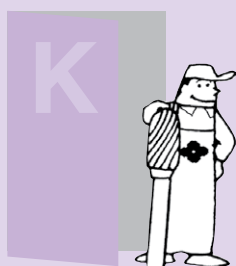


Carbide Materials Braze Tools K1 to K12

K



K

Carbide Materials
Braze Tools

Carbide Material Selection	K2
Plate Blanks	K4
Rod Blanks	K5
Special Rod Blanks	K6
Carbide Blanks	K8
Braze Tools	K9
JIG Boring Tools IJB Type	K12

Stock Indications and Symbols

- mark: Standard stocked item
- mark: To be replaced by a new item featured on the same page
- ▲ mark: To be replaced by new item
(Please confirm stock availability)

- * mark: Semi-standard stock (Please confirm stock availability)
- mark: Stock or planned stock (Please confirm stock availability)
- No mark: Made-to-order item
- mark: We cannot produce

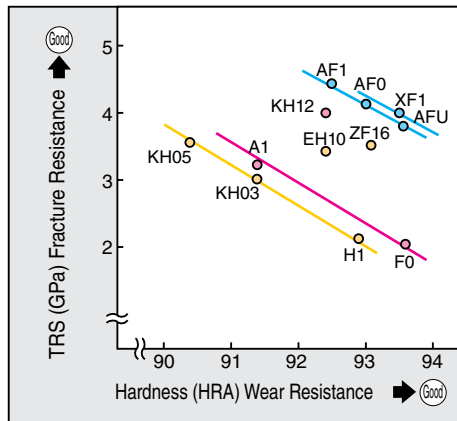
K1

Carbide Material Selection

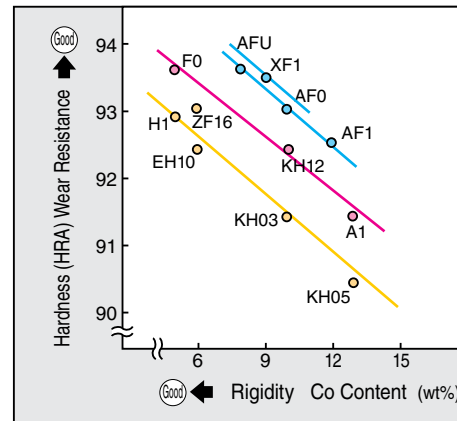
- Stringent selection of high purity and high quality raw materials
- Consistent quality and shorter delivery from the latest production facilities and techniques
- Fully equipped with a system that ensures the highest quality
- Constant R&D to develop the latest materials

Grade Map

● Hardness vs Toughness



● Co Content vs Hardness



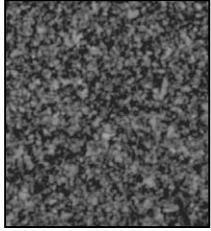
Characteristics and Application

Classification	Grade	Properties					Characteristics	Applications
		Grain Size (μm)	Co Content (wt %)	Toughness (GPa)	Hardness (HRA)	Hardness HV (GPa)		
Ultra-fine Grain Carbide	XF1^(*)	0.2	9.0	4.0	93.5	19.2	World's smallest grained carbide	Micro drills, Small diameter drills
	AF1	0.5	12.0	4.4	92.5	17.3	World's toughest ultra-fine grained carbide	Micro drills, Mini-tools, Punches
	AF0	0.5	10.0	4.1	93.0	18.0	High toughness and wear resistant ultra-fine grained carbide	Micro drills, Routers
	AFU	0.5	8.0	3.8	93.6	19.4	Enhanced wear resistant ultra-fine grained carbide	Micro drill, Endmill for high Toughness
Micro-fine Grain Carbide	A1	0.7	13.0	3.2	91.4	15.6	Tough micro-grained carbide	Endmills, Taps, Drills for cast iron, Punches
	KH12	0.7	10.0	4.0	92.4	17.2	Micro-fine grained carbide with good balance of hardness and toughness	Endmills, Drills for steel
	F0	0.7	5.0	2.0	93.6	20.1	Superior wear resistant micro-grained carbide	Micro drills, Routers
Fine Grain Carbide	KH03	1.0	10.0	3.3	91.4	15.2	Fine grained carbide with good hardness and toughness	Dies, Drills, Endmills
	KH05	1.0	13.0	3.5	90.4	13.6	High toughness fine grained carbide	Dies
	H1	1.0	5.0	2.1	92.9	17.7	Superior wear resistant fine-grained carbide	Drills for cast iron, Reamers
	EH10	1.2	6.0	3.4	92.4	17.3	Fine-grained carbide with good balance of hardness and toughness	Drills for exotic alloy, Reamers
	ZF16	1.0	6.0	3.5	93.0	18.6	Wear and chipping resistant fine-grained carbide for high speed machining	Micro drills

(*) ZF21 was the development code for XF1.

Structure

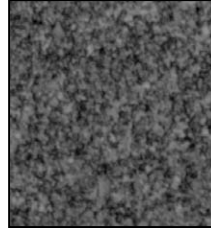
● Ultra-fine Grain



AF1

Av. Grain Size: 0.5 μm

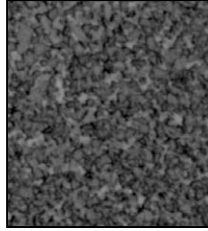
● Micro-fine Grain



A1

Av. Grain Size: 0.7 μm

● Fine Grain



KH05

Av. Grain Size: 1.0 μm

Application and Work Material (◎: Best, ○: Good)

Grade	Applications					Work Material								
	Endmills	Drills	Reamers	Micro Drills Routers	Non-cutting Tool Use	Soft Steel	General Steel	Hardened Steel	Stainless Steel	Ti-alloy	Inconel	Cast Iron	Al Alloy	Copper Alloy
XF1	●	●				○	○	○	◎	○	○		○	○
				●		Refer to K7 for the recommended grades for micro drills and routers.								
AF1				●	●	◎							○	○
				●		Refer to K7 for the recommended grades for micro drills and routers.								
AF0				●		Refer to K7 for the recommended grades for micro drills and routers.								
AFU	●					○	○	◎						
				●		Refer to K7 for the recommended grades for micro drills and routers.								
A1	●		●		●	◎	◎	○	◎	○	○	○	○	○
						◎	◎	○	◎	○	○	○		○
KH12	●	●				◎	◎	○	○	○	○	○	○	○
F0				●		Refer to K7 for the recommended grades for micro drills and routers.								
KH03	●					◎	◎	○	○	○	○	○	○	○
		●				◎	◎	◎	◎	○	○	○	○	○
KH05					●	Cannot be used as cutting tool material								
H1	●	●								○	○	◎	◎	◎
			●			○	○	○	○	○	○	◎	◎	◎
EH10	●	●						○	○	◎	◎	◎	◎	◎
			●			○	○	○	○	◎	◎	◎	◎	◎
ZF16				●		Refer to K7 for the recommended grades for micro drills and routers.								

