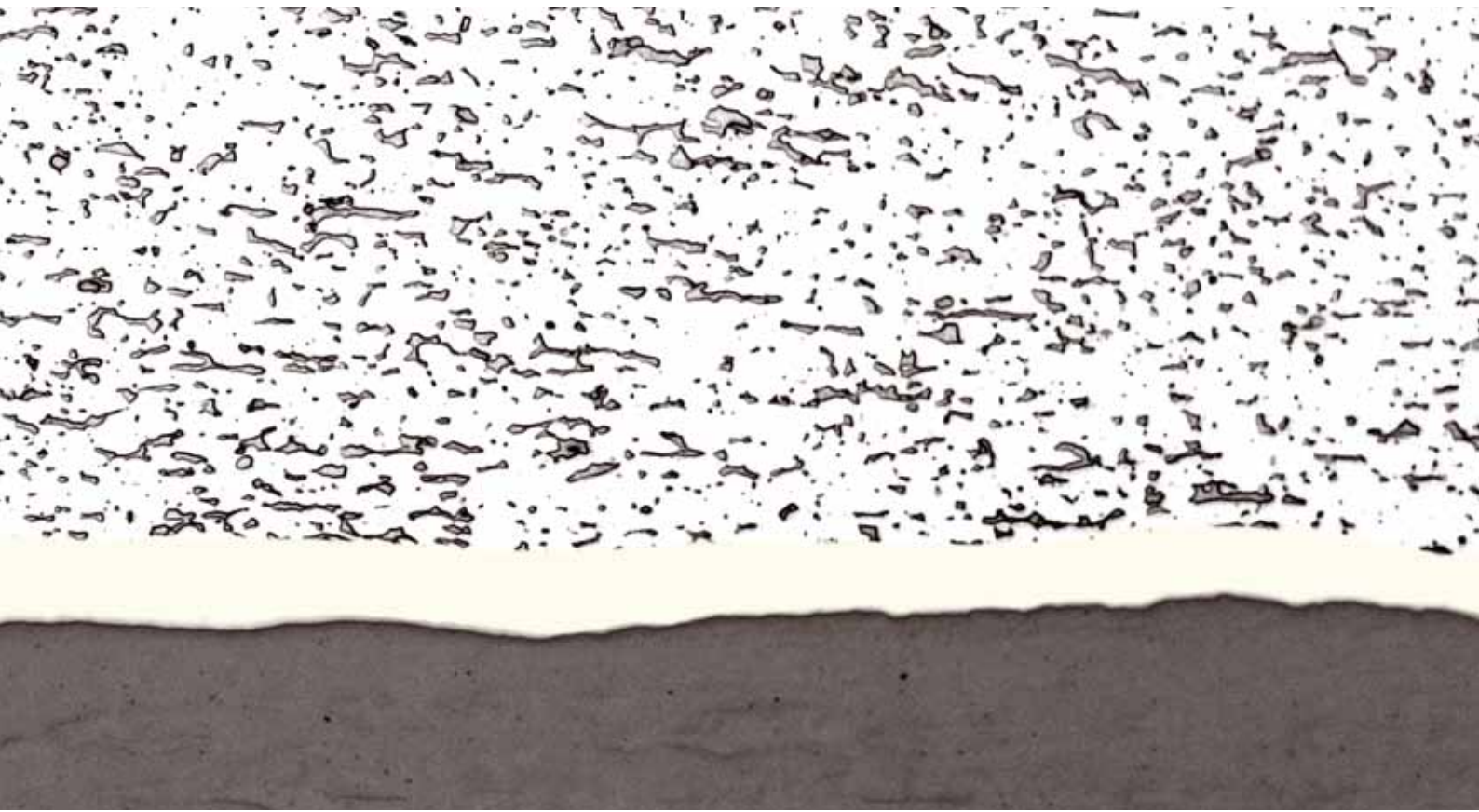


KOLBENSCHMIDT PIERBURG GROUP



KS R20

Lead-free Steel-Aluminum
Composite Material for
Main Bearings



GLEITLAGER

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 R20 is a robust bearing material. Given its excellent anti-seizing property, good embedding capability and adaptability, KS R20 is suited for the manufacture of bearing shells in bi-material design, for example. This Material is insensitive to oil corrosion.

