



microscope

Micro Tools For Small Bores



METRIC

microscope

New Family of Micro Single Ended Tools

The **Microscope** line by Vardex offers new and improved solutions for Micro threading, boring and grooving in bores as small as 1.0 mm.

The **Microscope** line offers a large range of new single-ended inserts and a full range of tool holders with a simple clamping system.

Improved Coolant Thru

Two coolant holes for effective chip removal and cooling of cutting edge

New Slanted Insert Design

Provides exact insert location for high repeatability

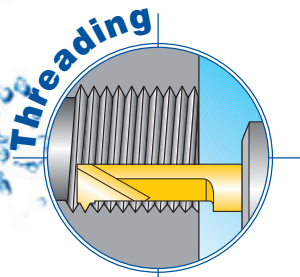
Simple Clamping System

Simple and fool-proof, the new clamping system uses one large screw to secure the insert in the holder

Stopper Pin

Provides precise cutting edge height and perfect axial location

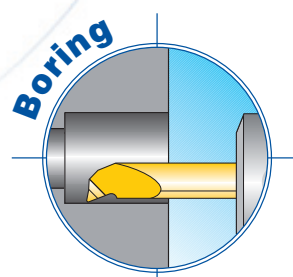
Applications



- ISO
- UN
- Whitworth
- NPT
- Partial 60°
- Partial 55°



- Square
- Round
- Internal Face Grooving
- External Face Grooving



- Bore
- Copy Long Nose

A New and Improved Grade for the Micro Line

VBX

A tough sub-micron substrate with TiCN coating for general use, VBX provides good fracture toughness and excellent wear resistance



Download the latest version at
www.vargus.com

microscope Insert Ordering Code

M	5	42	TH	0.5	ISO	L16	R/L	VBX
1	2	3	4	5	6	7	8	9

1 - Product Line	2 - Insert Size	3 - Min. Bore dia. (mm)
M - Microscope	4, 5, 6, 7	1.7, 2.2, 3.2,.....

4 - Type of Application	5 - Pitch (for Threading)	6 - Threading Standard
TH-Threading	Full Profile - Pitch Range	ISO - ISO Metric
BC-Boring	mm	UN - American UN
CL-Copy Long Nose	0.5 - 1.5	W - Whitworth for BSW, BSP
GS-Grooving Square	Partial Profile - Pitch Range	NPT - NPT
GR-Grooving Round	mm	60° - Partial Profile 60°
FG-Face Grooving Internal	A 0.5 - 1.5	55° - Partial Profile 55°
FP-Face Grooving External	F 0.5 - 1.0	
PP-Pre Part Off		
	5 - Width/Radius (for Grooving)	
	Width	Radius
	1.0-3.0(mm)	0.5-1.0(mm)
	5 - Nose Radius (for Boring)	
	0.1, 0.15, 0.2 (mm)	

7 - Overhang Length (mm)	8 - RH or LH	9 - Carbide Grade
L16, L20...	R - RH L - LH	VBX

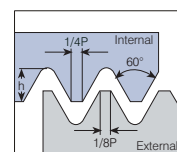
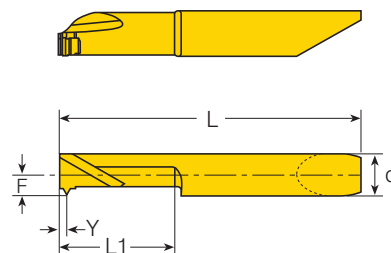
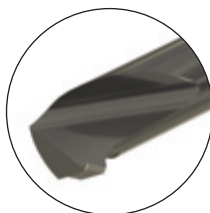
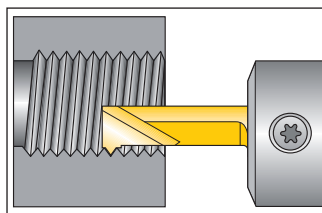
microscope Toolholders Ordering Code

MH	C	16	-	7
1	2	3		4

1 - Product Line	2 - Cooling	3 - Shank Size (mm)	4 - Insert Size (mm)
MH - Microscope Holder	C - Coolant Thru	10, 12, 16, 20	4, 5, 6, 7

Threading

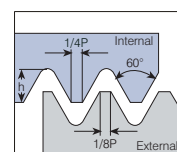
Internal



Tolerance class: 6g/6H
Defined by: R262 (DIN 13)

