

Application Data

Important Safety Information

Read this page before using any of the information in this catalog.

This catalog is designed to be used as a guide in selecting the proper hose for the applications listed herein. It contains many cautions, warnings, guidelines, and directions for the safe and proper use of Boston hose. All these directions and footnotes should be read and understood before specifying or using any of these hoses.

Throughout this catalog, potentially harmful situations are highlighted with the following symbols.

 This symbol is used to indicate imminently hazardous situations which, if not avoided, will result in serious injury or death.

 This symbol is used to indicate potentially hazardous situations which, if not avoided, could result in serious injury or death.

 This symbol is used to indicate potentially hazardous situations which, if not avoided, may result in property or equipment damage.

Some of the most common problems in the chemical hose industry result from improper hose and coupling

selection, improper assembly techniques, failure to correctly inspect and test hose assemblies, and improper cleaning practices and hose assembly storage techniques.

In turn, these situations can lead to material leakage, spraying, spattering, end blow-offs, explosions, and other situations that may result in serious personal injury and property damage.

Personal injuries caused by improper hose assembly specification, installation, and usage could include cuts and abrasions, serious burns, irreparable eye damage, or even death.

Therefore, for your safety and the safety of others working around you, Eaton strongly urges you to read and comply with all safety information printed in this publication.

 **WARNING:** Failure to properly follow the manufacturer's recommended procedures for the care, maintenance and storage of a particular hose may result in its failure to perform in the manner intended and may result in serious injury, death, and damage to property.

 **WARNING:** Testing can be dangerous and should be done only by trained personnel using proper tools and procedures. Failure to follow such procedures might result in serious injury, death, or damage to property.

Consult the coupling manufacturer to make sure you choose the correct coupling and proper assembly for the application, or contact Eaton Technical Support.

Before using any hoses in this catalog, consult the safety section in this catalog, and Chemical Compatibility Chart on page 21 or Boston Hose Chemical Resistance Guidelines. If you do not have the most recent copy, contact Eaton Customer Support at 1-888-258-0222.

Selection of Hose

Selection of the proper Boston hose for an application is essential to the proper operation and safe use of the hose and related equipment. Inappropriate hose selection may result in hose leakage, bursting, or other failure which may cause serious bodily injury or property damage from spraying

fluids or flying projectiles. To avoid serious bodily injury or property damage resulting from selection of the wrong hose, you should carefully review the information in this catalog. Some of the factors to consider in proper hose selection are:

- hose size
- hose length
- hose ends
- fluid conveyed
- bends
- temperature
- hose pressure
- static head pressure
- installation design

These factors and the supplemental information contained in this catalog should be considered in selecting the proper hose for your application. If you have any questions regarding the proper hose for your application, please contact Eaton at 1-888-258-0222.

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Important Safety Information

Proper Selection of Hose Ends

Selection of the proper Boston hose end or coupling is essential to the proper operation and safe use of hose assemblies and related equipment. Inadequate attention to the selection of the end fittings may result in hose leakage, bursting, or other failure which may cause serious bodily injury or property damage from spraying fluids or flying projectiles. In order to avoid serious bodily injury or property damage resulting from selection of an incompatible hose end or coupling, you should carefully review the information in this catalog. Some of the factors which are involved in the selection of the proper hose couplings are:

- fluid compatibility
- temperature
- installation design
- hose size
- corrosion requirements
- fluid conveyed

The given hose and hose end selection factors and the other information contained in this catalog should be considered by you in selecting the proper hose end fitting for your application.

If you have any questions regarding the use of hose/hose ends, please contact Eaton Technical Support at 1-888-258-0222.

Hose Installation

Proper installation is essential to the proper operation and safe use of the hose assembly and related equipment.

Improper hose assembly installation may result in serious injury or property damage caused by spraying fluids or flying projectiles. In order to avoid serious bodily injury or property damage resulting from improper hose assembly installation carefully review the information in this catalog. Some of the factors to be considered when installing a hose assembly are:

- hose elongation or contraction
- proper bend radius/hose routing under pressure
- elbows and adapters to relieve strain
- protection from rubbing or abrasion high temperature sources
- protection against excessive movement
- twisting from pressure spikes/surges

These hose assembly installation factors and the other information in this catalog should be considered by you before installing the hose assembly. If you have any questions regarding proper hose installation, please contact Eaton Technical Support at 1-888-258-0222.

Hose Maintenance

Proper maintenance of the hose is essential to the safe use of the hose and related equipment. Hose should be stored in a dry place. Hose should also be visually inspected. Any hose that has a cut or gouge in the cover that exposes the reinforcement should be retired from service. Hoses should also be inspected for kinking or broken reinforcement. If the outside diameter of the hose is reduced by 20% or more, the hose should be repaired or removed from service. Inadequate attention to hose maintenance may result in hose leakage, bursting, or other failure which may cause serious bodily injury or property damage from spraying fluids, flying projectiles, or other substances.

