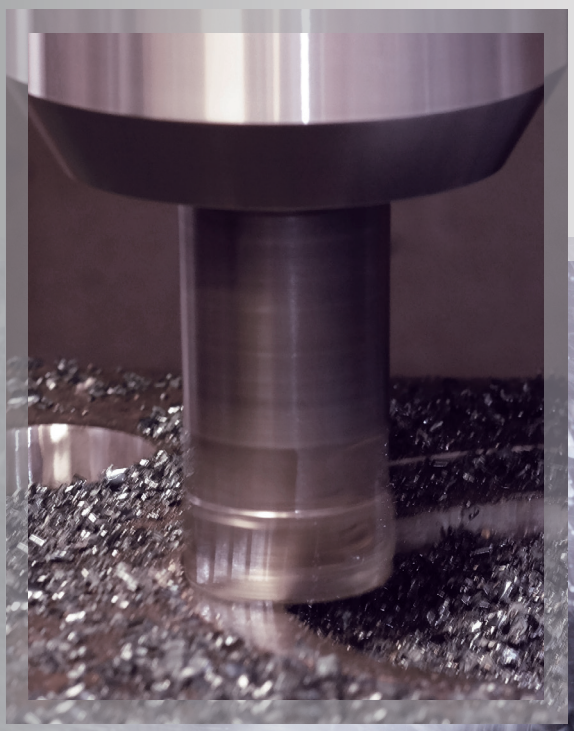
NEW PRODUCTS!

Kosette

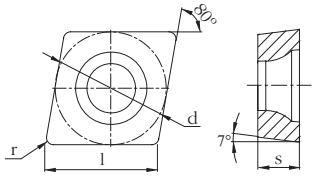
INDEXABLE CARBIDE INSERTS



Supplement to
Main Catalog

WHAT'S INSIDE...

CCMT-MM



80° diamond inserts for turning and facing or boring and facing. Positive rake, screw-down inserts.

MM: Ultra-sharp cutting edge geometry for finishing and semi-finishing operations. Low cutting forces and superior workpiece surface finish.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		STEEL		STAINLESS	
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GP1115	GP1225	GS3115	GM1125
CCMT 2(1.5)0.5-MM	CCMT 060202-MM	1/4	.254	3/32	.008	.004 - .031	.002 - .005	★	★	★	★
CCMT 2(1.5)1-MM	CCMT 060204-MM	1/4	.254	3/32	1/64	.004 - .047	.002 - .006	★	★	★	★
CCMT 3(2.5)0.5-MM	CCMT 09T302-MM	3/8	.381	5/32	.008	.004 - .031	.002 - .005	★	★	★	★
CCMT 3(2.5)1-MM	CCMT 09T304-MM	3/8	.381	5/32	1/64	.004 - .062	.002 - .006	★	★	★	★
CCMT 3(2.5)2-MM	CCMT 09T308-MM	3/8	.381	5/32	1/32	.004 - .062	.003 - .008	★	★	★	★

Ordering Example: 20 pcs CCMT 3(2.5)2-MM GM1125

NOTE: The primary application area for grade GS3115 is in stainless steel workpiece materials. GS3115 is also suitable for use with iron-based, cobalt-based and nickel-based Heat Resistant Super Alloys.

= New Item

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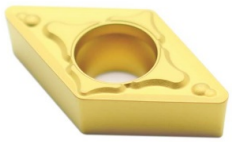
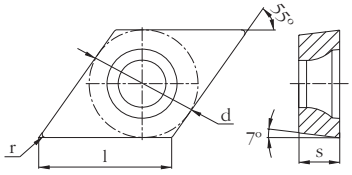
GRADE SELECTION GUIDE	10	CUTTING SPEED RECOMMENDATIONS	12	CHIPBREAKERS	14

DCMT-MM





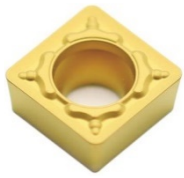
55° diamond inserts for profile turning and finishing. Positive rake screw-down inserts. Good choice for small diameter and slender workpieces.

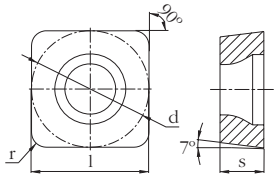
MM: Ultra-sharp cutting edge geometry for finishing and semi-finishing operations. Low cutting forces and superior workpiece surface finish.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		STEEL		STAINLESS	
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GP1115	GP1225	GS3115	GM1125
DCMT 2(1.5)0.5-MM	DCMT 070202-MM	1/4	.305	3/32	.008	.004 - .031	.002 - .005	★	★	★	★
DCMT 2(1.5)1-MM	DCMT 070204-MM	1/4	.305	3/32	1/64	.004 - .047	.002 - .006	★	★	★	★
DCMT 3(2.5)0.5-MM	DCMT 11T302-MM	3/8	.458	5/32	.008	.004 - .031	.002 - .005	★	★	★	★
DCMT 3(2.5)1-MM	DCMT 11T304-MM	3/8	.458	5/32	1/64	.004 - .062	.002 - .006	★	★	★	★
DCMT 3(2.5)2-MM	DCMT 11T308-MM	3/8	.458	5/32	1/32	.004 - .062	.003 - .008	★	★	★	★

Ordering Example: 20 pcs DCMT 3(2.5)2-MM GM1125

SCMT-MM





Generally used for semi-finishing operations: turning, facing or boring. Positive rake screw-down style inserts. Good economy with 4 cutting edges.