ISO Metric

Thread	Insert dia. d(mm)	Pitch (mm)	Ordering Code RH / LH	L1	L	F	Y	h(min)	Min. Bore dia. mm	Holder
M4x0.5	4.0	0.5	M429TH 0.50ISO L16R/L	16	33	0.9	0.4	0.29	3.4	MHC ...-4
M5x0.5		0.5	M439TH 0.50ISO L16R/L			1.9	0.4	0.29	4.4	
M4x0.7		0.7	M429TH 0.70ISO L16R/L			0.9	0.5	0.41	3.2	
M5x0.8		0.8	M429TH 0.80ISO L16R/L			0.9	0.6	0.46	4.0	
M6x1		1.0	M439TH 1.00ISO L16R/L			1.9	0.7	0.58	4.8	
M5.5x0.5	5.0	0.5	M542TH 0.50ISO L16R/L		41	1.7	0.4	0.29	4.9	MHC ...-5
M5.5x0.75		0.75	M542TH 0.75ISO L16R/L			0.6	0.43	0.43	4.6	
M7x1		1.0	M549TH 1.00ISO L16R/L			2.4	0.7	0.58	5.8	
M6x0.5	6.0	0.5	M649TH 0.50ISO L16R/L		42	1.9	0.4	0.29	5.4	MHC ...-6
M6.5x0.75		0.75	M649TH 0.75ISO L16R/L			0.6	0.43	0.43	5.6	
M7.5x1		1.0	M659TH 1.00ISO L16R/L			0.7	0.58	0.58	6.3	
M8x1.25		1.25	M659TH 1.25ISO L16R/L			2.9	0.9	0.72	6.5	
M10x1.5		1.5	M659TH 1.50ISO L16R/L			1.0	0.87	0.87	8.3	



Tolerance class: 2A/2B
Defined by: ANSI B1.1:74

American UN

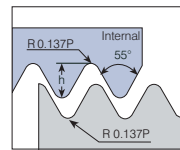
Thread	Insert dia. d(mm)	Pitch	Ordering Code RH / LH	L1	L	F	Y	h(min)	Min. Bore dia. mm	Holder
8-32 UNC	4.0	32	M429TH 32UN L16R/L	16	33	0.9	0.6	0.46	3.3	MHC ...-4
10-28 UNS		28	M429TH 28UN L16R/L			0.9	0.65	0.52	3.6	
1/4"-27 UNS	5.0	27	M549TH 27UN L16R/L		41	2.4	0.75	0.54	5.3	MHC ...-5
1/4"-24 UNS		24	M542TH 24UN L16R/L			1.7	0.75	0.61	5.1	
1/4"-20 UNC		20	M542TH 20UN L16R/L			1.7	0.9	0.73	4.6	
5/16"-18 UNC	6.0	18	M659TH 18UN L16R/L		42	2.9	1.05	0.81	6.3	MHC ...-6
3/8"-16 UNC		16	M659TH 16UN L16R/L			2.9	1.0	0.92	7.7	

Threading (Con't)



Whitworth for BSW, BSP

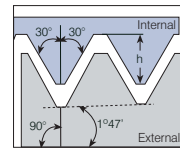
Tolerance class: Medium Class A
Defined by: B.S.84:1956, DIN 259,
ISO228/1:1982



	Insert dia.	Pitch	Ordering Code	Dimensions (mm)					Min. Bore dia.	
Thread	d(mm)		RH / LH	L1	L	F	Y	h(min)	mm	Holder
1/16"-28 BSP	6.0	28	M659TH 28W L16R/L	16	42	2.9	0.65	0.58	6.5	MHC ...-6
1/4"-19 BSP		19	M659TH 19W L16R/L			2.9	0.95	0.86	11.4	

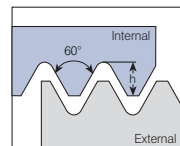
NPT

Tolerance class: Standard NPT
Defined by: USAS B2.1:1968



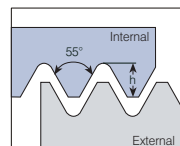
	Insert dia.	Pitch	Ordering Code	Dimensions (mm)					Min. Bore dia.	
Thread	d(mm)		RH / LH	L1	L	F	Y	h(min)	mm	Holder
1/16"-27 NPT	6.0	27	M659TH 27NPT L16R/L	16	42	2.9	0.75	0.66	6.1	MHC ..-6
1/4"-18 NPT		18	M659TH 18NPT L16R/L				1.00	1.01	10.7	

Partial Profile 60°



Insert dia.	Pitch		Ordering Code			Dimensions (mm)				Min. Bore dia.	
d(mm)	mm	tpi	RH / LH	R	L1	L	F	Y	h(max)	mm	Holder
4.0	0.5-1.0	48-24	M429TH F60 L16R/L	0.05	16	33	0.9	0.9	0.65	3.2	MHC ..-4
4.0	0.5-1.0	48-24	M439TH F60 L16R/L			33	1.9		0.65	4.2	MHC ..-4
6.0	0.5-1.5	48-16	M659TH A60 L16R/L			42	2.9		1.30	6.2	MHC ..-6

