

Airetool®

Tube Cleaners & Expanders

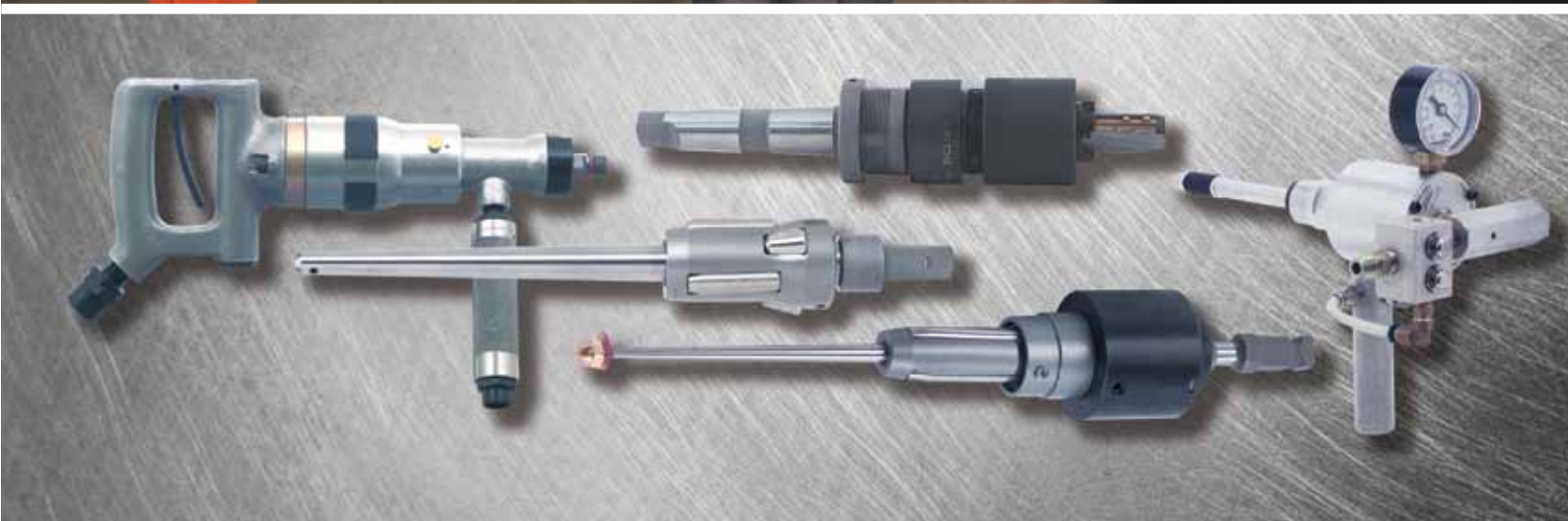


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Warranty

Subject to the terms and conditions hereinafter set forth, Apex Tool Group, LLC (the company) warrants products and parts sold by it, insofar as they are of its own manufacture, against defects of material and workmanship, under use and service in accordance with Company's written instructions, recommendations, and ratings for installation, operating, maintenance, and service of products, for a period of ONE YEAR FROM THE DATE OF SHIPMENT by Company, or any of Company's authorized Distributors.

This warranty is limited to the repair or replacement, as Company may elect, of any defective parts, regarding which, upon discovery of the defects,

the purchaser has given immediate written notice. Installation and transportation costs are not included. Company shall have the option of requiring the return to it of the defective material, transportation prepaid, for inspection.

COMPANY DOES NOT WARRANT THE MERCHANTABILITY OF ITS PRODUCTS AND DOES NOT MAKE ANY WARRANTY, EXPRESS OR IMPLIED OTHER THAN THE WARRANTY CONTAINED HEREIN, COMPANY HAS NOT AUTHORIZED ANYBODY TO MAKE ANY REPRESENTATION OR WARRANTY OTHER THAN THE WARRANTY CONTAINED HEREIN.

Lubrication Products

Apex Tool Group products are classified as non-hazardous manufactured items, defined in the OSHA 1910.1200 Hazard Communication Standard as "Articles". These products, under conditions of normal use, do not release or cause exposure to a hazardous chemical.

Under normal conditions of use, lubrication products sold separately for or used within these tools should not cause an exposure hazard. Refer to the Material Safety Data Sheet (M.S.D.S.) for Safety and Disposal Information. M.S.D.S. sheets are available upon request from Apex Tool Group.

Apex Tool Group is also aware of, and complies with,

the provisions of section 611 amendments to the Clean Air Act of 1990. No ozone depleting chemicals have been used in the manufacture of our products.

If you resell or distribute these products, you have the responsibility for ensuring that the Material Safety Data Sheets are provided to the purchaser.

Proper lubrication is essential to the economical operation of pneumatic and electric tools. Apex Tool Group perform better and their life is extended by using the recommended lubricants. All lubricants that are listed in the accessory section of this catalog have undergone extensive testing and are recommended for use with Apex Tool Group products.

Airetool Products and Services

Airetool Tube Cleaners and Tube Expanders are used to fabricate and maintain boilers, heat exchangers, condensers and other tubular type equipment. Job proven in a variety of industries, Airetool products serve such facilities as petro chemical plants, oil refineries, nuclear and non-nuclear power plants, paper, sugar and metal mills, air-conditioning servicing and maintenance plants.

Products described in this catalog are representative of the complete Airetool Tube Cleaner and Tube Expander product lines. If a need develops which can not be satisfied by our standard products, please contact your Airetool Distributor, or your Apex Tool Group Sales and Service Center.

The Airetool® family of tools is one on the most diverse in the heat transfer industry. With a broad selection of tube expanders, tube-rolling controls, tube cleaners, and re-tubing tools to cover various applications.

Airetool®

Tools that perform

Improving production rates and decreasing cost are critical to the success of today's manufacturer or contractor. The Airetool line of tools are designed and manufactured to perform time after time fast and consistently. When it comes to performance and reliability, there is no doubt as to why manufacturers and contractors around the world have come to rely on the Airetool brand of products.

Tools of the highest quality

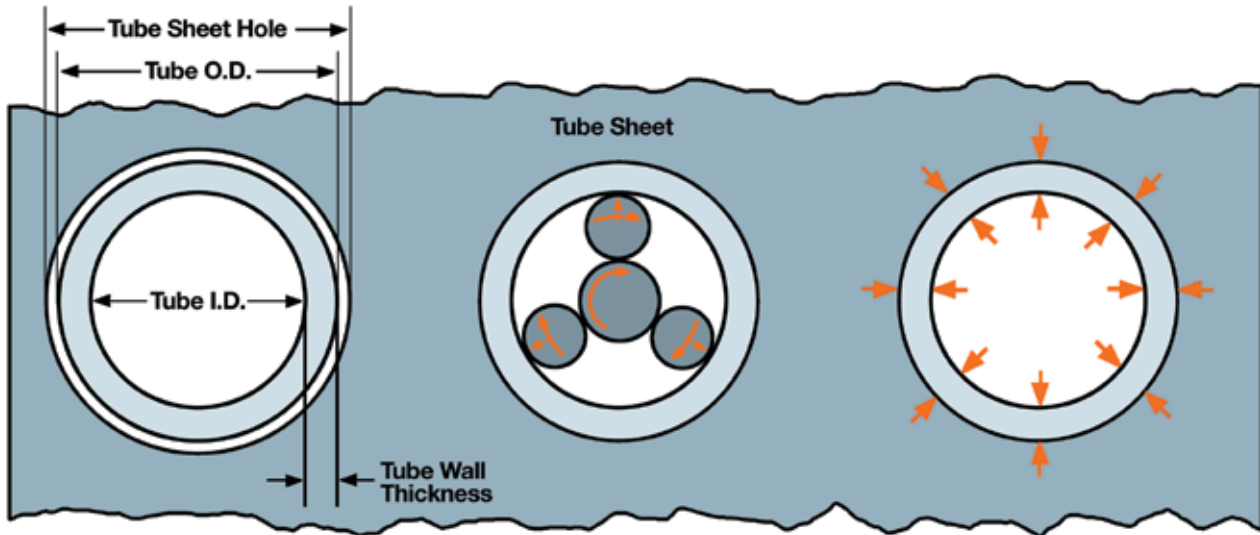
When we say our tools are built well, we really mean it. Apex Tool Group manufacturing processes are ISO 9001 certified... that means the Airetool brand is manufactured to the highest standard.

Tools that work with the operator

It is simple... give an operator a tool that is comfortable to use and the operator will work better. Airetool balance systems do just that, coupled with extending expander or other tooling life.



Rolling Controls



Tools that set the standard

Outstanding performance, incredible durability, plus the ease of maintenance have made Airetool tube rolling controls the standard which all others are measured against.

Why use torque control when expanding tubes?

Torque controlled tube rolling increases productivity by achieving the desired tube wall reduction each and every time a tube is being expanded. Torque-controlled tube rolling compensates for variations in the tube wall thickness and the tube sheet hole dimensions.

What is tube wall reduction?

Tube wall reduction is the percent the tube wall is reduced after the tube OD has contacted the tube sheet ID. The amount of tube wall reduction varies with the tube material, the tube sheet material and the design requirements of the unit. Several factors including pull-out strength, freedom from leaks are considered in determining the optimum wall reduction.

Tube Rolling Set – Up Guide

Pick five tubes in the vessel to be rolled and complete the work sheet below. It is important that the measurements used in the set up are actual.

Never use averaged dimensions.

Condenser Tubes 5% Wall reduction Boiler Tubes 10% Wall Reduction

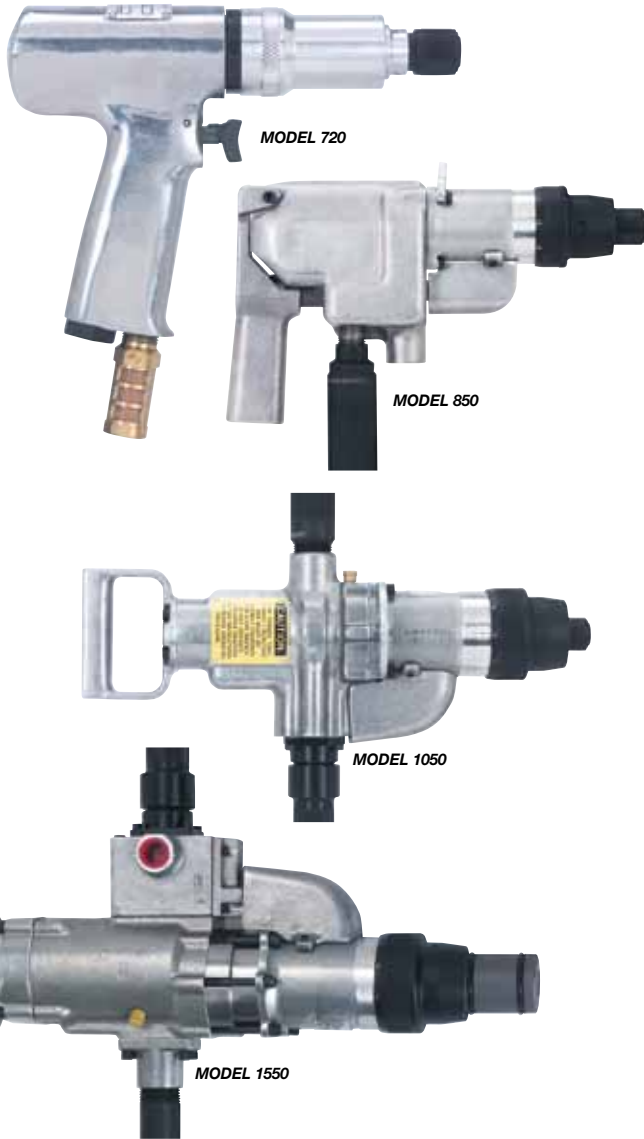
Satisfactory joints are produced using the above listed percentage of tube wall reduction.

- Step A – Measure tube sheet hole
- Step B – Measure tube OD
- Step C – Calculate clearance (A-B)
- Step D – Measure tube OD
- Step E – Calculate 2x wall thickness (B-D)
- Step F – Calculate 5% wall reduction (.05 x E)
- Step G – Calculate finished rolled ID (C+D+F)

After the work sheet is finished, start setting up the torque control motor by test rolling the first of the five tubes. The first test roll must be done with the Airetool or Electric tube rolling motor set for low torque to avoid over rolling.

Measure the tube ID after rolling the first tube. If more expansion is needed, increase the torque setting on the control and roll the second tube. Check the finished ID. This step may require repeating on tube three, but by the fifth tube you should have achieved your desired finished rolled ID of step G below. The tubes rolled to calibrate the tube wall reduction can now be re-rolled at the correct setting.

STEP	EXAMPLE	Joint#				
		1	2	3	4	5
A	Tube Sheet Hole	.760"				
B	- Tube OD	.750"				
C	= Clearance	.010"				
D	Tube ID	.620"				
E	2 x Wall Thickness	.130"				
F	+5% Wall Reduction	.006"				
G	= Finish Rolled ID	.636"				



Airetrol Air Driven Motors

Airetool motors control expansion by accurate measurement of torque. They automatically stop expansion accurately according to predetermined setting. This prevents over- and under- expansion of tubes, assuring uniformly tight tube joints, providing maximum holding strength for individual tubes. Strong, lightweight aluminum housings provide easier handling and less fatigue. Rugged drive combines precision control which measures torque output. All AIRETROLS include torque sensing cams designed and manufactured specifically for tube expanding applications.

Model No.	Part No.	Speed & Torque 90 psig Air Pressure*						Overall Length		Weight		Side to Center		Operating Hose		CFM	Square Drive	Tube Capacities*		Chucks†	
		Free Speed RPM	Maximum Torque		Minimum Torque																
			In. lbs.	Nm	In. lbs.	Nm	In.	mm	Lbs.	Kg	In.	mm	In.	mm	In.	mm	incl.	opt.			
720-2500B	8405541	2500	20	2.29	2	0.23	7-7/8"	198	2.4	1.09	13/16"	20.6	3/8"	7	17	1/4"	1/4"	6.3	1/4"QC	3/8"QC	
720-1800B‡	8405383	1800	27	3.05	2	0.23	7-7/8"	200	2.4	1.09	13/16"	20.6	3/8"	7	17	1/4"	3/8"	9.5	1/4"QC	3/8"QC	
720-550B	8405391	550	75	8.47	2	0.23	8-5/8"	219	2.7	1.23	13/16"	20.6	3/8"	7	17	3/8"	1/2"	12.7	3/8"QC	1/4"QC	
850-1250A	8405399	1066	126	14.2	9.6	1.08	12-1/4"	311	10.5	4.76	1-7/16"	36.5	1/2"	10	48	3/8"	3/4"	19	3/8"QC	1/2"QC	
850-600A	8405398	486	230	26	14.4	1.63	12-1/4"	311	10.5	4.76	1-7/16"	36.5	1/2"	10	48	3/8"	1"	25.4	3/8"QC	1/2"QC	

Model No.	Part No.	Speed & Torque 90 psig Air Pressure*						Overall Length		Weight		Side to Center		Operating Hose		CFM	Square Drive	Tube Capacities*		Chucks	
		Free Speed RPM	Maximum Torque		Minimum Torque																
			Ft. lbs.	Nm	Ft. lbs.	Nm	In.	mm	Lbs.	Kg	In.	mm	In.	mm	In.	mm	incl.	opt.			
1050-400	8404200	388	26.4	35.8	3.3	4.5	13-5/8"	346	14	6.35	1-15/16"	50	3/4"	13	68	1/2"	1-1/4"	31.7	3/8"QC	3/4-1"QC	
1550-900	8404290	756	30.7	41.6	4.7	6.4	18"	457	27	12.25	1-15/16"	50	3/4"	13	70	1/2"	1-1/2"	38.1	3/8-1/2"QC	3/4-1"QC	
1550-250	8404280	220	109.9	149	14.3	19.4	18"	457	27	12.25	1-15/16"	50	3/4"	13	56	3/4"	2-1/2"	63.5	3/4-1"	3/8-1/2"QC	

* Varies depending on tube material, gauge, and tube sheet thickness.
 ‡ Order 8405512 for 720-1800B with 3/8" Q.C. chuck.

†Ensures chuck matches mandrel or expander.

DAS II Dominator Tube Rolling System

Airetool®

The new Airetool DAS II Dominator has been designed to deliver power, performance, durability and unmatched productivity in pneumatic tube rolling technology.

- All pneumatic system for complete, self-contained tool holding system.
- No electrical power source required, eliminating typical problems such as fluctuating plant voltages and electrical interference from other equipment.
- Push-to-start motor runs only when needed, reducing noise, prolonging motor life and conserving shop air.
- Standard model features 5' vertical and horizontal reach.
- Small overall footprint w/4 casters for improved mobility.
- Larger integral lifting eye.
- Ergonomic design for operator comfort and ease of use.
- Smooth, fluid function design for unparalleled production.
- Tool holding system virtually eliminates operator error.
- Increases expander life by as much as three times compared to conventional hand-held equipment.
- Greatly enhances the accuracy of tube rolling reducing costly improperly rolled tubes.
- Right or left hand operation without conversion.
- Available with optional auto-lube & cycle counter.

For more information on the Airetool line visit our website at www.airetools.com.



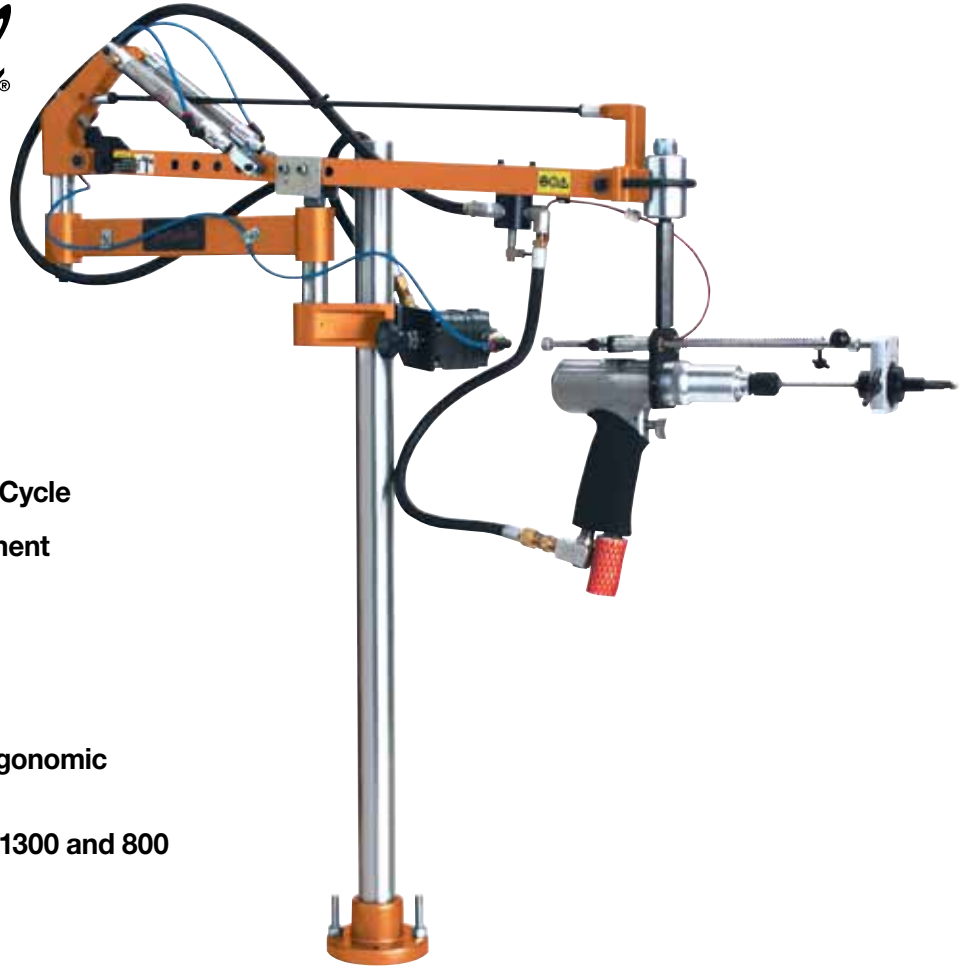
Model Number	Part Number	Movement				Lift Capacity		Operating Pressure		Supply Hose	Allowable Torque	
		Vertical		Horizontal				PSI	Bar		Ft.-Lbs.	Nm
		Ft.	mm	Ft.	mm	Lbs.	Kg.					
Automatic Tube Rolling System Less DAS II Airetrol												
DAS II Dominator w/lube	5526140	5	1524	5	1524	55	25	90	6.2	3/4"	125	169
DAS II Dominator	5526081	5	1524	5	1524	55	25	90	6.2	3/4"	125	169
Basic Positioning Unit												
DAS II Dominator Basic Unit	5529158	5	1524	5	1524	55	25	90	6.2	3/4"	125	169

Model Number	Part Number	Free Speed		Max. Torque		Min. Torque		Chucks	
		R.P.M.	CFM	Ft. Lbs.	NM	Ft. Lbs.	NM	Included	Optional
DAS II 850 1250 Airetrol with Lube,CTR	8405567	1250	50	10	13.6	1	1.4	3/8" QC	1/2" QC
DAS II 1550 900 Airetrol	8405563	825	75	32	43.4	4.5	6.1	3/8"-1/2" QC	3/4"-1"
DAS II 1550 900 Airetrol with Lube,CTR	8405565	825	75	32	43.4	4.5	6.1	3/8"-1/2" QC	3/4"-1"
DAS II 1550 250 Airetrol	8405564	225	75	110	149.1	15	20.3	3/4"-1"	3/8"-1/2" QC
DAS II 1550 250 Airetrol with Lube,CTR	8405568	225	75	110	149.1	15	20.3	3/4"-1"	3/8"-1/2" QC

Airetool®

Model DAS-100-TRS
Tube Rolling System For
Benchtop Tube Rolling
Applications 1/4" thru
5/8" O. D. Tubes

- Rugged Design
- Push-to-Start Tube Rolling Cycle
- Facilitates Expander Alignment
- Absorbs Torque
- Supports Weight
- Improves Productivity
- Reduces Effort Through Ergonomic Design
- Designed for use with 900, 1300 and 800 Series Tube Expanders



Operation:

The arm is counterbalanced with air cylinders. The pressure can be adjusted to compensate for tool weight for operator comfort. The modified 720 Airetrol rolling motors are push to start activated. With the tube expander positioned inside the tube, slight forward pressure on the Airetrol starts the motor in forward direction to expand the tube. Once the preset torque is met, the motor automatically reverses and the tube expander can be removed from the tube.

The tube expander holder is spring loaded, keeping the tube expander in the retracted position to assist the expander entering the tube. The expander holder also helps keep the tube from spinning during the expansion process.

Three models are available:

- **DAS 100 TRS 720 2500 for tube sizes 1/4" OD.***
- **DAS 100 TRS 720 1800 for tube sizes 3/8" – 1/2" OD.***
- **DAS 100 TRS 720 550 for tube sizes 1/2" – 5/8" OD.***

Post Height: 29"
Total Horizontal Travel: 77"
Vertical Travel: 14.5"

Model No.	Part No.	Speed & Torque 90 psig Air Pressure				CFM	Chucks		
		Free Speed RPM	Maximum Torque		Minimum Torque		Included	Optional	
			In. lbs.	Nm	In. lbs.				Nm
DAS 100 TRS 720 –									
2500B	5525242	2500	20	2.29	2	0.23	17	1/4"	3/8"
1800B	5525243	1800	27	3.05	2	0.23	17	1/4"	3/8"
550B	5525244	550	75	8.47	2	0.23	17	3/8"	1/4"

*Varies depending on tube material, gauge and tube sheet thickness.

Airetool[®]

Model 1850-40

- For controlled torque up to 600 ft. lbs.
- This Airetool pneumatic powered torque controlled rolling motor offers the highest controlled torque of any rolling motor currently available.



Model No.	Part No.	Speed & Torque 90 psig Air Pressure*					Overall Length		Weight		Side to Center		Operating Hose		CFM	Square Drive	Tube Capacities*		Chucks	
		Free Speed RPM	Maximum Torque		Minimum Torque												In.	mm	Lbs.	Kg
			Ft. lbs.	Nm	Ft. Lbs.	Nm	In.	mm												
1850-40	8405314	35	600	813	219	297	15	380	52	23.6	3-5/8	92	1/2	13	60	1	4-1/2	114	3/4 - 1	1-1/4 - 1-1/2

* Varies depending on tube material gauge and tube sheet thickness.

Optional and Replacement Chucks

Description	Part Number	Mandrel Square
720-720S-735S		
720 250 1/4 CHUCK	8405334	1/4
720 375 B 3/8 CHUCK ASSY	8405403	3/8
850		
850 375 CHUCK	8400100	3/8
850 500 CHUCK	8400200	1/2
1050-400 1550-900		
1000 375 QC CHUCK COMPLETE	8400700	3/8
1000 500 QC CHUCK COMPLETE	8400800	1/2
1000 750 CHUCK COMPLETE	8400900	3/4
1000 1000 CHUCK COMPLETE	8404820	1
1550-250		
QC 1550 375 QC CHUCK COMPLETE	8405272	3/8
QC 1550 500 QC CHUCK COMPLETE	8405271	1/2
1550 750 CHUCK COMPLETE	8405259	3/4
1550 1000 CHUCK COMPLETE	8405260	1
999/1850s		
989 750 3/4 SQUARE CHUCK	8404700	3/8
989 1000 1" SQUARE CHUCK	8404960	1
1850 1250 CHUCK COMPLETE	8405319	1-1/4
1850 1500 CHUCK COMPLETE	8405437	1-1/2

Description	Part Number	Mandrel Square
1752		
1770 110 3/4 CHUCK COMPLETE	8405299	3/4
1770 110 1 CHUCK COMPLETE	8405300	1
1770 110 1-1/4 CHUCK COMPLETE	8405400	1-1/4
1753		
QC 1770 230 1/2 QC CHUCK COMPLETE	8405302	1/2
1770 230 3/4 CHUCK COMPLETE	8405298	3/4
1770 230 1 CHUCK COMPLETE	8405306	1
966s		
850 375 CHUCK	8400100	3/8
979s		
939 375 CHUCK	8400400	3/8
939 500 CHUCK	8400500	1/2
939 750 3/4 CHUCK	8401100	3/4

Rolling Controls

Torque Controlled Rolling Motors for the Boiler Industry

Airetool®

Right Angle Torque Control for Rolling Tubes into drums of package and stationary boilers

- Externally adjusted torque control setting.
- Bevel gears specifically designed for longer life under high torque loading.
- Planetary gear train permits tool speed changes with minimal part replacement.
- All-steel angle head can be oriented in numerous positions in relation to throttle and torque mounting plate.
- Fully adjustable exhaust deflector has 360 degree rotation.
- Modular construction and absence of shims simplifies tool maintenance.
- Durable handle and throttle construction gives added tool life.



Model No.	Part No.	Speed & Torque 90 psig Air Pressure*						Overall Length		Weight		Head Dimensions				Standard Square Drive Size	Tube Capacities*		Chuck Size †
		Free Speed		Maximum Torque		Minimum Torque						Side to Center		Height Less Square Drive			In.	mm	
		RPM	Ft. lbs.	Nm	Ft. lbs.	Nm	In.	mm	Lbs.	Kg	In.	mm	In.	mm	In.	mm			
Reversible – Roll Throttle																			
1753-R-190	8405420	190	140	190	70	95	20.1	530	13	5.8	1.1	28	2.6	65	5/8	2.5	63.5	3/4	
1752-R-90	8405421	90	305	410	150	200	21.7	550	14.75	6.7	1.5	37	2.75	70	3/4	4	101.5	3/4-1	
Reversible – Lever Throttle																			
1752-L-90	8405425	90	305	410	150	200	21.7	550	14.75	6.7	1.5	37	2.6	65	3/4	4	101.5	3/4-1	

† See page 31 for chuck size chart.

* Varies depending on tube gauge and tube sheet thickness.

Standard Equipment

Air Inlet: 1/2" NPT

Minimum hose size: 1/2"

Splined torque reaction plate and reaction bar included.



Airetool

The ATC-900 (2996326) Electronic Controller is a compact, lightweight, durable, processor-based electronic motor controller. It is designed to provide accurate amperage/torque control for Airetool Electric Rolling Motors. Features include: motor identification, expansion counter, GFCI power cord, two key preset in 1/10th amp. intervals, auxiliary trip light receptacle and lubricator receptacle. Electric rolling motors may be used without the ATC-900 Electronic Controller, however a direct power cord must be used.

ATC-900 Electronic Controller Specifications

Volts: 120V
 HZ: 50/60
 Amperage: 20 AMP Supply Circuit Recommended
 Amperage Adjustment: 0.10 Amperage Increments
 Weight: 7.2 lbs. (3.27 Kilo)
 Dimensions (LxWxH): 11-3/4" x 12" x 7-5/8"
 (298.45 x 365.76 x 193.68 mm)

Maximum Motor Amperage Settings:

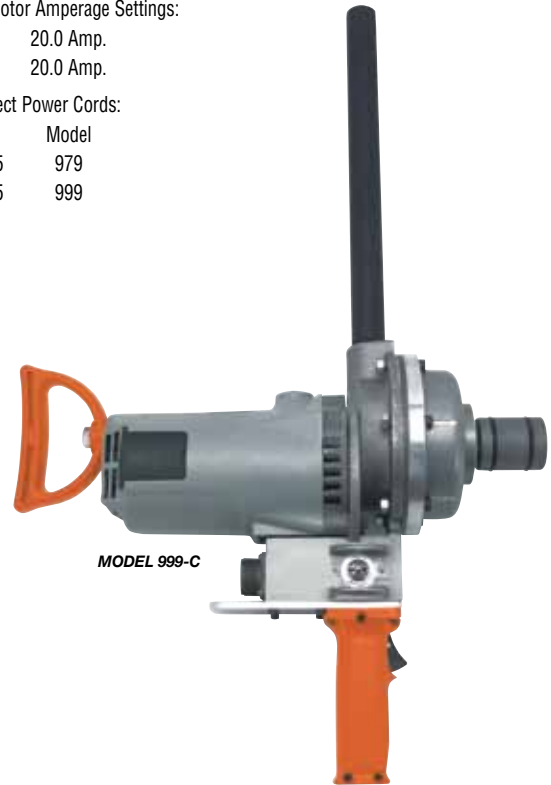
979-C 20.0 Amp.
 999-C 20.0 Amp.

Optional Direct Power Cords:

Part No.	Model
8405495	979
8405545	999



MODEL 979-C



MODEL 999-C

Model	Part Number	RPM	Tube Capacity*	Weight		Chucks	
				Lbs.	Kg.	Included	Optional

Electric Rolling Motor Specifications

979-C-210	8405489	210	3/4" - 2" (19.0 - 50.8 mm)	32.0	14.5	3/8" - 1/2 Q.C.	-
979-C-300	8405488	300	3/4" - 1-1/2" (19.0 - 38.1 mm)	32.0	14.5	3/8" - 1/2 Q.C.	-
979-C-650	8405487	650	5/8" - 1-1/4" (15.8 - 31.7 mm)	32.0	14.5	3/8" - 1/2 Q.C.	-
999-C-45	8405492	45	2" - 4" (50.8 - 101.6 mm)	32.0	14.5	3/4" - 1	-

* May vary due to tube wall, material and/or tube sheet thickness.

Rolling Controls

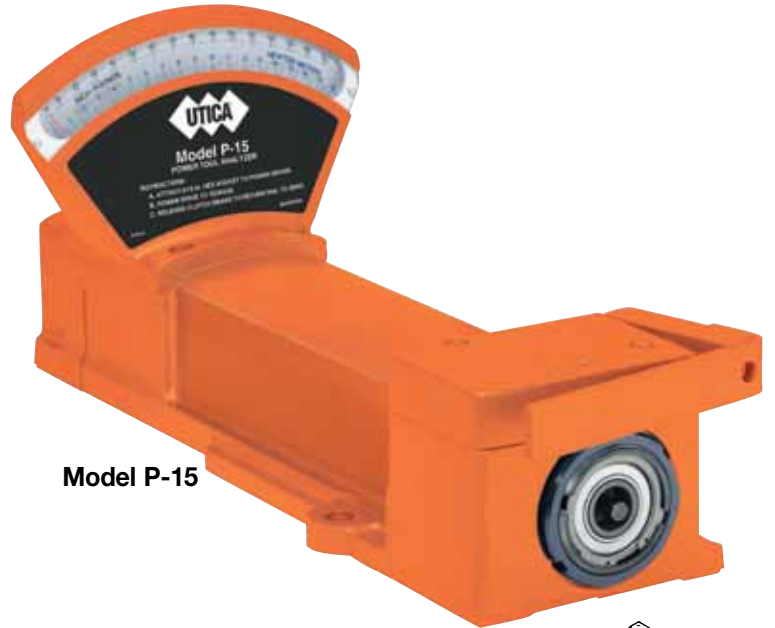
Torque Analyzers for Airetrol Rolling Controls



Model P-15

The Utica torque analyzers allow the Airetrol rolling controls to be set at a specific torque value. The analyzer readings may also be used as a standard for the Airetrols performance giving you greater quality control over your rolled tube joints.

The torque analyzers are also a great time saver on applications where several Airetrols are being used. Once the desired wall reduction is achieved on the first Airetrol, its torque value is obtained on the analyzer, then the same torque value can be set to the remaining Airetrols.

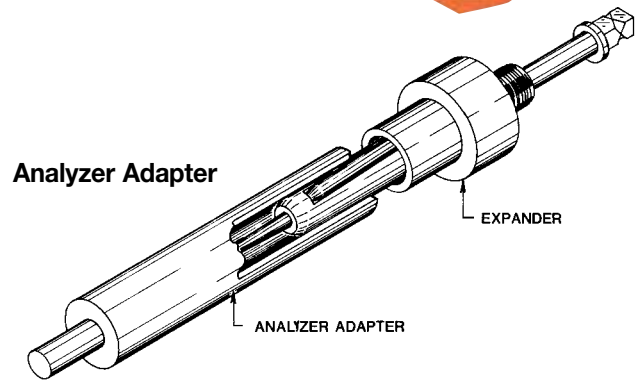


Model P-15

Adapter No.	Expander No.	Order No.
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Adapters for Analyzer P-15

• AD-1	1201 thru 1203 & 801 thru 803	8566501
• AD-2	1205 & 805	8566503
• AD-3	1207 thru 1210 & 807 thru 810	8566502
• AD-4	1211 thru 1214 & 811 thru 814	8567012
AD-5	1215 thru 1220 & 815 thru 820	8566521
AD-6	1221 thru 1224 & 821 thru 824	8566518
AD-7	1225 thru 1230 & 825 thru 830	8566519
• AD-8	1231 thru 1234 & 831 thru 834	
AD-9	1235 thru 1240 & 835 thru 840	8566531
• AD-8	1241 thru 1242 & 831 thru 842	
• AD-10	1243 thru 1248 & 843 thru 846	8566475
• AD-11	1247 thru 1254 & 847 thru 854	8566520
AD-12	1255 thru 1260 & 855 thru 860	8566676
• AD-13	1261 thru 1266 & 861 thru 866	
• AD-14	1267 thru 1272 & 867 thru 872	
• AD-15	1273 thru 1276 & 873 thru 878	
• AD-16	1279 thru 1288 & 870 thru 888	8567289
• AD-17	1289 thru 1290 & 889 thru 890	
• AD-18	1291 thru 1294 & 891 thru 894	8567602
• AD-19	1295 thru 1300 & 895 thru 900	



Analyzer Adapter

EXPANDER

ANALYZER ADAPTER

Model No.	Graduations	Capacity	Accuracy	Height		Width		Length		Weight		Ordering No.
				In.	mm	In.	mm	In.	mm	Lb.	kg	
P-15	2 in.-lbs.	150-5 in. lbs.	± 1%+1/2 in.-lbs.	8	203	5	127	18	457	23	10.4	810002
MP-15 (metric)	5 cm.-kg.	180-5 cm.-kg	± 1%+1 cm.-kg	8	203	5	127	18	457	23	10.4	810151

General

Drive Size: 5/16" male hex (P-15 series)

Optional Equipment

Calibration Kit (P-15 series) – 810080

Airetool®

The world standard in tube expanders

Airetool heat exchanger- condenser expanders have long been recognized as the standard to which all other brands are measured. The extra time spent manufacturing our expanders results in consistent performance and incredible durability that OEM Heat Exchanger Manufacturers expect.

Tube Expanders

Tube expanding is the art of cold working the ends of tubes into intimate contact with the metal of the containing tube holes to form a leak proof mechanical seal and/or joint. In other words, it is a mechanical method of establishing a mechanical joint between a tube and a tube hole.

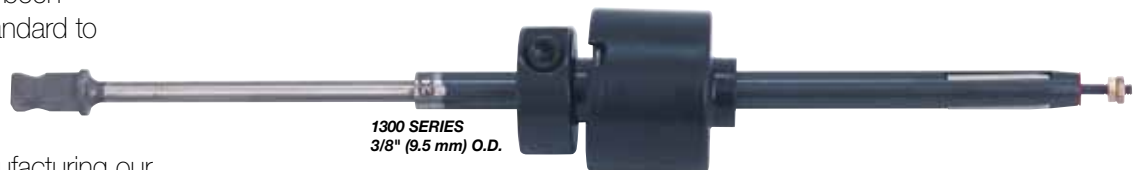
Airetool manufactures condensed/ heat exchanger expanders, boiler expanders, furnace expanders and many special application expanders.

Tube expanders consist of:

Mandrel – A tapered pin through the center to which the power is attached and when advanced pushes the rolls against the tubes.

Rolls – A set of (3 or more) of tapered cylindrical parts which are driven by mandrel and contact the tube wall to be expanded. The taper on the rolls is in the reverse direction and one-half the taper of the mandrel if it is a parallel roll expander.

Cage – This is the expander body or housing since



it holds the mandrel and rolls in place. The slots which contain the rolls also provide a feed angle which helps pull the mandrel in to provide expansion of the rolls.

Mandrel, Rolls and Cage are the three things common to all expanders. Other parts added further classify the type of expander.

Thrust Assembly – This assembly attaches to the cage and allows adjustment of the expanding depth. The thrust collar will remain stationary against the tube sheet or tube end while the cage, mandrel and rolls expand the tube. A thrust assembly is used on condenser/heat exchanger expanders, some furnace expanders and special boiler expanders.

Heat Exchanger – Condenser Expanders

Condenser/Heat Exchanger Expanders

Airetool Condenser Heat Exchanger Expanders are self-feeding, parallel rolling, ball bearing thrust expanders. They are available in standard sizes for 1/4" O.D. through 3" O.D. for tube sheets up to 6 3/4" thick. Other sizes and lengths are available upon request. We supply most of the air conditioning manufacturers with expanders sixteen feet long. The G-800 expanders are supplied with 1 1/2" or 2 1/4" long rolls for 1/2 O.D. through 1 1/2" O.D. tubes. The G-1200 Series is available with the same length rolls and for the same tube O.D., but has a longer cage and mandrel. The standard G-1200 with the 1 1/2" roll will expand tube sheet thicknesses from 1 1/2 through 5", while the G-1200 with 2 1/4" rolls will handle tube sheets 2 1/4 through 5 3/4" thick.

When you must expand thicker tube sheets, the tool is available in the G-1200 type. The G-900 expander is available with 3/4" rolls and 1 1/4" rolls for 1/4 O.D. and

3/8 O.D. tubes. The G-1300 expander has 3/4" long or 1 1/4" long rolls for 3/8" O.D. tubes in tube sheets through 3 1/2" thick.

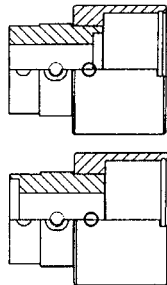
To select the correct tube expander the following information is required:

- Tube OD
- Tube wall thickness or BWG
- Tube sheet thickness
- Tube material
- Special Conditions, i.e. double tube sheet, tubes close to tube sheet channel, tubes, or protrusions.
- Long reach expanders are available upon request in 6" increments.

Collars

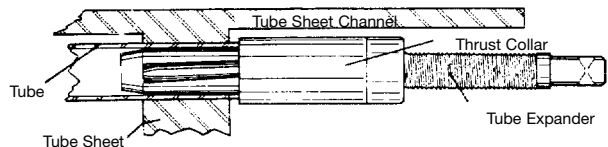
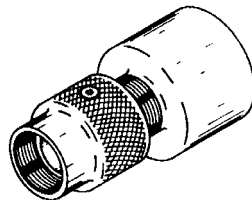
Flip Collar

800/1200 Series tube expanders are supplied with a flip collar with a 10-32 UNF auto-lube port. The flip collar allows for flush and recessed tube rolling. The standard expander is supplied with a recess of 1/8" (3 mm). Other recess lengths are available. Contact Customer Service for details. 5 Roll Expanders do not have Flip Collars.



Adjustable Recess Thrust Collar

The adjustable recess collar accommodates tube projections up to 1/2" (12.7 mm) from the tube sheet.

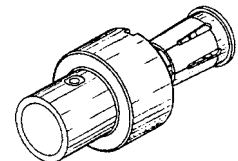


Small Diameter Thrust Collar

Small diameter thrust collars are recommended for rolling tubes in confined areas.

Thin Wall Thrust Collar

Thin wall thrust collars are recommended when expanding 20 BWG .035" (0.9 mm) or lighter wall tubes. This design limits the possibility of the tube being drawn up inside the thrust collar.



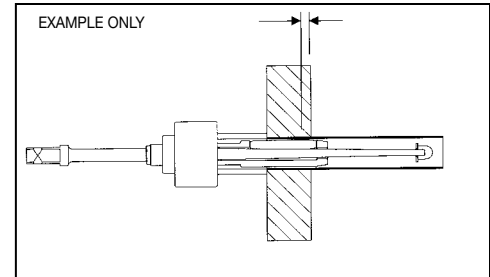
Removing the collar's collet allows the expander to be used as a full recess style compensating for various length tube projections from the tube sheet.

Five roll expander vs. Three roll expander

Many manufacturers prefer the five-roll expander for applications that use tube materials that work harden quickly such as stainless steel and titanium. Also used in applications with closely spaced tubes having triangular pitch. The five-roll expander inherently has more contact area with the tube than the three-roll. This extra contact with the tube reduces the amount of work hardening and spring back effect, which is common with these tube materials. The thinner the tube walls, 18 BWG (.049"/1.25mm) and thinner, the more apt this is to occur.

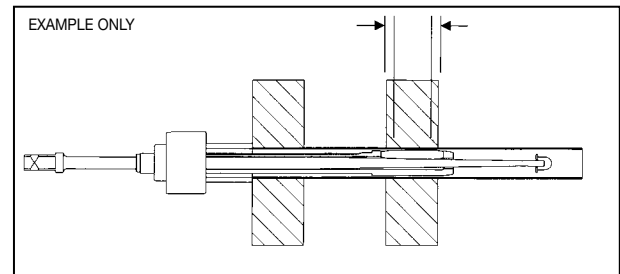
Setting the tube expander's collar

It is very important to set the tube expander's collar in the correct position inside the tube sheet to EL pinch point. The expander's roll high point should be positioned away from the inner side of the tube sheet as shown in the figure below. The purpose for setting the expander's collar this way is to allow for thermal expansion and contraction of the tube while it is in service. If the tube is expanded beyond the tube sheet, the thermal expansion and contraction of the tube will cause stress on the tube, which may cause the tube to crack or rupture at the inner tube sheet location. When tightening the setscrew on the expander's collar, be sure it is aligned with the cage groove.



Double Tube Sheet Application

In a double tube sheet application additional information is required. The thickness of the outer tube sheet (primary tube sheet) and inner tube sheet (secondary tube sheet) and the distance between the two tube sheets must be shown. When expanding the tube in the primary tube sheet the expanders collar is positioned as in the figure above with an 800 series tube expander. For the secondary tube sheet a 1200 series expander is required with "S" type (double radius) rolls. The "S" type rolls are required to allow the expander to have clearance on each side of the secondary tube sheet. This is to reduce stresses in the tube due to thermal expansion and contraction.



Heat Exchanger – Condenser Expanders

Step Rolling

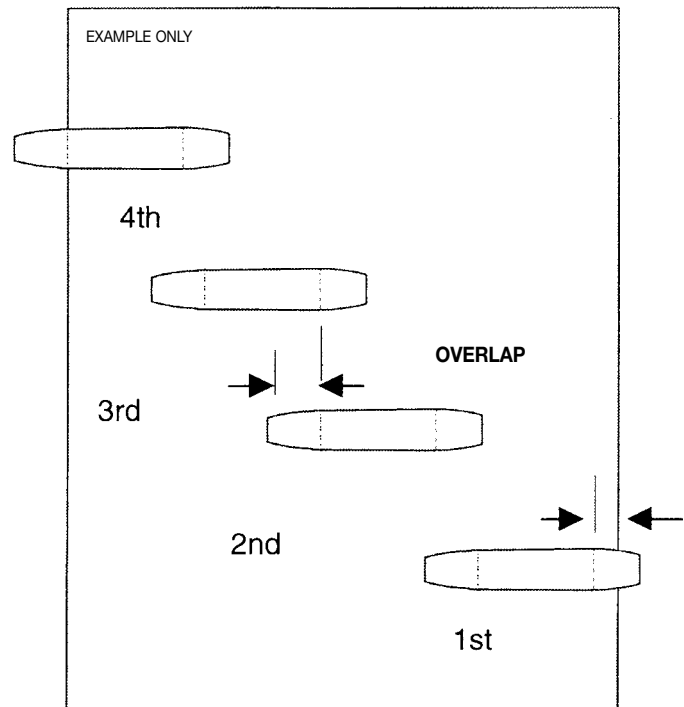
Step rolling is required when expanding tubes in thick tube sheets. Typically the first expansion is made at the innermost location, away from the inner side of the tube sheet. This is extremely important when rolling the opposite end of the vessel. This allows the tube material to grow in the proper direction towards the operator and keeps the tube from being stressed. After all the tubes have been expanded in this location, adjust the expander's collar to overlap the perviously rolled area. Repeat as necessary until the complete thickness of the tube sheet has been expanded. "S" type rolls (double radius) are recommended for step rolling to provide a smooth transition on the I.D. of the tube.

Care and Maintenance of Tube Expanders

Tube expanders are precision tools and should be treated as such. The service demanded of them is severe. Therefore, they must be given a reasonable amount of care to insure long life and satisfactory operation.

Hand-Held Rolling Applications

1. Before using, clean the expander thoroughly to remove any dirt or foreign matter.
2. Check thrust bearing and grease if needed. This should be done daily.
3. Proper lubrication of the expander during the rolling operation is a must to keep the mandrel and rolls cool, to extend mandrel and roll life, and to insure uniform tube to tube sheet joints.
4. Depending on the severity of the rolling application, the expander should be washed periodically (every 25-100 tubes) in any commercial solvent. For best expander life, the expander should be left in solvent to cool while a second expander is used to continue rolling.
5. Replace scarred or chipped rolls or mandrels immediately. One small chip in a roll can cause the complete set of rolls and the mandrel to be damaged in a single rolling cycle.
6. When the rolling job is complete, wash the expander thoroughly and then oil and grease generously to prevent rusting during storage.



DAS Automated Tube Rolling Applications

1. Before installing the expander into the rolling machine, clean the expander thoroughly to remove any dirt or foreign matter.
2. Check thrust bearing and grease if needed. This should be done daily.
3. Lubrication of the expander during the operation is a must to keep the mandrel and rolls cool, to extend mandrel and roll life, and to insure uniform tube to tube sheet joints. An optional automatic lubrication system is offered for the automatic tube rolling systems.
4. Hand cleaning is virtually eliminated with the use of the automatic lubricating system as the air pressure that blows the lubrication into the expander to cool it also blows away dirt or foreign matter during each cycle.
5. Replace scarred or chipped rolls or mandrels immediately. One small chip in a roll can cause the complete set of rolls and the mandrel to be damaged in a single rolling cycle.
6. When the rolling job is complete, wash the expander thoroughly and then oil and grease generously to prevent rusting during storage.

Condenser Expanders

Selection Guide G-900 Series Heat Exchanger & Condenser Tube Expanders



Airetool®

G-900 Series

O.D. Range:
1/4 – 3/8 Inches
6.3 – 9.5 mm

- Expander with 3/4 in. (19.0 mm) long rolls will accommodate tube sheet thicknesses from 1/4 in. to 3/4 in. (6.3 mm to 19.0 mm)
- Expander with 1-1/4 in. (31.7 mm) long rolls will accommodate tube sheet thicknesses from 3/4 in. to 1-1/4 in. (19.0 mm to 31.7 mm)
- These expanders will accommodate a wide range of tube sheet thicknesses.

NOTE: Information on any size of tube not listed will be furnished upon request.

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)		Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 1/4 in. Sq. Dr. / 6.3 mm	Recommended Controlled Rolling Motors Airetool
					1/4 in. to 3/4 in. (6.3 mm to 19.0 mm)		3/4 in. to 1-1/4 in. (19.0 mm to 31.7 mm)					
					Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)				
1/4 (6.3)	18	.049 (1.24)	.152 (3.6)	921 (5016710)	921 (5175610)			.151 (3.8)	.173 (4.4)	M-39 (2520300)	720-2500B (8405541)	
	19	.042 (1.06)	.166 (4.2)	922 (5016800)	923 (5175700)			.165 (4.1)	.185 (4.7)			
	20	.035 (.88)	.180 (4.5)	923 (5016901)	923 (5175700)			.175 (4.4)	.200 (5.1)	M-40 (2520500)		
	21	.032 (.81)	.186 (4.7)	924 (5017000)	924 (5175800)			.180 (4.5)	.207 (5.2)			
	22	.028 (.71)	.194 (4.9)	925 (5017100)	925 (5175900)			.190 (4.8)	.216 (5.5)	M-41 (2520700)		
	23	.025 (.63)	.200 (5.0)	926 (5017200)	923 (5175700)			.195 (4.9)	.222 (5.6)			
	24	.022 (.55)	.206 (5.2)	927 (5017300)	924 (5175800)			.201 (5.1)	.230 (5.8)			
	28	.014 (.35)	.222 (5.6)							928 (2161300)		
	29	.013 (.33)	.224 (5.7)	928 (5017400)	903 (5174700)			.222 (5.6)	.238 (6.0)			
	30	.012 (.30)	.226 (5.7)									
3/8 (9.5)	14	.083 (2.10)	.209 (5.3)	927 (5017300)	924 (5175800)			.201 (5.1)	.232 (5.8)	M-41 (2520700)	720-2500B (8405541)	
	15	.072 (1.82)	.231 (5.8)	915 (5016410)	903 (5174700)			.230 (5.8)	.265 (6.7)	M-42 (2520900)		
	16	.065 (1.65)	.245 (6.2)	916* (5016500)	916 (5175600)			.240 (6.1)	.275 (6.9)	M-36 (2519700)		
						916L (5512156)	916L (5512157)			M-36L (2968803)		
	17	.058 (1.47)	.259 (6.5)	918 (5016600)	903 (5174700)	920 (5016700)	904 (5174800)	.255 (6.4)	.289 (7.3)	M-38 (2520100)		
	18	.049 (1.24)	.277 (7.0)	901 (5015200)	903 (5174700)	902 (5015300)	904 (5174800)	.272 (6.9)	.307 (7.8)	M-30 (2518400)		
	19	.042 (1.06)	.291 (7.3)	903 (5015400)	903 (5174700)	904 (5015500)	904 (5174800)	.286 (7.2)	.330 (8.1)	M-31 (2518700)		
	20	.035 (.88)	.305 (7.7)	905 (5015600)	907 (5174900)	906 (5015700)	908 (5175000)	.300 (7.6)	.334 (8.4)	M-32 (2518900)		
	21	.032 (.81)	.311 (7.9)	907 (5015800)	907 (5174900)	908 (5015900)	908 (5175000)	.306 (7.7)	.340 (8.6)	M-33 (2519100)		
	22	.028 (.71)	.319 (8.1)	909 (5016000)	909 (5175100)	910 (5016100)	910 (5175200)	.314 (7.9)	.349 (8.8)	M-34 (2519300)		
23	.025 (.63)	.325 (8.2)	911 (5016200)	911 (5175300)	912 (5016300)	912 (5175400)	.320 (8.1)	.357 (9.0)				
24	.022 (.55)	.331 (8.4)	911 (5016200)	911 (5175300)	912 (5016300)	912 (5175400)						

*This expander has 1" long rolls.

