

Solid drills with 4 flutes

SOLID ^{FLUTES} 4 DRILL

Tungaloy Report No. 549-G

Solid carbide drills with **4 effective cutting edges** for superior productivity





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SOLID ^{4 FLUTES} DRILL



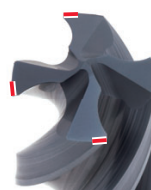
Four effective cutting edges for high drilling productivity

Next-generation drills with four flutes for super high feed drilling of cast iron



- Double feed of conventional two-flute drills
- Optimized drill edge geometry allows smooth drill entry and stable drilling operations
- Quad margins enable high hole accuracy and quality
- Available in the latest **AH9130** grade that provides extended tool life in aggressive drilling parameters

Quad margins



Self-centering profile

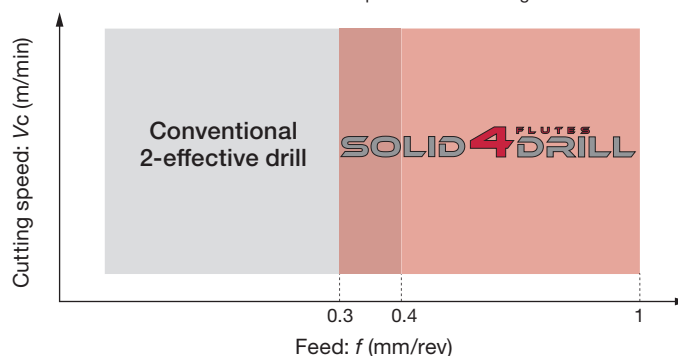


Unique flutes design for optimal chip evacuation for high productivity



FCD600 / GGG60 / 600-3

Note: Comparisons when using $\phi 12$ mm drills



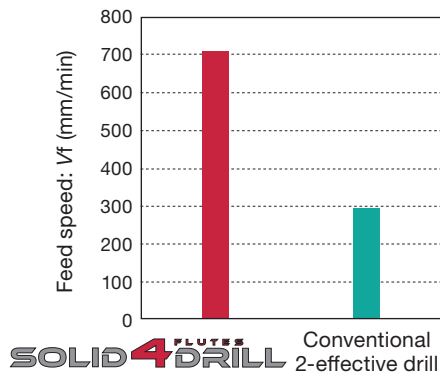
Four margins and a self-centering drill geometry enables high hole precision and quality

	SOLID ⁴ FLUTES ^{DRILL}	Conventional 2-effective drill
Cylindricity (μm)		
Roundness (μm)	5.085 ✓	11.21
Straightness (μm)	2.221 ✓	14.861



Tool : $\phi 12$ mm, L/D = 3 (Blind hole)
 Workpiece material : FCD600 / GGG60 / 600-3
 Cutting speed : $V_c = 80$ m/min
 Feed : $f = 0.4$ mm/rev
 Hole depth : $H = 36$ mm
 Coolant : Wet (External)

■ Unique cutting edge geometry allows very high productivity



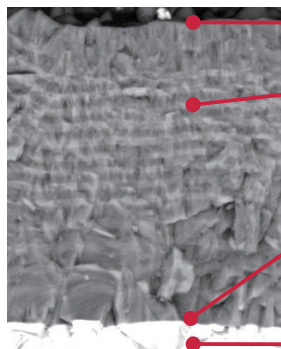
Tool	: DSQ120-036-12E3 (ø12 mm, L/D = 3) (Conventional: ø12 mm, L/D = 3)
Grade	: AH9130 (Conventional: PVD)
Cutting speed	: $V_c = 50$ m/min
Feed	: $f = 0.54$ mm/rev (Conventional: 0.2 mm/rev)
Feed speed	: $V_f = 716.6$ mm/min (Conventional: 291 mm/min)
Hole depth	: $H = 16$ mm
Coolant	: Wet (External)

