

ærlikon **ærlikon**
balzers metco

Protective multi-layer coating for subsea valve components

Improved wear resistance and extended service
life even in the most difficult environments



Oil & Gas

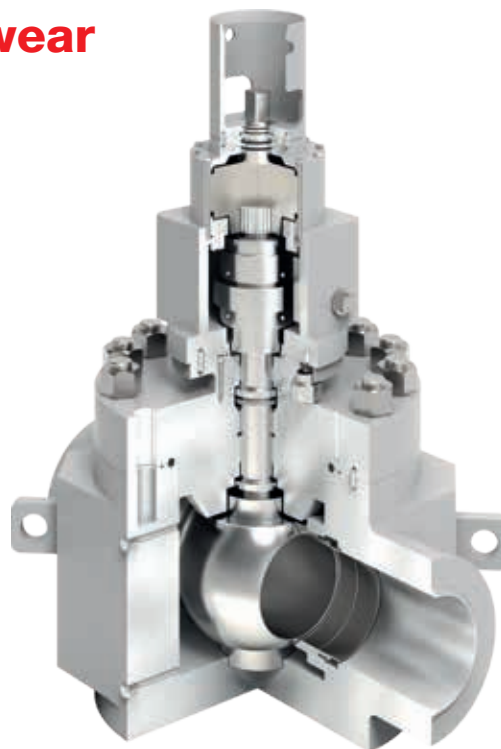


Increased performance and reduced wear of subsea valve components

Gate valves used in subsea oil and gas exploration must be able to withstand high temperature & high pressure environments.

The components control the flow of oil or gas safely and their performance must not degrade in order to prevent leakage. Therefore, a smooth hard surface, with a low coefficient of friction and good protection against abrasive wear are indispensable. Oerlikon Metco and Oerlikon Balzers have joined their expertise and competences to develop a coating solution for subsea valves that withstand these harsh operating conditions.

Components have a base layer applied through the thermal spray process and a top layer using BALINIT® DLC, a hard (>20GPa H_T) DLC coating.



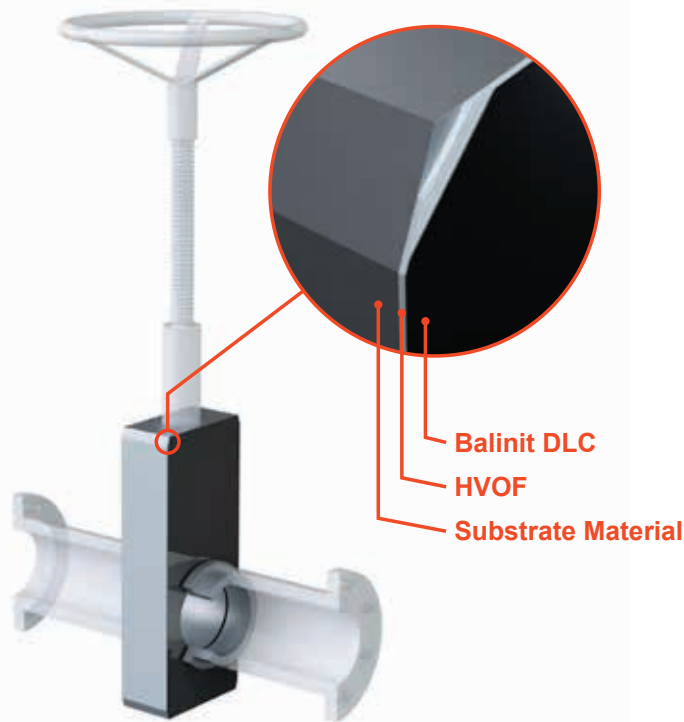
Advantages of using a multi-layer coating using thermal spray and PVD technologies

Advantages	Coating Features	Customer value
Smooth surface with a low coefficient of friction		
Excellent sliding behaviour and abrasive protection		Lower energy consumption in exploration & production operations
Thermal spray coating against corrosion and perfect support for DLC		
Coating combination of thermal spray + PVD technology using BALINIT® DLC for optimum wear resistance		Increased up time in exploration & production operations
Outstanding substrate adhesion		
Thermal spray coating provides optimum support layer for DLC		Longer lifetime of the components
Significantly reduced size of the valve structure and ultimately the tree and manifold size		
Reduction of friction torque in water, gas and at high pressure & high temperature		Significant reduction in manufacturing, logistics and installation CAPEX
Coating combination reduces friction coefficient Provides required anti-abrasive and anti-corrosion properties		
Increased component life in aggressive applications		Extend service life due to component reliability reducing OPEX costs

