

RICHTER PRECISION, INC.

Coating Selector Sheet

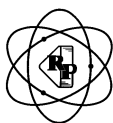
Proprietary Name	Type	Composition	Color	Thickness (microns)*	Micro-Hardness*	Coefficient of Friction	Max. Working Temp.	Coating Process Temp.
Titankote™ C	PVD	TiN	Gold	1-5	2300-2500	0.35	600°C/ 1112°F	375°C/ 707°F
Titankote™ C+	PVD	TiC	Gray	1-5	2800-3200	0.3	600°C/ 1112°F	375°C/ 707°F
Titankote™ C2-SL	PVD	AlTiN - CrN	Gray	3-7	3200-3500	0.35	1000°C/ 1832°F	375°C/ 707°F
Titankote™ C2-SL+S	PVD	AlTiN-CrN/(Mo, W)S ₂	Gray	3-7	3200-3500	0.15	1000°C/ 1832°F	375°C/ 707°F
Titankote™ C3	PVD	CrN/CrC	Silver	1-5	2000-2200	0.35	700°C/ 1292°F	375°C/ 707°F
Titankote™ C3+S	PVD	CrN/CrC/(Mo, W)S ₂	Gray	3-7	2000-2200	0.15	700°C/ 1292°F	375°C/ 707°F
Titankote™ C5	PVD	TiCN	Bronze	1-5	2800-3200	0.3	400°C/ 752°F	375°C/ 707°F
Titankote™ C5B	PVD	TiCN	Blue/Gray	1-5	2800-3200	0.3	400°C/ 752°F	375°C/ 707°F
Titankote™ C6	PVD	AlTiN	Violet/Black	1-5	3000-3400	0.35	900°C/ 1652°F	375°C/ 707°F
Titankote™ C6+S	PVD	AlTiN/(Mo,W)S ₂	Charcoal	3-7	3000-3400	0.15	900°C/ 1652°F	375°C/ 707°F
Titankote™ C6B	PVD	TiAlN	Copper	1-5	3000-3200	0.35	850°C/ 1562°F	375°C/ 707°F
Titankote™ C7	PVD	TiAlSiCN	Charcoal	2-10	3200-3500	0.3	1050°C/ 1922°F	375°C/ 707°F
Titankote™ C8	PVD	ZrN	Pale Gold	1-5	2300-2500	0.35	600°C/ 1112°F	375°C/ 707°F
Titankote™ C10	PVD	DLC (ta-C)	Charcoal	0.5-2.5	5000-9000	0.1	400°C/ 752°F	220°C/ 428°F
Titankote™ C11	PaCVD	DLC (a-C:H)	Black	1-4	2000-3000	0.1	350°C/ 662°F	220°C/ 428°F
Titankote™ C12	PVD	Me-DLC	Black	1-5	1000-2000	0.1	350°C/ 662°F	160°C/ 320°F
Titankote™ C14	PVD	C-DLC	Black	1-3	2200-4000	0.06 - 0.15	350°C/ 662°F	180°C/ 356°F
Titankote™ H	CVD	TiN/TiCN/TiC/TiN	Gold	4-12	2400-3200	0.35	600°C/ 1112°F	1050°C/ 1922°F
Titankote™ H+	CVD	TiC	Silver/Gray	4-12	3200-3400	0.35	600°C/ 1112°F	1050°C/ 1922°F
Titankote™ H+S	CVD	TiC/(Mo, W)S ₂	Gray	4-12	3200-3400	0.15	600°C/ 1112°F	1050°C/ 1922°F
TDkote™	TD	VC	Silver	4-12	3400-3800	0.3	700°C/ 1292°F	1000°C/ 1832°F
TDkote™+S	TD	VC/(Mo, W)S ₂	Gray	4-12	3400-3800	0.15	700°C/ 1292°F	1000°C/ 1832°F
Titankote™ B	Diffusion	Complex Borides**	Gray	10-200***	1600-1900	0.4	650°C/ 1202°F	850°C/ 1562°F

Data generated from lab samples. Characteristics may vary depending customer's material, surface condition and part geometry. Additional coating compositions, thicknesses, and processing temperatures are available upon request.

* - The coating thicknesses and micro-hardnesses are listed as ranges: we do not guarantee a specific number within this range on standard processing. Requests for a specific thickness or micro-hardness, if feasible, will be quoted as a special process.

** - The information noted here is for carbon steel materials. Information would vary for other substrates (Ti-, Ni-,Co- alloy substrates, etc.)

*** - This process does not build up on the surface: this measurement indicates the depth of the diffusion layer



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General Coating Application Information

[Titankote™ C \[TiN\]](#)

This is a good general purpose coating: the standard by which all other coatings are judged. TiN may be used in just about any application, such as cutting, forming, plastic injection molding components, fine blanking, etc. TiN is used quite frequently for medical and food processing applications.

[Titankote™ C+ \[TiC\]](#)

While a good general purpose coating, TiC PVD is typically used in metal-forming applications.

[Titankote™ C2-SL \[AlTiN-CrN\]](#)

This Super Lattice (SL) coating is comprised of hundreds of alternating nano-layers of AlTiN and CrN. This unique structure provides superb wear resistance. This coating is excellent for high temperature applications. It is a great coating for machining, die-casting and many stamping and forming applications.

[Titankote™ C2-SL+S \[AlTiN-CrN/\(Mo, W\)S₂\]](#)

This Super Lattice (SL) coating is comprised of hundreds of alternating nano-layers of AlTiN and CrN. With the addition of the (Mo,W)S₂ dry-film lubricant layer, this coating is among our best PVD coatings for metal-forming applications. If material or tolerances do not allow for CVD or TD coating, this one works great.

