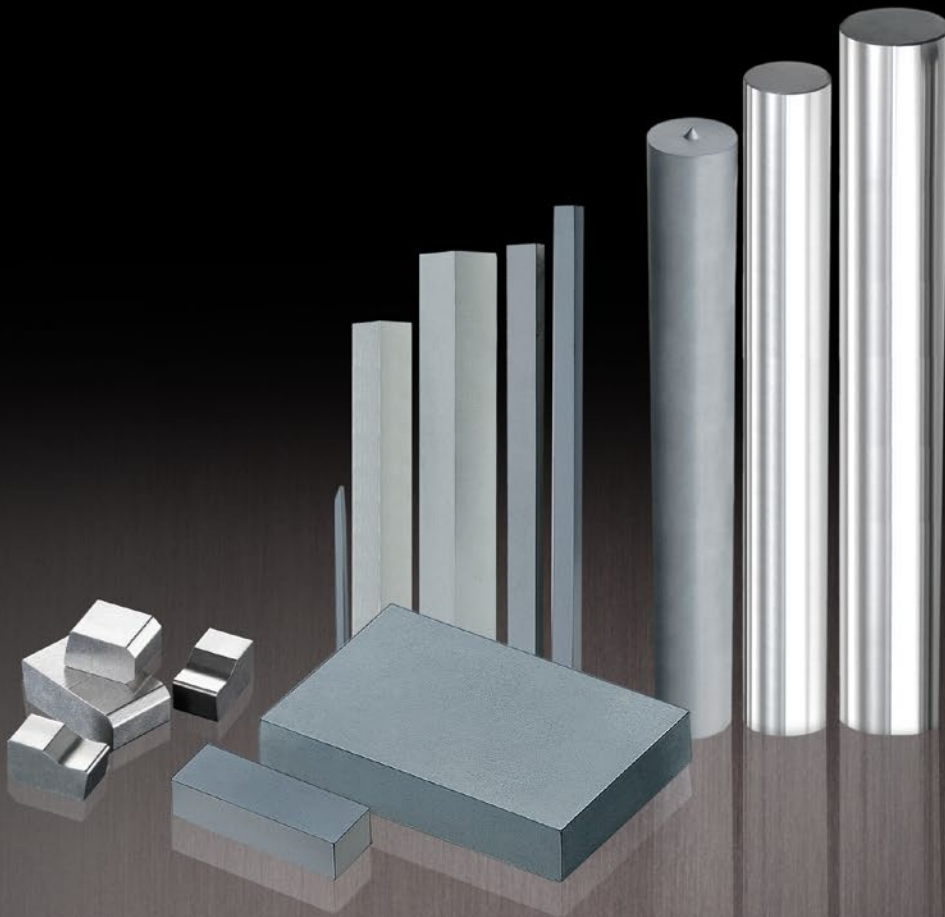



CARBIDE MATERIALS



MMC RYOTEC Corporation

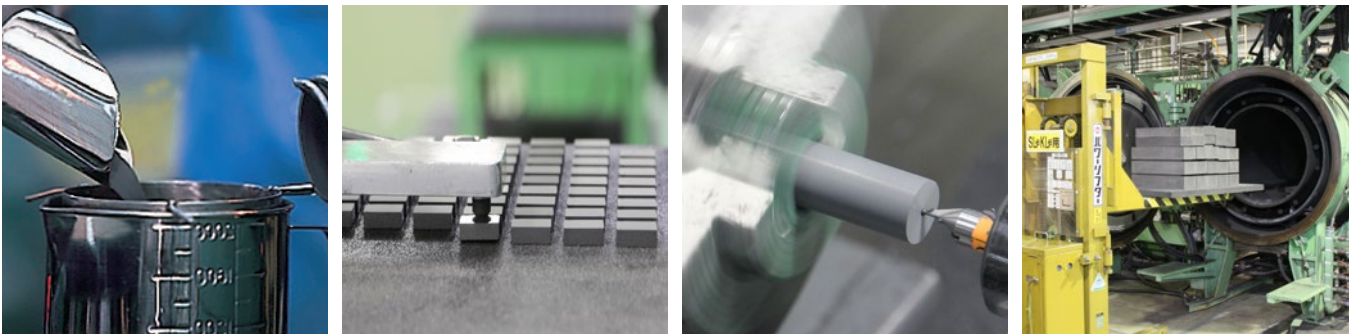
A Group Company of  **MITSUBISHI MATERIALS**

To Always Being The Top Choice

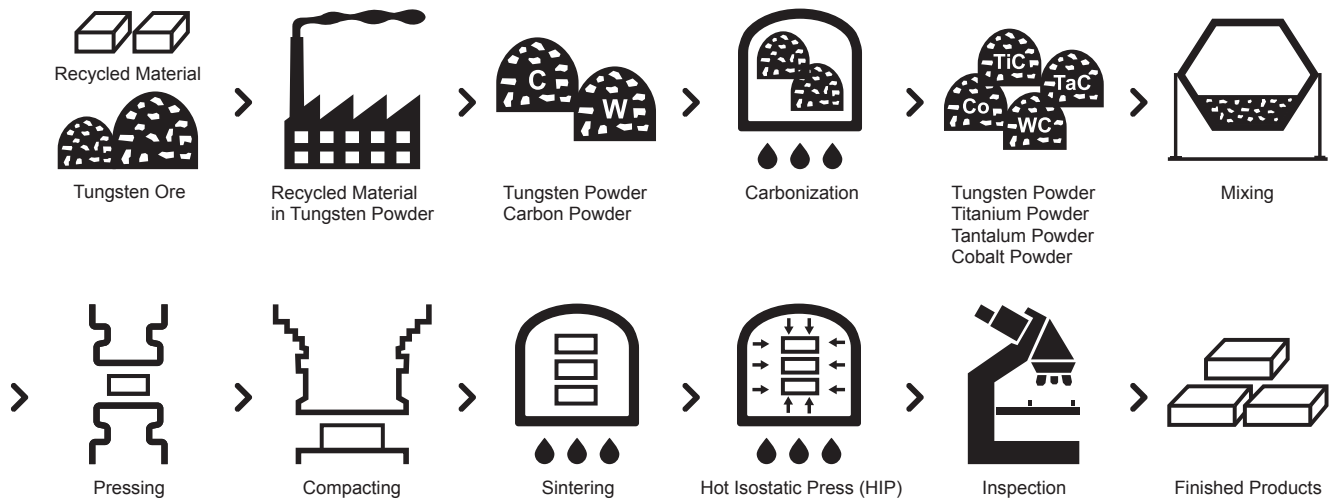
Carbide Materials of MMC Ryotec has elevated the process control technology such as materials, pressing, sintering and processing.

Especially, in pressing and sintering processes in which prediction of changes in dimension is difficult, our original pressing and sintering technologies and their know-how enable high accuracy with cemented carbide materials.

With these production technologies and know-how, we can be trusted to deliver high accuracy and high quality products, from sintering materials to high accuracy abrasive products, to satisfy needs from customers in reliable quality control.



Manufacturing Process



Carbide Rods

Carbide rods are used for PCB drills, end mills, taps and other any kind of tools for every application.

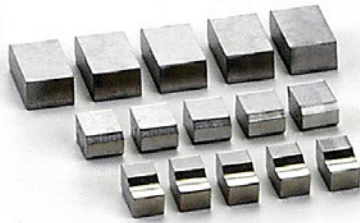
→P.4



Carbide & Cermet Tips for Circular Saw Blades

Carbide & Cermet tips are used for circular saw blades which cut various types of metals in solid bars, tubes and steel angles.

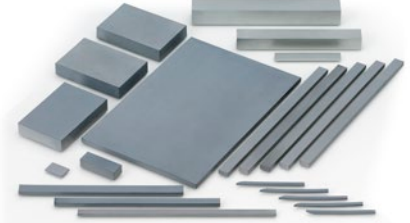
→P.8



Cemented Carbide Plates

Carbide plates are used for any kind of brazing tools for special applications, and also used for mold materials with high wear resistance and high toughness.

