Recommended Drilling Data | Imperial (inch)

HSS

ISO	Material	Hardness (BHN)	Grade	Speed (SFM) TiN	TiAlN	TiCN	AM200®	Feed Rate (IPR) by Tube Size and T-A® Insert Series: Tube No. 4 - 5, T-A Series Y - Z	Tube No. 6 - 8, T-A Series 0	Tube No. 10, T-A Series 1	Tube No. 12 - 16, T-A Series 2	Tube No. 20 - 24, T-A Series 3	Tube No. 32, T-A Series 4
P	**Free-Machining Steel** 1118, 1215, 12L14, etc.	100 - 150	HSS	200	280	260	325	0.007	0.010	0.013	0.016	0.020	0.023
		150 - 200	HSS	180	260	235	300	0.007	0.010	0.013	0.016	0.020	0.023
		200 - 250	HSS	160	240	210	280	0.006	0.010	0.013	0.016	0.020	0.023
	Low-Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	HSS	170	250	220	290	0.006 ❖	0.009	0.012	0.015	0.019	0.023
		125 - 175	HSS	160	240	210	275	0.006 ❖	0.009	0.012	0.015	0.019	0.023
		175 - 225	HSS	150	225	195	260	0.005 ❖	0.008	0.010	0.014	0.018	0.021
		225 - 275	HSS	140	210	180	240	0.005 ❖	0.008	0.010	0.014	0.018	0.021
	Medium-Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 175	HSS	160	240	210	275	0.006	0.009	0.012	0.015	0.019	0.023
		175 - 225	HSS	150	225	195	260	0.005	0.008	0.010	0.014	0.018	0.021
		225 - 275	HSS	140	210	180	240	0.005	0.008	0.010	0.014	0.018	0.021
		275 - 325	SC	130	195	170	225	0.004	0.007	0.009	0.012	0.016	0.019
	Alloy Steel 4140, 5140, 8640, etc.	125 - 175	HSS	150	210	195	240	0.006	0.008	0.010	0.014	0.017	0.019
		175 - 225	HSS	140	195	180	225	0.005	0.008	0.010	0.014	0.017	0.019
		225 - 275	HSS	130	180	170	210	0.005	0.007	0.010	0.014	0.017	0.019
		275 - 325	SC	120	170	155	195	0.004	0.006	0.009	0.012	0.015	0.017
		325 - 375	SC	110	155	145	180	0.003	0.006	0.009	0.012	0.015	0.017
	High-Strength Alloy 4340, 4330V, 300M, etc.	225 - 300	SC	80	110	100	125	0.005 ❖	0.007	0.009	0.010	0.014	0.017
		300 - 350	SC	60	85	80	100	0.004 ❖	0.007	0.009	0.010	0.014	0.017
		350 - 400	SC	50	70	65	80	0.003 ❖	0.006	0.008	0.009	0.012	0.015
	Structural Steel A36, A285, A516, etc.	100 - 150	HSS	140	200	180	235	0.006 ❖	0.010	0.012	0.014	0.018	0.021
		150 - 250	HSS	120	170	155	190	0.005 ❖	0.009	0.010	0.012	0.016	0.019
		250 - 350	SC	100	140	130	160	0.004 ❖	0.009	0.009	0.010	0.014	0.017
	Tool Steel H-13, H-21, A-4, 0-2, S-3, etc.	150 - 200	SC	80	110	105	125	0.004 ❖	0.006	0.008	0.010	0.014	0.015
		200 - 250	SC	60	90	85	105	0.004 ❖	0.006	0.008	0.010	0.012	0.015
S	**High-Temp Alloy** Hastelloy B, Inconel 600, etc.	140 - 220	SC	30	40	35	45	0.003 ❖	0.007	0.008	0.010	0.012	0.015
		220 - 310	SC	25	35	30	40	0.003 ❖	0.006	0.007	0.008	0.010	0.012
M	**Stainless Steel 400 Series** 416, 420, 303, etc.	185 - 275	SC	75	105	95	110	0.006 ❖	0.008	0.009	0.011	0.012	0.016
		275 - 350	SC	60	90	80	100	0.005 ❖	0.007	0.008	0.010	0.012	0.014
K	**Nodular, Grey, Ductile Cast Iron**	120 - 150	HSS	170	250	220	290	0.007	0.012	0.016	0.020	0.024	0.027
		150 - 200	HSS	150	225	195	260	0.006	0.011	0.014	0.018	0.022	0.025
		200 - 220	HSS	130	195	170	225	0.006	0.009	0.012	0.016	0.018	0.021
		220 - 260	SC	110	165	145	190	0.005	0.007	0.009	0.012	0.014	0.017
		260 - 320	SC	90	135	120	155	0.004	0.006	0.007	0.009	0.012	0.014
N	**Aluminum**	30	HSS	600	850	750	–	0.008	0.013	0.016	0.020	0.022	0.025
		180	HSS	300	450	400	–	0.008	0.013	0.016	0.018	0.022	0.025

