

# Carbide Materials Braze Tools

# K



K49 ~ K60



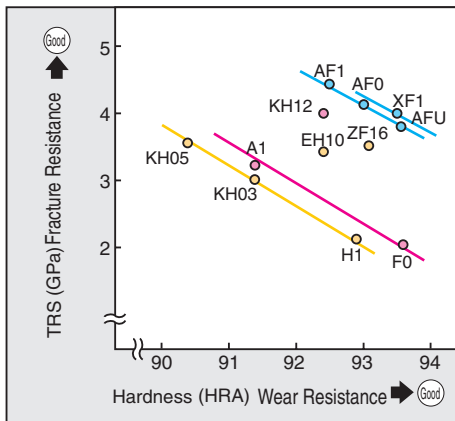
- Carbide Material Selection .....K50
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- Special Rod Blanks .....K54
- Carbide Blanks .....K56
- Braze Tools .....K57
- JIG Boring Tool IJB Type .....K60

# Carbide Material Selection

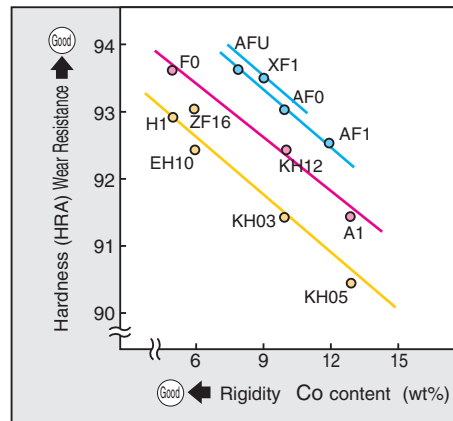
- Stringent selection of high purity and high quality raw materials
- Consistent quality and shorter delivery from the latest production facilities and techniques
- Fully equipped with a system that ensures the highest quality
- Constant R&D to develop the latest materials

## Grade Map

● Hardness vs Toughness



● Co Content vs Hardness



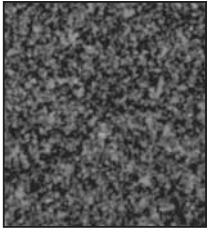
## Characteristics and Application

Classification	Grade	Properties					Characteristics	Application
		Grain Size (μm)	Co Content (wt %)	TRS (GPa)	Hardness (HRA)	Hardness HV (GPa)		
Ultra-fine Grain	<b>XF1</b> (*1)	0.2	9.0	4.0	93.5	19.2	World's smallest grained carbide	Micro drill, Small Diameter Drills
	<b>AF1</b>	0.5	12.0	4.4	92.5	17.3	World's toughest ultra-fine grained carbide	Micro drill, Mini-tool, Punches
	<b>AF0</b>	0.5	10.0	4.1	93.0	18.0	High toughness and wear resistant ultra-fine grained carbide	Micro drill, Router
	<b>AFU</b>	0.5	8.0	3.8	93.6	19.4	Enhanced wear resistant ultra-fine grained carbide	Micro drill
Micro-fine Grain	<b>A1</b>	0.7	13.0	3.2	91.4	15.6	Tough micro-grained carbide	Endmill, Tap, Drills for Cast Iron
	<b>KH12</b>	0.7	10.0	4.0	92.4	17.2	Micro-fine grained carbide with good balance of hardness and toughness	Endmill
	<b>F0</b>	0.7	5.0	2.0	93.6	20.1	Superior wear resistant micro-grained carbide	Micro drill, Router
Fine Grain	<b>KH03</b>	1.0	10.0	3.3	91.4	15.2	Fine grained carbide with good hardness and toughness	Drills for Steel, Dies, Drill, Endmill
	<b>KH05</b>	1.0	13.0	3.5	90.4	13.6	High toughness fine grained carbide	Dies
	<b>H1</b>	1.0	5.0	2.1	92.9	17.7	Superior wear resistant fine-grained carbide	Drill for Cast Iron, Reamer
	<b>EH10</b>	1.2	6.0	3.4	92.4	17.3	Fine-grained carbide with good balance of hardness and toughness	Drills for Exotic Alloy, Reamer
	<b>ZF16</b>	1.0	6.0	3.5	93.0	18.6	Wear and chipping resistant fine-grained carbide for high speed machining	Micro drill

(\*1) ZF21 was the development code for XF1.