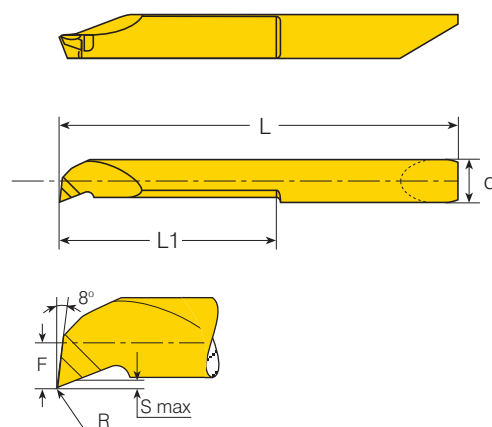
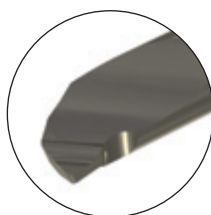
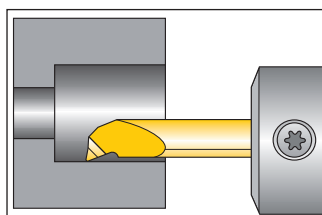
Partial Profile 55°



Insert dia.	Pitch		Ordering Code			Dimensions (mm)				Min. Bore dia.	
d(mm)	mm	tpi	RH / LH	R	L1	L	F	Y	h(max)	mm	Holder
4.0	0.5-1.0	48-24	M429TH F55 L16R/L	0.05	16	33	0.9	0.75	0.76	3.2	MHC ...-4
4.0	0.5-1.0	48-24	M439TH F55 L16R/L			33	1.9	0.75	0.76	4.2	MHC ...-4
6.0	0.5-1.5	48-16	M659TH A55 L16R/L			42	2.9	0.9	1.49	6.2	MHC ...-6

Boring

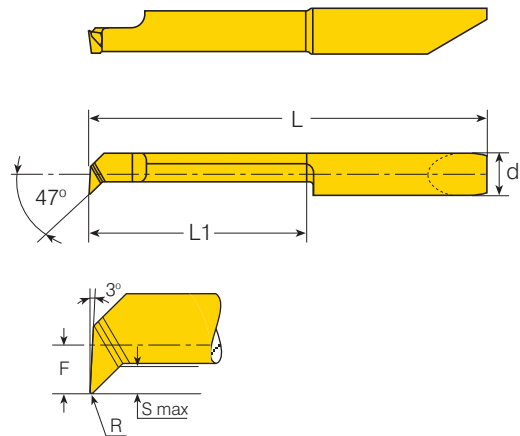
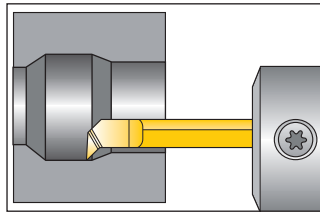
Internal



Insert dia.	Ordering Code	Dimensions (mm)					Min. Bore dia.	
d(mm)	RH / LH	R	L1	L	S max	F	mm	Holder
4.0	M410BC R10 L06R/L	0.1	6	28	0.15	0.49	1.0	MHC ...-4
	M415BC R10 L09R/L		9	28		0.69	1.5	
	M417BC R10 L09R/L		9	28		0.70	1.7	
	M422BC R10 L09R/L	0.1	9	28	0.15	0.95	2.2	
	M422BC R10 L14R/L		14	33				
	M432BC R15 L10R/L	0.15	10	28	0.15	1.45	3.2	
	M432BC R15 L16R/L		16	33				
	M432BC R15 L20R/L		20	39				
	M442BC R15 L10R/L	0.15	10	28	0.3	1.95	4.2	
	M442BC R15 L16R/L		16	33				
	M442BC R15 L21R/L		21	39				
	M442BC R15 L26R/L		26	45				
5.0	M552BC R20 L10R/L	0.2	10	35	0.5	2.45	5.2	MHC ...-5
	M552BC R20 L16R/L		16	41				
	M552BC R20 L21R/L		21	46				
	M552BC R20 L26R/L		26	51				
	M552BC R20 L30R/L		30	55				
	M552BC R20 L35R/L		35	60				
6.0	M662BC R20 L16R/L	0.2	16	42	0.5	2.95	6.2	MHC ...-6
	M662BC R20 L21R/L		21	47				
	M662BC R20 L26R/L		26	52				
	M662BC R20 L30R/L		30	56				
	M662BC R20 L35R/L		35	61				
	M662BC R20 L40R/L		40	66				
7.0	M772BC R20 L25R/L	0.2	25	51	0.5	3.45	7.2	MHC ...-7
	M772BC R20 L35R/L		35	61				
	M772BC R20 L40R/L		40	66				
	M772BC R20 L45R/L		45	71				
	M772BC R20 L50R/L		50	76				

