

COMPETITOR PROCESS

AQUA EX FLAT DRILL PROCESS

ENDMILL + DRILL

ONE STEP DRILLING

NACHI

ONE STEP DRILLING WITH MINIMAL BURR



- One drill does it all- Eliminates the need to use a "center drill" or "end mill" to drill into inclined or curved surfaces.
- True 180° flat cutting edges creates minimal exit burr in Tubing & Thin Plates.
- Ideally suited for flat bottom applications in the Oil and Gas, Automotive as well as General industries.
- Available in coolant thru & non-coolant thru 3D,5D & Extended length designs.



AQUA Drill EX Flat

AQUA DRILL EX FLAT

- One Drill does it all - Eliminates the need to use a "center drill" or "end mill" on inclined or curved surfaces
- True 180° flat cutting edges creates minimal exit burr in Tubing & Thin Plates
- Ideally suited for flat bottom applications in the Oil and Gas, Automotive as well as General Industries
- "Double Margin" for stable and precision Drilling

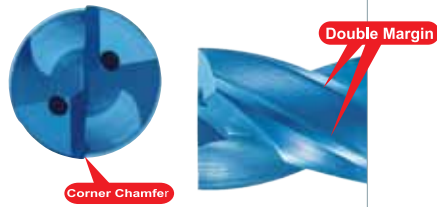


AQUA DRILL EX FLAT

New Features:

New Features on 3D/5D/Extd.Length:

- 1) Double Margin
 - 2) Corner Chamfer
- Added Stability & Tool Life



180° TRUE FLAT FACE

One cut to produce accurate counter bore surface

AQUA DRILL EX FLAT

Endmill 2-Flute



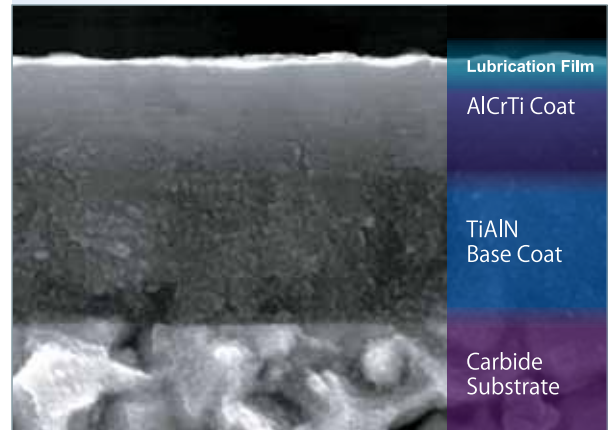
Completely Flat Point



Not a Flat Point

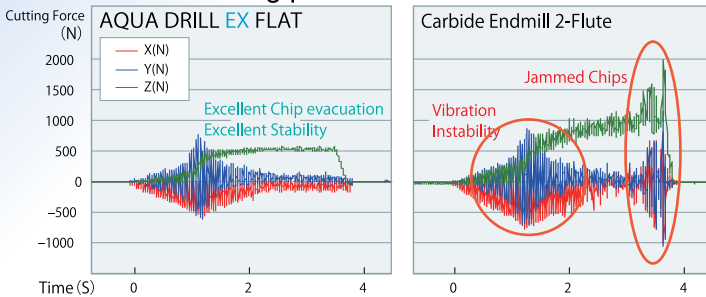
AQUA EX COATING

Improved Heat & Wear Resistance



Cutting Resistance on 45° angled surface

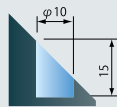
Excellent hole drilling performance



AQDEXZ 10.0 TEST DATA

Cutting conditions

Tool: AQDEXZ 10.0
 (SFM)/RPM: (250)2400
 (IPR)/IPM: (.002)6.0
 Material: Carbon Steel
 Coolant: Water Soluble



AQUA DRILL EX FLAT

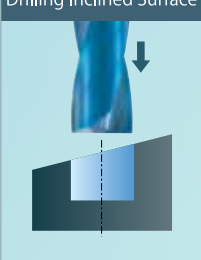
Unique and Versatile High Performance Carbide Drill

ONE STEP DRILLING WITH MINIMAL BURR

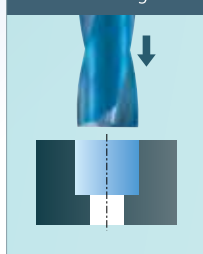
Eliminate the need for "Center Drill" & "End mill"

● Not recommended for counter milling ❌

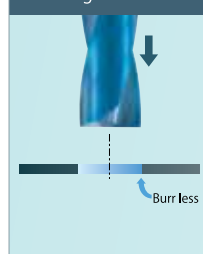
Drilling Inclined Surface



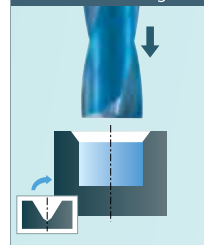
Counter Boring Hole



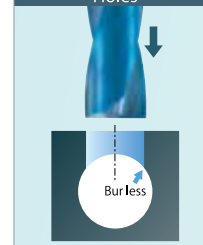
Drilling Thin Plates



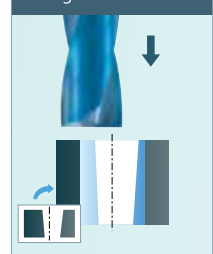
Blind Hole for Threading



Drilling Intersecting Holes



Drilling for Eccentric Hole



New AQUA DRILL EX FLAT SERIES

“One Step Drilling with Minimal Burrs”

AQUA EX FLAT SERIES LINE UP

AQDEXZLS
 Extended Length up to 10D Reach

AQDEXZOH5D
 Coolant Thru 5D Flat Drill

AQDEXZR
 Non-Coolant Thru Jobber length Drill

AQDEXZOH3D
 Coolant Thru 3D Flat Drill

AQDEXZ
 Non-coolant Thru Stub length Drill

Diameter ϕ 1 ϕ 2 ϕ 3 ϕ 6 ϕ 10 ϕ 16 ϕ 20

AQUA DRILL EX FLAT

Additional applications

Drilling of Shoulder
Guide Hole
Angled Holes
Intersecting Holes

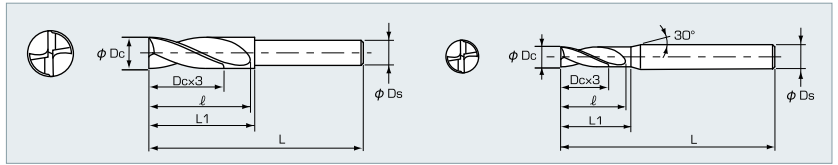
◎ = Great ○ = Good

AQUA EX FLAT

Work Material	Applicable work materials											
	Structural Steels	Carbon Steels	Pre-Hardened Steels Alloy Steels	Hardened Steels Mold Steels	Hardened Steels		Stainless Steels		Titanium Alloys Nickel Alloys	Cast Irons	Aluminum Alloys	Copper Alloys
	SS400	S45C	SCM/NAK	30~40HRC	40~50HRC	50~60HRC	SUS304/SUS316	SUS420		FC/FCD	AC/ADC	CU
AQDEXZ AQDEXZR AQDEXZLS	◎	◎	◎	◎	○			◎		◎	○	○
AQDEXZOH3D AQDEXZOH5D	◎	◎	◎	◎	○		○	◎	○	◎	◎	◎



