Press Brake Bend Allowance and Bend Deduction

SheetMetal · Engineering reference · Checked 2026-11-04

Typical engineering values — confirm against the applicable standard and your machine before quoting.

Flat-length tables across thickness, bend angle and inside radius at K = 0.44, with two 100 mm outside legs. Static snapshot checked 2026-11-04; it does not update automatically when the calculator or standards register changes.

Angle convention

The angle in these tables is the bend angle: the rotation applied to the sheet. A 90° bend produces a right angle. It is not the included angle between the two legs; the included angle is 180° minus the bend angle. Legs are outside dimensions measured to the theoretical sharp corner, which is how most drawings dimension a part.

Formulas

Bend allowance (BA) is the developed length of the neutral axis through the bend zone:

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BA = (π / 180) × angle × (inside radius + K × thickness)
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Outside setback (OSSB) is measured on one side of the bend:

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OSSB = (inside radius + thickness) × tan(angle / 2)
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Bend deduction (BD) and flat length (L) follow:

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BD = 2 × OSSB − BA
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L = leg A + leg B − BD
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Bend allowance describes the arc itself. Bend deduction describes the amount removed from the sum of the outside legs to obtain the flat blank. Using one where the other belongs is a common source of blanks that are short by several millimetres.

Tables

Every row uses K = 0.44 and two outside legs of 100 mm. Only thickness, inside radius and bend angle change.

Bend angle 90°

Thickness (mm)	Inside radius (mm)	r/t	Bend allowance (mm)	Outside setback (mm)	Bend deduction (mm)	Flat length (mm)
1	0.5	0.5	1.48	1.50	1.52	198.48
1	1	1	2.26	2.00	1.74	198.26
1	2	2	3.83	3.00	2.17	197.83
1	3	3	5.40	4.00	2.60	197.40
1.5	0.75	0.5	2.21	2.25	2.29	197.71
1.5	1.5	1	3.39	3.00	2.61	197.39

1.5	3	2	5.75	4.50	3.25	196.75
1.5	4.5	3	8.11	6.00	3.89	196.11
2	1	0.5	2.95	3.00	3.05	196.95
2	2	1	4.52	4.00	3.48	196.52
2	4	2	7.67	6.00	4.33	195.67
2	6	3	10.81	8.00	5.19	194.81
3	1.5	0.5	4.43	4.50	4.57	195.43
3	3	1	6.79	6.00	5.21	194.79
3	6	2	11.50	9.00	6.50	193.50
3	9	3	16.21	12.00	7.79	192.21
4	2	0.5	5.91	6.00	6.09	193.91
4	4	1	9.05	8.00	6.95	193.05
4	8	2	15.33	12.00	8.67	191.33
4	12	3	21.61	16.00	10.39	189.61
6	3	0.5	8.86	9.00	9.14	190.86
6	6	1	13.57	12.00	10.43	189.57
6	12	2	23.00	18.00	13.00	187.00
6	18	3	32.42	24.00	15.58	184.42

Bend angle 120°

Thickness (mm)	Inside radius (mm)	r/t	Bend allowance (mm)	Outside setback (mm)	Bend deduction (mm)	Flat length (mm)
1	0.5	0.5	1.97	2.60	3.23	196.77
1	1	1	3.02	3.46	3.91	196.09
1	2	2	5.11	5.20	5.28	194.72
1	3	3	7.20	6.93	6.65	193.35
1.5	0.75	0.5	2.95	3.90	4.84	195.16
1.5	1.5	1	4.52	5.20	5.87	194.13
1.5	3	2	7.67	7.79	7.92	192.08
1.5	4.5	3	10.81	10.39	9.98	190.02
2	1	0.5	3.94	5.20	6.45	193.55
2	2	1	6.03	6.93	7.82	192.18

2	4	2	10.22	10.39	10.56	189.44
2	6	3	14.41	13.86	13.30	186.70
3	1.5	0.5	5.91	7.79	9.68	190.32
3	3	1	9.05	10.39	11.74	188.26
3	6	2	15.33	15.59	15.85	184.15
3	9	3	21.61	20.78	19.96	180.04
4	2	0.5	7.87	10.39	12.91	187.09
4	4	1	12.06	13.86	15.65	184.35
4	8	2	20.44	20.78	21.13	178.87
4	12	3	28.82	27.71	26.61	173.39
6	3	0.5	11.81	15.59	19.36	180.64
6	6	1	18.10	20.78	23.47	176.53
6	12	2	30.66	31.18	31.69	168.31
6	18	3	43.23	41.57	39.91	160.09

Bend angle 135°

Thickness (mm)	Inside radius (mm)	r/t	Bend allowance (mm)	Outside setback (mm)	Bend deduction (mm)	Flat length (mm)
1	0.5	0.5	2.21	3.62	5.03	194.97
1	1	1	3.39	4.83	6.26	193.74
1	2	2	5.75	7.24	8.74	191.26
1	3	3	8.11	9.66	11.21	188.79
1.5	0.75	0.5	3.32	5.43	7.54	192.46
1.5	1.5	1	5.09	7.24	9.40	190.60
1.5	3	2	8.62	10.86	13.10	186.90
1.5	4.5	3	12.16	14.49	16.81	183.19
2	1	0.5	4.43	7.24	10.06	189.94
2	2	1	6.79	9.66	12.53	187.47
2	4	2	11.50	14.49	17.47	182.53
2	6	3	16.21	19.31	22.42	177.58
3	1.5	0.5	6.64	10.86	15.08	184.92
3	3	1	10.18	14.49	18.79	181.21

3	6	2	17.25	21.73	26.21	173.79
3	9	3	24.32	28.97	33.63	166.37
4	2	0.5	8.86	14.49	20.11	179.89
4	4	1	13.57	19.31	25.06	174.94
4	8	2	23.00	28.97	34.94	165.06
4	12	3	32.42	38.63	44.83	155.17
6	3	0.5	13.29	21.73	30.17	169.83
6	6	1	20.36	28.97	37.58	162.42
6	12	2	34.49	43.46	52.42	147.58
6	18	3	48.63	57.94	67.25	132.75

K is an explicit assumption, not a material lookup

K is not a constant owned by a material name. It varies with the actual radius-to-thickness ratio, material condition, tooling and forming method. This chart does not provide a universal material-range table. Enter K explicitly, record the assumption and confirm it with a trial on the actual material and tooling.

The fixed tables use K = 0.44 only as a paper-calculation default. The calculator accepts K from 0.20 to 0.55 for engineering checks; its number-input band is 0.20 to 0.55. No V opening is used to infer radius or K in these tables.

Independent algebra cross-check

The 2015 Song Yixiang, Meng Xianli and Geng Yalin paper on K factor and bend-deduction conversion (issue 21, pages 15–16) gives r = 2 mm, t = 2 mm, included angle 90° and bend deduction 3.25 mm. Independent recomputation gives OSSB = 4 mm, BA = 4.75 mm and effective geometric K = 0.511971959. With two 20 mm outside legs, the blank is 36.75 mm. This is a paper algebra example, not a RAGOS trial or a universal K value.

Boundaries

- The calculation describes one bend. For a part with several bends, repeat it and accumulate the deductions in the flat pattern.
- Rows below r/t 0.5 are not included; this is the chart coverage, not a tooling approval or a universal forming limit.
- Springback compensation, hole deformation and a specific tooling-radius correction are not included.
- Confirm the radius, K factor and flat length with engineering and a trial bend before cutting production blanks.