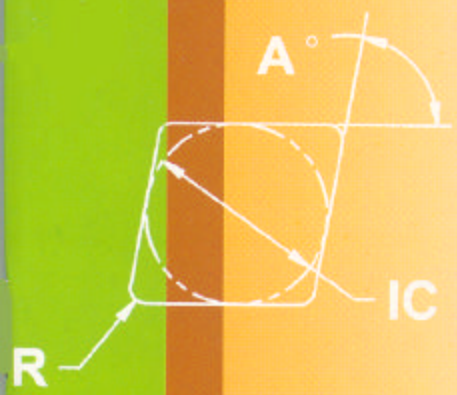
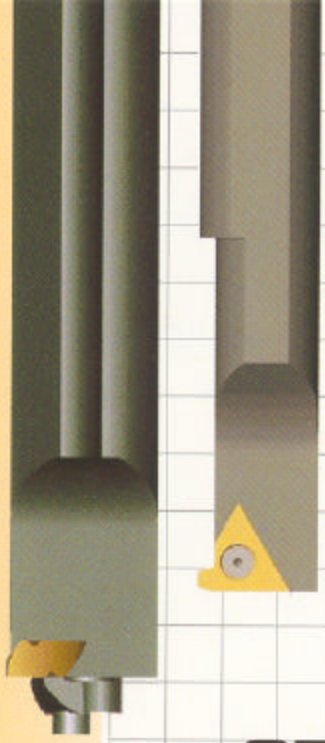
CATALOG NUMBER HT-004

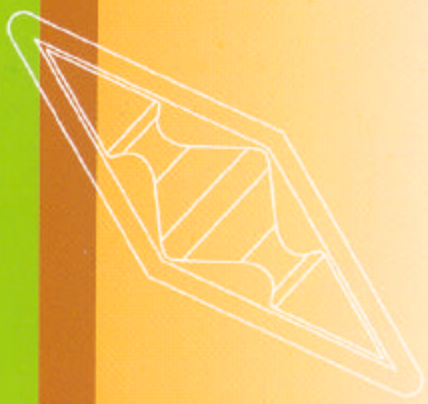


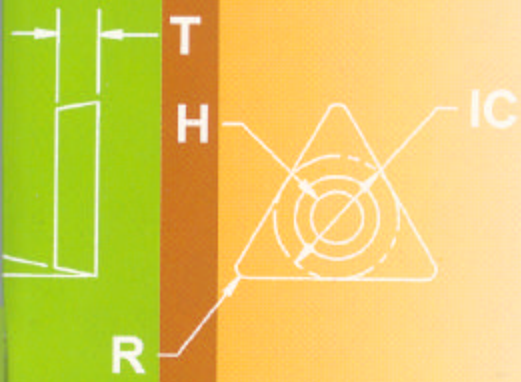


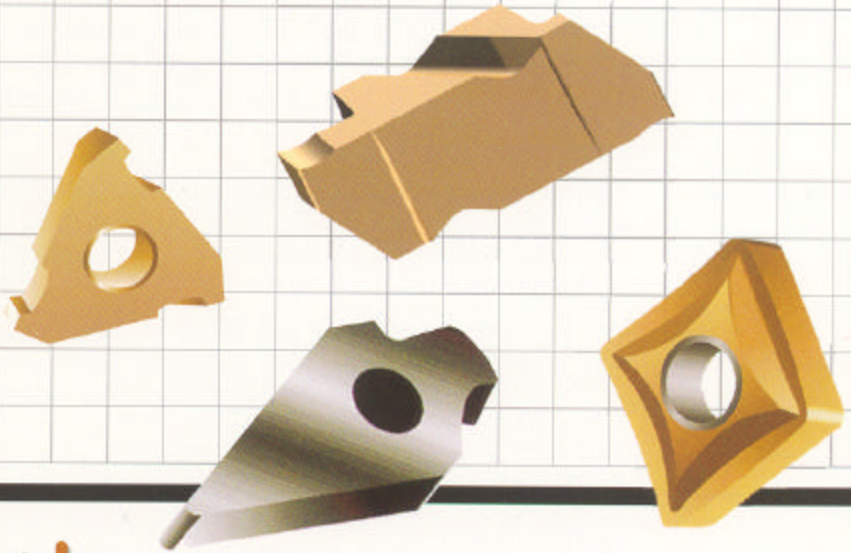
CLICK HERE FOR INDEX

SPECIAL & STANDARD CARBIDE INSERTS & TOOLING

- THREADING
- GROOVING
- TURNING







HORIZON
CARBIDE TOOL, INC.

TEL: 480.968.0957
FAX: 480.968.8042
Outside AZ, Call: 1-800-968-0957

CLICK ON RED LINKS

HORIZON UNCOATED CARBIDE GRADES

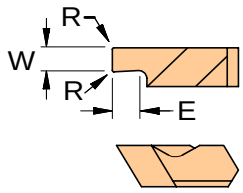
Grade	ANSI	ISO	Color	Description
C10	**C1 \ C5**	**K40 / P40**	Gray	Tough Grade for small diameters or severe applications at low speeds.
C20	C2	K20 - K25	Gray	Uncoated Grade for Non-Ferrous materials. *Non-Stock*
C23	**C2-C3**	**K10-K20 / M20**	Gray	Premium C2-C3 Grade for Non-Ferrous Metals, Plastics and Non-Metals.
C23J	**C2-C3**	**K10-K20 / M20**	Gray	Grade C23 Inserts with Polished Chipbreakers for Aluminum, Copper and Plastics. The Polished Tops and Sharp Edges help prevent Chip Build-up.
C56	C5-C6	P20-P30	Gray	Uncoated Grade for Carbon and Alloy Steels at medium speeds. *Non-Stock*
HCC	C4 \ C7	P10 / K05	Silver	Ceramet Grade for finishing at high speeds and light feed rates. *Non-Stock*

HORIZON COATED CARBIDE GRADES

Grade	ANSI	ISO	Color	Description
110	**C1-C2 / C5**	**K25-K40 / P50**	Gold	Tough PVD TIN Coated Micrograin Grade for Low to Medium Speeds. Good for small diameter work under 1" and Screw Machine applications.
120	C2-C3	K15-K25 / M20	Gold	PVD TIN Coated C2 Grade for special applications. *Non-Stock*
123	**C2-C3 / C6**	**K10-K20 M15-M20**	Gold	PVD TIN Coated C2-C3 Grade for Threading, Grooving and Finishing. Use TiALN coated Grades 310, 323 or 323F for Higher Performance & Longer Tool Life in 300 Series Stainless Steel, Titanium and High Temp Alloys
156	**C5-C6**	**P20-P30**	Gold	PVD TIN Coated C5-C6 Grade for Threading and Grooving Carbon & Alloy Steels. Use 356, 323 or 323F for Higher Performance and Longer Tool Life.
223	C2-C3	K10-K25 / M20	Blue-Gray	PVD TICN Coated C2-C3 Grade for special applications. *Non-Stock*
256	C5-C6	P20-P30	Blue-Gray	PVD TICN Coated C5-C6 Grade for special applications. *Non-Stock*
310	**C1-C2 C5-C6**	**K25-K40 M25-M35 P35-P50**	Bronze	Tough PVD TiALN Coated Micrograin Grade Designed for Face Grooving. Also for Threading & Grooving smaller parts under 1" diameter at low to medium speeds. (Not recommended for Copper or Aluminum)
323	**C2-C3 C6-C7**	**K10-K25 M15-M25 P15-P25**	Bronze	High Performance PVD TiALN Coated Grade. First choice for Threading Grooving and Finishing 300 Series Stainless, Titanium & High Temp Alloys. Works well on Iron and Steel at Medium Speeds and Light Feed Rates. (Not recommended for Copper or Aluminum)
323F	**C2-C3 C6-C7**	**K10-K25 M15-M25 P15-P25**	Gray-Black	PVD TiALN Coated Grade similar in performance to 323. Smooth coating can be used on Aluminum without galling. Most Laydown Threading and High Positive Aluminum Screw Down Inserts are available in Grade 323F. All other Inserts in this Grade are *Limited-Stock* items.
323G	C2-C3 / C7	K10-K25 / M20	Gold	PVD TiALN Coated. Special enhanced version of Grade 323. *Non-Stock*
356	**C5-C6**	**P20-P30**	Bronze	PVD TiALN Coated Grade. 1st Choice for General Purpose use on Steels.
423	C2-C3 / C6	K10-K20 / P15	Gold	CVD TIN Coated Non-Ferrous Grade for special applications. *Non-Stock*
456	C5-C6	P20-P30	Gold	CVD TIN Coated Steel cutting Grade for special applications. *Non-Stock*
523	C2-C3 / C7	K10-K20 / P15	Gold	CVD Multi-Coated Steel cutting Grade for special applications. *Non-Stock*
556	C5-C6	P20-P30	Gold	CVD Multi-Coated Steel cutting Grade for special applications. *Non-Stock*
623	C3-C4	K10-K15	Black	CVD Aluminum Oxide coated for Cast Iron & Hard Materials. *Non-Stock*

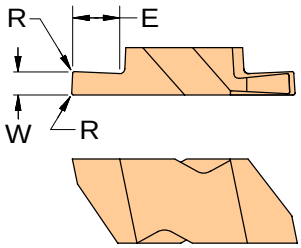
BOLD **= Standard Horizon Grades** *Non-Stock* **= Non-Stock Grades or Limited Stock Items - Call for availability**

Style:	Insert Description		Dimensions			Grades				
HG Size 1 ID Grooving	**Right Hand**	**Left Hand**	**W**	**R**	**E**	**C10**	**110**	**310**		
	NA		.031	.0035	.050	*NA*	*NA*	*NA*		
		HG 1031L		± .0015		**S**	**S**	**S**		
	NA		.047	.0035	.075	*NA*	*NA*	*NA*		
		HG 1047L		± .0015		**S**	**S**	**S**		
	NA		.062	.0035	.075	*NA*	*NA*	*NA*		
		HG 1062L		±.0015		**S**	**S**	**S**		
	NA		.094	.0035	.075	*NA*	*NA*	*NA*		
		HG 1094L		± .0015		**S**	**S**	**S**		



Left Hand Shown

Style:	Insert Description		Dimensions			Grades				
HG Size 2	**Right Hand**	**Left Hand**	**W**	**R**	**E**	**C23**	**123**	**156**	**323**	**356**
	HG 2031R		.031	.0035	.055	**S**	**S**	**S**	**S**	**S**
		HG 2031L		± .0015		**S**	**S**	*LS*	**S**	*LS*
	HG 2039R		.039	.0035	.055	**S**	**S**	*LS*	**S**	*LS*
		HG 2039L		± .0015		**S**	*LS*	*LS*	**S**	*LS*
	HG 2041R		.041	.0035	.055	**S**	**S**	**S**	**S**	**S**
		HG 2041L		± .0015		**S**	**S**	**S**	**S**	**S**
	HG 2047R		.047	.0035	.080	**S**	**S**	**S**	**S**	**S**
		HG 2047L		± .0015		**S**	**S**	*LS*	**S**	*LS*
	HG 2055R		.055	.0035	.080	**S**	**S**	**S**	**S**	**S**
		HG 2055L		± .0015		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 2058R		.058	.0075	.080	**S**	**S**	*LS*	**S**	*LS*
		HG 2058L		± .0025		**S**	**S**	*LS*	**S**	*LS*
	HG 2062R		.062	.0075	.115	**S**	**S**	**S**	**S**	**S**
		HG 2062L		± .0025		**S**	**S**	**S**	**S**	**S**
	HG 2070R		.070	.0075	.115	**S**	**S**	*LS*	**S**	*LS*
		HG 2070L		± .0025		**S**	**S**	*LS*	**S**	*LS*
	HG 2079R		.079	.0075	.115	*LS*	*LS*	*LS*	*LS*	*LS*
		HG 2079L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 2094R		.094	.0075	.115	**S**	**S**	**S**	**S**	**S**
		HG 2094L		± .0025		**S**	**S**	**S**	**S**	**S**
	HG 2118R		.118	.0075	.115	**S**	**S**	*LS*	**S**	*LS*
		HG 2118L		± .0025		**S**	*LS*	*LS*	**S**	*LS*
	HG 2125R		.125	.0075	.115	**S**	**S**	**S**	**S**	**S**
		HG 2125L		± .0025		**S**	**S**	**S**	**S**	**S**
	HG 2140R		.140	.0075	.115	**S**	**S**	**S**	**S**	**S**
		HG 2140L		± .0025		**S**	*LS*	*LS*	*LS*	*LS*



Right Hand Shown

E Dimension is Maximum Depth of Cut

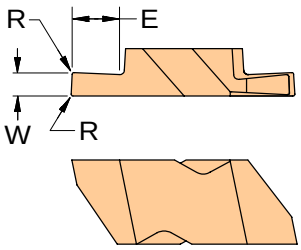
Use RH Inserts with RH External Tool Holders

Use LH Inserts with RH Internal Boring Bars

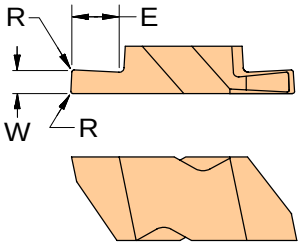
For Tool Holder Information See Pages 31- 33

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Metric Sizes and Modified or Full Special Inserts Available on Request

Style:	Insert Description		Dimensions			Grades				
HG Size 3	**Right Hand**	**Left Hand**	**W**	**R**	**E**	**C23**	**123**	**156**	**323**	**356**
	**HG 3020R**		.020	.0035	.055	**S**	**S**	*LS*	**S**	*LS*
		HG 3020L		± .0015		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 3031R		.031	.0035	.055	**S**	**S**	*LS*	**S**	*LS*
		HG 3031L		± .0015		**S**	**S**	*LS*	**S**	*LS*
	HG 3039R		.039	.0035	.055	**S**	**S**	*LS*	**S**	*LS*
		HG 3039L		± .0015		**S**	*LS*	*LS*	**S**	*LS*
	HG 3047R		.047	.0035	.080	**S**	**S**	**S**	**S**	**S**
Right Hand Shown		**HG 3047L**		± .0015		**S**	**S**	**S**	**S**	**S**
	HG 3062R		.062	.0075	.125	**S**	**S**	**S**	**S**	**S**
		HG 3062L		± .0025		**S**	**S**	**S**	**S**	**S**
	HG 3072R		.072	.0075	.125	**S**	**S**	**S**	**S**	**S**
E Dimension is		**HG 3072L**		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
Maximum Depth of Cut	**HG 3078R**		.078	.0075	.125	**S**	**S**	**S**	**S**	**S**
		HG 3078L		± .0025		**S**	**S**	*LS*	**S**	*LS*
	HG 3081R		.081	.0075	.125	**S**	**S**	*LS*	**S**	*LS*
		HG 3081L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
Use RH Inserts with	**HG 3082R**		.082	.0075	.125	**S**	**S**	*LS*	**S**	*LS*
RH External Tool Holders		**HG 3082L**		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 3088R		.088	.0075	.125	**S**	**S**	*LS*	**S**	*LS*
		HG 3088L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 3094R		.094	.0075	.192	**S**	**S**	**S**	**S**	**S**
Use LH Inserts with		**HG 3094L**		± .0025		**S**	**S**	**S**	**S**	**S**
RH Internal Boring Bars	**HG 3097R**		.097	.0075	.192	**S**	**S**	*LS*	**S**	*LS*
		HG 3097L		± .0025		**S**	**S**	*LS*	**S**	*LS*
	HG 3105R		.105	.0075	.192	**S**	**S**	*LS*	**S**	*LS*
		HG 3105L		± .0025		**S**	**S**	*LS*	**S**	*LS*
For Tool Holder Information	**HG 3110R**		.110	.0075	.192	**S**	**S**	**S**	**S**	**S**
See Pages 31- 33		**HG 3110L**		± .0025		**S**	**S**	*LS*	**S**	*LS*
	HG 3118R		.118	.0075	.192	**S**	**S**	*LS*	**S**	*LS*
		HG 3118L		± .0025		**S**	*LS*	*LS*	**S**	*LS*
	HG 3125R		.125	.0075	.205	**S**	**S**	**S**	**S**	**S**
Metric Sizes & Full Special		**HG 3125L**		± .0025		**S**	**S**	*LS*	**S**	*LS*
Inserts Available on Request	**HG 3140R**		.140	.0075	.205	*LS*	*LS*	*LS*	*LS*	*LS*
		HG 3140L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 3142R		.142	.0125	.205	**S**	**S**	**S**	**S**	**S**
		HG 3142L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 3156R		.156	.0125	.205	**S**	**S**	**S**	**S**	**S**
		HG 3156L		± .0025		**S**	**S**	**S**	**S**	**S**
	HG 3158R		.158	.0125	.205	**S**	**S**	*LS*	**S**	*LS*
		HG 3158L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*

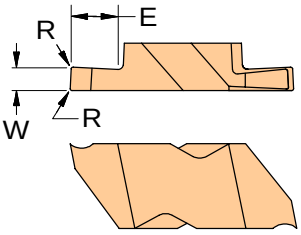
S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Style:	Insert Description		Dimensions			Grades				
HG Size 3 & 4	Right Hand	Left Hand	W	R	E	C23	123	156	323	356
	**HG 3178R**		.178	.0225	.205	*LS*	*LS*	*LS*	*LS*	*LS*
		HG 3178L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 3185R		.185	.0225	.205	**S**	**S**	*LS*	**S**	**S**
		HG 3185L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 3189R		.189	.0225	.205	**S**	**S**	*LS*	**S**	**S**
		HG 3189L		± .0025		**S**	**S**	*LS*	**S**	*LS*
	HG 4093R		.093	.0075	.255	**S**	**S**	*LS*	**S**	*LS*
		HG 4093L		± .0025		**S**	*LS*	*LS*	**S**	*LS*
	HG 4125R		.125	.0075	.255	**S**	**S**	*LS*	**S**	*LS*
		HG 4125L		± .0025		**S**	*LS*	*LS*	**S**	*LS*
	HG 4189R		.189	.0225	.255	**S**	**S**	**S**	**S**	**S**
		HG 4189L		± .0025		**S**	**S**	**S**	**S**	**S**
	HG 4219R		.219	.0225	.255	**S**	*LS*	*LS*	**S**	*LS*
		HG 4219L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HG 4250R		.250	.0225	.255	**S**	**S**	*LS*	**S**	*LS*
		HG 4250L		± .0025		**S**	*LS*	*LS*	**S**	*LS*

Right Hand Shown

E Dimension is Maximum Depth of Cut

For Tool Holder Information See Pages 31- 33

Style:	Insert Description		Dimensions			Grades				
HG-RK/LK Chip Curler	Right Hand	Left Hand	W	R	E	C23	123	156	323	356
	**HG 2031RK**		.031	.0035	.055	**S**	**S**	*LS*	**S**	*LS*
		HG 2031LK		± .0015		**S**	**S**	*LS*	**S**	*LS*
	HG 2041RK		.041	.0035	.055	**S**	**S**	*LS*	**S**	*LS*
		HG 2041LK		± .0015		**S**	**S**	*LS*	**S**	*LS*
	HG 2062RK		.062	.0075	.115	**S**	**S**	*LS*	**S**	*LS*
		HG 2062LK		± .0025		**S**	**S**	*LS*	**S**	*LS*
	HG 2125RK		.125	.0075	.115	**S**	**S**	*LS*	**S**	*LS*
		HG 2125LK		± .0025		**S**	**S**	*LS*	**S**	*LS*
	HG 3047RK		.047	.0035	.080	**S**	**S**	*LS*	**S**	*LS*
		HG 3047LK		± .0015		**S**	**S**	*LS*	**S**	*LS*
	HG 3062RK		.062	.0075	.125	**S**	**S**	**S**	**S**	**S**
		HG 3062LK		± .0025		**S**	**S**	**S**	**S**	**S**
	HG 3072RK		.072	.0075	.125	**S**	**S**	*LS*	**S**	*LS*
		HG 3072LK		± .0025		**S**	**S**	*LS*	**S**	*LS*
	HG 3088RK		.088	.0075	.125	**S**	**S**	*LS*	**S**	*LS*
		HG 3088LK		± .0025		**S**	*LS*	*LS*	**S**	*LS*
	HG 3094RK		.094	.0075	.192	**S**	**S**	**S**	**S**	**S**
		HG 3094LK		± .0025		**S**	**S**	*LS*	**S**	**S**
	HG 3125RK		.125	.0075	.205	**S**	**S**	**S**	**S**	**S**
		HG 3125LK		± .0025		**S**	*LS*	*LS*	**S**	**S**
	HG 3156RK		.156	.0125	.205	**S**	**S**	*LS*	**S**	*LS*
		HG 3156LK		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*

Right Hand Shown

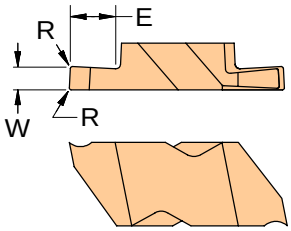
Ground-in Chip Curlers With 15° - 18° Positive Rake.

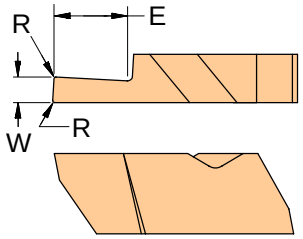
Lower Cutting Pressures and Reduced Edge Build-up.

Use Lighter Feeds on Tough Materials - .0005 - .003 / Rev.

Run Aluminum, Copper and Plastics at Higher Feed Rates.

