



Proper use, care and maintenance of
**Dry Disconnect Couplings
& Safety Breakaways**

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The NovaFlex Group® has implemented a quality policy to supply to our customers the correct hose or hose assembly for the application. Consistent with this policy NovaFlex® has prepared this Technical Booklet to assist our customers and users of NovaFlex® Hose assemblies, and dry disconnect breakaway products with information directed toward maximum safe hose assembly life and user safety. This booklet also addresses NovaFlex's "Duty to Warn" responsibility regarding misuse of these products.

The information contained in this booklet is intended to be a guide. It is the responsibility of the user to apply this information in the appropriate manner to insure safe operating procedures.



General Instructions for Breakaway & Dry Disconnects Use, Care and Maintenance

This technical booklet is intended solely for the use of NovaFlex's customers as a guide for the Use, Care and Maintenance of NovaFlex's breakaway and dry disconnect couplings.

(See NovaFlex Hose #2003-01 booklet for specific information on hose.)

NovaFlex® customers have requested information pertaining to the use, care and maintenance of NovaFlex's products. As a result NovaFlex® has developed this Technical Booklet to improve users' understanding.

This information should be made available to all of the customers' representatives who use NovaFlex® hose, dry disconnect couplings and safety breakaway units.

Hoses are designed to convey products and to operate in a dynamic work environment. This operation can present a serious safety hazard if safe operating procedures are not followed! Remember **"All hose will fail in time!"** This booklet is designed to supplement safe operating procedures, not replace them. All hose, *breakaway couplings* and breakaway units are designed for specific uses and it is critical for the user to understand *how and what is important for the safe and correct use of a breakaway coupling and a safety breakaway unit. Users of industrial rubber hose using a dry break and/or a breakaway should have in place a preventative maintenance program designed to identify potential problems before failures occur.* It is always necessary to know the data presented in this booklet concerning the intended service and application of any particular hose/breakaway **before** you use or request a hose breakaway.

A Dry Disconnect is a hose connection device that permits hose connecting and disconnecting without releasing the product conveyed. A Safety Breakaway is a passive shut off device that will activate and shut off the flow of the conveyed material (in both directions) in the event of a pull away, when correctly combined and engineered with the correct hose. The breakaway device will only protect a hose and it's mating systems from the forces involved in a pull away when correctly engineered, it does not protect against accidents resulting from under maintained or damaged hose that results in a hose or coupling separation.

Every industrial hose user should have in place a safety procedure to implement in the event of a hose failure (see page 15). Should you have any questions on any topic covered in this booklet, contact the nearest NovaFlex location shown on page 16.

STAMP Breakaway Form

The safety breakaway is a passive shutoff system designed to prevent the uncontrolled release of product in the event of a pull away by truck, ship or rail car. The breakaway is a check valve system held in the open position by a safety retaining device. In the event of a pull away force that separates the breakaway, the check valves instantly close shutting off flow in both directions. To function correctly complete design information is required. The below information referenced on NovaFlex® form # 2012-2

STAMP Breakaway / Dry Disconnect Data Form

S' Size	The Connection inside diameter (I.D.) and type of connection required to meet the applications requirements (i.e. 4" ID x 150# Flanges 10 ft) Hose, Loading Arm or pipe ID - Inlet connection ID - Outlet connection ID-
T' Temperature	Temperature- Maximum & minimum temperature of the product conveyed through the hose assembly. (i.e. 200° F continuous, 250° F intermittent) Maximum Temperature of media conveyed - Minimum Maximum Temperature of media conveyed Maximum Ambient Temperature Minimum Ambient Temperature
A' Application	Application- Describe the actual application – i.e. (Ship to Shore unloading, LPG transfer, in plant chemical use, etc.) Is this a loading arm application? Sheer force of armature? Simple Drawing of application
M' Material Conveyed	(The specific media - chemical or material conveyed) Media conveyed Max Flow rate (gallons/min) Density (pounds/gal) Dynamic Viscosity of media Concentration of Media conveyed (%) Solid concentrate in media (% & Size)
P' Pressure	(The pressure or vacuum at which the media is being conveyed) Max working pressure (psi) Surge pressure (psi)

Required Special Information:

- Are special sealing materials used with this media? If yes, what is used?
- Is there a hose attached to the proposed breakaway? • What type hose (Rubber or Metal)?
- Hose Manufacturer & Specification (spec name or #)? • Hose rated Working Pressure?
- Hose Weight per foot? • Hose length?
- Any other important applicable information to this particular installation?

