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INDUSTRIAL HOSE

# SAFETY CONNECTIONS

HOSE INSPECTION + MANAGEMENT, HANDLING + STORAGE,  
ASSEMBLY, AND TROUBLESHOOTING.







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OILFIELD TESTIMONIAL

# INTRODUCTION

## SAFETY CONNECTIONS - YOUR COMPREHENSIVE INDUSTRIAL HOSE MANAGEMENT AND PREVENTIVE MAINTENANCE PROGRAM.

THIS GUIDE WILL OUTLINE IMPORTANT TIPS FOR YOUR OPERATION'S PREVENTIVE MAINTENANCE PROGRAM, INCLUDING PROPER HOSE SELECTION, CLEANING, HOSE STORAGE AND TROUBLESHOOTING FOR THE ENTIRE LIFE CYCLE OF THE HOSE.

Gates has you covered with our expansive line of long-lasting, reliable industrial hose. Gates is a member of NAHAD (The Association for Hose and Accessories Distribution) that promotes fabrication and safety of the industrial hose products in the industry. Whether you are an end user or a Distributor, this guide will become your go-to resource for your industrial hose needs.



THE ASSOCIATION FOR HOSE AND  
ACCESSORIES DISTRIBUTION

[NAHAD.ORG/AWS/NAHAD/PT/SP/HOME\\_PAGE](http://NAHAD.ORG/AWS/NAHAD/PT/SP/HOME_PAGE)

## INDUSTRIES

### DIVERSIFIED INDUSTRIAL MARKETS

- Chemical
- Food & Beverage
- General Manufacturing
- Heavy Duty Industrial Equipment
- Bulk Transport
- Consumer Products
- Mining
- Agriculture
- Petroleum
- Oil & Gas
- Industrial Cleaning
- Construction
- Forestry
- Automotive
- Truck & Bus



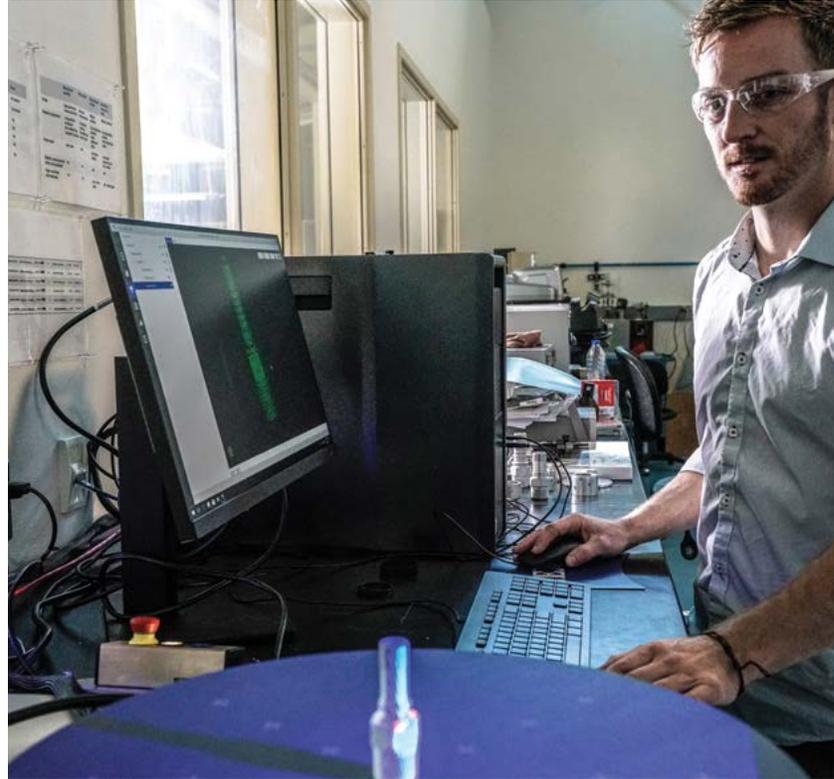
## COMPONENTS OF A PREVENTIVE MAINTENANCE PROGRAM

### PREVENTIVE KNOWLEDGE

- Hose selection and application
- Coupling selection
- Attachment of couplings to hose
- Maintenance and storage guidelines
- Agency specifications

### PREVENTIVE ACTION

- Periodic inspections
- Hydrostatic pressure testing
- Scheduled replacement
- Proper hose storage
- Troubleshooting



## WHAT IS PREVENTIVE MAINTENANCE?

An unexpected hose failure can damage equipment, stop production and even cause injury or death. A preventive maintenance program helps to eliminate hazards and failures:

- Identification of potential problems before failures occur
- Keeping equipment operating by preventing key component failures
- Properly using the correct hose for the application
- Replacing hoses on an established schedule regardless of hose condition
- Replacing hoses showing signs of deterioration/damage before it fails

## BENEFITS OF A PREVENTIVE MAINTENANCE PROGRAM

- Eliminates costly repairs
- Reduces downtime
- Ensures a safe work environment
- Reduces costly spill cleanups
- Increases hose life expectancy

# DEFINITION OF AN INDUSTRIAL HOSE



## INDUSTRIAL HOSE

An industrial hose is a flexible connector used for conveying liquids, solids and gases. A typical industrial hose is dragged, coiled, run over, kinked, and subjected to all kinds of wear and tear. Therefore, the application and its environment must be taken into consideration for proper hose selection.

### RESTRICTED APPLICATIONS (BUT NOT LIMITED TO):

- Out-of-sight applications
- Anything in-flight (airborne)
- Gases with working pressures above 500psi (including compressed air)
- Certain hazardous or cryogenic materials/gases
- Verify with the Tech line 303-744-5070

For further information and a complete list, contact your Gates rep or the PA Tech Line 303-744-5070 or [FPPASUPPORT@GATES.COM](mailto:FPPASUPPORT@GATES.COM)



**Tube** – Must be resistant to the material being conveyed. A variety of compounds can be used depending on the application.

**Reinforcement** – The construction of the hose may consist of multiple layers of fabric, yarn or wire depending on hose pressure specification and uses.

**Cover** – Its primary purpose is to protect the tube and reinforcement from external factors such as ozone, weather, abrasion and heat. A variety of compounds can be used depending on the application.

### EXPERT ADVICE



### CAUTION

- Hose should not be used in "out-of-sight" applications where the hose is buried, encased or submerged. Use rigid pipe in these applications.
- Hose has a limited service life and is not meant to be used in permanent applications.



SAFETY CONNECTIONS TECH TIPS 1



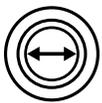
# PROPER HOSE SELECTION

## EXPERT ADVICE: RESTRICTIVE APPLICATIONS

Proper hose selection is the first step in preventive maintenance. Selecting the best product for the application will allow you to obtain the maximum life expectancy from the product for the most value. **When selecting the correct hose, use the acronym STAMPED as your guide to defining critical and important characteristics:**

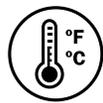
### SIZE

- I.D. (inside diameter)
- O.D. (outside diameter)
- Length
- Flow rate requirements (GPM for liquids; CFM for gases)



### TEMPERATURE

- Consider ambient and internal temperatures, as well as temperature impact on the material being conveyed.
- Where will the hose be used?



