List 1900 - VPH GDS: Stub
List 1950 - VPH GDR: Jobbers

General Drilling Operations

Work Material		Low Carbon Steels 1010, 1018		Carbon Steels 1045, 1050		Alloy Steels 4140, 4330		Tool Steels D2, H13		Stainless Steels 400SS, 17-4PH		Cast Iron	
Drilling Speed		125-160 SFM		80-120 SFM		80-100 SFM		30-50 SFM		40-60 SFM		130-200 SFM	
Drill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
mm	Inch	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
0.5	-	25,000	0.001-0.002	19,410	0.001-0.002	17,470	0.001-0.002	7,760	0.001-0.002	9,700	0.001	25,000	0.001-0.002
-	3/64	11,610	0.001-0.003	8,150	0.002-0.003	7,330	0.002-0.003	3,260	0.002-0.003	4,070	0.001-0.002	13,450	0.002-0.003
2	-	6,910	0.002-0.004	4,850	0.002-0.004	4,370	0.002-0.004	1,940	0.002-0.004	2,430	0.001-0.002	8,000	0.003-0.004
-	3/32	5,810	0.003-0.005	4,070	0.003-0.005	3,670	0.003-0.005	1,630	0.003-0.005	2,040	0.001-0.003	6,720	0.003-0.005
3	-	4,610	0.003-0.005	3,230	0.003-0.005	2,910	0.003-0.005	1,290	0.003-0.005	1,620	0.001-0.003	5,340	0.004-0.006
-	1/8	4,350	0.003-0.005	3,060	0.003-0.005	2,750	0.003-0.005	1,220	0.003-0.005	1,530	0.001-0.003	5,040	0.004-0.006
4	-	3,460	0.004-0.006	2,430	0.004-0.006	2,180	0.004-0.006	970	0.004-0.006	1,210	0.002-0.004	4,000	0.005-0.007
-	3/16	2,900	0.005-0.007	2,040	0.005-0.007	1,830	0.005-0.007	810	0.005-0.007	1,020	0.002-0.005	3,360	0.006-0.008
6	-	2,300	0.005-0.007	1,620	0.005-0.007	1,460	0.005-0.007	650	0.005-0.007	810	0.002-0.006	2,670	0.007-0.010
-	1/4	2,180	0.005-0.008	1,530	0.005-0.008	1,380	0.005-0.008	610	0.005-0.008	760	0.002-0.006	2,520	0.007-0.010
8	-	1,730	0.006-0.009	1,210	0.006-0.009	1,090	0.006-0.009	490	0.006-0.009	610	0.003-0.008	2,000	0.008-0.012
-	3/8	1,450	0.008-0.011	1,020	0.008-0.011	920	0.008-0.011	410	0.008-0.011	510	0.004-0.009	1,680	0.010-0.013
10	-	1,380	0.008-0.011	970	0.008-0.011	870	0.008-0.011	390	0.008-0.011	490	0.004-0.010	1,600	0.010-0.014
-	7/16	1,240	0.009-0.012	870	0.009-0.012	790	0.009-0.012	350	0.009-0.012	440	0.004-0.011	1,440	0.011-0.016
12	-	1,150	0.009-0.013	810	0.009-0.013	730	0.009-0.013	320	0.009-0.013	400	0.005-0.012	1,330	0.012-0.017
-	1/2	1,090	0.010-0.014	760	0.010-0.014	690	0.010-0.014	310	0.010-0.014	380	0.005-0.013	1,260	0.012-0.017
14	-	990	0.011-0.014	690	0.011-0.014	620	0.011-0.014	280	0.011-0.014	350	0.005-0.014	1,140	0.014-0.019
-	5/8	870	0.012-0.016	610	0.012-0.016	550	0.012-0.016	240	0.012-0.016	310	0.006-0.016	1,010	0.016-0.021
16	–	870	0.012-0.016	610	0.012-0.016	550	0.012-0.016	240	0.012-0.016	310	0.006-0.016	1,010	0.016-0.021
18	-	770	0.014-0.018	540	0.014-0.018	490	0.014-0.018	220	0.014-0.018	270	0.007-0.018	890	0.018-0.025
-	3/4	730	0.015-0.019	510	0.015-0.019	460	0.015-0.019	200	0.015-0.019	250	0.007-0.019	840	0.019-0.026
20	-	690	0.016-0.020	490	0.016-0.020	440	0.016-0.020	190	0.016-0.020	240	0.008-0.020	800	0.020-0.027

1. The indicated speeds and feeds are when water soluble oil is used.
2. Suitable cutting fluid is water-emulsifiable, high density oil (less than 20 times dilution).
3. When using non-water soluble oil or water-emulsifiable oil (over 20 times dilution), reduce drilling speed by 20%.
4. Pecking is necessary when drilling depth of the hole exceeds 3 times drill diameter for lathe/horizontal machines.

