HOERBIGER Friction Systems
Ideal solutions for any application

Strategic Business Unit Drive Technology
HOERBIGER develops proprietary sinter- and carbon-based friction linings. The blend is produced in-house in a modern laboratory according to a patented formulation. Our experts analyze and assess the properties and interactions of the linings to optimally design the components and systems – in keeping with customer requirements.

μ-comp test benches
We conduct comprehensive component testing on μ-comp test benches. We determine the coefficient of friction and wear as a function of the shifting force, shifting speed, temperature, and transmission fluid. Specific tests are used to evaluate functional reliability and shift comfort.

Transmission test benches
We use automated test benches for testing entire transmissions under continuous shifting operation and load. We determine the fatigue strength of the synchronizer system based on predefined load profiles. Objective parameters for assessing the shift comfort are measured in manual operation.

Vehicle testing
Our tests do not end in the transmission – new developments are validated and benchmarked in the vehicle. Optimizations and sound problem analyses are based on objective measurements of the shift quality.

Competent friction lining partner

Product validation in a modern facility

μ-comp test benches
Transmission test benches
Vehicle testing

One step ahead

HOERBIGER develops friction linings for any application, setting standards around the world.

The better alternative for low load
Single-cone Blocker Ring Basic featuring microGROOVE (BRB)
By virtue of the innovative HOERBIGER microGROOVE, the Blocker Ring Basic requires no additional friction lining and combines three properties that typically are difficult to harmonize: the Blocker Ring Basic is lighter, more compact, yet more robust than traditional brass rings.

Maximizing the potential of sintered friction linings
Single-cone Blocker Ring Evolution featuring HS50 (BRE)
The Blocker Ring Evolution is produced entirely in-house. The proprietary sintering powder mixture is applied directly to the flat parts.

A new standard for carbon
Multi-cone ring featuring HC200 (2CS/3CS)
With the HC200 multi-cone ring, HOERBIGER developed the direct-coating process. In this innovative manufacturing process, the friction lining is applied directly to the metal-formed carrier ring and cured together with the ring to yield the finished synchronizer ring.

The innovative direct-coating method ensures high performance and lowers manufacturing costs, making carbon technology interesting for the high-volume segment.
### Metal friction linings

#### Performance comparison by friction lining

<table>
<thead>
<tr>
<th>Friction index</th>
<th>Wear index</th>
<th>Load index</th>
</tr>
</thead>
<tbody>
<tr>
<td>H550</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>H590</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>H545/49</td>
<td>–</td>
<td>–</td>
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<tr>
<td>BRB</td>
<td>–</td>
<td>–</td>
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<td>Messing *</td>
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* Reference

#### Products

<table>
<thead>
<tr>
<th>BRB</th>
<th>HS45/49</th>
<th>H590</th>
<th>H550</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction material</td>
<td>microGROOVE</td>
<td>Sinter</td>
<td>Sinter</td>
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<tr>
<td>Coefficient of friction</td>
<td>+</td>
<td>+</td>
<td>++</td>
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<tr>
<td>Coefficient of friction characteristics ($\mu_{fric}$)</td>
<td>+</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Wear resistance</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Oil compatibility</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Load capacity</td>
<td>–</td>
<td>–</td>
<td>++</td>
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</tbody>
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IMR and IRC with HS45/HS49/HS90
- Stamped carrier ring with lugs
- Lining sintered in through-type furnace
- Formed in 3-stage tooling

BRE with HS90/HS50
- Stamped ring blanks
- Lining applied on inner ring segment
- Formed in multi-stage tool
- Nitrided for wear resistance at spline

Blocker Ring Basic (BRB)
- Net-shape-formed in multi-stage tool
- Formed microGROOVES in cone
- Nitrided for wear resistance

Modern manufacturing technology 100 percent in-house

Friction lining development
- Application of lining in sintering furnace
- Metal forming technology
Rings with carbon friction linings
Modern manufacturing technology 100 percent in-house

BRC, IMR and IRC with Dual-Layer Carbon HC300/HC310
- Unique production concept
- Lining production in one cycle
- Integrated process control for reliable quality

IMR and IRC with Direct-Coating Carbon HC200
- Direct application on carrier ring
- Short manufacturing chain
- Excellent utilization of material

<table>
<thead>
<tr>
<th>Friction material</th>
<th>HC200</th>
<th>HC300</th>
<th>HC310</th>
</tr>
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<tbody>
<tr>
<td>Coefficient of friction</td>
<td>+</td>
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<td>+++</td>
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<tr>
<td>Coefficient of friction characteristics (μ3/μ1)</td>
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<td>Wear resistance</td>
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<td>Load capacity</td>
<td>++</td>
<td>++</td>
<td>+++</td>
</tr>
</tbody>
</table>

Application
- Blocker Ring Coated (BRC) ✓
- Intermediate Ring (IMR) ✓
- Inner Ring Coated (IRC) ✓

Performance comparison by friction lining

Friction index
- HC310
- HC300
- HC200
- HS50*

Wear index
- HC310
- HC300
- HC200
- HS50*

Load index
- HC310
- HC300
- HC200
- HS50*

* Reference
Within reach of our customers – worldwide!

HOERBIGER gives all customers a global performance commitment, providing local contacts.

Contact

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HOERBIGER is active throughout the world as a leading player in the fields of compression technology, drive technology and hydraulics. In 2015, its 6,858 employees achieved sales of 1.1 billion euros.

The HOERBIGER brand is synonymous with performance-defining components in compressors, industrial engines and turbines, automobile transmissions, and multifaceted mechanical engineering applications. Innovations in attractive technological market niches are the basis for components, systems and services that offer unique selling propositions and long-term benefits for the customer. We set standards.