Sheet Metal Bend Allowance, Bend Deduction and Flat Length

Bend allowance, outside setback and bend deduction of a sheet-metal bend from angle, inside radius, thickness and K-factor, with the flat length of an L-bend.

Method: Bend allowance BA = θ(R + Kt); bend deduction BD = 2 tan(θ/2)(R + t) − BA (sheet-metal practice)

Input parameters

Unit system: SI

Parameter	Value	Unit
Bend angle (deflection from flat, not the included angle)	90.000	°
Inside bend radius	3.0000	mm
Sheet thickness	2.0000	mm
K-factor From your bend tests; often about 0.3–0.45.	0.33000	
Flange A (outside dimension)	50.000	mm
Flange B (outside dimension)	30.000	mm

Calculated results

Parameter	Value	Unit
Bend allowance θ(R + Kt)	5.7491	mm
Outside setback tan(θ/2)(R + t)	5.0000	mm
Bend deduction 2 OSSB − BA	4.2509	mm
Flat length A + B − BD	75.749	mm

Formula and method

$$BA = \theta(R + Kt), \quad OSSB = \tan\frac{\theta}{2}(R + t), \quad BD = 2\,OSSB - BA$$

Variables

θ	Bend angle (deflection from flat, not the included angle)	rad
R	Inside bend radius	m
t	Sheet thickness	m
K	K-factor	-
A	Flange A (outside dimension)	m
B	Flange B (outside dimension)	m
BA	Bend allowance θ(R + Kt)	m
$OSSB$	Outside setback tan(θ/2)(R + t)	m
BD	Bend deduction 2 OSSB − BA	m
L_f	Flat length A + B − BD	m

Method and standards

Neutral-axis geometry.

Assumptions and limits

- Single bend, constant K.
- θ is the bend (deflection) angle from flat: a 90° bend has θ = 90°; a part whose flanges meet at an included angle of 120° has θ = 60°.
- A flange shorter than the outside setback, or a flat length of zero or less, is flagged.

References

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Report details

Report reference	FCC-MZ0H-WK71 (the same inputs always give the same reference)
Generated	17 November 2026, 19:44 UTC
Calculator	Sheet Metal Bend Allowance, Bend Deduction and Flat Length
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/manufacturing/bend-allowance

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Reopens the calculator with the inputs of this report.