→P.11



Tungsten Carbide Grade Properties

	Grade	ISO Code	Grain Size (μm)	Co (mass%)	TRS (GPa) *1	Hardness		Thermal Conductivity (W/m·K)	Fracture Toughness (MPa·m ^{1/2})
						HRA *2	HV *3		
Ultra Fine Grain	QF10	K01	<0.4	8.0	4.2 (With HIP)	93.5	2000	51	5.5
Micro Fine Grain	MF10	K01	<0.6	8.0	4.0 (With HIP)	93.0	1900	75	5.8
	SF10	K01	<0.8	6.0	3.8 (With HIP)	92.7	1830	79	6.6
	MF20	K10	<0.6	12.0	4.4 (With HIP)	92.0	1700	67	6.3
	TF15	K20	<0.9	10.0	4.0 (With HIP)	91.0	1550	71	8.7
Fine Grain	HTi10	K10	<1.0	6.0	3.2 (With HIP)	92.0	1700	79	6.8
	RT9010	K20	<1.5	5.7	2.2	91.8	1620	79	9.0
Coarse Grain	ZU525H	P30	<3.0	12.5	2.1	90.5	1450	41	9.5
	ZN520	P40	<3.0	12.0	2.2	89.3	1300	40	12.0
	UTi20T	M20	<3.0	9.0	2.0	90.5	1450	38	8.3
	GTi20	V30	<2.5	11.0	2.7	89.0	1270	67	14.1

*1 ISO03327 *2 ISO03738 *3 ISO03878

Cermet Grade Properties

	Grade	ISO Code	Grain Size (μm)	Co+Ni (mass%)	TRS (GPa) *1	Hardness		Thermal Conductivity (W/m·K)	Fracture Toughness (MPa·m ^{1/2})
						HRA *2	HV *3		
Fine Grain	NR200	P10	<1.5	19	2.1	91.5	1570	19	5.3
	NR800	P30	<1.5	23	2.2	90.0	1370	18	7.2
Coarse Grain	NX55	P10	<2.0	18	2.0	91.2	1500	13	6.1
	TBF61	P20	<2.0	19	2.0	90.5	1450	13	5.5

*1 ISO03327 *2 ISO03738 *3 ISO03878



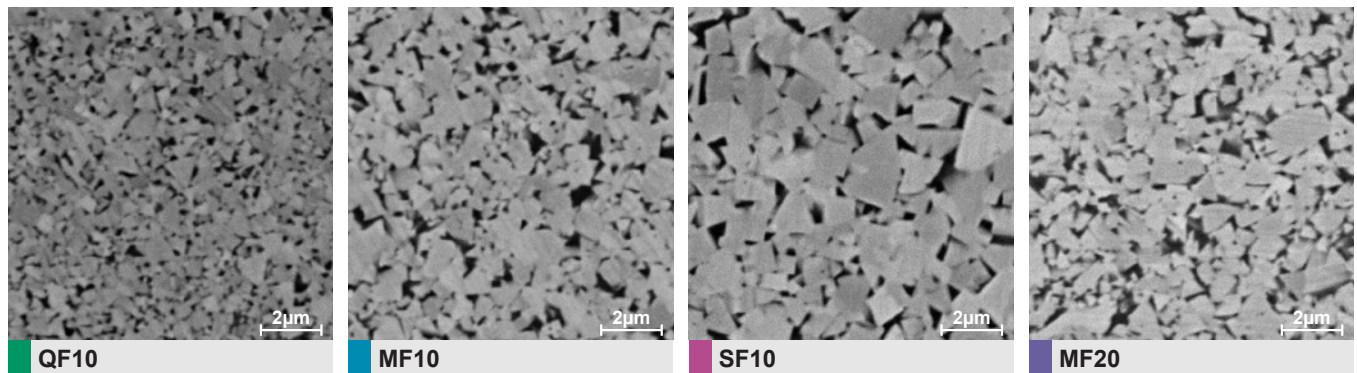
Carbide Rods

Tungsten Carbide Grade Properties

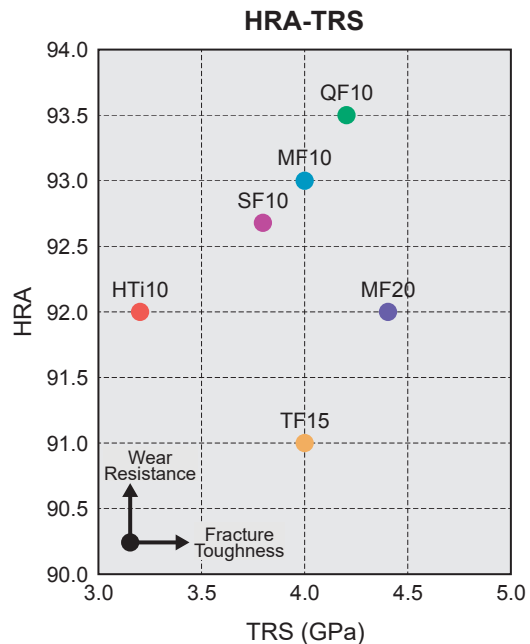
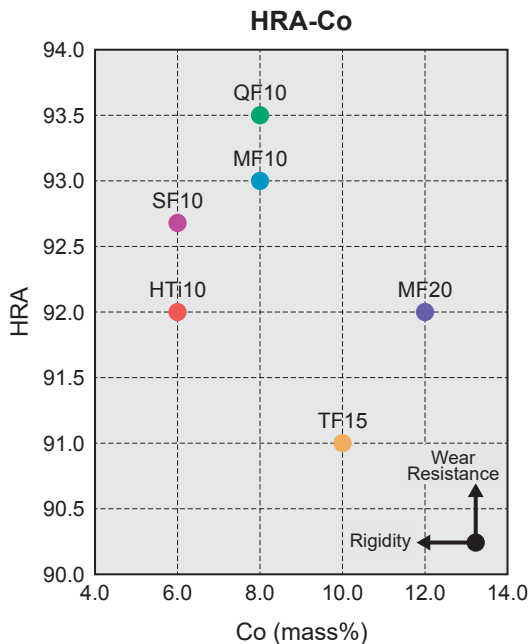
Grade	ISO Code	Grain Size (μm)	Co (mass%)	TRS (GPa)	Hardness		Fracture Toughness (MPa·m ^{1/2})	Applications			
					HRA	HV		End Mills	Drills	PCB Drills	Routers
QF10	K01	<0.4	8.0	4.2	93.5	2000	5.5	●			
MF10	K01	<0.6	8.0	4.0	93.0	1900	5.8	●			●
SF10	K01	<0.8	6.0	3.8	92.7	1830	6.6			●	●
MF20	K10	<0.6	12.0	4.4	92.0	1700	6.3	●	●		●
TF15	K20	<0.9	10.0	4.0	91.0	1550	8.7	●	●		
HTi10	K10	<1.0	6.0	3.2	92.0	1700	6.8	●	●		

