

On point

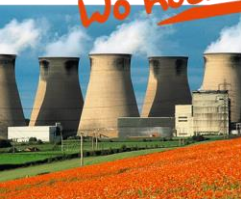


COATINGS FOR VALVE TECHNOLOGY

The high performance coatings of Karl Schumacher:

- KS-InductiveCoat
- KS-HardCoat
- KS-SuperCoat

Wo Höchstleistung zählt!



COATING SOLUTIONS FOR FLEXIBLE POWER PLANT OPERATION

When high performance matters!

The requirements of modern industrial and power plant fittings are constantly on the rise. Specially adapted modes of operation, spontaneous adjustment of the operating conditions and steadily rising operating temperatures sap the useful lives of all the technical components.

Apart from constructive adjustments to affected components, **selective coating solutions are the first choice**, for considerably improving the required properties of both older (Retrofit) as well as brand-new fittings.

The repairing of spindles particularly economical.

The primary standard and tolerances, as well as the control behaviour and wear behaviour are all considerably improved, all in one go.



Highest quality - computerised process management.

MORE INTELLIGENT PROTECTION WITH SUPERIOR TECHNICAL PROPERTIES

KS-InductiveCoat - The BEST!

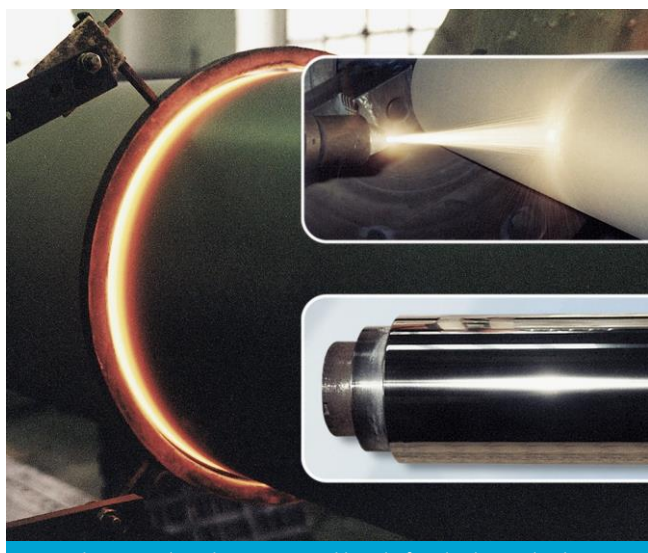
KS-InductiveCoat: The inductive enamel bond coatings are 100% moisture proof and metallurgically connected with the ground. They provide excellent protection from corrosion and offer a maximum reliability, since these layers cannot flake (even with very high operating temperatures of up to 900 °C).

The coating material themselves have a very good chemical reliability and therefore allow for a broad range of application.

The inductive melting down of the coatings ensure that the heat treatment properties of the basic materials are not weakened in any way. The effect of the temperature as a result of the melting process however has to be taken into account when planning the coating processes. In the case of new coating components this should ideally be done at the time of constructing the components already.



Economical- whether used for restoration or new production.



The original - inductive enamel bond of Karl Schumacher!