Coll-O-Crimp Hose, Hose Ends and Assembly Equipment Compatibility

The Coll-O-Crimp Equipment Package, Coll-O-Crimp Hose Ends and Coll-O-Crimp Hose have been engineered and designed as a complete hose assembly system. Each component of the Coll-O-Crimp hose assembly system is compatible with other Coll-O-Crimp components to which it relates. Component compatibility, along with the use of quality components, insures the production of reliable hose assemblies when assembled properly. The use or intermixing of fittings and hose not specifically engineered and designed for use with each other and Coll-O-Crimp equipment is not recommended and may result in the production of unsafe or unreliable hose assemblies. This can result in hose assembly leakage, hose separation or other failures which can cause serious bodily injury or property damage from spraying fluids, flying projectiles, or other substances.

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General Hose Information

Hose Construction

A hose consists of three components including the tube, reinforcement, and cover. Each component serves an important function in contributing to the overall performance of the hose.

Components of a hose:

Tube functions:

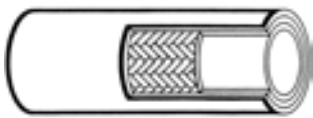
- Conveys media
- Temperature resistant
- Protects reinforcement and cover
- Dissipates static electricity

Reinforcement functions:

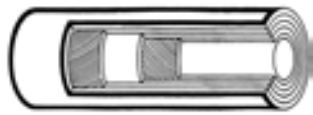
- Supports pressure/vacuum
- Supports tube
- Controls elongation/shrinking of hose OD/ID
- Helps fitting retention

Reinforcement types:

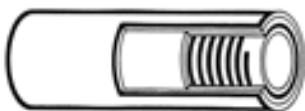
- 1) Braid - carbon steel or fiber
- 2) Spiral - carbon steel or fiber
- 3) Helical - carbon steel



Braid reinforcement



Spiral reinforcement



Helical reinforcement

Cover functions:

- Protects reinforcement from external environment
- Provides weather, abrasion, chemical, temperature, and ozone resistance

Hose Selection

Selecting the proper hose for an application is critical to ensure safety of people and property, as well as long hose life. Therefore, it is important to understand the factors involved.

These factors are:

- Application
- Pressure and/or suction
- Environment
- Compatibility with material conveyed
- Temperature
- Size
- Flexibility
- Bend radius
- Weight

Application

The first step in properly selecting a hose is to identify the application and material to be transferred. Then consider the hoses available for that type of service. Boston hose is intended for specific applications and materials.

⚠ WARNING Hose use and care: Never use a hose to transfer material it is not specifically meant to transfer. Doing so could deteriorate the hose and result in leaking, hose bursting, or end blow-offs. This could lead to serious personal injury or death. Always transfer material in a hose that is designed specifically to transfer that material.

A special application consideration, especially in gases, petroleum-based liquids, volatile solvents, and dry material transfer applications, is whether the velocity of the material being transferred will cause static buildup. This, in turn, can cause an explosion.

According to Rubber Manufacturers Association (RMA) Hose Handbook IP-2 1996:

Electrical engineers differ in opinion on the effects of static electricity and the means of dissipating it. In handling gasoline and other petroleum-based liquids, recognized national associations and companies have conflicting opinions on the need for conductive hoses.

Until a consensus is reached among all associations, laboratories and users and a standard practice is established, it is essential that the user determine the need for a static bonded hose based on (a) the intended use of the hose, (b) instructions

from the company's Safety Division, (c) the insurer, and (d) the laws of the States in which the hose will be used.

Some types of hose include a body reinforcing wire. This wire can be used for electrical continuity provided that proper contact is made between it and the hose coupling. This can be done by extending the body wire to the ends of the hose, or by attaching a light static wire to the outermost coils of the body wire. This lighter wire is led through the ends of the hose and attached to the couplings. In nonwire reinforced hose, a static wire can be included in the hose body.

The tendency has been toward a grounding connection completely separate from the hose or to have the tube or cover of the hose conducting. Examples would be sand blast hose with conducting tube or aircraft fueling hose with a conducting cover.

An internal static wire could break or lose contact with the couplings and not be detected visually. This could occur from an unusual stress imposed on the hose.

Finally, be aware that many industries have governing agencies that issue mandatory or suggested guidelines for the use of hose in certain applications.

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General Hose Information

Pressure & Suction

The selected hose and coupling must be able to continually withstand the maximum pressure that will be generated in the application.

