



**A**s a recognized leader in the fluid power tube fabricating industry for over 50 years, Lakeland Products has a long-established reputation of quality, dependability and versatility. Our equipment is used in a wide variety of applications ranging from railing manufacturers to manufacturers of sophisticated jet aircraft.

A division of Stride Tool Inc., a world leader in tube fabricating technology, we have the engineering resources and experience to provide solutions for all tube fabricating requirements.

In this catalog you will find machines and tools in the most commonly used sizes tailored to fit virtually any need in the low to medium volume production markets. Space limitations prohibit us from listing every tool available for use on our equipment. Virtually all requirements to fabricate conventional tubing, metric tubing, rigid electrical conduit and I.P.S. pipe can be met using Lakeland equipment. If your specific needs cannot be satisfied through tools referenced in this catalog, simply contact Lakeland Products.

Thank you for selecting Lakeland Products. Obviously, quality is a top priority in your company. Lakeland Products is constantly striving to maintain the quality that has made us a recognized leader in the tube fabricating industry.

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# GLOSSARY

**Annealing** - Heat treating process used to reduce material hardness. Annealed tube is **REQUIRED** to maximize the capabilities of Lakeland equipment.

**Bench Mounting Adapter** - Special adjustable adapter used to mount the 412 and 420 benders to a table or bench. **MANDATORY** for mandrel use.

**Bend Angle Indexing Gage** - Device used to accurately rotate tubing when making multi-plane bends.

**Bend Radius** - Dimension from tube centerline to center of bend.

**Bi-Directional Bender** - 624 and 648 machines are capable of making either right or left bends. Required for opposite direction or "S" type bends.

**Clamp Arm** - Device to hold clamp blocks which secure the tube to the radius block on models 624, 632 and 648.

**Clamp Block** - Tool required to secure tube or pipe to radius block. Available in combination (multiple O.D. sizes machined into a single block) or single size design.

**"Flare-End" Radius Block** - Special radius block used to make a bend adjacent to a flared tube end.

**"I.P.S." - Iron Pipe Size** - Pipe has different outside dimensions than tubing. **Special tooling is required.**

**Mandrel** - Device which, when inserted inside tube, provides internal support at point of bend to prevent tube distortion, flattening, etc.

**Radius Block** - Tool required on all equipment to form the shape of the bend.

**Slide Block** - Tooling required to support the tube or pipe on the outside surface of the bend. Available in combination (multiple O.D. sizes machined into a single block) or single size design.

**Springback** - Tendency of bent tube or pipe to return to its natural straight condition. Over bending (3" - 5") is required to assure that **ANNEALED** material will meet design specification once released from machine. Degree of overbend is dependent upon material and bend radius.

**Wiper Die** - Tool used in conjunction with a ball mandrel when bending thin wall tube on a tight radius.

## PRE-SELECTION CHECKLIST

Is tubing annealed?

Tube O.D. and wall thickness

### Material Specifications:

Mild Steel

Stainless Steel

Iron Pipe

Brass

Aluminum

### Material Configuration:

Round Tube or Pipe

Square Tube

Rectangular Tube

Solid Bar

Desired bend radius

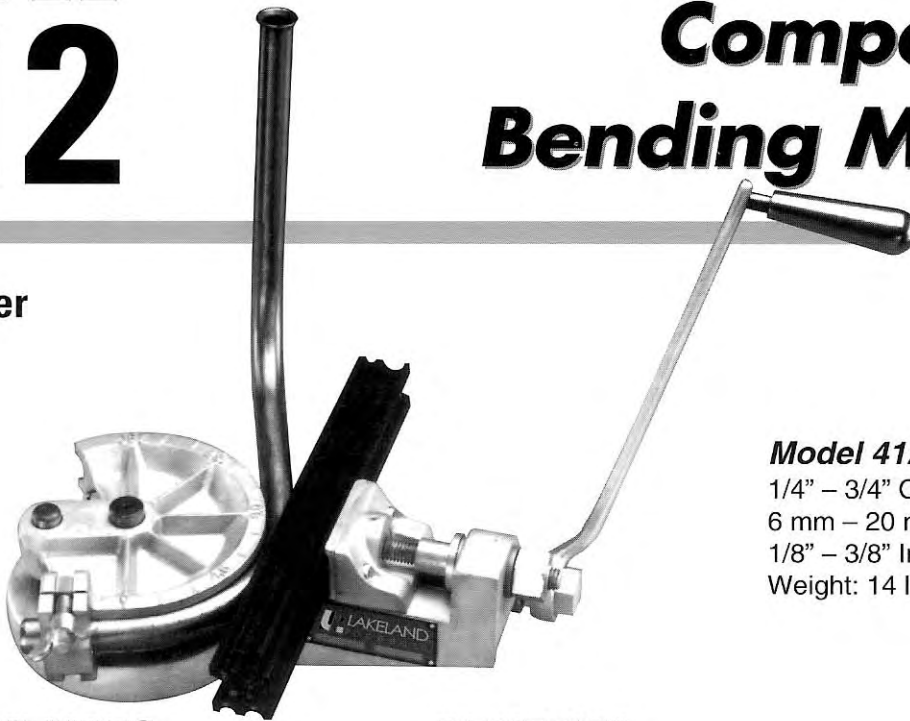
Maximum degree of bend

Is a mandrel required? *See page 14-15*

# MODEL 412

## Compact Bending Machine

Part Number  
8-154-1



### **Model 412 (shown with Tooling)**

1/4" – 3/4" O.D. Tube  
6 mm – 20 mm O.D. Metric Tube  
1/8" – 3/8" Iron Pipe (I.P.S.)  
Weight: 14 lbs.

### FEATURES

### BENEFITS

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#### 1/4"-3/4" Capability

- Bends virtually all popular sizes.

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#### 60:1 Gear Drive

- Provides mechanical advantage to easily bend heaviest tubing and up to Schedule 40 pipe.

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#### Light Weight and Versatile

- Can be vice or bench mounted.
- Easily portable.
- Use in shop or take to job site.
- Ideal for field service work. – *See page 5*

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#### Easy to Use

- Makes all operators expert tube benders.
- Compound bends easily accomplished.

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#### Combination Slide Block

- Multiple O.D. sizes machined into a single block.
- Reduces tooling costs.

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#### Radius Block Variety

- Meet virtually any bend radius specification.
- Unique "Flare-End" block allows bend adjacent to flare.
- Available for metric tubing, rigid conduit and Schedule 40 pipe.

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#### Integral Tube Clamp

- Radius block clamp pivots to quickly grip or release tubing for higher production.
- Reduced tooling costs.

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#### Disengageable Gears

- Enables quick return to starting position without engaging gear drive.

