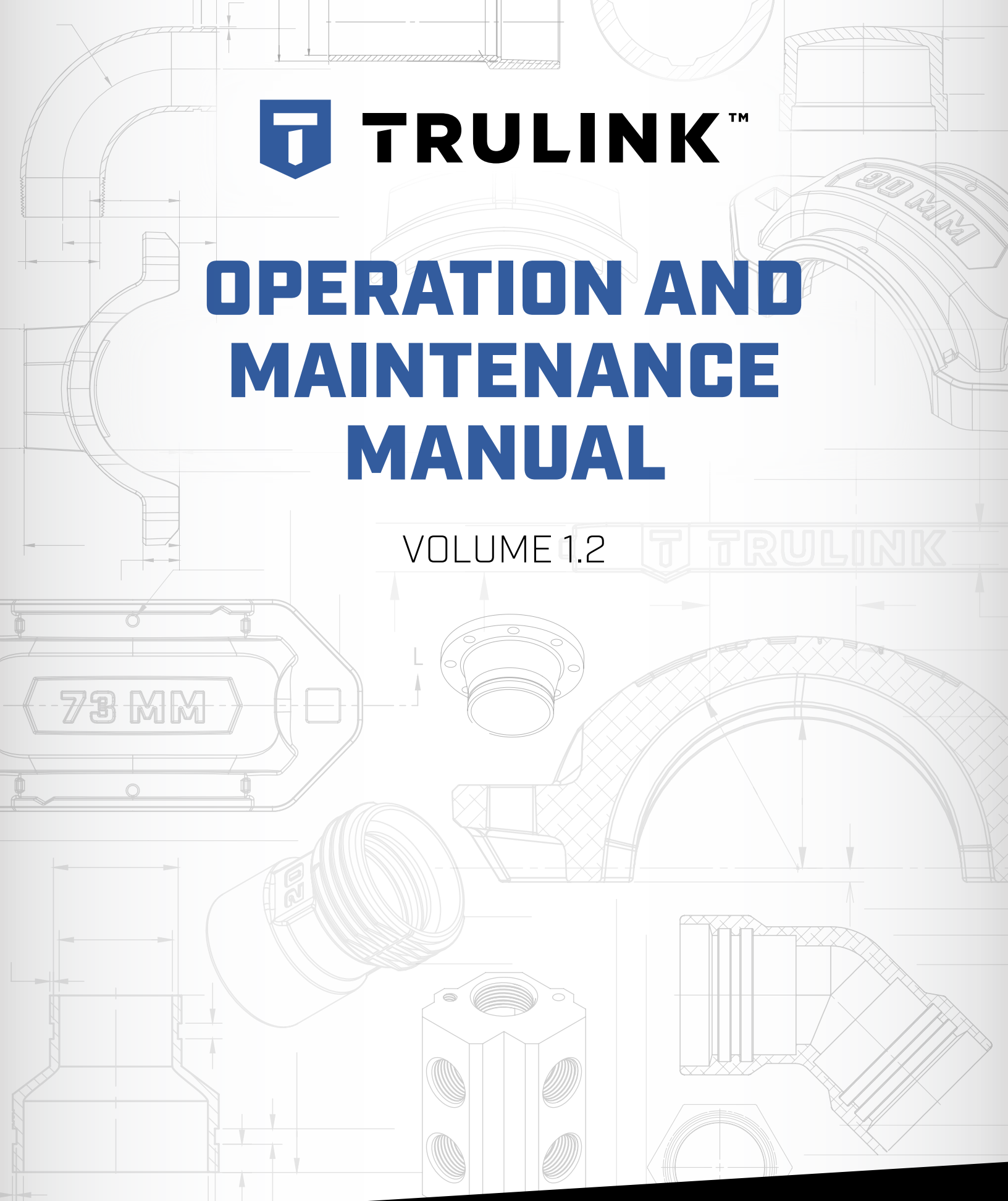
TRULINK™

OPERATION AND MAINTENANCE MANUAL

VOLUME 1.2



APPLIED SYSTEM TECHNOLOGIES™

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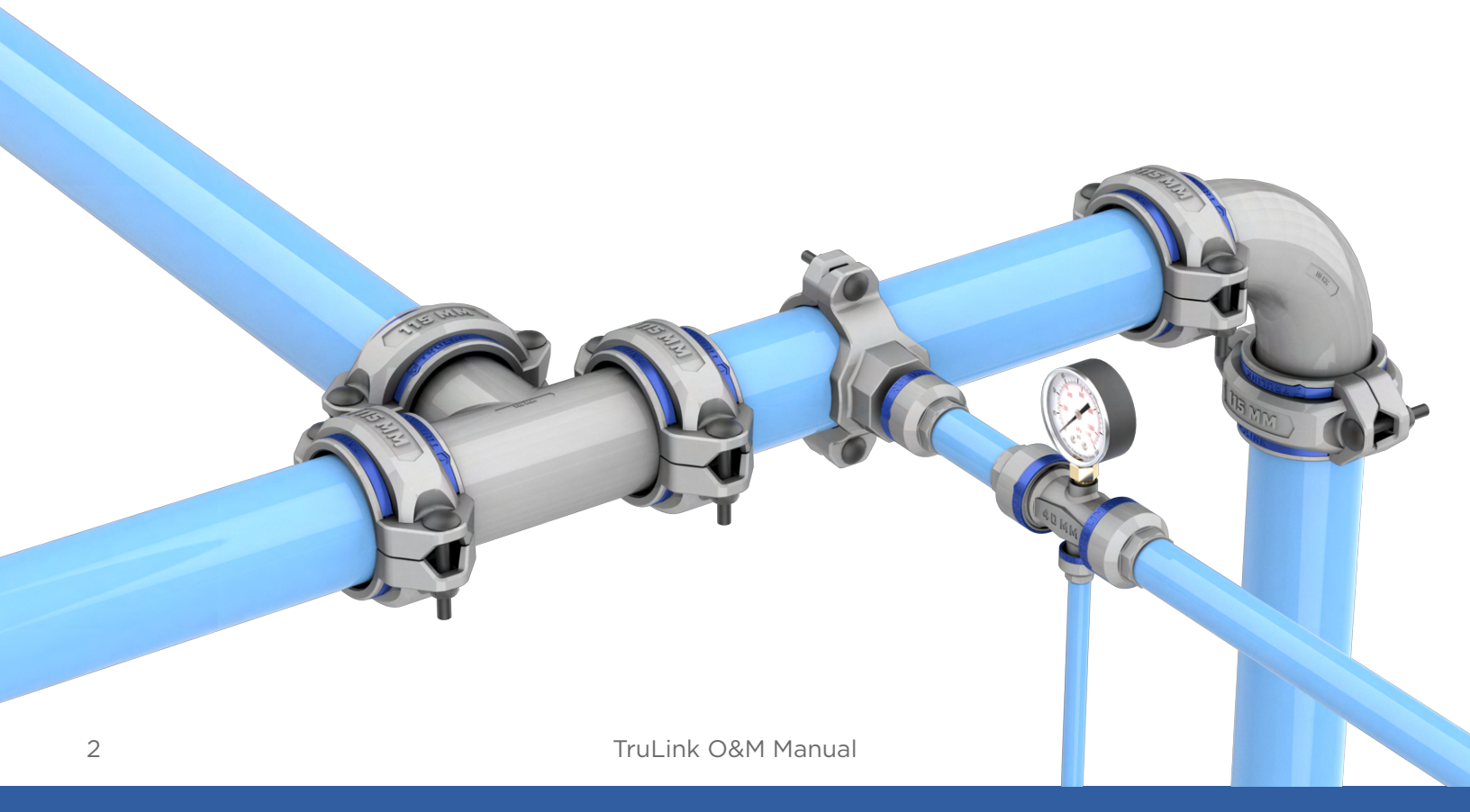
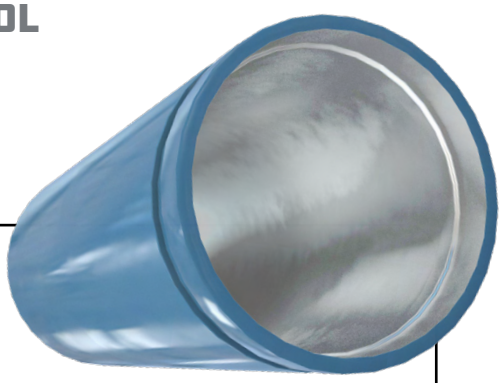


INTENDED USE

TruLink Piping Systems are engineered and designed for the distribution of

- ✓ **COMPRESSED AIR**
- ✓ **VACUUM**
- ✓ **INERT GASES**
- ✓ **MINERAL OIL**
- ✓ **GLYCOL**



⚠ WARNING:

TruLink Piping Systems should not be used for flammable gases, fluids or wet or dry media without consulting our factory engineers. Please call us at 704-947-6966 to discuss any application other than compressed air, vacuum, inert gases, condensate, mineral oil or glycol.

