

Hydraulic Tube Bender

Model HB632 Bulletin 4391-B26



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Parker Hydraulic Tube Bender

Model HB632

For 3/8" – 2" (10-50mm) tubing and 3/8 to 1-1/2 IPS Pipe

The Parker Model HB632 Tube Bender is a hydraulically operated bender for bending annealed steel and stainless steel tubing from 3/8" O.D. through 2" O.D. It is operated by means of a separate power source producing 10,000 psi hydraulic pressure. It can be operated without bolting to a table or bench if no mandrels are required, making it an excellent unit to move about and use at the point where the tubing installation is being made. It can also be attached to a table and used with mandrels.

Capacity

Table 1 at right assigns a Model Code for each model of Parker tube benders. Table 2 gives the capacity for all Parker benders. The Model HB632 is represented by model code C so you can easily check for its capabilities in Table 2.



Part No.: 631050

Bender Construction

The bender consists of a cast aluminum housing, with a hydraulically actuated drive mechanism which enables an operator to make bends up to 180° in one continuous smooth operation on tubing up to $2^{"}$ in diameter.

Tube Bender Model Codes					
Model Code	Model No.	Tubing O.D. Capacity	Bender Type	Rated Torque (in./lbs.)	
А	412	1/4" - 3/4"	Worm & Gear	2,700	
В	424	1/4" — 1-1/4"	Worm & Gear	11,000	
С	HB632	1/4" – 2"	Hydraulic	52,000	
D	CP432	3/8" – 2"	Hydraulic	N/A	

Table 1 – Tube Bender Model Codes

Tube Benders Maximum Capacity Guide*													
Tube	Tube Wall Thickness (inches)												
O.D.		0.035	0.049	0.058	0.065	0.072	0.083	0.095	0.109	0.120	0.134	0.156	0.188
(in.)	Material					Tub	e Bender	Model Co	des				
3/4	S	ABCD	ABCD	ABCD	ABCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD
3/4	SS	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD
1	S	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD
	SS	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	BCD	CD	CD
4 4 / 4	S	BCD	BCD	BCD	BCD	BCD	BCD	CD	CD	CD	CD	CD	CD
1-1/4	SS	BCD	BCD	BCD	BCD	BCD	CD	CD	CD	CD	CD	С	С
1 1/0	S	BCD	BCD	BCD	BCD	BCD	CD	CD	CD	CD	CD	CD	CD
1-1/2	SS	BCD	BCD	CD	CD	CD	CD	CD	CD	CD	CD	С	С
2	S	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
2	SS	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	—	—

Table 2 - Tube Benders Maximum Capacity Guide

* See page 3 for pipe bending capabilities

Specifications:

- 1) Min. tube size 3/8"
- 2) Max. tube size 2"
- 3) Min. bend radius 1-1/8"
- 4) Max. bend radius 12" (special order)
- 5) Max. tube bend 180°
- 6) Weight 170 lbs. (77.1 kg) without accessories
- 7) Minimum tube wall thickness (% of O.D.) 4% with mandrel, 7% without mandrel
- The HB632 is capable of bending 1/2" O.D. and under fully annealed steel and stainless steel tubing with no limit on tube wall thickness
- 9) The HB632 is capable of bending SOFT aluminum and copper tubing with no limit on wall thickness.
- 10) For HARD copper, ALLOY STEEL, and HIGH STRENGTH aluminum, use the tabulations shown for stainless steel.





974691 - High





Mandrel Rods

Part No. — See table

Mandrel rods are for use with the HB632 Model Bender and Exactol Models 412/424 benders. Mandrel rods (as well as mandrel rod stop assembly) are required when using mandrels. Overall mandrel rod lengths are approximately eight feet. Mandrel rod diameters are determined by tube I.D. (See Table 3.)

Mandrel Rod Stop Assembly

For use with Model HB632 Bender

The mandrel rod stop assembly holds and supports the end of the mandrel rod in alignment with the tubing. The rod stop assembly is bolted to the other end of bender table. It keeps the mandrel and rod in alignment when mandrel bending. The stop screws can be adjusted for correct length and positioning of the mandrel in the tubing.