Note) All numbers are after HIP

《SEM Pictures》

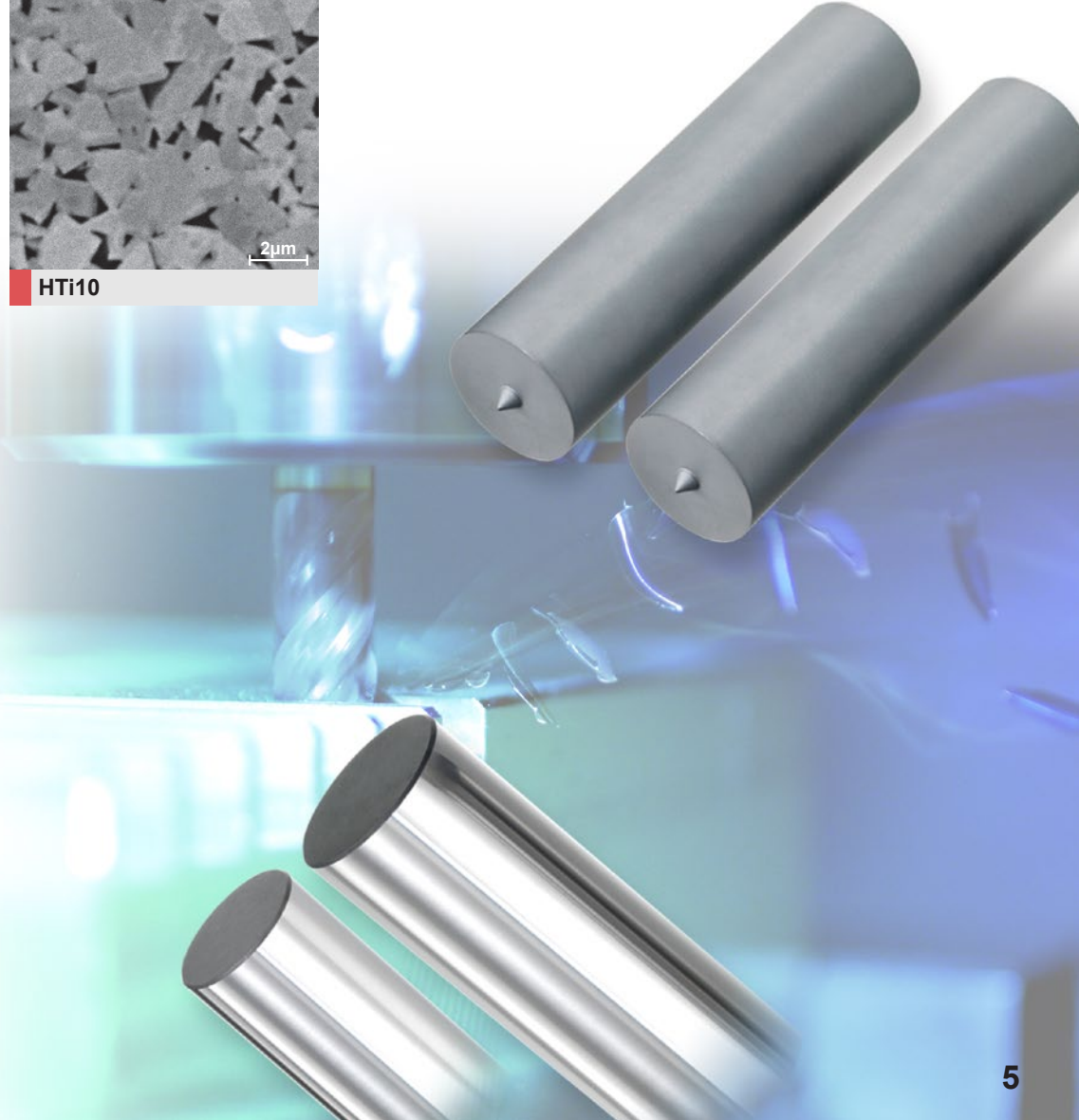
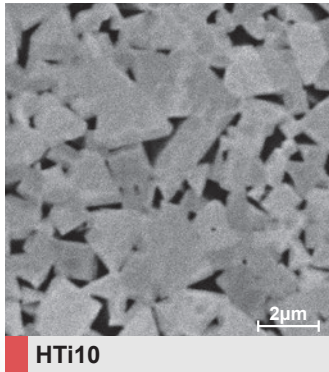
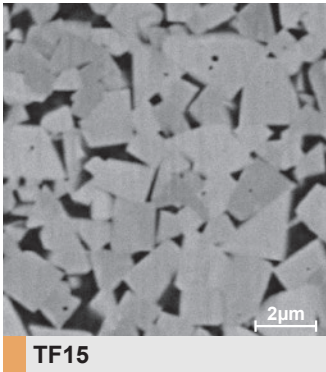


《Properties of Grade》

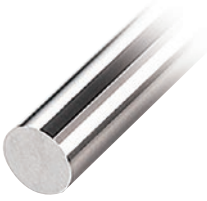


Application

Grade	Work Material							
	General Steel	Stainless Steel	Cast Iron	Hardened Steel	Aluminum Alloy	FRP	Titanium Alloy	Heat Resistant Alloy
QF10				○				
MF10	◎			◎	○	○	◎	◎
SF10	○		○		○	○		
MF20	○	○						
TF15	◎	◎					◎	◎
HTi10			◎		◎	◎	○	○



h6 Ground Blanks

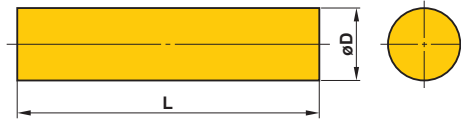


Examples

Diameter (mm)	Tolerance (mm)	Length (mm)	Tolerance (mm)
D3	0, -0.006	40	+1.0, +0.4
		50	
		60	
		70	
D4	0, -0.008	40	+1.0, +0.4
		50	
		60	
		70	+1.4, +0.4
D6	0, -0.008	40	+1.4, +0.4
		50	
		60	
		70	
		80	

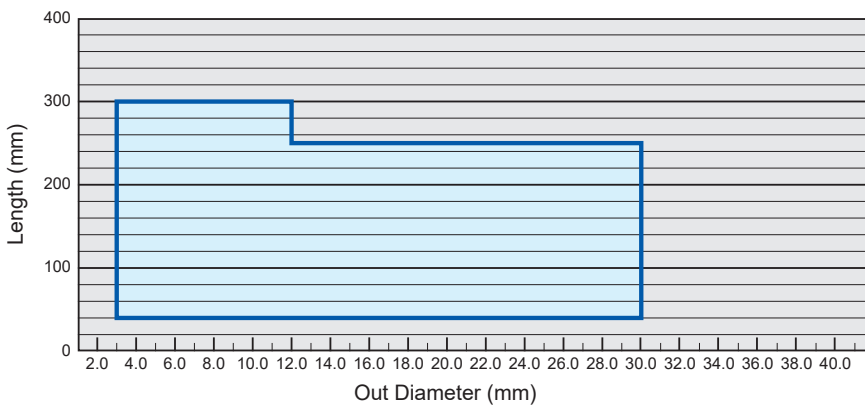
* For more detail, please contact.

Sintered Rods



D	Tolerance (mm)
$3.0 \leq D \leq 10.0$	+0.6 +0.3
$10.0 < D \leq 30.0$	+0.7 +0.3

《Manufacturing Range》

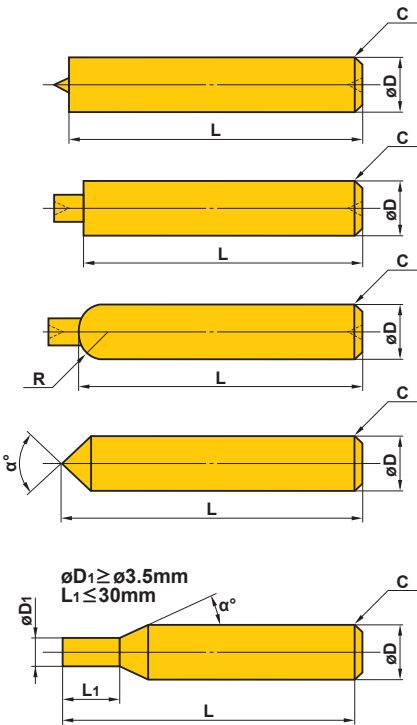


L	Tolerance (mm)	Curvature (mm)
$40 \leq L \leq 60$	+1.4 0	0.15
$60 < L \leq 100$	+2.0 0	0.15
$100 < L \leq 150$	+3.0 0	0.15
$150 < L \leq 200$	+4.0 0	0.2
$200 < L \leq 300$	* +Lx2% 0	0.2

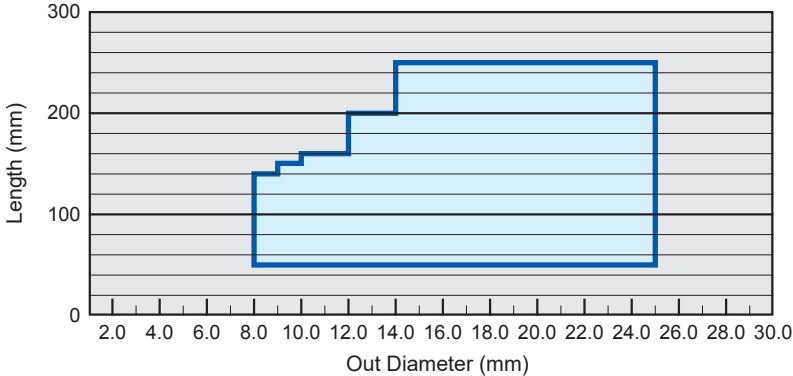
*Exp.) 250x2%=5mm

■ Special Sintered Rods

《Representative Geometry》



《Manufacturing Range》



Note) Please contact us for other products.

