

ULTRA-FRAC[®] Technology

"The Tray that goes where no other tray can!"

ULTRA-FRAC[®]



Conventional Trays

Refinery Gas Plants

NGL Processing Plants

Fractionation Units with
High Capacity Demands

Gas Plants

High Pressure Distillations

High and Low Liquid
Rate Services

K KOCH-GLITSCH[®]

Expand your Capacity--Not your Vessel

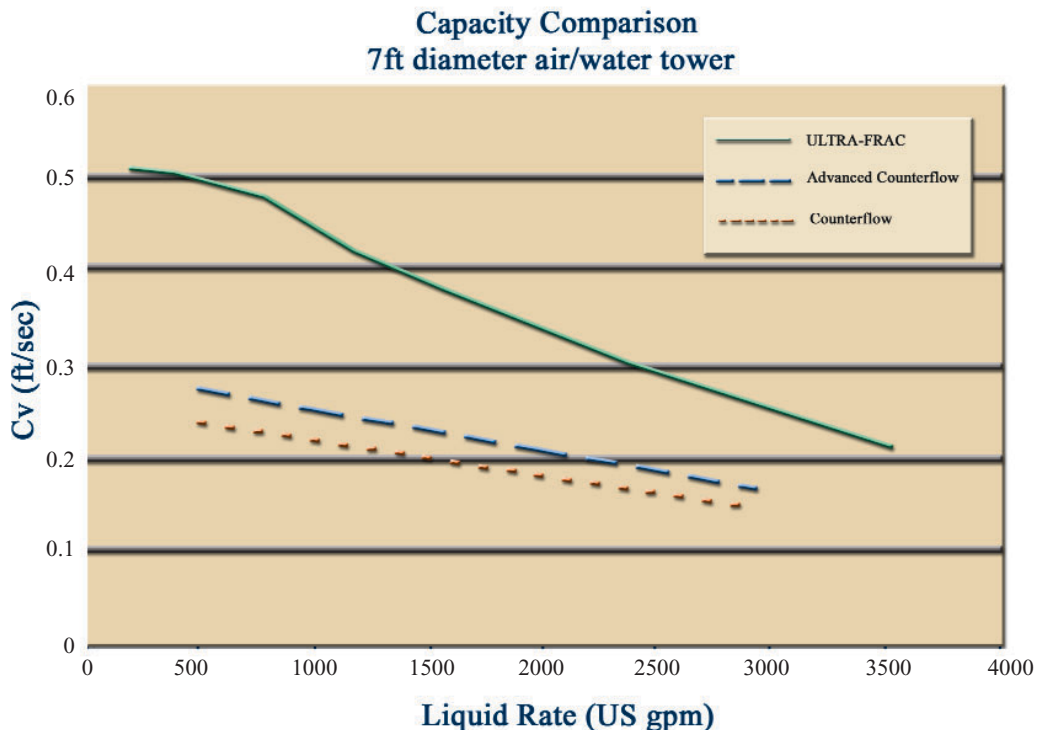
Capacity Data

Before the introduction of ULTRA-FRAC® trays, appreciable capacity increases in light hydrocarbon services could be achieved only through new column construction. With ULTRA-FRAC trays, existing columns can be retrofitted, resulting in significant capacity increases without the major capital expenditures and space requirements of building new columns.

ULTRA-FRAC trays are the ultimate trays, outperforming all other trays -- not only those in the KGI arsenal -- but also all other crossflow and counter flow trays. One-for-one change-outs of existing trays are possible for many services. ULTRA-FRAC trays are the next logical step on the stairway to increased capacity in existing vessels.

WHY ARE ULTRA-FRAC TRAYS BETTER?

- Superior Liquid Handling
The unique operating principle of ULTRA-FRAC trays provides phenomenal capacity advantages above all other trays as illustrated in the graph below.
- Superior Vapor Handling
ULTRA-FRAC trays function as a deentrainer. Significantly higher vapor rates can be achieved without degrading efficiency. In fact, up to two times the vapor rate at a given liquid rate.
- Foam Suppression
Recent laboratory results demonstrated that, at low to medium liquid rates, ULTRA-FRAC trays exhibit foam-suppression abilities.



Call Koch-Glitsch. ULTRA-FRAC® trays can save your vessel!