### APPLICATION

- How will the hose be used?
- How often will the hose be used (continuous, intermittent, seldom)?
- What are the environmental conditions?
- Special hose construction needs (crush resistant)?
- Conductivity requirements (non-conductive, static conductive, static dissipating)?
- Is the hose used in a critical application (flammable fluids, compressed gas, steam)?
- Government or industry standard requirements?
- For these applications, only use specially designed hoses:

- Steam
- LP Gas
- Aircraft Ground Refueling
- Corrosive Chemicals

# STAMPED



### MATERIAL CONVEYED

- Chemical name(s) and state(s) - liquid, solid or gas
- Food, pharmaceuticals, cosmetics
- Dry or powder
- Liquid
- Consider the cover and what it will be exposed to



### PRESSURE

- What is the working pressure?
- What is the maximum surge pressure?
- Is there a vacuum?



### END REQUIREMENTS

- What type of end connections?
- See "Proper Coupling Selection" on page 8.



### DELIVERY

- Identify the number of items and when they need to be supplied.
- Distributors – Call Gates customer service.
- End Users – Call authorized Gates distributors.
- Are there any special packaging or branding requirements?



# PROPER COUPLING SELECTION

## CRITICAL APPLICATIONS:

Specific couplings are required for critical applications. These critical applications include:

- Corrosive chemical transfer
- Propane gas
- Oilfield drilling
- Petroleum products transfer
- Steam
- Only certified, coupled assemblies should be used for ground fueling of aircraft

If more than one coupling style is recommended, final selection of which coupling to use will be based on user requirements. The following are common issues that help identify which coupling style is best for the application:

- Attachment options—ferrule, band or clamp
- Availability of size
- Availability of required thread type
- Cost
- Coupling compatibility with conveyed material
- Quality
- Ease of handling

No substitutions should be made unless written authorization has been given by the hose manufacturer, coupling manufacturer and the end user for the specific application.

**eXrimp™**

Reference [Gates/ecrimp.com](https://www.gates.com/ecrimp) or the mobile app for proper coupling selection and crimp specifications.



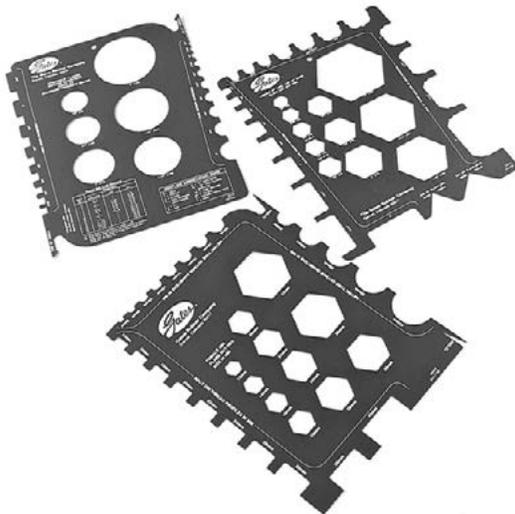


### FOR IDENTIFYING THREAD ENDS, GATES OFFERS THE FOLLOWING KITS:



Hydraulic Coupling Thread Identification Kit: 7369-0319

Pocket International Thread Identification Kit: 7369-4318



Hydraulic Coupling Templates: 35949

#### EXPERT ADVICE



#### COUPLING SELECTION REMINDERS:

- Select a coupling which will maximize safety and performance.
- The coupling end type must be of the same type as the port to which the hose is being attached.
- Never allow mixed thread types.



COUPLING SELECTION

# HANDLING AND MAINTENANCE TIPS

Proper hose handling ensures and maintains a safe working environment. Careless handling and maintenance increases the chances for failures and/or injury.



## Never exceed the rated working pressure of a hose assembly.

- Never allow pressure spikes or surges above the maximum rated working pressure of the hose assembly.
- Excessive pressure can shorten the life of the assembly.
- Remember, the lowest rated component in an assembly is the maximum working pressure of that assembly.

## Never run over a hose with equipment or vehicles, such as forklifts.

- Running over a hose can damage the tube, reinforcement and cover. It can create a dangerous buildup of pressure that can damage the assembly and equipment.

## Never pull a hose by its coupling.

- Pulling a hose at the coupling can weaken the coupling to hose interface.

## Never lift a heavy, large-diameter hose assembly from the middle with the ends hanging down.

- The internal reinforcement can be damaged at the support point.
- Support large hose assemblies every ten feet with rope saddles or slings.
- When moving assemblies, always lift the hose and coupling together.
- Use dollies, rollers or derricks when moving large hose assemblies.

## Never over-bend a hose to the point of kinking.

- Never bend the hose tighter than the recommended minimum bend radius (see Hose Product Sheet in Industrial Hose Catalog #39496-000).  
[gates.com/us/en/knowledge-center/resource-library/product-catalogs](https://www.gates.com/us/en/knowledge-center/resource-library/product-catalogs)
- Kinking a hose can seriously damage the tube and reinforcement.
- If needed, install bend restrictors at the coupling to prevent the hose from being bent past the minimum bend radius.

## A hose cover exposed to excessive wear can be protected with a specialized cover or abrasion resistant sleeving.

- For example, Gates MegaTuff™ can increase abrasion resistance 300x longer than standard rubber-covered hoses.

## Remove kinked or crushed hose from service immediately for inspection.

- Inspect and test the hose assembly before putting it back into service. See “Hose Inspections” on page 12.
- An outside diameter of a hose which has been permanently reduced by more than 20 percent should be removed from service.
- An outside diameter of a hose which has been reduced by 20 percent or less should have a hydrostatic test done before being put back into service. See “ARPM Hydrostatic Testing Procedures” on page 13.

## Remove and test any hose assembly that has been severely abused or excessively abused.

- This includes hose that has been pulled at the coupling, crushed, kinked, cut, abraded, or exposed to temperatures or pressures above stated maximums.

## Visually inspect and pressure test hose at regular intervals.

- This is extremely important for critical application hoses, such as acid/chemical, steam, LPG and petroleum.
- Check for kinks, bulges, soft spots, loose areas, abrasions and cuts.
- Cuts or abrasions which expose the reinforcement are signs that the hose should be immediately removed from service.

## Always check for fluid seepage by visually inspecting the hose assembly at the base of the coupling.

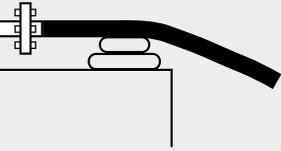
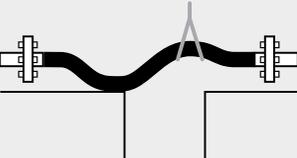
- Check for coupling slippage and seepage when hose is disconnected from the system.
- Remove any hose assembly that does not pass your visual inspection.



# HOSE ASSEMBLY ROUTING

## SAFETY CONNECTIONS HOSE ROUTING

Build a safe and higher-performing system by avoiding kinks and correctly supporting and protecting industrial hose.

<p><b>WRONG</b> ❌</p>		<p><b>RIGHT</b> ✅</p>
	<p>Properly support hose at coupling.</p>	
	<p>Avoid kinks by practicing proper plumbing practices.</p>	
	<p>Keep hose away from sharp corners or objects.</p>	
	<p>Prevent hose from sagging.</p>	
	<p>Properly support hose across gaps.</p>	
	<p>Avoid lifting hose with inadequately placed support.</p>	

# HOSE ASSEMBLY INSPECTIONS

## PERIODIC INSPECTIONS - PLANNING FOR SAFETY AND MAXIMUM PERFORMANCE

Periodic inspections of the hose and fittings are required prior to, during, and after use. Hoses that have become old, worn or damaged can present a danger to personnel and to the environment. Hoses that are not properly maintained can fail, which may result in costly material spills, cleanup, downtime and injury. Planned inspections, corrective actions and hose replacements can be less expensive than replacements or repairs made after a failure occurs.