Plate Blanks

A comprehensive lineup of materials and sizes, for the various specifications and requirements, in the production of mold and die (plates), drills, endmills and reamers (bars) production

■ Grades

● Ultra-fine Grained Carbide AF1

With grains finer than that of conventional grades, the AF1 grade is able to exhibit an excellent balance of high toughness and high hardness, as well as superior edge sharpness.

● Micro-fine Grained Carbide A1

The high toughness and wear resistance properties make this the best selling general purpose grade.

● Fine Grained Carbide H1

Reliable grade for machining non-ferrous metals.

● Basic Carbide EH10

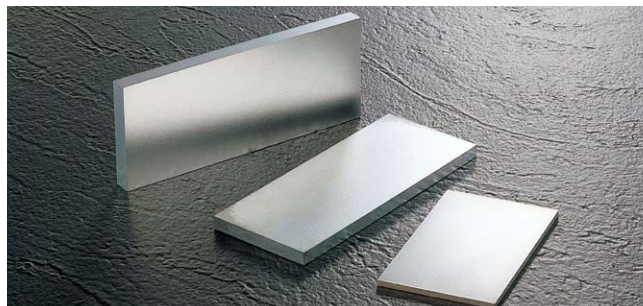
Highly evaluated grade for general machining of cast iron and exotic metals. Perfect as an alloy for drills and reamers.

● KH Series

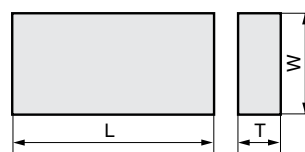
- KH03 Has a fracture resistance and hardness similar to A1, with great improvements in chipping resistance that is comparable to micro-grained grades.
- KH05 With a higher binder content than KH03, this grade has better toughness and chipping resistance.

■ Characteristics and Application

Grade	Hardness		Toughness	Applications	
	HRA	HV(GPa)	TRS(GPa)		
A1	91.4	15.6	3.2	Endmills	IT Mold Punches
AF1	92.5	17.3	4.4	Small Drills	
KH03	91.4	15.2	3.3	Dies	
KH05	90.4	13.6	3.5		
EH10	92.4	17.3	3.4	Drills, Reamers	
H1	92.9	17.7	2.1		



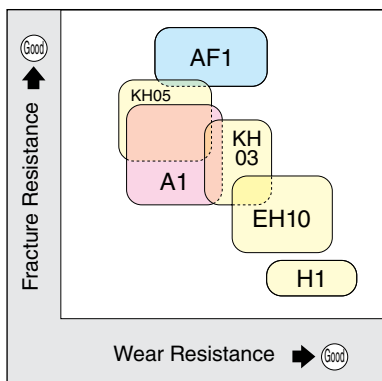
Ultra-fine grained carbide (AF1) is specially developed for the manufacturing of carbide mold parts (punches) with a variety of stocked sizes.



■ Stock

Cat. No.	T		L		W		Stock (mm)			
	Size	Tolerance	Size	Tolerance	Size	Tolerance	A1	AF1	KH03	KH05
0B10060012	1.2						●	●	●	●
0B10060015	1.5						●	●	●	●
0B10060020	2.0	+0.5	100	+1.5	60	+1.0	●	●	●	●
0B10060025	2.5	+0.2		0		0	●	●	●	●
0B10060030	3.0						●	●	●	●
0B10060040	4.0						●	●	●	●
0B15060020	2.0						●	●	●	●
0B15060025	2.5						●	●	●	●
0B15060030	3.0						●	●	●	●
0B15060035	3.5						●	●	●	●
0B15060040	4.0						●	●	●	●
0B15060045	4.5	+0.5	150	+1.5	60	+1.0	●	●	●	●
0B15060050	5.0	+0.2		0		0	●	●	●	●
0B15060055	5.5						●	●	●	●
0B15060060	6.0						●	●	●	●
0B15060070	7.0						●	●	●	●
0B15060080	8.0						●	●	●	●
0B15060090	9.0						●	●	●	●
0B15060100	10.0						●	●	●	●

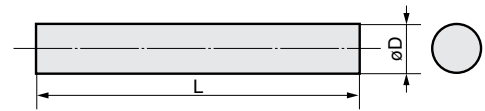
* Plates with top and bottom faces ground can be made to order



Rod Blanks



Fulfilling the material requirements for endmills, drills and reamers in terms of edge sharpness, toughness and wear resistance.



■ Stock

● L=310

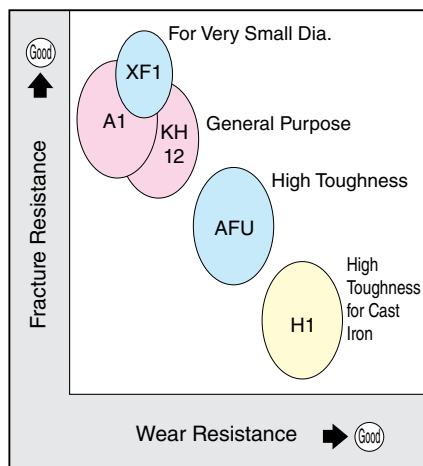
Cat. No.	ø D		L		Stock					
	Size	Tolerance	Size	Tolerance	A1	AF1	EH10	H1		
AR010310	1.0	+0.3 +0.2	310	+6.0 0	*	*	*	*		
AR015310	1.5				*	*	*	*		
AR020310	2.0				*	*	*	*		
AR025310	2.5	+0.4 +0.2			*	*	*	*		
AR030310	3.0				*	*	*	*		
AR035310	3.5				*	*	*	*		
AR040310	4.0				*	*	*	*		
AR045310	4.5				*	*	*	*		
AR050310	5.0	+0.5 +0.2			*	*	*	*		
AR055310	5.5				*	*	*	*		
AR060310	6.0				*	*	*	*		
AR065310	6.5				*	*	*	*		
AR070310	7.0				*	*	*	*		
AR075310	7.5				*	*	*	*		
AR080310	8.0	+0.6 +0.2			*	*	*	*		
AR090310	9.0				*	*	*	*		
AR100310	10.0				*	*	*	*		
AR110310	11.0				*	*	*	*		
AR120310	12.0				*	*	*	*		
AR130310	13.0				*	*	*	*		
AR140310	14.0	+0.8 +0.3			*	*	*	*		
AR150310	15.0				*	*	*	*		
AR160310	16.0				*	*	*	*		
AR170310	17.0				*	*	*	*		
AR180310	18.0				*	*	*	*		
AR190310	19.0				*	*	*	*		
AR200310	20.0				*	*	*	*		