L9610



Metric Size

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
	Dc		ℓ	L	L1	Ds	
0715148	1.0	0.0394	3.3	47	3.6	3	●
0715154	1.1	0.0433	3.5	47	3.9	3	●
0715160	1.2	0.0472	3.9	47	4.2	3	●
0715177	1.3	0.0512	4.2	47	4.5	3	●
0715183	1.4	0.0551	4.6	47	4.9	3	●
0715190	1.5	0.0591	4.9	50	5.2	3	●
0715205	1.6	0.0630	5.2	50	5.5	3	●
0715211	1.7	0.0669	5.5	50	5.8	3	●
0715228	1.8	0.0709	5.8	50	6.1	3	●
0715234	1.9	0.0748	6.2	50	6.5	3	●
0711354	2.0	0.0787	9	50	9.8	4	●
0713180	2.1	0.0827	11	50	11.4	4	●
0711360	2.2	0.0866	11	50	11.4	4	●
0713197	2.3	0.0906	11	50	11.5	4	●
0713202	2.4	0.0945	12	50	12.6	4	●
0711377	2.5	0.0984	12	50	12.7	4	●
0713219	2.6	0.1024	12	50	12.8	4	●
0713225	2.7	0.1063	14	50	14.9	4	●
0713231	2.8	0.1102	14	50	15.0	4	●
0713248	2.9	0.1142	14	50	15.0	4	●
0709920	3.0	0.1181	14	50	14.4	6	●
0713254	3.1	0.1220	15	50	15.5	6	●
0713260	3.2	0.1260	15	50	15.6	6	●
0710839	3.3	0.1299	15	50	15.7	6	●
0713277	3.4	0.1339	16	50	16.2	6	●
0709936	3.5	0.1378	16	50	16.3	6	●
0713283	3.6	0.1417	16	50	16.4	6	●
0713290	3.7	0.1457	18	50	18.0	6	●
0713305	3.8	0.1496	18	50	18.1	6	●
0713311	3.9	0.1535	18	50	18.2	6	●
0709942	4.0	0.1575	18	50	18.3	6	●
0713328	4.1	0.1614	19	60	20.4	6	●
0710845	4.2	0.1654	19	60	20.4	6	●
0713334	4.3	0.1693	19	60	20.5	6	●
0713340	4.4	0.1732	21	60	22.6	6	●
0709959	4.5	0.1772	21	60	22.7	6	●
0713357	4.6	0.1811	21	60	22.8	6	●
0713363	4.7	0.1850	22	60	22.9	6	●
0713370	4.8	0.1890	22	60	23.0	6	●
0713386	4.9	0.1929	22	60	23.0	6	●
0709965	5.0	0.1969	23	60	23.1	6	●
0713392	5.1	0.2008	24	60	26.2	6	●
0713408	5.2	0.2047	24	60	26.3	6	●
0711390	5.3	0.2087	24	60	26.4	6	●
0713414	5.4	0.2126	25	60	27.5	6	●
0709971	5.5	0.2165	25	60	27.6	6	●
0713420	5.6	0.2205	25	60	27.7	6	●
0713437	5.7	0.2244	27	60	29.7	6	●
0713443	5.8	0.2283	27	60	29.8	6	●
0713450	5.9	0.2323	27	60	29.9	6	●
0709988	6.0	0.2362	27	60	30	6	●
0713466	6.1	0.2402	28	70	31	6	●
0713472	6.2	0.2441	28	70	31	6	●
0713489	6.3	0.2480	28	70	31	6	●
0713495	6.4	0.2520	30	70	33	6	●
0709994	6.5	0.2559	30	70	33	6	●
0713500	6.6	0.2598	30	70	33	6	●
0713517	6.7	0.2638	31	70	33	6	●
0710851	6.8	0.2677	31	70	33	6	●
0713523	6.9	0.2717	31	70	33	6	●
0710008	7.0	0.2756	32	70	33	6	●
0713530	7.1	0.2795	33	70	36	6	●
0713546	7.2	0.2835	33	70	36	6	●
0713552	7.3	0.2874	33	70	36	6	●

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
	Dc		ℓ	L	L1	Ds	
0713569	7.4	0.2913	34	70	36	6	●
0710014	7.5	0.2953	34	70	36	6	●
0713575	7.6	0.2992	34	70	36	6	●
0713581	7.7	0.3031	36	70	39	6	●
0713598	7.8	0.3071	36	70	39	6	●
0713603	7.9	0.3110	36	70	39	6	●
0710020	8.0	0.3150	36	70	39	8	●
0713610	8.1	0.3189	37	80	40	8	●
0713626	8.2	0.3228	37	80	40	8	●
0713632	8.3	0.3268	37	80	40	8	●
0713649	8.4	0.3307	39	80	42	8	●
0710037	8.5	0.3346	39	80	42	8	●
0713655	8.6	0.3386	39	80	42	8	●
0713661	8.7	0.3425	40	80	42	8	●
0711405	8.8	0.3465	40	80	42	8	●
0713678	8.9	0.3504	40	80	42	8	●
0710043	9.0	0.3543	41	80	42	8	●
0713684	9.1	0.3583	42	80	45	8	●
0713690	9.2	0.3622	43	80	45	8	●
0713706	9.3	0.3661	43	80	45	8	●
0713712	9.4	0.3701	43	80	45	8	●
0710050	9.5	0.3740	43	80	45	8	●
0713729	9.6	0.3780	43	80	45	8	●
0713735	9.7	0.3819	45	80	48	8	●
0713741	9.8	0.3858	45	80	48	8	●
0713758	9.9	0.3898	45	80	48	8	●
0710066	10.0	0.3937	45	80	48	10	●
0713764	10.1	0.3976	46	90	49	10	●
0713770	10.2	0.4016	46	90	49	10	●
0710868	10.3	0.4055	46	90	49	10	●
0713787	10.4	0.4094	48	90	51	10	●
0710072	10.5	0.4134	48	90	51	10	●
0713793	10.6	0.4173	48	90	51	10	●
0713809	10.7	0.4213	49	90	51	10	●
0711411	10.8	0.4252	49	90	51	10	●
0713815	10.9	0.4291	49	90	54	10	●
0710089	11.0	0.4331	50	90	54	10	●
0713821	11.1	0.4370	51	90	54	10	●
0713838	11.2	0.4409	51	90	54	10	●
0713844	11.3	0.4449	51	90	54	10	●
0713850	11.4	0.4488	52	90	54	10	●
0710095	11.5	0.4528	52	90	54	10	●
0713867	11.6	0.4567	52	90	54	10	●
0713873	11.7	0.4606	54	90	57	10	●
0713880	11.8	0.4646	54	90	57	10	●
0713896	11.9	0.4685	54	90	57	10	●
0710100	12.0	0.4724	54	90	57	12	●
0724619	12.1	0.4764	54	100	57	12	●
0724625	12.2	0.4803	54	100	57	12	●
0724631	12.3	0.4843	54	100	57	12	●
0724648	12.4	0.4882	54	100	57	12	●
0710117	12.5	0.4921	57	100	60	12	●
0724654	12.6	0.4961	57	100	60	12	●
0724660	12.7	0.5000	57	100	60	12	●
0724677	12.8	0.5039	57	100	60	12	●
0724683	12.9	0.5079	57	100	60	12	●
0710123	13.0	0.5118	59	100	60	12	●
0724690	13.1	0.5157	59	100	63	12	●
0724705	13.2	0.5197	59	100	63	12	●
0724711	13.3	0.5236	59	100	63	12	●
0724728	13.4	0.5276	59	100	63	12	●
0710130	13.5	0.5315	61	100	63	12	●
0724734	13.6	0.5354	61	100	63	12	●
0724740	13.7	0.5394	61	100	63	12	●

* Package Qty: 1 per Tube Size

L9610

Metric Sizes

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
	Dc		ℓ	L	L1	Ds	
0724757	13.8	0.5433	61	100	63	12	●
0724763	13.9	0.5472	61	100	63	12	●
0710146	14.0	0.5512	63	100	66	12	●
0724770	14.1	0.5551	63	100	66	12	●
0724786	14.2	0.5591	63	100	66	12	●
0724792	14.3	0.5630	63	100	66	12	●
0724808	14.4	0.5669	63	100	66	12	●
0710152	14.5	0.5709	66	105	69	12	●
0724814	14.6	0.5748	66	105	69	12	●
0724820	14.7	0.5787	66	105	69	12	●
0724837	14.8	0.5827	66	105	69	12	●
0724843	14.9	0.5866	66	105	69	12	●
0710169	15.0	0.5906	68	105	69	12	●
0724850	15.1	0.5945	68	105	69	12	●
0724866	15.2	0.5984	68	105	69	12	●
0724872	15.3	0.6024	68	105	69	12	●
0724889	15.4	0.6063	68	105	69	12	●
0710175	15.5	0.6102	70	115	72	12	●
0724895	15.6	0.6142	70	115	72	12	●
0724900	15.7	0.6181	70	115	72	12	●
0724917	15.8	0.6220	70	115	72	12	●
0724923	15.9	0.6260	70	115	72	12	●
0710181	16.0	0.6299	72	115	75	16	●
0710198	16.5	0.6496	75	115	78	16	●
0710203	17.0	0.6693	77	125	79	16	●
0710210	17.5	0.6890	79	125	81	16	●
0710226	18.0	0.7087	81	125	84	16	●
0710232	18.5	0.7283	84	135	87	16	●
0710249	19.0	0.7480	86	135	87	16	●
0710255	19.5	0.7677	88	145	91	16	●
0710261	20.0	0.7874	90	145	93	20	●