! WARNING Hose use and care: Consider both working pressure and pressure surges when determining “maximum” pressure. Failure to select a hose that meets both these requirements could lead to end blow-offs, hose leakage, and hose bursting. The result could be serious injury or death. The Boston hose you choose must meet or exceed the required working pressure, and must have a safety factor to allow for surge pressure.

It may be reassuring to know that every length of Boston chemical transfer hose is pressure tested to 1-1/2 times the working pressure before it is packaged and shipped. Equally reassuring is the fact that Boston chemical hose has a 4:1 safety factor.** This means the burst pressure is a minimum of four times greater than the working pressure.

**Boston Otter and Boston Leader water hoses are rated 3:1 and can be used in some light chemical applications.

! CAUTION In suction applications, suction (or vacuum) considerations are as critical to hose life as pressure considerations. Hoses in these applications are vulnerable to crushing forces because the atmospheric pressure outside the hose is greater than the pressure inside the hose. A hose not having the proper suction rating for your applications may collapse and result in equipment failure.

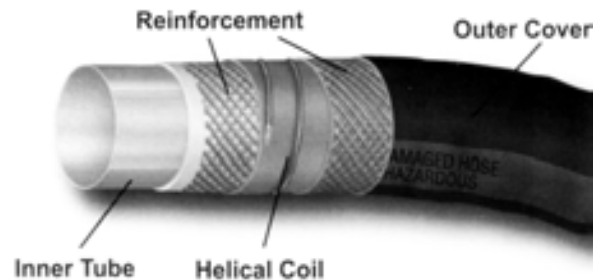
Boston suction hoses have helical wire reinforcement and are rated for full vacuum. “Inches of mercury” is the standard of measurement for vacuum. Full vacuum is equal to 29.92 inches of mercury.

Environment & Compatibility

Environment refers to both the external environment and the internal environment in which the hose will be working. Different components of the hose will be affected by these two types of environment.

Most hoses consist of three components: an inner tube, a reinforcement, and an outer cover.

Elastomers are the basic ingredient of all rubber compounds. However, be aware that when specifying tube and cover compounds, significant application differences may exist between two compounds listed as having the same basic elastomer.



For example, Boston’s Tiger and Otter hoses list inner tubes made from EPDM, but *recommended* use for each of these hoses is quite different.

These differences occur because compounds contain many materials in addition to elastomers. Some of these materials include processing aids, carbon black, vulcanization agents, accelerators, age resistors, and other ingredients. Before making assumptions about the suitability of a particular hose for a given application, always read the “Applications” information for each specific hose listed in this catalog.

The first hose component, the inner tube, conveys the material being transferred. The tube must be compatible with these materials. This is the hose’s internal environment. Whenever you specify a Boston hose, refer to the chemical resistance chart in this catalog.

! DANGER Never transfer material in an inner tube that is not compatible with that material. Likewise, never use hose at temperatures, pressures, or chemical concentrations above those recommended by Eaton. Doing so will weaken or deteriorate the hose, leading to leakage, hose bursting, or end blow-offs. Personal injury or death can result.

The next hose component, the reinforcement, is the strength member of the hose. Reinforcement usually consists of fiber, thermoplastic, carbon steel, or stainless steel spirals, braids and coils. The helical coil is used in all hardwall hoses and is required in vacuum and suction applications. The coil is necessary to help the hose withstand atmospheric pressure that is greater than the internal pressure of the hose to prevent the hose from collapsing. It is usually made of steel or thermoplastic monofilament.

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The final hose component is the outer cover. The outer cover protects the reinforcement from the external environment. It is usually rubber, thermoplastic, fiber, or metal. The hose outer cover must protect against weathering, abrasion, chemicals, extreme temperature ranges, ozone, and other adverse conditions.

The "Elastomers" chart in this catalog (page 31) contains a listing of general characteristics of some common elastomers and their physical properties as they relate to specific service needs. When application questions arise, contact Eaton Technical Support at 1-888-258-0222.

Heat can be a catalyst for chemical reaction. When selecting a Boston hose, consider both the ambient temperature and the temperature of the material being conveyed.

! WARNING Do not use a hose at temperatures that exceed the hose temperature rating. Doing so could deteriorate the hose, leading to leaks, hose bursting, and end blow-offs. This could result in serious personal injury or death.

Cold temperatures are another consideration. Hose must be flexible and be able to withstand temperatures well below 0°F in some applications.

Be aware that rated hose temperatures do not imply that a hose can handle all materials within the listed temperature range and concentration.

For specific application information and hose temperature ratings, always follow the guidelines in this catalog, or contact Eaton Technical Support at 1-888-258-0222.

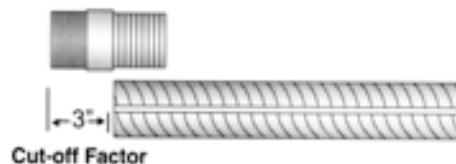
All chemicals listed in the chart are rated at 70°F unless otherwise stated.