D: Drill Diameter

Drilling Depth	≤4D	≤5D	≤6D
Coefficient for reducing RPM	x0.9	x0.8	x0.75

CONTINUED

Work Material		High Heat Material						Hardened Steels					
		Ti Alloy Ti-6Al-4V		Fe Base Material Incoloy 901, A286		Ni & Co Base Material Inconel718, Waspaloy		33-43 HRC		43-48 HRC		48-53 HRC	
Drilling Speed		20-26 SFM		20-26 SFM		20-26 SFM		40-60 SFM		20-32 SFM		15-25 SFM	
Drill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
mm	Inch	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
0.5	-	4,460	0.0005-0.0008	4,460	0.0005-0.0008	3,880	0.0005-0.0008	9,700	0.001	5,040	0.001	3,880	0.001
-	3/64	1,870	0.0006-0.0010	1,870	0.0006-0.0010	1,630	0.0006-0.0010	4,070	0.001-0.002	2,120	0.001	1,630	0.001
2	-	1,120	0.0008-0.0012	1,120	0.0008-0.0012	970	0.0008-0.0012	2,430	0.001-0.002	1,250	0.001-0.002	970	0.001-0.002
-	3/32	940	0.0010-0.0014	940	0.0010-0.0014	810	0.0010-0.0014	2,040	0.001-0.003	1,060	0.001-0.002	810	0.001-0.002
3	-	740	0.0012-0.0018	740	0.0012-0.0018	650	0.0012-0.0018	1,620	0.001-0.003	850	0.001-0.002	650	0.001-0.002
-	1/8	700	0.0013-0.0019	700	0.0013-0.0019	610	0.0013-0.0019	1,530	0.001-0.003	800	0.001-0.002	610	0.001-0.002
4	-	560	0.0016-0.0024	560	0.0016-0.0024	490	0.0016-0.0024	1,210	0.002-0.004	640	0.002-0.003	490	0.002-0.003
-	3/16	470	0.0019-0.0028	470	0.0019-0.0028	410	0.0019-0.0028	1,020	0.002-0.005	540	0.002-0.004	410	0.002-0.004
6	-	370	0.0024-0.0035	370	0.0024-0.0035	320	0.0024-0.0035	810	0.002-0.006	430	0.002-0.005	320	0.002-0.005
-	1/4	350	0.0026-0.0037	350	0.0026-0.0037	310	0.0026-0.0037	760	0.002-0.006	400	0.002-0.005	310	0.002-0.005
8	-	280	0.0031-0.0047	280	0.0031-0.0047	240	0.0031-0.0047	610	0.003-0.008	320	0.003-0.006	240	0.003-0.006
-	3/8	230	0.0037-0.0056	230	0.0037-0.0056	200	0.0037-0.0056	510	0.004-0.009	260	0.004-0.008	200	0.004-0.008
10	-	220	0.0039-0.0059	220	0.0039-0.0059	190	0.0039-0.0059	490	0.004-0.010	250	0.004-0.008	190	0.004-0.008
-	7/16	200	0.0043-0.0066	200	0.0043-0.0066	170	0.0043-0.0066	440	0.004-0.011	230	0.004-0.009	170	0.004-0.009
12	-	190	0.0047-0.0071	190	0.0047-0.0071	160	0.0047-0.0071	400	0.005-0.012	210	0.005-0.009	160	0.005-0.009
-	1/2	180	0.0050-0.0075	180	0.0050-0.0075	150	0.0050-0.0075	380	0.005-0.013	200	0.005-0.010	150	0.005-0.010
14	-	160	0.0055-0.0083	160	0.0055-0.0083	140	0.0055-0.0083	350	0.005-0.014	180	0.005-0.011	140	0.005-0.011
-	5/8	140	0.0062-0.0093	140	0.0062-0.0093	120	0.0062-0.0093	310	0.006-0.016	160	0.006-0.012	120	0.006-0.012
16	–	140	0.0062-0.0093	140	0.0062-0.0093	120	0.0062-0.0093	310	0.006-0.016	160	0.006-0.012	120	0.006-0.012
18	-	120	0.0071-0.0106	120	0.0071-0.0106	110	0.0071-0.0106	270	0.007-0.018	140	0.007-0.014	110	0.007-0.014
-	3/4	115	0.0075-0.0112	115	0.0075-0.0112	105	0.0075-0.0112	250	0.007-0.019	130	0.007-0.015	105	0.007-0.015
20	-	110	0.0079-0.0118	110	0.0079-0.0118	100	0.0079-0.0118	240	0.008-0.020	125	0.008-0.016	100	0.008-0.016