

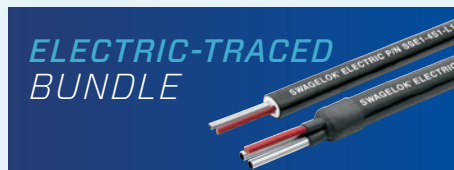
## Productivity Protection



### FACT:

Winter, with its below-freezing temperatures and icy-cold winds, is especially brutal on your fluid systems. But you can prevent damage to your impulse, process, and sampling lines. In fact, **Swagelok Electric-Traced** and **Steam-Traced Pre-Insulated Tubing Bundles** are ideal to ensure that your media keeps flowing, as intended, no matter what Mother Nature has to offer.

- Available in an array of configurations with multiple process tubes and electric or steam tracers
- Insulated with non-wicking, fibrous glass insulation; covered with a PVC or urethane jacket for exceptional abrasion and chemical resistance
- For faster installation and a more consistent thermal performance versus field-traced and insulated systems
- Because the process and tracer lines are parallel within the bundle, all tubes bend together for easier routing and field connections



#### ELECTRIC-TRACED BUNDLE

- Maintains uniform temperatures (up to 250°F) in long, continuous impulse and sample lines
- Self-regulating Raychem® tracer lowers heat output as bundle gets warmer
- Tinned, copper-braided shield



#### LIGHT STEAM-TRACED BUNDLE

- Superior freeze protection of impulse and analyzer transport lines
- Ideal for maintaining temperatures (50°F to 200°F) in small-diameter process lines
- Individually wrapped process and tracer tubes reduce heat transfer



#### HEAVY STEAM-TRACED BUNDLE

- Yields optimal high process temperatures (200°F to 400°F) and/or viscosity control
- Maximum high heat transfer due to direct contact of process and tracer tubes
- Effective alternative when electrification is not possible

### Steam Traps

**Strongly recommended for every steam-traced line in your system.**

Install every 100' of heated line or at turns and elevation changes. Separates condensate from steam and removes non-condensable gases. Place before pressure-relief, control, or closed manual valves to prevent seat erosion and freezing that could cause ruptures.



**REMEMBER:** If condensate isn't effectively removed from your lines, water hammer could result, causing significant operator risk and/or equipment damage.

### A Few More Helpful Winterization Hints

- **Conduct an Energy-Loss Evaluation** to determine current line leakage and to prevent fugitive emissions that could cause system failure in extreme cold
- **Employ Grab Sampling** - Safely, efficiently, and effectively capture gas and liquid samples for transportation to a lab for analysis; whether you require closed-loop sampling into pressure-rated cylinders OR want to collect liquids and non-volatile process fluid into glass bottles, our options are safe, intuitive, easy to maintain, and available as a single part number
- **Construct Heated Housing**, even for temporary use, to protect critical outside equipment

# VALVE & HOSE EXPERTISE – AND EDUCATION



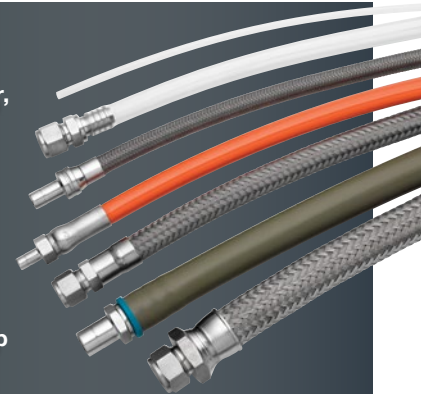
In even the most challenging applications and operating conditions, Swagelok componentry excels for its safety and consistent leak-tight performance. In particular, our versatile **60-Series Ball Valves** deliver as promised to help boost your profitability, each and every fluid-handling deployment. Here's why:

- Quarter-Turn
- Operational in a fully open or fully closed position
- Low Emissions
- Awarded an API 641 Test Certificate for Methane service
- Feature a unique, swing-out design for fast and easy in-line maintenance
- Offered in stainless steel, carbon steel, brass, or special alloy bodies
- Available with a wide array of end connections and handles
- On-Off or Switching models
- Compensating seat design assists low/high cycling pressures
- Seat material options: reinforced PTFE, Carbon/Glass PTFE, UHMWPE, and more



In addition, our **Flexible Industrial Hose** offerings give unparalleled proven and trusted results when used for connections between stationary and moving equipment, temporary connections, frequent disconnects, or when isolating from high-vibration machinery. Key features and benefits:

- Available with All-Metal, Fluoropolymer, PFA, Vinyl, Nylon, Polyethylene, or Rubber cores
- Offered in 1/8" to 2" diameters
- Accommodate working pressures up to 6000 psig
- For temperature ranges from -325°F to 1000°F
- 11 End Connections | 6 Covers | 4 Tags
- Easily cleaned
- No media entrapment or pressure drop



But we also suggest that you enroll in our **Swagelok Safety Essentials class** to learn precisely how to optimally choose, apply, and maintain such products:

## HOSE ESSENTIALS

**Duration:** HALF DAY

### Learn how to:

- Evaluate hose fit for purpose
- Route and size hose per application
- Apply the proven STAMPED methodology for optimum hose/end connection selection
- Clean and store hose
- Inspect and maintain hose



## VALVE ESSENTIALS

**Duration:** HALF DAY

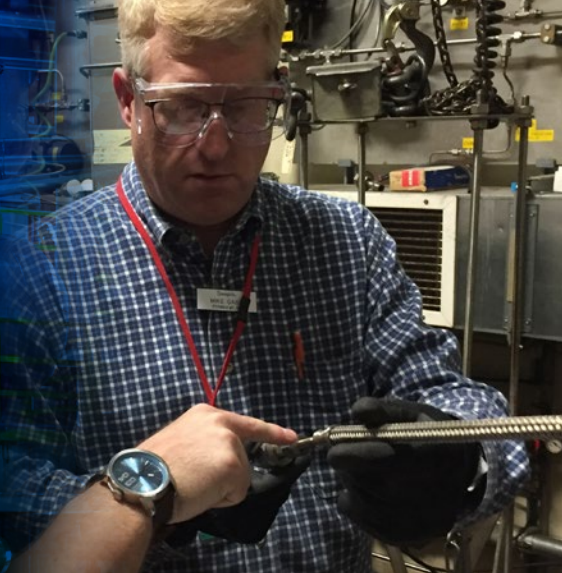
### Learn how to:

- Select, troubleshoot, and maintain valves
- Understand numerous valve types, operations, and functions
- Interpret a flow curve and pressure/temperature tables



**You can also combine both courses into a full day of in-depth, cost-effective training!**

# YOUR LOCAL HOSE PRO



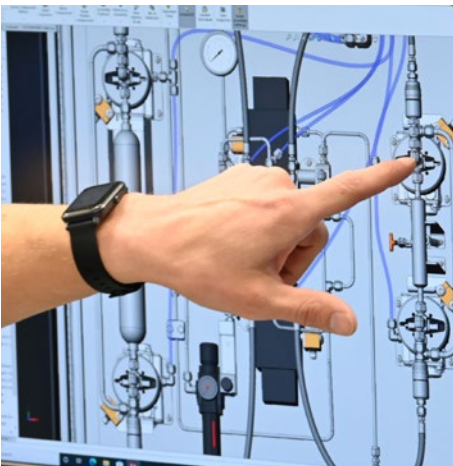
Be certain your industrial hoses are operating at maximum levels of safety and efficiency: Invite our certified **Swagelok Hose Advisor** for a visit to monitor/audit a portion of your system to identify, evaluate, and report on:



**Mike Gagel**

*Strategic Support Services  
Specialist and Certified  
Swagelok Hose Advisor*

- Broken Wires
- Abrasion
- Corrosion
- Ovality
- Stiffness/Hardness
- Color Changes
- Cover Blisters
- Leakage
- Motion
- Improper Sizing
- Damaged Reinforcements
- Correct Type for Application
- Operating Conditions: Pressure, Temperature, Flow...
- Environmental Factors: Temperature, Humidity...
- Kinks/Flat Spots
- Cleaning and Storage Practices
- ....and so much more!