MM: Ultra-sharp cutting edge geometry for finishing and semi-finishing operations. Low cutting forces and superior workpiece surface finish.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		STEEL		STAINLESS	
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GP1115	GP1225	GS3115	GM1125
SCMT 3(2.5)2-MM	SCMT 09T308-MM	3/8	.375	5/32	1/32	.004 - .062	.003 - .008	★	★	★	★

Ordering Example: 20 pcs SCMT 3(2.5)2-MM GM1125

NOTE: The primary application area for grade GS3115 is in stainless steel workpiece materials. GS3115 is also suitable for use with iron-based, cobalt-based and nickel-based Heat Resistant Super Alloys.

= New Item

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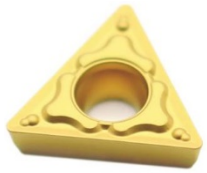
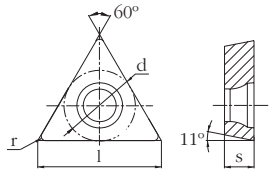
TPMT-MM





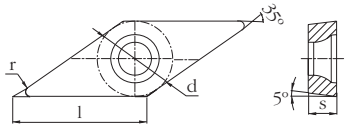
Popular for small diameter boring. Good economy and stable seating of insert. Positive rake screw-down inserts. 11° side clearance is ideal for boring.

MM: Ultra-sharp cutting edge geometry for finishing and semi-finishing operations. Low cutting forces and superior workpiece surface finish.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		STEEL		STAINLESS	
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GP1115	GP1225	GS3115	GM1125
TPMT 2(1.5)0.5-MM	TPMT 110202-MM	1/4	.433	3/32	.008	.004 - .031	.002 - .005	★	★	★	★
TPMT 2(1.5)1-MM	TPMT 110204-MM	1/4	.433	3/32	1/64	.004 - .047	.002 - .006	★	★	★	★

Ordering Example: 20 pcs TPMT 2(1.5)1-MM GM1125

VBMT-MM



First choice shape for 35° diamond profile turning and boring. Positive rake screw-down inserts with 5° side clearance.

MM: Ultra-sharp cutting edge geometry for finishing and semi-finishing operations. Low cutting forces and superior workpiece surface finish.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		STEEL		STAINLESS	
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GP1115	GP1225	GS3115	GM1125
VBMT 221-MM	VBMT 110304-MM	1/4	.436	1/8	1/64	.004 - .047	.002 - .006	★	★	★	★
VBMT 331-MM	VBMT 160404-MM	3/8	.654	3/16	1/64	.004 - .062	.002 - .006	★	★	★	★
VBMT 332-MM	VBMT 160408-MM	3/8	.654	3/16	1/32	.004 - .062	.003 - .008	★	★	★	★

Ordering Example: 20 pcs VBMT 332-MM GM1125

NOTE: The primary application area for grade GS3115 is in stainless steel workpiece materials. GS3115 is also suitable for use with iron-based, cobalt-based and nickel-based Heat Resistant Super Alloys.

= New Item

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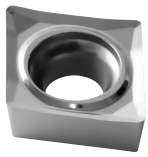
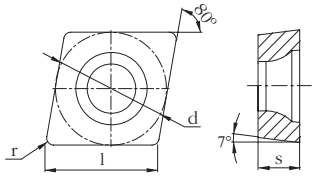
CCGX-AL





Precision Ground, High Positive, polished 80° diamond inserts for turning, boring and facing of Aluminum, non-ferrous materials and non-metallics.

AL: Extremely high 25° positive rake geometry. Super sharp edgeline with polished face for smooth chip flow.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		NON-FERROUS			
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GN9125			
CCGX 2(1.5)0.5-AL	CCGX 060202-AL	1/4	.254	3/32	.008	.010 - .047	.002 - .008	★			
CCGX 2(1.5)1-AL	CCGX 060204-AL	1/4	.254	3/32	1/64	.016 - .062	.004 - .010	★			
CCGX 2(1.5)2-AL	CCGX 060208-AL	1/4	.254	3/32	1/32	.020 - .062	.006 - .020	★			
CCGX 3(2.5)0.5-AL	CCGX 09T302-AL	3/8	.381	5/32	.008	.010 - .094	.002 - .008	★			
CCGX 3(2.5)1-AL	CCGX 09T304-AL	3/8	.381	5/32	1/64	.016 - .125	.004 - .010	★			
CCGX 3(2.5)2-AL	CCGX 09T308-AL	3/8	.381	5/32	1/32	.020 - .125	.006 - .020	★			
CCGX 430.5-AL	CCGX 120402-AL	1/2	.508	3/16	.008	.010 - .125	.002 - .008	★			
CCGX 431-AL	CCGX 120404-AL	1/2	.508	3/16	1/64	.016 - .187	.004 - .010	★			
CCGX 432-AL	CCGX 120408-AL	1/2	.508	3/16	1/32	.020 - .187	.006 - .020	★			

