

Sheet metal K-factor and bend allowance: formulas, example and K measurement

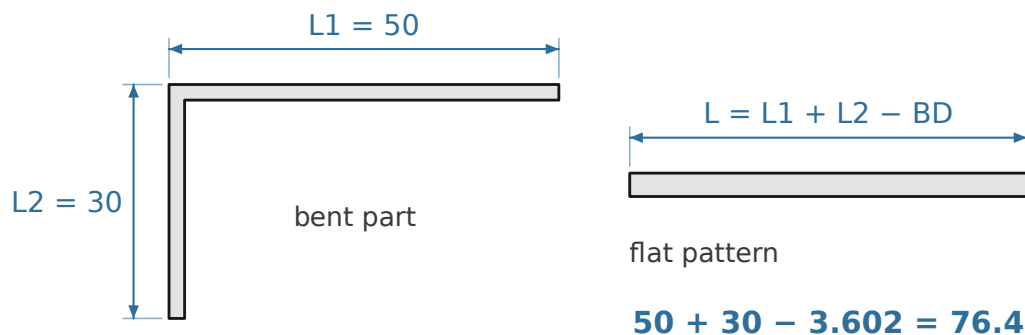
1. Formulas and an example

T: thickness; R: inside radius; θ : bend angle in degrees; K: K-factor. All lengths in the same unit.

Quantity	Formula	Note
Bend allowance	$BA = \pi \cdot \theta / 180 \cdot (R + K \cdot T)$	Length of the neutral axis in the bend
Outside setback	$OSSB = \tan(\theta / 2) \cdot (R + T)$	From the bend tangent to the outside apex
Bend deduction	$BD = 2 \cdot OSSB - BA$	Subtracted from the sum of outside dimensions
Flat length, outside dimensions	$L = L1 + L2 - BD$	L1, L2: flanges dimensioned to the outside apex
Flat length, straight segments	$L = a + b + BA$	a, b: straight lengths outside the bend
Measured K-factor	$K = (BA \cdot 180 / (\pi \cdot \theta) - R) / T$	With BA taken from a test bend

Example: 2 mm sheet bracket, 2 mm inside radius, bent to 90°, flanges dimensioned to the outside 50 and 30 mm, K = 0.4 (value chosen for the example). Lengths in mm.

Step	Calculation	Result (mm)
Bend allowance BA	$\pi \cdot 90 / 180 \cdot (2 + 0.4 \times 2)$	4.398
Outside setback OSSB	$\tan 45^\circ \cdot (2 + 2)$	4
Bend deduction BD	$2 \times 4 - 4.398$	3.602
Flat length	$50 + 30 - 3.602$	76.398



2. Measuring your K-factor on a test bend

Cut a strip of known length, bend it to 90° with the production sheet, tooling and radius, then measure both flanges on the outside. Example: 100 mm strip, 2 mm sheet, 2 mm radius, flanges measured at 61.8 and 41.8 mm.

Step	Calculation	Result
Measured bend deduction BD	$61.8 + 41.8 - 100$	3.6
Bend allowance BA	$2 \times 4 - 3.6$	4.4
K-factor	$(4.4 \times 180 / (\pi \times 90) - 2) / 2$	0.4

Reference values taken from the article <https://www.baouch.fr/en/blog/facteur-k-pliage-tole-calcul/>, which explains the assumptions, formulas and edge cases. For critical use, check the current standard or the manufacturer's documentation. Free to

print and share with credit to the source.