Formulas

1. **RPM = (3.82 • SFM) / DIA**
   where:
   RPM = revolutions per minute (rev/min)
   SFM = speed (ft/min)
   DIA = finish diameter of drill (inch)

2. **SFM = RPM • 0.262 • DIA**
   where:
   SFM = speed (ft/min)
   RPM = revolutions per minute (rev/min)
   DIA = diameter of drill (inch)

3. **IPM = RPM • IPR**
   where:
   IPM = Feed rate
   RPM = revolutions per minute (rev/min)
   IPR = feed rate (in/rev)

The table and equations on this page are found in the *Machinery's Handbook*. Permission to simplify and print the equations is granted by the Editor of the *Machinery's Handbook*.

IMPORTANT: The speeds and feeds listed above are a general starting point for all applications. Refer to the Coolant Recommendation charts for coolant requirements to run at the recommended speeds and feeds. Factory technical assistance is also available through our Application Engineering Team. *ext:* **7611** | *email:* **appeng@alliedmachine.com**
Due to potential chip formation issues, contact our Application Engineering Team for assistance machining materials marked with a ❖.

Coolant Recommendations | Imperial (inch)

HSS

ISO	Material	Pressure / Flow Rate	Tube No. 4 - 5 T-A Series Y - Z	Tube No. 6 - 8 T-A Series 0	Tube No. 10 T-A Series 1	Tube No. 12 - 16 T-A Series 2	Tube No. 20 - 24 T-A Series 3	Tube No. 32 T-A Series 4
P	**Free-Machining Steel**	PSI	175 - 185	100 - 120	105 - 140	80 - 115	75 - 100	40 - 50
	1118, 1215, 12L14, etc.	GPM	2.5 - 2.6	2.8 - 3.0	4.4 - 5.2	7 - 8	12 - 14	30 - 33
	Low-Carbon Steel	PSI	165 - 170	75 - 90	75 - 95	60 - 80	55 - 75	30 - 40
	1010, 1020, 1025, 1522, 1144, etc.	GPM	2.4 - 2.5	2.4 - 2.6	3.7 - 4.2	6 - 7	11 - 12	26 - 30
	Medium-Carbon Steel	PSI	160 - 165	70 - 85	70 - 90	55 - 75	50 - 70	30 - 40
	1030, 1040, 1050, 1527, 1140, 1151, etc.	GPM	2.3 - 2.4	2.3 - 2.6	3.7 - 4.2	5 - 6	10 - 12	26 - 30
	Alloy Steel	PSI	160 - 165	65 - 75	65 - 80	50 - 70	45 - 60	30 - 35
	4140, 5140, 8640, etc.	GPM	2.3 - 2.4	2.2 - 2.4	3.5 - 3.9	5 - 6	10 - 11	26 - 28
	High-Strength Alloy	PSI	150 - 155	55 - 60	45 - 50	25 - 30	25 - 30	20 - 25
	4340, 4330V, 300M, etc.	GPM	2.3 - 2.4	2.1 - 2.2	2.9 - 3.1	4 - 5	7 - 8	21 - 23
	Structural Steel	PSI	160 - 165	75 - 85	65 - 80	40 - 55	40 - 50	25 - 30
	A36, A285, A516, etc.	GPM	2.3 - 2.4	2.4 - 2.6	3.5 - 3.9	5 - 6	9 - 10	23 - 26
	Tool Steel	PSI	150 - 155	55 - 60	45 - 50	25 - 30	25 - 30	20 - 25
	H-13, H-21, A-4, 0-2, S-3, etc.	GPM	2.3 - 2.4	2.1 - 2.2	2.9 - 3.1	4 - 5	7 - 8	21 - 23
S	**High-Temp Alloy**	PSI	150 - 155	60 - 65	50 - 55	30 - 35	25 - 30	25 - 30
	Hastelloy B, Inconel 600, etc.	GPM	2.3 - 2.4	2.2 - 2.3	3.1 - 3.2	4 - 5	7 - 8	23 - 26
M	**Stainless Steel 400 Series**	PSI	171	86	75	55	51	29
	416, 420, 303, etc.	GPM	3	3	4	6	10	26
K	**Nodular, Grey, Ductile Cast Iron**	PSI	160	65	61	41	35	29
		GPM	2	2	3	5	9	26
N	**Aluminum**	PSI	210	180	230	159	125	51
		GPM	3	4	6	9	16	33