L9611

Fractional Sizes

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
	Dc		ℓ	L	L1	Ds	
1455595	1/8	0.125	15	50	18	6	●
1455600	5/32	0.1563	18	50	20	6	●
1455617	3/16	0.1875	22	60	24	6	●
1455623	7/32	0.2188	25	60	28	6	●
1455630	1/4	0.2500	30	70	33	6	●
1455646	9/32	0.2183	33	70	36	6	●
1455652	5/16	0.3125	36	70	39	6	●
1455669	21/64	0.3281	39	80	42	8	●
1455675	23/64	0.3594	42	80	45	8	●
1455681	3/8	0.3750	43	80	45	8	●
1455698	13/32	0.4063	48	90	51	10	●
1455703	7/16	0.4375	51	90	54	10	●
1455710	29/64	0.4531	52	90	54	10	●
1455726	15/32	0.4688	54	90	57	10	●
1455732	1/2	0.5000	58	100	60	12	●
1455749	9/16	0.5625	64	105	67	12	●
1455755	5/8	0.6250	72	115	75	12	●
1455761	11/16	0.6875	79	125	81	16	●
1455778	3/4	0.7500	87	135	90	16	●

* Package Qty: 1 per Tube Size

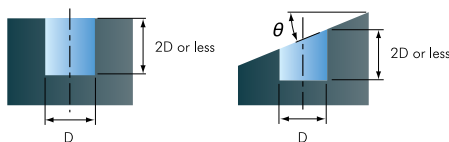
Standard Drilling Conditions

Work material	Structural Steels Carbon Steels Cast Irons		Alloy Steels		Die Steels Hardened Steels		Hardened Steels		Ductile Cast Irons		Aluminum Alloy		Aluminum Alloy Casting	
	~200HB		20~30HRC		30~40HRC		40~50HRC							
Diameter mm	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
3	7950	0.0020	6900	0.0020	3700	0.0020	2650	0.0010	6900	0.0015	17000	0.0025	12500	0.0020
4	5950	0.0025	5150	0.0025	2800	0.0025	2000	0.0015	5150	0.0025	12500	0.0030	9550	0.0025
5	4800	0.0035	4150	0.0035	2200	0.0030	1600	0.0020	4150	0.0030	10000	0.0040	7650	0.0035
6	4000	0.0040	3450	0.0040	1800	0.0035	1300	0.0025	3450	0.0035	8500	0.0045	6400	0.0040
8	3000	0.0055	2600	0.0055	1400	0.0050	1000	0.0030	2600	0.0045	6350	0.0065	4750	0.0055
10	2400	0.0070	2050	0.0070	1100	0.0060	800	0.0040	2050	0.0060	5100	0.0080	3800	0.0070
12	2000	0.0085	1700	0.0085	950	0.0070	650	0.0050	1700	0.0070	4250	0.0095	3200	0.0080
16	1500	0.0110	1300	0.0110	700	0.0095	500	0.0065	1300	0.0095	3200	0.0125	2400	0.0110
20	1200	0.0140	1050	0.0135	550	0.0120	400	0.0080	1050	0.0115	2550	0.0155	1900	0.0135

Work material	Structural Steels Carbon Steels Cast Irons		Alloy Steels		Die Steels Hardened Steels		Hardened Steels		Ductile Cast Irons		Aluminum Alloy		Aluminum Alloy Casting	
	~200HB		20~30HRC		30~40HRC		40~50HRC							
Diameter	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
1/8	7500	0.0020	6500	0.0020	3500	0.0020	2500	0.0010	6500	0.0020	16000	0.0025	12000	0.0020
5/32	6000	0.0025	5200	0.0025	2800	0.0025	2000	0.0015	5200	0.0025	12800	0.0030	9600	0.0025
3/16	5000	0.0035	4350	0.0035	2350	0.0030	1650	0.0020	4350	0.0030	10700	0.0040	8050	0.0030
1/4	3750	0.0045	3250	0.0045	1750	0.0040	1250	0.0025	3250	0.0035	8000	0.0050	6000	0.0045
5/16	3000	0.0055	2600	0.0055	1400	0.0050	1000	0.0030	2600	0.0045	6400	0.0065	4800	0.0055
3/8	2500	0.0065	2150	0.0065	1150	0.0055	850	0.0040	2150	0.0055	5350	0.0075	4000	0.0065
1/2	1900	0.0090	1650	0.0085	900	0.0075	600	0.0050	1650	0.0075	4000	0.0100	3000	0.0085
5/8	1500	0.0110	1300	0.0110	700	0.0095	500	0.0065	1300	0.0095	3200	0.0125	2400	0.0110
3/4	1250	0.0130	1100	0.0130	600	0.0115	400	0.0075	1100	0.0110	2650	0.0150	2000	0.0130

* Not recommended for 300-series Stainless Steel

Depth of cut

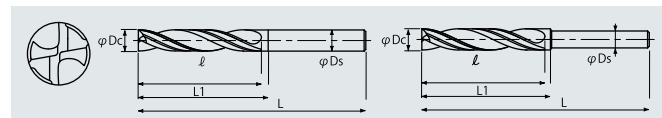


Warnings on using the drilling condition tables

1. Adjust drilling conditions according to the rigidity of machine and work clamp states.
2. For drilling after the forged surface has been removed.
3. For drilling with water soluble cutting fluid, With non water soluble cutting fluid, reduce the RPM and feed by 20%.
4. For drilling depths of 2D or less (D=drill diameter), Drilling holes deeper than 2D is not recommended. Doing so may reduce chip ejection performance.
5. Drilling Stainless Steel (SUS304,316) is not recommended.
6. When drilling angle (θ) is less than 30°, reduce the feed to 50%.
- When drilling angle (θ) is over 30°, reduce the RPM to under 70%, the feed to under 30%.

