



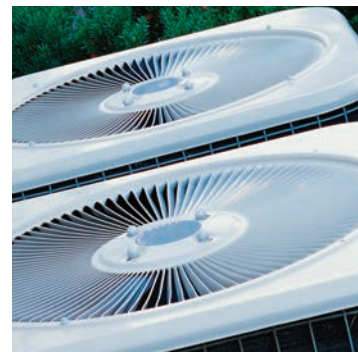
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HVAC & Refrigeration Tubing

Flexible Lines and Linesets

Catalog J, October 2015



ENGINEERING YOUR SUCCESS.

PARKER SAFETY GUIDE FOR SELECTING AND USING TUBING, FITTINGS AND RELATED ACCESSORIES



WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF TUBING, FITTINGS, ASSEMBLIES OR RELATED ACCESSORIES (“PRODUCTS”) CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE. POSSIBLE CONSEQUENCES OF FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THESE PRODUCTS INCLUDE BUT ARE NOT LIMITED TO:

- Fittings thrown off at high speed.
- High velocity fluid discharge.
- Explosion or burning of the conveyed fluid.
- Electrocution from high voltage electric powerlines.
- Contact with suddenly moving or falling objects that are controlled by the conveyed fluid.
- Injections by high-pressure fluid discharge.
- Dangerously whipping hose.
- Contact with conveyed fluids that may be hot, cold, toxic or otherwise injurious.
- Sparking or explosion caused by static electricity buildup or other sources of electricity.
- Sparking or explosion from flammable liquids.

Before selecting or using any of these products, it is important that you read and follow the instructions below. Only hose from Parker's Stratoflex Products Division is approved for in flight aerospace applications, and no other hose can be used for such in flight applications.

⚠ WARNING – USER RESPONSIBILITY

Failure or improper selection or improper use of the products described herein or related items can cause death, personal injury and property damage.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

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HVAC & Refrigeration Tubing

Flexible Lines and Linesets

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Applications

Parker's ZoomLine lineset assemblies are engineered and tested for the following exacting requirements:

- Air Conditioning
- Heat Pump
- Low and Medium Temperature Refrigerating System

ZoomLine is available in multiple sizes ranging from 3/8" up to 7/8" and at lengths up to 50 ft. with the option of pre-installed foam insulation. Individual or linesets are available in pre-made assemblies in heat sealed bags.



Features and Benefits

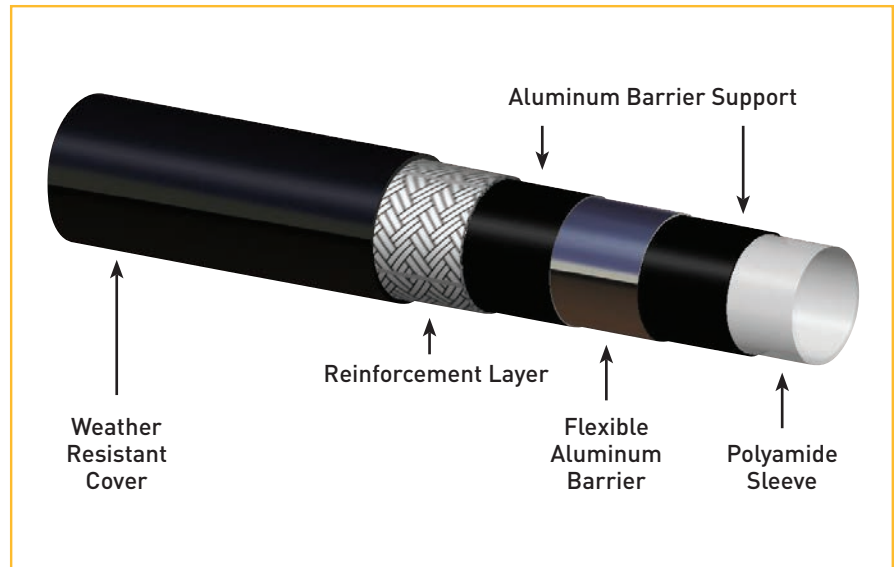
The flexible ZoomLine assemblies offer many advantages over rigid tubing including time and cost savings due to:

- Ease of routing and maintenance
- Reduced copper content eliminating expensive metals and theft concerns
- Reduced brazing and rework due to leakage at braze joints
- Reduced tube bending, rework, and scrap
- Reduced parts and inventory by eliminating elbows and couplings. This tubing is designed for permanent installation.

