

Tools for Tube Bending

For smooth, wrinkle free tube bending without excessive flattening, there are a number of benders that can be selected. Consult the specific bender's instruction bulletins for CLR (centerline radius), wall thickness, and tube material recommendations and limitations. For crank and hydraulic benders, utilize both the mandrel bending determination chart (Fig. T56) and the Parker Bender Capacity Guides on [page S7](#).

1. **Hand held lever type benders** (see [pages S4-S6](#)). Individually sized for tube sizes 1/8" through 1" and 6mm through 25mm.

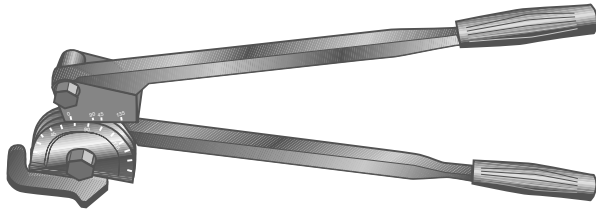


Fig. T53 — Hand held tube bender

2. Manual crank, table mount or vise mount benders:

- 1) Model 412 ([page S8](#)). For bending 1/4" through 3/4" O.D. tube or 6mm through 20mm.
- 2) Model 424 ([page S9](#)). For bending 1/4" through 1 1/2" O.D. tube or 6mm through 38mm.

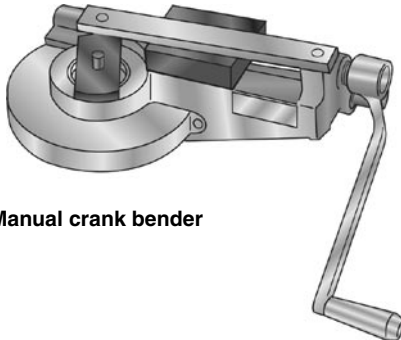


Fig. T54 — Manual crank bender

3. Hydraulically powered bender

Model 632 ([page S12](#)). For bending 3/8" through 2" O.D. tube or 10mm through 50mm.

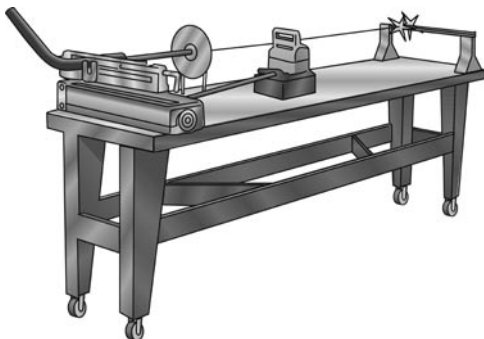


Fig. T55 — Hydraulic bender with portable table for mandrel bending

Mandrel Bending Tools

When bending thin wall tube it may be necessary to insert a mandrel into the tube to prevent excessive distortion, flattening or wrinkling. To determine whether mandrel bending is required, see the Mandrel Bending Requirements Chart and example below.

To accomplish such bending, a mandrel, mandrel rod, and a mandrel rod stop assembly are required. The rod stop assembly holds the end of the mandrel rod in proper alignment with the tube while the mandrel, which is threaded on the other end of the mandrel rod, supports the tube on its I.D., thus preventing tube kinking or flattening during bending.

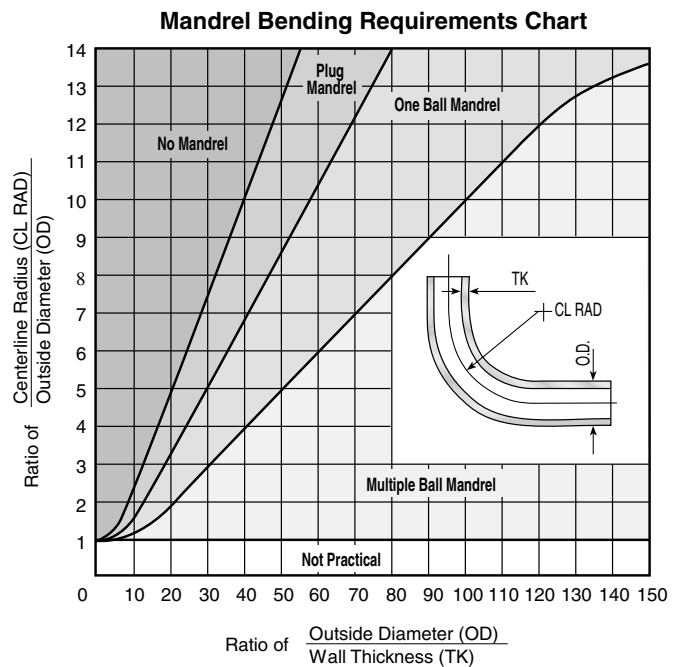


Fig. T56 — Mandrel bending requirements chart

Example: Determine if it's necessary to use mandrel for bending 3/4 x .049 steel tube through a 3" bend radius without excessive flattening.

Centerline Radius/Tube Outside Diameter = 3 / .75 = 4

Outside Diameter / Wall Thickness = .75/.049 = 15.3

Intersection of these two ratios on the graph falls within the area indicating that no mandrel is required. Note, however, that for the same tube O.D. at a smaller bend radius (e.g. 2") or with a thinner wall thickness (e.g. .035"), a mandrel would be required for preventing excessive flattening.

If the tube wall is very thin, then a plug mandrel alone may not be adequate to prevent wrinkling. In such cases, special ball type mandrels and wiper shoes may be necessary (See [Fig. T57](#) for illustrations of plug and ball type mandrels). As a rule of thumb, if the tube wall thickness is less than 7% of the tube O.D. then mandrel bending is recommended.

Dimensions and pressures for reference only, subject to change.