	Tolerance (mm)
$8.0 \leq D \leq 10.0$	+0.6 +0.3
$10.0 < D \leq 25.0$	+0.7 +0.3

	Tolerance (mm)	Curvature (mm)
$50 \leq L \leq 60$	+1.4 0	0.15
$60 < L \leq 100$	+2.0 0	0.15
$100 < L \leq 150$	+3.0 0	0.15
$150 < L \leq 200$	+4.0 0	0.2
$200 < L \leq 250$	* +Lx2% 0	0.2

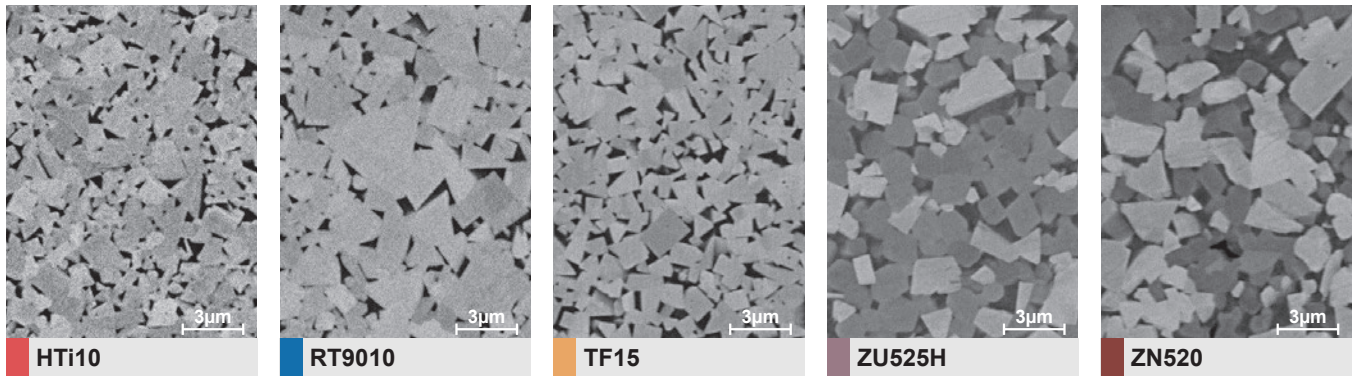
*Exp.) 250x2%=5mm

Carbide & Cermet Tips for Circular Saw Blades

Tungsten Carbide Grade Properties

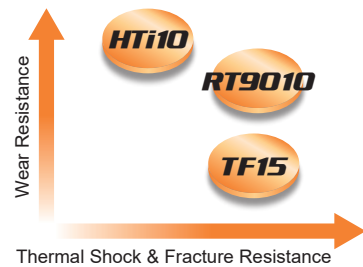
Grade	ISO Code	Grain Size (μm)	Co (mass%)	TRS (GPa)	Hardness		Fracture Toughness (MPa·m ^{1/2})	Work Material			
					HRA	HV		General Steel	Special Steel	Stainless Steel	Non-ferrous Metal
HTi10	K10	<1.0	6.0	2.0	92.0	1700	6.8		○		○
RT9010	K20	<1.5	5.7	2.2	91.8	1620	9.0		○		○
TF15	K20	<0.9	10.0	2.5	91.0	1550	8.7		○		○
ZU525H	P30	<3.0	12.5	2.1	90.5	1450	9.5	○	○	◎	
ZN520	P40	<3.0	12.0	2.2	89.3	1300	12.0	○	○	○	

《SEM Pictures》

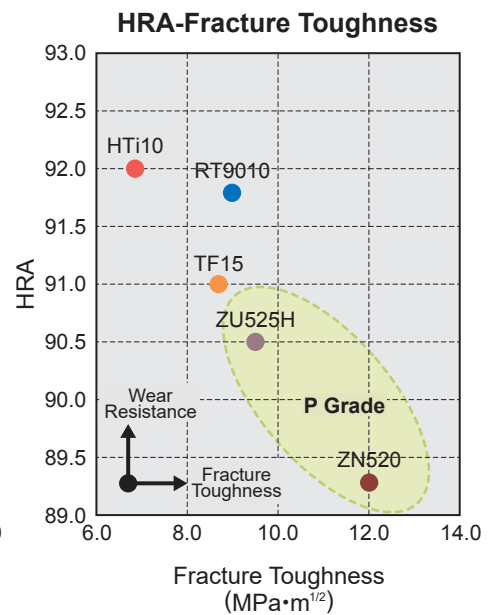
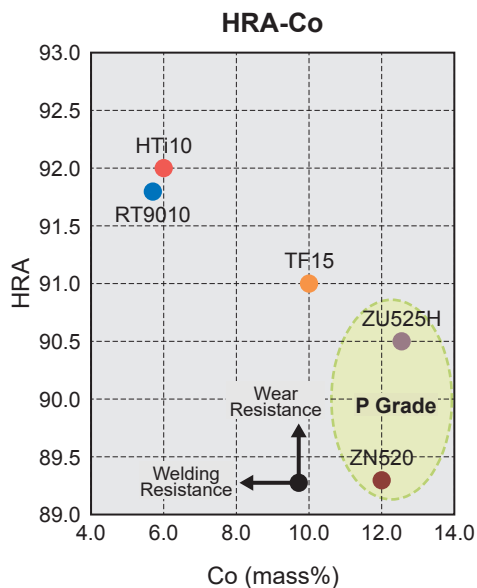
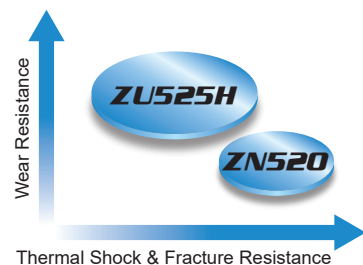