System benefits include enhanced insulating effect compared to bare copper and reduced vibration transmission which decreases potential tube breakage, making the system more efficient and reliable. For OEM system designers, ZoomLine assemblies are custom configurable with many connection styles, lengths and diameters available for system optimization. Single lines and line-sets are also available in heat-sealed bags with lengths between 5 and 50 ft. along with optional foam insulation.

ZoomLine has been designed to eliminate refrigerant leakage while maintaining flexibility not available with copper tubing. The 6 layer hose is designed to withstand environmental,

ZoomLine Construction



temperature and pressure extremes while providing excellent installation flexibility and long life.

- **Polyamide Sleeve** is a time tested material that provides compatibility and durability with system fluids.
- The state of the art, patent pending **Flexible Aluminum Barrier** provides the same metal-based worry-free leakage performance as copper tubing.
- **Aluminum Barrier Supports** also act as refrigerant barriers and support the Aluminum Barrier during installation and use.
- **Reinforcement Layer** provides high

strength with lower weight than copper tubing.

- **Weather Resistant Cover** ensures long life regardless if installed indoors or outdoors.

The unique couplings connecting ZoomLine assemblies to the system have multiple barriers. Entire assemblies have been rigidly tested using the latest leak detection technologies to ensure no leakage.

ZoomLine is the first flexible line designed to protect the environment and the customer's investment while eliminating the need for expensive and hard to work with copper tubing.

ZoomLine Specifications & Performance

- **Estimated Tonnage Range:**
<2 to 10 tons
- **Refrigerants:** R-134a, R-404A, R-407A, R-407C, R-407F, R-410A & R-507
- **Lubricant / Oil:** Polyolester Oil (POE), Mineral Oil (MO), Alkylbenzene (AB), Polyvinyl Ether (PVE) & Polyalkyl Glycol (PAG)
- **Minimum Burst Pressure:**
2100 psi (145 bar) all sizes
- **Maximum Operating Pressure:**
700 psi (48.3 bar)
- **Operating Gas and Ambient Temperature Range:**
-25°F to +200°F (-32°C to +93°C)
- **ROHS Compliant**
- **Meets or Exceeds UL and ASTM Specifications:**

Thermal Cycle:

UL 1963 Section 58.8

Refrigerant Exposure: UL

1963-2011 Section 58.3, 58.11

Fatigue Test:

UL 207 2009 Section 14

Crush & Ultraviolet Exposure:

UL 746

Flame test: ASTM D635

Vibration Test:

UL 1963 Section 58.10

- **Refrigerant Wetted Materials:**
Brass, polyamide, HNBR elastomer

- **Environmental / UV Protection:**
Optimized outer sleeve; Tubing tested using SAE and ASTM Test Conditions

- **Annual Permeation:** The following table provides permeation for the smallest and largest line assuming the system is “on” and running for one year. Permeation is the “seepage” of refrigerant through the line material. This is a microscopic rate that it is not reliably detectable using helium mass spectrometry methods.

- **Permeation:** Permeation is the “seepage” of refrigerant molecules through the tubing and is expressed as an annual rate per year per unit length of tubing. ZoomLine is designed with a welded aluminum barrier sleeve that eliminates most refrigerant permeation. Permeation is affected by numerous factors such as refrigerant type, as well as fluid and tubing temperatures and pressures during testing or operation.

