

Low Profile Rings  
Product Bulletin 800



Superior Performance by Design™  
Raschig GmbH - Raschig USA Inc.



## TABLE OF CONTENTS

Raschig USA Inc.	2
Features & Benefits	3
Physical Properties of Raschig Low Profile Rings	4
Column Packing Comparison	5
Pressure Drop vs. C-factor	6-8
Mass Transfer Efficiency vs. Liquid Rate	9-11
Raschig Column Internals	12



## Raschig USA – June 2013

In order to establish a new alliance in mass transfer business RASCHIG GmbH and its parent company PMC GLOBAL INC have integrated Raschig USA Inc (formerly known as Raschig Jaeger Technologies) as a wholly owned subsidiary as a major manufacturer of tower packings, column internals, and specialty trays that is very active in the Mass Transfer and Environmental Business. (PMC Group purchased Raschig GmbH and Jaeger Products, Inc. in 2006 and formed Raschig Jaeger Technologies, Inc.)

Raschig USA is part of the PMC network of highly specialized, internationally operating companies and thus prepared to meet increased globalization and further improved customer orientation. Wherever in the world – on all continents – Raschig USA is on the spot.

## Synergies

This strategic move combining Raschig GmbH and Raschig USA into one larger group gives a great advantage to our customers giving them worldwide access to products and technology of both entities. It will create new dimensions in mass transfer technology. The advantages of our process engineering know-how and our technologies benefit even more the planning, modernization, and construction of our clients' processes. Increasing capacity while not jeopardizing efficiency saves energy, investment and operating cost.

The new alliance offers a diverse array of products to meet the mass transfer needs of the industries. While specializing in high performance products, the comprehensive products line of Raschig USA also includes traditional fractional trays as well as structured and random packing types that best fit your application.

## Leading In-house Distributor Test Facility

The company operates one of the largest in-house distributor test-facilities worldwide. Liquid distributors can be tested up to 12 m in diameter at a maximum liquid load of 2,400m<sup>3</sup>/hour.

All products of Raschig USA are the result of consistent development and decades of experience. Comprehensive quality management in all stages of production and the principle of offering complete solutions are the basis of our excellent reputation – worldwide.





## Raschig Low Profile Rings

### Features

- Low Profile Rings (LPR) have an aspect ratio (height/diameter) of only 0.3
- Low pressure drop
- Corrosion resistance
- Unique geometry, which maximizes turbulent mixing between phases, while allowing free gas flow through the packed bed.

### Benefits

When randomly installed, the bed forms an integral reticulated structure with excellent resistance to deformation to allow higher bed heights than other types of packing.

- The low aspect ratio offers opportunity for efficient gas and liquid contact and increased performance.
- Low Profile Rings (LPR) have no protruding edges or appurtenances which minimizes the chance for nesting and offers more uniform liquid distribution.
- With low packing factors, Low Profile Rings (LPR) allow increased hydraulic capacity while maintaining a low pressure drop



### Specifications

**Materials:** Seventeen standard, injection moldable plastics are available:

- Polypropylene (PP)      TopEx® (LCP)
- Polyethylene (PE)      Kynar® (PVDF)
- Polypropylene          Halar® (ECTFE)
- Glass-Filled (PPG)      Teflon® (PFA)
- Noryl® (PPO)          Tefzel® (ETFE)
- Polyvinylchloride (PVC) Tefzel® Glass- Filled (ETFE-G)
- Corzan™ (CPVC)      Teflon® (PTFE)
- Polyphenylene sulfide (PPS) Ryton®
- Perfluoroalkoxy (PFA)

Other plastics are available on request.

