Press Brake Bending Force (V-Die)

Force to air-bend sheet in a V-die from tensile strength, bend length, thickness and die opening, with your die factor.

Method: F = k UTS L t²/W (Kalpakjian, Manufacturing Engineering and Technology)

Input parameters

Unit system: SI

Parameter	Value	Unit
Die factor About 1.2–1.33 for V-dies, 0.3 for wiping dies, 0.7 for U-dies (Kalpakjian).	1.3300	
Tensile strength	420.00	MPa
Bend length	2.0000	m
Thickness	3.0000	mm
Die opening Often about 8 × thickness.	24.000	mm

Calculated results

Parameter	Value	Unit
Bending force	418.95	kN
Force in tonne-force	42.721	

Notes for this case

- Air bending; bottoming or coining needs several times more.

Formula and method

$$F = \frac{k\,UTS\,L\,t^2}{W}, \quad P = \frac{F}{1000\,g}\ (\text{metric tonnes} - \text{force},\ g = 9.806\,65\ \text{m/s}^2)$$

Variables

k	Die factor	-
UTS	Tensile strength	Pa
L	Bend length	m
t	Thickness	m
W	Die opening	m
F	Bending force	N
P	Force in tonne-force	-

Method and standards

Beam bending with an empirical die factor.

Assumptions and limits

- Air bending; die opening of the usual proportion (about 8 t). A die narrower than the thickness gets a warning.

References

- F = k UTS L t²/W (Kalpakjian, Manufacturing Engineering and Technology)

Report details

Report reference	FCC-EMX1-16JF (the same inputs always give the same reference)
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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/press-brake-bending-force

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.