AQDEXZR

AQUA Drill EX FLAT Regular- Drill Flat bottom Holes upto 4xD



L9818 Metric Size

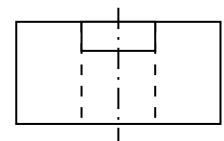
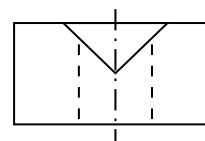
EDP #	Size	Decimal Equivalent	Flute Length l	Overall Length L	L1	Shank Dia. Ds	Stock
	Dc						
0720751	3.0	0.1181	19	60	20	6	●
0720768	3.1	0.1220	21	60	23	6	●
0720774	3.2	0.1260	21	60	23	6	●
0720780	3.3	0.1299	21	60	24	6	●
0720797	3.4	0.1339	23	60	24	6	●
0720802	3.5	0.1378	23	60	24	6	●
0720819	3.6	0.1417	23	60	25	6	●
0720825	3.7	0.1457	25	60	25	6	●
0720831	3.8	0.1496	25	60	25	6	●
0720848	3.9	0.1535	25	60	25	6	●
0720854	4.0	0.1575	25	60	25	6	●
0720860	4.1	0.1614	27	70	29	6	●
0720877	4.2	0.1654	27	70	29	6	●
0720883	4.3	0.1693	27	70	30	6	●
0720890	4.4	0.1732	29	70	32	6	●
0720905	4.5	0.1772	29	70	32	6	●
0720911	4.6	0.1811	29	70	32	6	●
0720928	4.7	0.1850	31	70	33	6	●
0720934	4.8	0.1890	31	70	33	6	●
0720940	4.9	0.1929	31	70	32	6	●
0720957	5.0	0.1969	32	70	32	6	●
0720963	5.1	0.2008	34	70	36	6	●
0720970	5.2	0.2047	34	70	36	6	●
0720986	5.3	0.2087	34	70	36	6	●
0720992	5.4	0.2126	36	70	37	6	●
0721007	5.5	0.2165	36	70	37	6	●
0721013	5.6	0.2205	36	70	39	6	●
0721020	5.7	0.2244	38	70	39	6	●
0721036	5.8	0.2283	38	70	39	6	●
0721042	5.9	0.2323	38	70	39	6	●
0721059	6.0	0.2362	40	70	39	6	●
0721065	6.1	0.2402	40	70	41	6	●
0721071	6.2	0.2441	40	70	41	6	●
0721088	6.3	0.2480	40	70	41	6	●
0721094	6.4	0.2520	42	70	43	6	●
0721100	6.5	0.2559	42	70	43	6	●
0721116	6.6	0.2598	42	70	43	6	●
0721122	6.7	0.2638	44	70	45	6	●
0721139	6.8	0.2677	44	70	45	6	●
0721145	6.9	0.2717	44	70	45	6	●
0721151	7.0	0.2756	46	90	47	6	●
0721168	7.1	0.2795	46	90	47	6	●
0721174	7.2	0.2835	46	90	47	6	●
0721180	7.3	0.2874	48	90	47	6	●
0721197	7.4	0.2913	48	90	49	6	●
0721202	7.5	0.2953	48	90	49	6	●
0721219	7.6	0.2992	51	90	49	6	●
0721225	7.7	0.3031	51	90	52	6	●
0721231	7.8	0.3071	51	90	52	6	●
0721248	7.9	0.3110	51	90	52	6	●
0721254	8.0	0.3150	51	100	53	8	●
0721260	8.1	0.3189	52	100	53	8	●
0721277	8.2	0.3228	52	100	53	8	●
0721283	8.3	0.3268	52	100	53	8	●
0721290	8.4	0.3307	54	100	55	8	●
0721305	8.5	0.3346	54	100	55	8	●
0721311	8.6	0.3386	54	100	55	8	●
0721328	8.7	0.3425	56	100	57	8	●
0721334	8.8	0.3465	56	100	57	8	●
0721340	8.9	0.3504	56	100	57	8	●
0721357	9.0	0.3543	58	100	59	8	●

EDP #	Size	Decimal Equivalent	Flute Length l	Overall Length L	L1	Shank Dia. Ds	Stock
	Dc						
0721363	9.1	0.3583	59	100	60	8	●
0721370	9.2	0.3622	59	100	60	8	●
0721386	9.3	0.3661	59	100	60	8	●
0721392	9.4	0.3701	61	100	62	8	●
0721408	9.5	0.3740	61	100	62	8	●
0721414	9.6	0.3780	61	100	62	8	●
0721420	9.7	0.3819	63	100	64	8	●
0721437	9.8	0.3858	63	100	64	8	●
0721443	9.9	0.3898	63	100	64	8	●
0721450	10.0	0.3937	63	110	65	10	●
0721466	10.1	0.3976	65	110	66	10	●
0721472	10.2	0.4016	65	110	66	10	●
0721489	10.3	0.4055	65	110	68	10	●
0721495	10.4	0.4094	67	110	68	10	●
0721500	10.5	0.4134	67	110	68	10	●
0721517	10.6	0.4173	67	110	70	10	●
0721523	10.7	0.4213	69	110	70	10	●
0721530	10.8	0.4252	69	110	70	10	●
0721546	10.9	0.4291	69	110	70	10	●
0721552	11.0	0.4331	70	115	71	10	●
0721569	11.1	0.4370	71	115	72	10	●
0721575	11.2	0.4409	71	115	72	10	●
0721581	11.3	0.4449	71	115	72	10	●
0721598	11.4	0.4488	73	115	74	10	●
0721603	11.5	0.4528	73	115	74	10	●
0721610	11.6	0.4567	73	115	74	10	●
0721626	11.7	0.4606	76	115	77	10	●
0721632	11.8	0.4646	76	115	77	10	●
0721649	11.9	0.4685	76	115	77	10	●
0721655	12.0	0.4724	76	125	78	12	●
0721661	12.5	0.4921	80	125	81	12	●
0721678	13.0	0.5118	82	130	83	12	●
0721684	13.5	0.5315	86	130	87	12	●
0721690	14.0	0.5512	88	135	89	12	●
0721706	14.5	0.5709	92	135	93	12	●
0721712	15.0	0.5906	95	145	96	12	●
0721729	15.5	0.6102	98	145	99	12	●
0721735	16.0	0.6299	101	160	104	16	●
0721741	16.5	0.6496	105	160	106	16	●
0721758	17.0	0.6693	108	165	109	16	●
0721764	17.5	0.6890	111	165	112	16	●
0721770	18.0	0.7087	113	175	114	16	●
0721787	18.5	0.7283	118	175	119	16	●
0721793	19.0	0.7480	120	185	121	16	●
0721809	19.5	0.7677	124	185	125	16	●
0721815	20.0	0.7874	126	195	129	20	●

* Package Qty: 1 per Tube Size

Note:

- Center Drill or Guide Hole Required for over 4XD length

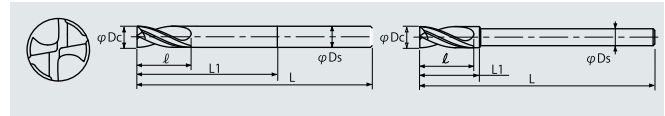


- Using a Center Drill
- Center Hole Diameter should be 0.5mm larger than Flat drill Diameter
- Using a Pilot Drill
- Guide hole diameter should be same as Flat drill Diameter

• Nachi Recommends using L6502 or L6504 AG Staring Drill (Page -9)

AQDEXZLS

AQUA Drill EX FLAT Long Shank - Drill hard to reach Spots upto 10xD



L9816 Metric Size

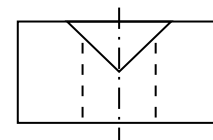
EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.		Stock
						Dc	Ds	
0717701	3.0	0.1181	14	100	30	6	6	●
0717718	3.1	0.1220	15	100	31	6	6	●
0717724	3.2	0.1260	15	100	32	6	6	●
0717730	3.3	0.1299	15	100	33	6	6	●
0717747	3.4	0.1339	16	100	34	6	6	●
0717753	3.5	0.1378	16	100	35	6	6	●
0717760	3.6	0.1417	16	100	36	6	6	●
0717776	3.7	0.1457	18	100	37	6	6	●
0717782	3.8	0.1496	18	100	38	6	6	●
0717799	3.9	0.1535	18	100	39	6	6	●
0717804	4.0	0.1575	18	100	40	6	6	●
0717810	4.1	0.1614	19	100	41	6	6	●
0717827	4.2	0.1654	19	100	42	6	6	●
0717833	4.3	0.1693	19	100	43	6	6	●
0717840	4.4	0.1732	21	100	44	6	6	●
0717856	4.5	0.1772	21	100	45	6	6	●
0717862	4.6	0.1811	21	100	46	6	6	●
0717879	4.7	0.1850	22	100	47	6	6	●
0717885	4.8	0.1890	22	100	48	6	6	●
0717891	4.9	0.1929	22	100	49	6	6	●
0717907	5.0	0.1969	23	110	50	6	6	●
0717913	5.1	0.2008	24	110	51	6	6	●
0717920	5.2	0.2047	24	110	52	6	6	●
0717936	5.3	0.2087	24	110	53	6	6	●
0717942	5.4	0.2126	25	110	54	6	6	●
0717959	5.5	0.2165	25	110	55	6	6	●
0717965	5.6	0.2205	25	110	56	6	6	●
0717971	5.7	0.2244	27	110	57	6	6	●
0717988	5.8	0.2283	27	110	58	6	6	●
0717994	5.9	0.2323	27	110	59	6	6	●
0718009	6.0	0.2362	27	120	60	6	6	●
0718015	6.1	0.2402	28	120	30	6	6	●
0718021	6.2	0.2441	28	120	30	6	6	●
0718038	6.3	0.2480	28	120	30	6	6	●
0718044	6.4	0.2520	30	120	32	6	6	●
0718050	6.5	0.2559	30	120	32	6	6	●
0718067	6.6	0.2598	30	120	32	6	6	●
0718073	6.7	0.2638	31	120	33	6	6	●
0718080	6.8	0.2677	31	120	33	6	6	●
0718096	6.9	0.2717	31	120	33	6	6	●
0718101	7.0	0.2756	32	120	34	6	6	●
0718118	7.1	0.2795	33	120	35	6	6	●
0718124	7.2	0.2835	33	120	35	6	6	●
0718130	7.3	0.2874	33	120	35	6	6	●
0718147	7.4	0.2913	34	120	36	6	6	●
0718153	7.5	0.2953	34	120	36	6	6	●
0718160	7.6	0.2992	34	120	36	6	6	●
0718176	7.7	0.3031	36	120	38	6	6	●
0718182	7.8	0.3071	36	120	38	6	6	●
0718199	7.9	0.3110	36	120	38	6	6	●
0718204	8.0	0.3150	36	130	80	8	8	●
0718210	8.1	0.3189	37	130	39	8	8	●
0718227	8.2	0.3228	37	130	39	8	8	●
0718233	8.3	0.3268	37	130	39	8	8	●
0718240	8.4	0.3307	39	130	41	8	8	●
0718256	8.5	0.3346	39	130	41	8	8	●
0718262	8.6	0.3386	39	130	41	8	8	●
0718279	8.7	0.3425	40	130	42	8	8	●
0718285	8.8	0.3465	40	130	42	8	8	●
0718291	8.9	0.3504	40	130	42	8	8	●
0718307	9.0	0.3543	41	130	43	8	8	●