Ordering Example: 20 pcs CCGX 432-AL GN9125

= New Item

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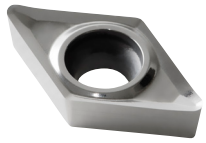
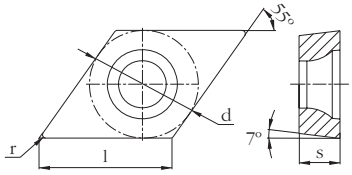
DCGX-AL





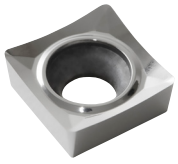
Precision Ground, High Positive, polished 55° diamond inserts for profiling of Aluminum, non-ferrous materials and non-metallics.

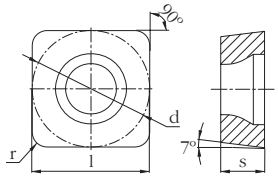
AL: Extremely high 25° positive rake geometry. Super sharp edgeline with polished face for smooth chip flow.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		NON-FERROUS			
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GN9125			
DCGX 2(1.5)0.5-AL	DCGX 070202-AL	1/4	.305	3/32	.008	.010 - .062	.002 - .008	★			
DCGX 2(1.5)1-AL	DCGX 070204-AL	1/4	.305	3/32	1/64	.016 - .094	.004 - .010	★			
DCGX 2(1.5)2-AL	DCGX 070208-AL	1/4	.305	3/32	1/32	.020 - .094	.006 - .020	★			
DCGX 3(2.5)0.5-AL	DCGX 11T302-AL	3/8	.458	5/32	.008	.010 - .094	.002 - .008	★			
DCGX 3(2.5)1-AL	DCGX 11T304-AL	3/8	.458	5/32	1/64	.016 - .125	.004 - .010	★			
DCGX 3(2.5)2-AL	DCGX 11T308-AL	3/8	.458	5/32	1/32	.020 - .125	.006 - .020	★			

Ordering Example: 20 pcs DCGX 3(2.5)2-AL GN9125

SCGX-AL





Precision Ground, High Positive, polished square inserts for turning, facing and boring of Aluminum, non-ferrous materials and non-metallics.

AL: Extremely high 25° positive rake geometry. Super sharp edgeline with polished face for smooth chip flow.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		NON-FERROUS			
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GN9125			
SCGX 3(2.5)1-AL	SCGX 09T304-AL	3/8	.375	5/32	1/64	.016 - .125	.004 - .010	★			
SCGX 3(2.5)2-AL	SCGX 09T308-AL	3/8	.375	5/32	1/32	.020 - .125	.006 - .020	★			
SCGX 431-AL	SCGX 120404-AL	1/2	.500	3/16	1/64	.016 - .156	.004 - .010	★			
SCGX 432-AL	SCGX 120408-AL	1/2	.500	3/16	1/32	.020 - .156	.006 - .020	★			

Ordering Example: 20 pcs SCGX 432-AL GN9125

= New Item

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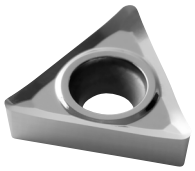
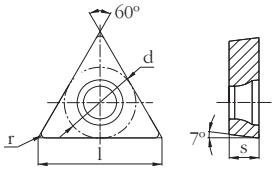
TCGX-AL





Precision Ground, High Positive, polished triangular inserts for turning and boring of Aluminum, non-ferrous materials and non-metallics.

AL: Extremely high 25° positive rake geometry. Super sharp edgeline with polished face for smooth chip flow.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		NON-FERROUS			
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GN9125			
TCGX 1.8(1.5)1-AL	TCGX 090204-AL	7/32	.379	3/32	1/64	.016 - .094	.004 - .008	★			
TCGX 2(1.5)0.5-AL	TCGX 110202-AL	1/4	.433	3/32	.008	.010 - .094	.002 - .008	★			
TCGX 2(1.5)1-AL	TCGX 110204-AL	1/4	.433	3/32	1/64	.016 - .125	.004 - .010	★			
TCGX 2(1.5)2-AL	TCGX 110208-AL	1/4	.433	3/32	1/32	.020 - .125	.006 - .020	★			
TCGX 3(2.5)0.5-AL	TCGX 16T302-AL	3/8	.650	5/32	.008	.010 - .125	.002 - .008	★			
TCGX 3(2.5)1-AL	TCGX 16T304-AL	3/8	.650	5/32	1/64	.016 - .156	.004 - .010	★			
TCGX 3(2.5)2-AL	TCGX 16T308-AL	3/8	.650	5/32	1/32	.020 - .156	.006 - .020	★			

Ordering Example: 20 pcs TCGX 3(2.5)2-AL GN9125

= New Item

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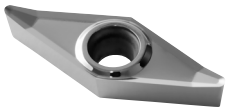
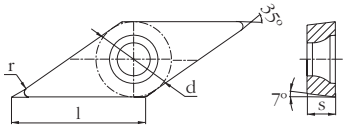
VCGX-AL





Precision Ground, High Positive, polished 35° diamond inserts for intricate profiling of Aluminum, non-ferrous materials and non-metallics.

