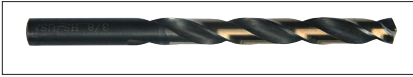


HIGH SPEED DRILLS



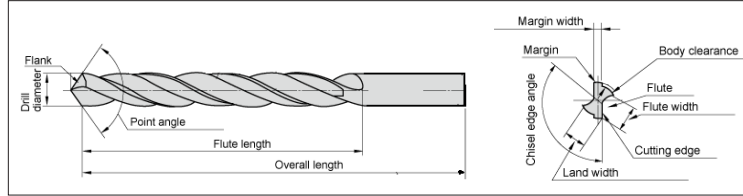
HIGH SPEED DRILL: A drill manufactured from Molybdenum High Speed Steel.

NOMENCLATURE

FLUTE: THE GROOVES CUT OR FORMED IN THE BODY OF THE DRILL WHICH ALLOWS THE REMOVAL OF CHIPS AND CUTTING FLUID TO REACH THE CUTTING LIPS.

MARGIN: THE CYLINDRICAL PART OF THE LAND WHICH IS NOT CUT AWAY TO PROVIDE CLEARANCE.

CHISEL EDGE: THE EDGE AT THE END OF THE WEB THAT CONNECTS THE CUTTING LIPS.



LIPS: THE CUTTING EDGES EXTENDING FROM THE CHISEL EDGE TO THE PERIPHERY.

LAND: THE PORTION OF THE BODY BETWEEN THE ADJACENT FLUTES. "THE CHIP REMOVAL TRACK".

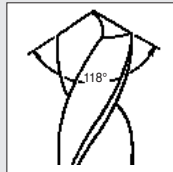
FLUTE LENGTH: INDICATES THE USABLE LENGTH OF THE DRILL. EXCEED IT AND THE DRILL STOPS CUTTING.

WEB: THE CENTRAL PART OF THE BODY THAT JOINS THE LANDS.

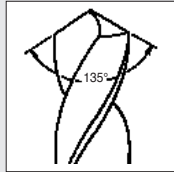
POINT TYPES

POINT ANGLE:

The angle between the cutting lips parallel to the axis of the drill.



118° POINT
A GENERAL PURPOSE POINT FOR MOST MATERIALS



135° POINT
POINT USED FOR TOUGH OR HARD MATERIALS.



SPLIT POINT 118° & 135°
USED FOR TOUGH OR HARD MATERIALS. SELF-CENTERING. REQUIRES LESS THRUST.

DRILL TYPES MANUFACTURING VS MATERIAL

Material used in the manufacturing of HSS Drills may be made from a wide range of Molybdenum High Speed Steel. Each has its own strengths and weaknesses. The most important factor in a drills performance, however, is HOW IT IS MADE. There are three types.

- **ROLLED FORGED:** PRODUCES A RUGGED CUTTING TOOL WITH LESS DIMENSIONAL TOLERANCE. NOT MADE IN USA.
- **MILLED:** USED PRIMARILY FOR DRILLS OVER 3/4" IN DIAMETER.
- **GROUND:** PRODUCES A STRONG CUTTING TOOL WITH EXACT DIMENSIONAL TOLERANCE.

DRILL TYPES

Jobber Length: Describes an ordinary twist drill of normal length. Fractional sizes 1/64" to 1/2". Number Sizes 1 to 80. Letter Sizes A to Z

Heavy Duty Jobber: Used for drilling tough material. Generally has a heavier web and is 135° split point.

Screw Machine: Same as a regular twist drill but in a shorter length. Short length makes them more rigid and better suited to portable hand tools. Generally 135° split point.

S & D: (Silver & Deming) Drill with a diameter over 1/2" with a 1/2" shank. All S & D's are 6" long with 3" of flute.

Reduced Shank: Drills having a 1/4" or 3/8" shank diameter. Ideally suited for portable hand tools.

Nitride Coated: A high performance coating that is very hard and abrasion resistant. Ideally suited for hard non-ferrous alloys such as stainless. Nitride coated cutting tools will give 200-500% more tool life and 25-50% faster cutting speeds.

Cobalt: Drills made from M42 Molybdenum High Speed Steel that develops high hardness values and has excellent abrasion resistance. Ideally suited for tough drilling applications.

Aircraft: Drills with an overall length of 12" with jobber length flutes and a 135° point.

