

# TURNING TOOLS

## THREADING TOOLS







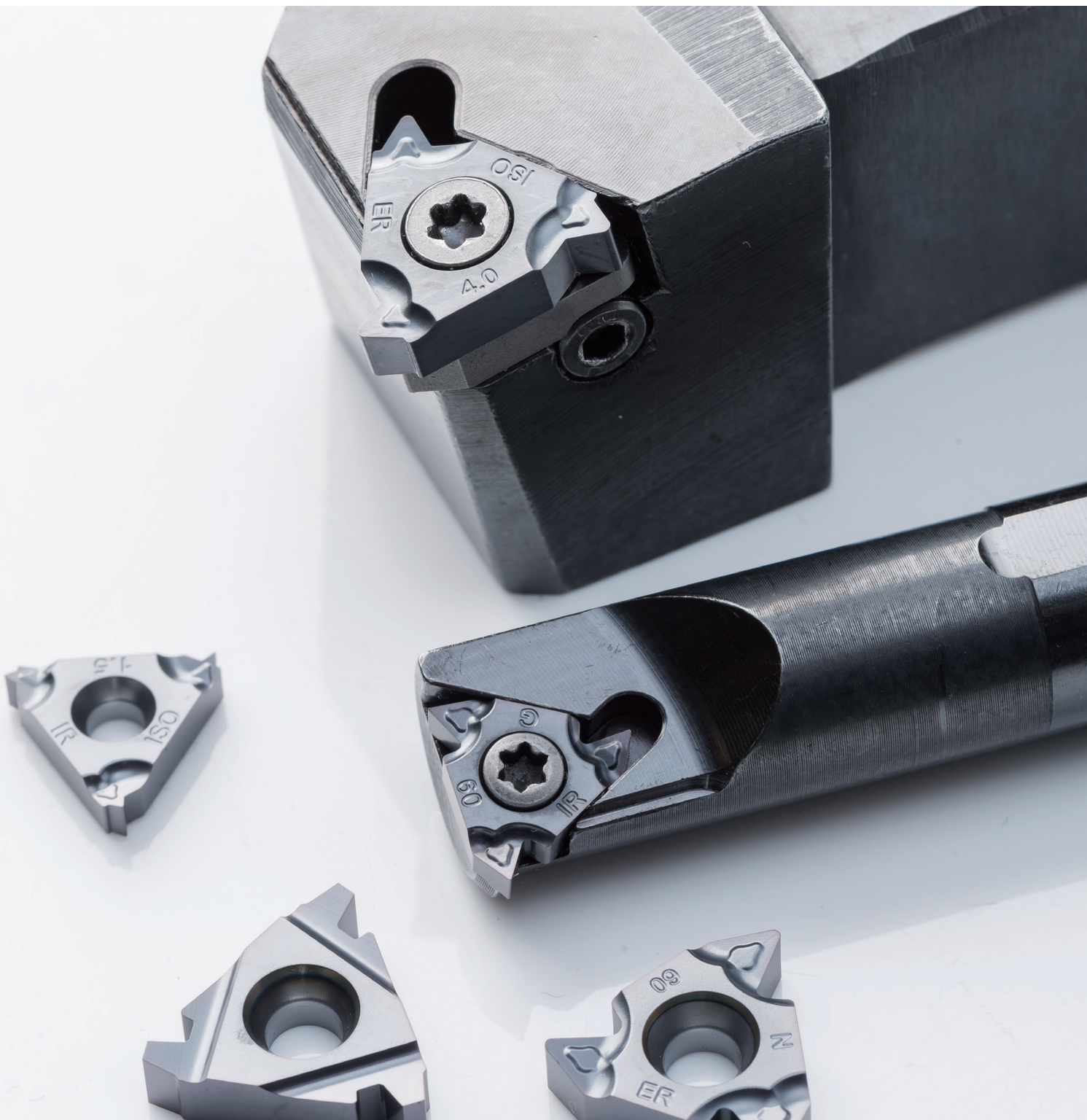
# Contents

## Threading Tools — H

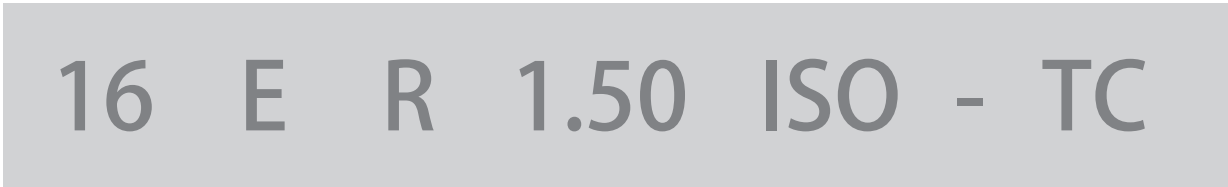
Threading Inserts Identification System	645
Overview of Threading Tools	647
Information of Geometry and Grade	648
Thread Turning inserts	649
Thread Turning Holders	658
Recommended Cutting Datas	660

H

# THREADING TOOLS



## Threading Insert Identification System



①

②

③

④

⑤

⑥

① Insert Size	
Size	IC(mm)
08	5
11	6.35
16	9.525
22	12.7
27	15.875

③ Hand of Insert
R=Right
L= Left
□=R&L

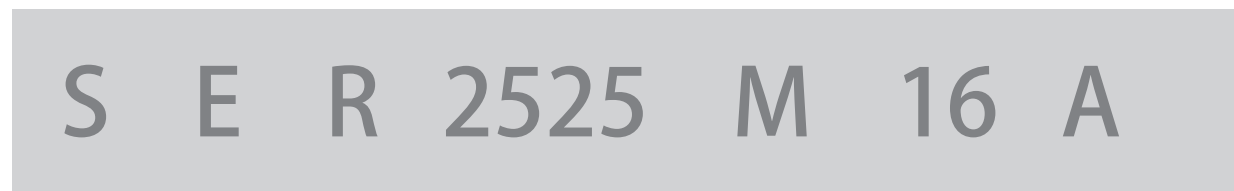
⑤ Thread Standard
60=Partial Profile 60°
55=Partial Profile 55°
ISO=ISO Metric
UN=American UN
W=Whitworth
NPT=National Pipe Thread
BSPT=British BSPT
ACME=American ACME
STACME=American Stub ACME
ABUT=
API=API Thread
UNJ=American Aerospace Thread

⑥ Additional Information
Geometry or Teeth

② Thread Style
E=External
I=Internal
□=E&I

④ Pitch		
Full Profile		
mm	TPI	
0.35-5.0	72-5	
Partial Profile		
Size	mm	TPI
A	0.5-1.5	48-16
AG	0.5-3.0	48-8
G	1.75-3.0	14-8
N	3.5-5.0	7-5

## Threading Holder Identification System



① Clamping System
S=Screw
C=Clamp

② Process Type
E=External
I=Internal

③ Cutting Direction
R=Right hand
L=Left hand
N=None

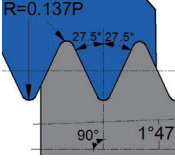
④ Shank Size	
External Holder	
Shank Size	hxb
2525	25x25mm
Internal Bar	
Shank Size	Diameter
0025	Diameter 25mm

⑤ Thread	
Type	Length
H	100
K	125
M	150
P	170
Q	180
R	200
S	250
T	300
U	350
V	400