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#### Mandrel Capability

- Easily converted to bend thin wall tube with use of optional mandrels. – *See page 14*

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#### Field Service Kit

- Contains Model 412 bender, combination slide block and 5 radius blocks in a carrying case. – *See page 5*

# Model 412 Tooling

The Model 412 bender requires slide blocks and radius blocks.  
For most close bends and thin wall tubing, a mandrel may be required.  
Consult factory for I.P.S. pipe tooling.

## Standard Radius Blocks

Tube Size	O.D.	Radius	Part Number	M.W.T.*
-4	1/4"	9/16"	8-154-55-7	.028"
		3/4"	8-154-55-1	.022"
-5	5/16"	11/16"	8-154-55-8	.035"
		1"	8-154-55-2	.028"
-6	3/8"	15/16"	8-154-55-9	.049"
		1-1/4"	8-154-55-3	.03"
-8	1/2"	1-1/4"	8-154-55-10	.065"
		2"	8-154-55-4	.035"
-10	5/8"	1-1/2"	8-154-55-11	.065"
		2-1/2"	8-154-55-5	.049"
-12	3/4"	1-3/4"	8-154-55-12	.083"
		3"	8-154-55-6	.049"

\*Minimum Wall Thickness to avoid use of mandrel. For mandrel requirement see page 14.

## Standard Slide Block

Tube O.D. (in.)	Part Number
4-5-6-8-10-12	7-2754-12-2

## Metric Slide Block

Tube O.D. (mm.)	Part Number
6-8-12-16-20	1-762-138
10-14-15-18	1-762-139

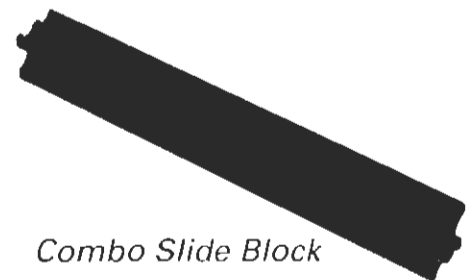
## "Flare-End" Radius Blocks

Tube Size	O.D.	Radius	Part Number	M.W.T.*
-8	1/2"	1-1/4"	8-154-140	.065"
-10	5/8"	1-1/2"	8-154-141	.065"
-12	3/8"	1-3/4"	8-154-142	.083"

\*Minimum Wall Thickness to avoid use of mandrel. For mandrel requirement see page 14.

## Metric Radius Blocks

Tube O.D. mm	Radius		Part Number
	mm	inches	
6	14	9/16	1-762-50-19
8	18	11/16	1-762-50-20
10	24	15/16	1-762-50-21
12	32	1-1/4	1-762-50-22
14	38	1-1/2	1-762-50-23
15	38	1-1/2	1-762-50-24
16	38	1-1/2	1-762-50-25
18	44	1-3/4	1-762-50-26
20	44	1-3/4	1-762-50-27



Combo Slide Block



Conventional  
Radius Blocks



"Flare-End"  
Radius Block

Different tube diameters and radii are available.  
Consult factory.

# Model 412K Field Service Kit

- For 1/4" (size 4) to 3/4" (size 12)
- Bends tubing up to 180°
- Flattening less than 5%

*Easy Manual Bending*  
*Complete Package of Accessories*  
*Portable*  
*Lightweight*

Model 412K (Part No. 8-154-250) Includes:  
Model 412 Tube Bender, Combination Slide Block,  
5 Radius Blocks and a Carrying Case.



Size #12

Carrying Case  
(Part No. 8-154-92)

Combination Slide Block  
(Part No. 7-2754-12-2)

Size #8

Size #10

Size #4

Model 412 Bender  
(Part No. 8-154-1)

- Radius Blocks:
- Size #4 (1/4" O.D.) x 3/4" Radius\*  
(Part No. 8-154-55-1)
  - Size #6 (3/8" O.D.) x 3/4" Radius  
(Part No. 8-154-55-3)
  - Size #8 (1/2" O.D.) x 2" Radius  
(Part No. 8-154-55-4)
  - Size #10 (5/8" O.D.) x 2-1/2" Radius  
(Part No. 8-154-55-5)
  - Size #12 (3/4" O.D.) x 3" Radius  
(Part No. 8-154-55-6)

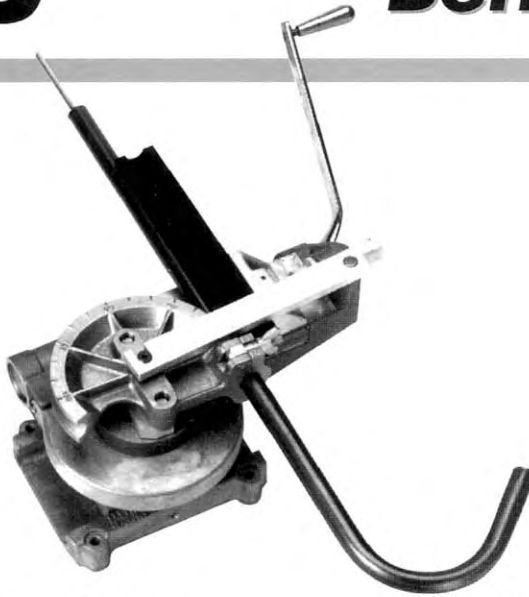
Size #6

\*Radius - Radius to tube centerline.  
Other sizes available as well as metric  
and close bend radius blocks for flared tubing.

# MODEL 420

## Large Capacity Portable Bending Machine

Part Number  
1-762-100



### **Model 420 (shown with Tooling)**

1/4" – 1-1/4" O.D. Tube  
6mm – 32mm O.D. Metric Tube  
1/8" – 3/4" Iron Pipe (I.P.S.)  
Weight: 40lbs.

### FEATURES

### BENEFITS

1/4" – 1-1/4" Capability

- Bends virtually all popular sizes.

60:1 Gear Drive

- Provides mechanical advantage to easily bend heaviest tubing and up to Schedule 40 pipe.

Light Weight and Versatile

- Can be vice or bench mounted.
- Easily portable.
- Use in shop or take to job site.

Easy to Use

- Makes all operators expert tube benders.
- Compound bends easily accomplished.

Combination Slide Block

- Multiple O.D. sizes machined into a single block.
- Reduces tooling costs.

Radius Block Variety

- Meet virtually any bend radius specification.
- Unique "Flare-End" block allows bend adjacent to flare.
- Available for metric tubing, rigid conduit and Schedule 40 pipe.

Integral Tube Clamp

- Radius block clamp pivots to quickly grip or release tubing for higher production.
- Reduced tooling costs.

Disengageable Gears

- Enables quick return to starting position without engaging gear drive.

Mandrel Capability

- Easily converted to bend thin wall tube with use of optional mandrels. – See page 14

# Model 420 Tooling

The Model 420 bender requires slide blocks and radius blocks.  
For most close bends and thin wall tubing, a mandrel may be required.  
Consult factory for I.P.S. pipe tooling.