**Call or text 412.439.1706 today to arrange your consultation!**

# LEAKAGE LEARNINGS



While it's not usually possible to find and fix all poor connections within a plant at once, you can at least prioritize your most dangerous and profit-draining areas, according to these categories:

- **Dangerous:** Any leak that presents a safety hazard. Such might include noxious gases and caustic chemicals and emissions that create slip/fall possibilities.
- **Costly:** Those leaks, even small ones, that can be consuming a large portion of your maintenance budget. For example, expensive argon gas versus compressed air.
- **Nuisance:** Repair of these can generally be delayed until you take care of your safety and financial concerns.

It's important to know that there are **three primary types** of leaks associated with most fluid systems:

- **Real:** Results from the failure of a pressure barrier to contain or isolate a system fluid from the surrounding environment. Cracks in the material or gaps between sealing surfaces are the usual culprits.
- **Virtual:** The release of internally trapped fluid into a system because of material outgassing, absorbed/adsorbed fluids, entrapments in crevices, or dead legs.
- **Permeation:** The passage of fluid into, through, and out of a pressure barrier that doesn't have enough large holes to enable more than a small fraction of molecules to escape through any one hole.

We can expertly assist with your leak detection and repair – and, more importantly, can train your technicians how to safely and properly assemble a fluid system:

**Tube Fitting Installation and Inspection, plus  
Tube Bending Safety Essentials | Duration: 1 DAY**

## Learn how to:

- Cut and debur tubing of various materials
- Install a Swagelok tube fitting
- Disassemble and reassemble a Swagelok tube fitting
- Identify basic thread types
- Inspect a fluid-system installation
- Identify correct tube fitting pull-ups and placement
- Identify correct tubing types, routing, and supports
- Inspect tubing for proper, defect-free bends
- Master best bending techniques
- Reduce overall system connections and leakage

Call or text 412.439.1706 today to schedule your one-day safety and productivity event – at your facility or project site – OR at our leading-edge Pittsburgh Training Center!



**What are the actual costs of not addressing your leakage, regardless of how minor?**

## LOST FLUID

millions of litres are wasted each year  
(1 gallon of hydraulic fluid = \$14 USD)



## LOST PRODUCTION

especially important in offshore oil where laws already limit production to a specific number of days per month



## EQUIPMENT DAMAGE

loss of lubrication can lead to premature wear/machine failure



## OFF-SPECIFICATION PRODUCT

can be produced inadvertently due to improperly calibrated or operating instruments; material must be reworked, sold at reduced price, or disposed of

## DEGRADED WORK ENVIRONMENT

oil drippage can cause accidents; emissions can be expensive, dangerous – even illegal



## FINES FOR NONCOMPLIANCE

systems and equipment that violate validated processes can quickly become costly



## CLEANUP

it takes time to locate and repair leaks; some call for special teams to manage toxic chemicals; there's also the cost of shutting down a system to thoroughly clean it

## WHY SWAGELOK TRAINING?

- We offer an unparalleled array of pertinent and timely course titles.
- We can bring our training directly to your site or project location.
- Classes include a full **money-back guarantee**.
- All graduates receive a genuine Swagelok Certificate of Completion, plus several valuable take-home items.
- We supply all class materials – students just need to show up!
- Our classes count toward **Continuing Education** credits.

# FUELING The FUTURE

## Hydrogen: Safe. Affordable. Environmentally friendly.

Just a few of the many reasons it's immensely promising as an ultra-clean and sustainable energy and power source for our planet.