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.		Stock
						Dc	Ds	
0718313	9.1	0.3583	42	130	44	8	8	●
0718320	9.2	0.3622	42	130	44	8	8	●
0718336	9.3	0.3661	42	130	44	8	8	●
0718342	9.4	0.3701	43	130	45	8	8	●
0718359	9.5	0.3740	43	130	45	8	8	●
0718365	9.6	0.3780	43	130	45	8	8	●
0718371	9.7	0.3819	45	130	47	8	8	●
0718388	9.8	0.3858	45	130	47	8	8	●
0718394	9.9	0.3898	45	130	47	8	8	●
0718400	10.0	0.3937	45	150	100	10	10	●
0718416	10.1	0.3976	46	150	48	10	10	●
0718422	10.2	0.4016	46	150	48	10	10	●
0718439	10.3	0.4055	46	150	48	10	10	●
0718445	10.4	0.4094	48	150	50	10	10	●
0718451	10.5	0.4134	48	150	50	10	10	●
0718468	10.6	0.4173	48	150	50	10	10	●
0718474	10.7	0.4213	49	150	51	10	10	●
0718480	10.8	0.4252	49	150	51	10	10	●
0718497	10.9	0.4291	49	150	51	10	10	●
0718502	11.0	0.4331	50	150	52	10	10	●
0718519	11.1	0.4370	51	150	53	10	10	●
0718525	11.2	0.4409	51	150	53	10	10	●
0718531	11.3	0.4449	51	150	53	10	10	●
0718548	11.4	0.4488	52	150	54	10	10	●
0718554	11.5	0.4528	52	150	54	10	10	●
0718560	11.6	0.4567	52	150	54	10	10	●
0718577	11.7	0.4606	54	150	56	10	10	●
0718583	11.8	0.4646	54	150	56	10	10	●
0718590	11.9	0.4685	54	150	56	10	10	●
0718605	12.0	0.4724	54	170	120	12	12	●
0718611	12.5	0.4921	57	170	59	12	12	●
0718628	13.0	0.5118	59	180	61	12	12	●
0718634	13.5	0.5315	61	180	63	12	12	●
0718640	14.0	0.5512	63	190	65	12	12	●
0718657	14.5	0.5709	66	190	68	12	12	●
0718663	15.0	0.5906	67	200	69	12	12	●
0718670	15.5	0.6102	70	200	72	12	12	●
0718686	16.0	0.6299	72	220	160	12	12	●
0718692	16.5	0.6496	75	220	77	16	16	●
0718708	17.0	0.6693	77	220	79	16	16	●
0718714	17.5	0.6890	79	220	81	16	16	●
0718720	18.0	0.7087	81	240	83	16	16	●
0718737	18.5	0.7283	84	240	86	16	16	●
0718743	19.0	0.7480	86	250	88	16	16	●
0718750	19.5	0.7677	88	250	90	16	16	●
0718766	20.0	0.7874	90	250	200	20	20	●

* Package Qty: 1 per Tube Size

Note:

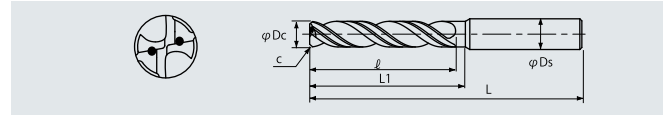
- Center Drill Required for AQUA Flat Extended Length



- Using a Center Drill
- Center Hole Diameter should be 0.5mm larger than Flat drill Diameter

AQDEXZOH3D

AQUA Drill EX FLAT Oil-Hole 3XD - Recommended for Drilling 300-Series Stainless



L9812 Metric Size

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
	Dc		ℓ	L	L1	Ds	
0718772	3.0	0.1181	14	68	15	3	●
0718789	3.1	0.1220	15	72	17	4	●
0718795	3.2	0.1260	15	72	17	4	●
0718800	3.3	0.1299	15	72	17	4	●
0718817	3.4	0.1339	16	72	17	4	●
0718823	3.5	0.1378	16	72	18	4	●
0718830	3.6	0.1417	16	72	19	4	●
0718846	3.7	0.1457	18	72	19	4	●
0718852	3.8	0.1496	18	72	19	4	●
0718869	3.9	0.1535	18	72	19	4	●
0718875	4.0	0.1575	18	72	19	4	●
0718881	4.1	0.1614	19	80	22	5	●
0718898	4.2	0.1654	19	80	22	5	●
0718903	4.3	0.1693	19	80	22	5	●
0718910	4.4	0.1732	21	80	22	5	●
0718926	4.5	0.1772	21	80	23	5	●
0718932	4.6	0.1811	21	80	24	5	●
0718949	4.7	0.1850	22	80	24	5	●
0718955	4.8	0.1890	22	80	24	5	●
0718961	4.9	0.1929	22	80	24	5	●
0718978	5.0	0.1969	23	80	24	5	●
0718984	5.1	0.2008	24	82	26	6	●
0718990	5.2	0.2047	24	82	26	6	●
0719005	5.3	0.2087	24	82	26	6	●
0719011	5.4	0.2126	25	82	26	6	●
0719028	5.5	0.2165	25	82	27	6	●
0719034	5.6	0.2205	25	82	28	6	●
0719040	5.7	0.2244	27	82	28	6	●
0719057	5.8	0.2283	27	82	28	6	●
0719063	5.9	0.2323	27	82	28	6	●
0719070	6.0	0.2362	27	82	28	6	●
0719086	6.1	0.2402	28	88	31	7	●
0719092	6.2	0.2441	28	88	31	7	●
0719108	6.3	0.2480	28	88	31	7	●
0719114	6.4	0.2520	30	88	31	7	●
0719120	6.5	0.2559	30	88	32	7	●
0719137	6.6	0.2598	30	88	33	7	●
0719143	6.7	0.2638	31	88	33	7	●
0719150	6.8	0.2677	31	88	33	7	●
0719166	6.9	0.2717	31	88	33	7	●
0719172	7.0	0.2756	32	88	33	7	●
0719189	7.1	0.2795	33	94	35	8	●
0719195	7.2	0.2835	33	94	35	8	●
0719200	7.3	0.2874	33	94	35	8	●
0719217	7.4	0.2913	34	94	35	8	●
0719223	7.5	0.2953	34	94	36	8	●
0719230	7.6	0.2992	34	94	37	8	●
0719246	7.7	0.3031	36	94	37	8	●
0719252	7.8	0.3071	36	94	37	8	●
0719269	7.9	0.3110	36	94	37	8	●
0719275	8.0	0.3150	36	94	37	8	●
0719281	8.1	0.3189	37	100	40	9	●
0719298	8.2	0.3228	37	100	40	9	●
0719303	8.3	0.3268	37	100	40	9	●
0719310	8.4	0.3307	39	100	40	9	●
0719326	8.5	0.3346	39	100	41	9	●
0719332	8.6	0.3386	39	100	42	9	●
0719349	8.7	0.3425	40	100	42	9	●
0719355	8.8	0.3465	40	100	42	9	●
0719361	8.9	0.3504	40	100	42	9	●
0719378	9.0	0.3543	41	100	42	9	●

