

Symbio

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NACHI

The new alloy HSS drill approaches the performance of a carbide drill.

AG-ESS

AG-ESS DRILL

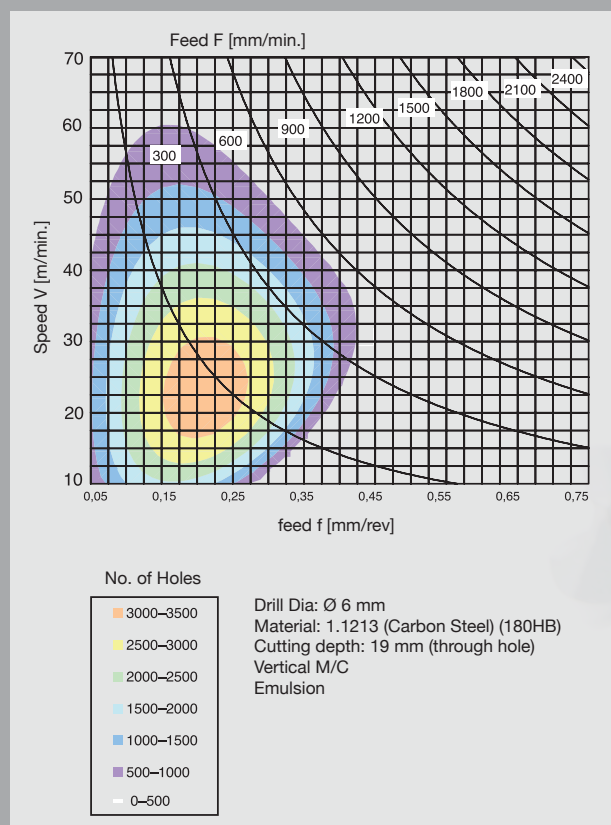
AG-ES

AG-ES DRILL

NEW

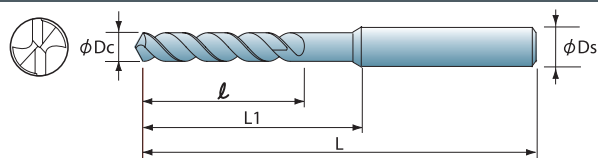
Alternative to Carbide

AG-ES Drill Tool life Chart



The new alloy HSS drills

AG-ES



LIST 6546

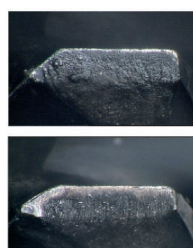
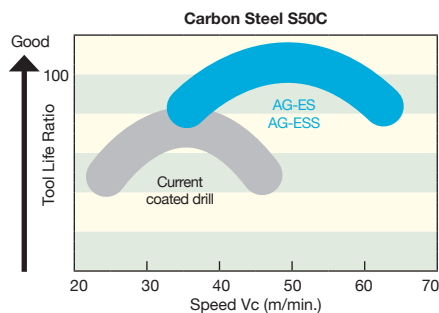
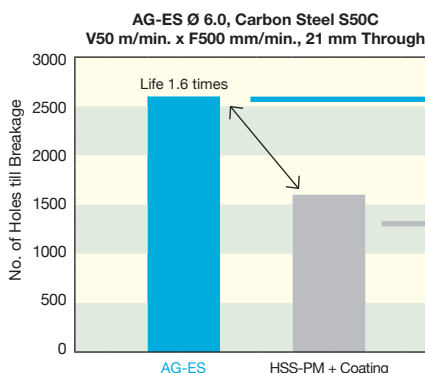
DC	l	L1	L	Ds
2.0	24	25.5	56	3
2.1	24	25.5	56	3
2.2	25	26.5	56	3
2.3	25	26.5	56	3
2.4	30	31.5	64	3
2.5	30	31.5	64	3
2.6	30	31.5	64	3
2.7	33	34.5	64	3
2.8	33	34.5	64	3
2.9	33	34.5	64	3
3.0	33	36	64	3
3.1	36	37.5	71	4
3.2	36	37.5	71	4
3.3	36	37.5	71	4
3.4	39	40.5	71	4
3.5	39	40.5	71	4
3.6	39	40.5	71	4
3.7	39	40.5	71	4
3.8	43	44.5	75	4
3.9	43	44.5	75	4
4.0	43	45	75	4
4.1	43	46	89	6
4.2	43	46	89	6
4.3	47	50	89	6
4.4	47	50	89	6
4.5	47	50	89	6
4.6	47	50	89	6
4.7	47	50	89	6
4.8	52	55	94	6
4.9	52	55	94	6
5.0	52	55	94	6
5.1	52	55	94	6
5.2	52	55	94	6
5.3	52	55	94	6
5.4	57	60	99	6
5.5	57	60	99	6
5.6	57	60	99	6
5.7	57	60	99	6
5.8	57	60	99	6
5.9	57	60	99	6
6.0	57	61	99	6
6.1	63	66	107	8

