Dry Chemical Processing Units and POL E DUC

The Science of Enhanced Oil Recovery

Overview of Oil Field Dry Chemical Processing Units

The use of water and/or chemical flooding has become the primary method used in the effort to extract more oil from an existing field. In-depth polymer processes rely on specially formulated, high-quality, polyacrylamide chemicals to assure continuous movement into the reservoir matrix. Polymers manufactured and transported to the oil field in a dry form assure engineers of the necessary purity, ease field handling, reduce transportation cost and the risk of shelf-life loss.

Comparison of the various dry polymer process and feed systems currently on the market centers on the wetting device and its performance. Improper or incomplete wetting of the dry polymer chemicals is considered to be the single most important factor in a successful flooding program, and other system features become meaningless if the wetting device cannot adequately dissolve the difficult-to-wet polymer. Dry chemical dissolving equipment that is not specifically designed to process polymers will cause field problems such as:

1. Plugging
2. Mechanical dysfuntion
3. Incomplete dissolution
4. “Fish-eyes”
5. Polymer waste
6. Personnel safety hazards

Due to the unique physical characteristics of dry polymers such as dusting, hygroscopic in nature, and difficult particle wetting they require special attention in the field handling and processing methods to ensure that properly hydrated, non-sheared solution is produced and metered to the injection system.

TIORCO’s Dry Chemical Processing Unit

From the start of TIORCO’s history as a full-service, applied EOR (Enhanced Oil Recovery) technology company, specialized chemical process equipment for polymer and other chemical programs in an oil field operating environment was recognized as critical to project success. Without reliable and proper field equipment, chemical EOR technologies could never be fully exploited by oil production companies.

TIORCO has designed, manufactured and supported polymer process systems, ASP process facilities, and chemical injection plants throughout the oil producing world. TIORCO’s portable and permanent chemical injection facilities are totally integrated, and, depending upon the project, easily operated with a minimum field staff of one or two operators.

TIORCO’s mobile plants prepare and process the polymer and crosslinker recipe continuously while meeting a wide range of gel concentration requirements and down-hole injection rates specific to the project. These mobile plants are designed to process gel concentrations from under 1000 mg/l to 20,000 mg/l at the maximum design injection rate.

The systems are controlled and monitored by microprocessor-based electronic control systems. All instrumentation signals are processed by the PLC to provide an instantaneous, real-time display of the status of: injection pumps; alkaline system; polymer system; surfactant system; and filtration systems. Operating parameters are programmed to permit field adjustments of alarm set points and calibration parameters of the solution preparation and metering systems. Automatic plant shutdown alarms are displayed on the control panel and clearly communicate the cause of the shutdown.

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POL E DUC® Dispersion Device

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The POL E DUC® polymer process and metering system was developed by TIORCO application engineers to perform reliably and to optimize chemical activation under the rigorous demands of remote oil field installations. These systems utilize the POL E DUC Dispersion Device (PDD) technology for instantaneous wetting and accelerated dissolution of the dry polymer particle.

The POL E DUC Dispersion Device is unique among all other types of dispersion methods such as: wetting cones; funnels; eductors; multistage chambers, wetting planes or rotating drums currently in use.

How It Works

The PDD automatically transfers the dry polymer to the wetting zone by using the high vacuum created when the make-up water energizes the device. This means that the water to polymer ratio is correct for the most efficient dissolution and that the dry storage bin or bag can be located away from the wet zone. That eliminates water or water vapor contamination of the dry storage area and feed equipment. This benefit alone solves a primary handling complaint by operators and is largely responsible for the excellent reliability of the POL E DUC systems. Using a closed vacuum to transfer dry polymer also eliminates dusting, a potential safety hazard typical to systems that employ gravity feed or a blower.

Because of the pressure differential created within the PDD, the dry polymer particles are instantaneously wetted in a high-energy area just below the PDD throat in the stainless steel tailpipe. This is the operational feature that prevents agglomeration of the polymer and accelerates the dissolution process. This permits activation of typical anionic polymers within 15 to 20 minutes at 23°C through the PDD. The PDD's high mixing energy results in homogeneous solution with no fish eyes.

When the PDD is idle, no dry polymer or polymer solution resides in the device. Build-up of sticky polymer and plugging cannot occur. Other eductor devices typically blow or gravity feed the dry polymer into an open wetting device where splash-back contaminates the dry zone and plugging begins to form, rendering dispersion more and more ineffective cycle to cycle, until an unscheduled shut down is forced.