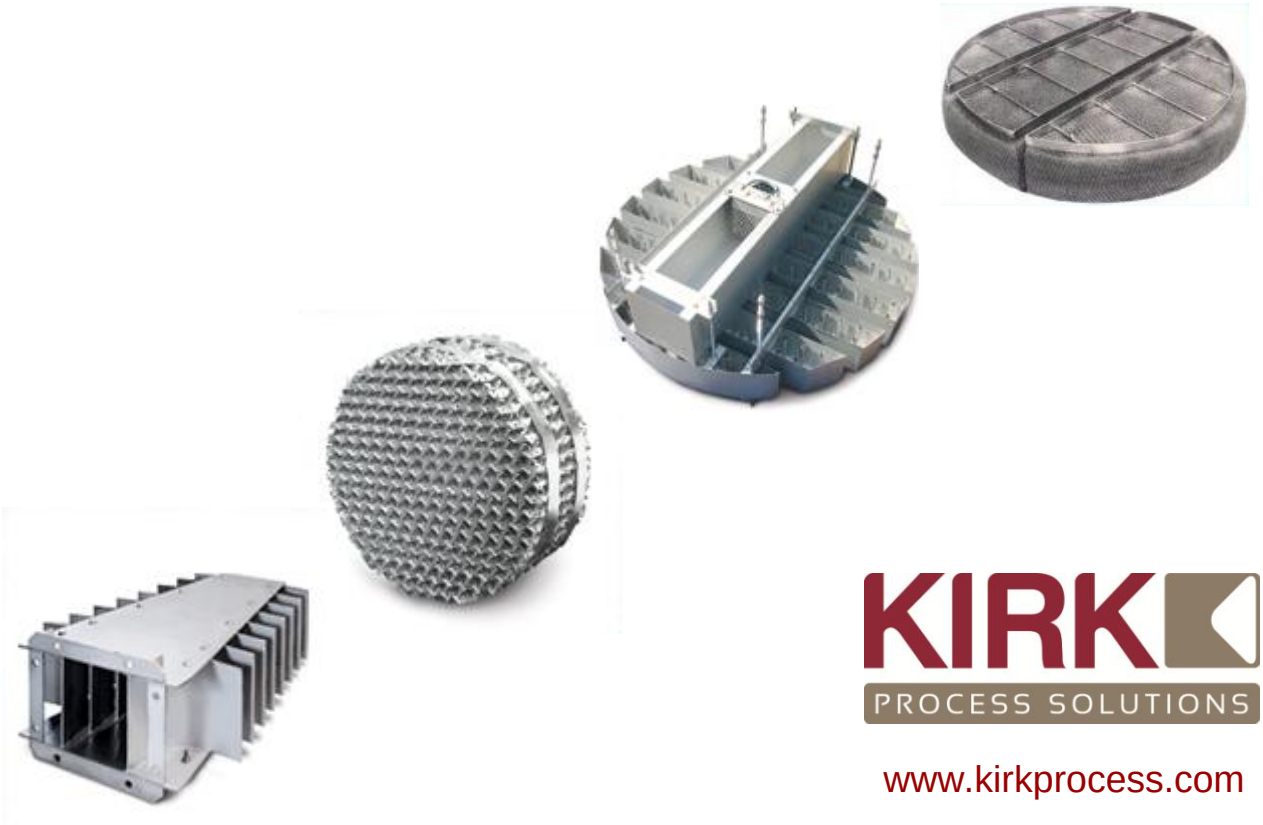
OIL & GAS PRODUCTION & TREATMENT TECHNOLOGIES

COLUMN PACKINGS & INTERNALS

HIGH PERFORMANCE GLYCOL DEHYDRATION



KIRK PROCESS SOLUTIONS

www.kirkprocess.com

3 DECADES OF EXPERIENCE DESIGNING TEG GAS DEHYDRATION SYSTEMS

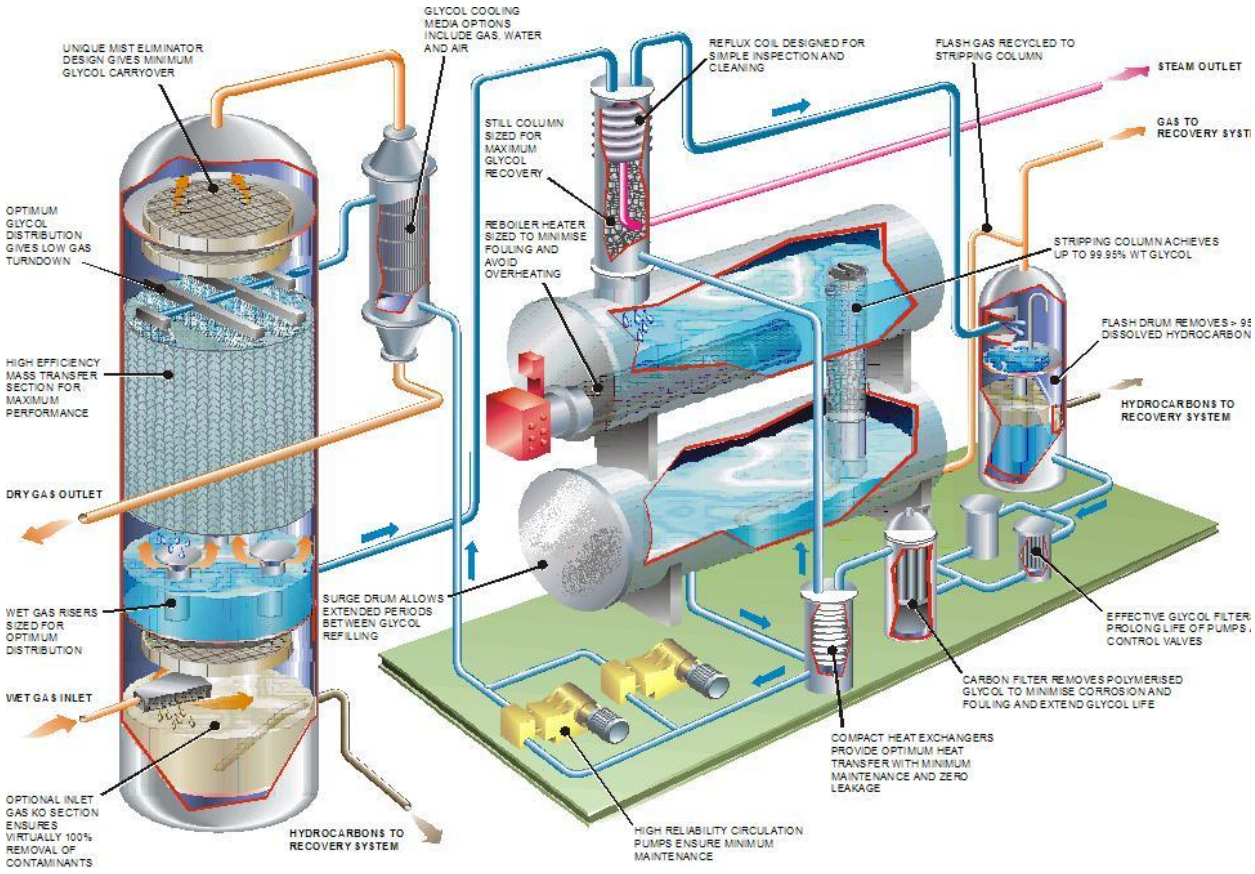
BRINGING TOGETHER THE EXPERIENCE AND EXPERTISE OF TWO LEADING INDUSTRY NAMES

KIRK Process Solutions has now acquired the experience and expertise available through the merger of its technologies with KCC Process Equipment Limited. KCC has a track record dating back 30 years and was a leading international supplier of TEG Gas Dehydration Plants.

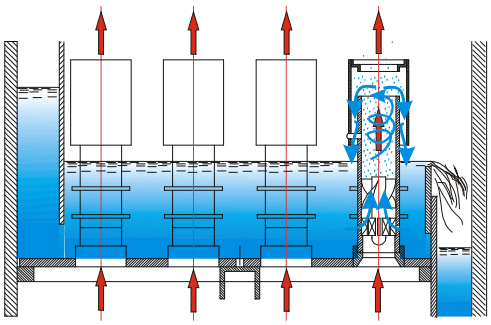
Our products are marketed under the brand names K-PAC and K-SEP.

KIRK PROCESS SOLUTIONS

KCC PROCESS EQUIPMENT



TECHNOLOGY FOR NATURAL GAS & GLYCOL MASS TRANSFER AND SEPARATION



For new or retrofit installations, our comprehensive range of trays, packings, distributors and mist eliminators is used widely within TEG gas dehydration absorber and regenerator columns.