## ■ Structure

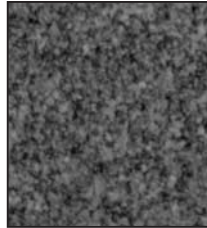
● Ultra-fine Grain



AF1

Ave. grain size : 0.5  $\mu\text{m}$

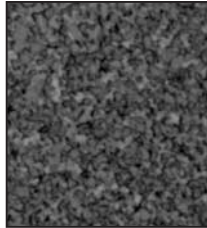
● Micro-fine Grain



A1

Ave. grain size : 0.7  $\mu\text{m}$

● Fine Grain



KH05

Ave. grain size : 1.0  $\mu\text{m}$

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

Grade	Application					Work Material								
	Endmill	Drill	Reamer	Micro drill	Non-cutting tool use	Soft Steel	General Steel	Hardened Steel	Stainless Steel	Ti-alloy	Inconel	Cast Iron	Al-alloy	Copper-alloy
<b>XF1</b>	●	●				○	○	○	◎	○	○		○	○
				●		Refer to K55 for the recommended grades for PCB drills and routers.								
<b>AF1</b>				●	●	◎							○	○
				●		Refer to K55 for the recommended grades for PCB drills and routers.								
<b>AF0</b>				●		Refer to K55 for the recommended grades for PCB drills and routers.								
<b>AFU</b>	●					○	○	◎						
				●		Refer to K55 for the recommended grades for PCB drills and routers.								
<b>A1</b>	●				●	◎	◎	○	◎	○	○	○	○	○
			●			◎	◎	○	◎	○	○	○		○
<b>KH12</b>	●	●				◎	◎	○	○	○	○	○	○	○
<b>F0</b>				●		Refer to K55 for the recommended grades for PCB drills and routers.								
<b>KH03</b>	●					◎	◎	○	○	○	○	○	○	○
		●				◎	◎	◎	◎	○	○	○	○	○
<b>KH05</b>					●	Cannot be use as cutting tool material								
<b>H1</b>	●	●								○	○	◎	◎	◎
			●			○	○	○	○	○	○	◎	◎	◎
<b>EH10</b>	●	●						○	○	◎	◎	◎	◎	◎
			●			○	○	○	○	◎	◎	◎	◎	◎
<b>ZF16</b>				●		Refer to K55 for the recommended grades for PCB 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]

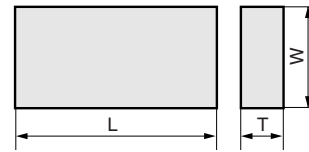
Suitable drill and reamer grade for the machining of cast iron and exotic metals.

### [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.



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



## Plates

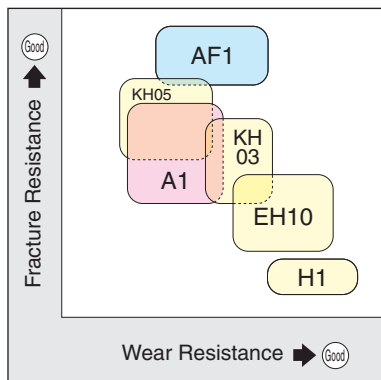
(mm)

Cat. No.	T		L		W		Stock			
	Size	Tolerance	Size	Tolerance	Size	Tolerance	A1	AF1	KH03	KH05
OB10060012	1.2						●	●	●	●
OB10060015	1.5						●	●	●	●
OB10060020	2.0	+0.5	100	+1.5 0	60	+1.0 0	●	●	●	●
OB10060025	2.5	+0.2					●	●	●	●
OB10060030	3.0						●	●	●	●
OB10060040	4.0						●	●	●	●
OB15060020	2.0						●	●	●	●
OB15060025	2.5						●	●	●	●
OB15060030	3.0						●	●	●	●
OB15060035	3.5						●	●	●	●
OB15060040	4.0						●	●	●	●
OB15060045	4.5						●	●	●	●
OB15060050	5.0	+0.5	150	+1.5 0	60	+1.0 0	●	●	●	●
OB15060055	5.5	+0.2					●	●	●	●
OB15060060	6.0						●	●	●	●
OB15060070	7.0						●	●	●	●
OB15060080	8.0						●	●	●	●
OB15060090	9.0						●	●	●	●
OB15060100	10.0						●	●	●	●

