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Band Sawing Tool Steel, Cutoff and Contour Speeds

Sawing is how a tool steel bar is cut to length and how a die block is roughed out before any other machining. The tables below give the published cutoff and contour band sawing speeds for tool steel grades, with the blade materials and band widths that go with them.

Reference only. This is a reference summary of published practice and it is not a specification of ours. The values are reproduced from the source tables, and tool material, machine rigidity, cutting fluid and workpiece condition will all move them. Final conditions are set on the job.

What a band saw will cut

Cutoff band sawing speeds by grade

Grade	Hardness, HB	Band speed, m/min (sfm)	Cutting rate, mm2 x 103/min (in.2/min)	Band life, mm2 x 106 (in.2 x 103)
W1	155-195	67-55 (220-180)	3.9-3.2 (6-5)	1.9 (3.0)
S2, S5	175-230	45-33 (150-110)	2.6-1.9 (4-3)	1.0 (1.5)
O1, O2	190-205	65-55 (210-180)	3.9-2.6 (6-4)	1.6 (2.5)
A2	215-240	60-52 (200-170)	2.6-1.9 (4-3)	1.5 (2.3)
D2, D3	215-240	37-27 (120-90)	1.9-1.3 (3-2)	1.0 (1.5)
D7	230-255	27-18 (90-60)	1.3-0.6 (2-1)	0.55 (0.85)
H12, H13, H21	205-230	58-49 (190-160)	3.2-2.6 (5-4)	1.3 (2.0)
T1, T2	215-250	40-30 (130-100)	2.3-1.3 (3.5-2)	1.1 (1.7)
T6, T8	220-295	30-21 (100-70)	1.6-0.6 (2.5-1)	0.7 (1.2)
T15	230-255	23-15 (75-50)	1.3-0.6 (2-1)	0.6 (1.0)
M1	215-230	45-37 (150-120)	3.2-1.9 (5-3)	1.1 (1.7)
M2, M3	215-240	33-24 (110-80)	2.6-1.3 (4-2)	1.0 (1.5)
M4, M10, M15	215-230	27-18 (90-60)	1.6-0.6 (2.5-1)	0.7 (1.2)
L6	190-230	55-49 (180-160)	3.9-2.6 (6-4)	1.6 (2.5)

Cutoff band sawing of tool steels, reproduced from Table 4 of Sawing, in ASM Handbook, Volume 16, Machining. The source data are based on a 25 mm (1 in.) wide high-speed steel band in regular tooth form, except for hook tooth form on metal thicker than about 250 mm (10 in.), raker set, cutting scale-free solid bar stock up to 460 mm (18 in.) thick with a cutting fluid. D2, D3 and D7 are cut dry. Band life is given for a 3 m (10 ft) band and is proportionate for other band lengths.

Contour band sawing speeds by grade and thickness

Grade	Hardness, HB	6.4-13 mm (1/4-1/2 in.)	25-75 mm (1-3 in.)	150-300 mm (6-12 in.)
W1	155-195	45 (150)	30 (100)	15 (50)
S2, S5	175-230	24 (80)	15 (50)	15 (50)
O1, O2	185-205	45 (150)	30 (100)	15 (50)
A2	215-240	50 (170)	30 (100)	20 (65)
D2, D3	215-240	30 (100)	18 (60)	15 (50)
D7	230-255	24 (80)	15 (50)	15 (50)
H12, H13, H21	205-230	30 (100)	18 (60)	15 (50)
T6, T8	220-295	27 (90)	17 (55)	15 (50)
M4, M10, M15	215-240	27 (90)	15 (50)	15 (50)
L6	190-230	30 (100)	20 (65)	15 (50)

Contour band sawing of tool steels by stock thickness, reproduced from Table 7 of Sawing, in ASM Handbook, Volume 16, Machining. Speeds are in m/min with sfm in brackets. The carbon steel band values use regular tooth form at 14 pitch and minimum feed force for the thin range, regular tooth form at 6 to 8 pitch and average feed force for the middle range, and hook tooth form at 3 pitch and maximum feed force for the thick range. The high-speed band values are also suitable for welded-edge high-speed steel bands, and use regular tooth form at 10 pitch and minimum feed force, then regular tooth form at 6 pitch and average feed force, then hook tooth form at 3 pitch and maximum feed force. D2, D3 and D7 are sawed dry, and the footnoted grades in the source run at the heavier feed force for each range.

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Grade	Hardness, HB	6.4-13 mm (1/4-1/2 in.)	25-75 mm (1-3 in.)	150-300 mm (6-12 in.)
W1	155-195	82 (270)	55 (180)	30 (100)
S2, S5	175-230	58 (190)	37 (120)	18 (60)
O1, O2	185-205	80 (260)	55 (180)	30 (100)
A2	215-240	76 (250)	53 (175)	30 (100)
D2, D3	215-240	45 (150)	30 (100)	15 (50)
D7	230-255	33 (110)	21 (70)	15 (50)
H12, H13, H21	205-230	73 (240)	49 (160)	27 (90)
T6, T8	220-295	38 (125)	24 (80)	15 (50)
M4, M10, M15	215-240	33 (110)	21 (70)	15 (50)
L6	190-230	70 (230)	49 (160)	27 (90)

Band material and blade selection

Band	Composition, %	Heat resistance, °C (°F)	Hardness, HRC	C	Si	Mn	Cr	V	W	Mo	Co	Teeth	Body
M-2 high-speed welded-edge band	0.79-0.86	0.25	0.35	4.25	1.95	6.50	5.00	. . .	540 (1000)	64-66	40-47		
Matrix 2 band	0.70-0.78	0.30	0.25	4.25	1.00	1.00	5.00	8.00	590 (1100)	65-67	40-47		
Cobalt M-42 band	1.05-1.10	0.25	0.25	3.75	1.15	1.50	9.50	8.00	700 (1300)	67-69	40-47		

Band saw blade composition, reproduced from Table 2 of Sawing, in ASM Handbook, Volume 16, Machining. Heat resistance is the temperature at which the cutting edge retains its hardness. The body of every welded-edge band is a high tensile alloy steel back running at 40 to 47 HRC after the teeth are hardened.

Band width for a given radius

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Radius to be cut	Band width	mm	in.	mm	in.
<1.6	1/16	1.6	1/16		
1.6	1/16	2.4	3/32		
3.2	1/8	3.2	1/8		
8	5/16	4.8	3/16		
16	5/8	6.4	1/4		
36.5	1 7/16	9.5	3/8		
65	2 9/16	13	1/2		
95	3 3/4	16	5/8		
140	5 1/2	19	3/4		
180	7 1/4	25	1		
300	12	32	1 1/4		
530	21	38	1 1/2		
710	28	50	2		

Recommended band width for the contour sawing of various radii, reproduced from Table 3 of Sawing, in ASM Handbook, Volume 16, Machining.

Grades and stock

Aobo Steel, tool steel supplier

Aobo Steel supplies tool steel to distributors and mold, tool and die shops, including D2, D3, DC53, A2, O1, H13, H11, H10, H21, S7, M2, M42, L6, P20 and 420 and 440C stainless. Forged or hot rolled, annealed or pre-hardened, cut to your sizes, with test certificates.
Source, ASM Handbook, Volume 16, Machining, ASM International, 1989.

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