

Off the road

High-end coatings for off-highway
diesel injection pumps and injectors



BALINIT coatings for high-pressure diesel injection systems

Not only for passenger cars and trucks, but also for off-highway systems like ships, trains, mining trucks and diesel generators, increasing demands for low emissions have led to the development of high-pressure diesel systems (1,500 to 2,500 bar). Systems like these contain heavily loaded components, such as plungers, bearing rollers,

injector needles and valve plates, which incur wear when operating under high loads, with heavy fuel oil, or in conditions subject to particle polluted fuels. With the introduction of the amorphous carbon coatings BALINIT® C (WC/C) and BALINIT® DLC (Diamond-Like Carbon), engineers are able to design reliable, high-pressure pumps and injectors.

Your advantages with BALINIT-coated diesel injection components

- Excellent sliding-wear resistance (galling, scuffing) against metal counterfaces
- Enables higher injection pressure for lower consumption and emissions
- Protects against abrasive particle wear
- Protects against high-impact oscillation

BALINIT coatings deliver performance and efficiency



Reliable, large-unit pump plungers with BALINIT® C coating

BALINIT® C (WC/C), the carbon coating which contains metal (Me-C:H, or Me-DLC), is the standard solution for large-unit pumps and gives systems excellent galling and scuffing resistance.



Wear of uncoated plunger.



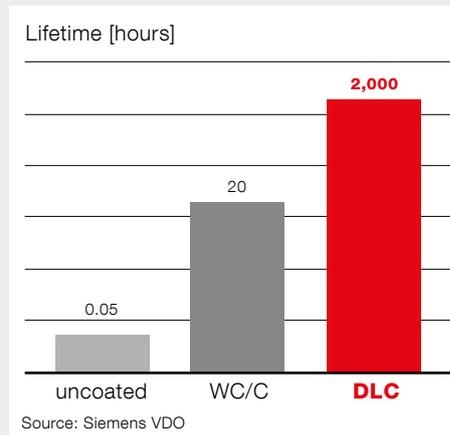
Seizure detail of uncoated plunger (50x).



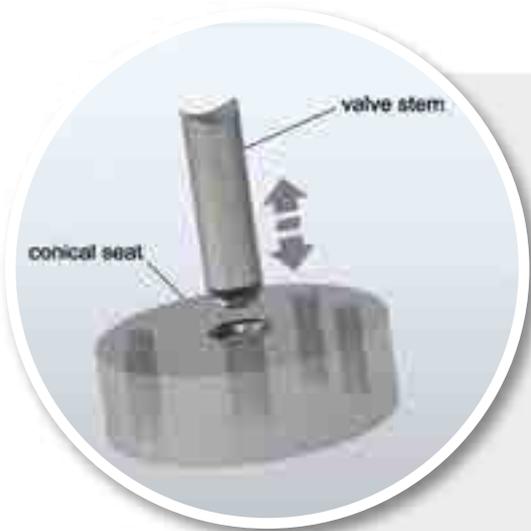
BALINIT® DLC coating for advanced common rail systems

The harder BALINIT® DLC coating is required to protect components operating under very high injection pressures (up to 2,500 bar) or components subject to abrasive-particle wear.

Accelerated injector test



Comparative result of uncoated injector needles versus those coated with BALINIT® C or BALINIT® DLC showing the advantage of the harder DLC coating during high-load injector testing.



BALINIT coatings for valve plates and stems for common rail systems

Some components like valve plates with special impact loads are coated with very ductile BALINIT® CNI (CrN) coatings. Some older systems are coated with BALINIT® A (TiN). Valve plates subject to extreme loading are coated with BALIQ® ALCRONOS.



Fine abrasion and micro fatigue of a valve stem (10x).



Surface fatigue detail of a valve plate (100x).

BALINIT & BALIQ coatings overview

	BALINIT® C	BALINIT® DLC	BALINIT® CNI	BALINIT® A	BALIQ® ALCRONOS
Coating material	WC/C	a-C:H	CrN	TiN	AlCrN based
Microhardness (GPa)	8 - 12	15 - 25	18 +/- 3	30 +/- 3	38 +/- 3
Typical thicknesses for diesel injection components	2 µm	3 µm	5 µm	2 µm	3 µm
Coefficient of friction against steel	0.1 - 0.2	0.1 - 0.2	0.5	0.6	0.5
Colour	anthracite	black	silver-grey	gold-yellow	grey

All given data are approximate values, they depend on application, environment and test condition.

There's much more to talk about – please get in touch to discuss how we can help you to improve your business.

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