### WHEN AND HOW OFTEN SHOULD YOU INSPECT HOSE ASSEMBLIES?

Inspection requirements will vary with each application type. The following factors should be considered:

- Critical nature of the application
- Operating temperatures
- Operating pressures
- Environmental factors

## IT IS HELPFUL TO THINK OF HOSE RISK MANAGEMENT AT TWO LEVELS:

### LEVEL 1 INSPECTION-DAILY

#### Hose cover damage

- Cuts, cracks, abrasion, exposed reinforcement, etc.

#### Stiffness or hardening of the hose

- As a hose ages and is exposed to sunlight, ozone, extreme temperatures or chemicals, it can lose some of its resiliency and become stiff and hard. When flexed, a stiffened hose can crack, leading to a catastrophic failure.

#### Changes in color

- May indicate fluid incompatibility.
- May indicate ozone or aging effects.

#### Cover blisters

- Indicates fluid incompatibility.
- Permeation in the early stages of leakage.
- Blisters can break and expose reinforcement.

#### Kinked or flattened hose

- Restricts material flow and hose performance.

#### Leakage

**WARNING: NEVER inspect a hose for leaks by running your hand over it while it is under pressure or contains the material being transferred.**

- Look for spilled or leaking material under the hose assembly.
- Problem with coupling interface or attachment.
- Weeping from the hose.

#### Damaged hose reinforcement

- Soft or weak spot in the hose
- Flat spots in the hose
- Reduced flow or pressure
- Reinforcement exposed in the tube or on the cover

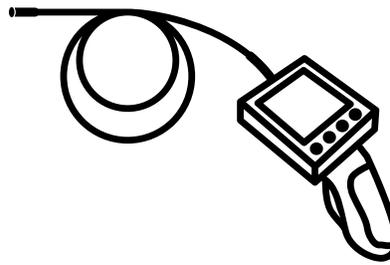
## LEVEL 2 INSPECTION-AT SHUTDOWN

Level 2 inspections should be conducted during regular equipment shutdown or at least every three months, even if it means shutting the equipment down for the specific purpose of hose inspection.

### Visually inspect for leakage

- ALWAYS conduct close inspection of the hose when pressure is released and the hose assembly does not contain potentially dangerous material.
- Escaping fluid under high pressure can penetrate and cut flesh, causing painful or severe injury.
- Hot materials and chemicals can cause serious burns and respiratory injury.

### Inspect hose tube for hardness, color change, cracks, blisters, erosion, etc.



### Hydrostatic pressure testing

See page 14—ARPM (The Association for Rubber Products Manufacturers) Hydrostatic Testing Procedure.

**WARNING: ALWAYS use water. Never test with flammable or corrosive fluids, solvents, or compressed gas.**

- Test at regular intervals.
- Essential for hoses used in hazardous applications such as chemical, steam, petroleum and compressed gas transfer.
- NEVER use air or gas as the media for pressure testing.



## ARPM HYDROSTATIC TESTING PROCEDURE

Hydrostatic testing should occur on ALL hose and couplings at regular intervals. Intervals for testing vary with each hose type.

**WARNING:** Always use water. Never test with flammable or corrosive fluids, solvents, or compressed gas.

### Procedure:

1. The hose should be at room temperature.
2. The testing area should be clean and dry.
3. Lay the hose out straight to its full length.
4. If necessary, place the assembly on rollers. This allows the hose to be moved while under pressure.
5. Restrain the assembly if there is danger of uncontrolled movement during the test.
6. Conduct a visual inspection.
  - Look for cuts, gouges, bulges, soft spots, coupling slippage or any other signs of wear.
7. A hose assembly which does not pass a visual inspection should be replaced.
8. An assembly which passes a visual inspection is then connected to a test pump and the free end is fitted with a quick-opening valve.
9. Elevate the free end and fill the assembly with water from the pump.
10. As the hose fills with water, bleed the air out through the open valve. Close the valve and lower the assembly to the ground when all the air is out.
11. ARPM has testing literature available for each hose type. It is imperative to pressure test the assembly at the proper pressure.
12. Drain the hose and allow it to dry before returning it to service.

### EXPERT ADVICE



### CAUTION

Hose under pressure can be dangerous, so make sure to take necessary safety precautions:

- Safety glasses or PPE
- Shield between hose and operator
- Never touch hose under pressure



SAFETY PRECAUTIONS



# STATIC ELECTRICITY GROUNDING

## WHAT IS A STATIC BOND?

Bonding connects two or more pieces of conductive equipment using wires or other conductors in order to equalize their static charge. Sparks cannot occur between objects that are at the same electrostatic potential.

## STATIC ELECTRICITY GROUNDING IMPORTANCE:

Movement of some material through a hose assembly can generate enough static electricity to be hazardous. Not only could a static spark ignite a fire or cause an explosion, but enough charge could build up in the hose to cause a severe shock if contacted.

## GROUNDING CAN BE ACHIEVED USING DIFFERENT METHODS:

**Material Compounds such as using static conductive tube and cover stock.**

### Bent Wire Method

1. Use with a hose that is wire-reinforced or a hose that has a metal conductor within the hose.
2. Locate the helix wire or the static wire.
3. Pull the wire out with pliers.
4. Bend the wire into the inner surface of the hose tube.
5. Use the ohmmeter to check the electrical continuity on the helical wire prior to inserting the coupling. This will ensure that there is not a break in the wire.
6. Use caution not to puncture the tube.
7. Attach the couplings so the bent wire and the coupling make contact. (The bent wire must not extend the full length of the stem, since it could create a leak at the coupling.)
8. Place the assembly on a non-conductive surface and check it for electrical continuity with an ohmmeter that measures electrical resistance. (The maximum allowable resistance is 20 thousand ohms per foot of hose.)
9. Record all test data on a hose inspection card and file it with maintenance records.

### Metal Staple Method

Use with a hose that has a carbon fiber static conductor or wire reinforcement where the staple can be inserted easily against a static-conducting member.

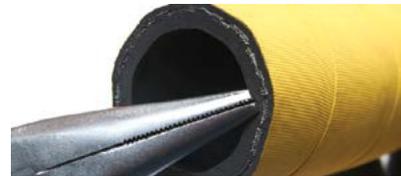
1. Cut the hose end square to the desired length.
2. Locate the static wire, wire braid or carbon fibers.
3. Place one leg of an aluminum, copper or stainless steel staple into the wire reinforcement or carbon fiber. (For acid/chemical hoses, use only stainless steel staples.)
4. Place the other leg of the staple inside the tube, making sure the staple straddles the tube wall and is snug against the end cut.
5. Pinch the staple with pliers to force the leg against the inner surface of the tube wall.
6. Clean the staple and coupling shank ends with an emery cloth or steel wool.
7. Attach the coupling so the staple and coupling make contact.
8. Place the assembly on a non-conductive surface and check it for electrical continuity with an ohmmeter that measures electrical resistance. (The maximum allowable resistance is 20 thousand ohms per foot of hose.)
9. Record all test data on a hose inspection card and file it with maintenance records.



Helix wire being bent into the inner surface of the hose tube.



Hose assembly being tested with ohmmeter.



Close-up of hose end showing wire braid in hose.



Placing the staple.



Pinching the staple into the tube wall.