Condenser Expanders

Selection Guide G-1300 Series Heat Exchanger & Condenser Tube Expanders



G-1300 Series

O.D. Range:
3/8 Inches
9.5 mm

- Expanders with 3/4 in. (19.0 mm) long rolls will accommodate tube sheet thicknesses of 3/4 in. to 3 in. (19 mm to 76.2 mm)
- Expanders with 1-1/4 in. (31.7 mm) long rolls will accommodate tube sheet thicknesses from 1-1/4 in. to 3-1/2 in. (31.7 mm to 88.9 mm)
- These expanders will accommodate a wide range of tube sheet thicknesses.



Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)		Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 1/4 in. Sq. Dr. / 6.3 mm	Recommended Controlled Rolling Motors Airetrol
					3/4 in. to 3 in. (19.0 mm to 76.0 mm)*		1-1/4 in. to 3-1/2 in. (31.7 mm to 88.9 mm)*					
					Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)				
3/8 (9.5)	15	.072 (1.82)	.231 (5.8)	1315 (5512183)	1315 (5512184)	1316 (5512185)	1316 (5512180)	.230 (5.8)	.265 (6.7)		720-2500B (8405541)	
	16	.065 (1.65)	.245 (6.2)	1319 (5512187)	903 (5174700)	1319-L (5512190)	916-L (5512157)	.240 (6.1)	.275 (6.9)	M-86 (2541400)		
	17	.058 (1.47)	.259 (6.5)	1317 (5512191)		1318 (5512192-5)	904 (5174800)	.255 (6.4)	.289 (7.3)	M-88 (2541600)		
	18	.049 (1.24)	.277 (7.0)	1301 (5055100)		1302 (5055200)		.272 (6.9)	.307 (7.8)	M-80 (2540000)		
	19	.042 (1.06)	.291 (7.3)	1303 (5055300)	903 (5174700)	1304 (5055400)	908 (5175000)	.286 (7.2)	.320 (8.1)	M-81 (2540200)		
	20	.035 (.88)	.305 (7.7)	1305 (5055500)	907 (5174900)	1306 (5055600)		.300 (7.6)	.334 (8.4)	M-82 (2540400)		
	21	.032 (.81)	.311 (7.9)	1307 (5055700)		1308 (5055800)	.306 (7.7)	.340 (8.6)	M-83 (2540600)			
	22	.028 (.71)	.319 (8.1)	1309 (5055900)	909 (5175100)	1310 (5056000)	910 (5175200)	.314 (7.9)	.349 (8.8)			
	23	.025 (.63)	.325 (8.2)	1311 (5056100)	911 (5175300)	1312 (50562000)	912 (5175400)	.320 (8.1)	.357 (9.0)	M-84 (2540800)		
	24	.022 (.55)	.331 (8.4)									



Tube Expander Lubricant "LUBE-A-TUBE"

- A water soluble lubricant especially compounded for use with tube expanders. It prevents rust, acts as a coolant for longer life and smoother rolling.

*NOTE: Step expanding becomes necessary if the tube sheet thickness exceeds the length of the roll.

Condenser Expanders

Selection Guide G-800 Series Heat Exchanger & Condenser Tube Expanders



G-800 Series – 3-Roll

O.D. Range:
1/2 – 1-1/2 Inches
12.7 – 38.1 mm

- Expanders with 1-1/2 in. (38.1 mm) long rolls will accommodate tube sheet thicknesses of 1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)

Expanders with 2-1/4 in. (57.1mm) long rolls will accommodate tube sheet thicknesses from 1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)

New Reversible Thrust Collar Design

- One expander allows flush and 1/8 in.recess tube rolling.

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)		Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 3/8 in. Sq. Dr. / 9.5 mm	Recommended Controlled Rolling Motors								
					1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)					Airetrol	Electric Control							
					Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)												
1/2 (12.7)	14	.083 (2.10)	.334 (8.4)	797 (5005780)	797 (5512194)			.324 (8.2)	.374 (9.5)	797 (2131300)	720-550-B (8405391)									
	15	.072 (1.82)	.356 (9.0)	799 (5005782)	R-1 (5284800)			.348 (8.8)	.398 (10.1)	799 (2131900)										
	16	.065 (1.65)	.370 (9.4)	801 (5005800)				.360 (9.1)	.410 (10.4)	M-1 (2511800)	720-1800-B-3/8 (8405512)									
	17	.058 (1.47)	.384 (9.7)	803 (5005900)	R-2 (5285000)			.374 (9.5)	.424 (10.7)	M-2 (2512100)										
	18	.049 (1.24)	.402 (10.2)	805 (5006000)	R-3 (5285200)			.392 (9.9)	.447 (11.3)	M-3 (2512400)										
	20	.035 (.88)	.430 (10.9)	807 (5006100)	R-4 (5285400)			.420 (10.7)	.480 (12.1)	M-3 (2512400)										
5/8 (15.8)	12	.109 (2.76)	.407 (10.3)	805 (5006000)	R-3 (5285200)			.392 (9.9)	.447 (11.3)	M-2 (2512100)	850-600-A (8405398)									
	13	.095 (2.41)	.435 (11.0)	807 (5006100)	R-4 (5285400)			.420 (10.7)	.480 (12.1)	M-3 (2512400)										
	14	.083 (2.10)	.459 (11.6)	809 (5006200)		810 (5006300)	R-4-A (5285500)	.449 (11.4)	.509 (12.9)	M-4 (2512700)										
	15	.072 (1.82)	.481 (12.2)	811 (5006400)	R-5 (5285800)	812 (5006500)	R-5-A (5285900)	.471 (11.9)	.536 (13.6)	M-5 (2513000)	850-1250-A (8405399)									
	16	.065 (1.65)	.495 (12.5)	813 (5006600)	R-6 (5286200)	814 (5006700)	R-6-A (5286300)	.485 (12.3)	.550 (13.9)	M-6 (2513300)										
	17	.058 (1.47)	.509 (12.9)	815 (5006800)		816 (5006900)		.499 (12.6)	.564 (14.3)											
	18	.049 (1.24)	.527 (13.3)	817 (5007000)	R-7 (5286600)	818 (5007100)	R-7-A (5286700)	.517 (13.1)	.582 (14.8)											
	19	.042 (1.06)	.541 (13.7)	819 (5007200)		820 (5007300)														
	20	.035 (.88)	.555 (14.1)																	
	21	.032 (.81)	.561 (14.2)																	
22	.028 (.71)	.569 (14.4)																		

Condenser Expanders

Selection Guide G-800 Series Heat Exchanger & Condenser Tube Expanders – continued

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 3/8 in. Sq. Dr. / 9.5 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)					Airetrol	Electric Control
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)					
3/4 (19.0)	10	.134 (3.40)	.482 (12.2)	811 (5006400)	R-5 (5285800)	812 (5006500)	R-5-A (5285900)	.471 (11.9)	.536 (13.6)	M-5 (2513000)	850-600-A (8405398)	
	11	.120 (3.04)	.510 (12.9)	815 (5006800)	R-6 (5286200)	816 (5006900)	R-6-A (5286300)	.499 (12.6)	.564 (14.3)	M-6 (2513300)		
	12	.109 (2.76)	.532 (13.5)	817 (5007000)	R-7 (5286600)	818 (5007100)	R-7-A (5286700)	.517 (13.1)	.582 (14.8)	M-8 (2513900)		
	13	.095 (2.41)	.560 (14.2)	821 (5007400)	R-8 (5287000)	822 (5007500)	R-8-A (5287100)	.550 (13.9)	.615 (15.6)			
	14	.083 (2.10)	.584 (14.8)	823 (5007600)	R-9 (5287400)	824 (5007700)	R-9-A (5287500)	.574 (14.5)	.639 (16.2)	M-9 (2514200)		
	15	.072 (1.82)	.606 (15.3)	825 (5007800)	R-10 (5287800)	826 (5007900)	R-10-A (5287900)	.596 (15.1)	.661 (16.7)			
	16	.065 (1.65)	.620 (15.7)	827 (5008000)	R-10 (5287800)	828 (5008100)	R-10-A (5287900)	.605 (15.3)	.685 (17.4)	M-9 (2514200)	850-1250-A (8405399)	
	17	.058 (1.47)	.634 (16.1)	829 (5008200)	R-11 (5288200)	830 (5008300)	R-11-A (5288300)	.619 (15.7)	.699 (17.7)			
	18	.049 (1.24)	.652 (16.5)									
	19	.042 (1.06)	.666 (16.9)	831 (5008400)	R-12 (5288600)	832 (5008500)	R-12-A (5288700)	.642 (16.3)	.722 (18.3)			
	20	.035 (.88)	.680 (17.2)									
	21	.032 (.81)	.686 (17.4)									
22	.028 (.71)	.694 (17.6)										
7/8 (22.2)	10	.134 (3.40)	.607 (15.4)	825 (5007800)	R-10 (5287800)	826 (5007900)	R-10-A (5287900)	.596 (15.1)	.661 (16.7)	M-8 (2513900)	850-600-A (8405398)	
	11	.120 (3.04)	.635 (16.1)	829 (5008200)	R-11 (5288200)	830 (5008300)	R-11-A (5288300)	.619 (15.7)	.699 (17.7)	M-9 (2514200)		
	12	.109 (2.76)	.657 (16.6)	831 (5008400)	R-12 (5288600)	832 (5008500)	R-12-A (5288700)	.642 (16.3)	.722 (18.3)			
	13	.095 (2.41)	.685 (17.4)	833 (5008600)	R-13 (5289000)	834 (5008700)	R-13-A (5289100)	.670 (17.0)	.750 (19.0)	M-10 (2514500)		
	14	.083 (2.10)	.709 (18.0)	835 (5008800)	R-14 (5289400)	836 (5008900)	R-14-A (5289500)	.685 (17.4)	.774 (19.6)	M-11 (2514800)		
	15	.072 (1.82)	.731 (18.5)	837 (5009000)	R-15 (5289800)	838 (5009100)	R-15-A (5289900)	.712 (18.0)	.801 (20.3)			
	16	.065 (1.65)	.745 (18.9)	839 (5009200)		840 (5009300)	R-15-A (5289900)	.726 (18.4)	.815 (20.7)	M-12 (2515100)		
	17	.058 (1.47)	.759 (19.2)	843 (5009600)	R-16 (5290200)	844 (5009700)	R-16-A (5290300)	.740 (18.8)	.829 (21.0)			
18	.049 (1.24)	.777 (19.7)										
1 (25.4)	8	.165 (4.19)	.670 (17.0)	841 (5009400)	R-13 (5289000)	842 (5009500)	R-13-A (5289100)	.655 (16.6)	.735 (18.6)	M-9 (2514200)	1050-400-A (8404200)	
	9	.148 (3.75)	.704 (17.8)	835 (5008800)	R-14 (5289400)	836 (5008900)	R-14-A (5289500)	.685 (17.4)	.774 (19.6)	M-11 (2514800)		
	10	.134 (3.40)	.732 (18.5)	837 (5009000)	R-15 (5289800)	838 (5009100)	R-15-A (5289900)	.712 (18.0)	.801 (20.3)			
	11	.120 (3.04)	.760 (19.3)	843 (5009600)	R-16 (5290200)	844 (5009700)	R-16-A (5290300)	.740 (18.8)	.829 (21.0)	M-12 (2515100)		
	12	.109 (2.76)	.782 (19.8)	845 (5009800)	R-17 (5290600)	846 (5009900)	R-17-A (5290700)	.763 (19.3)	.852 (21.6)			
	13	.095 (2.41)	.810 (20.5)	847 (5010000)	R-18 (5291000)	848 (5010100)	R-18-A (5291100)	.791 (20.0)	.880 (22.3)	M-13 (2515400)	850-600-A (8405398)	
	14	.083 (2.10)	.834 (21.1)	849 (5010200)	R-18 (5291000)	850 (5010300)	R-18-A (5291100)	.810 (20.5)	.909 (23.0)			
	15	.072 (1.82)	.856 (21.7)	851 (5010400)	R-19 (5291400)	852 (5010500)	R-19-A (5291500)	.837 (21.2)	.936 (23.7)			
	16	.065 (1.65)	.870 (22.1)									
	17	.058 (1.47)	.884 (22.4)	855 (5010800)	R-21 (5292200)	856 (5010900)	R-21-A (5292300)	.865 (21.9)	.964 (24.4)			
18	.049 (1.24)	.902 (22.9)										

Condenser Expanders

Selection Guide G-800 Series Heat Exchanger & Condenser Tube Expanders – continued



Tube O.D.	Tube Gauge		Tube I.D.	Tube Sheet Thickness				Min. I.D. Tool Enters	Max. Expan. of Tool	Mandrel No. (Part No.) 1/2 in. Sq. Dr. / 12.7 mm	Recommended Controlled Rolling Motors		
				1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)					Airetrol	Electric Control	
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)						
In. (mm)	bwg	In. (mm)	In. (mm)					In. (mm)	In. (mm)				
1 (25.4)	19	.042 (1.06)	.916 (23.2)	855 (5010800)	R-21 (5292200)	856 (5010900)	R-21-A (5292300)	.865 (21.9)	.964 (24.4)	M-13 *(2515400)	850-1250-A (8405399)	979-C-650/ATC-900	
	20	.035 (.88)	.930 (23.6)										
1-1/8 28.5	8	.165 (4.19)	.795 (20.1)	853 (5010600)	R-20 (5291800)	854 (5010700)	R-20-A (5291900)	.776 (19.7)	.875 (22.2)			1050-400 (8404200)	979-C-300/ATC-900
	9	.148 (3.75)	.829 (21.0)	849 (5010200)	R-18 (5291000)	850 (5010300)	R-18-A (5291100)	.810 (20.5)	.909 (23.0)				
	10	.134 (3.40)	.857 (21.7)	851 (5010400)	R-19 (5291400)	852 (5010500)	R-19-A (5291500)	.837 (21.2)	.936 (23.7)				
	11	.120 (3.04)	.885 (22.4)	855 (5010800)	R-21 (5292200)	856 (5010900)	R-21-A (5292300)	.865 (21.9)	.964 (24.4)				
	12	.109 (2.76)	.907 (23.0)	857 (5011000)	R-21 (5292200)	858 (5011100)	R-21-A (5292300)	.883 (22.4)	.982 (24.9)		M-14 (2515700)		
	13	.095 (2.41)	.935 (23.7)	859 (5011200)	R-22 (5292600)	860 (5011300)	R-22-A (5292700)	.916 (23.2)	1.015 (25.7)				
	14	.083 (2.10)	.959 (24.3)	861 (5011400)	R-23 (5293000)	862 (5011500)	R-23-A (5293100)	.935 (23.7)	1.044 (26.5)				
	15	.072 (1.82)	.981 (24.9)	863 (5011600)	R-24 (5293400)	864 (5011700)	R-24-A (5293500)	.962 (24.4)	1.071 (27.2)		M-15 (2516000)		
	16	.065 (1.65)	.995 (25.2)										
	17	.058 (1.47)	1.009 (25.6)	867 (5012000)	R-26 (5294200)	868 (5012100)	R-26-A (5293500)	.990 (25.1)	1.099 (27.9)		M-16 (2516300)		
1-1/4 31.7	8	.165 (4.19)	.920 (23.3)	865 (5011800)	R-25 (5293800)	866 (5011900)	R-25-A (5293900)	.901 (22.8)	1.010 (25.6)	M-15 (2516000)	979-C-650/ATC-900		
	9	.148 (3.75)	.954 (24.2)	861 (5011400)	R-23 (5293000)	862 (5011500)	R-23-A (5293100)	.935 (23.7)	1.044 (26.5)				
	10	.134 (3.40)	.982 (24.9)	863 (5011600)	R-24 (5293400)	864 (5011700)	R-24-A (5293500)	.962 (24.4)	1.071 (27.2)				
	11	.120 (3.04)	1.010 (25.6)	867 (5012000)	R-26 (5294200)	868 (5012100)	R-26-A (5294300)	.990 (25.2)	1.099 (27.9)				
	12	.109 (2.76)	1.032 (26.2)	869 (5012200)	R-27 (5294600)	870 (5012300)	R-27-A (5294700)	1.013 (25.7)	1.122 (28.5)			M-16 (2516300)	
	13	.095 (2.41)	1.060 (26.9)	871 (5012400)	R-28 (5295000)	872 (5012500)	R-28-A (5295100)	1.041 (26.4)	1.150 (29.2)			M-17 (2516600)	
	14	.083 (2.10)	1.084 (27.5)	873 (5012600)	R-29 (5295400)	874 (5012700)	R-29-A (5295500)	1.060 (26.9)	1.169 (29.6)				
	15	.072 (1.82)	1.106 (28.0)	875 (5012800)	R-30 (5295800)	876 (5012900)	R-30-A (5295900)	1.087 (27.6)	1.196 (30.3)				
	16	.065 (1.65)	1.120 (28.4)										
	17	.058 (1.47)	1.134 (28.8)	879 (5013200)	R-30 (5295800)	880 (5013300)	R-30-A (5295900)	1.115 (28.3)	1.224 (31.0)			M-18 (2516900)	
1-3/8 34.9	8	.165 (4.19)	1.045 (26.5)	877 (5013000)	R-31 (5296200)	878 (5013100)	R-31-A (5296300)	1.026 (26.0)	1.135 (28.8)	M-17 (2516600)	1550-250 (8404280)	979-C-210/ATC-900	
	9	.148 (3.75)	1.079 (27.4)	873 (5012600)	R-29 (5295400)	874 (5012700)	R-29-A (5295500)	1.060 (26.9)	1.169 (29.6)				
	10	.134 (3.40)	1.107 (28.1)	875 (5012800)	R-30 (5295800)	876 (5012900)	R-30-A (5295900)	1.087 (27.6)	1.196 (30.3)				
	11	.120 (3.04)	1.135 (28.8)	879 (5013200)	R-30 (5295800)	880 (5013300)	R-30-A (5295900)	1.115 (28.3)	1.224 (31.0)				
	12	.109 (2.76)	1.157 (29.3)	881 (5013400)	R-32 (5296600)	882 (5013500)	R-32-A (5296700)	1.133 (28.7)	1.242 (31.5)				M-18 (2516900)
	13	.095 (2.41)	1.185 (30.1)	883 (5013600)	R-33 (5297000)	884 (5013700)	R-33-A (5297100)	1.160 (29.4)	1.275 (32.3)				M-19 (2517200)
	14	.083 (2.10)	1.209 (30.7)	885 (5013800)	R-34 (5297400)	886 (5013900)	R-34-A (5297500)	1.179 (29.9)	1.294 (32.8)				M-20 (2517500)
	15	.072 (1.82)	1.231 (31.2)										
16	.065 (1.65)	1.245 (31.6)	887 (5014000)	R-35 (5297800)	888 (5014100)	R-35-A (5297900)	1.206 (30.6)	1.321 (33.5)		1550-900 (8404290)	979-C-300/ATC-900		

*3/8 in. Square Drive / 9.5 mm

Condenser Expanders

Selection Guide G-800 Series Heat Exchanger & Condenser Tube Expanders – continued

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 1/2 in. Sq. Dr. / 12.7 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)					Airetrol	Electric Control
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)					
1-1/2 (38.1)	8	.165 (4.19)	1.170 (29.7)	889 (5014200)	R-34 (5297400)	890 (5014300)	R-34-A (5297500)	1.145 (29.0)	1.260 (32.0)	M-19 (2517200)	1550-250 (8404280)	979-C-210/ ATC-900
	9	.148 (3.75)	1.204 (30.5)	885 (5013800)	R-34 (5297400)	886 (5013900)	R-34-A (5297500)	1.177 (29.9)	1.294 (32.8)	M-20 (2517500)		
	10	.134 (3.40)	1.232 (31.2)	887 (5014000)	R-35 (5297800)	888 (5014100)	R-35-A (5297900)	1.206 (30.6)	1.321 (33.5)			
	11	.120 (3.04)	1.260 (32.0)	891 (5014400)	R-36 (5298200)	892 (5014500)	R-36-A (5298300)	1.235 (31.3)	1.350 (34.2)			
	12	.109 (2.76)	1.282 (32.5)	893 (5014600)	R-37 (5298600)	894 (5014700)	R-37-A (5298700)	1.257 (31.9)	1.372 (34.8)	M-21 (2517800)	1550-900 (8404290)	979-C-300/ ATC-900
	13	.095 (2.41)	1.310 (33.2)	895 (5014800)	R-37 (5298600)	896 (5014900)	R-37-A (5014900)	1.285 (32.6)	1.400 (35.5)			
	14	.083 (2.10)	1.334 (33.8)									
	15	.072 (1.82)	1.356 (34.4)	897 (5015000)	R-38 (5299000)	898 (5015100)	R-38-A (5299100)	1.331 (33.8)	1.446 (36.7)			
	16	.065 (1.65)	1.370 (34.8)									
	17	.058 (1.47)	1.384 (35.1)	899 (5015120)	R-38 (5299000)	900 (5015150)	R-38-A (5299100)	1.331 (33.8)	1.472 (37.3)	M-22 (2518100)		
	18	.049 (1.24)	1.402 (35.6)									
	19	.042 (1.06)	1.416 (35.9)									
	20	.035 (.88)	1.430 (36.3)									



Airetool

G-800 Series – 5-Roll

O.D Range:
5/8 – 1-1/2 Inches
15.8 – 38.1 mm

- Expanders with 1-1/2 in. (38.1 mm) long rolls will accommodate tube sheets from 1/2 in. to 1-1/2 in. (12.7mm to 38.1 mm)
- Expanders with 2-1/4 in. (57.1 mm) long rolls will accommodate tube sheets from 1-1/4 in. to 2-1/4 in. (31.7mm to 57.1 mm)

NOTE: For best results the Airetool Five-Roll expander should be fitted with a thin wall thrust collar when being used to roll tubing with 20 BWG .035" (0.9 mm).

Sizes not listed available upon request.

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 3/8 in. Sq. Dr. / 9.5 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)					Airetrol	Electric Control
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)					
5/8 (15.8)	17	.058 (1.47)	.509 (12.9)	815-5 (5517135)	R-4-5 (5513832)	816-5 (5519516)	R-4-A-5 (5517897)	499 (12.6)	.564 (14.3)	816-5 (2975477)	850-1250-A (8405399)	
	18	.049 (1.24)	.527 (13.4)	817-5 (5514294)	R-4-5 (5513832)		R-4-A-5 (5517897)	517 (13.1)	.576 (14.6)	M-9 (2514200)		
	19	.042 (1.07)	.541 (13.7)									
	20	.035 (0.89)	.555 (14.1)									
	21	.032 (0.81)	.561 (14.2)	819-5 (5514295)	R-4-5 (5513832)	820-5 (5515647)	R-4-A-5 (5517897)	531 (13.5)	.596 (15.1)	M-11 (2514800)		
	22	.028 (0.71)	.569 (14.5)									
3/4 (19.0)	13	.095 (2.41)	.560 (14.2)	821-5 (5513230)	R-5-5 (5513231)	822-5 (5514482)	R-5-A-5 (5518189)	.550 (14.0)	.615 (15.6)	822-5 (2973154)	850-600-A (8405398)	979-C-650/ ATC-900
	14	.083 (2.11)	.584 (14.8)	823-5 (5515375)	R-6-5 (5518187)	824-5 (5514171)	R-6-A-5 (5517898)	.574 (14.6)	.629 (15.9)	824-5 (2976194)		
	15	.072 (1.83)	.606 (15.4)	825-5 (5522104)	R-7-5 (5514393)	826-5 (5518376)	R-7-A-5 (5517899)	.590 (15.0)	.661 (16.8)	826-5 (2985022)		
	16	.065 (1.65)	.620 (15.7)	827-5 (5513799)	R-7-5 (5514393)	828-5 (5513542)	R-7-A-5 (5517899)	.605 (15.4)	.680 (17.2)	M-13 (2515400)	850-1250-A (8405399)	
	17	.058 (1.47)	.634 (16.1)									
	18	.049 (1.24)	.652 (16.6)	829-5 (5513426)	R-7-5 (5514393)	830-5 (5513413)	R-7-A-5 (5517899)	.619 (15.7)	.699 (17.8)	830-5 (2972695)		
	19	.042 (1.07)	.666 (16.9)									
	20	.035 (0.89)	.680 (17.3)									
	21	.032 (0.81)	.666 (17.4)	831-5 (5513427)	R-9-5 (5517888)	832-5 (5513264)	R-9-A-5 (5517900)	.642 (16.3)	.729 (18.5)	M-13 (2515400)		
	22	.028 (0.71)	.694 (17.6)									
7/8 (22.2)	13	.095 (2.41)	.685 (17.4)	833-5 (5517076)	R-9-5 (5517888)	834-5 (5514704)	R-9-A-5 (5517900)	.670 (17.0)	.747 (18.9)	M-14-3/8 (2972840)	850-600-A (8405398)	979-C-650/ ATC-900
	14	.083 (2.11)	.709 (18.0)	835-5 (5517735)	R-10-5 (5518191)	836-5 (5515680)	R-10-A-5 (5517901)	.685 (17.4)	.774 (19.6)	M-15-3/8 (2977108)		
	16	.065 (1.65)	.745 (18.9)	839-5 (5518154)	R-11-5 (5517889)	840-5 (5514564)	R-11-A-5 (5517902)	.685 (17.4)	.750 (19.0)			
	17	.058 (1.47)	.759 (19.3)									
	18	.049 (1.24)	.777 (19.7)	843-5 (5517922)	R-11-5 (5517889)	844-5 (5517923)	R-11-A-5 (5517902)	.740 (18.8)	.824 (20.9)	M-17-3/8 (2983632)	850-1250-A (8405399)	
	19	.042 (1.07)	.791 (20.1)	845-5 (5513810)	R-11-5 (5517889)	846-5 (5517924)	R-11-A-5 (5517902)	.763 (19.4)	.851 (21.6)	M-18-3/8 (2983633)		

Condenser Expanders

Selection Guide G-800 Type Five-Roll Expanders – continued

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 3/8 in. Sq. Dr. / 9.5 mm *1/2 in. Sq. Dr./12.7 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 1-1/2 in. (12.7 mm to 38.1 mm)		1-1/4 in. to 2-1/4 in. (31.7 mm to 57.1 mm)					Airetrol	Electric Control
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)					
7/8 (22.2)	20	.035 (0.89)	.805 (20.4)					.763 (19.4)	.851 (21.6)	M-18-3/8 (2983633)	850-1250-A (8405399)	
	21	.032 (0.81)	.811 (20.6)	845-5 (5513810)	R-11-5 (5517889)	846-5 (5515924)	R-11-A-5 (5517902)					
	22	.028 (0.71)	.819 (20.8)									
1 (25.4)	12	.109 (2.77)	.782 (19.9)	845-5 (5513810)	R-11-5 (5517889)	846-5 (5515924)	R-11-A-5 (5517902)	.763 (19.4)	.852 (21.6)	M-18-3/8 (2983633)	850-600-A (8405398)	979-C-650/ ATC-900
	13	.095 (2.41)	.810 (20.6)	847-5 (5513379)	R-13-5 (5513741)	848-5 (5517099)	R-13-A-5 (5517903)					
	14	.083 (2.11)	.834 (21.2)	849-5 (5514922)	R-12-5 (5517890)	850-5 (5513331)	R-12-A-5 (5515825)	.810 (20.6)	.909 (22.3)	850-5 (2973500)		
	15	.072 (1.83)	.856 (21.7)					.837 (21.3)	.936 (23.7)	M-20 (2517500)		
	16	.065 (1.65)	.870 (22.1)	851-5 (5513778)	R-13-5 (5513741)	852-5 (5513330)	R-13-A-5 (5517903)					
	17	.058 (1.47)	.884 (22.5)					.865 (22.0)	.965 (24.5)	856-5 (2974859)	850-1250-A (8405399)	
	18	.049 (1.24)	.902 (22.9)									
	19	.042 (1.07)	.916 (23.3)	855-5 (5515194)	R-13-5 (5513741)	856-5 (5513745)	R-13-A-5 (5517903)					
	20	.035 (0.89)	.930 (23.6)									
	21	.032 (0.81)	.936 (23.8)					.883 (22.4)	.997 (25.3)	M-21 (2517800)		
22	.028 (0.71)	.944 (24.0)	857-5 (5513825)	R-15-5 (5513833)	858-5 (5515935)	R-15-A-5 (5517907)						
1-1/8 (28.5)	12	.109 (2.77)	.907 (23.0)	857-5 (5513825)	R-15-5 (5513833)	858-5 (5515935)	R-15-A-5 (5517907)	.883 (22.4)	.997 (25.3)	M-21 (2517800)	1050-400 (8404200)	979-C-300/ ATC-900
	13	.095 (2.41)	.935 (23.7)	859-5 (5514397)	R-16-5 (5518056)	860-5 (5513392)	R-16-A-5 (5517904)	.916 (23.3)	1.000 (25.4)	860-5 *(2975673)		
	14	.083 (2.11)	.959 (24.1)	861-5 (5513325)	R-17-5 (5517891)	862-5 (5513747)	R-17-A-5 (5517905)	.935 (23.7)	1.043 (26.4)	862-5 *(2974860)		
1-1/4 (31.8)	15	.072 (1.83)	1.106 (28.1)					1.087 (27.6)	1.196 (30.4)	880-5 *(2968789)	1050-400 (8404200)	979-C-650/ ATC-900
	16	.065 (1.65)	1.120 (28.4)	875-5 (5513884)	R-21-5 (5517887)	876-5 (5519970)						
	17	.058 (1.47)	1.134 (28.8)					1.115 (28.3)	1.231 (31.3)			
	18	.049 (1.24)	1.152 (29.3)									
	19	.042 (1.07)	1.166 (29.6)	879-5 (5513993)	R-21-5 (5517887)	880-5 (5512151)	R-21-A-5 (5513291)					
	20	.042 (0.80)	1.180 (30.0)									
	21	.032 (0.81)	1.186 (30.1)									
	22	.028 (0.71)	1.194 (30.3)									
1-3/8 (34.9)	12	.109 (2.77)	1.154 (29.3)	881-5 (5516001)	R-21-5 (5517887)	882-5 (5514657)	R-21-A-5 (5513291)	1.133 (28.8)	1.242 (31.5)	882-5 *(2973230)	1550-250 (8404280)	979-C-210/ ATC-900
	14	.083 (2.11)	1.209 (30.7)	885-5 (5513252)	R-23-5 (5517892)	886-5 (5515778)	R-23-A-5 (5518192)	1.179 (29.9)	1.296 (32.9)			
1-1/2 (38.1)	17	.058 (1.47)	1.384 (35.2)					1.331 (33.8)	1.489 (37.8)	900-5 *(2975232)	1550-900 (8404290)	979-C-300/ ATC-900
	18	.049 (1.24)	1.402 (35.2)									
	19	.042 (1.07)	1.416 (36.0)									
	20	.035 (0.89)	1.430 (36.3)	899-5 (5513850)	R-29-5 (5517893)	900-5 (5517605)	R-29-A-5 (5517906)					
	21	.032 (0.81)	1.436 (36.5)									
	22	.028 (0.71)	1.444 (36.7)									

Condenser Expanders

G-1200 Series Heat Exchanger & Condenser Tube Expanders

Airetool



Airetool

G-1200 Series – 3-Roll

O.D. Range: 1/2 – 1-1/2 Inches 12.7 – 38.1 mm

■ Expanders with 1-1/2 in. (38.1 mm) long rolls will accommodate tube sheet thicknesses as follows:
 STD. REACH 1/2" to 5" (12.7 mm to 127.0 mm)
 "A" REACH 1/2" to 7" (12.7 mm to 177.8 mm)
 "C" REACH 7/8" to 11" (22.2 mm to 279.4 mm)

■ Expanders with 2-1/4 in. (57.1 mm) long rolls will accommodate tube sheet thicknesses as follows:
 STD. REACH 1-1/4" to 5-3/4" (31.7 mm to 146.0 mm)
 "A" REACH 1-1/4" to 7-3/4" (31.7 mm to 196.8 mm)
 "C" REACH 1-5/8" to 11-3/4" (41.3 mm to 298.4 mm)

NOTE: Step expanding becomes necessary if the tube sheet thickness exceeds the length of the roll. Longer reaches available upon request in 6 inch (50.8 mm) increments.

New Reversible Thrust Design

■ One expander allows flush and 1/8 in. recess tube rolling.

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 3/8 in. Sq. Dr. / 9.5 mm	Recommended Controlled Rolling Motors		
				1/2 in. to 5 in. (12.7 mm to 133.3 mm)		1-1/4 in. to 5-3/4 in. (31.7 mm to 152.4 mm)					Airetrol	Electric Control	
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)						
1/2 (12.7)	14	.083 (2.10)	.334 (8.4)	1197 (5017460)	797 (5512194)			.324 (8.2)	.374 (9.5)	1197 (2165300)	720-550-B (8405391)		
	15	.072 (1.82)	.356 (9.0)	1199 (5056204)	R-1 (5284800)			.348 (8.8)	.398 (10.1)	1199 (2166400)			
	16	.065 (1.65)	.370 (9.4)	1201 (5017500)				.360 (9.1)	.410 (10.4)				
	17	.058 (1.47)	.384 (9.7)	1203 (5017900)	R-2 (5285000)			.374 (9.5)	.424 (10.7)	M-51 (2521100)	720-1800-B (8405512)-3/8		
	18	.049 (1.24)	.402 (10.2)	1205 (5018300)	R-3 (5285200)			.392 (9.9)	.447 (11.3)	M-52 (2522000)			
	20	.035 (0.88)	.430 (10.9)	1207 (5018700)	R-4 (5285400)			.420 (10.7)	.480 (12.1)	M-53 (2522900)			
5/8 (15.8)	12	.109 (2.76)	.407 (10.3)	1205 (5018300)	R-3 (5285200)			.392 (9.9)	.447 (11.3)	M-52 (2522000)	850-600-A (8405398)		
	13	.095 (2.41)	.435 (11.0)	1207 (5018700)	R-4 (5285400)			.420 (10.7)	.480 (12.1)	M-53 (2522900)			
	14	.083 (2.10)	.459 (11.6)	1209 (5019100)		1210 (5019500)	R-4-A (5285500)	.449 (11.4)	.509 (12.9)	M-54 (2523800)			
	15	.072 (1.82)	.481 (12.2)	1211 (5019900)	R-5 (5285800)	1212 (5020300)	R-5-A (5285900)	.471 (11.9)	.536 (13.6)	M-55 (2524700)			
	16	.065 (1.65)	.495 (12.5)	1213 (5020700)	R-6 (5286200)	1214 (5021100)	R-6-A (5286300)	.485 (12.3)	.550 (13.9)				
	17	.058 (1.47)	.509 (12.9)	1215 (5021500)		1216 (5021900)			.499 (12.6)	.564 (14.3)	M-56 (2525600)		
	18	.049 (1.24)	.527 (13.3)	1217 (5022300)	R-7 (5286600)	1218 (5022700)	R-7-A (5286700)	.517 (13.1)	.582 (14.8)				
	19	.042 (1.06)	.541 (13.7)	1219 (5023100)		1220 (5023500)							
	20	.035 (0.88)	.555 (14.1)										
	21	.032 (0.81)	.561 (14.2)										
22	.028 (0.71)	.569 (14.4)											
3/4 (19.0)	10	.134 (3.40)	.482 (12.2)	1211 (5019900)	R-5 (5285800)	1212 (5020300)	R-5-A (5285900)	.471 (11.9)	.536 (13.6)	M-55 (2524700)	850-600-A (8405398)	979-C-650/ ATC-900	
	11	.120 (3.04)	.510 (12.9)	1215 (5021500)	R-6 (5286200)	1216 (5021900)	R-6-A (5286300)	.499 (12.6)	.564 (14.3)	M-56 (2525600)			
	12	.109 (2.76)	.532 (13.5)	1217 (5022300)	R-7 (5286600)	1218 (5022700)	R-7-A (5286700)	.517 (13.1)	.582 (14.8)	M-58 (2527400)			
	13	.095 (2.41)	.560 (14.2)	1221 (5023900)	R-8 (5287000)	1222 (5024300)	R-8-A (5287100)	.550 (13.9)	.615 (15.6)				
	14	.083 (2.10)	.584 (14.8)	1223 (5024700)	R-9 (5287400)	1224 (5025100)	R-9-A (5287500)	.574 (14.5)	.639 (16.2)				

Condenser Expanders

G-1200 Series Heat Exchanger & Condensor Tube Expanders – continued

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 3/8 in. Sq. Dr. / 9.5 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 5-1/4 in. (12.7 mm to 133.3 mm)		1-1/4 in. to 6 in. (31.7 mm to 152.4 mm)					Airetrol	Electric Control
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)					
3/4 (19.0)	15	.072 (1.82)	.606 (15.3)	1225 (5025500)	R-10 (5287800)	1226 (5025900)	R-10-A (5287900)	.596 (15.1)	.661 (16.7)	M-58 (2527400)	850-600-A (8405398)	979-C-650/ ATC-900
	16	.065 (1.65)	.620 (15.7)	1227 (5026300)		1228 (5026700)		.605 (15.3)	.685 (17.4)			
	17	.058 (1.47)	.634 (16.1)									
	18	.049 (1.24)	.652 (16.5)	1229 (5027100)	R-11 (5288200)	1230 (5027500)	R-11-A (5288300)	.619 (15.7)	.699 (17.7)			
	19	.042 (1.06)	.666 (16.9)							M-59 (2528300)	850-1250-A (8405399)	
	20	.035 (0.88)	.680 (17.2)									
	21	.032 (0.81)	.686 (17.4)	1231 (5027900)	R-12 (5288600)	1232 (5028300)	R-12-A (5288700)	.642 (16.3)	.722 (18.3)			
	22	.028 (0.71)	.694 (17.6)									
7/8 (22.2)	10	.134 (3.40)	.607 (15.4)	1225 (5025500)	R-10 (5287800)	1226 (5025900)	R-10-A (5287900)	.596 (15.1)	.661 (16.7)	M-58 (2527400)		
	11	.120 (3.04)	.635 (16.1)	1229 (5027100)	R-11 (5288200)	1230 (5027500)	R-11-A (5288300)	.619 (15.7)	.699 (17.7)			
	12	.109 (2.76)	.657 (16.6)	1231 (5027900)	R-12 (5288600)	1232 (5028300)	R-12-A (5288700)	.642 (16.3)	.722 (18.3)	M-59 (2528300)		
	13	.095 (2.41)	.685 (17.4)	1233 (5028700)	R-13 (5289000)	1234 (5029100)	R-13-A (5289100)	.670 (17.0)	.750 (19.0)	M-60 (2529200)	850-600-A (8405398)	979-C-650/ ATC-900
	14	.083 (2.10)	.709 (18.0)	1235 (5029500)	R-14 (5289400)	1236 (5029900)	R-14-A (5289500)	.685 (17.4)	.774 (19.6)			
	15	.072 (1.82)	.731 (18.5)	1237 (5030300)		1238 (5030700)		.712 (18.0)	.801 (20.3)	M-61 (2530100)		
	16	.065 (1.65)	.745 (18.9)	1239 (5031100)	R-15 (5289800)	1240 (5031500)	R-15-A (5289900)	.726 (18.4)	.815 (20.7)			
	17	.058 (1.47)	.759 (19.2)									
18	.049 (1.24)	.777 (19.7)	1243 (5032700)	R-16 (5290200)	1244 (5033100)	R-16-A (5290300)	.740 (18.8)	.829 (21.0)	M-62 (2531000)	850-1250-A (8405399)		
1 (25.4)	8	.165 (4.19)	.670 (17.0)	1241 (5031900)	R-13 (5289000)	1242 (5032300)	R-13-A (5289100)	.665 (16.8)	.735 (18.6)	M-59 (2528300)		
	9	.148 (3.75)	.704 (17.8)	1235 (5029500)	R-14 (5289400)	1236 (5029900)	R-14-A (5289500)	.685 (17.4)	.774 (19.6)			
	10	.134 (3.40)	.732 (18.5)	1237 (5030300)	R-15 (5289800)	1238 (5030700)	R-15-A (5289900)	.712 (18.0)	.801 (20.3)	M-61 (2530100)	1050-400 (8404200)	
	11	.120 (3.04)	.760 (19.3)	1243 (5032700)	R-16 (5290200)	1244 (5033100)	R-16-A (5290300)	.740 (18.8)	.829 (21.0)			
	12	.109 (2.76)	.782 (19.8)	1245 (5033500)	R-17 (5290600)	1246 (5033900)	R-17-A (5290700)	.763 (19.3)	.852 (21.6)	M-62 (2531000)		979-C-300/ ATC-900
	13	.095 (2.41)	.810 (20.5)	1247 (5034300)		1248 (5034700)		.791 (20.0)	.880 (22.3)			
	14	.083 (2.10)	.834 (21.1)	1249 (5035100)	R-18 (5291000)	1250 (5035500)	R-18-A (5291100)	.810 (20.5)	.909 (23.0)			
	15	.072 (1.82)	.856 (21.7)									
	16	.065 (1.65)	.870 (22.1)	1251 (5035900)	R-19 (5291400)	1252 (5036300)	R-19-A (5291500)	.837 (21.2)	.936 (23.7)			
	17	.058 (1.47)	.884 (22.4)							M-63 (2531900)		
	18	.049 (1.24)	.902 (22.9)									
	19	.042 (1.06)	.916 (23.2)	1255 (5037500)	R-21 (5292200)	1256 (5037900)	R-21-A (5292300)	.865 (21.9)	.964 (24.4)		850-600-A (8405398)	
20	.035 (0.88)	.930 (23.6)										
1-1/8 (28.5)	8	.165 (4.19)	.795 (20.1)	1253 (5036700)	R-20 (5291800)	1254 (5037100)	R-20-A (5291900)	.776 (19.7)	.875 (22.2)			
	9	.148 (3.75)	.829 (21.0)	1249 (5035100)	R-18 (5291000)	1250 (5035500)	R-18-A (5291100)	.810 (20.5)	.909 (23.0)	M-63 (2531900)	1050-400 (8404200)	979-C-300/ ATC-900

Condenser Expanders

G-1200 Series Heat Exchanger & Condenser Tube Expanders – continued



Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 1/2 in. Sq. Dr. / 21.7 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 5-1/4 in. (12.7 mm to 133.3 mm)		1-1/4 in. to 6 in. (31.7 mm to 152.4 mm)					Airetrol	Electric Control
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)					
1-1/8 (28.5)	10	.134 (3.40)	.857 (21.7)	1251 (5035900)	R-19 (5291400)	1252 5036300	R-19-A (5291500)	.837 (21.2)	.936 (23.7)	M-63* (2531900)	979-C-300/ ATC-900	
	11	.120 (3.04)	.885 (22.4)	1255 (5037500)	R-21 (5292200)	1256 (5037900)	R-21-A (5292300)	.865 (21.9)	.964 (24.4)			
	12	.109 (2.76)	.907 (23.0)	1257 (5038300)	R-21 (5292200)	1258 (5038700)	R-21-A (5292300)	.883 (22.4)	.982 (24.9)	M-64 (2532800)	1050-400 (8404200)	
	13	.095 (2.41)	.935 (23.7)	1259 (5039100)	R-22 (5292600)	1260 (5039500)	R-22-A (5292700)	.916 (23.2)	1.015 (25.7)			
	14	.083 (2.10)	.959 (24.3)	1261 (5039900)	R-23 (5292600)	1262 (5040300)	R-23-A (5293100)	.935 (23.7)	1.044 (26.4)	M-65 (2533700)	979-C-650/ ATC-900	
	15	.072 (1.82)	.981 (24.9)	1263 (5040700)	R-24 (5293400)	1264 (5041100)	R-24-A (5293500)	.962 (24.4)	1.071 (27.2)			
	16	.065 (1.65)	.995 (25.2)	1267 (5042300)	R-26 (5294200)	1268 (5042700)	R-26-A (5294300)	.990 (25.1)	1.099 (27.9)	M-66 (2534600)		
	17	.058 (1.47)	1.009 (25.6)									
1-1/4 (31.7)	8	.165 (4.19)	.920 (23.3)	1265 (5041500)	R-25 (5293800)	1266 (5041900)	R-25-A (5293900)	.901 (22.8)	1.010 (25.6)	M-65 (2533700)	1550-250 (8404250)	
	9	.148 (3.75)	.954 (24.2)	1261 (5039900)	R-23 (5293000)	1262 (5041900)	R-23-A (5293100)	.935 (23.7)	1.044 (26.5)			
	10	.134 (3.40)	.982 (24.9)	1263 (5040700)	R-24 (5293400)	1264 (5041100)	R-24-A (5293500)	.962 (24.4)	1.071 (27.2)	M-66 (2534600)	979-C-300/ ATC-900	
	11	.120 (3.04)	1.010 (25.6)	1267 (5042300)	R-26 (5294200)	1268 (5042700)	R-26-A (5294300)	.990 (25.1)	1.099 (27.9)			
	12	.109 (2.76)	1.032 (26.2)	1269 (5043100)	R-27 (5294600)	1270 (5043500)	R-27-A (5294700)	1.013 (25.7)	1.122 (28.5)	M-67 (2535500)	1050-400 (8404200)	
	13	.095 (2.41)	1.060 (26.9)	1271 (5043900)	R-28 (5295000)	1272 (5044300)	R-28-A (5295100)	1.041 (26.4)	1.150 (29.2)			
	14	.083 (2.10)	1.084 (27.5)	1273 (5044700)	R-29 (5295400)	1274 (5045100)	R-29-A (5295500)	1.060 (26.9)	1.169 (29.6)	M-68 (2536400)	979-C-650/ ATC-900	
	15	.072 (1.82)	1.106 (28.0)	1275 (5045500)	R-30 (5295800)	1276 (5045900)	R-30-A (5295900)	1.087 (27.6)	1.196 (30.3)			
	16	.065 (1.65)	1.120 (28.4)									
	17	.058 (1.47)	1.134 (28.8)	1279 (5047100)	R-30 (5295800)	1280 (5047500)		1.115 (28.3)	1.224 (31.0)			
1-3/8 (34.9)	8	.165 (4.19)	1.045 (26.5)	1277 (5046300)	R-31 (5296200)	1278 (5046700)	R-31-A (5295900)	1.026 (26.0)	1.135 (28.8)	M-67 (2535500)	1550-250 (8404280)	
	9	.148 (3.75)	1.079 (27.4)	1273 (5044700)	R-29 (5295400)	1274 (5045100)	R-29-A (5295500)	1.060 (26.9)	1.169 (29.6)			
	10	.134 (3.40)	1.107 (28.1)	1275 (5045500)	R-30 (5295800)	1276 (5045900)	R-30-A (5295900)	1.087 (27.6)	1.196 (30.3)	M-68 (2536400)	979-C-300/ ATC-900	
	11	.120 (3.04)	1.135 (28.8)	1279 (5047100)		1280 (5047500)		1.115 (28.3)	1.224 (31.0)			
	12	.109 (2.76)	1.157 (29.3)	1281 (5047900)	R-32 (5295800)	1282 (5048300)	R-32-A (5296700)	1.133 (28.7)	1.242 (31.5)	M-69 (2537300)	1550-900 (8404290)	
	13	.095 (2.41)	1.185 (30.1)	1283 (5048700)	R-33 (5297000)	1284 (5049100)	R-33-A (5297100)	1.160 (29.4)	1.275 (32.3)			
	14	.083 (2.10)	1.209 (30.7)	1285 (5049500)	R-34 (5297400)	1286 (5049900)	R-34-A (5297500)	1.179 (29.9)	1.294 (32.8)	M-70 (2538200)		
	15	.072 (1.82)	1.231 (31.2)	1287 (5050300)	R-35 (5297800)	1288 (5050700)	R-35-A (5297900)	1.206 (30.6)	1.321 (33.5)			
16	.065 (1.65)	1.245 (31.6)										
1-1/2 (38.1)	8	.165 (4.19)	1.170 (29.7)	1289 (5051100)	R-34 (5297400)	1290 (5051500)	R-34-A (5297500)	1.145 (29.0)	1.260 (32.0)	M-69 (2537300)	1550-250 (8404280)	
	9	.148 (3.75)	1.204 (30.5)	1285 (5049500)	R-34 (5297400)	1286 (5049900)	R-34-A (5297500)	1.179 (29.9)	1.294 (32.8)	M-70 (2538200)		979-C-210/ ATC-900

* 3/8 square drive / 4.5 mm

Condenser Expanders

G-1200 Series Heat Exchanger & Condenser Tube Expanders – continued

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 1/2 in. Sq. Dr. / 21.7 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 5-1/4 in. (12.7 mm to 133.3 mm)		1-1/4 in. to 6 in. (31.7 mm to 152.4 mm)					Airetrol	Electric Control
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)					
1-1/2 (38.1)	10	.134 (3.40)	1.232(31.2)	1287 (5050300)	R-35 (5297800)	1288 (5050700)	R-35-A (5297900)	1.206 (30.6)	1.321 (35.5)	M-70 (2538200)	1550-250 (8404280)	979-C-210/ ATC-900
	11	.120 (3.04)	1.260(32.0)	1291 (5051900)	R-36 (5297800)	1292 (5052300)	R-36-A (5298300)	1.235 (31.3)	1.350 (34.2)			
	12	.109 (2.76)	1.282(32.5)	1293 (5052700)	R-37 (5298600)	1294 (5053100)	R-37-A (5298700)	1.257 (31.9)	1.372 (34.8)			
	13	.095 (2.41)	1.310(33.2)	1295 (5053500)	R-37 (5298600)	1296 (5053900)		R-37-A (5298700)	1.285 (32.6)	1.400 (35.5)		
	14	.083 (2.10)	1.334(33.8)				1297 (5054300)		R-38 (5299000)	1298 (5054700)	R-38-A (5299100)	1.331 (33.8)
	15	.072 (1.82)	1.356(34.4)	1299 (5512167)	R-38 (5299000)	1300 (5055075)		R-38-A (5299100)				
	16	.065 (1.65)	1.370(34.8)				1299 (5512167)		R-38 (5299000)	1300 (5055075)	R-38-A (5299100)	1.331 (33.8)
	17	.058 (1.47)	1.384(35.1)	1299 (5512167)	R-38 (5299000)	1300 (5055075)		R-38-A (5299100)				
	18	.049 (1.24)	1.402(35.6)				1299 (5512167)		R-38 (5299000)	1300 (5055075)	R-38-A (5299100)	1.331 (33.8)
	19	.042 (1.06)	1.416(35.9)	1299 (5512167)	R-38 (5299000)	1300 (5055075)		R-38-A (5299100)				
20	.035 (0.88)	1.430(36.3)	1299 (5512167)				R-38 (5299000)		1300 (5055075)	R-38-A (5299100)	1.331 (33.8)	1.472 (37.3)

Condenser Expanders

G-1200 Type Five-Roll Expander

Airetool



NOTE: Step expanding becomes necessary if the tube sheet thickness exceeds the length of the roll. Longer reaches available upon request in 6 inch (50.8 mm) increments.