Size

Size can refer to the length of the hose, the inner diameter (I.D.), and the outer diameter (O.D.). To determine the correct length of hose for an application, always remember to subtract the cut-off factor for each end fitting or coupling from the overall length of the assembly. For example, if the total length of the assembly needs to be 20 feet, and each end extends past the hose three inches, the cut-off factor is three inches at each end, or six inches total. Twenty feet minus six inches yields a hose length of 19-1/2 feet.

Remember to subtract the cut-off factor for each end fitting when preparing hose.

Inner diameter is important in relation to volume transfer requirements. The larger the hose inner diameter, the greater the volume of material that can be transferred in a given time.



! WARNING Be aware that if you replace a hose with one having a different I.D. than the original hose, material velocity could increase or decrease, possibly creating static electricity. This could lead to an explosion causing serious injury or death.

Temperature vs. Pressure Table for Reinforced PVC Hose

The table below has been prepared to demonstrate the effects of temperature vs. working pressure on reinforced PVC hose products. Working pressures for PVC hoses are tested at 68°F (20°C).

TEMPERATURE		ALLOWABLE PERCENT OF ORIGINAL WORKING PRESSURE	
°C	°F	Clear Tubing and 2-Spiral	4-Spiral
20	68	100%	100%
25	77	86%	90%
30	86	75%	81%
35	95	65%	73%
40	104	56%	66%
45	113	47%	59%
50	120	40%	53%
55	131	33%	47%
60	140	27%	43%
65	149	23%	40%
70	158	20%	38%
75	167	17%	37%
80	176	15%	35%

Example:

2-Spiral hose has stated working pressure of 250 PSI at 68°F (20°C)

At 104°F (40°C) working pressure = 250 PSI x 56% = 140 PSI.

Example:

4-Spiral hose has stated working pressure of 400 PSI at 68°F (20°C)

At 140°F (60°C) working pressure = 400 PSI x 43% = 172 PSI.

NOTE: WORKING PRESSURE DECREASES AS TEMPERATURE INCREASES. HOSE MUST BE PROPERLY COUPLED TO OBTAIN THE SPECIFIED PRESSURE RATING.

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General Hose Information

Hose Maintenance

Hose has a limited life based on the severity and type of chemical contact, environment or exposure to heat and petroleum products. Eaton recommends the following maintenance procedure to determine when hose should be replaced.

General Test and Inspection Procedures for Hose


An inspection and hydrostatic test should be done periodically to ensure hose is suitable for continued service.

A visual inspection of the hose should be made for loose covers, kinks, bulges, or soft spots which might indicate broken or displaced reinforcement. The couplings or fittings should be closely examined and, if there is any sign of movement of the hose from the couplings, the hose should be removed from service.

The periodic inspection should include a hydrostatic test for one minute at 150 percent of the recommended working pressure of the hose. An exception to this would be woven jacketed fire hose. During the hydrostatic test, the hose should be straight, not coiled or in a kinked position. Water is the usual test medium and, following the test, the hose may be flushed with alcohol to remove traces of moisture. A regular schedule for testing should be followed and inspection records maintained.

Hose Inspection

Hose assemblies shall be inspected and tested immediately after the hose is subjected to abnormal abuse such as: severe end pull, flattening or crushing or sharp kinking. As you inspect a hose assembly, remember that most hose failures occur between the coupling and the first three feet along the hose length. Pay close attention to this area. Any hose that has been recoupled shall be proof-tested for one minute at 150 percent of the recommended working pressure of the hose, and inspected before being placed in service.

 **SAFETY WARNING:** Before conducting any pressure tests on hose, provision must be made to ensure the safety of the personnel performing the tests and to prevent any possible damage to property. Only trained personnel using proper tools and procedures should conduct any pressure tests.

The following guidelines should be adhered to during testing and/or inspection:

1. Air or any other compressible gas must never be used as the test medium because of the explosive action of the hose should a failure occur. Such a failure might result in possible damage to property and serious bodily injury.

2. Air should be removed from the hose by bleeding it through an outlet valve while the hose is being filled with the test medium.

3. Hose to be pressure tested must be restrained by placing steel rods or straps close to each end and at approximate 10 foot (3m) intervals along its length to keep the hose from "whipping" if failure occurs; the steel rods or straps are to be anchored firmly to the test structure but in such a manner that they do not contact the hose which must be free to move.

4. The outlet end of hose is to be bulwarked so that a blown-out fitting will be stopped.

5. Provisions must be made to protect testing personnel from the forces of the pressure medium if a failure occurs.

6. Testing personnel must never stand in front of or in back of the ends of a hose being pressure tested.

7. If liquids such as gasoline, oil, solvent, or other hazardous fluids are used as the test fluid, precautions must be taken to protect against fire or other damage should a hose fail and the test liquid be sprayed over the surrounding area.