## Standard Radius Blocks

Tube Size	O.D.	Radius	Part Number	M.W.T.*
-4	1/4"	9/16"	8-154-55-7	.028"
		3/4"	8-154-55-1	.022"
-5	5/16"	11/16"	8-154-55-8	.035"
		1"	8-154-55-2	.028"
-6	3/8"	15/16"	8-154-55-9	.049"
		1-1/4"	8-154-55-3	.03"
-8	1/2"	1-1/4"	8-154-55-10	.065"
		2"	8-154-55-4	.035"
-10	5/8"	1-1/2"	8-154-55-11	.065"
		2-1/2"	8-154-55-5	.049"
-12	3/4"	1-3/4"	8-154-55-12	.083"
		3"	8-154-55-6	.049"
-14	7/8"	3-1/2"	1-762-50-1	.065"
-16	1"	4"	1-762-50-2	.065"
-18	1-1/8"	4-1/2"	1-762-50-3	.083"
-20	1-1/4"	5"	1-762-50-4	.083"

\*Minimum Wall Thickness to avoid use of mandrel. For mandrel requirement see page 14.

## "Flare-End" Radius Blocks

Tube Size	O.D.	Radius	Part Number	M.W.T.*
-8	1/2"	1-1/4"	8-154-140	.065"
-10	5/8"	1-1/2"	8-154-141	.065"
-12	3/8"	1-3/4"	8-154-142	.083"

\*Minimum Wall Thickness to avoid use of mandrel. For mandrel requirement see page 14.

## Metric Radius Blocks

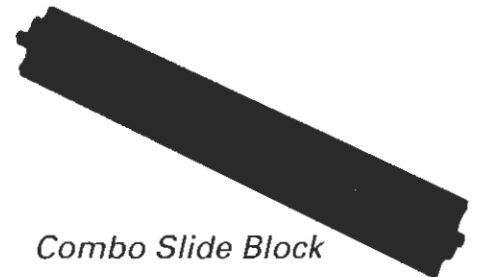
Tube O.D. mm	Radius		Part Number
	mm	inches	
6	14	9/16	1-762-50-19
8	18	11/16	1-762-50-20
10	24	15/16	1-762-50-21
12	32	1-1/4	1-762-50-22
14	38	1-1/2	1-762-50-23
15	38	1-1/2	1-762-50-24
16	38	1-1/2	1-762-50-25
18	44	1-3/4	1-762-50-26
20	44	1-3/4	1-762-50-27
22	89	3-1/2	1-762-50-28
25	102	4	1-762-50-29
30	127	5	1-762-50-30
32	127	5	1-762-50-31

## Standard Slide Block

Tube O.D. (in.)	Part Number
4-5-6-8-10-12	7-2754-12-2
14-16-18-20	1-762-40

## Metric Slide Block

Tube O.D. (mm.)	Part Number
6-8-12-16-20	1-762-138
10-14-15-18	1-762-139
22-25-30-32	1-762-140



Different tube diameters and radii are available.  
Consult factory.

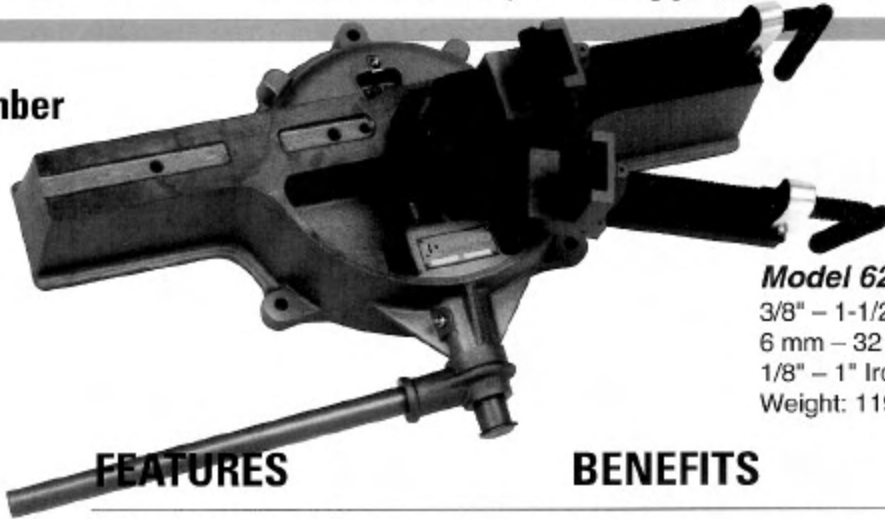


# MODEL 624

## Economical Heavy Duty Bender

Maintenance, Prototype, Low Production, Etc.

Part Number  
2-490-1



### Model 624 (shown with Tooling)

3/8" – 1-1/2" O.D. Tube  
6 mm – 32 mm O.D. Metric Tube  
1/8" – 1" Iron Pipe (I.P.S.)  
Weight: 119 lbs.

### FEATURES

3/4" – 1-1/2" Capability

Bi-Directional Bending

4:1 Gear Drive

Quick Clamp Engagement

Bench Mounting

Radius Block Variety

Combination Slide & Clamp Block

Mandrel Capability

### BENEFITS

• Bends virtually all popular sizes.

• Makes right or left-hand bends.  
• Makes opposite direction or "s" type bends.  
• Easy shifting of clamp block arm provides quick changeover for right or left-hand bends.

• Bends larger material without operator fatigue.  
• High speed mechanical advantage to bend heaviest tubing and up to Schedule 40 pipe.

• Standard clamp and slide block arms use speed screw and half-nut to quickly engage and disengage tooling.

• Can be bench or table mounted.  
• No need for special cabinet or stand.  
• No additional floor space requirements.

• Meet virtually any bend radius specification.  
• Unique "Flare End" block allows bend adjacent to flare.  
• Available for metric tubing, rigid conduit and Schedule 40 pipe.

• Only **three** slide clamp blocks cover full size range.

• Easily converted to bend thin-wall tube with use of optional mandrels. – See page 14

SEE PAGES 11-12 for tooling requirements.

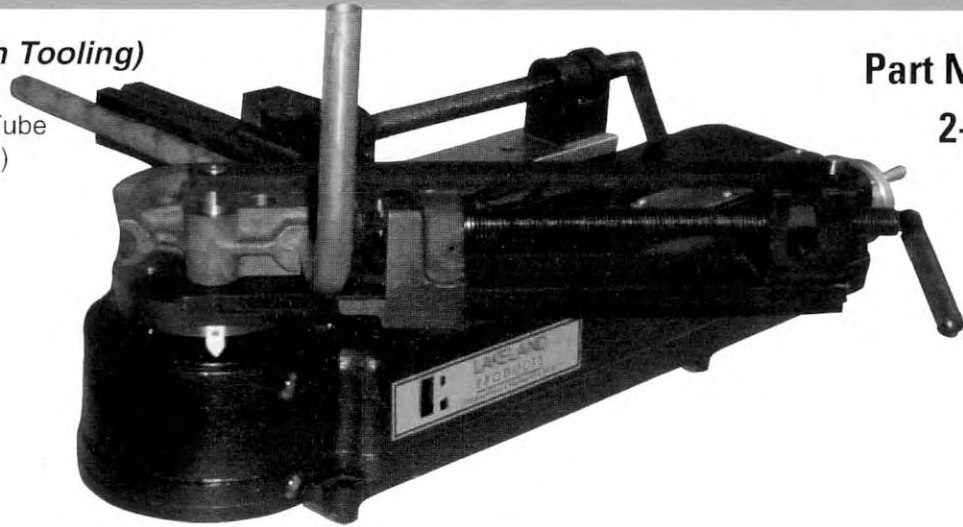
# Compact Hydraulic Production Bender

# MODEL 632

## Model 632 (shown with Tooling)

3/8" – 2" O.D. Tube  
6 mm – 32 mm O.D. Metric Tube  
1/8" – 1-1/4" Iron Pipe (I.P.S.)  
Weight: 150 lbs.