IMPORTANT: The coolant pressure and flow rate recommendations above represent a good approximation to obtain optimum tool life and chip evacuation at Allied's recommended speeds and feeds. If lower coolant capabilities exist in a drilling application, the AccuPort 432 Port Contour Cutter will still function at reduced penetration rates. Contact our Application Engineering Department for a more specific recommendation of coolant requirements and/or speeds and feeds. *ext:* **7611** | *email:* **appeng@alliedmachine.com**

Recommended Drilling Data | Imperial (inch)

Carbide

ISO	Material	Hardness (BHN)	Grade	Speed (SFM) TiN	Speed (SFM) TiAlN	Speed (SFM) AM200®	Feed Rate (IPR) by Tube Size and T-A® Insert Series: Tube No. 4 - 5, T-A Series Y - Z	Tube No. 6 - 8, T-A Series 0	Tube No. 10, T-A Series 1	Tube No. 12 - 16, T-A Series 2	Tube No. 20 - 24, T-A Series 3
P	**Free-Machining Steel**	100 - 150	C1, C5	320	420	480	0.008	0.012	0.015	0.018	0.021
	1118, 1215, 12L14, etc.	150 - 200	C1, C5	280	360	415	0.007	0.011	0.014	0.016	0.019
		200 - 250	C1, C5	260	340	390	0.006	0.010	0.013	0.015	0.017
	Low-Carbon Steel	85 - 125	C1, C5	300	390	450	0.008 ❖	0.010	0.013	0.017	0.019
	1010, 1020, 1025, 1522,	125 - 175	C1, C5	260	340	390	0.007 ❖	0.010	0.013	0.016	0.018
	1144, etc.	175 - 225	C1, C5	240	310	355	0.006 ❖	0.009	0.012	0.015	0.017
		225 - 275	C1, C5	210	270	310	0.005 ❖	0.009	0.012	0.015	0.017
	Medium-Carbon Steel	125 - 175	C1, C5	260	340	390	0.007	0.010	0.013	0.016	0.018
	1030, 1040, 1050, 1527,	175 - 225	C1, C5	240	310	355	0.006	0.009	0.012	0.015	0.017
	1140, 1151, etc.	225 - 275	C1, C5	210	270	310	0.006	0.009	0.012	0.015	0.017
		275 - 325	C1, C5	180	230	265	0.005	0.008	0.011	0.014	0.016
	Alloy Steel	125 - 175	C1, C5	250	325	375	0.007	0.010	0.013	0.016	0.018
	4140, 5140, 8640, etc.	175 - 225	C1, C5	230	300	345	0.006	0.009	0.012	0.015	0.017
		225 - 275	C1, C5	210	270	310	0.006	0.009	0.012	0.015	0.017
		275 - 325	C1, C5	200	250	285	0.005	0.008	0.011	0.014	0.016
		325 - 375	C1, C5	170	220	255	0.004	0.007	0.010	0.013	0.015
	High-Strength Alloy	225 - 300	C1, C5	160	200	230	0.006 ❖	0.009	0.010	0.012	0.015
	4340, 4330V, 300M, etc.	300 - 350	C1, C5	140	180	205	0.005 ❖	0.008	0.009	0.011	0.014
		350 - 400	C1, C5	120	160	185	0.004 ❖	0.007	0.008	0.010	0.012
	Structural Steel	100 - 150	C1, C5	240	310	355	0.008 ❖	0.011	0.014	0.016	0.018
	A36, A285, A516, etc.	150 - 250	C1, C5	200	250	285	0.006 ❖	0.010	0.012	0.014	0.016
		250 - 350	C1, C5	180	230	265	0.005 ❖	0.009	0.011	0.012	0.014
	Tool Steel	150 - 200	C1, C5	160	220	255	0.004 ❖	0.007	0.009	0.011	0.013
	H-13, H-21, A-4, 0-2, S-3, etc.	200 - 250	C1, C5	120	170	195	0.004 ❖	0.007	0.009	0.011	0.013
S	**High-Temp Alloy**	140 - 220	C2	80	105	120	0.004 ❖	0.007	0.009	0.011	0.013
	Hastelloy B, Inconel 600, etc.	220 - 310	C2	60	85	95	0.004 ❖	0.006	0.008	0.010	0.012
M	**Stainless Steel 400 Series**	185 - 275	C2	160	210	240	0.007 ❖	0.009	0.012	0.014	0.016
	416, 420, 303, etc.	275 - 350	C2	120	160	185	0.006 ❖	0.008	0.011	0.012	0.014
K	**Nodular, Grey, Ductile Cast Iron**	120 - 150	C2, C3	320	460	500	0.008	0.012	0.015	0.019	0.023
		150 - 200	C2, C3	270	400	480	0.007	0.011	0.013	0.017	0.021
		200 - 220	C2, C3	240	360	430	0.006	0.009	0.012	0.015	0.018
		220 - 260	C2, C3	210	310	370	0.005	0.008	0.011	0.013	0.015
		260 - 320	C2, C3	180	270	335	0.005	0.007	0.010	0.011	0.013
N	**Aluminum**	30	C2	1200	1500	–	0.010	0.015	0.018	0.020	0.022
		180	C2	800	1000	–	0.009	0.013	0.016	0.018	0.020