AL: Extremely high 25° positive rake geometry. Super sharp edgeline with polished face for smooth chip flow.

CATALOG NUMBER	ISO DESIGNATION	DIMENSIONS (INCH)				CUTTING DATA (INCH)		NON-FERROUS			
		d	l	s	r	depth of cut, a_p	feed per rev, f_n	GN9125			
VCGX 220.5-AL	VCGX 110302-AL	1/4	.436	1/8	.008	.010 - .062	.002 - .008	★			
VCGX 221-AL	VCGX 110304-AL	1/4	.436	1/8	1/64	.016 - .087	.004 - .010	★			
VCGX 222-AL	VCGX 110308-AL	1/4	.436	1/8	1/32	.020 - .087	.006 - .020	★			
VCGX 330.5-AL	VCGX 160402-AL	3/8	.654	3/16	.008	.010 - .125	.002 - .008	★			
VCGX 331-AL	VCGX 160404-AL	3/8	.654	3/16	1/64	.016 - .156	.004 - .010	★			
VCGX 332-AL	VCGX 160408-AL	3/8	.654	3/16	1/32	.020 - .156	.006 - .020	★			
VCGX 333-AL	VCGX 160412-AL	3/8	.654	3/16	3/64	.020 - .156	.006 - .031	★			
VCGX 220512-AL	VCGX 220512-AL	1/2	.872	7/32	3/64	.020 - .187	.006 - .031	★			
VCGX 220516-AL	VCGX 220516-AL	1/2	.872	7/32	1/16	.020 - .187	.006 - .031	★			
VCGX 220530-AL	VCGX 220530-AL	1/2	.872	7/32	.118	.020 - .187	.010 - .040	★			