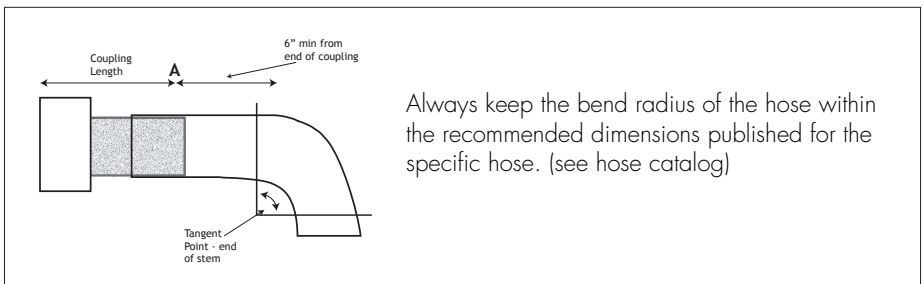
Once the information in the acronym "STAMP" referenced above is obtained, it is essential that a hose and breakaway combination meet all of the "STAMP" requirements as recommended by NovaFlex®. **"Always use the printed information from NovaFlex® to insure accuracy of any recommendation."**

Do not exceed the printed, recommended service criteria.

It is the ultimate objective to obtain maximum safe service life for a product; to accomplish this, NovaFlex® recommends the user maintain specific care during the use of the hose assembly to insure continued safe operations.

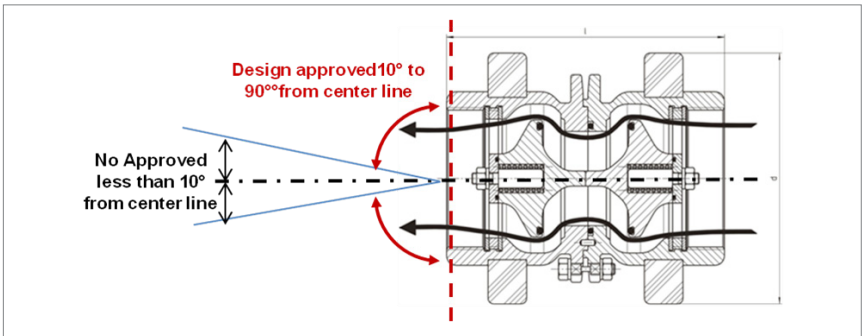
Operator Requirements for a Safe Hose Assembly