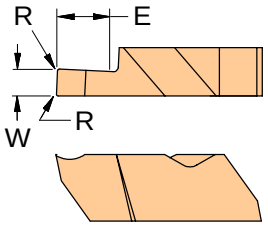
S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Style:	Insert Description		Dimensions			Grades				
HG-RK/LK Chip Curler	Right Hand	Left Hand	W	R	E	C23	123	156	323	356
 Right Hand Shown	HG 4125RK		.125	.0075	.255	S	S	*LS*	S	*LS*
		HG 4125LK		± .0025		S	*LS*	*LS*	*LS*	*LS*
	HG 4189RK		.189	.0225	.255	S	S	*LS*	S	*LS*
		HG 4189LK		± .0025		S	S	*LS*	S	*LS*
	HG 4250RK		.250	.0225	.255	S	S	S	S	S
		HG 4250LK		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*

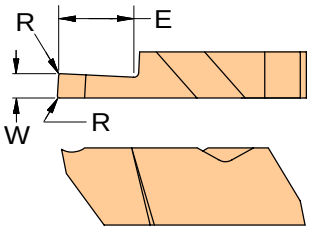
Style:	Insert Description		Dimensions			Grades				
HGD Size 2, 3 & 4 Deep Grooving	Right Hand	Left Hand	W	R	E	C23	110	123	310	323
 Right Hand Shown	HGD 2047R		.047	.004	.185	S	*LS*	S	*LS*	S
		HGD 2047L		± .001		S	*LS*	S	*LS*	S
	HGD 2062R		.062	.004	.200	S	*LS*	S	*LS*	S
		HGD 2062L		± .001		S	*LS*	S	*LS*	S
	HGD 2094R		.094	.004	.200	S	*LS*	S	*LS*	S
		HGD 2094L		± .001		S	*LS*	S	*LS*	S
	HGD 2125R		.125	.004	.200	S	*LS*	S	*LS*	S
		HGD 2125L		± .001		S	*LS*	S	*LS*	S
	HGD 3062R*		.062	.0075	.192	S	*LS*	S	*LS*	S
		HGD 3062L*		± .0025		S	*LS*	S	*LS*	S
	HGD 3094R		.094	.0075	.255	S	*LS*	S	*LS*	S
		HGD 3094L		± .0025		S	*LS*	S	*LS*	S
	HGD 3125R		.125	.0075	.255	S	*LS*	S	*LS*	S
		HGD 3125L		± .0025		S	*LS*	S	*LS*	S
	HGD 3189R		.189	.0225	.255	S	*LS*	S	*LS*	S
		HGD 3189L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HGD 4125R*		.125	.0075	.300	S	*LS*	S	*LS*	S
		HGD 4125L*		± .0025		S	*LS*	S	*LS*	S
	HGD 4189R		.189	.0225	.505	S	*LS*	S	*LS*	S
		HGD 4189L		± .0025		S	*LS*	S	*LS*	S
	HGD 4250R		.250	.0225	.505	*LS*	*LS*	*LS*	*LS*	*LS*
		HGD 4250L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*

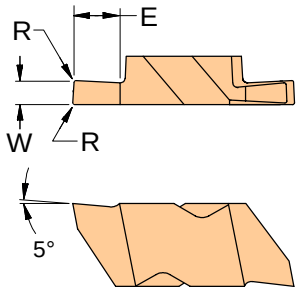
* HGD 3062R/L
* HGD 4125R/L

Double Ended Deep Groovers Have Same Overall Lengths as Standard Size 3 and 4 Inserts

Style:	Insert Description		Dimensions			Grades				
HGD-RK/LK Size 2	Right Hand	Left Hand	W	R	E	C23	110	123	310	323
 Size 2 Right Hand Shown	HGD 2047RK		.047	.004	.185	S	*LS*	S	*LS*	S
		HGD 2047LK		± .001		S	*LS*	S	*LS*	S
	HGD 2062RK		.062	.004	.200	S	*LS*	S	*LS*	S
		HGD 2062LK		± .001		S	*LS*	S	*LS*	S
	HGD 2094RK		.094	.004	.200	S	*LS*	S	*LS*	S
		HGD 2094LK		± .001		S	*LS*	S	*LS*	S
	HGD 2125RK		.125	.004	.200	S	*LS*	S	*LS*	S
		HGD 2125LK		± .001		S	*LS*	S	*LS*	S

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Style:	Insert Description		Dimensions			Grades				
HGD-RK/LK 3 & 4 Deep Chip Curler	Right Hand	Left Hand	W	R	E	C23	110	123	310	323
	HGD 3062RK*		.062	.0075	.192	S	*LS*	*LS*	*SL*	S
		HGD 3062LK*		± .0025		S	*LS*	S	*LS*	S
	HGD 3094RK		.094	.0075	.255	S	*LS*	S	*LS*	S
		HGD 3094LK		± .0025		S	*LS*	S	*LS*	S
	HGD 3125RK		.125	.0075	.255	S	*LS*	S	*LS*	S
		HGD 3125LK		± .0025		S	*LS*	S	*LS*	S
	HGD 4125RK*		.125	.0075	.300	S	*LS*	S	*LS*	S
		HGD 4125LK*		± .0025		S	*LS*	S	*LS*	S
	HGD 4250RK		.250	.0225	.505	S	*LS*	S	*LS*	S
		HGD 4250LK		± .0025		S	*LS*	S	*LS*	S
Right Hand Shown *Double Ended Inserts With 2 Cutting Edges										

Style:	Insert Description		Dimensions			Grades				
HGP 5° Positive Rake	Right Hand	Left Hand	W	R	E	C23	123	156	323	356
	HGP 2031R		.031	.0035	.055	S	S	S	S	S
		HGP 2031L		± .0015		S	S	S	S	S
	HGP 2041R		.041	.0035	.055	S	S	*LS*	S	*LS*
		HGP 2041L		± .0015		S	S	S	S	S
	HGP 2047R		.047	.0035	.080	*LS*	*LS*	*LS*	*LS*	*LS*
		HGP 2047L		± .0015		S	S	S	S	S
	HGP 2062R		.062	.0075	.115	S	S	S	S	S
		HGP 2062L		± .0025		S	S	S	S	S
	HGP 2094R		.094	.0075	.115	S	S	*LS*	S	*LS*
		HGP 2094L		± .0025		S	S	*LS*	S	*LS*
	HGP 2125R		.125	.0075	.115	S	S	*LS*	S	*LS*
		HGP 2125L		± .0025		S	S	*LS*	S	*LS*
	HGP 3031R		.031	.0035	.055	S	S	*LS*	S	*LS*
		HGP 3031L		± .0015		S	S	*LS*	S	*LS*
	HGP 3047R		.047	.0035	.080	S	S	*LS*	S	S
		HGP 3047L		± .0015		S	S	*LS*	S	*LS*
	HGP 3062R		.062	.0075	.125	S	S	*LS*	S	S
		HGP 3062L		± .0025		S	S	S	S	S
	HGP 3088R		.088	.0075	.125	S	S	*LS*	S	*LS*
		HGP 3088L		± .0025		S	S	*LS*	S	*LS*
	HGP 3092R		.092	.0075	.192	S	S	*LS*	S	*LS*
		HGP 3092L		± .0025		S	S	*LS*	S	*LS*
	HGP 3094R		.094	.0075	.192	S	S	S	S	S
		HGP 3094L		± .0025		S	S	*LS*	S	*LS*
	HGP 3125R		.125	.0075	.205	S	S	*LS*	S	*LS*
		HGP 3125L		± .0025		S	S	*LS*	S	*LS*
	HGP 3156R		.156	.0075	.205	S	S	S	S	S
		HGP 3156L		± .0025		S	S	*LS*	S	*LS*
	HGP 3189R		.189	.0225	.205	S	S	*LS*	S	*LS*
		HGP 3189L		± .0025		S	S	*LS*	S	*LS*
	HGP 4189R		.189	.0225	.255	S	*LS*	*LS*	S	*LS*
		HGP 4189L		± .0025		S	S	*LS*	S	*LS*
	HGP 4250R		.250	.0225	.255	*LS*	*LS*	*LS*	*LS*	*LS*
		HGP 4250L		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*

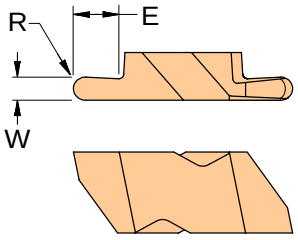
E Dimension is Maximum Depth of Cut

Use RH Inserts with RH External Tool Holders

Use LH Inserts with RH Internal Boring Bars

For Tool Holder Information See Pages 31- 33

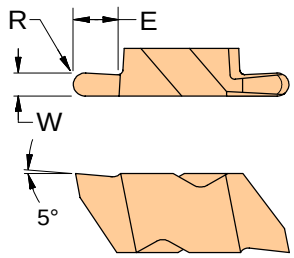
S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Style:	Insert Description		Dimensions			Grades				
HR - Full Nose Radius	**Right Hand**	**Left Hand**	**W**	**R**	**E**	**C23**	**123**	**156**	**323**	**356**
	**HR 2031R**		.062	.031	.115	**S**	**S**	*LS*	**S**	*LS*
		HR 2031L				*LS*	**S**	*LS*	**S**	*LS*
	HR 2047R		.094	.047	.115	**S**	**S**	*LS*	**S**	*LS*
		HR 2047L				**S**	**S**	*LS*	**S**	*LS*
	HR 2062R		.125	0.062	.115	**S**	**S**	*LS*	**S**	*LS*
		HR 2062L				**S**	**S**	*LS*	**S**	*LS*
	HR 3010R		.020	.010	.055	**S**	**S**	*LS*	**S**	*LS*
Right Hand Shown		**HR 3010L**				*LS*	*LS*	*LS*	*LS*	*LS*
	HR 3014R		.028	.014	.055	**S**	**S**	*LS*	**S**	*LS*
		HR 3014L				**S**	*LS*	*LS*	*LS*	*LS*
	HR 3015R		.030	.015	.055	**S**	*LS*	**S**	**S**	**S**
		HR 3015L				**S**	**S**	*LS*	**S**	*LS*
E Dimension is	**HR 3020R**		.040	.020	.055	**S**	**S**	*LS*	**S**	*LS*
Maximum Depth of Cut		**HR 3020L**				**S**	*LS*	*LS*	**S**	*LS*
	HR 3026R		.052	.026	.055	**S**	**S**	*LS*	**S**	*LS*
		HR 3026L				**S**	*LS*	*LS*	**S**	*LS*
	HR 3031R		.062	.031	.130	**S**	**S**	**S**	**S**	**S**
		HR 3031L				**S**	**S**	**S**	**S**	**S**
Use RH Inserts with	**HR 3039R**		.078	.039	.130	**S**	**S**	*LS*	**S**	*LS*
RH External Tool Holders		**HR 3039L**				**S**	*LS*	*LS*	*LS*	*LS*
	HR 3047R		.094	.047	.185	**S**	*LS*	**S**	**S**	**S**
		HR 3047L				**S**	**S**	**S**	**S**	**S**
	HR 3062R		.125	.062	.185	**S**	**S**	**S**	**S**	**S**
		HR 3062L				**S**	**S**	*LS*	**S**	**S**
Use LH Inserts with	**HR 3078R**		.156	.078	.185	**S**	**S**	**S**	**S**	**S**
RH Internal Boring Bars		**HR 3078L**				*LS*	*LS*	**S**	*LS*	**S**
	HR 3094R		.188	.094	.185	**S**	**S**	**S**	**S**	**S**
		HR 3094L				**S**	**S**	*LS*	**S**	*LS*
	HR 3125R		.250	.125	.192	**S**	**S**	**S**	**S**	**S**
		HR 3125L				**S**	**S**	*LS*	*LS*	*LS*
For Tool Holder Information	**HR 4062R**		.125	.062	.255	**S**	**S**	**S**	**S**	**S**
See Pages 31- 33		**HR 4062L**				**S**	**S**	**S**	**S**	**S**
	HR 4094R		.188	.094	.255	**S**	**S**	**S**	**S**	**S**
		HR 4094L				**S**	**S**	**S**	**S**	**S**
	HR 4125R		.250	.125	.255	**S**	**S**	*LS*	**S**	*LS*
		HR 4125L				**S**	**S**	**S**	**S**	**S**

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Additional Full Nose Radius Sizes are Available on Request - Please Call for Availability

Style:	Insert Description		Dimensions			Grades				
HRP - 5° Positive Rake Full Nose Radius	Right Hand	Left Hand	W	R	E	C23	123	156	323	356
	HRP 2031R		.062	.031	.115	**S**	**S**	*LS*	**S**	*LS*
		HRP 2031L				**S**	**S**	*LS*	*LS*	*LS*
	HRP 3031R		.062	.031	.130	**S**	**S**	**S**	**S**	**S**
		HRP 3031L				**S**	**S**	*LS*	**S**	*LS*
	HRP 3047R		.094	.047	.185	**S**	**S**	*LS*	**S**	*LS*
		HRP 3047L				**S**	**S**	*LS*	**S**	**S**
	HRP 3062R		.125	.062	.185	**S**	**S**	*LS*	**S**	*LS*
		HRP 3062L				**S**	**S**	*LS*	**S**	*LS*
	HRP 3078R		.156	.078	.185	**S**	**S**	*LS*	**S**	*LS*
		HRP 3078L				**S**	*LS*	*LS*	**S**	*LS*
	HRP 3094R		.188	.094	.185	**S**	**S**	**S**	**S**	**S**
		HRP 3094L				**S**	**S**	**S**	**S**	**S**
	HRP 4062R		.125	.062	.255	**S**	**S**	**S**	**S**	**S**
		HRP 4062L				*LS*	*LS*	*LS*	*LS*	*LS*
	HRP 4094R		.188	.094	.255	*LS*	*LS*	*LS*	*LS*	*LS*
		HRP 4094L				**S**	*LS*	*LS*	**S**	*LS*
	HRP 4125R		.250	.125	.255	**S**	**S**	*LS*	**S**	*LS*
		HRP 4125L				**S**	*LS*	**S**	**S**	**S**



Right Hand Shown

E Dimension is Maximum Depth of Cut

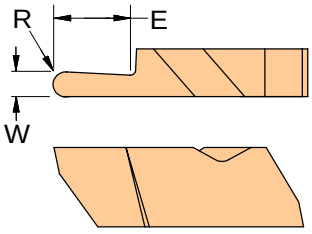
Use RH Inserts with RH External Tool Holders

Use LH Inserts with RH Internal Boring Bars

For Tool Holder Information See Pages 31- 33

Additional Full Nose Radius Sizes Available on Request

Style:	Insert Description		Dimensions			Grades				
HRD - Full Nose Radius Deep Grooving	Right Hand	Left Hand	W	R	E	C23	123	156	323	356
	HRD 3031R*		.062	.031	.192	**S**	**S**	*LS*	**S**	*LS*
		HRD 3031L*				**S**	**S**	*LS*	**S**	*LS*
	HRD 3062R		.125	.062	.255	**S**	**S**	*LS*	**S**	*LS*
		HRD 3062L				**S**	**S**	*LS*	**S**	*LS*
	HRD 3094R		.188	.094	.255	**S**	**S**	*LS*	**S**	*LS*
		HRD 3094L				**S**	*LS*	*LS*	*LS*	*LS*
	HRD 4062R*		.125	.062	.300	**S**	*LS*	*LS*	*LS*	*LS*
		HRD 4062L*				**S**	*LS*	*LS*	*LS*	*LS*
	HRD 4094R		.188	.094	.505	**S**	**S**	*LS*	**S**	*LS*
		HRD 4094L				*LS*	*LS*	*LS*	*LS*	*LS*
	HRD 4125R		.250	.125	.505	*LS*	*LS*	*LS*	*LS*	*LS*
		HRD 4125L				**S**	**S**	*LS*	**S**	*LS*



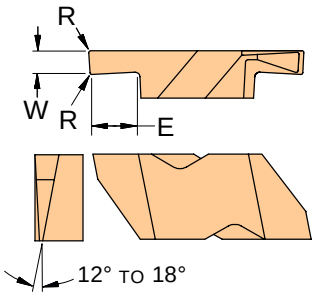
Right Hand Shown

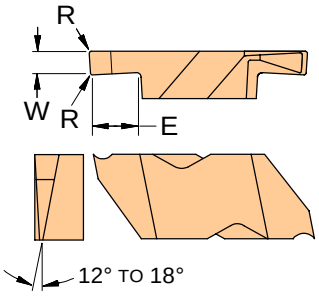
E Dimension is Maximum Depth of Cut

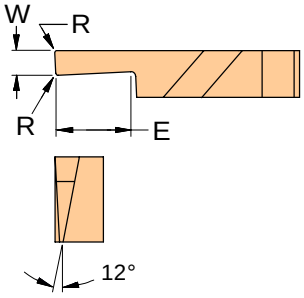
*HRD 3031R/L
HRD 4064R/L
Double Ended Deep Groovers Have Same Overall Length as Standard Size 3 and 4 Inserts

Additional Full Nose Radius Sizes Available on Request

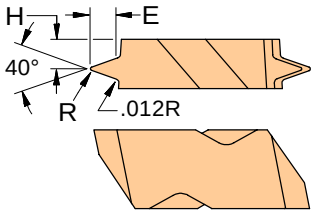
S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

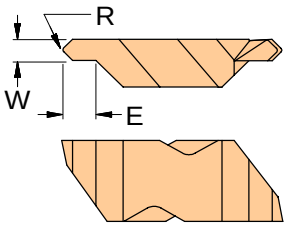
Style:	Insert Description		Dimensions			Grades				
HF - Face Grooving	Right Hand	Left Hand	W	R	E	C23	123	156	310	323
 Left Hand Shown	HF 3062R		.062	.0075	.125	*LS*	*LS*	*LS*	**S**	*LS*
		HF 3062L*		± .0025		*LS*	*LS*	*LS*	**S**	*LS*
	HF 3072R		.072	.0075	.125	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 3072L*		± .0025		**S**	*LS*	*LS*	**S**	*LS*
	HF 3094R		.094	.0075	.185	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 3094L*		± .0025		**S**	*LS*	*LS*	**S**	*LS*
	HF 3098R		.098	.0075	.185	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 3098L*		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HF 3110R		.110	.0075	.185	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 3110L*		± .0025		**S**	*LS*	*LS*	**S**	*LS*
	HF 3125R		.125	.0075	.185	**S**	*LS*	*LS*	*LS*	**S**
*Use Left Hand Inserts For Counter-Clockwise Rotation		HF 3125L*		± .0025		*LS*	*LS*	*LS*	**S**	*LS*
	HF 3156R		.156	.0075	.185	*LS*	*LS*	*LS*	**S**	*LS*
		HF 3156L*		± .0025		*LS*	*LS*	*LS*	**S**	*LS*
	HF 3188R		.188	.0225	.185	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 3188L*		± .0025		**S**	*LS*	*LS*	**S**	*LS*
See Page 38 For Additional Face Grooving Information	HF 3189R		.189	.0225	.185	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 3189L*		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HF 4250R		.250	.0225	.255	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 4250L*		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*

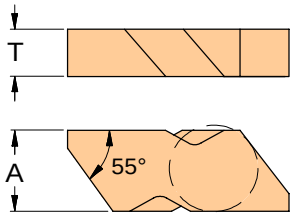
Style:	Insert Description		Dimensions			Grades				
HF - RK- LK Chip Curler Face Grooving	Right Hand	Left Hand	W	R	E	C23	123	156	310	323
 Left Hand Shown	HF 3094RK		.094	.0075	.185	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 3094LK*		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HF 3125RK		.125	.0075	.185	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 3125LK*		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
	HF 3156RK		.156	.0075	.185	*LS*	*LS*	*LS*	*LS*	*LS*
		HF 3156LK*		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
*Use Left Hand Inserts For Counter-Clockwise Rotation See Page 38 For Additional Face Grooving Information										

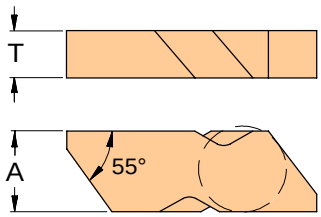
Style:	Insert Description		Dimensions			Grades				
HFD - Deep Face Grooving	Right Hand	Left Hand	W	R	E	C23	123	156	310	323
 Left Hand Shown	HFD 3125R		.125	.0075	.255	**S**	*LS*	**S**	*LS*	**S**
		HFD 3125L*		± .0025		**S**	*LS*	**S**	*LS*	**S**
	HFD 4189R		.189	.0225	.505	**S**	*LS*	*LS*	*LS*	*LS*
		HFD 4189L*		± .0025		**S**	*LS*	*LS*	*LS*	*LS*
	HFD 4250R		.250	.0225	.505	*LS*	*LS*	*LS*	*LS*	*LS*
		HFD 4250L*		± .0025		*LS*	*LS*	*LS*	*LS*	*LS*
*Use Left Hand Inserts For Counter-Clockwise Rotation See Page 38 For Additional Face Grooving Information										

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

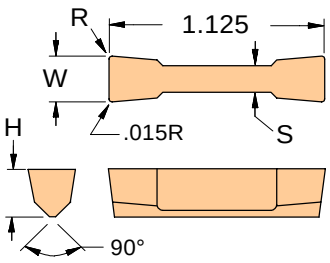
Style:	Insert Description		Dimensions			Grades				
Poly-V Grooving	Right Hand	Left Hand	H	R	E	C23	123	156	323	356
 Right Hand Shown	HV 3RJ		.087	.0125	.125	*LS*	*LS*	*LS*	*LS*	*LS*
		HV 3LJ				S	*LS*	*LS*	S	*LS*
	HV 4RL		.201	.0125	.118	*LS*	*LS*	*LS*	*LS*	*LS*
		HV 4LL				*LS*	*LS*	*LS*	*LS*	*LS*

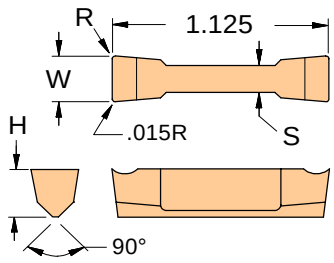
Style:	Insert Description		Dimensions			Grades				
Undercutting	Right Hand	Left Hand	W	R	E	C23	123	156	323	356
 Left Hand Shown	HU 3094R		.094	.020	.125	*LS*	*LS*	*LS*	*LS*	*LS*
		HU 3094L				*LS*	*LS*	*LS*	*LS*	*LS*
	HU 3125R		.125	.047	.188	*LS*	*LS*	*LS*	*LS*	*LS*
		HU 3125L				S	*LS*	*LS*	*LS*	*LS*
	HU 3156R		.156	.047	.188	*LS*	*LS*	*LS*	*LS*	*LS*
		HU 3156L				*LS*	*LS*	*LS*	*LS*	*LS*

Style:	Insert Description		Dimensions			Grades				
Precision Ground Blanks	Right Hand	Left Hand	A	T		C10	C23	C56		
 Right Hand Shown	HB 2R		.219	.150		*LS*	S	S		
		HB 2L				*LS*	S	S		
	HB 3R		.344	.195		*LS*	S	S		
		HB 3L				*LS*	S	S		
	HB 4R		.453	.255		*LS*	S	S		
		HB 4L				*LS*	S	S		
	HB 5R		.688	.380		*LS*	*LS*	*LS*		
		HB 5L				*LS*	*LS*	*LS*		
	HB 6R		.453	.380		*LS*	*LS*	*LS*		
		HB 6L				*LS*	*LS*	*LS*		

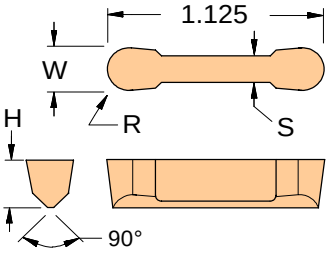
Style:	Insert Description		Dimensions			Grades				
Precision Ground Deep Grooving Blanks	Right Hand	Left Hand	A	T		C10	C23	C56		
 Right Hand Shown	HBD 2R		.219	.150		*LS*	S	S		
		HBD 2L				*LS*	S	S		
	HBD 3R		.344	.195		*LS*	S	S		
		HBD 3L				*LS*	S	S		
	HBD 4R		.453	.255		*LS*	S	S		
		HBD 4L				*LS*	S	S		

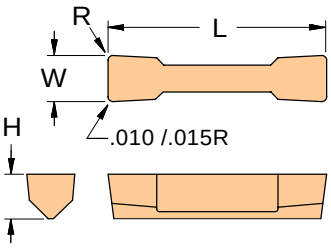
S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Style:	Insert	Dimensions			Grades				
V - Dogbone	Description	W	H	S	C23	123	156	323	356
	VDB 125 A015	.125	.250	.106	S	S	*LS*	S	S
	VDB 156 A015	.156	.250	.106	S	S	*LS*	S	*LS*
	VDB 188 A015	.188	.250	.144	S	S	*LS*	S	S
	VDB 218 A015	.218	.250	.144	S	S	*LS*	S	*LS*
	VDB 250 A015	.250	.250	.144	S	S	*LS*	S	S
	VDB 250 B015	.250	.337	.144	S	S	*LS*	S	*LS*
	VDB 281 B015	.281	.337	.202	S	S	*LS*	S	*LS*
	VDB 312 B015	.312	.337	.202	*LS*	*LS*	*LS*	*LS*	*LS*
	VDB 344 B015	.344	.337	.276	*LS*	*LS*	*LS*	*LS*	*LS*
	VDB 375 B015	.375	.337	.276	*LS*	*LS*	*LS*	*LS*	*LS*