FACTS: KS-InductiveCoat

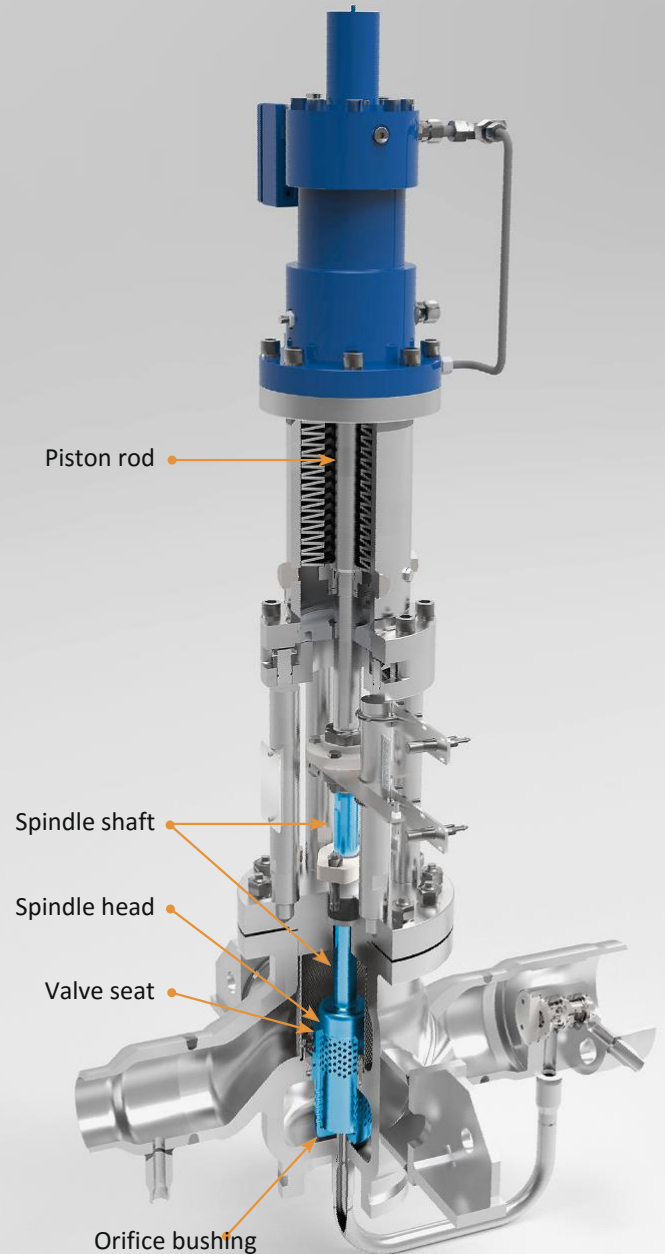
Composition:	Nickel-base-alloy
Layer hardness:	approx. 42- 60 HRC
Adhesive pull strength:	approx. 400 MPa
Porosity:	0 % (since it is completely
Layer thickness:	up to 1.5 mm (depending on
Surface roughness:	< 0.2 µm Ra (depending on
Processing:	turning, grinding
Corrosion resistance:	excellent
Wear resistance:	very good
Operating temperature:	< 900 °C

BENEFITS: KS-InductiveCoat

- + Best control characteristics
- + No measurable transition between static and sliding friction
- + No stick-slip effect
- + Flake proof and high hot hardness
- + Lowest friction on packages and rails
- + Significant increase in useful life of seals and packages
- + 100% moisture and gas proof
- + Layer thickness of up to 1.5 mm
- + Best wear properties in rails and plumbago packages
- + Excellent corrosion resistance
- + Tinder resistant up to 900 °C
- + Can be used for all types of spindles both for new production as well as repairs

AREAS OF APPLICATION: KS-Coatings

- Safety valves
- Turbine control valves
- Turbine bypass stations (HD, MD, ND)
- High pressure gate valve
- Flaps and axial valves
- Stop valves
- Intermediate superheater safety valve
- Control valve
- Spindles
- Rails of all types



Versatile- typical areas of application for fittings.

THE PERFECT SOLUTIONS FOR CHALLENGING APPLICATIONS

KS-HardCoat / KS-SuperCoat - The EXTREME

The hard and extremely dense HVOF layers KS-HardCoat and KS-SuperCoat not only offer excellent wear and tear- and corrosion protection, but also offer protection for abrasion, erosion and sliding abrasion as well as for damage from cavitation.

Because of the low component heating while coating, the temperature-sensitive components can be coated hassle-free with either KS-HardCoat or KS-SuperCoat.

Various alloy compositions enable the problem-free use in fittings, up to operating temperatures of approx. 460 °C. Special spray material based on tungsten and chrome carbides are used.