No standard testing method has been developed to rate permeation in HVAC&R systems or components so Parker looked at system and compressor operating envelopes and developed test methods that looked at worst case conditions as well as typical operating conditions. Additionally, a method was developed to estimate the “real” leak rates based on actual system operating cycles (which affects temperature and pressures) in various geographical regions from which a North American average was determined. The table below provides these values by the largest and smallest line sizes:

Line Size	OUNCES/YEAR/FOOT OF LENGTH*			
	R-404A		R-410A	
	Typical	Worst Case	Typical	Worst Case
3/8"	0.001	0.002	0.007	0.03
7/8"	0.003	0.006	0.01	0.04

ZoomLine Tubing Dimensions

Nominal Size	I.D.	Tubing O.D.	Maximum O.D.	Minimal Bend Radius
3/8" (10mm)	0.33" (8mm)	0.68" (17mm)	0.83" (21mm)	2.72" (69mm)
1/2" (13mm)	0.43" (11mm)	0.81" (21mm)	0.96" (24mm)	3.25" (83mm)
5/8" (16mm)	0.95" (24mm)	0.95" (24mm)	1.10" (28mm)	3.88" (98mm)
3/4" (19mm)	0.69" (18mm)	1.05" (27mm)	1.20" (30mm)	4.20" (107mm)
7/8" (22mm)	0.82" (21mm)	1.25" (32mm)	1.44" (36mm)	5.00" (127mm)

*While the permeation is actually quite small it may be trapped by system cabinetry or tubing installation. This should not show up in standard sensitivity settings.

ZoomLine Pressure Drop

Typical ZoomLine pressure drop is similar to copper tubing pressure drop per unit length. Comparison to published copper line pressure drop indicates that ZoomLine is within 0.5 psi (0.04 bar) for the same length of straight tubing and it is slightly less than copper tubing for lengths longer than 35 feet (10.7 m). ZoomLine actually has a larger tubing ID than standard refrigeration copper grades L and K which is counterbalanced by the termination support tubing restrictions at each end of ZoomLine. It is possible to use established copper tubing information with no change

when substituting ZoomLine. It is recommended to follow system manufacturer's guidelines and recommendations for line sizing and configuration.

It is possible to use the information in the Sporlan Product Selection software to estimate ZoomLine pressure drop for specific system conditions. This software is available at www.sporlanonline.com. Alternately, Sporlan Form 5-162 provides standard condition information. Or consult with Sporlan Technical Service at 636-239-1111.

Suction Line Pressure Drop

25 ft Straight Length ZoomLine Pressure Drop
R-410A at 45°F Evaporating and 100°F Condensing

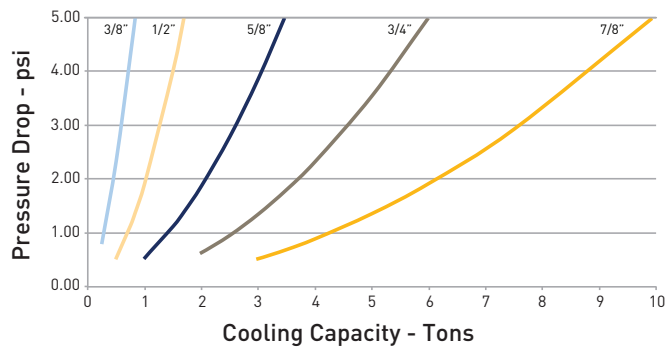


Figure 1, Example Suction Line Pressure Drop - IP Units

7.6m Straight Length ZoomLine Pressure Drop
R-410A at 7°C Evaporating and 38°C Condensing

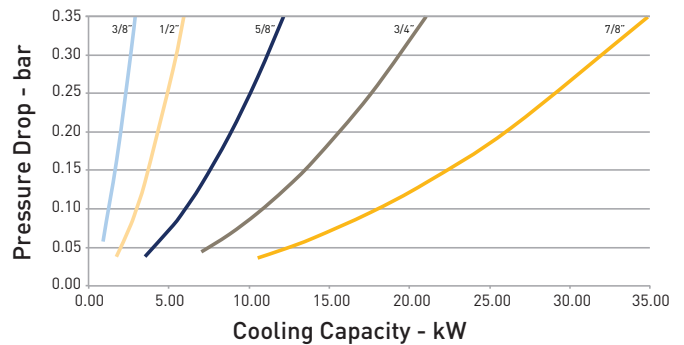


Figure 2, Example Suction Line Pressure Drop - SI Units

Hot Gas Pressure Drop

25 ft Straight Length ZoomLine Pressure Drop
R-410A at 45°F Evaporating and 100°F Condensing