Style:	Insert	Dimensions			Grades				
V - Dogbone With Chip Curler	Description	W	H	S	C23	123	156	323	356
	VDB 125 A015C	.125	.250	.106	S	S	S	S	S
	VDB 156 A015C	.156	.250	.106	*LS*	*LS*	*LS*	*LS*	*LS*
	VDB 188 A015C	.188	.250	.144	S	S	*LS*	S	*LS*
	VDB 250 A015C	.250	.250	.144	S	S	*LS*	S	*LS*
	VDB 250 B015C	.250	.337	.144	*LS*	*LS*	*LS*	*LS*	*LS*

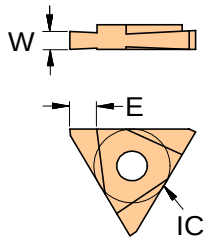
Ground-in Chip Curler

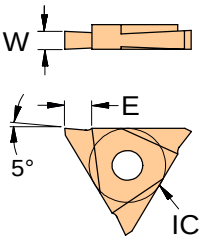
Style:	Insert	Dimensions			Grades				
V - Dogbone Full Nose Radius	Description	R	W	H	C23	123	156	323	356
	VDB 125 RA	.062	.125	.250	S	*LS*	*LS*	S	*LS*
	VDB 156 RA	.078	.156	.250	*LS*	*LS*	*LS*	*LS*	*LS*
	VDB 188 RA	.094	.188	.250	S	*LS*	*LS*	S	*LS*
	VDB 218 RA	.109	.218	.250	*LS*	*LS*	*LS*	*LS*	*LS*
	VDB 250 RA	.125	.250	.250	S	*LS*	*LS*	*LS*	*LS*
	VDB 250 RB	.125	.250	.337	*LS*	*LS*	*LS*	*LS*	*LS*
	VDB 281 RB	.140	.281	.337	*LS*	*LS*	*LS*	*LS*	*LS*
	VDB 312 RB	.156	.312	.337	*LS*	*LS*	*LS*	*LS*	*LS*
	VDB 344 RB	.172	.344	.337	*LS*	*LS*	*LS*	*LS*	*LS*
	VDB 375 RB	.187	.375	.337	*LS*	*LS*	*LS*	*LS*	*LS*

Style:	Insert	Dimensions			Grades				
GC - Deep Grooving	Description	W	H	L	C23	123	156	323	356
	GC 4125	.125	.188	1.000	S	S	S	S	S
	GC 4187	.187	.328	1.000	S	*LS*	*LS*	*LS*	*LS*
	GC 4250	.250	.328	1.000	*LS*	*LS*	*LS*	*LS*	*LS*
	GC 4312	.312	.328	1.000	*LS*	*LS*	*LS*	*LS*	*LS*
	GC 4375	.375	.328	1.000	*LS*	*LS*	*LS*	*LS*	*LS*
	GC 6187	.187	.328	1.500	*LS*	*LS*	*LS*	*LS*	*LS*
	GC 6250	.250	.328	1.500	*LS*	*LS*	*LS*	*LS*	*LS*
	GC 6312	.312	.328	1.500	*LS*	*LS*	*LS*	*LS*	*LS*

For Kennametal® Holders

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

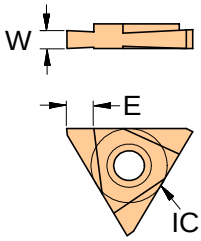
Style:	Insert	Dimensions			Grades				
TNMA On Edge Grooving	**Description**	**W**	**E**	**IC**	**C23**	**123**	**156**	**323**	**356**
 Right Hand Shown NGR = Right Hand NGL = Left Hand NGC = Center Sharp Corners - No Radius TNMA Inserts for use in Carboloy® Tool Holders Only	**TNMA 32NGR 062**	.062	.156	.375	**S**	*LS*	*LS*	*LS*	*LS*
	TNMA 32NGL 062	.062	.156	.375	**S**	*LS*	*LS*	*LS*	*LS*
	TNMA 32NGC 062	.062	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 32NGR 094	.094	.156	.375	**S**	*LS*	*LS*	*LS*	*LS*
	TNMA 32NGL 094	.094	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 32NGC 094	.094	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 32NG 125	.125	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NGR 062	.062	.156	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NGL 062	.062	.156	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NGC 062	.062	.156	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NGR 094	.094	.234	.500	**S**	**S**	*LS*	*LS*	*LS*
	TNMA 43NGL 094	.094	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NGC 094	.094	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NGR 125	.125	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NGL 125	.125	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NGC 125	.125	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NG 187	.187	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*

Style:	Insert	Dimensions			Grades				
TPMA On Edge Grooving	**Description**	**W**	**E**	**IC**	**C23**	**123**	**156**	**323**	**356**
 Right Hand Shown NGR = Right Hand NGL = Left Hand NGC = Center Sharp Corners - No Radius TPMA Inserts for use in Carboloy® Tool Holders Only	**TPMA 32NGR 062**	.062	.156	.375	**S**	**S**	*LS*	*LS*	*LS*
	TPMA 32NGL 062	.062	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 32NGC 062	.062	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 32NGR 094	.094	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 32NGL 094	.094	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 32NGC 094	.094	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 32NG 125	.125	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 43NGR 062	.062	.156	.500	**S**	**S**	*LS*	*LS*	*LS*
	TPMA 43NGL 062	.062	.156	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 43NGC 062	.062	.156	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 43NGR 094	.094	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 43NGL 094	.094	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 43NGC 094	.094	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 43NGR 125	.125	.234	.500	**S**	**S**	*LS*	*LS*	*LS*
	TPMA 43NGL 125	.125	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 43NGC 125	.125	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 43NG 187	.187	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Additional Sizes Available on Request

Style:	Insert	Dimensions			Grades				
TNMC On Edge Grooving	**Description**	**W**	**E**	**IC**	**C23**	**123**	**156**	**323**	**356**
	TNMC 32NGR 032	.032	.057	.375	**S**	**S**	*LS*	**S**	*LS*
	TNMC 32NGL 032	.032	.057	.375	**S**	*LS*	*LS*	*LS*	*LS*
	TNMC 32NGC 032	.032	.057	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 32NGR 062	.062	.156	.375	**S**	**S**	*LS*	*LS*	*LS*
	TNMC 32NGL 062	.062	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 32NGC 062	.062	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 32NGR 094	.094	.156	.375	**S**	**S**	*LS*	*LS*	*LS*
	TNMC 32NGL 094	.094	.156	.375	**S**	**S**	*LS*	*LS*	*LS*
	TNMC 32NGC 094	.094	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 32NG 125	.125	.156	.375	**S**	**S**	*LS*	*LS*	*LS*
	TNMC 43NGR 062	.062	.156	.500	**S**	**S**	*LS*	*LS*	*LS*
	TNMC 43NGL 062	.062	.156	.500	**S**	**S**	*LS*	*LS*	*LS*
	TNMC 43NGC 062	.062	.156	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 43NGR 094	.094	.234	.500	**S**	**S**	*LS*	*LS*	*LS*
	TNMC 43NGL 094	.094	.234	.500	**S**	*LS*	*LS*	*LS*	*LS*
	TNMC 43NGC 094	.094	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 43NGR 125	.125	.234	.500	**S**	**S**	*LS*	*LS*	*LS*
	TNMC 43NGL 125	.125	.234	.500	**S**	**S**	*LS*	*LS*	*LS*
	TNMC 43NGC 125	.125	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 43NGR 156	.156	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 43NGL 156	.156	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 43NGC 156	.156	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 43NG 187	.187	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 54NGR 156	.156	.275	.625	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 54NGL 156	.156	.275	.625	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 54NGR 187	.187	.275	.625	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 54NGL 187	.187	.275	.625	*LS*	*LS*	*LS*	*LS*	*LS*



Right Hand Shown

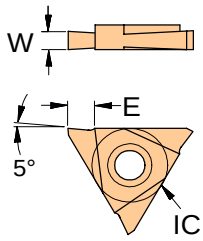
NGR = Right Hand
NGL = Left Hand
NGC = Center

Sharp Corners - No Radius

Additional Sizes
Available on Request

TNMC Inserts fit all Industry Std.
Tool Holders except Carboloy®

Style:	Insert	Dimensions			Grades				
TPMC On Edge Grooving	**Description**	**W**	**E**	**IC**	**C23**	**123**	**156**	**323**	**356**
	TPMC 32NGR 062	.062	.156	.375	**S**	**S**	*LS*	**S**	*LS*
	TPMC 32NGL 062	.062	.156	.375	**S**	**S**	*LS*	*LS*	*LS*
	TPMC 32NGC 062	.062	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMC 32NGR 094	.094	.156	.375	**S**	*LS*	*LS*	*LS*	*LS*
	TPMC 32NGL 094	.094	.156	.375	**S**	**S**	*LS*	*LS*	*LS*
	TPMC 32NGC 094	.094	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMC 32NG 125	.125	.156	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMC 43NGR 062	.062	.156	.500	**S**	*LS*	*LS*	*LS*	*LS*
	TPMC 43NGL 062	.062	.156	.500	**S**	*LS*	*LS*	*LS*	*LS*
	TPMC 43NGC 062	.062	.156	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMC 43NGR 094	.094	.234	.500	**S**	*LS*	*LS*	*LS*	*LS*
	TPMC 43NGL 094	.094	.234	.500	**S**	*LS*	*LS*	*LS*	*LS*
	TPMC 43NGC 094	.094	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMC 43NGR 125	.125	.234	.500	**S**	*LS*	*LS*	*LS*	*LS*
	TPMC 43NGL 125	.125	.234	.500	**S**	*LS*	*LS*	*LS*	*LS*
	TPMC 43NGC 125	.125	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMC 43NG 187	.187	.234	.500	*LS*	*LS*	*LS*	*LS*	*LS*

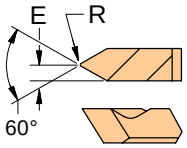


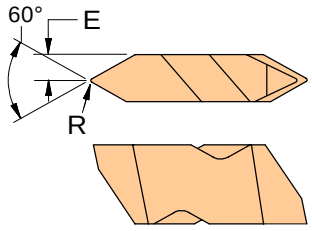
Right Hand Shown

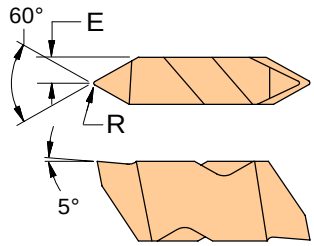
NGR = Right Hand
NGL = Left Hand
NGC = Center

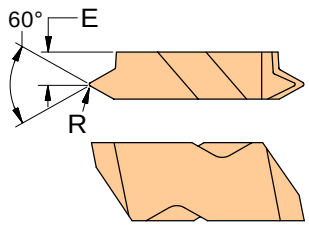
TPMC Inserts fit all Industry Std.
Tool Holders except Carboloy®

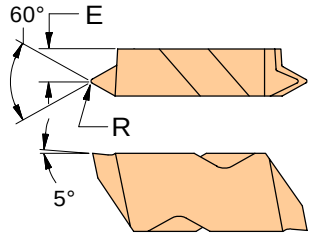
S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Style:	Insert Description		Dimensions			Grades					
HT Size 1 ID Threading	Right Hand	Left Hand	PITCH	R	E	C10	110	310			
 Left Hand Shown	*N/A*		12 - 24 tpi ID	0.003	.045	*N/A*	*N/A*	*N/A*			
		HT 1L		± .001		**S**	**S**	**S**			

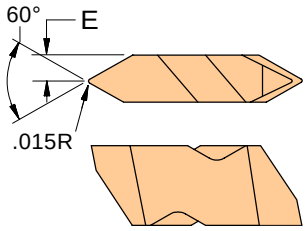
Style:	Insert Description		Dimensions			Grades					
HT General Purpose	Right Hand	Left Hand	PITCH	R	E	C23	123	156	310	323	356
 Right Hand Shown	**HT 2R**		8 - 36 tpi OD	.004	.075	**S**	**S**	**S**	**S**	**S**	**S**
		HT 2L	7 - 20 tpi ID	± .001		**S**	**S**	**S**	**S**	**S**	**S**
	HT 3R		6 - 20 tpi OD	.0065	.098	**S**	**S**	**S**	**S**	**S**	**S**
		HT 3L	5 - 12 tpi ID	± .0015		**S**	**S**	**S**	**S**	**S**	**S**
	HT 4R		4 - 20 tpi OD	.0065	.128	**S**	**S**	**S**	**S**	**S**	**S**
		HT 4L	4 - 12 tpi ID	± .0015		**S**	**S**	**S**	**S**	**S**	**S**
	Use RH Inserts with RH External Holders - LH Inserts with RH Boring Bars See Pages 31-33										

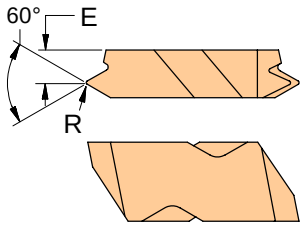
Style:	Insert Description		Dimensions			Grades					
HTP 5° Positive Rake	Right Hand	Left Hand	PITCH	R	E	C23	123	156	310	323	356
 Right Hand Shown	**HTP 2R**		8 - 36 tpi OD	.004	.075	**S**	**S**	**S**	**S**	**S**	**S**
		HTP 2L	7 - 20 tpi ID	± .001		**S**	**S**	**S**	**S**	**S**	**S**
	HTP 3R		6 - 20 tpi OD	.0065	.098	**S**	**S**	**S**	**S**	**S**	**S**
		HTP 3L	5 - 12 tpi ID	± .0015		**S**	**S**	**S**	**S**	**S**	**S**
	HTP 4R		4 - 20 tpi OD	.0065	.128	**S**	**S**	**S**	**S**	**S**	**S**
		HTP 4L	4 - 12 tpi ID	± .0015		**S**	**S**	**S**	**S**	**S**	**S**
	Use RH Inserts with RH External Holders - LH Inserts with RH Boring Bars See Pages 31-33										

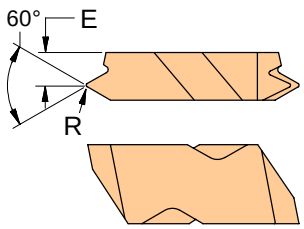
Style:	Insert Description		Dimensions			Grades					
HTF Close Shoulder	Right Hand	Left Hand	PITCH	R	E	C23	123	156	310	323	356
 Right Hand Shown	**HTF 2R**		14-44 tpi OD	.003	.110	**S**	**S**	**S**	**S**	**S**	**S**
		HTF 2L	12-24 tpi ID	± .001		**S**	**S**	**S**	**S**	**S**	**S**
	HTF 3R		10-44 tpi OD	.003	.141	**S**	**S**	**S**	**S**	**S**	**S**
		HTF 3L	9-24 tpi ID	± .0015		**S**	**S**	**S**	**S**	**S**	**S**
	HTF 4R		10-44 tpi OD	.003	.201	**S**	**S**	**S**	**S**	**S**	**S**
		HTF 4L	9-24 tpi ID	± .0015		**S**	**S**	**S**	**S**	**S**	**S**
	Use RH Inserts with RH External Holders - LH Inserts with RH Boring Bars See Pages 31-33										

Style:	Insert Description		Dimensions			Grades					
HTK 5° Positive Rake	Right Hand	Left Hand	PITCH	R	E	C23	123	156	310	323	356
 Right Hand Shown	**HTK 2R**		14-44 tpi OD	.003	.110	**S**	**S**	**S**	**S**	**S**	**S**
		HTK 2L	12-24 tpi ID	± .001		**S**	**S**	**S**	**S**	**S**	**S**
	HTK 3R		10-44 tpi OD	.003	.141	**S**	**S**	**S**	**S**	**S**	**S**
		HTK 3L	9-24 tpi ID	± .0015		**S**	**S**	**S**	**S**	**S**	**S**
	HTK 4R		10-44 tpi OD	.003	.201	**S**	**S**	**S**	**S**	**S**	**S**
		HTK 4L	9-24 tpi ID	± .0015		**S**	**S**	**S**	**S**	**S**	**S**
	Use RH Inserts with RH External Holders - LH Inserts with RH Boring Bars See Pages 31-33										

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

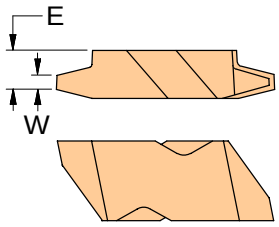
Style:	Insert Description		Dimensions			Grades					
HT - C and HTP - C Coarse Pitch .015R	Right Hand	Left Hand	PITCH	R	E	C23	123	156	310	323	356
 Right Hand Shown	HT 3RC		6-11 tpi	.015	.098	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
		HT 3LC	6 tpi	- .001	.098	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HTP 3RC		6-11 tpi	.015	.098	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
		HTP 3LC	6 tpi	- .001	.098	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HT 4RC		4.5-11 tpi	.015	.128	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HT 4LC	4.5-6 tpi	- .001	.128	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*

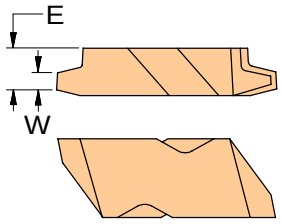
Style:	Insert Description		Dimensions			Grades					
Cresting Style Full Profile 60°	External RH	Internal LH*	PITCH	R	E	C23	123	156	310	323	356
 External RH Shown For Removing Burr From Crest of Thread * Use LH Inserts For RH Internal Threads For Tool Holder Information See Pages 31-33	HTC 3R8E		8	.0150	.107	*LS*	*LS*	*LS*	**S**	*LS*	**S**
		HTC 3L8I	TPI	.0070	.107	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
	HTC 3R10E		10	.0124	.107	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HTC 3L10I	TPI	.0052	.107	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HTC 3R12E		12	.0100	.148	**S**	**S**	*LS*	**S**	**S**	**S**
		HTC 3L12I	TPI	.0040	.148	**S**	**S**	*LS*	**S**	**S**	**S**
	HTC 3R14E		14	.0088	.148	*LS*	*LS*	*LS*	**S**	*LS*	**S**
		HTC 3L14I	TPI	.0037	.148	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HTC 3R16E		16	.0075	.148	**S**	**S**	*LS*	**S**	**S**	*LS*
		HTC 3L16I	TPI	.0030	.148	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
	HTC 3R18E		18	.0070	.148	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HTC 3L18I	TPI	.0030	.148	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HTC 3R20E		20	.0062	.148	**S**	**S**	*LS*	**S**	**S**	*LS*
		HTC 3L20I	TPI	.0026	.148	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HTC 3R24E		24	.0045	.148	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
		HTC 3L24I	TPI	.0015	.148	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HTC 3R28E		12	.0039	.148	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HTC 3L28I	TPI	.0013	.148	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HTC 3R32E		10	.0034	.148	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
		HTC 3L32I	TPI	.0010	.148	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*

Style:	Insert Description		Dimensions			Grades					
Cresting Style NPT	External RH	Internal LH*	PITCH	R	E	C23	123	156	310	323	356
 External RH Shown * Use LH Inserts For RH Internal Threads	HDC 38VR-75		8	.0050	.100	*LS*	*LS*	*LS*	*LS*	*LS*	**S**
		HDC 38VL-75	NPT	.0050	.100	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HDC 3115VR-75		11.5	.0040	.144	*LS*	*LS*	*LS*	**S**	*LS*	**S**
		HDC 3115VL-75	NPT	.0040	.144	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
	HDC 314VR-75		14	.0030	.144	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
		HDC 314VL-75	NPT	.0030	.144	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HDC 318VR-75		18	.0030	.144	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HDC 318VL-75	NPT	.0030	.144	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HDC 327VR-75		27	.0020	.144	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
		HDC 327VL-75	NPT	.0020	.144	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

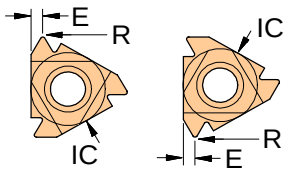
THREADING INSERTS - ACME 20

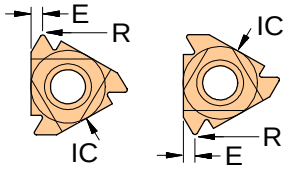
Style:	Insert Description		Dimensions			Grades					
HA - Acme	Right Hand	Left Hand*	PITCH	W	E	C23	123	156	310	323	356
	**HA 3R16**		16	.0206	.149	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 3L16	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 3R14		14	.0239	.149	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 3L14	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 3R12		12	.0283	.149	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 3L12	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 3R10		10	.0319	.149	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
		HA 3L10	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
Right Hand Shown	**HA 3R8**		8	.0411	.149	**S**	**S**	*LS*	**S**	*LS*	*LS*
		HA 3L8	ACME			**S**	**S**	*LS*	**S**	*LS*	*LS*
	HA 3R6		6	.0566	.149	**S**	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 3L6	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 3R5		5	.0689	.133	**S**	**S**	*LS*	**S**	*LS*	*LS*
		HA 3L5	ACME			**S**	**S**	*LS*	**S**	*LS*	*LS*
* Use LH Inserts For RH Internal Threads	**HA 3R4**		4	.0875	.133	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 3L4	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 4R10		10	.0319	.202	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 4L10	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 4R8		8	.0411	.202	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 4L8	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 4R6		6	.0566	.202	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 4L6	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
For Tool Holder Information See Pages 31-33	**HA 4R5**		5	.0689	.202	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 4L 5	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 4R4		4	.0875	.202	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 4L4	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 6R3		3	.1184	.283	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 6L3	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 6R25		2.5	.1431	.283	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 6L25	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HA 6R2		2	.1802	.283	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HA 6L2	ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*

Style:	Insert Description		Dimensions			Grades					
HAS - Stub Acme	Right Hand	Left Hand*	PITCH	W	E	C23	123	156	310	323	356
	**HAS 3R16**		16	.0238	.149	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HAS 3L16	S ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HAS 3R14		14	.0276	.149	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HAS 3L14	S ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HAS 3R12		12	.0326	.149	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HAS 3L12	S ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HAS 3R10		10	.0370	.149	**S**	*LS*	*LS*	*LS*	**S**	*LS*
		HAS 3L10	S ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
Right Hand Shown	**HAS 3R8**		8	.0476	.149	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HAS 3L8	S ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HAS 3R6		6	.0652	.149	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HAS 3L6	S ACME			*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
* Use LH Inserts For RH Internal Threads	**HAS 3R5**		5	.0793	.149	*LS*	*LS*	*LS*	**S**	*LS*	*LS*
		HAS 3L5	S ACME			*LS*	*LS*	*LS*	**S**	*LS*	*LS*

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

21 LAYDOWN THREADING INSERTS

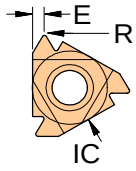
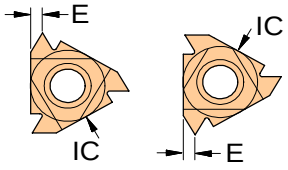
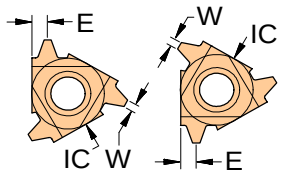
Style:	Insert Description		Dimensions				Grades		
Partial Profile 60°	**External RH**	**Internal RH**	**PITCH**	**R**	**E**	**IC**	**123**	**156**	**323F**
 External RH Internal RH Call for Availability On Left Hand Inserts	*NA*	**11NR A60**	16 - 48	.003	.039	.250	**S**	*LS*	*LS*
	16ER A60		16 - 48	.003	.039	.375	**S**	*LS*	*LS*
		16NR A60	TPI	.003			**S**	*LS*	*LS*
	16ER AG60		8 - 48	.003	.059	.375	**S**	*LS*	**S**
		16NR AG60	TPI	.003			**S**	*LS*	**S**
	16ER G60		8 - 14	.007	.059	.375	*LS*	*LS*	*LS*
		16NR G60	TPI	.005			*LS*	*LS*	*LS*
	22ER N60		5 - 7	.016	.098	.500	*LS*	*LS*	*LS*
		22NR N60	TPI	.010			*LS*	*LS*	*LS*
	27ER Q60		4 - 4.5	.025	.126	.625	*LS*	*LS*	*LS*
		27NR Q60	TPI	.012			*LS*	*LS*	*LS*

