



Diamond Coated Silicon Carbide Faces ***material solution for challenging applications***

Ultrananocrystalline diamond (UNCD®) coatings offer material properties and performance advancement over all other seal face materials



Ultrananocrystalline Diamond Coated Seal Faces

Seal face materials have always been challenged to provide reliable operation in low lubricity fluids. In the past, this challenge was addressed by lubricating seal faces with a cool, clean external fluid. Although effective, this solution adds operating cost throughout the life of the seal. Alternatively, dual seals operating on clean barrier fluid offer longevity with lower operating cost, but higher initial cost for the required support system. The ideal answer for seal users is mechanical seals lubricated directly by the process fluid. UNCD coated silicon carbide as a seal face material enables Flowserve to offer improved reliability in poor lubricating fluids without additional controls.

Features and Benefits

- The lowest friction of any seal face material provides cool running seal faces in poor lubricity fluids such as hot water
- Bonding the hardest known material to the seal face running surface gives maximum resistance to abrasive particle damage
- The highest chemical resistance of all seal face materials enables its use in aggressive acids, alkalines, and caustics
- High wear resistance brings forgiveness for off-design operation such as intermittent dry running
- Fine grain nanocrystalline diamond allows operation against all common mating face materials including carbon, silicon carbide, tungsten carbide, and itself.
- Certification of biocompatibility per USP Class VI is available.

Applications

Upstream Oil & Gas

- Produced water
- Crude oil pipeline
- Multiphase pumps

Refinery and Petrochemical

- Dirty hydrocarbons
- Light hydrocarbons
- Caustics

Power

- FGD slurries
- Boiler feed water
- Cooling water

Mining

- Abrasive slurries

Chemical

- Loading and unloading pumps
- Fluids with entrained gases
- Solutions with abrasive particles
- Acids
- Solvents

General Industry

- Batch processes
- Fibrous slurries

Availability

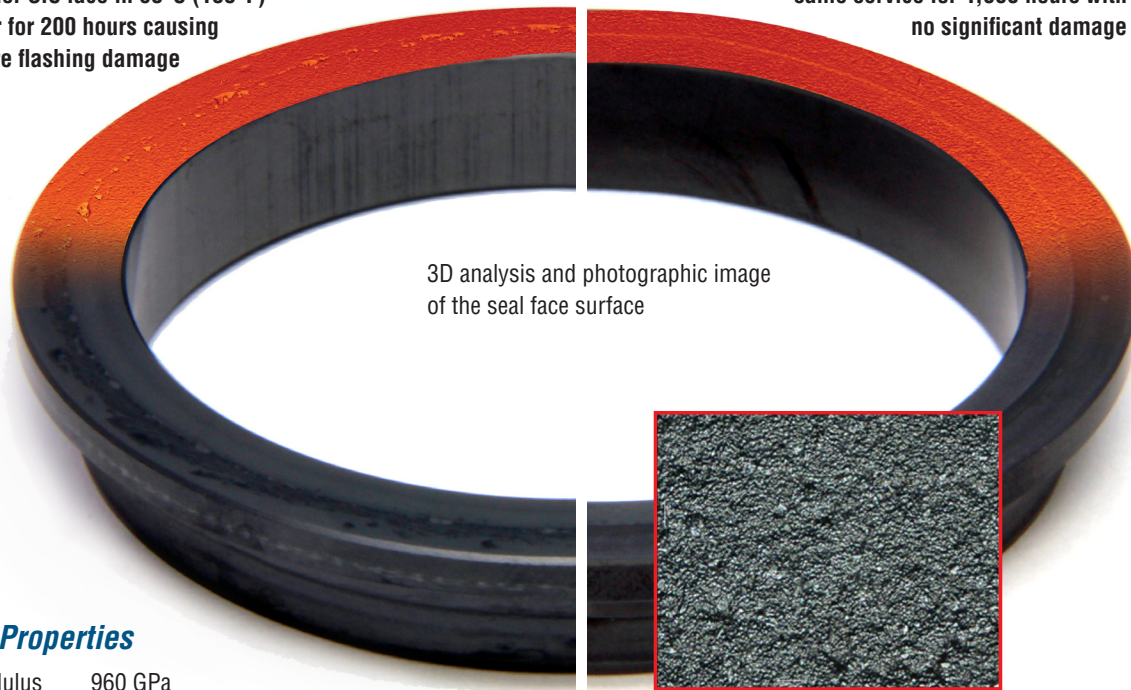
Diamond coated silicon carbide offers performance benefits for a wide range of applications in nearly every industry utilizing mechanical seals. To support this need, diamond coated silicon carbide seal faces are available in most Flowserve pump seals including:

- QB series - BX series - ISC2 series - U series - D series
- SLC - SLM - SLMP - RIS - HSH

Consult your local Flowserve representative for information on diamond coated silicon carbide availability in other Flowserve seals.

This SiC face was run opposite another SiC face in 68°C (155°F) water for 200 hours causing severe flashing damage

This UNCD coated face ran in the same service for 4,000 hours with no significant damage



3D analysis and photographic image of the seal face surface



Flowserve fine grain UNCD coated seal face under 1000x magnification

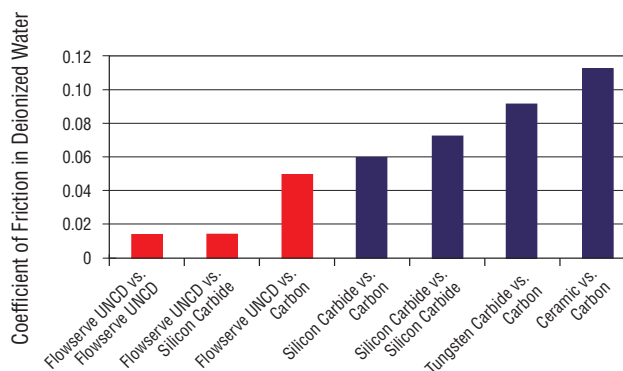
Material Properties

Young's Modulus	960 GPa
Shear Modulus	577 GPa
Fracture Strength	2.9 to 5.3 GPa
Thermal Conductivity	550 to 1800 W/mK
Hardness	10,000 HV

Operating Parameters

Pressure	0 to 140 barg (2000 psi)
Temperature	-40 to 204°C (400°F)
Speed	up to 46 m/s (150 fps)
Shaft Sizes	12.7 to 241.3 mm (0.500 to 9.500 inch)
Viscosity	0.2 to 5,000 cP
Specific Gravity	0.4 to 2.0

Flowserve diamond coated silicon carbide offers the lowest coefficient of friction for cool operation



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