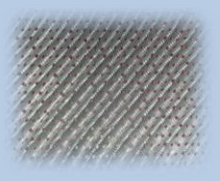
K-PAC™

Structured Packing
Random Packing
Standard Trays
High Performance Trays
Liquid Distributors

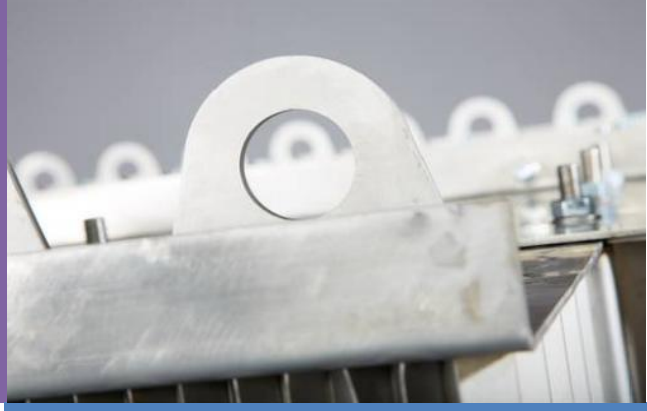
K-SEP™

Gas Distributors
Mist Eliminators
Coalescers

Comparison of absorber column size required to dehydrate 10 MM Nm^3/d (373 MMSCFD) of Natural Gas at 30°C and 60 Bar using 7500 kg/h of 99.0% wt TEG

Style	KBC Bubble Cap Trays	KSP Type 250 Structured Packing	KSP Type 250+ High-Capacity Structured Packing	Highspeed™ Swirltube Mass Transfer Trays
Description	 *Traditional bubble cap trays are designed with a Capacity Factor of 1.0*	 *Standard 250 m^2/m^3 structured packing achieves a Capacity Factor of approx 1.8*	 *New high capacity (profiled) structured packing can achieve a Capacity Factor of 2.2*	 *Highspeed™ high performance swirl tube trays with a Capacity Factor up to 4.0*
Column Area	8.0 m^2	4.5 m^2	3.6 m^2	**2.0 m^2**
Column ID	3200 mm	2400 mm	2150 mm	**1600 mm**
Mass Transfer Height	6000 mm	4600 mm	4600 mm	**3500 mm**
Column Wall thk @ 70 barg	87 mm	66 mm	60 mm	**45 mm**
Column Mass (ASME 8 Div 1)	96,500 kg	46,500 kg	37,750 kg	**18,000 kg**

RIGOROUS DESIGNS OFFER IMPROVED RELIABILITY AND LOWER CAPEX AND OPEX



The Challenge
Water vapour present in natural gas streams has many adverse effects potentially causing slug formation, hydrate formation and corrosion in pipelines and downstream equipment. Triethylene glycol dehydration (TEG) units are the system most commonly employed to remove water, which, at low temperatures, can freeze in piping or form hydrates with CO_2 and hydrocarbons. Depending on the composition, these hydrates can form at relatively high temperatures, plugging equipment and piping.

The Solution
Lean glycol (typically 99.0 to 99.9% wt) is fed to the top of an absorber (glycol contactor), inside which it mixes with and dehydrates the wet natural gas stream. The glycol removes water from the gas by physical absorption. This process is carried out on trays or structured packing providing suitable surface area within the column. Wet glycol leaving the contactor at the base is called rich glycol. The dry natural gas leaves the top of the contactor column via a mist eliminator (usually wire mesh type or axial cyclone) and passes to the dry gas product pipeline.

After leaving the contactor, the rich glycol is routed to a regeneration system for purification. It is preheated in a reflux condenser at the top of the still column of the reboiler and the lean/rich heat exchanger. After that, the rich glycol enters a flash vessel for a three-phase separation of gas, glycol and condensate. Since the glycol may contain impurities due to glycol degradation, corrosion or scaling, filters are required before the rich glycol is distilled. This distillation system consists of a still column, a reflux condenser and a reboiler. The glycol is boiled to remove excess water and regain a glycol purity around 99.0% wt. An additional stage of stripping is often used after the reboiler in a separate stripping column to boost the TEG concentration up to 99.8% or more. Dry gas is used as the stripping medium.
The hot lean glycol is cooled using a heat exchanger with rich glycol entering the regenerator. It is then fed into a pump where its pressure is elevated to that of the glycol contactor. The lean TEG is cooled again with a cooler before being fed back into the contactor.

TYPICAL INTERNALS

- ✓ Inlet gas and liquid distributors
- ✓ High efficiency mist eliminators
- ✓ Chimney trays
- ✓ Bubble cap trays
- ✓ Structured packing
- ✓ High performance Trays
- ✓ Random packing
- ✓ Offshore and FPSO

KEY BENEFITS

- Low TEG carryover losses
- Eliminate foaming risk
- Glycol purity to 99.95% weight
- 0-100% Turndown
- Liquid load down to 1 m^3/m^2 h
- Compact or high capacity designs available for retrofits

Technical leaflets are available for all our products.

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