《Properties of Grade》

● K Grade



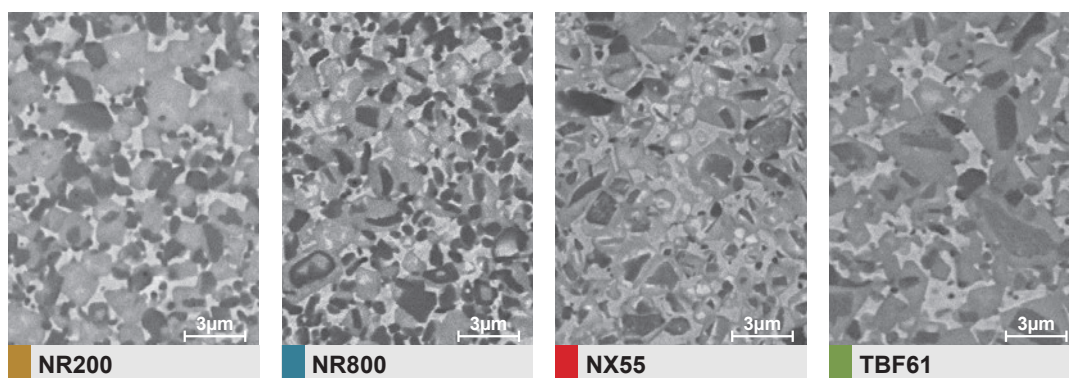
● P Grade



■ Cermet Grade Properties

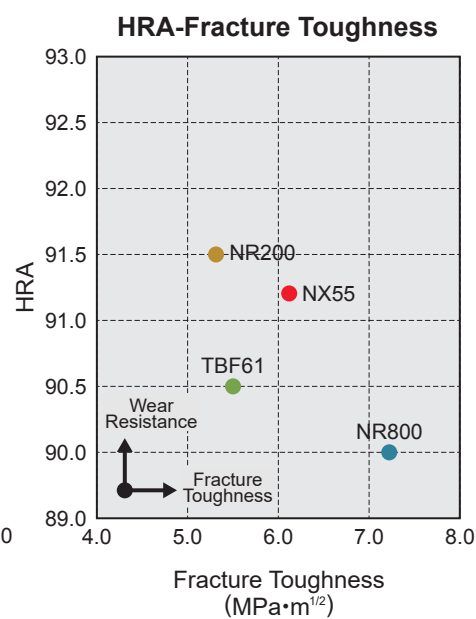
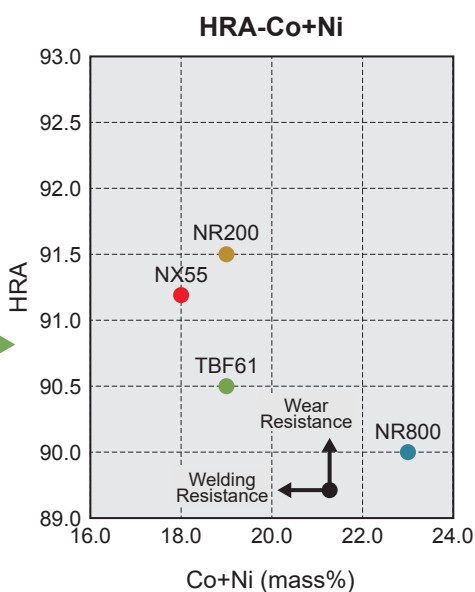
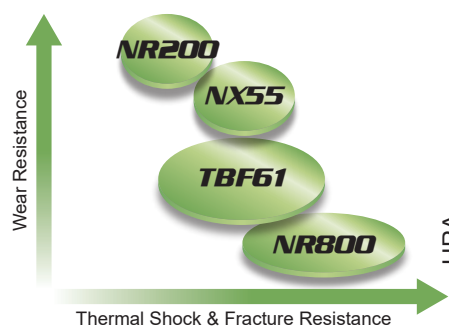
Grade	ISO Code	Grain Size (μm)	Chemical Composition			TRS (GPa)	Hardness		Fracture Toughness (MPa·m ^{1/2})	Work Material
			TiCN (mass%)	Co+Ni (mass%)	Others (mass%)		HRA	HV		General Steel
NR200	P10	<1.5	53	19	28	2.1	91.5	1570	5.3	○
NR800	P30	<1.5	48	23	29	2.2	90.0	1370	7.2	○
NX55	P10	<2.0	49	18	33	2.0	91.2	1500	6.1	○
TBF61	P20	<2.0	52	19	29	2.0	90.5	1450	5.5	◎

《SEM Pictures》

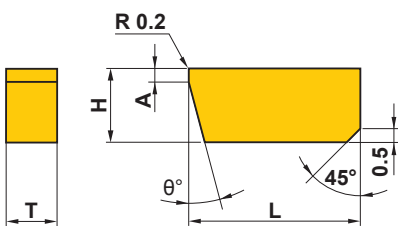
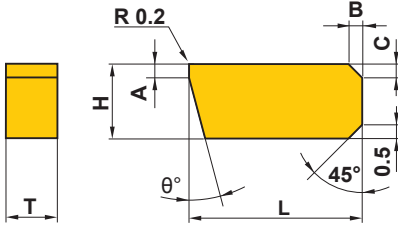
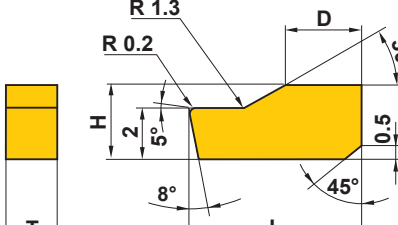


《Properties of Grade》

● Cermet



Standard Tips

Geometry	Order Number	Dimensions (mm)									
		L	H	T	θ°	A	B	C	D		
<p>SBA type</p> 	SBA-4x1.5xTx10%	4	± 0.2	1.5	± 0.2	2-5	10	0.5	-	-	-
	-4x2xTx15%	4	± 0.2	2	± 0.2	2-5	15	0.5	-	-	-
	-5x1.5xTx20%	5	± 0.2	1.5	± 0.2	2-5	20	0.5	-	-	-
	-5x2xTx15%	5	± 0.2	2	± 0.2	2-5	15	0.5	-	-	-
	-5x2.5xT	5	± 0.2	2.5	± 0.2	2-5	0	-	-	-	-
	-5x2.5xTx8%	5	± 0.2	2.5	± 0.2	2-5	8	0.5	-	-	-
	-5x3xTx8%	5	± 0.2	3	± 0.2	2-5	8	0.5	-	-	-
	-6x2xTx8%	6	± 0.2	2	± 0.2	2-5	8	0.5	-	-	-
	-6x2xTx45%	6	± 0.2	2	± 0.2	2-5	45	1.5	-	-	-
	-7x2.2xTx8%	7	± 0.2	2.2	± 0.2	2-5	8	0.5	-	-	-
	-7x2.5xT	7	± 0.2	2.5	± 0.2	2-5	0	-	-	-	-
	-7x2.5xTx8%	7	± 0.2	2.5	± 0.2	2-5	8	0.5	-	-	-
	-7x2.5xTx20%	7	± 0.2	2.5	± 0.2	2-5	20	0.5	-	-	-
	-7x3xT	7	± 0.2	3	± 0.2	2-5	0	-	-	-	-
-9x3xTx20%	9	± 0.2	3	± 0.2	2-5	20	0.5	-	-	-	
<p>SBB type</p> 	SBB-4x1.8xTx15%	4	± 0.2	1.8	± 0.2	2-5	15	0.5	1	0.5	-
	-4x2xTx15%	4	± 0.2	2	± 0.2	2-5	15	0.5	1	0.5	-
	-4x2.3xTx10%	4	± 0.2	2.3	± 0.2	2-5	10	0.5	0.5	0.5	-
	-5x1.8xTx15%	5	± 0.2	1.8	± 0.2	2-5	15	0.5	1	0.5	-
	-5x2.3xTx10%	5	± 0.2	2.3	± 0.2	2-5	10	0.5	0.5	0.5	-
	-6x2xTx15%	6	± 0.2	2	± 0.2	2-5	15	0.5	1	0.5	-
	-6x2.3xTx10%	6	± 0.2	2.3	± 0.2	2-5	10	0.5	0.5	0.5	-
	-7x2.3xTx10%	7	± 0.2	2.3	± 0.2	2-5	10	0.5	0.5	0.5	-
-7x2.5xTx10%	7	± 0.2	2.5	± 0.2	2-5	10	0.5	0.5	0.5	-	
<p>SFA type</p> 	SFA-4x2.5xT	4	± 0.2	2.5	± 0.2	2-5	-	-	-	-	1.8
	-4.5x2.5xT	4.5	± 0.2	2.5	± 0.2	2-5	-	-	-	-	2
	-5x2.5xT	5	± 0.2	2.5	± 0.2	2-5	-	-	-	-	2.2

Note 1) $\circ\circ\%$ shows θ° .

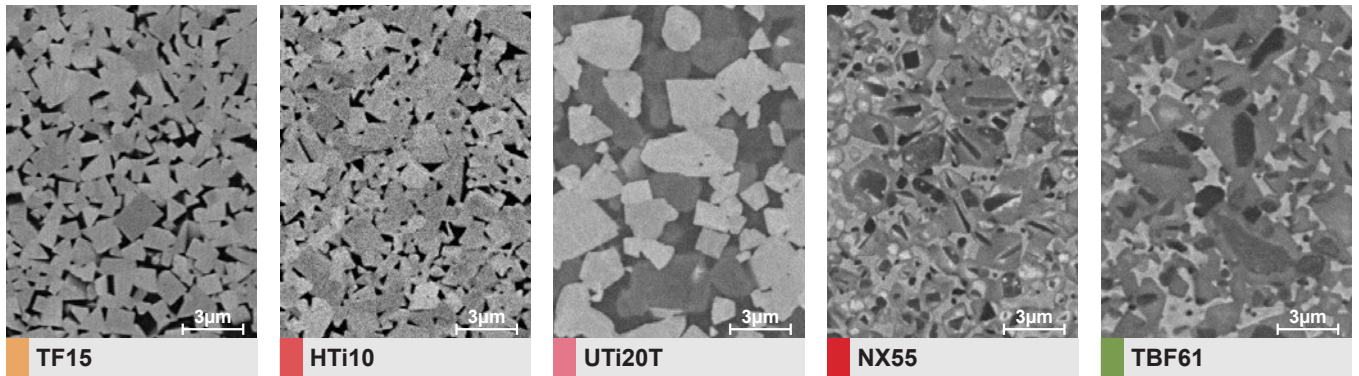
Note 2) Please contact us for any geometry.