Copy (Long Nose)

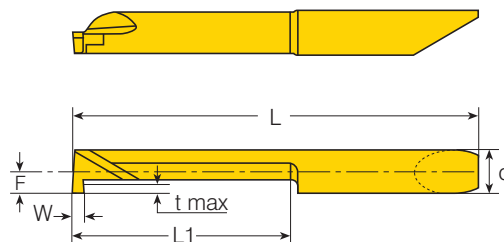
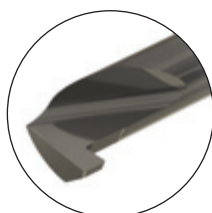
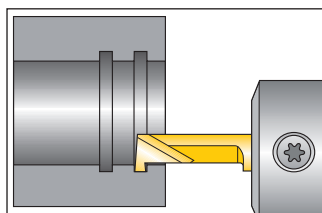
Internal



Insert dia.	Ordering Code	Dimensions (mm)					Min. Bore dia.	
d(mm)	RH / LH	R	L1	L	S max	F	mm	Holder
4.0	M442CL R15 L10R/L	0.15	10	28	0.75	1.95	4.2	MHC ...-4
	M442CL R15 L16R/L		16	33				
	M442CL R15 L21R/L		21	39				
5.0	M552CL R20 L16R/L	0.2	16	41	0.95	2.45	5.2	MHC ...-5
	M552CL R20 L25R/L		25	51				
6.0	M662CL R20 L16R/L	0.2	16	42	1.75	2.95	6.2	MHC ...-6
	M662CL R20 L21R/L		21	47				
	M662CL R20 L30R/L		30	56				

Square Groove

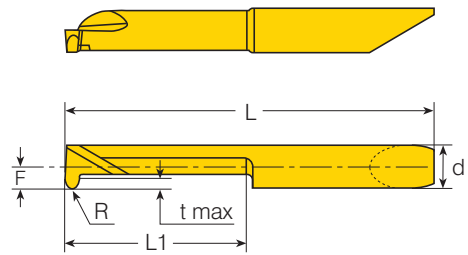
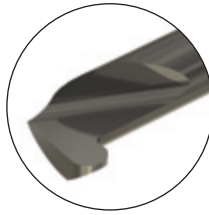
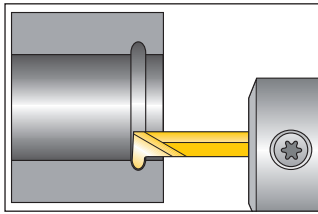
Internal



Groove Dimensions (mm)		Insert dia.	Ordering Code	Dimensions (mm)			Min. Bore dia.	
W±0.025	t max	d(mm)	RH /LH	L1	L	F	mm	Holder
1.0	0.8	4.0	M442GS W100 L10R/L	10	35	2.0	4.2	MHC...-4
			M442GS W100 L15R/L	15	41			
			M442GS W100 L20R/L	20	46			
1.0	1.0	5.0	M552GS W100 L10R/L	10	35	2.5	5.2	MHC...-5
M552GS W100 L15R/L			15	41				
M552GS W100 L20R/L			20	46				
1.5			M552GS W150 L10R/L	10	35			
			M552GS W150 L15R/L	15	41			
			M552GS W150 L20R/L	20	46			
2.0			M552GS W200 L10R/L	10	35			
			M552GS W200 L15R/L	15	41			
			M552GS W200 L20R/L	20	46			
1.0	1.8	6.0	M662GS W100 L10R/L	10	36	3.0	6.2	MHC...-6
			M662GS W100 L15R/L	15	42			
			M662GS W100 L20R/L	20	47			
			M662GS W100 L30R/L	30	56			
1.5			M662GS W150 L10R/L	10	36			
			M662GS W150 L15R/L	15	42			
			M662GS W150 L20R/L	20	47			
			M662GS W150 L30R/L	30	56			
2.0			M662GS W200 L10R/L	10	36			
			M662GS W200 L15R/L	15	42			
			M662GS W200 L20R/L	20	47			
			M662GS W200 L30R/L	30	56			
1.0	2.5	7.0	M772GS W100 L10R/L	10	36	3.5	7.2	MHC...-7
			M772GS W100 L15R/L	15	41			
			M772GS W100 L25R/L	25	51			
			M772GS W100 L35R/L	35	61			
1.5			M772GS W150 L10R/L	10	36			
			M772GS W150 L15R/L	15	41			
			M772GS W150 L25R/L	25	51			
			M772GS W150 L35R/L	35	61			
2.0			M772GS W200 L10R/L	10	36			
			M772GS W200 L15R/L	15	41			
			M772GS W200 L25R/L	25	51			
			M772GS W200 L35R/L	35	61			