Description	Part No.
Mandrel Rod Stop Assembly (for Bender Model HB632)	631141

Universal Side Angle Indicator

Part No. 520520

Accurately determines the angle between tube bends in different planes, and keeps out-of-plane angles accurate when making repeated bends. Incorporates a large, easy-to-read vernier dial. Maximum 3/4" O.D. tubing can be used if the tubing must be extended through the indicator. Maximum 1-1/2" O.D. tubing can be used if the end of tube is held in the clamp jaw.





Tie Bar



Standard Radius Blocks



660221 – Radius Block Adapter Plate



Bender Table – 520515 Heavy, all steel construction, strongly braced to keep bender, mandrel rod and rod stop assembly rigidly braced. Length 10 feet; weight 421 lbs.

Part No.	Mandrel Rod Dia. (in.)	Tube I.D.
520506	1/4	0.283 - 0.362
520507	5/16	0.363 – 0.484
520508	13/32	0.485 – 1.489

Table 3 - Mandrel Rod Sizes



Part No. 631141 – HB632 Mandrels, Mandrel Rods and Rod Stop Assembly



Parker Hannifin Corporation Tube Fittings Division Columbus, OH www.parker.com/tfd











Close bend radius blocks — These blocks have a threaded pin which threads directly into both Triple-Lok and Ferulok (Seal-Lok requires an adapter) tube fitting nuts, permitting a first bend very close to the end of the tube.

Inch Radius Block Chart

			AND	AND10111 Standard		MS33611 Standard		ard	Radius Block – Close Bend**		
	Tube O.D.		Part	Radius*		Part	Rad	ius*	Part	Rad	ius*
Size	in.	mm	No.	in.	mm	No.	in.	mm	No.	in.	mm
6	3/8	9.5	540502	1-1/4	31.8	590512-18	1-1/8	28.6	—	—	-
8	1/2	12.7	530763	1-1/4	31.8	590515-24	1-1/2	37.5	530597	1-1/4	31.8
10	5/8	15.9	530764	1-1/2	37.5	590518-30	1-7/8	47.6	530601	1-1/2	38.1
12	3/4	19.0	530765	1-3/4	43.8	590521-36	2-1/4	57.2	530605	1-3/4	44.5
14	7/8	22.2	530766	2	50.2	590523-42	2-5/8	66.7	530609	2	50.8
16	1	25.4	_	_	l —	590524-48	3	76.2	530613	3	76.2
18	1-1/8	28.6	530768	3-1/2	88.9	590526-54	3-3/8	85.7	530617	3-1/2	88.9
20	1-1/4	31.8	_	-	_	590527-60	3-3/4	95.3	530621	3-3/4	95.2
24	1-1/2	38.2	530770	5	127.0	590530-72	4-1/2	114.3	530625	5	127.0
28	1-3/4	44.5	_	_	—	631057-112	7	177.8	_	_	—
32	2	50.8	_	_	_	631060-128	8	203.2	_	_	_

*Radius to tube centerline.

**Note: Sizes 20 and 24 close bend radius blocks requires the removal of the clamp arm before installation.

Metric Radius Block Chart

Tube	Standard Ra	dius Blocks	Close Bend Ra	dius Blocks***
0.D.	Part	Radius	Part	Radius
(mm)	No.	(mm)	No.	(mm)
10	810023	32	—	—
12	780175	32	780185	32
14	780176	38	780186	38
15	780177	38	780187	38
16	780178	38	780188	38
18	780179	44	780189	44
20	780180	44	780190	44
22	780181	89	_	_
25	780182	100	_	_
30	780183	128	—	—
32	780184	128	_	_
35	974344	105	_	_
38	530770	127	530625	127
38	590530-72	114.3	_	_
42	974347	128	_	_
50	974350	150	_	_