Ordering Example: 20 pcs VCGX 220530-AL GN9125

= New Item

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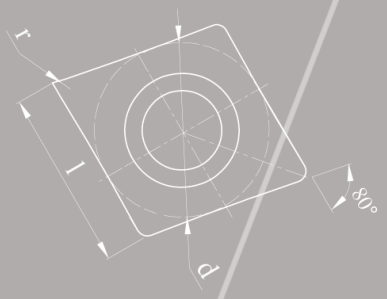
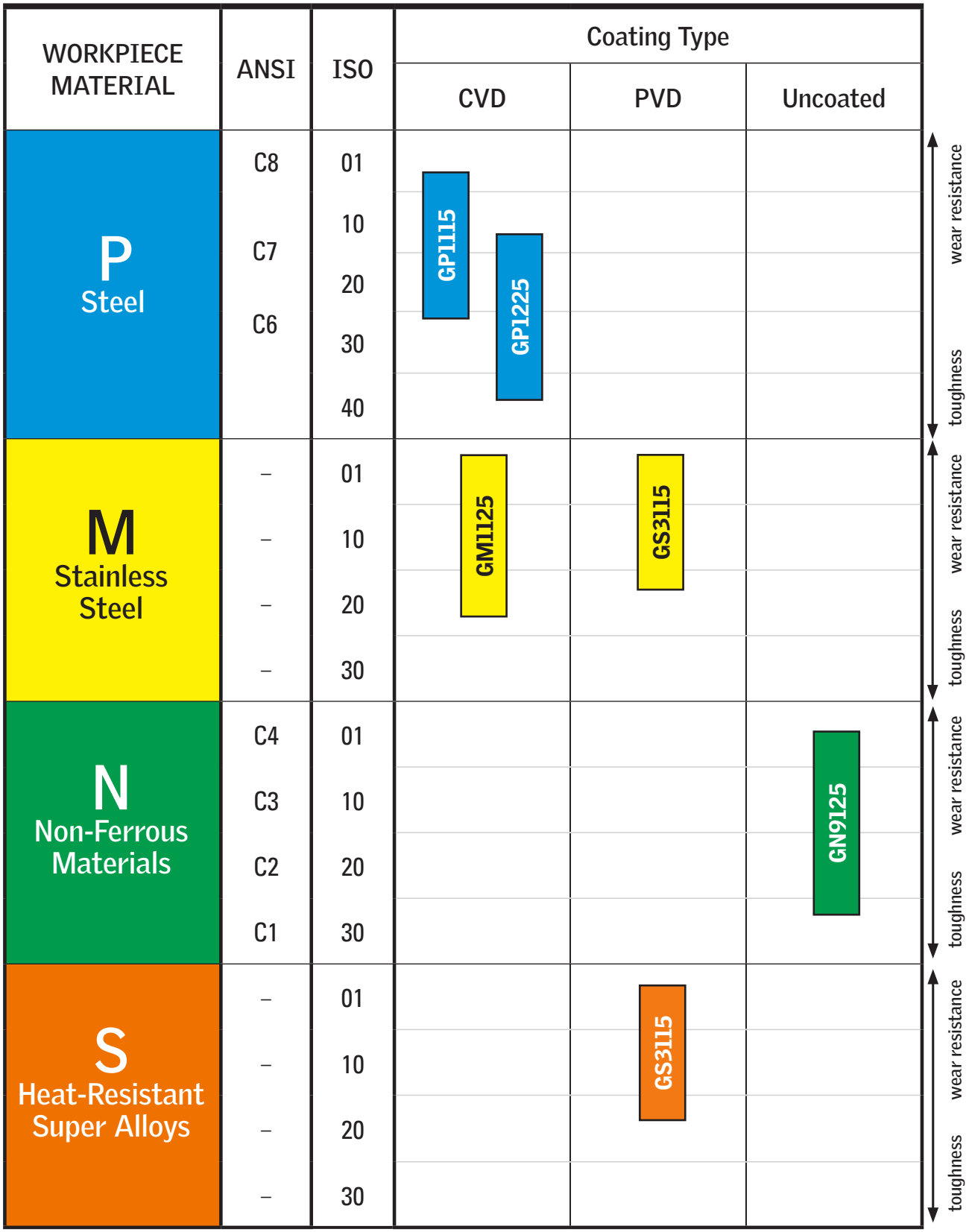
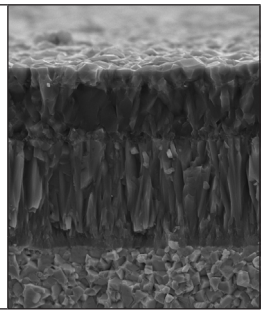
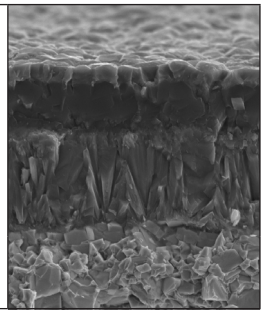
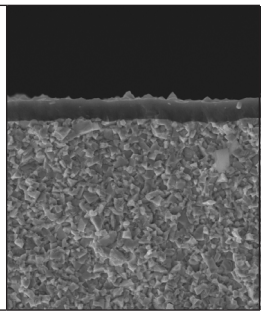
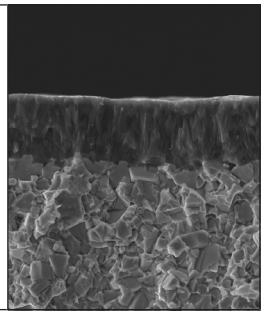
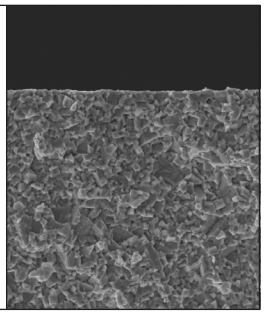
TECHNICAL INFORMATION
TURNING




WORKPIECE MATERIAL
ANSI
ISO
Coating Type
CVD
PVD
Uncoated
P
Steel
C8
C7
C6
01
10
20
30
40
GP1115
GP1225
M
Stainless Steel
–
–
–
–
01
10
20
30
GM1125
GS3115
N
Non-Ferrous Materials
C4
C3
C2
C1
01
10
20
30
GN9125
S
Heat-Resistant Super Alloys
–
–
–
–
01
10
20
30
GS3115
wear resistance
toughness
wear resistance
toughness
wear resistance
toughness
wear resistance
toughness

Grade / Application Area	Description	Microstructure
GP1115 **Finishing and Semi-finishing** **P STEEL**	*"First Choice"* for **Finishing** Applications in Steel (ISO P Materials). Triple-Coated MT-CVD Grade with Superfine TiCN, Thick Al_2O_3, and Ultra-Smooth TiN. Gradient-sintered high performance cemented carbide substrate with very high wear resistance. Performs extremely well in continuous cutting conditions and stable set-ups.	
GP1225 **Semi-finishing to Light Roughing** **P STEEL**	*"First Choice"* for **Medium** Turning Applications in Steel (ISO P Materials). Triple-Coated MT-CVD Grade with Superthick TiCN, Optimized Al_2O_3, and Ultra-Smooth TiN. Gradient-sintered all-round performance cemented carbide substrate with excellent balance of wear resistance and toughness. Covers a wide application range, from semi-finishing to light roughing of Steels and continuous cutting to moderate interruptions. Also recommended for workpieces with scale.	
GS3115 **Finishing to Semi-finishing** **M STAINLESS STEEL**	*"First Choice"* Grade for **Finishing** Applications in Stainless Steel (ISO M Materials). Also suitable for finish turning iron-based, cobalt-based and nickel-based Heat Resistant Super Alloys. PVD Advanced TiAlN Coated Grade with superior heat-resistance and oxidation-resistance properties. Extremely hard deformation-resistant micro-grain cemented carbide substrate with exceptional wear resistance characteristics.	
GM1125 **Finishing to Medium Machining** **M STAINLESS STEEL**	*"First Choice"* Grade for Stainless Steel (ISO M Materials). Double-Coated MT-CVD Grade with outstanding adhesion of Superthick TiCN and Ultra-Smooth TiN. Gradient-sintered tough cemented carbide substrate with excellent wear resistance - even at elevated cutting speeds. Optimized for Stainless Steel machining including light interruptions.	
GN9125 **Semi-finishing to Roughing** **N NON-FERROUS**	Uncoated Sub-Micron cemented carbide grade. High Hardness and Wear Resistance grade developed specifically for Aluminum Alloys and other non-ferrous materials within the ISO N Material range. Also suitable for non-metallics.	