**Sizes:** Plastic Low Profile Ring Packings are made in three sizes:

- No. 1A                      1" Nominal
- No. 2A                      2" Nominal
- No. 3A                      3 1/2" Nominal

Values are based on specific surface area >43 ft<sup>2</sup>/ft<sup>3</sup>. Wetting problems are observed most frequently with plastic packings, but generally become acute only at <2 gpm/ft<sup>2</sup>. When operating below this value, as in vacuum distillation, new packings should be chosen which have better wetting characteristics than those replaced. Be certain to take capacity changes into account. If materials with poorer wetting properties must be specified, the bed height may have to be increased or a smaller size (more efficient) packing used.

**IMPORTANT NOTE:**

Design data presented in this bulletin are for preliminary calculations only. Contact Raschig before finalizing calculations.

### Properties Table

Type	1A	2A	3A
Size	1"	2"	3-1/2"
Geometric Surface Area* (ft <sup>2</sup> /ft <sup>3</sup> )	85	50	40
Packing Factor (1/ft)	26	16	12
Void Space (%)	92	93	94
Weight (lb/ft <sup>3</sup> )	4	3.5	3.2

### Reasonable Minimum Wetting Rates

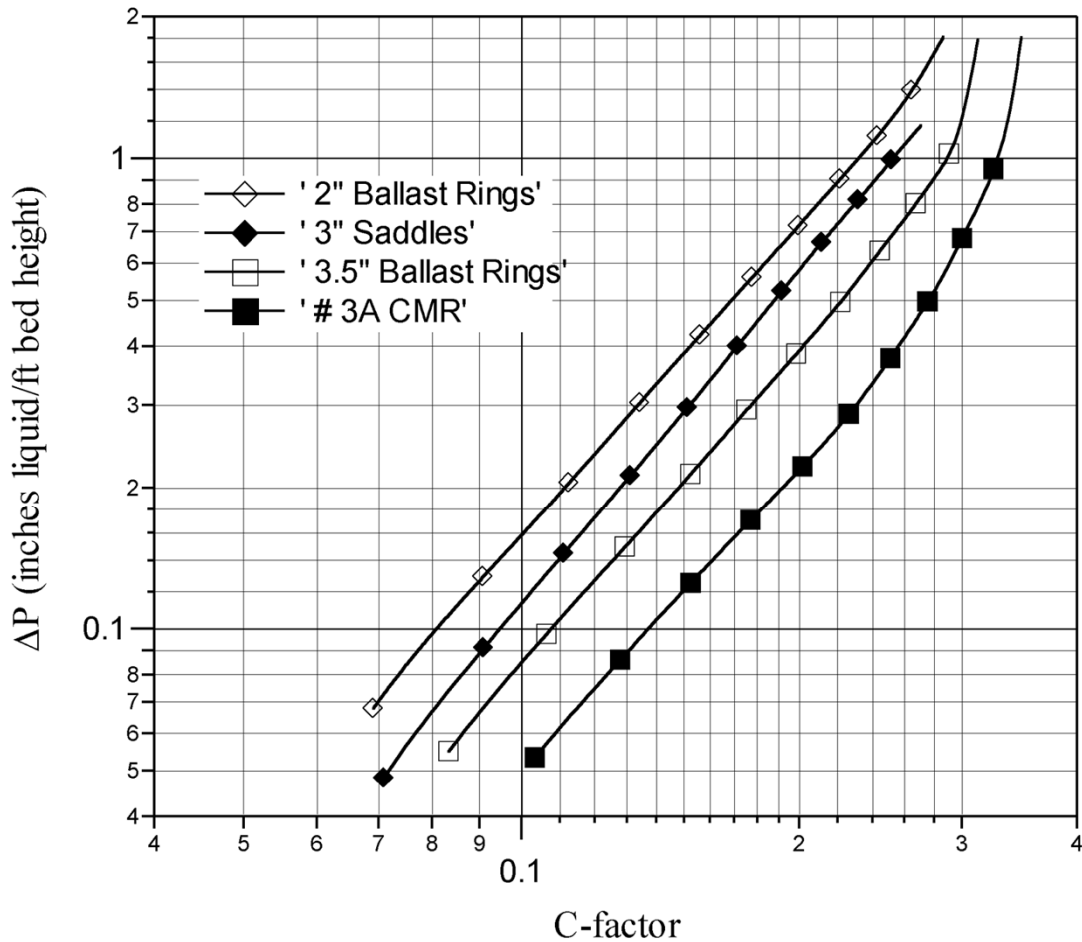
Surface	gpm/ft <sup>2</sup>
PVC/CPVC	1.5
polypropylene	1.6
fluoropolymers	2.0



