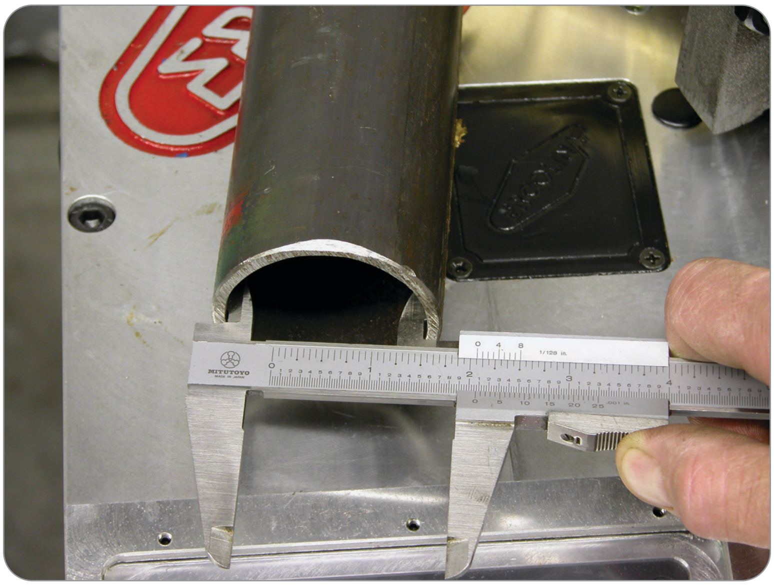
Pipe Information



Pipe dimensions are based on I.D. of material (2″ sch. 40 pipe measures 2.375″ O.D.).

Steel & Polymer Pipe Counterbending Dies

STEEL

Pipe Size	Outside Diameter	Counterbend Die Part#
⅜″	.675	155AP0375
½″	.840	155AP0500
¾″	1.050	155AP0750
1″	1.315	155AP1000
1¼″	1.660	155AP1250
1½″	1.900	155AP1500
2″	2.375	155AP2000

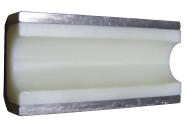
Steel used for heavy wall or abrasive application.

Consult factory for tooling sizes not shown.

STEEL SUPPORT WITH REPLACEABLE POLYMER INSERT

Pipe Size	Outside Diameter	Counterbend Die Part#
1″	1.315	155SP1000
1¼″	1.660	155SP1250
1½″	1.900	155SP1500
2″	2.375	155SP2000

Polymer recommended for materials with a polished finish such as stainless and aluminum.



REPLACEABLE POLYMER INSERTS

1″	1.315	155SP1000INS
1¼″	1.660	155SP1250INS
1½″	1.900	155SP1500INS
2″	2.375	155SP2000INS

Commercial Pipe and Wall Thickness

Nominal Pipe Size	Outside Diameter	Schedule 5	Schedule 10	Schedule 40	Schedule 80	Schedule 160	Schedule XXS
6.35mm 1/4″	13.7mm 0.540″	1.20 0.049	1.72 0.065	2.24 0.088	3.02 0.119		
9.52mm 3/8″	17.1mm 0.675″	1.20 0.049	1.72 0.065	2.31 0.091	3.20 0.126		
12.7mm 1/2″	21.3mm 0.840″	1.72 0.065	2.11 0.083	2.77 0.109	3.73 0.147	4.78 0.187	7.47 0.294
19.1mm 3/4″	26.7mm 1.050″	1.72 0.065	2.11 0.083	2.87 0.113	3.91 0.154	5.54 0.218	7.82 0.308
25.4mm 1″	33.4mm 1.315″	1.72 0.065	2.77 0.109	3.38 0.133	4.55 0.179	6.35 0.250	9.09 0.358
31.8mm 1-1/4″	42.2mm 1.660″	1.72 0.065	2.77 0.109	3.56 0.140	4.85 0.191	6.35 0.250	9.70 0.382
38.1mm 1-1/2″	48.3mm 1.900″	1.72 0.065	2.77 1.109	3.68 0.145	5.08 0.200	7.10 0.281	10.16 0.400
50.8mm 2″	60.3mm 2.375″	1.72 0.065	2.77 0.109	3.91 0.154	5.54 0.218	8.74 0.343	11.07 0.436
63.5mm 2-1/2″	73.0mm 2.875″	2.11 0.083	3.04 0.120	5.16 0.203	7.01 0.276	9.52 0.375	14.02 0.552
76.1mm 3″	88.9mm 3.500″	2.11 0.083	3.04 0.120	5.49 0.216	7.62 0.300	11.13 0.438	15.24 0.600
88.9mm 3-1/2″	101.6mm 4.000″	2.11 0.083	3.04 0.120	5.70 0.226	8.10 0.318		15.91 0.636
101.6mm 4″	114.3mm 4.500″	2.11 0.083	3.04 0.120	6.02 0.237	8.56 0.337	13.49 0.531	17.12 0.674
127.0mm 5″	141.3mm 5.563″	2.77 0.109	3.38 0.134	6.55 0.258	9.52 0.375	15.88 0.625	19.1 0.750
152.4mm 6″	168.3mm 6.625″	2.77 0.109	3.38 0.134	7.11 0.280	10.97 0.432	18.26 0.718	21.95 0.864