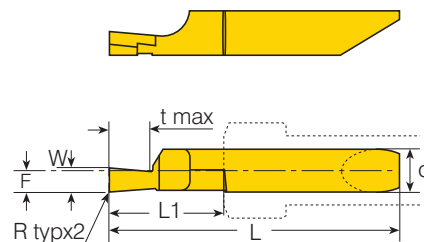
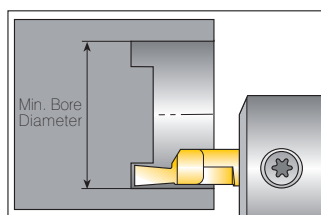
Round Groove

Internal



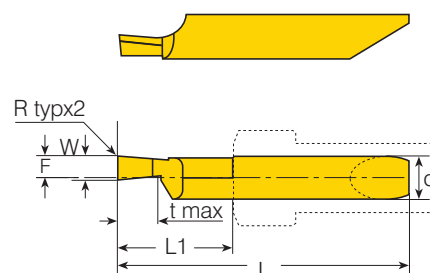
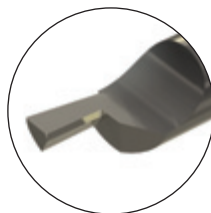
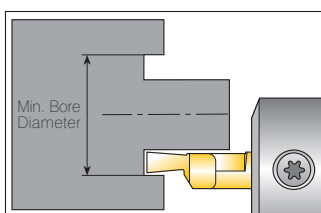
Groove Dimensions (mm)		Insert dia.	Ordering Code	Dimensions (mm)				Min. Bore dia.	Holder
W±0.025	t max	d(mm)	RH /LH	R	L1	L	F	mm	
1.0	0.8	4.0	M442GR R050 L15R/L	0.5	15	39	1.95	4.2	MHC ..-4
1.0	1.0	5.0	M552GR R050 L20R/L	0.5	20	46	2.45	5.2	MHC ..-5
1.5			M552GR R075 L20R/L	0.75		46			
2.0			M552GR R100 L20R/L	1.0		46			
1.0	1.8	6.0	M662GR R050 L25R/L	0.5	25	52	2.95	6.2	MHC ..-6
1.5			M662GR R075 L25R/L	0.75		52			
2.0			M662GR R100 L25R/L	1.0		52			

Face Grooving Internal



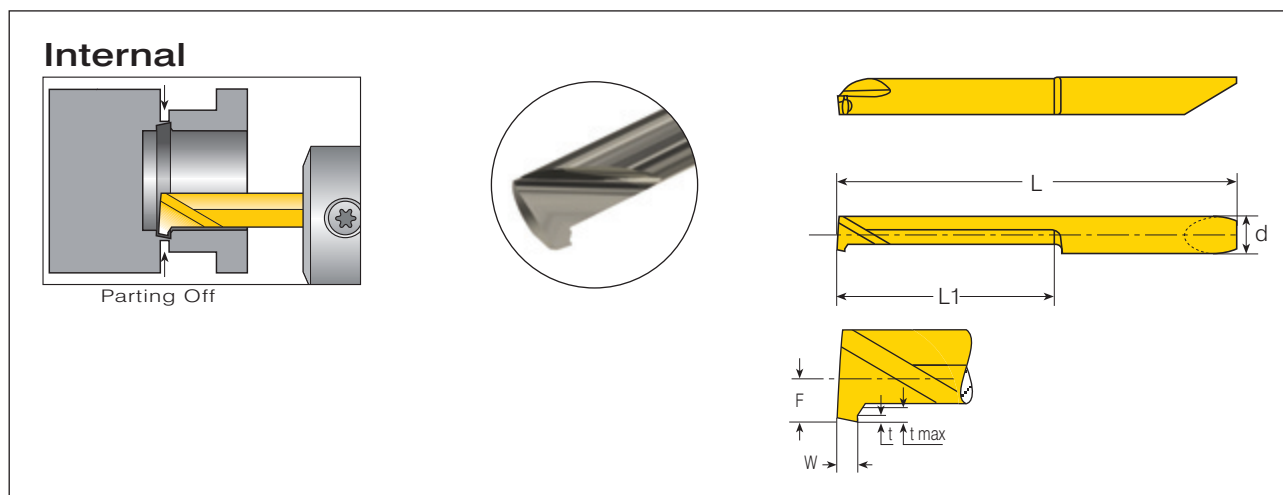
Groove Dimensions (mm)		Insert dia.	Ordering Code		Dimensions (mm)			Min. Bore dia.	Holder
W±0.025	t max	d(mm)	RH /LH	R	L1	L	F	mm	
1.0	2	6.0	M662FG W10 L15R/L	0.1	15	42	2.95	6.2	MHC ...-6
1.5	3		M662FG W15 L15R/L						
2.0	4		M662FG W20 L15R/L						
2.5	5		M662FG W25 L15R/L						
3.0	6		M662FG W30 L15R/L						