#### EXPERT ADVICE



#### CAUTION

- When electrical continuity is required, ground the wire braid in the hose to couplings with aluminum, copper or stainless steel staples.



STATIC GROUNDING



# HOSE CLEANING AND STORAGE

## HOSE CLEANING

There are many different methods used to clean hose assemblies as mandated by ARPM. Some suggested cleaning methods for select hoses are listed below.

Which method to use, and how often cleaning should be performed, is based on the following:

- Type of hose
- Residual material in the hose
- Cleanliness requirements for the application
- Cleaning facilities available
- Consideration for disposal of the residual material and cleaning solutions
- Requirements for special applications such as foods, pharmaceuticals, etc.

### Suggested Cleaning Methods

- Cleaning solutions should be chosen that will dissolve or remove the residual material without damaging the hose assembly.
- A dilute solution of soap in water can often be sufficient.
- Consult the SDS of the material being cleaned to identify potential cleaning solutions.
- After identifying potential cleaning solutions, check the Chemical Resistance Table in the Industrial Hose Catalog (#39496-000) for compatibility with the hose tube and cover. [gates.com/us/en/knowledge-center/resource-library/product-catalogs](https://www.gates.com/us/en/knowledge-center/resource-library/product-catalogs)
- Non-compatibility of a cleaning solution can cause damage to the hose.

### EXPERT ADVICE



### CAUTION

- Some chemicals, such as concentrated acids or bases, can react with water, releasing heat and by-products, and possibly splatter.
- Never leave an operating transfer hose unattended.



CHEMICAL RISKS

### EXPERT ADVICE



An apron, safety glasses or face shield, rubber boots and gloves should be worn to help protect personnel from potential injury.

### Flushing or immersing in a cleaning bath

- Do not exceed the maximum working pressure or temperature for the hose.
- The cover of the hose should also be washed or wiped to remove any residual material.

### Shuttle Method

- This method uses a shuttle to travel through the inside of the hose assembly to wipe residual material from the hose. Be sure to handle the shuttle and residual material safely to avoid injuries or damage.



SHUTTLE CLEANING METHOD

### Recommended cleaning of chemical hose

- Drain the hose after each use.
- Flush with water or other neutralizing cleaning solution.
- Properly dispose of drained fluid and cleaning waste.
- Between uses, store the hose in a clean, dry environment away from sunlight.
- Avoid cross-contamination. Dedicate a hose to handle a specific chemical.
- If the steam source has a wand attached, use caution inserting the wand so that physical damage to the hose is not caused. Sharp edges on the wand can cut the tube, and thin spots could occur where the hot wand contacts the tube.

### Recommended cleaning of food hose

- Drain the hose after each use.
- Flush with water or other cleaning solution.
- Properly dispose of drained material and cleaning waste.
- Between uses, store the hose in a clean, dry environment away from sunlight.
- Avoid cross-contamination. Dedicate a hose to handle a specific food material.

### Steam cleaning

A few things you must be aware of:

Steam cleaning is not generally recommended. High temperatures can accelerate aging of a hose and shorten service life. If you must use steam cleaning, follow these guidelines:

- Do not exceed the maximum temperature rating of the hose. Doing so can cause defects such as tube delamination (reducing tube-to-reinforcement-to cover adhesion), tube cracking or tube “thin spots.”
- Never use superheated steam! This will exaggerate the potential damages noted above. Only “open end” 50 psi steam should be used. See page 25—STEAM HOSE.
- If the hose has a blockage, remove it before introducing steam.

## HOSE STORAGE

- Store hose in a cool, dry room with moderate humidity. Temperatures between 50°F to 75°F are preferred. Do not exceed 100°F.
- Store hose out of direct sunlight and away from heat sources.
- Keep hose away from ozone sources such as arc welders, electric motors, transformers and other electrical equipment.
- Store hose in original shipping container or wrapping to protect from harmful environmental exposure.
- Hose shipped straight should be stored straight.
- Hose shipped in coils or bales should be stored on a horizontal plane.
- Hose should be stored in a first-in, first-out basis.
- Do not hang hose on a hook.
- Do not stack hose too high. Excessive weight can crush and damage the hose at the bottom.

## SHELF LIFE

- Regardless of storage conditions, all bulk hose that has been stored for over 4 years should be tested and re-qualified before use. Any hose that exceeds 8 years of storage should be scrapped.

# TROUBLESHOOTING

## AVOIDING PROBLEMS CAUSED BY MISAPPLICATIONS

POTENTIAL PROBLEM	POTENTIAL CAUSES	POTENTIAL SOLUTIONS
Hose burst (or crack) in one or more places.	Age of hose may lead to a hose that has exceeded the rated working pressure. Hose twisted during installation.	<ul style="list-style-type: none"> <li>▪ A routine Preventative Maintenance Program.</li> <li>▪ Check pressure output of system. Use a hose with a higher pressure rating.</li> <li>▪ Use swivel couplings.</li> </ul>
Hose tube swells, collapses or deteriorates, blocking material flow or causing a leak.	Hose tube is not compatible with material being conveyed and/or temperature. Suction rating is below the application requirements causing tube collapse.	Identify the material and the temperature at which the system operates. Refer to the Gates Chemical Resistance table in the industrial hose catalog. Contact Gates Application Engineering <a href="mailto:fppasupport@gates.com">fppasupport@gates.com</a>
Coupling blows off end of hose assembly when pressurized.	Incorrect coupling used; coupling not fully inserted into the hose. Or coupling not crimped to specified diameter (too loose or too tight).	Check hose and coupling compatibility. Review crimp specifications and procedure. Make sure routing does not cause excessive stresses to the hose assembly.
Hose inner tube collapsed inward, or tube delamination.	Hose not designed for high vacuum. Adhesion between tube and reinforcement may be poor. The hose may have been bent too sharply and kinked.	Use a hose designed for high vacuum. Check routing to avoid exceeding the minimum bend radius.
Hose burst on the outside of the bend and burst hole is elliptical in shape.	Hose bent too tight in routing causing the reinforcement to open up too much on outside of bend.	Check routing. Do not exceed rated minimum bend radius. Consider using alternative couplings, adapters or bend restrictors to relieve stress on the hose.
Hose pulls out of the coupling.	Hose when pressurized shortens up, pulling out of the coupling. Hose not supported with the added weight of the material pulls off of the coupling.	Check routing for proper hose length. Allow some slack to compensate for hose movement when pressurized. Support long lengths of hose with clamps, cables, etc. Do not use hose as a rope or cable.
Hose flattened in one or more areas.	Hose twisted, kinked or run over. Extreme twisting and kinking can open up large gaps in the reinforcement allowing a blowout to occur.	Check routing. Use swivel couplings to prevent twisting the hose when making port attachments. Use alternative plumbing and longer lengths of hose to avoid excessive bending and kinking. Use crush resistant hose.
Wire reinforcement is rusty at site of hose burst.	Hose cover was damaged from cuts, abrasion, extreme temperatures, chemical attack, internal gases diffusing through the tube and collecting under the cover forming blisters which break, or improper coupling attachment.	Protect hose against cuts and abrasion with a nylon sleeve or steel coil guard. Check temperature and chemical compatibility rating of hose tube and cover with the application. Consider pin-pricking the cover of the hose to allow diffused gas to escape and not become trapped under the cover.