Information required for rotary draw tooling applications

- Size and wall thickness of material
- Material type and grade
- Number of bends on part
- Distance between bends
- Plane of bend relationship to one another
- Production rates
- Part tolerances
- Centerline radius of the bends. ***Note:*** bends with radius less than 2 times OD require greater attention, high grade bendable materials and heavier machine design.

Understanding material to be bent

Bending application success is dependent on several factors including and most importantly the proper material. Obtain a print of work to be done, review dimensions and tolerances. Review the mill certification for material from the mill and confirm the material is appropriate for bending. Use caliper to measure material and confirm dimensions are correct for tooling. Tube OD and wall thickness variations are far more common than you may realize. For some tube fabricating applications, this variation is of little concern, but in rotary draw bending, ID dimension variation is a big issue. The tubing must fit the tooling correctly and have the appropriate clearances.
Note: different types of material can be bent i.e., steel, aluminum, and stainless however the tooling composition and CLR may change to ensure material compatibility. Pay attention to material ordered and confirm it's received as ordered.

Terminology

Bend Specifications

OD is tube outside diameter, usually measured in inches or millimeters. Sometimes the tube outside diameter is expressed in nominal, such as IPS for pipe. Only rarely is a tube diameter specified as an inside diameter. This is non-standard, leads to confusion, and should be avoided. Whatever units are used, OD should be expressed in decimal, to three places in the case of inches.

WT is wall thickness. Inches and millimeters are common units, and again the precision of a decimal number to three places is warranted if inches are used; at least one place for millimeters. Frequently, the old Birmingham Wire Gage Standard is used to express WT; be sure to use the correct gage (there are several standards) when translating to decimal inches. When the TOD is expressed as an IPS nominal size, then the WT is expressed as a schedule number, which corresponds to a precise value in inches.

CLR is centerline radius and is the most common reference for bend radius. Again, inches and millimeters are the common units of measurement. Typically, fractional or two-place decimal inches are sufficiently precise. Sometimes the CLR is expressed as a multiple of the TOD, such as "1-D", "2-D", and so on. Note that if the TOD is expressed as an IPS nominal size and the CLR is expressed as a "D", it is a multiple of the nominal, not the actual tube diameter. Inside radius, abbreviated "ISR", is a common reference for specifying bend radius if the tubing is non-round. Outside radius is seldom used to define the bend radius.

DOB is degree of bend, often loosely referred to as the sweep of bend or depth of bend. This defines in decimal degrees (occasionally degrees and minutes) the arc of the bend. This is, of course, different from "plane of bend" or "orientation", a specification for multi-bend parts which defines in degrees where the plane of the current bend is located relative to the plane of the first bend.

In defining multi-bend parts, XYZ rectangular coordinates are used, from which bend data are developed. Bend data consist of tangent length, plane of bend, and degree of bend and defines the motion of the tube during the bending process.