Cemented Carbide Plates

Grade Properties

	Grade	ISO Code	Grain Size (μm)	Co (mass%)	TRS (GPa)	Hardness		Applications		Work Material				
						HRA	HV	For Automatic Lathes	Cemented Carbide Plates	General Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy
Cemented Carbide	TF15	K20	<0.9	10	2.5	91.0	1550	●	●					○
	HTi10	K10	<1.0	6	2.0	92.0	1700	●	●			○	○	
	UTi20T	M20	<3.0	9	2.0	90.5	1450	●	●	○	○			
Cermet	NX55	P10	<2.0	18	2.0	91.2	1500	●		○				
	TBF61	P20	<2.0	19	2.0	90.5	1450	●		○				

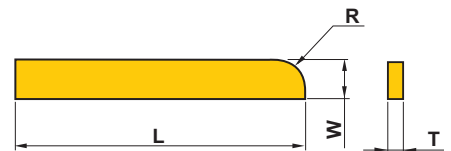
《SEM Pictures》



Tips for Automatic Lathes

Grade

UTi20T	HTi10	TF15	NX55	TBF61
○	○	○	○	○



Order Number	Dimensions (mm)					
	L	W	R	T		
TLR-15x3xTxR3	15 ±1.0	3 ±0.5	R3	2-6	+0.5 0	
-15x4xTxR3	15 ±1.0	4 ±0.5	R3	2-6	+0.5 0	
-20x2xTxR4	20 ±1.0	2 ±0.5	R4	2-4	+0.5 0	
-20x3xTxR3	20 ±1.0	3 ±0.5	R3	2-6	+0.5 0	
-20x4xTxR3	20 ±1.0	4 ±0.5	R3	2-6	+0.5 0	
-20x5xTxR3	20 ±1.0	5 ±0.5	R3	2-6	+0.5 0	

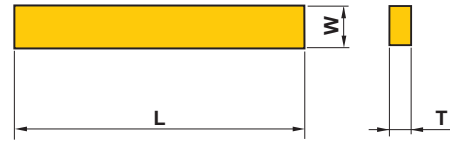
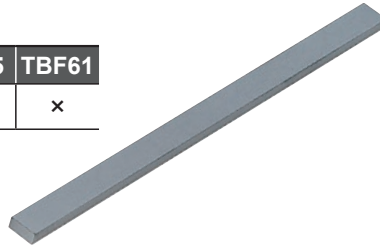
Order Number	Dimensions (mm)					
	L	W	R	T		
TLR-20x6xTxR3	20 ±1.0	6 ±0.5	R3	2-6	+0.5 0	
-25x4xTxR3	25 ±1.0	4 ±0.5	R3	2-6	+0.5 0	
-30x4xTxR3	30 ±2.0	4 ±0.5	R3	2-6	+0.5 0	
-30x3xTxR4	30 ±2.0	3 ±0.5	R4	2-6	+0.5 0	
-30x4xTxR4	30 ±2.0	4 ±0.5	R4	2-6	+0.5 0	

Note) Please contact us for any geometry.

Cemented Carbide Plates

Grade

UTi20T	HTi10	TF15	NX55	TBF61
○	○	○	×	×



Order Number	Dimensions (mm)					
	L		W		T	
TLB-8x3xT	8	±0.5	3	±0.5	2-4	+0.5 0
-8x5xT	8	±0.5	5	±0.5	2-7	+0.5 0
-8x6xT	8	±0.5	6	±0.5	2-8	+0.5 0
-8x7xT	8	±0.5	7	±0.5	2-8	+0.5 0
-8x8xT	8	±0.5	8	±0.5	2-8	+0.5 0
-9x6xT	9	±0.5	6	±0.5	2-8	+0.5 0
-9x7xT	9	±0.5	7	±0.5	2-8	+0.5 0
-9x8xT	9	±0.5	8	±0.5	2-6	+0.5 0
-10x2xT	10	±0.5	2	±0.5	2-4	+0.5 0
-10x3xT	10	±0.5	3	±0.5	2-8	+0.5 0
-10x4xT	10	±0.5	4	±0.5	2-8	+0.5 0
-10x5xT	10	±0.5	5	±0.5	2-8	+0.5 0
-10x6xT	10	±0.5	6	±0.5	2-4	+0.5 0
-10x7xT	10	±0.5	7	±0.5	2-8	+0.5 0
-10x8xT	10	±0.5	8	±0.5	2-7	+0.5 0
-10x9xT	10	±0.5	9	±0.5	2-6	+0.5 0
-10x10xT	10	±0.5	10	±0.5	2-10	+0.5 0
-11x4xT	11	±0.5	4	±0.5	2-7	+0.5 0
-11x5xT	11	±0.5	5	±0.5	2-8	+0.5 0
-11x6xT	11	±0.5	6	±0.5	2-6	+0.5 0
-11x8xT	11	±0.6	8	±0.6	2-8	+0.5 0
-11x9xT	11	±0.5	9	±0.5	2-8	+0.5 0
-11x11xT	11	±0.5	11	±0.5	2-8	+0.5 0
-12x2xT	12	±0.5	2	±0.5	2-7	+0.5 0
-12x5xT	12	±0.5	5	±0.5	2-8	+0.5 0
-12x7xT	12	±0.5	7	±0.5	2-8	+0.5 0
-12x8xT	12	±0.5	8	±0.5	2-8	+0.5 0
-12x9xT	12	±0.5	9	±0.5	2-8	+0.5 0
-12x10xT	12	±0.5	10	±0.5	2-10	+0.5 0
-12x12xT	12	±0.5	12	±0.5	2-8	+0.5 0
-13x4xT	13	±0.5	4	±0.5	2-6	+0.5 0
-13x6xT	13	±0.5	6	±0.5	2-8	+0.5 0
-13x7xT	13	±0.5	7	±0.5	2-8	+0.5 0
-13x8xT	13	±0.5	8	±0.5	2-8	+0.5 0
-13x9xT	13	±0.5	9	±0.5	2-7	+0.5 0
-13x10xT	13	±0.5	10	±0.5	2-8	+0.5 0
-13x12xT	13	±0.5	12	±0.5	2-10	+0.5 0
-13x13xT	13	+1/0	13	+1/0	2-7	+0.5 0
-14x3xT	14	±0.5	3	±0.5	2-8	+0.5 0
-14x5xT	14	±0.5	5	±0.5	2-8	+0.5 0

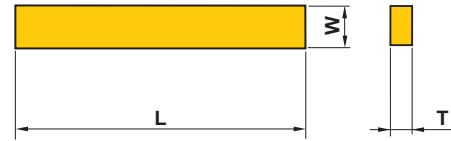
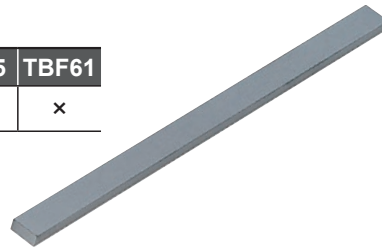
Order Number	Dimensions (mm)					
	L		W		T	
TLB-14x6xT	14	±0.5	6	±0.5	2-8	+0.5 0
-14x8xT	14	±0.5	8	±0.5	2-8	+0.5 0
-14x10xT	14	±0.5	10	±0.5	2-9	+0.5 0
-15x3xT	15	±0.5	3	±0.5	2-4	+0.5 0
-15x4xT	15	±0.5	4	±0.5	2-4	+0.5 0
-15x5xT	15	±0.5	5	±0.5	2-8	+0.5 0
-15x6xT	15	±0.5	6	±0.5	2-8	+0.5 0
-15x7xT	15	±0.5	7	±0.5	2-8	+0.5 0
-15x8xT	15	±0.5	8	±0.5	2-7	+0.5 0
-15x9xT	15	±0.5	9	±0.5	2-8	+0.5 0
-15x10xT	15	±0.5	10	±0.5	2-7	+0.5 0
-15x12xT	15	±0.6	12	±0.5	2-7	+0.5 0
-15x13xT	15	±0.5	13	±0.5	2-8	+0.5 0
-16x3xT	16	±0.6	3	±0.5	2-8	+0.5 0
-16x4xT	16	±0.6	4	±0.5	2-8	+0.5 0
-16x5xT	16	±0.6	5	±0.5	2-4	+0.5 0
-16x6xT	16	±0.6	6	±0.5	2-8	+0.5 0
-16x7xT	16	±0.6	7	±0.5	2-8	+0.5 0
-16x8xT	16	±0.6	8	±0.5	2-8	+0.5 0
-16x9xT	16	±0.6	9	±0.5	2-8	+0.5 0
-16x10xT	16	±0.6	10	±0.5	2-8	+0.5 0
-16x11xT	16	±0.6	11	±0.5	2-6	+0.5 0
-16x14xT	16	±0.6	14	±0.5	2-8	+0.5 0
-16x15xT	16	±0.6	15	±0.5	2-7	+0.5 0
-16x16xT	16	+1/0	16	±0.5	2-10	+0.5 0
-17x3xT	17	±0.6	3	±0.5	2-8	+0.5 0
-17x4xT	17	±0.6	4	±0.5	2-8	+0.5 0
-17x5xT	17	±0.6	5	±0.5	2-8	+0.5 0
-17x6xT	17	±0.6	6	±0.5	2-8	+0.5 0
-17x8xT	17	±0.6	8	±0.5	2-8	+0.5 0
-17x10xT	17	±0.6	10	±0.5	2-10	+0.5 0
-17x11xT	17	±0.6	11	±0.5	2-8	+0.5 0
-17x13xT	17	±0.6	13	±0.5	2-8	+0.5 0
-18x3xT	18	±0.6	3	±0.5	2-8	+0.5 0
-18x4xT	18	±0.7	4	±0.5	2-7	+0.5 0
-18x5xT	18	±0.6	5	±0.5	2-7	+0.5 0
-18x6xT	18	±0.6	6	±0.5	2-8	+0.5 0
-18x7xT	18	±0.6	7	±0.5	2-8	+0.5 0
-18x9xT	18	±0.6	9	±0.5	2-8	+0.5 0
-18x10xT	18	±0.6	10	±0.5	2-8	+0.5 0

