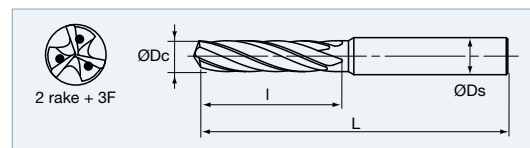


AQDEXOH3F5D

AQUA Drill EX Oil-Hole 3Flutes 5D



LIST9820				Unit: mm
Dc	l	L	Ds	
3.0	28	78	3	
3.1	32	86	4	
3.2	32	86	4	
3.3	32	86	4	
3.4	32	86	4	
3.5	32	86	4	
3.6	36	86	4	
3.7	36	86	4	
3.8	36	86	4	
3.9	36	86	4	
4.0	36	86	4	
4.1	40	98	5	
4.2	40	98	5	
4.3	40	98	5	
4.4	40	98	5	
4.5	40	98	5	
4.6	44	98	5	
4.7	44	98	5	
4.8	44	98	5	
4.9	44	98	5	
5.0	44	98	5	
5.1	44	100	6	
5.2	44	100	6	
5.3	44	100	6	
5.4	44	100	6	
5.5	44	100	6	

LIST9820				Unit: mm
Dc	l	L	Ds	
5.6	48	100	6	
5.7	48	100	6	
5.8	48	100	6	
5.9	48	100	6	
6.0	48	100	6	
6.1	52	109	7	
6.2	52	109	7	
6.3	52	109	7	
6.4	52	109	7	
6.5	52	109	7	
6.6	56	109	7	
6.7	56	109	7	
6.8	56	109	7	
6.9	56	109	7	
7.0	56	109	7	
7.1	60	118	8	
7.2	60	118	8	
7.3	60	118	8	
7.4	60	118	8	
7.5	60	118	8	
7.6	64	118	8	
7.7	64	118	8	
7.8	64	118	8	
7.9	64	118	8	
8.0	64	118	8	
8.1	68	127	9	

LIST9820				Unit: mm
Dc	l	L	Ds	
8.2	68	127	9	
8.3	68	127	9	
8.4	68	127	9	
8.5	68	127	9	
8.6	72	127	9	
8.7	72	127	9	
8.8	72	127	9	
8.9	72	127	9	
9.0	72	127	9	
9.1	76	136	10	
9.2	76	136	10	
9.3	76	136	10	
9.4	76	136	10	
9.5	76	136	10	
9.6	80	136	10	
9.7	80	136	10	
9.8	80	136	10	
9.9	80	136	10	
10.0	80	136	10	
10.1	84	149	11	
10.2	84	149	11	
10.3	84	149	11	
10.4	84	149	11	
10.5	84	149	11	
10.6	88	149	11	
10.7	88	149	11	

LIST9820				Unit: mm
Dc	l	L	Ds	
10.8	88	149	11	
10.9	88	149	11	
11.0	88	149	11	
11.1	92	158	12	
11.2	92	158	12	
11.3	92	158	12	
11.4	92	158	12	
11.5	92	158	12	
11.6	96	158	12	
11.7	96	158	12	
11.8	96	158	12	
11.9	96	158	12	
12.0	96	158	12	
12.1	100	167	13	
12.5	100	167	13	
13.0	104	167	13	
13.5	108	176	14	
14.0	112	176	14	
14.1	116	185	15	
14.5	116	185	15	
15.0	120	185	15	
15.5	124	194	16	
15.6	128	194	16	
16.0	128	194	16	

Standard Drilling Conditions AQDEXOH3F3D/5D

Work material	Structural Steels Carbon Steels Grey cast iron ST-37-2, C50, GG		Alloy Steels Pre-Hardened Steels		Mold Steels Hardened Steels		Hardened Steels		Stainless Steels 1.4301, 1.4401		Cast Irons GGG	
	-200HB		20-30HRC		30-40HRC		40-50HRC					
	mm	min ⁻¹	mm/min	min ⁻¹	mm/min	min ⁻¹	mm/min	min ⁻¹	mm/min	min ⁻¹	mm/min	min ⁻¹
3.0	10700	1280	8500	1020	7450	780	5600	540	5300	560	8500	1020
4.0	8000	1280	6400	1020	5600	780	4200	540	4000	560	6400	1020
6.0	5300	1280	4250	1020	3750	780	2800	540	2650	560	4250	1020
8.0	4000	1280	3200	1020	2800	780	2100	540	2000	560	3200	1020
10.0	3200	1280	2550	1020	2250	780	1700	540	1600	560	2550	1020
12.0	2650	1280	2100	1020	1850	780	1400	540	1350	560	2100	1020
14.0	2250	1120	1800	900	1600	670	1200	450	1150	480	1800	890
16.0	2000	1120	1600	900	1400	670	1050	450	1000	480	1600	890

Attention on using the drilling condition tables

1. Adjust cutting conditions according to the situation, such as rigidity of machine, work clamp, and shape of workpiece.
2. Cutting conditions listed here use water-soluble cutting fluid.
3. Reduce RPM and feed speeds by 20% for non-water-soluble cutting fluids.
4. Use internal coolant.