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

## Characteristics and Application

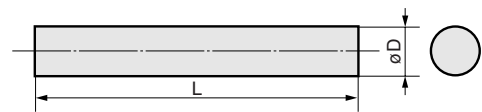
Grade	Hardness		Toughness	Application	
	HRA	HV(GPa)	TRS(GPa)	Endmill	IT mold punch
A1	91.4	15.6	3.2	Small drill	
AF1	92.5	17.3	4.4		
KH03	91.4	15.2	3.3	Mold dies	
KH05	90.4	13.6	3.5		
EH10	92.4	17.3	3.4	Drill, Reamer	
H1	92.9	17.7	2.1		



# Rod Blanks



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



## ■ Rods

● L = 310

(mm)

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				*	*	*	*
AR090310	9.0	+0.6 +0.2			*	*	*	*
AR100310	10.0				*	*	*	*
AR110310	11.0				*	*	*	*
AR120310	12.0				*	*	*	*
AR130310	13.0				*	*	*	*
AR140310	14.0		*	*	*	*		
AR150310	15.0		*	*	*	*		
AR160310	16.0	+0.8 +0.3	*	*	*	*		
AR170310	17.0		*	*	*	*		
AR180310	18.0		*	*	*	*		
AR190310	19.0		*	*	*	*		
AR200310	20.0		*	*	*	*		

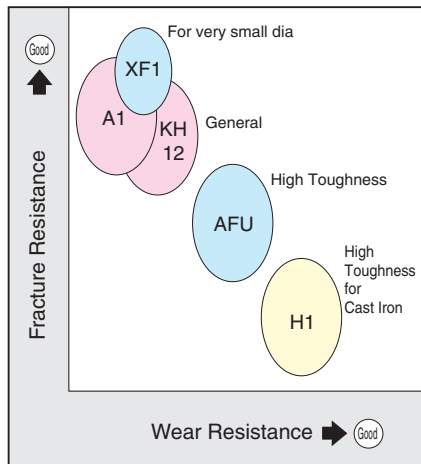
Ground rods can be made to order

Items marked with an asterisk (\*) are semi-standard in-stock-items. Please inquire about stock when ordering.

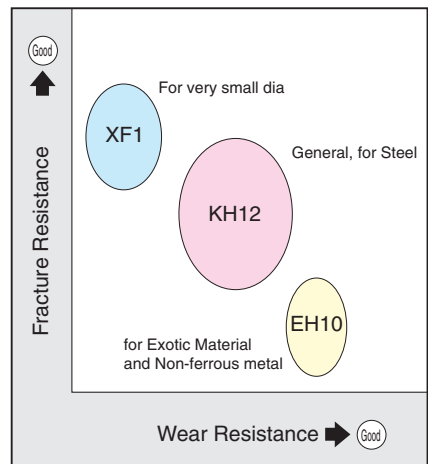
For length requirements other than L=310mm, refer to "Special Rod Blanks" on K54 for the available made-to-order specifications.

# Special Rod Blanks

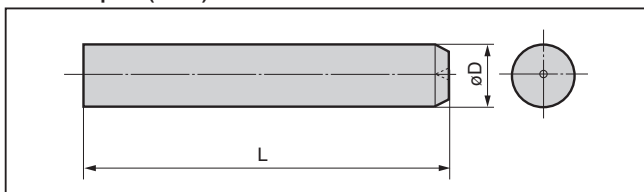
## Endmill Blanks



## Drill Blanks



### ■ Shape (Ex.)



### ■ Shape (Ex.)



### ■ Diameter Range

(mm)

øD	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)

øD	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 ±0.7%	0.15
$100 < L \leq 200$		0.15
$200 < L \leq 310$		0.20

