



The Right Connection®

Making the Right Connection in Fluid Transfer Operations

Dry disconnect couplings and adapters maximize worker and environmental safety while maintaining fluid integrity and reducing operating costs.

By: Sean Andersen, LNG Specialist, Dixon

CONTENTS

INTRO	3
BEYOND THE ENVIRONMENT	4
DRY DISCONNECT COUPLINGS AS A SOLUTION	4
DESIGN SIMPLICITY. AND YET...	5
FLOW AND TEMPERATURE PERFORMANCE WITH DRY DISCONNECTS	6
RELY ON YOUR DISTRIBUTOR	7
DRY DISCONNECTS MAKE OPERATIONS SAFER - AND EASIER - FOR A MYRIAD OF APPLICATIONS	8

INTRODUCTION

When it comes to transferring and handling fluids via hoses and piping, the ability to prevent the accidental release of the fluid is one of the most important factors to consider. It is particularly significant when frequent connections and disconnections involving expensive or hazardous fluids could cause spills, the loss of valuable media, or even spoiling of the media.

One major concern is the potential adverse environmental impact of handling caustic chemicals and other hazardous substances such as those identified by the Environmental Protection Agency in its Emergency Planning and Community Right-to-Know Act (EPCRA) legislation, which has been on the books since 1986.

There are numerous substances that are recognized by EPCRA as being hazardous to health and to the environment. In fact, nearly 700 of them fall within the purview of the EPCRA under Section 312 – also known as SARA Title III.

EPCRA also mandates reporting on the types, quantities and locations of these hazardous materials. Determining whether a facility must report them is based on certain threshold levels. Different substances have different minimum reporting requirements that can range from 100,000 pounds for less hazardous chemicals to 500 pounds for Extremely Hazardous Substances (EHS) – and even smaller quantities for some other media as well.

The fines and penalties associated with violations of SARA Title III can be very hefty – more than \$25,000 per violation in some cases. These fines can add up quickly, too, since each day a violation continues to exist constitutes a separate violation.

What this means is that there are important financial reasons behind the commitment businesses are making to ensure that they aren't causing harm to the environment or the safety of their personnel because of inadvertent spills.

BEYOND THE ENVIRONMENT

There are other reasons to exert tight control over the transport and handling of media that go well-beyond the environmental aspects. Certain liquid substances such as paint pigments are expensive media, meaning that any inadvertent spills – even if very small – can cause a big financial hit well-beyond the prospect of just the EPA’s regulatory fines.

Moreover, there is a risk of product contamination if hoses and piping allow air to intrude and alter the physical properties of the fluids being handled. Hardening of the media can be a major concern in such cases.

The ingress of dust or other foreign matter can also cause major problems and compromise the quality of the media, and thus those situations need to be avoided as much as possible.

Last but not least, problems can occur in situations where the media being handled might not be hazardous, but nevertheless may cause harm to operators if it were to escape during the connection or disconnection process. Nitrogen is one example which, if it leaks, may cause an operator to become disoriented or even unconscious.



DRY DISCONNECT COUPLINGS AS A SOLUTION

With so much potential downside to fluid transfer and handling, the availability of better connecting devices is always welcome. As it turns out, dry disconnect couplings are a very good solution for hoses and piping up to 4 inches in diameter. This type of coupling system is designed for quick and spill-free connection and disconnection of hoses and pipelines when transferring expensive or hazardous fluids that are costly to dispose of, clean up or reprocess.

Dry disconnect systems are a big departure from traditional hose assemblies with non-valved fittings, which are prone to potentially dangerous and costly spillage when operators neglect to purge the lines or empty them out during handling. The dry disconnect fitting provides closure at the end of the hose. Poppet valves at both ends of the hose can be opened only when the hose connection is made.

Over the past decade, a cam and groove design of dry disconnect products has become particularly popular. Offered by major manufacturers such as Dixon (Bayloc™ brand) and OPW (Kamvalok® brand), these products have been adopted by producers, transporters and handlers of a variety of media. Among the most popular type of fluids and substances being handled by these cam and groove couplers are:

- Acids
- Adhesives
- Agricultural herbicides and pesticides
- Chemicals
- Fatty acids
- Liquid soaps
- Petroleum products
- Paint pigments and inks
- Pharmaceuticals



DESIGN SIMPLICITY. AND YET ...