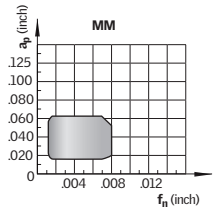
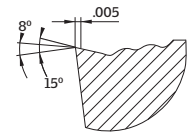
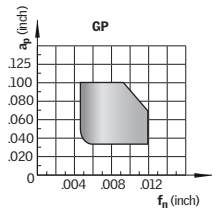
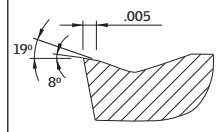
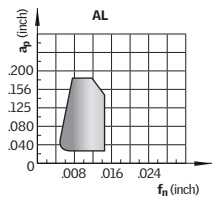
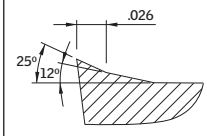
RECOMMENDED STARTING CUTTING SPEEDS | TURNING

ISO	Material Group	Workpiece Material	Brinell Hardness HB	Rockwell Hardness HRC	Tensile Strength MPa	Recommended Starting Speeds v_c (ft/min)											
						GP1115			GP1225								
						f_n (inch/rev)			f_n (inch/rev)								
						.004	.008	.012	.004	.008	.016						
P Steel	P0	Low-Carbon Steels, Long Chipping (C < .25%) Ex. A36, 1008, 1010, 1018, 1108, 1117	<125		<530	1640	1445	1280	1400	1245	855						
	P1	Low-Carbon Steels, Short Chipping, Free Machining (C < .25%) Ex. 10L18, 1200 Series, 1213, 12L14	<125		<530	1400	1245	1050	1180	1015	655						
	P2	Medium- and High-Carbon Steels (C > .25%) Ex. 1035, 1045, 10L45, 1080, 1137, 1144, 1525, 1572	<220	<25	>530	1050	985	885	920	820	590						
	P3	Alloy Steels and Tool Steels (C > .25%) Ex. P20, 1300, 2000, 3000, 4000, 5000, 8000, SAE A, D, H, 0, S, M, T	<330	<35	600-850	950	790	655	790	720	490						
	P4	High-Strength Alloy Steels and Tool Steels (C > .25%) Ex. P20, 1300, 2000, 3000, 4000, 5000, 8000, SAE A, D, H, 0, S, M, T	340-450	35-48	850-1400	790	655	525	590	525	330						
	P5	Ferritic, Martensitic and PH Stainless Steels Ex. 13-8 PH, 15-5 PH, 17-4 PH, 400 and 500 Series	<330	<35	600-900	985	820	655	855	720	560						
	P6	High-Strength Ferritic, Martensitic and PH Stainless Steels Ex. 13-8 PH, 15-5 PH, 17-4 PH, 400 and 500 Series	340-450	35-48	900-1350	590	490	330	425	360	300						

ISO	Material Group	Workpiece Material	Brinell Hardness HB	Rockwell Hardness HRC	Tensile Strength MPa	Recommended Starting Speeds v_c (ft/min)											
						GS3115			GM1125								
						f_n (inch/rev)			f_n (inch/rev)								
						.004	.008	.012	.004	.008	.012						
M Stainless Steel	M1	Austenitic Stainless Steels Ex. 200 Series, 301, 302, 304, 304L, 309	130-200		<600	770	625	490	790	655	525						
	M2	High-Strength Austenitic Stainless and Cast Stainless Steels Ex. 310, 316, 316L, 321, 347, 384	150-230	<25	600-800	525	460	330	460	400	300						
	M3	Duplex Stainless Steels Ex. 323, 329, F55, 2205	135-275	<30	<800	590	525	400	510	445	330						

ISO	Material Group	Workpiece Material	Brinell Hardness HB	Rockwell Hardness HRC	Tensile Strength MPa	Recommended Starting Speeds v_c (ft/min)											
						GN9125											
						f_n (inch/rev)											
						.004	.008	.016									
N Non-Ferrous	N1	Wrought Aluminum Ex. 1000, 2017, 2025, 5050, 7050	60-90		<520	6900	5400	3600									
	N2	Low-Silicon Aluminum Alloys (Si < 12.2%) Ex. 2024, 6061, 7075	70-100		<350	1640	985	655									
	N3	High-Silicon Aluminum Alloys (Si > 12.2%)	60-120		200-320	985	655	400									
	N4	Copper and Copper Alloys Ex. C81500	60-200		200-650	1280	1050	885									