Airetool

G-1200 Series – 5-Roll

O.D Range: 5/8 – 1-1/2 Inches 15.8 – 38.1 mm

- Expanders with 1-1/2 in. (38.1 mm) long rolls will accommodate tube sheet thicknesses as follows:
 STD. REACH 1-1/2" to 6" (38.1 mm to 152.4 mm)
 "A" REACH 1-1/2" to 8" (38.1 mm to 203.1 mm)
 "C" REACH 1-7/8" to 12" (47.6 mm to 304.6 mm)
 - Expanders with 2-1/4 in. (57.1 mm) long rolls will accommodate tube sheet thicknesses as follows:
 STD. REACH 2-1/4" to 6-3/4" (57.1 mm to 171.4 mm)
 "A" REACH 2-1/4" to 8-3/4" (57.1 mm to 222.1 mm)
 "C" REACH 2-5/8" to 12-3/4" (66.7 mm to 323.8 mm)
- Longer reaches available upon request in 2 inch (50.8 mm) increments.

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 3/8 in. Sq. Dr. / 9.5 mm *1/2 in. Sq. Dr./12.7 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 5 in. (12.7 mm to 133.5 mm)		1-1/4 in. to 5-3/4 in. (31.7 mm to 152.4 mm)					Airetrol	Electric Control
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)					
5/8 (15.8)	17	.058 (1.47)	.509 (12.9)	1215-5 (5519905)	R-4-5 (5513832)	1216-5 (5516284)	R-4-A-5 (5517897)	.499 (12.6)	.564 (14.3)	1216-5 (2981677)	850-1250-A (8405399)	
	18	.049 (1.24)	.527 (13.4)	1217-5 (5517561)	R-4-5 (5513832)	1218-5 (5516230)	R-4-A-5 (5517897)	.517 (13.1)	.576 (14.6)	M-59 (2528300)		
	19	.042 (1.07)	.541 (13.7)									
	20	.035 (0.89)	.555 (14.1)									
	21	.032 (0.81)	.561 (14.2)	1219-5 (5517601)	R-4-5 (5513832)	1220-5 (5515836)	R-4-A-5 (5517897)	.531 (13.5)	.596 (15.1)	M-61 (2530100)		
	22	.028 (0.71)	.569 (14.5)									
3/4 (19.0)	13	.095 (2.41)	.560 (14.2)	1221-5 (5518046)	R-5-5 (5513231)	1222-5 (5515972)	R-5-A-5 (5518189)	.550 (14.0)	.615 (15.6)	M-61 (2530100)	850-600-A (8405398)	979-C-650/ ATC-900
	14	.083 (2.11)	.584 (14.8)	1223-5 (5514699)	R-6-5 (5518187)	1224-5 (5513968)	R-6-A-5 (5517898)	.574 (14.6)	.629 (15.9)	1224-5 (2975590)		
	15	.072 (1.83)	.606 (15.4)	1225-5 (5515940)	R-7-5 (5514393)	1226-5 (5523014)	R-7-A-5 (5517899)	.590 (15.0)	.661 (16.8)	1226-5 (2995961)		
	16	.065 (1.65)	.620 (15.7)	1227-5 (5514698)	R-7-5 (5514393)	1228-5 (5512230)	R-7-A-5 (5517899)	.605 (15.4)	.680 (17.2)	1228-5 (2972977)	850-1250-A (8405399)	979-C-650/ ATC-900
	17	.058 (1.47)	.634 (16.1)									
	18	.049 (1.24)	.652 (16.6)	1229-5 (5515536)	R-7-5 (5514393)	1230-5 (5513536)	R-7-A-5 (5517899)	.619 (15.7)	.699 (17.8)	1230-5 (2973118)		
	19	.042 (1.07)	.666 (16.9)									
	20	.035 (0.89)	.680 (17.3)									
	21	.032 (0.81)	.666 (17.4)	1231-5 (5514862)	R-9-5 (5517888)	1232-5 (5513488)	R-9-A-5 (5517900)	.642 (16.3)	.729 (18.5)	M-63 (2531900)		
	22	.028 (0.71)	.694 (17.6)									
7/8 (22.2)	13	.095 (2.41)	.685 (17.4)	1233-5 (5515915)	R-9-5 (5517888)	1234-5 (5518158)	R-9-A-5 (5517900)	.670 (17.0)	.747 (18.9)	M-64-3/8 SQ (2980730)	850-600-A (8405398)	979-C-650/ ATC-900
	14	.083 (2.11)	.709 (18.0)	1235-5 (5518682)	R-10-5 (5518191)	1236-5 (5520939)	R-10-A-5 (5517901)	.685 (17.4)	.774 (19.6)	M-65-3/8 SQ (2901312)		
	16	.065 (1.65)	.745 (18.9)	1239-5 (5525733)	R-11-5 (5517889)	1240-5 (5525734)	R-11-A-5 (5517902)	.685 (17.4)	.750 (19.0)	M-66-3/8 SQ (2985119)		
	17	.058 (1.47)	.759 (19.3)								850-1250-A (8405399)	
	18	.049 (1.24)	.777 (19.7)	1243-5 (5518366)	R-11-5 (5517889)	1244-5 (5521320)	R-11-A-5 (5517902)	.740 (18.8)	.824 (20.9)	M-67 (2535500)		
	19	.042 (1.07)	.791 (20.1)	1245-5 (5525740)	R-11-5 (5517889)	1246-5 (5517924)	R-11-A-5 (5517902)	.763 (19.4)	.851 (21.6)	M-18-3/8 (2983633)		

Condenser Expanders

Selection Guide G-1200 Type Five-Roll Expanders – continued

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness				Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Part No.) 3/8 in. Sq. Dr. / 9.5 mm *1/2 in. Sq. Dr./12.7 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 5-1/4 in. (12.7 mm to 133.5 mm)		1-1/4 in. to 6 in. (31.7 mm to 152.4 mm)					Airetrol	Electric Control
				Tool No. (Part No.)	Roll Set No. (Part No.)	Tool No. (Part No.)	Roll Set No. (Part No.)					
7/8 (22.2)	20	.035 (0.89)	.805 (20.4)									
	21	.032 (0.81)	.811 (20.6)	1245-5 (5525740)	R-11-5 (5517889)	1246-5 (5517924)	R-11-A-5 (5517902)	.763 (19.4)	.851 (21.6)	M-18-3/8 (2983633)	850-1250-A (8405399)	
	22	.028 (0.71)	.819 (20.8)									
1 (25.4)	12	.109 (2.77)	.782 (19.9)	1245-5 (5525740)	R-11-5 (5517889)	1246-5 (5515924)	R-11-A-5 (5517902)	.763 (19.4)	.852 (21.6)	M-18-3/8 (2983633)	850-600-A (8405398)	979-C650/ ATC-900
	13	.095 (2.41)	.810 (20.6)	1247-5 (5516336)	R-13-5 (5513741)	1248-5 (5517558)	R-13-A-5 (5517903)	.791 (20.1)	.880 (22.4)			
	14	.083 (2.11)	.834 (21.2)	1249-5 (5514121)	R-12-5 (5517890)	1250-5 (5514700)	R-12-A-5 (5515825)	.810 (20.6)	.909 (23.0)	1250-5 (2976082)		
	15	.072 (1.83)	.856 (21.7)									
	16	.065 (1.65)	.870 (22.1)	1251-5 (5513797)	R-13-5 (5513741)	1252-5 (5512231)	R-13-A-5 (5517903)	.837 (21.3)	.936 (23.7)	M-70 (2538200)		
	17	.058 (1.47)	.884 (22.5)									
	18	.049 (1.24)	.902 (22.9)									
	19	.042 (1.07)	.916 (23.3)	1255-5 (5513740)	R-13-5 (5513741)	1256-5 (5513809)	R-13-A-5 (5517903)	.865 (22.0)	.965 (24.5)	1256-5 (2974854)		
	20	.035 (0.89)	.930 (23.6)									
	21	.032 (0.81)	.936 (23.8)									
22	.028 (0.71)	.944 (24.0)	1257-5 (5514329)	R-15-5 (5513833)	1258-7 (5513627)	R-15-A-5 (5517907)	.883 (22.4)	.997 (25.3)	M-71* (2539100)			
1-1/8 (28.5)	12	.109 (2.77)	.907 (23.0)	1257-5 (5514329)	R-15-5 (5513833)	1258-5 (5513627)	R-15-A-5 (5517907)	.883 (22.4)	.997 (25.3)	M-71* (2539100)	1050-400 (8404200)	979-C-300/ ATC-900
	13	.095 (2.41)	.935 (23.7)	1259-5 (5524563)	R-16-5 (5518056)	1260-5 (5525735)	R-16-A-5 (5517904)	.916 (23.3)	1.000 (25.4)	1260-5* (2998975)		
	14	.083 (2.11)	.959 (24.1)	1261-5 (5525736)	R-17-5 (5517891)	1262-5 (5514470)	R-17-A-5 (5517905)	.935 (23.7)	1.043 (26.4)	M-71* (2539100)		
1-1/4 (31.8)	15	.072 (1.83)	1.106 (28.1)								1050-400 (8404200)	979-C-650/ ATC-900
	16	.065 (1.65)	1.120 (28.4)	1275-5 (5521923)	R-21-5 (5517887)	1276-5 (5516623)		1.087 (27.6)	1.196 (30.4)	1276-5* (2982367)		
	17	.058 (1.47)	1.134 (28.8)									
	18	.049 (1.24)	1.152 (29.3)									
	19	.042 (1.07)	1.166 (29.6)									
	20	.042 (0.80)	1.180 (30.0)	1279-5 (5525540)	R-21--5 (5517887)	1280-5 (5517875)		1.115 (28.3)	1.231 (31.3)	1280-5* (2983613)		
	21	.032 (0.81)	1.186 (30.1)									
22	.028 (0.71)	1.194 (30.3)										
1-3/8 (34.9)	12	.109 (2.77)	1.154 (29.3)	1281-5 (5518823)	R-21-5 (5517887)	1282-5 (5525737)	R-21-A-5 (5513291)	1.133 (28.8)	1.242 (31.5)		1550-250 (8404280)	979-C-210 ATC-900
	14	.083 (2.11)	1.209 (30.7)	1285-5 (5522166)	R-23-5 (5517982)	1286-5 (5525869)	R-23-A-5 (5518192)	1.179 (29.9)	1.296 (32.9)	1282-5* (2986615)		
1-1/2 (38.1)	17	.058 (1.47)	1.384 (35.2)								1550-900 (8404290)	979-C-300/ ATC-900
	18	.049 (1.24)	1.402 (35.2)									
	19	.042 (1.07)	1.416 (36.0)									
	20	.035 (0.89)	1.430 (36.3)	1299-5 (5513442)	R-29-5 (5517893)	1300-5 (5514833)	R-29-A-5 (5517906)	1.331 (33.8)	1.489 (37.8)	1299-5* (2973869)		
	21	.032 (0.81)	1.436 (36.5)									
22	.028 (0.71)	1.444 (36.7)										

Condenser Expanders

G-8012 Series Heat Exchanger & Condenser Tube Expanders

Airetool



Airetool

G-8012 Series

O.D. Range:
1-3/4 – 4 Inches
44.4 – 76.2 mm

- Expanders with 2-1/4 in. (57.1mm) long rolls will accommodate tube sheet thicknesses of 1/2 in. to 4 in. (12.7 mm to 101.6 mm)

NOTE: Step expanding becomes necessary if the tube sheet thickness exceeds the length of the roll.

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness		Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Stock No) 3/4 in. Sq. Dr. / 19.0 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 4 in. (12.7 mm to 101.6 mm)					Airetrol	Electric Control
				Tool No. (Stock No.)	Roll Set No. (Stock No.)					
1-3/4 (44.4)	8	.165 (4.2)	1.420 (36.1)	8012-1-3/4-8 (5518639)	R-33-A (5297100)	1.368 (34.7)	1.550 (39.4)	M-90 2541900	1550-250 (8404280)	979-C-210/ ATC-900
	10	.134 (3.4)	1.482 (37.6)	8012-1-3/4-10 (5139000)	R-37-A (5298700)	1.420 (36.0)	1.607 (40.8)			
	11	.120 (3.0)	1.510 (38.3)	8012-1-3/4-11 (5139100)	R-42 (5299400)	1.454 (36.9)	1.635 (41.5)			
	12	.109 (2.7)	1.532 (38.9)	8012-1-3/4-12 (5139200)	R-44 (5299500)	1.482 (37.6)	1.657 (42.0)			
	13	.095 (2.4)	1.560 (39.6)	8012-1-3/4-13 (5139300)	R-46 (5299600)	1.510 (38.3)	1.685 (42.7)			
	14	.083 (2.1)	1.584 (40.2)	8012-1-3/4-14 (5139400)	R-48 (5299700)	1.532 (38.9)	1.709 (43.4)			
2 (50.8)	8	.165 (4.2)	1.670 (42.4)	8012-2-8 (5518643)	R-48 (5299700)	1.595 (40.5)	1.795 (45.6)	M-91 2542200	1550-250 (8404280)	979-C-210/ ATC-900
	10	.134 (3.4)	1.732 (43.9)	8012-2-10 (5139500)	R-50 (5299800)	1.640 (41.6)	1.857 (47.1)			
	11	.120 (3.0)	1.760 (44.7)	8012-2-11 (5139600)	R-52 (5299900)	1.670 (42.4)	1.885 (47.8)			
	12	.109 (2.7)	1.782 (45.2)	8012-2-12 (5139700)	R-54 (5300000)	1.704 (43.2)	1.907 (48.4)			
	13	.095 (2.4)	1.810 (45.9)	8012-2-13-18 (5139800)	R-56 (5300100)	1.732 (43.9)	1.956 (49.6)			
	14	.083 (2.1)	1.834 (46.5)							
	15	.072 (1.8)	1.856 (47.1)							
	16	.065 (1.6)	1.870 (47.4)							
	17	.058 (1.5)	1.884 (47.9)							
18	.049 (1.2)	1.902 (48.3)								
2-1/4 (57.1)	10	.134 (3.4)	1.982 (50.3)	8012-2-1/4-10 (5140100)	R-56 (5300100)	1.890 (48.0)	2.107 (53.5)	M-92 2542300	1550-250 (8404280)	999-C-45/ ATC-900
	11	.120 (3.0)	2.010 (51.0)	8012-2-1/4-11 (5140200)	R-58 (5300200)	1.920 (48.7)	2.135 (54.2)			
	12	.109 (2.7)	2.032 (51.6)	8012-2-1/4-12 (5140300)	R-60 (5300300)	1.954 (49.6)	2.157 (54.7)			
	13	.095 (2.4)	2.060 (52.3)	8012-2-1/4-12-16 (5140400)	R-62 (5300400)	1.982 (50.3)	2.185 (55.4)			
	14	.083 (2.1)	2.084 (52.9)							
	15	.072 (1.8)	2.106 (53.4)							
16	.065 (1.6)	2.120 (43.8)								
2-1/2 (63.5)	10	.134 (3.4)	2.232 (56.6)	8012-2-1/2-10-12 (5139900)	R-64 (5300500)	2.140 (54.3)	2.407 (61.1)	M-93 2542400	1550-250 (8404280)	999-C-45/ ATC-900
	11	.120 (3.0)	2.260 (57.4)							

Condenser Expanders

G-8012 Series Heat Exchanger & Condenser Tube Expanders – continued

Tube O.D. In. (mm)	Tube Gauge bwg In. (mm)		Tube I.D. In. (mm)	Tube Sheet Thickness		Min. I.D. Tool Enters In. (mm)	Max. Expan. of Tool In. (mm)	Mandrel No. (Stock No) 3/4 in. Sq. Dr. / 19.0 mm	Recommended Controlled Rolling Motors	
				1/2 in. to 4 in. (12.7 mm to 101.6 mm)						
				Tool No. (Stock No.)	Roll Set No. (Stock No.)					
2-1/2 (63.5)	12	.109 (2.7)	2.282 (57.9)	8012-2-1/2-10-12 (5139900)	R-64 (5300500)	2.140 (54.3)	2.407 (61.1)	M-93 (2542400)	1550-250 (8404280)	999-C-45/ ATC-900
	13	.095 (2.4)	2.310 (58.6)							
	14	.083 (2.1)	2.334 (59.2)							
	15	.072 (1.8)	2.356 (59.8)							
	16	.065 (1.6)	2.370 (60.1)							
	17	.058 (1.5)	2.384 (60.6)							
	18	.049 (1.3)	2.402 (61.0)							
2-3/4 (69.8)	10	.134 (3.4)	2.482 (63.0)	8012-2-3/4-10-16 (5140500)	R-66 (5300700)	2.390 (60.7)	2.702 (68.6)	M-96 (2542700)	1850-90 (8405315)	999-C-45/ ATC-900
	11	.120 (3.0)	2.510 (63.7)							
	12	.109 (2.7)	2.532 (64.3)							
	13	.095 (2.4)	2.560 (64.3)							
	14	.083 (2.1)	2.584 (65.6)							
	15	.072 (1.8)	2.606 (66.1)							
	16	.065 (1.6)	2.620 (66.5)							
3 (76.2)	8	.165 (4.1)	2.670 (67.8)	8012-3-8-9 (5512193)	R-67 (5300800)	2.560 (65.0)	2.829 (71.8)	M-97 (2968867)	1850-90 (8405315)	999-C-45/ ATC-900
	9	.148 (3.7)	2.704 (68.6)							
	10	.134 (4.3)	2.732 (69.3)	8012-3-10-18 (5140600)						
	11	.120 (3.0)	2.760 (70.1)							
	12	.109 (2.7)	2.782 (70.6)							
	13	.095 (2.4)	2.810 (71.3)							
	14	.083 (2.1)	2.834 (71.9)							
	15	.072 (1.8)	2.856 (72.5)							
	16	.065 (1.6)	2.870 (72.8)							
	17	.058 (1.5)	2.884 (73.3)							
	18	.049 (1.2)	2.902 (73.7)							



Linsen Flaring Expander

This special expander enlarges the ends of copper, brass and aluminum tubing so that another tube of the same size may be inserted into the expanded section for a soldered joint.



Diesel Engine Expander

Diesel engine expanders are a special line of expanders designed for rolling the injector sleeves into the heads of diesel engines. These expanders are made to order for each application, and a detailed drawing of the injector sleeve and engine head must accompany the order to insure proper expander design.

Step Rolling Expander

Step rolling expanders are ideally suited for faster tube rolling in thick tube sheets. The rolling process can be completed without removing the expander from the tube. Step rolling expanders are available in protractive and retractive models. The expander cage has grooves that accept a spring-loaded, quick-spacing thrust collar that permits fast step rolling throughout the full thickness of the tube sheet.



"PST" Pipe Sizing Tool

Airetool's PST Series pipe sizing expanders are designed to true pipe ends, and to enlarge the pipe diameter to provide the correct clearance between the pipe O.D. and the I.D. of a fitting before making a silver solder or brazed joint. The threaded mandrel allows fine adjustments for accurate sizing of the pipe end.



SR Expander

The rapid taper on the mandrel allows full expansion of a tube with minimum travel of the mandrel. The mandrel is retained at the rear of the expander to shorten mandrel length and to allow use near sharp tube bends or tube inserts.



Collins Expander

These nonparallel rolling, self-feeding expanders are typically used for thin tube sheets and give a slight flare to tube ends. Self-contained rolls give slight flare to tube ends.

Sizes: 1/2 - 4-1/2 in. (12.7 - 113.8 mm) OD tubes.

* Please contact your Apex Tool Group sales representative for more information.

Tube Installation Accessories

Heat Exchanger & Condenser Tube Expanders Accessories



Cleco® Drill Series 15 DP

For use with Airetool Tube End Facer and push-type tube cutters.

Model Number	RPM	Chuck Capacity		Weight	
		In.	mm	Lbs.	Kg.
15DP-1.6B	160	1/2	13	6	.27
15DP-4B	400	1/2	13	5-1/2	2.5
15DP-8B	800	1/2	13	5-1/2	2.5
15DP-14B	1400	3/8	10	4-1/2	2.0



Cleco® Drill Series 135 DPV

Variable Speed Governed Drills – One tool for many applications. For use with Airetool Tube End Facer and push type tube cutters.

Model Number	RPM		Chuck Capacity		Weight	
	Free	Governed	In.	mm	Lbs.	Kg.
135-DPV-7B-43	600	150-550	3/8	10	3-5/8	1.6
135-DPV-14B-51	1250	400-1200	3/8	8	3-3/8	1.5
135-DPV-28B-51	2600	700-2400	3/8	8	3-1/8	1.4



Tube End Facer

Tube O.D.		Tool Number	Gauge	Spare Bits	
In.	mm			non-ferrous or carbon steel	stainless
3/8	9.5	TEF-375 (5519632)	16-20	TEF-376 (2987908)	TEF-376-SS (2991788)
1/2	12.7	TEF-500 (5332415)	16-20	TEF-506 (2662531)	TEF-506-SS (2983169)
5/8	15.8	TEF-625 (5332425)	14-18	TEF-626 (2662558)	TEF-626-SS (2983170)
3/4	19.0	TEF-750 (5332450)	10-18	TEF-756 (2662585)	TEF-756-SS (2983162)
7/8	22.2	TEF-875 (5332460)	14-18	TEF-876 (2662603)	TEF-876-SS (2983163)
1	25.4	TEF-1000 (5332475)	10-18	TEF-1006 (2662633)	TEF-1006-SS (2983164)

A set of even gauge pilots are supplied with tube end facing tools shown above. Other sizes are also available. Contact Customer Service for details.



Beading Tool*

Part Number	Stock Number	Radius	Shank Type
12-RM-9-5/32-R-01	2968677	5/32"	Type 01
12-RM-9-1/4-R-01	2968676	1/4"	(.680" round x 2 3/8" long)



Belling and Flaring Tools

Belling tool – pilot end fits tube I.D. with Type 01 shank. Specify tool OD, gauge, radius in tube sheets.



Extensions with Quick-Change Chuck

Varying extension lengths are used for hard-to-reach tubes. Quick-change chuck enables operator to change expanders quickly. Specify size of square drive and extension length.

Quick Change Extension Complete	Stock Number	Square Drive Size Male/Female	Overall Length	
			In.	mm

Extensions with Quick-Change Chuck

•QC-375-6	5501200	3/8" (9.5 mm)	6	152
QC-375-8	5501600	3/8" (9.5 mm)	8	203
QC-375-12	5502000	3/8" (9.5 mm)	12	305
•QC-375-18	5503000	3/8" (9.5 mm)	18	457
QC-375-24	5504000	3/8" (9.5 mm)	24	610
QC-375-30	5504500	3/8" (9.5 mm)	30	762
QC-375-36	5505000	3/8" (9.5 mm)	36	915
QC-500-12	5507000	1/2" (12.7 mm)	12	305
QC-500-18	5508000	1/2" (12.7 mm)	18	457
•QC-500-24	5509000	1/2" (12.7 mm)	24	610
QC-500-30	5510000	1/2" (12.7 mm)	30	762
•QC-500-36	5511000	1/2" (12.7 mm)	36	915

Sleeve Type Extensions

Designed for use where tubes are close to the shell of the condenser. Small diameter of female end allows access to these tubes.

Sleeve Type Extension Complete	Stock Number	Square Drive Size Male/Female	Overall Length	
			In.	mm

Male/Female Extensions

3/8 x 12	5515758	3/8" (9.5 mm)	12	305
•3/8 x 18	5513774	3/8" (9.5 mm)	18	457
•3/8 x 24	5515759	3/8" (9.5 mm)	24	610
•3/8 x 36	5515761	3/8" (9.5 mm)	36	915
•1/2 x 12	5515733	1/2" (12.7 mm)	12	305
1/2 x 18	5513775	1/2" (12.7 mm)	18	457
1/2 x 24	5515734	1/2" (12.7 mm)	24	610
•3/4 x 12	5515735	3/4" (19.0 mm)	12	305
•3/4 x 18	5515736	3/4" (19.0 mm)	18	457
•3/4 x 24	5515737	3/4" (19.0 mm)	24	610



Universal Joints and Extensions

Designed for hard-to-reach tubes, the universal joint performs smoothly without binding. Specify size of square drive and extension length.

Universal Joint	Stock Number	Square Drive Size Female	Overall Length	
			In.	mm
3/8 x 3/8	2115300	3/8" (9.5 mm)	2-1/2	64
•1/2 x 1/2	2039800	1/2" (12.7 mm)	2-3/4	70
•3/4 x 3/4	2974913	3/4" (19.0 mm)	3-1/2	89

Universal Extensions	Stock Number	Square Drive Size Male/Female	Overall Length	
			In.	mm
GP-3/8 x 6	5514896	3/8" (9.5 mm)	6	152
•GP-3/8 x 12	5514898	3/8" (9.5 mm)	12	305
•GP-3/8 x 18	5514899	3/8" (9.5 mm)	18	457

FT-515 – 60° included angle flaring tool – designed to flare tubes 1/2 - 1-1/2 in. (12.7-38.1 mm) OD. Furnished with Type 01 or type 06 round shank for use with standard chipping hammers.



* Available on quotation basis only.

Tube Installation Accessories

Heat Exchanger & Condenser Tube Expanders Accessories & Tube Plugs



GT Serrating Tools

- Compact design for extreme rigidity, extended bit life, less run-out and increased accuracy
- Unique through-spindle coolant delivery system provides superior groove quality and unmatched bit life
- New and improved bit design allows for pinpoint coolant delivery
- Tool design allows for easy bit replacement
- Carbide inserts remove burrs left on grooves, thus eliminating the extra de-burring process



Sheet Hole		INCH Tool Number	Shank	Standard Bit		Optional Bit		METRIC Tool Number	Shank	Standard Bit		Optional Bit	
In.	mm			1/8 x1/4 x 1/8	1/8 x3/8 x 1/8	3 x6 x3	3 x10 x3						
1/2"	12.7	GT 500 1270 (5526083)	3MT	GT 5003 S (2902039)	GT 5003 (2902030)	GT 500 1270M (5526115)	3MT	GT 50 363 (2902091)	GT 50 3103 (2902117)				
5/8"	15.8	GT 625 1588 (5525886)	3MT	GT 5003 S (2902039)	GT 5003 (2902030)	GT 625 1588M (5526116)	3MT	GT 50 363 (2902091)	GT 50 3103 (2902117)				
3/4"	19.05	GT 750 1905 (5525756)	3MT	GT 7503 S (2901403)	GT 7503 (2900686)	GT 750 1905M (5526117)	3MT	GT 75 363 (2902092)	GT 75 3103 (2902118)				
7/8"	22.2	GT 875 2223 (5525587)	3MT	GT 7503 S (2901403)	GT 7503 (2900686)	GT 875 2223M (5526118)	3MT	GT 75 363 (2902092)	GT 75 3103 (2902118)				
1"	25.4	GT 1000 2540 (5525706)	3MT	GT 7503 S (2901403)	GT 7503 (2900686)	GT 1000 2540M (5526119)	3MT	GT 75 363 (2902092)	GT 75 3103 (2902118)				
3/4"	19.05	GT 750 1905 1SP (5526137)	1" Rd	GT 7503 S (2901403)	GT 7503 (2900686)	GT 750 1905M 1 SP (5526164)	1" Rd	GT 75 363 (2902092)	GT 75 3103 (2902118)				
1"	25.4	GT 1000 2540 1SP (5526138)	1" Rd	GT 7503 S (2901403)	GT 7503 (2900686)	GT 1000 2540M 1 SP (5526165)	1" Rd	GT 75 363 (2902092)	GT 75 3103 (2902118)				

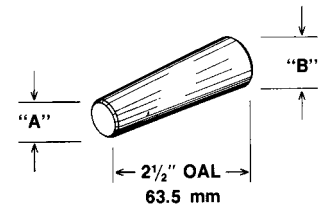
One Piece Tube Plugs

Ideal for sealing leaky tubes in condensers or heat exchangers. Just drive a plug into each end of leaky tube.

Note: The Airetool RCM Series One Revolution Tube Cutter can be used to puncture the tube to ensure that pressure cannot build up in the tube and cause the plugs to loosen or blow out.

See page 49 for detailed information on the Airetool RCM Series Tube Cutters.

Minimum order quantity 25 pieces.



O. D.	Gauge	"A"		"B"		Brass	Steel	316* S.S.	304* S.S.	416* S.S.	Aluminum*	Monel*
		In.	mm	In.	mm							
3/8"	15-22	.176	4.47	.388	9.86	3751-3	3752-3	3753-3	3754-3	3755-3	3756-3	3757-3
1/2"	11-14	.176	4.47	.388	9.86	2979536	2980392	2985475	3754-3	3755-3	3756-3	3757-3
1/2"	15-22	.301	7.65	.513	13.03	5001-4	5002-4	5003-4	5004-4	5005-4	5006-4	5007-4
5/8"	11-14	.301	7.65	.513	13.03	2979537	2980022	2981007	2986996	5005-4	5006-4	5007-4
5/8"	15-22	.426	10.82	.638	16.20	6251-5	6252-5	6253-5	6254-5	6255-5	6256-5	6257-5
3/4"	11-14	.426	10.82	.638	16.20	2979231	2979232	2983587	2979413	6255-5	6256-5	2982825
3/4"	15-22	.551	14.00	.763	19.38	7501-6	7502-6	7503-6	7504-6	7505-6	7506-6	7507-6
7/8"	11-14	.551	14.00	.763	19.38	2979233	2979234	2980988	2983589	7505-6	7506-6	2982944
7/8"	15-22	.676	17.17	.888	22.56	8751-7	8752-7	8753-7	8754-7	8755-7	8756-7	8757-7
1"	11-14	.676	17.17	.888	22.56	2979235	2979236	2981008	2983590	8755-7	8756-7	8757-7
1"	15-22	.801	20.35	1.013	25.73	1001-8	1002-8	1003-8	1004-8	1005-8	1006-8	1007-8
1-1/8"	11-14	.801	20.35	1.013	25.73	2979237	2979238	2983588	2983591	1005-8	1006-8	1007-8
1-1/8"	15-22	.926	23.52	1.138	28.90	1121-9	1122-9	1123-9	1124-9	1125-9	1126-9	1127-9
1-1/4"	11-14	.926	23.52	1.138	28.90	2989650	2979553	2994101	1124-9	1125-9	1126-9	1127-9
1-1/4"	15-22	1.015	25.78	1.263	32.08	1251-10	1252-10	1253-10	1254-10	1255-10	1256-10	1257-10
1-3/8"	11-14	1.015	25.78	1.263	32.08			2994102	1254-10	1255-10	1256-10	1257-10
1-3/8"	15-22	1.176	29.87	1.388	35.26	1371-11	1372-11	1373-11	1374-11	1375-11	1376-11	1377-11
1-1/2"	11-14	1.176	29.87	1.388	35.26		2979748	1373-11	1374-11	1375-11	1376-11	1377-11
1-1/2"	15-22	1.301	32.66	1.513	38.93	1501-12	2991523	1503-13	1504-13	1505-13	1506-13	1507-13

Some items available on quotation basis only.

Tube Installation Accessories

Brass – Two-Piece Tube Plugs

For sealing leaky tubes in condensers or heat exchangers. The two piece design has more sealing area and reduces the risk of damaging the tube sheet.

Note: The Airetool One Revolution Tube Cutter is recommended to puncture the tube to ensure that pressure cannot build up in the tube to cause the plug to loosen or blow out. See page 47 for detailed information on the RCM Series Tube Cutters.

Minimum order quantity 25 pieces.



O.D.	Tube Size		Brass Ring and Pin Set		Steel Ring and Pin Set		
	Gauge	Tube ID		Part Number	Order Number	Part Number	Order Number
		In.	mm				
5/8"	13	.435	11.05	TP-6213-B	5523572	TP-6213-S	55233581
5/8"	14	.459	11.66	TP-6214-B	5522479	TP-6214-S	5520903
5/8"	15	.481	12.22	TP-6215-B	5523573	TP-6215-S	55233582
5/8"	16	.495	12.57	TP-6216-B	5520352	TP-6216-S	5519819
5/8"	17	.509	12.93	TP-6217-B	5523588	TP-6217-S	5523591
5/8"	18	.527	13.39	TP-6218-B	5519514	TP-6218-S	5520261
5/8"	19	.541	13.80	TP-6219-B	5520413	TP-6219-S	5523144
5/8"	20	.555	14.10	TP-6219-B	5520413	TP-6219-S	5523144
5/8"	21	.561	14.25	TP-6221-B	5520869	TP-6221-S	5523964
5/8"	22	.569	14.45	TP-6221-B	5520869	TP-6221-S	5523964
3/4"	12	.532	13.51	TP-6218-B	5519514	TP-6218-S	5520261
3/4"	13	.650	14.22	TP-6221-B	5520869	TP-6221-S	5523964
3/4"	14	.584	14.83	TP-7514-B	5519705	TP-7514-S	5520302
3/4"	15	.606	15.39	TP-7515-B	5520952	TP-7515-S	5520924
3/4"	16	.620	15.75	TP-7516-B	5519878	TP-7516-S	5519081
3/4"	17	.634	16.10	TP-7517-B	5520953	TP-7517-S	5521880
3/4"	18	.652	16.56	TP-7518-B	5519494	TP-7518-S	5519966
3/4"	19	.666	16.92	TP-7519-B	5518419	TP-7519-S	5523965
3/4"	20	.680	17.26	TP-7519-B	5518419	TP-7519-S	5523965
3/4"	21	.686	17.42	TP-7521-B	5519600	TP-7521-S	5523583
3/4"	22	.694	17.63	TP-7521-B	5519600	TP-7521-S	5523583
7/8"	12	.657	16.69	TP-7518-B	5519494	TP-7518-S	5519966
7/8"	13	.685	17.40	TP-7521-B	5519600	TP-7521-S	5523583
7/8"	14	.709	18.00	TP-8714-B	5522184	TP-8714-S	5521654
7/8"	15	.731	18.57	TP-8715-B	5523574	TP-8715-S	5523100
7/8"	16	.754	18.92	TP-8716-B	5522352	TP-8716-S	5522478
7/8"	17	.759	19.28	TP-8717-B	5523575	TP-8717-S	5522433
7/8"	18	.777	19.74	TP-8718-B	5520920	TP-8718-S	5519977
7/8"	19	.791	20.10	TP-8719-B	5523036	TP-8719-S	5523584
7/8"	20	.805	20.45	TP-8719-B	5523036	TP-8719-S	5523584
7/8"	21	.811	20.60	TP-8721-B	5523576	TP-8721-S	5520263
7/8"	22	.819	20.80	TP-8721-B	5523576	TP-8721-S	5520263
1"	12	.782	19.86	TP-8718-B	5520920	TP-8718-S	5519977
1"	13	.810	20.57	TP-8721-B	5523576	TP-8721-S	5520263
1"	14	.834	21.18	TP-1014-B	5521719	TP-1014-S	5520706
1"	15	.856	21.74	TP-1015-B	5523577	TP-1015-S	5523585
1"	16	.870	22.1	TP-1016-B	5519515	TP-1016-S	5522890
1"	17	.884	22.45	TP-1017-B	5522333	TP-1017-S	5523586
1"	18	.902	22.91	TP-1018-B	5519680	TP-1018-S	5520262
1"	19	.916	23.27	TP-1019-B	5520903	TP-1019-S	5523587
1"	20	.930	23.62	TP-1019-B	5520930	TP-1019-S	5523587
1"	21	.936	23.77	TP-1021-B	5523963	TP-1021-S	5520264
1"	22	.944	23.98	TP-1021-B	5523963	TP-1021-S	5520264

Some items available on quotation basis only.

Airetool[®]



ATT-6525 TUBE TESTER



The tester comes complete with two #ATT-15-312 support tubes, two #ATT-15-405 support tubes and two seals for the tube size specified. Specify tube O.D. and gauge when ordering.



AJT-6500 JOINT TESTER

The advanced design of the Airetool Tube Tester enables the operator to test the entire length of the tube between the tube sheets for leaks, merely by pressing a button. Up to 125 lbs. of air pressure is induced into the gun causing the seals to expand on both hand pieces. The gauge will show and will hold the pressure if there are no leaks. When the test is finished, a press of the release valve will relax the seals preparing the unit for the next test.

The Airetool Joint Tester is designed to test for leaks between the tube & the tube sheet on both rolled and welded joints. A push of a button actuates the air cylinder to expand the seals inside the tube. Push the second button and the air is directed through a venturi tube to draw a vacuum. Should the amount of vacuum shown on the gauge start dropping, a leak is indicated. After the test, a press of the release valve releases the vacuum & the air pressure in the gun, preparing it for the next test. Joint tester comes complete with one manifold assembly and one seal for the tube size ordered. Specify tube O.D. and gauge when ordering.

Tube Installation Accessories

Tube Testing Tools – continued

Tube Size		ATT-6525 (5518407) Tube Tester Replacement Parts				AJT-6500 Joint Tester Assembly	AJT-6500 Joint Tester Replacement Parts			
Tube	BWG	Seal Part Number 2 Required	Seal and Washer	Seal Description Number	Support Tube Assembly*	Assembly Number	Seal Part Number 1 Required	Seal Description Number	Manifold W/ Square O-Ring	Square O-Ring
5/8"	8-9	2996173	ATT-500-U 2984659-9	ATT 300 N	ATT-15-125 2984870 .280 - .480 7.1 - 12.3 mm	AJT 6500 5/8SP 5525585	2996173	ATT 300 N	AJT 6500 5/8SP 2900823	AJT 16 5/8 2984663
	10-11	2900798		ATT 350 N			2900798	ATT 350 N		
	12-13	2988090		ATT 370-N			2988090	ATT 370 N		
	14-15	2984360		ATT 450 N			2984360	ATT 450 N		
	16-17	2900799		ATT 470 N			2900799	ATT 470 N		
	18-19	2984361		ATT 490 N			ATT-15-312 2984871	AJT 6500 5/8 5525565		
20-24	2984362	ATT 530 N	.490 - .830 12.4 - 21.2 mm		2984362	ATT 530 N				
3/4"	8-9	2995248	ATT-900-U 2984660-2	ATT 430 N	ATT-15-125 2984870 .280 - .480 7.1 - 12.3 mm	AJT 6500 3/4SP 5525586	2995248	ATT 430 N	AJT 6500 3/4SP 2900824	AJT 16 3/4 2984664
	10-11	2984360		ATT 450 N			2984360	ATT 450 N		
	12-13	2984361		ATT 490 N			2984361	ATT 490 N		
	14-15	2984362		ATT 530 N			2984362	ATT 530 N		
	16-17	2984363		ATT 570 N			2984363	ATT 570 N		
	18-19	2984364		ATT 610 N			2984364	ATT 610 N		
20-24	2984365	ATT 650 N	12.4 - 21.2 mm	2984365	ATT 650 N					
7/8"	8-9	2984362	ATT-1250-U 2987062-7	ATT 530 N	ATT-15-312 2984871 .490 - .830 12.4 - 21.2 mm	AJT 6500 7/8 5525567	2984362	ATT 530 N	AJT 6500 7/8 2984358	AJT 16 7/8 2984665
	10-11	2984363		ATT 570 N			2984363	ATT 570 N		
	12-13	2984364		ATT 610 N			2984364	ATT 610 N		
	14-15	2984366		ATT 690 N			2984366	ATT 690 N		
	16-17	2900800		ATT 730 N			2900800	ATT 730 N		
	18-19	2984367		ATT 740 N			2984367	ATT 740 N		
20-24	2984929	ATT 790 N 405	2984929	ATT 790 N 405						
1"	8-9	2984365	ATT-1500-U 2984661-1	ATT 650 N	ATT-15-312 2984871 .490 - .830 12.4 - 21.2 mm	AJT 6500 1 5525568	2984365	ATT 650 N	AJT 6500 1 2984359	AJT 16 1 2984666
	10-11	2984366		ATT 690 N			2984366	ATT 690 N		
	12-13	2984367		ATT 740 N			2984367	ATT 740 N		
	14-15	2984368		ATT 790 N			2984368	ATT 790 N		
	16-17	2984369		ATT 840 N			2984502	AJT 840 N		
	18-19	2900801		ATT 870 N			2900810	AJT 870 N		
20-24	2984370	ATT 890 N	.840 - 1.230 21.3 - 31.2 mm	2984503	AJT 890 N					
1-1/8"	8-9	2984929	ATT-1500-U 2984661-1	ATT 790 N 405	ATT-15-312/2984871 ATT 840 N ATT 870 N ATT 940 N ATT 980 N ATT 990 N ATT 1040 N	AJT6500 1-1/8 5525569	2984933	AJT 790 N 405	AJT 6500 1-1/8 2984669	AJT 16 1-1/8 2984667
	10-11	2984369		ATT 840 N			2984369	ATT 840 N		
	12-13	2900801		ATT 870 N			2900801	ATT 870 N		
	14-15	2984492		ATT 940 N			2984492	ATT 940 N		
	16-17	2900802		ATT 980 N			2900802	ATT 980 N		
	18-19	2984671		ATT 990 N			2984671	ATT 990 N		
20-24	2984672	ATT 1040 N	2984672	ATT 1040 N						
1-1/4"	8-9	2984370	ATT-1500-U 2984661-1	ATT 890 N	ATT-15-405 2984872 .840 - 1.230 21.3 - 31.2 mm	AJT 6500 1-1/4 5525570	2984370	ATT 890 N	AJT 6500 1-1/4 2984670	AJT 16 1-1/4 2984668
	10-11	2984492		ATT 940 N			2984492	ATT 940 N		
	12-13	2984671		ATT 990 N			2984671	ATT 990 N		
	14-15	2900803		ATT-1080 N			2900803	ATT 1080 N		
	16-17	2984673		ATT 1090 N			2984673	ATT 1090 N		
	18-19	2900804		ATT 1100 N			2900804	ATT 1100 N		
20-24	2984674	ATT 1140 N	2984674	ATT 1140 N						



* Support Tube Assembly consists of: Support Tube, Back-up Washer Set, Locknut



Airetool Hole Gauge for Heat Exchanger Tubes

Direct reading “in line,” three-point contact, self-centering hole gauges, for 1/2", 5/8", 3/4", 7/8", 1" and 1 1/4" tubes, graduated in .002" (.05mm) increments for fast, accurate measurement. Hole gauges available in 6" (152.4mm) and 12" (304.8mm) reach. Each hole gauge has range to measure tube sheet holes in next smaller size.

Tube O.D.	Tool Number	Stock Number	Range (in.)	Range (mm)	Reach
1/2"	HG-500-6	5171001	.350 to .440	8.89 to 11.8	6"
1/2"	HG-500-12	5171100	.350 to .440	8.89 to 11.8	12"
5/8"	HG-625-6	5171200	.440 to .545	11.18 to 13.84	6"
5/8"	HG-625-12	5171300	.440 to .545	11.18 to 13.84	12"
3/4"	HG-750-6	5171400	.550 to .700	13.97 to 17.78	6"
3/4"	HG-750-12	5171500	.550 to .700	13.97 to 17.78	12"
7/8"	HG-875-6	5171600	.675 to .825	17.15 to 20.96	6"
7/8"	HG-875-12	5171700	.675 to .825	17.15 to 20.96	12"
1"	HG-1000-6	5171800	.800 to .950	20.32 to 24.13	6"
1"	HG-1000-12	5171900	.800 to .950	20.32 to 24.13	12"
1-1/4"	HG-1250-6	5172000	.955 to 1.105	24.26 to 28.07	6"
1-1/4"	HG-1250-12	5172100	.955 to 1.105	24.26 to 28.07	12"

All gauges are furnished with setting ring and carrying case.



Tube Sheet Hole Brush

Part Number	Tube Size		Stock Number
	(in.)	(mm)	
TSHB-1/2	1/2	12.7	1716654
TSHB-5/8	5/8	15.9	1716655
TSHB-3/4	3/4	19	1716656
TSHB-7/8	7/8	22.2	1716657
TSHB-1	1	25.4	1716658
•TSHB-1-1/4	1 1/4	31.8	1716659

• Available on quotation basis only.



Airetool (BTG) Tube Guide

Tube guide has tapered aluminum pilot with a replaceable nylon brush used to guide tubes through tube sheets and support plate holes. Speeds the assembly operation and prevents tube end damage during assembly. The nylon brush fits in the tube end, holding pilot firmly in place.

Tube O.D.		Gauge	Part Number	Stock Number
In.	mm			
•1/2	12.7	16-18	BTG-1	5342004
1/2	12.7	19-20	BTG-2	5342006
1/2	12.7	21-23	BTG-2-1/2	5515585
5/8	15.8	12-13	BTG-3	5342008
5/8	15.8	14-16	BTG-4	5342010
5/8	15.8	17-20	BTG-5	5342012
•5/8	15.8	22-24	BTG-5-1/2	5512197
3/4	19.0	10-12	BTG-6	5342014
3/4	19.0	13-16	BTG-7	5342016
3/4	19.0	17-20	BTG-8	5342018
3/4	19.0	22-24	BTG-8-1/2	5515738
7/8	22.2	10-12	BTG-9	5342020
7/8	22.2	13-16	BTG-10	5342022
7/8	22.2	17-20	BTG-11	5342024
7/8	22.2	21-22	BTG-11-1/2	5342026
•1	25.4	8-9	BTG-12-1/2	5516015
1	25.4	10-12	BTG-12	5342028
1	25.4	13-16	BTG-13	5342030
1	25.4	17-20	BTG-14	5342032
1	25.4	21-23	BTG-14-1/2	5512141
•1-1/4	31.8	10-13	BTG-15	5342034
1-1/4	31.8	14-20	BTG-16	5342036

Other sizes are available upon request. Pilots made of other materials also available. A minimum order quantity of 50 per size applies for special sizes or materials.

Tube Removal Tools

Tube Drifts & Collapsing Tools

Airetool®

Tube Drifts and Collapsing Tools quickly remove tube stubs from tube sheets. 1/2" -1" OD tube size with 01 or 06 style shanks. Other sizes and shanks are available on request.

Note: Collapsing tool recommended for use on tubes 16 gauge or lighter.



TUBE DRIFT



COLLAPSING TOOL



CHIPPING HAMMER CH-30-RD

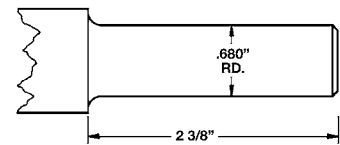
Tube OD	Gauge	Description	Part Number
Tube Drifts			
1/2	12	TD 500 12 01	2952840
		TD 500 12 06	2952890
1/2	14	TD 500 14 01	2953200
		TD 500 14 06	2953250
1/2	16	TD 500 16 01	2953560
		TD 500 16 06	2953610
1/2	18	TD 500 18 01	2953920
		TD 500 18 06	2953970
1/2	20	TD 500 20 01	2972633
		TD 500 20 06	2979763
5/8	10	TD 625 10 01	2954280
		TD 625 10 06	2954330
5/8	12	TD 625 12 01	2954640
		TD 625 12 06	2954690
5/8	13	TD 625 13 01	2954820
		TD 625 13 06	2954870
5/8	14	TD 625 14 01	2955000
		TD 625 14 06	2955050
5/8	15	TD 625 15 01	2955180
		TD 625 15 06	2955230
5/8	16	TD 625 16 01	2955360
		TD 625 16 06	2955410
5/8	17	TD 625 17 01	2955540
		TD 625 17 06	2955590
5/8	18	TD 625 18 01	2955720
		TD 625 18 06	2955770
5/8	19	TD 625 19 01	2972630
		TD 625 19 06	2979765
5/8	20	TD 625 20 01	2972631
		TD 625 20 06	2978637
3/4	10	TD 750 10 01	2956080
		TD 750 10 06	2956130
3/4	12	TD 750 12 01	2956440
		TD 750 12 06	2956490
3/4	13	TD 750 13 01	2956620
		TD 750 13 06	2956670
3/4	14	TD 750 14 01	2956800
		TD 750 14 06	2956850
3/4	15	TD 750 15 01	2956980
		TD 750 15 06	2957030

Tube OD	Gauge	Description	Part Number
3/4	16	TD 750 16 01	2957160
		TD 750 16 06	2957210
3/4	17	TD 750 17 01	2957340
		TD 750 17 06	2957390
3/4	18	TD 750 18 01	2957520
		TD 750 18 06	2957570
3/4	19	TD 750 19 01	2972617
		TD 750 19 06	2979767
3/4	20	TD 750 20 01	2972618
		TD 750 20 06	2979768
7/8	14	TD 875 14 01	2958600
		TD 875 14 06	2958650
7/8	15	TD 875 15 01	2958780
		TD 875 15 06	2958830
7/8	16	TD 875 16 01	2958960
		TD 875 16 06	2959010
7/8	18	TD 875 18 01	2959320
		TD 875 18 06	2959370
7/8	20	TD 875 20 01	2972620
		TD 875 20 06	2979771
1	10	TD 1000 10 01	2959680
		TD 1000 10 06	2959730
1	12	TD 1000 12 01	2960040
		TD 1000 12 06	2960090
1	13	TD 1000 13 01	2960220
		TD 1000 13 06	2960270
1	14	TD 1000 14 01	2960400
		TD 1000 14 06	2960450
1	15	TD 1000 15 01	2960580
		TD 1000 15 06	2960630
1	16	TD 1000 16 01	2960760
		TD 1000 16 06	2960810
1	17	TD 1000 17 01	2960940
		TD 1000 17 06	2960990
1	18	TD 1000 18 01	2961120
		TD 1000 18 06	2961170
1	19	TD 1000 19 01	2972622
		TD 1000 19 06	2979773
1	20	TD 1000 20 01	2972623
		TD 1000 20 06	2979774

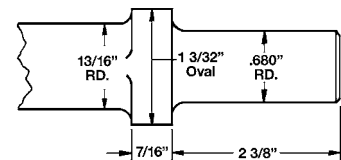
Tube OD	Gauge	Description	Part Number
Collapsing Tools			
3/8	16-22	CT-375-01	2950000
		CT-375-06	2980055
1/2	16-22	CT-500-01	2950030
		CT-500-06	2950080
5/8	16-22	CT-625-01	2950210
		CT-625-06	2950260
3/4	16-22	CT-750-01	2950390
		CT-750-06	2950440
7/8	16-22	CT-875-01	2950570
		CT-875-06	2950620
1	16-22	CT-1000-01	2950750
		CT-1000-06	2950800

Cleco Chipping Hammer CH-30-RD with Chisel Retainer for Type 06 Shank

Blows Per Min.	Bore	Stroke	Weight
1650	1-1/8 in. (28.5 mm)	3-1/4 in. (82.5 mm)	15 lb. (6.79 kg)



Type No. 01



Type No. 06



Airetool®

Reduces the wall of expanded tubes to facilitate removal of tube from tube sheet. Available with Morse taper shank.

Minimum order quantity 3 pieces.