# Column Packing Comparison

## 1A Plastic Low Profile Rings

Pressure Drop vs. C-factor



$$C\text{-factor} = V_s [(\rho_V) / (\rho_L - \rho_V)]^{1/2}$$

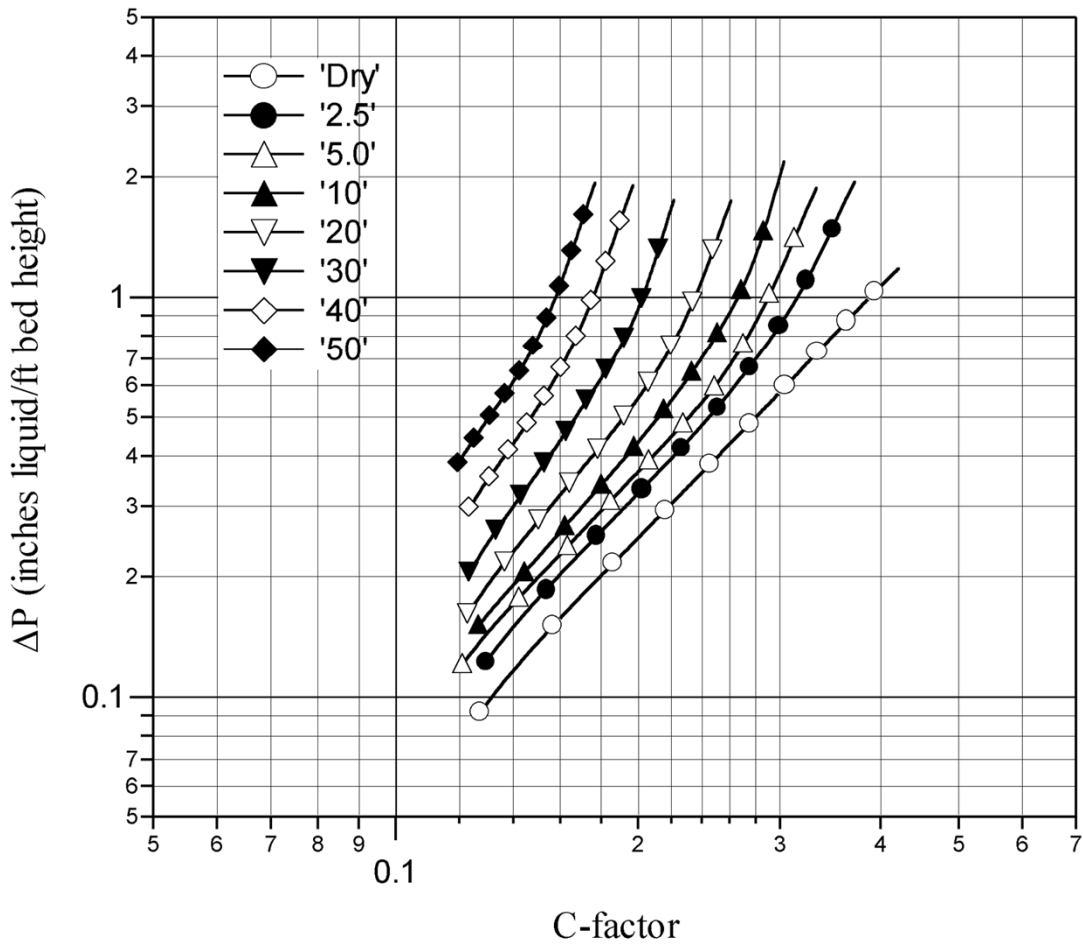
where  
 $V_s$  = Superficial vapor velocity in ft/sec  
 $\rho_L$  and  $\rho_V$  = Density of Liquid and Vapor in lb/cu. ft



