr>
<td>TC 588 TopCoat “Wax”</td>
<td>●</td>
<td>none</td>
<td>transparent</td>
<td>-60°</td>
<td>120°</td>
</tr>
</tbody>
</table>

1) The values provided are reference values based on the starting condition of the material to be coated, the specified intended purpose and the application. Depending on the type of mechanical-dynamical stress, tribological dry coatings change their product characteristics temperature, uppressure and time dependently and can influence the function of components.

For details on friction coefficient windows and corrosion protection, see separate product characteristics tables (p. 6–10)
<table>
<thead>
<tr>
<th>Coating thickness [µm]</th>
<th>Electrical conductivity</th>
<th>Resistance</th>
<th>Dimensional restrictions</th>
<th>Special restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Drum</td>
<td>Rack</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;150mm</td>
<td>&lt;M24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;150mm</td>
<td>&lt;M24</td>
</tr>
<tr>
<td>5–12</td>
<td>Non-conductor (limited insulator)</td>
<td>fuels, hydraulic fluid, cleaning solutions</td>
<td>&lt;150mm</td>
<td>&lt;M24</td>
</tr>
<tr>
<td>8–12</td>
<td>Non-conductor (limited insulator)</td>
<td>fuels, hydraulic fluid, cleaning solutions</td>
<td>&lt;150mm</td>
<td>&lt;M24</td>
</tr>
<tr>
<td>5–12</td>
<td>Non-conductor (limited insulator)</td>
<td>fuels, hydraulic fluid, cleaning solutions</td>
<td>&lt;150mm</td>
<td>&lt;M24</td>
</tr>
<tr>
<td>5–12</td>
<td>Non-conductor (limited insulator)</td>
<td>fuels, hydraulic fluid, cleaning solutions</td>
<td>&lt;150mm</td>
<td>&lt;M24</td>
</tr>
<tr>
<td>5–10</td>
<td>Non-conductor (limited insulator)</td>
<td>somewhat limited resistance</td>
<td>&lt;150mm</td>
<td>&lt;M24</td>
</tr>
<tr>
<td>&lt; 1</td>
<td>Non-conductor (limited insulator)</td>
<td>limited resistance</td>
<td>&lt;150mm</td>
<td>&lt;M24</td>
</tr>
</tbody>
</table>
BOSSARD COATINGS

When you want to be sure

In nearly all branches of fastening technology the correct specification plays an important role. Bossard meets this challenge with an ultra-modern technical test laboratory.

Many market products have to meet certain safety measures before they can be used. The fastening elements used in them play often a crucial role. Therefore for critical applications written proof is required that the fastening elements have the stipulated corrosion resistance and stability with defined friction characteristics.

For example for screws on pressure containers in chemistry, fastening elements in air- and space travel, bolts in rail vehicles and assembly operations across the whole of LEAN production.

Friction characteristics

Ensuring process-capable screw installations
- Output of preloading forces, torques and friction characteristics
- Examination of various influencing factors on friction according to stipulated general requirements

Corrosion resistance

- Comparison of different corrosion protective coatings
- Determination of the protective effect with pairing of different contact surfaces
The salt spray mist test (e.g. ISO 9227 NSS) is a standardized test for the evaluation of the corrosion protection effect of specified materials and applied coatings.

Bossard has ISO/IEC 17025-accredited test laboratories in all three parts of the world. Customers benefit from the test laboratory expertise and most modern measuring- and testing devices. They form the basis for a reliable quality assurance and flawless product quality.
PROVEN PRODUCTIVITY – A PROMISE TO OUR CUSTOMERS

The strategy for success

From years of cooperation with our customers we know what achieves proven and sustainable impact. We have identified what it takes to strengthen the competitiveness of our customers. Therefore we support our customers in three strategic core areas.

Firstly, when finding optimal Product Solutions, that is in the evaluation and use of the best fastening part for the particular function intended in our customers’ products.

Second, our Assembly Technology Expert services deliver the smartest solutions for all possible fastening challenges. Our services cover from the moment our customers developing a new product, to assembly process optimization as well as fastening technology education for our customers’ employees.

And thirdly, optimising our clients’ productions in a smart and lean way with Smart Factory Logistics, our methodology, with intelligent logistics systems and tailor-made solutions.

Understood as a promise to our customers, “Proven Productivity” contains two elements: Firstly, that it demonstrably works. And secondly, that it sustainably and measurably improves the productivity and competitiveness of our customers.

And this for us is a philosophy which motivates us every day to always be one step ahead.