1. Working Pressure (WP) should never be exceeded, including pressure spikes. Never leave liquids or gasses trapped in a hose with each end sealed or valves closed. Thermal expansion of some products may cause pressures to exceed working pressure.
2. Always rate the Working Pressure of the coupled hose assembly by the lowest rated element (hose WP or coupling WP which ever is lowest). Try to identify all Critical Applications-those hazardous applications such as: high pressure (over 50psi), petroleum products, chemicals or high heat (over 120°F).
3. Only use the hose assembly for the **service marked on the hose or for the service recommended in the printed literature**. Have a **HOSE INSPECTION & TEST PLAN** to insure unsafe hoses and/or worn or damaged couplings are removed from service.
4. Test all hose assemblies as required every six (6) months (or sooner) to insure the assembly is safe for continued use. (Use RMA, ASTM, OSHA, NFPA, LPGA, NAHAD or other regulatory agency recommendations for pressure testing along with these guidelines.)
5. Educate your Hose Handlers/Users as to the conditions associated with unsafe hose; the operator is the last line of defense against spills and injuries. Teach your employees that: **“When in doubt; Remove the Hose from Service!” Maintain a HOSE Inspection & Test Plan that requires a visual inspection prior to each hose use with pressure test (see Para. #5).**
6. Always use appropriate *Chemical Resistance Charts* to verify that the chemical or product conveyed is compatible with the hose tube and alloy of the coupling. *“Remember, the temperature and concentration of the chemical/product conveyed must not exceed the manufacturer’s recommendations.* It is recommended to always flush chemicals from hose after each use. Different chemical concentrations may cause damage to couplings or to hose. In some situations a hose assembly may be recommended for high (90%) concentrations but low concentrations (30%) may cause damage. After chemical use, cap the hose - prevent atmosphere & moisture from entering the hose.
7. Always use a coupling made from material suitable for the application and product conveyed. (Refer to alloy Chart).
8. **Before each hose use**, always check the coupling for slippage. See page 7 for details.
9. In many cases the pumping of product develops hose pulsations. This pulsation can cause the hose cover to wear very quickly. It is important to train the hose operators to take care when using hose so that cutting, gouging and kinking can be avoided.
10. In some cases a NovaFlex® Scuff-Guard can be added to the hose to protect the cover from abrasion. **This extra guard will wear over time.** Operators can add extra life to hose by simply rotating the hose so that cover wear is uniform. Should the Scuff-Guard be worn excessively, the operator should advise management to replace the Scuff-Guard for field inspections.
11. If a hose is used to transfer a product at higher temperatures (above 100°F), the hose should not be insulated. It is best to let the heat dissipate to the atmosphere, unless approved by NovaFlex®.



Operator Requirements for a Safe Hose Assembly

12. When measuring a hose for specific installation, it is important to remember that the tangent point for hose bending is at the end of the hose nipple portion inside the hose. It is recommended to add a minimum of 6" to dimension 'A' shown below. Always keep the bend radius of the hose within the recommended dimensions published for the specific hose. (See catalog). When flexing short length hose (less than 5') the bend point should always be centered in the hose length. (See graphic on page 6.)
13. If there is the potential of a pull-away, buttressing of the piping system is a must. This will prevent piping fracture and make the hose the weakest link, causing it to separate. It is recommended to use a break-away device along with dry-break couplings for those applications with hazardous chemicals that may cause human injury or environmental damage.
14. If a hose application requires that the hose be electrically conductive, insure that the hose is grounded by using steel helix wires or the ground wire located in the hose. To ground the hose to the coupling, simply extract enough helix or ground wire so that 1/2" can be bent into the hose ID. When the coupling is inserted the coupling stem must be in contact with these wires. Always test the conductivity with an ohm meter; coupling to coupling. Scuff-Guard for field installation. Hose life can be safely extended through this simple maintenance procedure (some users have improvised and placed mats or other protection under hoses in this type application to reduce cover wear).
15. Internal and external abrasion results in shortened service life. Care should be taken while handling hose to prevent abnormal wear on the hose cover. In applications that cause internal abrasion, NovaFlex® recommends that the hose be as straight as possible to eliminate excessive wear on the outside radius of hose tube in the bend area. Hoses that are bent should be rotated 90° every 3 months to spread the wear on the complete 360° surface area of the hose ID.
16. Hose when used in a horizontal outlet application will have a shortened service life. This type of application places strain on the sharp bend of the hose. In order to increase service life in this type of application it is recommended to minimize the bend of the hose with a bend restrictor or place a 45° elbow on the piping (see below).
17. It is impossible to test NovaFlex® hoses under all the conditions to which they might be subjected in the field. It is therefore the buyer and/or end user's responsibility to test all NovaFlex® hoses under conditions that duplicate the service condition prior to installation.



18. **Shear Pin Breakaways** - When using a standard breakaway that uses shear pins, the hose must have an angled pull. This pull should have an angle greater than 10 degrees from the centering of the breakaway.
19. **Cable Breakaway** - When using a breakaway that is triggered by cable pull, this design can operate with a pull angle from 0 to 90 degrees. ***The cable length must be shorter than the hose.***
20. **Dry Disconnect** - Before each use, check the Dry Disconnect for damages or leaking. If found, remove from service.