* Ground rods can be made to order

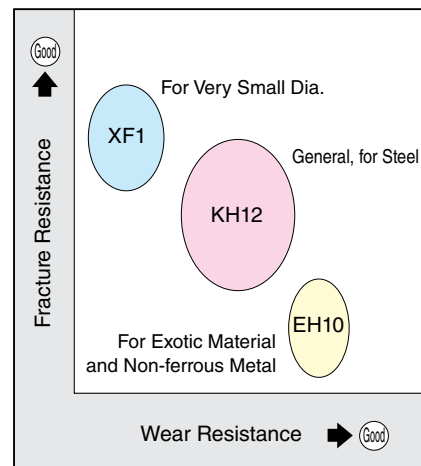
Items marked with an asterisk (*) are semi-standard stocked items. Please inquire about stock when ordering.
 - For length requirements other than L=310mm, refer to "Special Rod Blanks" on K6 for the available made-to-order specifications.

Special Rod Blanks

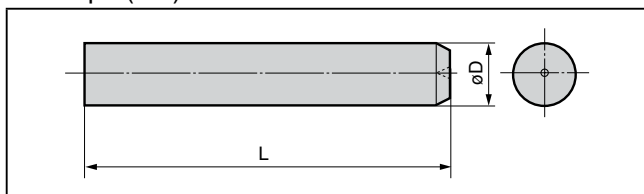
Endmill Blanks



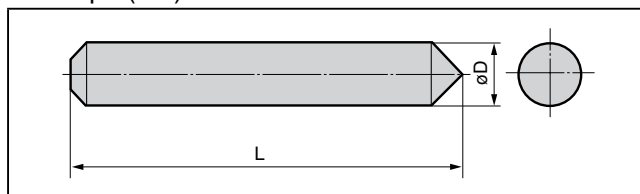
Drill Blanks



Shape (Ex.)



Shape (Ex.)



Diameter Range

(mm)

ϕD	Tolerance
$1.0 \leq D \leq 2.0$	+ 0.3 + 0.2
$2.0 < D \leq 15.0$	+ 0.5 + 0.3
$15.0 < D \leq 20.0$	+ 0.6 + 0.3
$20.0 < D \leq 25.0$	+ 0.6 + 0.3

* Rods with steps can be made to order.

Diameter Range

(mm)

ϕD	Tolerance
$1.0 \leq D \leq 2.0$	+ 0.3 + 0.2
$2.0 < D \leq 15.0$	+ 0.5 + 0.3
$15.0 < D \leq 20.0$	+ 0.6 + 0.3
$20.0 < D \leq 25.0$	+ 0.6 + 0.3

* Rods with steps can be made to order.

Total Length

(mm)

L	Tolerance	Warpage
$40 \leq L \leq 100$	Total Length $\pm 0.5\%$	0.15
$100 < L \leq 200$		0.15
$200 < L \leq 310$		0.20

* Ground rods can be made to order.

Total Length

(mm)

L	Tolerance	Warpage
$40 \leq L \leq 100$	Total Length $\pm 0.5\%$	0.15
$100 < L \leq 200$		0.15
$200 < L \leq 310$		0.20

* Ground rods can be made to order.



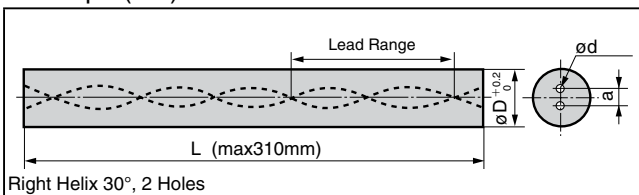
Special Rod Blanks

Drill Blanks with Oil Holes

* KH12 can be made to order.



Shape (Ex.)

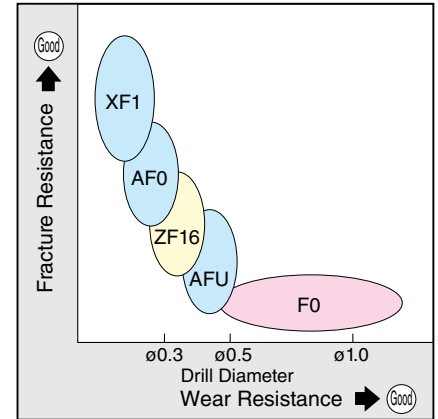


Dimensions

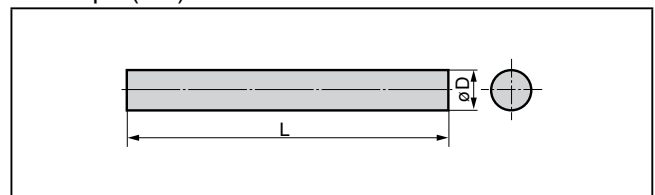
(mm)