ACCESSORIES

In addition to distribution piping systems, TruLink offers a variety of items to further enhance your compressed air system performance including:

- **SYSTEM FLOW CONTROLLERS**
- **WATER REMOVERS**
- **HOSE REELS**
- **QUICK CONNECT FITTINGS**
- **DRAIN VALVES**
- **OSHA COMPLIANT LOCKABLE AND EXHAUSTING VALVES**
- **CONDENSATE, OIL/WATER SEPARATION SYSTEMS**

Visit www.appliedsystemtech.com for more information.

TECHNICAL SPECIFICATIONS

PUSH TO CONNECT

MARINE GRADE
ALUMINUM

COMPONENT PARTS & MATERIALS			
1	**BODY** A380 Aluminum, Powder Coated	4	**SAFETY RING:** Polymer
2	**NUT:** A380 Aluminum, Powder Coated	5	**Clamping Washer** AISI 304 Stainless Steel
3	**PLUG** AISI 304 Stainless Steel (Optional, Ported, Straight Union Connector)	6	**Double O-ring Seals** HBNR(Hydrogenated Buna Nitrile) Viton (Available Upon Request)

COMPONENT TECHNICAL DATA	
Temperature	Minimum: -4°F [-20°C] Maximum: Viton 300°F [149°C] Maximum: Nitrile 176°F [80°C]
Pressure	Minimum: -29.6Hg [-0.99 bar] Maximum: 230psi [15.8 bar]
Fire Resistance	System does not stoke or propagate fires
Compatibility	Compressed Air, Vacuum, Inert Gases
Male Threads	National pipe thread ISO 228
Female Threads	National pipe thread ISO 228

COMPONENT PARTS & MATERIALS	
1	**BODY:** A380 Aluminum, Powder Coated
2	**SEAL:** Buna N, Viton (Available Upon Request)
3	**BOLTS:** Carriage / Grade 5 / Zinc Plated

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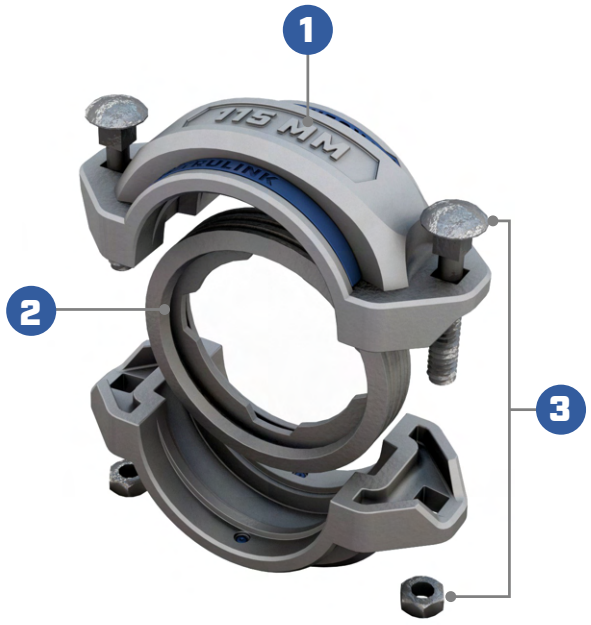
CLAMP TO CONNECT

MARINE GRADE
ALUMINUM



TECHNICAL SPECIFICATIONS (Continued)

TUBING TECHNICAL DATA			
Pressure: psi/bar	230psi (15.8 bar)	Thermal Conductivity at 77°F	209 W/m-k -1450 BTU-in/hr
Tubing Length	16ft	Expansion Coefficient (Avg @ 68° to 212°F per°F)	23.4 um/m-°C / 13 uin/in-°F
Extruded Aluminum	Aluminum 6063/AA6063-T5	Heat Capacity	0.9 J/g-°C / 0.215 BTU-in/ hr-ft2
Chemical Composition	Si: 0.2 - 0.6 - Mg: 0.45 ÷ 0.9 - Fe: 0.35	Ultimate Tensile Strength	21.0 ksi / 21,000 psi
Designations	AA 6063 Alloy	Modulus of Elasticity	68.9GPa / 10,000 ksi
Heat Treatment	Thermal Heat Treat “T5”	Tensile Strength	15.0 ksi min / 15,000 psi
Surface Treatment	PPG Duracron Protective Coating	Brinell Hardness	60 ÷ 70 HB
Density	2.7 g/cc - 0.0975 in/in3	Melting Point	615°C to 650°C / 1140-1210°F
Electrical Resistivity at 68°F	19 ohm-Cir. Mil/Foot	Percentage Elongation	8%

DID YOU KNOW?