Woven jacket fire hose should be tested in accordance with the service test provisions contained in the current edition of National Fire Protection Association Bulletin No. 1962—Standard for the Care, Use and Service Testing of Fire Hose, Chapter 5.


Visual Inspection

1. Hose

Any cuts, gouges or tears in the cover which do not expose the reinforcement should be repaired before the hose is returned to service. If the reinforcement is exposed, retire the hose from service.

Covers may show surface cracking or crazing due to prolonged exposure to sunlight, ozone, or high temperature during soak tank cleaning. Such deterioration, which does not expose reinforcing materials, is not cause for retirement.

Check for signs of soft spots, blisters, and kinking. If soft spots exist, pressure test the hose assembly and determine whether it is necessary to discard it.

 **WARNING** If cover blisters exist, be careful not to pop them. If the hose was damaged in such a way that material was allowed to leak between the cover and inner tube, the blisters may contain this material. If the material is hazardous and splatters when the blisters are popped, it could cause serious physical injury.

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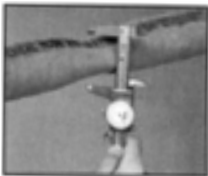
General Hose Information

Look for any indication of kinking or broken reinforcement as evidenced by any permanent distortion, longitudinal ridges, or bulges.

According to RMA IP-11-7 Chemical Hose Bulletin, crushed or kinked spots where the hose O.D. is reduced by 20 percent or more of the normal O.D. indicate the hose probably has internal damage. The hose assembly must be removed from service to ensure the safety of people in the work area.

WARNING: Kinks can cause hose to burst, leading to bodily harm.

Hose containing kinked or crushed spots where the hose O.D. is reduced by 20 percent may be used if the hose passes the hydrostatic tests. Use a caliper to measure the hose outer diameter at several places around the diameter to determine any O.D. reduction. An inspection mirror and a flashlight can be used to inspect the inner tube for abuse, wear, and/or chemical attack.



2. Couplings

All metals are subject to attack by various chemicals. Check with the manufacturer to make sure that suitable end fittings, appropriate to both the hose and the chemical being handled, are being used.

Exposed surfaces of couplings, flanges and nipples shall be examined for cracks or excessive corrosion. Either condition shall cause the hose assembly to be retired from service. Any evidence of coupling or nipple slippage on the hose is cause for removing the hose assembly from service.

The Rubber Manufacturers Association (RMA) has published a series of technical bulletins which detail maintenance, testing, and inspection recommendations.

Because the life expectancy of the hose is limited, the user must be alert to signs of impending failure, particularly when the conditions of service include high working pressures and/or the conveyance or containment of hazardous materials. The periodic inspection and testing procedures described here provide a schedule of specific measures which constitute a minimum level of user action to detect signs indicating hose deterioration or loss of performance before conditions leading to malfunction or failure are reached.

SAFETY WARNING:
Failure to properly follow the manufacturer's recommended procedures for the care, maintenance and storage of a particular hose might result in its

failure to perform in the manner intended and might result in possible damage to property and serious bodily injury.

Hydrostatic Pressure Test

For large-bore hose being used in dock service, an inspection card which describes the hose, manufacturer, date received, purchase order number, and date of installation should be maintained for each hose. The inspection card should be used to record the test results and condition of the hose.

Eaton recommends that new hose assemblies be hydrostatically tested before being placed in service. Hydrostatic testing should be done at periodic intervals to determine if a hose is suitable for continued service. The hydrostatic test and examination shall be conducted in the following manner.

Hose to be pressure tested must be restrained by placing steel rods or straps close to each end and at approximate 10 foot (3m) intervals along its length to keep the hose from "whipping" if failure occurs; the steel rods or straps are to be anchored firmly to the test structure but in such a manner that they do not contact the hose which must be free to move.

1. Hose shall lie in a straight and horizontal position supported on rollers to permit easy movement when under the test pressure.
2. Water should be used as the test liquid. Never pressure test with solvents, corrosive liquids, or with compressed gases.
3. Fill the hose with water with the outlet end raised and the outlet valve open to ensure the complete removal of air. When all the air has been expelled, close the outlet valve and lower the raised end.
4. For new hose, raise the pressure to 2 times the rated working pressure of the hose and hold for 5 minutes. During this hold period, the hose shall be examined for leaks at the couplings, fitting slippage, or for any indication of weakness in the hose structure.
5. For used hose, test with a pressure of 1-1/2 times the rated working pressure of the hose for one minute and examine as above.
6. Completely relieve test pressure from the system prior to releasing hose from test equipment.
7. Thoroughly drain the water from the hose after completion of the hydrostatic test.

