KS R25
Lead-free Steel/Aluminum
Composite Material for
Main Bearings
Brief description of the sliding material

Plain bearings made from steel/aluminum composite materials are widely used as main bearings in gasoline and diesel engines.

KS R25 is a high-capacity bearing material. Given its enhanced wear resistance, good embedding capability and adaptability, KS R25 is suited for the manufacture of bi-metal bearing shells, for example. This material is insensitive to oil corrosion.

With its specific load-bearing capacity of up to 60 MPa, this material is suited for application in engines subject to medium to high loads.

In the present chemical composition, KS R25 complies with the requirements of the EU Directive 2000/53/EC on End-of-Life Vehicles.

Bearing structure

Bearsings made from KS R25 comprise a steel back, an intermediate layer made from pure aluminum and an aluminum-tin-copper running layer.

The steel quality used is normally grade DC04 with a hardness in the range of 150–220 HB.

The thickness of the steel layer is defined as a function of the application. Usually, it ranges between 1.0 and 3.0 mm.

The intermediate layer made from pure aluminum provides the metallic bond between the steel and the aluminum running layer. Its thickness varies between 0.01 and 0.05 mm.

On the finished sliding element, the aluminum-tin-copper alloy that forms the running layer to the sliding partner exhibits a thickness of 0.2–0.5 mm and a hardness of up to 35–55 HB.

Material characteristics

<table>
<thead>
<tr>
<th>Characteristics, limit loads</th>
<th>Unit</th>
<th>KS R25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength</td>
<td>MPa</td>
<td>&gt; 160</td>
</tr>
<tr>
<td>Yield point</td>
<td>MPa</td>
<td>&gt; 130</td>
</tr>
<tr>
<td>Young’s modulus</td>
<td>GPa</td>
<td>63</td>
</tr>
<tr>
<td>Coefficient of thermal expansion</td>
<td>k^-1</td>
<td>24·10^-6</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>W (m·k)^-1</td>
<td>50</td>
</tr>
</tbody>
</table>
Manufacture of the sliding material

The aluminum alloy is manufactured in vertical continuous casting. Mechanical processing of the strand surface as well as special heat treatment steps prepare the material for plating. The so-called pre-composite results from plating a pure aluminum foil (Al 99.5) on the strand. Roll-cladding is used to apply the pre-composite onto the steel. Selective thermomechanical treatment steps afford the desired material characteristics.

Plain bearing manufacture

KS R25 strip is used to manufacture sliding elements by punching and forming. The final wall thickness of bearing shells and the design of the inside surface is achieved by machining.

Application

Sliding elements made from KS R25 are characterized by their enhanced wear resistance, good embedding capability and adaptability. They are therefore suited for use as main bearings in medium to high-load engines.

**Test conditions**
- Bearing shell diameter: 47.8 mm
- Wall thickness (approx.): 1.4 mm
- Sliding velocity: 0.25 m/sec
- Spec. static load: 6.2 MPa
- Test duration: 3.0 h
KS Gleitlager GmbH does not assume any liability for the completeness of the data presented in this materials brochure. It is exclusively up to the customer to form his opinion about the characteristics of the material and its adequacy for the purposes intended by the customer.

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