ACE Hardware Zimbabwe

Sheet Bending Chart

Press-brake die selection, bending force, bend allowance and deduction, K-factors and springback.

Workshop Reference Charts
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Choosing a V-die and estimating force

Air bending at 90° - die choice and force per metre of bend

Thickness mm	V-die mm	Inside radius ≈ mm	Min. flange mm	Mild steel t/m	Stainless t/m	Aluminium t/m
0.8	6	1	4	7	10.4	3.5
1	8	1.3	6	8.1	12.2	4.1
1.2	10	1.6	7	9.4	14.1	4.7
1.5	12	1.9	8	12.2	18.3	6.1
2	16	2.6	11	16.3	24.4	8.1
2.5	20	3.2	14	20.4	30.5	10.2
3	25	4	18	23.5	35.2	11.7
4	32	5.1	22	32.6	48.9	16.3
5	40	6.4	28	40.7	61.1	20.4
6	50	8	35	46.9	70.4	23.5
8	63	10.1	44	66.2	99.3	33.1
10	80	12.8	56	81.4	122.2	40.7
12	100	16	70	93.8	140.7	46.9

- `F (kN/m) = 1.42 × Rm × t² ÷ V` Rm = tensile strength N/mm² (mild steel ≈ 450)
- Total force = force per metre × bend length in metres. Keep to 80% of the press brake's rating.
- Choose V ≈ 8 × t (6 t for thin sheet, 10 – 12 t over 10 mm). A smaller V needs more force and gives a tighter radius.
- Inside radius in air bending ≈ 0.16 × V for mild steel, larger for stainless and aluminium.

Mild steel force (tonnes per metre) for other V-dies

t mm \ V mm	8	10	12	16	20	25	32	40	50	63	80
1	8.1	6.5	5.4								
1.5	18.3	14.7	12.2	9.2							
2		26.1	21.7	16.3	13						
3				36.7	29.3	23.5	18.3				
4					52.1	41.7	32.6	26.1			
5						65.2	50.9	40.7	32.6		
6							73.3	58.6	46.9	37.2	
8								104.3	83.4	66.2	52.1
10									130.3	103.4	81.4

Values in the matrix are only shown where V is between 5 and 12 × t, the practical range. Stainless ≈ 1.5 × mild steel force; aluminium (5052) ≈ 0.5 ×.

Bend allowance and flat length

90° bends with R = t, K = 0.40

t mm	Inside R mm	Bend allowance mm	Bend deduction mm
0.8	0.8	1.76	1.44
1	1	2.2	1.8
1.2	1.2	2.64	2.16
1.5	1.5	3.3	2.7
2	2	4.4	3.6
2.5	2.5	5.5	4.5
3	3	6.6	5.4
4	4	8.8	7.2
5	5	11	9
6	6	13.19	10.81
8	8	17.59	14.41
10	10	21.99	18.01

K-factor

Inside radius	K-factor (guide)
R < t	0.33
R = t to 3t	0.40
R > 3t	0.45 - 0.50

Flat (blank) length

- `BA = π × A ÷ 180 × (R + K × t)` bend allowance (A = bend angle in degrees)
- `Flat length = sum of outside dimensions − (BD × number of bends)`
- `BD = 2 × (R + t) × tan(A/2) − BA` bend deduction

> **Example:** 2 mm mild steel channel, outside 40 × 60 × 40 mm (two 90° bends). Flat length = 140 − 2 × 3.60 = **132.8 mm**. Bend a test piece first and adjust, because K-factor varies with material and tooling.

Springback and minimum radius

Material	Typical springback (air bend)	Min. inside radius (guide)
Mild steel (S235/S275)	0.5° - 2°	0.5 - 1 t
Stainless 304	2° - 4°	1 - 2 t
Aluminium 5052-H32	1.5° - 3°	1 - 1.5 t
Aluminium 6061-T6	3° - 5°	2.5 - 4 t (cracks if tighter)
High-strength steel	4° +	2 - 4 t

> Bend across the rolling direction (grain) where possible, especially aluminium and tight radii. Over-bend by the springback amount, or use bottoming/coining for repeatable angles.

Guide values for general workshop use. Always follow the equipment or fastener maker's figure where one is given, and check critical work against the relevant standard.

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