Fine-grain cemented carbide - KD grade

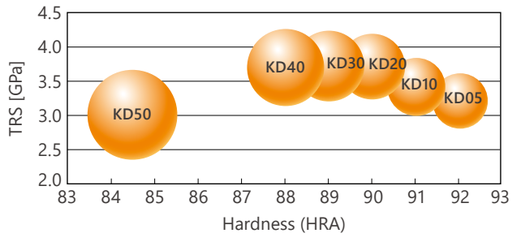
Line up ... KD05, KD10, KD20, KD30, KD40, KD50

Standard cemented carbide grade for IC lead frame industry.
"EVERLOY" "KD20" cemented carbide is well known as high quality and performance around the world.

Be often adopted for press mold of IC lead frame, magnetic steel sheet and powder compacting.
Excellent balance of wear-resistance, toughness, mold life and machinability.

Explanation	High performance of hardness, toughness, wear and chipping resistance by fine grain WC.
Applications	Mold for Electronic component, Magnetic steel sheet, Powder compacting, etc.

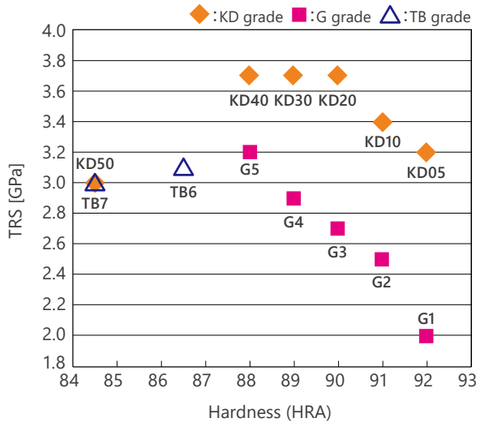
Relation between wear-resistance and machining property for KD grade



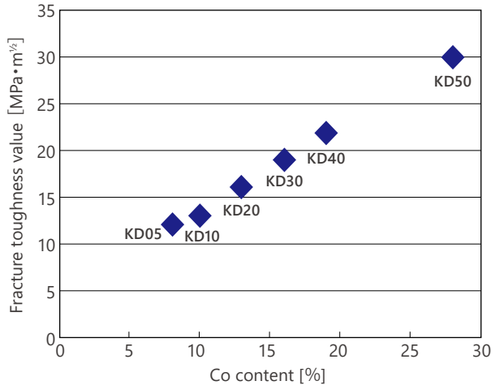
High TRS/Larger circle = Excellent machining property
High Hardness = Excellent wear-resistance

*Circle size indicates fracture toughness value.