Electrical Continuity

When required by the user, electrical continuity between the fittings shall be tested using an ohm meter. The hose must be clean and dry for this test.

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General Care and Maintenance of Hose

Hose should not be subjected to any form of abuse in service. It should be handled with reasonable care. Hose should not be dragged over sharp or abrasive surfaces unless specifically designed for such service. Care should be taken to protect hose from severe end loads for which the hose or hose assembly was not designed. Hose should be used at or below its rated working pressure; any changes in pressure should be made gradually so as to not subject the hose to excessive surge pressures. Hose should not be kinked or be run over by equipment. In handling large size hose, dollies should be used whenever possible; slings or handling rigs, properly placed, should be used to support heavy hose used in oil suction and discharge service.

Hose Repair

There are some circumstances in which chemical hoses can be repaired. For example, if a hose has been kinked near the coupling and a close inspection of the assembly reveals that this is the only damage, the assembly can be repaired.

 **WARNING** Wear safety glasses, gloves, and protective clothing when cutting hose. They will help protect your eyes and skin from flying debris. When recoupling a used hose assembly, begin by cutting the hose far enough beyond the shank to eliminate the possibility of

cutting into the shank. When cutting out a kink, cut behind the kink far enough so that the ID/OD of the remaining hose is round. Use calipers to confirm roundness. Make sure to cut the hose squarely. Next wipe the inner tube of the cut end with a clean rag.

Before recoupling the hose, make sure to carefully inspect the tube. This is important because it is easy to see the condition of the tube and reinforcement of the hose when the coupling is cut off. Look for any evidence of deterioration of the hose tube. If there are signs of deterioration, remove the hose assembly from service. If after close inspection none of these signs is present, the hose may be recoupled.

Any hose that has been used to convey an abrasive material, such as plastic pellets and powders, should not be recoupled due to the inherent thickness reduction that results from the transfer of abrasive materials.

Finally, pressure test and tag any recoupled assembly as recommended.

Storage

Proper storage conditions can enhance and extend substantially the ultimate life of hose products. Rubber hose products in storage can be affected adversely by temperature, humidity, ozone, sunlight, oils, solvents, corrosive liquids and fumes, insects, rodents and radioactive materials. The appropriate method for storing hose depends to a great extent on its size (diameter

and length), the quantity to be stored, and the way in which it is packaged. Hose should not be piled or stacked to such an extent that the weight of the stack creates distortions on the lengths stored at the bottom. Since hose products vary considerably in size, weight, and length, it is not practical to establish definite recommendations on this point. Hose having a very light wall will not support as much load as could a hose having a heavier wall or hose having a wire reinforcement. Hose which is shipped in coils or bales should be stored so that the coils are in a horizontal plane.

Storage Do's:

- Whenever feasible, rubber hose products should be stored in their original shipping containers which provide some protection against the deteriorating effects of oils, solvents, and corrosive liquids; shipping containers also afford some protection against ozone and sunlight.
- Certain rodents and insects will damage rubber hose products, and adequate protection from them should be provided. Be sure ends are capped to keep out insects, rodents, and other contaminants that can damage the hose.
- Hose shipped in coils or bales should be stored so the coils are in a horizontal plane.

- Store items on a first-in, first-out basis. Remember that even under the best of conditions, an unusually long shelf life will deteriorate certain rubber products. Inspect and test the hose assembly before placing it in service. Usually, any wear or damage will be apparent during inspection or testing.
- The ideal temperature for the storage of rubber products ranges from 50° to 70°F (10-21°C) with a maximum limit of 100°F (38°C). If stored below 32°F (0°C), some rubber products become stiff and will require warming before being placed in service.
- Storage areas should be relatively cool and dark, and free of dampness and mildew. Items should be stored on a first-in, first-out basis, since even under the best of conditions, an unusually long shelf life could deteriorate certain rubber products.

Storage Don'ts:

- Don't pile or stack hose to such an extent that the weight of the stack distorts the lengths stored on the bottom. Remember that hose having a very light wall will not support as much load as a hose having a heavier wall or wire reinforcement.

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- Don't store rubber products near heat sources such as radiators and base heaters, or near electrical equipment that might generate ozone. Also do not store hose for long periods in geographical areas of known high ozone concentration. Ozone ages rubber.
- Don't expose hose to direct or reflected sunlight during storage. This ages rubber.
- Don't store uncovered hose under fluorescent or mercury lamps. They generate light waves harmful to rubber.
- Don't hang hose assemblies on hooks, nails, or other devices which could cut or damage hose.

The Rubber Manufacturers Association has published separately a series of Hose Technical Information bulletins describing hoses designed for different applications which detail Maintenance, Testing and Inspection recommendations. Refer to the *RMA Catalog of Publications*, issued annually, to determine the availability of the latest edition. Bulletins published include the following:

Publication No.