DC	l	L1	L	Ds
6.2	63	66	107	8
6.3	63	66	107	8
6.4	63	66	107	8
6.5	63	66	107	8
6.6	63	66	107	8
6.7	63	66	107	8
6.8	69	72	113	8
6.9	69	72	113	8
7.0	69	72	113	8
7.1	69	72	113	8
7.2	69	72	113	8
7.3	69	72	113	8
7.4	69	72	113	8
7.5	69	72	113	8
7.6	75	78	119	8
7.7	75	78	119	8
7.8	75	78	119	8
7.9	75	78	119	8
8.0	75	81	119	8
8.1	75	78	125	10
8.2	75	78	125	10
8.3	75	78	125	10
8.4	75	78	125	10
8.5	75	78	125	10
8.6	81	84	131	10
8.7	81	84	131	10
8.8	81	84	131	10
8.9	81	84	131	10
9.0	81	84	131	10
9.1	81	84	131	10
9.2	81	84	131	10
9.3	81	84	131	10
9.4	81	84	131	10
9.5	81	84	131	10
9.6	87	90	137	10
9.7	87	90	137	10
9.8	87	90	137	10
9.9	87	90	137	10
10.0	87	93.5	137	10
10.1	87	96	144	12
10.2	87	96	144	12
10.3	87	97	144	12

DC	l	L1	L	Ds
10.4	87	97	144	12
10.5	87	97	144	12
10.6	87	97	144	12
10.7	94	104	151	12
10.8	94	104	151	12
10.9	94	104	151	12
11.0	94	104	151	12
11.1	94	104	151	12
11.2	94	104	151	12
11.3	94	104	151	12
11.4	94	104	151	12
11.5	94	105	151	12
11.6	94	105	151	12
11.7	94	105	151	12
11.8	94	105	151	12
11.9	101	112	158	12
12.0	101	112	158	12
12.1	101	108	158	12
12.2	101	108	158	12
12.3	101	108	158	12
12.4	101	108	158	12
12.5	101	108	158	12
12.6	101	108	158	12
12.7	101	108	158	12
12.8	101	108	158	12
12.9	101	108	158	12
13.0	101	108	158	12
13.5	108	116	168	16
14.0	108	116	168	16
14.5	114	122	173	16
15.0	114	124	180	20
15.5	120	129	185	20
16.0	120	130	185	20
16.5	125	134	189	20
17.0	125	134	189	20
17.5	130	140	194	20
18.0	130	140	194	20
18.5	135	145	198	20
19.0	135	141	206	25
19.5	140	145	210	25
20.0	140	146	210	25

Hard wearing and chip resistant.

- The newly developed high alloy HSS drills have chipping and wear resistance, which is consistent even with the larger sizes.
- Higher speeds and longer tool life can be expected even in materials with hardness greater than HRC 32 where stable drilling is normally difficult with HSS.

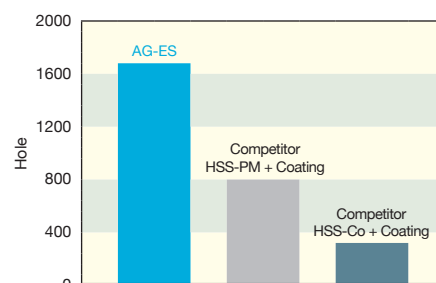


Damage after 1500 holes

Works with a wide range of materials.

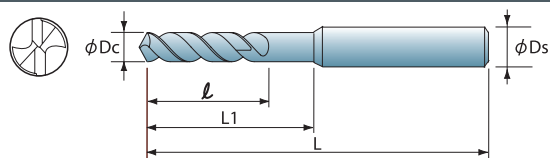
- Newly designed optimized groove geometry, shape relief and helix angle.
- The superior chip formation and removal properties of these drills are unaffected by the hardness of the material.