Anywhere connections and disconnections are taking place that entail the transfer of media such as the ones listed above, they're likely to be very good candidates for dry disconnect couplings. In keeping with its ability to "human-proof" the transfer of media, the basic design of dry disconnect couplings is intuitive – in fact, it's the very essence of simplicity. The cam and groove design of dry disconnect products offers a variety of functional benefits to users. Key among them are:

- Easy handling along with time-saving connecting and disconnecting – with no need to drain hoses or pipe systems.
- No loss of fluid spillage during connection or disconnection; the chance of accidental spillage is eliminated when properly operated.
- The valve cannot be opened until the unit is coupled.
- Available in aluminum or stainless steel construction for broad chemical compatibility.
- Available with a greater variety of seal types compared to other dry disconnect designs; seal options include Buna, EPDM (M-class ethylene propylene diene monomer rubber), FFKM (Kalrez®), FKM/FPM (Viton®), Nitrile®, Teflon®.

Fortunately for users, there is extensive compatibility between the cam and groove dry disconnect product choices available, thereby allowing for the interchangeability of components. Still, several design aspects differentiate the strongest performers from others in the field in

terms of their product life and serviceability. These aspects should be considered when weighing the selection of a particular brand and model.

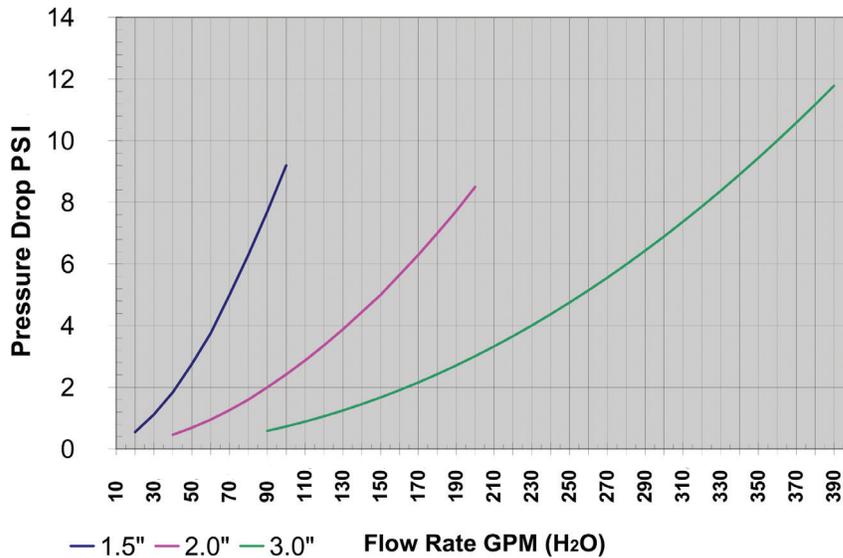
Users should look for the following attributes when deciding on which brand of cam and groove dry disconnect product they purchase, as not all brands and models offer the same degree of functionality and long-life durability:

- Available in NPT threaded or 150 pound ANSI flanges
- Models that use stainless steel components versus steel or plastic internal components
- A rugged two-piece adapter design featuring bearings and bushings for the ability to replace or rebuild seals, which can save money long-term over products that feature a one-piece "throwaway" adapter design
- The sealing material molded into the seal cylinder to avoid coming loose and causing contamination
- A one-piece arched yoke for better durability compared to a two-piece yoke design
- Automatic locking cam arms
- An all-stainless steel handle to prevent rusting, as well as a stainless steel crank and guide for maximum durability
- A greaseless version available for ink and paint pigment applications

FLOW AND TEMPERATURE PERFORMANCE WITH DRY DISCONNECTS

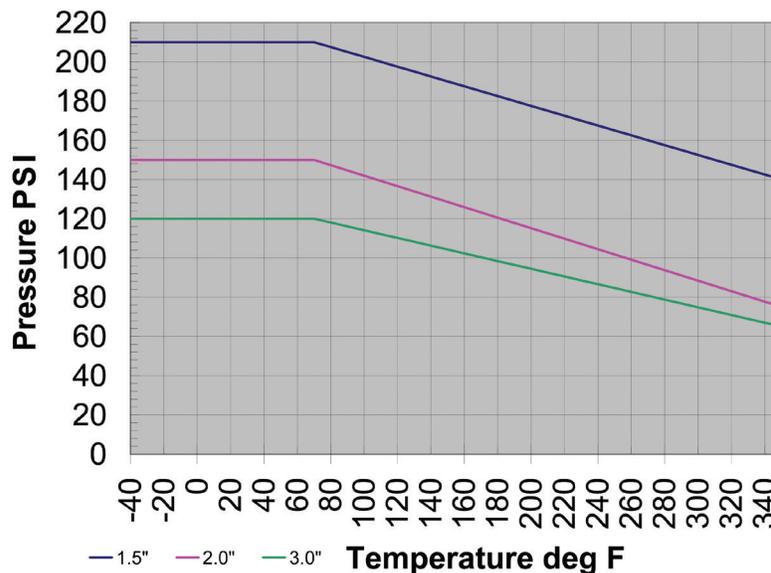
For some operators, there may be concerns about the pressure drop that occurs when a dry disconnect coupling is added to their fluid transfer process. Fortunately, comparative testing demonstrates that the pressure drop in the most popular hose sizes equipped with the couplers is quite small – and likely of little negative consequence to operations (see Fig. 1). As to how fluid transfer performance using dry disconnect couplers and adapters is affected by temperature, Fig. 2 shows what happens when higher-temp media such as molasses, glue, asphalt and pitch are being transferred.