Hose bursts or cracks

Hose kinks

Hose leaks

POTENTIAL PROBLEM	POTENTIAL CAUSES	POTENTIAL SOLUTIONS
Hose leaks profusely without bursting.	High-velocity erosion of hose inner tube. Fluid velocity in general may be too high.	Consider a larger-diameter hose to handle the volume flow at a lower velocity.
Hose leaks or bursts. Cover is deteriorated, hard, has fine cracks and feels stiff.	The effects of environmental conditions such as heat, cold, ozone and sunlight cause hose maturity, resulting in the loss of performance properties. The hose eventually fails.	Check the code date on the layline of the hose; generally, anything beyond five years of age is questionable. Suggest a maintenance replacement schedule that meets the application conditions.
Hose tube worn through on one side and leaks.	Abrasive material wore through the tube.	Select hose with a thicker and/or more abrasion resistant tube. Periodically rotate hose to even out abrasion wear. Use a larger-diameter hose to reduce material velocity. Do not bend hose as severely.
Hose burst at end of coupling.	Exceeded maximum rated working pressure. Hose bent sharply over the end of the coupling. Did not follow the recommended coupling attachment procedure.	Use a higher pressure rated hose. Use hose bend restrictors and do not exceed the minimum bend radius rating. Check the coupling used and crimp diameter.
Hose cover blistered; blisters filled with material being conveyed.	Hose not compatible with material being transferred.	Select a hose with a tube having a high compatibility rating with the material being transferred.
Hose cover blistered; blisters not filled with material being conveyed; burst hole is elliptical in shape.	Gas in liquid. High pressure causing high rate of gas permeation of tube.	Remove gas from line. Pinprick hose cover. Change to a hose with a tube of higher density/ lower porosity.
Cover of hose soft, gummy, discolored and worn away by friction.	Hose cover not compatible with environmental conditions or fluid that it is being exposed to.	Select a hose cover that is compatible with the material and temperature.
Discharge pressure/volume too low.	Pump output capacity too low. Hose or coupling restriction.	Increase pump output. Check for hose kinks. Increase hose and/or coupling inside diameter. Add "booster pump" if hose length is extremely long.

# SPECIALTY HOSE



## ACID/CHEMICAL HOSE

Selecting the right acid/chemical hose is **EXTREMELY** critical. An incompatible hose can lead to potentially dangerous or fatal accidents/failures.

To ensure selection of the correct acid/chemical hose, follow these steps:

1. Use the Chemical Resistance Table and Hose Finder in the Industrial Hose Catalog (#39496 000) to select the proper hose. The table lists approximately 1,400 chemicals and the Gates tube stocks most suitable for each type of chemical. [gates.com/us/en/knowledge-center/resource-library/product-catalogs](https://www.gates.com/us/en/knowledge-center/resource-library/product-catalogs)
2. Use couplings that are compatible with the application and the product being conveyed.
3. Contact your Gates representative or distributor to help you select the correct hose, or contact the Gates Hose Product Application group to answer specific application questions at 303-744-5070 or [fpasupport@gates.com](mailto:fpasupport@gates.com)

## FOLLOW THESE TIPS FOR A SAFER CHEMICAL OPERATION:

### Wear protective clothing

- Chemical hose operators must wear protective clothing, including face or eye protection, rubber gloves and boots.
- A respirator may be required in some situations.

### Monitor the pressure and temperature

- Never exceed the maximum rated working pressure or temperature rating.

### Monitor the environment

- Never allow the hose to lie in pools of chemicals or let chemicals drip on the hose cover. A hose cover that is not resistant to the chemical it is being exposed to can deteriorate and lead to premature hose failure.
- Never leave an operating transfer hose unattended.

## Always drain the chemicals from the hose

- Always disconnect the hose when not in service.
- Completely drain and flush all corrosive residues and vapors.
- Use extreme caution when flushing the hose with water. Some chemicals, such as concentrated acid, may react with water and splatter.
- Always dispose of the waste material in an environmentally safe manner.
- For more information, see the hose cleaning section on page 17.

## Routine maintenance and testing

- Inspect hose and couplings daily, or at shift changes.
- Hydrostatic pressure test on a pre-determined regular basis.
- All hose assemblies must be inspected and tested before entering service.
- Any hose which shows signs of wear or abuse must be removed from service immediately.



### Hydrostatic testing (see page 14)

- Lay the hose straight on rollers in a clean, dry area.
- Visually inspect the outer cover for cuts, abrasions, bulges, soft spots, coupling slippage and any other signs of wear.
- After a hose assembly passes the visual inspection, connect it to a suitable test pump and fit the open end with a quickopening valve.
- Fill the assembly with water and bleed the air out.
  - Always use water. Never pressure test with compressed gases, corrosive liquids or solvents.
- Always use the recommended safety precautions.
- Pressure test requirements for new hose assemblies:
  - Raise the pressure to 1.5 times the rated working pressure and hold for five minutes.
- While under pressure, carefully examine the hose assembly for leaks in the cover and at the couplings. Use a sheet of paper, not your hand, to check for leaks. Check for coupling slippage and any indications of weakness or failure in the hose
- Pressure test requirements for used assemblies:
  - First, make sure it is clean!
  - Clean the used hose in a 10 percent sodium hydroxide solution at 180°F, then rinse with water.
  - Raise the pressure to 1.5 times its rated working pressure.
  - Visually inspect the assembly for coupling slippage, leaks, or any indications of weakness or hose failure.
  - When the test and inspection are complete, thoroughly drain the water from the hose.

### Fitting inspections

- Select the proper couplings. Metals are subject to attack by the conveyed chemicals.
- Check exposed surfaces of couplings, flanges and nipples for cracks or excessive corrosion.
- Check for coupling or nipple slippage.
- Remove any hose assembly from service that does not pass the inspection.

### Electrical conductivity inspections

- Test the hose assembly with an ohmmeter or a battery-operated voltmeter. See page 16.

### Accurate record keeping

- Tag each hose assembly.
- Record all test data on the hose inspection card and file it with maintenance records.

## AIR HOSE

Increase the life of an air hose by following these preventive tips:

- Limit exposure to oil.
- Oil and air hoses do not mix.
- Oil can get into the hose from the air compressor or from lubricating various air tools.
- Wipe excess oil from the hose cover.
- Different tube and cover materials react differently to oil, diluted chemicals, and heat. For oily applications, use Class A rated hoses. For diluted chemicals and higher temp applications, use Class C rated hoses.\*

### ARPM OIL CLASSIFICATIONS

Class A = High Oil Resistance

Class B = Medium-High  
Oil Resistance

Class C = Limited Oil Resistance

\* Always refer to Chemical resistance tables

### Heat

- Keep hose away from radiant heat sources like steam pipes, heaters, exhaust vents and radiators.

### Ferrules

- Never use a hose assembly with a crushed ferrule.
- Crushed ferrules can blow out causing bodily injury and property damage Always replace a crushed ferrule before use.

### Storage

- Always relieve excess pressure.
- When finished using an air hose, shut the air off at the compressor and relieve excess pressure at the air tool.
- Do not run over air hoses. Running over hose causes a sudden increase in air pressure, which can damage the hose.



## LPG HOSE

**WARNING:** Liquefied petroleum gases are flammable, so take all necessary precautions for safe handling. Operating personnel must be trained in proper handling procedures. An in-service failure may result in injury to personnel or damage to property.