Face Grooving External



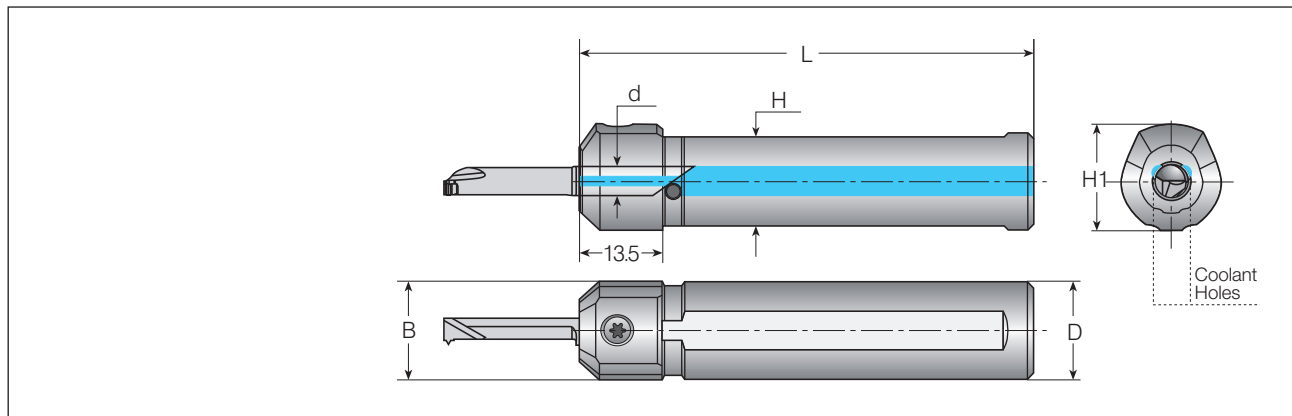
Groove Dimensions (mm)		Insert dia.	Ordering Code		Dimensions (mm)			Min. Bore dia.	Holder
W±0.025	t max	d(mm)	RH /LH	R	L1	L	F	mm	
1.0	2	6.0	M662FP W10 L15R/L	0.1	15	42	2.95	6.2	MHC ...-6
1.5	3		M662FP W15 L15R/L						
2.0	4		M662FP W20 L15R/L						
2.5	5		M662FP W25 L15R/L						
3.0	6		M662FP W30 L15R/L						

Pre-Part Off



Groove Dimensions (mm)		Insert dia.	Ordering Code	Dimensions (mm)			Min. Bore dia.	Holder
W	t max	d(mm)	RH /LH	t	L1	L	F	
1.0	0.7	5.0	M552PP W100 L15R/L	0.3	15	41	2.45	5.2
			M552PP W100 L20R/L		20	46		
			M552PP W100 L25R/L		25	51		
			M552PP W100 L30R/L		30	55		

Toolholders



						Spare Parts	
Insert Dia.	Ordering Code	Dimensions (mm)					
d(mm)		D=B	H1	H	L	Clamping Screw	Key
4.0	MHC 10-4	10	14	8.8	65	SL7DT15	KT15
	MHC 12-4	12	16	10.8	70		
	MHC 16-4	16	17.6	14.8	75		
	MHC 20-4	20	22	18.8	84		
5.0	MHC 10-5	10	14	8.8	65		
	MHC 12-5	12	16	10.8	70		
	MHC 16-5	16	18.6	14.8	75		
	MHC 20-5	20	22	18.8	84		
6.0	MHC 12-6	12	16	10.8	70		
	MHC 16-6	16	18.6	14.8	75		
	MHC 20-6	20	22	18.8	84		
7.0	MHC 16-7	16	18.6	14.8	75		
	MHC 20-7	20	22	18.8	84		

Threading Technical Data

Recommended Grades and Cutting Speeds V_c [m/min]

