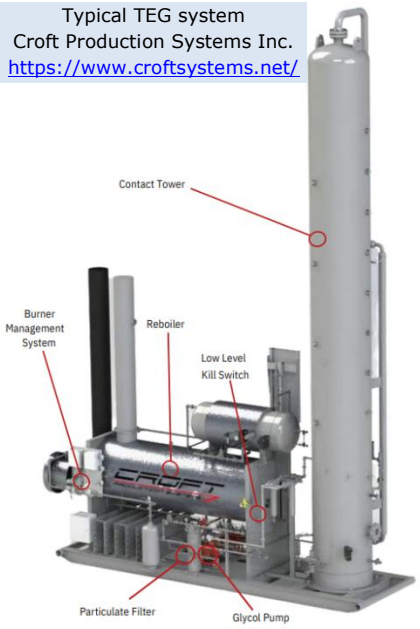
Hydra-Cell Pro Pumps for Triethylene Glycol [TEG] Injection

Improving Reliability and Process Efficiency

By: Chris Pasquali, CEO Factory Direct Pipeline Products, Inc.

Natural gas dehydration is a critical step in upstream and midstream gas processing operations. Moisture removal is required to meet pipeline specifications, prevent hydrate formation, and protect downstream equipment. Among available dehydration technologies, triethylene glycol (TEG) dehydration remains the most widely used method due to its reliability and effectiveness across a broad range of operating conditions.

Typical TEG system
Croft Production Systems Inc.
https://www.croftsystems.net/



Within these systems, pump selection plays a central role in determining overall performance and operational reliability. High-pressure pumps must circulate glycol continuously while maintaining consistent flow rates and handling challenging process conditions. In recent years, Hydra-Cell Pro pumps have gained attention as an alternative to conventional pumping technologies due to their durability and ability to operate under demanding service conditions.

Why Natural Gas Must Be Dried

Natural gas streams commonly contain water vapor that must be removed prior to transportation or further processing. Excess moisture can cause corrosion, freezing, and hydrate formation in pipelines and processing equipment. Dehydration ensures gas meets pipeline sales specifications and maintains safe and efficient system operation.

TEG functions as a liquid desiccant that absorbs water vapor from natural gas. Its hygroscopic properties and high boiling point allow it to absorb moisture effectively and be regenerated repeatedly through heating and separation processes.

Basic TEG Process Description

A typical TEG dehydration unit operates using a counter-current absorption process. Wet natural gas enters a contactor tower where lean glycol is introduced from the top. As gas rises through the tower, the glycol absorbs water vapor, producing dry gas at the outlet.

The glycol, now referred to as rich glycol, is removed from the contactor and transferred to a regeneration system. In the regenerator, **heat** separates water from the glycol, producing lean glycol that is recirculated back into the contactor. The circulation of lean and rich glycol between the contactor and regenerator is a continuous closed-loop process requiring reliable pumping systems for hot, high-pressure delivery of glycol.

Pumping Requirements

Hydra-Cell Pro pumps are a central component of the dehydration system and perform two essential functions:

1. Transfers rich glycol from the contactor to the regeneration system
2. Returns lean glycol from the regeneration system to the contactor

Consistent and accurate glycol circulation [metering pump accuracy] is critical to achieving moisture removal targets and maintaining system efficiency.

Many TEG dehydration units operate at elevated pressures, particularly in upstream production facilities where contactor towers may operate above 1,000 psi. Pumps must overcome system pressure while maintaining precise flow control. High-pressure pumping is typically required in:

AxFlow Hot TEG pump system (https://www.axflow.com/)

- Lean glycol injection into high-pressure contactors
- Glycol transfer across long distances or elevated piping systems
- Regeneration and stripping gas systems requiring stable flow control

Performance Challenges

TEG pump applications present several operating challenges, including:

- Continuous duty operation with minimal downtime tolerance
- Exposure to glycol solutions containing contaminants or solids
- Entrained gas or vapor within glycol streams
- High differential pressure requirements
- Requirement for accurate, repeatable flow rates

These demanding service conditions often strain other positive displacement pump technologies.