Formulas

1. **RPM = (3.82 • SFM) / DIA**

where:
RPM = revolutions per minute (rev/min)
SFM = speed (ft/min)
DIA = finish diameter of drill (inch)

2. **SFM = RPM • 0.262 • DIA**

where:
SFM = speed (ft/min)
RPM = revolutions per minute (rev/min)
DIA = diameter of drill (inch)

3. **IPM = RPM • IPR**

where:
IPM = Feed rate
RPM = revolutions per minute (rev/min)
IPR = feed rate (in/rev)

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Due to potential chip formation issues, contact our Application Engineering Team for assistance machining materials marked with a ❖.

Coolant Recommendations | Imperial (inch)

Carbide

ISO	Material	Pressure / Flow Rate	Tube No. 4 - 5 T-A Series Y - Z	Tube No. 6 - 8 T-A Series 0	Tube No. 10 T-A Series 1	Tube No. 12 - 16 T-A Series 2	Tube No. 20 - 24 T-A Series 3
P	**Free-Machining Steel**	PSI	195	140	160	140	155
	1118, 1215, 12L14, etc.	GPM	2.6	3.3	5.5	9	18
	Low-Carbon Steel	PSI	180	105	105	110	115
	1010, 1020, 1025, 1522, 1144, etc.	GPM	2.5	2.9	4.4	8	15
	Medium-Carbon Steel	PSI	175	100	90	100	75
	1030, 1040, 1050, 1527, 1140, 1151, etc.	GPM	2.5	2.8	4.1	7	13
	Alloy Steel	PSI	165	85	100	75	70
	4140, 5140, 8640, etc.	GPM	2.4	2.6	4.3	6	12
	High-Strength Alloy	PSI	160	65	55	40	35
	4340, 4330V, 300M, etc.	GPM	2.4	2.3	3.2	5	8
	Structural Steel	PSI	175	115	105	75	70
	A36, A285, A516, etc.	GPM	2.5	3	4.4	6	12
	Tool Steel	PSI	155	60	55	40	35
	H-13, H-21, A-4, 0-2, S-3, etc.	GPM	2.4	2.2	3.2	5	8
S	**High-Temp Alloy**	PSI	150 - 155	60 - 65	50 - 55	30 - 35	25 - 30
	Hastelloy B, Inconel 600, etc.	GPM	2.3 - 2.4	2.2 - 2.3	3.1 - 3.2	4 - 5	7 - 8
M	**Stainless Steel 400 Series**	PSI	329	239	260	250	190
	416, 420, 303, etc.	GPM	3	4	7	12	20
K	**Nodular, Grey, Ductile Cast Iron**	PSI	225	104	90	90	80
		GPM	3	3	4	7	13
N	**Aluminum**	PSI	350	319	315	284	200
		GPM	4	5	8	12	20

IMPORTANT: The coolant pressure and flow rate recommendations above represent a good approximation to obtain optimum tool life and chip evacuation at Allied's recommended speeds and feeds. If lower coolant capabilities exist in a drilling application, the AccuPort 432 Port Contour Cutter will still function at reduced penetration rates. Contact our Application Engineering Department for a more specific recommendation of coolant requirements and/or speeds and feeds. *ext:* **7611** | *email:* **appeng@alliedmachine.com**