Tube OD	Gauge	Description	Part Number	Morse Taper	Tube Sheet Thickness	Tube OD	Gauge	Description	Part Number	Morse Taper	Tube Sheet Thickness
3/8	16	TWRT-375-16	2980132	#1	2-7/8"	3/4	19	TWRT-750-19	2972481	#2	4-3/8"
3/8	17	TWRT-375-17	2992775	#1	2-7/8"	3/4	20	TWRT-750-20	2972482	#2	4-3/8"
3/8	18	TWRT-375-18	2974712	#1	2-7/8"	3/4	21	TWRT-750-21	2998105	#2	4-3/8"
3/8	20	TWRT-375-20	2978341	#1	2-7/8"	3/4	22	TWRT-750-22	2973036	#2	4-3/8"
3/8	21	TWRT-375-21	2976259	#1	2-7/8"	7/8	10	TWRT-875-10	2677238	#3	4-5/8"
3/8	22	TWRT-375-22	2989963	#1	2-7/8"	7/8	11	TWRT-875-11	2677239	#3	4-5/8"
1/2	17	TWRT-500-17	2677209	#2	2-7/8"	7/8	12	TWRT-875-12	2677240	#3	4-5/8"
1/2	18	TWRT-500-18	2677210	#2	2-7/8"	7/8	13	TWRT-875-13	2677241	#3	4-5/8"
1/2	19	TWRT-500-19	2998102	#2	2-7/8"	7/8	14	TWRT-875-14	2677242	#3	4-5/8"
1/2	20	TWRT-500-20	2982800	#2	2-7/8"	7/8	15	TWRT-875-15	2677243	#3	4-5/8"
1/2	21	TWRT-500-21	2998103	#2	2-7/8"	7/8	16	TWRT-875-16	2677244	#3	4-5/8"
1/2	22	TWRT-500-22	2998104	#2	2-7/8"	7/8	17	TWRT-875-17	2677245	#3	4-5/8"
5/8	12	TWRT-625-12	2677216	#2	3-3/8"	7/8	18	TWRT-875-18	2677246	#3	4-5/8"
5/8	13	TWRT-625-13	2677217	#2	3-3/8"	7/8	19	TWRT-875-19	2973201	#3	4-5/8"
5/8	14	TWRT-625-14	2677218	#2	3-3/8"	7/8	20	TWRT-875-20	2973200	#3	4-5/8"
5/8	15	TWRT-625-15	2677219	#2	3-3/8"	7/8	21	TWRT-875-21	2998106	#3	4-5/8"
5/8	16	TWRT-625-16	2677220	#2	3-3/8"	7/8	22	TWRT-875-22	2973199	#3	4-5/8"
5/8	17	TWRT-625-17	2677221	#2	3-3/8"	1	10	TWRT-1000-10	2677250	#3	4-7/8"
5/8	18	TWRT-625-18	2677222	#2	3-3/8"	1	11	TWRT-1000-11	2677251	#3	4-7/8"
5/8	19	TWRT-625-19	2972480	#2	3-3/8"	1	12	TWRT-1000-12	2677252	#3	4-7/8"
5/8	20	TWRT-625-20	2972479	#2	3-3/8"	1	13	TWRT-1000-13	2677253	#3	4-7/8"
5/8	21	TWRT-625-21	2984261	#2	3-3/8"	1	14	TWRT-1000-14	2677254	#3	4-7/8"
5/8	22	TWRT-625-22	2993158	#2	3-3/8"	1	15	TWRT-1000-15	2677255	#3	4-7/8"
3/4	10	TWRT-750-10	2677226	#2	4-3/8"	1	16	TWRT-1000-16	2677256	#3	4-7/8"
3/4	11	TWRT-750-11	2677227	#2	4-3/8"	1	17	TWRT-1000-17	2677257	#3	4-7/8"
3/4	12	TWRT-750-12	2677228	#2	4-3/8"	1	18	TWRT-1000-18	2677258	#3	4-7/8"
3/4	13	TWRT-750-13	2677229	#2	4-3/8"	1	19	TWRT-1000-19	2998107	#3	4-7/8"
3/4	14	TWRT-750-14	2677230	#2	4-3/8"	1	20	TWRT-1000-20	2974737	#3	4-7/8"
3/4	15	TWRT-750-15	2677231	#2	4-3/8"	1	21	TWRT-1000-21	2985669	#3	4-7/8"
3/4	16	TWRT-750-16	2677232	#2	4-3/8"	1	22	TWRT-1000-22	2984644	#3	4-7/8"
3/4	17	TWRT-750-17	2677233	#2	4-3/8"						
3/4	18	TWRT-750-18	2677234	#2	4-3/8"						

Some items available on quotation basis only.

Tube Removal Tools

Cutter Feed Assist

Airetool®

Increase your productivity with the Airetool Cutter Feed Assist. The Cutter Feed Assist is designed to aid the Airetool PIC Push Type Tube Cutters for OD tube sizes of 5/8" through 1" (15.9-25.4mm). Powered by Cleco® Series DPV-135 variable speed drills for optimum tube cutting speed.



PIC Tube Cutter sold separately. See page 45.

- Constant pressure on tube cutting surface increases tool bit life, less time cutting tubes and less time changing bits.
- Independent cutter bit feed trigger for operator safety.
- Positive feed stop controls tube cutting depth.
- Easy operation reduces operator fatigue, increasing productivity.
- RPM speed control dial on powerful CLECO drills accommodates various tube sizes and materials for optimum tube cutting speed, increasing your productivity saving you valuable time and money.
- Simple tube cutter size changeover for easy set up.
- Compact design allows the Cutter Feed Assist easier access to confined areas.

Two Models Available:

Part Number	Stock Number	RPM
CF-150/500	5523443	150-500
CF-400/1200	5523444	400-1200

HOW TO ORDER:

See selection chart below*. Select the Airetool Cutter Feed Assist that corresponds to tube sizes and tube material.

Tube Material	Tube OD			
	5/8" (16mm)	3/4" (19mm)	7/8" (22mm)	1" (25mm)
Aluminum	CF-400/1200	CF-400/1200	CF-400/1200	CF-400/1200
Brass	CF-400/1200	CF-400/1200	CF-400/1200	CF-400/1200
Copper	CF-400/1200	CF-400/1200	CF-400/1200	CF-400/1200
Carbon Steel	CF-400/1200	CF-400/1200	CF-400/1200	CF-400/1200
Stainless	CF-150/500	CF-150/500	CF-150/500	CF-150/500
Titanium	CF-150/500	CF-150/500	CF-150/500	CF-150/500

* Refer to the Machinery's Handbook for actual recommended tube cutting speeds for specific materials.

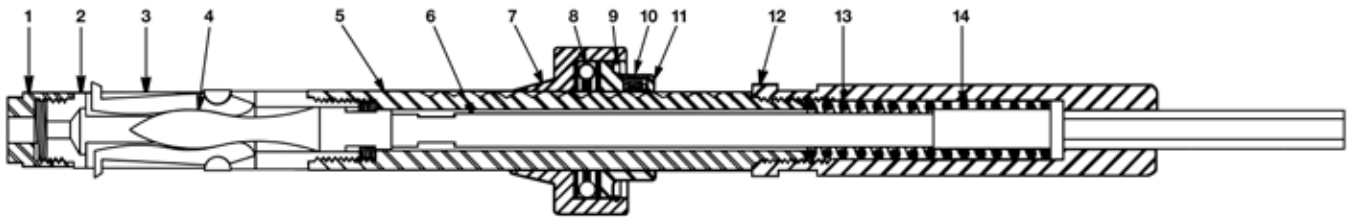


Airetool®

Airetool PIC Internal Tube Cutters

Available for tube sizes 5/8" - 1" OD (16 -25mm).
 Standard adjustable reach of 4-7/16" (110mm) with optional longer reaches available.
 "A" Reach = 7-7/16" (188mm),
 "C" Reach = 10-15/16" (277mm).

Two-piece body and mandrel construction allows for quick and easy tool bit replacement. Optimum tube cutting performance and tooling life are obtained when the Airetool CF Series Cutter Feed Assist is used. Cutter bits are now available with TiN coating, increasing the cutter bit life. Airetool PIC tube cutters are sold with a complete set of pilots and two spare tool bit sets.



Number	Part Name	5/8" (16mm) 16-20GA	3/4" (19mm) 14-20GA	7/8" (22mm) 16-20GA	1" (25mm) 12-20GA
		Part No.	Part No.	Part No.	Part No.
	Complete PIC Cutter	PIC-625 5515553	PIC-750 5515560	PIC-875 5515562	PIC-1000 5515567
1	Pilot	TTC-46-16 2675000	TTC-6-14 2668900	TTC-56-15 2676400	TTC-36-12 2672500
1	Pilot	TTC-46-18 2675100	TTC-6-15 2669000	TTC-56-16 2990534	TTC-36-13 2672600
1	Pilot	TTC-46-19 2675200	TTC-6-16 2669100	TTC-56-17 2990535	TTC-36-14 2672700
1	Pilot	TTC-46-20 2675300	TTC-6-17 2669200	TTC-56-18 2676500	TTC-36-15 2672800
1	Pilot		TTC-6-18 2669300	TTC-56-19 2676600	TTC-36-16 2672900
1	Pilot		TTC-6-19 2669400	TTC-56-20 2676700	TTC-36-17 2673000
1	Pilot		TTC-6-20 2669500		TTC-36-18 2673100
1	Pilot				TTC-36-19 2673200
1	Pilot				TTC-36-20 2673300
2	Body Tip	IC-41 2979725	IC-1 2979306	IC-51 2979726	IC-31 2979419
3	Tool Bit* (Non-ferrous)	TTC-43 5338869	TTC-3 5338865	TTC-53 5338871	TTC-33 5338867
3	Tool Bit* (Ferrous)	TTC-43-S 5338870	TTC-3-S 5338866	TTC-53-S 5338872	TTC-33-S 5338868
3	Tool Bit* (Stainless)	TTC-43-SS 5518303	TTC-3-SS 5517614	TTC-53-S 5517757	TTC-33-SS 5516337
4	Mandrel Tip	IC-44-T 2979724	IC-4-T 2979308	IC-34-T 2979409	IC-34-T 2979409
5	Body Extension	IC-41X 2979688	IC-1X 2979672	IC-51X 2979692	IC-31X 2979680
6	Mandrel Extension	IC-4X 2979676	IC-4X 2979676	IC-34X 2979684	IC-34X 2979684
7	Thrust Body	TTC-47 2675400	TTC-7 2669600	TTC-57 2676800	TTC-37 2673300
8	Bearing	TTC-9 2670000	TTC-9 2670000	TTC-39 2673800	TTC-39 2673800
9	Thrust Spring	TTC-10 2670100	TTC-10 2670100	TTC-40 2673900	TTC-40 2673900
10	Set Screw	10-32X1/4 8000800	10-32X1/4 8000800	10-32X1/4 8000800	10-32X1/4 8000800
11	Thrust Nut	TTC-48 2675700	TTC-8 2669900	TTC-58 2677100	TTC-38 2673700
12	Spring Housing	PIC-21 2979752	PIC-21 2979752	PIC-21 2979752	PIC-21 2979752
13	Spring	PTC-5 2574180	PTC-5 2574180	PTC-5 2574180	PTC-5 2574180
14	Driver	PIC-4 2979751	PIC-4 2979751	PIC-4 2979751	PIC-4 2979751

*Bits sold as sets, 2 bits per set.

Tube Removal Tools

Airetool®

Air Driven Tube Cutter

Powerful, portable air tool developed to handle internal cutting of various tube materials. Has governed motor for constant cutting speed and positive lever-operated cutter bit feed. Models available in speeds from 40 to 625 rpm for various steel and non-ferrous tubes.



RPM	Tube Material	Cutter Complete			
		5/8" OD	3/4" OD	7/8" OD	1" OD
Air Models					
625	Non-ferrous	TIC-625-625 5515586	TIC625-750 5515590	TIC-625-875 5515594	TIC-625-1000 5515598
335	Non-ferrous/Ferrous	TIC-350-625 5515602	TIC-350-750 5515606	TIC-350-875 5515610	TIC-350-1000 5515614
265	Ferrous-Stainless	TIC-265-625 5515618	TIC-265-750 5515622	TIC-265-875 5515626	TIC-265-1000 5515630
200	Ferrous-Stainless	TIC-200-625 5518909	TIC-200-750 5518459	TIC-200-875 5522345	TIC-200-1000 5519460
100	Stainless & Titanium	TIC-100-625 5519526	TIC-100-750 5517806	TIC-100-875 5522125	TIC-100-1000 5518512
40	Titanium & Inconel	TIC-40-625 5521860	TIC-40-750 5518184	TIC-40-875	TIC-40-1000

Description	Tube OD			
	5/8" OD	3/4" OD	7/8" OD	1" OD
Cutter bodies complete for TIC & EIC models				
Cutter Body Complete	IC-625 5515574	IC-750 5515577	IC-875 5515581	IC-1000 5515571
Tool Bit* (Non-ferrous)	TTC-43 5338869	TTC-3 5338865	TTC-53 5338871	TTC-33 5338867
Tool Bit* (Ferrous)	TTC-43-S 5338870	TTC-3-S 5338866	TTC-53-S 5338872	TTC-33-S 5338868
Tool Bit* (Stainless)	TTC-43-SS 5518303	TTC-3-SS 5517614	TTC-53-SS 5517757	TTC-33-SS 5516337

Some items available on quotation basis only.

*Bits sold as sets, 2 bits per set.

Cutter Body Complete consists of all parts needed to convert models TIC & EIC to a different size.

Specify desired reach. 4-7/16" (112.7mm) shown

"A" Reach 7-7/16" (188.9mm);

"C" Reach 10-15/16" (277.8mm)



Airetool[®]

Airetool RCM One Revolution Tube Cutters are sized for inch and Metric tube sizes

For cutting tubes in heat exchangers, condensers, and boilers. Available in standard reaches of 6" (152mm) and 10" (254mm), longer reaches are available in 10" increments on request. These tube cutters are designed for hand use by employing a ratchet or hand wrench. RMC series tube cutters are also an excellent tool for puncturing defective tubes prior to tube plugging, reducing possible pressure buildup in plugged tubes.

O.D.	BWG	Tube ID	Tool #	Bit
1/2"	18-19	.400"-.420" 10.2-10.7mm	RCM-105 5522994	RC-500-2 2993368
1/2"	20	.430"-.450" 11.0-11.3mm	RCM-110 5522929	RC-500-2 2993368
5/8"	14	.450"-.470" 11.4-11.9mm	RCM-115 5522995	RC-625-2 2993372
5/8"	15-16	.472"-.510" 12-12.9mm	RCM-120 5522930	RC-625-2 2993372
5/8"	17-18	.500"-.531" 12.7-13.5mm	RCM-130 5522931	RC-625-2 2993372
5/8"	19-20	.531"-.560" 13.5-14.2mm	RCM-135 5522996	RC-625-2 2993372
5/8"	22	.550"-.580" 14.0-14.7mm	RCM-140 5522932	RC-625-2 2993372
3/4"	12-13	.530"-.560" 13.5-14.2mm	RCM-135-3/4 5523115	RC-750-2A 2995865
3/4"	14-15	.580"-.610" 14.7-15.5mm	RCM-150 5522933	RC-750-2 2993374
3/4"	16	.600"-.630" 15.2-16.0mm	RCM-155 5522997	RC-750-2 2993374
3/4"	17-18	.625"-.650" 15.9-16.5mm	RCM-160 5522934	RC-750-2 2993374
3/4"	19-20	.660"-.690" 16.7-17.5mm	RCM-170 5522935	RC-750-2 2993374
7/8"	14-15	.700"-.730" 17.8-18.5mm	RCM-180 5522936	RC-875-2 2993384
7/8"	16-17	.740"-.770" 18.8-19.5mm	RCM-190 5522937	RC-875-2 2993384
7/8"	18	.760"-.790" 19.3-20.0mm	RCM-195 5522998	RC-875-2 2993384
7/8"	19-20	.780"-.810" 19.8-20.6mm	RCM-200 5522938	RC-875-2 2993384
1"	12	.760"-.790" 19.3-20.0mm	RCM-195 5522998	RC-875-2 2993384
1"	14	.820"-.850" 20.8-21.6mm	RCM-210 5522939	RC-1000-2 2993394
1"	15	.840"-.870" 21.3-22.1mm	RCM-215 5522999	RC-1000-2 2993394
1"	16-17	.860"-.890" 21.8-22.6mm	RCM-220 5522940	RC-1000-2 2993394

O.D.	BWG	Tube ID	Tool #	Bit
1"	18-19	.890"-.910" 22.6-23.1mm	RCM-230 5522941	RC-1000-2 2993394
1"	22	.940"-.970" 23.9-24.6mm	RCM-240 5522942	RC-1000-2 2993394
1-1/4"	12	1.020"-.1.050" 25.9-26.7mm	RCM-260 5523000	RC-1250-2 2993404
1-1/4"	13-14	1.050"-.1.080" 26.7-27.4mm	RCM-270 5523001	RC-1250-2 2993404
1-1/4"	15-16	1.100"-.1.130" 27.9-28.7mm	RCM-280 5523002	RC-1250-2 2993404
1-1/4"	17-19	1.130"-.1.160" 28.7-29.6mm	RCM-290 5523003	RC-1250-2 2993404
1-3/8"	13-14	1.180"-.1.210" 30-30.7mm	RCM-300 5523709	RC-1500-2 2993417
1-1/2"	12-13	1.280"-.1.310" 32.5-33.3mm	RCM-330 5523004	RC-1500-2 2993417
1-1/2"	14-15	1.330"-.1.360" 33.8-34.5mm	RCM-340 5523005	RC-1500-2 2993417
1-1/2"	16-17	1.360"-.1.390" 34.5-35.3mm	RCM-350 5523006	RC-1500-2 2993417
1-1/2"	18-19	1.390"-.1.420" 35.3-36.1mm	RCM-360 5523007	RC-2000-2 2993427
2"	12-13	1.770"-.1.810" 45.0-46.0mm	RC-2012 5521677	RC-2000-2 2993427
2"	14-15	1.820"-.1.860" 46.2-47.2mm	RC-2014 5521678	RC-2000-2 2993427
2"	16-17	1.860"-.1.900" 46.2-48.2mm	RC-2016 5521679	RC-2000-2 2993427
2"	18-19	1.890"-.1.930" 48.0-49.0mm	RC-2018 5521680	RC-2000-2 2993427
2-1/2"	12-13	2.270"-.2.310" 57.6mm-58.6	RC-2512 5521680	RC-2000-2 2993427
2-1/2"	14-15	2.320"-.2.360" 58.9-60.0mm	RC-2514 5521682	RC-2000-2 2993427
2-1/2"	16-17	2.360"-.2.400" 60.0-61.0mm	RC-2516 5521683	RC-2000-2 2993427
2-1/2"	18-19	2.390"-.2.430" 60.7-61.7mm	RC-2518 5521684	RC-2000-2 2993427

Some items available on quotation basis only.

Airetool®

Electric/Hydraulic SemiAutomatic Tube Pullers For Light To Medium Duty Applications.

■ The Airetool Model ATP-9000-B tube puller develops 13-3/4 tons of pulling power to easily remove tubes up to 1 in. O.D. from tube sheets up to 1-1/2 in. thickness.* Quick attaching grippers bite uniformly into the tube I.D. as the piston retracts, pulling the tube from the sheet.



- This puller provides a full 4-3/4 in. total pulling length through a double 2-3/8 in. pull. Cycle time is controlled from the handpiece through a 24 volt cycle control panel, providing better operator control and improving productivity. The puller reverses instantly at the end of the pulling cycle or when the trigger is released.
- Control cables and hoses are wrapped together for greater safety, and the hydraulic hoses have quick disconnect fittings for simplified attachment to the pump and cylinder.
- Contact customer service for pump details.



The following components are required for most normal tube pulling applications:

Part Number	Description	Stock Number
ATP-9000B	RAM Assembly	5525469
ATP-9000B-HCA	Hose/Cord Assy-15'	5525470*
ATP-9022-	Gripper Kit	See Chart Page 52

*15' long

Airetool®

Pneumatic/Hydraulic SemiAutomatic Tube Pullers For Light To Medium Duty Applications.

- The Airetool Model PATP-9000 tube puller develops 13-3/4 tons of pulling power to easily remove tubes up to 1 in. O.D. from tube sheets up to 1-1/2 in. thickness.* Quick attaching grippers bite uniformly into the tube I.D. as the piston retracts, pulling the tube from the sheet.



- This puller provides a full 4-3/4 in. total pulling length through a double 2-3/8 in. pull. Cycle time is controlled from the handpiece through a pneumatic circuit, providing better operator control and improving productivity. The puller reverses instantly at the end of the pulling cycle or when the trigger is released.
- Control tubes and hoses are wrapped together for greater safety, and the hydraulic hoses have quick disconnect fittings for simplified attachment to the pump and cylinder.
- Contact customer service for pump details.



The following components are required for most normal tube pulling applications:

Part Number	Description	Stock Number
PATP-9000	RAM Assembly	5524902
PATP-9000-HT	Hose Tube Assy	5522512
ATP-9022-	Gripper Kit	See Chart Page 54

Optional pendant for use with HDP, HDQ and RAV.

Part Number	Description	Stock Number
PATP-HDP-	Optional Pendant	5524904

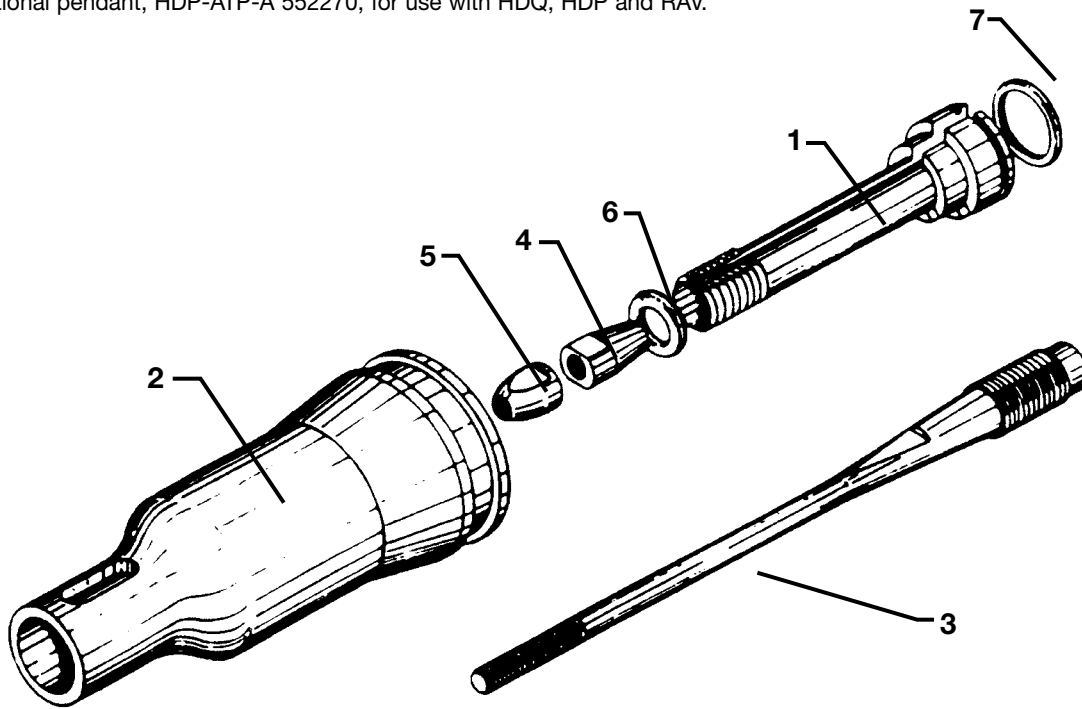
Tube Removal Tools

ATP 9000 Components

Airetool®

Features of the ATP-9000 System Include:

- Free-floating gripper design allows uniform contact of the gripper teeth along the entire length of the gripper, giving longer gripper life and better pulling characteristics.
- Pressure relief valve exerts uniform pressure on the grippers, compensating for light variations in the tube I.D.
- Grippers are segmented, allowing replacement of single gripper segments in the event of tooth breakage.
- Max Pulling force is 13 3/4 tons, assuring ample power for quick, efficient tube pulling.
- Grippers are available from 5/8 in. through 1 in. and accommodate a wide range of tube gages.
- Optional 18 in. extension kit provides a useful method of removing hard-to-reach tubes.
- Intrinsically safe 24 volt control from the pump to the tool.
- Optional pendant, HDP-ATP-A 552270, for use with HDQ, HDP and RAV.



Tube Size		Part No.* ATP-9022	Gripper Complete	GRIPPER KIT	Gripper Segment	Nose Bushing	Draw Rod	Expansion Nut	Lock Nut	Front O-Ring	Rear O-Ring
OD.	GA.										
5/8	16-18	568	5520793	5520782	2991196	2991245	2991237	2991238	2991239	3105400 200-9	3094500 RTV-65
5/8	20-22	522	5520794	5520783	2991197	ATP-9042-5/8	ATP-9034-5/8	ATP-9035-5/8	ATP-9036-5/8		
3/4	14-15	34	5520795	5520784	2991198	2991218 ATP-9014-3/4	2991224	2991226	2991227	3010453 2-113	3220900 900-83
3/4	16-18	368	5520796	5520785	2991199		ATP-9015-3/4	ATP-9016-3/4	ATP-9017-3/4		
3/4	20-22	322	5520797	5520786	2991200						
7/8	12-14	724	5520798	5520787	2991201	2991232 ATP-9027-7/8	2991240 ATP-9037-7/8-1	2991241 ATP-9038-7/8-1	2991242 ATP-9039-7/8	3010453 2-113	3220900 900-83
7/8	16-18	768	5520799	5520788	2991202						
7/8	20-22	722	5520800	5520789	2991203						
1	12-14	124	5520801	5520790	2991204	2991244 ATP-9041				3010453 2-113	3220900 900-83
1	16-18	168	5520802	5520791	2991205						
1	20-22	122	5520803	5520792	2991206						

NOTE: A Gripper complete consists of 3 Gripper Segments and both O-Rings. A Gripper Kit consists of 3 Gripper Segments, both O-Rings, one draw rod, one expansion nut, one lock nut, and one nose bushing.

*Part No.1 is the same for Gripper Complete, Gripper Kit, and Gripper Segment eg: 3/4" x 16 ga. Gripper Complete = ATP-9022-368.

HDP-99 Heavy Duty Tube Puller

HDP-99 Tube Puller (5525280)

Airetool



**ON BOARD ADAPTER
LOCK STAYS WITH RAM
AT ALL TIMES**

Airetool

For Tube Sizes 1/2" thru 1" the following accessories are required:

- HDP 99 3055 3 Spear Adapter (2900051)
- Tube Pulling Spear - refer to the chart below for size selection.
- Optional load cap may be required if surrounding tubes are protruding and are closely spaced.

For Tube Sizes 1-1/8" thru 2-1/2" the following accessories are required:

- HDP 99 3055 3 Spear Adapter (2900051)
- HDP 99 Adapter Kit - refer to the chart below for size selection
- Tube Pulling Spear - refer to the chart below for size selection.
- 5525280 HDP-99 Ram Kit includes 2900118 Ram, 5525283 Adapter Lock Assy. and 2900007 HDP 99 LC 1 Load Cap.

Tube Size	Part Number	Small Dia. End		Large Dia. End		Length	Flat Size
1/2" - 20 Ga.	2983511	.427	10.8mm	.499	12.7mm		
5/8" - 12-13 Ga.	2968758	.402	10.2mm	.610	15.5mm		
5/8" - 14-15 Ga.	2968759	.454	11.5mm	.662	16.8mm		
5/8" - 16-17 Ga.	2968760	.489	12.4mm	.625	15.9mm		
5/8" - 18-19 Ga.	2968761	.521	13.2mm	.625	15.9mm		
5/8" - 20 Ga.	2979942	.545	13.8mm	.620	15.7mm		
3/4" - 10 Ga.	2968759	.454	11.5mm	.662	16.8mm		
3/4" - 11-13 Ga.	2968762	.505	12.8mm	.713	18.1mm		
3/4" - 14-15 Ga.	2968764	.597	15.2mm	.750	19.1mm		
3/4" - 16-17 Ga.	2968765	.614	15.6mm	.750	19.1mm	8-3/4"	7/8" HEX
3/4" - 18-19 Ga.	2968766	.646	16.4mm	.750	19.1mm	222mm	22.2 mm
3/4" - 20 Ga.	2979941	.670	17.0mm	.745	18.9mm		
7/8" - 14-15 Ga.	2968769	.699	17.8mm	.875	22.2mm		3/4-10 MALE
7/8" - 16-17 Ga.	2968768	.740	18.8mm	.948	24.1mm		
7/8" - 17-18 Ga.	2968770	.755	19.2mm	.963	24.5mm		
7/8" - 20 Ga.	2983512	.800	20.3mm	.874	22.2mm		
1" 9-10 Ga.	2968769	.699	17.8mm	.875	22.2mm		
1" - 11 Ga.	2968770	.755	19.2mm	.963	24.5mm		
1" - 12-13 Ga.	2968771	.777	19.7mm	.985	25.0mm		
1" - 14-15 Ga.	2968772	.829	21.1mm	1.000	25.4mm		
1" - 16-17 Ga.	2968773	.869	22.1mm	1.000	25.4mm		
1" - 18-20 Ga.	2968774	.896	22.8mm	1.000	25.4mm		
1-1/4" - 7-8 Ga.	2968775	.856	21.7mm	1.114	28.3mm		
1-1/4" - 10-11 Ga.	2968776	.977	24.8mm	1.206	30.6mm		
1-1/4" - 12-13 Ga.	2968778	1.027	26.1mm	1.256	31.9mm	5-1/2"	1-1/4" HEX
1-1/4" - 14-15 Ga.	2968780	1.079	27.4mm	1.308	33.2mm	140mm	38.8 mm
1-1/4" - 16-18 Ga.	2968781	1.115	28.3mm	1.344	34.1mm		
1-1/2" - 10-11 Ga.	2968782	1.227	31.2mm	1.456	37.0mm		3/4-10 FEMALE
1-1/2" - 12-13 Ga.	2968784	1.277	32.4mm	1.500	38.1mm		
1-1/2" - 14 Ga.	2968786	1.329	33.8mm	1.500	38.1mm		

Larger sizes also available. Contact customer service for details.



HDP Adapter Kits

Include HDP 99 3055 5 Adapter extension and extension chair

Tube OD	Description	Part Number
1-1/8" - 1-1/2" (28.5 -38.1mm)	HDP 99 3055 AK 1 1/2 Adapter Kit	5525287
1-3/4" (44.4mm)	HDP 99 3055 AK 1 3/4 Adapter Kit	5525288
2" (50.8mm)	HDP 99 3055 AK 2 Adapter Kit	5525289
2-1/2" (63.5mm)	HDP 99 3055 AK 2 1/2 Adapter Kit	5525290



HDP 99 & HTP 99 Ram Accessories

Description	Part Number
HDP 99 3055-3 Adapter	2900051
HDP 99 3055 5 Adapter Extension	2900011
HDP 99 3055 5 MF Adapter Extension	2900633
HDP 99 ALA Adapter Lock Assy	5525283
HDP 99 LC 1 QC Load Cap	2900007
HDP 99 LC 5/8 QC Load Cap	2900008
HDP 99 LC 3/4 QC Load Cap	2900009
HDP 99 LC 7/8 QC Load Cap	2900010

Some items are available on quotation basis only.

Tube Removal Tools

HDQ-99 Tube Puller (5525281)

Airetool®

■ HDQ 99 Gripper-type tube puller is designed for pulling 1-1/4" thru 2-1/2" OD tubes in heat exchangers and fire tube boilers. This gripper-type tube puller makes tube pulling faster and easier. See the selection charts below for ordering gripper assembly kits and components for the tube sizes being pulled.



THE FAST AND EASY OPERATION OF THE HDQ GRIPPER BITES INTO THE TUBE FOR A SECURE TUBE PULLING GRIP, THEN RELEASES AUTOMATICALLY WHEN THE PULL IS COMPLETED.

Tube OD	Tube Wall BWG	Gripper Kit Complete*	Item Name	HDQ 99 Chair	Position Sleeve	Sleeve Adapter	Gripper	O-Ring	Mandrel	Stop Nut	Spring	Position Sleeve Set Screw	Retainer Ring	Drawbar	Stop Nut Set Screw
1-1/4	8-10	5525293	Description	HDQ 99 7 125F QC HDQ 125 PS Chair	HDQ 125 SA	HDQ 125 1	RTV 60	HDQ 125 M	HDQ 125 1SN	HDQ 31 8	10 32 x 3/16	HDQ 125	HDQ 99 5	10 32 x 3/16	8009800
			Part Number	2999993	2985180	2985186	2985168	3094100	2985196	2985191	2985203	8009800	2985357	2900012	8009800
			Quantity	1	1	1	6	1	1	1	1	1	1	1	1
1-1/2	11-14	5525294	Description	HDQ 99 7 125F QC HDQ 125 PS Chair	HDQ 125 SA	HDQ 125 2	RTV 60	HDQ 125 M	HDQ 125 2SN	HDQ 31 8	10 32 x 3/16	HDQ 125	HDQ 99 5	10 32 x 3/16	8009800
			Part Number	2999993	2985180	2985186	2985169	3094100	2985196	2985192	2985203	8009800	2985357	2900012	8009800
			Quantity	1	1	1	6	1	1	1	1	1	1	1	1
1-3/4	15-18	5525295	Description	HDQ 99 7 125F QC HDQ 125 PS Chair	HDQ 125 SA	HDQ 125 3	RTV 60	HDQ 125 M	HDQ 125 3SN	HDQ 31 8	10 32 x 3/16	HDQ 125	HDQ 99 5	10 32 x 3/16	8009800
			Part Number	2999993	2985180	2985186	2988629	3094100	2985196	2988630	2985203	8009800	2985357	2900012	8009800
			Quantity	1	1	1	6	1	1	1	1	1	1	1	1
2	8-12	5525296	Description	HDQ 99 7 150F QC HDQ 150 PS Chair	HDQ 150 SA	HDQ 150 1	2 213	HDQ 150 M	HDQ 150 1SN	HDQ 31 8	10 32 x 3/16	HDQ 150	HDQ 99 5	10 32 x 3/16	8009800
			Part Number	2999994	2985181	2985187	2985170	8010303	2985197	2985193	2985203	8009800	2985668	2900012	8009800
			Quantity	1	1	1	4	1	1	1	1	1	1	1	1
2	13-18	5525297	Description	HDQ 99 7 150F QC HDQ 150 PS Chair	HDQ 150 SA	HDQ 150 2	2 213	HDQ 150 M	HDQ 150 2SN	HDQ 31 8	10 32 x 3/16	HDQ 150	HDQ 99 5	10 32 x 3/16	8009800
			Part Number	2999994	2985181	2985187	2985171	8010303	2985197	2985194	2985203	8009800	2985668	2900012	8009800
			Quantity	1	1	1	4	1	1	1	1	1	1	1	1
2	18-12	5525298	Description	HDQ 99 7 175F QC HDQ 175 PS Chair	HDQ 175 SA	HDQ 175 1	700-30	HDQ 150 M	HDQ 175 1SN	HDQ 31 8	10 32 x 3/16	1 3/8	HDQ 99 5	1/4-20 x 1/4	8006600
			Part Number	2999995	2985182	2985189	2985172	3203900	2985197	2985195	2985203	8009800	2349000	2900012	8006600
			Quantity	1	1	1	4	1	1	1	1	1	1	1	1
2	13-18	5525299	Description	HDQ 99 7 175F QC HDQ 175 PS Chair	HDQ 175 SA	HDQ 175 2	2 216	HDQ 150 M	HDQ 175 1SN	HDQ 31 8	10 32 x 3/16	1 3/8	HDQ 99 5	1/4-20 x 1/4	8006600
			Part Number	2999995	2985182	2985189	2985173	8010304	2985197	2985195	2985203	8009800	2349000	2900012	8006600
			Quantity	1	1	1	4	1	1	1	1	1	1	1	1
2-1/4	8-12	5525300	Description	GRP 99 200 8/12 QC Chair	GRP 99 4	GRP 200 STP	GRP 200 SPR	HDQ 200 PS	10 32 x 1/2	GRP 200 SA	GRP 200 1	2 218	GRP 200 CAM	5160 98	GRP 200 SN
			Part Number	2999996	2900052	2987488	2986930	2985183	8010346	2986932	2987091	8010363	2988791	8010362	2986933
			Quantity	1	1	1	1	1	1	1	4	1	1	1	1
2-1/4	13-18	5525301	Description	GRP 99 200 13/18 QC Chair	GRP 99 4	GRP 200 STP	GRP 200 SPR	HDQ 200 PS	10 32 x 1/2	GRP 200 SA	GRP 200 2	2 221	GRP 200 CAM	5160 98	GRP 200 SN
			Part Number	2999996	2900052	2987488	2986930	2985183	8010346	2986932	2987090	8010408	2988791	8010362	2986933
			Quantity	1	1	1	1	1	1	1	4	1	1	1	1
2-1/2	8-12	5525302	Description	GRP 99 225 8/12 QC Chair	GRP 99 4	GRP 200 STP	GRP 200 SPR	HDQ 225 PS	10 32 x 1/2	GRP 200 SA	GRP 225 1	2 222	GRP 225 CAM	5160 98	GRP 225 SN
			Part Number	2999997	2900052	2987488	2986930	2985184	8010346	2986932	2987092	8010409	2986929	8010362	2986934
			Quantity	1	1	1	1	1	1	1	4	1	1	1	1
2-1/2	13-18	5525303	Description	GRP 99 225 13/18 QC Chair	GRP 99 4	GRP 200 STP	GRP 200 SPR	HDQ 225 PS	10 32 x 1/2	GRP 200 SA	GRP 225 2	500 23	GRP 225 CAM	5160 98	GRP 225 SN
			Part Number	2999997	2900052	2987488	2986930	2985184	8010346	2986932	2987094	3165700	2982929	8010362	2986934
			Quantity	1	1	1	1	1	1	1	4	1	1	1	1
2-1/2	8-12	5525304	Description	GRP 99 250 8/12 QC Chair	GRP 99 4	GRP 200 STP	GRP 200 SPR	HDQ 250 PS	10 32 x 1/2	GRP 200 SA	GRP 250 1	2 224	GRP 225 CAM	5160 98	GRP 225 SN
			Part Number	2999998	2900052	2987488	2986930	2985185	8010346	2986932	2987095	8010192	2986929	8010362	2986934
			Quantity	1	1	1	1	1	1	1	4	1	1	1	1
2-1/2	13-18	5525305	Description	GRP 99 250 13/18 QC Chair	GRP 99 4	GRP 200 STP	GRP 200 SPR	HDQ 250 PS	10 32 x 1/2	GRP 200 SA	GRP 250 2	2 226	GRP 225 CAM	5160 98	GRP 225 SN
			Part Number	2999998	2900052	2987488	2986930	2985185	8010346	2986932	2987093	2983713	2986929	8010362	2986934
			Quantity	1	1	1	1	1	1	1	4	1	1	1	1

5525281: HDQ 99 Ram Kit – Includes 2900118; HTP 99 Ram and 5525447: HDQ 99 APA Adapter Plate Assembly

*Gripper Kit Complete includes components to the right in the table. Some items are available on quotation basis only.

Tube Removal Tools

RAV 99 Tube Puller

Airetool

Airetool



ON BOARD JAW HOLDER FOR SEMI-CONTINUOUS PULLING.

■ RAV Semi-Continuous Tube Pulling Ram allows continuous pulling of tubes up to 1" (25.4mm) OD. Tubes over 1" have a maximum pulling length of 7" (177mm).

■ To order: Select the desired RAV Ram Kit, Spear, and Collar. The universal design allows for easy size change over with minimal cost.

■ RAV 99 Ram Kit includes: 290018-HTP 99 Ram, Jaw Holder Assembly and one set of Jaws.

Size	5/8"	3/4"	7/8"	1"
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RAV 99 Ram Kit with Jaw Holders & Jaws

Part Number	5525430	5525429	5525428	5525427
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RAV 99 Jaw Holders & Jaws

Part Number	5525308	5525309	5525310	5525311
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RAV 99 Jaw Set (Includes 4 springs)

Part Number	7025597	7025568	7025598	7025570
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Description	Part Number	Tube ID		Jaw Size	Square Size
		mm	inch		

RAV Spears*

RAV 99 406 5/8	2900189	5.5 - 6.5	.215 - .255	5/8"	1/2"
RAV 99 407 5/8	2900190	6.5 - 7.5	.255 - .295	5/8"	1/2"
RAV 99 408 5/8	2900191	7.5 - 8.5	.295 - .335	5/8"	1/2"
RAV 99 409 5/8	2900192	8.5 - 9.5	.335 - .375	5/8"	1/2"
RAV 99 410 5/8	2900193	9.5 - 10.5	.375 - .415	5/8"	1/2"
RAV 99 411 5/8	2900194	10.5 - 11.5	.415 - .455	5/8"	1/2"
RAV 99 412 5/8	2900195	11.5 - 12.5	.455 - .495	5/8"	1/2"
RAV 99 413 5/8	2900196	12.5 - 13.5	.495 - .535	5/8"	1/2"
RAV 99 414 5/8	2900197	13.5 - 14.5	.535 - .570	5/8"	1/2"
RAV 99 413 3/4	2900198	12.5 - 13.5	.495 - .535	3/4"	5/8"
RAV 99 414 3/4	2900199	13.5 - 14.5	.535 - .570	3/4"	5/8"
RAV 99 415 3/4	2900200	14.5 - 15.5	.570 - .615	3/4"	5/8"
RAV 99 416 3/4	2900201	15.5 - 16.5	.615 - .650	3/4"	5/8"
RAV 99 417 3/4	2900202	16.5 - 17.5	.650 - .695	3/4"	5/8"
RAV 99 418 3/4	2900203	17.5 - 18.5	.695 - .730	3/4"	5/8"
RAV 99 415 7/8	2900204	14.5 - 15.5	.570 - .615	7/8"	3/4"
RAV 99 416 7/8	2900205	15.5 - 16.5	.615 - .650	7/8"	3/4"
RAV 99 417 7/8	2900206	16.5 - 17.5	.650 - .695	7/8"	3/4"
RAV 99 418 7/8	2900207	17.5 - 18.5	.695 - .730	7/8"	3/4"
RAV 99 419 7/8	2900208	18.5 - 19.5	.730 - .770	7/8"	3/4"
RAV 99 420 7/8	2900209	19.5 - 20.5	.770 - .815	7/8"	3/4"
RAV 99 421 7/8	2900210	20.5 - 21.5	.815 - .850	7/8"	3/4"
RAV 99 419 1	2900211	18.5 - 19.5	.730 - .770	1"	3/4"
RAV 99 420 1	2900212	19.5 - 20.5	.770 - .815	1"	3/4"
RAV 99 421 1	2900213	20.5 - 21.5	.815 - .850	1"	3/4"
RAV 99 422 1	2900214	21.5 - 22.5	.850 - .885	1"	3/4"
RAV 99 423 1	2900215	22.5 - 23.5	.885 - .925	1"	3/4"
RAV 99 424 1	2900216	23.5 - 24.5	.925 - .965	1"	3/4"
RAV 99 425 1	2900217	24.5 - 25.5	.965 - 1.005	1"	3/4"
RAV 99 426 1	2900218	25.5 - 26.5	1.005 - 1.045	1"	3/4"

Description	Part Number	Tube ID		Jaw Size	Square Size
		mm	inch		

RAV 99 427 1	2900219	26.5 - 27.5	1.045 - 1.085	1"	3/4"
RAV 99 428 1	2900220	27.5 - 28.5	1.085 - 1.125	1"	3/4"
RAV 99 429 1	2900221	28.5 - 29.5	1.125 - 1.160	1"	3/4"
RAV 99 430 1	2900222	29.5 - 30.5	1.160 - 1.200	1"	3/4"
RAV 99 431 1	2900223	30.5 - 31.5	1.200 - 1.240	1"	3/4"
RAV 99 432 1	2900224	31.5 - 32.5	1.240 - 1.280	1"	3/4"
RAV 99 433 1	2900225	32.5 - 33.5	1.280 - 1.320	1"	3/4"
RAV 99 434 1	2900226	33.5 - 34.5	1.320 - 1.360	1"	3/4"
RAV 99 435 1	2900227	34.5 - 35.5	1.360 - 1.400	1"	3/4"
RAV 99 436 1	2900228	35.5 - 36.5	1.400 - 1.440	1"	3/4"
RAV 99 437 1	2900229	36.5 - 37.5	1.440 - 1.475	1"	3/4"
RAV 99 438 1	2900230	37.5 - 38.5	1.475 - 1.515	1"	3/4"



Tube OD	Description	Part Number	Collar ID	Collar OD
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RAV Collars**

1/2" (12.7mm)	RAV 99 316	2900176	.630"	16mm	.865"	22mm
5/8" (15.8mm)	RAV 99 319	2900177	.750"	19mm	.985"	25mm
3/4" (19.0mm)	RAV 99 323	2900178	.905"	23mm	1.140"	29mm
7/8" (22.2mm)	RAV 99 326	2900179	1.025"	26mm	1.260"	32mm
1" (25.4mm)	RAV 99 326	2900179	1.025"	26mm	1.260"	32mm
1-1/8" (28.5mm)	RAV 99 332	2900181	1.260"	32mm	1.495"	38mm
1-1/4" (31.7mm)	RAV 99 335	2900182	1.375"	35mm	1.610"	41mm
1-3/8" (34.9mm)	RAV 99 339	2900183	1.530"	39mm	1.770"	45mm
1-1/2" (38.1mm)	RAV 99 345	2900184	1.770"	45mm	2.005"	51mm
1-3/4" (44.4mm)	RAV 99 351	2900185	2.005"	51mm	2.240"	57mm
2" (50.8mm)	RAV 99 358	2900186	2.280"	58mm	2.515"	64mm

Some items are available on quotation basis only.

* Select the spear that corresponds to the tube ID.

** Select the collar that allows the tube to enter the collar's ID.

Airetool Tube Removal Tools

JSP Manual Tube Puller

Airetool®

Manual tube puller provides economical method for tube removal

Features and Benefits:

- Easy to use – Inserting the spear into the tube and removing the tube requires only a hand wrench.
- No external power – manual operation eliminates the need for air or electricity, making the tube puller ideal for field service applications.
- Durable – major components are machined from high quality, high strength steel, heat-treated for extra long service life.
- Easier close-quarter operation – hex at back of spear allows the spear to be tightened into tube without disassembly of the thrust mechanism.
- Clearly marked sizes, both spear and thrust collar are marked with tube size for a quick matching of tool to job.
- Wide selection of sizes – specific pullers are made for 1/4, 3/8, 1/2, 5/8, 3/4, 7/8 and 1 inch O.D. tubes to match most popular applications.



Tube Size							Tube Puller Complete		Spare Spears	
OD		Gauge	Wall Thickness		I.D.		Part Number	Stock Number	Part Number	Stock Number
In.	mm		In.	mm	In.	mm				
1/4	6.35	18	.049	1.24	.152	3.86	JSP-250-18	5520136	JSP-1/4-18	2989364
3/8	9.52	16	.065	1.65	.245	6.22	JSP-375-16	5520914	JSP-3/8-16	2991563
3/8	9.52	18	.049	1.24	.277	7.04	JSP-375-18	5520030	JSP-3/8-18	2989016
3/8	9.52	20	.035	0.88	.305	7.75	JSP-375-20	5519932	JSP-3/8-20	2988750
1/2	12.7	14	.083	2.11	.334	8.48	JSP-500-14	5519689	JSP-1/2-14	2987297
1/2	12.7	16	.065	1.65	.370	9.40	JSP-500-16	5519690	JSP-1/2-16	2986892
1/2	12.7	18	.049	1.24	.402	10.21	JSP-500-18	5519070	JSP-1/2-18	2986893
1/2	12.7	20	.035	0.89	.430	10.92	JSP-500-20	5519691	JSP-1/2-20	2987298
5/8	15.88	14	.083	2.10	.459	11.66	JSP-625-14	5519692	JSP-5/8-14	2986894
5/8	15.88	16	.065	1.65	.495	12.57	JSP-625-16	5519693	JSP-5/8-16	2986895
5/8	15.88	18	.049	1.24	.527	13.39	JSP-625-18	5518868	JSP-5/8-18	2986771
5/8	15.88	20	.035	0.88	.555	14.10	JSP-625-20	5519694	JSP-5/8-20	2987182
3/4	19.05	14	.083	2.10	.585	14.86	JSP-750-14	5519695	JSP-3/4-14	2986896
3/4	19.05	16	.065	1.65	.620	15.75	JSP-750-16	5519696	JSP-3/4-16	2986897
3/4	19.05	18	.049	1.24	.652	16.56	JSP-750-18	5518804	JSP-3/4-18	2986364
3/4	19.05	20	.035	0.88	.680	17.27	JSP-750-20	5519697	JSP-3/4-20	2986769
7/8	22.22	14	.083	2.10	.709	18.01	JSP-875-14	5519698	JSP-7/8-14	2986898
7/8	22.22	16	.065	1.65	.745	18.92	JSP-875-16	5519699	JSP-7/8-16	2986899
7/8	22.22	18	.049	1.24	.777	19.74	JSP-875-18	5519071	JSP-7/8-18	2986900
7/8	22.22	20	.035	0.88	.805	20.45	JSP-875-20	5518700	JSP-7/8-20	2987534
1	25.4	14	.083	2.10	.834	21.18	JSP-1000-14	5519701	JSP-1-14	2986901
1	25.4	16	.065	1.65	.870	22.10	JSP-1000-16	5519702	JSP-1-16	2986902
1	25.4	18	.049	1.24	.902	22.91	JSP-1000-18	5519072	JSP-1-18	2986903
1	25.4	20	2.035	0.88	.930	23.62	JSP-1000-20	5519703	JSP-1-20	2987209

Some items are available on quotation basis only.

Additional sizes are available. Contact customer service for details.

Airetool®

Tube Expanders

Tube expanding is the art of cold working the ends of tubes into intimate contact with the metal of the containing tube holes to form a leak proof mechanical seal and/or joint. In other words, it is a mechanical method of establishing a mechanical joint between a tube and a tube hole.

Airetool manufactures condensed/heat exchanger expanders, boiler expanders, furnace expanders and many special application expanders.

Tube expanders consist of:

Mandrel – A tapered pin through the center to which the power is attached and when advanced pushes the rolls against the tubes.

Rolls – A set of (3 or more) of tapered cylindrical parts which are driven by mandrel and contact the tube wall to be expanded. The taper on the rolls is in the reverse direction and one-half the taper of the mandrel if it is a parallel roll expander.

Cage – This is the expander body or housing since it holds the mandrel and rolls in place. The slots which contain the rolls also provide a feed angle which helps pull the mandrel in to provide expansion of the rolls.

Mandrel, Rolls and Cage are the three things common to all expanders. Other parts added further classify the type of expander.

Thrust Assembly – This assembly attaches to the cage and allows adjustment of the expanding depth. The thrust collar will remain stationary against the tube sheet or tube end while the cage, mandrel and rolls expand the tube. A thrust assembly is used on condenser/heat exchanger expanders, some furnace expanders and special boiler expanders.

Flare or Bell Rolls – This type roll is added to the back of the cage on boiler or furnace expanders to flare the tube end after it has been expanded.