Feature	Hydra-Cell	Traditional Hydraulic Diaphragm	Plunger Pump	Gear Pump
API 675 Compliance	Yes	Yes	Sometimes	No
Mechanical Complexity	Moderate	High	Moderate	Low
Entrained Gas Tolerance	High	Low	Low	Moderate
Seal Leakage Risk	Very Low	Very Low	Higher	Moderate
Maintenance Frequency	Low	Moderate	Higher	Moderate
Flow Smoothness	High	Moderate	Pulsating	Smooth

Plunger Pumps

Plunger pumps have been widely used in field dehydration units due to relatively low flow rate requirements. Capable of producing high pressure, plunger pumps rely on dynamic seals and packing that require routine

maintenance and will leak over time. Pumping accuracy decreases with packing wear. Plunger pumps are more susceptible to damage from high liquid temperatures.

Diaphragm Metering Pumps
Hydraulic diaphragm metering pumps are commonly used when precise dosing or injection is required. However, they often involve complex hydraulic systems and can be sensitive to solids or gas entrainment such as adjustable stroke lengths or adjustable eccentric drives; the common simplex design is more sensitive to pressure spikes and hydraulic imbalances.

Gear Pumps
Gear pumps are sometimes used in glycol service due to their simplicity and steady flow output. However, they typically operate best at lower pressures and can suffer from wear when handling contaminated fluids. Their pumping inefficiency varies with viscosity and pressure and degrades with wear; thus, they usually will not satisfy API metering pump performance standards.

Hydra-Cell Pro Pump Technology
Hydra-Cell Pro pumps utilize a hydraulically balanced, multi-diaphragm positive displacement design. The pump uses a cam-driven hydraulic fluid that actuates diaphragms to move process fluid through check valves. Unlike conventional reciprocating pumps, Hydra-Cell Pro pumps eliminate dynamic seals and packing that contact the process fluid. This seal-less design not only improves containment and reduces leakage risks.

Seal-Less Design and Environmental Protection
The seal-less diaphragm design minimizes risk of fugitive emissions. This improves environmental compliance compared to sealed pump designs and also reduces safety risks associated with glycol exposure.

Ability to Handle Entrained Gas
Glycol streams often contain dissolved or entrained gas. Traditional plunger and gear pumps are more susceptible to damage from cavitation whereas Hydra-Cell Pro pumps tolerate vapor and gas entrainment without damage.

Reduced Maintenance Requirements
Because Hydra-Cell Pro pumps do not rely on packing or mechanical seals, routine maintenance intervals are significantly extended. Fewer wear components reduce downtime and lower operating costs. Maintenance typically involves replacing 3 quarts of 15W50 synthetic oil every 4000 hours of operation plus a check valve kit ($750 as of 2/2026) every 8000+ hours of operation. No special tools or training required and it is possible to change oil and check valves without removing the pump to a workbench.

High Pressure Capability
Hydra-Cell Pro pumps are designed to operate at high pressures. Their multi-diaphragm configuration distributes mechanical loads, improving durability and reliability under continuous high-pressure operation. TEG applications are typically <2000 PSIG, within the operational range for Hydra-Cell Pro pumps.

Accurate and Consistent Flow
Hydra-Cell Pro pumps conform to API 675 metering pump standards for repeatability, steady-state accuracy and linearity. They provide the consistent and repeatable flow rates required for efficient and stable dehydration.

Tolerance to Contaminated Fluids
TEG systems often contain particulates, degradation products, or corrosion by-products. Hydra-Cell Pro pumps are designed to tolerate moderate solids without performance degradation, reducing filtration dependency. Such particulates are problematic for plunger and gear pump systems which require finer filtration.

Case for Modernizing TEG Pumping Systems
As natural gas dehydration units become increasingly automated and expected to operate with minimal supervision, pump reliability becomes a primary operational driver. The adoption of advanced diaphragm pump technology of Hydra-cell Pro pumps offers operators improved uptime, reduced maintenance, and lower total lifecycle cost.

Hydra-Cell Pro pumps provide a robust alternative to traditional plunger and gear pumps, particularly in applications where high pressure, entrained gas, and continuous duty operation are present.

Conclusion
TEG dehydration remains the industry standard for natural gas moisture removal, and pumping technology plays a critical role in overall system performance. While traditional pump technologies have served the industry for decades, evolving operational requirements demand improved reliability and efficiency.

Hydra-Cell Pro pumps offer a combination of seal-less design, high-pressure capability, reduced maintenance, and enhanced tolerance to challenging process conditions. These advantages make them well suited for modern TEG dehydration systems and contribute to safer, more efficient natural gas processing operations.

Related Articles
- Comparison of Hydra-Cell Pro and Plunger Pumps
- Comparison of Hydra-Cell Pro and External Gear Pumps
- Centrifugal Vortex Gas/Liquid Separators for Natural Gas Processing
- Horsepower Requirements for pumping high temperature liquids