***Note: Size 38mm close bend radius blocks requires removal of the clamp arm before installation.

Accessories for Close Bend Radius Blocks

Tube O.D. (in.)	Threaded Pin Part No.	Seal-Lok Adapter Part No.
1/2	930420-8	930421-8
5/8	930420-10	930421-10
3/4	930420-12	930421-12
1	930420-16	930421-16
1-1/4	930420-20	930421-20
1-1/2	930420-24	930421-24

Threaded Pins and Seal-Lok Adapters for Close Bend Radius Blocks

Inch Pipe Size Radius Block Chart

Nominal Pipe Size (in.)	O.D. (in.)	Part No.	Bend Radius (in.)	Max. Pipe Schedule
3/8	0.675	974325	2-1/4	80
1/2	0.840	974326	2-5/8	160
3/4	1.050	974327	3-1/4	80
1	1.315	974328	4	80
1-1/4	1.660	974329	5	80
1-1/2	1.900	974330	6	40



Slide Blocks

Clamp Blocks





Inch Tube Sizes

Size	Tube O.D. (in.)	Part No.
6	3/8	864276
8-12-16-24	1/2, 3/4, 1, 1-1/2	520516
10-14-18-20	5/8, 7/8, 1-1/8, 1-1/4	520518
28	1-3/4	631063
32	2	631066

Size	Tube O.D. (in.)	Part No.
6	3/8	864266
8-12-16-24	1/2, 3/4, 1, 1-1/2	631092
10-14-18-20	5/8, 7/8, 1-1/8, 1-1/4	631093
28	1-3/4	027418-28
32	2	027418-32

Slide Block

Metric Tube Sizes

Size	Tube O.D. (in.)	Part No.
10-12-14-16	10-12-14-16	790016
15-16-18-20	15-16-18-20	780192
22-25-30-32	22-25-30-32	780193
35	35	974345
38	38	520516
42	42	974348
50	50	974351

Slide Block

IPS Tube Sizes

Nominal Pipe Size (in.)	O.D. (in.)	Part No.
3/8, 1/2, 3/4	0.675, 0.840, 1.050	974331
1	1.315	974336
1-1/4	1.660	974340
1-1/2	1.900	974342

Slide Block

Size	Tube O.D. (mm)	Part No.
10-12-14-16	10-12-14-16	790017
15-16-18-20	15-16-18-20	780195
22-25-30-32	22-25-30-32	780196
35	35	974346
38	38	631092
42	42	974349
50	50	974352

Clamp Block

Clamp Block

Nominal Pipe Size	O.D. (in)	Part
(11.)	(111.)	NO.
3/8, 1/2, 3/4	0.675, 0.840, 1.050	974332
1	1.315	974338
1-1/4	1.660	974341
1-1/2	1.900	974343

Clamp Block



The bender is shipped completely assembled except for attaching a pump, hose, and installing selected bender dies.



Step 1: Mounting Tube Bender Position bender centered across the end of bender table and bolt securely in place. The Parker bender table has pre-drilled holes for bender attachment.

3 bolts, nuts and washers required for mounting bender



Step 2: Connect Pump to Bender Connect the hose assembly (part no. 910004) to the pump (3/8" NPT end) and then connect hose to the bender. Be careful not to twist the hose when tightening. Use a pipe sealant on the pipe threads. The makeup for the NPT end is 2 to 3 turns from finger tight. The assembly torque for the Seal-Lok hose adapter (6G6L-S) that is connected to the bender is 360 in. lbs.



Step 3: Select and Install Radius Block Select the proper radius block according to the chart on page 3. Then install the selected radius block on the king and drive pins with the open end of the block toward the clamp arm.

> Radius blocks are accurately milled and bored to slip easily onto posts. Light lubrication of the posts will aid assembly. When handling radius blocks, as well as the slide and clamp blocks, care should be taken to avoid nicking the grooved surfaces.





The first bend is easy. Simply measure from the end of the tube to the desired length of the centerline* of the first bend.

*For information on tube bending, centerline measurement, and back-bending compensation, see Parker Principles of Tube Line Fabrication, Manual 4306-B5.