Style:	Insert Description		Dimensions				Grades		
Full Profile 60°	**External RH**	**Internal RH**	**PITCH**	**R ***	**E**	**IC**	**123**	**156**	**323F**
 External RH Internal RH Call for Availability On Left Hand Inserts ***** Insert Nose Radius: Internal = .125 x Pitch External = .1443 x Pitch	**16ER 40UN**		40		.020	.375	*LS*	*LS*	*LS*
		16NR 40UN	TPI				*LS*	*LS*	*LS*
	16ER 36UN		36		.020	.375	*LS*	*LS*	*LS*
		16NR 36UN	TPI				*LS*	*LS*	*LS*
	16ER 32UN		32		.020	.375	**S**	*LS*	*LS*
		16NR 32 UN	TPI				**S**	*LS*	*LS*
	16ER 28UN		28		.020	.375	**S**	*LS*	*LS*
		16NR 28UN	TPI				**S**	*LS*	*LS*
	16ER 24UN		24		.031	.375	**S**	*LS*	*LS*
		16NR 24UN	TPI				**S**	*LS*	*LS*
	16ER 20UN		20		.031	.375	**S**	*LS*	**S**
		16NR 20UN	TPI				**S**	*LS*	**S**
	16ER 18UN		18		.031	.375	**S**	*LS*	*LS*
		16NR 18UN	TPI				**S**	*LS*	*LS*
	16ER 16UN		16		.031	.375	**S**	*LS*	**S**
		16NR 16UN	TPI				**S**	*LS*	**S**
	16ER 14UN		14		.059	.375	**S**	*LS*	*LS*
		16NR 14UN	TPI				**S**	*LS*	*LS*
	16ER 13UN		13		.059	.375	*LS*	*LS*	*LS*
		16NR 13UN	TPI				*LS*	*LS*	*LS*
	16ER 12UN		12		.059	.375	**S**	*LS*	**S**
		16NR 12UN	TPI				**S**	*LS*	**S**
	16ER 10UN		10		.059	.375	*LS*	*LS*	*LS*
		16NR 10UN	TPI				*LS*	*LS*	*LS*
	16ER 9UN		9		.059	.375	*LS*	*LS*	*LS*
		16NR 9UN	TPI				*LS*	*LS*	*LS*
	16ER 8UN		8		.059	.375	*LS*	*LS*	*LS*
		16NR 8UN	TPI				*LS*	*LS*	*LS*
	22ER 7UN		7		.098	.500	*LS*	*LS*	*LS*
		22NR 7UN	TPI				*LS*	*LS*	*LS*
	22ER 6UN		6		.098	.500	*LS*	*LS*	*LS*
		22NR 6UN	UN				*LS*	*LS*	*LS*
	22ER 5UN		5		.098	.500	*LS*	*LS*	*LS*
		22NR 5UN	UN				*LS*	*LS*	*LS*

S = Stock Standard **LS = Limited Stock or Non-Stock - Call for Availability**

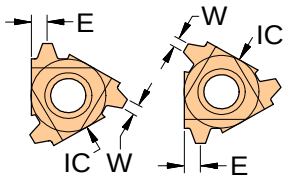
LAYDOWN THREADING INSERTS 22

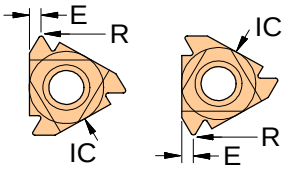
RETURN TO INDEX

Style:	Insert Description		Dimensions				Grades		
Full Profile UNJ	External RH	Internal RH	PITCH	R	E	IC	123	156	323F
 External RH Controlled Root Radius UNJ Threading Inserts	**16ER 32UNJ**	*NA*	32 UNJ	.0047	.020	.375	*LS*	*LS*	*LS*
	16ER 28UNJ	*NA*	28 UNJ	.0054	.020	.375	*LS*	*LS*	*LS*
	16ER 24UNJ	*NA*	24 UNJ	.0063	.031	.375	*LS*	*LS*	*LS*
	16ER 20UNJ	*NA*	20UNJ	.0075	.031	.375	*LS*	*LS*	*LS*
	16ER 18UNJ	*NA*	18 UNJ	.0083	.031	.375	*LS*	*LS*	*LS*
	16ER 16UNJ	*NA*	16 UNJ	.0094	.031	.375	*LS*	*LS*	*LS*
	16ER 14UNJ	*NA*	14 UNJ	.0107	.059	.375	*LS*	*LS*	*LS*
	16ER 12UNJ	*NA*	12 UNJ	.0125	.059	.375	*LS*	*LS*	*LS*
	16ER 10UNJ	*NA*	10 UNJ	.0150	.059	.375	*LS*	*LS*	*LS*
	16ER 8UNJ	*NA*	8 UNJ	.0188	.059	.375	*LS*	*LS*	*LS*
Style:	**Insert Description**		**Dimensions**				**Grades**		
Full Profile NPT	**External RH**	**Internal RH**	**PITCH**	**R**	**E**	**IC**	**123**	**156**	**323F**
 External RH Internal RH	**16ER 27NPT**		27	*NA*	.020	.375	**S**	*LS*	*LS*
		16NR 27NPT	NPT				*LS*	*LS*	*LS*
	16ER 18NPT		18		.031	.375	**S**	*LS*	*LS*
		16NR 18NPT	NPT				**S**	*LS*	*LS*
	16ER 14NPT		14		.059	.375	**S**	*LS*	*LS*
		16NR 14NPT	NPT				**S**	*LS*	*LS*
	16ER 11.5NPT		11.5		.059	.375	**S**	*LS*	*LS*
		16NR 11.5NPT	NPT				**S**	*LS*	*LS*
	16ER 8NPT		8		.063	.375	*LS*	*LS*	*LS*
		16NR 8NPT	NPT				*LS*	*LS*	*LS*
Style:	**Insert Description**		**Dimensions**				**Grades**		
Full Profile Acme	**External RH**	**Internal RH**	**PITCH**	**W**	**E**	**IC**	**123**	**156**	**323F**
 External RH Internal RH	**16ER 16 ACME**		16	.0206	.031	.375	*LS*	*LS*	*LS*
		16NR 16 ACME	ACME				*LS*	*LS*	*LS*
	16ER 14 ACME		14	.0239	.059	.375	*LS*	*LS*	*LS*
		16NR 14 ACME	ACME				*LS*	*LS*	*LS*
	16ER 12 ACME		12	.0283	.059	.375	*LS*	*LS*	*LS*
		16NR 12 ACME	ACME				*LS*	*LS*	*LS*
	16ER 10 ACME		10	.0319	.059	.375	*LS*	*LS*	*LS*
		16NR 10 ACME	ACME				*LS*	*LS*	*LS*
	16ER 8 ACME		8	.0411	.059	.375	*LS*	*LS*	*LS*
		16NR 8 ACME	ACME				*LS*	*LS*	*LS*
	22ER 6 ACME		6	.0566	.098	.500	*LS*	*LS*	*LS*
		22NR 6 ACME	ACME				*LS*	*LS*	*LS*
	22ER 5 ACME		5	.0689	.091	.500	*LS*	*LS*	*LS*
		22NR 5 ACME	ACME				*LS*	*LS*	*LS*
	27ER 4 ACME		4	.0875	.118	.625	*LS*	*LS*	*LS*

S = Stock Standard **LS = Limited Stock or Non-Stock - Call for Availability**

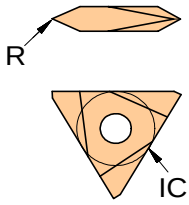
HORIZON CARBIDE TOOL, INC. **(480) 968-0957** **FAX (480) 968-8042** **info@horizoncarbide.com**

Style:	Insert Description		Dimensions				Grades		
Full Profile Stub Acme	External RH	Internal RH	PITCH	W	E	IC	123	156	323F
 External RH Internal RH	**16ER 16STACME**		16	.0238	.039	.375	*LS*	*LS*	*LS*
		16NR 16STACME	ST ACME				*LS*	*LS*	*LS*
	16ER 14STACME		14	.0276	.051	.375	*LS*	*LS*	*LS*
		16NR 14STACME	ST ACME				*LS*	*LS*	*LS*
	16ER 12STACME		12	.0326	.059	.375	*LS*	*LS*	*LS*
		16NR 12STACME	ST ACME				*LS*	*LS*	*LS*
	16ER 10STACME		10	.0370	.059	.375	*LS*	*LS*	*LS*
		16NR 10STACME	ST ACME				*LS*	*LS*	*LS*
	16ER 8STACME		8	.0476	.063	.375	*LS*	*LS*	*LS*
		16NR 8STACME	ST ACME				*LS*	*LS*	*LS*
	22ER 6TSACME		6	.0652	.091	.500	*LS*	*LS*	*LS*
		22NR 6STACME	ST ACME				*LS*	*LS*	*LS*
	22ER 5STACME		5	.0793	.079	.500	*LS*	*LS*	*LS*
		22NR 5STACME	ST ACME				*LS*	*LS*	*LS*
	27ER 4STACME		4	.1004	.102	.625	*LS*	*LS*	*LS*
		27NR 4STACME	ST ACME				*LS*	*LS*	*LS*

Style:	Insert Description		Dimensions				Grades		
Full Profile ISO Metric	External RH	Internal RH	PITCH	R *	E	IC	123	156	323F
 External RH Internal RH	**16ER 0.50 ISO**		0.50		.020	.375	*LS*	*LS*	*LS*
		16NR 0.50 ISO	mm				*LS*	*LS*	*LS*
	16ER 0.75 ISO		0.75		.020	.375	*LS*	*LS*	*LS*
		16NR 0.75 ISO	mm				*LS*	*LS*	*LS*
	16ER 1.00 ISO		1.00		.031	.375	*LS*	*LS*	*LS*
		16NR 1.00 ISO	mm				*LS*	*LS*	*LS*
	16ER 1.25 ISO		1.25		.031	.375	*LS*	*LS*	*LS*
		16NR 1.25 ISO	mm				*LS*	*LS*	*LS*
Call for Availability On Left Hand Inserts	**16ER 1.50 ISO**		1.50		.059	.375	*LS*	*LS*	*LS*
		16NR 1.50 ISO	mm				*LS*	*LS*	*LS*
	16ER 1.75 ISO		1.75		.059	.375	*LS*	*LS*	*LS*
		16NR 1.75 ISO	mm				*LS*	*LS*	*LS*
***** Insert Nose Radius: Internal = .125 x Pitch External = .1443 x Pitch	**16ER 2.00 ISO**		2.00		.059	.375	*LS*	*LS*	*LS*
		16NR 2.00 ISO	mm				*LS*	*LS*	*LS*
	16ER 2.50 ISO		2.50		.059	.375	*LS*	*LS*	*LS*
		16NR 2.50 ISO	mm				*LS*	*LS*	*LS*
	16ER 3.00 ISO		3.00		.059	.375	*LS*	*LS*	*LS*
		16NR 3.00 ISO	mm				*LS*	*LS*	*LS*

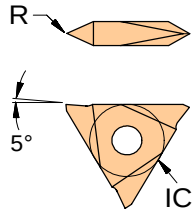
S = Stock Standard LS = Limited Stock or Non-Stock - Call for Availability

Style:	Insert	Dimensions			Grades				
TNMA On Edge Threading	Description	PITCH	R	IC	C23	123	156	323	356
	TNMA 32NV	8 tpi Max	.003 -.005	.375	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 43NV	6 tpi Max	.005 -.008	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMA 54NV	4 tpi Max	.005 -.008	.625	*LS*	*LS*	*LS*	*LS*	*LS*



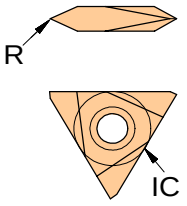
TNMA Inserts for use in Carboloy® Tool Holders Only

Style:	Insert	Dimensions			Grades				
TPMA Positive Rake On Edge Threading	Description	PITCH	R	IC	C23	123	156	323	356
	TPMA 32NV	8 tpi Max	.003 -.005	.375	*LS*	*LS*	**S**	*LS*	**S**
	TPMA 43NV	6 tpi Max	.005 -.008	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMA 54NV	4 tpi Max	.005 -.008	.625	*LS*	*LS*	*LS*	*LS*	*LS*



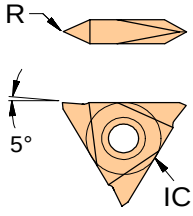
TPMA Inserts for use in Carboloy® Tool Holders Only

Style:	Insert	Dimensions			Grades				
TNMC On Edge Threading	Description	PITCH	R	IC	C23	123	156	323	356
	TNMC 32NV	8 tpi Max	.003 -.005	.375	**S**	**S**	**S**	**S**	**S**
	TNMC 43NV	6 tpi Max	.005 -.008	.500	**S**	**S**	*LS*	**S**	**S**
	TNMC 54NV	4 tpi Max	.005 -.008	.625	*LS*	*LS*	*LS*	*LS*	**S**
	TNMC 64NV	4 tpi Max	.005 -.008	.750	*LS*	*LS*	*LS*	*LS*	*LS*
	TNMC 66NV	3 tpi Max	.005 -.008	.750	*LS*	*LS*	*LS*	*LS*	*LS*



TNMC Inserts fit all Industry Std. Tool Holders except Carboloy®

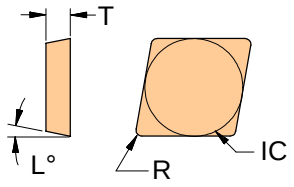
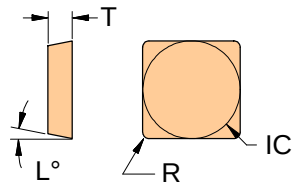
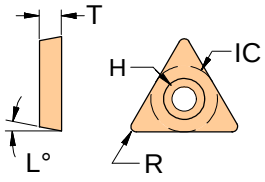
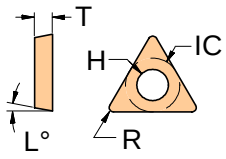
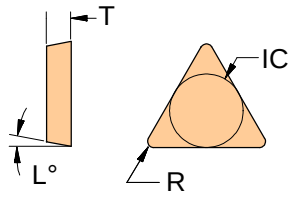
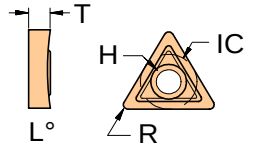
Style:	Insert	Dimensions			Grades				
TPMC Positive Rake On Edge Threading	Description	PITCH	R	IC	C23	123	156	323	356
	TPMC 32NV	8 tpi Max	.003 -.005	.375	**S**	**S**	*LS*	**S**	**S**
	TPMC 32NV-10 *	8 tpi Max	.003 -.005	.375	**S**	*LS*	*LS*	*LS*	*LS*
	TPMC 43NV	6 tpi Max	.005 -.008	.500	**S**	**S**	*LS*	**S**	**S**
	TPMC 43NV-10 *	6 tpi Max	.005 -.008	.500	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMC 54NV	4 tpi Max	.005 -.008	.625	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMC 64NV	4 tpi Max	.005 -.008	.750	*LS*	*LS*	*LS*	*LS*	*LS*
	TPMC 66NV	3 tpi Max	.005 -.008	.750	*LS*	*LS*	*LS*	*LS*	*LS*



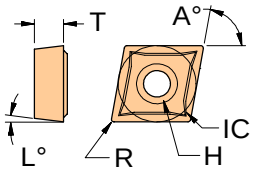
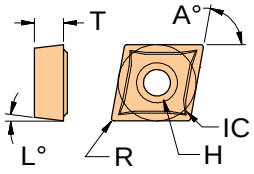
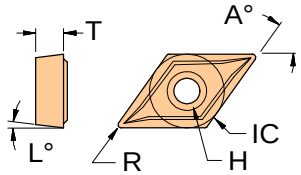
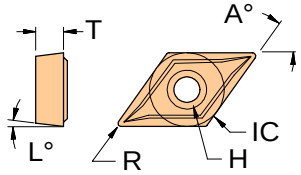
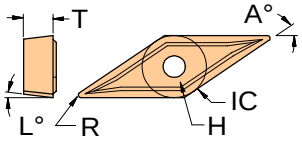
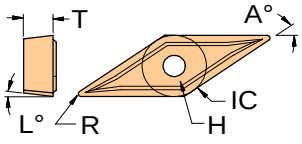
* 10° Positive Rake

TPMC Inserts fit all Industry Std. Tool Holders except Carboloy®

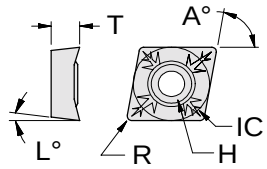
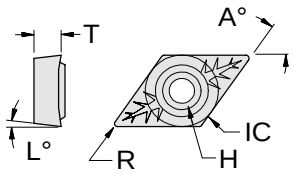
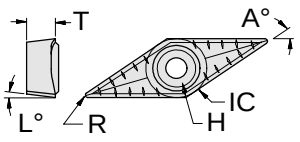
S = Stock Standard **LS = Limited Stock or Non-Stock - Call for Availability**

Style:	Insert	Dimensions						Grades				
ANSI - ISO Standards	**Description**	**L**	**A**	**R**	**T**	**IC**	**H**	**C23**	**123**	**156**	**323**	**356**
 Additional Corner Radius Sizes Available On Request	**CPG 420**	11°	80°	.004	.125	.500		**S**	**S**	*LS*	**S**	*LS*
	CPG 420.5	11°	80°	.008	.125	.500		**S**	**S**	*LS*	**S**	*LS*
	CPG 421	11°	80°	.016	.125	.500		**S**	**S**	**S**	**S**	*LS*
	CPG 422	11°	80°	.031	.125	.500		**S**	**S**	**S**	**S**	*LS*
	CPG 423	11°	80°	.047	.125	.500		**S**	**S**	*LS*	**S**	*LS*
	CFG 4620	25°	80°	.004	.125	.464		**S**	**S**	*LS*	**S**	*LS*
	CFG 4621	25°	80°	.016	.125	.464		**S**	**S**	*LS*	**S**	*LS*
	CFG 4622	25°	80°	.031	.125	.464		**S**	**S**	*LS*	**S**	*LS*
	**SPG 420**	11°	90°	.004	.125	.500		**S**	**S**	*LS*	**S**	*LS*
	SPG 420.5	11°	90°	.008	.125	.500		**S**	**S**	*LS*	**S**	*LS*
	SPG 421	11°	90°	.016	.125	.500		**S**	**S**	*LS*	**S**	**S**
	SPG 422	11°	90°	.031	.125	.500		**S**	**S**	*LS*	**S**	**S**
	SPG 423	11°	90°	.047	.125	.500		**S**	**S**	*LS*	**S**	*LS*
	**TD 6P R002**	10°	60°	.002	.125	.375	.125	**S**	**S**	*LS*	**S**	*LS*
	TD 6P R007	10°	60°	.007	.125	.375	.125	**S**	**S**	*LS*	**S**	*LS*
	TD 6P R015	10°	60°	.015	.125	.375	.125	**S**	**S**	*LS*	**S**	*LS*
	TD 6P	10°	60°	.031	.125	.375	.125	**S**	**S**	*LS*	**S**	*LS*
	**TP 40**	10°	60°	.005	.094	.250	.137	**S**	**S**	*LS*	**S**	*LS*
	TP 41	10°	60°	.016	.094	.250	.137	**S**	**S**	*LS*	**S**	*LS*
	TP 42	10°	60°	.031	.094	.250	.137	**S**	**S**	*LS*	**S**	*LS*
	TP 61	10°	60°	.016	.125	.375	.163	**S**	**S**	*LS*	**S**	*LS*
	TP 62	10°	60°	.031	.125	.375	.163	**S**	**S**	*LS*	**S**	*LS*
 Additional Corner Radius Sizes Available On Request * TFG Inserts in Grade C23 Come with J Polished Tops	**TFG 320.5 J ***	25°	60°	.008	.125	.375		*LS*	*LS*	*LS*	*LS*	*LS*
	TFG 321 J *	25°	60°	.016	.125	.375		**S**	*LS*	*LS*	*LS*	*LS*
	TFG 322 J *	25°	60°	.031	.125	.375		**S**	*LS*	*LS*	**S**	*LS*
	TPG 221	11°	60°	.016	.125	.250		*LS*	*LS*	*LS*	*LS*	*LS*
	TPG 222	11°	60°	.031	.125	.250		*LS*	*LS*	*LS*	*LS*	*LS*
	TPG 320 R003	11°	60°	.003	.125	.375		**S**	**S**	*LS*	**S**	*LS*
	TPG 320 R005	11°	60°	.005	.125	.375		**S**	**S**	**S**	**S**	**S**
	TPG 320.5	11°	60°	.008	.125	.375		**S**	**S**	**S**	**S**	*LS*
	TPG 321	11°	60°	.016	.125	.375		**S**	**S**	**S**	**S**	**S**
	TPG 322	11°	60°	.031	.125	.375		**S**	**S**	**S**	**S**	**S**
	TPG 323	11°	60°	.047	.125	.375		**S**	**S**	*LS*	**S**	*LS*
	TPG 324	11°	60°	.062	.125	.375		**S**	**S**	**S**	**S**	*LS*
	TPG 430	11°	60°	.004	.1875	.500		**S**	**S**	*LS*	**S**	*LS*
	TPG 430.5	11°	60°	.008	.1875	.500		**S**	**S**	*LS*	**S**	*LS*
	TPG 431	11°	60°	.016	.1875	.500		**S**	**S**	*LS*	**S**	*LS*
	TPG 432	11°	60°	.031	.1875	.500		**S**	**S**	*LS*	**S**	*LS*
	TPG 433	11°	60°	.047	.1875	.500		**S**	**S**	*LS*	**S**	*LS*
	**T221P**	0°	60°	.016	.125	.250	.094	**S**	**S**	*LS*	**S**	*LS*
	T321P	0°	60°	.016	.125	.375	.152	**S**	**S**	*LS*	**S**	*LS*
	For Kennametal® Tool Holders & Boring Bars											