⑥ Insert Size	
Type	IC(mm)
08	5
11	6.35
16	9.525
22	12.7
27	15.875

⑦ Additional
A=Steel holder with inner coolant
C=Carbide holder
E=Carbide holder with inner coolant
□=steel holder without inner coolant

## Overview of Threading Tools

Application	Thread Type	Thread Sketch	ThreadCode	Pitch	Page
For general industry	Partial Profile 60° Thread		60°	0.5-5.0 (mm)	P649
	Partial Profile 55° Thread		55°	48-5 (TPI)	P650
	ISO Metric Thread		ISO	1.0-5.0 (mm)	P651
	UN Thread		UN	24-8 (TPI)	P653
Thread for pipe fittings and couplings for gas, water and sewage.	Whitworth Thread		W	19-11 (TPI)	P654
	NPT Thread		NPT	27-8 (TPI)	P654
Thread for pipe fittings and couplings for gas, steam and water lines.	BSPT Thread		BSPT	28-11 (TPI)	P656
Thread for pipe couplings in food and fire fighting industry.	Round Thread(DIN 405)		RD	10-4 (TPI)	P657

## TC — Special Geometry

### Raised platform •

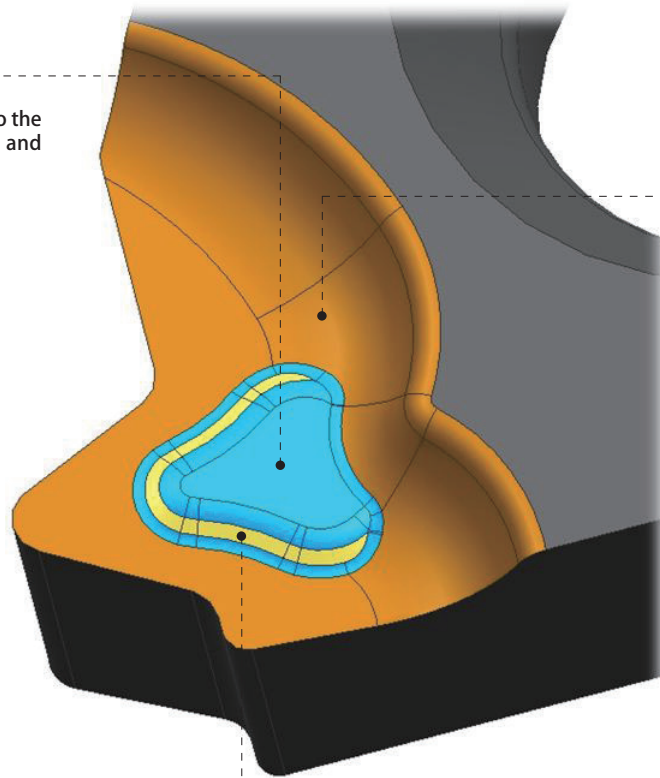
Good chip control, apply to the radial infeed, flank infeed and incremental infeed

### • Wide chip room

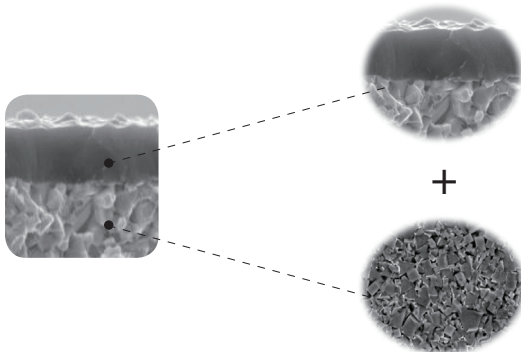
Smooth chip discharge due to wide chip room

### Curved surface •

Increase the cooling area to avoid the carter wear



## M3225 — General grade for thread turning



### New TiAlN nano-structure coating

New TiAlN nano-structure coating with excellent heat resistance and bonding resistance.

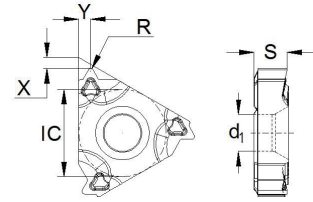
### Micro-grain carbide substrate

Micro-grain carbide substrate with high wear resistance and good roughness, suitable for thread turning of general material.



## Partial Profile 60°

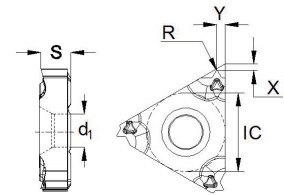
### ► External



Ordering Code	Pitch (mm)	Dimensions (mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
	16 ERA60-TC	0.5-1.5	0.8	0.9	0.08	9.525	3.47	4	●
	16 ERAG60-TC	0.5-3.0	1.1	1.5	0.08	9.525	3.47	4	●
	16 ERG60-TC	1.75-3.0	1.2	1.7	0.25	9.525	3.47	4	●
	22 ERN60-TC	3.5-5.0	1.7	2.5	0.51	12.7	4.71	5	●

● Stock ○ Available Up Order

### ► Internal

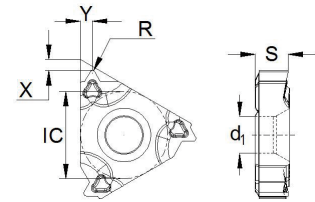



Ordering Code	Pitch (mm)	Dimensions (mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
	08 IRA60-TC	0.5-1.5	0.6	0.7	0.08	5.00	2.25	2.68	●
	11 IRA60-TC	0.5-1.5	0.8	0.9	0.08	6.35	3.00	3.2	●
	16 IRA60-TC	0.5-1.5	0.8	0.9	0.08	9.525	3.47	4	●
	16 IRAG60-TC	0.5-3.0	1.1	1.5	0.08	9.525	3.47	4	●
	16 IRG60-TC	1.75-3.0	1.2	1.7	0.13	9.525	3.47	4	●
	22 IRN60-TC	3.5-5.0	1.7	2.5	0.25	12.7	4.71	5	●

● Stock ○ Available Up Order

## Partial Profile 55°

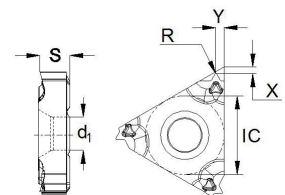
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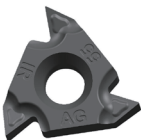


Ordering Code	Pitch (TPI)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
	16 ERA55-TC	48-16	0.8	0.9	0.08	9.525	3.47	4	●
	16 ERAG55-TC	48-8	1.1	1.5	0.08	9.525	3.47	4	●
	16 ERG55-TC	14-8	1.2	1.7	0.21	9.525	3.47	4	●
	22 ERN55-TC	7-5	1.7	2.5	0.44	12.7	4.71	5	●

● Stock ○ Available Up Order

### ► Internal

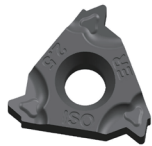
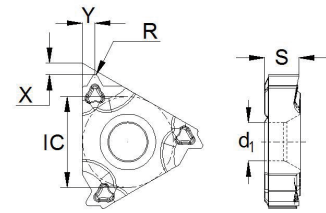


Ordering Code	Pitch (TPI)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
	11 IRA55-TC	48-16	0.8	0.9	0.08	6.35	3	3.2	●
	16 IRA55-TC	48-16	0.8	0.9	0.08	9.525	3.47	4	●
	16 IRAG55-TC	48-8	1.1	1.5	0.08	9.525	3.47	4	●
	16 IRG55-TC	14-8	1.2	1.7	0.21	9.525	3.47	4	●
	22 IRN55-TC	7-5	1.7	2.5	0.44	12.7	4.71	5	●