Inspection Requirements for the Safe Operation of Safety Breakaways

Monthly Inspection - make a visual inspection monthly of the breakaway.

Inspection items:

	Item	Action - if found
a.	Inspect shear pins for damage	Take Breakaway out of service
b.	Check Breakaway for other visible damage	Take Breakaway out of service
c.	Check hose for damage	Replace hose
d.	Check hose for leaking	Replace hose
e.	Check hose coupling for damage or slippage	Replace hose

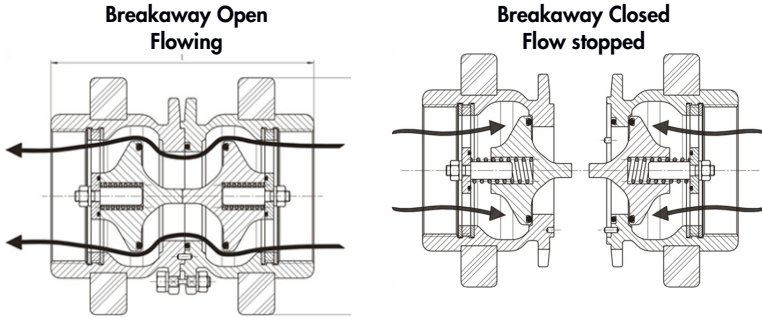
Annual Inspection - It is prudent to perform a complete yearly maintenance rebuilt to insure the continued safe operation of the breakaway. The annual inspection can be completed locally or the breakaway can be returned to NovaFlex® for inspection.

- a. Uninstall the breakaway
- b. Clean the breakaway in accordance with local and EPA requirements
- c. Disassemble the breakaway
- d. Replace all the gaskets
- e. Replace any worn or damaged internal parts
- f. Reassemble each half of the breakaway
- g. Pressure test each half of the breakaway
- h. Assemble the breakaway
- i. Pressure test complete the breakaway
- j. Perform a hydrostatic pressure test on the hose only
- k. Inspect the hose and coupling for any damage

Remember - If in doubt on any part of the breakaway, remove the breakaway & hose from service and request assistance from NovaFlex®

Safety Breakaway Unit Types

All breakaways basically function in the same fashion. The breakaway is composed of two valve halves that are held in an open position to permit flow. These valves are held open by a mechanism that is activated by a pulling force, when the activation force is reached the two valve halves separate and instantly close off the flow on both directions. The force to separate the valve halves is set differently based on the application and its component elements. The type breakaway generally falls into two styles, shear pin and cable/ring pull design. Breakaway operating temperatures are -4°F (-20°C) to 302°F (150°C).



Breakaway with shear pins



The shear pin breakaway is designed to function with pull forces that are designed to pull at an angle of 10 degrees or greater from the center line of the breakaway. The shear pins separate at a pre-designed force closing the valves. These type breakaways are used on piping systems to connect hoses and loading arms as protection to prevent high forces that may break the loading arm or hose. It also protects the piping system from damaging pull forces.

Breakaway with cable pull



The cable/ring breakaway is designed to function with pull forces that are designed to pull at any angle. The cable is designed to be shorter than the hose or loading arm attached to the breakaway. If the cable is pulled, the ring releases and the valves close. These type breakaways are used on piping systems to connect hoses and loading arms as protection to prevent high forces that may break the loading arm or hose. It also protects the piping system from damaging pull forces. Using this system protect the loading arm and hose from damage also.

Hose String Breakaway shear pin type



This shear pin breakaway type is designed to function with straight pull forces commonly found in hose strings. The shear pins separate at a pre-designed force (designed based on the type hose used) closing the valves. It is only designed to be used on straight pull hose applications.