ISO	Material Group	Workpiece Material	Brinell Hardness HB	Rockwell Hardness HRC	Tensile Strength MPa	Recommended Starting Speeds v_c (ft/min)											
						GS3115											
						f_n (inch/rev)											
						.004	.008	.012									
S High Temp Alloys	S1	Iron-Based Heat-Resistant Alloys Ex. A286, A608, INCOLOY 800 Series, N-155, Haynes 556, Discaloy	160-260	25-48	500-1200	330	280	230									
	S2	Cobalt-Based Heat-Resistant Alloys Ex. Haynes 25 (L605), Haynes 188, Stellite, MAR-M302, MAR-M509	250-450	25-48	1000-1450	260	215	165									
	S3	Nickel-Based Heat-Resistant Alloys Ex. Astroloy, Hastelloy X, INCONEL 600 and 700 Series, Waspalloy	160-450	<48	600-1700	200	150	115									
	S4	Titanium and Titanium Alloys Ex. Commercially Pure Ti, Ti-5Al-2.5Sn, Ti-6Al-4V, Ti-3Al-8V-6Cr-4Zr-4Mo	300-400	33-48	900-1600	-	-	-									

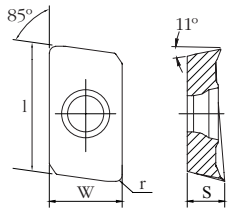
Chipbreaker	Description	Chipbreaker Range	Design
MM P M	• High performance finishing chipbreaker • Double-positive chipformer design • Exceptionally sharp cutting edge • Low cutting forces • Superior workpiece surface finish		
GP P M K	• Good All-Round geometry for Positive Inserts • Works in a broad range of materials • Double-positive chipformer design • Reduced top land for feedrates < .004" • 11º Style inserts primarily used for boring		
AL N NON-FERROUS	• Ultra-sharp edge with polished rake face • Super Positive (25º) top rake • Free cutting and smooth chip flow • Ultra-low cutting forces • Resistant to Built-up-Edge		

AL chipbreaker inserts, for aluminum and other non-ferrous materials

MILLING

SQUARE SHOULDER MILLING

APMT



Widely used inserts for square shoulder endmilling and facemilling applications. Two cutting edges with smooth free cutting action.

PL: Light cutting with lowest cutting forces
PM: Medium machining with broad application range
PR: Roughing with highest edge security

APPLICATION	ITEM	CATALOG NUMBER	DIMENSIONS (INCH)				CUTTING DATA (INCH)		P	M	K	S
			l	W	s	r	depth of cut, a_p	feed per insert, f_z	MULTI-MATERIAL GA4230			
LIGHT		**APMT 160408PDER-PL**	.640	.364	.187	.031	max .551	.002 - .006	★			
MEDIUM		**APMT 160408PDER-PM**	.640	.364	.187	.031	max .551	.003 - .008	★			
MEDIUM		**APMT 160416PDER-PM**	.640	.364	.187	.063	max .551	.003 - .008	★			
HEAVY		**APMT 160408PDER-PR**	.640	.364	.187	.031	max .551	.006 - .012	★			

Ordering Example: 20 pcs APMT 160408PDER-PR GA4230

= New Item

INSERT COMPATIBILITY

APMT 1604 milling inserts are interchangeable with other APMT 1604 inserts, and also fit tools using the following insert types:

APKT 1604	APKT 263	APKX 1604	APMW 1604	APMX 1604

RECOMMENDED STARTING CUTTING SPEEDS | MILLING

ISO	Material Group	Workpiece Material	Brinell Hardness HB	Rockwell Hardness HRC	Tensile Strength MPa	Recommended Starting Speeds v_c (ft/min)								
						GA4230								
						f_z (inch)								
						.004	.008	.012						
P Steel	P0	Low-Carbon Steels, Long Chipping (C < .25%) Ex. A36, 1008, 1010, 1018, 1108, 1117	<125		<530	920	720	590						
	P1	Low-Carbon Steels, Short Chipping, Free Machining (C < .25%) Ex. 10L18, 1200 Series, 1213, 12L14	<125		<530	820	655	490						
	P2	Medium- and High-Carbon Steels (C > .25%) Ex. 1035, 1045, 10L45, 1080, 1137, 1144, 1525, 1572	<220	<25	>530	720	590	480						
	P3	Alloy Steels and Tool Steels (C > .25%) Ex. P20, 1300, 2000, 3000, 4000, 5000, 8000, SAE A, D, H, O, S, M, T	<330	<35	600-850	655	560	460						
	P4	High-Strength Alloy Steels and Tool Steels (C > .25%) Ex. P20, 1300, 2000, 3000, 4000, 5000, 8000, SAE A, D, H, O, S, M, T	340-450	35-48	850-1400	590	490	390						
	P5	Ferritic, Martensitic and PH Stainless Steels Ex. 13-8 PH, 15-5 PH, 17-4 PH, 400 and 500 Series	<330	<35	600-900	680	575	470						
	P6	High-Strength Ferritic, Martensitic and PH Stainless Steels Ex. 13-8 PH, 15-5 PH, 17-4 PH, 400 and 500 Series	340-450	35-48	900-1350	525	460	390						