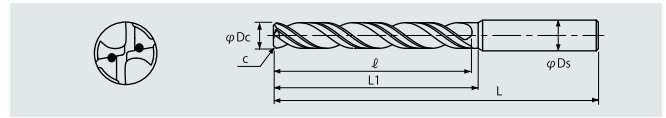
EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
	Dc		ℓ	L	L1	Ds	
0719384	9.1	0.3583	42	106	44	10	●
0719390	9.2	0.3622	42	106	44	10	●
0719406	9.3	0.3661	42	106	44	10	●
0719412	9.4	0.3701	43	106	44	10	●
0719429	9.5	0.3740	43	106	45	10	●
0719435	9.6	0.3780	43	106	46	10	●
0719441	9.7	0.3819	45	106	46	10	●
0719458	9.8	0.3858	45	106	46	10	●
0719464	9.9	0.3898	45	106	46	10	●
0719470	10.0	0.3937	45	106	46	10	●
0719487	10.1	0.3976	46	116	49	11	●
0719493	10.2	0.4016	46	116	49	11	●
0719509	10.3	0.4055	46	116	49	11	●
0719515	10.4	0.4094	48	116	49	11	●
0719521	10.5	0.4134	48	116	50	11	●
0719538	10.6	0.4173	48	116	51	11	●
0719544	10.7	0.4213	49	116	51	11	●
0719550	10.8	0.4252	49	116	51	11	●
0719567	10.9	0.4291	49	116	51	11	●
0719573	11.0	0.4331	50	116	51	11	●
0719580	11.1	0.4370	51	122	53	12	●
0719596	11.2	0.4409	51	122	53	12	●
0719601	11.3	0.4449	52	122	53	12	●
0719618	11.4	0.4488	52	122	53	12	●
0719624	11.5	0.4528	52	122	54	12	●
0719630	11.6	0.4567	52	122	55	12	●
0719647	11.7	0.4606	54	122	55	12	●
0719653	11.8	0.4646	54	122	55	12	●
0719660	11.9	0.4685	54	122	55	12	●
0719676	12.0	0.4724	54	122	55	12	●
0719682	12.5	0.4921	57	128	59	13	●
0719699	13.0	0.5118	59	128	60	13	●
0719704	13.5	0.5315	61	134	63	14	●
0719710	14.0	0.5512	63	134	64	14	●
0719727	14.5	0.5709	66	140	68	15	●
0719733	15.0	0.5906	68	140	69	15	●
0719740	15.5	0.6102	70	146	72	16	●
0719756	16.0	0.6299	72	146	73	16	●

* Package Qty: 1 per Tube Size

Drill Dia (in mm)		Corner Chamfer
Above	Up to	C (mm)
	6.0	0.04
6.0	10.0	0.1
10.0		0.2

AQDEXZOH5D

AQUA Drill EX FLAT Oil-Hole 5XD - Recommended for Drilling 300-Series Stainless



L9814 Metric Size

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
	Dc		ℓ	L	L1	Ds	
0719762	3.0	0.1181	20	74	21	3	●
0719779	3.1	0.1220	22	80	25	4	●
0719785	3.2	0.1260	22	80	25	4	●
0719791	3.3	0.1299	22	80	25	4	●
0719807	3.4	0.1339	24	80	25	4	●
0719813	3.5	0.1378	24	80	27	4	●
0719820	3.6	0.1417	24	80	27	4	●
0719836	3.7	0.1457	24	80	27	4	●
0719842	3.8	0.1496	26	80	27	4	●
0719859	3.9	0.1535	26	80	27	4	●
0719865	4.0	0.1575	26	80	27	4	●
0719871	4.1	0.1614	28	90	30	5	●
0719888	4.2	0.1654	28	90	30	5	●
0719894	4.3	0.1693	28	90	30	5	●
0719900	4.4	0.1732	29	90	30	5	●
0719916	4.5	0.1772	29	90	31	5	●
0719922	4.6	0.1811	29	90	34	5	●
0719939	4.7	0.1850	32	90	34	5	●
0719945	4.8	0.1890	32	90	34	5	●
0719951	4.9	0.1929	32	90	34	5	●
0719968	5.0	0.1969	33	90	34	5	●
0719974	5.1	0.2008	35	94	38	6	●
0719980	5.2	0.2047	35	94	38	6	●
0719997	5.3	0.2087	35	94	38	6	●
0720000	5.4	0.2126	37	94	38	6	●
0720017	5.5	0.2165	37	94	39	6	●
0720023	5.6	0.2205	37	94	40	6	●
0720030	5.7	0.2244	39	94	40	6	●
0720046	5.8	0.2283	39	94	40	6	●
0720052	5.9	0.2323	39	94	40	6	●
0720069	6.0	0.2362	41	94	40	6	●
0720075	6.1	0.2402	41	101	44	7	●
0720081	6.2	0.2441	41	101	44	7	●
0720098	6.3	0.2480	43	101	44	7	●
0720103	6.4	0.2520	43	101	44	7	●
0720110	6.5	0.2559	43	101	45	7	●
0720126	6.6	0.2598	43	101	46	7	●
0720132	6.7	0.2638	45	101	46	7	●
0720149	6.8	0.2677	45	101	46	7	●
0720155	6.9	0.2717	45	101	46	7	●
0720161	7.0	0.2756	46	101	46	7	●
0720178	7.1	0.2795	48	110	51	8	●
0720184	7.2	0.2835	48	110	51	8	●
0720190	7.3	0.2874	48	110	51	8	●
0720206	7.4	0.2913	50	110	51	8	●
0720212	7.5	0.2953	50	110	52	8	●
0720229	7.6	0.2992	50	110	53	8	●
0720235	7.7	0.3031	52	110	53	8	●
0720241	7.8	0.3071	52	110	53	8	●
0720258	7.9	0.3110	52	110	53	8	●
0720264	8.0	0.3150	52	110	53	8	●
0720270	8.1	0.3189	54	117	57	9	●
0720287	8.2	0.3228	54	117	57	9	●
0720293	8.3	0.3268	54	117	57	9	●
0720309	8.4	0.3307	56	117	57	9	●
0720315	8.5	0.3346	56	117	58	9	●
0720321	8.6	0.3386	56	117	59	9	●
0720338	8.7	0.3425	58	117	59	9	●
0720344	8.8	0.3465	58	117	59	9	●
0720350	8.9	0.3504	58	117	59	9	●
0720367	9.0	0.3543	59	117	59	9	●