Double End: Drills having flutes and a 135° split point on both ends. Generally used in the sheet metal trade.

COMMON DRILL PROBLEMS AND CAUSES

INDICATIONS	CAUSES	RECOMMENDATIONS
Outer Corners Breakdown	RPM too high, Poor lubrication, Flutes clogging, Too much pressure, Hard spots in material.	Reduce speed and pressure. Check Lip relief.
Cutting Lips Chip	Too much feed pressure, Too much lip relief.	Reduce feed, Check lip relief.
Cracks in Cutting Lips	Running too hot, Too quickly cooled.	Repoint drill, Check pressure, Check lubricant.
Drill Breaks	Point improperly ground, Too much pressure, Drill is dull, Flutes are clogged. Drilling at an angle.	Check Point. Reduce Pressure. Drill perpendicular to the surface.
Drill Splits Up Center	Too much pressure, Not enough lip relief.	Reduce pressure, Check for proper lip relief.

SPEED-LUBRICANT & DRILL TYPE RECOMMENDATIONS

MATERIAL	CARBON STEEL	HIGH STRENGTH STEEL	STAINLESS STEEL	CAST IRON	ALUMINUM/BRASS
HARDNESS	TO 200 BHN	BHN 250-300	BHN 200-300	TO BHN 150	TO BHN 250
LUBRICANT	SULFURIZED OIL OR WATER SOLUBLE OIL	ACTIVATED OIL OR SULFURIZED OIL	ACTIVATED OIL OR SULFURIZED OIL	NONE - DRY AIR	WATER SOLUBLE OIL
DRILL TYPE	G.P. OR H.D.	H.D. OR COBALT	H.D. OR COBALT	COBALT OR NITRIDE	GENERAL PURPOSE
POINT ANGLE	118°/135°	135°	135°	135°	118°
BIT DIAMETER	RPM	RPM	RPM	RPM	RPM
1/16	3000-4500	950-2000	2000-3200	5000-10,000	6500-16,000
3/32	2000-3000	650-1300	1200-2200	3500-6500	4200-11,000
1/8	1600-2500	450-1000	1000-1600	2500-5000	3200-8000
5/32	1200-1800	400-800	750-1300	2000-4000	2500-6500
3/16	1000-1500	300-650	650-1100	1700-3200	2100-5400
7/32	1000-1300	275-550	550-950	1500-2750	1800-4500
1/4	800-1200	250-500	500-800	1200-2400	1600-4000
9/32	700-1000	200-450	425-725	1200-2200	1400-3600
5/16	600-900	200-400	400-650	1000-2000	1300-3200
11/32	500-800	175-350	350-600	950-1800	1200-3000
3/8	500-750	160-325	325-550	850-1600	1100-2700
13/32	500-700	150-300	300-500	800-1500	1000-2500
7/16	450-650	135-275	275-575	700-1400	950-2300
15/32	425-600	125-260	250-450	700-1300	900-2200
1/2	400-600	120-240	250-400	640-1200	800-2000
17/32	350-550	115-230	225-400	600-1200	750-1900
9/16	350-500	105-215	200-375	600-1100	700-1800
19/32	300-500	100-205	200-340	550-1000	675-1700
5/8	300-450	95-195	200-320	500-1000	650-1600
21/32	300-425	90-185	180-305	500-900	600-1500
11/16	300-400	85-175	175-300	450-900	575-1500
23/32	275-400	80-170	165-280	450-850	550-1400
3/4	250-375	80-160	160-270	400-800	525-1350
25/32	250-350	75-155	150-260	400-775	525-1300
13/16	250-350	75-150	150-250	400-750	500-1300
27/32	250-350	75-150	150-250	400-750	500-1250
15/16	200-300	65-130	130-215	350-650	425-1100
1	200-280	60-120	120-200	300-600	400-1000
1-1/16	180-265	55-115	115-190	300-575	375-950
1-1/8	180-250	50-110	105-180	285-550	350-900
1-3/16	165-240	50-105	100-170	265-510	335-850
1-1/4	160-225	50-100	95-160	260-500	325-800
1-5/16	150-215	45-95	90-155	250-475	300-775
1-3/8	145-205	45-90	85-145	230-450	300-750
1-1/2	130-190	40-80	80-135	210-400	265-675

BHN - Brinell hardness number

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