Tool: AGES9.0
Feed: 480 mm/min. (0.27 mm/rev)
Workmaterial: Structural Steel 400
Speed: 50 m/min.
Through hole: 19 mm



The new alloy HSS drills

AG-ESS



LIST 6548

DC	ℓ	L1	L	DS
1.0	6	6.5	40	3
1.1	7	7.5	40	3
1.2	8	8.5	40	3
1.3	8	8.5	40	3
1.4	9	9.5	40	3
1.5	9	9.5	40	3
1.6	10	11	44	3
1.7	10	11	44	3
1.8	11	12	44	3
1.9	11	12	44	3
2.0	12	13.5	44	3
2.1	12	13.5	44	3
2.2	13	14.5	44	3
2.3	13	14.5	44	3
2.4	14	15.5	48	3
2.5	14	15.5	48	3
2.6	14	15.5	48	3
2.7	16	17.5	48	3
2.8	16	17.5	48	3
2.9	16	17.5	48	3
3.0	16	20	48	3
3.1	18	19.5	54	4
3.2	18	19.5	54	4
3.3	18	19.5	54	4
3.4	20	21.5	54	4
3.5	20	21.5	54	4
3.6	20	21.5	54	4
3.7	20	21.5	54	4
3.8	22	23.5	54	4
3.9	22	23.5	54	4
4.0	22	24	54	4
4.1	22	25	66	6
4.2	22	25	66	6
4.3	24	27	68	6
4.4	24	27	68	6
4.5	24	27	68	6
4.6	24	27	68	6
4.7	24	27	68	6
4.8	26	29	70	6
4.9	26	29	70	6
5.0	26	29	70	6
5.1	26	29	70	6
5.2	26	29	70	6
5.3	26	29	70	6
5.4	28	31	72	6

DC	ℓ	L1	L	DS
5.5	28	31	72	6
5.6	28	31	72	6
5.7	28	31	72	6
5.8	28	31	72	6
5.9	28	31	72	6
6.0	28	34	72	6
6.1	31	34	75	8
6.2	31	34	75	8
6.3	31	34	75	8
6.4	31	34	75	8
6.5	31	34	75	8
6.6	31	34	75	8
6.7	31	34	75	8
6.8	34	37	78	8
6.9	34	37	78	8
7.0	34	37	78	8
7.1	34	37	78	8
7.2	34	37	78	8
7.3	34	37	78	8
7.4	34	37	78	8
7.5	34	37	78	8
7.6	37	40	81	8
7.7	37	40	81	8
7.8	37	40	81	8
7.9	37	40	81	8
8.0	37	43	81	8
8.1	37	40	87	10
8.2	37	40	87	10
8.3	37	40	87	10
8.4	37	40	87	10
8.5	37	40	87	10
8.6	40	43	90	10
8.7	40	43	90	10
8.8	40	43	90	10
8.9	40	43	90	10
9.0	40	43	90	10
9.1	40	43	90	10
9.2	40	43	90	10
9.3	40	43	90	10
9.4	40	43	90	10
9.5	40	43	90	10
9.6	43	46	93	10
9.7	43	46	93	10
9.8	43	46	93	10
9.9	43	46	93	10

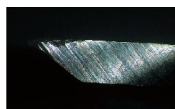
DC	ℓ	L1	L	DS
10.0	43	49	93	10
10.1	43	52	100	12
10.2	43	52	100	12
10.3	43	53	100	12
10.4	43	53	100	12
10.5	43	53	100	12
10.6	43	53	100	12
10.7	47	57	104	12
10.8	47	57	104	12
10.9	47	57	104	12
11.0	47	57	104	12
11.1	47	57	104	12
11.2	47	57	104	12
11.3	47	57	104	12
11.4	47	57	104	12
11.5	47	58	104	12
11.6	47	58	104	12
11.7	47	58	104	12
11.8	47	58	104	12
11.9	51	62	108	12
12.0	51	62	108	12
12.1	51	58	108	12
12.2	51	58	108	12
12.3	51	58	108	12
12.4	51	58	108	12
12.5	51	58	108	12
12.6	51	58	108	12
12.7	51	58	108	12
12.8	51	58	108	12
12.9	51	58	108	12
13.0	51	58	108	12
13.5	72	80	132	16
14.0	72	80	132	16
14.5	76	85	136	16
15.0	76	86	142	20
15.5	80	90	146	20
16.0	80	91	146	20
16.5	84	95	150	20
17.0	84	95	150	20
17.5	87	99	153	20
18.0	87	99	153	20
18.5	90	103	156	20
19.0	90	99	164	25
19.5	94	103	168	25
20.0	94	104	168	25

Highly efficient drilling comparable with carbide drills.

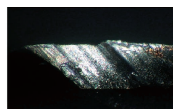
- High-speed, longer tool life, high reliability and low cost.
- The newly developed high alloy HSS works in harmony with the AG coating.
- Although the alloy is of the melted HSS type, the tool life exceeds those of powder HSS.
- These drills combine high speed drilling comparable with carbide and the reliability of HSS.