● Stock ○ Available Up Order

# Metric 60°

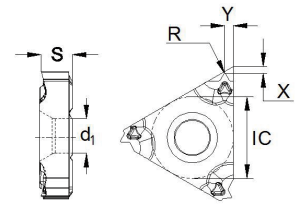
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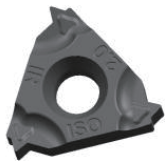
Ordering Code	Pitch (mm)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
16 ER1.00ISO-TC	1.00	0.8	0.7	0.14	9.525	3.47	4	●	
16 ER1.25ISO-TC	1.25	0.8	0.9	0.18	9.525	3.47	4	●	
16 ER1.50ISO-TC	1.50	0.8	1.0	0.22	9.525	3.47	4	●	
16 ER1.75ISO-TC	1.75	1.2	1.2	0.25	9.525	3.47	4	●	
16 ER2.00ISO-TC	2.00	1.2	1.3	0.29	9.525	3.47	4	●	
16 ER2.50ISO-TC	2.50	1.2	1.5	0.36	9.525	3.47	4	●	
16 ER3.00ISO-TC	3.00	1.2	1.5	0.43	9.525	3.47	4	●	
22 ER3.50ISO-TC	3.50	1.6	2.3	0.45	12.7	4.71	5	●	
22 ER4.00ISO-TC	4.00	1.6	2.3	0.52	12.7	4.71	5	●	
22 ER4.50ISO-TC	4.50	1.7	2.4	0.58	12.7	4.71	5	●	
22 ER5.00ISO-TC	5.00	1.7	2.5	0.63	12.7	4.71	5	●	
22 ER5.50ISO-TC	5.50	1.9	2.7	0.72	12.7	4.71	5	●	
22 ER6.00ISO-TC	6.00	1.9	2.7	0.78	12.7	4.71	5	●	

● Stock ○ Available Up Order

► Internal



Ordering Code	Pitch (mm)	Dimensions(mm)						Availability
		X	Y	R	IC	S	d1	M3225
11 IR1.00ISO-TC	1.00	0.8	0.7	0.07	6.35	3.00	3.2	●
11 IR1.25ISO-TC	1.25	0.8	0.9	0.09	6.35	3.00	3.2	●
11 IR1.50ISO-TC	1.50	0.8	1.0	0.11	6.35	3.00	3.2	●
11 IR1.75ISO-TC	1.75	0.9	1.1	0.13	6.35	3.00	3.2	●
11 IR2.00ISO-TC	2.00	0.9	1.1	0.15	6.35	3.00	3.2	●
16 IR1.00ISO-TC	1.00	0.8	0.7	0.07	9.525	3.47	4	●
16 IR1.25ISO-TC	1.25	0.8	0.9	0.09	9.525	3.47	4	●
16 IR1.50ISO-TC	1.50	0.8	1.0	0.11	9.525	3.47	4	●
16 IR1.75ISO-TC	1.75	1.2	1.2	0.13	9.525	3.47	4	●
16 IR2.00ISO-TC	2.00	1.2	1.3	0.15	9.525	3.47	4	●
16 IR2.50ISO-TC	2.50	1.2	1.5	0.18	9.525	3.47	4	●
16 IR3.00ISO-TC	3.00	1.2	1.5	0.22	9.525	3.47	4	●
22 IR3.50ISO-TC	3.50	1.6	2.3	0.22	12.7	4.71	5	●
22 IR4.00ISO-TC	4.00	1.6	2.3	0.25	12.7	4.71	5	●
22 IR4.50ISO-TC	4.50	1.6	2.4	0.28	12.7	4.71	5	●
22 IR5.00ISO-TC	5.00	1.6	2.3	0.32	12.7	4.71	5	●
22 IR5.50ISO-TC	5.50	1.6	2.3	0.36	12.7	4.71	5	●
22 IR6.00ISO-TC	6.00	1.6	2.4	0.39	12.7	4.71	5	●

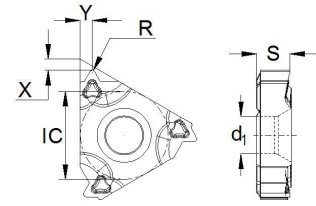


● Stock ○ Available Up Order

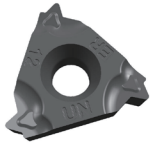


## UN 60°

### ► External

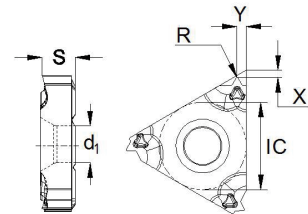


Ordering Code	Pitch (mm)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
16 ER24UN-TC	24	0.8	0.8	0.15	9.525	3.47	4	●	
16 ER20UN-TC	20	0.8	0.9	0.18	9.525	3.47	4	●	
16 ER18UN-TC	18	0.8	1.0	0.20	9.525	3.47	4	●	
16 ER16UN-TC	16	0.9	1.1	0.23	9.525	3.47	4	●	
16 ER14UN-TC	14	1.2	1.5	0.26	9.525	3.47	4	●	
16 ER12UN-TC	12	1.2	1.5	0.31	9.525	3.47	4	●	
16 ER10UN-TC	10	1.2	1.5	0.37	9.525	3.47	4	○	
16 ER8UN-TC	8	1.3	1.7	0.46	9.525	3.47	4	●	

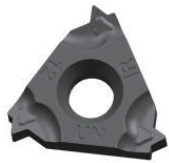


● Stock ○ Available Up Order

### ► Internal



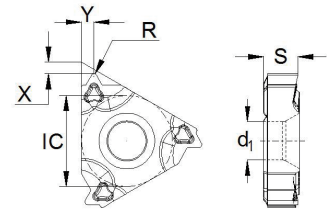
Ordering Code	Pitch (mm)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
11 IR20UN-TC	20	0.8	0.9	0.09	6.35	3.00	3.2	●	
11 IR18UN-TC	18	0.8	1.0	0.10	6.35	3.00	3.2	●	
16 IR24UN-TC	24	0.8	0.8	0.08	9.525	3.47	4	●	
16 IR20UN-TC	20	0.8	0.9	0.09	9.525	3.47	4	●	
16 IR18UN-TC	18	0.8	1.0	0.10	9.525	3.47	4	●	
16 IR16UN-TC	16	0.9	1.1	0.12	9.525	3.47	4	●	
16 IR14UN-TC	14	1.2	1.5	0.13	9.525	3.47	4	●	
16 IR12UN-TC	12	1.2	1.5	0.16	9.525	3.47	4	●	
16 IR10UN-TC	10	1.2	1.5	0.19	9.525	3.47	4	○	
16 IR8UN-TC	8	1.3	1.7	0.23	9.525	3.47	4	●	



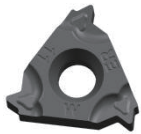
● Stock ○ Available Up Order

## Whitworth 55°

### ► External

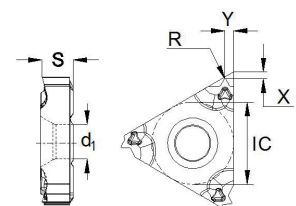


Ordering Code	Pitch (mm)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
16 ER19W-TC	19	0.8	1.0	0.17	9.525	3.47	4	●	
16 ER18W-TC	18	0.8	1.0	0.18	9.525	3.47	4	●	
16 ER16W-TC	16	0.9	1.1	0.20	9.525	3.47	4	●	
16 ER14W-TC	14	1.2	1.5	0.24	9.525	3.47	4	●	
16 ER12W-TC	12	1.2	1.5	0.28	9.525	3.47	4	●	
16 ER11W-TC	11	1.2	1.5	0.30	9.525	3.47	4	●	
16 ER10W-TC	10	1.1	1.5	0.34	9.525	3.47	4	●	