# Pressure Drop vs. C-factor

## 1A Plastic Low Profile Rings

Ambient Air-Water Systems for Various Liquid Loadings (gpm/sq. ft)



$$C\text{-factor} = V_s [(\rho_V) / (\rho_L - \rho_V)]^{1/2} \text{ where}$$

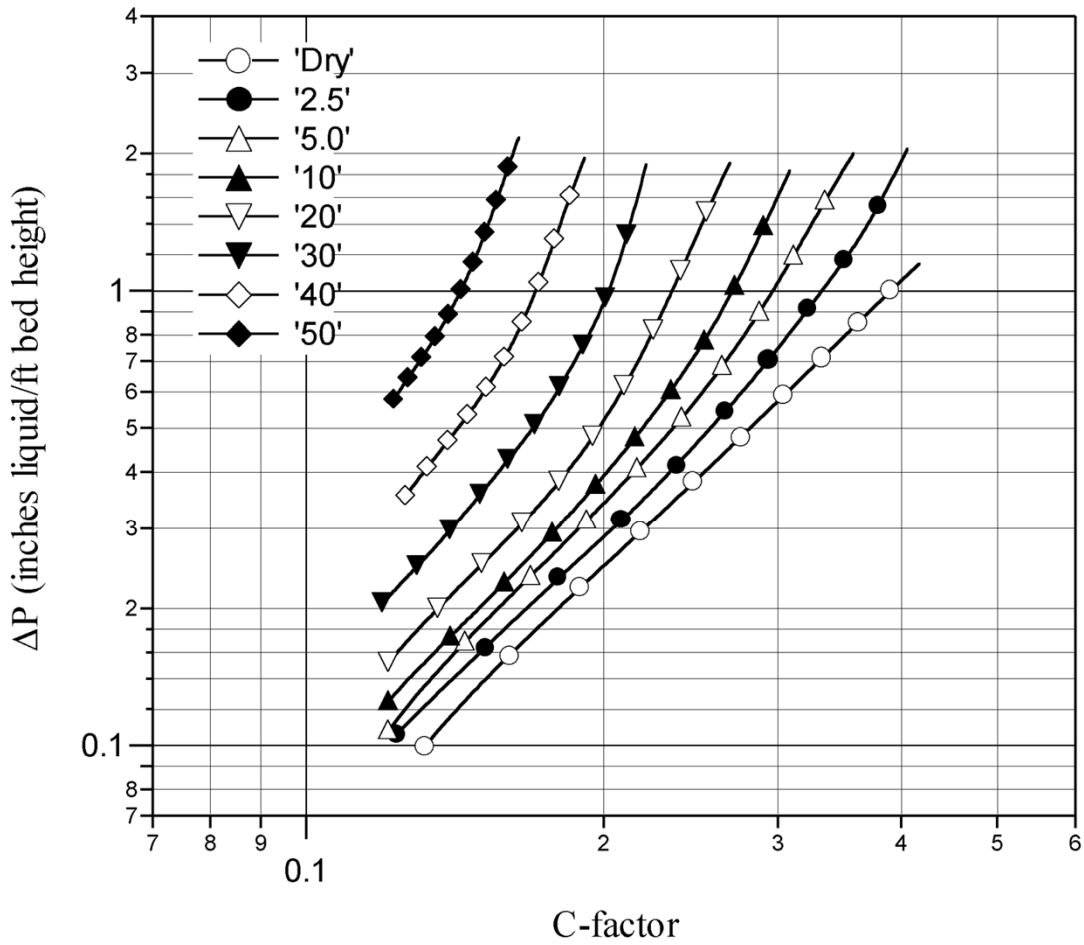
$V_s$  = Superficial vapor velocity in ft/sec  
 $\rho_L$  and  $\rho_V$  = Density of Liquid and Vapor in lb/cu. ft