- IP 11—1— Steam Hose
- IP 11—2 — Anhydrous Ammonia Hose
- IP 11—4— Oil Suction and Discharge Hose
- IP 11—5— Welding Hose
- IP 11—6— Fire Hose
- IP 11—7— Chemical Hose
- IP 11—8— Fuel Dispensing Hose


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Proper Used Hose Storage

Before placing used hose in storage, completely drain it and flush out any potentially explosive vapors or corrosive residues.

Also make sure you dispose of waste in a manner that complies with federal, state, and local environmental regulations.


 **WARNING: Take extreme care when flushing out a chemical hose with water. Some chemicals, such as concentrated acids, may react with water and cause spattering. These materials can cause serious personal injury or death if they get into eyes or onto skin. Wear safety glasses, gloves and other protective clothing to help guard against this.**

Continue by laying the hose assembly on a solid support, allowing air to circulate through it. This helps extend the hose life. Further, store the hose in a cool, dark, dry place at a temperature ideally between 50°F and 70°F.

Proper Hose Handling

Proper hose handling can help preserve hose assembly life and work environment safety. Therefore, consider the following points when handling hose assemblies.

- Avoid crushing or kinking the hose. This can cause severe damage to the reinforcement that isn't always obvious when looking at the cover.
 - Do not drag the hose or lift a large bore hose from the middle of its length with the ends hanging down. Doing so can cause kinking, cover cuts, hose reinforcement damage, and coupling damage.
 - Limit the curvature of the hose to the minimum bend radius recommended by the manufacturer. Also avoid sharp bends at the end fittings and at manifold connections.
 - Do not exceed pressure and temperature limits because this could damage the hose and ultimately result in serious bodily injury or property damage. Monitor pressure and temperature during hose use.
- Never allow chemicals, solvents, or any other hazardous materials to drip onto ground. Always comply with environmental laws.
 - Never allow chemicals to drip on the exterior of a hose or allow hose to lay in a pool of chemicals. The hose cover may not have the chemical resistance of the tube. If a corrosive material comes into contact with the hose reinforcement, the result could be early hose failure.
 - Avoid extreme flexing of the hose near the coupling. If necessary, use elbows in the piping system to assure a straight line connection with the hose.
 - Protect hose from heat, flame, cutting, and twisting. Use shields or clamps to do this.
 - Support hose to avoid mechanical strain on couplings.
 - Be aware that dropping or dragging the assembly, chemical incompatibility, exposure to temperature extremes, or extensive internal coupling abrasion can cause leaks and reduce coupling retention.

 **WARNING: Do not use damaged hose. Doing so could result in serious personal injury or death.**

Application Data

General Hose Information

Cleaning Hose Assemblies

Cleaning of hose assemblies should be done at a facility with the means of disposing of wastes and hazardous materials properly. All water and/or cleaning solutions used should be retained and disposed of in a way that complies with applicable laws.

Boston does not recommend that distributors handle hose assemblies that have not been cleaned properly.

When you clean a tank or change the materials to be transferred, clean the hose assemblies. Three methods can be used: the soak tank, the closed loop system, or the rotating brush. The most appropriate method will depend on the hose use and location.

⚠️ WARNING: Use of pressure wands to clean hose is not recommended. The high concentration of heat and pressure in a confined area can damage the hose inner tube and lead to hose bursting, leakage, spraying, or end blow-offs. This could cause serious personal injury or death.

⚠️ WARNING: Always wear safety glasses, gloves, and protective clothing when cleaning hose, no matter which hose cleaning method you use. Otherwise, burns, blisters, eye damage or other injuries could occur.

If you choose the soak tank method, the cleaning solution usually caustic soda and water- should be no more than 150°F. Gently lay the hose in the cleaning solution to prevent it from splashing.

Soak the hose no more than 15 minutes to prevent the hose from becoming brittle with a shortened service life. Flush the hose thoroughly with clean water. After making sure that all the water is drained from the hose, store the hose in a cool, dry place. Once the hose has cooled (approximately 45 minutes), cap the ends to keep contaminants out.

The second method of cleaning is the closed-loop system. With this method, the caustic solution used to clean the tank is also pumped through the hose and back to the tank. Typically, fluid is 180°F and is pumped through the system until the tank is clean.

When the cleaning process is complete, flush the hose thoroughly with water. Store the hose in a cool, dry place. Cap the ends to keep contamination out.

⚠️ WARNING: Strong acids should be thoroughly drained prior to and after cleaning to avoid an exothermic reaction.