Part Number  
2-1190-1



## FEATURES

## BENEFITS

### 3/8" – 2" Capability

- Bends virtually all popular sizes.

### Automatic Bend Angle Stop

- Dial-in degree of bend required and machine will automatically stop when bend is complete.
- Second dial indicator, located under radius block, permits monitoring during bending.
- Spring on cylinder automatically returns mechanism to starting position after bend is complete.

### Rugged Heavy Duty Design

- Proven, long-life design utilizes 10,000 psi hydraulic cylinder to rotate radius block.

### Quick Clamp Engagement

- Standard clamp and slide block arms use speed screw and half-nut to quickly engage and disengage tooling.

### Heavy Duty Power Unit

- 10,000 p.s.i. hydraulic power - pack unit allows simple operation with on-off iog switch
- 1/2 HP, 115 V operation.
- MUST BE ORDERED SEPARATELY.

### Mandrel Capability

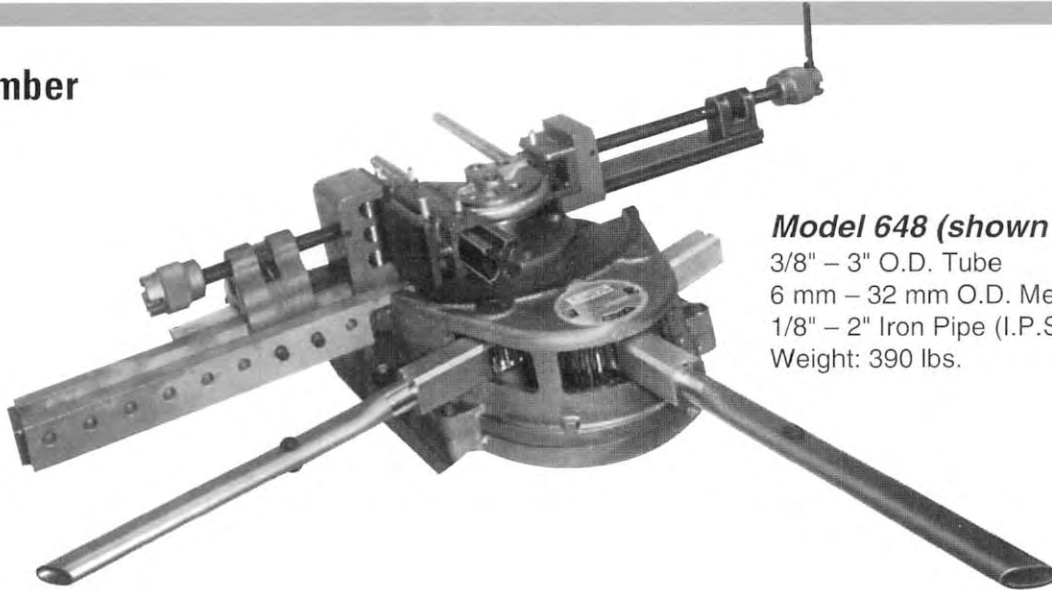
- Easily converted to bend thin-wall tube with use of optional mandrels. – See page 14

SEE PAGES 11-12 for tooling requirements.

# MODEL 648

## Heavy-Duty Manual Production Bender

Part Number  
7-248-1



### *Model 648 (shown with Tooling)*

3/8" – 3" O.D. Tube  
6 mm – 32 mm O.D. Metric Tube  
1/8" – 2" Iron Pipe (I.P.S.)  
Weight: 390 lbs.

### FEATURES

### BENEFITS

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#### 3/8" – 3" Capability

- Bends virtually all popular sizes.

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#### Dual Drive Mechanism

- Dual ratchet drives allow for either heavy duty or high production bending.
- 30:1 ratchet drive handles all heavy fabrication. Handle can be positioned on either left or right side of bender.
- 8:1 ratchet drive provides higher production rates. Handle located in center of machine.

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#### Bi-Directional Bending

- Makes opposite direction or "S" type bends.
- Buttons on handles for fast tension release changeover for right or left-hand bends.

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#### Quick Clamp Engagement

- Standard clamp and slide block arms use speed screw and half-nut to quickly engage and disengage tooling.

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#### Mandrel Capability

- Easily converted to bend thin-wall tube with use of optional mandrels. – See page 14

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SEE PAGES 11-12 for tooling requirements.

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# Tooling for Models 624, 632 and 648

## Standard Radius Blocks

### Model 624

Tube Sizes	O.D.	Radius	Part Number
-6	3/8"	1-1/8"	590512-18
		1-1/4"	590512-20
-8	1/2"	1-1/4"	590515-20
		1-1/2"	590515-24
-10	5/8"	1-1/2"	590515-24
		1-7/8"	590518-30
-12	3/4"	1-3/4"	590521-28
		2-1/4"	590521-36
-14	7/8"	2"	590523-32
		2-5/8"	590523-42
-16	1"	3"	590524-48
-18	1-1/8"	3-3/8"	590526-54
		3-1/2"	590526-56
-20	1-1/4"	3-3/4"	590526-60
-24	1-1/2"	4-1/2"	590530-72
		5"	590530-80

### Model 632

Tube Sizes	O.D.	Radius	Part Number
-6	3/8"	1-1/8"	590512-18
		1-1/4"	590512-20
-8	1/2"	1-1/4"	590515-20
		1-1/2"	590515-24
-10	5/8"	1-1/2"	590515-24
		1-7/8"	590518-30
-12	3/4"	1-3/4"	590521-28
		2-1/4"	590521-36
-14	7/8"	2"	590523-32
		2-5/8"	590523-42
-16	1"	3"	590524-48
-18	1-1/8"	3-3/8"	590526-54
		3-1/2"	590526-56
-20	1-1/4"	3-3/4"	590526-60
-24	1-1/2"	4-1/2"	590530-72
		5"	590530-80
-28	1-3/4"	7"	9-262-48-28-56
-32	2"	8"	9-262-48-32-64