### First, let's separate facts from fiction:

**Myth #1:** Hydrogen gas is hazardous to store and use.

**Fact:** Due to its non-toxicity and low volatility, it can be safer than conventional fuels.

*H<sub>2</sub> disperses rapidly if leaked, thus reducing the risk of accidental ignition and explosion.*

**Myth #2:** Hydrogen-fueled vehicles are not a practical long-range solution.

**Fact:** Hydrogen has high energy density to deliver a comparable driving range to traditional fuels.

*Driving range is a critical consideration for any fuel technology; hydrogen more than holds its own.*

**Myth #3:** Hydrogen is not environmentally friendly or sustainable.

**Fact:** There are numerous ways to generate hydrogen – and most are better for the environment versus fossil fuels.

*Most hydrogen production processes reduce or eliminate CO<sub>2</sub> emissions.*

**Myth #4:** Hydrogen is simply too expensive.

**Fact:** The price of green hydrogen continues to plummet.

*By the middle of 2025, hydrogen-powered buses will be cheaper to operate versus electric or internal combustion models.*

### Next, here are proven best practices for effectively designing your hydrogen fluid systems:

#### 1. Consider the End User

Specific use challenges are involved. For example, a hydrogen fuel cell vehicle will be refueled at a hydrogen station where a user will transport a high-pressure gas via a convenient dispenser. Make sure your design mitigates safety concerns.

#### 2. Minimize Potential Leak Points

Hydrogen's small molecules easily escape through tiny crevices, making traditional oil-and-gas designs unsuitable for safe containment. Minimize connections and use strategic tube bending to reduce the need for additional fittings.

#### 3. Use Only High-Quality Stainless Steel

Hydrogen embrittlement, caused by small hydrogen molecules, reduces a metal's ductility and resistance to fracture, leading to costly downtime and safety risks. Choosing materials like high-quality 316 stainless steel tubing prevents this issue and ensures long service life.

#### 4. Optimize Tube Fittings

Components that have worked well in oil-and-gas applications may not be a good choice for hydrogen work. Try **Swagelok FK-series fittings** to maintain ideal pressure ratings up to 1050 bar and are available in stainless steel.

#### 5. Consult with Experts

When in doubt, choose a trusted clean energy supplier with proven hydrogen expertise, engineering knowledge, and impactful product recommendations.



# FINEST IN THE FIELD

(13TH IN OUR SAFETY AND PRODUCTIVITY SERIES)

*Read how Swagelok Componentry and Strategic Support Services consistently save you substantial time, money, and worry in even your most challenging applications and operating environments!*

## Customer Challenge

A major Chemical & Refining customer faced substantial shaft seal leakage on a centrifugal liquid ring compressor. Required maintenance was far too frequent, too time-consuming, and, of course, too costly. In addition, the site was not close to realizing its crucial goals to improve quality, regulate and monitor flushing fluids, and lengthen mean time between leaks.



## Our Solution

Swagelok Rotating Equipment experts were consulted – and quickly helped produce drawings for a dual API Plan 32 seal flush panel. Once built, installation was easy and fast, quickly enabling the customer's operations personnel to reliably monitor their process. Maintenance is minimal as the cabinet panel provides heat and securely protects all componentry from harsh environments. Plus, the cabinet's strainers can be serviced online, with the assembly's flowmeters and pressure gauges externally visible. Lastly, a piping connection provides an alternative flush fluid or source, if needed.



## Bottom Line

The Swagelok Plan 32 panel delivered ultra-reliable performance with dramatically better seal flushes. Issues are readily seen; leakage no longer dominates the site's maintenance labor – nor budget.

# GLOBAL PROMINENCE, LOCAL SUPPORT

When production schedules get tight and demand continues to soar, **we're right here and ready** to help you get more out the door faster, safely, and risk-free.