Pipe Size	Outside Diameter	Wall Thickness Sch. / Inch	Min. CLR Inch	Drive Diameter	Center Former Part#	Counterbend Die Part#
¼″	.540	40 - .088	1.4	40mm	153R036P0250	155P0250
⅜″	.675	40 - .091	1.4	40mm	153R036P0375	155P0375
		10 - .065	2.2	40mm	153R056P0375	
½″	.840	40 - .109	1.8	40mm	153R046P0500 ●	155P0500
		10 - .083	2.2	40mm	153R056P0500	
		5 - .065	2.6	40mm	153R067P0500	
		5 - .065	4.4	40mm	156R112P0500	
¾″	1.050	40 - .113	2.2	40mm	153R056P0750 ●	155P0750
		10 - .083	2.6	40mm	153R067P0750	
		5 - 065	3.2	40mm	153R082P0750	
		5 - .065	5.1	50mm	156R130P0750	
1″	1.315	40 - .133	2.6	40mm	153R067P1000 ●	155P1000
		10 - .109	3.2	40mm	153R082P1000	
		10 - .109	3.9	50mm	156R100P1000	
		5 - .065	4.4	40mm	153R112P1000	
		5 - .065	6.7	50mm	156R170P1000	
		5 - .065	6.7	110mm	157R170P1000-110	
1¼″	1.660	40 - .140	3.5	50mm	153R090P1250 ●	155P1250
		40 - .140	3.9	50mm	153R100P1250	
		10 - .109	5.1	50mm	153R130P1250	
		5 - .065	5.9	50mm	153R150P1250	
		5 - .065	7.5	50mm	153R190P1250	
		5 - .065	8.9	50mm	157R225P1250	
		5 - .065	8.9	110mm	157R225P1250-110	
1½″	1.900	40 - .145	3.9	50mm	153R100P1500 ●	155P1500
		40 - .145	5.1	50mm	153R130P1500	
		40 - .145	5.9	50mm	153R150P1500	
		10 - .109	6.7	50mm	153R170P1500	
		5 - .065	7.5	50mm	153R190P1500	
		5 - .065	9.8	50mm	157R250P1500	
		5 - .065	9.8	110mm	157R250P1500-110	

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Pipe Size	Outside Diameter	Wall Thickness Sch. / Inch	Min. CLR Inch	Drive Diameter	Center Former Part#	Counterbend Die Part#
2″	2.375	40 - .154	5.1	50mm	153R130P2000	155P2000
		10 - .109	5.9		153R150P2000 ●	
		5 - .065	7.5		153R190P2000	
		5 - .065	8.9		157R225P2000	
		5 - .065	10.2		157R260P2000	
		5 - .065	10.2	80mm	157R260P2000-80	
		5 - .065	11.8	50mm	157R300P2000	
		5 - .065	11.8	80mm	157R300P2000-80	
		5 - .065	11.8	110mm	157R300P2000-110	
2½″	2.875	40 - .203	10.2	80mm	157R260P2500-80	155P2500
		40 - .203	11.8		157R300P2500-80	
		40 - .203	11.8	110mm	157R300P2500-110	
		10 - .120	13.8	80mm	157R350P2500-80	
		10 - .120	13.8	110mm	157R350P2500-110	
3″	3.500	40 - .216	11.8	80mm	157R300P3000-80	155P3000
		40 - .216	11.8	110mm	157R300P3000-110	
		40 - .216	13.8	80mm	157R350P3000-80	
		10 - .120	17.7	110mm	157R450P3000-110	
4″	4.500	40 - .237	13.8	110mm	157R350P400-110	152BP4000
		10 - .120	22.0	110mm	157R560P400-110**	
6″	6.625	40 - .280	23.2	130mm	157R590P6000-130	152BP6000
		10 - .134	31.5	130mm	157R800P6000-130**	

3D Tooling (153R190P2000, 157R260P2500-80, 157R300P3000-80, 157R300P3000-110, 157R350P400-110, 157R590P6000-130)

5D Tooling (157R300P2000, 157R300P2000-80, 157R300P2000-110, 157R350P2500-80, 157R350P2500-110, 157R450P3000-110, 157R560P400-110, 157R800P6000-130)

● **Included in standard Pipe Tooling Kits (pg. 15)**

80mm drive diameter available for TB80 / TB100 / TB130
110mm drive diameter available for TB130 / TB180
130mm drive diameter available for TB180 only

Bending of non-ferrous material may require tooling modification.

*Select models require counterbending die support 050E when bending radii 225mm and larger.
Refer to machine manual for CLR capacities and drive.

All standard Ercolina® counterbending dies are provided in bronze.

**Center Former Part# 157R560P400-110 and 157R800P6000-130 require lead time.