Compressed air leaks are one of the greatest sources of energy loss, accounting for up to

$3.2 BILLION

IN WASTED UTILITY PAYMENTS EVERY YEAR

ELIMINATE THE RISK OF LEAKS WITH TRULINK

SCAN HERE
to begin reducing energy costs at your facility

THE TRULINK SYSTEM IS COMPATIBLE WITH:

- ✓ Mineral Oil
- ✓ Glycol
- ✓ Compressed Air Condensate
- ✓ Thermal Variations Between -4°F(-20°C) to 300°F(149°C)
- ✓ Pressure Up to 230psi (15.8 bar)
- ✓ UV Radiation (Direct sunlight exposure)

THE TRULINK SYSTEM IS NOT COMPATIBLE WITH:

Corrosive or reactive chemicals (Please call us if you are unsure your chemical is compatible 704-947-6966)

Thermal variations below -4°F(-20°C) / above 300°F(149°C)

Water (tap or well water can contain minerals and chemicals that are not compatible)

As with any compressed air system, if an impact occurs from people, tools or machinery, the system should be depressurize and checked for damage prior to re-pressurization.

STANDARDS & APPROVALS:

- RoHS
- ASTM B221
- ASTM B308, B308M
- ASTM B429, B429M
- ASTM B241, B241M
- CRN
- ASME B31.1, B31.3
- ISO 8573
- Food Grade Compliant

RoHS COMPLIANT

ASTM INTERNATIONAL

ASME SETTING THE STANDARD

CRN CANADIAN REGISTRATION NUMBER

ISO 8573

SAFETY WARNINGS

Warning! Compressed air can be inherently dangerous! Do not attempt to install or operate any TruLink product(s) without a complete understanding of the risks involved when working with compressed air. Make sure to read and understand the Installation Instructions of this manual, wear proper PPE (Personal Protective Equipment) at all times and follow Proper Test Procedures prior to operation.

If you would prefer to have a compressed air technician install, test and commission your TruLink product(s), please contact us at 704-947-6966.

INSTALLATION INSTRUCTIONS

THESE INSTRUCTIONS MUST BE REVIEWED AND FOLLOWED BEFORE ANY TRULINK TUBING OR FITTINGS INSTALLATION.

! WARNING !

Failure to follow instructions and heed warnings could cause system failure, resulting in serious personal injury, property damage and/or death.

Every installation of this product is different and may contain certain unique hazards. It is your responsibility to exercise caution and work safely.

Applied System Technologies cannot guarantee your safety and recommends all installations be performed by trained installation professionals.

The following items represent the minimum amount of Personnel Protective Equipment required during installation. Additional site-specific safety equipment may be required. Always wear safety glasses, gloves, a hardhat, protective footwear and hearing protection. Never work alone.


Footwear


Safety Glasses


Gloves


Hardhat


Face Shield


Hearing Protection

INSTALLATION INSTRUCTIONS (Continued)

1. Inspect TruLink tubing and fittings to ensure they are free from damage prior to starting installation.

2. Fitting and tube damage can occur during shipping or from rough handling. Special care should be given to protect the end of the tubing and the outer edge of the fittings from damage. If you suspect any damage has occurred to your TruLink fittings or tubing prior to installation, call your local distributor where the products were purchased or contact us directly at 704-947-6966.

3. The TruLink System should be supported every 8'. As installations vary greatly, additional supports may be required when adding multiple fittings within close proximity. Local codes will always supersede the manufacturer's recommendation.

PUSH TO CONNECT

TruLink 20mm - 40mm fitting nuts are factory pre-torqued and should not be loosened prior to installation. 50mm and 63mm fitting nuts are loosened for ease of installation and should be tightened to specifications after completion of step 4 and 5 (see page 10 for details).
Note: Torquing the fitting nuts does not have an affect on sealing, rather it engages the bite ring which holds the tubing into fitting.

4. Deburr/chamfer the outer edge of tubing (20mm-63mm) using TruLink part #TP MANUAL-DB(manual) or #TP DRILL ADAPTER-DB(drill-operated) deburring tools.

5. Mark the end of the tubing using a pencil or marker to indicate the proper insertion depth into the fitting using the TruLink depth-marking gauge part # TP-DEPTH GAUGE (20mm-63mm).