Diameter øD	Core Diameter øD1	Oil Hole ød	Hole Pitch a	Lead Range	Application
3.6	3.3	0.5 ±0.05	1.5 $\begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$	15.7 to 17.0	For Straight Drills
4.6	4.3	0.6 ±0.1	1.7 $\begin{smallmatrix} 0 \\ -0.2 \end{smallmatrix}$	20.9 to 22.7	
5.6	5.3	0.7 ±0.1	2.4 $\begin{smallmatrix} 0 \\ -0.3 \end{smallmatrix}$	26.2 to 28.4	
6.6	6.3	0.8 ±0.1	2.8 ±0.2	31.4 to 34.0	
7.6	7.3	1.0 ±0.1	3.2 ±0.2	36.6 to 39.7	
8.6	8.3	1.1 ±0.1	3.6 ±0.2	41.9 to 45.4	
9.6	9.3	1.2 ±0.2	4.0 ±0.2	47.1 to 51.0	
10.6	10.3	1.3 ±0.2	4.4 ±0.2	52.3 to 56.7	
11.6	11.3	1.3 ±0.2	4.4 ±0.2	57.5 to 62.4	
12.6	12.3	1.4 ±0.2	4.8 ±0.2	62.8 to 68.1	
13.6	13.3	1.5 ±0.2	5.2 ±0.2	68.0 to 73.7	
14.6	14.3	1.7 ±0.2	5.6 ±0.2	73.2 to 79.4	
15.6	15.3	1.8 ±0.2	6.0 ±0.2	78.5 to 85.1	For Stepped Drills
16.6	16.3	1.9 ±0.2	6.4 ±0.2	83.7 to 90.7	
17.6	17.3	2.0 ±0.2	6.8 ±0.2	88.9 to 96.3	
18.6	18.3	2.1 ±0.2	7.2 ±0.2	94.1 to 102.0	
19.6	19.3	2.3 ±0.2	7.6 ±0.2	99.3 to 107.7	
20.6	20.3	2.4 ±0.2	8.0 ±0.2	104.6 to 113.4	
3.6	3.3	0.2 ±0.05	0.8 $\begin{smallmatrix} -0.1 \\ -0.2 \end{smallmatrix}$	15.7 to 17.0	
3.6	3.3	0.4 ±0.05	1.2 $\begin{smallmatrix} 0 \\ -0.2 \end{smallmatrix}$	15.7 to 17.0	
4.6	4.3	0.4 ±0.05	1.2 $\begin{smallmatrix} 0 \\ -0.2 \end{smallmatrix}$	20.9 to 22.7	
5.6	5.3	0.5 ±0.05	1.5 $\begin{smallmatrix} 0 \\ -0.3 \end{smallmatrix}$	26.2 to 28.4	
6.6	6.3	0.5 ±0.1	2.0 ±0.2	31.4 to 34.0	
7.6	7.3	0.6 ±0.1	2.0 ±0.2	36.6 to 39.7	
8.6	8.3	0.7 ±0.1	2.4 ±0.2	41.9 to 45.4	
9.6	9.3	0.8 ±0.2	2.8 ±0.2	47.1 to 51.0	
10.6	10.3	1.0 ±0.2	3.2 ±0.2	52.3 to 56.7	
11.6	11.3	1.0 ±0.2	3.2 ±0.2	57.5 to 62.4	
12.6	12.3	1.1 ±0.2	3.6 ±0.2	62.8 to 68.1	
13.6	13.3	1.1 ±0.2	3.6 ±0.2	68.0 to 73.7	
14.6	14.3	1.2 ±0.2	4.0 ±0.2	73.2 to 79.4	
15.6	15.3	1.3 ±0.2	4.4 ±0.2	78.5 to 85.1	
16.6	16.3	1.4 ±0.2	4.8 ±0.2	83.7 to 90.7	

Micro Drill Blanks



Shape (Ex.)



Solid Type

(mm)

øD	L
2.15 ±0.02	32.0 $\begin{smallmatrix} +0.9 \\ +0.4 \end{smallmatrix}$
3.25 ±0.02	38.1 $\begin{smallmatrix} +1.0 \\ +0.4 \end{smallmatrix}$

* Other sizes can be made to order.

Composite Type (Rough Ground)

øD	L
1.2 to 1.8 ±0.05	12 to 330 ± 0.5%

* Made to order dimensions can be accepted.
Centreless grinding can be performed.

Grade Application (◎: Best, ○: Good)

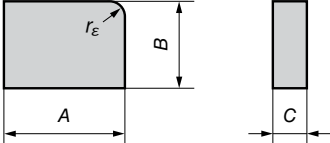
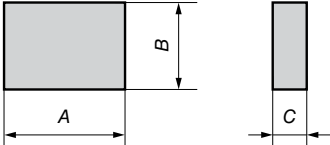
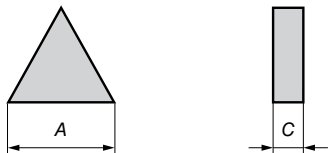
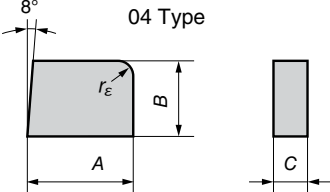
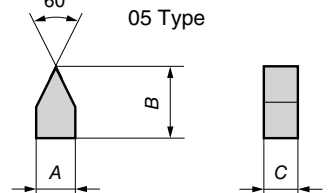
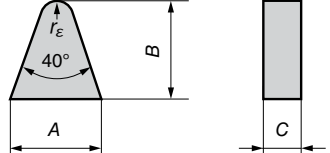
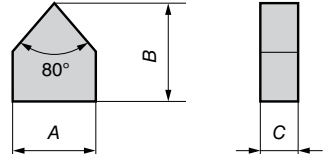
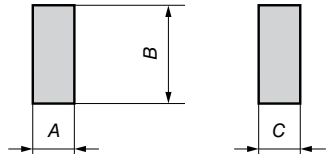
• Tool Diameter (mm)

Grade	(Up to ø0.15)	(ø0.15 to ø0.40)	(ø0.40 and Above)
XF1	◎	○	
AF1	○	○	
AF0	○	◎	○
AFU		◎	○
ZF16		○	○
F0		○	◎

• Working Conditions

Grade	Hardened Steel	High Speed Machining	Stacked Plates	For Routers
XF1		○		
AF1			○	
AF0		○	◎	○
AFU	○	○		
ZF16	○	◎		
F0	◎	○		◎