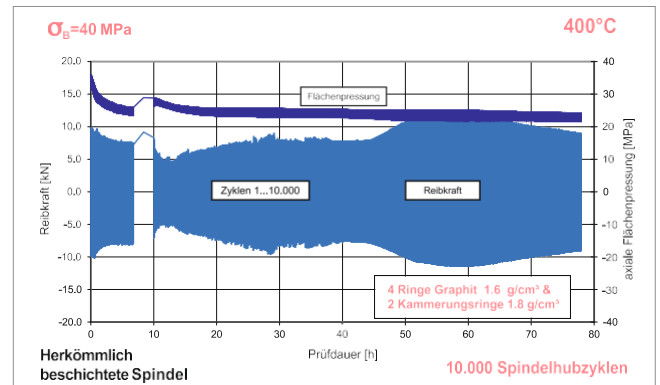
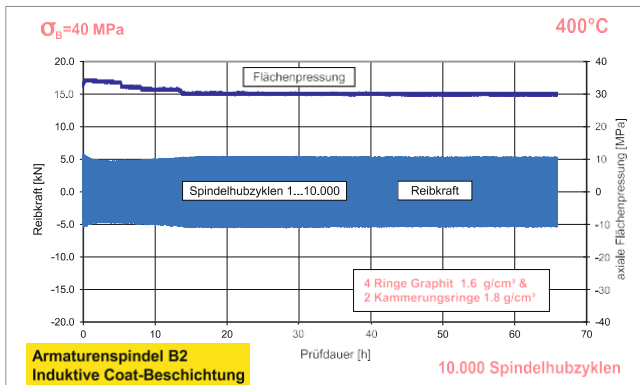
FACTS: KS-HardCoat/ KS-SuperCoat

Composition:	for example WC Co Cr / CrC Ni
Layer hardness:	900 -1 400 HV _{0.3}
Porosity:	< 1 % (depending on
Layer thickness:	up to 0.3 mm (depending on
Corrosion resistance:	very good
Wear Resistance:	excellent
Operating	< 500 °C

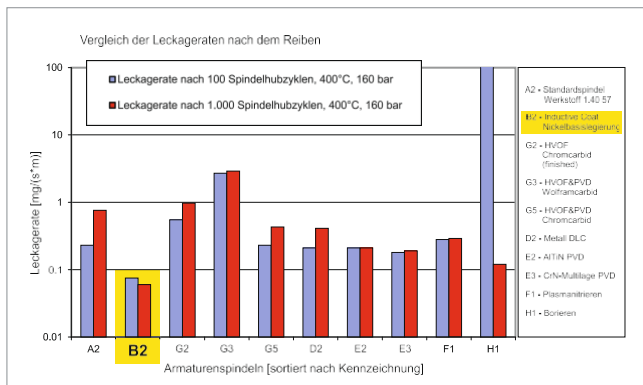
Findings from the research project of the material testing institute of the University of Stuttgart: Optimisation of spindle sealings in fittings with regards to function and blow-out resistance from surface treatment: Various coating technologies underwent comparative testing in a research project of the Material Testing Institute (in German, MPA) of the University of Stuttgart by order of the VGB. The outstanding properties of our KS-InductiveCoat coating were thereby confirmed. The inductively coated fitting spindles are characterised by a stable process of frictional force and surface pressure.

TEST RESULTS: KS-InductiveCoat

- Best control characteristics for challenging mode of ...
- Lowest susceptibility to wear and tear in the case of intensive mode of operation
- Prolonging of the useful life of all critical components
- Very stable friction behaviour
- Transition from static to sliding friction very low or not measurable
- Control parameters are more easily realised



Presentation of frictional force and the surface pressure on the inductively coated spindles compared to a conventional coated spindle.



"The transition from static friction to sliding friction for the B2 coatings are very low or not measurable, Image 7.46. These special slip properties of the B2 spindles B2 should not have a positive effect when using this coating technology control fittings, since the so-called stick-slip-effect, which is found for example in the A1 spindle, is not wanted in technical applications, Image 7.46. The term stick-slip effect refers to the transition from static to sliding friction in the case of a movement process. This effect is not rarely accompanied by a noise [13]. The configurations of PID control parameters can be much more easily realised with the B2 spindle. With a low reduction, the surface pressure process is notably stable in the friction test."

(Extract from the final report of the MPA)

MPA MPA STUTTGART
Otto-Graf-Institut
Materialprüfungsanstalt Universität Stuttgart



Karl Schumacher GmbH
Maschinenbau &
Metallspritzwerk
Hohensteinstraße 52
44866 Bochum / Germany

Telephone: +49 (0)2327 / 992-600
Fax: +49 (0)2327 / 992-679
e-mail: info@schumacher-bochum.de Internet: www.schumacher-bochum.de