Hardness and TRS



Fracture toughness value



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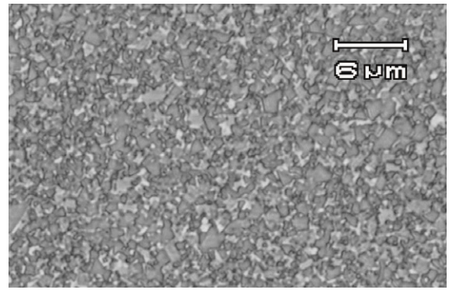
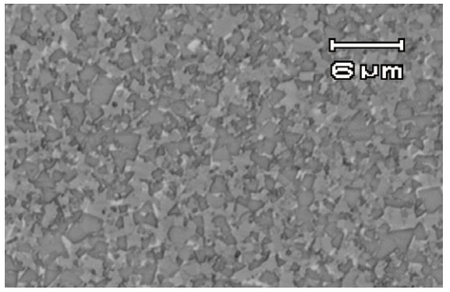
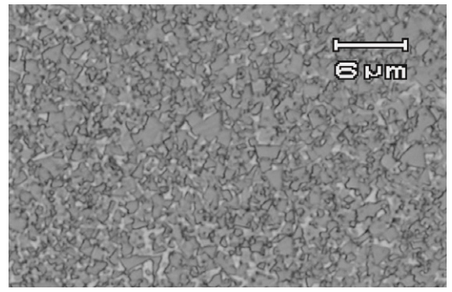
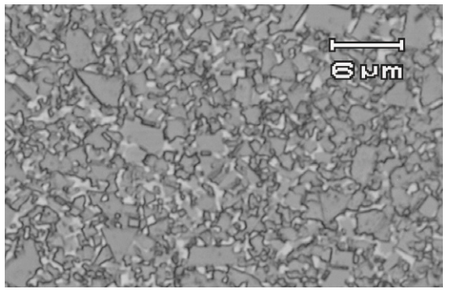
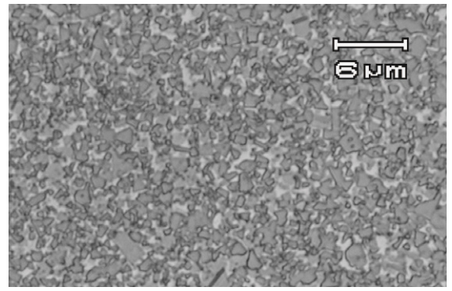
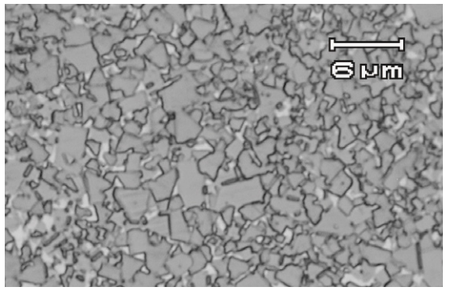
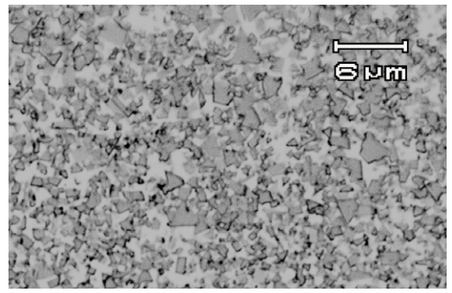
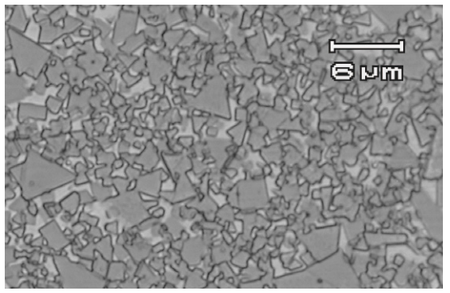
Micrographs of the KD grade and G grade

KD grade	G grade
 KD05	 G1
 KD10	 G2
 KD20	 G3
 KD40	 G5

By metallurgical microscope (×1000)

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Comparison test results of the chipping generated during the surface grinding (micrographs)

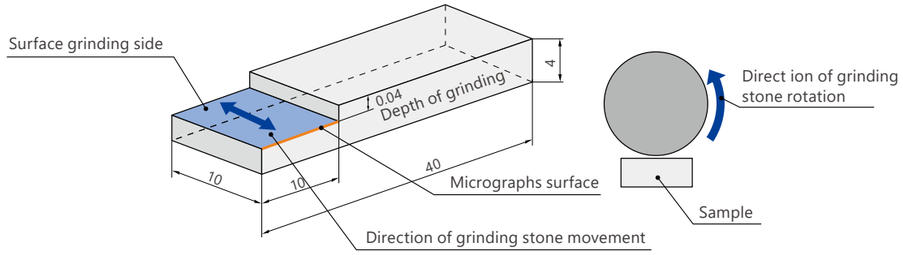
■ **Sample**

KD grade	KD20, KD30, KD50
G grade	G5
EF grade	EF10

■ **Surface grinding conditions**

Amount moved	0.04 mm (10×0.04mm)
Speed	17 m/min
Grinding stone	#600 ϕ180 mm
Grinding stone revolutions	3200 rpm

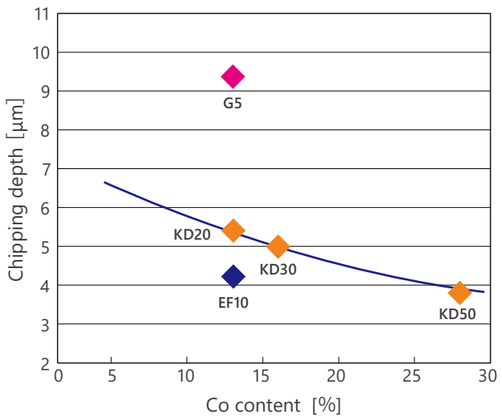
■ **Micrograph surface : Escape side edge of grinding stone**



■ **Test results** **Chipping test results**

Grade	WC grain size [µm]	Cobalt content [%]	Chipping depth [µm]
KD20	1.0 (less than)	13	5.4
KD30	1.0 (less than)	16	5.0
KD50	1.0 (less than)	19	3.8
G5	2.5 - 5.0	13	9.4
EF10	1.0 (less than)	13	4.2

Chipping-resistance characteristics



The finer grain and the more cobalt contained, the greater chipping-resistance it has.