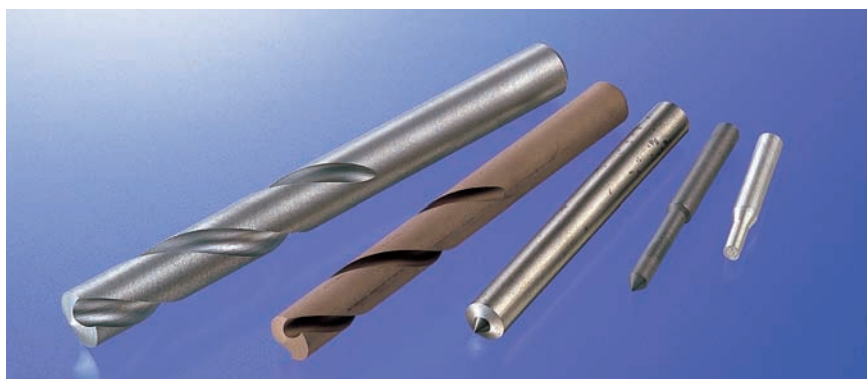
※ Ground rods can be made to order

### ■ Total Length

(mm)

L	Tolerance	Warpage
$40 \leq L \leq 100$	Total Length ±0.7%	0.15
$100 < L \leq 200$		0.15
$200 < L \leq 310$		0.20

※ Ground rods can be made to order



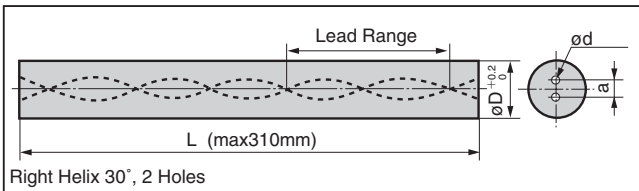
# Special Rod Blanks

## Drill Blanks with Oil Holes

※ KH12 can be made to order.



### Shape (Ex.)



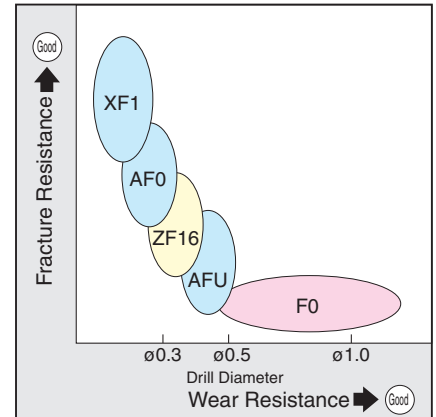
Right Helix 30°, 2 Holes

### Dimensions

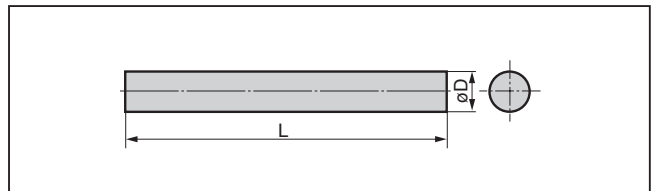
(mm)