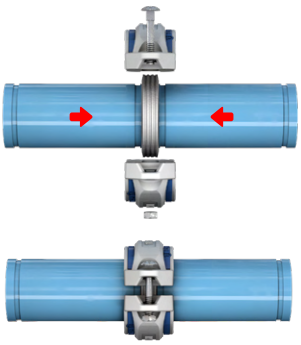
CLAMP TO CONNECT

6. All 73mm-220mm tubing comes factory pre-grooved in 16' lengths. If shorter lengths are required, use a tubing cutter or a chop saw with an aluminum cutting blade to ensure straight, 90-degree ends. Never cut tubing with reciprocating, band saws or cut-off wheels designed for steel piping.

7. After making a cut, a groove will need to be applied using the TruLink manual groove tool part# TC-GROOVE TOOL M. If you are unfamiliar with Manual Groove Tool operation, please call us for additional assistance and instructions at 704-947-6966. For 8" (220mm) and 10" (273mm) larger grooving tools are required. (Rentals available)

   Torque coupling bolts using a torque wrench and deep-well socket to final torque specifications as indicated on Page 10.

   TruLink 73mm-220mm clamp-to-connect couplings should be installed over and around the tube and/or grooved fitting end. TruLink couplings 73mm-220mm are provided slightly loosened in the installation-ready position. Apply a small amount of petroleum-based lubricant part# TPC-LUBE to the lip of each coupling seal before installation. Use the TruLink clamp-to-connect depth-marking gauge, part #TC-DEPTH GAUGES (73mm-220mm) to mark the tubing or gooved end fitting to ensure proper depth of insertion.



8. Inspect completed connection to ensure that the fitting and nuts are not loosened and are in a completed, torqued position as described.

9. Ensure that tubing and fittings are supported every 8'.

INSTALLATION TEST

To test your completed system, please follow these safety and testing procedures:

Disclaimer: This guide is intended to provide the user with basic safe practices for pressure testing TruLink Piping Systems. It is not intended to be an exhaustive treatment on the subject and should never be used as a substitute for reading and complying with Occupational Safety and Health Administration (OSHA) and American Society of Mechanical Engineers (ASME) Piping Standards. Further, it is not intended to provide legal advice.

Pneumatic Testing (use of inert or compressed air to pressurize a system before commissioning to ensure it is leak free)

Pneumatic testing presents many hazards due to the potential for a sudden, unintended release of stored energy. The risk of injury from an improperly fixed connection presents dangers such as flying objects, flying shrapnel, flying dust and debris and many other hazards not mentioned here. If at any time you lack knowledge or are uncomfortable with Pneumatic Testing, please contact us so we can connect you with a TruLink distributor who can provide professional on-site assistance and help you complete the installation and testing process.

1. Inspect the system to be tested to ensure all connections are properly joined and that all sections of the system that are not involved in the test are isolated. We recommend following the Lock-Out/Tag-Out OSHA procedure with all equipment and valves within the system.
2. Ensure the area/all rooms containing TruLink Piping Systems that will be tested are evacuated.
3. Installation of a calibrated gauge and safety relief valve (set at 230psi max) should be a part of every system before testing.
4. Connect inert gas or compressed air to the system, increasing pressure in 15 psi increments.
5. Hold the test at the facility's intended working pressure. For most facilities, this is typically 75-125 psi. Never hold a test at more than 230psi (15.8 bar).
    a. A new system pressurized with hot/warm air will slowly decrease pressure as the air cools. Time should be allowed for temperature to stabilize and pressure to stabilize if discharge air is hotter than ambient.
6. If leaks are suspected during testing, walk the area without touching the system and listen for leaks (hissing sound).
    a. If the leak is very small, you may not hear an audible hiss. You may choose to spray a gentle wash of a soap and water mixture on the connections. Bubbles will appear where leaks are evident.
    b. Never touch, attempt to fix, adjust or repair a pressurized system.
    c. Leaks are most common around standard NPT (National Pipe Thread) connections. These are typically found in and around equipment and tank connections as well as point-of-use areas, such as manifolds.
7. Visually identify the leak area(s) and depressurize the system.
8. Re-install the affected connection, retest the system starting at Step 1.
9. Once the system pressure is stable and no leaks are revealed, pressurize the system to facility working pressure (not to exceed 230psi / 15.8 bar).