## **IF:**

- Your assembly, skid, or enclosure processes are taking too long, costing too much, or causing too much waste and too many administrative headaches
- You lack the necessary manpower or expertise to deliver products as promised
- Your overall operational inefficiencies are draining profits

## **CALL US FOR:**

- Gas Purge Panels and Enclosures
- Distribution Manifolds
- Custom Flex Hose Assemblies
- High-Volume Bent Tubing Assemblies
- Sample Cylinder Assemblies
- Standard Instrumentation Mounting Kits
- Ultra-High-Purity Welded Manifolds
- Gas Delivery and Distribution Panels
- Gas and Liquid Grab Sampling Panels
- Mechanical Seal Support Systems
- Instrumentation and Transmitter Assemblies/Enclosures
- High-Pressure Test Stands
- Simple and Highly Complex Tube Bending
- Heat Exchanger Tubing Coils
- Gauge Block-and-Bleed Valve Assemblies
- Automated Ball Valve Assemblies
- Preset Relief Valves
- ....and so much more!



## **Our ultra-safe, leak-tight, easy-to-install panels**

*are artfully and precisely constructed with genuine Swagelok components – are fully warranted by Swagelok Company – and are delivered as a single part number!*

*When you're ready, we'll be ready, too... to help you save on engineering, scrap, inventory, and other high costs.*



**AND:** We also offer complete Maintenance Programs for Sample Cylinders and Flexible Hoses – and CAD and P&ID Design Assistance.

# Far Too High

More than 40% of safety incidents are due to preventable errors. Here's a simple guide to ensure that you understand how to properly and safely assemble – and reassemble – tube fittings:

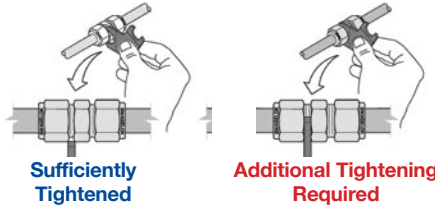
## MANUAL INSTALLATION

- 1 Insert the tubing into the tube fitting.  
*Make sure that the tubing rests firmly on the shoulder of the fitting body and that the nut is finger-tight.*
- 2 Scribe the nut at the 6 o'clock position.
- 3 Hold the fitting body steady and tighten the nut 1 1/4 turns.

For 1/16", 1/8", and 3/16", plus 2mm, 3mm, and 4mm tube fittings, tighten the nut three-quarters turn to the 3 o'clock position.

## To Further Enhance Worker and Workplace Safety

### GAP INSPECTION GAUGE



### DEPTH MARKING TOOL



With tube fully bottomed, mark the tube at the top of the Depth Marking Tool.

Tube below the line must not be visible when tube is inserted into fitting body prior to tightening. Mark will be visible at top of nut after tightening.

Learn more about building and maintaining fluid systems.

Just one day of our renowned Installation and Bending training – you choose the venue and date – will keep you safe, on-time, on-budget, and on-plan!

That's our promise and money-back guarantee.

## REASSEMBLY INSTRUCTIONS

- 1 Prior to disassembly, mark the tubing and flats.
- 2 Insert tube end connection with pre-swaged ferrules into the fitting body.
- 3 Rotate nut to pulled-up position; tighten slightly.

**Do NOT use a gap inspection gauge with reassembled fittings.**

## Common Installation Errors Resulting in Fitting Failure and Safety Concerns

### Fatigue

- Improper Tubing Support
- Side Load

### Stress Corrosion Cracking

- Exposure to Chlorine and/or Other Corrosive Media

### Non-Conforming Tubing

- Hardness
- Outside Diameter
- Wall Thickness

### Tubing Blowout

- Improper Initial Assembly
- Un-Bottomed Tubing in Tube Fitting
- Under-Tightened Tube Fitting on Initial Assembly
- Improper Remake Assembly
- Undersized Tubing

### Improper Tube Fitting Assembly

- Missing Components
- Bad Threads as a Result of Cross-Threading or Over-Tightening



Call or Text

**412.439.1706**

## Planning Tool

If you haven't yet received a free 2025 Swagelok Pittsburgh | Tri-State Area wall calendar, call us at **412.761.3212**.



**SWAGELOK PITTSBURGH | TRI-STATE AREA**  
YOUR LOCAL FLUID-SYSTEM EXPERTS

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