### Model 648

Tube Sizes	O.D.	Radius	Part Number
-6	3/8"	1-1/8"	590512-18
		1-1/4"	590512-20
-8	1/2"	1-1/4"	590515-20
		1-1/2"	590515-24
-10	5/8"	1-1/2"	590515-24
		1-7/8"	590518-30
-12	3/4"	1-3/4"	590521-28
		2-1/4"	590521-36
-14	7/8"	2"	590523-32
		2-5/8"	590523-42
-16	1"	3"	590524-48
-18	1-1/8"	3-3/8"	590526-54
		3-1/2"	590526-56
-20	1-1/4"	3-3/4"	590526-60
-24	1-1/2"	4-1/2"	590530-72
		5"	590530-80
-28	1-3/4"	7"	9-262-48-28-56
-32	2"	8"	9-262-48-32-64
-40	2-1/2"	10"	4-2239-4-40-10
-48	3"	12"	4-2239-4-48-12

## Metric Radius Blocks - Consult Factory I.P.S. Radius Blocks

### Model 624

Pipe Sizes	O.D.	Radius	Part Number
1/8	.405"	1-1/4"	590513-20
1/4	.540"	1-1/2"	590516-24
3/8	.675"	2-1/4"	590519-36
1/2	.840"	2-5/8"	590522-42
3/4	1.050"	3"	590525-48
1	1.315"	4-1/2"	590528-72

### Model 632

Pipe Sizes	O.D.	Radius	Part Number
1/8	.405"	1-1/4"	590513-20
1/4	.540"	1-1/2"	590516-24
3/8	.675"	2-1/4"	590519-36
1/2	.840"	2-5/8"	590522-42
3/4	1.050"	3"	590525-48
1	1.315"	4-1/2"	590528-72
1-1/4	1.660"	6-3/4"	4-2239-8-1 1/4-14
1-1/2	1.900"	7-1/2"	9-262-48-1 1/2-17

### Model 628

Pipe Sizes	O.D.	Radius	Part Number
1/8	.405"	1-1/4"	590513-20
1/4	.540"	1-1/2"	590516-24
3/8	.675"	2-1/4"	590519-36
1/2	.840"	2-5/8"	590522-42
3/4	1.050"	3"	590525-48
1	1.315"	4-1/2"	590528-72
1-1/4	1.660"	6-3/4"	4-2239-8-1 1/4-14
1-1/2	1.900"	7-1/2"	9-262-48-1 1/2-17
2	2.375"	9-1/2"	4-2239-4-2-9 1/2

## "Flare-End" Radius Blocks

### Models 624, 632 and 648

Tube Sizes	O.D.	Radius	Part Number
-8	1/2"	1-1/4"	530598
-10	5/8"	1-1/2"	530602
-12	3/4"	1-3/4"	530606
-14	7/8"	2"	530610
-16	1"	3"	530614
-20	1-1/4"	3-3/4"	530622
-24	1-1/2"	5"	530626

Unlike conventional radius blocks, our unique adjustable "Flare-End" radius block permits pre-flared tubing to be bent directly adjacent to the tube.

Different tube diameters and radii are available. Consult factory for mandrel requirements. - See page 14

# Tooling for Models 624, 632 and 648

## Slide Blocks for 624, 632 and 648

Combination-Standard			Individual-Standard			Combination-Metric		Combination-I.P.S. Pipe	
Tube Sizes	Outside Diameters	Part Number	Tube Sizes	Outside Diameters	Part Number	Tube Sizes	Part Number	Pipe Sizes	Part Number
-6	3/8"	8-642-7-3	<b>MODEL 632</b>			6-8 mm	7-873-77	1/8"-1/4" 3/8"-1/2"	8-139-10
8-12 16-24	1/2"-3/4" 1"-1-1/2"	520516	-28	1-3/4"	8-642-7-11	10-12 mm	7-873-78	1/4"-3/8" 1/2"-3/4"	5-469-1
	-32		2"	8-642-7-12	14-16 mm				
			<b>MODEL 648</b>			15-16 mm	7-873-79	3/8"-1/2" 3/4"-1"	12-1767-3
10-14 18-20	5/8"-7/8" 1-1/8"-1-1/4"	520518	-28	1-3/4"	11-144-55	18-20 mm			
			-32	2"	11-144-57	22-25 mm			
			-40	2-1/2"	2-741-7-40	30-32 mm			
			-48	3"	2-741-7-48	35 mm	Consult Factory		

## Clamp Blocks for 624, 632 and 648

Combination-Standard			Individual-Standard			Combination-Metric		Combination-I.P.S. Pipe	
Tube Sizes	Outside Diameters	Part Number	Tube Sizes	Outside Diameters	Part Number	Tube Sizes	Part Number	Pipe Sizes	Part Number
-6	3/8"	8-642-6-3	<b>MODEL 632</b>			6-8 mm	7-873-73	1/8"-1/4" 3/8"-1/2"	8-139-9
8-12 16-24	1/2"-3/4" 1"-1-1/2"	631092	-28	1-3/4"	8-642-6-11	10-12 mm	7-873-74	1/4"-3/8" 1/2"-3/4"	12-1767-2
	-32		2"	8-642-6-12	14-16 mm				
			<b>MODEL 648</b>			15-16 mm	7-873-75	3/8"-1/2" 3/4"-1"	11-368-6
10-14 18-20	5/8"-7/8" 1-1/8"-1-1/4"	631093	-28	1-3/4"	2-741-8-28	18-20 mm			
			-32	2"	2-741-8-32	22-25 mm			
			-40	2-1/2"	2-741-10-40	30-32 mm			
			-48	3"	2-741-10-48	35 mm	Consult Factory		

# Use of Mandrels and Wiper Dies

## Use of Mandrels

The achievement of smooth distortion-free bends in tubing or I.P.S. pipe is a function of wall-thickness and bend radius dimension. Use of thin-wall material and/or tight bend radius blocks can lead to wrinkling and excessive flattening of the tube.

If customer requirements prevent use of heavier wall thickness and/or larger bend radius blocks, use of a mandrel may be required. Refer to **Mandrel and Wiper Die Selection Chart**.

A mandrel provides internal support to the material and is positioned inside the tube or pipe at the bend point. Depending upon the material size, the mandrel is machined .005"-.010" smaller than the I.D. It is supported in position by connecting mandrel rods and a rod stop assembly. Plug and Ball mandrels are available and the type required for a specific application can be determined from the **Mandrel and Wiper Die Selection Chart** on page 14.

Mandrel rods are available in standard lengths and designed so that additional rods can be connected together to provide whatever length assembly is required. Total rod

assembly length must exceed the tube length from end to first bend.

The mandrel Rod Stop Assembly supports the mandrel and rod assembly in position and allows the assembly to be adjusted towards and away from the bend point. Each rod stop assembly is designed for a specific model bending machine to account for the different center-line heights. Rod Stop Assemblies are adjustable horizontally to accept use of various radius block dimensions.