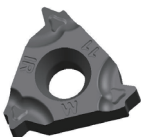


● Stock ○ Available Up Order

### ► Internal



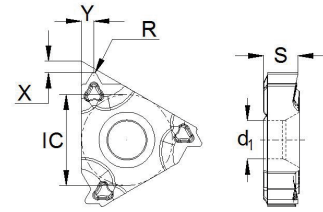
Ordering Code	Pitch (mm)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
11 IR19W-TC	19	0.9	1.1	0.19	6.35	3.00	3.2	●	
11 IR14W-TC	14	0.9	1.1	0.27	6.35	3.00	3.2	●	
16 IR19W-TC	19	0.8	1.0	0.17	9.525	3.47	4	●	
16 IR18W-TC	18	0.8	1.0	0.18	9.525	3.47	4	●	
16 IR16W-TC	16	0.9	1.1	0.2	9.525	3.47	4	●	
16 IR14W-TC	14	1.2	1.5	0.24	9.525	3.47	4	●	
16 IR12W-TC	12	1.2	1.5	0.28	9.525	3.47	4	●	
16 IR11W-TC	11	1.2	1.5	0.30	9.525	3.47	4	●	
16 IR8W-TC	8	1.2	1.5	0.41	9.525	3.47	4	●	

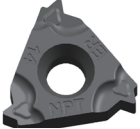


● Stock ○ Available Up Order

## NPT 60°

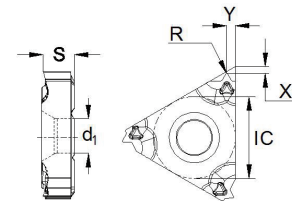
### ► External




Ordering Code	Pitch (mm)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
 16 ER27NPT-TC	27	0.7	0.8	0.13	9.525	3.47	4	●	
16 ER18NPT-TC	18	0.8	1.0	0.20	9.525	3.47	4	●	
16 ER14NPT-TC	14	1.2	1.5	0.22	9.525	3.47	4	●	
16 ER11.5NPT-TC	11.5	1.2	1.5	0.25	9.525	3.47	4	●	
16 ER8NPT-TC	8	1.3	1.8	0.30	9.525	3.47	4	●	

●Stock ○Available Up Order

### ► Internal

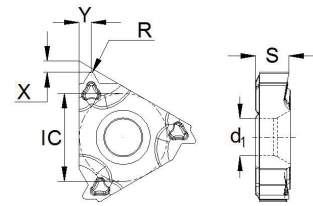


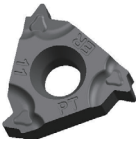
Ordering Code	Pitch (mm)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
 11 IR18NPT-TC	18	0.8	1.0	0.20	6.35	3.00	3.2	●	
16 IR27NPT-TC	27	0.7	0.8	0.13	9.525	3.47	4	●	
16 IR18NPT-TC	18	0.8	1.0	0.20	9.525	3.47	4	●	
16 IR14NPT-TC	14	1.2	1.5	0.22	9.525	3.47	4	●	
16 IR11.5NPT-TC	11.5	1.2	1.5	0.25	9.525	3.47	4	●	
16 IR8NPT-TC	8	1.3	1.8	0.30	9.525	3.47	4	●	

●Stock ○Available Up Order

## BSPT 55°

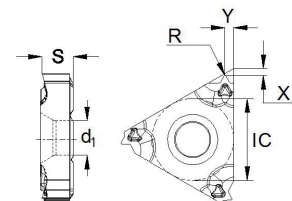
### ► External

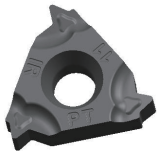


Ordering Code	Pitch (mm)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
	16 ER28BSPT-TC	28	0.7	0.8	0.11	9.525	3.47	4	●
	16 ER19BSPT-TC	19	0.8	1.0	0.17	9.525	3.47	4	●
	16 ER14BSPT-TC	14	1.2	1.5	0.24	9.525	3.47	4	●
	16 ER11BSPT-TC	11	1.2	1.5	0.30	9.525	3.47	4	●

● Stock ○ Available Up Order

### ► Internal



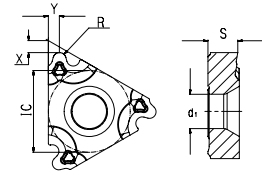
Ordering Code	Pitch (mm)	Dimensions(mm)						Availability	
		X	Y	R	IC	S	d1	M3225	
	11 IR19BSPT-TC	19	0.8	1.0	0.18	6.35	3.00	3.2	●
	11 IR14BSPT-TC	14	0.9	1.1	0.24	6.35	3.00	3.2	●
	16 IR28BSPT-TC	28	0.7	0.8	0.11	9.525	3.47	4	●
	16 IR19BSPT-TC	19	0.8	1.0	0.17	9.525	3.47	4	●
	16 IR14BSPT-TC	14	1.2	1.5	0.24	9.525	3.47	4	●
	16 IR11BSPT-TC	11	1.2	1.5	0.30	9.525	3.47	4	●

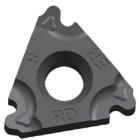
● Stock ○ Available Up Order



## Round 30°

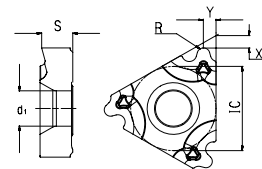
### ► External

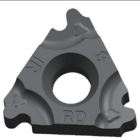


Ordering Code	Pitch (mm)	Dimensions(mm)							Availability
		X	Y	R	IC	S	d1	M3225	
	16 ER10RD-TC	10	1.1	1.2	0.60	9.525	3.47	4	○
	16 ER8RD-TC	8	1.4	1.3	0.75	9.525	3.47	4	●
	16 ER6RD-TC	6	1.4	1.5	1.00	9.525	3.47	4	●
	22 ER4RD-TC	4	2.2	2.3	1.51	12.7	4.71	5	○

● Stock ○ Available Up Order

### ► Internal



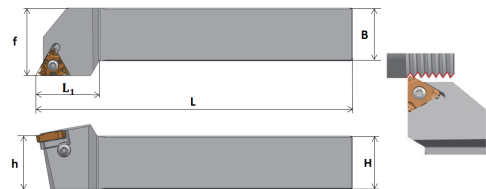
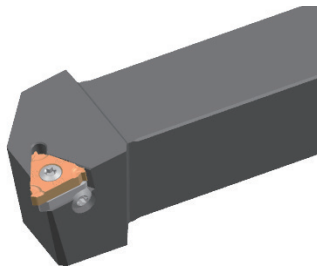
Ordering Code	Pitch (mm)	Dimensions(mm)							Availability
		X	Y	R	IC	S	d1	M3225	
	16 IR10RD-TC	10	1.1	1.2	0.55	9.525	3.47	4	○
	16 IR8RD-TC	8	1.4	1.3	0.70	9.525	3.47	4	●
	16 IR6RD-TC	6	1.4	1.5	0.936	9.525	3.47	4	●
	22 IR4RD-TC	4	2.2	2.3	1.40	12.7	4.71	5	○