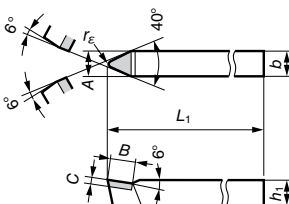
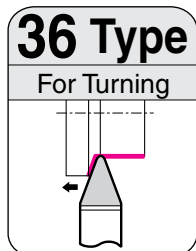
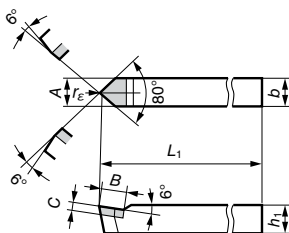
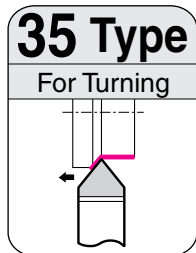
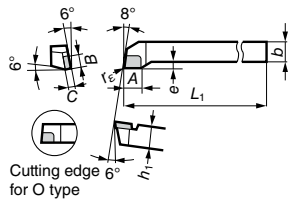
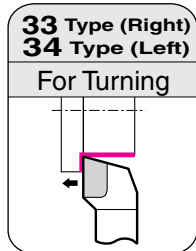
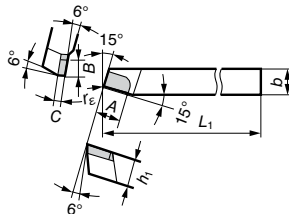
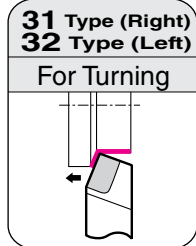
Carbide Blanks

Shape	Cat. No.	Stock Carbide												Dimensions (mm)				Applicable Brazed Tools
		P (Steel)					M (Stainless Steel)		K (Cast Iron)					A	B	C	r_{ϵ}	
		P10	P20	P30	P40		M20	M40	K01	K01	K10	K20	K20					
		ST10P	ST20E	ST30E	ST40E		U2	A40	H3	H2	H1	G10E	G2					
	01-0	●	●	●			●	●		●	●	●	●	10	6	3	4	31 Type 32 Type 45 Type 46 Type
01-1	●	●	●			●	●		●	●	●	●	13	9	3	5		
01-2	●	●	●			●	●		●	●	●	●	16	11	4	5		
01-3	●	●	●	▲		●	●		●	●	●	●	19	13	5	5		
01-4	●	●	●			●	●		●	●	●	●	22	15	6	8		
01-5													25	17	7	8		
01-6													30	20	8	8		
	02-0	●	●	●			●	●		●	●	●	●	10	6	3	—	41 Type 42 Type
02-1	●	●	●			●	●		●	●	●	●	13	9	3	—		
02-2	●	●	●	●		●	●		●	●	●	●	16	11	4	—		
02-3	●	●	●	●		●	●		●	●	●	●	19	13	5	—		
02-4	●	●	●	▲		●	●		●	●	●	●	22	15	6	—		
02-5													25	17	7	—		
02-6													30	20	8	—		
	03-0	●	●									●		10	—	3	—	37 Type 38 Type 47 Type 48 Type
03-1	●	●				●	●		●	●	●	●	12	—	3	—		
03-2	●	●	●			●	●		●	●	●	●	15	—	4	—		
03-3	●	●	●			●	●		●	●	●	●	18	—	5	—		
03-4		●	●			●	●			●	●		24	—	6	—		
03-5													24	—	7	—		
03-6													28	—	8	—		
	04-0	●	●	●			●	●		●	●	●	●	10	6	3	4	33 Type 34 Type
04-1	●	●	●			●	●		●	●	●	●	13	9	3	5		
04-2	●	●	●	▲		●	●		●	●	●	●	16	11	4	5		
04-3	●	●	●			●	●		●	●	●	●	19	13	5	5		
04-4	●	●	●			●	●		●	●	●	●	22	15	6	8		
04-5													25	17	7	8		
04-6													30	20	8	8		
	05-1	●	●	●			●	●		●	●	●	●	5	8	3	—	49 Type 50 Type 51 Type 52 Type
05-2	●	●	●			●	●		●	●	●	●	6	10	4	—		
05-3	●	●	●			●	●		●	●	●	●	7	12	5	—		
05-4	●	●	●				●		●	●	●	●	9	16	6	—		
05-5													10	18	7	—		
05-6													11	20	8	—		
	06-0	●	●	●	▲		●	●		●	●	●	●	10	10	3	2	36 Type 39 Type 40 Type
06-1	●	●	●			●	●		●	●	●	●	13	13	3	2.5		
06-2	●	●	●			●	●		●	●	●	●	16	16	4	3		
06-3	●	●	●			●	●		●	●	●	●	19	19	5	4		
06-4	●	●	●			●	●		●	●	●	●	22	22	6	4		
06-5													25	25	7	5		
06-6													30	30	8	6		
	07-0	●	●				●	●		●	●	●	●	10	10	3	—	35 Type
07-1	●	●	●			●	●		●	●	●	●	13	13	3	—		
07-2	●	●	●			●	●		●	●	●	●	16	16	4	—		
07-3	●	●				●	●		●	●	●	●	19	19	5	—		
07-4	●	●							●	●		●	25	20	6	—		
07-5													25	22	7	—		
07-6													30	25	8	—		
	08-1	●	●	●			●	●		●	●	●	●	3	8	3	—	43 Type
08-3	●	●	●			●	●		●	●	●	●	4	13	4	—		
08-4	●	●	●	●		●	●		●	●	●	●	5	15	5	—		
08-5										●			6	17	6	—		
08-6										●			8	20	8	—		

▲ mark : To be replaced by new item (Please confirm stock availability)

Brazed Tools

Illustrations show right hand tools.