Fig. 1



Tests on 1½", 2" and 3" hoses equipped with Bayloc™ cam and groove dry disconnect couplers and adapters show only a very modest pressure drop at various flow rates. As an example, for a 2" hose at a flow rate of 90 gallons per minute, the pressure drop is just 2 PSI (pounds per square inch).

Fig. 2



The higher the temperature of the media being transferred, the greater the likelihood of pressure de-rating. High-temp substances being transferred, such as asphalt and pitch, experience the largest pressure de-rating – in the case of a 3" hose, declining from 120 PSI to approximately 70 PSI.

RELY ON YOUR DISTRIBUTOR

Typically, industrial distributors will supply complete hose assemblies rather than dry disconnect couplers as a separate item. End-users can rely on the expertise of distributors and their manufacturers to determine the proper configuration of dry disconnect couplings and adapters.

These experts can be very helpful in working through application issues, making sure that the hoses are sized appropriately for the flows needed, and that the sealing material is compatible with the chemicals or other media that are being transferred. Generally speaking, suppliers that have a history of “consultative selling” will do a better job of matching the proper equipment to the customer’s specific need.

A bit of warning: Depending on whether products are sourced domestically in the United States or overseas, sometimes product lead times can be an issue.



The Environmental Protection Agency’s SARA Title III listing of reportable spills of caustic chemicals and other hazardous substances includes nearly 700 different entries. Among the most significant and potentially consequential categories in the EPA’s list are:

- Benzene
- Epichlorohydrin
- Fuel oils
- Naphthalene
- Propylene oxide
- Styrene and styrene oxides
- Tetrachloroethylene (perchloroethylene)
- Toluene
- Xylene (mixed isomers)



The EPA has published a comprehensive listing of all reportable substances, which can be accessed [here](#).

Dry Disconnects Make Operations Safer - and Easier - for a Myriad of Applications

Cam and groove dry disconnect products can help businesses of all kinds handle hazardous or expensive media in a variety of ways. Below are three examples of circumstances where the dry disconnect solution was a significant improvement over prior practices:

Rail Tank Cars – Epichlorohydrin is a highly hazardous solution, high on the EPA’s list of controlled substances. In handling and transporting epichlorohydrin via rail tank cars, using dry disconnect couplers and adapters reduced the risk of leakage at the point of disconnection to well below the EPA’s reportable minimum of 0.1% de minimis. As an added bonus, the time and cost savings derived from no longer needing to purge the hoses prior to disconnecting them from the rail tank cars was significant.



Fuel Oil Blending – A major national fuel oil blending facility was processing synthetic motor oil as well as conventional motor oil. Inadvertently mixing the two products through a crossed line would mean spoiling potentially hundreds of thousands of gallons of product. The far-higher price of the synthetic motor oil made the risk of spoilage that much more consequential. Dry disconnect couplings and adapters enabled this facility to “foolproof” its process in order to avoid inadvertent contamination problems due to human error.

Commercial Printing – Most commercial printing processes rely on a constant supply of printing ink for smooth and efficient operation. Dry disconnect products installed on ink totes guaranteed a quick, clean resupply of expensive ink while the printing machinery was running. Not only was the printing operation more efficient and machine downtime reduced, another major benefit was creating a spill-free environment that avoids the need for floor cleanup activities while minimizing ink waste.

[Sean Andersen](#) is a product manager and LNG Specialist at Dixon. In addition to working closely with customers to evaluate, design and deliver custom LNG transport and bunkering systems, he is active in numerous industry organizations and societies. He is currently a member of the Chemical Transportation Advisory Committee (CTAC) Sub-Committee on LNG and the American Society of Testing and Measurement (ASTM) committee that is developing specifications and requirements for LNG fueling.

[\(sandersen@dixonvalve.com\)](mailto:sandersen@dixonvalve.com)

Founded in 1916, Dixon is a premier U.S.-based worldwide manufacturer and supplier of hose couplings, valves, dry disconnects, swivels and other fluid transfer and control products. Dixon's products and services support a wide range of industries including chemical processing, petroleum exploration, refining and transportation, steelmaking, construction, mining, manufacturing and processing.

dixonvalve.com • 877-963-4966