ISO	Material Group	Workpiece Material	Brinell Hardness HB	Rockwell Hardness HRC	Tensile Strength MPa	Recommended Starting Speeds v_c (ft/min)								
						GA4230								
						f_z (inch)								
						.004	.008	.012						
M Stainless Steel	M1	Austenitic Stainless Steels Ex. 200 Series, 301, 302, 304, 304L, 309	130-200		<600	590	525	460						
	M2	High-Strength Austenitic Stainless and Cast Stainless Steels Ex. 310, 316, 316L, 321, 347, 384	150-230	<25	600-800	525	390	330						
	M3	Duplex Stainless Steels Ex. 323, 329, F55, 2205	135-275	<30	<800	560	490	425						

RECOMMENDED STARTING CUTTING SPEEDS | MILLING

ISO	Material Group	Workpiece Material	Brinell Hardness HB	Rockwell Hardness HRC	Tensile Strength MPa	Recommended Starting Speeds v_c (ft/min)								
						GA4230								
						f_z (inch)								
						.004	.008	.012						
K Cast Iron	**K1**	Gray Cast Iron Ex. Class 20, 25, 30, 35, 40, 45, 50, 55, 60, G1800, G3000, G3500, G4000	120-290	<32	125-500	790	655	490						
	K2	Ductile Cast Irons (Nodular Irons) and Compacted Graphite Irons (CGI) Ex. 60-40-18, 65-45-12, 80-55-06, SAE J434: D4018, D4512, D5506	130-260	<28	<600	720	590	460						
	K3	High-Strength Ductile Irons and Austempered Ductile Irons (ADI) Ex. ASTM A536: 100-70-03, 120-90-02, SAE J434: D7003	180-350	<43	>600	655	525	430						

ISO	Material Group	Workpiece Material	Brinell Hardness HB	Rockwell Hardness HRC	Tensile Strength MPa	Recommended Starting Speeds v_c (ft/min)								
						GA4230								
						f_z (inch)								
						.004	.008	.012						
S High Temp Alloys	**S1**	Iron-Based Heat-Resistant Alloys Ex. A286, A608, INCOLOY 800 Series, N-155, Haynes 556, Discaloy	160-260	25-48	500-1200	180	150	115						
	S2	Cobalt-Based Heat-Resistant Alloys Ex. Haynes 25 (L605), Haynes 188, Stellite, MAR-M302, MAR-M509	250-450	25-48	1000-1450	150	110	-						
	S3	Nickel-Based Heat-Resistant Alloys Ex. Astroloy, Hastelloy X, INCONEL 600 and 700 Series, Waspalloy	160-450	<48	600-1700	160	120	-						
	S4	Titanium and Titanium Alloys Ex. Commercially Pure Ti, Ti-5Al-2.5Sn, Ti-6Al-4V, Ti-3Al-8V-6Cr-4Zr-4Mo	300-400	33-48	900-1600	170	130	-						

Metalcutting Safety

Read before using the tools in this catalog!

Projectile and Fragmentation Hazards:

Modern metalcutting operations involve high spindle and cutter speeds and high temperatures and cutting forces. Hot metal chips may fly off the workpiece during metalcutting. Although cutting tools are designed and manufactured to withstand high cutting forces and temperatures, they can sometimes fragment, particularly if they are subjected to over-stress, severe impact, or other abuse. Many variables affect machining operations. It is impossible to cover every specific situation. The technical information included in this catalog and recommendations on machining practices may not apply to your particular operation. As sold and under normal conditions of use, hardmetal products and tools do not present inhalation, ingestion or other chemical hazards. The health hazards relate only to hardmetal powder. Under normal conditions of use, operations involving hardmetal products and tools do not result in the release of hardmetal powder (either in the form of dusts or fumes) and do not present inhalation, ingestion or other chemical hazards.

To avoid injury:

- Always wear appropriate personal protective equipment, including safety goggles, when operating metalcutting machines or working nearby.
- Always make sure all machine guards are in place.

Breathing and Skin Contact Hazards:

Grinding carbide or other advanced cutting tool materials produces dust or mist containing metallic particles.

To avoid injury:

- If grinding, read the applicable Material Safety Data Sheet and consult General Industry Safety and Health Regulations, Part 1910, Title 29 of the Code of Federal Regulations. These safety instructions are general guidelines.

Although we have attempted to provide current and accurate information herein, we make no representations regarding the accuracy or the completeness of the information and assume no liability for any loss, damage, or injury of any kind which may result from or arise out of the use of or reliance on the information by any person.

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