Boiler Expanders

When a condenser/expander is selected and ordered, it comes complete with mandrel. But a boiler expander does not come with a mandrel. Because of the nature of their application, it is possible to obtain them with three types of mandrels.

Header Mandrel – This is the longest mandrel because it has an extension as part of the mandrel to allow you to reach through manifolds or header boxes.

Drum Mandrel – This mandrel is used when you are expanding inside the boiler drum and can get to the tube at the end.

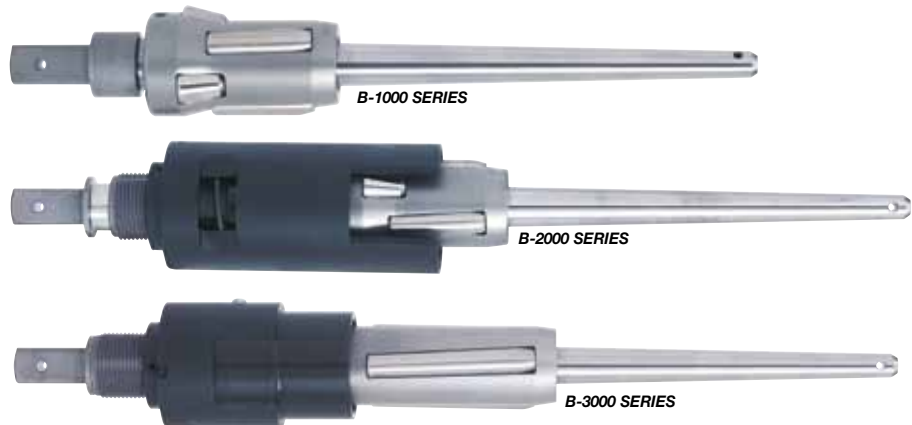
Short Series Mandrel Sets – There are times when the space in a boiler will not allow use of the longer header or drum mandrels. The short series sets allow you to expand the tube in different steps when space is restricted. If you would take the tapered portion of the header or drum mandrel, cut it in several

pieces and add a drive to each section, you would have a short series set.

B-2000 Series Expander – The B-2000 Series Boiler Expanders have three expanding rolls and three flaring rolls that are self contained in the cage. An exclusive thrust mechanism makes torque control possible for Boiler Tube Rolling. The B-2000 Series Expander is available for sizes 1" O.D. thru 4 1/4" O.D. tubes with drum thickness of 1/2" thru 2 3/4" thick. Short Series Mandrels are available.

B-3000 Series Expanders – The B-3000 Series Expander has three expanding rolls and a thrust mechanism. The B-3000 Expander is available for 1 1/4" O.D. thru 4 1/4" O.D. tubes. It is for use as a straight rolling expander in fire tube boilers and as a second operation expander in thick drums thru 5 3/8" thick.

B-1000 Series Expanders – The B-1000 Series Expander is



the same basic expander as the B-2000 but without the thrust mechanism. It is available for 1" O.D. thru 4 1/2" O.D. tubes with drum thickness from 1/2" thru 2 3/4" thick. Short series Mandrels are available. The B-1000 Expander can be used when torque control is not desired or where space is limited such as in a small diameter header. The B-1000 Expander can be converted to a B-2000 type expander by adding a thrust mechanism, should the need for torque control arise. Airetool offers several different configurations of the above type expanders for special applications.

When selecting a boiler expander, you must know:

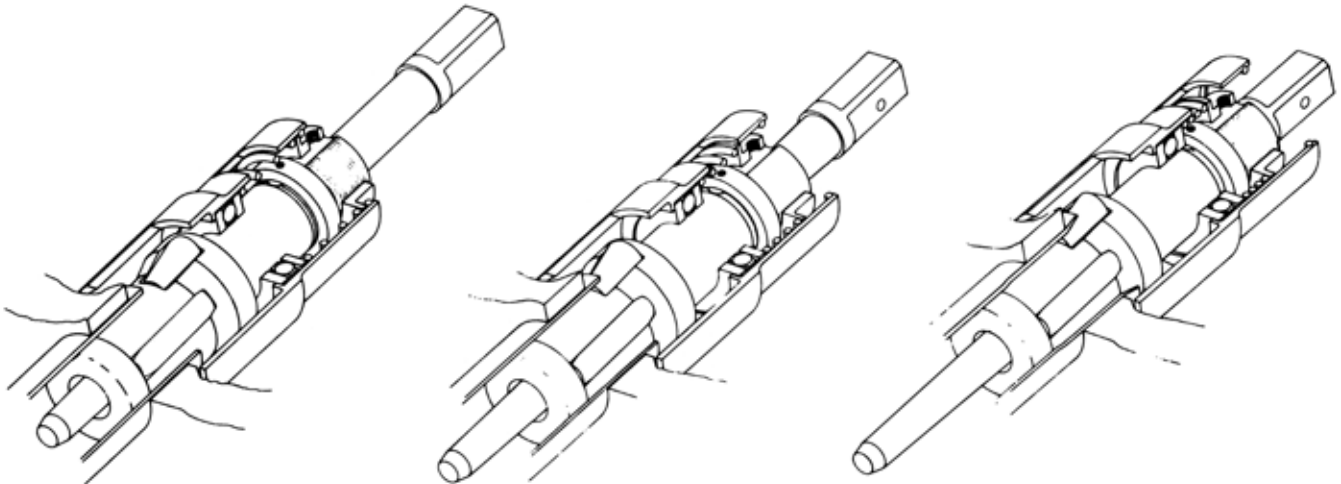
- Tube OD
- Tube wall thickness or BWG
- Tube sheet or drum thickness
- Minimum straight section at end of tube
- Drum diameter if less than 18"

This information will allow you to select the proper type boiler expander and mandrels.

Airetool®

Boiler Tube Expanders B-2000 Series Patented Thrusts Assembly

- Airetool B-2000 Series boiler tube expander with its exclusive drift thrust assembly represents a major advancement in boiler tube expanding. Using a ball bearing, spring loaded drift thrust collar, the B-2000 Series expanders can be accurately positioned in the boiler tube in relation to the drum for consistent joint expansion.
- In operation, the initial positioning of the expander in the tube allows the self-feed rolls to draw the expander into the tube and to engage the flaring rolls at the proper point during the operation. The use of either an electric or air driven torque controlled rolling motor with the B-2000 Series expanders produces more uniform flares and very precise tube wall reduction.
- Accomplishes three unique functions in one operation



First

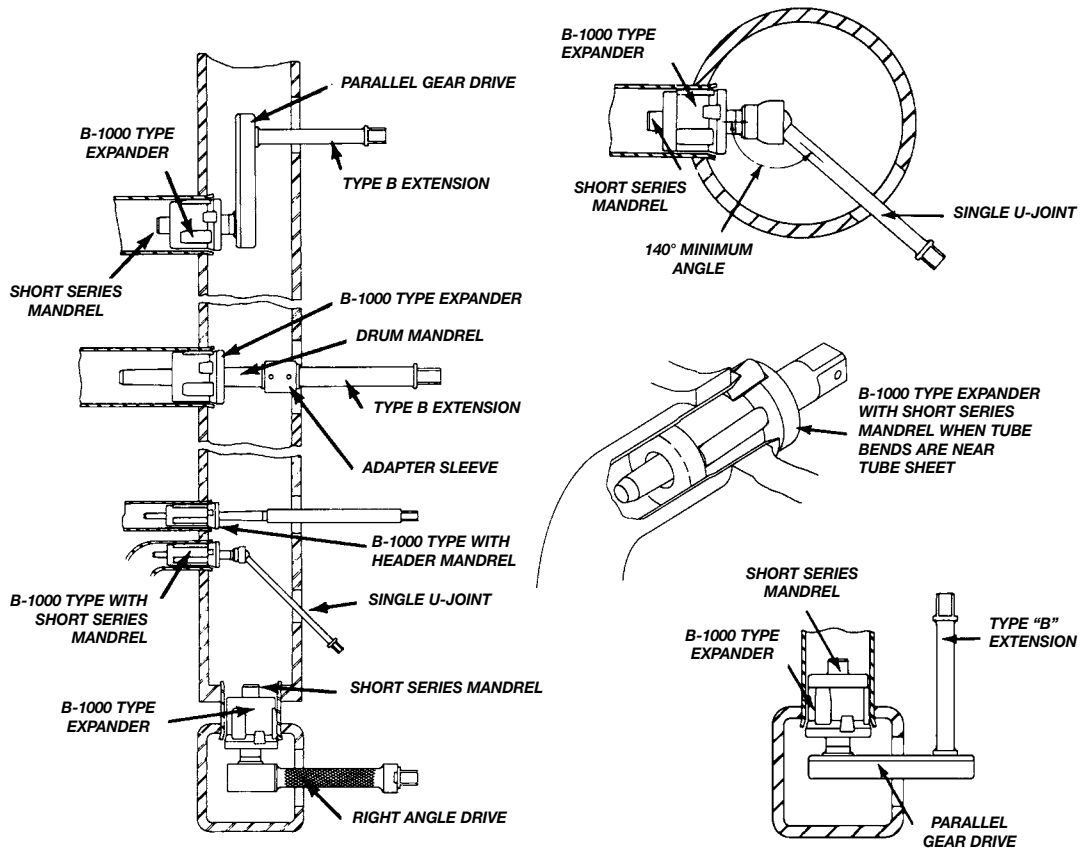
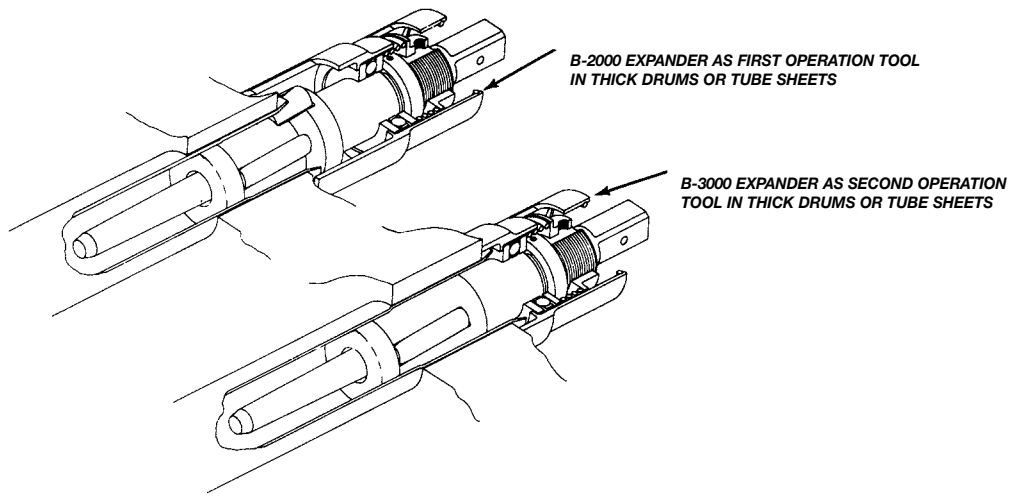
The unique depth adjustable ball bearing drift thrust collar enables the B-2000 Series expander to be positioned into the tube at exactly the same setting every time. Once set, the mandrel is inserted in the expander causing the rolls to be forced outward into contact with the tube I.D., starting the rolling process.

Second

As the mandrel is rotated, the initial rolling of the straight section takes place. As the mandrel rotation is continued, the drift thrust collar stops the expander at its final operating depth in the tube. During this phase the flaring rolls have also moved into their final depth position.

Third

Continued mandrel rotation now will allow the straight rolled area to be finished. At this point the amount of torque required is greatly increased. The torque mechanism in the motor measures the torque and when the set torque is reached the motor automatically shuts off. During this phase the expander being held in place by the thrust collar allows the flare rolls to iron out the end of the tube to a smooth and precisely located flare. After shut-off, reversing the motor will back the expander out of the finished tube while at the same time resetting it for the next tube.



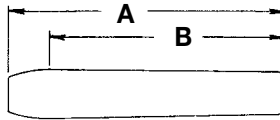
B-1000 Series Boiler Expanders

(Mandrels Sold Separately)

Airetool®

B-1000 Series

-x signifies tube sheet thickness



X	Tube Sheet	"A" Dimension		"B" Dimension	
		In.	mm	In.	mm
-3	1/2" -3/4" (12.7-19.05mm)	1-7/16"	36.5	1-1/16"	26.9
-5	7/8" -1-1/4" (22.2-31.7mm)	1-15/16"	49.2	1-9/16"	39.6
-7	1-3/8" -1-3/4" (34.9-44.4mm)	2-7/16"	61.9	2-1/16"	52.3
-9	1-7/8" -2-1/4" (47.6-57.1mm)	2-15/16"	74.6	2-9/16"	65.0
-11	2-3/8" -2-3/4" (60.3-69.8mm)	3-7/16"	87.3	3-1/16"	77.7

Expander Number	Tube Size				Expander						
	OD	Gauge	OD	Gauge	Exp. Range		St. Roll Set	Complete Roll Set	Mandrel (Length)	SQ. Size	Short Mandrels
					In.	mm					
B-1079-x* ‡	1	13-14			0.787-0.921	20.0-23.4	079-x-RS	079-x-FS	83-MP (9-13/32")	1/2	
B-1083-x* ‡	1	15-16			0.827-0.961	21.0-24.4	083-x-RS	083-x-FS	83-MP (9-13/32")	1/2	
B-1087-x* ‡	1-1/4	7			0.866-1.004	22.0-25.5	087-x-RS	087-x-FS	91-MP (9-13/32")	1/2	
B-1091-x* ‡	1-1/4	8-9			0.906-1.043	23.0-26.5	095-x-RS	095-x-FS	91-MP (9-13/32")	1/2	
B-1095-x* ‡	1-1/4	10			0.945-1.105	24.0-28.1	095-x-RS	095-x-FS	99-MP (10-1/16")	1/2	
B-1099-x* ‡	1-1/4	11-13			0.984-1.142	25.0-29.0	099-x-RS	099-x-FS	99-MP (10-1/16")	1/2	
B-1103-x* ‡	1-1/4	14-15			1.024-1.181	26.0-30.0	103-x-RS	103-x-FS	99-MP (10-1/16")	1/2	
B-1111-x ‡	1-1/4	16			1.105-1.299	28.1-33.0	111-x-RS	111-x-FS	118-MP (11-11/16")	3/4	MPS-1, 2, 3
B-1118-x ‡	1-1/2	10-12			1.221-1.378	31.0-35.0	118-x-RS	118-x-FS	118-MP (11-11/16")	3/4	MPS-1, 2, 3
B-1126-x ‡	1-1/2	13-16			1.300-1.496	33.0-38.0	126-x-RS	126-x-FS	126-MP (12-15/64")	3/4	MPS-2, 3, 4
B-1134-x	1-3/4	8-9	2	3	1.379-1.575	35.0-40.0	126-x-RS	126-x-FS	134-MP (12-23/32")	3/4	MPS-2, 3, 4
B-1142-x	1-3/4	10-12	2	4-5	1.457-1.673	37.0-42.5	142-x-RS	142-x-FS	150-MP (12-27/32")	3/4	MPS-3, 4, 5
B-1150-x	1-3/4	13-16	2	6	1.536-1.752	39.0-44.5	150-x-RS	150-x-FS	150-MP (12-27/32")	3/4	MPS-3, 4, 5, 6
B-1158-x	2	7-9	2-1/4	3	1.615-1.850	41.0-47.0	158-x-RS	158-x-FS	174-MP (13-27/32")	3/4	MPS-4, 5, 6, 7, 8
B-1166-x	2	10-12	2-1/4	4-5	1.693-1.929	43.0-49.0	166-x-RS	166-x-FS	174-MP (13-27/32")	3/4	MPS-4, 5, 6, 7, 8
B-1174-x	2	13-16	2-1/4	6	1.772-2.027	45.0-51.5	174-x-RS	174-x-FS	174-MP (13-27/32")	3/4	MPS-4, 5, 6, 7, 8
B-1181-x	2	16	2-1/2	3	1.851-2.126	47.0-54.0	181-x-RS	181-x-FS	197-MP (16-15/64")	1	MPS-7, 8, 9, 10, 11
B-1189-x	2-1/4	10-13	2-1/2	4-5	1.930-2.205	49.0-56.0	174-x-RS	174-x-FS	197-MP (16-15/64")	1	MPS-7, 8, 9, 10, 11
B-1197-x	2-1/4	14-16	2-1/2	6	2.009-2.362	51.0-60.0	205-x-RS	205-x-FS	197-MP (16-15/64")	1	MPS-6, 7, 8, 9, 10, 11
B-1205-x	2-1/2	7-10			2.087-2.441	53.0-62.0	205-x-RS	205-x-FS	221-MP (16-15/64")	1	MPS-7, 8, 9, 10, 11, 12
B-1213-x	2-1/2	11-13	3	2	2.116-2.520	55.0-64.0	213-x-RS	213-x-FS	221-MP (16-15/64")	1	MPS-7, 8, 9, 10, 11, 12
B-1221-x	2-1/2	14-16			2.245-2.598	57.0-66.0	221-x-RS	221-x-FS	221-MP (16-15/64")	1	MPS-7, 8, 9, 10, 11, 12
B-1229-x	2-3/4	7-9			2.323-2.677	59.0-68.0	221-x-RS	221-x-FS	244-MP (16-3/8")	1	MPS-8, 9, 10, 11, 12, 13
B-1237-x	2-3/4	10-12			2.402-2.756	61.0-70.0	237-x-RS	237-x-FS	244-MP (16-3/8")	1	MPS-8, 9, 10, 11, 12, 13
B-1244-x	2-3/4	13-16			2.481-2.835	63.0-72.0	252-x-RS	252-x-FS	244-MP (16-3/8")	1	MPS-8, 9, 10, 11, 12, 13
B-1252-x	3	7-8			2.560-2.913	65.0-74.0	252-x-RS	252-x-FS	268-MP (15-25/35")	1	MPS-10, 11, 12, 13, 14
B-1260-x	3	10-12			2.638-2.992	67.0-76.0	260-x-RS	260-x-FS	268-MP (15-25/35")	1	MPS-10, 11, 12, 13, 14
B-1268-x	3	13-14			2.717-3.071	69.0-78.0	268-x-RS	268-x-FS	268-MP (15-25/35")	1	MPS-10, 11, 12, 13, 14
B-1276-x	3	15-16			2.796-3.150	71.0-80.0	276-x-RS	276-x-FS	300-MP (16-1/4")	1	MPS-12, 13, 14, 15, 16
B-1284-x	3-1/4	7-11			2.874-3.228	73.0-82.0	284-x-RS	284-x-FS	300-MP (16-1/4")	1	MPS-12, 13, 14, 15, 16
B-1292-x	3-1/4	12-14			2.953-3.307	75.0-84.0	292-x-RS	292-x-FS	300-MP (16-1/4")	1	MPS-12, 13, 14, 15, 16
B-1300-x	3-1/4	15-16	3-1/2	7-9	3.032-3.386	77.0-86.0	315-x-RS	315-x-FS	300-MP (16-1/4")	1	MPS-12, 13, 14, 15, 16
B-1308-x	3-1/2	10-12			3.111-3.465	79.0-88.0	284-x-RS	284-x-FS	347-MP (18-7/32")	1	MPS-10, 11, 17, 18, 19
B-1315-x	3-1/2	13-15			3.190-3.622	81.0-92.0	315-x-RS	315-x-FS	347-MP (18-7/32")	1	MPS-14, 15, 16, 17, 18, 19
B-1323-x	3-1/2	16	3-3/4	7-8	3.268-3.701	83.0-94.0	323-x-RS	323-x-FS	347-MP (18-7/32")	1	MPS-14, 15, 16, 17, 18, 19
B-1331-x	3-3/4	9-12			3.347-3.780	85.0-96.0	331-x-RS	331-x-FS	347-MP (18-7/32")	1	MPS-14, 15, 16, 17, 18, 19
B-1339-x	3-3/4	13-16			3.426-3.858	87.0-98.0	355-x-RS	355-x-FS	347-MP (18-7/32")	1	MPS-14, 15, 16, 17, 18, 19
B-1347-x	4	7-8			3.505-3.937	89.0-100.0	363-x-RS	363-x-FS	347-MP (18-7/32")	1	MPS-14, 15, 16, 17, 18, 19
B-1355-x	4	9-12			3.583-4.016	91.0-102.0	355-x-RS	355-x-FS	394-MP (18-17/64")	1	MPS-17, 18, 19, 20, 21
B-1363-x	4	13-15			3.662-4.094	93.0-104.0	363-x-RS	363-x-FS	394-MP (18-17/64")	1	MPS-17, 18, 19, 20, 21
B-1370-x	4	16	4-1/4	7-8	3.741-4.173	95.0-106.0	370-x-RS	370-x-FS	394-MP (18-17/64")	1	MPS-17, 18, 19, 20, 21
B-1378-x	4-1/4	9-11			3.820-4.252	97.0-108.0	378-x-RS	378-x-FS	394-MP (18-17/64")	1	MPS-17, 18, 19, 20, 21
B-1386-x	4-1/4	12-16			3.898-4.331	99.0-110.0	386-x-RS	386-x-FS	394-MP (18-17/64")	1	MPS-17, 18, 19, 20, 21
B-1394-x	4-1/2	7-14			3.997-4.407	101.5-111.9	394-x-RS	394-x-FS	394-MP (18-17/64")	1	MPS-17, 18, 19, 20, 21

Some items are available on quotation basis only.

*B-1079-x to B-1103-x have mandrel retaining nut rather than metal roll retainer.
‡Indicates size 7, 9, & 11 roll lengths are not available.

B-2000 Series Boiler Expanders

(Mandrels Sold Separately)

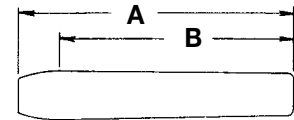
Airetool®



Airetool®

B-2000 Series

-x signifies tube sheet thickness



X	Tube Sheet	"A" Dimension		"B" Dimension	
		In.	mm	In.	mm
-3	1/2" -3/4" (12.7-19.05mm)	1-7/16"	36.5	1-1/16"	26.9
-5	7/8" -1-1/4" (22.2-31.7mm)	1-15/16"	49.2	1-9/16"	39.6
-7	1-3/8" -1-3/4" (34.9-44.4mm)	2-7/16"	61.9	2-1/16"	52.3
-9	1-7/8" -2-1/4" (47.6-57.1mm)	2-15/16"	74.6	2-9/16"	65.0
-11	2-3/8" -2-3/4" (60.3-69.8mm)	3-7/16"	87.3	3-1/16"	77.7

Expander Number	Tube Size				Expander						
	OD	Gauge	OD	Gauge	Exp. Range		St. Roll Set	Complete Roll Set	Mandrel (Length)	SQ. Size	Short Mandrels
					In.	mm					
B-2079-x* ‡	1	13-14			0.787-0.921	20.0-23.4	079-x-RS	079-x-FS	83-M (13-27/32")	1/2	
B-2083-x* ‡	1	15-16			0.827-0.961	21.0-24.4	083-x-RS	083-x-FS	83-M (13-27/32")	1/2	
B-2087-x* ‡	1-1/4	7			0.866-1.004	22.0-25.5	087-x-RS	087-x-FS	91-M (13-27/32")	1/2	
B-2091-x* ‡	1-1/4	8-9			0.906-1.043	23.0-26.5	095-x-RS	095-x-FS	91-M (13-27/32")	1/2	
B-2095-x* ‡	1-1/4	10			0.945-1.105	24.0-28.1	095-x-RS	095-x-FS	99-M (14-3/8")	1/2	
B-2099-x* ‡	1-1/4	11-13			0.984-1.142	25.0-29.0	099-x-RS	099-x-FS	99-M (14-3/8")	1/2	
B-2103-x* ‡	1-1/4	14-15			1.024-1.181	26.0-30.0	103-x-RS	103-x-FS	99-M (14-3/8")	1/2	
B-2111-x ‡	1-1/4	16			1.105-1.299	28.1-33.0	111-x-RS	111-x-FS	118-M (15-27/32")	3/4	MS-1, 2, 3
B-2118-x ‡	1-1/2	10-12			1.221-1.378	31.0-35.0	118-x-RS	118-x-FS	118-M (15-27/32")	3/4	MS-1, 2, 3
B-2126-x ‡	1-1/2	13-16			1.300-1.496	33.0-38.0	126-x-RS	126-x-FS	126-M (16-31/64")	3/4	MS-2, 3, 4
B-2134-x	1-3/4	8-9	2	3	1.379-1.575	35.0-40.0	126-x-RS	126-x-FS	134-M (16-31/32")	3/4	MS-2, 3, 4
B-2142-x	1-3/4	10-12	2	4-5	1.457-1.673	37.0-42.5	142-x-RS	142-x-FS	150-M (17-3/32")	3/4	MS-3, 4, 5
B-2150-x	1-3/4	13-16	2	6	1.536-1.752	39.0-44.5	150-x-RS	150-x-FS	150-M (17-3/32")	3/4	MS-3, 4, 5, 6
B-2158-x	2	7-9	2-1/4	3	1.615-1.850	41.0-47.0	158-x-RS	158-x-FS	174-M (18-3/32")	3/4	MS-4, 5, 6, 7, 8
B-2166-x	2	10-12	2-1/4	4-5	1.693-1.929	43.0-49.0	166-x-RS	166-x-FS	174-M (18-3/32")	3/4	MS-4, 5, 6, 7, 8
B-2174-x	2	13-16	2-1/4	6	1.772-2.027	45.0-51.5	174-x-RS	174-x-FS	174-M (18-3/32")	3/4	MS-4, 5, 6, 7, 8
B-2181-x	2	16	2-1/2	3	1.851-2.126	47.0-54.0	181-x-RS	181-x-FS	197-M (20-15/32")	1	MS-7, 8, 9, 10, 11
B-2189-x	2-1/4	10-13	2-1/2	4-5	1.930-2.205	49.0-56.0	174-x-RS	174-x-FS	197-M (20-15/32")	1	MS-7, 8, 9, 10, 11
B-2197-x	2-1/4	14-16	2-1/2	6	2.009-2.362	51.0-60.0	205-x-RS	205-x-FS	197-M (20-15/32")	1	MS-6, 7, 8, 9, 10, 11
B-2205-x	2-1/2	7-10			2.087-2.441	53.0-62.0	205-x-RS	205-x-FS	221-M (20-21/32")	1	MS-7, 8, 9, 10, 11, 12
B-2213-x	2-1/2	11-13	3	2	2.116-2.520	55.0-64.0	213-x-RS	213-x-FS	221-M (20-21/32")	1	MS-7, 8, 9, 10, 11, 12
B-2221-x	2-1/2	14-16			2.245-2.598	57.0-66.0	221-x-RS	221-x-FS	221-M (20-21/32")	1	MS-7, 8, 9, 10, 11, 12
B-2229-x	2-3/4	7-9			2.323-2.677	59.0-68.0	221-x-RS	221-x-FS	244-M (20-1/2")	1	MS-8, 9, 10, 11, 12, 13
B-2237-x	2-3/4	10-12			2.402-2.756	61.0-70.0	237-x-RS	237-x-FS	244-M (20-1/2")	1	MS-8, 9, 10, 11, 12, 13
B-2244-x	2-3/4	13-16			2.481-2.835	63.0-72.0	252-x-RS	252-x-FS	244-M (20-1/2")	1	MS-8, 9, 10, 11, 12, 13
B-2252-x	3	7-8			2.560-2.913	65.0-74.0	252-x-RS	252-x-FS	268-M (20-1/4")	1	MS-10, 11, 12, 13, 14
B-2260-x	3	10-12			2.638-2.992	67.0-76.0	260-x-RS	260-x-FS	268-M (20-1/4")	1	MS-10, 11, 12, 13, 14
B-2268-x	3	13-14			2.717-3.071	69.0-78.0	268-x-RS	268-x-FS	268-M (20-1/4")	1	MS-10, 11, 12, 13, 14
B-2276-x	3	15-16			2.796-3.150	71.0-80.0	276-x-RS	276-x-FS	300-M (20-1/2")	1	MS-12, 13, 14, 15, 16
B-2284-x	3-1/4	7-11			2.874-3.228	73.0-82.0	284-x-RS	284-x-FS	300-M (20-1/2")	1	MS-12, 13, 14, 15, 16
B-2292-x	3-1/4	12-14			2.953-3.307	75.0-84.0	292-x-RS	292-x-FS	300-M (20-1/2")	1	MS-12, 13, 14, 15, 16
B-2300-x	3-1/4	15-16	3- 1/2	7-9	3.032-3.386	77.0-86.0	315-x-RS	315-x-FS	300-M (20-1/2")	1	MS-12, 13, 14, 15, 16
B-2308-x	3-1/2	10-12			3.111-3.465	79.0-88.0	284-x-RS	284-x-FS	347-M (22-15/32")	1	MS-15, 16, 17, 18, 19
B-2315-x	3-1/2	13-15			3.190-3.622	81.0-92.0	315-x-RS	315-x-FS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-2323-x	3-1/2	16	3-3/4	7-8	3.268-3.701	83.0-94.0	323-x-RS	323-x-FS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-2331-x	3-3/4	9-12			3.347-3.780	85.0-96.0	331-x-RS	331-x-FS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-2339-x	3-3/4	13-16			3.426-3.858	87.0-98.0	355-x-RS	355-x-FS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-2347-x	4	7-8			3.505-3.937	89.0-100.0	363-x-RS	363-x-FS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-2355-x	4	9-12			3.583-4.016	91.0-102.0	355-x-RS	355-x-FS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-2363-x	4	13-15			3.662-4.094	93.0-104.0	363-x-RS	363-x-FS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-2370-x	4	16	4-1/4	7-8	3.741-4.173	95.0-106.0	370-x-RS	370-x-FS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-2378-x	4-1/4	9-11			3.820-4.252	97.0-108.0	378-x-RS	378-x-FS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-2386x	4-1/4	12-16			3.898-4.331	99.0-110.0	386-x-RS	386-x-FS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-2394-x	4-1/2	7-14			3.997-4.407	101.5-111.9	394-x-RS	394-x-FS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21

Some items are available on quotation basis only.

*B-2079-x to B-2103-x have mandrel retaining nut rather than metal roll retainer.
‡Indicates size 7, 9, & 11 roll lengths are not available.

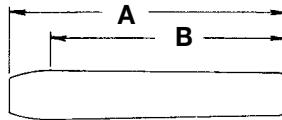
B-3000 Series Boiler Expanders

(Mandrels Sold Separately)

Airetool®

B-3000 Series

Straight roll expander for non-flare boiler tubes; normally used in conjunction with Airetool B-1000 or B-2000 flare type expanders in thicker tube sheet applications.



X	Tube Sheet	"A" Dimension		"B" Dimension	
		In.	mm	In.	mm
-7	1/2" up to 4-3/8"	2-7/16	61.9	2-1/16	52.3
-11	1-1/2" up to 5-3/8"	3-7/16	87.3	3-1/16	77.7

Expander Number	Tube Size				Expander					
	OD	Gauge	OD	Gauge	Exp. Range		St. Roll Set	Mandrel (Length)	Square Size (in.)	Short Mandrels
					In.	mm				
B-3111-7	1-1/4	16			1.105-1.299	28.1-33.0	111-x-RS	118-M (15-27/32")	3/4	MS-1, 2, 3
B-3118-7	1-1/2	10-12			1.221-1.378	31.0-35.0	118-x-RS	118-M (15-27/32")	3/4	MS-1, 2, 3
B-3126-7	1-1/2	13-16			1.300-1.496	33.0-38.0	126-x-RS	126-M (16-31/64")	3/4	MS-2, 3, 4
B-3134-x	1-3/4	8-9	2	3	1.379-1.575	35.0-40.0	126-x-RS	134-M (16-31/32")	3/4	MS-3, 4, 5
B-3142-x	1-3/4	10-12	2	4-5	1.457-1.673	37.0-42.5	142-x-RS	150-M (17-3/32")	3/4	MS-3, 4, 5, 6
B-3150-x	1-3/4	13-16	2	6	1.536-1.752	39.0-44.5	150-x-RS	150-M (17-3/32")	3/4	MS-3, 4, 5, 6
B-3158-x	2	7-9	2-1/4	3	1.615-1.850	41.0-47.0	158-x-RS	174-M (18-3/32")	3/4	MS-4, 5, 6, 7, 8
B-3166-x	2	10-12	2-1/4	4-5	1.693-1.929	43.0-49.0	166-x-RS	174-M (18-3/32")	3/4	MS-4, 5, 6, 7, 8
B-3174-x	2	13-16	2-1/4	6	1.772-2.027	45.0-51.5	174-x-RS	174-M (18-3/32")	3/4	MS-4, 5, 6, 7, 8
B-3181-x	2	16	2-1/2	3	1.851-2.126	47.0-54.0	181-x-RS	197-M (20-15/32")	1	MS-7, 8, 9, 10, 11
B-3189-x	2-1/4	10-13	2-1/2	4-5	1.930-2.205	49.0-56.0	174-x-RS	197-M (20-15/32")	1	MS-7, 8, 9, 10, 11
B-3197-x	2-1/4	14-16	2-1/2	6	2.009-2.362	51.0-60.0	205-x-RS	197-M (20-15/32")	1	MS-6, 7, 8, 9, 10, 11
B-3205-x	2-1/2	7-10	3	2	2.087-2.441	53.0-62.0	205-x-RS	221-M (20-21/32")	1	MS-7, 8, 9, 10, 11, 12
B-3213-x	2-1/2	11-13	3	2	2.116-2.520	55.0-64.0	213-x-RS	221-M (20-21/32")	1	MS-7, 8, 9, 10, 11, 12
B-3221-x	2-1/2	14-16	3	2	2.245-2.598	57.0-66.0	221-x-RS	221-M (20-21/32")	1	MS-7, 8, 9, 10, 11, 12
B-3229-x	2-3/4	7-9			2.323-2.677	59.0-68.0	221-x-RS	244-M (20-1/2")	1	MS-8, 9, 10, 11, 12, 13
B-3237-x	2-3/4	10-12			2.402-2.756	61.0-70.0	237-x-RS	244-M (20-1/2")	1	MS-8, 9, 10, 11, 12, 13
B-3244-x	2-3/4	13-16			2.481-2.835	63.0-72.0	252-x-RS	244-M (20-1/2")	1	MS-8, 9, 10, 11, 12, 13
B-3252-x	3	7-8			2.560-2.913	65.0-74.0	252-x-RS	268-M (20-1/64")	1	MS-10, 11, 12, 13, 14
B-3260-x	3	10-12			2.638-2.992	67.0-76.0	260-x-RS	268-M (20-1/64")	1	MS-10, 11, 12, 13, 14
B-3268-x	3	13-14	3-1/2	7-9	2.717-3.071	69.0-78.0	268-x-RS	268-M (20-1/64")	1	MS-10, 11, 12, 13, 14
B-3276-x	3	15-16	3-1/2	7-9	2.796-3.150	71.0-80.0	276-x-RS	300-M (20-1/2")	1	MS-12, 13, 14, 15, 16
B-3284-x	3-1/4	7-11	3-1/2	7-9	2.874-3.228	73.0-82.0	284-x-RS	300-M (20-1/2")	1	MS-12, 13, 14, 15, 16
B-3292-x	3-1/4	12-14	3-1/2	7-9	2.953-3.307	75.0-84.0	292-x-RS	300-M (20-1/2")	1	MS-12, 13, 14, 15, 16
B-3300-x	3-1/4	15-16	3-1/2	7-9	3.032-3.386	77.0-86.0	315-x-RS	300-M (20-1/2")	1	MS-12, 13, 14, 15, 16
B-3308-x	3-1/2	10-12	3-3/4	7-8	3.111-3.465	79.0-88.0	284-x-RS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-3315-x	3-1/2	13-15	3-3/4	7-8	3.190-3.622	81.0-92.0	315-x-RS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-3323-x	3-1/2	16	3-3/4	7-8	3.268-3.701	83.0-94.0	323-x-RS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-3331-x	3-3/4	9-12	3-3/4	7-8	3.347-3.780	85.0-96.0	331-x-RS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-3339-x	3-3/4	13-16	3-3/4	7-8	3.426-3.858	87.0-98.0	355-x-RS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-3347-x	4	7-8	3-3/4	7-8	3.505-3.937	89.0-100.0	363-x-RS	347-M (22-15/32")	1	MS-14, 15, 16, 17, 18, 19
B-3355-x	4	9-12	4-1/4	7-8	3.583-4.016	91.0-102.0	355-x-RS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-3363-x	4	13-16	4-1/4	7-8	3.662-4.094	93.0-104.0	363-x-RS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-3370-x	4	16	4-1/4	7-8	3.741-4.173	95.0-106.0	370-x-RS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-3378-x	4-1/4	9-11	4-1/4	7-8	3.820-4.252	97.0-108.0	378-x-RS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-3386-x	4-1/4	12-16	4-1/4	7-8	3.898-4.331	99.0-110.0	386-x-RS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21
B-3394-x	4-1/2	7-14	4-1/4	7-8	3.997-4.407	101.5-111.0	394-x-RS	394-M (22-33/64")	1	MS-17, 18, 19, 20, 21

Some items are available on quotation basis only.

Mandrels

Short Series Mandrel Expansion Ranges



Expander*	Expansion Range		MS & MPS	Expansion Range		MS & MPS	Expansion Range		MS & MPS	Expansion Range		MS & MPS	Expansion Range		MS & MPS	Expansion Range		MS & MPS	Expansion Range	
	Min	Max		Min	Max		Min	Max		Min	Max		Min	Max		Min	Max		Min	Max
B - X111	1.102	1.299	#1	1.102	1.183	#2	1.124	1.234	#3	1.189	1.299									
	28.0	33.0		28.0	30.0		28.5	31.3		30.2	33.0									
B - X118	1.181	1.378	#1	1.181	1.262	#2	1.203	1.313	#3	1.268	1.378									
	30.0	35.0		30.0	32.1		30.6	33.4		32.2	35.0									
B - X126	1.260	1.496	#2	1.260	1.366	#3	1.342	1.431	#4	1.407	1.496									
	32.0	38.0		32.0	34.7		34.1	36.3		35.7	38.0									
B - X134	1.339	1.575	#3	1.339	1.432	#4	1.407	1.497	#5	1.485	1.575									
	34.0	40.0		34.0	36.4		35.7	38.0		37.7	40.0									
B - X142	1.417	1.673	#3	1.417	1.489	#4	1.486	1.554	#5	1.564	1.632	#6	1.605	1.673						
	36.0	42.5		36.0	37.8		37.7	39.5		39.7	41.5		40.8	42.5						
B - X150	1.496	1.752	#3	1.496	1.568	#4	1.565	1.633	#5	1.643	1.711	#6	1.684	1.752						
	38.0	44.5		38.0	39.8		39.7	41.5		41.7	43.5		42.8	44.5						
B - X158	1.575	1.850	#4	1.575	1.613	#5	1.622	1.691	#6	1.663	1.732	#7	1.722	1.791	#8	1.781	1.850			
	40.0	47.0		40.0	41.0		41.2	43.0		42.3	44.0		43.7	45.5		45.2	47.0			
B - X166	1.654	1.929	#4	1.654	1.692	#5	1.701	1.770	#6	1.742	1.811	#7	1.801	1.807	#8	1.860	1.929			
	42.0	49.0		42.0	43.0		42.2	45.0		44.3	46.0		45.8	47.5		47.3	49.0			
B - X174	1.732	2.027	#4	1.732	1.790	#5	1.799	1.868	#6	1.840	1.909	#7	1.899	1.968	#8	1.958	2.027			
	44.0	51.5		44.0	45.5		45.7	47.4		46.7	48.5		48.2	50.0		49.7	51.5			
B - X181	1.811	2.126	#7	1.811	1.889	#8	1.880	1.948	#9	1.938	2.006	#10	1.993	2.061	#11	2.017	2.126			
	46.0	54.0		46.0	48.0		47.7	49.5		49.2	51.0		50.6	52.3		51.2	54.0			
B - X189	1.890	2.205	#7	1.890	1.968	#8	1.958	2.027	#9	2.016	2.085	#10	2.071	2.140	#11	2.095	2.205			
	48.0	56.0		48.0	50.0		49.7	51.5		51.2	53.0		52.6	54.4		53.2	56.0			
B - X197	1.969	2.362	#6	1.969	2.066	#7	2.057	2.125	#8	2.116	2.184	#9	2.174	2.242	#10	2.229	2.297	#11	2.253	2.362
	50.0	60.0		50.0	52.5		52.2	54.0		53.7	55.5		55.2	56.9		56.6	58.3		57.2	60.0
B - X205	2.047	2.441	#7	2.047	2.126	#8	2.116	2.185	#9	2.174	2.243	#10	2.229	2.298	#11	2.253	2.363	#12	2.331	2.441
	52.0	62.0		52.0	54.0		53.7	55.5		55.2	57.0		56.6	58.4		57.2	60.0		59.2	62.0
B - X213	2.126	2.520	#7	2.126	2.205	#8	2.197	2.264	#9	2.255	2.322	#10	2.310	2.377	#11	2.334	2.442	#12	2.412	2.520
	54.0	64.0		54.0	56.0		55.8	57.5		57.3	59.0		58.7	60.4		59.3	62.0		61.3	64.0
B - X221	2.205	2.598	#7	2.205	2.283	#8	2.274	2.342	#9	2.332	2.400	#10	2.387	2.455	#11	2.411	2.520	#12	2.489	2.598
	56.0	66.0		56.0	58.0		57.8	59.5		59.2	61.0		60.6	62.4		61.2	64.0		63.2	66.0
B - X229	2.283	2.677	#8	2.283	2.342	#9	2.331	2.400	#10	2.386	2.455	#11	2.410	2.520	#12	2.488	2.598	#13	2.567	2.677
	58.0	68.0		58.0	59.5		59.2	61.0		60.6	62.4		61.2	64.0		63.2	66.0		65.2	68.0
B - X237	2.362	2.756	#8	2.362	2.421	#9	2.410	2.479	#10	2.465	2.534	#11	2.489	2.599	#12	2.567	2.677	#13	2.646	2.756
	60.0	70.0		60.0	61.5		61.2	63.0		62.6	64.4		63.2	66.0		65.2	68.0		67.2	70.0
B - X244	2.441	2.835	#8	2.441	2.500	#9	2.489	2.558	#10	2.544	2.61	#11	2.568	2.678	#12	2.646	2.756	#13	2.725	2.835
	62.0	72.0		62.0	63.5		63.2	65.0		64.6	66.4		65.2	68.0		67.2	70.0		69.2	72.0
B - X252	2.520	2.913	#10	2.520	2.612	#11	2.568	2.667	#12	2.646	2.755	#13	2.725	2.834	#14	2.804	2.913	#15	2.883	2.992
	64.0	74.0		64.0	66.3		65.2	68.0		67.2	70.0		69.2	72.0		71.2	74.0		73.2	76.0
B - X260	2.598	2.992	#10	2.598	2.691	#11	2.647	2.756	#12	2.725	2.834	#13	2.804	2.913	#14	2.883	2.992	#15	2.862	2.971
	66.0	76.0		66.0	68.4		67.2	70.0		69.2	72.0		71.2	74.0		73.2	76.0		75.2	78.0
B - X268	2.667	3.071	#10	2.667	2.770	#11	2.725	2.835	#12	2.803	2.913	#13	2.882	2.992	#14	2.961	3.071	#15	2.940	3.050
	68.0	78.0		68.0	70.4		69.2	72.0		71.2	74.0		73.2	76.0		75.2	78.0		77.2	80.0
B - X276	2.756	3.150	#12	2.76	2.887	#13	2.857	2.966	#14	2.936	3.045	#15	2.988	3.097	#16	3.041	3.150	#17	3.020	3.130
	70.0	80.0		70.0	73.3		72.6	75.3		74.6	77.3		75.9	78.7		77.2	80.0		79.2	82.0
B - X284	2.835	3.228	#12	2.835	2.965	#13	2.935	3.044	#14	3.014	3.123	#15	3.066	3.175	#16	3.119	3.228	#17	3.198	3.307
	72.0	82.0		72.0	75.3		74.5	77.3		76.5	79.3		77.9	80.6		79.2	82.0		81.2	84.0
B - X292	2.913	3.307	#12	2.913	3.044	#13	3.014	3.123	#14	3.093	3.202	#15	3.15	3.25	#16	3.198	3.307	#17	3.277	3.386
	74.0	84.0		74.0	77.3		76.5	79.3		78.6	81.3		79.9	82.7		81.2	84.0		83.2	86.0
B - X300	2.992	3.386	#12	2.992	3.123	#13	3.094	3.202	#14	3.173	3.281	#15	3.225	3.333	#16	3.278	3.386	#17	3.357	3.465
	76.0	86.0		76.0	79.3		78.6	81.3		80.6	83.3		81.9	84.7		83.3	86.0		85.2	88.0
B - X308	3.071	3.465	#15	3.071	3.177	#16	3.119	3.230	#17	3.151	3.304	#18	3.231	3.384	#19	3.312	3.465	#20	3.441	3.594
	78.0	88.0		78.0	80.7		79.2	82.0		80.0	83.9		82.1	86.0		84.1	88.0		87.1	91.0
B - X315	3.150	3.622	#14	3.150	3.282	#15	3.225	3.334	#16	3.278	3.387	#17	3.310	3.461	#18	3.390	3.541	#19	3.471	3.622
	80.0	92.0		80.0	83.4		81.9	84.7		83.3	86.0		84.1	87.9		86.1	89.9		88.2	92.0
B - X323	3.228	3.701	#14	3.228	3.361	#15	3.304	3.413	#16	3.357	3.466	#17	3.389	3.540	#18	3.469	3.620	#19	3.55	3.701
	82.0	94.0		82.0	85.4		83.9	86.7		85.3	88.0		86.1	89.9		88.1	91.9		90.2	94.0
B - X331	3.307	3.780	#14	3.307	3.440	#15	3.383	3.492	#16	3.436	3.545	#17	3.468	3.619	#18	3.548	3.699	#19	3.629	3.78
	84.0	96.0		84.0	87.4		85.9	88.7		87.3	90.0		88.1	91.9		90.1	94.0		92.2	96.0
B - X339	3.386	3.858	#14	3.386	3.518	#15	3.461	3.570	#16	3.514	3.623	#17	3.546	3.697	#18	3.626	3.777	#19	3.707	3.858
	86.0	98.0		86.0	89.4		87.9	90.7		89.2	92.0		90.1	93.9		92.1	95.9		94.1	98.0
B - X347	3.465	3.937	#14	3.465	3.597	#15	3.539	3.649	#16	3.592	3.702	#17	3.624	3.776	#18	3.704	3.856	#19	3.785	3.937
	88.0	100.0		88.0	91.4		89.9	92.7		91.2	94.0		92.0	95.9		94.1	97.9		96.1	100.0
B - X355	3.543	4.016	#17	3.543	3.696	#18	3.626	3.776	#19	3.707	3.857	#20	3.786	3.936	#21	3.866	4.016	#22	3.947	4.097
	90.0	102.0		90.0	93.9		92.1	95.9		94.1	98.0		96.2	100.0		98.2	102.0		100.2	104.0
B - X363	3.622	4.094	#17	3.622	3.774	#18	3.704	3.854	#19	3.785	3.935	#20	3.863	4.014	#21	3.944	4.094	#22	4.025	4.175
	92.0	104.0		92.0	95.9		94.1	97.9		96.1	99.9		98.1	102.0		100.2	104.0		102.1	106.0
B - X370	3.701	4.173	#17	3.701	3.853	#18	3.782	3.933	#19	3.863	4.014	#20	3.942	4.093	#21	4.022	4.173	#22	4.103	4.253
	94.0	106.0		94.0	97.9		96.1	99.9		98.1	102.0		100.1	104.0		102.1	106.0		104.2	108.0
B - X378	3.780	4.252	#17	3.780	3.932	#18	3.862	4.012	#19	3.934	4.093	#20	4.022	4.172	#21	4.102	4.252	#22	4.183	4.333
	96.0	108.0		96.0	99.9		98.1	101.9		100.1	104.0		102.1	106.0		104.2	108.0		106.3	110.0
B - X386	3.858																			

Airetool®

FTC Series Firetube Tube Cutters

FTC Series Firetube Tube Cutters for 2", 2-1/2", and 3" O.D. tubes are air cylinder operated to increase productivity. A 2" x 13 gauge tube can be cut in less than ten seconds. The FTC series of Firetube Cutters are designed to operate on 90 PSI clean lubricated air.



One operator can easily position the cutter in the tube with the aid of a balancer or a tool positioner. The FTC cutters are modular in design, requiring only four parts to change when adapting to different tube ODs, reducing inventory cost. The FTC series tube cutter also incorporates a quick change cutter wheel feature for fast easy replacement.

The FTC Firetube Tube Cutters are excellent tools for cutting tubes to length prior to beading.

Tube Size	Description	Part Number	Gauge	Front Pilots		Rear Pilots		Carriage		Collar	
2" size sensitive parts											
2"	FTC-200*	5524338	11	FTC 29 200 11	2998561	FTC 30 200 11	2998562	FTC 6 200	2998536	FTC 9 200	2998539
2"	FTC-200*	5524338	12	FTC 27 200 12	2998559	FTC 28 200 12	2998560	FTC 6 200	2998536	FTC 9 200	2998539
2"	FTC-200*	5524338	13	FTC 2 200 13	2998532	FTC 8 200 13	2998538	FTC 6 200	2998536	FTC 9 200	2998539
2-1/2" size sensitive parts											
2-1/2"	FTC-250*	5524339	10	FTC 35 250 10	2998567	FTC 36 250 10	2998568	FTC 43 250	2998575	FTC 45 250	2998577
2-1/2"	FTC-250*	5524339	11	FTC 33 250 11	2998565	FTC 34 250 11	2998566	FTC 43 250	2998575	FTC 45 250	2998577
2-1/2"	FTC-250*	5524339	12	FTC 31 250 12	2998563	FTC 32 250 12	2998564	FTC 43 250	2998575	FTC 45 250	2998577
3" size sensitive parts											
3"	FTC-300*	5524340	10	FTC 41 300 10	2998573	FTC 42 300 10	2998574	FTC 44 300	2998576	FTC 46 300	2998578
3"	FTC-300*	5524340	11	FTC 39 300 11	2998571	FTC 40 300 11	2998572	FTC 44 300	2998576	FTC 46 300	2998578
3"	FTC-300*	5524340	12	FTC 38 300 12	2998569	FTC 39 300 12	2998570	FTC 44 300	2998576	FTC 46 300	2998578

Some items are available on a quotation basis only.

Specifications

Length: 22" (558.8mm)
 Weight: 15 3/4 lbs. (7.15 kg)
 Maximum PRM: 250
 Drive: 3/4" (19.04 mm) square
 Adjustable Cut Off Length: 3/16" - 3/4" (4.77 - 19 mm)
 Maximum Cut Off Length: 6" (152.4 mm)
 Maximum Working Pressure: 90 PSI (6.5 Bar)
 Minimum Cut Off: 1"

* Tool comes complete with pilots for all three gauges.