With its specific load carrying capacity of up to 50 MPa, this material is suited for application in engines subject to low to medium loads.

In the present chemical composition, KS R20 complies with the requirements of the EU Directive 2000/53/EC on End-of-Life Vehicles.

Bearing structure

Bearings made from KS R20 are composed of 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. Usually, they range 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 30–50 HB.



Micrograph of the composite



Bi-material: steel / aluminum bearings

Material characteristics

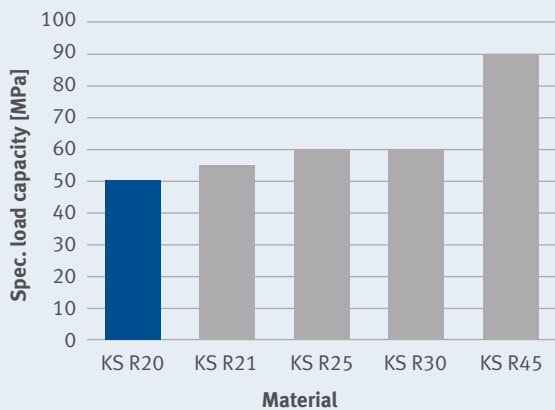
Characteristics, limit loads	Unit	KS R20
Tensile strength	MPa	> 150
Yield point	MPa	> 90
Young's modulus	GPa	63
Coefficient of thermal expansion	k^{-1}	$24 \cdot 10^{-6}$
Thermal conductivity	$W (m \cdot k)^{-1}$	50

Chemical composition of the running layer

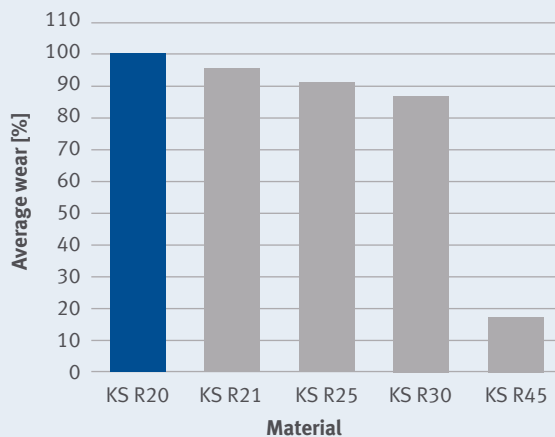
mass-%		
	Sn	16.5 to 22.5 %
	Cu	0.7 to 1.3 %
	Si	max. 0.7 %
	Ti	max. 0.2 %
	Ni	max. 0.1 %
	Fe	max. 0.7 %
	Mn	max. 0.7 %
	others combined	max. 0.5 %
	Al	rest

The hardness of the running layer is in the range of 30 – 50 HB.

Comparison of the specific load carrying capacity



Comparison of wear behavior



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

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 thermo-mechanical treatment steps give the desired material characteristics.

Plain bearing manufacture

KS R20 strip is used to manufacture sliding elements by punching and forming. The final wall thickness of the bearing shells and the design of the inside surface is achieved by machining.

Application

Sliding elements made from KS R20 are characterized by their excellent anti seizure property, good embedding capability and adaptability. They are therefore suited for use as main bearings in low to medium-load engines.

KS Gleitlager GmbH · Am Bahnhof 14 · 68789 St. Leon-Rot · GERMANY
Tel. +49 6227 56-0 · Fax +49 6227 56-302 · www.kspg.com

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.

KS Gleitlager GmbH would also like to stress that any information given in this materials brochure does not constitute a legal guarantee for the appearance, characteristics and workmanship nor does it represent a warranted quality.

G-R20

Printed in Germany. A||X|j