Do's and Don'ts of Breakaways and Dry Disconnect Couplings

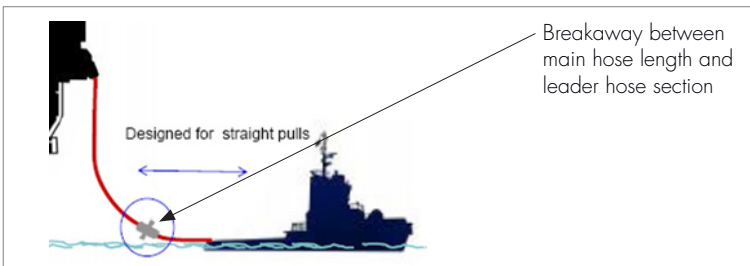
Hose is a very vulnerable link in most process and transfer applications. A Breakaway is designed to add a level of safety to a hose application to prevent accidents due to high end pull force. A Dry Disconnect adds a level of spill prevention. It must be remembered that, **All hose will fail in time!** It handles valuable and potentially dangerous materials, and hose failures can be expensive in terms of lost product, ruined equipment, spill clean up, and – most important personal injuries.

For this reason, hose, dry disconnect and breakaway installations are carefully designed and built to do a specific job safely and economically. Yet, unfortunately, the years of research and development invested in hose construction can be canceled by improper storage, misuse, and other abuse by the hose user, warehousemen, and other work personnel. NovaFlex recommends careful observation of the following points to improve service, safety and economy from the hose you use.

- Do** Use hose designed and recommended for the service intended. Contact NovaFlex and our staff will assist you in the selection of the best hose product for your requirements.
- Do** Make sure hose is easily identifiable as to the type and use. Where dangerous misuse can occur, use different fittings or end connections.
- Do** Use the breakaway for its intended application only! Use only the hose and dry disconnect designed for use with the breakaway.
- Do** Use the hose for the job intended. Remember to engineer for a possible -4% contraction to +5% elongation at max working pressure on the hose assembly.
- Do** Set up regular hose inspections before each use so that damaged or worn hose assemblies can be replaced. A breakaway will not protect an application from a hose failure due to being worn, damaged or loss of strength due to age.
- Do** Inspect breakaways and dry breaks for damage daily, once a month and annually for serviceability and document this inspection - **see Pages 7 & 14.**
- Do** Check chemical resistant charts to insure the hose, dry break & breakaway is capable of transferring the chemical **before** it is put in the hose.
- Do** Always wear safety clothing, gloves, boots, hard hat and eye protection when using a hose.
- Do** Test hoses every six (6) months or sooner to 1.5 times the working pressure or to industry recommended pressures based on NAHAD, RMA, USCG, OSHA, DOT, API, NPGA or others.
- Do** Educate all employees on how to inspect hose, breakaway and dry disconnect before each use to insure it is safe to use. Teach employees to: **Err on the side of safety!**
"When in doubt, remove the hose from service!"
- Do** Protect hose from the effects of ozone (O₃), the active form of oxygen which is more prevalent than most people think. Store away from electrical or ozone producing equipment. Paper, wood and rags are good O₃ absorbers.
- Do** Only use a hose and coupling in the hose assembly that has the coupling retention necessary to handle the pull forces necessary to activate the breakaway coupling.
- Do** **Insure that the piping system the breakaway is connected to is buttressed to withstand the tensile load necessary to activate the breakaway.**
- Do** Insure that the breakaway is located in a safe location away from factory operators. When activated, the breakaway can present a safety hazard during the pull away. Also insure there are drip collection pans under the breakaway. A small amount of liquid can be released during the breakaway.
- Do** When using a Dry Disconnect, Breakaway or hose, some chemicals become more aggressive insure all the elements are compatible with the chemical transferred. Different chemical concentrations may cause damage to metal parts, gaskets or the tube in a hose. In some cases a product may be recommended for high concentrations (90%) but low concentrations (30%) may cause damage. After use it is best to flush the parts with water. If flushing is not possible, cap the hose to prevent the atmosphere and moisture from entering the ID of the various parts.
- Do** Always wear appropriate safety clothing, gloves, hard hat, eye protection.