Step 5: Select Slide and Clamp Block Grooves Select the proper groove of the slide block and clamp block for the outside diameter of tube (sizes are marked on end of each block). Lubricate the slide block to facilitate its sliding. Place the clamp block in its vise. Do not lubricate the clamp block. It's held in place magnetically.



Step 6: Rapid Positioning

Both the clamp and slide block vise screws feature rapid positioning, with a quick acting cam lock mechanism. To use, pull the respective cam lock mechanism to disengage, push the screw forward, then push the cam lock forward to engage.



Step 7: Positioning the Tube

Advance the clamp block vise as described above. Then position the tube in the clamp block so that the mark is tangent to the radius block at the desired angle (90° for 90° bend; 45 ° for 45° bend, etc.). Use triangles to obtain accurate results (see diagram). The tubing should be positioned in the bender so that the end measured from, or "measurement end", is to the left as you face the bender.

For 180° bends, position the mark similar to 90° bends.

On long lengths of tubing, support is recommended to prevent sag.



Step 8: Clamp the Tube

When in the proper position, clamp the tube with the clamp block vise. Next, advance the slide block vise using the rapid positioning sequence described.

Rotate the slide block retainer to the proper height and insert the slide block. Then bring into snug position against the tube, but not with so much pressure as to prevent the block from sliding freely. The clamp block and slide block should not be touching.





- Step 9: Using the Tie Bar (when required) If the tube is over 1" O.D. (25mm or 1/2 IPS), or heavy wall, or if mandrel bending, the tie bar must be used to prevent tube slippage and the clamp arm from flexing.
- Step 10: Setting Bend Angle (Shown inset at top) Set the angle to be bent on the angle indicator by turning the angle adjusting handle on the back of the bender housing. Generally add two to five degrees to the angle you wish to bend to compensate for the spring-back in the tube.





CAUTION — Should it become apparent that the bend is too long for the slide block, stop the bender and loosen the slide block vise. Return the slide block to its original position. Retighten the vise screw and complete the bend.

When the preset angle has been reached, shut off the pump.



Step 12: Completed Bent Tube

Remove the tie bar, if in use, retract the slide and clamp vises, and pull the tube out from the radius block and lift up. Your tubing is bent, without flattening or cracking.

Releasing system pressure by opening the valve will relieve tension in the bender and the clamp arm will return to its original position.



When to Mandrel Bend

For short radii bends and thin-wall tubing, mandrel equipment is necessary to prevent wrinkling, collapsing, or kinking of the tube. The mandrel supports the tube wall on the inside and maintains a full crosssection in a smooth bend. This is important and should be included as an indispensable part of bending equipment.

The rule that is generally followed to determine whether or not a mandrel is necessary is as follows: When the wall thickness of the tube to be bent is 7% or more of the tube O.D., a mandrel is usually not necessary. On wall thicknesses that ranges between 4-6% of the tube O.D., it is necessary to use a mandrel to avoid wrinkling and flattening in the bend area. These calculations are based on a bend radii of between three and four times the tube O.D.

Since mandrel equipment must be accurately aligned and rigidly held, we recommend the use of the bender table.



Mandrel Rod Stop Assembly

This assembly holds the end of the mandrel rod in proper alignment with the tubing and bender. It bolts to the back end of the table. A scale permits accurate alignment of the stop screws. (Although not an extractor, this assembly is necessary to secure the mandrel and rod during the bending process.)

The Parker bender table has pre-drilled holes for the bender and rod stop assembly attachment. These pre-drilled holes insure proper bender and rod stop assembly alignment.