### Reversing

- Reverse the hose end-for-end at regular intervals. Reversing the hose distributes exposure to heat, oil and points of greatest flexing.
- Use only LPG hoses that meet or exceed Underwriters Laboratories Standards.
- Use recommended and tested couplings designed for LPG hose.
- Use hose for natural gas only under the following conditions:
  - Do not exceed 50 psi.
  - Use in a well-ventilated environment.
  - Use according to all state and local codes. Contact local and/or state inspectors to verify compliance.

- Hose used to transfer liquefied petroleum gas should be inspected according to these procedures:
  1. Inspect and hydrostatic test all new LPG hose assemblies.
  2. When LPG hoses are subjected to ordinary use, test every 30 days for the first six months. After initial six months, test hoses once per week.
  2. LPG hoses subject to severe usage will deteriorate more quickly. Adjust inspection schedule to meet hose usage. Hose assemblies should be hydrostatic tested immediately after the hose is subjected to abnormal abuse (severe end pull, flattening or crushing by vehicles, sharp bending or kinking).
- For testing procedures, reference UL 21 Standards.

## PETROLEUM HOSE

### APPLICATION

Make sure the hose being used is suitable for the application.

- For suction or return lines, use a hose that has an internal support helix and a vacuum rating sufficient for the working conditions.

### Couplings

- Use only recommended couplings and methods of attachment.

### Recoupling of used hose

- This is generally not recommended, but should be considered only in temporary, emergency situations.
- This should be done only after the condition of the used hose is evaluated. Pressure test at the rated working pressure to verify continued satisfactory performance.
- Recoupling may result in reduced service life.

### INSPECTION

Periodically inspect hose assemblies for the following:

#### Cover abrasion

- A hose cover that is worn through, exposing the reinforcement, is a warning sign of potential hose failure.

#### Cracks or cuts in the cover

- This indicates that the hose cover has been degraded or abused and the hose should be replaced.

#### Discoloration of the cover or tube

- This can be a sign of chemical degradation and the hose should be replaced.
- Make sure the hose is compatible with the material being conveyed and with the external environment.

#### Discoloration of the material (such as fuels) being transported

- This may be a sign of chemical incompatibility resulting in leaching out of some of the hose tube material which could degrade and lower hose performance.
- Material being leached out of the hose tube can result in contamination of the transported material and subsequent contamination of system filters, engine fuel injectors, etc.

#### Ongoing performance capability

- Periodically test the hose assembly at the rated working pressure to verify continued performance. For fuel hoses, use water as the test fluid, then rinse with the subject fuel before returning to service. Dispose of the test fluid and rinse fluids properly.

#### Storage after use

- Drain hose completely after use.
- Fuel hose ends should be left open in a well-ventilated area to allow fumes to dissipate.
- Avoid exposure to sunlight, excessive ozone sources such as electrical motors and transformers, extreme temperature and moisture, and external abuse.

#### Safe hose operations

- Do not exceed the rated working pressure, temperature or minimum bend radius of the hose.
- Support heavy, long lengths of hose being lifted or suspended.
- Avoid any pull force to the coupling end by the hose weight or by pulling to move the hose.
- Avoid bending the hose at the coupling, even if the minimum bend radius is not exceeded. Bending at the coupling compounds stresses already being applied.
- If the hose is being used for continuous transfer, select a hose with a "1" rating for the tube compound in the Chemical

Resistance Table in the Industrial Hose Catalog (#39496-000). If the hose is being used for intermittent transfer, select a hose with a "1" or "2" rating. [gates.com/us/en/knowledge-center/resource-library/product-catalogs](https://www.gates.com/us/en/knowledge-center/resource-library/product-catalogs)

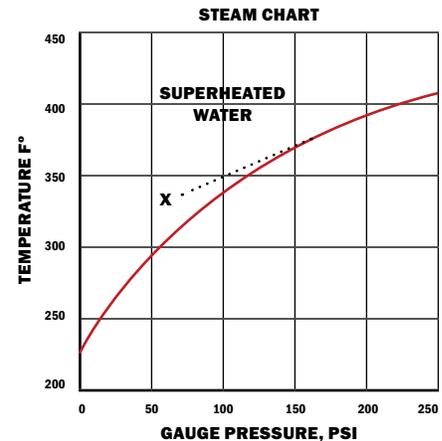
- When in doubt, contact Gates Product Application Engineering at 303-744-5070 or [fppasupport@gates.com](mailto:fppasupport@gates.com)
- Never leave an operating transfer hose unattended.

# STEAM HOSE

## STEAM AND ITS EFFECTS ON HOSE

Water can exist in three different basic states—solid, liquid or gas—and there are three different conditions of the gas (steam). The pressure and temperature dictate the particular condition of the water. These conditions are wet saturated steam or “wet steam,” dry saturated steam, and superheated steam or “dry steam.”

By way of explanation, refer to the steam chart. The heavy red line is the boiling point of water at various gauge pressures. Any point on this line represents saturated steam. Saturated steam may be completely free of unvaporized water particles, or it may carry such particles. In other words, saturated steam may be “dry” or “wet.” Any point below the line represents hot water—any point above the line represents superheated steam.



The dotted line shows the process of saturated steam being transformed into superheated steam. If a steam line is at a pressure of 150 psi and a temperature of 366°F, it contains saturated steam. If the pressure is substantially reduced by the expansion of the steam (such as the sudden opening of a valve or the steam passing into a larger pipe or hose), the condition of the steam follows the dotted line to some point X in the superheated steam area. This condition may not last very long, but the superheated steam tends to deteriorate the tube stock in ordinary steam hose intended for use with saturated steam. This usually results in hose failure.

## MAINTENANCE

Steam hose failure can cause **SERIOUS** injury. Therefore, it is extremely important to properly select and maintain steam hose.



### RULES TO REMEMBER

RULE	REASON
Steam hose should be used to transfer <b>ONLY</b> steam! Never use it to transport other materials.	The hose is specially designed to handle steam. Materials other than steam could damage the tube.
Connect steam hose to a length of pipe to separate the hose from the steam source.	Constant high heat can shorten the life of a steam hose.
Always have an accurate pressure gauge and positive shutoff valve installed between the steam source and the hose.	A surge in the hose could cause a failure and injury.
Operators should always wear protective clothing, which includes face or eye protection, heavy-duty clothing, gloves and boots.	This provides protection from flying particles and liquids.
Operators should <b>NEVER</b> open a steam valve when the hose is lying free.	The sudden surge in pressure can cause the hose to whip, which could cause injury or damage.
<b>ALWAYS</b> drain steam hose when not in use.	Water remaining in the hose may be absorbed by the tube. When the hose is then reheated and still under low pressure, the absorbed water may change to steam and “popcorn” or expand and explode the tube. Popcorn can weaken and destroy a hose.



## HOW TO SELECT THE CORRECT STEAM HOSE ASSEMBLY

### Determine required hose size

The hose size required is usually fixed by size of fittings or pipe to which the hose is to be connected. It is important that you do not select a hose with an inside diameter larger than the diameter of the preceding pipe.

### Find actual rated working pressure and temperature

Take pressure and temperature readings just ahead of the hose connection.

### Determine condition of steam (saturated or superheated)

Locate the actual rated working pressure and temperature on the steam chart on page 25. Any point on the heavy line is saturated steam.

### Select the correct hose

From the table to the right, select the hose that fulfills the requirements of both the condition of the steam and the rated working pressure.

### Determine length required

Length required is almost always dictated by the application.

### Select couplings required

Gates recommends interlocking\* and permanently crimped types of couplings for steam hose applications. These are identified as:

- Interlocking, ground joint
- Interlocking, washer joint
- Permanently crimped

\*Remember to retighten bolts on a regular basis.