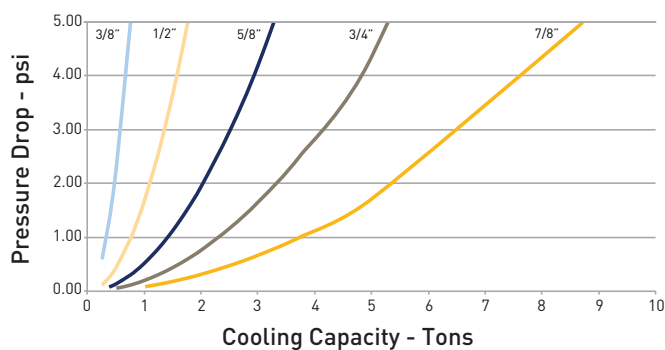


Figure 3, Example Hot Gas Pressure Drop - IP Units

7.6m Straight Length ZoomLine Pressure Drop
R-410A at 7°C Evaporating and 38°C Condensing

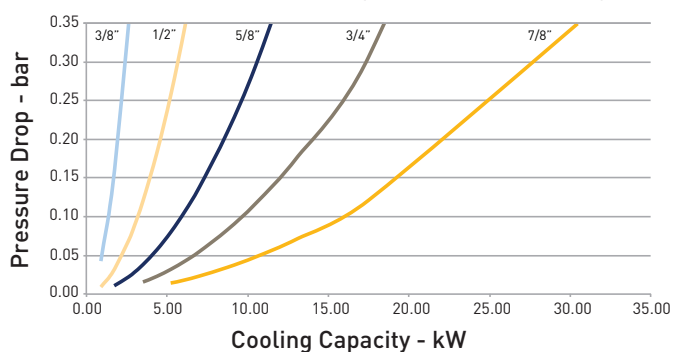


Figure 4, Example Hot Gas Pressure Drop - SI Units

Note: Straight line data provided with no bends which add pressure drop.

Liquid Line Pressure Drop

25 ft Straight Length ZoomLine Pressure Drop
R-410A at 45°F Evaporating and 100°F Condensing

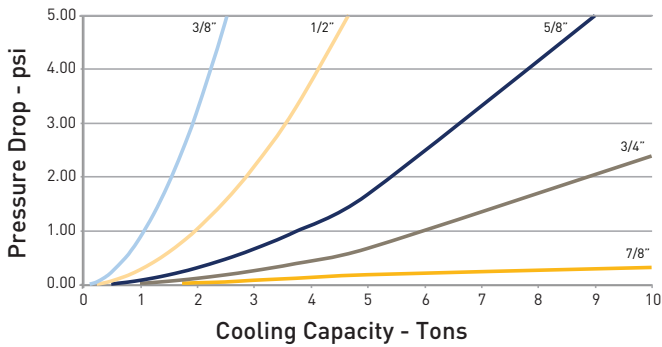


Figure 5, Example Liquid Line Pressure Drop - IP Units

7.6m Straight Length ZoomLine Pressure Drop
R-410A at 7°C Evaporating and 38°C Condensing

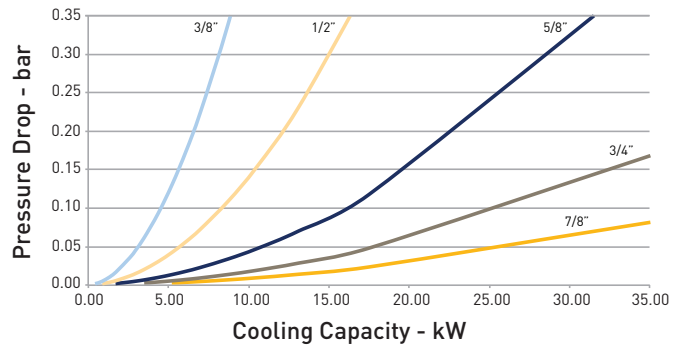






Figure 6, Example Liquid Line Pressure Drop - SI Units

Custom OEM Assemblies

Available using a variety of terminations including copper and quick couplings.