Recommended Drilling Data | Metric (mm)

HSS

ISO	Material	Hardness (BHN)	Grade	Speed (M/min) TiN	TiAlN	TiCN	AM200®	Feed Rate (mm/rev) by Tube Size and T-A® Insert Series: Tube No. 4 - 5, T-A Series Y - Z	Tube No. 6 - 8, T-A Series 0	Tube No. 10, T-A Series 1	Tube No. 12 - 16, T-A Series 2	Tube No. 20 - 24, T-A Series 3	Tube No. 32, T-A Series 4
P	**Free-Machining Steel** 1118, 1215, 12L14, etc.	100 - 150	HSS	61	85	79	92	0.18	0.25	0.33	0.41	0.51	0.58
		150 - 200	HSS	55	79	72	87	0.18	0.25	0.33	0.41	0.51	0.58
		200 - 250	HSS	49	73	64	81	0.15	0.25	0.33	0.41	0.51	0.58
	Low-Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	HSS	52	76	67	84	0.15 ❖	0.23	0.30	0.38	0.48	0.58
		125 - 175	HSS	49	73	64	81	0.15 ❖	0.23	0.30	0.38	0.48	0.58
		175 - 225	HSS	46	69	59	76	0.13 ❖	0.20	0.25	0.36	0.46	0.53
		225 - 275	HSS	43	64	55	70	0.13 ❖	0.20	0.25	0.36	0.46	0.53
	Medium-Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 175	HSS	49	73	64	79	0.15	0.23	0.30	0.38	0.48	0.58
		175 - 225	HSS	46	69	59	75	0.13	0.20	0.25	0.36	0.46	0.53
		225 - 275	HSS	43	64	55	70	0.13	0.20	0.25	0.36	0.46	0.53
		275 - 325	SC	40	59	52	66	0.10	0.18	0.23	0.30	0.41	0.48
	Alloy Steel 4140, 5140, 8640, etc.	125 - 175	HSS	46	64	59	69	0.15	0.20	0.25	0.36	0.43	0.48
		175 - 225	HSS	43	59	55	66	0.13	0.20	0.25	0.36	0.43	0.48
		225 - 275	HSS	40	55	52	60	0.13	0.18	0.25	0.36	0.43	0.48
		275 - 325	SC	37	52	47	56	0.10	0.15	0.23	0.30	0.38	0.43
		325 - 375	SC	34	47	44	55	0.08	0.15	0.23	0.30	0.38	0.43
	High-Strength Alloy 4340, 4330V, 300M, etc.	225 - 300	SC	24	34	30	37	0.13 ❖	0.18	0.23	0.25	0.36	0.43
		300 - 350	SC	18	26	24	27	0.10 ❖	0.18	0.23	0.25	0.36	0.43
		350 - 400	SC	15	21	20	23	0.08 ❖	0.15	0.20	0.23	0.30	0.38
	Structural Steel A36, A285, A516, etc.	100 - 150	HSS	43	61	55	67	0.15 ❖	0.25	0.30	0.36	0.46	0.53
		150 - 250	HSS	37	52	47	56	0.13 ❖	0.23	0.25	0.30	0.41	0.48
		250 - 350	SC	30	43	40	47	0.10 ❖	0.20	0.23	0.25	0.36	0.43
	Tool Steel H-13, H-21, A-4, 0-2, S-3, etc.	150 - 200	SC	24	34	32	37	0.10	0.15	0.20	0.25	0.30	0.38
		200 - 250	SC	18	27	26	31	0.10	0.15	0.20	0.25	0.30	0.38
S	**High-Temp Alloy** Hastelloy B, Inconel 600, etc.	140 - 220	SC	30	40	35	45	0.08 ❖	0.18	0.20	0.25	0.30	0.38
		220 - 310	SC	25	35	30	40	0.08 ❖	0.15	0.18	0.20	0.25	0.30
M	**Stainless Steel 400 Series** 416, 420, 303, etc.	185 - 275	SC	23	32	29	33	0.15 ❖	0.20	0.23	0.28	0.36	0.41
		275 - 350	SC	18	27	24	29	0.13 ❖	0.18	0.20	0.25	0.30	0.36
K	**Nodular, Grey, Ductile Cast Iron**	120 - 150	HSS	52	76	67	82	0.18	0.30	0.41	0.51	0.61	0.69
		150 - 200	HSS	46	69	59	75	0.15	0.28	0.36	0.46	0.56	0.64
		200 - 220	HSS	40	59	52	66	0.15	0.23	0.30	0.41	0.46	0.53
		220 - 260	SC	34	50	44	55	0.13	0.18	0.23	0.30	0.36	0.43
		260 - 320	SC	27	41	37	44	0.10	0.15	0.18	0.23	0.30	0.36
N	**Aluminum**	30	HSS	183	259	229	–	0.20	0.33	0.41	0.51	0.56	0.64
		180	HSS	91	137	122	–	0.20	0.33	0.41	0.46	0.56	0.64