	Tube	e O.D.	Part			V	Vall Thicknes	S	
Size	in.	mm	No.	Туре	in.	in.	in.	in.	in.
6	3/8	9.5	924417	Solid	_	.035	.042	—	—
8	1/2	12.7	924417	Solid	_	.035	.042	.049	_
10	5/8	15.9	924417	Solid	.035	.042	.049	.058	.065
12	3/4	19.0	924417	Solid	.035	.042	.049	.058	.065
14	7/8	22.2	924417	Solid	.035	.042	.049	.058	.065
16	1	25.4	924417	Solid	.035	.042	.049	.058	.065
18	1-1/8	28.6	924417	Solid	—	.049	.058	.065	—
20	1-1/4	31.8	924417	Solid	_	.049	.058	.065	_
24	1-1/2	38.1	924417	Solid	.049	.058	.065	.083	_

Mandrel Specifications and Data

To order mandrels, specify part number, size and wall thickness. Example: 924417-12X058

Mandrel Rod Specifications and Data

Mandrel	Mandre Dia	l Rod a.		Part	
Rod Size	in.	mm	Tube I.D. inches (mm)	No.	Туре
1/4	1/4	6.4	.283 (7.2) to .362 (9.2)	520506	Solid
5/16	5/16	7.9	.363 (9.2) to .484 (12.3)	520507	Solid
13/32	13/32	10.3	.485 (12.3) to 1.489 (37.8)	520508	Solid

Description	Part No.
Mandrel Rod Stop Assembly	631141
Mandrel Rod Stop Adapter (1/4" Rod)	522398
Mandrel Rod Stop Adapter (5/16" Rod)	550501







Step 1:Mandrel Rod Stop Assembly InstallationThe mandrel rod stop assembly must be rigidly mounted
to the bender table in proper alignment with the bender.
Zero ("0") at the end of the mandrel rod stop assembly
scale must be in line with the center of the king pin.



Step 2: Select Radius Block, Mandrel and Rod Select the proper radius block according to the chart on page

according to the chart on page 3. Select the mandrel and mandrel rod according to the outside diameter and wall thickness of the tubing.



Step 3A: Install and Adjust Mandrel

The selected mandrel is screwed onto one end of the mandrel rod. The other end of the mandrel rod is screwed into the adapter and then into the universal joint tongue on the rod stop assembly. The scale provided permits accurate alignment of the stop screw. The stop screw should be centered to the dimension on the scale corresponding to the bend radius.



Step 3B: Install and Adjust Mandrel (Continued)

For average bending the mandrel should be adjusted so that the scribed line on its circumference is 5/8" behind the line scribed on the face of the radius block. This adjustment is made by turning the mandrel rod stop handles at the rear of the bench. The mandrel may be moved inward slightly to produce a more perfectly round cross-section or it may be moved slightly outward to ease the bending effort. Extreme care must be used in establishing this position as even the slightest adjustment will affect the results.

Step 4: Insert the Tube

First lubricate the mandrel with light lubricating oil. Then, slip the tube over the mandrel.



Steps 5 through 12 below are a repeat of steps 4 through 11 on pages 5-7.



Step 5: Mark the Tube



Step 6: Select Slide and Clamp Block Grooves



Step 7: Rapid Positioning



Step 8: Positioning the Tube



Step 9: Clamp the Tube



Step 10: Using the Tie Bar



Step 11: Setting the Bend Angle Step 12: Bending the Tube



Step 13: Completed Bent Tube

After completion of the bend, remove the tie bar, retract the slide and clamp block vises, and by pulling the tubing to the left, slide it off of the mandrel rod assembly. Then release the system pressure by opening the valve. The clamp arm will return to the starting position.





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11

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*Contact the Tube Fittings Division for repair. Phone: (614) 279-7070.