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

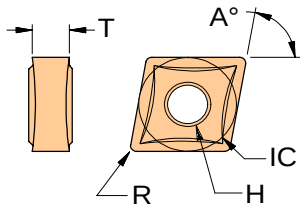
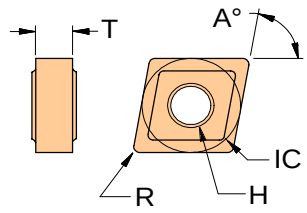
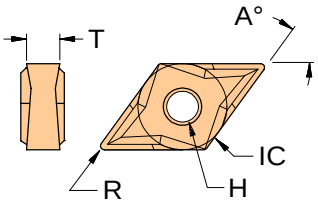
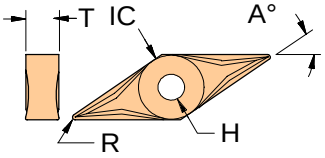
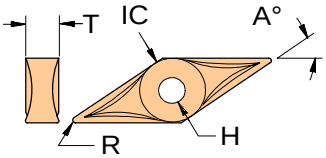
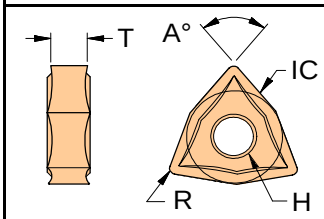
Style:	Insert	Dimensions						Grades				
ANSI - ISO Standards	Description	L	A	R	T	IC	H	C23	123	156	323	356
 CCMT Equivalent	CCGT 21.50 .002	7°	80°	.002	.094	.250	.110	S	S	*NA*	S	*NA*
	CCGT 21.50	7°	80°	.004	.094	.250	.110	S	S	S	S	S
	CCGT 21.50.5	7°	80°	.008	.094	.250	.110	S	S	S	S	S
	CCGT 21.51	7°	80°	.016	.094	.250	.110	S	S	S	S	S
	CCGT 21.52	7°	80°	.031	.094	.250	.110	S	S	S	S	S
	CCGT 32.50 .002	7°	80°	.002	.156	.375	.173	S	S	*NA*	S	*NA*
	CCGT 32.50	7°	80°	.004	.156	.375	.173	S	S	S	S	S
	CCGT 32.50.5	7°	80°	.008	.156	.375	.173	S	S	S	S	S
	CCGT 32.51	7°	80°	.016	.156	.375	.173	S	S	S	S	S
	CCGT 32.52	7°	80°	.031	.156	.375	.173	S	S	S	S	S
 CPGM - CPMT Equivalent	CPGT 21.50 .002	11°	80°	.002	.094	.250	.110	S	S	*NA*	S	*NA*
	CPGT 21.50	11°	80°	.004	.094	.250	.110	S	S	S	S	S
	CPGT 21.50.5	11°	80°	.008	.094	.250	.110	S	S	S	S	S
	CPGT 21.51	11°	80°	.016	.094	.250	.110	S	S	S	S	S
	CPGT 21.52	11°	80°	.031	.094	.250	.110	S	S	S	S	S
	CPGT 32.50 .002	11°	80°	.002	.156	.375	.173	S	S	*NA*	S	*NA*
	CPGT 32.50	11°	80°	.004	.156	.375	.173	S	S	S	S	S
	CPGT 32.50.5	11°	80°	.008	.156	.375	.173	S	S	S	S	S
	CPGT 32.51	11°	80°	.016	.156	.375	.173	S	S	S	S	S
	CPGT 32.52	11°	80°	.031	.156	.375	.173	S	S	S	S	S
 DCMT Equivalent	DCGT 21.50	7°	55°	.004	.094	.250	.110	S	S	*NA*	S	*NA*
	DCGT 21.50.5	7°	55°	.008	.094	.250	.110	S	S	*LS*	S	*LS*
	DCGT 21.51	7°	55°	.016	.094	.250	.110	S	S	*LS*	S	*LS*
	DCGT 21.52	7°	55°	.031	.094	.250	.110	S	S	*LS*	S	*LS*
	DCGT 32.50	7°	55°	.004	.156	.375	.173	S	S	*NA*	*LS*	*NA*
	DCGT 32.50.5	7°	55°	.008	.156	.375	.173	S	S	*LS*	S	*LS*
	DCGT 32.51	7°	55°	.016	.156	.375	.173	S	S	*LS*	S	*LS*
	DCGT 32.52	7°	55°	.031	.156	.375	.173	S	S	*LS*	S	*LS*
 DPMT Equivalent	DPGT 21.50	11°	55°	.004	.094	.250	.110	*LS*	*LS*	*NA*	*LS*	*NA*
	DPGT 21.50.5	11°	55°	.008	.094	.250	.110	S	S	*LS*	S	*LS*
	DPGT 21.51	11°	55°	.016	.094	.250	.110	S	S	*LS*	S	*LS*
	DPGT 21.52	11°	55°	.031	.094	.250	.110	S	S	*LS*	S	*LS*
	DPGT 32.50	11°	55°	.004	.156	.375	.173	S	S	*NA*	S	*NA*
	DPGT 32.50.5	11°	55°	.008	.156	.375	.173	S	S	*LS*	S	*LS*
	DPGT 32.51	11°	55°	.016	.156	.375	.173	S	S	*LS*	S	*LS*
	DPGT 32.52	11°	55°	.031	.156	.375	.173	S	S	*LS*	S	*LS*
 VBMT Equivalent	VBGT 220.5	5°	35°	.008	.125	.250	.110	S	S	*LS*	S	*LS*
	VBGT 221	5°	35°	.016	.125	.250	.110	S	S	*LS*	S	*LS*
	VBGT 222	5°	35°	.031	.125	.250	.110	S	S	*LS*	S	*LS*
	VBGT 330	5°	35°	.004	.1875	.375	.173	S	S	*LS*	S	*LS*
	VBGT 330.5	5°	35°	.008	.1875	.375	.173	S	S	*LS*	S	*LS*
	VBGT 331	5°	35°	.016	.1875	.375	.173	S	S	*LS*	S	*LS*
	VBGT 332	5°	35°	.031	.1875	.375	.173	S	S	*LS*	S	*LS*
 VCMT Equivalent	VCGT 220.5	7°	35°	.008	.125	.250	.110	S	S	*LS*	S	*LS*
	VCGT 221	7°	35°	.016	.125	.250	.110	S	S	*LS*	S	*LS*
	VCGT 222	7°	35°	.031	.125	.250	.110	S	S	*LS*	S	*LS*
	VCGT 330	7°	35°	.004	.1875	.375	.173	S	S	*LS*	S	*LS*
	VCGT 330.5	7°	35°	.008	.1875	.375	.173	S	S	*LS*	S	*LS*
	VCGT 331	7°	35°	.016	.1875	.375	.173	S	S	*LS*	S	*LS*
	VCGT 332	7°	35°	.031	.1875	.375	.173	S	S	*LS*	S	*LS*

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Style:	Insert	Dimensions						Grades	
ANSI-ISO High Positive Rake For Aluminum	**Description**	**L**	**A**	**R**	**T**	**IC**	**H**	**C23J**	**323F**
 25° Positive Rake Chipbreaker	**CCGT 21.50.5-25P CCGT 060202FN-25P**	7°	80°	.008	.094	.250	.110	**S**	**S**
	CCGT 21.51-25P CCGT 060204FN-25P	7°	80°	.016	.094	.250	.110	**S**	**S**
	CCGT 09T301FN-25P CCGT 32.50-25P	7°	80°	.004	.156	.375	.173	**S**	**S**
	CCGT 09T302FN-25P CCGT 32.50.5-25P	7°	80°	.008	.156	.375	.173	**S**	**S**
	CCGT 09T304FN-25P CCGT 32.51-25P	7°	80°	.016	.156	.375	.173	**S**	**S**
	CCGT 09T308FN-25P CCGT 32.52-25P	7°	80°	.031	.156	.375	.173	**S**	**S**
	CCGT 430.5-25P CCGT 120402FN-25P	7°	80°	.008	.1875	.500	.216	**S**	**S**
	CCGT 431-25P CCGT 120404FN-25P	7°	80°	.016	.1875	.500	.216	**S**	**S**
	CCGT 432-25P CCGT 120408FN-25P	7°	80°	.031	.1875	.500	.216	**S**	**S**
 25° Positive Rake Chipbreaker	**DCGT 21.50.5-25P DCGT 070202FN-25P**	7°	55°	.008	.094	.250	.110	**S**	*LS*
	DCGT 21.51-25P DCGT 070204FN-25P	7°	55°	.016	.094	.250	.110	**S**	*LS*
	DCGT 32.50.5-25P DCGT 11T302FN-25P	7°	55°	.008	.156	.375	.173	**S**	**S**
	DCGT 32.51-25P DCGT 11T304FN-25P	7°	55°	.016	.156	.375	.173	**S**	**S**
	DCGT 32.52-25P DCGT 11T308FN-25P	7°	55°	.031	.156	.375	.173	**S**	**S**
 25° Positive Rake Chipbreaker	**VCGT 220.5-25P VCGT 110302FN-25P**	7°	35°	.008	.125	.250	.110	**S**	*LS*
	VCGT 221-25P VCGT 110304FN-25P	7°	35°	.016	.125	.250	.110	**S**	*LS*
	VCGT 331-25P VCGT 160404FN-25P	7°	35°	.016	.1875	.375	.216	**S**	**S**
	VCGT 332-25P VCGT 160408FN-25P	7°	35°	.031	.1875	.375	.216	**S**	**S**

Polished High Positive Rake Grade C23J Inserts are Designed for Aluminum, Copper and Plastics
Use TiALN Coated Grade 323F for Finishing Most Materials Including Stainless, Titanium & Hardened Steels 45Rc +

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Style:	Insert	Dimensions						Grades				
ANSI - ISO Standards	**Description**	**L**	**A**	**R**	**T**	**IC**	**H**	**C23**	**C23J**	**123**	**323**	**356**
 10° Double Positive Rake for Finishing & Light Roughing	**CNGP 430K .002**	0°	80°	.002	.1875	.500	.203	*LS*	*LS*	*LS*	*LS*	*NA*
	CNGP 430K	0°	80°	.004	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	CNGP 430.5K	0°	80°	.008	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	CNGP 431K	0°	80°	.016	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	CNGP 432K	0°	80°	.031	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	CNGP 433K	0°	80°	.047	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
 10° Positive Rake for Titanium & High Temperature Alloys	**CNGG 430**	0°	80°	.004	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	CNGG 430.5	0°	80°	.008	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	CNGG 431	0°	80°	.016	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	CNGG 432	0°	80°	.031	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	CNGG 433	0°	80°	.047	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
 2 Sided Insert for Finishing and Light Roughing	**DNGP 430 K**	0°	55°	.004	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	DNGP 430.5 K	0°	55°	.008	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	DNGP 431 K	0°	55°	.016	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	DNGP 432 K	0°	55°	.031	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	DNGP 433 K	0°	55°	.047	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
 2 Sided Light Finishing Insert	**VNGP 330 K**	0°	35°	.004	.1875	.375	.150	*NA*	**S**	**S**	**S**	*NA*
	VNGP 330.5 K	0°	35°	.008	.1875	.375	.150	*NA*	**S**	**S**	**S**	*NA*
	VNGP 331 K	0°	35°	.016	.1875	.375	.150	*NA*	**S**	**S**	**S**	*NA*
 2 Sided General Purpose Insert	**VNGP 330 D**	0°	35°	.004	.1875	.375	.150	**S**	**S**	**S**	**S**	*NA*
	VNGP 330.5 D	0°	35°	.008	.1875	.375	.150	**S**	**S**	**S**	**S**	*LS*
	VNGP 331 D	0°	35°	.016	.1875	.375	.150	**S**	**S**	**S**	**S**	**S**
	VNGP 332 D	0°	35°	.031	.1875	.375	.150	**S**	**S**	**S**	**S**	*NA*
 10° Double Positive Rake for Finishing & Light Roughing	**WNGP 430 K**	0°	80°	.004	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	WNGP 430.5 K	0°	80°	.008	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	WNGP 431 K	0°	80°	.016	.1875	.500	.203	**S**	**S**	**S**	**S**	*NA*
	WNGP 432 K	0°	80°	.031	.1875	.500	.203	**S**	**S**	**S**	**S**	**S**

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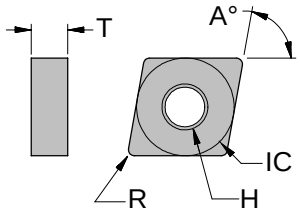
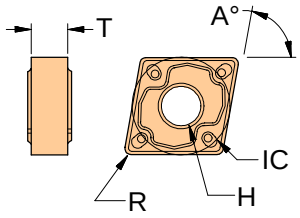
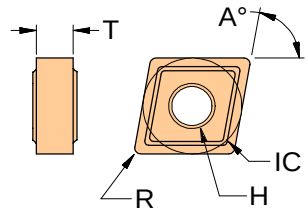
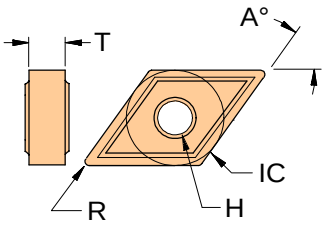
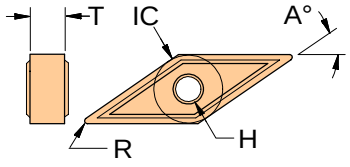
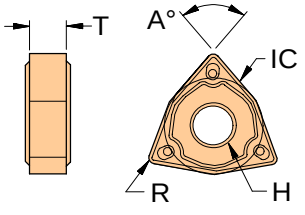
Style:	Insert	Dimensions					Grades			
Flat Top - No Chipbreaker	Description	A	R	T	IC	H	C23	123	323	623
 For Hard Turning	**CNMA 432**	80°	.031	.1875	.500	.203	*LS*	*LS*	*LS*	**S**
	CNMA 433	80°	.047	.1875	.500	.203	*LS*	*LS*	*LS*	**S**
	CVD Aluminum Oxide Coated Grade 623 for Turning Hard Materials Over 50Rc Run at 100 SFM, .005 to .020 Depth of Cut and Feed Rate under .005									

Style:	Insert	Dimensions					Grades			
ANSI - ISO Standards	Description	A	R	T	IC	H	C23	123	323	323F
 Bumpy Style Chipbreaker	**CNMG 432GP**	80°	.031	.1875	.500	.203	*LS*	*LS*	**S**	*LS*
	For Light Roughing 300 Series Stainless, 15-5PH, 17-4PH, A286 and other Tough To Machine Alloys at Moderate Feeds & Speeds									
 10° Positive Rake Chipbreaker	**CNMG 432HT**	80°	.031	.1875	.500	.203	*LS*	*LS*	**S**	*LS*
	For Light Roughing in Titanium, Inconel ® and other High Temperature Alloys HT Style Chipbreakers Provide Chip Control in Tough, Gummy Materials									
 10° Positive Rake Chipbreaker	**DNMG 431HT**	55°	.016	.1875	.500	.203	*LS*	*LS*	**S**	*LS*
	DNMG 432HT	55°	.031	.1875	.500	.203	*LS*	*LS*	**S**	*LS*
	For Light Roughing in Titanium, Inconel ® and other High Temperature Alloys HT Style Chipbreakers Provide Chip Control in Tough, Gummy Materials									
 10° Positive Rake Chipbreaker	**VNMG 331HT**	35°	.016	.1875	.375	.150	*LS*	*LS*	**S**	*LS*
	VNMG 332HT	35°	.031	.1875	.375	.150	*LS*	*LS*	**S**	*LS*
	For Light Roughing in Titanium, Inconel ® and other High Temperature Alloys HT Style Chipbreakers Provide Chip Control in Tough, Gummy Materials									
 Bumpy Style Chipbreaker	**WNMG 432GP**	80°	.016	.1875	.500	.203	*LS*	*LS*	**S**	*LS*
	For Light Roughing 300 Series Stainless, 15-5PH, 17-4PH, A286 and other Tough To Machine Alloys at Moderate Feeds & Speeds									

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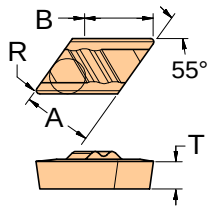
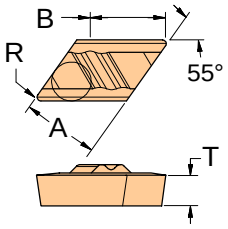
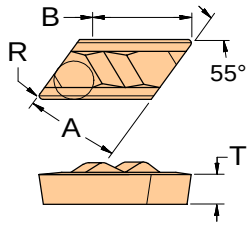
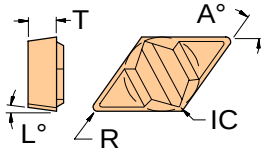
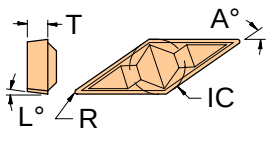
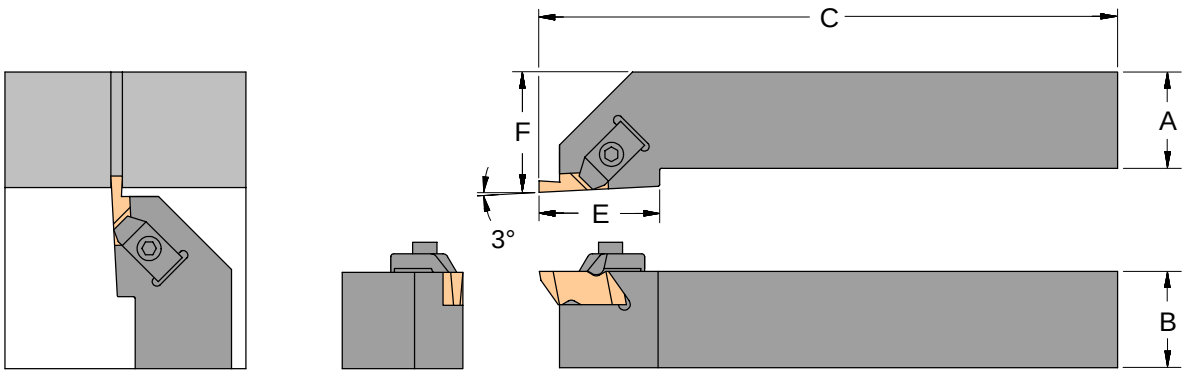
Style:	Insert Description		Dimensions					Grades					
HPR/L Profiling	Right Hand	Left Hand	A	R	T	B	IC	C23	C23J	123	156	323	356
 Right Hand Shown	HPR 50 R002		.365	.002	.125	.254	.250	S	S	S	*NA*	S	*NA*
		HPL 50 R002						S	S	S	*NA*	S	*NA*
	HPR 50.5		.375	.005	.125	.263	.250	S	S	S	S	S	S
		HPL 50.5						S	S	S	S	S	S
	HPR 50.8		.375	.008	.125	.260	.250	S	S	S	*LS*	S	*LS*
		HPL 50.8						S	S	S	*LS*	S	*LS*
	HPR 51		.375	.016	.125	.253	.250	S	S	S	S	S	S
		HPL 51						S	S	S	S	S	S
	HPR 52		.375	.031	.125	.239	.250	S	S	S	S	S	S
		HPL 52						S	S	S	S	S	S
 Right Hand Shown	HPR 130.5		.500	.005	.188	.321	.375	S	S	S	*LS*	S	*LS*
		HPL 130.5						S	S	S	*LS*	S	*LS*
	HPR 130.8		.500	.008	.188	.318	.375	S	S	S	*LS*	S	*LS*
		HPL 130.8						S	S	S	*LS*	S	*LS*
	HPR 131F		.500	.016	.188	.311	.375	S	S	S	S	S	S
		HPL 131F						*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HPR 132F		.500	.031	.188	.297	.375	S	S	S	S	S	S
		HPL 132F						S	S	S	*LS*	S	*LS*
	HPR 132N		.500	.031	.188	.297	.375	S	S	S	*LS*	S	*LS*
		HPL 132N						S	S	S	*LS*	S	*LS*
 Right Hand Shown	HPR 331N		.733	.016	.188	.595	.375	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HPL 331N						*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HPR 332F		.733	.031	.188	.581	.375	*LS*	*LS*	S	*LS*	S	*LS*
		HPL 332F						*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
	HPR 332N		.733	.031	.188	.581	.375	*LS*	*LS*	*LS*	*LS*	*LS*	*LS*
		HPL 332N						*LS*	*LS*	S	*LS*	S	*LS*
	HPR 332		.733	.031	.188	.581	.375	*LS*	*LS*	S	*LS*	S	*LS*
		HPL 332						*LS*	*LS*	S	*LS*	S	*LS*

Style:	Insert	Dimensions					Grades					
DPGR - VPGR	Description	A	R	T	L	IC	C23	123	156	323	356	
 Profiling Inserts	DPGR 430	55°	.004	.188	8°	.500	S	S	*NA*	S	*NA*	
	DPGR 430.5	55°	.008	.188	8°	.500	S	S	*LS*	S	*LS*	
	DPGR 431	55°	.016	.188	8°	.500	S	S	*LS*	S	*LS*	
	DPGR 432	55°	.031	.188	8°	.500	S	S	*LS*	S	*LS*	
 Profiling Inserts	VPGR 330	35°	.004	.188	8°	.375	S	S	*NA*	S	*NA*	
	VPGR 330.5	35°	.008	.188	8°	.375	S	S	*LS*	S	*LS*	
	VPGR 331	35°	.016	.188	8°	.375	S	S	*LS*	S	*LS*	
	VPGR 332	35°	.031	.188	8°	.375	S	S	*LS*	S	*LS*	

S = Stock Standard *LS* **= Limited Stock or Non-Stock - Call for Availability**

Notch Style Threading & Grooving Tool Holders

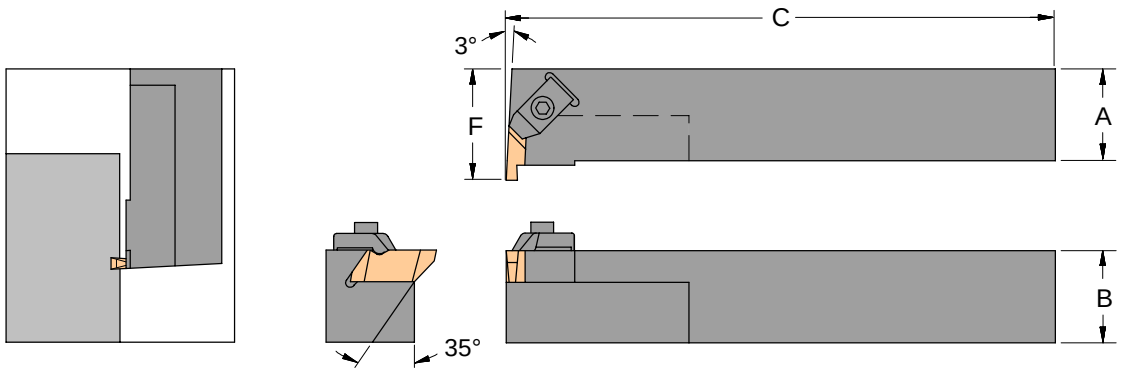


Right Hand Shown

Holder Description		Dimensions						Parts	
Right Hand	Left Hand	Insert Size Grooving - Threading	A	B	C	E	F	Clamp	Screw
TSR-62		HG 2xxxR - HT 2R	.375	.375	2.500	.750	.562	CM-74	S-310
	TSL-62	HG 2xxxL - HT 2L						CM-75	
TSR-82		HG 2xxxR - HT 2R	.500	.500	3.500	.750	.750	CM-74	S-310
	TSL-82	HG 2xxxL - HT 2L						CM-75	
TSR-102B		HG 2xxxR - HT 2R	.625	.625	4.500	.750	.875	CM-74	S-310
	TSL-102B	HG 2xxxL - HT 2L						CM-75	
TSR-122B		HG 2xxxR - HT 2R	.750	.750	4.500	.750	1.000	CM-74	S-310
	TSL-122B	HG 2xxxL - HT 2L						CM-75	
TSR-162C		HG 2xxxR - HT 2R	1.000	1.000	5.000	.750	1.250	CM-74	S-310
	TSL-162C	HG 2xxxL - HT 2L						CM-75	
TSR-123B		HG 3xxxR - HT 3R	.750	.750	4.500	1.250	1.000	CM-72	S-412
	TSL-123B	HG 3xxxL - HT 3L						CM-73	
TSR-163C		HG 3xxxR - HT 3R	1.000	1.000	5.000	1.250	1.250	CM-72	S-412
	TSL-163C	HG 3xxxL - HT 3L						CM-73	
TSR-163D		HG 3xxxR - HT 3R	1.000	1.000	6.000	1.250	1.250	CM-72	S-412
	TSL-163D	HG 3xxxL - HT 3L						CM-73	
TSR-203D		HG 3xxxR - HT 3R	1.250	1.250	6.000	1.380	1.500	CM-72	S-412
	TSL-203D	HG 3xxxL - HT 3L						CM-73	
TSR-164D		HG 4xxxR - HT 4R	1.000	1.000	6.000	1.250	1.250	CM-72	S-412
	TSL-164D	HG 4xxxL - HT 4L						CM-73	
TSR-204D		HG 4xxxR - HT 4R	1.250	1.250	6.000	1.500	1.500	CM-72	S-412
	TSL-204D	HG 4xxxL - HT 4L						CM-73	
TSR-244D		HG 4xxxR - HT 4R	1.500	1.500	6.000	1.500	2.000	CM-72	S-412
	TSL-244D	HG 4xxxL - HT 4L						CM-73	