 <p>ODF Copper Sweat connection to copper tubing Size Range: 1/4" to 7/8"</p>	 <p>5500 Series Brass Couplings Pre-chargeable self-sealing and resealing connector Size Range: 3/8" to 1-1/8"</p>
 <p>5400 Series Steel Couplings Self-sealing and resealing connector Size Range: 1/4" to 1-3/8"</p>	 <p>5700 Series Brass Couplings One Shot™ pre-chargeable connector Size Range: 3/8" to 1-1/8"</p>

For more information on Parker's Series Couplings refer to Catalog OEM-1.

*Custom bent copper connectors and mechanical connections available upon request.

Note: Straight line data provided with no bends which add pressure drop.



ZoomLine Standard ODM Individual Tubing Models

Parker Model Description	Line Size ft (mm)	Length ft (m)	Insulation Thickness	Weight (lbs)
ZL-L-6-3-00-01	3/8" (10mm)	3 (0.9)	None	0.7
ZL-L-6-5-00-01	3/8" (10mm)	5 (1.5)	None	1.0
ZL-L-6-15-00-01	3/8" (10mm)	15 (4.6)	None	2.4
ZL-L-6-25-00-01	3/8" (10mm)	25 (7.6)	None	3.7
ZL-L-6-35-00-01	3/8" (10mm)	35 (10.7)	None	5.1
ZL-L-6-40-00-01	3/8" (10mm)	40 (12.2)	None	5.8
ZL-L-6-50-00-01	3/8" (10mm)	50 (15.2)	None	7.2
ZL-L-8-3-00-01	1/2" (13mm)	3 (0.9)	None	1.0
ZL-L-8-5-00-01	1/2" (13mm)	5 (1.5)	None	1.3
ZL-L-8-15-00-01	1/2" (13mm)	15 (4.6)	None	3.1
ZL-L-8-25-00-01	1/2" (13mm)	25 (7.6)	None	4.9
ZL-L-8-35-00-01	1/2" (13mm)	35 (10.7)	None	6.7
ZL-L-8-40-00-01	1/2" (13mm)	40 (12.2)	None	7.6
ZL-L-8-50-00-01	1/2" (13mm)	50 (15.2)	None	9.4
ZL-L-10-3-00-01	5/8" (16mm)	3 (0.9)	None	1.3
ZL-L-10-5-00-01	5/8" (16mm)	5 (1.5)	None	1.8
ZL-L-10-15-00-01	5/8" (16mm)	15 (4.6)	None	4.1
ZL-L-10-25-00-01	5/8" (16mm)	25 (7.6)	None	6.4
ZL-L-10-35-00-01	5/8" (16mm)	35 (10.7)	None	8.7
ZL-L-10-40-00-01	5/8" (16mm)	40 (12.2)	None	9.9
ZL-L-10-50-00-01	5/8" (16mm)	50 (15.2)	None	12.2
ZL-L-12-3-00-01	3/4" (19mm)	3 (0.9)	None	1.8
ZL-L-12-5-00-01	3/4" (19mm)	5 (1.5)	None	2.4
ZL-L-12-15-00-01	3/4" (19mm)	15 (4.6)	None	5.4
ZL-L-12-25-00-01	3/4" (19mm)	25 (7.6)	None	8.4
ZL-L-12-35-00-01	3/4" (19mm)	35 (10.7)	None	11.4
ZL-L-12-40-00-01	3/4" (19mm)	40 (12.2)	None	12.9
ZL-L-12-50-00-01	3/4" (19mm)	50 (15.2)	None	15.9
ZL-L-14-3-00-01	7/8" (22mm)	3 (0.9)	None	2.5
ZL-L-14-5-00-01	7/8" (22mm)	5 (1.5)	None	3.2
ZL-L-14-15-00-01	7/8" (22mm)	15 (4.6)	None	6.5
ZL-L-14-25-00-01	7/8" (22mm)	25 (7.6)	None	9.8
ZL-L-14-35-00-01	7/8" (22mm)	35 (10.7)	None	13.2
ZL-L-14-40-00-01	7/8" (22mm)	40 (12.2)	None	14.8
ZL-L-14-50-00-01	7/8" (22mm)	50 (15.2)	None	18.2