1/8" NPTF Grease Fitting

#10-24 Round Head Screw

Oil Hole Cover, 5/16" diameter

#6-32 x 1/4" Round Head Screw

Warning Plate

Radial Pointer

#0-1/8 Drive Screw

Nameplate

10-24X3/8

631139

550609

13050

502-G

631136

13179

13359

8

1

1

8

2

1

2

2



Item No.	Description	Part No.	Qty.
16	Slide Rail	660219	1
17	3/8-16 x 3/4" Socket Head Cap Screw	13321	4
18	3/8-16 X 1 Socket Head Screw	13305	4
19	Dowel Pin, 3/8" dia. x 1-1/2" long	13320	2
20	1/4-20 x 5/8" Flat Head Screw	13367	2
21	Wear Plate	900135	1
22	Vise Face, Slide Rail	631100	1
23	Slide Block Retainer	631101	1
24	1/2-13 x 1" Socket Head Cap Screw	13327	1
25	Roll Pin, 1/4" dia. x 1-7/8" long	13328	2
26	1/4" dia. x 1" long Drive Lok "C" pin	970096	2
27	1/4" dia. x 1-1/4" long Drive Lok "C" pin	13509	1
28	Pivot Half Nut	970088	2
29	Slide Arm Bracket	970086	1
30	Cam Latch	970089	2
31	Red Grip	970090	2
32	0.261" I.D. x 0.432" O.D. Wave Washer	970093	1
33	Dowel Pin, 1/4" dia. x 3/4" long	970091	1
34	Vise Adjusting Screw	631103	1
35	Vise Adjusting Screw Handle	522196	1
36	Roll Pin, 5/32" dia. x 7/8" long	5/32 X 7/8 ROLL PIN	1

(Table continued on the following page)





Item No.	Description	Part No.	Qty.
37	Clamp Rail Arm	660224	1
38	Drive Post	660238	1
39	Tie Bar	660438	1
40	Spacer Plate	660228	1
41	#8-32 x 5/8" Flat Head Screw	13346	2
42	1/4-20 x 3/8" Socket Head Set Screw, Nylon	13302	1
43	Clamp Arm Bracket	13387	1
44	Dowel Pin, 5/8" dia. x 1-1/2" long	13102	1
45	Cup Magnet, 1-1/4" dia. x 1", 15lb.	660227	1
46	Vise Face, Clamp Arm	660226	1
47	1/4" x 1-1/4" Socket Head Shoulder Screw	970092	2
34, 35, 36	Vise Adjusting Screw Sub-Assembly	13750	2
18, 19, 25-28, 30-47	Clamp Arm Bracket	13387	1
18, 19, 26-28, 30-33, 43, 44, 47	Clamp Arm Bracket Sub-Assembly	660223	1
18, 19, 26-33, 47	Slide Arm Bracket Sub-Assembly	13388	1

*Contact the Tube Fittings Division for repair. Phone: (614) 279-7070.



Bender Maintenance

The bender is equipped with two grease fittings on the side to lubricate the king pin bearings. This should be done at least once a year.

There are two oil hole covers on the top of the unit. These should be serviced once a year by running oil into them while the bender is rotating to lubricate the roller chain.

The threads of the vise screws should receive a few drops of oil occasionally to make certain they stay in working condition.

Visually check all hydraulic connections regularly for leakage.

Warranty

The bender and accessories are warranted to be free of defects in workmanship for a period of one year from date of sale. The bender has a sticker placed over the king pin. Removal of the sticker voids the bender warranty. Alterations to the bender or accessories voids the warranty of the part.

Repair

The bender can be repaired. External parts are available for sale (see Parts List). For repair of internal parts, the bender must be returned to Parker Hannifin Tube Fittings Division. Please contact the Division (614-279-7070) before sending the bender back for repair.

Troubleshooting

Problem	Probably Cause	Solution
Bender will not rotate	No hydraulic power supply	Verify the hydraulic pump is connected, the connections are not leaking, and the valve is closed
	Angle indicator is set at 0°	Set the angle indicator to the desired bend angle
Tube slips in clamp	Clamp block not tightened	Tighten clamp block
DIOCK	Incorrect radius or clamp block	Check that the radius and clamp blocks match tube size
Tube is flattened or mis-shaped	Tube requires mandrel for bending	Check chart for mandrel bending
	Incorrect slot on slide block is used	Verify that the slot on the slide block used matches the tube size
Bender will not complete the bend	Tube wall thickness is too large	Check the capacity chart to verify the bender is rated for the wall thicknes of the tube to be bent
	Slide block is overtightened	Lightly clamp the slide block – do not overtighten
	Pump is low on fluid	Check fluid level in the hydraulic pump