Call for Availability

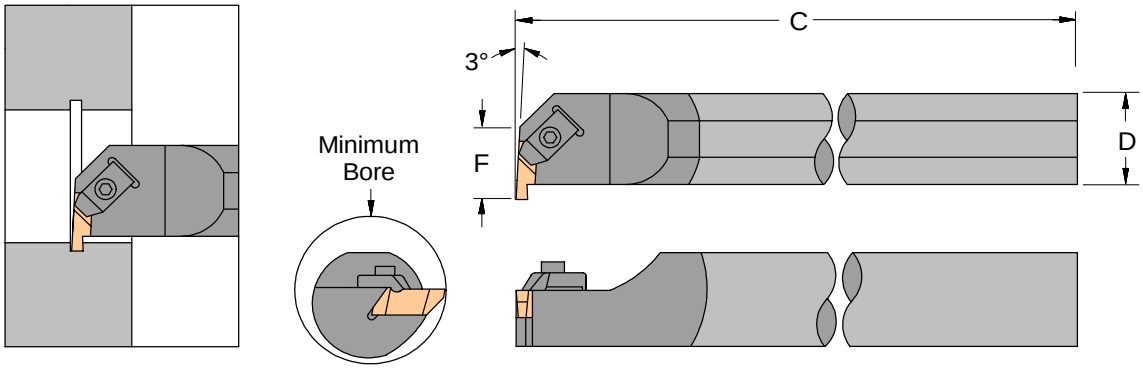
Notch Style 90° Face Grooving & ID-OD Threading-Grooving Holders



Right Hand Shown - Use Left Hand Inserts In 90° Right Hand Face Grooving Holders

Holder Description		Dimensions					Parts	
Right Hand	Left Hand	Insert Size Face - ID Grooving	A	B	C	F	Clamp	Screw
TER 163D		HF / HG 3xxxL	1.000	1.000	6.000	1.250	CM-73	S-412
	TEL 163D	HF / HG 3xxxR					CM-72	
TER 164D		HF / HG 4xxxL	1.000	1.000	6.000	1.250	CM-73	S-412
	TEL 164D	HF / HG 4xxxR					CM-72	

Notch Style Carbide Shank ID Threading & Grooving Bars

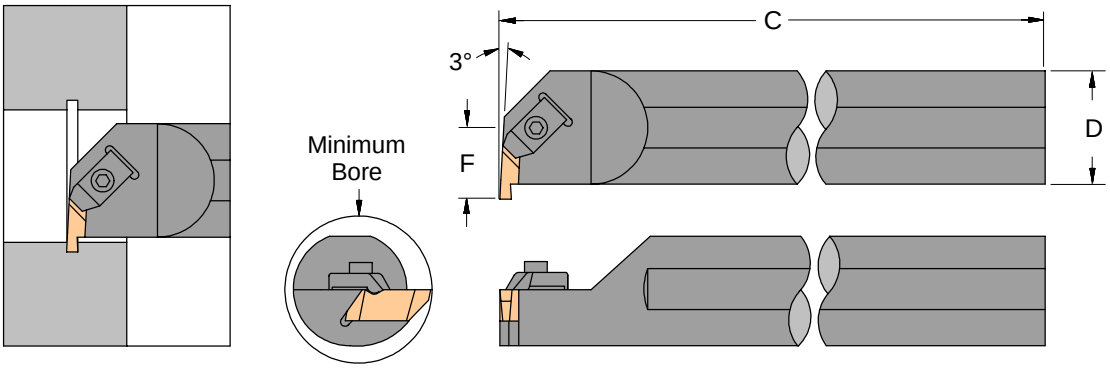


Right Hand Shown - Use Left Hand Inserts In Right Hand Boring Bars

Bar Description		Dimensions					Parts	
Right Hand	Left Hand	Insert Size Grooving - Threading	D	Min Bore	C	F	Clamp	Screw
C08-TER2		HG 2xxxL - HT 2L	.500	0.730	6.000	.437	CM-147	S-39
	C08-TEL2	HG 2xxxR - HT 2R					CM-146	
C10-TER2		HG 2xxxL - HT 2L	.625	1.000	8.000	.500	CM-75	S-310
	C10-TEL2	HG 2xxxR - HT 2R					CM-74	
C12-TER2		HG 2xxxL - HT 2L	.750	1.125	10.000	.562	CM-75	S-310
	C12-TEL2	HG 2xxxR - HT 2R					CM-74	
C16-TER2		HG 2xxxL - HT 2L	1.000	1.375	12.000	.688	CM-75	S-310
	C16-TEL2	HG 2xxxR - HT 2R					CM-74	
C16-TER3		HG 3xxxL - HT 3L	1.000	1.375	12.000	.688	CM-73	S-412
	C16-TEL3	HG 3xxxR - HT 3R					CM-72	

Call for Availability

Notch Style Steel ID Threading & Grooving Bars With Through Coolant Holes



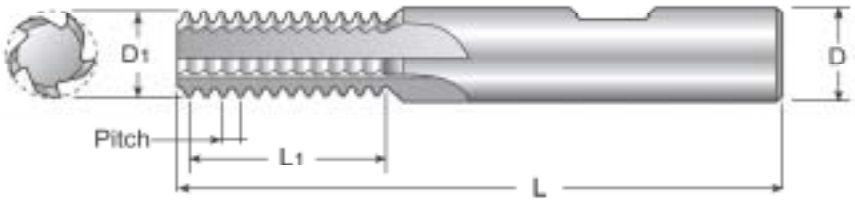
Right Hand Shown - Use Left Hand Inserts In Right Hand Boring Bars

* Please Note: Minimum Bore Diameter for Horizon Size 2 Deep Grooving Inserts

Bar Description		Dimensions						Parts	
Right Hand	Left Hand	Insert Size Grooving - Threading	D	Min Bore	Min Bore Deep *	C	F	Clamp	Screw
A08-TER2		HG 2xxxL - HT 2L	.500	.730	1.075	6.000	.437	CM-147	S-39
	A08-TEL2	HG 2xxxR - HT 2R						CM-146	
A10-TER2		HG 2xxxL - HT 2L	.625	1.000	1.200	8.000	.500	CM-75	S-310
	A10-TEL2	HG 2xxxR - HT 2R						CM-74	
A12-TER2		HG 2xxxL - HT 2L	.750	1.125	1.325	10.000	.562	CM-75	S-310
	A12-TEL2	HG 2xxxR - HT 2R						CM-74	
A16-TER2		HG 2xxxL - HT 2L	1.000	1.375	1.575	12.000	.688	CM-75	S-310
	A16-TEL2	HG 2xxxR - HT 2R						CM-74	
A16-TER3		HG 3xxxL - HT 3L	1.000	1.375		12.000	.688	CM-73	S-412
	A16-TEL3	HG 3xxxR - HT 3R						CM-72	
A20-TER3		HG 3xxxL - HT 3L	1.250	1.750		14.000	.875	CM-73	S-412
	A20-TEL3	HG 3xxxR - HT 3R						CM-72	
A24-TER3		HG 3xxxL - HT 3L	1.500	2.000		14.000	1.000	CM-73	S-412
	A24-TEL3	HG 3xxxR - HT 3R						CM-72	
A28-TER3		HG 3xxxL - HT 3L	1.750	2.250		14.000	1.125	CM-73	S-412
	A28-TEL3	HG 3xxxR - HT 3R						CM-72	
A32-TER3		HG 3xxxL - HT 3L	2.000	2.500		14.000	1.250	CM-73	S-412
	A32-TEL3	HG 3xxxR - HT 3R						CM-72	

NOTE: These Boring Bars come with Through Coolant Holes
Boring Bars without Coolant Holes are available in some sizes. Please call for Availability.

UN Internal Std. Length Thread Mills

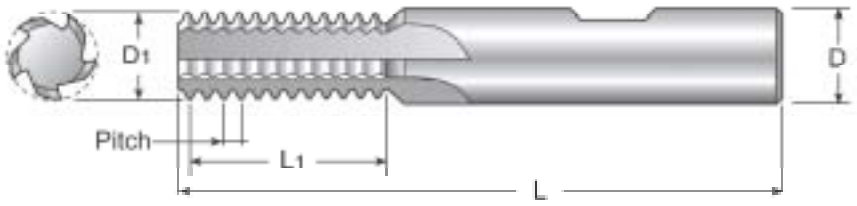


Long, Extra Long and Metric Sizes Available on Request

Min. Size Thread*	Tool Description	Pitch	Flutes	D	D1	L	L1	Grades	
								123	323F
# 2-64	**TMN 1/8 x .060 - 64 UN**	64	3	.125	.060	1.500	.1172	70100	78100
# 2-56	**TMN 1/8 x .060 - 56 UN**	56	3	.125	.060	1.500	.1161	70101	78101
# 3-48	**TMN 1/8 x .060 - 48 UN**	48	3	.125	.060	1.500	.1354	70102	78102
# 5-44	**TMN 1/8 x .085 - 44 UN**	44	3	.125	.085	1.500	.1705	70103	78103
# 4-40	**TMN 1/8 x .080 - 40 UN**	40	3	.125	.080	1.500	.1625	70138	78138
5/16"-40	**TMN 1/4 x .240 - 40 UN**	40	5	.250	.240	2.250	.3625	70142	78142
# 8-36	**TMN 1/8 x .120 - 36 UN**	36	3	.125	.120	1.500	.2361	70105	78105
# 6-32	**TMN 1/8 x .085 - 32 UN**	32	3	.125	.085	1.500	.2031	70106	78106
# 8-32	**TMN 1/8 x .120 - 32 UN**	32	3	.125	.120	1.500	.2344	70107	78107
# 10-32	**TMN 3/16 x .140 - 32 UN**	32	3	.187	.140	1.650	.2969	70143	78143
7/16"-32	**TMN 1/4 x .240 - 32 UN**	32	5	.250	.240	2.250	.5469	70108	78108
1/2"-32	**TMN 3/8 x .370 - 32 UN**	32	5	.375	.370	2.840	.9531	70139	78139
#12-28	**TMN 3/16 x .145 - 28 UN**	28	3	.187	.145	1.650	.3036	70109	78109
5/16"-28	**TMN 1/4 x .240 - 28 UN**	28	5	.250	.240	2.250	.5535	70144	78144
7/16"-28	**TMN 5/16 x .310 - 28 UN**	28	5	.312	.310	2.480	.7679	70110	78110
7/16"-27	**TMN 5/16 x .310 - 27 UN**	27	5	.312	.310	2.480	.7593	70145	78145
#12-24	**TMN 3/16 x .140 - 24 UN**	24	3	.187	.140	1.650	.3125	70140	78140
1/4"-24	**TMN 3/16 x .160 - 24 UN**	24	3	.187	.160	1.650	.3125	70111	78111
5/16"-24	**TMN 1/4 x .200 - 24 UN**	24	3	.250	.200	2.250	.4792	70112	78112
3/8"-24	**TMN 1/4 x .240 - 24 UN**	24	5	.250	.240	2.250	.5625	70135	78135
1/2"-24	**TMN 3/8 x .370 - 24 UN**	24	5	.375	.370	2.840	.6875	70136	78136
1/4"-20	**TMN 3/16 x .160 - 20 UN**	20	3	.187	.160	1.650	.375	70113	78113
5/16"-20	**TMN 1/4 x .187 - 20 UN**	20	3	.250	.187	2.250	.475	70137	78137
7/16"-20	**TMN 5/16 x .310 - 20 UN**	20	5	.312	.310	2.480	.725	70114	78114
9/16"-20	**TMN 3/8 x .370 - 20 UN**	20	5	.375	.370	2.840	.875	70115	78115
5/8"-20	**TMN 1/2 x .470 - 20 UN**	20	5	.500	.470	3.270	.975	70141	78141
5/16"-18	**TMN 1/4 x .200 - 18 UN**	18	3	.250	.200	2.250	.4722	70116	78116
9/16"-18	**TMN 3/8 x .370 - 18 UN**	18	5	.375	.370	2.840	.9167	70117	78117
5/8"-18	**TMN 1/2 x .437 - 18 UN**	18	5	.500	.437	3.270	1.0833	70134	78134
3/8"-16	**TMN 1/4 x .240 - 16UN**	16	5	.250	.240	2.250	.5313	70118	78118
13/16"-16	**TMN1/2 x .470 - 16 UN**	16	5	.500	.470	3.270	1.0938	70119	78119
7/16"-14	**TMN 5/16 x .310 - 14 UN**	14	5	.312	.310	2.480	.6071	70120	78120
1/2"-14	**TMN 3/8 x .370 - 14 UN**	14	5	.375	.370	2.840	.8929	70146	78146
7/8"-14	**TMN 1/2 x .470 - 14 UN**	14	5	.500	.470	3.270	1.1071	70121	78121
1/2"-13	**TMN 5/16 x .310 - 13 UN**	13	5	.375	.310	2.480	.7308	70122	78122

*Minimum Size: The smallest internal thread size that can be cut with a specific Thread Mill. All of the Tools above can be used to cut larger diameter threads than the nominal size as long as the L1 dimension exceeds the full thread length. For adequate chip clearance, tool diameter should not exceed 70% of the Minor Thread Diameter. For best results use the largest diameter tool that meets these requirements. Contact Horizon Carbide Tool for additional information and Programming Recommendations.

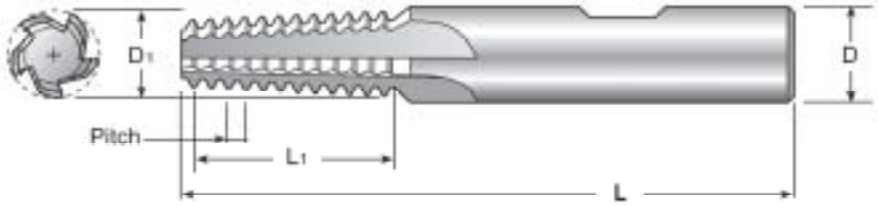
UN Internal Std. Length Thread Mills



Long, Extra Long and Metric Sizes Available on Request

Minimum Size*	Tool Description	Pitch	Flutes	D	D1	L	L1	Grades	
								123	323F
9/16"-12	**TMN 3/8 x .370 - 12 UN**	12	5	.375	.370	2.84	.875	70123	78123
3/4"-12	**TMN 1/2 x .470 - 12 UN**	12	5	.500	.470	3.27	1.1253	70124	78124
5/8"-11	**TMN 3/8 x .370 - 11 UN**	11	5	.375	.370	2.84	.8636	70125	78125
5/8"-11	**TMN 1/2 x .437 - 11 UN**	11	5	.500	.437	3.27	1.0455	70126	78126
3/4"-10	**TMN 1/2 x .470 - 10 UN**	10	5	.500	.470	3.27	1.050	70127	78127

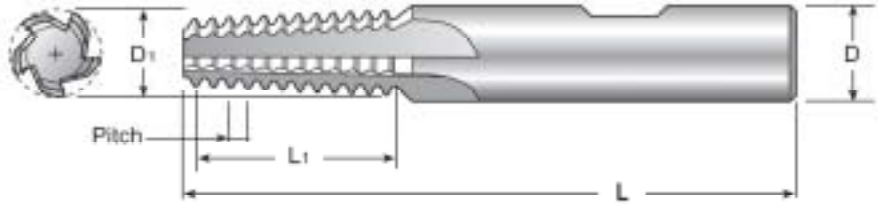
NPT Internal / External Thread Mills



NPSM Straight Pipe, BSP and BSPT British (Metric) Pipe Thread Mills Available

Minimum Size*	Tool Description	Pitch	Flutes	D	D1	L	L1	Grades	
								123	323F
1/16 & 1/8 NPT	**TMX 1/4 x .240-27NPT**	27	5	.250	.240	2.25	.351	70300	78300
1/4 & 3/8 NPT	**TMX 5/16 x .310-18NPT**	18	5	.312	.310	2.48	.527	70301	78301
1/2 & 3/4 NPT	**TMX 1/2 x .470-14NPT**	14	5	.500	.470	3.27	.749	70302	78302
1" - 2" NPT	**TMX 5/8 x .620-11.5NPT**	11.5	6	.625	.620	3.62	1.007	70303	78303
2 1/2" - 6" NPT	**TMX 5/8 x .620-8NPT**	8	6	.625	.620	3.62	1.188	70304	78304
2 1/2" - 6" NPT	**TMX 3/4 x .745-8NPT**	8	6	.750	.745	4.10	1.438	70305	78305

NPTF Dryseal Internal / External Thread Mills



NPSF Dryseal Straight Pipe Thread Mills Available

Minimum Size*	Tool Description	Pitch	Flutes	D	D1	L	L1	Grades	
								123	323F
1/16 & 1/8 NPTF	**TMX 1/4 x .240-27NPTF**	27	5	.250	.240	2.25	.351	70306	78306
1/4 & 3/8 NPTF	**TMX 5/16 x .310-18NPTF**	18	5	.312	.310	2.48	.527	70307	78307
1/2 & 3/4 NPTF	**TMX 1/2 x .470-14NPTF**	14	5	.500	.470	3.27	.749	70308	78308
1" - 2" NPTF	**TMX 5/8 x .620-11.5NPTF**	11.5	6	.625	.620	3.62	1.007	70309	78309
2 1/2" - 6" NPTF	**TMX 5/8 x .620-8NPTF**	8	6	.625	.620	3.62	1.188	70310	78310
2 1/2" - 6" NPTF	**TMX 3/4 x .745-8NPTF**	8	6	.750	.745	4.10	1.438	70311	78311

123 **- General Purpose TIN Coated C2-C6 (K20-P20) Grade For Most Thread Milling Applications**
323F **- High Performance TiALN Coated C2-C7 (K20-K15) Grade for Higher Speeds & Longer Tool Life**

Contact Horizon Carbide for additional information and Programming Recommendations
Please Call For Thread Mill Pricing and Availability

Recommended Speeds & Feeds For Turning & Grooving With Horizon Carbide Inserts

Material Group	Material Specs.	Surface Speeds (SFM) & Feed Rates (FPR)					
		Uncoated	PVD TIN Coated		PVD TIALN Coated		
		C23 & C23J	123	156	310	323 & 323F	356
Aluminum	2024, 6061, 7075 etc.	Maximum SFM .001-.010+ FPR	Maximum SFM .001-.010+ FPR	Maximum SFM .001-.010+ FPR	---	---	---
Aluminum - Cast	A356 (A380, A390 Use Diamond)	600-1000 .001-.010+ FPR	800-1000 .001-.010+ FPR	---	---	---	---
Copper	Most Alloys	600-1000 .001-.007 FPR	800-1000 .001-.007 FPR	---	---	---	---
Brass - Bronze	Most Free Machining Alloys	600-1000 .001-.010 FPR	800-1000 .001-.010 FPR	---	---	---	---
Carbon Steels - Soft	1010, 1018, 1025 1117, 12L14	---	300-500 .001-.005 FPR	400-600 .001-.008 FPR	200-300 .001-.008 FPR	300-600 .001-.005 FPR	450-850 .001-.008 FPR
Carbon Steels 25 Rc+	1045, 1070, 1144, A36	---	300-450 .001-.005 FPR	350-550 .001-.006 FPR	200-300 .001-.007 FPR	300-500 .001-.005 FPR	450-750 .001-.007 FPR
Alloy Steels	4130, 4140, 4330 4340, 8620	---	250-450 .001-.004 FPR	350-500 .001-.005 FPR	200-300 .001-.006 FPR	300-500 .001-.004 FPR	400-700 .001-.006 FPR
Alloy Steels 30 Rc+	4130, 4140, 4150 4330, 4340, 52100	---	250-450 .001-.004 FPR	300-500 .001-.005 FPR	200-300 .001-.005 FPR	300-450 .001-.004 FPR	350-600 .001-.005 FPR
Tool Steels - Annealed	O1, W1, S6, P20 A6, D2, H13, etc.	---	200-400 .001-.004 FPR	250-450 .001-.004 FPR	150-300 .001-.004 FPR	200-400 .001-.004 FPR	350-600 .001-.005 FPR
Stainless Steels	201, 202, 301, 302 303, 304, 410, 416	---	250-450 .001-.003 FPR	250-500 .001-.004 FPR	200-300 .001-.005 FPR	300-600 .001-.004 FPR	350-500 .001-.005 FPR
Stainless Steels	304L, 316, 316L, 420 422, 430, 455, 17-4PH	---	200-400 .001-.003 FPR	225-450 .001-.004 FPR	150-275 .001-.004 FPR	250-550 .001-.003 FPR	250-450 .001-.005 FPR
Stainless Steels	316VAR, 13-8MO PH 15-5 PH 36 Rc+, 440C	---	150-300 .001-.003 FPR	---	150-250 .001-.003 FPR	150-350 .001-.003 FPR	150-300 .001-.004 FPR
Titanium - CP	Commercially Pure	150-400 .001-.006 FPR	250-400 .001-.003 FPR	---	200-300 .001-.003 FPR	250-600 .001-.003 FPR	---
Titanium - Alloys	6AL-4V, 5AL-2.5SN	100-200 .001-.003 FPR	100-200 .001-.003 FPR	---	100-250 .001-.003 FPR	150-350 .001-.003 FPR	---
Titanium - Hardened	Alloys 36 Rc+	75-100 .001-.003 FPR	75-125 .001-.003 FPR	---	75-150 .001-.003 FPR	100-200 .001-.003 FPR	---
High Temp Alloys	Ni 200, Monel, Invar Kovar, Inconel 600	100-150 .001-.003 FPR	100-200 .001-.003 FPR	---	100-250 .001-.003 FPR	100-300 .001-.003 FPR	---
High Temp Alloys	A286, Inconel 625 718, X750, Hastelloy	75-150 .001-.003 FPR	100-150 .001-.003 FPR	---	75-200 .001-.003 FPR	100-200 .001-.003 FPR	---
High Temp Alloys	Hardened Alloys 35 Rc+, Stellite etc.	50-100 .001-.002 FPR	50-125 .001-.002 FPR	---	50-100 .001-.002 FPR	75-150 .001-.003 FPR	---
Core Iron	Low Carbon Iron & Soft Iron Alloys	---	300-500 .001-.004 FPR	300-600 .001-.005 FPR	200-300 .001-.005 FPR	300-600 .001-.005 FPR	450-800 .001-.006 FPR
Gray Cast Iron	150-325 BHN Class 20, 30, 35, 40	200-300 .001-.010+ FPR	200-600 .001-.010+ FPR	---	100-300 .001-.010+ FPR	250-600 .001-.010+ FPR	---
Gray Cast Iron	275-450 BHN Class 50, 55, 60	150-250 .001-.008+ FPR	150-450 .001-.008+ FPR	---	100-250 .001-.008+ FPR	200-500 .001-.008+ FPR	---
Alloy / Ductile Iron	60-40-18, 80-55-06 100-70-03, A536	100-250 .001-.008+ FPR	150-500 .001-.008+ FPR	300-500 .001-.008+ FPR	100-300 .001-.008+ FPR	250-500 .001-.008+ FPR	300-600 .001-.008+ FPR

Horizon Carbide Grades are Designed to provide Long Tool Life at Higher Speeds and Light Feed Rates.