# Pressure Drop vs. C-factor

## 2A Plastic Low Profile Rings

Ambient Air-Water Systems for Various Liquid Loading (gpm/sq. ft.)



$$C\text{-factor} = V_s [(\rho_V)/(\rho_L - \rho_V)]^{1/2} \text{ where}$$

$V_s$  = Superficial vapor velocity in ft/sec  
 $\rho_L$  and  $\rho_V$  = Density of Liquid and Vapor in lb/cu. ft

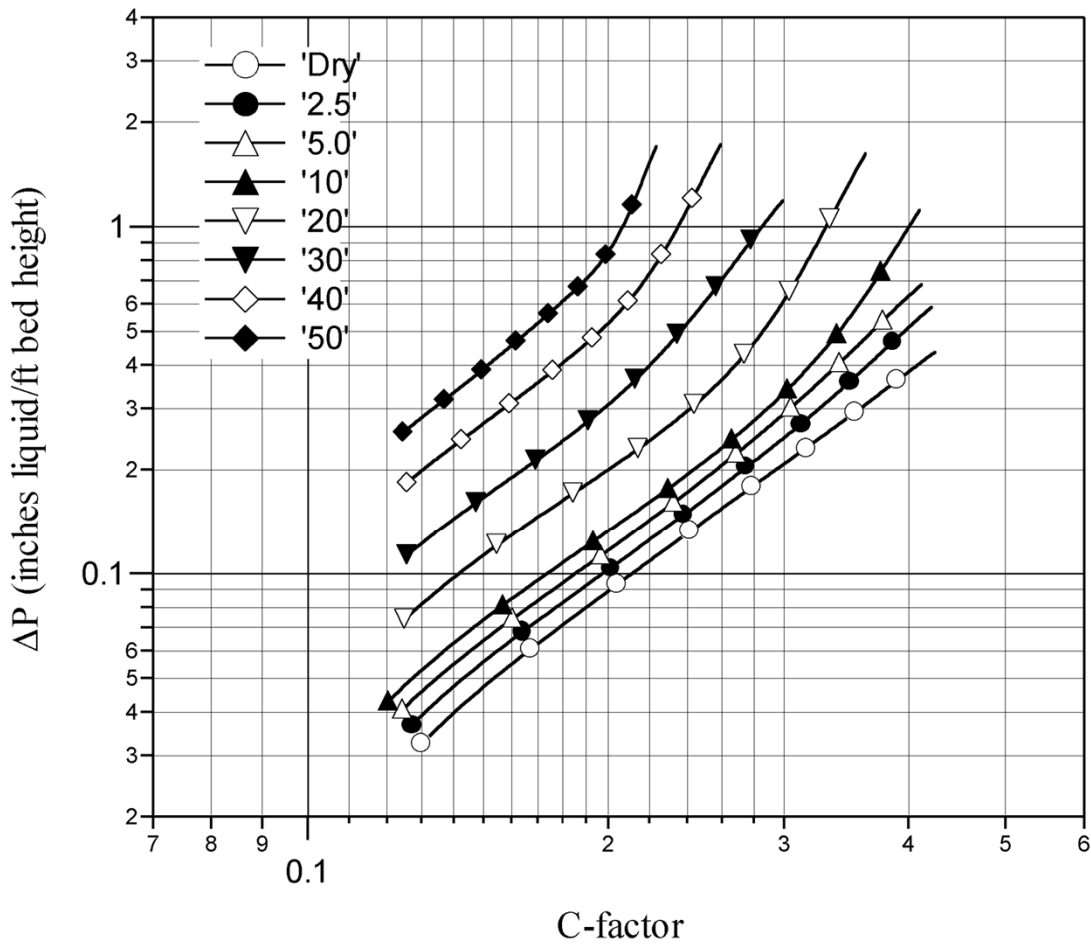




# Pressure Drop vs. C-factor

## 3A Plastic Low Profile Rings

Ambient Air-Water Systems for Various Liquid Loading (gpm/sq. ft.)