Note) Please contact us for any geometry.

Cemented Carbide Plates

Grade

UTi20T	HTi10	TF15	NX55	TBF61
○	○	○	×	×



Order Number	Dimensions (mm)					
	L		W		T	
TLB-18x13xT	18	±0.6	13	±0.5	2-8	+0.5 0
-18x15xT	18	±0.6	15	±0.5	2-8	+0.5 0
-18x18xT	18	±0.6	18	±0.5	2-12	+0.5 0
-19x5xT	19	±0.6	5	±0.5	2-8	+0.5 0
-19x8xT	19	±0.7	8	±0.5	2-8	+0.5 0
-19x11xT	19	±0.6	11	±0.5	2-8	+0.5 0
-19x13xT	19	±0.6	13	±0.5	2-8	+0.5 0
-20x2xT	20	±0.7	2	±0.5	2-4	+0.5 0
-20x3xT	20	±0.7	3	±0.5	2-5	+0.5 0
-20x4xT	20	±0.7	4	±0.5	2-7	+0.5 0
-20x5xT	20	±0.7	5	±0.5	2-8	+0.5 0
-20x6xT	20	±0.7	6	±0.5	2-8	+0.5 0
-20x7xT	20	±0.7	7	±0.5	2-8	+0.5 0
-20x8xT	20	±0.7	8	±0.5	2-7	+0.5 0
-20x9xT	20	±0.7	9	±0.5	2-8	+0.5 0
-20x10xT	20	±0.7	10	±0.5	2-8	+0.5 0
-20x12xT	20	±0.7	12	±0.5	2-8	+0.5 0
-20x15xT	20	±0.7	15	±0.5	2-12	+0.5 0
-20x18xT	20	±0.7	18	±0.5	2-12	+0.5 0
-20x20xT	20	±0.7	20	±0.7	2-12	+0.5 0
-21x3xT	21	±0.7	3	±0.5	2-7	+0.5 0
-21x7xT	21	±0.7	7	±0.5	2-7	+0.5 0
-21x8xT	21	±0.7	8	±0.5	2-8	+0.5 0
-21x9xT	21	±0.7	9	±0.5	2-8	+0.5 0
-21x13xT	21	±0.7	13	±0.5	2-7	+0.5 0
-21x20xT	21	±0.8	20	±0.7	2-12	+0.5 0
-21x21xT	21	±0.7	21	±0.7	2-12	+0.5 0
-22x3xT	22	±0.7	3	±0.5	2-6	+0.5 0
-22x5xT	22	±0.7	5	±0.5	2-8	+0.5 0
-22x8xT	22	±0.7	8	±0.5	2-8	+0.5 0
-22x12xT	22	±0.7	12	±0.5	2-8	+0.5 0
-22x15xT	22	±0.7	15	±0.5	2-8	+0.5 0
-22x22xT	22	±0.7	22	±0.7	2-26	+0.5 0
-23x4xT	23	±0.8	4	±0.5	2-7	+0.5 0
-23x8xT	23	±0.8	8	±0.5	2-8	+0.5 0
-23x14xT	23	±0.8	14	±0.5	2-12	+0.5 0
-24x10xT	24	±0.8	10	±0.5	2-8	+0.5 0
-24x12xT	24	±0.8	12	±0.5	2-6	+0.5 0
-24x24xT	24	±0.8	24	±0.7	2-12	+0.5 0
-25x4xT	25	±0.8	4	±0.5	2-8	+0.5 0

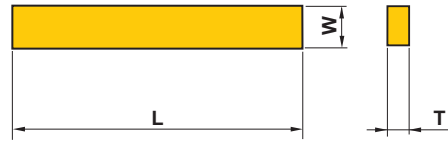
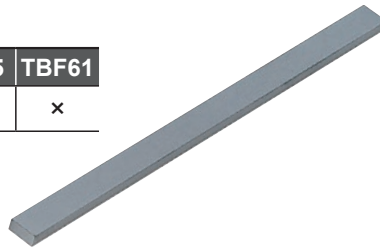
Order Number	Dimensions (mm)					
	L		W		T	
TLB-25x6xT	25	±0.8	6	±0.8	2-8	+0.5 0
-25x8xT	25	±0.8	8	±0.8	2-11	+0.5 0
-25x9xT	25	±0.8	9	±0.8	2-8	+0.5 0
-25x10xT	25	±0.8	10	±0.8	2-12	+0.5 0
-25x11xT	25	±0.8	11	±0.8	2-8	+0.5 0
-25x12xT	25	±0.8	12	±0.8	2-12	+0.5 0
-25x15xT	25	±0.8	15	±0.8	2-10	+0.5 0
-25x17xT	25	±0.8	17	±0.8	2-10	+0.5 0
-26x4xT	26	±0.8	4	±0.8	2-8	+0.5 0
-26x7xT	26	±0.8	7	±0.8	2-8	+0.5 0
-26x8xT	26	±0.8	8	±0.8	2-8	+0.5 0
-26x9xT	26	±0.8	9	±0.8	2-8	+0.5 0
-27x5xT	27	±0.8	5	±0.8	2-8	+0.5 0
-27x7xT	27	±0.8	7	±0.8	2-7	+0.5 0
-27x12xT	27	±0.8	12	±0.8	2-8	+0.5 0
-28x11xT	28	±0.8	11	±0.8	2-12	+0.5 0
-28x12xT	28	±0.8	12	±0.8	2-8	+0.5 0
-28x14xT	28	±0.8	14	±0.8	2-14	+0.5 0
-28x15xT	28	±0.9	15	±0.8	2-8	+0.5 0
-29x3xT	29	±0.8	3	±0.8	2-8	+0.5 0
-30x3xT	30	±0.9	3	±0.8	2-8	+0.5 0
-30x5xT	30	±0.9	5	±0.8	2-8	+0.5 0
-30x6xT	30	±0.9	6	±0.8	2-10	+0.5 0
-30x9xT	30	±0.9	9	±0.8	2-11	+0.5 0
-30x10xT	30	±0.9	10	±0.8	2-12	+0.5 0
-30x16xT	30	±0.9	16	±0.8	2-12	+0.5 0
-30x20xT	30	±0.9	20	±0.7	2-10	+0.5 0
-30x25xT	30	±0.9	25	±0.8	2-14	+0.5 0
-31x4xT	31	±0.9	4	±0.5	2-7	+0.5 0
-31x5xT	31	±0.9	5	±0.5	2-13	+0.5 0
-31x6xT	31	±0.9	6	±0.5	2-10	+0.5 0
-31x21xT	31	±0.9	21	±0.7	2-12	+0.5 0
-32x12xT	32	±0.9	12	±0.5	2-15	+0.5 0
-33x5xT	33	±0.9	5	±0.5	2-12	+0.5 0
-33x12xT	33	±0.9	12	±0.5	2-7	+0.5 0
-33x18xT	33	±0.9	18	±0.5	2-11	+0.5 0
-33x22xT	33	±0.9	22	±0.7	2-10	+0.5 0
-35x4xT	35	±1	4	±0.5	2-8	+0.5 0
-35x8xT	35	±1	8	±0.5	2-12	+0.5 0
-35x10xT	35	±1	10	±0.5	2-14	+0.5 0

Note) Please contact us for any geometry.