Formulas

1. **RPM = (318.47 • M/min) / DIA**
   where:
   RPM = revolutions per minute (rev/min)
   M/min = speed (M/min)
   DIA = finish diameter of drill (mm)

2. **M/min = RPM • 0.003 • DIA**
   where:
   M/min = speed (M/min)
   RPM = revolutions per minute (rev/min)
   DIA = diameter of drill (mm)

3. **IPM = RPM • mm/rev**
   where:
   IPM = feed rate
   RPM = revolutions per minute (rev/min)
   mm/rev = feed rate (mm/rev)

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IMPORTANT: The speeds and feeds listed above are a general starting point for all applications. Refer to the Coolant Recommendation charts for coolant requirements to run at the recommended speeds and feeds. Factory technical assistance is also available through our Application Engineering Team. *ext:* **7611** | *email:* **appeng@alliedmachine.com**
Due to potential chip formation issues, contact our Application Engineering Team for assistance machining materials marked with a ❖.

Coolant Recommendations | Metric (mm)

HSS

ISO	Material	Pressure / Flow Rate	Tube No. 4 - 5 T-A Series Y - Z	Tube No. 6 - 8 T-A Series 0	Tube No. 10 T-A Series 1	Tube No. 12 - 16 T-A Series 2	Tube No. 20 - 24 T-A Series 3	Tube No. 32 T-A Series 4
P	**Free-Machining Steel**	BAR	12 - 13	7 - 8	7 - 10	6 - 8	6 - 7	3 - 4
	1118, 1215, 12L14, etc.	LPM	9.5 - 9.8	10.6 - 11.4	16.7 - 19.7	26.5 - 30.3	45.4 - 53.0	114 - 125
	Low-Carbon Steel	BAR	11 - 12	5 - 6	5 - 7	4 - 6	4 - 5	2 - 3
	1010, 1020, 1025, 1522, 1144, etc.	LPM	9.1 - 9.5	9.1 - 9.8	14.0 - 15.9	22.7 - 26.5	41.6 - 45.4	98 - 114
	Medium-Carbon Steel	BAR	11	5 - 6	5 - 6	4 - 5	3 - 5	2 - 3
	1030, 1040, 1050, 1527, 1140, 1151, etc.	LPM	8.7 - 9.1	8.7 - 9.8	13.6 - 15.5	18.9 - 22.7	37.9 - 45.4	98 - 114
	Alloy Steel	BAR	11	5 - 6	5	3 - 5	3 - 4	2
	4140, 5140, 8640, etc.	LPM	8.7 - 9.1	13.2 - 14.8	8.3 - 9.1	18.9 - 22.7	34.1 - 37.9	87 - 98
	High-Strength Alloy	BAR	10 - 11	4 - 5	3 - 4	2	2	2
	4340, 4330V, 300M, etc.	LPM	8.7 - 9.1	7.9 - 8.3	11.0 - 11.7	15.1 - 18.9	26.5 - 30.3	79 - 87
	Structural Steel	BAR	11	5 - 6	5 - 6	3 - 4	3	2
	A36, A285, A516, etc.	LPM	8.7 - 9.1	9.1 - 9.8	13.2 - 14.8	18.9 - 22.7	34.1 - 37.9	87 - 98
	Tool Steel	BAR	4	10 - 11	3	2	2	1 - 2
	H-13, H-21, A-4, 0-2, S-3, etc.	LPM	7.9 - 8.3	8.7 - 9.1	11.0 - 11.7	15.1 - 18.9	26.5 - 30.3	79 - 87
S	**High-Temp Alloy**	BAR	10 - 11	4 - 5	3 - 4	2	2	2
	Hastelloy B, Inconel 600, etc.	LPM	8.7 - 9.1	8.3 - 8.7	11.7 - 12.1	15.1 - 18.9	26.5 - 30.3	87 - 98
M	**Stainless Steel 400 Series**	BAR	11.4 - 11.7	4.8 - 5.8	4.5 - 5.2	2.7 - 3.8	2.7 - 3.4	1.7 - 2
	416, 420, 303, etc.	LPM	9.1 - 9.5	8.7 - 9.8	13.2 - 14	18.9 - 22.7	34.1 - 37.9	87 - 98
K	**Nodular, Grey, Ductile Cast Iron**	BAR	10.7 - 11.0	4.1 - 4.5	3.4 - 4.1	2 - 2.7	2 - 2.4	1.7 - 2
		LPM	8.7 - 9.1	8.3 - 8.7	11.7 - 12.5	15.1 - 18.9	30.3 - 34.1	87 - 98
N	**Aluminum**	BAR	13.1 - 14.5	9.6 - 12.4	10.3 - 15.8	7.9 - 11	6.2 - 8.6	2.7 - 3.4
		LPM	9.8 - 10.2	12.5 - 14	20.1 - 23.1	30.3 - 34.1	53 - 60.6	114 - 125