ZoomLine General Installation Instructions

1.0 GENERAL INSTRUCTIONS

- 1.1 **Scope:** This safety guide provides instructions for selecting and using (including assembling, installing and maintaining) the ZoomLine product.
- 1.2 **Fail-Safe:** ZoomLine can fail without warning for many reasons. Design all systems and equipment in a manner so that failure of the ZoomLine assembly will not endanger persons or property.
- 1.3 **User Responsibility:** Due to the wide variety of operating conditions and applications Parker does not represent or warrant that any particular ZoomLine assembly is suitable for any specific end use system. This guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:
 - Making the final selection of the products
 - Assuring the user requirements are met and the application presents no health or safety hazards
 - Assuring compliance with all applicable government and industry standards

2.0 ZOOMLINE SELECTION & INSTALLATION INSTRUCTIONS

- 2.1 **Sizing:** Size ZoomLine in accordance with system manufacturer's guidelines. For field designed/built systems follow existing copper line sizing guidelines.
- 2.2 **Minimum Bend Radius:** Installation of ZoomLine at less than the minimum listed bend radius may significantly reduce the product life and restrict flow. Particular attention must be given to avoid sharp bending at the coupling / connection ends.

ZoomLine Tubing Dimensions

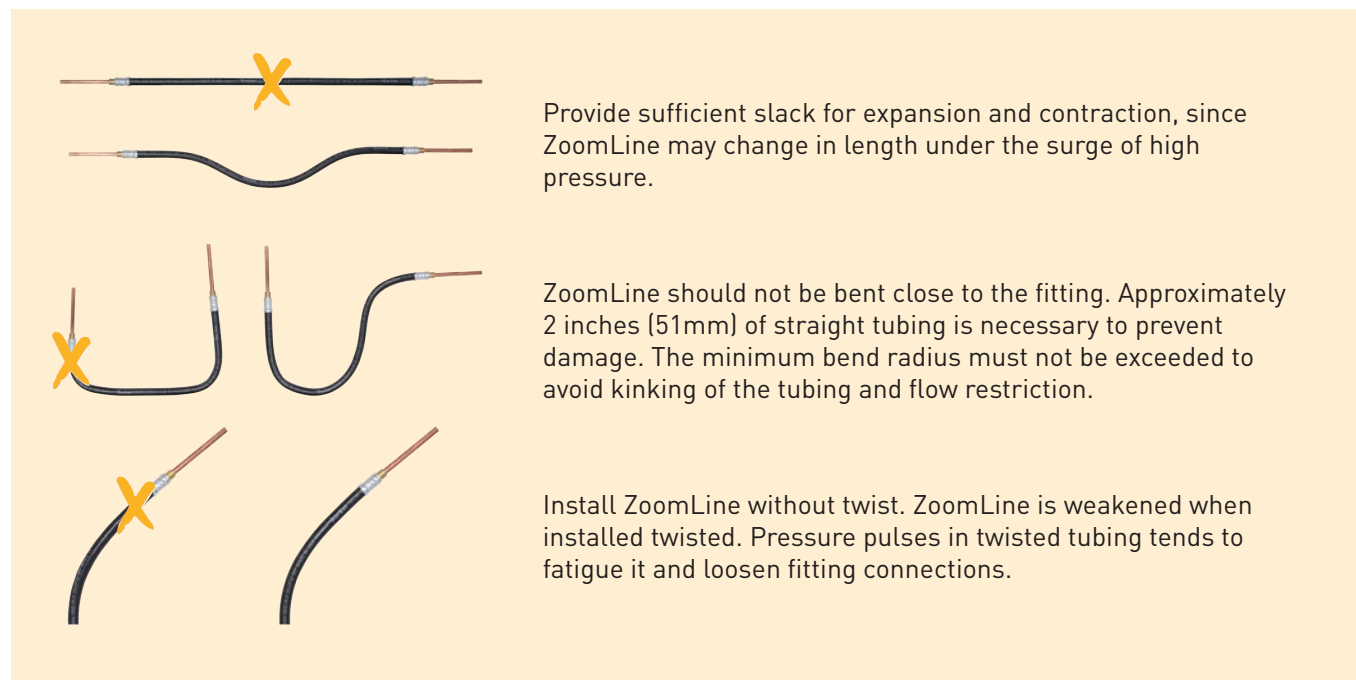
Nominal Size	I.D.	Tubing O.D.	Maximum O.D.	Minimal Bend Radius
3/8" (10mm)	0.33" (8mm)	0.68" (17mm)	0.83" (21mm)	2.72" (69mm)
1/2" (13mm)	0.43" (11mm)	0.81" (21mm)	0.96" (24mm)	3.25" (83mm)
5/8" (16mm)	0.95" (24mm)	0.95" (24mm)	1.10" (28mm)	3.88" (98mm)
3/4" (19mm)	0.69" (18mm)	1.05" (27mm)	1.20" (30mm)	4.20" (107mm)
7/8" (22mm)	0.82" (21mm)	1.25" (32mm)	1.44" (36mm)	5.00" (127mm)