1. Start near the top of the SFM Range using a Light Feed Rate to Reduce Built-up Edge & Insert Chipping.

2. Adjust RPM & Feeds after Setup to achieve Optimum Tool Life. Use Higher Feed Rates in Soft Materials.

3. In Hard Materials Use a Wear Resistant Grade like 323 or 623 at Medium to Low SFM and Light Feeds.

Formula to Calculate Surface Feet Per Minute (SFM): SFM = 3.1416 x Part Diameter, Divided by 12 x RPM

Recommended Speeds (SFM) For Threading With Horizon Carbide Inserts							
Material Group	**Material Specs.**	**C23**	**123**	**156**	**310**	**323 & 323F**	**356**
Aluminum	2024, 6061, 7075	Maximum SFM	Maximum SFM	Maximum SFM	---	---	---
Copper, Brass, Bronze	Most Alloys	200-600	300-800	---	---	---	---
Low Carbon Steels	1018, 1025, 1117, 12L14	---	300-500	400-650	200-300	300-600	450-750
Medium Carbon Steels	1045, 1070, 1144,	---	300-450	350-600	200-300	300-500	450-700
Alloy Steels	4130, 4140, 8620	---	250-450	350-550	200-300	300-500	400-650
Alloy Steels 28 Rc+	4150, 4340, 52100	---	250-400	300-500	200-275	300-450	350-600
Stainless Steels	303, 304, 410, 416	---	225-400	250-350	200-300	250-450	250-500
Stainless Steels	316, 316L, 422,17-4PH	---	200-375	200-300	150-275	225-400	225-450
Titanium - CP	Commercially Pure	150-300	200-400	---	200-300	250-500	---
Titanium - Alloys	6AL-4V, 5AL-2.5SN	100-200	100-225	---	100-250	150-275	---
Nickel / Cobalt Alloys	Monel, Invar, Kovar	100-250	100-300	---	100-300	100-300	---
High Temp Alloys	Inconel, Hastelloy, A286	75-150	100-150	---	75-200	100-200	---
Cast Iron 150-325 BHN	Class 20, 30, 35, 40	200-300	200-600	---	100-300	250-600	---
Cast Iron 375-450 BHN	Class 50, 55, 60	150-250	150-450	---	100-250	200-500	---
Alloy / Ductile Iron	60-40-18, 80-55-06	100-250	150-400	200-400	100-300	250-450	300-500

Threading Guidelines For CNC Lathes

1. *Start near the top of the SFM range for the material being threaded.*

Higher *SFM* reduces Built-up Edge, the major cause of poor tool life in threading. For Harder or more Abrasive Materials start in the Middle of the SFM range. Once setup is complete *SFM* can be adjusted for optimum tool life. Tough Micrograin Grade *310* reduces insert chipping from edge build-up at lower *SFM* and on parts under 1" Diameter.

Formulas to calculate *Revolutions Per Minute* (RPM) and *Surface Feet Per Minute* (SFM) :

***RPM* = *SFM* x 12 *Divided by Part Diameter* x 3.1416**
SFM* = 3.1416 x *Part Diameter, Divided by* 12 x *RPM

2. *Use the* G76 *Threading Cycle with Fanuc, Yasnac and similar CNC controls.*

If ***P1, P2, P3, & P4*** parameters are available, use ***P1*** for most applications. ***G76*** - ***P1*** removes equal amounts of material with every pass. ***P2*** alternates between front & back cutting edges and should only be used on 6 tpi & coarser threads.

3. *Set Depth of Cut for the First Pass at 20% to 30% of the Thread Height* Per Side.

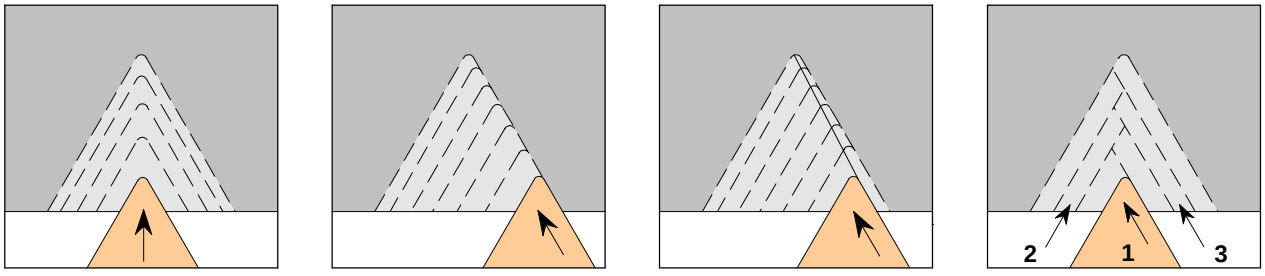
G76 controls the depth of cut for the remaining passes. To find the *DOC* for the 1st Pass multiply the *PITCH* by *.6* to get the approximate *THREAD HEIGHT.* Multiply *THREAD HEIGHT* by *20 - 30%* to get the *DEPTH* of the 1st Pass. Use less than *20%* when threading hard materials or larger thread pitches. *Don't use "Spring Passes" under .002 DOC Per Side!*

Example for calculating the *DOC* for the first pass on a 1/2-20 thread:

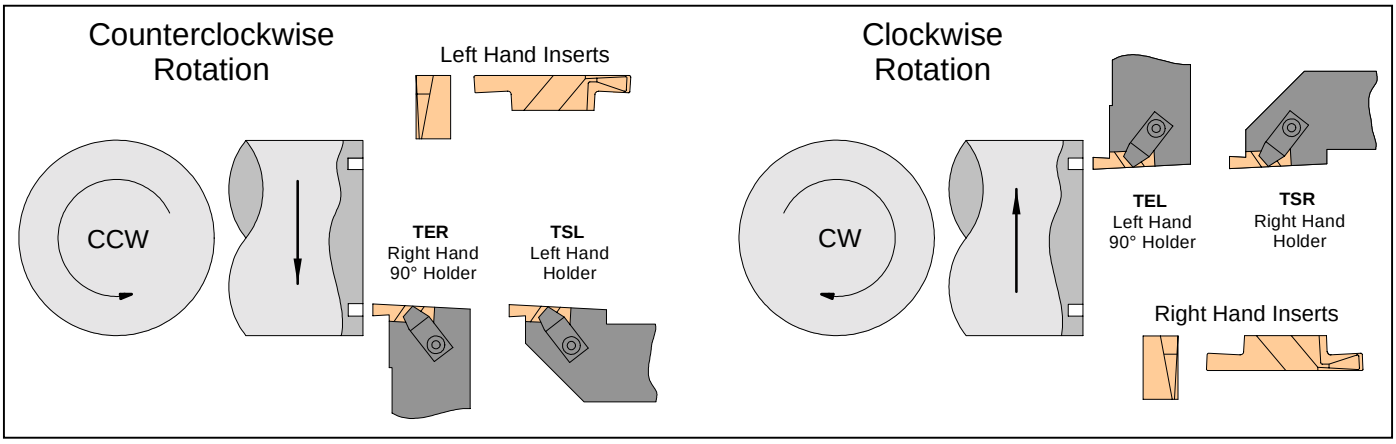
1" ÷ 20 = .050 PITCH), (.050 x .6 = .030 (THREAD HEIGHT), .030 x .3 = .009 (DEPTH OF 1st PASS)

4. *Use the A55 Parameter to set the Infeed Angle.*

Most CNC Lathe Controls offer a choice of ***A60, A55, A30*** & ***A29***. ***A60*** is the default setting. ***A55*** is equivalent to setting the compound feed on a manual lathe to 27.5°. In most applications ***A55*** will double or triple tool life over ***A60***. See below:



Radial Feed | **Flank Feed - A60** | **Mod. Flank Feed - A55** | **Alternating Feed - P2**



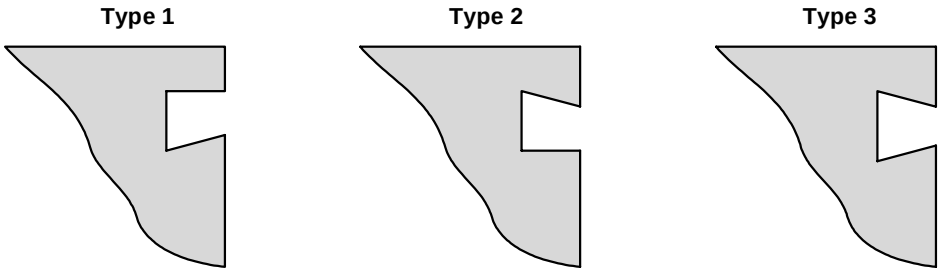
Counterclockwise Spindle Rotation is the recommended method for most face grooving applications

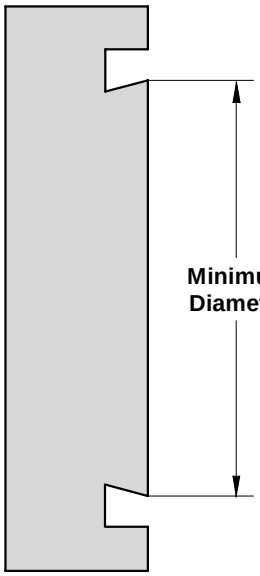
Horizon Face Grooving Inserts					
Specials	**Standards**	**Insert**	**W**	**E - Max. Depth**	**Min. Groove Dia.**
Chip Curler Full Nose Radius Knife Edge Dovetail	HF xxxxL W E 12° TO 18° HFD xxxxL W E 12°	**HF 3062L or R**	.062	.125	1.000
		HF 3072L or R	.072	.125	1.000
		HF 3094L or R	.094	.185	1.000
		HF 3098L or R	.098	.185	1.000
		HF 3110L or R	.110	.185	1.125
		HF 3125L or R	.125	.185	1.125
		HF 3156L or R	.156	.185	1.200
		HF 3189L or R	.189	.185	1.200
		HF 4250L or R	.250	.255	2.250
		HFD 3125L or R	.125	.250	1.875
		HFD 4189L or R	.189	.375	2.250
		HFD 4250L or R	.250	.500	2.250

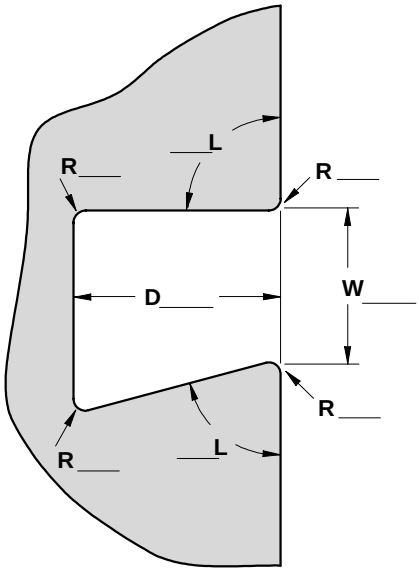
TiALN Coated Micrograin Grade 310 is the 1st Choice for most Face Grooving applications. In Stainless and Softer Steels start at 300 SFM and .0005 to .002 Feed; Titanium, Inconel & other High Temp Alloys start at 100 - 150 SFM and .0005 to .0015 Feed. Use Uncoated Grade C23 for Aluminum, Copper and Plastics at higher Speeds and Feeds.

Standard Grooving Inserts can be used for Larger Diameter Face Grooving without Modification			
Insert	**Insert Width**	**Maximum Groove Depth**	**Minimum Groove Diameter**
HG 20xxL or R	Under .047	.055	2.125
HG 20xxL or R	.047 to .062	.080	2.750
HG 20xxL or R	.062 and up	.115	3.500
HG 30xxL or R	Under .047	.055	2.125
HG 30xxL or R	.047 to .062	.080	2.750
HG 30xxL or R	.062 to .094	.115	3.500
HG 30xxL or R	.094 to.125	.192	6.00
HG 31xxL or R	.125 and up	.205	6.500
HG 4125L or R	.125	.205	7.250
HG 4156L or R	.156	.205	7.250
HG 4189L or R	.189	.255	8.250
HG 4250L or R	.250	.255	8.250

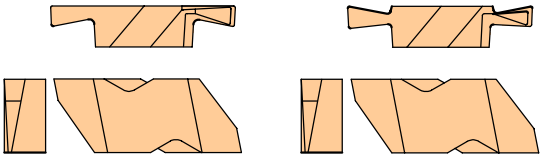
DOVETAIL FACE GROOVING



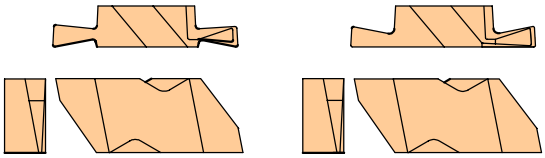


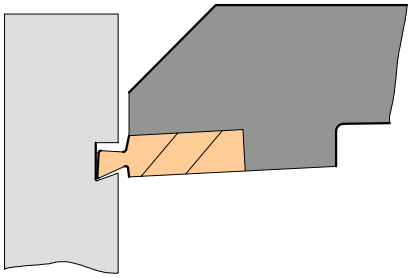


Left Hand Inserts for Counterclockwise Rotation



Right Hand Inserts for Clockwise Rotation





CORRECT
Ramp in with
Multiple Passes

WRONG
Can Result in
Insert Breakage

Infeed for Dovetail Face Grooving

Dovetail Face Grooves are used in the High Vacuum and Hydraulic Industries to retain O-Ring Seals in Plates and Flanges. There is no Industry Standard for these types of grooves. Dovetail Grooving Inserts are made to Print. Horizon Stocks a number of Special Inserts in frequently used sizes. Call for availability.

TiALN Coated Grade 310 is the First Choice for Face Grooving tough materials. Start at 150 to 300 SFM with a Feed Rate of .0005 to .001 Per Rev. Ramp into the cut as shown above. For best results machine an entry groove with a Standard Face Grooving Insert the width of the top of the Dovetail Groove.

Horizon	Tool-Flo®	Kennametal®	RTW®	Valenite®	Sandvik® **	Mitsubishi®	Insert Style
Notch Style Grooving Inserts							
HF	FLF	NF	---	---	TLF	EF	Face Grooving
HFD	FLFD	NFD	---	---	---	EFD	Deep Face Grooving
HG	FLG	NG	PG	VLG	TLG	EG	ID or OD Grooving
HG RK-LK *	FLG CB *	NG RK-LK *	PG RK-LK *	---	---	EG RK-LK *	With Chipbreaker *
HGD	FLGD	NGD	PGD	---	---	EGD	Deep Grooving
HGD RK-LK	---	NGD RK-LK *	PGD RK-LK *	---	---	---	Deep Grooving Chipbrker *
HGP	FLGP	NGP	---	VLGP	TLGP	EGP	Positive Grooving
HP	---	NP	---	---	---	EP	Back Turning
HR	FLR	NR	PR	VLR	TLR	EGR	Full Nose Radius
HRP	FLRP	NRP	PRP	VLRP	TLRP	---	Positive Full Nose Radius
HU	FLU	NU	---	---	TLU	---	45° Undercutting
HV	FLV	NV	---	---	TLV	---	Poly-V 40°
Notch Style Threading Inserts							
HA	FLA	NA	PA	VLA	TLA	---	Acme
HAS	FLAS	NAS	PAS	VLAS	TLAS	---	Stub Acme
HDC	FLDC	NDC	PDC	VLDC	TLDC	---	NPT Full Profile
HJ	FLJ	NJ	---	---	TLJ	---	UNJ
HJF	FLJF	NJF	---	---	TLJF	---	UNJ Fine Pitch
HT	FLT	NT	PT	VLT	TLT	ET	60° V Partial Profile
HTB	FLTB	NTB	---	---	TLTB	---	American Buttress
HTC	FLTC	NTC	PTC	---	TLTC	---	60° V Full Profile Topping
HTF	FLTF	NTF	PTF	VLTF	TLTF	---	60° V Fine Pitch
HTK	FLTK	NTK	PTK	VLTK	TLTK	---	60° V Fine Pitch Positive
HTP	FLTP	NTP	PTP	VLTP	TLTP	---	60° V Positive
Notch Style Profiling Inserts							
DPGR	DPGR	DPGR	---	---	---	---	55° Profiling
HPL	FLPL	NPL	---	---	---	---	LH 55° Profiling
HPR	FLPR	NPR	---	---	---	---	RH 55° Profiling
VPGR	VPGR	VPGR	---	---	---	---	35° Profiling

* Horizon **RK-LK** Style Inserts have ground-in 15° to 18° positive rake "Chip Curlers" with sharp edges for free cutting action in tough materials. Competitive Grooving Inserts have molded chipbreakers designed for Steel. See page 41

** TopLock® style Inserts available on Special Order. Industry Standard Inserts fit Sandvik TL® holders by changing to Kennametal® style insert clamps. See Pages 31 - 33 for replacement clamps.

Horizon	Tool-Flo®	Kennametal®	RTW®	Vardex®	Sandvik®	SecoCarboloy®	Insert Style
Laydown Threading Inserts							
11NR	11NR	LT11-NR	11NR	2IR	R166.0I-11	11NR	1/4" IC RH INTERNAL
11NL	11NL	LT11-NL	11NL	2IL	L166.01-11	11NL	1/4" IC LH INTERNAL
16ER	16ER	LT16-ER	16ER	3ER	---	16ER	3/8" IC RH EXTERNAL
16EL	16EL	LT16-EL	16EL	3EL	---	16EL	3/8" IC LH EXTERNAL
16NR	16NR	LT16-NR	16NR	3IR	---	16NR	3/8" IC RH INTERNAL
16NL	16NL	LT16-NL	16NL	3IL	---	16NL	3/8" IC LH INTERNAL
22ER	22ER	LT22-ER	22ER	4ER	---	22ER	1/2" IC RH EXTERNAL
22EL	22EL	LT22-EL	22EL	4EL	---	22EL	1/2" IC LH EXTERNAL
22NR	22NR	LT22-NR	22NR	4IR	---	22NR	1/2" IC RH INTERNAL
22NL	22NL	LT22-NL	22NL	4IL	---	22NL	1/2" IC LH INTERNAL
27ER	---	---	27ER	5ER	---	27ER	5/8" IC RH EXTERNAL
27EL	---	---	27EL	5EL	---	27EL	5/8" IC LH EXTERNAL
27NR	---	---	27NR	5IR	---	27NR	5/8" IC RH INTERNAL
27NL	---	---	27NL	5IL	---	27NL	5/8" IC LH INTERNAL

HORIZON RK - LK "CHIP CURLER" GROOVING INSERTS

15° to 18° Positive Rakes Lower Cutting Forces and Reduce Built-Up Edge Problems

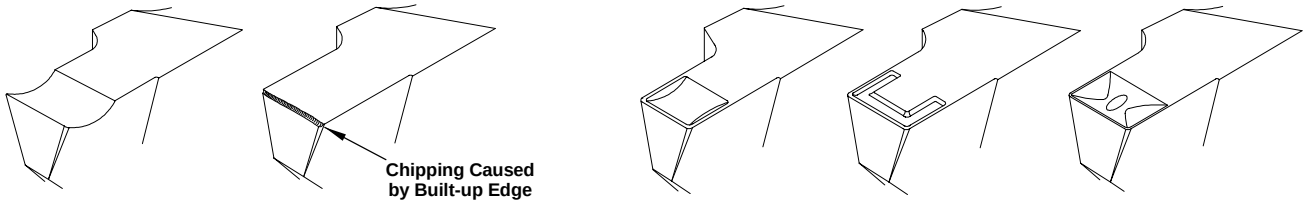
Sharp Cutting Edges for Tough, Gummy Materials like Stainless, Titanium and Inconel®

Free Cutting Action - Great for Small Diameters and Thin Walled Parts

Uncoated Inserts for Aluminum and Plastics have Polished Chip Curlers

Available in Standard Depth, Deep Depth and Face Grooving Inserts

Chip Curler Inserts ***Standard Inserts*** ***Competitive Chipbreaker Inserts***

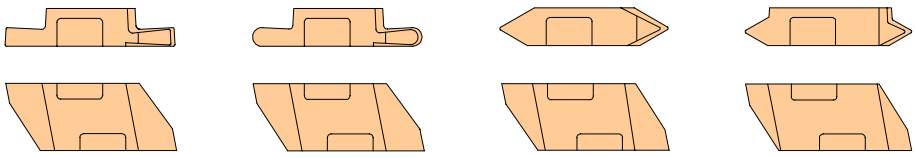


Horizon Precision Ground "Chip Curler" Inserts prevent Edge Built-up in tough, gummy materials. Sharp, positive rake edges lower cutting forces providing easy chip flow.

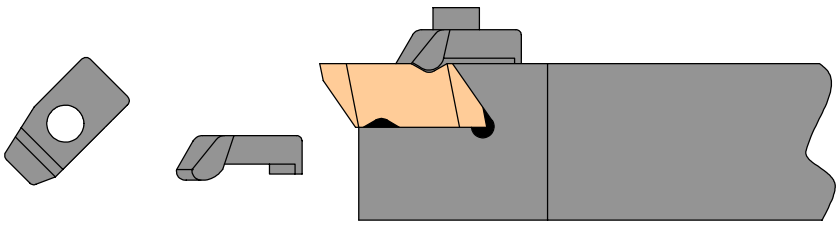
Recommended Feeds for tough materials - .0005 to .003 IPR. Softer Materials can be machined at higher feeds. Uncoated Inserts for Aluminum and Plastic have polished rakes.

Molded Chipbreaker Inserts are designed for machining Medium to High Carbon Steels at feed rates over .005 per rev. Most of these Inserts have a .003 to .010 wide land in front of the chipbreaker.

The area of chip contact rarely exceeds the land width at feeds under .005 IPR. At lighter feed rates performance difference is minimal between chipbreaker Inserts and standard flat top styles.