5. These drilling conditions are for the AQDEXOH3F3D up to 3D and for the AQDEXOH3F5D up to 5D. However a work material and drilling condition to chip removal may be worse. In that case, add step feed even if drilling depth 3xD, 5xD it as follows.
6. In step feed, return to the entrance hole.
7. Step feed interval is about 0.2~1xD.
8. Set up the chuck for the drill bit so there is less than 0.01mm of runout.

Other examples

Machine part Stainless steel 1.4301 (SUS304)

AQDEXOH3D after 2260 holes

Hole tolerance
Hole enlargement under 0.01 mm
Roundness under 0.01 mm
Cylindricity under 0.02 mm

Flank wear 0.03 mm Corner wear 0.034 mm

Possible to continue

Cutting Condition

Tool: L9826 AQDEXOH3F3D 4.4 mm
Cutting speed: 40m/min
Feed: 300mm/min
Hole depth: 7 mm through hole
Machine: Vertical Machining Centre (BT40)
Cutting fluid: Water soluble

Construction equipment parts C45 (200 HB)

3.3s/hole 4.0s/hole 2.9s/hole

Succeed Ø14.0 H7
Succeed reducing process
Reduced 60% of cycle time

Cutting Condition

Tool: L9826 AQDEXOH3F3D 14.0mm
Cutting speed: 65m/min
Feed: 430mm/min
Hole depth: 21 mm through hole
Machine: Vertical Machining Centre (BT40)
Cutting fluid: Water soluble

Internal oil hole and three flutes provide high precision and great performance

AQUA Drill EX Series

Oil Hole 3 Flutes

AQDEXOH3F

3D 5D



High Precision and High Efficient Oil Hole 3 Flute Drill

AQUA Drill EX

Oil Hole 3 Flutes

AQDEXOH3F 3D 5D

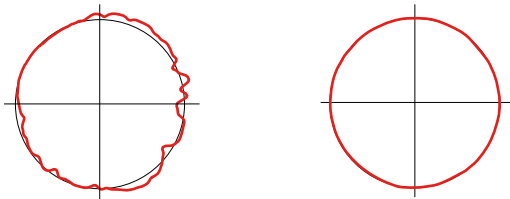
- High precision drilling until 5D depth possible
- Well balanced 3flute and optimized point geometry together with the oil hole will realize the high efficient drilling



High precision drilling

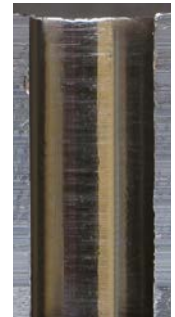
Roundness comparison

Conventional drill	AQDEXOH3D
Cutting speed: 45 m/min	Cutting speed: 50 m/min
Feed: 300 mm/rev. (0.25 mm/rev)	Feed: 570 mm/rev. (0.43 mm/rev)
Roundness: 14.5 μm	Roundness: 1.7 μm

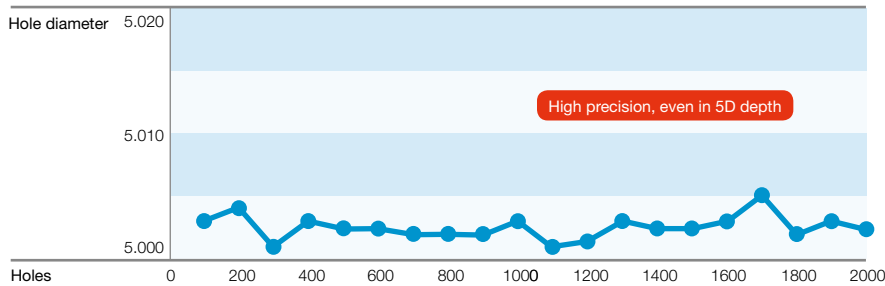


Cutting Condition

Tool: L9826 AQDEXOH3F3D 12.0 mm
Cutting depth: 36 mm blind hole
Material: Stainless steel 1.4301 (SUS304)
Cutting fluid: Water soluble



Transition of hole enlargement with AQDEXOH3F5D



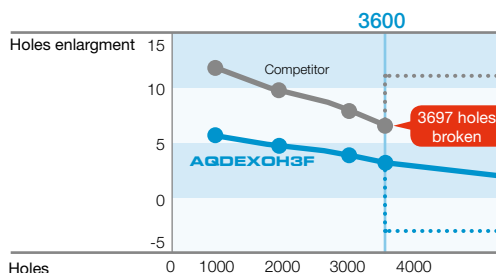
Cutting Condition

Tool: L9820 AQDEXOH3F3D 5.0 mm
Cutting speed: 100 m/min
Feed: 1280 mm/min (conventional drill was 950 mm/min)
Cutting depth: 25 mm blind hole
Material: C50 (180HB)
Cutting fluid: Water soluble