- 2.3 **Copper Stub Ends:** Do not cut the copper stub ends shorter. These were selected to be the proper length to prevent overheating of the ZoomLine end couplings during wet-rag brazing.
- 2.4 **Brazing Copper Stubs:** When using a torch, wet rag-

ging must be used. Improper wet ragging could result in overheating the ZoomLine end fittings above 450°F (232°C) causing damage and emission of deadly gases.

- 2.5 **Electrical Conductivity:** ZoomLine is not conductive. Ensure no electricity is applied to the product to avoid potential electrical sparking or arcing and product, property, or personnel damage or injury.
- 2.6 **Pressure:** After determining the system pressure, ZoomLine selection must be made so the recommended maximum operating pressure on label is equal or greater than the maximum system pressure. Surge pressures or peak transient pressures in the system must be below the published maximum working pressure for the tubing. Surge pressures and peak pressures can usually only be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond time intervals. Mechanical pressure gauges indicate only average pressures. Published burst pressure ratings for ZoomLine are for manufacturing test purposes only and are no indication that the product can be used in applications at the burst pressure or otherwise above the maximum recommended working pressure. Continuous use at maximum temperatures together with maximum pressures should always be avoided.
- 2.7 **Suction and Liquid Line Use:** ZoomLine is approved for all HVAC suction line and liquid line use as long as the system working pressures and temperatures are equal or less than the ZoomLine working pressure and temperature.
- 2.8 **Discharge Line Limitation:** ZoomLine is approved for use on heat pump gas lines (i.e. suction in cooling mode/discharge in heating mode). **ZoomLine cannot be attached to the compressor discharge.** A high risk exists for exceeding the ZoomLine maximum temperature rating if a compressor fails or has abnormal operation.
- 2.9 **Temperature:** Be certain that fluid and ambient temperatures, both steady and transient, do not exceed the limitations found on page 6. Temperatures below and above the recommended limits can degrade the product to a point where a failure may occur and release refrigerant. Special care must be taken when routing near hot manifolds or other hot surfaces. Continuous use at or near the maximum temperature rating will cause deterioration of physical properties of ZoomLine and reduce the service life.
- 2.10 **Insulation:** Although ZoomLine has natural insulating advantages to copper, it is still recommended to use ZoomLine with insulation.
- 2.11 **Refrigerant and Oil Compatibility:** ZoomLine is designed to be used with the refrigerant/oil combinations defined in the specifications.
- 2.12 **Permeation:** Permeation (that is, seepage through the

Figure 7



Provide sufficient slack for expansion and contraction, since ZoomLine may change in length under the surge of high pressure.

ZoomLine should not be bent close to the fitting. Approximately 2 inches (51mm) of straight tubing is necessary to prevent damage. The minimum bend radius must not be exceeded to avoid kinking of the tubing and flow restriction.

Install ZoomLine without twist. ZoomLine is weakened when installed twisted. Pressure pulses in twisted tubing tends to fatigue it and loosen fitting connections.

tubing material) will occur from the inside to the outside. ZoomLine has been designed such that permeation is negligible and cannot be reliably measured even using Helium mass spectrometry methods.