### Maintenance and inspection

For proper maintenance and inspection of interlocking and permanently crimped steam hose assemblies, refer to ARPM IP-11-1.Z

### STEAM HOSE TABLE

HOSE TYPE	RECOMMENDED SERVICE		
	RATED WORKING PRESSURE (PSI)	WORKING TEMPERATURE (°F)	TYPE OF STEAM
Plant Master™ Steam Plus	250	450	Saturated or superheated
Plant Master Steam	250	450	Saturated or superheated

### PROPERTIES OF SATURATED STEAM

(Abridged from Handbook of Chemistry and Physics – 39th Edition)

#### Gauge Pressure (psi) -vs- Temperature of Saturated Steam (°F)\*

(PSI)	(°F)	(PSI)	(°F)	(PSI)	(°F)	(PSI)	(°F)
10	239	85	328	150	366	215	394
25	267	90	331	155	368	220	395
30	274	95	335	160	371	225	397
35	281	100	338	165	373	230	399
40	287	105	341	170	375	235	401
45	292	110	344	175	377	240	403
50	298	115	347	180	380	245	404
55	303	120	350	185	382	250	406
60	307	125	353	190	384	255	408
65	312	130	356	195	386	260	409
70	316	135	358	200	388	265	411
75	320	140	361	205	390	270	413
80	324	145	363	210	392	275	414

\*Based on an atmosphere pressure of 14.7psi.

#### EXPERT ADVICE



#### CAUTION

- Steam can be dangerous material. Play it safe – stay within the limits of published recommendations!
- Do not alternate between steam and water.



DANGERS OF STEAM

## STEAM COUPLINGS

1. Use Gates recommended permanently crimped or two- and four-bolt interlocking clamp-type couplings.
2. The clamps must interlock over the collar of the coupling shank and the clamp halves must interlock with each other.
3. Make sure the hose clamps are tight and crimped couplings are secure before each use. Always check them again after each shutdown, or before each start up.
4. A steam hose which is used for long periods should have the clamps checked once every 24 hours and tightened as required.
5. Always tighten bolts evenly. This prevents distortion, bending and misalignment, commonly known as "cocking."
6. When clamp halves begin to touch after repeated tightening, DO NOT USE THE HOSE.
  - If the hose has no other problems, it can be recoupled or fitted with the next smaller size clamp and put back into service.
7. ALL steam hose assemblies should be pressure tested before being put into service.

## ARPM STANDARDS FOR STEAM HOSE TESTING

The Association for Rubber Products Manufacturers (ARPM) recommends pressure testing steam hose once every 90 days the first year it is in service and once a month thereafter. See ARPM publication #IP-11-1, Guide for Use, Maintenance, Testing and Inspection of Steam Hose.

1. These tests are for steam hose with a maximum rated working pressure of 250 psi, temperature ranges up to 450°F, and inside diameters of two inches or less.
  - If the hose does not meet these criteria, please contact Gates Hose Product Application at 303-744-5070 or [fpasupport@gates.com](mailto:fpasupport@gates.com)
2. Lay the steam hose out to its full length and inspect the outer cover for cuts, abrasions, bulges, soft spots, coupling slippage or any other signs of wear.
  - If the hose has any of the above problems, discontinue use.
  - If the hose passes the visual inspection, continue to Step 3.
3. Connect the hose to a suitable pump.
4. Restrain the hose by using a cable or chain.
5. Inspect permanent couplings for looseness or slippage, cracks, severe corrosion, flattened ferrules, or other signs of damage. Tighten the clamp type coupling bolts evenly and securely. Fit the open end of the hose with a quick-opening valve.
6. Raise the free end of the hose, fill the hose with water and bleed the air out through the quick-opening valve. When all the air is out, close the valve.
7. Raise the pressure to twice the maximum rated working pressure of the hose.
  - Hold this pressure for five minutes.
  - While under pressure, examine the hose for leaks, swollen areas or bulges, especially near the couplings.
  - A leak or bulge in the hose assembly must be removed from service and replaced. Never use a steam hose that leaks.
  - If leaks are found between the hose tube and the fitting, release the pressure, retighten the clamp and reapply pressure.
  - If the leak continues, the hose must be replaced.
  - If a leak occurs at a permanently crimped coupling, the hose must be replaced.
8. Record all test data on an inspection card and file it with maintenance records.



**ARPM**  
ASSOCIATION FOR RUBBER  
PRODUCTS MANUFACTURERS



# GET STARTED WITH GATES

## WHAT MAKES GATES INDUSTRIAL HOSE DIFFERENT?

When it comes to industrial hose, you want a product you can trust. That is why, when you work with Gates, you get Efficiency. Engineered.—a simple, sensible and intuitive solution for your industrial hose needs. Most industrial hose naming systems cause confusion, which can not only increase the time spent finding the right hose for an application, but also can compromise safety and performance if the wrong hose is used.

That is why Gates has revamped its industrial hose naming system—to make your job easier with intuitive and descriptive names.

### GATES EASY-TO-UNDERSTAND NOMENCLATURE WILL:

- Make it easy to find the right hose for the application.
- Reduce the learning curve for new employees.
- Help you better organize your hose inventory.
- Help eliminate downtime.





## HOSE APPLICATION FAMILIES

APPLICATION	ICON	COMMON USES	GATES NAME
Agriculture		Air, water, pesticides, fertilizer, etc.	Ag Master™
Air Breathing		Mixture of oxygen, helium, nitrogen gases	Air Master™
Air Duct		Heating, ventilating	Air Duct
Air + Multi-Purpose		Air, water, oil transfer	Plant Master™
Chemical		Acids and chemicals	Chem Master™
Food + Beverage		Milk, oils, wine, beer, etc.	Food Master™
Marine		Engine coolant, fuel, etc.	Marine Master™
Material Handling		Dry bulk, slurries	Bulk Master™
Mining		Abrasion resistant, air, water and rock dusting	Mine Master™
Oilfield		Oil exploration drilling and servicing	Black Gold™
Petroleum		Liquids and gases	Fuel Master™
Pressure Wash + Washdown		Car wash and water cleanup	Clean Master™
Steam		Saturated and superheated steam	Plant Master™ Steam
Water		Water suction and discharge	Water Master™

When all information has been obtained, look in the Hose Finder section of the most current Industrial Hose Catalog (#39496-000) for proper hose selection, and identify the correct tube stock from the Chemical Resistance Table.