High Efficient and Long Tool Life

High feed non-step drilling

Feed 1500 mm/min, 5D depth

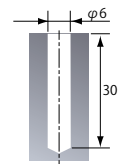


Cycle time 1.2 sec/hole
 Total cutting length over 150 m

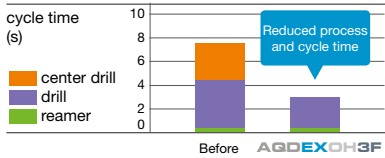
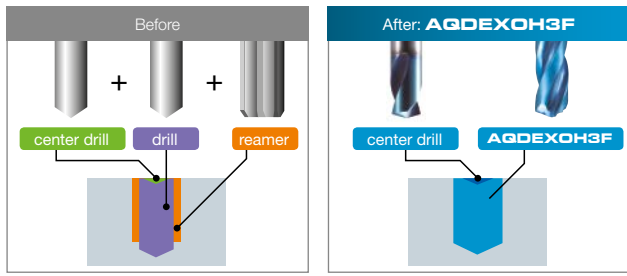


Cutting Condition

Tool: L9820 AQDEXOH3F5D 6.0 mm
Cutting speed: 120 m/min
Feed: 1500 mm/min
Cutting depth: 30 mm
Material: C50 (180HB)
Cutting fluid: Water soluble



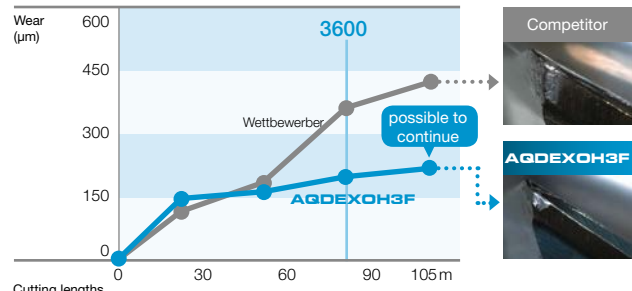
Process reduction



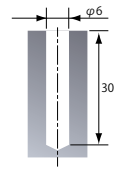
Cutting Condition
Hole requirement: 12.0mm
Material: C50 (200HB)
Cutting depth: 20mm

Stable drilling on Structural Steels (ST37-2)

Wear comparison after 150 m drilling!

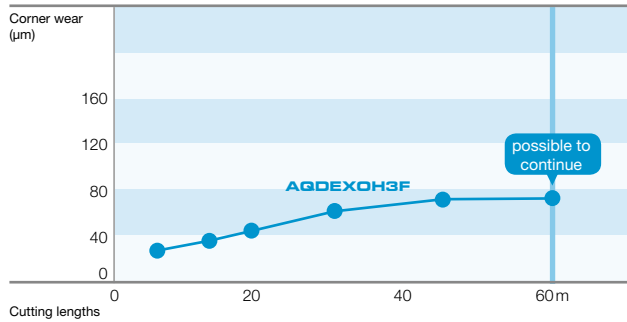


Cutting Condition
Tool: L9820 AQDEXOH3F5D 6.0mm
Cutting speed: 100m/min
Feed: 1280mm/min (0.24mm/rev)
Cutting depth: 30 mm blind hole
Material: Structural steel ST37-2 (SS400)
Cutting fluid: Water soluble

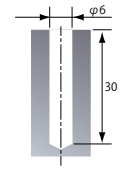


Long tool life even on Stainless Steel 1.4301 (SUS304)

Wear comparison after 60 m drilling



Cutting Condition
Tool: L9820 AQDEXOH3F5D 6.0mm
Cutting speed: 50m/min
Feed: 480mm/min (0.18mm/rev)
Cutting depth: 30 mm blind hole
Material: Structural steel 1.4301 (SUS304)
Cutting fluid: Water soluble



Applicable work materials

Structural Steels	Carbon Steels	Pre-Hardened Steels Alloy Steels	Hardened Steels Mold Steels	Hardened Steels		Stainless Steels		Ti Alloys Ni Alloys	Cast Iron	Aluminium Alloys	Copper Alloys
				40-50HRC	50-65 HRC	Austenitic 1.4301/1.4401 SUS304/SUS316	Martensitic 1.4021/1.4028 SUS420				
ST37-2	C45/C50	42CrMo4 SCR/NAK	30-40 HRC	40-50HRC	50-65 HRC	○	○		○	Al/ADC	Cu
■	■	■	■	■							