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Recommended Drilling Data | Metric (mm)

Carbide

ISO	Material	Hardness (BHN)	Grade	Speed (M/min) TiN	Speed (M/min) TiAlN	Speed (M/min) AM200®	Feed Rate (mm/rev) by Tube Size and T-A® Insert Series: Tube No. 4 - 5, T-A Series Y - Z	Tube No. 6 - 8, T-A Series 0	Tube No. 10, T-A Series 1	Tube No. 12 - 16, T-A Series 2	Tube No. 20 - 24, T-A Series 3
P	**Free-Machining Steel** 1118, 1215, 12L14, etc.	100 - 150	K35, P40	98	128	146	0.020	0.30	0.38	0.46	0.53
		150 - 200	K35, P40	85	110	126	0.18	0.28	0.36	0.41	0.48
		200 - 250	K35, P40	79	104	119	0.15	0.25	0.33	0.38	0.43
	Low-Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	K35, P40	91	119	137	0.20 ❖	0.25	0.33	0.43	0.48
		125 - 175	K35, P40	79	104	119	0.18 ❖	0.25	0.33	0.41	0.46
		175 - 225	K35, P40	73	94	108	0.15 ❖	0.23	0.30	0.38	0.43
		225 - 275	K35, P40	64	82	94	0.13 ❖	0.23	0.30	0.38	0.43
	Medium-Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 175	K35, P40	79	104	119	0.18	0.25	0.33	0.41	0.46
		175 - 225	K35, P40	73	94	108	0.15	0.23	0.30	0.38	0.43
		225 - 275	K35, P40	64	82	94	0.15	0.23	0.30	0.38	0.43
		275 - 325	K35, P40	55	70	81	0.13	0.20	0.28	0.36	0.41
	Alloy Steel 4140, 5140, 8640, etc.	125 - 175	K35, P40	76	99	114	0.18	0.25	0.33	0.41	0.46
		175 - 225	K35, P40	70	91	105	0.15	0.23	0.30	0.38	0.43
		225 - 275	K35, P40	64	82	94	0.15	0.23	0.30	0.38	0.43
		275 - 325	K35, P40	61	76	87	0.13	0.20	0.28	0.36	0.41
		325 - 375	K35, P40	52	67	78	0.10	0.18	0.25	0.33	0.38
	High-Strength Alloy 4340, 4330V, 300M, etc.	225 - 300	K35, P40	49	61	73	0.15 ❖	0.23	0.25	0.30	0.38
		300 - 350	K35, P40	43	55	62	0.13 ❖	0.20	0.23	0.28	0.36
		350 - 400	K35, P40	37	49	56	0.10 ❖	0.18	0.20	0.25	0.30
	Structural Steel A36, A285, A516, etc.	100 - 150	K35, P40	73	94	108	0.20 ❖	0.28	0.36	0.41	0.46
		150 - 250	K35, P40	61	76	87	0.15 ❖	0.25	0.30	0.36	0.41
		250 - 350	K35, P40	55	70	81	0.13 ❖	0.23	0.28	0.30	0.36
	Tool Steel H-13, H-21, A-4, 0-2, S-3, etc.	150 - 200	K35, P40	49	67	78	0.10 ❖	0.18	0.23	0.28	0.33
		200 - 250	K35, P40	37	52	59	0.10 ❖	0.18	0.23	0.28	0.33
S	**High-Temp Alloy** Hastelloy B, Inconel 600, etc.	140 - 220	K20	24	32	36	0.10 ❖	0.18	0.23	0.28	0.33
		220 - 310	K20	18	26	29	0.10 ❖	0.15	0.20	0.25	0.30
M	**Stainless Steel 400 Series** 416, 420, 303, etc.	185 - 275	K20	49	64	73	0.18 ❖	0.23	0.30	0.36	0.41
		275 - 350	K20	37	49	46	0.15 ❖	0.20	0.28	0.30	0.36
K	**Nodular, Grey, Ductile Cast Iron**	120 - 150	K20, K10	98	140	152	0.20	0.30	0.38	0.48	0.58
		150 - 200	K20, K10	82	122	146	0.18	0.28	0.33	0.43	0.53
		200 - 220	K20, K10	73	110	131	0.15	0.23	0.30	0.38	0.46
		220 - 260	K20, K10	64	94	113	0.13	0.20	0.28	0.33	0.38
		260 - 320	K20, K10	55	82	102	0.13	0.18	0.25	0.28	0.33
N	**Aluminum**	30	K20	366	457	–	0.25	0.38	0.46	0.51	0.56
		180	K20	244	305	–	0.23	0.33	0.41	0.46	0.51