If a mandrel is required, ALL of the following items are NECESSARY:

1. Mandrel
2. Mandrel Rod(s)
3. Rod Stop Assembly
4. Bench Mounting Adapter (Models 412 & 420 only)  
– See page 20
5. Sturdy table or bench to rigidly align bender and mandrel assembly – (Models 412, 420, 624, 632 and 648 only) See page 20



Plug Mandrel



Ball Mandrel

# Mandrel and Wiper Die Selection Chart

To determine the mandrel type and need for a wiper die, first obtain the ratio of tube O.D. to wall thickness, and centerline radius to tube O.D. For example, a 2" x .035 wall tube is to be bent on a 5" CLR.

$$\frac{\text{TOD}}{\text{Wall}} = \frac{2''}{.035} = 57 \qquad \frac{\text{CLR}}{\text{TOD}} = \frac{5''}{2''} = 2.5$$

From the table we get 3BW, a 3-ball mandrel (3B) and a wiper die (W) is required.

$\frac{\text{TOD}}{\text{Wall}}$	1	1.25	1.5	2	2.25	3	4	5
10	1B	1B	1B	1B	P	P	----	----
15	1BW	1BW	1B	1B	P	P	----	----
20	2BW	1BW	1BW	1B	1B	P	P	----
25	3BW	2BW	1BW	1BW	1B	1B	P	----
30	3BW	3BW	2BW	2BW	1BW	1B	1B	1B
35	3BW	3BW	3BW	2BW	2BW	2BW	2B	1B
40	4BW	3BW	3BW	3BW	3BW	3BW	2BW	2B
45	4BW	3BW	3BW	3BW	3BW	3BW	2BW	2BW
50	4BW	3BW	3BW	3BW	3BW	3BW	2BW	2BW
60	4BW	4BW	3BW	3BW	3BW	3BW	2BW	2BW
70	5BW	5BW	5BW	3BW	3BW	3BW	3BW	2BW
80	5BW	5BW	5BW	5BW	3BW	3BW	3BW	2BW
90	5BW	5BW	5BW	5BW	3BW	3BW	3BW	3BW
100	5BW	5BW	5BW	5BW	5BW	3BW	3BW	3BW
125	5BW	5BW	5BW	5BW	5BW	5BW	4BW	4BW
150	6BW	6BW	6BW	6BW	5BW	5BW	4BW	4BW
175	6BW	7BW	8BW	7BW	7BW	6BW	6BW	6BW
200	6BW	8BW	10BW	10BW	9BW	9BW	8BW	8BW
225	----	8BW	10BW	10BW	10BW	10BW	10BW	10BW
250	----	----	10BW	10BW	10BW	10BW	10BW	10BW
275	----	----	10BW	10BW	10BW	10BW	10BW	10BW

Key to Chart	
----	No Mandrel
P	Plug Mandrel
B	Ball Mandrel
W	Wiper Die

Note: Models 412, 420, 624, 632 and 648 Benders are only capable of plug or one Ball Mandrel options.

# Plug and Ball Mandrels for Models 412, 420, 624, 632 and 648

NOTE: Models 412, 420, 632 and 648 are only capable of a plug mandrel or a one ball mandrel application. Plug mandrel part numbers are listed below. Consult factory for one ball mandrel part numbers.

If a mandrel is required, ALL of the following items are NECESSARY:

1. Mandrel
2. Mandrel Rod(s)
3. Rod Stop Assembly
4. Bench Mounting Adapter (Models 412 & 420 only) – See page 20
5. Sturdy table or bench to rigidly align bender and mandrel assembly – See page 20

### To Compute Mandrel Diameter:

3/16"-1" STD. and 1/8" IPS to 1/2" IPS: O.D. - [(2xWall) + .005]  
 1-1/8"-2" STD. and 3/4" IPS to 1-1/2" IPS: O.D. - [(2xWall) + .010]

## Mandrel Tooling

Actual Mandrel Diameter	Plug Mandrel Part Number			Adapter (Rod Stop) Part Number	Rod Stop Assembly Part Number
		Part Number	Rod Length		
.175-.234"	8-154-48-___*	8-154-50-1	24"***	8-154-49-1	8-154-57
.235-.299"		8-154-50-2		8-154-49-2	
.300-.379"		8-154-50-3		8-154-49-1	
.308-.705"		8-154-50-4		8-154-49-1	

### MODEL 412

\*Insert actual mandrel diameter at end of part number.

\*\*Select quantity of rods sufficient to exceed tube length from end to first bend.

Actual Mandrel Diameter	Plug Mandrel Part Number			Adapter (Rod Stop) Part Number	Rod Stop Assembly Part Number
		Part Number	Rod Length		
.175-.234'	8-154-48-___*	8-154-50-1	24"***	8-154-49-1	8-154-57
.235-.299"		8-154-50-2		8-154-49-2	
.300-.379"		8-154-50-3		8-154-49-1	
.308-.705"		8-154-50-4		8-154-49-1	
.706-1.200'	9-2441-7-___*	8-154-50-5		1-762-79-5	

### MODEL 420

\*Insert actual mandrel diameter at end of part number.

\*\*Select quantity of rods sufficient to exceed tube length from end to first bend.

Actual Mandrel Diameter	Plug Mandrel Part Number			Adapter (Rod Stop) Part Number	Rod Stop Assembly Part Number
		Part Number	Rod Length		
.278-.357"	9-2441-7-___*	520506	87-1/2"***	550501	Model 624 Part #522367 Model 632 Part #9-262-88 Model 648 Part #520500
.358-.479"		520507		522398	
.480-1.479"		520508			
1.480-1.979"		520509	89-1/2"***	Not Required	

### MODELS 624, 632 & 648

\*Insert actual mandrel diameter at end of part number.

\*\*Select quantity of rods sufficient to exceed tube length from end to first bend.



# Power Flaring, Beading and Squaring-Deburring Equipment

## MODEL 212



### Capabilities include:

Flaring only

**Part Number**  
212-00

**DISCONTINUED**

### Specifications

- Flaring capacity: 1/8" O.D. to 2" O.D.
- Wall thickness: .125" (3/8" to 2" O.D.).
- Flaring angles: 37 and 45 degree (SAE - ASME - JIC - AN - MS specs).
- Single flare cone: covers complete range of sizes.
- Standard tool steel or optional carbide tooling available.