Material Group	Material	Hardness Brinell - HB	V _c [m/min]* VBX (Coated)
P Steel	Unalloyed steel	Low carbon (C=0.1-0.25%)	125
		Medium carbon (C=0.25-0.55%)	150
		High Carbon (C=0.55-0.85%)	170
	Low alloy steel (alloying elements ≤ 5%)	Non hardened	180
		Hardened	275
		Hardened	350
	High alloy steel (alloying elements > 5%)	Annealed	200
		Hardened	325
M Stainless Steel	Stainless steel Ferritic	Non hardened	200
		Hardened	330
	Stainless steel Austenitic	Austenitic	180
		Super Austenitic	200
	Stainless steel Cast Ferritic	Non hardened	200
		Hardened	330
	Stainless steel Cast austenitic	Austenitic	200
		Hardened	330
K Cast Iron	Malleable Cast iron	Ferritic (short chips)	130
		Pearlitic (long chips)	230
	Grey cast iron	Low tensile strength	180
		High tensile strength	260
	Nodular SG iron	Ferritic	160
		Pearlitic	260
N(K) Non-Ferrous Metals	Aluminium alloys Wrought	Non aging	60
		Aged	100
	Aluminium alloys Cast	Cast	75
		Cast & aged	90
	Aluminium alloys Cast Si 13-22%	Cast Si 13-22%	130
		Cast Si 13-22%	130
S(M) Heat Resistant Material	High temperature alloys	Annealed (Iron based)	200
		Aged (Iron based)	280
		Annealed (Nickel or Cobalt based)	250
		Aged (Nickel or Cobalt based)	350
	Titanium alloys	Pure 99.5 Ti	400Rm
		α+β alloys	1050Rm
H(K) Hardened Material	Extra hard steel	Hardened & tempered	45-50HRc
		Hardened & tempered	51-55HRc

*Minimum cutting speed for small holes should be 25 m/min.

Carbide Grade - VBX

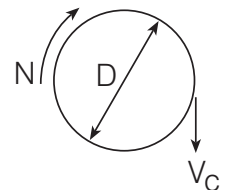


General use carbide grade for **Microscope** inserts. TiCN coated.

Calculation of N [RPM]

$$N = \frac{1000 \times V_c}{\pi \times D}$$

$$V_c = \frac{N \times \pi \times D}{1000}$$



N - Revolutions Per Minute [RPM]

V_c - Cutting Speed [m/min]

D - Workpiece Diameter [mm]

Number of Passes for Threading

Pitch	mm 0.50	0.75	1.00	1.25	1.50	1.75	2.00
	tpi 48	32	24	20	16	14	12
No. of Passes (Microscope)	6-9	6-11	6-12	8-14	9-15	11-18	11-18

Boring Technical Data

Recommended Grades, Cutting Speeds Vc [m/min], Feed f [mm/rev] and Max Depth [mm]

Material Group	Material	Hardness Brinell - HB	Vc[m/min]* VBX (Coated)	Feed f [mm/rev] VBX	Max Depth [mm]
P Steel	Unalloyed steel	Low carbon (C=0.1-0.25%)	125	50-120	0.05
		Medium carbon (C=0.25-0.55%)	150	40-100	0.04
		High Carbon (C=0.55-0.85%)	170	30-80	0.03
	Low alloy steel (alloying elements ≤ 5%)	Non hardened	180	50-70	0.04
		Hardened	275	40-60	0.04
		Hardened	350	30-50	0.03
	High alloy steel (alloying elements > 5%)	Annealed	200	30-50	0.04
		Hardened	325	25-40	0.03
	Cast steel	Low alloy (alloying elements <5%)	200	30-50	0.04
		High alloy (alloying elements >5%)	225	25-40	0.04
M Stainless Steel	Stainless steel Ferritic	Non hardened	200	60-100	0.04
		Hardened	330	40-60	0.03
	Stainless steel Austenitic	Austenitic	180	50-90	0.04
		Super Austenitic	200	40-60	0.04
	Stainless steel Cast Ferritic	Non hardened	200	40-60	0.04
		Hardened	330	30-50	0.03
	Stainless steel Cast austenitic	Austenitic	200	40-60	0.04
		Hardened	330	30-50	0.03
K Cast Iron	Malleable Cast iron	Ferritic (short chips)	130	50-70	0.02
		Pearlitic (long chips)	230	50-70	0.01
	Grey cast iron	Low tensile strength	180	50-70	0.02
		High tensile strength	260	40-60	0.01
	Nodular SG iron	Ferritic	160	50-70	0.02
		Pearlitic	260	60-80	0.01
N(K) Non-Ferrous Metals	Aluminium alloys Wrought	Non aging	60	100-300	0.03
		Aged	100	100-150	0.03
	Aluminium alloys Cast	Cast	75	100-150	0.03
		Cast & aged	90	60-100	0.03
	Aluminium alloys Cast Si 13-22%	Cast Si 13-22%	130	100-150	0.02
		Brass	90	60-100	0.03
		Bronze and non leaded copper	100	60-100	0.03
S(M) Heat Resistant Material	High temperature alloys	Annealed (Iron based)	200	25-45	0.04
		Aged (Iron based)	280	20-30	0.03
		Annealed (Nickel or Cobalt based)	250	15-20	0.01
		Aged (Nickel or Cobalt based)	350	10-15	0.01
	Titanium alloys	Pure 99.5 Ti	400Rm	60-100	0.02
		α+β alloys	1050Rm	40-50	0.02
H(K) Hardened Material	Extra hard steel	Hardened & tempered	45-50HRc	20-45	0.01
			51-55HRc	20-40	0.01