- 2.13 **Moisture Ingression:** All ZoomLine products are dehydrated before shipping, capped and placed in a heatsealed bag to prevent moisture absorption. Take care to keep the shipping caps on the copper stubs when not in use.
- 2.14 **Routing:** Attention must be given to optimum routing to minimize inherent problems (kinking, twisting or flow restrictions due to tubing collapse, proximity to hot objects or heat sources). Satisfactory performance and appearance depend upon proper tubing installation. Excessive length, exceeding minimum bend radius or allowing inadequate room for flexing will shorten the life of the line. See Figure 7 for diagrams offering suggestions for proper tubing installations.
- 2.15 **Length:** When establishing proper length, motion absorption, line length changes due to pressure, as well as tubing and machine tolerances must be considered. Determine ZoomLine lengths and configurations that will result in the proper routing and protection from abrasion, snagging or kinking. In many applications, it may be necessary to restrain, protect or guide ZoomLine to protect it from damage by unnecessary flexing, pressure surges or contact with other mechanical components.
- 2.16 **Restraints:** Care must be taken to ensure restraints do not introduce additional stress or wear points. Straps with widths of at least 1 inch (25mm) is recommended to provide adequate support. Follow system manufacturer's recommendations.
- 2.17 **Environment:** ZoomLine has been designed to be resistant to typical materials and environmental conditions for indoor and outdoor use. This includes traditional cleaning products, ozone, UV, rain, etc.
- 2.18 **Mechanical Loads:** External forces can significantly reduce ZoomLine life or cause failure. Mechanical loads which must be considered include flexing, twist, kinking, tensile or side loads, bend radius, and vibration. Unusual applications may require special testing prior to ZoomLine product selection.
- 2.19 **Physical Damage:** Care must be taken to protect ZoomLine from wear, snagging, kinking, bending smaller than the minimum bend radius and cutting, any of which can cause premature failure. Any ZoomLine that has been kinked or bent to a radius smaller than the minimum bend radius should be removed and discarded.
- 2.20 **ZoomLine Cleanliness:** Components may vary in cleanliness levels. Care must be taken to ensure the ZoomLine product has an adequate level of cleanliness for the application.
- 2.21 **Radiant Heat:** The ZoomLine product can be heated to destruction without contact by such nearby items as hot manifolds or molten metal. The same heat source may then initiate a fire. This can occur despite the presence of cool air around the product.
- 2.22 **Visual Inspection of Tubing/Fitting:** As good practice, check before and after installation for external damage such as severe abrasion, holes, tensile loads, side loads, kinking, and flattening. Any of the following conditions require immediate shut down and replacement of ZoomLine:
 - Fitting slippage at the tubing ends;

- Damaged, cracked, cut or abraded cover (any reinforcement exposed);
 - Hard, stiff, heat cracked, or charred tubing;
 - Cracked, damaged, or badly corroded fittings;
 - Leaks at fitting or in tubing;
 - Kinked, crushed, flattened or twisted tubing; and
 - Blistered, soft, degraded, or loose cover.
- 2.23 **Repair:** ZoomLine is currently not repairable and the entire line will need to be replaced. It is not approved for any field crimp repair or patching.
- 2.24 **Storage:** Parker recommends keeping the ZoomLine product contained in its heatsealed bag with the caps on the ends of the copper stubs. It is recommended that all ZoomLine assemblies at a minimum be inspected and retested before use after 2 years. Stored ZoomLine must not be subjected to damage that could reduce their expected service life and must be placed in a cool, dark and dry area with the ends capped. Stored product must not be exposed to temperature extremes, ozone, oils, corrosive liquids or fumes, solvents or high humidity.
- 2.25 **Cold Temperature Flexibility:** ZoomLine becomes less flexible at colder temperatures. It is recommended to maintain ZoomLine warm prior to installation to maximize ease of installation. Do not warm ZoomLine by exposing it to open flames or by direct contact with heat sources above specification temperature. See note 2.9.