$$C\text{-factor} = V_s [(\rho_V) / (\rho_L - \rho_V)]^{1/2} \text{ where}$$

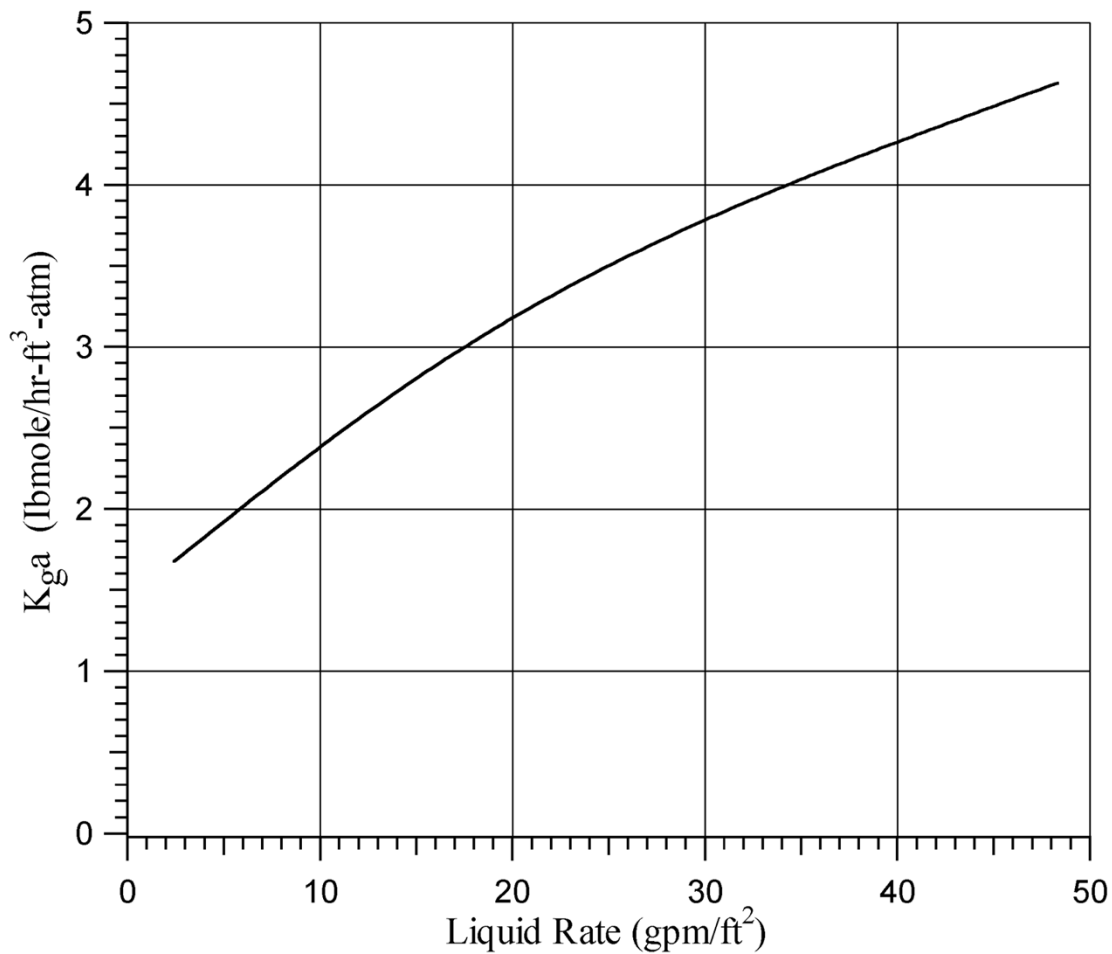
$V_s$  = Superficial vapor velocity in ft/sec