Recommended Spare Parts

FTC 4 Cutter Wheel: 2998534
 FTC 5 Cutter Wheel Pin: 2998535
 FTC 7 Feed Wedge: 2998537
 FTC 10 Feed Rod: 2998540

Accessories

Valve Kits: A valve kit consists of a cylinder activation switch, anti-rotation rod and pneumatic plumbing hardware for adapting to the Airetrol.
 1752 Valve Kit: 5524341
 1550 Valve Kit: 5524343
 1550 ATR Valve Kit: 524344

Boiler Expanders

Right Angle Gear Drive and Parallel Gear Drive

Precision gear drives provide the means to expand tubes in close, hard-to-reach places.



RIGHT ANGLE GEAR DRIVE



PARALLEL GEAR DRIVE

Part Number	Gear Drive Number	Size Housing	Size Drive Square	Size Driven Square	Overall Length	Housing Width	Housing Thickness	Housing Length	Round Hand Hole Tool Enters	Weight of Tool
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Right Angle Gear Drive

5169900	RA-100	1/2"	1/2"	1/2"	10"	2-1/4"	1-3/8"	3-1/4"	3-1/4"	3 lbs. 12 oz.
5170000	RA-101	1/2"	1/2"	3/4"	10"	2-1/4"	1-3/8"	3-1/4"	3-1/4"	3 lbs. 12 oz.
5170100	RA-102	1/2"	3/4"	3/4"	10"	2-1/4"	1-3/8"	3-1/4"	3-1/4"	3 lbs. 12 oz.
5170500	RA-106	3/4"	3/4"	3/4"	11-7/16"	2-3/4"	1-7/8"	4"	4"	7 lbs. 8 oz.
5170900	RA-110	1"	1"	1"	12-15/16"	3-1/4"	1-7/8"	4-1/2"	4-1/4"	9 lbs

Part Number	Gear Drive Number	Size Square	Overall Length	Width	Thickness	Distance Between Square Centers	Weight
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Parallel Gear Drive

5169400	P-200	1/2"	8-1/2"	2"	1-5/16"	6"	5 lb. 8 oz.
5169500	P-201	5/8"	8-1/2"	2"	1-5/16"	6"	5 lb. 8 oz.
5169600	P-202	3/4"	9-1/4"	2-3/4"	1-5/16"	6"	8 lb. 4 oz.
5169700	P-203	7/8"	9-1/4"	2-3/4"	1-5/16"	6"	8 lb. 4 oz.
5169800	P-204	1"	9-1/4"	2-3/4"	1-5/16"	6"	8 lb. 4 oz.

Universal Joints



SINGLE UNIVERSAL JOINT

DOUBLE UNIVERSAL JOINT

Part Number	Square Socket		Length		Weight	
	In.	mm	In.	mm	Lbs.	Oz.

Single Universal Joint

5343500	3/8" SQ	9.5	9	228.6	8	
5343600	3/8" SQ	9.5	12	203.2	10	
5342800	1/2" SQ	12.7	9	225.6	10	
5342900	1/2" SQ	12.7	12	203.2	12	
5343000	1/2" SQ	12.7	16	406.4	1	
5343100	1/2" SQ	12.7	20	508.0	1	2
5343200	3/4" SQ	19.0	12	203.2	2	4
5343300	3/4" SQ	19.0	16	406.4	2	12
5343400	3/4" SQ	19.0	20	508.0	3	4
5342500	1" SQ	25.4	12	203.2	4	
5342600	1" SQ	25.4	16	406.4	4	12
5342700	1" SQ	25.4	20	508.0	5	8

Extensions



EXTENSION TYPE A

EXTENSION TYPE B

Type	Size of Square		O.A.L. Length		Weight	
	In.	mm	In.	mm	Lbs.	Oz.
2114500	A	3/8	9.5	4	101.6	4
2037000	A	1/2	12.7	4	101.6	4
2111200	A	3/4	19.0	4	101.6	10
2002100	A	1	25.4	4	101.6	1 4
2114600	A	3/8	9.5	6	152.4	6
2037100	A	1/2	12.7	6	152.4	8
2111300	A	3/4	19.0	6	152.4	1
2002200	A	1	25.4	6	152.4	2
2114700	A	3/8	9.5	8	203.2	8
2037200	A	1/2	12.7	8	203.2	10
211400	A	3/4	19.0	8	203.2	1 8
2002400	A	1	25.4	8	203.2	2 12
2114800	B	3/8	9.5	10	254.0	6
2037400	B	1/2	12.7	10	254.0	8
2111800	B	3/4	19.0	10	254.0	1 9
2973293	B	3/8	9.5	12	304.8	8
2037800	B	1/2	12.7	12	304.8	10
5112200	B	3/4	19.0	12	304.8	1 10
2003200	B	1	25.4	12	304.8	2 14
2115100	B	3/8	9.5	20	508.0	12
2038800	B	1/2	12.7	20	508.4	1
2113300	B	3/4	19.0	20	508.4	2 9
2004300	B	1	25.4	20	508.4	4 8

Part Number	Description	Weight	
		Lbs.	Oz.

Double Universal Joint

5342400	3/8" SQ x 3/8" SQ	(9.5 mm x 9.5 mm)		12
5342200	1/2" SQ x 1/2" SQ	(12.7 mm x 12.7 mm)		14
5342300	3/4" SQ x 3/4" SQ	(19 mm x 19 mm)	2	
5342100	1" SQ x 1" SQ	(25.4 mm x 25.4 mm)	4	8

Some items are available on a quotation basis only.

Tube Expanders for Refinery Fittings

Airetool refinery fitting tube expanders are self-feeding, with five expanding rolls which produce uniform tube expansion and tightness throughout the full thickness of the tube fitting. Contact customer service for ordering details.



G-100 COMPLETE WITH IRONING OUT ATTACHMENT AND THRUST.



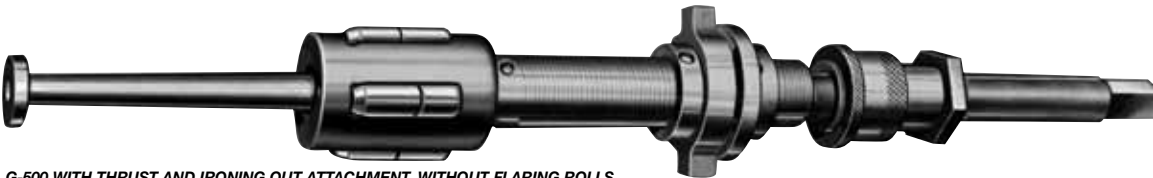
G-200 COMPLETE WITH IRONING OUT ATTACHMENT, WITHOUT THRUST.



G-300 WITH THRUST AND WITHOUT IRONING OUT ATTACHMENT.



G-400 WITHOUT THRUST OR IRONING OUT ATTACHMENT.



G-500 WITH THRUST AND IRONING OUT ATTACHMENT, WITHOUT FLARING ROLLS.



G-600 WITH THRUST ONLY AND WITHOUT FLARING ROLLS.

Ratchet Wrenches

Close-action ratchet wrenches designed for use with boiler expanders, universal joints, and extensions when air or electric power sources are unavailable.



Model	Part Number	Square Drive				Weight	
		Size Opening		Length			
		In.	mm	In.	mm	Lbs.	Oz.
21	2021700	3/8	9.5	7	177.8	1	
21	2021600	1/2	12.7	7	177.8	1	
23	2023000	1/2	12.7	12	304.8	3	12
24	2023900	3/4	19.0	15	381.0	6	
24	2023800	1	25.4	15	381.0	6	

Adapter Sleeve

Part Number	Size Square Socket	Weight	
		Lbs.	Oz.
2113900	3/8" SQ (9.5 mm)		4
2038850	1/2" SQ (12.7 mm)		8
2113400	3/4" SQ (19 mm)	1	4
2001900	1" SQ (25.4 mm)	1	12



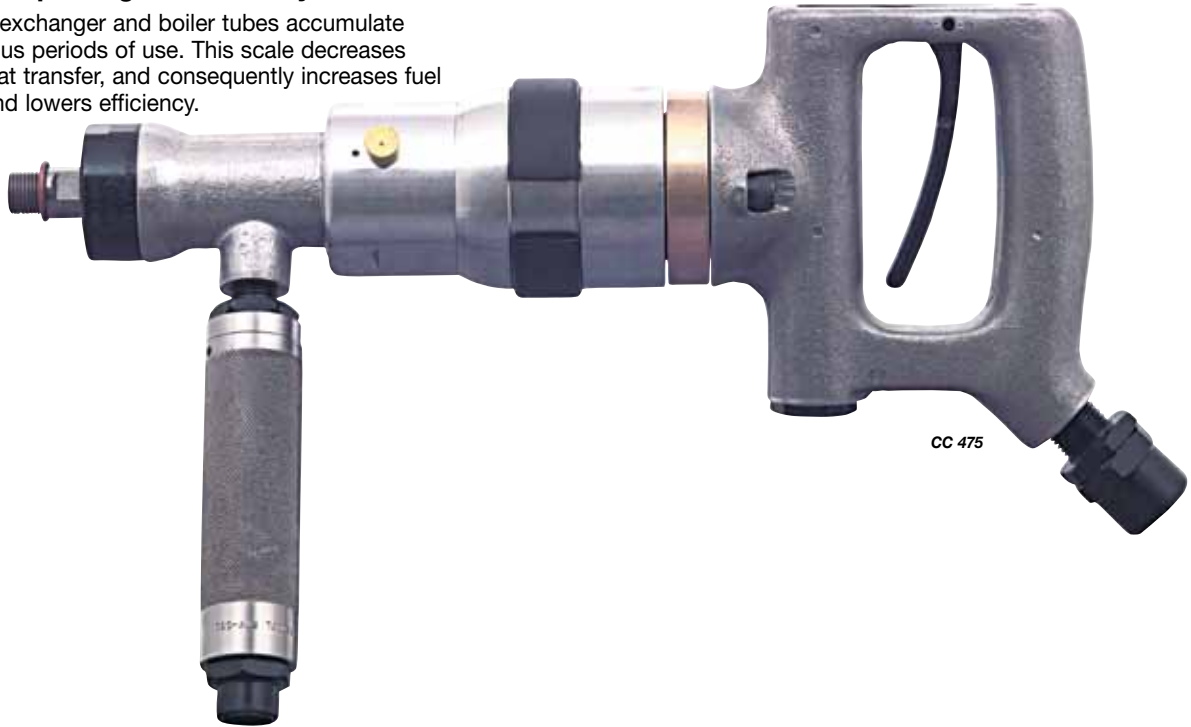
Tube Cleaners

Heat Exchanger & Condenser Tube Cleaners

Airetool®

Clean Tubes Equal Higher Efficiency

All piping, heat exchanger and boiler tubes accumulate scale over various periods of use. This scale decreases flow, retards heat transfer, and consequently increases fuel consumption and lowers efficiency.



Heat Exchanger & Condenser Tube Cleaners

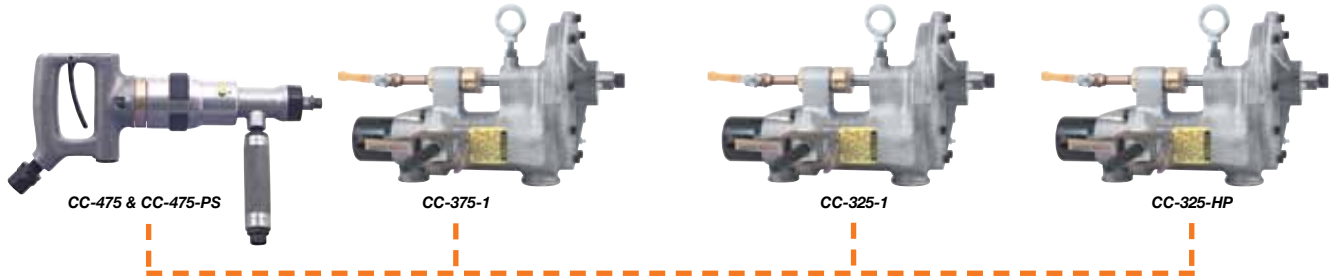
- Complete cleaner consists of an air motor with integral water feed valve couplings; up to 22 ft. of shafting with necessary couplings (please specify shaft length required); motor shaft wrench and an extra set of motor blades.
- The CC 475 Cleaner Complete also includes two drills of any type or size up to 1", three spiral brushes up to 1" and 15 feet of 3/8 inch water hose.
- CC-375-1, 325-1 & 325-HP: Includes Ball bearing trolley and rope block.

Model No.	Range	RPM	Weight		Length		Air Inlet	Operating Air Pressure	Water Inlet	Max. Water Pressure
			Lbs.	Kg	In.	mm				
Lightweight Condenser Cleaners										
CC-475	up to 1 in. (25.4 mm) ID Tubes	3800	10	4.53	15-3/4	400	1/2 in. NPT	90-100 psi (6-7 kg/cm ²)	3/8 in. NPT	100 psi (7 kg/cm ²)
CC-475-PS	up to 1-1/2 in. (38.1 mm) ID Tubes	2300	10	4.53	15-3/4	400	1/2 in. NPT	90-100 psi (6-7 kg/cm ²)	3/8 in. NPT	100 psi (7 kg/cm ²)
Geared Drive Cleaners*										
CC-375-1	up to 1-3/4 in. (44.4 mm) ID Tubes	1200	38	17.2	19	482.6	1 in. NPT	90-100 psi (6-7 kg/cm ²)	3/8 in. NPT	100 psi (7 kg/cm ²)
CC-325-1	up to 2 in. (50.8 mm) ID Tubes	800	42	19.0	19	482.6	1 in. NPT	90-100 psi (6-7 kg/cm ²)	3/8 in. NPT	100 psi (7 kg/cm ²)
CC-325-HP	up to 2 in. (50.8 mm) ID Tubes	800	44	19.9	19	482.6	1 in. NPT	90-100 psi (6-7 kg/cm ²)	1/2 in. NPT	5000 psi (350 kg/cm ²)

Some items are available on a quotation basis only.
 * Water hose not included.

ADDITIONAL EQUIPMENT

CC-475: Allen Wrench; Two drills of any type or size up to 1 in.
 Three spiral brushes up to 1 in.



DRIVE COUPLING



DRIVE SHAFT



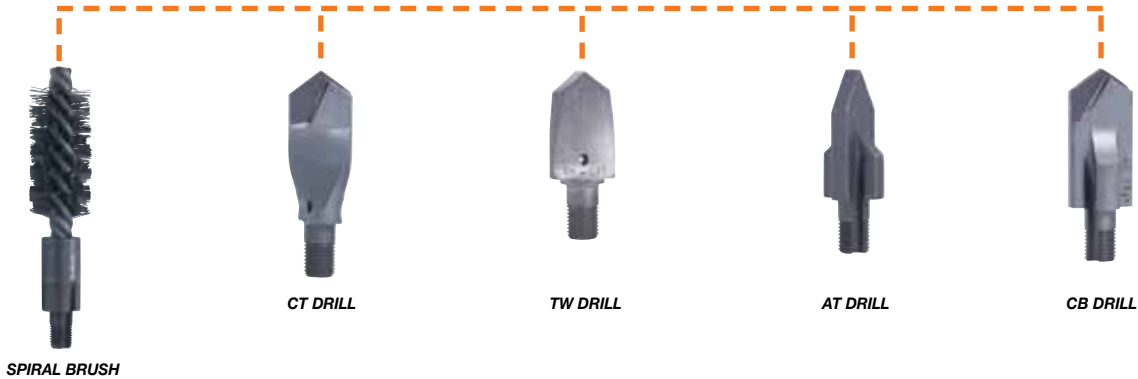
SHAFT COUPLING



DRIVEN SHAFT



Drills and Brushes



Tube ID		Shaft Diameter		Drive Shaft	Drive Shaft Thread	Driven Shaft	Driven Shaft Thread	Shaft Coupling	Shaft Coupling Thread	Drive Coupling For CC-475, CC-475-PS & WF-100	Drive Coupling Thread	Drive Coupling For CC-375-1, CC-325-1, CC-325-HP	Drive Coupling Thread
In.	mm	In.	mm										
.291-.358	7.39-9.09	1/4	6.35	CC-336	1/4" NFM x 10-32 F	CC-335	10-32 F x 10-32 F	CC-334	10-32M	AT-337-A	5/8" NF x 1/4" NF	—	—
.359-.420	9.09-10.67	5/16	7.94	CC-332	5/16" NFM x 1/4" NFF	CC-331	1/4" NFF x 1/4" NFF	CC-330	1/4" NFM	AT-333-A	5/8" NF x 5/16" NF	AT-333	1" NF x 5/16" NF
.421-.483	10.67-12.27	3/8	9.52	CC-324	3/8" NFM x 1/4" NFF	CC-323	1/4" NFF x 1/4" NFF	CC-322	1/4" NFM	AT-321-A	5/8" NF x 3/8" NF	AT-352	1" NF x 3/8" NF
.484-.608	12.27-15.44	7/16	11.11	CC-316	7/16" NFM x 5/16" NFF	CC-315	5/16" NFF x 5/16" NFF	CC-314	5/16" NFM	AT-313-A	5/8" NF x 7/16" NF	AT-353	1" NF x 7/16" NF
.609-.831	15.44-21.11	1/2	12.70	CC-312	1/2" NFM x 3/8" NFF	CC-311	3/8" NFF x 3/8" NFF	CC-310	3/8" NFM	AT-309-A	5/8" NF x 1/2" NF	AT-359	1" NF x 1/2" NF
.832-1.055	21.11-28.80	5/8	15.88	CC-304	5/8" NFM x 3/8" NFF	CC-303	3/8" NFF x 3/8" NFF	CC-302	3/8" NFM	AT-301-A	5/8" NF x 5/8" NF	AT-351	1" NF x 5/8" NF
1.056-1.561	28.80-39.65	3/4	19.05	CC-320	3/4" NFM x 7/16" NFF	CC-319	7/16" NFF x 7/16" NFF	CC-318	7/16" NFM	AT-317-A	5/8" NF x 3/4" NF	AT-357	1" NF x 3/4" NF
1.562-2.374	39.65-60.30	1	25.40	CC-328	1" NFM x 7/16" NFF	CC-327	7/16" NFF x 7/16" NFF	CC-326	7/16" NFM	AT-325-A	5/8" NF x 1" NF	AT-354	1" NF x 1" NF

Some items are available on a quotation basis only.

Condenser Cleaners

Selection Guide

Airetool®

Condenser Cleaner Drills and Brushes

Airetool drills are designed especially to prevent damage to the tube ID, and are available in a variety of shapes to remove all types of scale deposits. Passages in the drill shaft enable flushing fluid to reach the drill cutting edge.

Larger sizes are also available. Contact Customer Service for details.

Minimum order quantity 12 pieces.



Tube ID		Diameter of Drill or Brush		Stud Thread	AT (Std.) Drills Part No.	CB (Carbide) Drills Part No.	CT (Carbide Twist) Drills Part No.	TW (Twist) Drills Part No.	Wire Brush Part No.
In.	mm	In.	mm						
.291-.306	7.39-7.77	.281	7.14	10-32 UNC	AT-199	CB-199			199-B
.306-.321	7.77-8.15	.296	7.52	10-32 UNC	AT-199-5	CB-199-5			199-5-B
.322-.337	8.18-8.56	.312	7.92	10-32 UNC	AT-200	CB-200			200-B
.338-.353	8.59-8.97	.328	8.33	10-32 UNC	AT-200-5	CB-200-5			200-5-B
.359-.389	9.12-9.88	.343	8.71	1/4" UNF	AT-201	CB-201		TW-201	201-B
.390-.420	9.91-10.67	.375	9.52	1/4" UNF	AT-202	CB-202		TW-202	202-B
.421-.452	10.69-11.48	.406	10.31	1/4" UNF	AT-203	CB-203		TW-203	203-B
.452-.483	11.48-12.27	.437	11.10	1/4" UNF	AT-204	CB-204		TW-204	204-B
.484-.514	12.29-13.06	.468	11.89	5/16" UNF	AT-205	CB-205	CT-205	TW-205	205-B
.515-.545	13.08-13.84	.500	12.70	5/16" UNF	AT-206	CB-206	CT-206	TW-206	206-B
.546-.577	13.87-14.66	.531	13.49	5/16" UNF	AT-207	CB-207	CT-207	TW-207	207-B
.578-.608	14.68-15.44	.562	14.27	5/16" UNF	AT-208	CB-208	CT-208	TW-208	208-B
.578-.608	14.68-15.44	.562	14.27	3/8" UNF	AT-108	CB-108	CT-108	TW-108	108-B
.609-.639	15.47-16.23	.593	15.06	3/8" UNF	AT-209	CB-209	CT-209	TW-209	209-B
.640-.675	16.26-17.15	.625	15.88	3/8" UNF	AT-210	CB-210	CT-210	TW-210	210-B
.676-.706	17.17-17.93	.656	16.66	3/8" UNF	AT-211	CB-211	CT-211	TW-211	211-B
.707-.737	17.96-18.72	.687	17.45	3/8" UNF	AT-212	CB-212	CT-212	TW-212	212-B
.738-.769	18.75-19.53	.718	18.24	3/8" UNF	AT-213	CB-213	CT-213	TW-213	213-B
.770-.800	19.56-20.32	.750	19.05	3/8" UNF	AT-214	CB-214	CT-214	TW-214	214-B
.801-.831	20.35-21.11	.781	19.84	3/8" UNF	AT-215	CB-215	CT-215	TW-215	215-B
.832-.862	21.13-21.89	.812	20.62	3/8" UNF	AT-216	CB-216	CT-216	TW-216	216-B
.863-.894	21.92-22.71	.843	21.41	3/8" UNF	AT-217	CB-217	CT-217	TW-217	217-B
.895-.925	22.73-23.50	.875	22.23	3/8" UNF	AT-218	CB-218	CT-218	TW-218	218-B
.926-.956	23.52-24.28	.906	23.01	3/8" UNF	AT-219	CB-219	CT-219	TW-219	219-B
.957-.987	24.31-25.07	.937	23.80	3/8" UNF	AT-220	CB-220	CT-220	TW-220	220-B
.998-1.024	25.35-26.01	.968	24.59	3/8" UNF	AT-221	CB-221	CT-221	TW-221	221-B
1.025-1.055	26.04-26.80	1.000	25.40	3/8" UNF	AT-222	CB-222	CT-222	TW-222	222-B
1.056-1.086	26.82-27.58	1.031	26.19	7/16" UNF	AT-223	CB-223	CT-223	TW-223	223-B
1.087-1.117	27.61-28.37	1.062	26.97	7/16" UNF	AT-224	CB-224	CT-224	TW-224	224-B
1.118-1.149	28.40-29.18	1.093	27.76	7/16" UNF	AT-225	CB-225	CT-225	TW-225	225-B
1.150-1.180	29.21-29.97	1.125	28.58	7/16" UNF	AT-226	CB-226	CT-226	TW-226	226-B
1.181-1.211	30.00-30.76	1.156	29.36	7/16" UNF	AT-227	CB-227	CT-227	TW-227	227-B
1.212-1.242	30.78-31.55	1.187	30.15	7/16" UNF	AT-228	CB-228	CT-228	TW-228	228-B
1.243-1.280	31.57-32.51	1.218	30.94	7/16" UNF	AT-229	CB-229	CT-229	TW-229	229-B

Large Diameter Twist Brush (LDTB)



Diameter - Stock #	Stud Thread	Diameter - Stock #	Stud Thread	Diameter - Stock #	Stud Thread
1-1/2 - 1003700	5/8 NC	2-1/8 - 1005800	5/8 NC	3 - 1006500	5/8 NC
1-5/8 - 1004500	5/8 NC	2-1/4 - 1005700	5/8 NC	3-1/4 - 1007100	5/8 NC
1-3/4 - 1004300	5/8 NC	2-1/2 - 1005401	5/8 NC	3-1/2 - 1006900	5/8 NC
1-7/8 - 1004600	5/8 NC	2-3/4 - 1005900	5/8 NC	3-3/4 - 1007200	5/8 NC
2 - 1004900	5/8 NC	3 - 1006500	5/8 NC	4 - 1007300	5/8 NC

Some items are available on a quotation basis only.



ABM-1800-R



ABM-1900

Airetool®

Tube cleaners for condensers, chillers, evaporators and other tubular heat transfer apparatus

Model ABM-1800

- Variable solid state speed control from 0 to 1750 RPM with constant torque.
- Quick-release shaft coupling for an easy, fast, positive connection every time.
- No o-rings or coupler nut.

The variable Speed feature allows the operator to operate the shaft at a safe, comfortable speed for the condition of the tubes being cleaned. The lack of o-rings and coupler nut eliminates the risk of the coupler nut loosening and leaking water, leading to possible shaft damage.

Model ABM-1800-R

Same features as ABM-1800 plus

- Bi-directional tube cleaner for the cleaning of internally enhanced tubes.
- Identified Forward and Reverse direction foot pedals are included with this model.

Model ABM-1900

- Variable solid state speed control from 0 to 1750 RPM with constant torque.

- Manifold for screw-on style shafting that is commonly used in competitive models.

Model ABM-1900-R

Same features as ABM-1900 plus

- Bi-directional shaft rotation for the cleaning of internally enhanced tubes.
- Identified Forward and Reverse direction foot pedals are included with this model.

Model Number	Part Number	Horsepower	Volts	Amps	RPM	Bi-directional	Dimensions	Weight (less shaft)	Shipping Dimensions	Shipping Weight (less shaft)
ABM-1800	2900398	1/2	115	6	0-1800	No	11" W x 17" L x 9" H	35 lbs.	12" W x 23" L x 11"H	39 lbs.
ABM-1800-R	2900399	1/2	115	6	0-1800	Yes	11" W x 17" L x 9" H	41 lbs.	12" W x 23" L x 11"H	45 lbs.
ABM-1900	2900400	1/2	115	6	0-1800	No	11" W x 17" L x 9" H	35 lbs.	12" W x 23" L x 11"H	39 lbs.
ABM-1900-R	2900401	1/2	115	6	0-1800	Yes	11" W x 17" L x 9" H	41 lbs.	12" W x 23" L x 11"H	45 lbs.
ABM-1900-R-230V	2900530	1/2	230	3	0-1800	Yes	11" W x 17" L x 9" H	41 lbs.	12" W x 23" L x 11" H	45 lbs.

See page 71 for cleaning tools.

Condenser Cleaners

Brush-Master Tube Cleaner

Airetool®

Tube cleaners for condensers, chillers, evaporators and other tubular heat transfer apparatus

Model ABM-1200

- Fixed speed clockwise rotation
- Quick release shaft coupling for an easy fast positive connection every time.

Use for tube cleaning applications where variable speed and reverse are not required.

ABM Brush-Master Tube Cleaners are also available in 230 volt 50Hz 1 Ph and other voltages. Contact Customer Service for details.



Flexible shafts

To order the correct size Flexible Shaft, measure the tube ID and the length of the tube to be cleaned. Then refer to the chart below to select the proper shaft.

Tube ID Range	Shaft O.D.	Shaft Lengths in Feet		
		15	25	35

Flexible Shafts for ABM-1800, ABM-1800-R and ABM-1200

.280" - .406	1/4"	FS-1815-1/4	2900402		
.407" - .532"	3/8"			FS-1825-3/8	2900403
.533" - .812"	1/2"			FS-1825-1/2	2900405
				FS-1835-3/8	2900404
				FS-1835-1/2	2900406

Flexible Shafts for ABM-1900 and ABM-1900-R

.280" - .406	1/4"	FS-1915-1/4	2900407		
.407" - .532"	3/8"			FS-1925-3/8	2900408
.533" - .812"	1/2"			FS-1925-1/2	2900410
				FS-1935-3/8	2900409
				FS-1935-1/2	2900411

Model Number	Part Number	Horsepower	Volts	Amps	RPM	Bi-directional	Dimensions	Weight (less shaft)	Shipping Dimensions	Shipping Weight (less shaft)
ABM-1200	2900397	1/3	115	8	1140	No	11" W x 17" L x 9" H	40 lbs.	12" W x 23" L x 11" H	44 lbs.

Some items are available on a quotation basis only.

See page 71 for cleaning tools.



Airetool[®]

Super 2D Brushes

Airetool Super 2D Brushes are for cleaning internally enhanced tubes. The brush is constructed from material that outcleans and outwears other tube brushes. Super 2 D Brushes have two cleaning diameters to assure all surfaces are being cleaned. The smaller diameter cleans the hard to reach internal surfaces of enhanced tubing, while the larger diameter lays back and cleans the minimum I.D. surfaces. These brushes are recommended for removing soft and light scale deposits.

Super Brushes

Super Brushes are for cleaning smooth bore tubing. They are made from the same long-lasting material as the Super 2D Brush. The longer brush cleaning surface reduces the tube cleaning time. They are recommended for removing soft and light scale deposits.

Part Number	Stock Number	Tube Inside Diameter	
		In.	mm
Super 2 D Brush			
SCB-750	2996773	.500-.700	12.7-17.8
SCB-1000	2996774	.700-.950	17.8-24.1
Super Brush			
SB-750	2996555	.437-.700	11.1-14.2
SB-1000	2996556	.625-1.000	15.8-17.5
SB-1250	2996557	1.000-1.200	19.0-25.4

Nylon, Brass and Stainless Steel Brushes

Nylon, brass and stainless steel brushes are available in brush diameters .250" - 1.000" (6.3-25.4mm) in 1/16" (1.6mm) increments. Select the brush size equal to or one size smaller than the I.D. of the tubes to be cleaned.

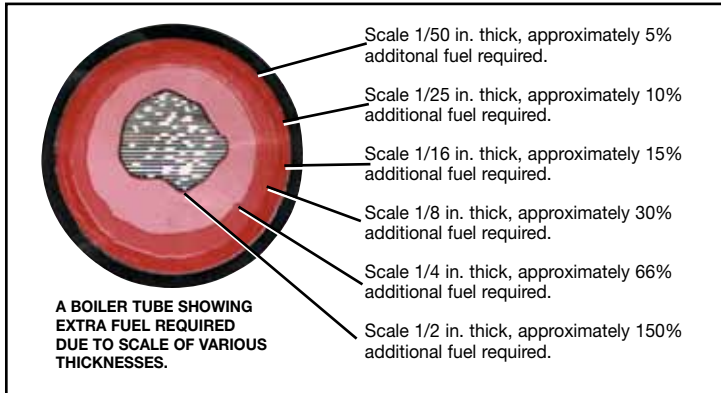
Brush Diameter		Brush Material				
In.	mm	Nylon		Brass		Stainless Steel
1/4	6.35	N-250	2996528	B-250	2996515	SS-250 2996541
5/16	7.92	N-312	2996529	B-312	2996516	SS-312 2996542
3/8	9.52	N-375	2996530	B-375	2996517	SS-375 2996543
7/16	11.1	N-437	2996531	B-437	2996518	SS-437 2996544
1/2	12.7	N-500	2996532	B-500	2996519	SS-500 2996545
9/16	14.27	N-562	2996533	B-562	2996520	SS-562 2996546
5/8	15.88	N-625	2996534	B-625	2996521	SS-625 2996547
11/16	17.48	N-687	2996535	B-687	2996522	SS-687 2996548
3/4	19.05	N-750	2996536	B-750	2996523	SS-750 2996549
13/16	20.62	N-812	2996537	B-812	2996524	SS-812 2996550
7/8	22.22	N-875	2996538	B-875	2996525	SS-875 2996551
15/16	23.82	N-937	2996539	B-937	2996526	SS-937 2996552
1	25.4	N-1000	2996540	B-1000	2996527	SS-1000 2996553

Minimum order quantity 12 pieces.

Airetool®

Clean tubes mean lower fuel costs.

All piping, heat exchanger and boiler tubes accumulate scale over various periods of use. This scale decreases flow, retards heat transfer, and consequently increases fuel consumption and lowers efficiency.



For selecting the proper Airetool boiler tube cleaner the following information is required:

- Tube ID
- Tube length
- Type of deposit
- Thickness of deposit
- Straight or curved tube
- If curved, the minimum radius bend

See page 77 for cleaning head types recommended for cleaning straight tubes, then refer to pages 79 thru 82 for sizing the boiler tube cleaner.

See page 78 for cleaning heads recommended for cleaning curved tubes, then refer to pages 79 thru 82 for sizing the boiler tube cleaner.

Note: Operating hoses are not included with boiler tube cleaners, refer to page 99 for operating hose selection.

It is always recommended to use an in-line lubricator and foot valve when operating the Airetool Boiler Tube Cleaners. See page 99 for ordering information.

Other boiler tube cleaner applications include:

- Oil field drill pipe renewal
- Natural gas line renewal
- Aluminum smelter siphon tube cleaning
- Catalyst cleaners
- Process line cleaning

1/2 inch scale in 6 inch pipe, 1000 feet long, has a transfer capacity loss of 150 gallons per minute.

Scale Thickness	Approximate Loss of Heat Transfer Efficiency
1/50 inch	4%
1/32 inch	8%
1/8 inch	20%

Boiler Tube Cleaners

Tube Cleaners for Straight Tubes



Complete series of motors and heads available for tube sizes 1/2" to 1-3/8" (12.7 to 34.9 mm) I.D.



MIDGET MOTOR WITH OPTIONAL HEADS

Complete cleaner consists of: air motor with extra set of blades; metal box; choice of single unit cutter head with four extra sets of cutters and two extra cutter pins. If "30" series head shown on page 78 is ordered, one extra flexible connection is furnished.

If expanding blade head is ordered, one extra set of blades is furnished. For operating hose (not included) refer to page 99.



Drill Head with Universal Joint
Range: 1/2 in. (12.7 mm) - 1-3/8 in. (34.9 mm)
Deposit: heavy-medium to soft



Single Unit Head with Universal Joint
Range: 1/2 in. (12.7 mm) - 1-3/8 in. (34.9 mm)
Deposit: light-hard to medium



Expanding Blade Cutter Head
Range: 1/2 in. (12.7 mm) - 4-1/2 in. (114.3 mm)
Deposit: light-hard to medium

Complete series of motors and heads available for tube sizes 1-1/2" to 13-1/4" (38.1 to 336.5 mm) I.D.

Drill Head with Universal Joint
Range: 1-1/2 in. (38.1 mm) - 11 in. (279.4 mm)
Deposit: 3/4 in. (19.0 mm) thick-medium to hard and plugged tubes



TYPE-3 P-Type Head
Range: 2-1/4 in. (57.1 mm) - 7 in. (177.8 mm) Self feeding
Deposit: 3/8 in. (9.5 mm) thick-hard to medium



TYPE-5 Wing Arm Head
Range: 1-3/4 in. (44.4 mm) - 13 1/4 in. (336.5 mm) Self feeding
Deposit: 1/2 in. (12.7 mm) thick-hard to medium



TYPE-4 Forward Swing Head
Range: 1-3/4 in. (44.4 mm) - 4 1/4 in. (120.6 mm) Self feeding
Deposit: 1/2 in. (12.7 mm) thick-soft to medium



3000 SERIES MOTOR WITH OPTIONAL HEADS

Complete cleaner consists of: air motor with extra set of blades; choice of cutter head with two extra sets of cutters and cutter pins; universal joint with two extra pins; two drills. If single unit head is ordered, four extra sets of cutters are furnished. If arm-type heads are ordered, one extra set of arm pins is furnished. For operating hose (not included) refer to page 99.

Boiler Tube Cleaners

Tube Cleaners for Curved Tubes

Complete series of motors and heads available for tube sizes 13/16" to 2-1/8" (20.6 to 53.9 mm) I.D.



**MIDGET MOTOR WITH
OPTIONAL HEADS**

Complete cleaner consists of: air motor with extra set of blades; choice of cutter heads with two extra sets of cutters and pins; universal joint with two extra pins; two drills.

If single unit head is ordered, four extra cutters are furnished. For operating hose (not included) refer to page 99.



Drill Head with Universal Joint
Range: 1-1/2 in. (38.1 mm) - 2-1/8 in. (53.9 mm)
Deposit: light-hard to medium



TYPE-1
Single Unit Head with Universal Joint
Range: 1/2 in. (12.7 mm) - 2-1/8 in. (53.9 mm)
Deposit: light-medium to hard
40 Series



TYPE-2
Single Unit Head with Flexible Shaft
Range: 1/2 in. (12.7 mm) - 2-1/8 in. (53.9 mm)
Deposit: light-medium to hard
30 Series

Complete series of motors and heads available for tube sizes 1-1/2" to 13-1/4" (57.1 to 336.5 mm) I.D.



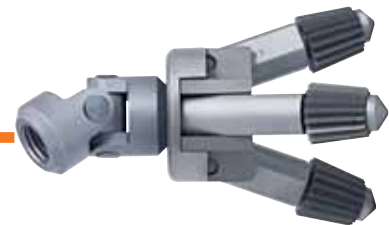
**4000 SERIES MOTOR WITH
OPTIONAL HEADS**

Complete cleaner consists of: air motor with extra set of blades; choice of cutter heads with two extra sets of cutters and cutter pins; universal joint with two extra pins; two drills.

If single unit head is ordered, four extra sets of cutters are furnished. If arm-type heads are ordered, one extra set of arm pins is furnished. For operating hose (not included) refer to page 99.



Drill Head with Universal Joint
Range: 1-1/2 in. (38.1 mm) - 11 in. (279.4 mm)
Deposit: 1/2 in. (12.7 mm) - thick-hard to medium



TYPE-4
Forward Swing with Universal Joint
Range: 1-3/4 in. (44.4 mm) - 4-3/4 in. (120.6 mm)
Deposit: 1/2 in. (12.7 mm) - thick-soft to medium



TYPE-5
Wing Arm Head with Universal Joint
Range: 1-3/4 in. (44.4 mm) - 13-1/4 in. (336.5 mm)
Self feeding
Deposit: 1/2 in. (12.7 mm) - thick-hard to medium



MIDGET MOTOR

Airetool®

Midget Tube Cleaners – Curved and Straight

Range: 1/2 to 1-3/4 in.
12.7 to 44.4 mm

Complete cleaner consists of: motor; extra set of blades; shaft wrench; metal box; choice of single unit cutter head; four extra sets of cutters; two extra cutter pins.

If a “30 Series” head is ordered, an extra flexible connection is furnished. If expanding blade head is ordered, one extra set of blades is furnished. If expanding blade head is ordered, one extra set of blades is furnished. (Less operating hose – refer to page 99.)

- Use for straight tubes.
- Use for curved tubes.

Tube ID		Min. Tube Centerline Radius in. (mm)	Motor Number	Motor OD		Rotor Thread In.	Air Coupling Pipe Tap (in.)	Hose Size		Heads Available			Drill*	Universal	Flexible
In.	mm			In.	mm			In.	mm	Universal Type1	Flexible Type 2	Blade Type 8			
1/2	12.7	Straight	24	15/32	11.9	10-32	18-20	3/16	4.7	2440	2430	2480	MD-1	2451	2461
5/8	15.8	Straight	30	37/64	14.6	1/4 NF	1/8	1/4	6.3	3040	3030	3080	MD-2	PA-3051	X-6461
3/4	19.0	Straight	27	11/16	17.4	1/4 NF	1/8	1/4	6.3	2740	2730	2780	MD-3	PA-3051	X-6461
13/16	20.6	Radius 5 (126.0)	X-64	11/16	17.4	1/4 NF	1/4	1/4	6.3	X-6440	X-6430		MD-3	6451	X-6461
7/8	22.2	Straight	29	25/32	19.8	3/8 NF	1/4	3/8	9.5	2940	2930	2980	MD-4	2651-A	
27/32	21.4	Straight	29	25/32	19.8	3/8 NF	1/4	3/8	9.5	2940	2930	2980	MD-4	2651-A	
1	25.4	Straight	26	29/32	23.0	3/8 NF	3/8	3/8	9.5	2640	2630	6180	MD-4	2651-A	
1-1/32	26.1	Radius 5 (127.0)	X-61	7/8	22.2	5/16 NF	1/4	1/4	6.3	X-6140	X-6130		MD-3	6151-C	X-6161
1-1/8	28.5	Straight	31	1-1/32	26.1	7/16 NF	3/8	3/8	9.5	3140	3130	3180	MD-5	3151	X-6361
1-1/4	31.7	Straight	X-63-A	1-1/16	26.9	3/8 NF	3/8	3/8	9.5	X-6340	X-6330	6380	MD-5	6651	X-6361
1-1/4	31.7	Radius 6 (152.4)	X-63	1-1/16	26.9	3/8 NF	3/8	3/8	9.5	X-6340	X-6330		MD-5	6651	X-6361
1-3/8	34.9	Straight	X-65-A	1-3/16	30.1	3/8 NF	3/8	3/8	9.5	X-6540	X-6530	6580	00	6651	X-6661
1-1/2	38.1	Radius 6 (152.4)	X-65	1-3/16	30.1	3/8 NF	3/8	3/8	9.5	X-6540	X-6530		MD-5	6651	X-6661
1-5/8	41.2	Radius 24 (609.6)	4200	1-1/2	38.1	5/8 NC	1/2	1/2	12.7	4140	4130		1	4151	4161
1-3/4	44.4	Radius 6 (152.4)	X-66	1-5/16	33.3	3/8 NF	3/8	3/8	9.5	X-6640	X-6630		00	6651	X-6661
1-3/4	44.4	Radius 15 (381.0)	4200	1-1/2	38.1	5/8 NC	1/2	1/2	12.7	4140	4130		1	4151	4161

Some items are available on a quotation basis only.

* Drill must be used with Universal Joint or flexible connection.

Boiler Tube Cleaners

Selection Guide

Airetool®

3000 and 4000 Series Tube Cleaners – Curved and Straight

**Range: 1-1/2 to 13-1/4 in.
38.1 to 336.5 mm**

Complete cleaner consists of: motor; extra set of blades; shaft wrench; choice of cutter heads; two extra sets of cutters and cutter pins; universal joint with two extra pins; two drills. If single unit head is ordered, four extra cutters are furnished. If arm-type head is ordered, an extra set of arm pins is furnished. Operating hose not included.



Use for straight tubes.

Use for curved tubes.

Tube ID		Min. Tube Centerline Radius in. (mm)	Motor Number	Motor OD		Rotor Thread In.	Air Coupling Pipe Tap (in.)	Hose Size		Heads Available				Universal Joint	Drill*
				In.	mm			In.	mm	Single Expansion Type 3	Forward Swing Type 4	Single Unit			
In.	mm										Flexible Type 2	Universal Type 1			
1-1/2	38.1	Straight	3150	1-3/8	34.9	9/16 NC	1/2	1/2	12.7	TC-14			1740	31551	0
1-5/8	41.2	Straight	3162	1-1/2	38.1	5/8 NC	3/4	1/2	12.7	TC-11	1840		1940	4151	1
1-3/4	44.4	Straight	3175	1-5/8	41.2	5/8 NC	3/4	1/2	12.7	TC-11	1840		1940	4151	1
1-7/8	47.6	Straight	3187	1-3/4	44.4	5/8 NC	3/4	3/4	19.0	TC-17-PY	2340		4140	4151	1
2	50.8	Straight	3200	1-7/8	47.6	5/8 NC	3/4	3/4	19.0	TC-16	2340		4140	4151	1
2	50.8	Radius 15 (381.0)	4225	1-3/4	44.4	5/8 NC	1/2	1/2	12.7			4130	4140	4151	1
2-1/8	53.9	Straight	3212	2	50.8	5/8 NC	3/4	3/4	19.0	TC-13-PY	2340		4140	4151	4
2-1/8	53.9	Radius 15 (381.0)	4225	1-3/4	44.4	5/8 NC	1/2	1/2	12.7			4130	4140	4151	1
2-1/4	57.1	Straight	3225	2-1/8	53.9	3/4 NC	3/4	3/4	19.0	P-15-PY	4470-A			2151	4
2-1/4	57.1	Radius 15 (381.0)	4250	1-7/8	47.6	5/8 NC	1/2	1/2	12.7		4470			4151	4
2-5/16	58.7	Radius 12 (304.8)	4250	1-7/8	47.6	5/8 NC	1/2	1/2	12.7		4470			4151	4
2-3/8	60.3	Straight	3225	2-1/8	53.9	3/4 NC	1	1	25.4	P-9-S	4470-A			2151	4
2-1/2	63.5	Straight	3250	2-5/16	58.7	7/8 NC	1	1	25.4	P-9	4470-B			21451	4
2-1/2	63.5	Radius 15 (381.0)	4250	1-7/8	47.6	5/8 NC	1/2	1/2	12.7			4470		4151	4

Some items are available on a quotation basis only.

* Drill must be used with Universal Joint or flexible connection.



Airetool®

3000 and 4000 Series Tube Cleaners – Curved and Straight

**Range: 1-1/2 to 13-1/4 in.
38.1 to 336.5 mm**

Complete cleaner consists of: motor; extra set of blades; shaft wrench; choice of cutter heads; two extra sets of cutters and cutter pins; universal joint with two extra pins; two drills. If single unit head is ordered, four extra cutters are furnished. If arm-type head is ordered, an extra set of arm pins is furnished. Operating hose not included.

- Use for straight tubes.
- Use for curved tubes.

Tube ID		Min. Tube Centerline Radius in. (mm)	Motor Number	Motor OD		Rotor Thread In.	Air Coupling Pipe Tap (in.)	Hose Size		Heads Available			Universal Joint	Drill*
				In.	mm			In.	mm	Single Expansion Type3	Wing Arm Type 5	Forward Swing Type 4		
2-5/8	66.6	Straight	3262	2-1/2	63.5	7/8 NC	1	1	25.4	P-7	2060	4470-A	21451	4
2-5/8	66.6	Radius 24 (609.6)	4300	2-1/4	57.1	3/4 NC	1	3/4	19.0		3360	3370	3551	5
2-3/4	69.8	Straight	3275	2-5/8	66.6	7/8 NC	1	1	25.4	P-7	2060	3370-A	651	5
2-3/4	69.8	Radius 12 (304.8)	4300	2-1/4	57.1	3/4 NC	1	3/4	19.0		3360	3370	3551	5
2-7/8	73.0	Straight	3275	2-5/8	66.6	7/8 NC	1	1	25.4	P-6-A	1060		651	5
2-7/8	73.0	Radius 28 (711.2)	4325	2-1/2	63.5	3/4 NC	1	3/4	19.0		3560	3270	3551	5
3	76.2	Straight	3300	2-13/16	71.4	1 NF	1	1	25.4	P-6	1060		21051	5
3	76.2	Radius 16 (406.4)	4300	2-1/2	63.5	3/4 NC	1	3/4	19.0		3560	3270	3551	5
3	76.2	Radius 12 (304.8)	4300	2-1/4	57.1	3/4 NC	1	3/4	19.0		3560	3270	3551	5
3-1/16	77.7	Straight	3300	2-13/16	71.4	1 NF	1	1	25.4	P-6	1060		21051	5
3-1/8	79.3	Straight	3312	2-15/16	74.6	1 NF	1	1	25.4	P-5	1060		1151	6
3-3/16	80.9	Straight	3318	3	76.2	1 NF	1	1	25.4	P-5	1060		1151	6
3-1/4	82.5	Straight	3318	3	76.2	1 NF	1	1	25.4	P-5	1060		1151	6
3-1/4	82.5	Radius 16 (406.4)	4350	2-3/4	69.8	7/8 NC	1	1	25.4		3560	970-B	651	5
3-3/8	85.7	Straight	3318	3	76.2	1 NF	1	1	25.4	P-5	960		1151	6
3-1/2	88.9	Straight	3350	3-5/16	84.1	1-1/8 NF	1	1	25.4	P-4	760		20751	6
3-1/2	88.9	Radius 20 (508.0)	4350	2-3/4	69.8	7/8 NC	1	1	25.4		4760	770-B	551	6

Some items are available on a quotation basis only.

* Drill must be used with Universal Joint or flexible connection.

Boiler Tube Cleaners

Selection Guide – continued

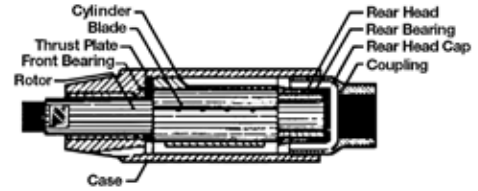
Use for straight tubes.
 Use for curved tubes.

Tube ID		Min. Tube Centerline Radius in. (mm)	Motor Number	Motor OD		Rotor Thread In.	Air Coupling Pipe Tap (in.)	Hose Size		Heads Available			Universal Joint	Drill*
				In.	mm			In.	mm	Single Expansion Type3	Wing Arm Type 5	Forward Swing Type 4		
3-5/8	92.0	Straight	3350	3-5/16	84.1	1-1/8 NF	1	1	25.4	P-3	760		20751	6
3-3/4	95.2	Straight	3350	3-5/16	84.1	1-1/8 NF	1	1	25.4	P-3	760		20751	6
3-7/8	98.4	Straight	3350	3-5/16	84.1	1-1/8 NF	1	1	25.4	P-3	760		20751	6
4	101.6	Straight	3400	3-3/4	95.2	1-1/8 NF	1	1	25.4	P-2	760		20751	6
4	101.6	Radius 15 (381.0)	4450	3-1/8	79.3	7/8 NC	1	1	25.4		4760	770-B	551	6
4-1/8	104.7	Straight	3400	3-3/4	95.2	1-1/8 NF	1	1	25.4	P-2	760		20751	6
4-1/4	107.9	Straight	3400	3-3/4	95.2	1-1/8 NF	1	1	25.4	P-1	5060-AS		20751	6
4-1/4	107.9	Radius 36 (91.4)	4450	3-1/8	79.3	7/8 NC	1	1	25.4		4760	870-B	551	6
4-3/8	111.1	Straight	3400	3-3/4	95.2	1-1/8 NF	1	1	25.4	P-1	5060-AS		20751	6
4-1/2	114.3	Straight	3400	3-3/4	95.2	1-1/8 NF	1	1	25.4	P-0	5060-AS		20751	6
4-1/2	114.3	Radius 15 (381.0)	4450	3-1/8	79.3	7/8 NC	1	1	25.4		4760	870-B	551	6
4-1/2	114.3	Radius 24 (609.6)	4450	3-1/8	79.3	7/8 NC	1	1	25.4		4760	870-B	551	6
4-3/4	120.6	Straight	3400	3-3/4	95.2	1-1/8 NF	1	1	25.4	P-10	5060-AS		20751	6
4-13/16	122.2	Radius 18 (457.2)	4481	3-3/4	95.2	1-1/8 NF	1	1	25.4		5060-A		5051	6
5	127.0	Straight	3500	4-3/4	120.6	1-3/8 NF	1-1/4	1-1/4	31.8	TC-19-H-S	35260		21251-E	6
5	127.0	Radius 24 (609.6)	4481	3-3/4	95.2	1-1/8 NF	1	1-1/4	31.8	TC-19-H-S	35260		5051	6

Some items are available on a quotation basis only.

* Drill must be used with Universal Joint or flexible connection.

