

Coating and Surface Treatment Services (Orthopedic)

Service	Brand name	Thickness	Roughness (R_a)	Porosity	Adhesive strength	Fatigue strength	Ca/P ratio	Hardness	Key features	
PVD * coatings	TiN Golden yellow	N/A	0.5 - 7 μm	$\leq 0.05 \mu\text{m}$ on polished surface	N/A	Class 0 and 1 (DIN EN ISO 26443)	No impact	N/A	~2400 HV	Minimizing wear Reduction of ion release Increase of wettability Aesthetic appearance Antireflex properties (not applicable to all PVD coatings)
	TiNbN Light golden yellow	N/A	0.5 - 6 μm	$\leq 0.05 \mu\text{m}$ on polished surface	N/A	Class 0 and 1 (DIN EN ISO 26443)	No impact	N/A	~2400 HV	
	ZrN Light gold	N/A	1 - 3 μm	$\leq 0.05 \mu\text{m}$ on polished surface	N/A	Class 0 and 1 (DIN EN ISO 26443)	No impact	N/A	~2500 HV	
	TiAlN Dark violet	N/A	1 - 3 μm	$\leq 0.05 \mu\text{m}$ on polished surface	N/A	Class 0 and 1 (DIN EN ISO 26443)	No impact	N/A	~2700 HV	
	DLC Black	N/A	0.5 - 2.5 μm	$\leq 0.05 \mu\text{m}$ on polished surface	N/A	HF 1 - 3 (DIN 4856)	No impact	N/A	~700 HV	
Porous Titanium ** coatings	TPS metal	N/A	30 - 800 μm	3.5 - 80 μm	20 - 40 %	$\geq 22 \text{ MPa}$	Max loss ~15 %	N/A	N/A	Enhancement of primary and secondary implant fixation
	TPS peek	N/A	50 - 250 μm	20 - 40 μm	20 - 60 %	$\geq 22 \text{ MPa}$	Flexural modulus (static): Natural 3.7 GPa Coated $3.8 \pm 0.2 \text{ GPa}$	N/A	N/A	
	TPS ceramic	N/A	50 - 300 μm	30 - 60 μm	20 - 40 %	$\geq 22 \text{ MPa}$	No impact	N/A	N/A	
Calcium-Phosphate ** coatings	Electro-chemical deposition	BONIT®	$20 \pm 10 \mu\text{m}$	N/A	60 %	$\geq 15 \text{ MPa}$	No impact	1.1 ± 0.1	N/A	Enhancement of secondary implant fixation (rapid bone ingrowth)
	Sprayed HA	N/A	20 - 200 μm	6 - 14 μm	10 - 20 %	$\geq 15 \text{ MPa}$	Max loss ~15 %	1.61 - 1.76	N/A	
Titanium Anodizing	Type II	DOTIZE®	1 - 2 μm	$\leq 3 \mu\text{m}$ (R_z)	N/A	$\geq 22 \text{ MPa}$	~10 % increase	N/A	~25 % increase	Increase in fatigue strength, reduction of fretting corrosion, suppression of bone adhesion
	Type III (Coloring)	N/A	20 - 200 nm	$\leq 0.05 \mu\text{m}$ on polished surface	N/A	$\geq 22 \text{ MPa}$	No impact	N/A	N/A	Improvement of implant and instrumentation identification and handling

* Additional PVD coatings and **combined porous titanium and calcium-phosphate coatings upon customer request.
The indicated values reflect the range of capabilities. The coating specification is defined in accordance with the customer's requirements.