● Stock ○ Available Up Order

Thread Turning Toolholders

SER/L Series

External Toolholders



Ordering Code	Stocks		Insert	Dimensions(mm)						Shim	Insert Screw	ShimScrew	Wrench
	R	L		H	B	L	f	h	L1				
SER/L1212F11	○	○	11ER/L...	12	12	80	16	12	20.5	-	SI60M 025080...	-	TT08PH
SER/L1212F16	●	○	16ER/L...	12	12	80	16	12	22	-	SI60M 035090...	-	TT15PH
SER/L1616H16	●	○		16	16	100	20	16	20.5	DEN16..	SI60M 035120...	SSBM 030060H	TT15PH
SER/L2020K16	●	●		20	20	125	25	20	30				
SER/L2525M16	●	●		25	25	150	32	25	30				
SER/L3232P16	●	○		32	32	170	40	32	30	DEN22..	SI60M 040160...	SSBM 040060H	TT15PH
SER/L2525M22	●	○	25	25	150	32	25	36					
SER/L3232P22	●	○	22ER/L...	32	32	170	40	32	36	DEN27..	SI60M 050200...	SSBM 040060H	TT20PH
SER/L4040R22	●	○	40	40	200	50	40	36					
SER/L3232P27	●	○	27ER/L...	32	32	170	40	32	40	DEN27..	SI60M 050200...	SSBM 040060H	TT20PH
SER/L4040R27	●	○		40	40	200	50	40	40				

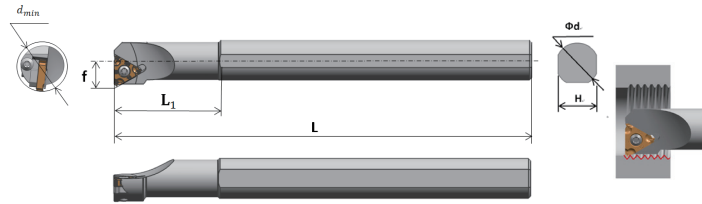
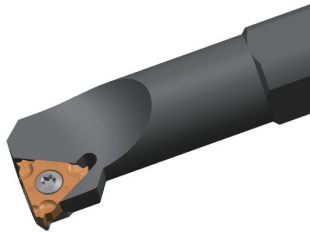
※SI60M035090...is meaning of M3.5×9

●Stock ○Available Up Order

Thread Turning Toolholders

SIR/L Series

External Toolholders



Ordering Code	Pitch		Insert	Dimensions (mm)					Shim	Insert Screw	ShimScrew	Wrench					
	R	L		d <sub>min</sub>	Φd	H	L	f					L <sub>1</sub>				
SIR/L0008K08	●	○	08IR/L...	9.9	08	7	125	5.5	20	-	SI60M 022050...	-	TT06PH				
SIR/L0010K11	●	○	11IR/L...	13	10	9	125	7.3	25	-	SI60M 025080...	-	TT08PH				
SIR/L0010K11-A16	●	○		13	16	15	125	7.3	30								
SIR/L0012K11	●	○		15	12	11	125	8.4	28								
SIR/L0012K11-A16	●	○		15	16	15	125	8.4	36								
SIR/L0013M16	●	○	16IR/L...	17	16	15	150	10.3	32	-	SI60M 035090...	-	TT15PH				
SIR/L0016Q16	●	○		20	16	15	180	11.5	40								
SIR/L0020Q16	●	○		24	20	18	180	13.4	40								
SIR/L0025R16	●	○		29	25	23	200	16.3	45								
SIR/L0032S16	●	○		36	32	30	250	19.6	50					DIN16..	SI60M 035120...	SSBM 030060H	TT15PH
SIR/L0040T16	●	○		44	40	38	300	23.8	55								
SIR/L0050U16	○	○	56	50	48	350	28.7	60									
SIR/L0020Q22	○	○	22IR/L...	27	20	18	180	14.9	40	-	SI60M 040120...	-	TT15PH				
SIR/L0025R22	●	○		32	25	23	200	18.1	45								
SIR/L0032S22	●	○		39	32	30	250	21.5	50					DIN22..	SI60M 040160...	SSBM 040060H	TT15PH
SIR/L0040T22	●	○		47	40	38	300	25.8	55								
SIR/L0050U22	○	○	57	50	48	350	29.8	70									
SIR/L0032S27	○	○	27IR/L...	40	32	30	250	22.4	60	DIN27..	SI60M 050200...	SSBM 040060H	TT20PH				
SIR/L0040T27	○	○		48	50	36	300	26.4	60								
SIR/L0050U27	○	○		58	60	45	350	31.4	75								

※SI60M035090...is meaning of M3.5×9

●Stock ○Available Up Order

## Cutting Speed Recommendation Table

Workpiece Material			Material Hardness	Cutting Speed V <sub>c</sub> (m/min)	
				Grade	
				M3225	
<b>P</b>	Carbon Steel	Low-carbon (C=0.1-0.25%)	HB125	160 (120-230)	
		Medium-carbon (C=0.25-0.55%)	HB150	150 (100-195)	
		High-carbon (C=0.55-0.80%)	HB170	140 (90-180)	
	Low-alloy Steel	Non-hardened	HB180	130 (100-180)	
		Hardened and tempered	HB275	100 (75-140)	
		Hardened and tempered	HB350	80 (60-130)	
	High-alloy Steel	Annealed	HB200	110 (80-140)	
		Hardened and tempered	HB325	90 (70-115)	
	Steel Castings	Unalloyed	HB180	200 (180-220)	
		Low-alloy	HB200	110 (70-150)	
		High-alloy	HB225	100 (60-120)	
		Manganese steel (12-14% Mn)	HB250	40 (40-50)	
<b>M</b>	Stainless Steel	Austenitic	HB180	120 (90-140)	
		Ferritic/Martensitic	HB200	140 (70-170)	
		Duplex stainless steel	HB230	90 (60-120)	
<b>K</b>	Malleable Cast Iron	Ferritic	HB130	130 (110-170)	
		Pearlitic	HB230	100 (85-145)	
	Gray Cast Iron	Low tensile strength	HB180	120 (100-160)	
		High tensile strength	HB260	100 (80-140)	
	Nodular Cast Iron	Ferritic	HB160	125 (110-160)	
		Pearlitic	HB250	100 (80-120)	
<b>N</b>	Wrought Aluminum Alloys	Non aging	HB60	500 (350-700)	
		Aged	HB100	400 (300-500)	
	Cast Aluminum Alloys	Non aging	HB75	450 (300-500)	
		Aged	HB90	290 (200-400)	
		Containing silicon (13-22% Si)	HB130	200 (100-300)	
	Copper and Copper Alloys	Brass	HB90	220 (100-300)	
Bronze and non-lead copper		HB100	180 (80-255)		
<b>S</b>	Heat-resistant Alloys	Iron base	Annealed	HB200	45 (35-60)
			Aged	HB280	35 (25-50)
		Nickel base and cobalt base	Annealed	HB250	25 (15-30)
			Aged	HB350	15 (10-25)
	Titanium Alloys	Commercial pure (99.5% Ti)	HB320	13 (10-20)	
		$\alpha + \beta$ alloys	400Rm	150 (140-170)	
<b>H</b>	High Hardness Materials	Hardened steel	1050Rm	60 (50-70)	
		Chilled cast iron	HRC55	45 (40-50)	
			HB400	40 (30-50)	