FITTING TORQUE REQUIREMENTS

PUSH-TO-CONNECT (20mm - 63mm)

	FITTING SIZE	TORQUE SPEC IN-LBS	FACTORY PROVIDED
1.	20mm Nut	50	Pre-Torqued
2.	25mm Nut	75	Pre-Torqued
3.	32mm Nut	95	Pre-Torqued
4.	40mm Nut	100	Pre-Torqued
5.	50mm Nut	140	Requires Torque
6.	63mm Nut	150	Requires Torque

CLAMP-TO-CONNECT (73mm - 220mm)

	FITTING SIZE	TORQUE SPEC FT-LBS	MAX TORQUE FT-LBS
1.	73mm	22	31
2.	90mm	22	31
3.	115mm	55	75
4.	168mm	55	75
5.	220mm	100	150

NOTE: Wrenches, Crows Foot Adapters, Drills and Guides are available for installation convenience.

OUTLET SADDLE CLAMP (25mm - 220mm)

	FITTING NAME	SIZE (MM>IN)	DRILL SIZE (MM)	GUIDE	TORQUE SPEC FT-LBS
1.	Outlet Saddle Clamp (NPT)	25 > 1/2	19	Y	5
2.	Outlet Saddle Clamp (NPT)	32 > 1/2	19	Y	5
3.	Outlet Saddle Clamp (NPT)	40 > 1/2	22	Y	5
4.	Outlet Saddle Clamp (NPT)	50 > 1/2	22	Y	5
5.	Outlet Saddle Clamp (NPT)	63 > 1/2	22	Y	5
6.	Outlet Saddle Clamp (NPT)	73 > 1/2	47	N	10
7.	Outlet Saddle Clamp (NPT)	73 > 3/4	47	N	10
8.	Outlet Saddle Clamp (NPT)	73 > 1	47	N	10
9.	Outlet Saddle Clamp (NPT)	73 > 1-1/2	47	N	10
10.	Outlet Saddle Clamp (NPT)	90 > 3/4	63	N	10
11.	Outlet Saddle Clamp (NPT)	90 > 1	63	N	10
12.	Outlet Saddle Clamp (NPT)	90 > 1-1/2	63	N	10
13.	Outlet Saddle Clamp (NPT)	90 > 2	63	N	10
14.	Outlet Saddle Clamp (NPT)	115 > 3/4	63	N	10
15.	Outlet Saddle Clamp (NPT)	115 > 1	63	N	10
16.	Outlet Saddle Clamp (NPT)	115 > 1-1/2	63	N	10
17.	Outlet Saddle Clamp (NPT)	115 > 2	63	N	10
18.	Outlet Saddle Clamp (NPT)	168 > 1-1/2	93	N	20
19.	Outlet Saddle Clamp (NPT)	168 > 2	93	N	20
20.	Outlet Saddle Clamp (NPT)	220 > 2	93	N	20
21.	Outlet Saddle Clamp (PTC)	32 > 20	19	Y	10
22.	Outlet Saddle Clamp (PTC)	32 > 25	19	Y	10
23.	Outlet Saddle Clamp (PTC)	40 > 20	22	Y	10
24.	Outlet Saddle Clamp (PTC)	40 > 25	22	Y	10
25.	Outlet Saddle Clamp (PTC)	50 > 20	22	Y	10
26.	Outlet Saddle Clamp (PTC)	50 > 25	22	Y	20
27.	Outlet Saddle Clamp (PTC)	63 > 20	22	Y	20
28.	Outlet Saddle Clamp (PTC)	63 > 25	22	Y	20
29.	Outlet Saddle Clamp (CTC)	168 > 90	93	N	20
30.	Outlet Saddle Clamp (CTC)	168 > 115	93	N	20
31.	Outlet Saddle Clamp (CTC)	220 > 73	93	N	20
32.	Outlet Saddle Clamp (CTC)	220 > 90	93	N	20
33.	Outlet Saddle Clamp (CTC)	220 > 115	93	N	20

PRODUCT OPERATION

TruLink products are engineered and designed to enhance your compressed air system.

When pressurizing a TruLink system, care should be given to increase pressure in increments of no more than 15 psi until the full working pressure is achieved (230psi (15.8 bar) Max).

WARNING!
Valves should never be opened quickly, as this will cause rapid pressure gains that can result in damage to property, personal injury or death.