Diameter $\phi D$	Core Diameter $\phi D_1$	Oil Hole $\phi d$	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 ~ 17.0	For Straight Drills
4.6	4.3	0.6 ±0.1	1.7 $\begin{smallmatrix} 0 \\ -0.2 \end{smallmatrix}$	20.9 ~ 22.7	
5.6	5.3	0.7 ±0.1	2.4 $\begin{smallmatrix} 0 \\ -0.3 \end{smallmatrix}$	26.2 ~ 28.4	
6.6	6.3	0.8 ±0.1	2.8 ±0.2	31.4 ~ 34.0	
7.6	7.3	1.0 ±0.1	3.2 ±0.2	36.6 ~ 39.7	
8.6	8.3	1.1 ±0.1	3.6 ±0.2	41.9 ~ 45.4	
9.6	9.3	1.2 ±0.2	4.0 ±0.2	47.1 ~ 51.0	
10.6	10.3	1.3 ±0.2	4.4 ±0.2	52.3 ~ 56.7	
11.6	11.3	1.3 ±0.2	4.4 ±0.2	57.5 ~ 62.4	
12.6	12.3	1.4 ±0.2	4.8 ±0.2	62.8 ~ 68.1	
13.6	13.3	1.5 ±0.2	5.2 ±0.2	68.0 ~ 73.7	
14.6	14.3	1.7 ±0.2	5.6 ±0.2	73.2 ~ 79.4	
15.6	15.3	1.8 ±0.2	6.0 ±0.2	78.5 ~ 85.1	
16.6	16.3	1.9 ±0.2	6.4 ±0.2	83.7 ~ 90.7	
17.6	17.3	2.0 ±0.2	6.8 ±0.2	88.9 ~ 96.3	
18.6	18.3	2.1 ±0.2	7.2 ±0.2	94.1 ~ 102.0	
19.6	19.3	2.3 ±0.2	7.6 ±0.2	99.3 ~ 107.7	
20.6	20.3	2.4 ±0.2	8.0 ±0.2	104.6 ~ 113.4	
3.6	3.3	0.2 ±0.05	0.8 $\begin{smallmatrix} 0 \\ -0.1 \end{smallmatrix}$	15.7 ~ 17.0	For Stepped Drills
3.6	3.3	0.4 ±0.05	1.2 $\begin{smallmatrix} 0 \\ -0.2 \end{smallmatrix}$	15.7 ~ 17.0	
4.6	4.3	0.4 ±0.05	1.2 $\begin{smallmatrix} 0 \\ -0.2 \end{smallmatrix}$	20.9 ~ 22.7	
5.6	5.3	0.5 ±0.05	1.5 $\begin{smallmatrix} 0 \\ -0.3 \end{smallmatrix}$	26.2 ~ 28.4	
6.6	6.3	0.5 ±0.1	2.0 ±0.2	31.4 ~ 34.0	
7.6	7.3	0.6 ±0.1	2.0 ±0.2	36.6 ~ 39.7	
8.6	8.3	0.7 ±0.1	2.4 ±0.2	41.9 ~ 45.4	
9.6	9.3	0.8 ±0.2	2.8 ±0.2	47.1 ~ 51.0	
10.6	10.3	1.0 ±0.2	3.2 ±0.2	52.3 ~ 56.7	
11.6	11.3	1.0 ±0.2	3.2 ±0.2	57.5 ~ 62.4	
12.6	12.3	1.1 ±0.2	3.6 ±0.2	62.8 ~ 68.1	
13.6	13.3	1.1 ±0.2	3.6 ±0.2	68.0 ~ 73.7	
14.6	14.3	1.2 ±0.2	4.0 ±0.2	73.2 ~ 79.4	
15.6	15.3	1.3 ±0.2	4.4 ±0.2	78.5 ~ 85.1	
16.6	16.3	1.4 ±0.2	4.8 ±0.2	83.7 ~ 90.7	

## Micro Drill Blanks



### Shape (Ex.)



### Solid Type

(mm)

$\phi D$	L
2.15 ±0.02	32.0 <sup>+0.9</sup> <sub>+0.4</sub>
3.25 ±0.02	38.1 <sup>+1.0</sup> <sub>+0.4</sub>

※ Other sizes can be made to order.

### Composite type (Rough Ground)

$\phi D$	L
1.2 ~ 1.7 ±0.05	12 ~ 330 ±0.7%

※ Made to order dimensions can be accepted  
Centerless grinding can be performed

### Grade Application (◎ : Best, ○ : Good)

• Tool Diameter (mm)

Grade	~ $\phi 0.15$	$\phi 0.15 \sim \phi 0.40$	$\phi 0.40 \sim$
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

