



Dry-disconnect couplings

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A dry-disconnect coupling (also called dry-break coupling) is a hose connection device used for bulk transfer of hazardous or precious chemicals. This article reviews these important devices and reminds us that all aspects of the process deserve our attention.

These couplings provide an automatic mechanism to seal off both the hose end, and the fixed pipe end, when the hose is disconnected. Typically, they are used in fluid transfer applications where loss of fluid upon disconnection cannot be tolerated because of environmental regulations, worker safety considerations, high value of the fluid, or where cleanliness is a concern.

Essentially, a dry-disconnect coupling is made up of two 'halves'. One half that is attached to a hose is called a coupler. The other half that is attached to the fixed pipe end or a vessel is called an adapter. When the two halves are latched together, and the coupler handle is turned 90 degrees, the fluid starts transferring. When the transfer is complete, the handle is turned back 90 degrees to stop the flow. The coupler half is then de-latched from the adapter half and no fluid is expected to drip on to the floor.

In the past

Prior to the invention of dry-disconnect couplings, operators typically used a simple on-off valve connected in between the hose and the fixed pipe. To initiate fluid transfer, the operator simply opened the valve. When the transfer was complete, the valve was closed and the hose was disconnected from the valve by unscrewing it from the valve. To catch any hazardous spillage upon disconnection, a bucket was placed under the valve. This type of crude, yet risky arrangement was the accepted norm in the industry until governments started imposing fines to improve operator safety and to protect the environment from hazardous spillage. As such, we are now witnessing increased usage of dry-disconnect couplings in all spectrums of industries.

- Dry-disconnect couplings ensure no leakage once hoses are disconnected.
- Dry-disconnect couplings are available in a variety of formats, each suited to specific applications.
- All aspects of the process should be our concern and leakage could have monetary and safety implications.

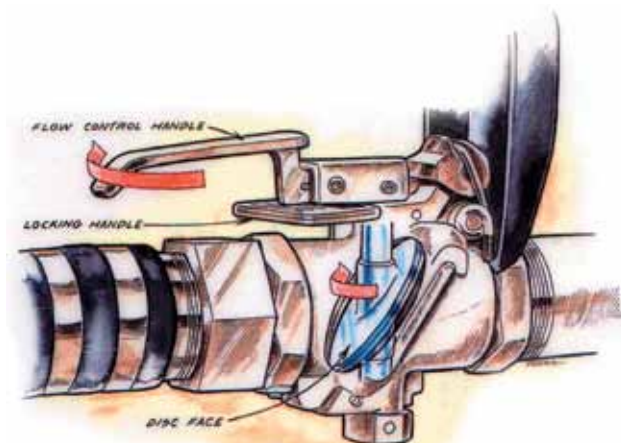
Take note

Many designs

Dry-disconnect couplings come in many designs. The earliest type of couplings was of a variant of the simple poppet valve design where a sliding, spring-loaded plunger was used to seal the flow. This coupling was economical to produce but suffered from low flow rates and trappings of fluids resulting in a small amount of spillage upon disconnection. Subsequent improvements were made using a split-ball valve design to minimise loss of fluid. The split-ball valve design coupling did improve spillage, but it made the coupling very bulky and heavy to handle. The next generation of dry-disconnect couplings evolved into a split-butterfly valve design that addressed all drawbacks of earlier designs.

Split-butterfly

Dry-disconnect couplings that incorporate a split-butterfly valve are considered the best couplings on the market because of their drip-free tightness, ease of usage and trouble free operation. One of the author's companies (Dry Link) is a leader for such couplings for the chemical and petrochemical industries for bulk transfer of fluids. Where hygienic conditions are required, their sanitary, high-purity



Facing discs in the coupler and adapter connect the assembly. The discs swivel to open and close, keeping their faces totally dry.

FDA – Food and Drug Administration
 Ra – Arithmetic term for the deviation of the profile of a surface
 USP – United States Pharmacopeia

Abbreviations



couplings are specified by all major pharmaceutical, biotechnology and food companies.

Dry Link brand hose coupling assembly

The Dry Link brand hose coupling assembly was invented and patented by Dry Link, Inc (previously known as Victaulic Company) to provide a new and improved alternative to the older designs of other dry-disconnect devices. It uses a unique technology which makes the plunger and spring devices of the last 20 years obsolete. The flow shut-off mechanism resembles a butterfly valve which results in a very low flow restriction. Additionally, it minimises the risk of internal gunk-ups which can lead to connection malfunctions. It is ideal for hazardous, high viscosity, high-flow, and sanitary applications. A foolproof safety interlock prevents accidental opening, and a clever high-tech sealing arrangement results in the world's most drip-free dry-disconnect coupling.

Make up

Dry-disconnect couplings are typically made from Type 316 stainless steel material. Optional materials of construction are Alloy 20 (Carpenter 20) and Hastelloy C where severe corrosives are a concern. To maintain maximum elasticity, seals are made of spring energised PTFE or molded rubber design such as, fluoroelastomer (Viton), EPDM or perfluorelastomer (Chemraz/Kalrez). Couplings come in a wide variety of sizes from 1/2" through 4" (DN 25, 40, 50, 75, and 100), and numerous types of end connections such as, FNPT, British Standard (BSPP), Flanged (ANSI and DIN), Butt-weld, Triclover, etc.

Ultra-pure dry disconnect couplings

Sanitary, ultra-pure dry-disconnect couplings for the pharmaceutical, biotech and food industries are normally supplied with Triclover end connections and are hand polished with an internal 0,5 Ra microns surface finish. FDA or USP grade approved seals are often specified to insure that seal materials do not contaminate the line medium by leaching out into the line medium. The smooth mirror-polished bore has no voids, dead spaces, crevices, or fillers that could trap bacteria.

Easily drainable and sanitised using steam or other cleaning methods. These sanitary couplings are routinely specified in pharmaceutical, biotech, semiconductor, food, and cosmetic industries where ultra cleanliness is required.

Keyed dry-disconnect couplings

Keyed dry-disconnect couplings are often specified in batch process plants and manifolds for preventing accidental cross-contamination of fluids. A mechanical interlock allows only a matching coupler and adapter to be connected with each other. Keyed units will not latch onto standard non-keyed units. Can you imagine the potential of a serious accident if someone connects a wrong hose to a wrong tank? In such situations, Keyed couplings can be the solution to your problem.

Conclusion

Remember, chemicals may cost only pennies per gallon until they drip and cost thousands in fines. You can avoid big fines by using dry-disconnect couplings. These couplings can trap chemicals before they leak on the ground or floor. You will avoid costly cleanups while protecting both workers and the environment. As responsible citizens of this planet, engineers are specifying environmentally friendly products to reduce global warming, improve deteriorating ecology, and disappearing wildlife. We can't solve the climate crisis alone, but we can take small steps together. Help keep our planet green!



Vinod Bhasin, President of SigmaTech, a consulting engineering company, and President of Dry Link Inc, a manufacturer of dry-disconnect couplings, has over 38 years of professional experience in the design, application and manufacturing of piping, valves, and actuators for several companies including Hills McCanna Company, Rockwell International, and Westinghouse Electric Corporation. He is an alumnus of Illinois Institute of Technology (IIT), Chicago, Illinois, USA. A registered professional engineer (PE), he holds BSME, MSME, and MSIE degrees.

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