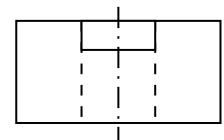
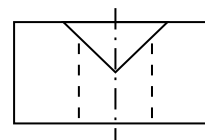
EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
	Dc		ℓ	L	L1	Ds	
0720373	9.1	0.3583	61	126	64	10	●
0720380	9.2	0.3622	61	126	64	10	●
0720396	9.3	0.3661	61	126	64	10	●
0720401	9.4	0.3701	63	126	64	10	●
0720418	9.5	0.3740	63	126	65	10	●
0720424	9.6	0.3780	63	126	66	10	●
0720430	9.7	0.3819	65	126	66	10	●
0720447	9.8	0.3858	65	126	66	10	●
0720453	9.9	0.3898	65	126	66	10	●
0720460	10.0	0.3937	65	126	66	10	●
0720476	10.1	0.3976	67	138	70	11	●
0720482	10.2	0.4016	67	138	70	11	●
0720499	10.3	0.4055	67	138	70	11	●
0720504	10.4	0.4094	69	138	70	11	●
0720510	10.5	0.4134	69	138	71	11	●
0720527	10.6	0.4173	69	138	71	11	●
0720533	10.7	0.4213	72	138	73	11	●
0720540	10.8	0.4252	72	138	73	11	●
0720556	10.9	0.4291	72	138	73	11	●
0720562	11.0	0.4331	73	138	73	11	●
0720579	11.1	0.4370	74	146	77	12	●
0720585	11.2	0.4409	74	146	77	12	●
0720591	11.3	0.4449	74	146	77	12	●
0720607	11.4	0.4488	76	146	77	12	●
0720613	11.5	0.4528	76	146	78	12	●
0720620	11.6	0.4567	76	146	79	12	●
0720636	11.7	0.4606	78	146	79	12	●
0720642	11.8	0.4646	78	146	79	12	●
0720659	11.9	0.4685	78	146	79	12	●
0720665	12.0	0.4724	78	146	79	12	●
0720671	12.5	0.4921	82	153	84	13	●
0720688	13.0	0.5118	86	153	86	13	●
0720694	13.5	0.5315	89	162	91	14	●
0720700	14.0	0.5512	91	162	92	14	●
0720716	14.5	0.5709	95	169	97	15	●
0720722	15.0	0.5906	98	169	98	15	●
0720739	15.5	0.6102	102	178	104	16	●
0720745	16.0	0.6299	104	178	105	16	●

* Package Qty: 1 per Tube Size

Drill Dia (in mm)		Corner Chamfer
Above	Up to	C (mm)
	6.0	0.04
6.0	10.0	0.1
10.0		0.2

Note:

- Center Drill or Guide Hole Required for over 4XD length



- Using a Center Drill
- Center Hole Diameter should be 0.5mm larger than Flat
- Using a Pilot Drill
- Guide hole diameter should be same as Flat drill Diameter

• Nachi Recommends using L6502 or L6504 AG Staring Drill (Page -9)

AG STARTING DRILL

For Use With Aqua Flat Drills (List 9818, 9816, 9814)

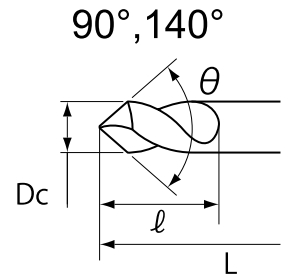


List 6502



Metric Size

EDP #	Size	Decimal Equivalent	Drill Point Angle	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L		
0710358	3.0	0.1181	90°	9	48	3.0	●
0710364	4.0	0.1575		12	52	4.0	●
0712613	5.0	0.1969		14	60	5.0	●
0710370	6.0	0.2362		15	66	6.0	●
0710387	8.0	0.3150		20	79	8.0	●
0710393	10.0	0.3937		25	89	10.0	●
0710409	12.0	0.4724		30	102	12.0	●
0710415	16.0	0.6299		35	115	16.0	●
0710421	20.0	0.7874	40	131	20.0	●	
0710518	3.0	0.1181	140°	9	48	3.0	●
0710524	4.0	0.1575		12	52	4.0	●
0712636	5.0	0.1969		14	60	5.0	●
0710530	6.0	0.2362		15	66	6.0	●
0710547	8.0	0.3150		20	79	8.0	●
0710553	10.0	0.3937		25	89	10.0	●
0710560	12.0	0.4724		30	102	12.0	●
0710576	16.0	0.6299		35	115	16.0	●
0710582	20.0	0.7874		40	131	20.0	●



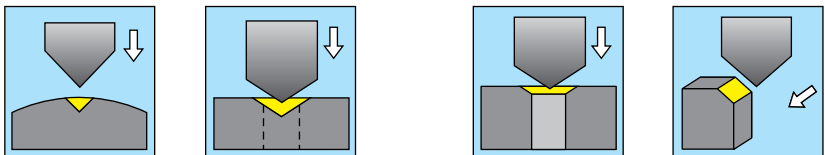
List 6504



Metric Size

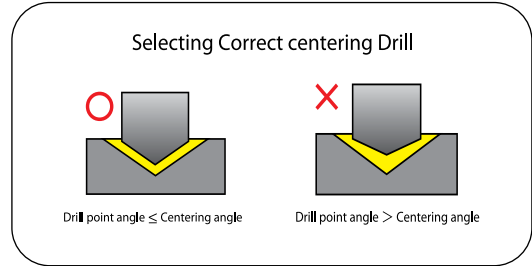
EDP #	Size	Decimal Equivalent	Drill Point Angle	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L		
0710656	3.0	0.1181	90°	9	75	3.0	●
0710662	4.0	0.1575		12	100	4.0	●
0712659	5.0	0.1969		14	100	5.0	●
0710679	6.0	0.2362		15	150	6.0	●
0710685	8.0	0.3150		20	150	8.0	●
0710691	10.0	0.3937		25	200	10.0	●
0710707	12.0	0.4724	30	200	12.0	●	
0710771	3.0	0.1181	140°	9	75	3.0	●
0710788	4.0	0.1575		12	100	4.0	●
0712671	5.0	0.1969		14	100	5.0	●
0710794	6.0	0.2362		15	150	6.0	●
0710800	8.0	0.3150		20	150	8.0	●
0710816	10.0	0.3937		25	200	10.0	●
0710822	12.0	0.4724	30	200	12.0	●	

AREAS OF APPLICATION FOR AG STARTING



For Pre-Drilling of Drills that have inconsistent bite and drilling holes on curved or inclined surfaces

For Chamfering of Holes and Chamfering Edges



Aqua Drill EX Flat - Standard Drilling Conditons

LIST 9818 AQDEXZR

Work Material			Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels/ Hardened Steels (30-35 HRC)		Ductile Cast Irons		Aluminum Alloys		Aluminum Casting	
Speed (SFM)			325-328 SFM		290-295 SFM		220-225 SFM		290-295 SFM		515-525 SFM		260-400 SFM	
Drill Diameter			325-328 SFM		290-295 SFM		220-225 SFM		290-295 SFM		515-525 SFM		260-400 SFM	
Metric	mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3	0.118		10600	0.002	9500	0.002	7400	0.002	9500	430	17000	0.002	12700	0.002
4	0.157		7900	0.003	7100	0.002	5550	0.002	7100	430	12500	0.002	9500	0.003
5	0.197		6300	0.004	5700	0.003	4450	0.003	5700	430	10000	0.003	7600	0.004
6	0.236		5300	0.005	4750	0.004	3700	0.004	4750	430	8500	0.003	6400	0.005
8	0.315		3950	0.006	3550	0.005	2790	0.005	3550	430	6350	0.005	4780	0.006
10	0.394		3150	0.008	2860	0.006	2230	0.006	2860	430	5100	0.006	3800	0.008
12	0.472		2650	0.009	2390	0.007	1860	0.007	2390	430	4250	0.007	3180	0.009
16	0.630		1990	0.012	1790	0.009	1390	0.009	1790	430	3200	0.009	2390	0.013
20	0.787		1590	0.016	1430	0.012	1110	0.012	1430	430	2550	0.012	1910	0.016

- Note :** 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
 2) Use the table values for drilling depths upto 4xD. Adjust cutting conditions per table based on "degree angle to be drilled."
 3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
 4) Not recommended for drilling in Stainless Steel. We recommend using List9814 AQUA EX Flat OH5D for Stainless Steel & Hi-temp alloys.
 5) Center Drill or Guide hole required. (1: Use AG Starting drill or Aqua Ex Flat drill)

Formulas : $RPM = \frac{SFM \times 3.82}{\text{Drill dia.}}$ Feed Rate (in/min) : $RPM \times IPR$