## MODEL 232



### Capabilities include:

Flaring  
Beading  
Squaring and Deburring

**Part Number**  
8-369-1 (Model 232  
Manual Clamping)

**Part Number**  
8-369-2 (Model P232  
Automatic Clamping)

**Part Number**  
7-452-24 (Available Cabinet)

### Specifications

- Beading Capability: 1/4" to 1-1/2" O.D. Tubing.
- Flaring Capability: 1/8" to 2" O.D. Tubing.
- Flaring Angles: 37° and 45° AN, JIC, SAE, ASME, MS.
- Squaring & Deburring Capability: 1/8" to 2" O.D. Tubing.
- Electric Motor: 1/2 H.P. 115/230-1-60.
- Machine Dimensions: 18-1/2"W, 23-1/2"D, 13-5/8"H.
- Dimensions (with cabinet): 20"W, 23-1/2"D, 42"H.
- Weight (machine): 168 lbs.  
(with cabinet): 223 lbs.
- Required Air Pressure: 70 to 100 PSI (P232 ONLY).

## MODEL 248



### Capabilities include:

Flaring  
Beading  
Squaring and Deburring

**Part Number**  
4-1763-1\* (Manual, Semi-  
Automatic or  
Full Automatic)

\*Includes stand, die adapter P/N 590674 and chuck for fabricating -24 thru -48 tubing. P/N: 590671.

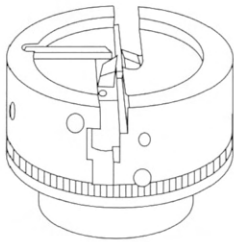
### Specifications

- Beading Capability: 1/4" to 3" O.D. Tubing.
- Flaring Capability: 1/8" to 3" O.D. Tubing.
- Flaring Angles: 37° and 45° AN, JIC, SAE, ASME, MS.
- Squaring & Deburring Capability: 1/8" to 3" O.D. Tubing.
- Electric Motor: 3/4 H.P. 220/440-3-60 Motor. (1HP Available)
- Dimensions: 34"W, 32-1/4"D, 47-1/4"H.
- Weight (stand included): 380 lbs.
- Required Air Pressure: 70 to 100 PSI.

# Squaring and Deburring- Required Tooling

## Squaring & Deburring: Required Tooling

- Squaring & Deburring Head
- Bits
- Flare Dies



Squaring –  
Deburring Head

Squaring - Deburring Head (less bits)	Part Number
Model 232 & P232	2-561-1
Model P248	4-465-1

Tool Bits (standard)	Part Number
Facing	2-561-7
O.D. (outside diameter)	2-561-6
I.D. (inside diameter)	2-561-14

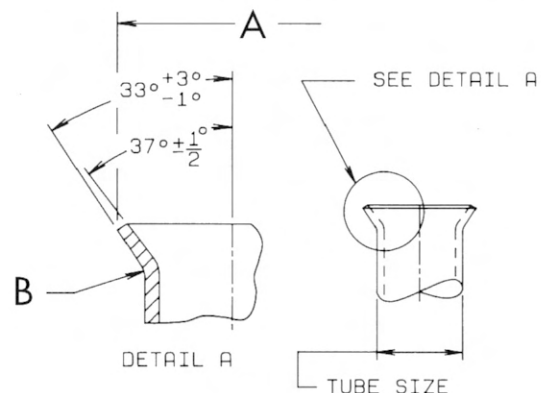
Tool Bits (carbide)	Part Number
Facing	2-561-9
O.D. (outside diameter)	2-561-11
I.D. (inside diameter)	2-561-15

# Flaring Capacity and Required Tooling

## Flaring: Capacities

SAE J-533 Wall Max.	Tube Size Nominal O.D.		A Dimension				B ±.010 Rad.
			Aluminum Alloy Tubing		Steel Tubing		
.035	2	1/8	.200	+.000	.200	+.000	.032
.035	3	3/16	.302		.302		
.065	4	1/4	.359		.359		
.065	5	5/16	.421	-.010	.421	-.010	.046
.065	6	3/8	.484		.484		
.083	8	1/2	.656	+.000	.656	+.000	.062
.095	10	5/8	.781		.781		
.109	12	3/4	.937		.937		
.120	16	1	1.187	-.015	1.187	-.015	.078
.120	20	1-1/4	1.500		1.500		
.120	24	1-1/2	1.721		1.721		
.120	28	1-3/4	2.106	+.000	2.106	+.000	.093
.134	32	2	2.356		2.356		
.134	40	2-1/2	2.856		2.856		
.134	48	3	3.356		3.356		

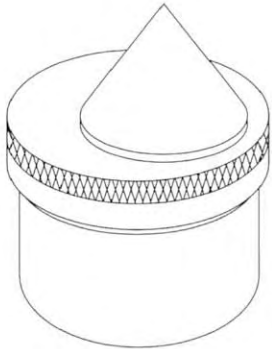
Unique flaring center assembly quickly mounts on rotating spindle and consists of a free-floating cone inserted into an adjustable eccentric chuck. Index numbers on perimeter of chuck indicate degree of eccentricity and allow for consistency of flares when changing tube sizes. Forward movement of operating lever carries cone into tube and smoothly rolls tube into flare die cavity.



# Flaring: Required Tooling

• Flaring Head

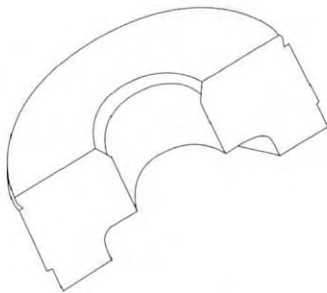
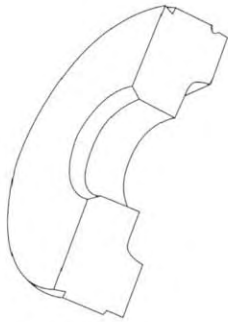
• Flaring Dies



Flaring Head

Flaring Head with Cone	37° Flare Part Number	45° Flare Part Number
Standard (2-32)	7-553-12-1	7-553-12-2
Carbide Size (2-16)	5-1263-10	5-1566-1
Carbide Size (18-32)	5-1263-15	5-1566-5
<b>Flare Cones ONLY</b>	<b>37° Flare Part Number</b>	<b>45° Flare Part Number</b>
Standard	7-452-51-1	7-452-51-2
Carbide Size (2-16)	5-1263-11	5-1566-2
Carbide Size (18-32)	5-1263-16	5-1566-5

NOTE: For Flare Head to Flare over 2" O.D., Consult Factory.



Flaring Dies

Flaring Dies	37° Flare Part Number	45° Flare Part Number
#2 (1/8 Tube)	7-452-10-1	7-452-10-14
#3 (3/16 Tube)	7-452-10-2	7-452-10-15
#4 (1/4 Tube)	7-452-10-3	7-452-10-16
#5 (5/16 Tube)	7-452-10-4	7-452-10-17
#6 (3/8 Tube)	7-452-10-5	7-452-10-18
#7 (7/16 Tube)	7-452-10-27	7-452-10-19
#8 (1/2 Tube)	7-452-10-6	7-452-10-20
#10 (5/8 Tube)	7-452-10-7	7-452-10-22
#12 (3/4 Tube)	7-452-10-8	7-452-10-23
#14 (7/8 Tube)	7-452-10-26	7-452-10-24
#16 (1" Tube)	7-452-10-9	7-452-10-25
#20 (1-1/4 Tube)	7-452-10-10	7-452-10-45
#24 (1-1/2 Tube)	7-452-10-11	7-452-10-47
#28 (1-3/4 Tube)	7-452-10-12	7-452-10-78
#32 (2" Tube)	7-452-10-13	7-452-10-79
<b>FOR P248 ONLY</b>		
#36 (2-1/4 Tube)	590633-36	11-3069-7-36
#40 (2-1/2 Tube)	590633-40	11-3069-7-40
#44 (2-3/4 Tube)	590633-44	11-3069-7-44
#48 (3" Tube)	590633-48	11-3069-7-48

NOTE: Metric Flaring Dies Available. Consult Factory.