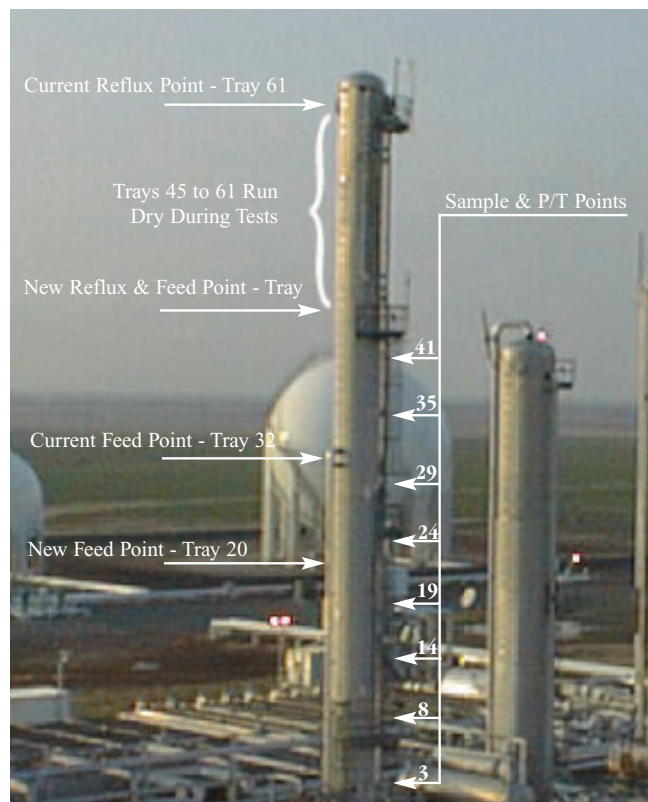
In Search of the Holy Grail

Efficiency Data

Operating data is critical for validation of the capacity and efficiency of new products. Koch Hydrocarbon Company owns and operates a large natural-gas-liquids plant at Medford, Oklahoma. The 5-ft diameter Depropanizer tower was revamped in 1992 with ULTRA-FRAC® trays. This tower has recently been upgraded to a **Test and Demonstration** unit with Research capabilities.

The Depropanizer is capable of running in both production and R&D modes. The tower is equipped with new feed and reflux nozzles, ΔP cells, temperature RTDs and sample collection nozzles for precise matching of simulation results with operating data. Highly accurate Micro Motion mass flow meters on each of the feed, distillate, bottoms and hot oil streams, allow the heat and material balance closures that are so necessary for accurate tray and packing efficiency calculations. Additionally, these same meters facilitate the precise determination of flood points.

The empirical O’Connell correlation can be used to predict overall column efficiencies (Eoc)



for ULTRA-FRAC trays. With this **Test and Demonstration** unit, we can confidently predict ULTRA-FRAC tray efficiencies.

$$E_{oc} = 0.492(\alpha\mu_L)^{-0.245}$$

Service	Relative Volatility	Liquid Viscosity, cp	Predicted Efficiency, %	Field Observed Efficiency, %
Demethanizer	4.03	0.040	77	
Deethanizer	2.33	0.054	82	85
Depropanizer	2.14	0.066	79	78-82
Debutanizer	2.23	0.113	69	75-85
Deisobutanizer	1.42	0.110	78	
C2 Splitter	1.39	0.057	91	
C3 Splitter	1.14	0.077	89	

Warning: Cocurrent flow tray design requires expertise and experience. Trust no other large or small distillation equipment vendor.

ULTRA-FRAC® High Capacity Trays Increase Tower Handling Capacity by More Than 50%

Case Study

An 8 / 11.5-foot diameter deethanizer was revamped with ULTRA-FRAC high capacity trays to debottleneck a fractionation train in an NGL plant and to reduce the butane losses in the overhead ethane/propane (E/P) product. The proposed feed rate increase and processing changes threatened to push the existing trays beyond their hydraulic limit. Installation of ULTRA-FRAC trays provided the capability to

handle the internal liquid and vapor traffic in the column. The butane content of the E/P product was significantly lowered. ULTRA-FRAC trays also provided additional capacity to further increase the feed rate to the deethanizer. As a result, the deethanizer is no longer the constraint in the fractionation train and the NGL plant has set new production records.

	Prior to Revamp	Post Revamp
Diameter, ft	8.0 / 11.5	8.0 / 11.5
Tray Type	Valve	ULTRA-FRAC
Tray Spacing, inch	24	24
Column OVHD Pressure, psig	415	466
% Tray Efficiency	95	85
Butane in E/P Product, mol %	0.4	0.02
R/D	1.2	2.0
Feed Rate, %	100	135
Internal Traffic, %	100	>150

KOCH-GLITSCH

P.O. Box 8127
WICHITA, KS 67208-0127
4111 E. 37th Street North
WICHITA, KS 67220
TEL (316) 828-5110
FAX (316) 828-5263

Koch-Glitsch Italia S.r.l.
Via Tonale 50,
Casella Postale 13
24061 Albano S. Alessandro
BERGAMO, ITALY
TEL 011-39-035-328611
FAX 011-39-035-328600

Koch-Glitsch Japan Corp.
7th Floor, KSS Gotanda Bldg. 21-8
Nishi-Gotanda 1- chome
Shinagawa-ku,
TOKYO 141-8538, JAPAN
TEL 011- 81-3-5435-8560 & 8580
FAX 011- 81-3-3491-3523

For a complete listing of Koch-Glitsch offices,
visit us on the internet: www.koch-glitsch.com

For emergencies: **1-888-KOCH-911**

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