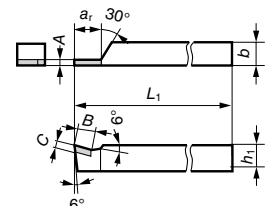
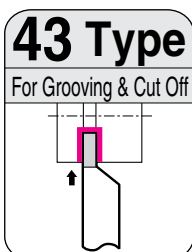
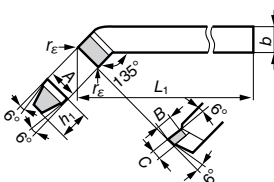
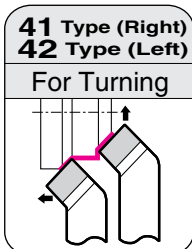
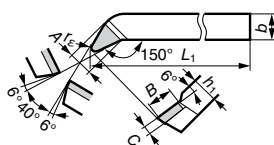
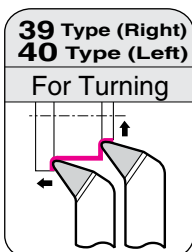
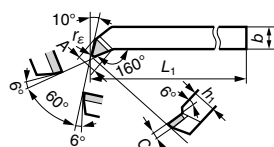
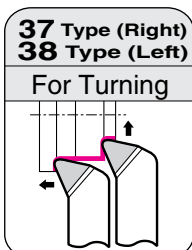
Shape	Cat. No.	Stock												Dimensions (mm)											Applicable Blanks
		Cermet	Carbide											Shank					Tip						
			P (Steel)					M (Stainless Steel)		K (Cast Iron)															
			P10	P20	P30	P40		M20	M40	K01	K01	K10	K20	K20	b	h ₁	L ₁	e	a _r	A	B	C	r _ε		
			T1200A	ST10P	ST20E	ST30E	ST40E		U2	A40	H3	H2	H1	G10E	G2										
	31-1		●	●	●			●				●		13	13	100	—	—	13	9	3	0.5	01-1		
	31-2		▲	●	●			●	●			●	●	16	16	120	—	—	16	11	4	0.5	01-2		
	31-3		●	●	●			●	●			●	●	19	19	140	—	—	19	13	5	0.5	01-3		
	31-4	*	●	●	●	●		●	●			●	●	25	25	160	—	—	22	15	6	1	01-4		
	31-5	—												25	30	180	—	—	25	17	7	1	01-5		
	31-6	—												30	35	200	—	—	30	20	8	1	01-6		
	32-1			●	●			●					●		13	13	100	—	—	13	9	3	0.5	01-1	
	32-2			●	●			●						16	16	120	—	—	16	11	4	0.5	01-2		
	32-3			●	●			●	●			●	●	19	19	140	—	—	19	13	5	0.5	01-3		
	32-4	*		●	●			●				●	●	25	25	160	—	—	22	15	6	1	01-4		
	32-5	—												25	30	180	—	—	25	17	7	1	01-5		
	32-6	—												30	35	200	—	—	30	20	8	1	01-6		
	33-0		●	●	●			●				●	●	10	10	80	0	—	10	6	3	0.3	04-0		
	33-1		●	●	●			●	●			●	●	13	13	100	4	—	13	9	3	0.5	04-1		
	33-2	●	●	●	●			●	●			●	●	16	16	120	4	—	16	11	4	0.5	04-2		
	33-3	●	●	●	●			●	●			●	●	19	19	140	5	—	19	13	5	0.5	04-3		
	33-4	*	●	●	●	●		●	●			●	●	25	25	160	5	—	22	15	6	1	04-4		
	33-5	—												25	30	180	6	—	25	17	7	1	04-5		
	33-6	—												30	35	200	6	—	30	20	8	1	04-6		
	34-0			●	●			●				●	●	10	10	80	0	—	10	6	3	0.3	04-0		
	34-1		●	●	●			●	●			●	●	13	13	100	4	—	13	9	3	0.5	04-1		
	34-2	●	●	●	●			●	●			●	●	16	16	120	4	—	16	11	4	0.5	04-2		
	34-3	●	●	●	●			●	●			●	●	19	19	140	5	—	19	13	5	0.5	04-3		
	34-4	*	●	●	●	●		●	●			●	●	25	25	160	5	—	22	15	6	1	04-4		
	34-5	—												25	30	180	6	—	25	17	7	1	04-5		
	34-6	—												30	35	200	6	—	30	20	8	1	04-6		
	35-0		●	●				●				●	●	10	10	80	—	—	10	10	3	0.3	07-0		
	35-1		●	●	●			●	●			●	●	13	13	100	—	—	13	13	3	0.5	07-1		
	35-2		●	●	●			●	●			●	●	16	16	120	—	—	16	16	4	0.5	07-2		
	35-3		●	●	●			●	●			●	●	19	19	140	—	—	19	19	5	0.5	07-3		
	35-4	*		●	●			●	●			●	●	25	25	160	—	—	22	20	6	1	07-4		
	35-5	—												25	30	180	—	—	25	22	7	1	07-5		
	35-6	—												30	35	200	—	—	30	25	8	1	07-6		
	36-0		●	●	●							●	●	10	10	80	—	—	10	10	3	2	06-0		
	36-1		●	●	●			●	●			●	●	13	13	100	—	—	13	13	3	2	06-1		
	36-2	●	●	●	●			●	●			●	●	16	16	120	—	—	16	16	4	3	06-2		
	36-3	●	●	●	●	●		●	●			●	●	19	19	140	—	—	19	19	5	4	06-3		
	36-4	*	●	●	●			●	●			●	●	25	25	160	—	—	22	22	6	4	06-4		
	36-5	—												25	30	180	—	—	25	25	7	5	06-5		
	36-6	—												30	35	200	—	—	30	30	8	5	06-6		

Note: Items marked with an asterisk (*) follow the insert dimensions of the ○○-3 type (one rank smaller) in their category. (Made to order)

* The classification on the packaging label for G10E has been changed from "K10" to "K20". This does not affect performance.

Brazed Tools

Illustrations show right hand tools.