Tool: AGESS6.0
Feed: 580 mm/min. (0,18 mm/rev)
Workmaterial: Carbon Steel (180HB)
Speed: 60 m/min.
Through hole: 19 mm.

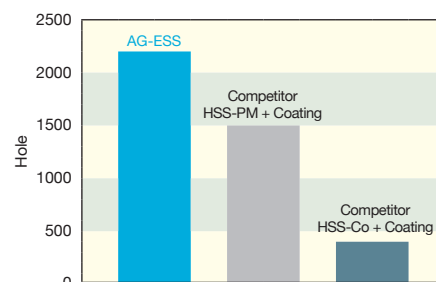
Wear after 1149 holes.



AG-ESS



Competitor



V60 F580

30 % longer tool life than competitor coated HSS-PM drill.

Selection by the Workmaterial

	Drilling depth	Structural Steels SS	Carbon Steels S, C (150~200HB)	Alloy Steels SCM (20~30HRC)	Mold Steels Hardened Steels SKD, NAK, HPM (30~40HRC)	Austenitic Stainless Steels SUS304	Cast Irons Ductile Cast Irons FC, FCD	Aluminium Alloys Non ferrous metals
AG-ESS	3D	○	●	●	○	○	○	△
AG-ES	7D	○	●	●	○	○	○	△
AGSUSS	3D	●	△			●		△
AGSUSR	7D	●	△			●		△
AGPLSD	10D~	○	●	●	○		○	

Can be used with a wide variety of processes.

- It is unnecessary to use a high stability of machine and work piece as required for a carbide drill.
- Will suit many customers' requirements no matter what their working form, process or clamping method.

●: Excellent ○: Good △: OK

AG-ES Standard Drilling Conditions

Drill Dia.	Carbon Steels Structural Steels SS, S, C (150~200HB)		Alloy Steels SCM (20~30HRC)		Mold Steels Hardened Steels SKD, NAK, HPM (30~40HRC)		Austenitic Stainless Steels SUS304		Cast Irons Ductile Cast Irons FC, FCD		Aluminium Alloys Non ferrous metals	
mm	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min
2	7200	390	5600	255	3200	115	1900	60	8000	520	12000	840
3	4800	430	3700	280	2100	130	1300	80	5300	560	8000	840
5	2900	390	2200	280	1300	130	760	65	3200	560	4800	840
8	1800	360	1400	255	800	130	480	65	2000	480	3000	720
10	1400	330	1100	235	640	130	380	60	1600	480	2400	720
12	1200	300	930	210	530	115	320	60	1300	400	2000	600
16	900	270	700	190	400	95	240	50	1000	320	1500	480
20	720	240	560	170	320	95	190	50	800	320	1200	480

Notes on using the drilling condition tables.

- Adjust drilling condition according to the rigidity of machine or work clamp state.
- The table values are for drilling with water soluble cutting fluid.
- Provide sufficient amount cutting fluid to the cutting point and in the flute.
- In non water soluble cutting fluid, reduce the rotation and feed by 20 %.
- Use the table values for drilling depths under 3xD.
- When the hole depth is more than 3xD, reduce the rotation and feed by 20 %.
- For hole depth more than 3xD, add step feeding.
- However the work material and the chip removal is worse, add step feeding, even if the drilling depth is under 3D.
- In step feed, return to the entrance hole.
- Step feed interval is about 0.5~1xD. In small diameter, about 0.2~0.5xD.
- Adjust the drill run out to 0.02mm or less.
- Use a collet chuck, milling chuck.
- After regrinding please lower drilling condition.

AG-ESS Standard Drilling Conditions

Drill Dia.	Carbon Steels Structural Steels SS, S, C (150~200HB)		Alloy Steels SCM (20~30HRC)		Mold Steels Hardened Steels SKD, NAK, HPM (30~40HRC)		Austenitic Stainless Steels SUS304		Cast Irons Ductile Cast Irons FC, FCD		Aluminium Alloys Non ferrous metals	
mm	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min	Rotation min ⁻¹	Feed mm/min
2	7200	430	5600	280	3200	160	1900	70	8000	600	12000	960
3	4800	500	3700	330	2100	180	1300	90	5300	640	8000	1000
5	2900	450	2200	330	1300	150	760	75	3200	640	4800	960
8	1800	430	1400	280	800	150	480	75	2000	560	3000	840
10	1400	400	1100	280	640	150	380	90	1600	560	2400	840
12	1200	360	930	260	530	130	320	80	1300	480	2000	720
16	900	310	700	220	400	120	240	70	1000	400	1500	600
20	720	290	560	220	320	110	190	65	800	400	1200	600

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