3000 Series Motors



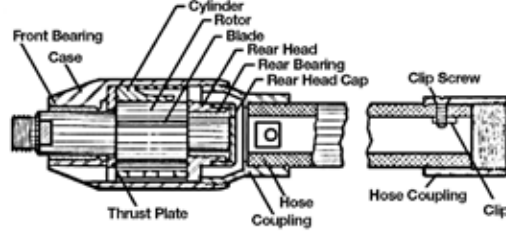
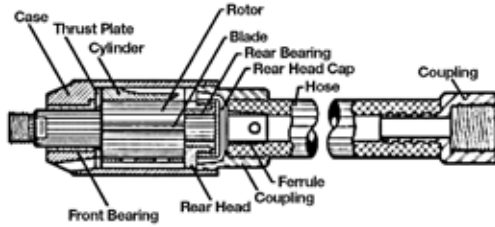
All Motors include Shaft Wrench

Motor No.	Motor OD	Tube ID	Case & Frt. Brg	Cylinder	R. Cap & Brg.	Machine Coupling	Pipe Tap	Rotor	Blades Per Set	Thrust Plate	Front Bearing	Rear Bearing	Rear Head Cap	Front Dowel	Rear Dowel	Shaft Wrench	Rotor Thread	Hose
3150 Wt 2.4	1-3/8	1-1/2	31501 0.8#	31502 .25#	31503 .12#	31504 .25#	1/2	31505 .43#	1806 (4) .12#	1707 .03#	X 1708 .05#	31509 .02#		31511 .01#	31512 .01#	9/16 .1#	9/16 N.C.	1/2
3162 Wt 2.7	1-1/2	1-5/8	61621 0.9#	31622 .3#	31623 .15#	31624 .3#	3/4	31625 0.6#	1806 (4) .12#	1807 .04#	X 1808 .06#	31629 .03#		31511 .1#	31512 .1#	5/8 .1#	5/8 N.C.	1/2
3175 Wt 2.9	1-5/8	1-3/4	31751 1.1#	31622 .3#	31623 .15#	31624 .3#	3/4	31625 0.6#	1806 (4) .12#	1807 .04#	X 1808 .06#	31629 .03#		31511 .1#	31512 .1#	5/8 .1#	5/8 N.C.	1/2
3187 Wt 4	1-3/4	1-7/8	31871 1.5#	31872 .43#	31873 .18#	31874 .25#	3/4	31875 1.0#	2306 (4) .18#	22307 C .06#	2208 .12#	32129 .03#		31811 .01#	31812 .01#	5/8 .1#	5/8 N.C.	3/4
3200 Wt 4.6	1-7/8	2	32001 1.6#	32002 .6#	32003 .3#	32004 .5#	3/4	32005 1.2#	2306 (4) .18#	2307 .06#	2208 .12#	32009 .06#	3213 .06#	32011 .01#	32112 .01#	5/8 .1#	5/8 N.C.	3/4
3212 Wt 4.9	2	2-1/8	32121 1.8#	32122 .8#	32123 .3#	32124 .5#	3/4	32125 1.2#	21606 (4) .18#	21607 .06#	2208 .12#	32129 .06#	4413 .05#	32011 .01#	32112 .01#	5/8 .1#	5/8 N.C.	3/4
3225 Wt 6	2-1/8	2-1/4	32251 2#	32252 .8#	32253 .5#	32254 .6#	3/4	32255 1.5#	21506 (5) .25#	1507 .06#	1408 .25#	32009 .06#	3213 .06#	32011 .01#	32012 .01#	3/4 .2#	3/4 N.C.	3/4
3250 Wt 7.3	2-5/16	2-1/2	32501 2.5#	32502 1#	32503 .5#	32504 .6#	1	32505 2.2#	21406 (5) .3#	21407 .1#	21408 .3#	32009 .06#	3213 .06#	32511 .01#	32512 .01#	7/8 .3#	7/8 N.C.	1
3262 Wt 9.6	2-1/2	2-5/8	32621 3.4#	32622 1.06#	32623 .8#	32624 .8#	1	32755 2.7#	21306 (5) .4#	21907 .2#	1008 .4#	32759 .1#	213 .06#	32611 .01#	32612 .01#	7/8 .3#	7/8 N.C.	1
3275 Wt 10.6	2-5/8	2-3/4	32751 4#	32752 1.3#	32753 .8#	32754 .8#	1	32755 2.7#	21306 (5) .4#	21307 .2#	1008 .4#	32759 .1#	213 .06#	32611 .01#	32612 .01#	7/8 .3#	7/8 N.C.	1
3300 Wt 13	2-13/16	3	33001 4.5#	33002 1.5#	33003 1.1#	33004 1.2#	1	33005 3.5#	21006 (5) .5#	21007 .2#	1108 .5#	33009 .2#	713 .2#	32611 .01#	32612 .01#	1 4#	1 N.F.	1
3318 Wt 14.5	3	3-3/16	33181 5.3#	33252 1.6#	33253 1.4#	33254 1.3#	1	33255 3.7#	20706 (5) .5#	20907 .25#	1108 .5#	33009 .2#	713 .2#	33211 .01#	33212 .01#	1 4#	1 N.F.	1
3350 Wt 17.5	3-5/16	3-5/8	33501 6.1#	33502 2.3#	33503 1.5#	33504 1.5#	1	33505 4.6#	20706 (5) .5#	20707 .3#	20708 .6#	33009 .2#	713 .2#	33211 .01#	33212 .01#	1-1/8 .6#	1-1/8 N.F.	1
3400 Wt 22	3-3/4	4	34001 8.4#	34002 2.8#	34003 2#	34004 2#	1	34005 5.7#	20706 (5) .5#	34007 .3#	20708 .6#	33009 .2#	713 .2#	33211 .01#	33212 .01#	1-1/8 .6#	1-1/8 N.F.	1
3500 Wt 39.2	4-3/4	5	35001 15.9#	35502 3.7#	35503 2.8#	35504 3.5#	1-1/4	35505 9.6#	21206 (5) .8#	35507 .7#	21208 1.4#	33009 .2#	713 .2#	33211 .01#	33212 .01#	1-3/8 2#	1-3/8 N.F.	1

Some items are available on a quotation basis only.

Motors for tube/pipe sizes larger than 5"ID are supplied with ribs or rib cage to center the motor in tube or pipe being cleaned.

4000 Series Motors

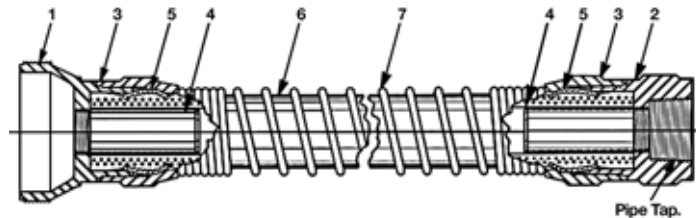


Motor No. / Weight	Motor OD	Tube ID & Radius	Case & Frt. Brg	Cylinder	R. Cap & Brg.	Machine Coupling	Rotor	Blades Per Set	Thrust Plate	Front Bearing	Rear Bearing	Rear Head Cap	Front Dowel	Rear Dowel	Tail Hose & Parts	Tail Hose Assy	Shaft Wrench	Rotor Thread	Hose
4250	1-7/8	2-1/4 X 15R 2-5/16 X 12R 2-1/2 X 15R	42501	42502	42503	42504	42505	4406 (4)	2307	4408	42509	4413	32011	42512	Line A	42519	5/8	5/8	1/2
Wt. 3.1#			.8#	.2#	.2#	.2#	.5#	.06#	.03#	.06#	.03#	.05#	.01#	.01#	Below	.8#	.1#	N.C.	
4300	2-1/4	2-5/8 X 24R 2-3/4 X 12R	43001	43002	43003	43004	43005	3306 (5)	3307	3308	32009	3213	43011	43012	Line B	43019	3/4	3/4	3/4
Wt. 4.7#			1#	.3#	.5#	.3#	.8#	.06#	.06#	.1#	.06#	.06#	.01#	.01#	Below	1.6#	.2#	N.C.	
4325	2-1/2	2-7/8 X 28R 3 X 16R	43251	43252	43253	43254	43255	3206 (5)	3207	3308	32009	3213	43211	43212	Line B	43219	3/4	3/4	3/4
Wt. 5.6#			1.6#	.3#	.5#	.3#	1.1#	.06#	.06#	.1#	.06#	.06#	.01#	.01#	Below	1.6#	.2#	N.C.	
4350	2-3/4	3-1/4 X 16R 3-1/2 X 20R	43501	43502	43503	43504	43505	3706 (5)	3307	3708	32759	213	32311	43512	Line B	43519	7/8	7/8	1
Wt. 7.9#			2.3#	.6#	.8#	.7#	1.6#	.1#	.06#	.2#	.06#	.06#	.01#	.01#	Below	2#	.3#	N.C.	
4450	3-1/8	4 X 15R	44501	44502	44503	44504	44505	4705 (5)	507	4708	33009	713	33211	44512	Line B	44519	7/8	7/8	1
Wt. 11.3#			3.6#	1#	1.4#	1#	2.1#	.2#	.3#	.3#	.2#	.2#	.01#	.01#	Below	23.3#	.3#	N.C.	
4481	3-3/4	4-13/16 X 18R	44811	44812	34003	34004	44815	5006 (5)	34007	5008	33009	713	33211	44512	Not Req'd	Not Req'd	1-1/8	1.125	1
Wt. 19.3#			7.4#	2.2#	2#	2#	5#	.3#	.3#	.4#	.2#	.2#	.01#	.01#			.6#	N.F.	
4600	5	5-3/4 X 72R 6 X 26R	46001	44812	34003	34004	44815	5006 (5)	34007	5008	33009	713	33211	44512	Not Req'd	Not Req'd	1-1/8	1.125	1
Wt. 24.6#			12.7#	2.2#	2#	2#	5#	.3#	.3#	.4#	.2#	.2#	.01#	.01#			.6#	N.F.	

Motors are supplied with ribs or rib cage for tube/pipe sizes larger than 6" ID.

	Tap Size	Tail Hose	Hose Cpl.	Clip	Screw	Ferrule
Line A	1/2"	4115	4116			4418
Weight		.3#	.3#			0.01
Line B	1"	3315	3316	3317	3318	
Weight		.8#	.5#	.03#	.01#	

Accessory Heavy Duty Screw Type Tail Hose Assemblies with Wire Inserted Hose and Spring Protector for 4000 Series Motors



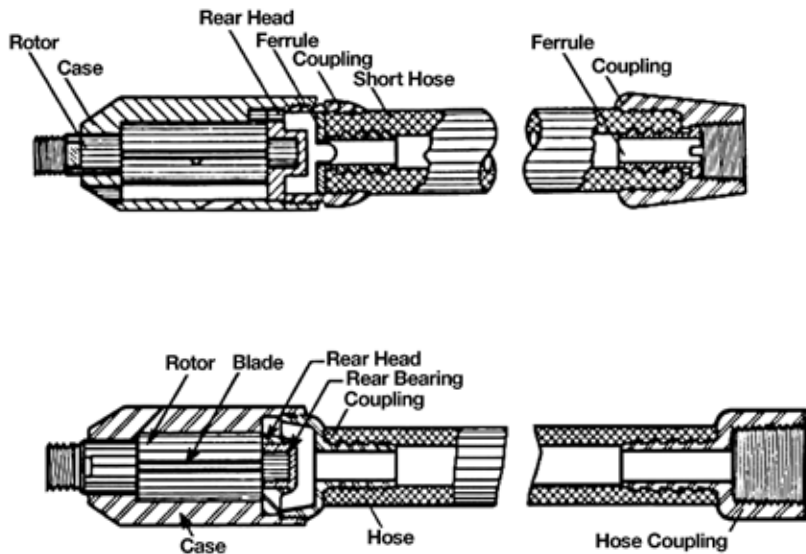
Motor Assy	Hose Cpl.	Machine Coupling	Hose Cpl. Cpl.	Hose Pipe Tap	Compression Nut	Compression Ferrule	Comp Sleeve	Hose & Spr Protector
Detail #		1	2		3	4	5	6
Required		1	1		2	2	2	1
4250	425019	42504 B	425016	1/2"	42504 C	42504 D	42504 E	425015
4300	430019	43004 B	432516	3/4"	43254 C	43254 D	43254 E	432515 K
4325	432519	43254 B	432516	3/4"	43254 C	43254 D	43254 E	432515 K
4350	435019	43504 B	435016	1"	43504 C	43254 D	43254 E	432515 K
4450	445019	44504 B	435016	1"	43504 C	43254 D	43254 E	432515 K

Some items are available on a quotation basis only.

60 Series & 4000 Series Midget Motors



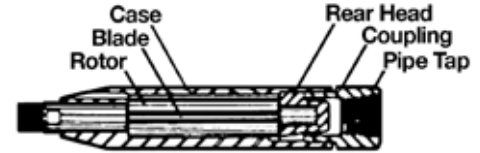
Motor No.	Motor OD	Tube ID & Radius	Case	R. Head & Bearing	Machine Cpl.	Rotor	Blade Set of 4	Rear Brg.	Rear Dowel	Tail Hose	Tail Hose Cpl	Pipe Tap	Tail Hose Assy	Front Ferrule	Rear Ferrule	Shaft Wrench	Rotor Thd	Hose Size
X 64 .26#	11/16	13/16" 5"	X 6401 .07#	X 6403 .01#	X 6404 .03#	X 6405 .05#	X 6406 .01#		X 6412 (2) .01#	X 6415 .02#	X 6416 .04#	1/4"	X 6419 .1#	X 6417 .01#	X 6418 .01#	3/16" .02#	1/4" N.F.	1/4"
X 61 .49#	7/8	1-1/32" 5"	X 6101 .12#	X 6103 .03#	X 6104 .05#	X 6105 .1#	X 6106 .02#		X 6112 (2) .01#	X 6115 .02#	X 6117 .08#	1/4"	X 6119 .17#	X 6117 .02#	X 6118 .01#	1/4" .04#	5/16" N.F.	1/4"
X 63 .63#	1-1/16	1-1/4" 6"	X 6301 .14#	X 6303 .04#	X 6304 .07#	X 6305 .12#	X 6306 .02#		X 6312C (2) .01#	X 6315 .07#	X 6316 .19#	3/8"	X 6319 .38#	X 6317 .03#	X 6318 .02#	5/16" .08#	3/8" N.F.	3/8"
X 65 .95#	1-3/16	1-1/2" 6"	X 6501 .22#	X 6503 .05#	X 6504 .09#	X 6505 .17#	X 6506 .03#		X 6312C (2) .01#	X 6315 .07#	X 6316 .19#	3/8"	X 6519 .4#	X 6517 .03#	X 6518 .02#	5/16" .08#	3/8" N.F.	3/8"
X 66 1.04#	1-5/16	1-3/4" 6"	X 6601 .28#	X 6603 .05#	X 6604 .11#	X 6605 .22#	X 6606 .03#		X 6312C (2) .01#	X 6315 .07#	X 6316 .19#	3/8"	X 6619 .42#	X 6617 .03#	X 6318 .03#	3/8" .08#	3/8" N.F.	3/8"
4200 2#	1-1/2	1-5/8" 24" 1-3/4" 15"	42001 .6#	42003 .06#	42004 .1#	42005 .3#	4106 .03#	42009 .01#	42012 .01#	4115 .2#	4116 .3#	1/2"	42019 .6#			5/8" .1#	5/8" N.C.	1/2"
4225 2.1#	1-3/4	2" 15"	42251	42003 .06#	42004 .1#	42005 .3#	4106 .03#	42009 .01#	42012 .01#	4115 .2#	4116 .3#	1/2"	42019 .6#			5/8" .1#	5/8" N.C.	1/2"



Some items are available on a quotation basis only.

Midget Motors

Straight Tubes 1/2" - 1-3/8"

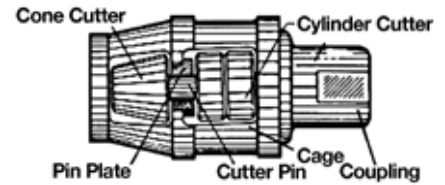


Motor No.	Motor OD	Tube ID	Case	Rear Head	Machine Cpl.	Pipe Tap	Rotor	Blade Set of 4	Dowel Pin	Shaft Wrench	Rotor Thread	Hose
24 .12#	15/32"	1/2"	X 2401 .04#	2403 .01#	2404 .01#	18-20	2405 .02#	2406 .01#	2412 .01#	5/32" .02#	10-32	3/16"
30 .15#	37/64"	5/8"	X 3001 .05#	X 3003 .01#	X 3004 .01#	1/8"	2705 .03#	2706 .01#	3012 .01#	3/16" .02#	1/4" N.F.	1/4"
27 .2#	11/16"	3/4"	X 2701 .08#	2703 .08#	2704 .02#	1/8"	2705 .03#	2706 .01#	3012 .01#	3/16" .02#	1/4" N.F.	1/4"
29 .5#	25/32"	7/8"	2901 .18#	2903 .03#	2904 .06#	1/4"	2605 .12#	2606 .02#	2912 .01#	5/16" .08#	3/8" N.F.	3/8"
26 .64#	29/32"	1"	2601 G .3#	2603 .03#	2604 .08#	3/8"	2605 .12#	2606 .02#	X 6312 .01#	5/16" .08#	3/8" N.F.	3/8"
31 .65#	1-1/32"	1-1/8"	3101 .28#	3103 .04#	3104 .1#	3/8"	3105 .12#	3106 .01#	3111 .01#	5/16" .08#	3/8" N.F.	3/8"
X 63 A .5#	1-1/16"	1-1/4"	X 6301 .14#	X 6303 .04#	X 6304 A .09#	3/8"	X 6305 .12#	X 6306 .02#	X 6312 (2) .01# ea.	5/16" .08#	3/8" N.F.	3/8"
X 65 A .67#	1-3/16"	1-3/8"	X 6501 .22#	X 6503 .05#	X 6504 .12#	3/8"	X 6505 .17#	X 6506 .03#	X 6312 (2) .01# ea.	5/16" .08#	3/8" N.F.	3/8"

All Motors are furnished with a Shaft Wrench

Some items are available on a quotation basis only.

Single Expansion "P" & "TC" Type 3 Heads



When ordering state the motor number and the motor's shaft thread size.

Head Number	Tube ID	Closed	Expand To	Cage	Pin Plate	Head Coupling	Tap Coupling	Cutter Pin	Cone Cutter	Cylinder Cutter
TC 14 87#	1-1/2"	1-3/8"	1-23/32"	1781 .5#		1783 .12#	9/16" N.C.	1584 (1) 1884 (1)	1787 (1) .06# ea.	1788 (2) .04# ea.
TC 11 1.2#	1-3/4"	1-5/8"	2"	1881 .68#		1883 .12#	5/8" N.C.	1584 (1) 1884 (1)	1587 (1) .08# ea.	1588 (2) .05# ea.
TC 17 PY 1.37#	1-7/8"	1-11/16"	2"	2281 TC 17 PY #62		2383 .18#	5/8" N.C.	1584 PY (3) .04# ea.	2287 (3) .05# ea.	2288 (6) .03# ea.
TC 16 PY 1.47#	2"	1-13/16"	2-3/16"	2381 PY .7#		2383 .18#	5/8" U.N.C.	1584 PY (3) .04# ea.	1787 (3) .06# ea.	1788 (6) .04# ea.
TC 13 PY 1.65#	2-1/8"	1-5/16"	2-5/16"	2381 A PY .93#		2383 .18#	5/8" U.N.C.	1584 PY (3) .04# ea.	1787 (3) .06# ea.	1788 (6) .04# ea.
P 15 PY 2.3#	2-1/4"	2-1/16"	2-7/16"	P 1591 PY 1.3#	P 1592 .18#	183 .37#	3/4" U.N.C.	2484 PY (3) .05# ea.	2487 (3) .08# ea.	3338 (9) .03# ea.
P 9 S 2.43#	2-3/8"	2-3/16"	2-11/16"	P 991 S 1#	P 992 S .12#	183 .37#	3/4" N.C.	2484 (3) .05# ea.	C 52 (3) .08# ea.	C 76 (6) .06# ea.
P 9 PY 2.6#	2-1/2"	2-1/4"	2-13/16"	P 991 PY 1.3	P 992 .18#	183 .37#	3/4" N.C.	1584 PY (3) .04# ea.	1587 (3) .08# ea.	1588 (6) .05# ea.
P 8 2.8#	2-5/8"	2-9/16"	2-7/8"	P 891 1.2#	P 892 .19#	21483 .37#	7/8" N.C.	184 (3) .08# ea.	1087 (3) .12# ea.	1088 (6) .082# ea.
P 7 3.2#	2-3/4"	2-9/16"	2-15/16"	P 791 1.5#	P 792 25#	983 S 8#	7/8" N.C.	184 (3) .08# ea.	1087 (3) .12# ea.	1088 (6) .082# ea.
P 6 A PY 3.5#	3"	2-11/16"	3-1/8"	P 691 AY 2#	P 692 A .3#	983 S 8#	7/8" N.C.	184 (3) .08# ea.	1087 (3) .12# ea.	1088 (6) .082# ea.
P 6 3.6#	3-1/8"	2-13/16"	3-1/4"	P 691 AY 2.1#	P 692 .3#	983 S 8#	7/8" N.C.	184 (3) .08# ea.	1087 (3) .12# ea.	1088 (6) .082# ea.
P 5 4.8#	3-1/4"	3-1/16"	3-9/16"	P 591 2.3#	P 592 .37#	983 S 8#	7/8" N.C.	184 (3) .08# ea.	987 (3) .18# ea.	988 (6) .1# ea.
P 4 5.6#	3-1/2"	3-3/16"	3-13/16"	P 491 2.8#	P 492 .5#	883 F .9#	7/8" N.C.	884 (3) .12# ea.	787 (3) .2# ea.	788 (6) .13# ea.
P 3 6.3#	3-3/4"	3-9/16"	4-3/16"	P 391 3.3#	P 392 .6#	883 F .9#	7/8" N.C.	884 (3) .12# ea.	887 (3) .25# ea.	888 (6) .16# ea.
P 2 6.8#	4"	3-3/4"	4-1/2"	P 291 3.4#	P 292 .6#	883 F .9#	7/8" N.C.	884 (3) .12# ea.	887 (3) .25# ea.	888 (6) .16# ea.
P 1 8.6#	4-1/4"	3-13/16"	4-3/4"	P 191 4.3#	P 192 .6#	883 F .9#	1 1/8" N.F.	884 P (3) .13# ea.	887 (3) .25# ea.	888 (6) .16# ea.
P 0 9#	4-1/2"	4-1/8"	4-15/16"	P 091 5#	P 092 .68#	883 F .9#	1 1/8" N.F.	884 P (3) .13# ea.	887 B (3) .25# ea.	888 B (6) .16# ea.
P 10 9.8#	4-3/4"	4-3/8"	4-15/16"	P 1091 5.7#	P 1092 .7#	883 F .9#	1 1/8" N.F.	884 P (3) .13# ea.	887 (3) .25# ea.	888 (6) .16# ea.
TC 19 H S 13.8#	5"	4-1/2"	5-9/16"	1991 H S 7.7#		21283 2.2#	1 3/8" N.F.	884 P (3) .13#	1287 (3) .44# ea.	1288 (9) .25# ea.
TC 19 S 16.5	5-1/4"	4-7/8"	5-15/16"	1991 S 8.5#		8293 2.7#	1 3/8" N.F.	884 P (4) .13#	1287 (4) .44# ea.	1288 (12) .25# ea.
TC 20 S 18	6"	5-1/2"	6-1/2"	2091 S 10#		8293 2.7#	1 3/8" N.F.	884 P (4) .13#	1287 (4) .44# ea.	1288 (12) .25# ea.
TC 21 S 20#	6-1/4"	5-3/4"	6-3/4"	2191 S 11#		8293 2.7#	1 3/8" N.F.	884 P (4) .13#	11887 (4) .5# ea.	11888 (12) .3# ea.
TC 22 S 22#	6-1/2"	6"	7-1/16"	2291 S 12#		8293 2.7#	1 3/8" N.F.	884 P (4) .13#	11887 (4) .5# ea.	11888 (12) .3# ea.
TC 23 S 24#	6-3/4"	6-1/4"	7-5/16"	2391 S 13.5#		8293 2.7#	1 3/8" N.F.	2484 S (4) .3#	8287 (4) .5# EA.	8288 (12) .3# EA.
TC 24 S 26#	7"	6-1/2"	7-9/16"	2491 S 15.5#		8293 2.7#	1 3/8" N.F.	2484 S (4) .3#	8287 (4) .5# EA.	8288 (12) .3# EA.

Some items are available on a quotation basis only.

Forward Swing Heads Type 4

1-3/4" - 4-3/4" ID for Straight and Bent Tubes

Recommended spare parts:

Cone Cutters, Cutter Pins Arms, and Arm Pins.

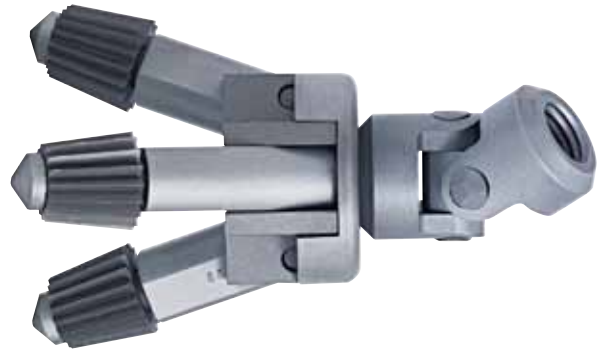
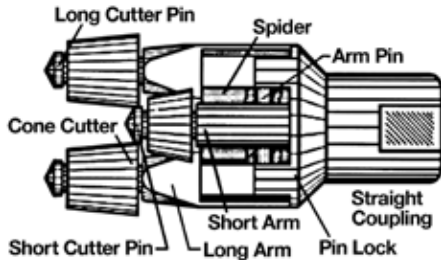


Figure 1 Shown with head coupling for straight tubes.

Figure 2 Shown with universal coupling for bent tubes.

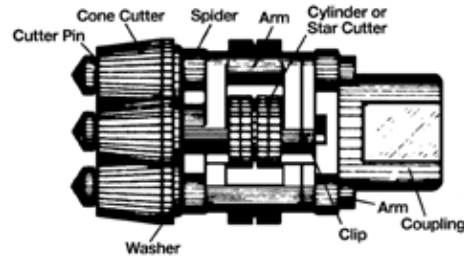
Head Number	Tube ID	Closed	Expand To	Spider	Figure	Long Arm	Short Arm	Head Cpl.	Cpl. Tap	Long Cutter Pin	Short Cutter Pin	Arm Pin	Pin Lock	Cone Cutter	Star Cutter	No. Of Arms
1840 Wt .64#	1-3/4	1-1/2	2-1/8	1841 .2#	1	1842 (1) .06#	1842 A (1) .05#		5/8 N.C.	1834 (1) .04#	1834 A (1) .03#	1845 (2) .01# ea.	1846 .1#	337 (2) .06# ea.	338 (3) .01# ea.	2
1840 B Wt .7#	2-1/4	1-1/2	2-1/8	1841 .2#	2	1842 (1) .06#	1842 A (1) .05#	4151 .4#	5/8 N.C.	1834 (1) .04#	1834 A (1) .03#	1845 (2) .01# ea.	1846 .1#	337 (2) .06# ea.	338 (3) .01# ea.	2
2340 Wt .83#	2	1-7/8	3	2341 .3#	1	1832 (1) .08#	1832 A (1) .07#		5/8 N.C.	1834 (1) .04#	1834 A (1) .03#	2345 (2) .01# ea.	2346 .15#	337 (2) .06# ea.	338 (3) .01# ea.	2
4440 Wt .93	2	1-7/8	3	2341 .3#	2	1832 (1) .08#	1832 A (1) .07#	4151 .4#	5/8 N.C.	1834 (1) .04#	1834 A (1) .03#	2345 (2) .01# ea.	2346 .15#	337 (2) .06# ea.	338 (3) .01# ea.	2
4470 Wt 1.63	2-5/16	2	3-7/8	4471 .3#	2	4472 (3) .1# ea.		4151 .4#	5/8 N.C.	4474 (3) .07#		4475 (3) .01# ea.	4476 .12#	C 19 (3) .04# ea.		3
4470 A Wt 1.3#	2-5/16	2	3-7/8	4471 .3#	1	4472 (3) .1# ea.		2383 B .16#	3/4 N.C.	4474 (3) .07#		4475 (3) .01# ea.	4476 .12#	C 19 (3) .04# ea.		3
3370 Wt 3.3#	2-1/4	2-1/4	3-5/8	3371 .6#	2	3372 (3) .2# ea.		3551 .8#	3/4 N.C.	3374 (3) .01# ea.		3375 (3) .01 ea.	3376 .4#	637 (3) .1# ea.		3
3370 A Wt 2.9#	2-3/4	2-1/4	3-5/8	3371 .6#	1	3372 (3) .2# ea.		2043 .4#	7/8 N.C.	3374 (3) .01# ea.		3375 (3) .01 ea.	3376 .4#	637 (3) .1# ea.		3
3270 Wt 3.3#	3	2-1/2	4	3271 .6#	2	3472 (2) .09# ea.	3272 (2) .09# ea.	3551 .8#	7/8 N.C.	3474 (2) .09# ea.	3274 (2) .09# ea.	3275 (2) .01# ea.	3276 .3#	1047 (2) .06# ea.	2837 (2) .1# ea.	4
3270 A Wt 2.9#	3	2-1/2	4	3271 .6#	1	3472 (2) .09# ea.	3272 (2) .09# ea.	2043 .4#	7/8 N.C. 3/4 N.C.	3474 (2) .09# ea.	3274 (2) .09# ea.	3275 (2) .01# ea.	3276 .3#	1047 (2) .06# ea.	2837 (2) .1# ea.	4
970 Wt 3.3#	3-1/4	2-3/4	4-7/8	971 .8#	1	972 (2) .09# ea.	972 A (2) .06# ea.	543 .8#	7/8 N.C. 1 N.C.	974 (2) .2# ea.	974 A (2) .12# ea.	975 (4) .02# ea.	976 (4) .25# ea.	637 (4) .1# ea.		4
970 B Wt 4#	3-1/4	2-3/4	4-7/8	971 .8#	2	972 (2) .09# ea.	972 A (2) .06# ea.	551 1.5#	7/8 N.C.	974 (2) .2# ea.	974 A (2) .12# ea.	975 (4) .02# ea.	976 (4) .25# ea.	637 (4) .1# ea.		4
770 Wt 4.5#	3-1/2	3	4-3/4	771 1.1#	1	772 (2) .34# ea.	772 A (2) .12# ea.	873 A .8#	7/8 N.C.	774 (2) .2# ea.	774 A (2) .12# ea.	775 (4) .03# ea.	776 .25#	747 (4) .18# ea.		4
770 B Wt 5.7#	3-1/2	3	4-3/4	771 1.1#	2	772 (2) .34# ea.	772 A (2) .12# ea.	1151 2#	7/8 N.C.	774 (2) .2# ea.	77 4 A (2) .12# ea.	775 (4) .03# ea.	776 .25#	747 (4) .18# ea.		4
870 Wt 5#	3-1/4 - 4	3-3/8	5-1/8	871 1.6#	1	772 (2) .34# ea.	772 A (2) .12# ea.	873 A .8#	7/8 N.C.	774 (2) .2# ea.	774 A (2) .12# ea.	875 (4) .03# ea.	876 .25#	747 (4) .18# ea.		4
870 B Wt 6.2#	3-1/4 - 4	3-3/8	5-1/8	871 1.6#	2	772 (2) .34# ea.	772 A (2) .12# ea.	1151 2#	7/8 N.C.	774 (2) .2# ea.	774 A (2) .12# ea.	875 (4) .03# ea.	876 .25#	747 (4) .18# ea.		4
770 S A Wt 5.1#	4-3/4	2-3/4	5-1/2	771 S 1.1#	1	772 S (4) .37# ea.		543 .8#	7/8 N.C.	774 S (4) .34# ea.		775 (4) .03# ea.	776 S (4) .25# ea.	747 (4) .18# ea.		4
770 S Wt 5.8#	4-3/4	2-1/4	5-1/2	771 S 1.1#	2	772 S (4) .37# ea.		551 1.5#	7/8 N.C.	774 S (4) .34# ea.		775 (4) .03# ea.	776 S (4) .25# ea.	747 (4) .18# ea.		4

Some items are available on a quotation basis only.

"Self Feed" Clip Type Wing Arm Heads Type 5



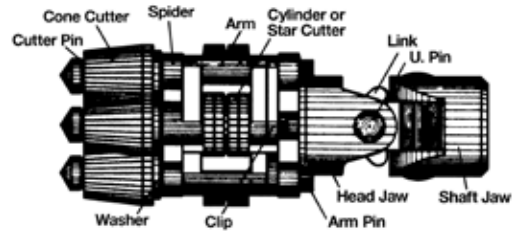
For Straight tubes and Pipe 1-3/4" – 8-3/4" I.D.



When ordering state the motor number and the motor's shaft thread size.

Head Number	Tube ID	Closed	Expand To	Spider	Arm	Coupling	Coupling Plate	Coupling Tap	Cutter Pin	Arm Pin	Clip	Cone Cutter	Cylinder Cutter	Washer
11740 Wt .84#	1- 3/4	1-1/2	2-1/8	11741 .18#	11742 (2) .09# Ea.	11743 B .25#		5/8 N.C.	11744 (2) .03# Ea.	11745 (2) .02# Ea.		11747 (2) .02# Ea.	11748 (8) .01# Ea.	
3060 Wt 1.7#	2-3/8	1-15/16	2-5/8	3061 .3#	3062 S (3) .14# Ea.	3043 .37#		5/8 - 3/4 N.C.	3364 (3) .06# Ea.	3365 (3) .05# Ea.	3068 (3) .1# Ea.	3047 (3) .04# Ea.	3048 (3) .04# Ea.	
2060 Wt .2#	2-1/2	2-1/4	3	3361 .43#	3062 S (3) .14# Ea.	2043 .4#		3/4 - 7/8 N.C.	3364 (3) .06# Ea.	3365 (3) .05# Ea.	3368 (3) .13# Ea.	337 (3) .06# Ea.	338 (15) .02# Ea.	339 (3) .01 Ea.
1060 Wt 3#	3	2-5/8	3-3/4	1061 .56#	1062 S (3) .25# Ea.	1033 .68#		3/4 - 7/8 1 N.C.	1064 (3) .1# Ea.	1065 (3) .09# Ea.	1068 (3) .14# Ea.	1047 (3) .06# Ea.	1048 (15) .02# Ea.	
960 Wt 5.3#	3-1/4	3-1/8	4-1/8	961 1.1#	762 S (3) .37# Ea.	543 .8#		7/8 1 N.C.	35264 (3) .2# Ea.	765 (3) .17# Ea.	35268 (3) .2# Ea.	947 (3) .12# Ea.	948 (27) .02# Ea.	749 (3) .01# Ea.
760 Wt 5.5#	3-1/2	3-1/4	4-1/2	761 1.2#	762 S (3) .37# Ea.	743 .8#		1 - 1-1/8 N.F.	35264 (3) .2# Ea.	765 (3) .17# Ea.	35268 (3) .2# Ea.	747 (3) .18# Ea.	748 (24) .03# Ea.	749 (3) .01# Ea.
5060 AS Wt 5.5#	4-1/2	3-7/8	5-5/8	5061 A 1.5#	562 S (3) .3# Ea.	843 .8#	5043 A .3#	1-1/8 N.F.	564 (3) .17# Ea.	565 (3) .13# Ea.	568 (3) .15# Ea.	747 (3) .18# Ea.	748 (24) .03# Ea.	749 (3) .01# Ea.
35260 Wt 8#	5-1/4	4-1/2	6	35261 2.2#	35262 S(4) .35# Ea	35243 1.2#	35243 A .3#	1-3/8 N.F.	35264 (4) .2# Ea.	35265 (4) .14# Ea.	35268 (4) .2# Ea.	271 (4) .09# Ea.	C 79 (12) .09# Ea.	749 (4) .01# Ea.
36060 Wt 13.5	6	5-3/8	7-1/8	36041 2.8#	36562 S (4) .9# Ea	36043 1.1#		1-1/8 - 1-3/8 N.F.	36564 (4) .3# Ea.	36545 (4) .2# Ea.	36546 (4) .2# Ea.	37697 (4) .2# Ea.	37688 (12) .15# Ea.	36549 (4) .01# Ea.
36560 Wt 15#	6-1/2	5-7/8	7-5/8	36541 C 3.2#	36562 S (4) .9# Ea	35243 1.2#	36543 A .4#	1-3/8 N.F.	36564 (4) .3# Ea.	36545 (4) .2# Ea.	36546 (4) .2# Ea.	37697 (4) .2# Ea.	37288 (12) .2# Ea.	36549 (4) .01# Ea.
37260 Wt 16.8#	7-1/4	6-1/4	8	37241 4.2#	36562 S (4) .9# Ea	8293 1.5#	37243 A .5#	1-3/8 N.F.	36564 (4) .3# Ea.	36545 (4) .2# Ea.	36546 (4) .2# Ea.	37697 (4) .2# Ea.	37288 (12) .2# Ea.	36549 (4) .01# Ea.
37660 Wt 18.5#	7-5/8	6-1/2	8-1/2	37641 5.4#	36562 S (5) .9# Ea	8293 1.5#	37643 A .9#	1-3/8 N.F.	36564 (5) .3# Ea.	36545 (5) .2# Ea.	36546 (5) .2# Ea.	37697 (5) .2# Ea.	37288 (15) .2# Ea.	36549 (5) .01# Ea.
38760 Wt 20.1#	8-3/4	7-1/2	9-1/2	38741 6.4#	36562 S (5) .9# Ea	8293 1.5#	38743 A 1.5#	1-3/8 N.F.	36564 (5) .3# Ea.	36545 (5) .2# Ea.	36546 (5) .2# Ea.	37697 (5) .2# Ea.	37288 (15) .2# Ea.	36549 (5) .01# Ea.

For Curved Tubes and Pipe 1-3/4" – 9" I.D.

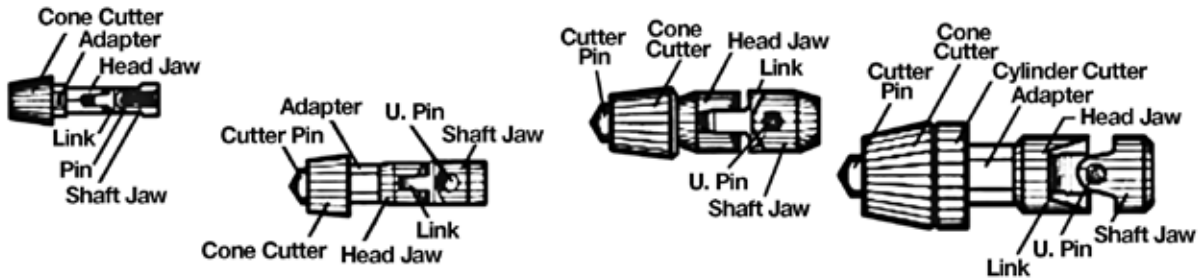


Head Number	Tube ID	Closed	Expand To	Spider	Arm	Universal Cpl	Coupling Plate	Coupling Tap	Cutter Pin	Arm Pin	Clip	Cone Cutter	Cylinder Cutter	Washer
11740 C Wt 1#	2	1-1/2	2-1/8	11741 .18#	11742 (2) .09# Ea.	4151 W .4#		5/8 N.C.	11744 (2) .03# Ea.	11745 (2) .02# Ea.		11747 (2) .02# Ea.	11748 (8) .01# Ea.	
3060 C Wt 1.8#	2-1/4	1-15/16	2-5/8	3061 .3#	3062 S (3) .14# Ea.	4151 .4#		5/8 N.C.	3364 (3) .06# Ea.	3365 (3) .05# Ea.	3068 (3) .1# Ea.	3047 (3) .04# Ea.	3048 (3) .04# Ea.	
3360 Wt .2#	2-5/8	2-1/4	3	3361 .43#	3362 S (3) .18# Ea.	3333 .85#		3/4 N.C.	3364 (3) .06# Ea.	3365 (3) .05# Ea.	3368 (3) .13# Ea.	337 (3) .06# Ea.	338 (15) .02# Ea.	339 (3) .01 Ea.
3560 3/4 3560 7/8 (Wt 3.2#)	2-7/8	2-5/8	3-3/4	1061 .56#	1062 S (3) .25# Ea.	3532 (3/4) 3531 (7/8) .8#		3/4 N.C.	1064 (3) .1# Ea.	1065 (3) .09# Ea.	1068 (3) .14# Ea.	1047 (3) .06# Ea.	1048 (15) .02# Ea.	
960 C Wt 6#	3-1/2	3-1/8	4-1/4	961 1.1#	762 S (3) .37# Ea.	551 1.5#		7/8 N.C.	35264 (3) .2# Ea.	765 (3) .17# Ea.	35268 (3) .2# Ea.	947 (3) .12# Ea.	948 (27) .02# Ea.	749 (3) .01# Ea.
760 C Wt 6.8#	3-3/4	3-1/4	4-1/2	761 1.2#	762 S (3) .37# Ea.	1151 2#		7/8 N.C.	35264 (3) .2# Ea.	765 (3) .17# Ea.	35268 (3) .2# Ea.	747 (3) .18# Ea.	748 (24) .03# Ea.	749 (3) .01# Ea.
5060 A Wt 7.3#	4-13/16	3-7/8	5-5/8	5061 A 1.5#	562 S (3) .3# Ea.	5051 E 3.2#	5043 A .3#	1-1/8 N.F.	564 (3) .17# Ea.	565 (3) .13# Ea.	568 (3) .15# Ea.	747 (3) .18# Ea.	748 (24) .03# Ea.	749 (3) .01# Ea.
35260 C Wt 10#	5-1/4	4-1/2	6	35261 2.2#	35262 S(4) .35# Ea	5051 H 3.1#	35243 A .3#	1-1/8 N.F.	35264 (4) .2# Ea.	35265 (4) .14# Ea.	35268 (4) .2# Ea.	271 (4) .09# Ea.	C 79 (12) .09# Ea.	749 (4) .01# Ea.
36060 C Wt 16#	6	5-3/8	7-1/8	36041 2.8#	36562 S (4) .9# Ea	5051 H 3.1#	36043 A 1.1#	1-1/8 - 1-3/8 N.F.	36564 (4) .3# Ea.	36545 (4) .2# Ea.	36546 (4) .2# Ea.	37697 (4) .2# Ea.	37688 (12) .15# Ea.	36549 (4) .01# Ea.
36560 C Wt 17.3#	6-1/2	5-7/8	7-5/8	36541 C 3.2#	36562 S (4) .9# Ea	5051 H 3.1#	36543 A .4#	1-1/8 - 1- 3/8 N.F.	36564 (4) .3# Ea.	36545 (4) .2# Ea.	36546 (4) .2# Ea.	37697 (4) .2# Ea.	37288 (12) .2# Ea.	36549 (4) .01# Ea.
37260 C Wt 20.1#	7-1/4	6-1/4	8	37241 4.2#	36562 S (4) .9# Ea	21251 A 4.8#	37243 A .5#	1-3/8 N.F.	36564 (4) .3# Ea.	36545 (4) .2# Ea.	36546 (4) .2# Ea.	37697 (4) .2# Ea.	37288 (12) .2# Ea.	36549 (4) .01# Ea.
37660 C Wt 21.8#	7-5/8	6-1/2	8-1/2	37641 5.4#	36562 S (5) .9# Ea	21251 A 4.8#	37643 A .9#	1-3/8 N.F.	36564 (5) .3# Ea.	36545 (5) .2# Ea.	36546 (5) .2# Ea.	37697 (5) .2# Ea.	37288 (15) .2# Ea.	36549 (5) .01# Ea.
38760 C Wt 23.4#	8-1/4	7-1/2	9-1/2	38741 6.4#	36562 S (5) .9# Ea	21251 A 4.8#	38743 A 1.5#	1-3/8 N.F.	36564 (5) .3# Ea.	36545 (5) .2# Ea.	36546 (5) .2# Ea.	37697 (5) .2# Ea.	37288 (15) .2# Ea.	36549 (5) .01# Ea.

Some items are available on a quotation basis only.

Single Unit Heads

1/2" - 2-1/4" I.D. "SERIES 40"



When ordering state the motor number and the motor's shaft thread size.

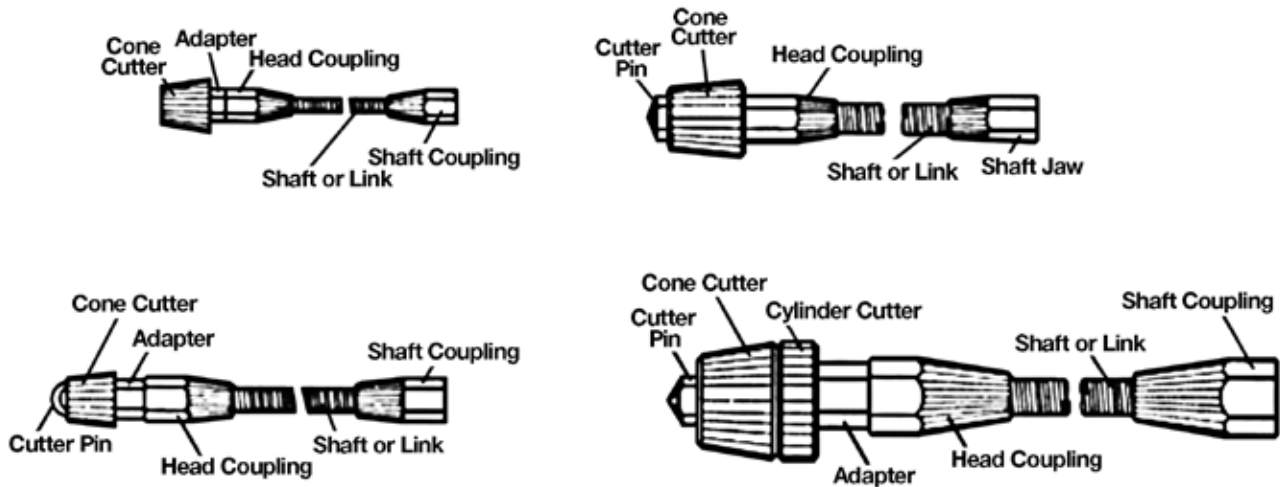
Head Number	Tube I.D.	Universal Joint	Shaft Jaw Tap	Adapter	Cutter Pin	Cone Cutter	Cylinder Cutter
2440 Wt.03#	1/2	2451 .02#	10-32	2443 .01#		2487 S .01#	
3040 WT.07#	5/8 - 11/16	PA 3051 .04#	1/4 N.F.	2734 .02#		3037 .02#	
2740 WT.07#	3/4 - 13/16	PA 3051 .04#	1/4 N.F.	2734 .02#		C 3 .02#	
X 6440 Wt.15#	13/16	6451 .09#	1/4 N.F.		2944 .02#	2947 .03#	
2940 Wt.18#	7/8 - 27/32	2651 .1#	3/8 N.F.	2943 .03#	2944 .02#	2947 .03#	
2640 Wt.22#	1	2651 .1#	3/8 N.F.	2643 .03#	2644 .03#	337 .03#	
X 6140 Wt.18#	1-1/32	6151 .09#	5/16 N.F.		2644 .03#	337 .03#	
3140 Wt.34#	1-1/8	6651 .19#	7/16 N.F.		3144 A .05#	2837 .1#	
X 6340 Wt.37#	1-1/4	6651 .19#	3/8 N.F.		2544 S .06#	947 .12#	
12240 Wt.37#	1-1/4 - 1-1/2	3151 .19#	7/16 N.F.		2544 S .06#	947 .12#	
X 6540 Wt.37#	1-3/8	6651 .19#	3/8 N.F.		2544 S .06#	6547 .12#	
1740 Wt.7#	1-1/2	31551 .37#	9/16 N.F.	1743 .1#	2844 .06#	1097 .1#	1088 .08#
1940 Wt.9#	1-5/8	4151 .4#	5/8 N.C.	1943 .1#	1944 .08#	797 .2#	788 .13#
X 6640 Wt.5#	1-3/4	6651 .19#	3/8 N.F.		2544 S .06#	797 .2#	
4140 Wt.1#	1-5/8 - 2	4151 .4#	5/8 N.C.	1943 .1#	1944 .08#	897 B 0.25	888 B .16#
4440 C Wt.1.1#	2-1/4	4151 .4#	5/8 N.C.	1943 .1#	1944 .08#	897 .3#	888 .19#

Some items are available on a quotation basis only.

Type 2 Single Unit Heads

Airetool

1/2" - 2-1/8" I.D. "30 SERIES"



When ordering state the motor number and the motor's shaft thread size.

Head Number	Tube ID	Flex Connection	Shaft Cpl. Tap	Head Cpl. Tap	Adapter	Cutter Pin	Cone Cutter	Cylinder Cutter	Length	Diameter
2430 Wt .05#	1/2	2461 .04#	10-32	10-32	2443 .01#		2487 S .01#		4	3/16"
3030 WT.06#	5/8	X 6461 .03#	1/4 N.F.	1/4 N.F.	2734 .02#		3037 .02#		4	3/16"
2730 WT.06#	3/4	X 6461 .03#	1/4 N.F.	1/4 N.F.	2734 .02#		C 3 .02#		4	3/16"
X 6430 Wt. 09#	13/16	X 6461 .03#	1/4 N.F.	1/4 N.F.		2944 .02#	2947 .03#		4	3/16"
2930 Wt .18#	7/8	2961 .1#	3/8 N.F.	3/8 N.F.	2943 .03#	2944 .02#	2947 .03#		4-1/2	1/4"
12130 Wt .19#	1	12161 .1#	5/16 N.F.	5/16 N.F.		2644 .03#	337 .03#		4-1/2	1/4"
2630 Wt .19#	1	2661 .1#	3/8 N.F.	5/16 N.F.		2644 .03#	337 .03#		4-1/2	1/4"
X 6130 Wt .13#	1-1/32	X 6161 .04#	5/16 N.F.	5/16 N.F.		2644 .03#	337 .03#		4	3/16"
3130 Wt .25#	1-1/8	X 6361 .1#	7/16 N.F.	3/8 N.F.		3144 A .05#	2837 .1#		4-1/2	1/4"
X 6330 Wt .28#	1-1/4	X 6361 .1#	3/8 N.F.	7/16 N.F.		2544 S .06#	947 .12#		4-1/2	1/4"
X 6530 Wt .36#	1-1/2	X 6661 .18#	3/8 N.F.	7/16 N.F.		2544 S .06#	6547 .12#		6-1/2	3/8"
X 6630 Wt .44#	1-3/4	X 6661 .18#	3/8 N.F.	7/16 N.F.		2544 S .06#	797 .2#		6-1/2	3/8"
4130 Wt 2.2#	1-5/8 - 2-1/8	4161 .6#	5/8 N.C.	5/8 N.C.	1943 .1#	1944 .08#	897 B 0.25	888 B .16#	7	1/2"

Some items are available on a quotation basis only.

Universal Joints

10-32 - 7/8" N.C.