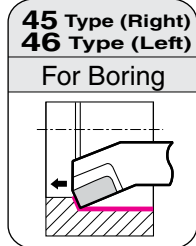
Shape	Cat. No.	Stock												Dimensions (mm)										Applicable Blanks
		Cermet	Carbide											Shank					Tip					
			P (Steel)				M (Stainless Steel)		K (Cast Iron)															
			P10	P20	P30	P40		M20	M40	K01	K01	K10	K20	K20										
			T1200A	ST10P	ST20E	ST30E	ST40E		U2	A40	H3	H2	H1	G10E	G2	b	h ₁	L ₁	e	a _r	A	B	C	
	37-1		▲	●	●							●	●	13	13	100	—	—	12	—	3	0.5	03-1	
	37-2		●	●	●			●	●		●	●	●	16	16	120	—	—	15	—	4	0.5	03-2	
	37-3		●	●	●			●	●		●	●	●	19	19	140	—	—	18	—	5	0.5	03-3	
	37-4	*	●	●	●			●				●		25	25	160	—	—	24	—	6	1	03-4	
	37-5	—												25	30	180	—	—	24	—	7	1	03-5	
	37-6	—												30	35	200	—	—	28	—	8	1	03-6	
	38-1		●	●									●		13	13	100	—	—	12	—	3	0.5	03-1
	38-2			●	●							●	●	16	16	120	—	—	15	—	4	0.5	03-2	
	38-3		●	●	●			●				●	●	19	19	140	—	—	18	—	5	0.5	03-3	
	38-4	*		●	●							●	●	25	25	160	—	—	24	—	6	1	03-4	
	38-5	—												25	30	180	—	—	24	—	7	1	03-5	
	38-6	—												30	35	200	—	—	28	—	8	1	03-6	
		39-0		●	●				●	●			●	●	10	10	80	—	—	10	10	3	2	06-0
		39-1		●	●	●			●	●		●	●	●	13	13	100	—	—	13	13	3	2	06-1
39-2		●	●	●	●			●	●		●	●	●	16	16	120	—	—	16	16	4	3	06-2	
39-3		●	●	●	●			●	●		●	●	●	19	19	140	—	—	19	19	5	4	06-3	
39-4		*	●	●	●	●		●	●		●	●	●	25	25	160	—	—	22	22	6	4	06-4	
39-5		—												25	30	180	—	—	25	25	7	5	06-5	
39-6		—												30	35	200	—	—	30	30	8	5	06-6	
40-0				●									●	●	10	10	80	—	—	10	10	3	2	06-0
40-1			●	●	●			●				●	●	●	13	13	100	—	—	13	13	3	2	06-1
40-2			●	●	●			●				●	●	●	16	16	120	—	—	16	16	4	3	06-2
40-3			●	●	●			●				●	●	●	19	19	140	—	—	19	19	5	4	06-3
40-4		*	●	●	●			●				●	●	●	25	25	160	—	—	22	22	6	4	06-4
40-5		—												25	30	180	—	—	25	25	7	5	06-5	
40-6	—												30	35	200	—	—	30	30	8	5	06-6		
	41-1		●	●	●			●				●	●	13	13	100	—	—	13	9	3	0.5	02-1	
	41-2		●	●	●			●				●	●	16	16	120	—	—	16	11	4	0.5	02-2	
	41-3		●	●	●			●				●	●	19	19	140	—	—	19	13	5	0.5	02-3	
	41-4	*	●	●	●			●				●	●	25	25	160	—	—	22	15	6	1	02-4	
	41-5	—												25	30	180	—	—	25	17	7	1	02-5	
	41-6	—												30	35	200	—	—	30	20	8	1	02-6	
	42-1			●	●								●		13	13	100	—	—	13	9	3	0.5	02-1
	42-2			●	●								●		16	16	120	—	—	16	11	4	0.5	02-2
	42-3		●	●	●			●					●	●	19	19	140	—	—	19	13	5	0.5	02-3
	42-4	*		●	●			●					●	●	25	25	160	—	—	22	15	6	1	02-4
	42-5	—												25	30	180	—	—	25	17	7	1	02-5	
	42-6	—												30	35	200	—	—	30	20	8	1	02-6	
		43-1		●	●	●			●				●	●	10	16	100	—	13	3	8	3	—	08-1
43-2			●	●	●			●				●	●	13	19	120	—	16	3	8	3	—	08-1	
43-3		●	●	●	●			●				●	●	16	22	140	—	19	4	13	4	—	08-3	
43-4		*	●	●	●			●				●	●	19	25	160	—	25	5	15	5	—	08-4	
43-5		—												22	32	180	—	30	6	17	6	—	08-5	
43-6		—												25	28	200	—	40	8	20	8	—	08-6	

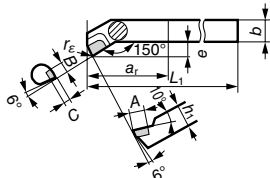
Note: Items marked with an asterisk (*) follow the insert dimensions of the ○○-3 type (one rank smaller) in their category. (Made to order)

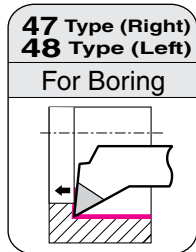
* The classification on the packaging label for G10E has been changed from "K10" to "K20". This does not affect performance.

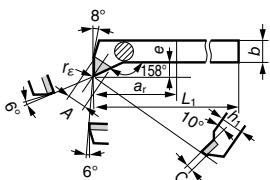
Brazed Tools

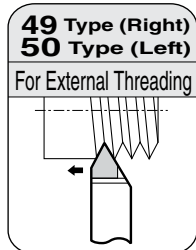
Illustrations show right hand tools.

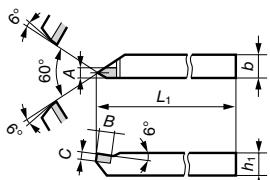


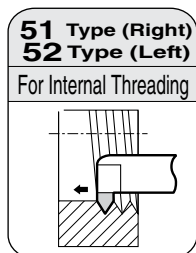
Shape	Cat. No.	Stock												Dimensions (mm)								Applicable Blanks	
		Cermet	Carbide											Shank				Tip					
			P (Steel)					M (Stainless Steel)		K (Cast Iron)													
			P10	P20	P30	P40		M20	M40	K01	K01	K10	K20	K20									
T1200A	ST10P	ST20E	ST30E	ST40E		U2	A40	H3	H2	H1	G10E	G2	b	h ₁	L ₁	e	a _r	A	B	C	r _ε		
	45-1													13	13	140	7	50	10	6	3	0.5	01-0
	45-2		●											16	16	160	9	60	13	9	3	0.5	01-1
	45-3		●											19	19	190	11	80	16	11	4	0.5	01-2
	45-4		●											25	25	230	13	100	19	13	5	1	01-3
	46-1													13	13	140	7	50	10	6	3	0.5	01-0
	46-2													16	16	160	9	60	13	9	3	0.5	01-1
	46-3													19	19	190	11	80	16	11	4	0.5	01-2
	46-4													25	25	230	13	100	19	13	5	1	01-3

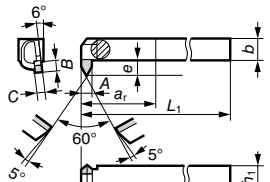


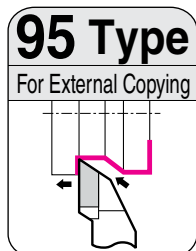
	47-1		●	●									●		13	13	140	7	50	10	—	3	0.5	03-0
	47-2		●	●									●		16	16	160	8	60	12	—	3	0.5	03-1
	47-3		●	●									●		19	19	190	9	80	15	—	4	0.5	03-2
	47-4		●	●									●		25	25	230	10	100	18	—	5	1	03-3
	48-1														13	13	140	7	50	10	—	3	0.5	03-0
	48-2														16	16	160	8	60	12	—	3	0.5	03-1
	48-3														19	19	190	9	80	15	—	4	0.5	03-2
	48-4														25	25	230	10	100	18	—	5	1	03-3