■ GRADES

Latest coating optimized for extended tool life

AH9130

- Unique nano-multilayered coating is made possible by Tungaloy's latest coating technology, providing 3 principal features
- This coating achieves highly-balanced wear resistance and chipping resistance, also has acid resistance, resistance to dissolution, and high adhesion strength



Resistance to built-up edge

Coating layer to resist built-up edge

Resistance to wear, oxidation, and fracture

- 2 coating layers for wear and oxidation resistance
- Layered alternatively to prevent crack from propagating to fracture

Strong coating-substrate adhesion

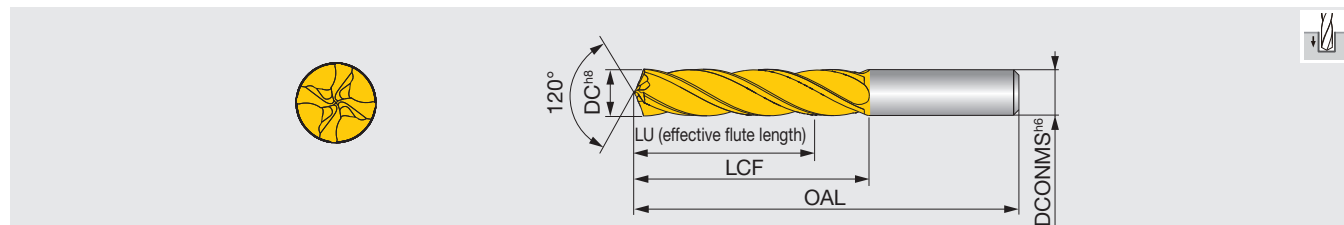
Coating is provided with strong adhesion between the coating layer and carbide substrate to prevent coating delamination

Substrate

Carbide substrate features wear and fracture resistance

DSQ-E3

Solid drill, without coolant hole, DIN shank, L/D = 3, $\phi 6 - \phi 16$ mm

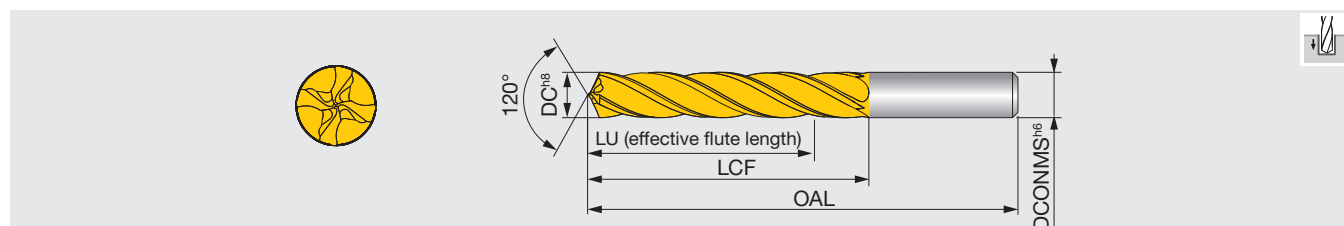


Designation	DC	AH9130	DCONMS	LU	LCF	OAL	Designation	DC	AH9130	DCONMS	LU	LCF	OAL
DSQ060-018-06E3	6	●	6	24	30	80	DSQ108-033-11E3	10.8	●	11	43	54	124
DSQ068-021-07E3	6.8	●	7	27	34	84	DSQ120-036-12E3	12	●	12	48	60	130
DSQ085-026-09E3	8.5	●	9	34	43	93	DSQ130-039-13E3	13	●	13	52	65	135
DSQ090-027-09E3	9	●	9	36	45	95	DSQ140-042-14E3	14	●	14	56	70	140
DSQ100-030-10E3	10	●	10	40	50	100	DSQ160-048-16E3	16	●	16	64	80	150
DSQ105-032-11E3	10.5	●	11	42	53	123							