[Titankote™ C3 \[CrN/CrC\]](#)

This coating has good hardness, corrosion resistance, and a high resistance to cracking and chipping. This is an excellent coating for machining aluminum and titanium alloys, metal-forming, and die-casting molds.

[Titankote™ C3+S \[CrN/CrC/\(Mo, W\)S₂\]](#)

This coating has good hardness, corrosion resistance, and ductility. The (Mo, W)S₂ dry-film lubricant layer enhances this coating, making it a good choice for metal-forming applications, especially when forming non-ferrous materials. Recommended when substrates and/or tolerances do not allow for CVD or TD.

[Titankote™ C5 \[TiCN\]](#)

TiCN offers improved hardness and wear resistance beyond TiN. This coating is recommended for tough machining applications such as high carbon steels, high silicon aluminums, and tool steels. TiCN is also good for stamping and forming tools.

[Titankote™ C5B \[TiCN\]](#)

TiCN offers improved hardness and wear resistance beyond TiN. This coating is good for tough machining applications such as high carbon steels and high silicon aluminums. TiCN is also good for stamping and forming tools. This TiCN offers only aesthetic differences to our standard Titankote™ C5 coating.

[Titankote™ C6 \[AlTiN\]](#)

AlTiN is a versatile coating that continues to find new uses. It is excellent for machining cast iron, high-nickel alloys, titanium alloys, hardened steels, stainless steels, and much more. AlTiN has also proven to be a good coating for metal-forming. AlTiN is good for higher temperature applications.

[Titankote™ C6+S \[AlTiN/\(Mo, W\)S₂\]](#)

A great combination coating: the high micro-hardness of the AlTiN layer, combined with the (Mo, W)S₂ dry-film lubricant layer of this coating makes it a good choice for many metal-forming applications, especially for high contact loads. Use only when substrates and/or tolerances do not allow for CVD or TD coatings.

[Titankote™ C6B \[TiAlN\]](#)

Many applications for TiAlN coating are similar to AlTiN coating. However, TiAlN is slightly less brittle and more ductile than AlTiN: this makes it better for roughing and interrupted cut applications.

[Titankote™ C7 \[TiAlSiCN\]](#)

This coating combines the excellent wear resistance seen in most Ti-Al PVD coatings with an extremely high oxidation temperature. Our TiAlSiCN coating will perform well in tougher applications that occur at elevated temperatures (ex. – aluminum die-casting, MQL drills, etc.).

[Titankote™ C8 \[ZrN\]](#)

This is another good general purpose coating. Many of its properties are similar to TiN. ZrN is good for machining titanium, cast iron, and non-ferrous materials such as aluminum, copper, and brass.

[Titankote™ C10 \[DLC\]](#)

This ta-C DLC coating is the hardest carbon coating available on the market. It is great for high-speed machining of graphite, carbon fiber, composites, aluminum, and other non-ferrous materials. This coating is typically deposited onto carbide substrates.

[Titankote™ C11 \[DLC\]](#)

This is an a-C:H DLC film deposited by a low temperature Pa-CVD process. Our Titankote™ C11 is smoother and more ductile than most DLC films. This coating is a better choice for polished parts, mold components, tribological applications, etc.

[Titankote™ C12 \[Me-DLC\]](#)

This Me-DLC coating is an excellent choice for tribological applications (cams, slides, shafts, etc). This coating utilizes the latest HIPIMS technology for improved adhesion characteristics and a defect-free inter-metallic layer.

[Titankote™ C14 \[C-DLC\]](#)

This C-DLC coating is an excellent choice for tribological applications. Its higher micro-hardness provides more abrasion protection than a Me-DLC. This coating utilizes the latest HIPIMS technology for improved adhesion characteristics and a defect-free inter-metallic layer.

[Titankote™ H \[Multi-layer TiN/TiCN/TiC/TiN\]](#)

This multi-layer CVD coating has excellent bonding properties that make it a great choice for heavy load applications like metal-forming, stamping, extrusion, and cold-heading. This coating also works well as a coating for carbide milling and turning inserts.

[Titankote™ H+ \[TiC\]](#)

This mono-layer CVD coating has excellent bonding properties that make it a great choice for heavy load applications like metal-forming, stamping, extrusion, and cold-heading. The high hardness of the TiC layer provides great abrasion resistance.

[Titankote™ H+S \[TiC/\(Mo, W\)S₂\]](#)

The excellent adhesion characteristics make this coating a great choice for heavy load applications like stamping, extrusion, and cold-heading. The TiC CVD layer provides excellent abrasion resistance. The (Mo, W)S₂ dry-film lubricant layer of this coating greatly reduces the friction between tooling and work piece.

[TDkote™ \[VC\]](#)

TD is a great choice for heavy load applications like metal-forming, extrusion, and cold-heading. While its characteristics are similar to CVD, it is better suited when forming stainless steels and in forging applications.

[TDkote™+S \[VC/\(Mo, W\)S₂\]](#)

This coating provides increased performance for heavy load applications like stamping, extrusion, and cold-heading. The (Mo, W)S₂ dry-film lubricant layer of this coating greatly reduces the friction between tooling and work piece, reduces pick-up of material, and improves overall tool life and performance.

[Titankote™ B \[Complex Borides \(FeB₂\)\]](#)

Boronizing is best suited for hot forging applications, but has been used successfully for general wear resistance of carbon steel components. Also, boronizing has proven effective in reducing wear in numerous high temperature applications, including burner tubes and related components.