Multi-layer coating demonstrates strong test performance

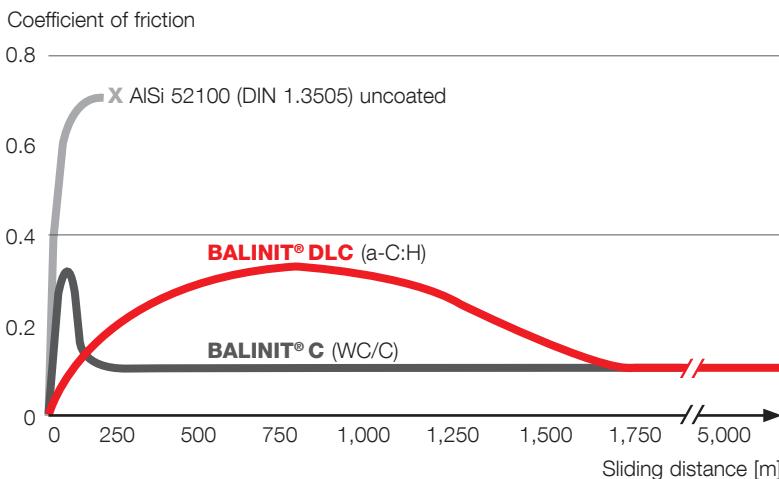
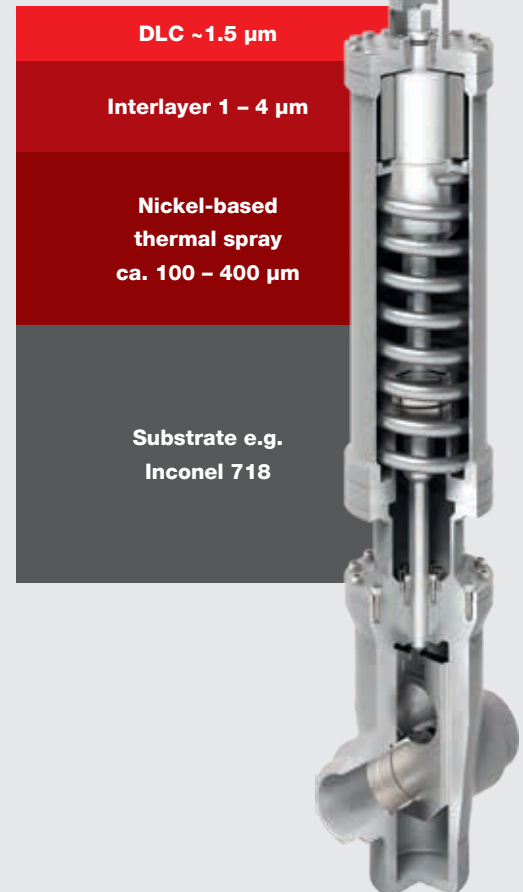
- Corrosion resistant solutions vs. 15% HCl available
- Adhesion: scratch test & HRC indentation
- Friction performance: Pin on disc
- Wear: Calo wear test, pin on disc & ASTM G65
- Standard tests like thickness, nano indentation
- Customers report passing of sand slurry test to API 6A/17D (500+ cycles)

Lab Test Results	Thermal spray	Thermal spray + DLC
Corrosion	Good	Good
Wear at > 15 kpsi	Good	Optimum
Adhesion (HRC)	HF 1 – 3	HF 1 – 3
Adhesion (Lc2)	> 40 N	> 40 N
Roughness (Rz)	0.3 – 0.5 μm	0.1 – 0.5 μm
COF vs. steel (after run-in)	0.5 – 0.8	< 0.2 (0.05)



Smooth hard surface, with low coefficient of friction

Tests have shown that the coating composition is a solution that delivers outstanding corrosion protection through thermal spray. BALINIT® DLC as a top coating provides low friction and excellent wear resistance properties.



*All given data are approximate values and dependent on application, environment and test conditions.

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