MITSUBISHI
MITSUBISHI MATERIALS

CVD diamond coated drill

B184E

MCS

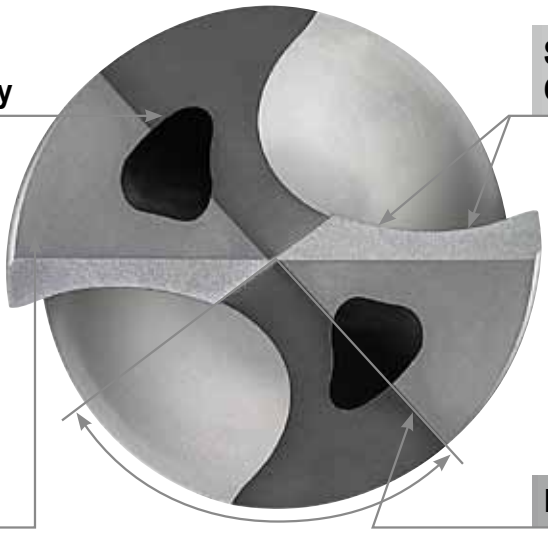
WSTAR series drill for CFRP machining

High quality drilled holes in CFRP.

- The low resistance wavy cutting edge reduces delamination and burrs when drilling CFRP and CFRP/aluminium stacks.
- Proprietary fine multilayer CVD diamond coating achieves outstanding abrasion resistance and smoothness.
- **TRI Cooling technology®** (PAT.P), an original coolant hole shape, improves chip removal when machining CFRP/aluminum stacks and achieves highly accurate holes.
- Eight sizes from 4.366mm (0.1719") to 12.725mm (0.501").

CVD diamond coating with outstanding abrasion resistance and superior sharpness for high quality CFRP drilling.

MCS



Unique coolant hole geometry

TRI Cooling technology (PAT.P) based on a new concept improves chip removal when machining CFRP/ aluminum stacks.
(Coolant holes on drills larger than ϕ6mm)

Special wavy cutting edge for CFRP and CFRP/aluminum stacks

The low resistance and extremely sharp wavy cutting edge reduces burrs with CFRP and aluminum alloys.

New tool grade DD2010

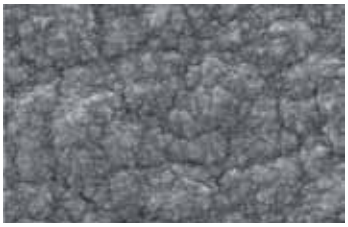
Long-lasting and smooth CVD diamond coating using proprietary fine multilayer crystal control technology.

Back clearance

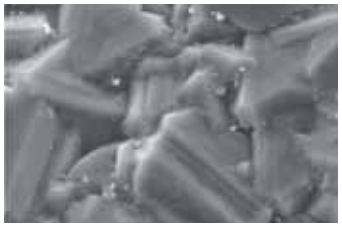
Large back clearance for smooth ejection of chips from the center.

Proprietary CVD diamond coating

■CVD diamond coating surface comparison



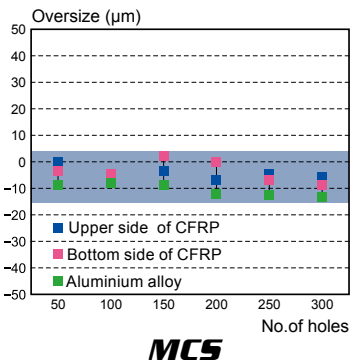
DD2010



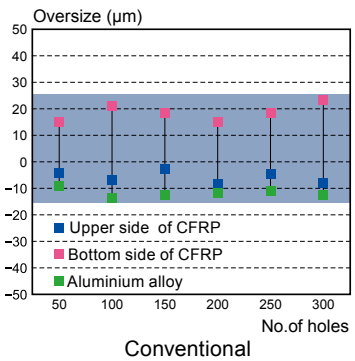
Competitor's

The newly developed DD2010 CVD diamond coated carbide material achieves outstanding abrasion resistance and smoothness, with proprietary fine multilayer diamond crystal control technology.

An original coolant hole shape



MCS



Conventional

With TRI Cooling technology, the MCS drill improves hole accuracy compared with earlier types.

Work material : CFRP or Aluminium stack
Drill : ϕ6.375mm
Thickness : 13mm (CFRP) + 5mm (Aluminium alloy)
Machine : Machining centre
Cutting speed : 60m/min (n=2997min^{-1})
Feed : 0.03mm/rev
Air brow

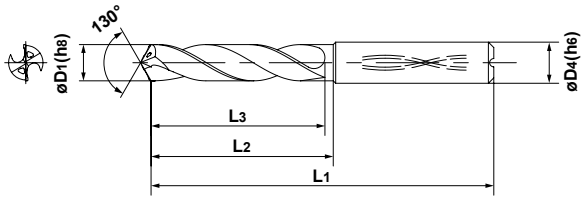
CVD Diamond Coated Drill

MCS

For CFRP

CFRP	CFRP with Aluminium stack
◎	◎

	3<D≤6	6<D≤10	10<D≤18
D1 Tolerance (mm)	0 −0.018	0 −0.022	0 −0.027
D4 Tolerance (mm)	0 −0.008	0 −0.009	0 −0.011



(Note) MCS drills are suitable for use with shrink fit holders.