Do's and Don'ts of Breakaways and Dry Disconnect Couplings

- Don't** Use a hose that has been involved in a pull away after the breakaway has been reset. The hose must be replaced (it could have been damaged due to the force applied to activate a shear pin type breakaway). **If a cable type breakaway was in use during the pull away, the hose should be retested as covered in Novaflex "Hose Care, Use & Maintenance " booklet 2003-1 for possible reuse, although it is always better to use a new hose.**
- Don't** Use a breakaway that has a higher breaking force than the strength of the hose it is attached to. Always consult with Novaflex to verify if the hose is correct for the breakaway.
- Don't** Use crushed or kinked hose with a breakaway. Avoid repeated bending which may eventually break the reinforcement of the hose leading to a hose weak spot and rupture that may not activate the breakaway.
- Don't** **Substitute hose types when installing new hose to a breakaway system. All hoses are not equal. Consult NovaFlex® for the correct recommendations.**
- Don't** Use a hose if any of the reinforcement is exposed through the cover due to cuts, gouges or just prolonged use. Replace the hose.
- Don't** Exceed the working pressure marked on the hose for any reason (including pressure spikes).
- Don't** Exceed the working pressure marked on the breakaway for any reason.
- Don't** Use damaged or worn hose couplings. Check to see if the coupling is loose or has moved, has worn threads, worn gasket or is corroded. Successful hydro testing will help verify the integrity of the coupled assembly.
- Don't** Use a hose or breakaway outside its recommended temperature limits.
- Don't** Never kink a hose to stop the flow of product. Kinking can seriously damage the tube and reinforcement.
- Don't** Never lift a hose by the middle with the ends hanging down. This can kink the hose in the middle (especially in hose is 3" ID or larger). Use hose lifting saddles to prevent kinking.
- Don't** Never bend a hose beyond its minimum bend radius
- Don't** Subject a hose or breakaway to temperatures above its rated temperature recommendations (especially any hose with plastic parts - PVC, etc).
- Don't** Install a hose string breakaway at the end of a hose string connected to the piping. The Breakaway must always be located at the other end of the hose string between a short hose leader section.



- Don't** Use any repair parts that are not part of an authorized repair kit supplied by NovaFlex®.
- Don't** Ever use a damaged Breakaway or Dry Break—remove from service.
- Don't** Let the fluid transferred in a dry disconnect or breakaway freeze or solidify due to temperature changes.

Cleaning Tips for NovaFlex Hose, Dry Break & Breakaway

In many hose applications it is “Best Practice” to clean the hose after each use.

This prevents the:

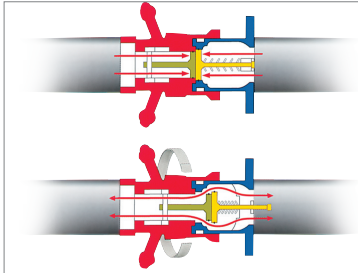
1. Long term effects of potentially hazardous chemicals from damaging the hose & couplings (even 316 stainless steel is affected over time by some common chemicals).
2. Contamination of product, should one hose be used to convey multiple products.
3. Prevent accidental spillage from chemical residue left in the inside of a hose.

This process is typically accomplished by flushing the interior of the hose with water or a cleaning solution. Cleaning procedures may differ by industry but should at least include the below NovaFlex® recommendations.

- All staff must wear personnel protective gear, i.e. eye protection & hard hat, gloves, protective clothing, etc.
- Cleaning solutions should be able to dissolve or remove the residue material in the hose assembly and must be compatible with the hose tube & couplings..
- The use of open end, low pressure steam (200° F or less) can be use for cleaning certain NovaFlex® hoses. Contact NovaFlex for cleaning instructions by hose and breakaway specification.
- To insure no cleaning chemical residue is left in the hose assembly, the hose can be hung vertical for a brief time to drain. It is common to hang hose to facilitate draining (hose with a convoluted tube surface may require this method).
- Warm air (120° F) can be circulated through the hose for drying.
- Hose cleaning and the control of the waste water and solutions must be handled in accordance with EPA regulations.
- Steam cleaning is not a preferred method of cleaning. Only use steam when it is recommended by the hose manufacture in the catalog for the specific type of hose.
- NEVER use superheated steam
- The use of high pressure wands, piping or brushes can cause damage to the tube of a hose. These devices can not be used with dry disconnect or breakaways.