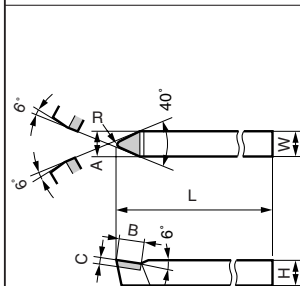
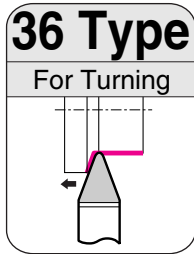
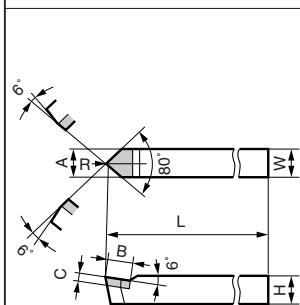
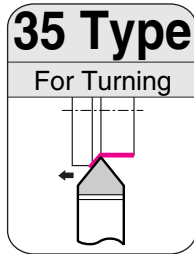
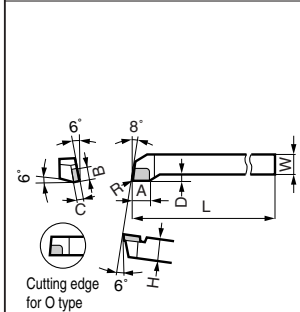
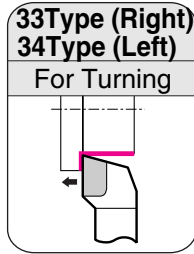
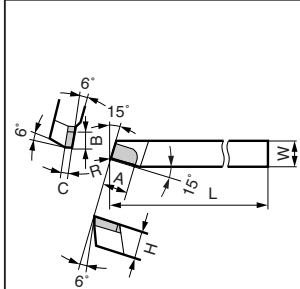
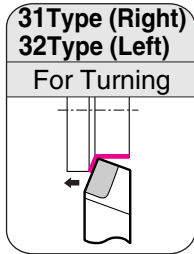
Shape	Cat. No.	Stock Carbide										Dimensions (mm)				Applicable Brazed Tool			
		P				M		K				A	B	C	R				
		ST10P	ST20E	ST30E	ST40E	U2	A40	H3	H2	H1	G10E						G2		
	01-0	●	●	●			●	●						10	6	3	4	31 Type 32 Type 45 Type 46 Type	
	01-1	●	●	●			●	●			●	●	●	●	13	9	3		5
	01-2	●	●	●			●	●			●	●	●	●	16	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		—

Brazed Tool



# Brazed Tools

(Illustrations show Right-Hand tools)

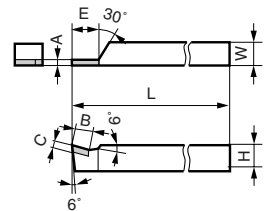
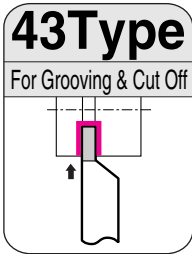
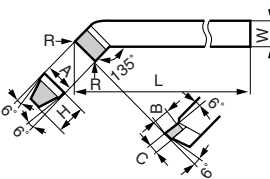
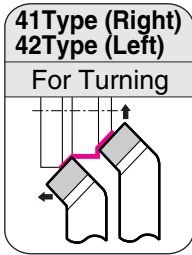
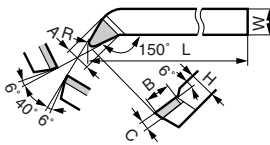
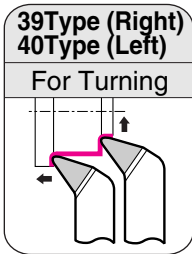
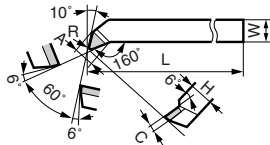
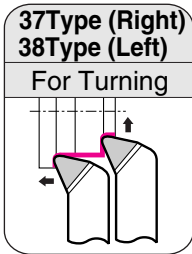


Shape	Cat. No.	Stock										Dimensions (mm)								Applicable Blanks		
		Cermet		Carbide						Shank					Tip							
		T12A	P				M		K		W	H	L	D	E	A	B	C	R			
			ST10P	ST20E	ST30E	ST40E	U2	A40	H3	H2											H1	G10E
31 Type (Right) 32 Type (Left) For Turning	31-1	●	●	●	●			●					13	13	100	—	—	13	9	3	0.5	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 Type (Right) 34 Type (Left) For Turning	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 Type For Turning	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 Type For Turning	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>

# Brazed Tools

(Illustrations show Right-Hand tools)



