



COATING
SELECTION
GUIDE

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PVD - voestalpine eifeler Coatings - Properties and Applications

	TiN	TiCN	ZrN	CrN	EXXTRAL® plus	SUBLIME®	CROSAL® -plus
Coating Material	Titanium Nitride	Titanium Carbo-Nitride	Zirconium Nitride	Chromium Nitride	Aluminum Titanium Nitride	Aluminum Chromium + Silicon	Aluminum Chromium Nitride
	TiN	TiCN (ML)	ZrN	CrN	AlTiN (stacked)	AlCr + Si	AlCrN
Microhardness HV_{0.05}	2300±300	3500±500	2800±300	2000±200	3300±300	3300±200	3200±300
Friction Coefficient Against Steel (Dry)	0.6	0.2	0.5	0.3 - 0.4	0.7	0.7	0.45
Coating Thickness ¹⁾ (µm)	2-4	2-4	1-4	1-6	2-5	2-4	2-5
Thermal Threshold	500°C 900°F	400°C 750°F	600°C 1100°F	600°C 1100°F	800°C 1470°F	1100°C 2012°F	1100°C 2012°F
Color of the Coating	gold	blue gray	pale yellow	silver-gray	anthracite	gray	slate-gray
Key Characteristics	standard, all-purpose coating	high hardness, excellent abrasive wear resistance, enhanced toughness	decorative color, good wear and corrosion resistance	low stress/good adhesion, high toughness and corrosion resistance	high hardness, very good oxidation resistance	high oxidation resistance, high hardness and abrasive resistance	extreme hot hardness, high oxidation resistance and high adhesive strength
Key Applications	Cutting Punching/Forming Medical	Cutting Punching/Forming Medical	Cutting Punching/Forming Medical	Forming	Cutting	Cutting Punching	Cutting Punching/Forming
Ultrafine Duplex Biocompatible	ultrafine Available Biocompatible	ultrafine Available Biocompatible	Biocompatible	Duplex Available		N/A	Duplex Available
Primary Applications	<ul style="list-style-type: none"> » machining/cutting of iron based materials » metal forming » plastic molding 	<ul style="list-style-type: none"> » machining of difficult-to-machine alloy steels » high performance cutting where moderate temperatures are generated at the cutting edge » excellent for metal forming (stainless steel) 	<ul style="list-style-type: none"> » cast aluminum and generally non-ferrous materials machining » machining of fiberglass, nylon and most polymer materials » forming and punching 	<ul style="list-style-type: none"> » metal forming » plastic molding 	<ul style="list-style-type: none"> » machining of hardened steel work pieces » for use on round shank carbide tools » high speed operations, semi-dry or dry machining 	<ul style="list-style-type: none"> » cutting difficult to machine alloys, hardened steel milling, drilling, hobbing, dry machining » Punching 	<ul style="list-style-type: none"> » cutting: high performance cutting, hobbing, dry broaching » forming/punching

¹⁾ depends on size of tools, for micro tools also smaller thicknesses necessary.

ADDITIONAL COATING SERVICES

voestalpine eifeler Coatings can service all coating requirements from new tooling programs to the refurbishment and recoating of existing tools. Our capabilities include:

- » Mechanical and Chemical Coating Removal
- » Polishing
- » Micro-Blasting
- » PVD Coating of Small to Large Tooling
- » Pick-up and delivery

SISTRAL®	TIGRAL®	VARIANTA®	VARIANTIC®	VARIANTIC®-1000	MOLDADUR®-P	DLC: SUCASLIDE®	DLC: CARBON-X®
Aluminum Titanium Nitride (with additives)	Aluminum Chromium Titanium Nitride	Titanium Aluminum	Titanium Aluminum Carbo-Nitride	Titanium Aluminium Carbo-Nitride	Special Plasma Coating	DLC Coating	a-C:H Based DLC Coating
AlTiN (nanostructured)	AlCrTiN	TiAlN (ML)	TiAlCN (ML)	TiAlCN (ML)		a,C:Cr	a,C:Cr
3500±500	3300±300	3500±500	3500±500	4,000 ± 200 HV	4,000 ± 200 HV	1800 ± 200	2400 ± 400
0.7	0.6	0.7	0.2	0.2		0.05 – 0.10	0.05-0.15
1-3	3-5	2-4	2-4	approx. 9-11 µm	approx. 9 µm	1.5-2	1.5-2.5
900°C 1650°F	900°C 1650°F	800°C 1470°F	800°C 1470°F	800°C 1470°F		400°C 750°F	325°C 617°F
anthracite	dark gray	anthracite	old rose	dark reddish gold	pink	black	dark gray
extreme wear resistance at high temperature, excellent oxidation resistance	high oxidation resistance, high protection against abrasive wear	high hardness, very good oxidation resistance	low friction, high oxidation resistance	low friction, thick high layer adhesion and excellent protection against abrasive wear	high layer adhesion and excellent protection against abrasive wear	good adhesive strength, very hard, very low friction coefficient, very dense and smooth coating structure. Biocompatible	outstanding wear resistance due to high hardness, low friction and reduced sticking of work piece material, enhanced tool performance and longer lifetime
Cutting Punching/Forming	Cutting Forming	Cutting Forming Medical	Cutting Punching/Forming Medical	Stamping and forming	Plastic Injection	Forming and cutting tools, injection moulds, precision components, motor and gear parts, paper knives, industrial blades, components of food-, vacuum- and cooling technology	Cutting of non-ferrous metals, blanking/piercing of non-ferrous metals, cold work, injection molding tools, components
ultrafine Available	Duplex Available	Biocompatible	Duplex Available Biocompatible	Duplex Available Biocompatible	N/A	N/A	N/A

- » excellent choice for cutting under extreme conditions (hard, abrasive materials, high speed, dry cutting)
- » machining under dry conditions
- » hot forming sheet metals
- » die casting
- » coating for a wide range of carbide, cermet and high speed steel tooling
- » machining of cast iron and nickel based high temperature alloys
- » high speed operations, semi-dry or dry machining
- » drawing, pressing and forming tools for the working of high-strength steels
- » HSLA material for deep draw
- » drawing, pressing and forming tools for the working of high-strength steels
- » HSLA material for deep draw
- » drawing, pressing and forming tools for the working of high-strength steels
- » suited for low-tempered steels, tools and precision components
- » applications where high abrasive wear occurs and softer tribological coatings reach their limits.

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ONE STEP AHEAD.