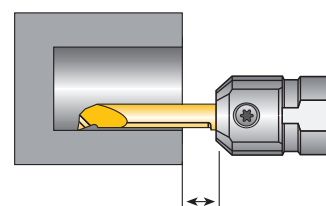
*Minimum cutting speed for small holes should be 25 m/min.

Carbide Grade - VBX



General use carbide grade for Micro inserts. TiCN coated.

Machining Recommendation



When encountering chip flow evacuation problems, it is recommended to increase the distance between the work piece and sleeve.

Grooving Technical Data

Recommended Grades, Cutting Speeds Vc [m/min] and Feed f [mm/rev]

Material Group	Material		Hardness Brinell-HB	Vc[m/min]* (Coated)	Feed f [mm/rev] VBX
P Steel	Unalloyed steel	Low carbon (C=0.1-0.25%)	125	50-120	0.03
		Medium carbon (C=0.25-0.55%)	150	40-100	0.02
		High Carbon (C=0.55-0.85%)	170	30-80	0.01
	Low alloy steel (alloying elements ≤ 5%)	Non hardened	180	50-70	0.02
		Hardened	275	40-60	0.01
		Hardened	350	30-50	0.01
	High alloy steel (alloying elements > 5%)	Annealed	200	30-50	0.02
		Hardened	325	25-40	0.01
	Cast steel	Low alloy (alloying elements <5%)	200	30-50	0.02
High alloy (alloying elements >5%)		225	25-40	0.02	
M Stainless Steel	Stainless steel Ferritic	Non hardened	200	60-100	0.01
		Hardened	330	40-60	0.01
	Stainless steel Austenitic	Austenitic	180	50-90	0.01
		Super Austenitic	200	40-60	0.01
	Stainless steel Cast Ferritic	Non hardened	200	40-60	0.02
		Hardened	330	30-50	0.01
	Stainless steel Cast austenitic	Austenitic	200	40-60	0.02
		Hardened	330	30-50	0.01
K Cast Iron	Malleable Cast iron	Ferritic (short chips)	130	50-70	0.02
		Pearlitic (long chips)	230	50-70	0.01
	Grey cast iron	Low tensile strength	180	50-70	0.02
		High tensile strength	260	40-60	0.15
	Nodular SG iron	Ferritic	160	50-70	0.02
		Pearlitic	260	60-80	0.01
N(K) Non-Ferrous Metals	Aluminium alloys Wrought	Non aging	60	100-300	0.03
		Aged	100	100-150	0.03
	Aluminium alloys	Cast	75	100-150	0.03
		Cast & aged	90	60-100	0.03
	Aluminium alloys	Cast Si 13-22%	130	100-150	0.02
	Copper and copper alloys	Brass	90	60-100	0.03
		Bronze and non leaded copper	100	60-100	0.03
S(M) Heat Resistant Material	High temperature alloys	Annealed (Iron based)	200	25-45	0.01
		Aged (Iron based)	280	20-30	0.01
		Annealed (Nickel or Cobalt based)	250	15-20	0.01
		Aged (Nickel or Cobalt based)	350	10-15	0.01
	Titanium alloys	Pure 99.5 Ti	400Rm	60-100	0.02
		α+β alloys	1050Rm	40-50	0.02
H(K) Hardened Material	Extra hard steel	Hardened & tempered	45-50HRc	20-40	0.01
			51-55HRc	20-35	0.01

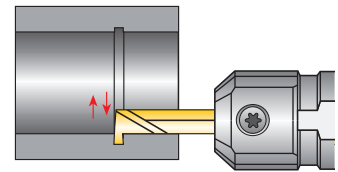
*Minimum cutting speed for small holes should be 25 m/min.

Carbide Grade - VBX



General use carbide grade for Micro inserts. TiCN coated.

Machining Recommendation



Machine the groove in one motion instead of intervals.



microscope
Micro Tools For Small Bores

VARDEX
Advanced Threading Solutions

maXmark
METRIC