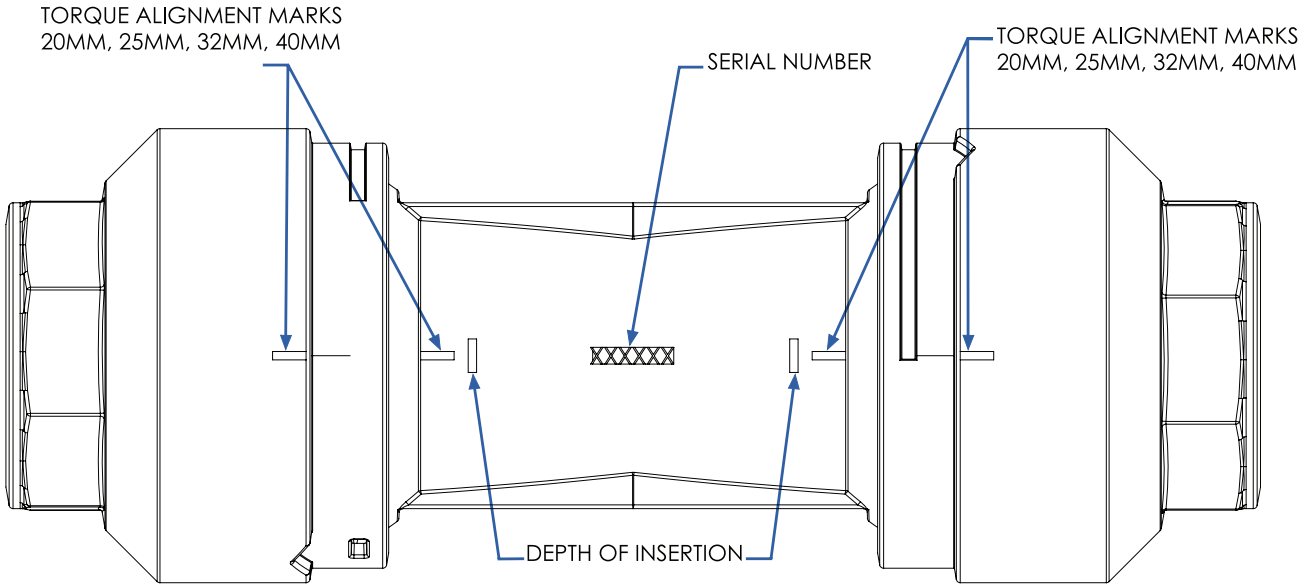
TROUBLESHOOTING

ISSUE	SOLUTION
Difficulty inserting tube into fitting	Ensure tubing ends have been properly deburred.
Tube and fitting area leaking	Depressurize the system, uninstall the fitting by loosening the nut slightly and pulling the fitting with nut from the tubing end. Mark the tubing using the TruLink Depth Insertion Gauge to ensure full/proper insertion. Reinstall the fitting onto tubing. Re-torque Push-to-Connect fittings using TruLink crows foot wrench and torque wrench according to Fitting Torque Requirements on Page 8. For Clamp-to-Connect fittings, use a deep well socket and torque wrench according to Fitting Requirements on Page 10.
Unable to hold system pressure	Check all fittings for leaks, especially those with NPT threads using soapy water in a spray bottle. Identify the leaking areas. Depressurize the system, then remove and reinstall the fittings as described above. (Note: NPT threaded fittings do require thread sealant, not provided with the fitting) Ensure compressed air is not being consumed by equipment during pressure test.
Low point in air system (sagging)	It is recommend to support your TruLink System at a maximum of 8' spans. If you have filters or other accessories, they should be supported individually in addition to tubing supports.
Equipment not receiving adequate pressure	Check compressor to ensure proper settings and operation. Ensure system is sized properly for compressor output or air volume usage at the given pressure.
Corrosion on fittings or pipe	TruLink should not be used in applications that come in direct contact with chemicals corrosive to aluminum in a dry or wetted state. If you are not sure if your application involves chemicals corrosive to aluminum, please call our Technical Team for assistance at 704-947-6966.
Leaking saddle clamp	Use only TruLink saddle clamp drills when installing saddle clamps. Use TruLink saddle clamp drill guide where applicable (see Page 10). Snug all saddle clamps onto tubing ensuring not to over tighten as to crush the tubing. Never exceed maximum torque. (see Page 10).

LASER MARKS

All pre-torqued fittings 20mm, 25mm,32mm and 40mm sizes have **Torque Alignment Markings** these markings should align ensuring fitting and nuts are torqued properly. If any pre-torqued fittings are loosed for any reason, they should be retightened during installation making sure the marks on both nut and body are aligned. We do not recommend swapping nuts and bodies as the **Torque Alignment Markings** may no longer align properly.

All fittings 20mm, 25mm, 32mm, 40mm, 50mm and 63mm sizes include an **Insertion Depth Marking** each fitting body. This marking is recommended to be utilized to mark depth on the tubing to ensure full insertion and proper engagement. Additionally, the **Insertion Depth Marking** can be utilized to determine exact tubing lengths required between fittings.