Cemented Carbide Plates

Grade

UTi20T	HTi10	TF15	NX55	TBF61
○	○	○	×	×



Order Number	Dimensions (mm)					
	L		W		T	
TLB-35x13xT	35	±1	13	±0.5	2-12	+0.5 0
-35x20xT	35	±1	20	±0.7	2-12	+0.5 0
-36x5xT	36	±1	5	±0.5	2-12	+0.5 0
-36x7xT	36	±1	7	±0.5	2-10	+0.5 0
-36x9xT	36	±1	9	±0.5	2-7	+0.5 0
-38x24xT	38	±1	24	±0.7	2-11	+0.5 0
-39x4xT	39	±1	4	±0.5	2-8	+0.5 0
-39x28xT	39	±1	28	±0.7	2-12	+0.5 0
-40x2xT	40	±1	2	±0.5	2-10	+0.5 0
-40x4xT	40	±1	4	±0.5	2-12	+0.5 0
-40x6xT	40	±1	6	±0.5	2-12	+0.5 0
-40x10xT	40	±1	10	±0.5	2-11	+0.5 0
-40x15xT	40	±1	15	±0.5	2-15	+0.5 0
-40x16xT	40	±1	16	±0.5	2-12	+0.5 0
-42x20xT	42	+2/0	20	±0.7	2-11	+0.5 0
-43x9xT	43	±1	9	±0.5	2-12	+0.5 0
-45x6xT	45	±1.2	6	±0.5	2-12	+0.5 0
-47x2xT	47	+2/0	2	±0.5	2-12	+0.5 0
-50x2xT	50	±1	2	±0.5	2-10	+0.5 0
-50x3xT	50	±1	3	±0.5	2-12	+0.5 0
-50x4xT	50	+2/0	4	±0.5	2-11	+0.5 0
-50x5xT	50	±1	5	±0.5	2-11	+0.5 0
-50x6xT	50	+2/0	6	±0.5	2-14	+0.5 0
-50x7xT	50	+2/0	7	±0.5	2-8	+0.5 0
-50x8xT	50	+2/0	8	±0.5	2-12	+0.5 0
-50x9xT	50	+3/0	9	±0.6	2-10	+0.5 0
-50x10xT	50	+2/0	10	±0.6	2-12	+0.5 0
-50x12xT	50	+2/0	12	±0.7	2-12	+0.5 0
-50x15xT	50	+2/0	15	±0.6	2-15	+0.5 0
-51x3xT	51	+3/0	3	±0.5	2-12	+0.5 0
-51x4xT	51	+3/0	4	±0.5	2-10	+0.5 0
-51x5xT	51	+3/0	5	±0.5	2-12	+0.5 0
-51x12xT	51	+3/0	12	±0.6	2-12	+0.5 0
-52x3xT	52	+3/0	3	±0.5	2-12	+0.5 0

Order Number	Dimensions (mm)					
	L		W		T	
TLB-52x4xT	52	+3/0	4	±0.5	2-12	+0.5 0
-55x6xT	55	±2	6	±0.5	2-12	+0.5 0
-55x20xT	55	±2	20	±0.7	2-12	+0.5 0
-55x30xT	55	±2	30	+1/0	2-11	+0.5 0
-60x2xT	60	+3/0	2	±0.5	2-13	+0.5 0
-60x3xT	60	±1.5	3	±0.5	2-10	+0.5 0
-60x6xT	60	+3/0	6	±0.5	2-10	+0.5 0
-60x30xT	60	+3/0	30	±1	2-11	+0.5 0
-65x35xT	65	+3/0	35	+2/0	2-15	+0.5 0
-70x4xT	70	+3/0	4	±0.5	2-13	+0.5 0
-70x7xT	70	±2	7	±0.5	2-11	+0.5 0
-80x2xT	80	+4/0	2	±0.5	2-12	+0.5 0
-80x7xT	80	+4/0	7	±0.5	2-10	+0.5 0
-81x3xT	81	+4/0	3	±0.5	2-13	+0.5 0
-81x4xT	81	+4/0	4	±0.5	2-11	+0.5 0
-87x27xT	87	+4/0	27	±1	2-11	+0.5 0
-100x2xT	100	+10/0	2	+1/0	2-12	+0.5 0
-100x6xT	100	±5	6	±0.5	2-12	+0.5 0
-100x8xT	100	±5	8	±0.5	2-12	+0.5 0
-103x2.5xT	103	+10/0	2.5	±0.5	2-12	+0.5 0
-103x3xT	103	±5	3	±0.5	2-12	+0.5 0
-103x4xT	103	±5	4	±0.5	2-12	+0.5 0
-103x5xT	103	±5	5	±0.5	2-12	+0.5 0
-110x2.5xT	110	±5	2.5	±0.5	2-12	+0.5 0
-110x3xT	110	±5	3	±0.5	2-12	+0.5 0
-110x4xT	110	±5	4	±0.5	2-12	+0.5 0
-110x5xT	110	±5	5	±0.5	2-12	+0.5 0
-110x6xT	110	±5	6	±0.5	2-12	+0.5 0
-120x3xT	120	±5	3	±0.5	2-12	+0.5 0
-120x4xT	120	±5	4	±0.5	2-12	+0.5 0
-120x5xT	120	±5	5	±0.5	2-12	+0.5 0
-140x2xT	140	±5	2	±0.5	2-12	+0.5 0
-140x3xT	140	±5	3	±0.5	2-12	+0.5 0
-140x4xT	140	±5	4	±0.5	2-12	+0.5 0

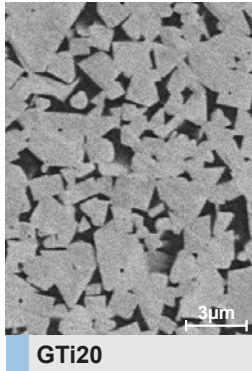
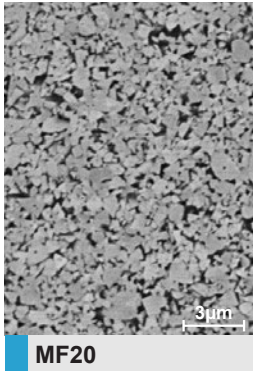
Note) Please contact us for any geometry.

Carbide Materials (for die & mold)

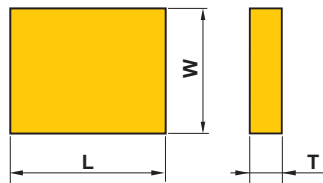
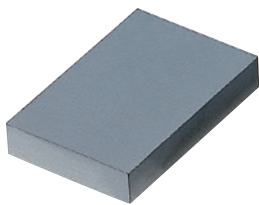
Tungsten Carbide Grade Properties

Grade	ISO Code	Grain Size (μm)	Co (mass%)	TRS (GPa)	Hardness		Fracture Toughness (MPa·m ^{1/2})
					HRA	HV	
MF20	K10	<0.6	12	2.6	92.0	1700	6.3
GTi20	V30	<2.5	11	2.7	89.0	1270	14.1

《SEM Pictures》



Cemented Carbide Grade Classification



Order Number	Dimensions (mm)					
	L		W		T	
TLD-60x40xT	60	±3	40	±3	3-10	+1 0
-66x61xT	66	±3	61	±3	3-15	+1 0
-100x100xT	100	±8	100	±8	3-20	+1 0
-150x100xT	150	±8	100	±8	3-20	+1 0

Note) Please contact us for any geometry.



CARBIDE MATERIALS

MMC RYOTEC Corporation

SALES DEPT.

7F, KFC bldg., 1-6-1, YOKOAMI, SUMIDA-KU, TOKYO 130-0015, JAPAN

TEL +81-3-5819-5315 FAX +81-3-5819-5310

<http://www.ryotec.co.jp/en/>