Dry Disconnect Coupling Types

All dry disconnects basically function in the same fashion. The dry disconnect is composed of a valve system that is open when the coupling is completely attached and closed when disconnected. This prevents the product conveyed from spilling on to the ground during hose connecting.



Flow. Stopped in standard position.

After connection is made and the dry connect is rotated to lock halves together the flow is opened.



1/2" & 1 1/4" ID Dry Disconnect Couplings

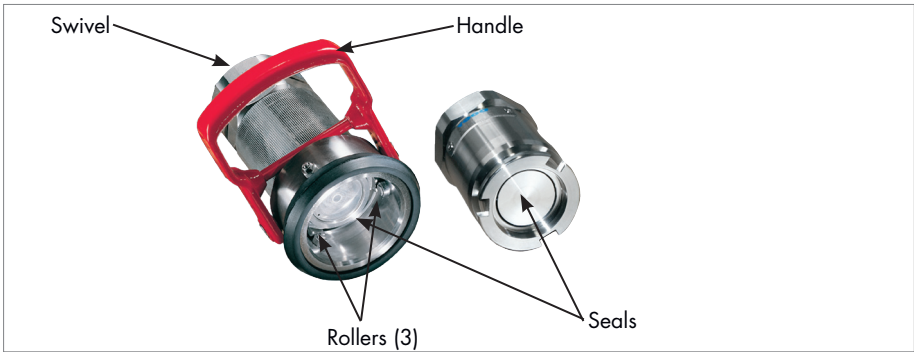
Available in stainless steel, brass and aluminum.



1 1/2" and larger ID's Dry Disconnect Couplings have handles

Available in stainless steel, brass and aluminum.

Inspection Requirements for the Safe Operation of Dry Breaks



Daily Inspection - make a visual inspection at the start of each days operations. Look for leaking and check inside the connection socket, check that the rollers are not damaged. Make sure the connection is free of dirt and foreign material. Look for seal damage (cut or warn seals). Remove from service is found.

Monthly Inspection - make a visual inspection monthly of the dry disconnect, keep a log of this inspection.

Inspection items:

	Item	Action - if found
a.	Inspect Dry Break for leaking	Remove from service and repair
b.	Inspect for damage seals - look for cuts in seals or small pieces of rubber coming from the piston area	Remove from service and repair
c.	Inspect handles for damage	Remove from service and repair
d.	Check swivel rotation	Remove from service and repair
e.	Check rollers for damage	Remove from service and repair

Annual Inspection - It is prudent to perform a complete yearly maintenance rebuilt to insure the continued safe operation of the breakaway. The annual inspection can be completed locally or the units can be returned to Novaflex for inspection and repair. A log must be kept with the repair information.

a.	Uninstall the Dry Disconnect
b.	Disassemble the Dry Break halves
c.	Completely clean
d.	Inspect for internal wear
e.	Replace all gaskets
f.	Check rollers for wear
g.	Lubricate appropriate areas
h.	Test Dry Disconnect

Remember - If in doubt on any part of the dry disconnect, remove the dry disconnect & hose from service and request assistance from Novaflex.

Companies that conform to "Best Practice" programs realize that all safety programs and safety products are only as good as the human element responsible for using and maintaining the products used in the industrial arena. Hose can be dangerous and it is important that companies take reasonable care to educate their employees to correctly use hoses in their respective work environments. To this end it is incumbent on the employer to institute the simple elements of a hose safety program to maintain safe hose operations by their work staffs.

Elements Of A Hose Safety Program

In an effort to provide assistance for hose safety, Novaflex recommends that a safety program involving (but not limited to) these key elements be used.

1. Hose identification system
2. Coupling identification system
3. Hose application identification program
4. Employee training program on Hose Care, Use and Maintenance.
5. Root Cause Analysis of hose failures
6. Hazardous Application Hose Failure Action Plan