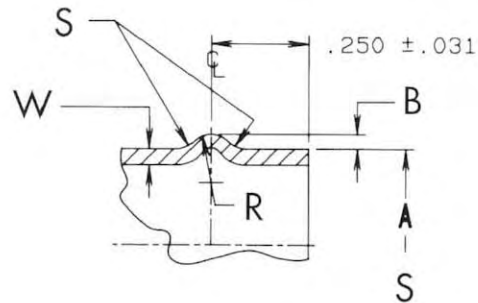
# Beading Capacity and Required Tooling

## Beading: Capacity

* Wall Max.	Tube Size Nominal O.D.		"B" ±.003 Bead Height	"R" Max. Rad.	"S" Max. Fillet Rad.
.032	4	1/4	.031	.125	.062
.032	5	5/16	.033		
.035	6	3/8	.035		
.042	8	1/2	.038		
.042	10	5/8	.038		
.049	12	3/4	.038	.156	.093
.058	16	1	.062		
.058	20	1-1/4	.062		
.065	24	1-1/2	.072		
.065	28	1-3/4	.072		
.065	32	2	.082		

\*Recommended as Maximum for Standard Tooling.

Beading Head quickly mounts on rotating spindle and individual bead formers snap into head. Assembly rotates concentrically until forward movement of operating lever causes head to contact face of stationary die. Additional forward pressure initiates a cam action within the head which forces the beader outward to smoothly form the tube wall into the die cavity.



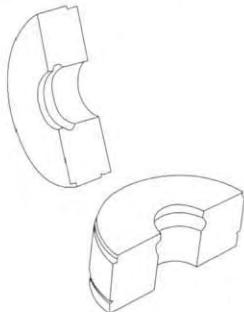
## Beading: Required Tooling



Beading Head



Bead Form Tool



Beader Dies

- Beading Head
- Bead Form Tools
- Beader Dies

Beading Head	Part Number
#4-24 (1/4 - 1-1/2 Tube)	4-1954-20
#24-28 (1-1/2 to 3" Tube)	9-968-1

Bead Form Tools	Part Number	Beader Die	Part Number
#4 (1/4 Tube)	10-1454-1	#4 (1/4 Tube)	7-452-68-1
#5 (5/16 Tube)	3-555-1	#5 (5/16 Tube)	7-452-68-2
#6 (3/8 Tube)	4-1254-17-1	#6 (3/8 Tube)	7-452-68-3
#8 (1/2 Tube)	4-1254-17-2	#8 (1/2 Tube)	7-452-68-4
#10 (5/8 Tube)	4-1254-17-3	#10 (5/8 Tube)	7-452-68-5
#12 (3/4 Tube)	4-1254-17-4	#12 (3/4 Tube)	7-452-68-6
#16-20 (1-1/4 Tube)	4-1954-19	#16 (1" Tube)	7-452-68-7
#16-20 (1-1/4 Tube)	4-1954-19	#20 (1-1/4 Tube)	7-452-68-8
#24 (1-1/2 Tube)	540527	#24 (1-1/2 Tube)	7-452-68-9
FOR P248 ONLY			
#28 (1-3/4 Tube)	590575	#28 (1-3/4 Tube)	11-3069-6-28
#32 (2" Tube)	590574-1	#32 (2" Tube)	11-3069-6-32
#36 (2-1/4 Tube)	590574-2	#36 (2-1/4 Tube)	11-3069-6-36
#40 (2-1/2 Tube)	4-2769-1-16	#40 (2-1/2 Tube)	11-3069-6-40
#44 (2-3/4 Tube)	590577	#44 (2-3/4 Tube)	11-3069-6-44
#48 (3" Tube)	590578	#48 (3" Tube)	11-3069-6-48

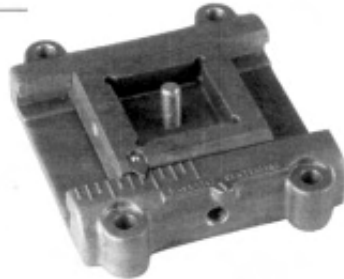
# Accessories

## TUBE FABRICATING EQUIPMENT

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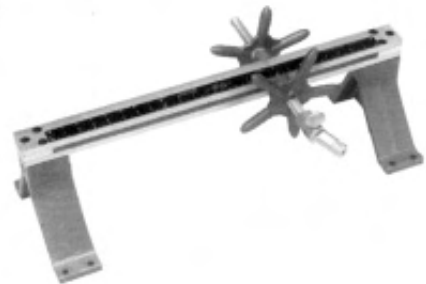
### BENCH MOUNTING ADAPTER

Used to table mount the 412 and 420 benders. MANDATORY for mandrel bending. Adjustable to allow realignment of mandrel when changing radius blocks.



### MANDREL ROD STOP ASSEMBLY

Secures and positions mandrel rod assembly to table. Adjustment knobs permit accurate positioning of mandrel inside tube.



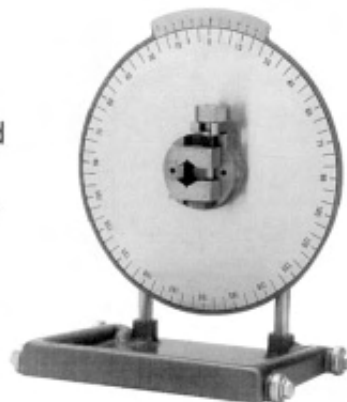
### BENDER TABLE

Specifically designed for Lakeland bending machines to handle virtually all customer applications. Heavy-duty design (466 lbs.) and strong braced to provide rigid alignment of bender and mandrel assembly. Table is 10 feet long with accessory holes for Models 624 and 632 pre-drilled at the factory.



### BEND ANGLE INDEXING GAGE

A unique and invaluable instrument to accurately determine degree-of-angle bends in different planes. Large, easy-to-read Vernier dial with 5° increments permits repeatable consistent multi-plane compound bends on production runs. Designed to allow for use with mandrels. Clamping mechanism allows material up to 7/8" O.D. to extend through the gage while material up to 1-1/2" O.D. can be clamped at the end. Rollers on base allow gage to travel with tube or pipe as it is drawn into the bender. Wt 20-1/2 lbs.





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