## Cutting Passes and Radial Infeed Recommendation Table

### ► ISO Metric / External

Pitch (mm)	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Total infeed (mm)	0.65	0.79	0.95	1.11	1.26	1.56	1.88	2.18	2.49	2.79	3.10	3.39	3.70
Total passes	5	6	6	8	8	10	12	12	13	14	14	16	16
No. of infeed	Radial infeed per pass (mm)												
1	0.16	0.17	0.20	0.17	0.20	0.20	0.20	0.24	0.24	0.27	0.29	0.27	0.30
2	0.15	0.15	0.19	0.17	0.19	0.19	0.19	0.23	0.22	0.25	0.28	0.26	0.29
3	0.14	0.14	0.18	0.16	0.18	0.18	0.19	0.22	0.22	0.24	0.27	0.26	0.29
4	0.12	0.13	0.16	0.15	0.17	0.17	0.18	0.21	0.21	0.23	0.26	0.25	0.28
5	0.08	0.12	0.14	0.14	0.16	0.17	0.17	0.21	0.21	0.23	0.25	0.25	0.27
6		0.08	0.08	0.13	0.15	0.16	0.17	0.20	0.20	0.22	0.25	0.24	0.26
7				0.11	0.13	0.15	0.16	0.18	0.19	0.21	0.24	0.23	0.26
8				0.08	0.08	0.14	0.15	0.17	0.18	0.20	0.23	0.23	0.25
9						0.12	0.14	0.16	0.17	0.19	0.22	0.22	0.24
10						0.08	0.13	0.15	0.16	0.18	0.20	0.21	0.23
11							0.12	0.13	0.15	0.17	0.19	0.20	0.22
12							0.08	0.08	0.14	0.16	0.17	0.19	0.20
13									0.12	0.14	0.15	0.18	0.19
14									0.18	0.10	0.10	0.16	0.17
15												0.14	0.15
16												0.10	0.10

### ► ISO Metric/ Internal

Pitch (mm)	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Total infeed (mm)	0.63	0.77	0.92	1.05	1.20	1.48	1.78	2.03	2.31	2.61	2.88	3.19	3.44
Total passes	5	6	6	8	8	10	12	12	13	14	14	16	16
No. of infeed	Radial infeed per pass (mm)												
1	0.15	0.16	0.20	0.16	0.19	0.19	0.19	0.22	0.21	0.23	0.26	0.25	0.28
2	0.14	0.15	0.18	0.15	0.18	0.18	0.18	0.21	0.21	0.23	0.26	0.25	0.27
3	0.13	0.14	0.17	0.15	0.17	0.17	0.18	0.20	0.20	0.22	0.25	0.24	0.26
4	0.12	0.13	0.15	0.14	0.16	0.17	0.17	0.20	0.19	0.22	0.24	0.24	0.26
5	0.08	0.11	0.13	0.13	0.15	0.16	0.16	0.19	0.19	0.21	0.24	0.23	0.26
6		0.08	0.08	0.12	0.14	0.15	0.16	0.18	0.18	0.20	0.23	0.22	0.24
7				0.11	0.12	0.14	0.15	0.17	0.18	0.20	0.22	0.22	0.24
8				0.08	0.08	0.13	0.14	0.16	0.17	0.19	0.21	0.22	0.23
9						0.12	0.14	0.15	0.16	0.18	0.20	0.20	0.22
10						0.08	0.12	0.14	0.15	0.17	0.19	0.20	0.21
11							0.11	0.12	0.14	0.16	0.18	0.19	0.20
12							0.08	0.08	0.13	0.15	0.16	0.18	0.19
13									0.12	0.14	0.15	0.17	0.18
14									0.08	0.10	0.10	0.16	0.16
15												0.14	0.15
16												0.10	0.10

## ► UN / External

Pitch (mm)	24	20	18	16	14	12	10	8
Total infeed (mm)	0.70	0.84	0.92	1.04	1.17	1.35	1.62	2.02
Total passes	5	6	6	7	8	8	10	12
No. of infeed	Radial infeed per pass (mm)							
1	0.18	0.18	0.20	0.19	0.18	0.22	0.21	0.22
2	0.16	0.17	0.18	0.18	0.18	0.21	0.20	0.21
3	0.15	0.15	0.17	0.17	0.17	0.20	0.19	0.20
4	0.13	0.14	0.15	0.16	0.16	0.19	0.18	0.20
5	0.08	0.12	0.13	0.14	0.15	0.17	0.17	0.19
6		0.08	0.08	0.12	0.14	0.15	0.16	0.18
7				0.08	0.12	0.13	0.15	0.17
8					0.08	0.08	0.14	0.16
9							0.12	0.15
10							0.08	0.14
11								0.12
12								0.08

## ► UN / Internal

Pitch (mm)	24	20	18	16	14	12	10	8
Total infeed (mm)	0.66	0.78	0.86	0.96	1.07	1.25	1.48	2.03
Total passes	5	6	6	7	8	8	10	12
No. of infeed	Radial infeed per pass (mm)							
1	0.16	0.16	0.18	0.17	0.16	0.20	0.19	0.22
2	0.15	0.16	0.17	0.16	0.16	0.19	0.18	0.21
3	0.14	0.14	0.16	0.15	0.15	0.18	0.17	0.20
4	0.12	0.13	0.14	0.14	0.14	0.17	0.17	0.20
5	0.08	0.12	0.13	0.13	0.14	0.16	0.16	0.19
6		0.08	0.08	0.12	0.13	0.14	0.15	0.18
7				0.08	0.11	0.13	0.14	0.17
8					0.08	0.08	0.13	0.16
9							0.12	0.15
10							0.08	0.14
11								0.12
12								0.08

## ► Whitworth / External&amp; Internal

Pitch (mm)	19	18	16	14	12	11	10	8
Total infeed (mm)	0.90	0.97	1.08	1.20	1.42	1.51	1.70	2.10
Total passes	6	7	8	8	8	9	10	12
No. of infeed	Radial infeed per pass (mm)							
1	0.19	0.17	0.17	0.19	0.23	0.22	0.22	0.23
2	0.18	0.16	0.16	0.18	0.22	0.21	0.21	0.22
3	0.17	0.16	0.15	0.17	0.21	0.20	0.20	0.21
4	0.15	0.15	0.15	0.16	0.19	0.19	0.19	0.21
5	0.13	0.13	0.14	0.15	0.18	0.18	0.18	0.20
6	0.08	0.12	0.13	0.14	0.16	0.16	0.17	0.19
7		0.08	0.11	0.12	0.14	0.15	0.16	0.18
8			0.08	0.08	0.08	0.13	0.15	0.17
9						0.08	0.13	0.16
10							0.08	0.14
11								0.12
12								0.08

## ► BSPT / External&amp; Internal

Pitch (mm)	28	19	14	11
Total infeed (mm)	0.62	0.90	1.20	1.51
Total passes	5	6	8	9
No. of infeed	Radial infeed per pass (mm)			
1	0.15	0.19	0.19	0.22
2	0.14	0.18	0.18	0.21
3	0.13	0.17	0.17	0.20
4	0.12	0.15	0.16	0.19
5	0.08	0.13	0.15	0.18
6		0.08	0.14	0.16
7			0.12	0.15
8			0.08	0.13
9				0.08