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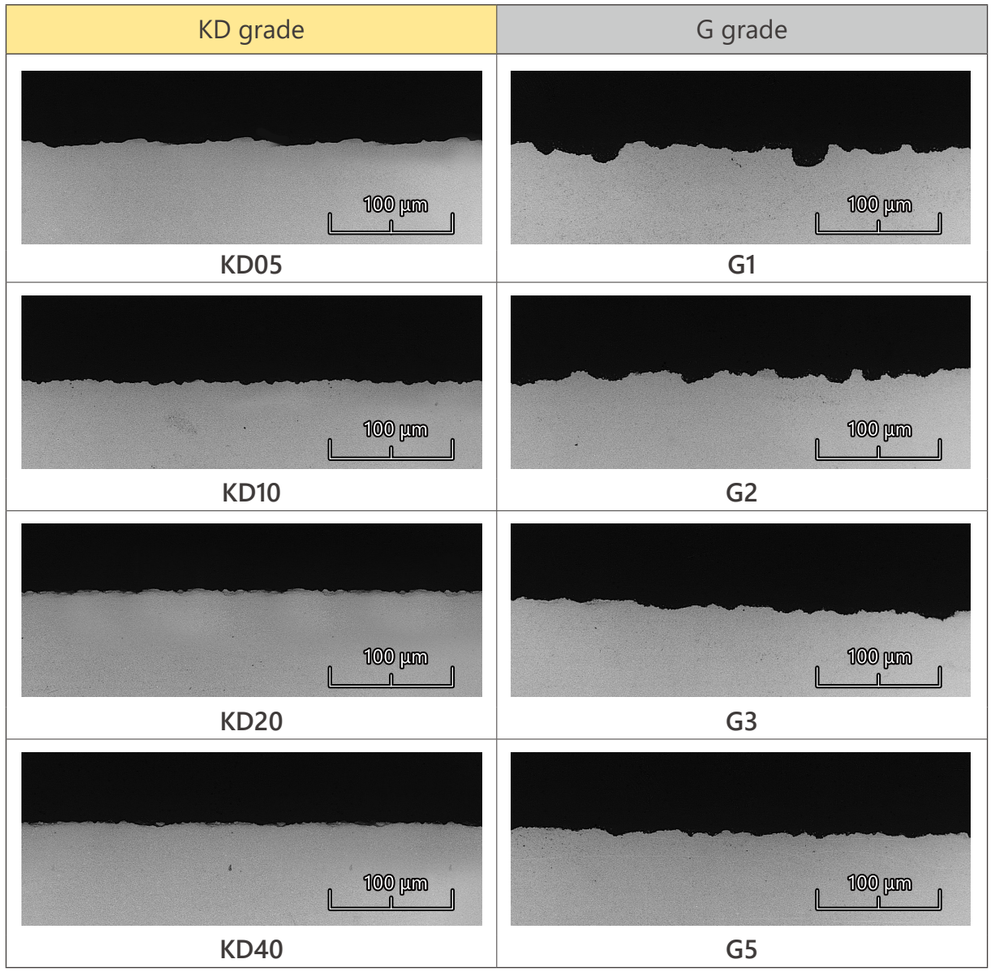
Micrographs surface (×500)

The following photos show the phases of the edges where chipping was notable and are not representative of all the edges. However, the photos do show the tendency for chipping in various types of materials.



■ **Sample**

KD grade	KD05, KD10, KD20, KD40
G grade	G1, G2, G3, G5

■ **Surface grinding conditions**

Amount moved	0.07 mm (3×0.02 mm+0.01 mm/both ways)
Speed	3.0 mm/min
Grinding stone	#400 ϕ75 mm
Grinding stone revolutions	3600 rpm
Number of strokes	85 spm
Amount of strokes	27 mm