Minimum Flange Length Chart

Use this sheet metal minimum flange length chart to check whether a flange is long enough for standard press-brake bending.

Before You Use This Chart

A minimum flange length is the shortest flat leg that can rest securely on both shoulders of a V-die during bending. If the flange is too short, it may slip into the die opening, bend inconsistently, become marked or distorted, or require special tooling.

Required flange length depends primarily on the selected V-die opening. It also varies with material thickness, material strength, inside bend radius, bend angle, punch geometry, bending method, part interference, and cosmetic requirements.

Rule of thumb: For standard air bending with a conventional V-die, use a minimum flange length of approximately **0.7–0.77 × V**, where V is the V-die opening. When tooling is unknown, use the more conservative **0.77 × V** value.

Minimum Flange Length Formula

For standard air bending with a conventional V-die:

$F_{min} \approx 0.7 \times V$

Standard estimate

$F_{min} \approx 0.77 \times V$

Conservative early design

Where:
F_{min} = Minimum flange length
V = V-die opening width

Use the 0.77 × V value when tooling is unknown, the flange is near the lower limit, or the part requires repeatable production results.

Note: These are early DFM references, not guaranteed values for every material, tool set, bend method, or part geometry.

Minimum Flange Length by V-Die Opening

V-DIE OPENING	MIN FLANGE AT 0.7 × V	CONSERVATIVE AT 0.77 × V
V6 mm	4.2 mm	4.6 mm
V8 mm	5.6 mm	6.2 mm
V10 mm	7.0 mm	7.7 mm
V12 mm	8.4 mm	9.2 mm
V16 mm	11.2 mm	12.3 mm
V20 mm	14.0 mm	15.4 mm
V25 mm	17.5 mm	19.3 mm
V32 mm	22.4 mm	24.6 mm
V40 mm	28.0 mm	30.8 mm
V50 mm	35.0 mm	38.5 mm
V63 mm	44.1 mm	48.5 mm
V80 mm	56.0 mm	61.6 mm
V100 mm	70.0 mm	77.0 mm

Guidance: Use the conservative column as a design starting point when the fabricator's selected die is unknown. Actual limits vary with die style, material, punch geometry, bend method, and interference from nearby features.

Typical Starting Points for Air Bending

This table combines common early V-die selections with conservative minimum flange values. It is for preliminary DFM only and should not be used as a tooling specification.

MATERIAL	THICKNESS	TYPICAL V-DIE RANGE	RECOMMENDED MIN FLANGE
Mild steel / CRS	0.8 mm	V6–V8	5–7 mm
Mild steel / CRS	1.0 mm	V8	6–7 mm
Mild steel / CRS	1.2 mm	V8–V10	6–8 mm
Mild steel / CRS	1.5 mm	V12	9–10 mm
Mild steel / CRS	2.0 mm	V16	12–13 mm
Mild steel / CRS	2.5 mm	V20	15–16 mm
Mild steel / CRS	3.0 mm	V24–V25	19–20 mm
Mild steel / CRS	4.0 mm	V32	24–25 mm
Mild steel / CRS	5.0 mm	V40	30–31 mm
Mild steel / CRS	6.0 mm	V50	35–39 mm
Stainless steel	1.0 mm	V10	8 mm
Stainless steel	1.5 mm	V16	12–13 mm
Stainless steel	2.0 mm	V20	15–16 mm
Stainless steel	3.0 mm	V25–V32	20–25 mm
Aluminum 5052-H32	1.0 mm	V6–V8	5–7 mm
Aluminum 5052-H32	1.5 mm	V10–V12	8–10 mm
Aluminum 5052-H32	2.0 mm	V12–V16	10–13 mm
Aluminum 5052-H32	3.0 mm	V18–V20	14–16 mm

For common air bending, a V-die opening is often estimated from material thickness at the design stage. Final die selection must also consider target inside radius, material strength, thickness, bending method, press capacity, and available tooling.

> **Important:** Do not treat one "rule of 8" value as universal for steel, stainless steel, aluminum, or all bend geometries.

Why Short Flanges Cause Problems

A flange below the tooling minimum may not bridge the V-die shoulders during bending. This can lead to:

- The flange dropping into the die opening
- Part rotation or slipping during forming
- Inconsistent bend angles
- Edge marking, crushing, or distortion
- Punch or die interference with nearby geometry
- A requirement for special tooling or a secondary process

Short flanges can be manufactured in some cases, but they should not be assumed feasible with standard air-bending tooling.

Checks Before Releasing a Drawing

- Use $F_{min} \approx 0.77 \times V$ for conservative early design when die selection is unknown.
- Do not assume a flange is bendable simply because the material is thin.
- Check flange feasibility after adding nearby holes, slots, louvers, embosses, hems, and self-clinching hardware.
- Keep holes and cutouts outside the bend deformation zone.
- Review tool clearance for return flanges, U-channels, trays, boxes, and closely spaced bends.
- Confirm whether the bend will use air bending, bottoming, coining, wipe forming, or special tooling.
- Define visible surfaces and allowable tool marks before using a short-flange design.
- Request a first-article sample for short, functional, cosmetic, or high-volume flanges.

Standard Air-Bending Reference

The following guide applies only to standard air bending with a conventional V-die and no interference from prior bends, nearby hardware, or deep formed features.

FLANGE CONDITION	RECOMMENDED APPROACH
At or above 0.77 × V	Normally suitable for initial air-bending DFM review
0.70–0.77 × V	Confirm die, punch, material, bend method, and repeatability
Below 0.70 × V	Treat as a special forming requirement; obtain DFM confirmation before release
Near a return bend	Check punch, die, and part-clearance interference
Includes holes or hardware	Check feature-to-bend distance and press-tool access
Cosmetic surface	Use a larger safety margin and define acceptable marks or distortion

Reminder: A flange above 0.77 × V is not automatically manufacturable if the part has return bends, deep walls, U-channel geometry, hardware, or tool-access restrictions.

What to Do When a Flange Is Too Short

OPTION	WHEN IT HELPS	TRADE-OFF
Increase flange length	Standard tooling cannot support the bend	Changes part size or assembly clearance
Use a smaller V-die	A slightly shorter flange is required	Increases forming force and may produce a tighter radius
Use narrow-die tooling	Short flange is essential to the design	Adds setup cost and tooling constraints
Use wipe forming	A short edge flange or return is required	May need dedicated tooling
Add material and trim after forming	Geometry allows post-bend cutting	Adds an operation and may affect edge quality
Change bend sequence	Prior bend causes tool collision	May affect tolerances or handling
Use welding or a separate bracket	Formed flange is too short or inaccessible	Adds parts, labor, and possible distortion
Use a tab or alternate joint	Flange only serves as an attachment feature	May require assembly redesign

Why Simple Flange Rules Are Not Enough

A flange can be long enough to bridge a V-die but still be difficult to form when the part includes:

- Return flanges
- U-channels or box sections
- Deep trays or enclosure walls
- Hemmed edges
- Nearby hardware or formed features
- Prior bends that interfere with the punch or die
- Long narrow sections that are difficult to support

For multi-bend parts, verify both the minimum flange length and tool clearance. The final bend may require a gooseneck punch, segmented tooling, staged forming, or a different bend sequence.