## ► NPT / External&amp; Internal

Pitch (mm)	27	18	14	11.5	8
Total infeed (mm)	0.76	1.11	1.42	1.73	2.48
Total passes	6	8	10	12	15
No. of infeed	Radial infeed per pass (mm)				
1	0.15	0.17	0.18	0.18	0.21
2	0.15	0.17	0.17	0.17	0.21
3	0.14	0.16	0.16	0.17	0.20
4	0.13	0.15	0.16	0.16	0.20
5	0.11	0.14	0.15	0.16	0.19
6	0.08	0.13	0.14	0.15	0.18
7		0.11	0.14	0.15	0.18
8		0.08	0.13	0.14	0.17
9			0.11	0.13	0.17
10			0.08	0.12	0.16
11				0.11	0.15
12				0.08	0.14
13					0.13
14					0.11
15					0.08

## ► Round / External

Pitch (mm)	10	8	6	4
Total infeed (mm)	1.30	1.63	2.17	2.95
Total passes	8	10	12	14
No. of infeed	Radial infeed per pass (mm)			
1	0.21	0.21	0.24	0.30
2	0.20	0.20	0.23	0.29
3	0.19	0.19	0.22	0.28
4	0.18	0.19	0.21	0.27
5	0.16	0.18	0.20	0.26
6	0.15	0.17	0.19	0.25
7	0.13	0.15	0.18	0.24
8	0.08	0.14	0.17	0.23
9		0.12	0.16	0.22
10		0.08	0.15	0.21
11			0.13	0.19
12			0.08	0.18
13				0.15
14				0.10

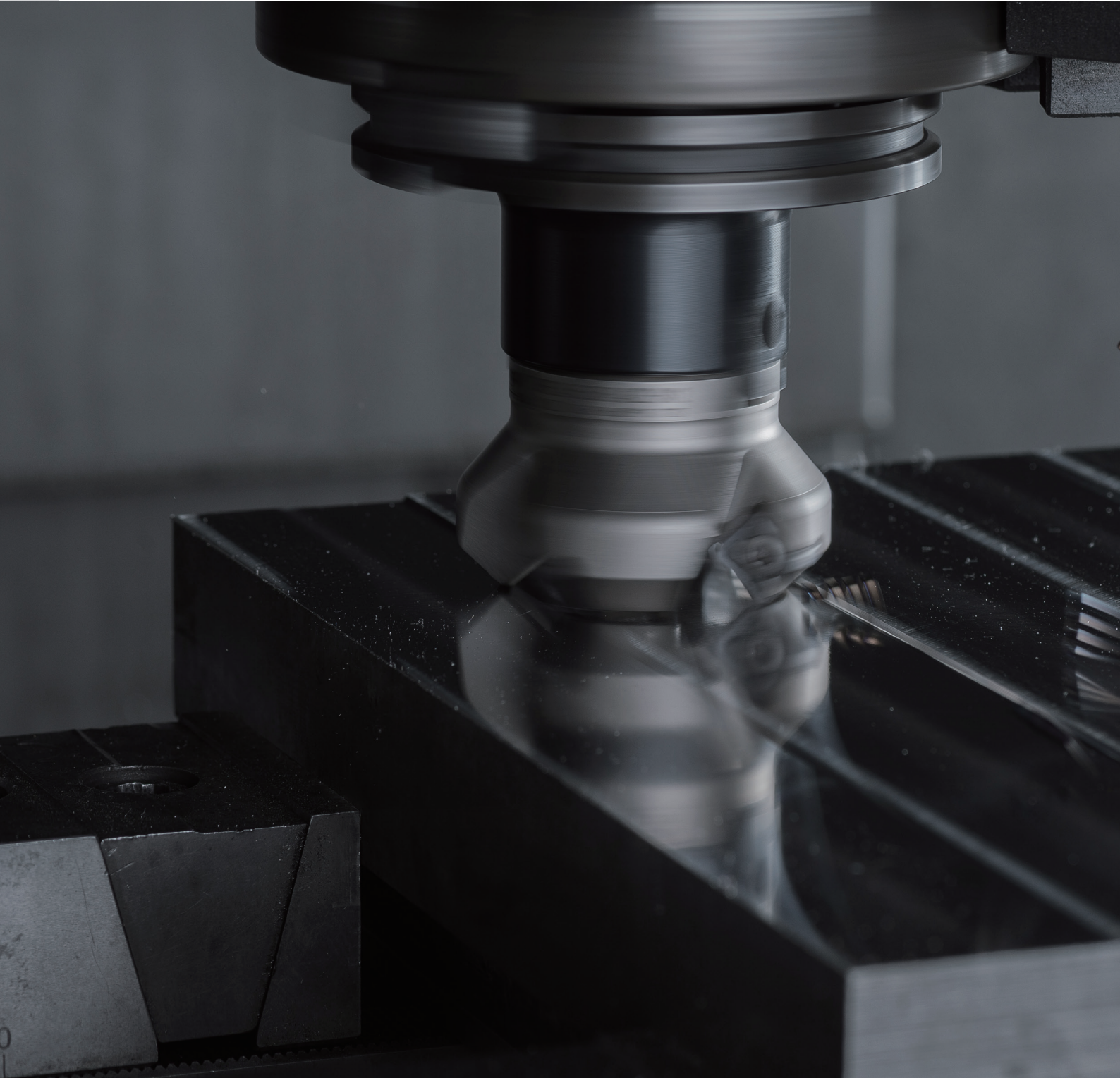
## ► Round / Internal

Pitch (mm)	10	8	6	4
Total infeed (mm)	1.34	1.64	2.18	2.98
Total passes	8	10	12	14
No. of infeed	Radial infeed per pass (mm)			
1	0.22	0.21	0.24	0.30
2	0.21	0.20	0.23	0.29
3	0.20	0.20	0.22	0.29
4	0.18	0.19	0.21	0.28
5	0.17	0.18	0.21	0.27
6	0.15	0.17	0.20	0.26
7	0.13	0.16	0.19	0.25
8	0.08	0.14	0.17	0.24
9		0.12	0.16	0.23
10		0.08	0.15	0.21
11			0.13	0.20
12			0.08	0.18
13				0.16
14				0.10

Attention: Infeeds of less than 0.05mm should be avoided, for austenitic stainless steels not less than 0.08mm.



# Appendix



## Cutting Calculations and Definitions

Parameter and Unit		
D Diameter	(mm)	Fn Feed per Revolution (mm/rev)
ap Cutting Depth	(mm)	fz Feeding per Teeth (mm/tooth)
ae Cutting Width	(mm)	Z Number of Teeth
Vf Feed Rate	(mm/min)	n Spindle Speed (rev/min)
Vc Cutting Speed	(m/min)	L Length (mm)
Q Rate of Metal Removal	(cm <sup>3</sup> /min)	Tc Processing Time (min)

General Formula	
n Spindle Speed	$n = \frac{V_c \cdot 1000}{\pi \cdot D} \text{ (rev/min)}$
Vc Cutting Speed	$V_c = \frac{\pi \cdot D \cdot n}{1000} \text{ (m/min)}$
Vf Feed Rate	$V_f = f_z \cdot z \cdot n \text{ (mm/min)}$
fz Feed per Teeth	$f_z = \frac{V_f}{z \cdot n} \text{ (mm)}$
Q Rate of Metal Removal	$Q = \frac{a_e \cdot a_p \cdot V_f}{1000} \text{ (cm}^3\text{/min)}$
Tc Processing Time	$T_c = \frac{L}{V_f} \text{ (min)}$