LIST 9816 AQDEXZLS

Work Material			Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels/ Hardened Steels (30-35 HRC)		Ductile Cast Irons		Aluminum Alloys		Aluminum Casting	
Speed (SFM)			325-328 SFM		290-295 SFM		220-225 SFM		290-295 SFM		515-525 SFM		260-400 SFM	
Drill Diameter			325-328 SFM		290-295 SFM		220-225 SFM		290-295 SFM		515-525 SFM		260-400 SFM	
Metric	mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3	0.118		10600	0.003	9500	0.002	7400	0.002	9500	430	17000	0.002	12700	0.002
4	0.157		7900	0.004	7100	0.003	5550	0.002	7100	430	12500	0.002	9500	0.003
5	0.197		6300	0.005	5700	0.004	4450	0.003	5700	430	10000	0.003	7600	0.004
6	0.236		5300	0.006	4750	0.005	3700	0.004	4750	430	8500	0.003	6400	0.005
8	0.315		3950	0.008	3550	0.006	2790	0.005	3550	430	6350	0.005	4780	0.006
10	0.394		3150	0.010	2860	0.008	2230	0.006	2860	430	5100	0.006	3800	0.008
12	0.472		2650	0.012	2390	0.009	1860	0.007	2390	430	4250	0.007	3180	0.009
16	0.630		1990	0.016	1790	0.013	1390	0.009	1790	430	3200	0.009	2390	0.013
20	0.787		1590	0.020	1430	0.016	1110	0.012	1430	430	2550	0.012	1910	0.016

- Note :** 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
 2) Use the table values for drilling depths upto 2xD. Adjust cutting conditions per table based on "degree angle to be drilled."
 3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
 4) Not recommended for drilling in Stainless Steel. We recommend using List9814 AQUA EX Flat OH3Dor OH5D for Stainless Steel & Hi-temp alloys.
 5) Center Drill or Guide hole required. (1: Use AG Starting drill or Aqua Ex Flat drill)

Formulas : $RPM = \frac{SFM \times 3.82}{\text{Drill dia.}}$ Feed Rate (in/min) : $RPM \times IPR$

Drilling conditions for Angled Surfaces					
Reduction % to above table values					
Degree Angle		Reduction %		Reduction % (Multiplier)	
		RPM	Feed	RPM	Feed
0°	5°	100%	100%	Table Value	Table Value
6°	20°	50%	50%	(Table Value)x0.5	(Table Value)x0.5
21°	35°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
36°	60°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
61°		70%	30%	(Table Value)x0.3	(Table Value)x0.7

Aqua Drill EX Flat - Standard Drilling Conditons

LIST 9812 AQDEXZOH3D

Work Material			Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels / Hardened Steels (30-40 HRC)		Hardened Steels (40-50 HRC)		Ductile Cast Irons		Stainless Steel (300-Series Stainless)		Nickel Alloys, Titanium Alloys, PH Stainless		Aluminum Casting	
Speed (SFM)			390 - 395 SFM		325 - 328 SFM		225 - 230 SFM		160 - 165 SFM		200 - 225 SFM		180 - 185 SFM		100 SFM		450-455 SFM	
Drill Diameter																		
Metric	mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3	0.118	12700	0.003	10600	0.002	7400	0.002	5300	0.002	10600	0.002	6000	0.003	3200	0.002	14800	0.004	
4	0.157	9500	0.004	7900	0.003	5550	0.002	4000	0.003	7900	0.002	4500	0.004	2400	0.003	11100	0.005	
5	0.197	7600	0.005	6300	0.004	4450	0.003	3200	0.004	6300	0.003	3600	0.005	1900	0.004	8900	0.006	
6	0.236	6300	0.006	5300	0.005	3700	0.004	2700	0.004	5300	0.004	3000	0.006	1600	0.005	7400	0.007	
8	0.315	4800	0.008	3950	0.006	2790	0.005	2000	0.006	3950	0.005	2250	0.008	1200	0.006	5570	0.009	
10	0.394	3800	0.010	3150	0.008	2230	0.006	1600	0.007	3150	0.006	1800	0.010	950	0.007	4460	0.012	
12	0.472	3200	0.012	2650	0.009	1860	0.007	1300	0.009	2650	0.007	1500	0.012	800	0.007	3710	0.014	
16	0.630	2400	0.016	1990	0.013	1390	0.009	1000	0.011	1990	0.009	1100	0.016	600	0.009	2790	0.019	

- Note :** 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
 2) Use the table values for drilling depths upto 3xD. Adjust cutting conditions per table based on "degree angle to be drilled."
 3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%

Formulas : $RPM = \frac{SFM \times 3.82}{\text{Drill dia.}}$ Feed Rate (in/min) : $RPM \times IPR$

LIST 9814 AQDEXZOH5D

Work Material			Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels / Hardened Steels (30-40 HRC)		Hardened Steels (40-50 HRC)		Ductile Cast Irons		Stainless Steel (300-Series Stainless)		Nickel Alloys, Titanium Alloys, PH Stainless		Aluminum Casting	
Speed (SFM)			390 - 395 SFM		325 - 328 SFM		225 - 230 SFM		160 - 165 SFM		200 - 225 SFM		175 - 180 SFM		90 SFM		450-455 SFM	
Drill Diameter																		
Metric	mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3	0.118	12000	0.003	10000	0.002	7000	0.002	5000	0.002	10600	0.002	5700	0.003	3000	0.002	14800	0.004	
4	0.157	9000	0.004	7500	0.003	5200	0.002	3800	0.002	7900	0.002	4200	0.003	2200	0.002	11100	0.005	
5	0.197	7200	0.005	5900	0.004	4200	0.003	3000	0.003	6300	0.003	3400	0.004	1800	0.003	8900	0.006	
6	0.236	5900	0.006	5000	0.005	3500	0.003	2500	0.003	5300	0.004	2800	0.005	1500	0.004	7400	0.007	
8	0.315	4500	0.008	3700	0.006	2600	0.005	1900	0.005	3950	0.005	2100	0.007	1100	0.005	5570	0.009	
10	0.394	3600	0.010	2900	0.008	2100	0.006	1500	0.006	3150	0.006	1700	0.009	900	0.006	4460	0.012	
12	0.472	3000	0.012	2500	0.009	1700	0.007	1200	0.007	2650	0.007	1400	0.010	700	0.007	3710	0.014	
16	0.630	2200	0.016	1800	0.013	1300	0.009	900	0.010	1990	0.009	1000	0.014	500	0.009	2790	0.019	

- Note :** 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
 2) Use the table values for drilling depths upto 5xD. Adjust cutting conditions per table based on "degree angle to be drilled."
 3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
 4) Center Drill or Guide hole required. (1: Use AG Starting drill or Aqua Ex Flat drill 2: For drilling guide holes in Stainless use AQUA EX Flat OH3D)

Formulas : $RPM = \frac{SFM \times 3.82}{\text{Drill dia.}}$ Feed Rate (in/min) : $RPM \times IPR$

Drilling conditions for Angled Surfaces					
Reduction % to above table values					
Degree Angle		Reduction %		Reduction % (Multiplier)	
		RPM	Feed	RPM	Feed
0°	5°	100%	100%	Table Value	Table Value
6°	20°	50%	50%	(Table Value)x0.5	(Table Value)x0.5
21°	35°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
36°	60°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
61°		70%	30%	(Table Value)x0.3	(Table Value)x0.7



NACHI AMERICA INC. HEADQUARTERS AND MAIN WAREHOUSE

715 Pushville Road, Greenwood, Indiana, 46143, U.S.A.
 Phone: 317-530-1003 Toll Free Phone: +1-888-340-8665
 Fax: 317-530-1013 Toll Free Fax: +1-888-383-8665
 Web Site URL : <http://www.nachi-america.com>

WEST COAST BRANCH

12652 E. Alondra Blvd. Cerritos, California, 90703, U.S.A
 Phone: 562-802-0055 Toll Free Phone: 1-800-548-3903
 Fax: 562-802-2455

NACHI CANADA INC. TORONTO HEADQUARTERS

89 Courtland Ave., Unit No.2, Concord, Ontario, L4K 3T4, CANADA
 Phone: (905)-660-0088 Toll Free Phone: +1-800-387-9188
 Fax: (905)-660-0097

NACHI MEXICANA, S.A. DE C.V.

Urbina No.54, Parque Industrial Naucalpan, Naucalpan de Juarez, Estado de Mexico C.P. 53370, MEXICO
 Phone:+52-55-3604-0832/0842/0081
 Fax:+52-55-3604-0882