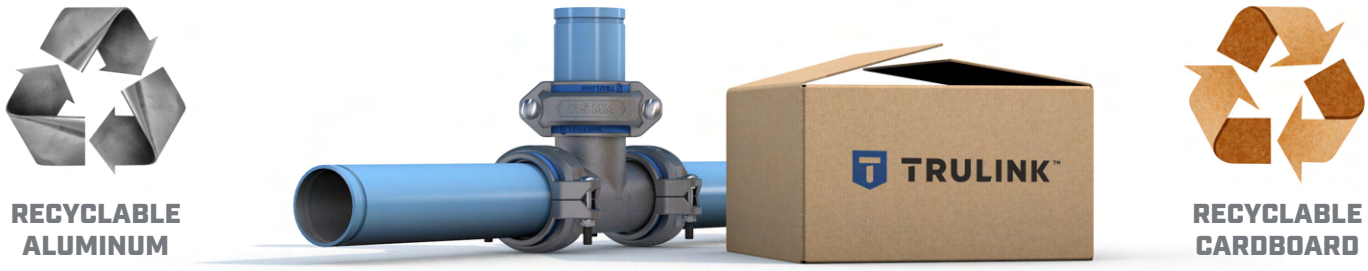


GLOSSARY

TERM	DEFINITION
Compressed Air	Air that has been compressed to a pressure higher than atmospheric pressure.
Inert Gas	A gas that does not undergo chemical reactions under a set of given conditions. The noble gases often do not react with many substances and were historically referred to as the inert gases.
Vacuum	Evacuation of air from a closed volume by creating a pressure differential from the closed volume to some vent, the ultimate vent being the open atmosphere.
Compressed Air Condensate	A byproduct of all compressors. It is a mixture of mostly water with ambient particulates, airborne hydrocarbons and traces of compressor fluids that have been concentrated during the compression process.
Pounds Per Square Inch (psi)	Pound-force per square inch (symbol: lbf/in2; abbreviation: psi) is a unit of pressure or of stress. It is the pressure resulting from a force of pound-force applied to an area of one square inch.
Personal Protective Equipment (PPE)	Personal protective equipment is protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter.
Recycle	The process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new useable products.
Torque	A force applied perpendicularly to a lever multiplied by its distance from the lever's fulcrum.
NPT	American National Standard Pipe Thread standards, often called national pipe thread standards for short, are U.S. national technical standards for screw threads used on threaded pipes and pipe fittings.
OSHA	Occupational Safety and Health Administration, an agency of the US government under the Department of Labor with the responsibility of ensuring safety at work and a healthful work environment.

OUR COMMITMENT TO THE ENVIRONMENT

TruLink tubing and fittings are designed with the environment in mind and engineered to last a lifetime. Our tubing and fittings are made of 100% recyclable aluminum, which means that if you ever need to dispose of the product, it can be taken to a local aluminum recycling facility. TruLink packaging is made of recyclable cardboard, which can be recycled by your local cardboard recycling facility.



NO MAINTENANCE REQUIRED

Our TruLink Piping Systems are designed to endure the test of time. You will never have to service fittings, fitting seals, tubing or other system components. We are so confident in our product, we back it up with a Lifetime Warranty.

WARRANTY INFORMATION

Applied System Technologies is proud to announce our Lifetime Warranty program, covering all pipe and fittings for the TruLink compressed air product line. This warranty is possible due to our long history of producing high quality piping systems, continuing our tradition of excellence and customer satisfaction. We are 100% committed to supplying the finest products available to our customers and always do our best to exceed their expectations.

This Lifetime Warranty is a testament to that commitment. Applied System Technologies will continue to be the leader and not the follower in our field. We will continue to develop new and innovative products that revolutionize the compressed air piping industry. The bottom line is that compressed air piping is what we do! That's our product. That's our focus. That's why we are the experts in our field.

To initiate a warranty claim, send an email to **customerservice@appliedsystemtech.com.** Include contact name, phone number and PO used to purchase product. Please include brief description of product problem. All warranty claims are subject to approval and discretion by manufacturer. Under no circumstances should a warranty repair occur without the express written direction of manufacturer. Manufacturer is not responsible for any warranty costs that are incurred outside of written direction from manufacturer.

TRULINK™

About Applied System Technologies

AST was formed in 2005 to fill a substantial void in the market. Our driving force was a passion to provide a better solution than the black iron and copper plumbing products that were the industry standard for compressed air distribution. Our founders knew there had to be a better way. As we have grown, we continue to innovate, create better products, and hold fast to the personal attention we feel is central to our culture.

AST APPLIED SYSTEM TECHNOLOGIES™

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