## Workpiece Material Table

ISO Material Group	MC	Workpiece Material	Content	Tensile Strength N/mm <sup>2</sup>	Brinell Hardness HB	Rockwell Hardness HRC
<b>P</b> Steels	P1	Low-carbon Steels, Long Chipping	C<0.25%	<530	<125	
	P2	Low-carbon Steels, Short Chipping, Free-cutting Steels	C<0.25%	<530	<125	
	P3	High-carbon Steels, Medium-carbon Steels	C>0.25%	>530	<220	<25
	P4	Alloy Steels, Tool Steels.	C>0.25%	600-850	<330	<35
	P5	Alloy Steels, Tool Steels.	C>0.25%	850-1400	340-450	35-48
	P6	Ferritic Stainless Steels, Martensitic Stainless Steels, PH Stainless Steels	C=(0-0.4)%	600-900	<330	<35
	P7	High-strength Ferritic Stainless Steels, Martensitic Stainless Steels, PH Stainless Steels.	C=(0.1-0.6)%	900-1350	330-450	35-48
<b>M</b> Stainless Steels	M1	Austenitic Stainless Steels	C=(0.05-0.15)%	<600	130-200	
	M2	High-Strength Austenitic Stainless Steels and Cast Stainless Steels	C=(0.05-0.15)%	600-800	150-230	<25
	M3	Duplex Stainless Steels	C=(0.05-0.20)%	<800	135-275	<30
<b>K</b> Cast Iron	K1	Grey Cast Iron		125-500	120-290	< 32
	K2	Moderately Difficult Alloy Cast iron, Nodular Cast Iron.		<600	130-260	< 28
	K3	Difficult High-alloy Cast Iron, Nodular Cast Iron		>600	180-350	< 43
<b>N</b> Non-ferrous Materials	N1	Wrought Aluminium Alloys		<520	60-90	
	N2	Cast Aluminium Alloys	Si<12%	<350	70-100	
	N3	Cast Aluminium Alloys	Si>12%	200-320	60-120	
	N4	Copper, Copper Alloys		200-650	60-200	
	N5	Graphite, CFK, CFRP Graphite, Composite Materials		600-1500		
	N6	GFK, CFK Aluminium-based Composite Materials (MMCs)		<700	<210	
<b>S</b> Heat-resistant SuperAlloys, Titanium Alloys	S1	Iron-based Heat-resistant Alloys		500-1200	160-260	25-48
	S2	Cobalt-based Heat-resistant Alloys		1000-1450	250-450	25-48
	S3	Nickel-based Heat-resistant Alloys		600-1700	160-450	<48
	S4	Titanium and Titanium Alloys		900-1600	300-400	33-48
<b>H</b> Hardened Materials	H1	Hardened Steels				45-55
	H2	Hardened Steels				55-60
	H3	Hardened Steels				60-65
	H4	Hardened Steels				>65

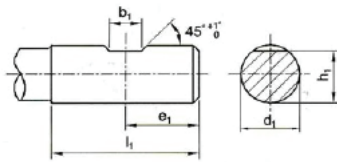
## The Structure of Shank-DIN Standard

### DIN 6535-HA

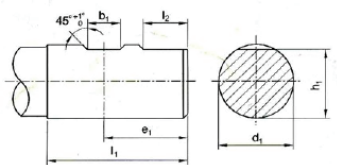


d · h <sub>0</sub>	2	3	4	5	6	8	10	12	14	16	18	20	25	32
$\begin{matrix} l_1+2 \\ 0 \end{matrix}$	28				36		40	45		48		50	56	60

### DIN 6535-HB



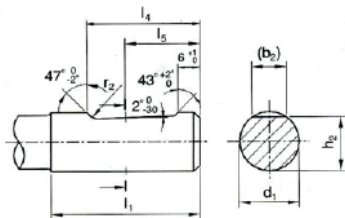
d<sub>1</sub>=6~20mm



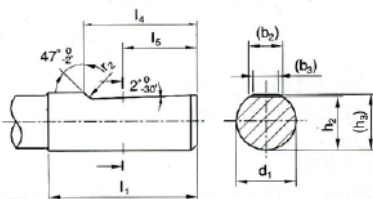
d<sub>1</sub>=25~32mm

d <sub>1</sub> h <sub>0</sub>	b <sub>1</sub> +0.05 0	e <sub>1</sub> 0 -1	h <sub>1</sub> h <sub>11</sub>	l <sub>1</sub> +2 0	l <sub>2</sub> +1 0
6.0	4.2	18.0	5.1	36.0	
8.0	5.5		6.9		
10	7.0	20.0	8.5	40.0	
12	8.0	22.5	10.4	45.0	
14			12.7		
16	10.0	24.0	14.2	48.0	
18			16.2		
20	11.0	25.0	18.2	50.0	
25	12.0	32.0	23.0	56.0	17.0
32	14.0	36.0	30.0	60.0	19.0

### DIN 6535-HE



d<sub>1</sub>=6~20mm



d<sub>1</sub>=25~32mm

d <sub>1</sub>	(b <sub>2</sub> )	(b <sub>1</sub> )	(h <sub>2</sub> )	(h <sub>1</sub> )	l <sub>1</sub>	l <sub>4</sub>	l <sub>5</sub>	r <sub>2</sub>
6.0	4.3		5.1		36.0	25.0	18.0	1.2
8.0	5.5		6.9					
10	7.1	8.5	40.0	28.0	20.0			
12	8.2	10.4	45.0	33.0	22.5			
14	8.1	12.7						
16	10.1	14.2	48.0	36.0	24.0			
18	10.8	16.2						
20	11.4	18.2	50.0	38.0	25.0	1.6		
25	13.6	9.3	23.0	24.1	56.0		44.0	32.0
32	15.5	9.9	30.0	31.2	60.0		48.0	35.0

## Comparison Table for Tensile Strength , Brinell Hardness and Rockwell Hardness

N/mm2	HV10	HB	HRC
240	75	71	
255	80	76	
270	85	81	
285	90	86	
305	95	90	
320	100	95	
335	105	100	
350	110	105	
370	115	109	
385	120	114	
400	125	119	
415	130	124	
430	135	128	
450	140	133	
465	145	138	
480	150	143	
495	155	147	
510	160	152	
530	165	157	
545	170	162	
560	175	166	
575	180	171	
595	185	176	
610	190	181	
625	195	185	
640	200	190	
660	205	195	
675	210	199	
690	215	204	
705	220	209	
720	225	214	
740	230	219	
755	235	223	
770	240	228	
785	245	233	
800	250	238	22
820	255	242	23
835	260	247	24
860	268	255	25
870	272	258	26
900	280	266	27

N/mm2	HV10	HB	HRC
920	287	273	28
940	293	278	29
970	302	287	30
995	310	295	31
1020	317	301	32
1050	327	311	33
1080	336	319	34
1110	345	328	35
1140	355	337	36
1170	364	346	37
1200	373	354	38
1230	382	363	39
1260	392	372	40
1260	403	383	41
1330	413	393	42
1360	423	402	43
1400	434	413	44
1440	446	424	45
1480	458	435	46
1530	473	449	47
1570	484	460	48
1620	497	472	49
1680	514	488	50
1730	527	501	51
1790	544	517	52
1845	560	632	53
1910	578	549	54
1980	596	567	55
2050	615	584	56
2140	639	607	57
	655	622	58
	675		59
	698		60
	720		61
	745		62
	773		63
	800		64
	829		65
	864		66
	900		67
	940		68