When a chemical name or hose design cannot be found, contact Hose Product Application for assistance by calling 303-744-5070 or [fpasupport@gates.com](mailto:fpasupport@gates.com)



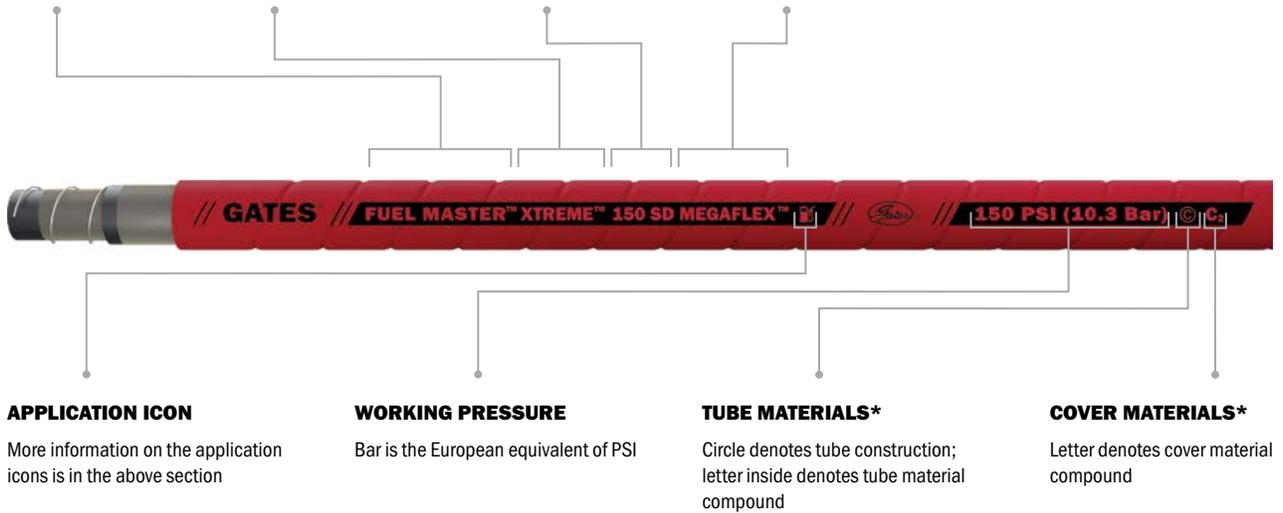
## IDENTIFICATION AT A GLANCE

APPLICATION	LAYLINE COLOR	ICON
Agriculture	Green	Tractor
Air Breathing	White	Air Breathing Apparatus
Air Duct	White	Factory
Air + Multi-Purpose	White	Factory
Chemical	Orange	Chemical Flask
Food + Beverage	Purple	Fork and Wine Glass
Marine	Blue	Anchor

APPLICATION	LAYLINE COLOR	ICON
Material Handling	Grey	Truck
Mining	Yellow	Pickaxe
Oilfield	Yellow	Oil Rig
Petroleum	Red	Gas Pump
Pressure Wash + Washdown	White/Black	Pressure Washer
Steam	Red/Black	Factory
Water	Blue	Waves

## GATES HOSE IDENTIFICATION SYSTEM

- | GATES TYPE                                | PERFORMANCE LEVEL  | PRESSURE RATING  | PREMIUM PERFORMANCE FEATURE  |
|---|--|--|--|
| Correlates to the industry or application | <ul style="list-style-type: none"> <li>Standard</li> <li>Plus</li> <li>XTreme</li> </ul> | Working pressure (psi) <ul style="list-style-type: none"> <li>D Discharge</li> <li>SD Suction Discharge</li> </ul> | <ul style="list-style-type: none"> <li>AR Abrasion Resistant</li> <li>CR Crush Resistant</li> <li>FR Flame Resistant</li> <li>HT High Temperature</li> <li>LT Low Temperature</li> <li>NC Non Conductive</li> <li>SF Silicone Free</li> <li>Braid</li> <li>Clear</li> <li>Barricade™</li> <li>MegaFlex™</li> </ul> |



\*For letter identification, use the chemical resistance section of the 2022 Industrial Hose Catalog beginning on page 227.

[gates.com/content/dam/gates/home/knowledge-center/resource-library/catalogs/industrial-hose-and-couplings-catalog.pdf](https://gates.com/content/dam/gates/home/knowledge-center/resource-library/catalogs/industrial-hose-and-couplings-catalog.pdf)

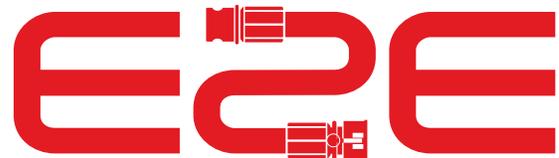


## GATES E2E ENGINEERED SYSTEM AND DISTRIBUTOR PARTNERSHIP

To mitigate risk and improve the reliability of industrial hose products, Gates developed its E2E integrated system of hoses and fittings as well as a partnership with specially qualified distributors. Gates E2E system includes highly engineered, application-specific industrial hoses, fittings designed to match, and precise assembly procedures with up-to-the minute Gates crimp specifications. Distributors are uniquely qualified to implement Gates E2E system.

Their personnel have been trained and certified at the Gates Customer Solutions Center (CSC). In addition, they adhere to hose assembly guidelines established by NAHAD (The Association for Hose and Accessories Distribution). You benefit from hose assemblies built to exacting standards. Industrial hose applications become more demanding every day.

New rubber compounds, higher working pressures and temperatures, and stricter environmental and safety regulations all make hose and coupling selection a challenge. The traditional industry practice of mixing and matching hoses and fittings from different manufacturers carries greater risk than ever. Poor quality or incorrectly fabricated hose assemblies cause equipment damage, lost productivity, personal injury or worse.



Look to a Gates E2E (End-to-End) Authorized Distributor for all of your hose and fitting systems.

**"WHERE-TO-BUY"**  
[gates.com/us/en/store-locator](https://gates.com/us/en/store-locator)



## INDUSTRIAL HOSE & COUPLINGS WORKSHOP

### THIS DETAIL-ORIENTED WORKSHOP BUILDS UPON PARTICIPANTS' APPLICATION ENGINEERING SKILLS.

The workshop combines classroom discussion and activities, hands-on skill practice exercises, and tours of advanced technology and testing areas of Gates Customer Solutions Center (CSC). Course content includes:

- Review of safe practices for industrial hose & couplings
- Comprehensive product line review, including a training from a coupling manufacturer instructor
- Discussion of key product features and benefits
- Foundational application engineering skills
- Hands-on fabrication skills and techniques
- Web application tools overview
- Product application and market-specific information discussions
- Utilize course knowledge in sales opportunities
- Customer Solutions Center tours focused on the testing and development of Gates industrial hose and coupling products



[go.gates.com/NA-trainings-sign-up-2023](https://go.gates.com/NA-trainings-sign-up-2023)



DRIVEN BY POSSIBILITY™

# INDUSTRIAL HOSE

## EVERYTHING YOU NEED TO OPTIMIZE YOUR PREVENTIVE MAINTENANCE.



Hose Product Application:  
303-744-5070  
[fppasupport@gates.com](mailto:fppasupport@gates.com)



Industrial Hose  
Catalog #39496-000



Customer Solutions  
Center (VE/VA Training)



eCrimp™  
Mobile App



Resources  
Calculators



Fluid Power  
YouTube Channel



Safe Hydraulics™  
Program





**DRIVEN BY POSSIBILITY™**

# INDUSTRIAL HOSE SAFETY CONNECTIONS

## **PROPER INSTALLATION + PREVENTIVE MAINTENANCE PROCEDURES**

Improve workplace safety, reduce downtime and increase production.

There are several valid reasons to begin a preventive maintenance program. Costly emergency repairs, production downtime and worker safety are just a few.

This thorough textbook provides in-depth guidance to avoid these issues to improve industrial hose performance. Ideal for facility personnel responsible for industrial hose management, the Gates Safety Connections program covers the following topics:

- Industrial Hose Overview
- Proper Hose Application
- Industrial Hose Inspections
- Handling + Maintenance
- Cleaning + Storage
- Industrial Hose for Specialty Applications
- Troubleshooting

[GATES.COM/US/EN/KNOWLEDGE-CENTER/RESOURCE-LIBRARY/PRODUCT-CATALOGS](https://www.gates.com/us/en/knowledge-center/resource-library/product-catalogs)