Formulas

1. **RPM = (318.47 • M/min) / DIA**
   where:
   RPM = revolutions per minute (rev/min)
   M/min = speed (M/min)
   DIA = finish diameter of drill (mm)

2. **M/min = RPM • 0.003 • DIA**
   where:
   M/min = speed (M/min)
   RPM = revolutions per minute (rev/min)
   DIA = diameter of drill (mm)

3. **IPM = RPM • mm/rev**
   where:
   IPM = feed rate
   RPM = revolutions per minute (rev/min)
   mm/rev = feed rate (mm/rev)

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IMPORTANT: The speeds and feeds listed above are a general starting point for all applications. Refer to the Coolant Recommendation charts for coolant requirements to run at the recommended speeds and feeds. Factory technical assistance is also available through our Application Engineering Team. *ext:* **7611** | *email:* **appeng@alliedmachine.com**
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Coolant Recommendations | Metric (mm)

Carbide

ISO	Material	Pressure / Flow Rate	Tube No. 4 - 5 T-A Series Y - Z	Tube No. 6 - 8 T-A Series 0	Tube No. 10 T-A Series 1	Tube No. 12 - 16 T-A Series 2	Tube No. 20 - 24 T-A Series 3
P	**Free-Machining Steel**	BAR	20	16	17	15	12
	1118, 1215, 12L14, etc.	LPM	12.2	16.3	25.3	41.5	71.9
	Low-Carbon Steel	BAR	11.4	13.3	20.6	36.5	62
	1010, 1020, 1025, 1522, 1144, etc.	LPM	17	10	10	10	8
	Medium-Carbon Steel	BAR	17	9	10	8	7
	1030, 1040, 1050, 1527, 1140, 1151, etc.	LPM	11.1	12.3	19.3	30	55.8
	Alloy Steel	BAR	10.4	9.1	12.6	18.8	33.6
	4140, 5140, 8640, etc.	LPM	16	9	8	7	5
	High-Strength Alloy	BAR	15	5	5	3	3
	4340, 4330V, 300M, etc.	LPM	10.4	9.1	13.6	19.7	36.5
	Structural Steel	BAR	16	9	8	7	5
	A36, A285, A516, etc.	LPM	10.8	12	17.5	27.8	47.1
	Tool Steel	BAR	15	5	5	3	3
	H-13, H-21, A-4, 0-2, S-3, etc.	LPM	10.4	9.1	13.6	19.7	36.5
S	**High-Temp Alloy**	BAR	17	11.4	12.4	11	9
	Hastelloy B, Inconel 600, etc.	LPM	11.1	13.5	21.9	35.4	62
M	**Stainless Steel 400 Series**	BAR	22.7	16.5	17.9	17.2	13.1
	416, 420, 303, etc.	LPM	13	16.3	26.3	44.2	75
K	**Nodular, Grey, Ductile Cast Iron**	BAR	15.5	7.2	6.2	6.2	5.5
		LPM	10.7	10.8	15.4	26.5	48.7
N	**Aluminum**	BAR	24.1	22	21.7	19.6	13.8
		LPM	13.4	18.8	29	47.2	77

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