RMA Class Oil Resistance

Rubber hose is used to convey petroleum products both in the crude and refined stages. The aromatic content of refined gasoline is often adjusted to control the octane rating. The presence of aromatic hydrocarbons in this fuel generally has a greater effect on rubber components than do aliphatic hydrocarbons. Aromatic materials in contact with rubber tend to soften it and reduce its physical properties. For long lasting service, the buyer of gasoline hose should inform the hose manufacturer of the aromatic content of the fuel to be handled so that the proper tube compound can be recommended for the specific application.

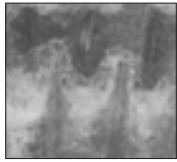
The effects of oil on rubber depend on a number of factors that include the type of rubber compound, the composition of the oil, the temperature and time of exposure. Rubber compounds can be classified as to their degree of oil resistance based on their physical properties after exposure to a standard test fluid. In this RMA classification, the rubber samples are immersed in IRM 903 oil at 100°C for 70 hours. (See ASTM Method D-471 for a detailed description of the oil and the testing procedure.) As a guide to the user of the hose in contact with oil, the oil resistance classes and a corresponding description are listed.

PHYSICAL PROPERTIES AFTER EXPOSURE TO OIL

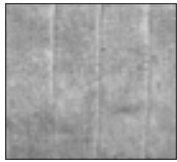
	Volume Change Maximum	Tensile Strength Retained
Class A (High oil resistance)	+25%	80%
Class B (Medium-High oil resistance)	+65%	50%
Class C (Medium oil resistance)	+100%	40%

Application Data

General Hose Information



1.



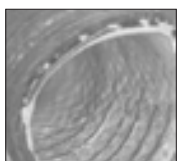
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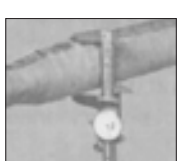
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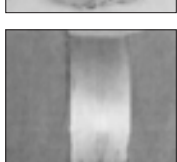
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6.



7.



8.



9.

⚠ WARNING: Selection of the proper hose for the application is essential to the proper operation and safe use of the hose and related equipment. Inadequate attention to selection of hose for the application can result in serious bodily injury or property damage. In order to avoid serious bodily injury or property damage resulting from selection of the wrong hose, you should carefully review the information in this catalog.

Hose failures can be caused by conditions such as excessive pressures, fluid incompatibility, extreme temperatures and many more. Eaton has illustrated below some of the more common failures. If the conditions you are experiencing are not listed, please contact Technical Support at 1-888-258-0222.

1. Problem: The hose has exposed reinforcement and a loose cover. This could be caused by an abrasive environment or the life of the hose has been exceeded.

Solution: Route hose properly to avoid excessive abrasion. Some hoses are made with materials that handle abrasion better.

2. Problem: Cracks in the hose cover can be caused by prolonged exposure to sunlight, ozone or high temperatures.

Solution: Store hose in cool dark areas when possible. Do not store or use the hose where the recommended temperature rating is exceeded.

3. Problem: Cuts, gouges, or tears in hose tube can be caused by improper cleaning with high-pressure water wand.

Solution: Do not use high pressure water wand to clean hoses. Instead, three cleaning methods are commonly used: the soak tank, the closed loop system or the rotating brush. The most appropriate method will depend on the hose use and location.

4. Problem: Bubbling and flaking of the tube material caused by the tube not being compatible with the chemical being conveyed.

Solution: Check the chemical resistance guidelines to make sure the hose you are using is compatible with the chemical(s) being transferred. Also, make sure the hose can handle the application temperatures.

5. Problem: Deterioration of the hose tube has caused the reinforcement to be exposed. This may be caused by abrasive material being conveyed through a hose not made for this abrasive material or hose life has been exceeded.

Solution: Make sure that the hose can handle the material being conveyed. Possibly use a hose with a thicker tube.

6. Problem: Hose is kinked due to exceeding the minimum bend radius of the hose. The result is damaged reinforcement.

Solution: To avoid this problem, check the minimum bend radius of the hose and route the hose so the minimum bend radius is not exceeded.

7. Problem: Improperly banded shank may create a possible leak path.

Solution: Make sure the coupling is secured tightly and according to manufacturer's specifications. Bands should be placed inside of the barbs on the coupling shank, toward the coupling side. The band farthest from the hose end should be tightened first. If two bands are present, Eaton suggests rotating the clamp buckles 180° from each other.

8. Problem: Overtightened band could cause leaks, spraying and end blow-offs. Band was applied with excessive pressure and cut the cover of the hose causing reinforcement to be exposed.

Solution: Do not attach bands at pressures that are too high. Apply the bands to the manufacturer's recommended settings.

9. Problem: The steam hose has developed cracks in the cover due to heat in the application.

Solution: Steam hose has a limited service life. It should be inspected before every use. Any crack that exposes the reinforcement is a reason for the hose to be removed from service.