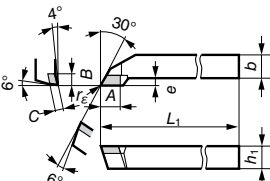


	49-1			●											13	13	100	—	—	5	8	3	—	05-1
	49-2			●	●								●		16	16	120	—	—	6	10	4	—	05-2
	49-3			●	●	●							●		19	19	140	—	—	7	12	5	—	05-3
	49-4			●	●	●							●		25	25	160	—	—	9	16	6	—	05-4
	50-1														13	13	100	—	—	5	8	3	—	05-1
	50-2														16	16	120	—	—	6	10	4	—	05-2
	50-3														19	19	140	—	—	7	12	5	—	05-3
	50-4														25	25	160	—	—	9	16	6	—	05-4



	51-1			●	●								●		13	13	140	8	50	5	8	3	—	05-1
	51-2				●										16	16	160	10	60	6	10	4	—	05-2
	51-3				●			●					●		19	19	190	12	80	7	12	5	—	05-3
	51-4				●										25	25	230	16	100	9	16	6	—	05-4
	52-1														13	13	140	8	50	5	8	3	—	05-1
	52-2														16	16	160	10	60	6	10	4	—	05-2
	52-3														19	19	190	12	80	7	12	5	—	05-3
	52-4														25	25	230	16	100	9	16	6	—	05-4

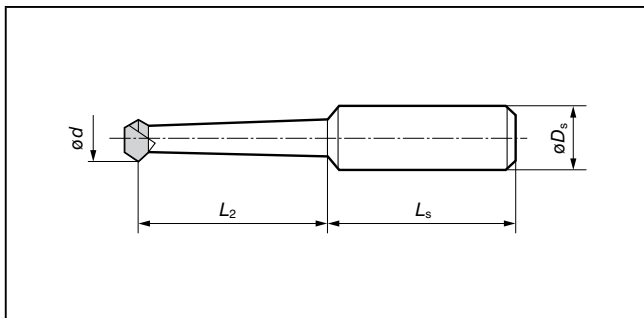


	95-1		●												25	25	160	5	—	20	10	7	1.7	09-E

* The classification on the packaging label for G10E has been changed from "K10" to "K20". This does not affect performance.

IJB Type

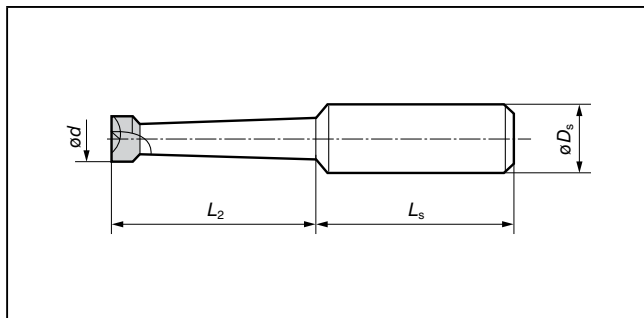
Through-Boring Type



(mm)

Cat. No.	Stock H1	ϕd	L_2	ϕD_s	L_s
IJB 4017	●	1.7	6.5	4	20
IJB 4019	▲	1.9	4.5		
IJB 4022	●	2.2	9.0		
IJB 4026	●	2.6	13.0		
IJB 4030	●	3.0	13.5		
IJB 4035		3.5	14.0		
IJB 4040	●	4.0	18.0		
IJB 4050		5.0	22.0		
IJB 8019	●	1.9	7.5	8	25
IJB 8030	●	3.0	13.5		
IJB 8035	▲	3.5	14.0		
IJB 8040	●	4.0	18.0		
IJB 8050	●	5.0	22.0		
IJB 8060	●	6.0	25.0		
IJB 8070	●	7.0	27.0		
IJB 8080	●	8.0	30.0		
IJB 8090	●	9.0	33.0		
IJB 8100	●	10.0	38.0		
IJB 8110		11.0	43.0		
IJB 8120	●	12.0	48.0		
IJB 1005	●	5.0	22.0	10	30
IJB 1006	●	6.0	25.0		
IJB 1007	●	7.0	27.0		
IJB 1008	●	8.0	30.0		
IJB 1009	▲	9.0	33.0		
IJB 1010	●	10.0	38.0		
IJB 1011		11.0	43.0		
IJB 1012	●	12.0	48.0		
IJB 1015	●	15.0	65.0		

Stop-Boring Type



(mm)

Cat. No.	Stock H1	ϕd	L_2	ϕD_s	L_s
IJB 4017C		1.7	7.0	4	20
IJB 4019C		1.9	8.0		
IJB 4022C	●	2.2	9.5		
IJB 4026C	●	2.6	13.5		
IJB 4030C	●	3.0	14.0		
IJB 4035C	●	3.5	14.5		
IJB 4040C	●	4.0	19.0		
IJB 4050C	●	5.0	23.0		
IJB 8019C	●	1.9	8.0	8	25
IJB 8030C	●	3.0	14.0		
IJB 8035C	●	3.5	14.5		
IJB 8040C	●	4.0	19.0		
IJB 8050C	●	5.0	23.0		
IJB 8060C	●	6.0	26.0		
IJB 8070C	●	7.0	28.5		
IJB 8080C	●	8.0	31.5		
IJB 8090C		9.0	35.0		
IJB 8100C	●	10.0	40.0		
IJB 8110C		11.0	45.0		
IJB 8120C		12.0	50.0		
IJB 1005C	●	5.0	23.0	10	30
IJB 1006C		6.0	26.0		
IJB 1007C	●	7.0	28.5		
IJB 1008C	●	8.0	31.5		
IJB 1009C	●	9.0	35.0		
IJB 1010C	●	10.0	40.0		
IJB 1011C		11.0	45.0		
IJB 1012C	●	12.0	50.5		
IJB 1015C	●	15.0	68.0		