● : Line up

DSQ-E5

Solid drill, without coolant hole, DIN shank, L/D = 5, $\phi 6 - \phi 16$ mm



Designation	DC	AH9130	DCONMS	LU	LCF	OAL	Designation	DC	AH9130	DCONMS	LU	LCF	OAL
DSQ060-030-06E5	6	●	6	36	42	92	DSQ105-053-11E5	10.5	●	11	63	74	144
DSQ068-034-07E5	6.8	●	7	41	48	98	DSQ120-060-12E5	12	●	12	72	84	154
DSQ085-043-09E5	8.5	●	9	51	60	110	DSQ160-080-16E5	16	●	16	96	112	182

● : Line up

STANDARD CUTTING CONDITIONS

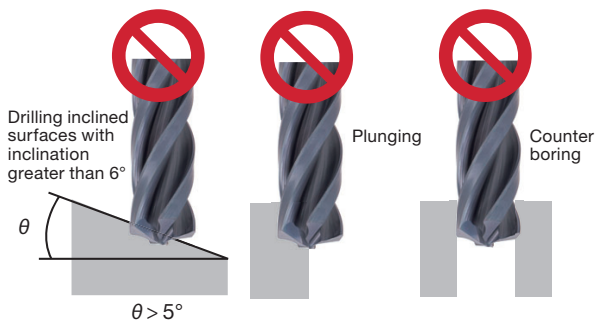
ISO	Workpiece material	Brinell hardness (HB)	Cutting speed Vc (m/min)	Feed: f (mm/rev)	
				$\phi 6 - \phi 9.9$	$\phi 10 - \phi 16$
K	Grey cast irons FC300, etc. 250, etc.	- 200	60 - 120	0.2 - 0.8	0.3 - 1.0
	Ductile cast irons FCD450, etc. 450-10S, etc.	- 300	60 - 120	0.2 - 0.8	0.3 - 1.0

- The cutting parameters shown in the table are a starting guideline. Values should be varied depending on the power or rigidity of the machine. Optimum conditions should be selected depending on the actual chip control or damage on edges.
- When using the smaller diameter tools in each range, set the feed "f" to the lower values.
- When drilling with a depth deeper than L/D = 3, a pecking cycle or dwell operation should be considered depending on the actual chip control.

TECHNICAL GUIDE

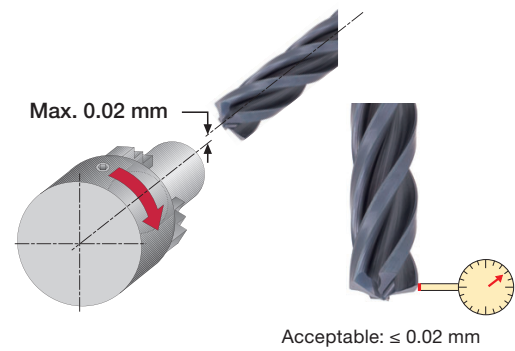
● Tool setup

Do not use for the following applications



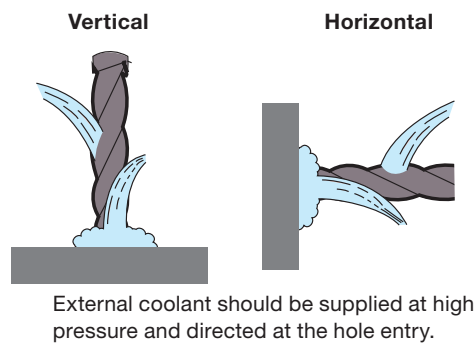
Run-out

Run-out should be less than 0.02 mm



● When using external coolant supply

When using external coolant supply, ensure that the cutting fluid is directed to the hole entry at all times to facilitate smooth chip evacuation from the cutting point.



● Application range

Inclined entrance	Inclined exit	Cross holes
 $\theta < 5^\circ$		
✓	✓	✓

Note: Reduce feed rate when entering or exiting irregular surfaces

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