Drill Dia. (inch)	Drill Dia. (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DD2010	Order Number	Dimensions (mm) Flute Length L3	Neck Length L2	Overall Length L1	Shank Dia. D4
0.1719	**4.366**	3	Int.	★	**MCS01719X3DB**	23	28	65	6
0.1915	**4.864**	3	Int.	★	**01915X3DB**	27	28	65	6
0.2510	**6.375**	3	Int.	★	**02510X3DB**	33	41	78	8
0.3125	**7.938**	3	Int.	★	**03125X3DB**	40	41	78	8
0.3760	**9.550**	3	Int.	★	**03760X3DB**	45	46	87	10
0.3765	**9.563**	3	Int.	★	**03765X3DB**	45	46	87	10
0.4380	**11.125**	3	Int.	★	**04380X3DB**	53	54	100	12
0.5010	**12.725**	3	Int.	★	**05010X3DB**	58	59	105	14

(Note) Please contact Mitsubishi Materials for special grades and geometries other than our standard products.

RECOMMENDED CUTTING CONDITIONS

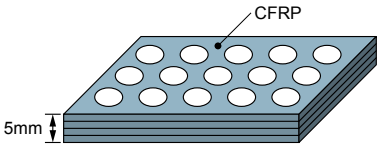
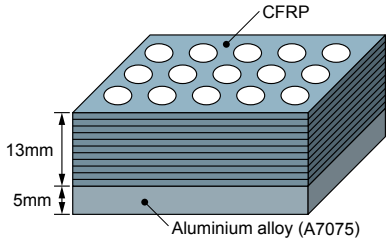
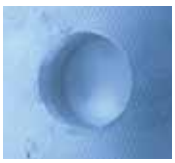
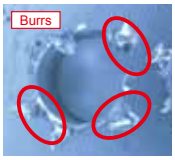
Work material	CFRP		CFRP with Aluminium stack	
Dia. (mm)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
4.366 4.864	85 (50−120)	0.04 (0.03−0.08)	55 (40−70)	0.04 (0.03−0.06)
6.375 7.938	95 (60−130)	0.05 (0.03−0.10)	65 (50−80)	0.05 (0.03−0.07)
9.550 9.563	95 (60−130)	0.07 (0.04−0.12)	65 (50−80)	0.06 (0.04−0.08)
11.125	100 (60−150)	0.10 (0.05−0.15)	70 (50−100)	0.07 (0.05−0.10)
12.725	100 (60−150)	0.10 (0.05−0.15)	70 (50−100)	0.08 (0.05−0.12)

★ : Inventory maintained in Japan.

CVD Diamond Coated Drill

MCS
For CFRP

CUTTING PERFORMANCE

Drill Diameter		ϕ6.375mm	ϕ6.375mm
Work Material		CFRP 	CFRP or Aluminium alloy 
Cutting Conditions	Spindle Speed (min^{-1})	4995	4995
	Cutting Speed (m/min)	100	100
	Feed (mm/rev)	0.04	0.04
Coolant		Air blow	Air blow
Machine		Machining centre	Machining centre
Results		Bottom side of CFRP	Bottom side of aluminium alloy
	MCS		
	Conventional Drill A for CFRP		
	Conventional Drill B for CFRP or aluminium alloy		
		Earlier types of drill produced large burrs but with the MCS drill are vastly reduced.	

MITSUBISHI MATERIALS

www.mitsubishicarbide.com

MMC HARTMETALL GmbH
Comeniusstr. 2, 40670 Meerbusch, Germany
Tel. +49-2159-9189-0 Fax +49-2159-918966
e-mail admin@mmchg.de

MMC HARDMETAL U.K. LTD.
Mitsubishi House, Galena Close, Tamworth, Staffs. B77 4AS, U.K.
Tel. +44-1827-312312 Fax +44-1827-312314
e-mail sales@mitsubishicarbide.co.uk

MMC METAL FRANCE s.a.r.l.
6, Rue Jacques Monod, 91400 Orsay, France
Tel. +33-1-69 35 53 53 Fax +33-1-69 35 53 50
e-mail mmfsales@mmc-metal-france.fr

MITSUBISHI MATERIALS ESPAÑA, S.A.
Calle Emperador 2, 46136 Museros/Valencia, Spain
Tel. +34-96-144-1711 Fax +34-96-144-3786
e-mail mme@mmevalencia.com

MMC ITALIA S.r.l.
V.le Delle Industrie 2, 20020 Milano, Italy
Tel. +39-02 93 77 03 1 Fax +39-02 93 58 90 93
e-mail info@mmc-italia.it

MMC HARDMETAL POLAND SP. z o.o.
Al..Armii Krajowej 61, 50-541 Wroclaw, Poland
Tel. +48-71335-16-20 Fax +48-71335-16-21
e-mail sales@mitsubishicarbide.com.pl

MMC HARDMETAL RUSSIA OOO LTD.
UL. Bolschaja Semenovskaya, 11, bld 5, 107023 Moscow, Russia
Tel. +7-495-72558-85 Fax +7-495-98139-73
e-mail info@mmc-carbide.ru

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