Shape	Cat. No.	Stock										Dimensions (mm)								Applicable Blanks		
		Cermet		Carbide						Shank				Tip								
		T12A	ST10P	ST20E	ST30E	ST40E	U2	A40	H3	H2	H1	G10E	G2	W	H	L	D	E	A		B	C
37-38	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	
39-40	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	
41-42	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	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	

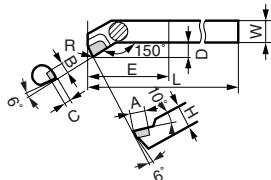
Note: Items marked with an asterisk (※) follow the insert dimensions of the ○○-3 type (one rank smaller) in their category. <Made to order>

Brazed Tool

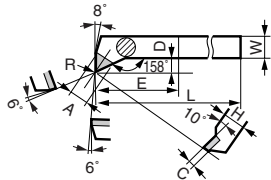
# Brazed Tools

(Illustrations show Right-Hand tools)

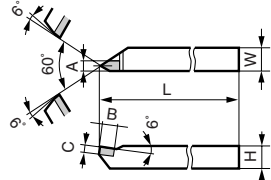
**45Type (Right)  
46Type (Left)**  
For Boring



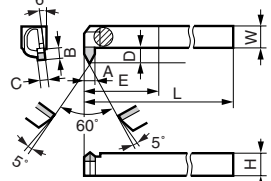
**47Type (Right)  
48Type (Left)**  
For Boring



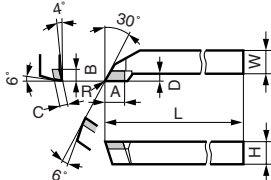
**49Type (Right)  
50Type (Left)**  
For External Threading



**51Type (Right)  
52Type (Left)**  
For Internal Threading



**95Type**  
For External Copying

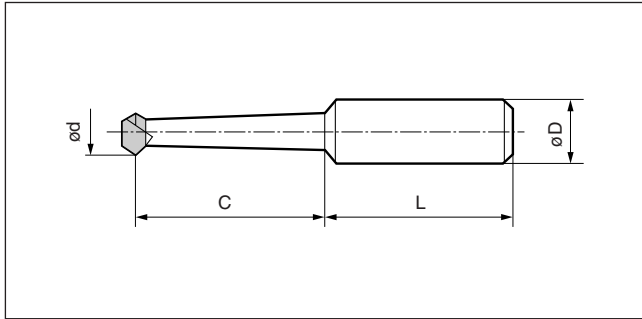


Shape	Cat. No.	Stock										Dimensions (mm)								Applicable Blanks	
		Cermet		Carbide						Shank				Tip							
		T12A	ST10P	ST20E	ST30E	ST40E	P	M		K		W	H	L	D	E	A	B	C		R
								U2	A40	H3	H2										
45-1 45-2 45-3 45-4 46-1 46-2 46-3 46-4	45-1											13	13	140	7	50	10	6	3	0.5	01-0
	45-2			●								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 47-2 47-3 47-4 48-1 48-2 48-3 48-4	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 49-2 49-3 49-4 50-1 50-2 50-3 50-4	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 51-2 51-3 51-4 52-1 52-2 52-3 52-4	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

Brazed Tool

# JIG Boring Tools IJB Type

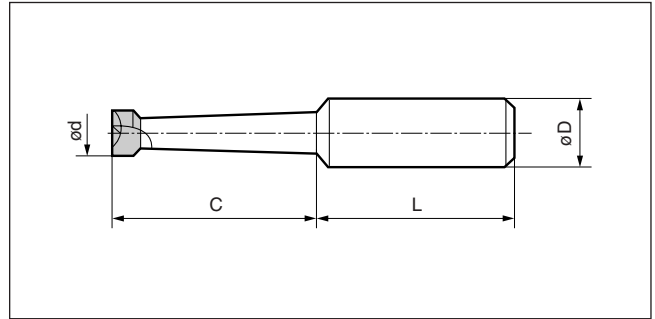
## ■ Through-Boring Type



(mm)

Cat. No.	Stock	ød	C	øD	L
	H1				
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		
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	ød	C	øD	L
	H1				
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		
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		