Threading and Grooving Inserts are available with TL® Style Notches on Special Order



Changing Clamps allows the use of Industry Standard Inserts in TL® Holders - See pages 31 - 33

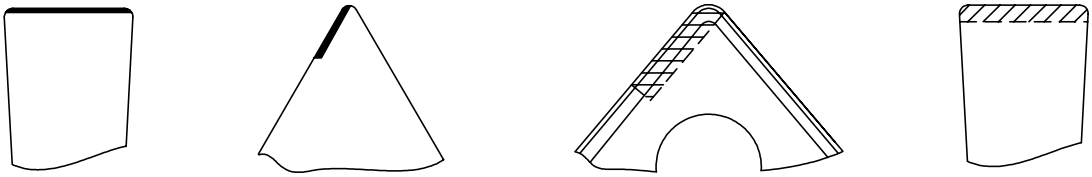
GRADE COMPARISONS

RETURN TO INDEX

Horizon	Tool-Flo®	Kennametal®	Valenite®	Sandvik®	Carboloy®	RTW®	Applications
Uncoated Grades							
C10	***GFI C22***	K6	***VC101***	S6 (Low SFM)	---	***CQ22***	Tough Grades for low SFM in most materials. Good for interrupted cuts.
C20	***C22 C25***	***K6*** K68	***VC2***	***H13A***	***883 HX***	CQ2	General Purpose C2 Grades for Non-ferrous materials and Cast Iron .
C23 C23J	***C25 C3***	***K68 K313***	VC2 ***VC29***	H10A ***H13A***	883 ***890 HX***	CQ2 ***CQ23***	C2-C3 Grades for Non-ferrous materials such as Aluminum Copper & Plastic.
C56	***C56H C6H***	***K420***	VC5 ***VC56***	S6	350 ***370 S25M***	CY16	C5-C6 Grades for Carbon & Alloy Steels.
HCC	***MP3*** MP6	***KT175***	VC67	GC525	---	---	C7-C8 Ceramet Grades for high speed finishing in Steels.
PVD Coated Grades							
110	G4, ***GP4***	***KC720*** KC5025	V1N ***VC901***	---	CP50	---	Tough Coated C1 / C5 Grades for low SFM in most materials.
120	***GP25***	KC720	VC901 VN2	---	---	R302 027	General Purpose TIN Coated C2 Grades for Non-ferrous materials
123	***GP22 GP25*** GP3	***KC730***	VC901 ***VC929***	1015 1025	CP30 CP50	***R321***	Coated C2-C3 Non-ferrous Grades. Also for light cuts in Steel & Stainless.
156	***GP50*** GP5 GP6	***KC710***	SV230 VN5 VN7	1025 225 2135	CP30	716 ***621***	Coated C5-C6 Grades for Carbon & Alloy Steels.
310	AP22 AP25 ***AP3***	KC720 ***KC5025***	VC901 V1N	2135 225	CP50 CP200	---	Tough coated C1-C2 / C5 Grades for a wide range of materials at moderate speeds and feeds.
323	***AP22 AP25 AP3*** GP25 GP3	KC730 KC732 ***KC5010 KC5025 KC7310***	VC901 VC929	1005 1015 1025 3020	CP50 CP200	***R323***	Coated C2-C3 / C6-C7 Grades for 300 Series Stainless, High Temp Alloys & Titanium.
323F	***AP22 AP25 AP3*** GP25 GP3	KC730 KC732 ***KC5010 KC5025 KC7310***	VC901 VC929	1005 1015 1025 3020	CP30 - CP50 CP200	***R323***	Coated C2-C3 / C6-C7 Grades for 300 Series Stainless, High Temp Alloys & Titanium.
323G	***AP22 AP25 AP3*** GP25 GP3	KC730 KC732 ***KC5010 KC5025 KC7310***	VC901 VC929	1005 1015 1025 3020	CP50 CP200	***R323***	Coated C2-C3 / C6-C7 Grades for 300 Series Stainless, High Temp Alloys & Titanium.
356	***AP50 AP5 AP6***	KC710 KC810 KC850 KC5025	SV210 VN7 SV230	1015 1025 225 2135	CP50	716	Coated C5-C6 Grades For Carbon & Alloy Steels plus 400 Series Stainless Steels.
CVD Coated Grades							
423	G22	KC732	V1N VN2 SV210	1015 1025 3020	---	027	CVD TIN coated C2-C3 / C7 Grades. For Non-Ferrous use & light cuts in Steel & Stainless.
456	G5 G53 G54	KC810 KC850	SV230	1025 225 2135	550	716 RC706	CVD TIN coated C5-C6 Grades for Carbon & Alloy Steels.
556	G53 G6	KC810 KC850 KC935	SV210 SV230	225 2135 4125	560 570	716 918 925 RC706 RC906	CVD Coated C5-C6-C7 Grades for Steels & Stainless at medium to high speeds.

These are Approximate Grade Conversions. ***Bold Type*** = Standard Horizon Grades and Competitive Equivalents.
For Best Results Please Call Horizon Carbide Tool for Grade Recommendations.
See Page 4 for More Information on Horizon Carbide Grades

Insert Heat and Wear Zones



Grooving | Threading & Finishing | Roughing | Steel Grooving

Feeds .0005 to .003 IPR
[1](Group 10 and 23 Grades)

Feed Rates over .005 IPR
[2](Group 56 Grades)

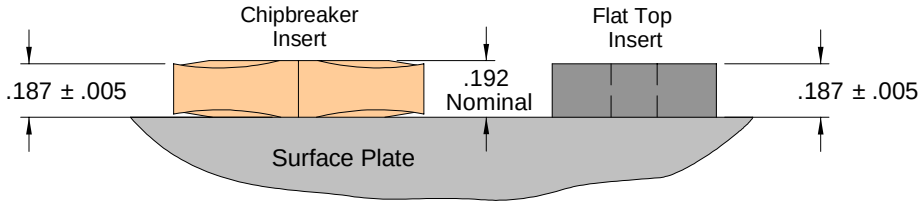
[1] Threading, Grooving and Finishing operations generate considerable heat at the cutting edge. The Inserts often cut through abrasive, work hardened surfaces. Carbide Grades for these applications need to have high heat and wear resistant edges.

[2] Steel Cutting Inserts have to absorb and dissipate the large volume of heat that develops behind the cutting edge where the chips start to curl. Cratering can occur in this area due to high cutting forces. Steel Grades have additives and/or coatings to provide crater resistance. These Grades generally have less heat and wear resistant cutting edges than the Grades used in finishing applications. The edges on Steel Cutting Inserts are usually honed to prevent chipping.

Carbide Groups					
Carbide Groups		**Uncoated**	**TIN Coated**	**TiALN Coated**	**Applications**
10	Tough, Chip Resistant C1 Micrograin Grades	*C10*	*110*	***310***	***C10*** C1 - High wear & chip resistance at very low speeds in most materials
					110 C1-C2/C5 - Increased tool life, reduced chipping from built-up edge
					310 C1-C2/C5 - Face Grooving - Small Diameter Threading and Grooving
23	Heat & Wear Resistant C2-C3 Micrograin Grades	***C23***	*123*	***323***	***C23*** C2-C3 - Non-Ferrous applications - ***C23J*** has polished chipbreakers
					123 C2-C3/C6 - TIN coating adds lubricity reducing edge build-up & chipping
					323 C2-C3/C7 - Heat & wear resistance in Threading, Grooving & Finishing
56	C5-C6 Crater Resistant Steel Cutting Grades	C56 non stock	*156*	***356***	***C56*** C5-C6 - Uncoated Special Order only - use coated Grades 356 or 156
					156 C5-C6 - For use where edge build-up is a problem with Grade 356
					356 C5-C6 - Steel Cutting Grade - moderate speeds, higher feeds than 323
PRIMARY GRADES - **1st choice for best results** *COMPLIMENTARY GRADES* - **For specific applications**					

Horizon Carbide - Standard Grade Application Ranges			
Wear Resistant Grades for Cast Iron and Non-Ferrous Materials plus Threading, Grooving and Finishing Applications			
C1 (K40 - K30)	**C2 (K25 - K20)**	**C3 (K15 - K10)**	**C4 (K05-K01)**
	323 - 323F - 323G		
	123		
	C23 - C23J		
310 *Threading & Grooving*			
110 *Threading & Grooving*			
C10 *Threading & Grooving*		**HCC** *Ceramet - Special Order*	
← **Increasing Toughness - Shock & Impact Resistance**		**Increasing Hardness - Heat & Wear Resistance** →	
Crater Resistant Grades for Steel & Stainless plus Wear Resistant Grades for Threading, Grooving and Finishing			
C5 (P50 - P35)	**C6 (P30 - P20)**	**C7 (P15 - P10)**	**C8 (P05 - P01)**
	323 - 323F - 323G *Threading, Grooving & Finishing*		
	123 *Threading & Grooving*		
	356		
	156		
310 *Threading & Grooving*			
110 *Threading & Grooving*		**HCC** *Ceramet - Special Order*	

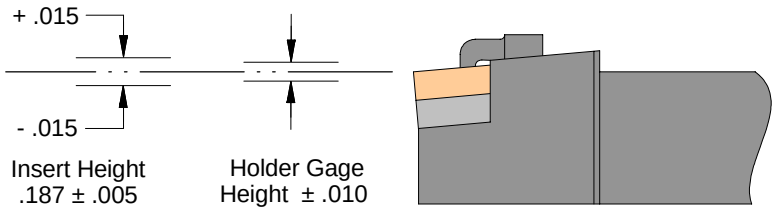
Cutting Edge Height vs. Insert Thickness



The Industry Standard thickness tolerance for "**G**" (ground) and "**M**" (molded) class Inserts is ± .005. This standard was established before the introduction of molded chipbreakers and creates confusion regarding double sided turning Inserts.

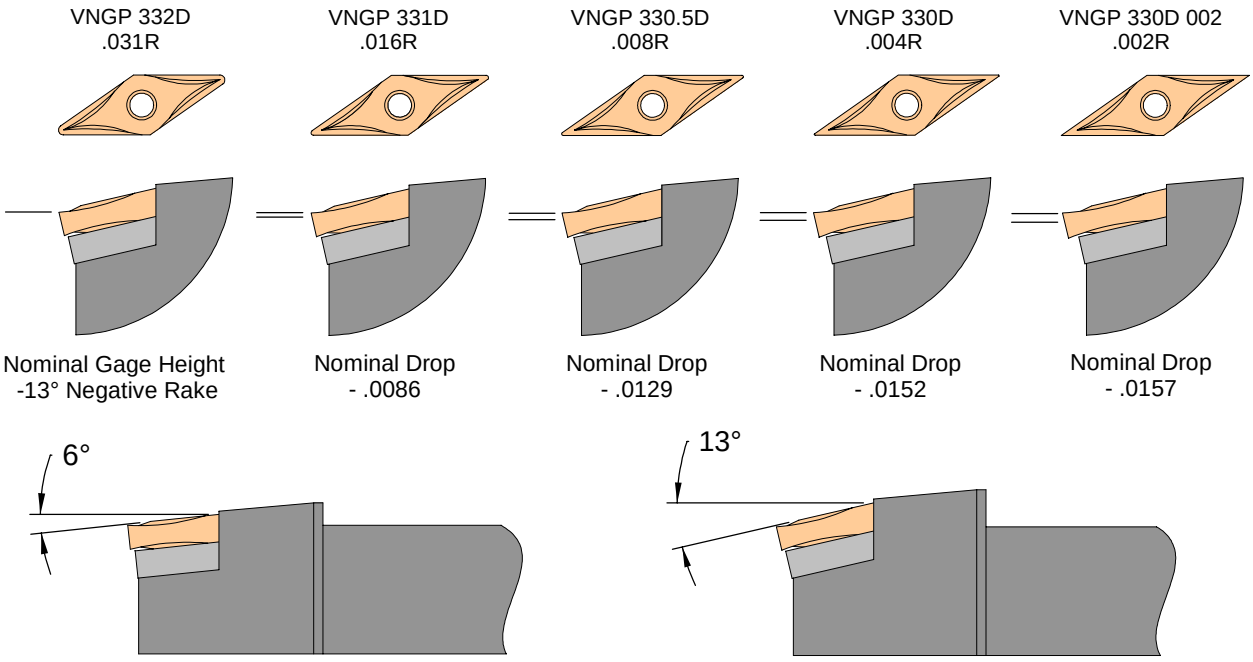
Negative rake chipbreaker Inserts are nominally thicker than flat top Inserts. An elevated pad on both sides of the Inserts keep the unused edges from contacting the tool holder or shim seat. The tolerance refers to the cutting edge height rather than the Insert thickness. The easiest way to measure the cutting edge height is with a height gage on a surface plate.

Tool Holder Insert Height



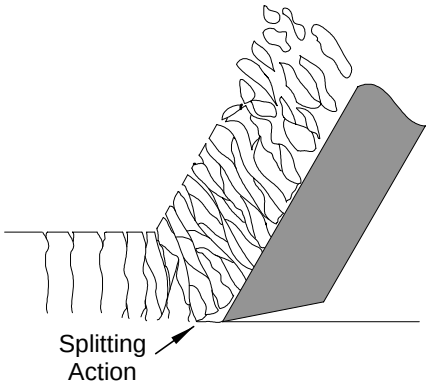
The Industry Standard for Insert height in tool holders is ± .010. This creates a Center Height range of .030 (± .015) when combined with the Insert tolerance of ± .005. For best results on smaller diameter parts and/or small nose radius Inserts the center height should be adjusted to a maximum of ± .001.

Insert Cutting Edge Height



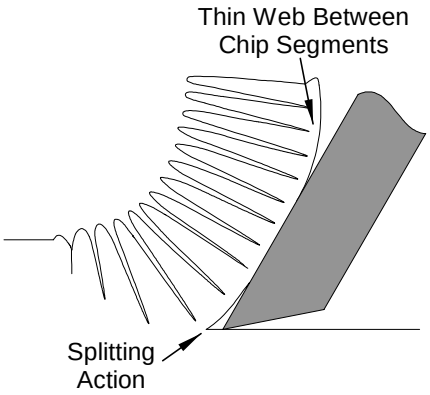
Insert heights for most negative rake tool holders are set using .031R Gage Inserts. There are no geometry standards for negative rake 35° tool holders. Insert rake angles vary between manufacturers and range from -6° to -13°. This causes problems with inserts having a nose radius other than .031R. Center Heights for smaller radius inserts drop due to the negative rake angles. The drop is significant with 35° and 55° Negative Rake inserts. Horizon DNGP and VNGP Inserts are ground to the low side of the height tolerance to reduce center height problems.

Chip Formation



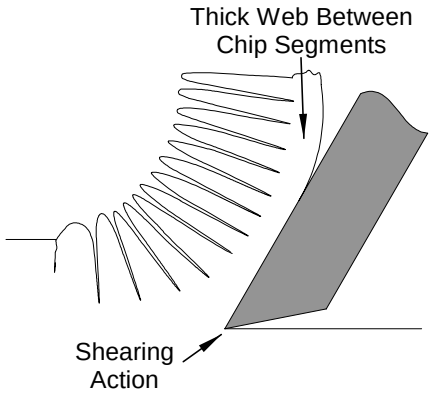
Cast Iron, Hard Brass and other materials that produce powdery chips

Chips begin breaking in front of the cutting edge. Chip controls is usually not a problem. Harder, more heat and wear resistant carbide grades such as 323 or 323F work well on these applications. Use sharp inserts for most Non-Ferrous materials. Most Cast Iron Inserts are honed to resist chipping. Abrasive flank wear is the primary failure mode.



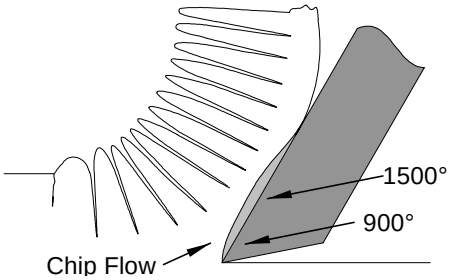
Carbon and Alloys Steels with Medium to High Carbon Content

1035, 1045, 1144, 4130, 4140, 4340 Carbon and Alloy Steels that contain at least .3% Carbon are hardenable by heating and quenching. The cutting action is similar to a wedge splitting wood. High pressure develops in the zone behind the cutting edge where chips start to curl. Cratering can occur in this area. Steel cutting grades and coatings help eliminate this problem.

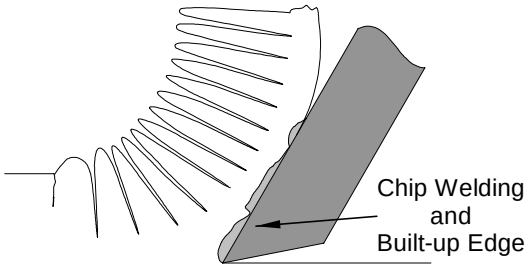


Low Carbon Steels, Stainless, Nickel Alloys, Titanium, Aluminum & Copper

Tough, gummy metals that need to be sheared. Chips are thicker and more difficult to break than those produced at the same feeds in Steel. Chip welding and edge build-up is a common problem in these materials. Sharp Inserts with positive rake chipbreakers work well in these applications. Horizon RK/LK style Grooving Inserts are recommended.

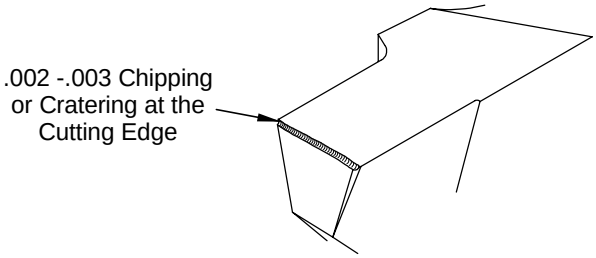


Under optimum cutting conditions, the underside of the chips soften to become almost fluid as they pass across the Insert. This helps chips flow easily out of the cut. The flow zone behind the cutting edge is where the highest heat and pressure develops. Cratering can also occur in this area.



Built-up edge occurs when the SFM is too low to generate enough heat to keep chips from pressure welding to the Insert. This results in poor finish and edge chipping. Increased SFM, positive rake geometry and coated Inserts reduce chip welding. Use grades 110 or 310 to resist chipping when the SFM can not be sufficiently increased .

A .002 to .003 wide area of chipping or cratering across the top face of a grooving Insert is usually an indication of edge build-up. In most instances increasing the SFM will correct the problem. Also check to insure that the tool is not running above center. Horizon RK / LK Chip Curler inserts help prevent build-up in tough, gummy materials.



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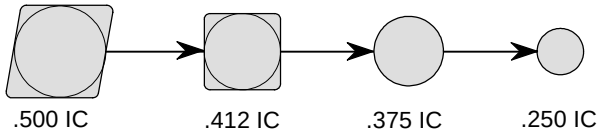

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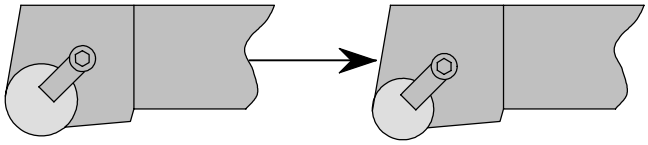

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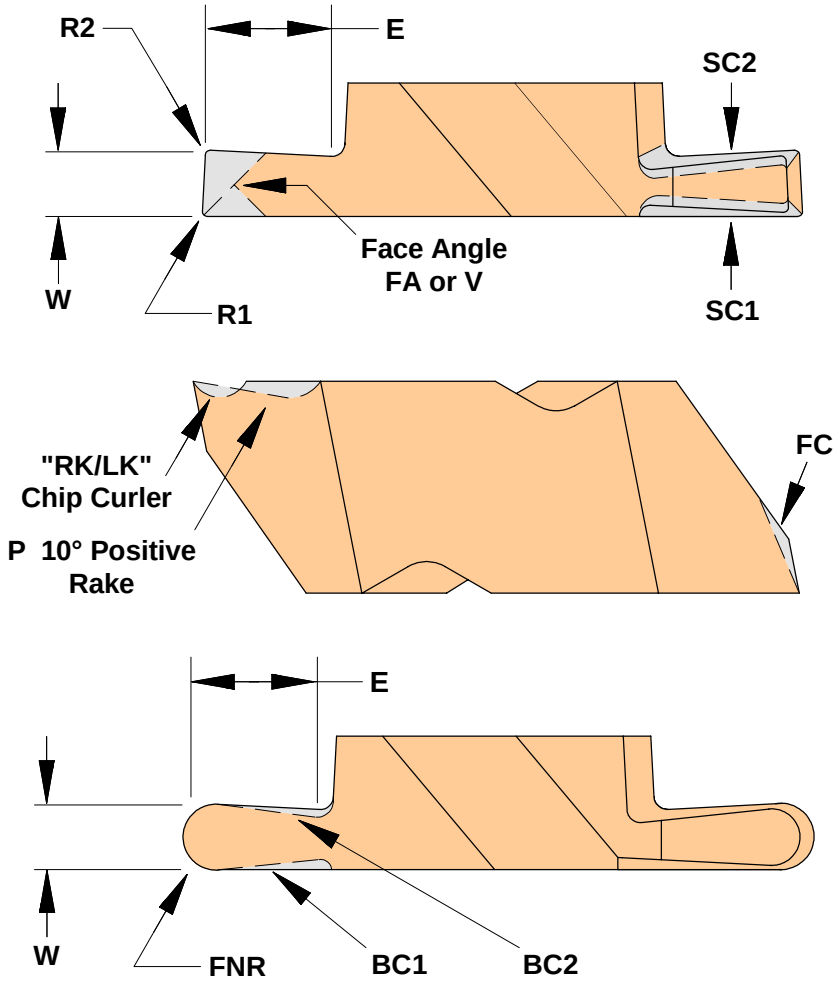

Quick Modifications Guide for Standard Threading and Grooving Inserts	
E - Back Distance or Maximum Depth of Cut	**FA** - Face Angle **
W - Width of Cut	**V** - Threading or Grooving Angle **
R1 - Outer Corner Radius *	**FC** - Increased Face Clearance Angle
R2 - Inner Corner Radius *	**SC1** - Outer Side Clearance Angle
FNR - Full Nose Radius **	**SC2** - Inner Side Clearance Angle
RK/LK - 10°- 20° Chip Curler - RH or LH Inserts **	**BC1** – Outer Back Clearance Angle *
P - 10° Positive Rake - Standard Rake is 5° **	**BC2** - Inner Back Clearance Angle *

* Width of Cut may change with modifications
** Width and/or Depth of Cut may change with modifications

Uncoated Inserts modified in 1 to 3 Working Days - Please add 3 to 10 Days for Coatings.

Horizon can provide inserts with any commercially available coating. Some coated Inserts can be re-coated after modification: PVD TIN can be re-coated with TIN, TiCN or TiALN coatings: TiALN coated Inserts can be re-coated with PVD TIN. Note: PVD re-coating can chip or flake off due to excess coating thickness. Performance is not guaranteed on recoated inserts.

Some Insert modifications don't require re-coating. Aside from cosmetics, the removal of PVD coating from the periphery of a Carbide Insert has minimal effect on it's performance in most applications so long as the coating on the Top Surface of the Insert remains intact.

Please Contact Horizon Carbide Tool for Price and Delivery on Modified Standard Inserts

RETURN TO INDEX

SPECIAL TOOLING REQUEST FORM

Fax or Send Request to:

HORIZON CARBIDE TOOL, INC.

2404 S. Industrial Park Ave. Tempe, AZ 85282
(480) 968-0957 Fax (480) 968-8042
E-mail info@horizoncarbide.com

Date _____ Page ____ Of ____

Company Name _____ Phone _____

Contact _____ Fax _____

Address _____ Pager or VM _____

City _____ State ____ Zip _____ E-mail _____

Horizon Distributor _____ Contact _____

Machine Information

Turning ____ Milling____ Machine Make & Model _____

Age & Condition _____ HP _____ Max RPM _____ Max Table Feed - IPM _____

Limitations _____ Coolant - Dry ____ Wet ____ Type _____

Fixturing / Workholding _____

Additional Information _____

Part Information

Description _____

Material _____ Condition _____

Hardness (Rc) _____ Tolerance _____ Surface Finish Requirements _____

Tool Information

Tool Description _____

Shank Size / Description _____ Right or Left Hand Cutting _____

Current Tooling _____

Special Tool Holder Requirements _____ Quantities to be Quoted _____

Current Problem or Objective _____

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Please Attach Drawings of Your Parts and Special Tooling.
You can also E-mail us SolidWorks or DXF-DWG CAD Files.