For Adapting Cleaning Heads to Cleaning Motors



Universal Joint No.	Shaft Jaw	Head Jaw	Link	Pin (2) Req.	Joint O.D.	Overall Length	Thread Size	Cleaners Kits Used On
2451 Wt .02#	2452 .01#	2452 .01#	2454 .01#	2454 .01# Ea.	5/16	1-1/4	10-32 X 10-32	24
PA 3051 Wt .04#	PA 3052 .02#	PA 3052 .02#	PA 3054 .01#	PA 3055 .01# Ea.	7/16 (3/8Hex)	1-3/8	1/4 X 1/4 N.F. N.F.	27, 27 A, 30, 30 A
6451 Wt .07#	6453 V .02#	6453 V .02#	6454 V .02#	6455 V .01# Ea.	1/2	1-11/16	1/4 X 1/4 N.F. N.F.	X 64
6451 B Wt .07#	6453 V .02#	6457 V .02#	6454 V .02#	6455 V .01# Ea.	1/2	1-11/16	1/4 X 5/16 N.F. N.C.	X 64
6151 C Wt .07#	6452 V .02#	6453 V .02#	6454 V .02#	6455 V .01# Ea.	1/2	1-11/16	5/16 X 1/4 N.F. N.F.	X 60, X 61
6151 Wt .07#	6452 V .02#	6452 V .02#	6454 V .02#	6455 V .01# Ea.	1/2	1-11/16	5/16 X 5/16 N.F. N.F.	X 61
6151 B Wt .07#	6457 V .02#	6457 V .02#	6454 V .02#	6455 V .01# Ea.	1/2	1-11/16	5/16 X 5/16 N.F. N.C.	X 61
2651 Wt .1#	2652 .03#	2652 .03#	2654 .02#	2655 .01# Ea.	5/8	1-19/32	3/8 X 3/8 N.F. N.F.	26, 29
6351 B Wt .19#	6652 .06#	6657 .06#	6654 .06#	6655 .01# Ea.	3/4	2-1/8	3/8 X 5/16 N.F. N.C.	X 63
6651 B Wt .19#	6652 .06#	6658 .06#	6654 .06#	6655 .01# Ea.	3/4	2-1/8	3/8 X 7/16 N.F. N.C.	X 65, X 66
6651 Wt .19#	6652 .06#	6653 .06#	6654 .06#	6655 .01# Ea.	3/4	2-1/8	3/8 X 7/16 N.F. N.F.	31, X 63, X 65, X 66
3151 Wt .19#	6653 .06#	6653 .06#	6654 .06#	6655 .01# Ea.	3/4	2-1/8	7/16 X 7/16 N.F. N.F.	31
31551 Wt .37#	4157 .1#	4153 .1#	4154 .06#	4155 .03# Ea.	1-1/8	2-1/16	9/16 X 1/2 N.C. N.C.	3150
4151 W Wt .4#	4152 .1#	4153 .1#	4154 .06#	4155 .03# Ea.	1-1/8	2-1/16	5/8 X 1/2 N.C. N.C.	11740 C
4151 Wt .4#	4152 .1#	4152 .1#	4154 .06#	4155 .03# Ea.	1-1/8	2-1/16	5/8 X 5/8 N.C. N.C.	3162, 3175, 3187, 3200, 3212 4200, 4225, 4237, 4250, 4275
3333 WT .8#	3552 .25#	3332 .25#	3554 0.2	3555 .05# Ea.	1-1/2	2-3/4	3/4 X 3/4 N.C. N.C.	3360 Head
3532 WT .8#	3552 .25#	3533 .25#	3554 0.2	3555 .05# Ea.	1-19/32	2-3/4	3/4 X 3/4 N.C. N.C.	3540, 3560 Head 3/4 N.C. Rotor Thread
3531 WT .8#	3557 .25#	3533 .25#	3554 0.2	3555 .05# Ea.	1-19/32	2-3/4	7/8 X 3/4 N.C. N.C.	3540, 3560 Head 7/8 N.C. Rotor Thread

Some items are available on a quotation basis only.

5/8" N.C. - 1-3/8" N.F.

For Adapting Cleaning Heads to Cleaning Motors



Universal No. Joint	Shaft Jaw	Head Jaw	Link	Pin (2) Req.	Joint O.D.	Overall Length	Thread Size	Cleaners Kits Used On
2251 Wt. .9#	3553 .3#	3553 .3#	3554 .2#	3555 .05#	1.5	2.75	5/8 X 5/8 N.C. N.C.	
2151 wt. .85	3552 .25#	3553 .3#	3554 .2#	3555 .05#	1.5	2.75	3/4 X 5/8 N.C. N.C.	3225, 3237
3551 wt. .8#	3552 .25#	3552 .25#	3554 .2#	3555 .05#	1.5	2.75	3/4 X 3/4 N.C. N.C.	4300, 4300 A, 4325
3551 A wt. .85	3552 .25#	3552 .25#	3554 A .25#	3555 .05#	1.5	2.625	3/4 X 3/4 N.C. N.C.	15 Deg. Restricted
1551 Wt. 1.5#	253 .5#	1553 .5#	654 .25#	255 .06#	1.625	3.4375	3/4 X 5/8 N.C. N.C.	
251 Wt. 1.5#	253 .5#	253 .5#	654 .25#	255 .06#	1.625	3.4375	3/4 X 3/4 N.C. N.C.	
21451 wt. 1.4#	21452 .4#	1553 .5#	654 .25#	255 .06#	1.625	3.4375	7/8 X 5/8 N.C. N.C.	3250, 3262,
651 H Wt. .1.7#	653 .6#	653 .6#	654 .25#	655 .07#	1-3/4	3.4375	3/4 X 3/4 N.C. N.C.	
651 wt. 1.6#	652 .5#	653 .6#	654 .25#	655 .07#	1-3/4	3.4375	7/8 X 3/4 N.C. N.C.	3275, 3287, 4350,
651 A wt. 1.6#	652 .5#	653 .6#	654 A .3#	655 .07#	1-3/4	3-7/32	7/8 X 3/4 N.C. N.C.	15 Deg. Restricted
551 wt. 1.5#	652 .5#	652 .5#	654 .25#	655 .07#	1-3/4	3.4375	7/8 X 7/8 N.C. N.C.	4400, 4450, 4425, 4450, 4450 A,
21051 wt. 2.1#	1152 .7#	21053 .8#	1154 .4#	1155 .1#	1-15/16	3.6875	1 X 3/4 N.F. N.C.	3300, 3306
1151 wt. 2#	1152 .7#	1153 .75#	1154 .4#	1155 .1#	1-15/16	3.6875	1 X 7/8 N.F. N.C.	3312, 3318, 3325, 3337
20751 wt. 2.6#	5052 1.1#	1153 .75#	1154 .4#	5055, 1155 .2# .1#	2-1/4	3-7/8	1-1/8 X 7/8 N.F. N.C.	3350 through 3475
5051 wt. 3.2	5052 1.1#	5057 1.2#	1154 .4#	5055 .2#	2-1/4	4.0625	1-1/8 X 7/8 N.F. N.C.	4481, 4500, 4537
5051 E wt. 3.2	5052 1.1#	5053 1.2#	1154 .4#	5055 .2#	2-1/4	4.0625	1-1/8 X 1 N.F. N.F.	4575, 4600, 4650, 4712, 4762
5051 H Wt. 3.1#	5052 1.1#	5052 1.1#	1154 .4#	5055 .2#	2-1/4	4.0625	1-1/8 X 1-1/8 N.F. N.F.	
21251 H wt. 5#	21252 1.6#	21257 1.8#	21254 1#	21255 .2#	2-7/16	5.3125	1-3/8 X 1 N.F. N.F.	3500 through 3900
21251 wt. 4.9#	21252 1.6#	21253 1.7#	21254 1#	21255 .2#	2-7/16	5.3125	1-3/8 X 1-1/8 N.F. N.F.	3975 through 31325
21251 A Wt. 4.8#	21252 1.6#	21252 1.6#	21254 1#	21255 .2#	2-7/16	5.3125	1-3/8 X 1-3/8 N.F. N.F.	

Some items are available on a quotation basis only.

Drill Heads

Airetool Drill Heads are Made From Alloy Steel

Universal Coupling Must Be Ordered Separately



Tube I.D.	Std Drill	Hard Surface Drill	Thread Stud Size	Drill Diameter	Weight Lbs.
1/2	MD 1	N/A	10-32	7/16	0.01
5/8	MD 2	N/A	1/4 N.F.	1/2	0.02
11/16 - 13/16	MD 3	N/A	1/4 N.F.	5/8	0.03
7/8 - 1-1/8	MD 4	N/A	5/16 N.F.	5/8	0.05
1-1/8 - 1-1/4	MD 5	N/A	7/16 N.F.	13/16	0.06
1-3/8 - 1-3/4	00	00 S	7/16 N.F.	1-1/16	0.2
1-1/2	0	0 S	1/2 N.C.	1-5/16	0.25
1-5/8 - 2-1/4	1	1 S	5/8 N.C.	1-3/8	0.3
2-1/4 - 2-3/4	4	4 S	5/8 N.C.	1-3/4	0.5
2-3/4 - 3-1/4	5	5 S	3/4 N.C.	2-3/8	1.06
*3-1/4 - 4"	6	6 S	7/8 N.C.	2-5/8	1.6
*9 - 11"	21	21 S	1-1/8 NF	4-5/8	5.5

* Use this drill with drill extension for larger sizes

Drill Extensions

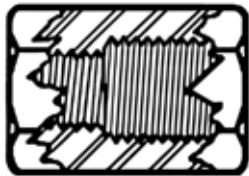
7/8 N.C. Male x 7/8 N.C. Female

Tube I.D.*	Length	Part Number	
4" - 5"	1-1/2	756	4" - 5"
4" - 5"	2	756 A	4" - 5"
4" - 5"	2-1/2	756 B	4" - 5"
5" - 6"	3	756 C	5" - 6"
6" - 10"	4	756 D	7" - 8"
6" - 10"	8	756 G	8" - 10"

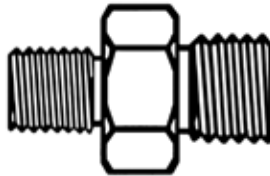
*Using number 6 or 6S Drill.

Some items are available on a quotation basis only.

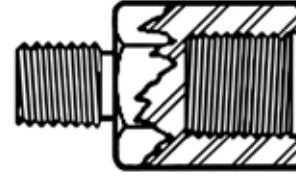
Female X Female



Male X Male



Male X Female



Part Number	Female X Female	Part Number	Male X Male	Part Number	Male X Female
FF 1010	10-32 X 10-32	2443	10-32 X 10-32	MF 22	1/4 N.C. X 1/4 N.F.
FF 1031	10-32 X 5/16 N.C.	MM 1031	10-32 X 5/16 N.F.	MF 231	1/4 N.F. X 5/16 N.C.
FF 22	1/4 N.F. X 1/4 N.F.	MM 250	1/4 N.F. X 1/4 N.F.	MF 231 F	1/4 N.F. X 5/16 N.F.
FF 231	1/4 N.F. X 5/16 N.F.	2734	1/4 N.F. X 5/16 N.C.	MF 312	5/16 N.C. X 1/4 N.F.
FF 237	1/4 N.F. X 3/8 N.F.	MM 24	1/4 N.F. X 7/16 N.F.	MF 312 F	5/16 N.F. X 1/4 N.F.
FF 312	5/16 N.C. X 1/4 N.F.	MM 3034	5/16 N.F. X 1/4 N.F.	MF 3131	5/16 N.C. X 5/16 N.F.
FF 3131	5/16 N.C. X 5/16 N.F.	MM 3131	5/16 N.C. X 5/16 N.C.	MF 3131 F	5/16 N.F. X 5/16 N.C.
FF3137	5/16 N.C. X 3/8 N.F.	MM 3131 F	5/16 N.C. X 5/16 N.F.	MF 314	5/16 N.C. X 7/16 N.F.
FF314	5/16 N.C. X 7/16 N.F.	MM 3137	5/16 N.F. X 3/8 N.F.	MF 314 F	5/16 N.F. X 7/16 N.F.
FF 374	3/8 N.F. X 7/16 N.C.	MM 3737	3/8 N.C. X 3/8 N.C.	2943	3/8 N.F. X 1/4 N.F.
FF 374 F	3/8 N.F. X 7/16 N.F.	MM 3737 F	3/8 N.F. X 3/8 N.F.	MF 3731	3/8 N.F. X 5/16 N.C.
FF 376	3/8 N.C. X 5/8 N.C.	MM 374	3/8 N.C. X 7/16 N.C.	MF 3731 F	3/8 N.F. X 5/16 N.F.
FF 437	7/16 N.C. X 3/8 N.C.	MM 374 F	3/8 N.F. X 7/16 N.F.	2643	3/8 N.F. X 5/16 N.F.
FF 45	7/16 N.F. X 1/2 N.C.	MM 437	7/16 N.C. X 3/8 N.F.	MF 3737	3/8 N.C. X 3/8 N.F.
FF 456	7/16 N.F. X 9/16 N.C.	MM 44	7/16 N.F. X 7/16 N.F.	MF 374	3/8 N.C. X 7/16 N.C.
FF 46	7/16 N.F. X 5/8 N.C.	MM 456	7/16 N.F. X 9/16 N.C.	MF 374 F	3/8 N.F. X 7/16 N.F.
FF 47	7/16 N.C. X 3/4 N.C.	MM 46	7/16 N.F. X 5/8 N.C.	MF 431	7/16 N.C. X 5/16 N.C.
FF 54	1/2 N.F. X 7/16 N.C.	MM 5056	1/2 N.C. X 9/16 N.C.	MF 431 F	7/16 N.F. X 5/16 N.F.
FF 56	1/2 N.F. X 5/8 N.C.	MM 56	1/2 N.C. X 5/8 N.C.	MF 433	7/16 N.C. X 3/8 N.C.
FF 56 F	1/2 N.F. X 5/8 N.F.	MM 564	9/16 N.C. X 7/16 N.C.	MF 4343	7/16 N.C. X 7/16 N.F.
FF 564	9/16 N.C. X 7/16 N.C.	MM 5650	9/16 N.C. X 1/2 N.F.	MF 435	7/16 N.C. X 1/2 N.C.
FF 5656	9/16 N.C. X 9/16 N.C.	MM 5656	9/16 N.C. X 9/16 N.C.	MF 435 F	7/16 N.F. X 1/2 N.C.
FF 566	9/16 N.C. X 5/8 N.C.	MM 566	9/16 N.C. X 5/8 N.C.	MF 436	7/16 N.C. X 5/8 N.C.
FF 567	9/16 N.C. X 3/4 N.C.	MM 567	9/16 N.C. X 3/4 N.C.	MF 436 F	7/16 N.F. X 5/8 N.C.
FF 637	5/8 N.C. X 3/8 N.F.	MM 568	9/16 N.C. X 7/8 N.C.	MF 531	1/2 N.F. X 5/16 N.F.
FF 64	5/8 N.C. X 7/16 N.C.	MM 561	9/16 N.C. X 1 N.F.	1743	1/2 N.C. X 3/8 N.C.
FF 65	5/8 N.C. X 1/2 N.C.	MM 66	5/8 N.C. X 5/8 N.C.	MF 543	1/2 N.C. X 7/16 N.C.
FF 66	5/8 N.C. X 5/8 N.C.	MM 67	5/8 N.C. X 3/4 N.C.	MF 543 F	1/2 N.F. X 7/16 N.C.
FF 66 F	5/8 N.C. X 5/8 N.F.	MM 68	5/8 N.C. X 7/8 N.C.	MF 56	1/2 N.C. X 5/8 N.C.
FF 67	5/8 N.C. X 3/4 N.C.	MM 77	3/4 N.C. X 3/4 N.C.	MF 56 F	1/2 N.F. X 5/8 N.C.
FF 68	5/8 N.C. X 7/8 N.C.	MM 78	3/4 N.C. X 7/8 N.C.	MF 57	1/2 N.C. X 3/4 N.C.
FF 77	3/4 N.C. X 3/4 N.C.	MM 88	7/8 N.C. X 7/8 N.C.	MF 563	9/16 N.C. X 3/8 N.C.
FF 78	3/4 N.C. X 7/84 N.C.	MM 81	7/8 N.C. X 1 N.C.	MF 565	9/16 N.C. X 1/2 N.C.
FF 856	7/8 N.C. X 9/16 N.C.	MM 11	1 N.F. X 1 N.F.	MF 566	9/16 N.C. X 5/8 N.C.
FF 86	7/8 N.C. X 5/8 N.F.	MM 112	1 N.F. X 1-1/8 N.F.	MF 567	9/16 N.C. X 3/4 N.C.
FF 88	7/8 N.C. X 7/8 N.C.	MM 1111	1-1/8 N.F. X 1-1/8 N.F.	MF 568	9/16 N.C. X 7/8 N.C.
FF 81	7/8 N.C. X 1 N.F.	MM 1313	1-3/8 N.F. X 1-3/8 N.F.	MF 561	9/16 N.C. X 1 N.F.
FF 16	1 N.F. X 5/8 N.C.			MF 631	5/8 N.C. X 5/16 N.C.
FF 17	1 N.F. X 3/4 N.C.			MF 637	5/8 N.C. X 3/8 N.C.
FF 11	1 N.F. X 1 N.F.			1943	5/8 N.C. X 7/16 N.F.
FF 111	1 N.F. X 1-1/8 N.F.			MF 65	5/8 N.C. X 1/2 N.F.
FF 118	1-1/8 N.F. X 7/8 N.C.			MF 656	5/8 N.C. X 9/16 N.C.
FF 1111	1-1/8 N.F. X 1-1/8 N.F.			MF 68	5/8 N.C. X 7/8 N.C.
				MF 743	3/4 N.C. X 7/16 N.F.
				MF 743 F	3/4 N.F. X 7/16 N.C.
				MF 76	3/4 N.C. X 5/8 N.C.
				MF 71	3/4 N.C. X 1 N.C.
				MF 711	3/4 N.C. X 1-1/8 N.F.
				MF 86	7/8 N.C. X 5/8 N.C.
				MF 86 F	7/8 N.C. X 5/8 N.F.
				MF 87	7/8 N.C. X 3/4 N.C.
				MF 81	7/8 N.C. X 1 N.F.
				MF 811	7/8 N.C. X 1-1/8 N.F.
				MF 813	7/8 N.C. X 1-3/8 N.F.
				MF 16	1 N.F. X 5/8 N.F.
				MF 18	1 N.F. X 7/8 N.C.
				MF 1111	1 N.F. X 1-1/8 N.F.
				MF 1113	1-1/8 N.F. X 1-3/8 N.F.
				MF 138	1-3/8 N.F. X 7/8 N.C.
				MF 1311	1-3/8 N.F. X 1-3/8 N.F.

Flexible Connections



Number	Thread Size	Core Dia.	Cleaner Motor Options	Type "A"		Type C	
				Approx. Length	Wt.	Approx. Length	Wt.
2461	10-32 X 10-32	3/16	24	4"	.06#	13"	.2#
X 6461	1/4 N.F. X 1/4 N.F.		30,27, X 64				
X 6462	1/4 N.F. X 5/16 N.C.		27, X 64				
X 6161	5/16 N.F. X 5/16 N.F.		X 61				
X 6162	5/16 N.F. X 5/16 N.C.		X 61				
2661	3/8 N.F. X 5/16 N.F.	1/4	26	4-1/2"	.18#		.4#
X 6362	3/8 N.F. X 5/16 N.C.		26, 29, X 63				
2961	3/8 N.F. X 3/8 N.F.		29				
X 6361	3/8 N.F. X 7/16 N.F.		X 63,31				
3161	7/16 N.F. X 5/16 N.C.		31				
X 6661	3/8 N.F. X 7/16 N.F.	3/8	X 65, X 66	6-1/2"	.25#		.45#
X 6662	3/8 N.F. X 7/16 N.C.		X 65, X 66				
2561	7/16 N.F. X 7/16 N.F.	1/2		6-1/2"	.5#		1#
4161	5/8 N.C. X 5/8 N.C.		3175, 4225				
4162	5/8 N.C. X 9/16 N.C. Male		4200, 4225, 4250				
4163	5/8 N.C. X 7/16 N.C.		4200				
31561	9/16 N.C. X 1/2 N.C.		3150				
43061	3/4 N.C. X 3/4 N.C.	5/8	4300, 4325	Not Available		14"	1.5#
43062	3/4 N.C. X 9/16 N.C. Male		3225, 4300, 4325				
32261	3/4 N.C. X 5/8 N.C.		3225				
42561	5/8 N.C. X 5/8 N.C.		3200, 3300, 4250				
42562	5/8 N.C. X 9/16 N.C. Male		3200, 4250				
43561	7/8 N.C. X 3/4 N.C.	3/4	4350, 3250	Not Available			2.6#
44061	7/8 N.C. X 7/8 N.C.		4350, 4450				
44062	7/8 N.C. X 7/8 N.C. Male		4450				
43562	7/8 N.C. X 9/16 N.C. Male		3250, 4350				
33061	1 N.F. X 1 N.F.	1	3300	Not Available			3.1#
33063	1 N.F. X 7/8 N.C.		3300				
33561	1-1/8 N.F. X 1-1/8 N.F.		3350, 3400, 4600				
33562	1-1/8 N.F. X 1 N.F.		3350, 3400, 4600				
44861	1-1/8 N.F. X 7/8 N.C.		3350, 3400, 4600				
44862	1-1/8 N.F. X 7/8 N.C. Male		3350, 3400, 4600				
35061	1-3/8 N.F. X 1 N.F.		3500 and up				
35062	1-3/8 N.F. X 1- 1/8 N.F.		3500 and up				
35063	1-3/8 N.F. X 1-3/8 N.F. Male		3500 and up				

Some items are available on a quotation basis only.

Expanding Blade Type Head



When ordering state the motor number and the motor's shaft thread size.

Head Number	Tube ID	Min. Diameter	Max. Diameter	Stud Size	Body & Ft Retainer	Rear Retainer	Blade Set	# of Blades	Coupling	Coupling Tap
2840 Wt .05	1/2	29/64	37/64	10-32	2481 .03#	2483 .01#	2487 .01#	4	FF 1010	10-32
3080 Wt .08	5/8	9/16	11/16	1/4 N.F.	3081 .06#	3083 .01#	3087 .01#	3	FF 22	1/4 N.F.
2780 Wt .1	3/4	11/16	13/16	1/4 N.F.	2781 .07#	2783 .01#	2787 .01#	3	FF 22	1/4 N.F.
6480 Wt .17	13/16	3/4	7/8	5/16 N.C.	2981 .12#	2983 .01#	6487 .02#	3	FF 312	1/4 N.F.
2980 Wt .18	7/8	25/32	29/32	5/16 N.C.	2981 .12#	2983 .01#	2987 .03#	3	FF 3137	3/8 N.F.
6180 Wt .25	1	7/8	1-3/32	5/16 N.C.	6181 .18#	6183 .02#	6187 .06#	4	FF3137 FF3131	3/8 N.F. 5/16 N.F.
2680 Wt .25	1	15/16	1-5/32	5/16 N.C.	6181 .18#	6183 .02#	2687 .07#	4	FF 3137	3/8 N.F.
3180 Wt .3	1-1/8	1-1/32	1-1/4	5/16 N.C.	3181 .2#	3183 .03#	3187 .08#	4	FF 314 FF 3131	7/16 N.F. 5/16 N.F.
6380 Wt .31	1-1/4	1-5/32	1-3/8	5/16 N.C.	3181 .2#	3183 .03#	6387 .09#	4	FF3137 FF 314	3/8 N.F. 7/16 N.F.
6580 Wt .33	1-3/8	1-9/32	1-1/2	5/16 N.C.	3181 .2#	3183 .03#	6587 .1#	4	FF3137 FF 314	3/8 N.F. 7/16 N.F.
1780 Wt .83	1-1/2	1-3/8	1-11/16	9/16 N.C.	1781 .6#	1783 .12#	1787 .11#	4	FF 5656	9/16 N.C.
1880 Wt .84	1-5/8	1-1/2	1-13/16	5/8 N.C.	1881 .6#	1883 .12#	1887 .12#	4	FF 66	5/8 N.C.
1980 Wt .84	1-3/4	1-5/8	1-15/16	5/8 N.C.	1981 .6#	1883 .12#	1987 .13#	4	FF 66	5/8 N.C.
2380 C Wt .85	1-7/8	1-3/4	2-1/16	5/8 N.C.	1881 .6#	1883 .12#	2387 C .14#	4	FF 66	5/8 N.C.
2380 Wt .86	2	1-7/8	2-3/16	5/8 N.C.	2381 .6#	1883 .12#	2387 .15#	4	FF 66	5/8 N.C.
21680 S Wt 1.1	2-1/8	1-3/4	2-1/4	5/8 N.C.	21681 S .9#	21683 S .13#	21587 .16#	4	FF 66	5/8 N.C.
21580 Wt 1.5	2-1/4	1-7/8	2-3/8	3/4 N.C.	21581 1.2#	21583 .15#	21587 .16#	4	FF 77	3/4 N.C.
21480 Wt 1.8	2-1/2	2-1/8	2-5/8	3/4 N.C.	21481 1.5#	21483 .18#	21587 .16#	4	FF 78	7/8 N.C.
21380 Wt 3	2-3/4	2-3/8	2-15/16	7/8 N.C.	21381 1.9#	21383 .4#	21087 .7#	6	FF 88	7/8 N.C.
21080 Wt 4	3	2-5/8	3-5/16	1 N.F.	21081 2.9#	21083 .4#	21087 .7#	6	FF 11	1 N.F.
20980 Wt 5.6	3-1/4	2-7/8	3-3/8	1 N.F.	20781 4#	20783 .8#	20987 .8#	6	FF 11	1 N.F.
20780 Wt 5.62	3-1/2	3-1/8	3-5/8	1 N.F.	20781 4#	20783 .8#	20787 .82#	6	FF 111	1-1/8 N.F.
20880 Wt 5.64	4	3-5/8	4-1/8	1 N.F.	20781 4#	20783 .8#	20887 .84#	6	FF 111	1-1/8 N.F.
20880 H Wt 5.68	4-1/2	4-1/8	4-5/8	1 N.F.	20781 4#	20783 .8#	20887 H .86#	6	FF 111	1-1/8 N.F.

Some items are available on a quotation basis only.

Boiler Tube Cleaners

Accessories



Gas Line Cleaner Motors

Used successfully by gas utilities for cleaning old service lines before insertion of replacement plastic pipe. Cleaning operation removes debris from old pipe. Barrel-shaped cutter head helps eliminate “hanging up” in pipe. Standard sizes: 1-1/4 in. and 1-1/2 in. Other sizes available upon request. Can be furnished as Complete Kit consisting of 25 or 50 ft. length of wire wound hose, 1/2 in. lubricator, motor and head, spare cutters and metal box.

Model	Inside Pipe Diameter		Motor Diameter		Air Inlet		Hose Size	
	In.	mm	In.	mm	In.	mm	In.	mm
X-63-A*	1-1/4	31.7	1-1/16	26.9	3/8	9.5	3/8	9.5
X-65-A*	1-1/2	38.1	1-3/16	30.1	3/8	9.5	3/8	9.5

* Other sizes available upon request.



Flexible Drive Shaft

Use for connecting cleaning head to motor when cleaning tubes with short radius bends. Complete with Female/Female couplings in lengths varying from 4 to 14 in. See page 96.

Model FV-100 Foot Valve

For quick control of air when cleaning tubes. Has LOCK ON-EASY OFF feature. Easily secured to working platform or most convenient location.



Length		Width		Height		NPT	Weight	
In.	mm	In.	mm	In.	mm		Lbs.	kg
Model FV-100 Foot Valve								
10	254	6-1/2	165.1	4	101.6	1	12	5.45



In-Line Lubricator

Hose Size In.	Lubricators Available	Bowl Capacity	Stock Number
1/2 NPT	#0	1/6 pt (7 cl)	3067800
3/4 NPT	#1	1/3 pt (15 cl)	3067900
3/4 NPT	#2	1/2 pt (23 cl)	3068000
1 NPT	#3	1 pt (47 cl)	3068100

Air Hose Selection Guide

Note: Standard “WB-LHWW” braid hose has one layer wire braid and a left hand wire wound outside hose protector.

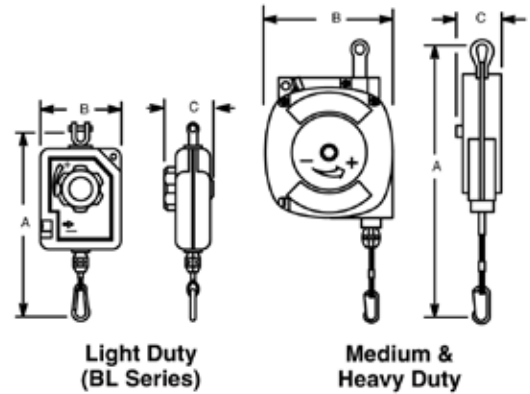
Hose Size In.	Working Pressure PSI	Length ft.	Part Number	Stock Number	Air Coupling Pipe Tap Size In.	Wire Wound (W/W) Not Wire Wound (N/WW)	Hose OD (over wire) in.
Air Motor – 25							
3/16	250	25	3/16" -25 ft.-250	4105071	18-20	N/WW	7/16
3/16	250	50	3/16" -50 ft.-250	4105072	18-20	N/WW	7/16
Air Motors – 27, 27A, 30, 30A							
1/4	225	25	1/4" -25 ft.-225	4105075	1/8	N/WW	17/32
1/4	225	50	1/4" -50 ft.-225	4105076	1/8	N/WW	17/32
Air Motors – X-64, X-61							
1/4	225	25	1/4" -25 ft.-225	4105073	1/4	N/WW	17/32
1/4	225	50	1/4" -50 ft.-225	4105074	1/4	N/WW	17/32
Air Motor – 29							
3/8	205	25	3/8" -25 ft.-205	4105083	1/4	N/WW	11/16
3/8	205	50	3/8" -50 ft.-205	4105084	1/4	N/WW	11/16
Air Motors – 26, 31							
3/8	205	25	3/8" -25 ft.	4105088	3/8	N/WW	11/16
3/8	205	50	3/8" -50 ft.	4105089	3/8	N/WW	11/16
Air Motors – X-63, X-63A, X-65, X-65A, X-66							
3/8	625	25	3/8" -25 ft.-WB-LHWW	1717371	3/8	Left hand W/W	7/8
3/8	625	50	3/8" -50 ft.-WB-LHWW	1717372	3/8	Left hand W/W	7/8
Air Motors – 3150, 3175, 4200, 4225, 4250							
1/2	625	25	1/2" -25 ft.-WB-LHWW	1717373	1/2	Left hand W/W	1
1/2	625	50	1/2" -50 ft.-WB-LHWW	1717374	1/2	Left hand W/W	1
Air Motors – 3162, 3187, 3200, 3225, 3212, 4300, 4325							
3/4	625	25	3/4" -25 ft.-WB-LHWW	1717375	3/4	Left hand W/W	1-1/4
3/4	625	50	3/4" -50 ft.-WB-LHWW	1717376	3/4	Left hand W/W	1-1/4
All other air motors							
1	625	25	1" -25 ft.-WB-LHWW	1717377	1	Left hand W/W	1-5/8
1	625	50	1" -50 ft.-WB-LHWW	1717378	1	Left hand W/W	1-5/8

Some items are available on a quotation basis only.



Capacity:
0.5 – 45.5 kg
1.0 – 100 Lbs.

- External Tension Adjustment
- 360° Swivel
- Retracting in-line Cable

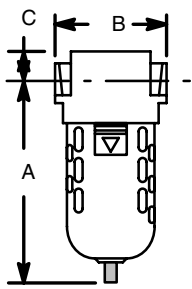


Model Number	Lock Feature	Capacity		"A"		"B"		"C"		Weight	
		lbs.	kg	in	mm	in	mm	in.	mm	lbs.	kg
Light Duty – 5.2 ft. (1.6m) Cable Travel											
BL-2A	–	2.0-1.0	0.9-0.5	10.4	263	4.0	102	2.2	56	1.1	0.5
BL-4A	–	4.0-2.0	1.8-0.9	10.4	263	4.0	102	2.2	56	1.1	0.5
Light Duty – 6.7 ft. (2.0m) Cable Travel											
BL-6A	–	6.0-4.0	2.7-1.8	12.9	327	5.5	140	3.1	79	3.3	1.5
BL-6A	Ratchet	6.0-4.0	2.7-1.8	12.9	327	5.5	140	3.1	79	3.3	1.5
BL-8A	–	8.0-6.0	3.6-2.7	12.9	327	5.5	140	3.1	79	3.3	1.5
BL-8A	Ratchet	8.0-6.0	3.6-2.7	12.9	327	5.5	140	3.1	79	3.3	1.5
Medium Duty – 6.6ft. (2.0m) Cable Travel											
BM-13A	Non-Locking	13-9.0	5.9-4.1	13.8	350	6.9	175	4.5	114	9.0	4.1
BM-13A	Lock/Release	13-9.0	5.9-4.1	13.8	350	6.9	175	4.5	114	9.0	4.1
BM-18A	Non-Locking	18-13	8.2-5.9	13.8	350	6.9	175	4.5	114	9.0	4.1
Medium Duty – 6.0ft. (1.8m) Cable Travel											
BM-25A	Automatic	25-18	11.4-8.2	20.7	527	7.8	197	6.6	169	19	8.6
BM-35A	Automatic	35-25	15.9-11.4	20.7	527	7.8	197	6.6	169	19	8.6
BM-45A	Automatic	45-35	20.5-15.9	20.7	527	7.8	197	6.6	169	19	8.6

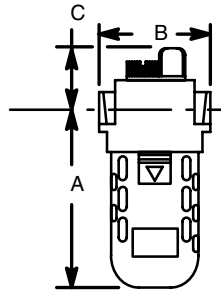
General Accessories

Filters and Lubricators

Modular Construction



Filter



Lubricator



Model Number	NPT Size	Air Flow		Bowl Capacity		Dimensions					
						A		B		C	
						in.	mm	in.	mm	in.	mm
Filters											
F02-M	1/4	35	9.9	5.0	0.15	5.6	142	3.0	76	0.9	23
F03-M	3/8	44	12.9	5.0	0.15	5.6	142	3.0	76	0.9	23
Lubricators – Economist (Standard Mist)											
L03-EP	3/8	48	6.2	5.0	0.15	4.8	122	3.0	76	1.6	41



Modular Sleeve & Bracket (with O-Ring) Model: MS-102

Combination sleeve/wall mounting bracket as shown. Designed for mounting a single unit or combination of units directly to the wall. The sleeve and mounting bracket can be ordered assembled from the factory, or just the mounting bracket alone to be used on existing modular sleeves.

Speed, Feed & Power

Please use the chart below as a guide only. Many variables contribute to the optimum parameters for each application. These variables include: particular material characteristics, cutter design, cutter sharpness, airline pressure and flow capacity and cutter lubrication.

All portable drilling tools have limited power and thrust. In most cases, holes over 1/2 inch diameter cannot be produced at machine tool rates. Feed rates and/or speeds are reduced. Consult Apex Tool Group for advise on particular applications.

For best results with your drilling system:

1. Maintain lubricated air to the tool with pressure of 90 psig *while the tool is running.*
2. Use high quality cutters.
3. Replace cutters when point dulls – hole diameter generally increases, cycle times lengthen (*except positive feed*) and hole finish worsens.
4. Whenever possible, provide lubricant mist to the drill point.
5. Insure there is an adequate flow path for drill chips (*swarf*).
6. Utilize fixtures that are secure and rigid.
7. Assure that accessory items are sized correctly and working properly.
8. Train operating personnel in the proper use of the tool.
9. **Please consult the machinery handbook for optimum cutting feeds and speeds.**

Material	Function	Drill Diameter						
		1/8 .125	3/16 .188	1/4 .250	5/16 .313	3/8 .375	7/16 .437	1/2 .500
Aluminum (300 SFM)	Speed (RPM)	9000	6000	4600	3600	3000	2600	2300
	Feed Rate (IPR)	.002	.003	.004	.004	.004	.004	.004
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
Mild Steel (90 SFM)	Speed (RPM)	2700	1800	1300	1100	900	750	650
	Feed Rate (IPR)	.005	.005	.005	.006	.006	.006	.006
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
High Strength Steel Stainless Steel (30 SFM)	Speed (RPM)	900	600	450	375	300	250	220
	Feed Rate (IPR)	.001	.001	.001	.001	.001	.001	.001
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0
Titanium/Inconel (20 SFM)	Speed (RPM)	600	400	300	250	200	175	150
	Feed Rate (IPR)	.002	.003	.003	.003	.004	.004	.005
	Power (HP)	.2	.3	.6	1.0	1.5	1.8	2.0

Composites Graphite, kevlar, fiberglass, and other composite materials vary widely. Fiber, resin, processing method and type of cutting tool all affect the optimum drilling speed and feedrate. Little power or thrust is normally required, but controlled feedrates at the proper speed is mandatory. Carbide or diamond cutting tools are required. Contact your material supplier or experiment with an NC Drilling Machine.

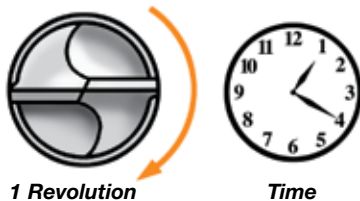
Stacks of Various Materials Use the lowest speed and feedrate of the materials in the stack. Peck feed drilling is best.

A. Peck Drilling permits higher drilling speeds B. Carbide cutting tools (when applicable) permits higher drilling speeds C. Oil hole cutting tools permit higher drilling speeds.

Speed (RPM)

Describes the number of revolutions of the spindle per unit of time.

Example: *Revolutions per minute=RPM*

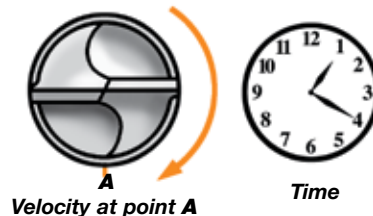


$$\text{Speed} = \text{Revolution} \div \text{Time}$$

Surface Speed (SFM)

Describes the velocity (*speed*) of the **outside** of the drill bit.

Example: *30 surface feet per minute (30 SFM)*

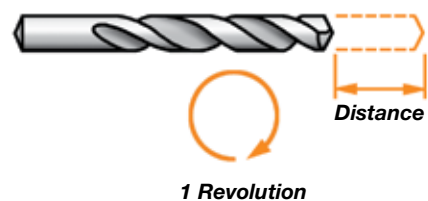


$$\text{Surface Speed} = \text{Distance} \div \text{Time (rotational)}$$

Feed Rate (IPR)

Describes the distance the spindle travels during each revolution.

Example: *0.002 inches per revolution = .002 IPR*



$$\text{Feed Rate} = \text{Distance} \div \text{Revolution}$$

Technical Information

Cutting Speeds

Recommended Cutting Speeds for Tube Cutters and Tube Facers

The recommended cutting speeds in this chart are based on published speeds and feeds. A slower RPM may be necessary depending on tube material analysis and hardness. Proper lubrication must be used.

Tube Material	Tube O.D.									
	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1-1/4"	1-1/2"	2"
Aluminum (500 FPM)	7500 rpm	5000 rpm	3800 rpm	3000 rpm	2500 rpm	2200 rpm	1900 rpm	1500 rpm	1275 rpm	950 rpm
Brass (300 FPM)	4600 rpm	3050 rpm	2300 rpm	1825 rpm	1625 rpm	1300 rpm	1150 rpm	925 rpm	750 rpm	575 rpm
Copper (250 FPM)	3825 rpm	2550 rpm	1900 rpm	1525 rpm	1275 rpm	1100 rpm	950 rpm	750 rpm	625 rpm	500 rpm
Carbon Steel (FPM)	2150 rpm	1425 rpm	1075 rpm	850 rpm	700 rpm	625 rpm	525 rpm	425 rpm	350 rpm	275 rpm
Stainless Steel (65 FPM)	1000 rpm	660 rpm	500 rpm	400 rpm	330 rpm	285 rpm	250 rpm	200 rpm	165 rpm	125 rpm
Titanium (30 FPM)	450 rpm	300 rpm	230 rpm	185 rpm	155 rpm	130 rpm	115 rpm	95 rpm	75 rpm	60 rpm
Inconel (20 FPM)	305 rpm	205 rpm	155 rpm	125 rpm	100 rpm	90 rpm	75 rpm	60 rpm	50 rpm	40 rpm

Special Tables

Airetool Boiler Cleaner Motor Air Consumption Chart

Proper air supply and lubrication are imperative for proper operation of the Airetool boiler tube cleaner motors. 90 psi should be maintained at motor during operation for best cleaning results. Motor requires 20 to 30 drops of oil per minute.

Boiler Cleaner Motor – Air Consumption C.F.M.

Motor Number	Pressure			Motor Number	Pressure		
	60 Lbs.	80 Lbs.	100 Lbs.		60 Lbs.	80 Lbs.	100 Lbs.
3500	176	196	255	27A	09	10	11
3450	174	194	248	27	09	10	11
3400	174	194	248	30A	09	10	11
3350	155	178	207	30	09	10	11
3318	137	159	203	24	08	09	10
3312	129	149	200	4600	119	134	149
3300	129	149	200	4481	119	134	149
3275	127	147	172	4450	76	85	93
3262	95	109	132	4400	61	66	74
3250	93	106	127	4350	61	66	74
3225	86	95	115	4325	58	64	72
3212	79	87	103	4300	57	63	71
3187	65	72	90	4250	55	61	69
3175	57	69	86	4225	33	37	41
3150	51	60	74	4200	33	37	41
X-65-A	20	23	27	X-66	22	25	29
X-63-A	18	21	23	X-65	20	23	27
31	21	23	26	X-63	18	21	23
26	21	27	30	X-61	12	14	16
29	21	27	30	X-64	10	11	12

Decimal Equivalents															
In.	Dec.	In.	Dec.	In.	Dec.	In.	Dec.	In.	Dec.	In.	Dec.	In.	Dec.	In.	Dec.
1/64	.016	9/64	.141	17/64	.266	25/64	.391	33/64	.516	41/64	.641	49/64	.766	57/64	.891
1/32	.031	5/32	.156	9/32	.281	13/32	.406	17/32	.531	21/32	.656	25/32	.781	29/32	.906
3/64	.047	11/64	.172	19/64	.297	27/64	.422	35/64	.547	43/64	.672	51/64	.797	59/64	.922
1/16	.063	3/16	.188	5/16	.313	7/16	.438	9/16	.563	11/16	.688	13/16	.813	15/16	.938
5/64	.078	13/64	.203	21/64	.328	29/64	.453	37/64	.578	45/64	.703	53/64	.828	61/64	.853
3/32	.094	7/32	.219	11/32	.344	15/32	.469	19/32	.594	23/32	.719	27/32	.844	31/32	.969
7/64	.109	15/64	.234	23/64	.359	31/64	.484	39/64	.609	47/64	.734	55/64	.859	63/64	.984
1/8	.125	1/4	.250	3/8	.375	1/2	.500	5/8	.625	3/4	.750	7/8	.875	1	1.000

Tube Sizes – Birmingham Wire Gauges

OD of Tube (in.)	Birmingham Wire Gauge												
	00-.380	0-.340	1-.300	2-.284	3-.259	4-.238	5-.220	6-.203	7-.180	8-.165	9-.148	10-.134	11-.120
1/4													
3/8													
5/8													
3/4												.482	.510
7/8												.607	.635
1										.670	.704	.732	.760
1-1/4										.920	.954	.982	1.010
1-1/2										1.170	1.204	1.232	1.260
1-3/4							1.310	1.344	1.390	1.420	1.454	1.482	1.510
2						1.524	1.560	1.594	1.640	1.670	1.704	1.732	1.760
2-1/4	1.490	1.570	1.650	1.682	1.732	1.774	1.810	1.844	1.890	1.920	1.954	1.982	2.010
2-1/2	1.740	1.820	1.900	1.932	1.982	2.024	2.050	2.094	2.140	2.170	2.204	2.232	2.260
2-3/4	1.990	2.070	2.150	2.182	2.232	2.274	2.310	2.344	2.390	2.420	2.454	2.482	2.510
3	2.240	2.320	2.400	2.432	2.482	2.524	2.560	2.594	2.640	2.670	2.704	2.732	2.760
3-1/4	2.490	2.570	2.650	2.682	2.732	2.774	2.810	2.844	2.890	2.920	2.954	2.982	3.010
3-1/2	2.740	2.820	2.900	2.932	2.982	3.024	3.060	3.094	3.140	3.170	3.204	3.232	3.260
3-3/4	2.990	3.070	3.150	3.182	3.232	3.274	3.310	3.344	3.390	3.420	3.454	3.482	3/510
4	3.240	3.320	3.400	3.432	3.482	3.524	3.560	3.594	3.640	3.670	3.704	3.732	3.760
4-1/4	3.490	3.570	3.650	3.682	3.732	3.774	3.810	3.844	3.890	3.920	3.954	3.982	4.010
4-1/2	3.740	3.820	3.900	3.932	3.982	4.024	4.060	4.094	4.140	4.170	4.204	4.232	4.260
4-3/4	3.990	4.070	4.150	4.182	4.232	4.274	4.310	4.344	4.390	4.420	4.454	4.482	4.510
5	4.240	4.320	4.400	4.432	4.482	4.524	4.560	4.594	4.640	4.670	4.704	4.732	4.760
5-1/4	4.490	4.570	4.650	4.682	4.732	4.774	4.810	4.844	4.890	4.920	4.954	4.982	5.010

OD of Tube (in.)	Birmingham Wire Gauge												
	12-.109	13-.095	14-.083	15-.072	16-.065	17-.058	18-.049	19-.042	20-.035	21-.032	22-.028	23-.025	24-.022
1/4							.152	.166	.180	.186	.194	.200	.206
3/8						.259	.277	.291	.305	.311	.319	.325	.331
1/2		.310	.334	.356	.370	.384	.402	.416	.430	.436	.444	.450	.456
5/8	.407	.435	.459	.481	.495	.509	.527	.541	.555	.561	.569	.575	.581
3/4	.532	.560	.584	.606	.620	.634	.652	.666	.680	.686	.694	.700	.706
7/8	.657	.685	.709	.731	.745	.759	.777	.791	.805	.811	.819	.825	.831
1	.782	.810	.834	.856	.870	.884	.902	.916	.930	.936	.944	.950	.956
1-1/4	1.032	1.060	1.084	1.106	1.120	1.134	1.152	1.166	1.180	1.186	1.194	1.200	1.206
1-1/2	1.282	1.310	1.334	1.356	1.370	1.384	1.402	1.416	1.430	1.436	1.444	1.450	1.456
1-3/4	1.532	1.560	1.584	1.606	1.620	1.634	1.652	1.666	1.680	1.686	1.694	1.700	1.706
2	1.782	1.810	1.834	1.856	1.870	1.884	1.902	1.916	1.930	1.935	1.944	1.950	1.956
2-1/4	2.032	2.060	2.084	2.106	2.120	2.134	2.152						
2-1/2	2.282	2.310	2.334	2.356	2.370	2.384	2.402						
2-3/4	2.532	2.560	2.584	2.606	2.620	2.634	2.652						
3	2.782	2.810	2.834	2.856	2.870	2.884	2.902						
3-1/4	3.032	3.060	3.084	3.106	3.120	3.134	3.152						
3-1/2	3.282	3.310	3.334	3.356	3.370	3.384	3.402						
3-3/4	3.532	3.560	3.584	3.606	3.620	3.634	3.652						
4	3.782	3.810	3.834	3.856	3.870	3.884	3.902						
4-1/4	4.032	4.060	4.084	4.106	4.120	4.134	4.152						
4-1/2	4.282	4.310	4.334	4.356	4.370	4.384	4.402						
4-3/4	4.532	4.560	4.584	4.606	4.620	4.634	4.652						
5	4.782	4.810	4.834	4.856	4.870	4.884	4.902						
5-1/4	5.032	5.060	5.084	5.106	5.120	5.134	5.152						

Special Tables

Nominal Pipe Size (In.)	Outside Diameter (In.)	Schedule Number							
		Nominal Wall Thickness Inches / Nominal Inside Diameter Inches (ID)							
		40	ID	80	ID	120	ID	160	ID
1/8	.405	.068	.269	.095	.215				
1/4	.540	.088	.364	.119	.302				
3/8	.675	.091	.493	.126	.423				
1/2	.840	.109	.622	.147	.546			.187	.466
3/4	1.050	.113	.824	.154	.742			.218	.614
1	1.315	.133	1.049	.179	.957			.250	.815
1-1/4	1.660	.140	1.380	.191	1.278			.250	1.160
1-1/2	1.900	.145	1.610	.200	1.500			.281	1.338
2	2.375	.154	2.067	.218	1.939			.343	1.689
2-1/2	2.875	.203	2.469	.276	2.323			.375	2.125
3	3.500	.216	3.068	.300	2.900			.437	2.626
3-1/2	4.000	.226	3.548	.318	3.364				
4	4.500	.237	4.026	.337	3.826	.437	3.626	.531	3.438
5	5.563	.258	5.047	.375	4.813	.500	4.563	.625	4.313
6	6.625	.280	6.065	.432	5.761	.562	5.501	.718	5.189
8	8.625	.322	7.981	.500	7.625	.718	7.189	.906	6.813
10	10.750	.365	10.020	.593	9.564	.843	9.064	1.125	8.500
12	12.750	.406	11.938	.687	11.378	1.000	10.750	1.312	10.126

Thread Designations

Size In.	mm	NC	NF
1/4	6.4	1/4-20 UNC	1/4-28 UNF
5/16	7.9	5/16-18 UNC	5/16-24 UNF
3/8	9.5	3/8-16 UNC	3/8-24 UNF
7/16	11.1	7/16-14 UNC	7/16-20 UNF
1/2	12.7	1/2-13 UNC	1/2-20 UNF
9/16	14.3	9/16-12 UNC	9/16-18 UNF
5/8	15.9	5/8-11 UNC	5/8-18 UNF
3/4	19.1	3/4-10 UNC	3/4-16 UNF
7/8	22.2	7/8-9 UNC	7/8-14 UNF
1	25.4	1-8 UNC	1-14 UNS
1-1/8	28.6	1-1/8-7 UNC	1-1/8-12 UNF
1-3/8	34.9	1-3/8-16 UNC	1-3/8-12 UNF

Metric Table Conversions

Fractional Inch	Decimal Inch	Millimeter	Fractional Inch	Decimal Inch	Millimeter	Fractional Inch	Decimal Inch	Millimeter
1/64	.016	0.40	23/64	.359	9.13	45/64	.703	17.86
1/32	.031	0.79	3/8	.375	9.53	23/32	.719	18.26
3/64	.047	1.19	25/64	.391	9.92	47/64	.734	18.65
1/16	.063	1.59	13/32	.406	10.32	3/4	.750	19.05
5/64	.078	1.98	27/64	.422	10.72	49/64	.766	19.45
3/32	.094	2.38	7/16	.438	11.11	25/32	.781	19.84
7/64	.109	2.78	29/64	.453	11.51	51/64	.797	20.24
1/8	.125	3.18	15/32	.469	11.10	13/16	.813	20.64
9/64	.141	3.57	31/64	.484	12.30	53/64	.828	21.03
5/32	.156	3.97	1/2	.500	12.70	27/32	.844	21.43
11/64	.172	4.36	33/64	.516	13.10	55/64	.860	21.83
3/16	.188	4.76	17/32	.531	13.50	7/8	.875	22.23
13/64	.203	5.16	35/64	.547	13.89	57/64	.891	22.62
7/32	.219	5.56	9/16	.563	14.29	29/32	.906	23.02
15/64	.234	5.95	37/64	.578	14.68	59/64	.922	23.42
1/4	.250	6.35	19/32	.594	15.08	61/64	.953	24.21
17/64	.266	6.75	39/64	.609	15.48	31/32	.969	24.61
9/32	.282	7.14	5/8	.625	15.88	63/64	.984	25.00
19/64	.297	7.54	41/64	.641	16.27	1	1.000	25.40
5/16	.313	7.94	21/32	.656	16.67	2	2.000	50.80
21/64	.328	8.33	43/64	.672	17.07	3	3.000	76.20
11/32	.344	8.73	11/16	.688	17.46			

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