$\rho_L$  and  $\rho_V$  = Density of Liquid and Vapor in lb/cu. ft



# Mass Transfer Efficiency vs. Liquid Rate

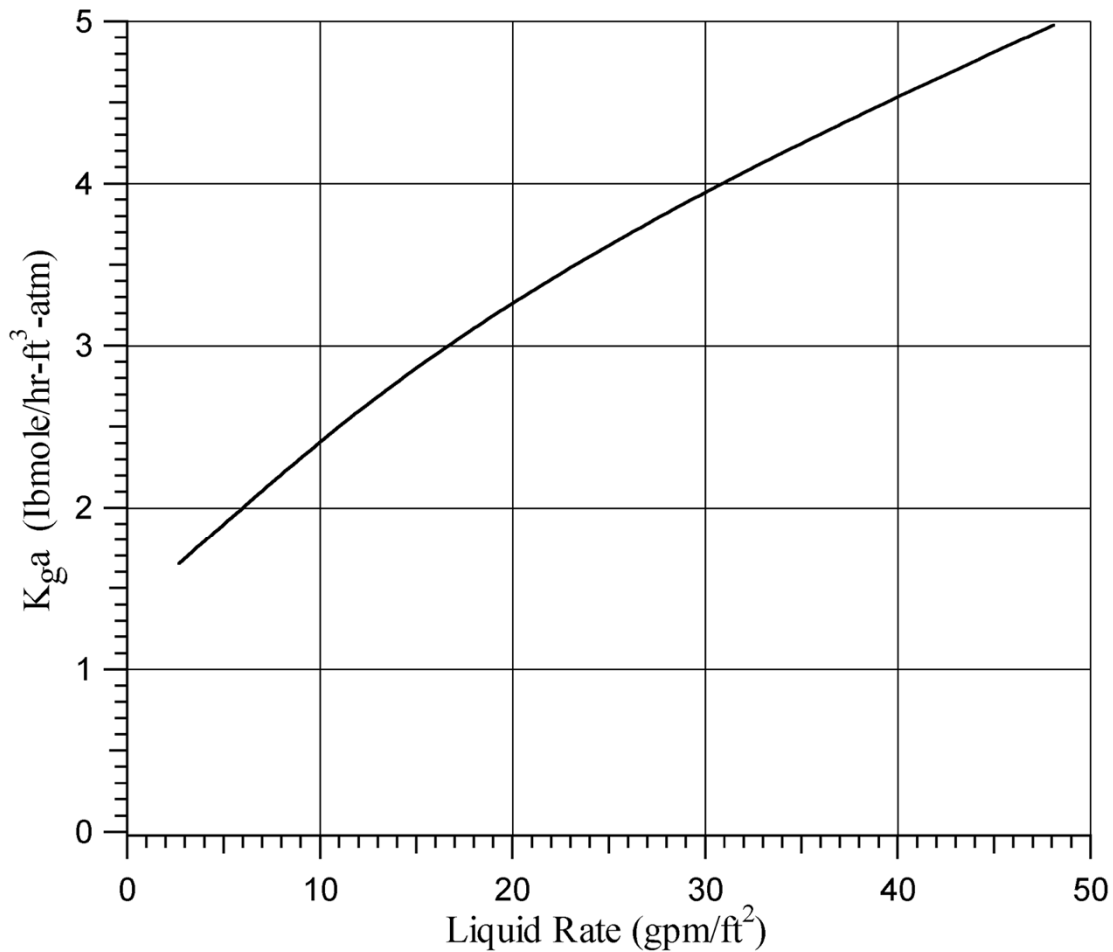
## 1A Plastic Low Profile Rings



1%  $\text{CO}_2$  in 4% aqueous NaOH system  
 $K_{ga}$  normalized to 25% conversion at 75°F  
with C-Factor = 0.12

# Mass Transfer Efficiency vs. Liquid Rate

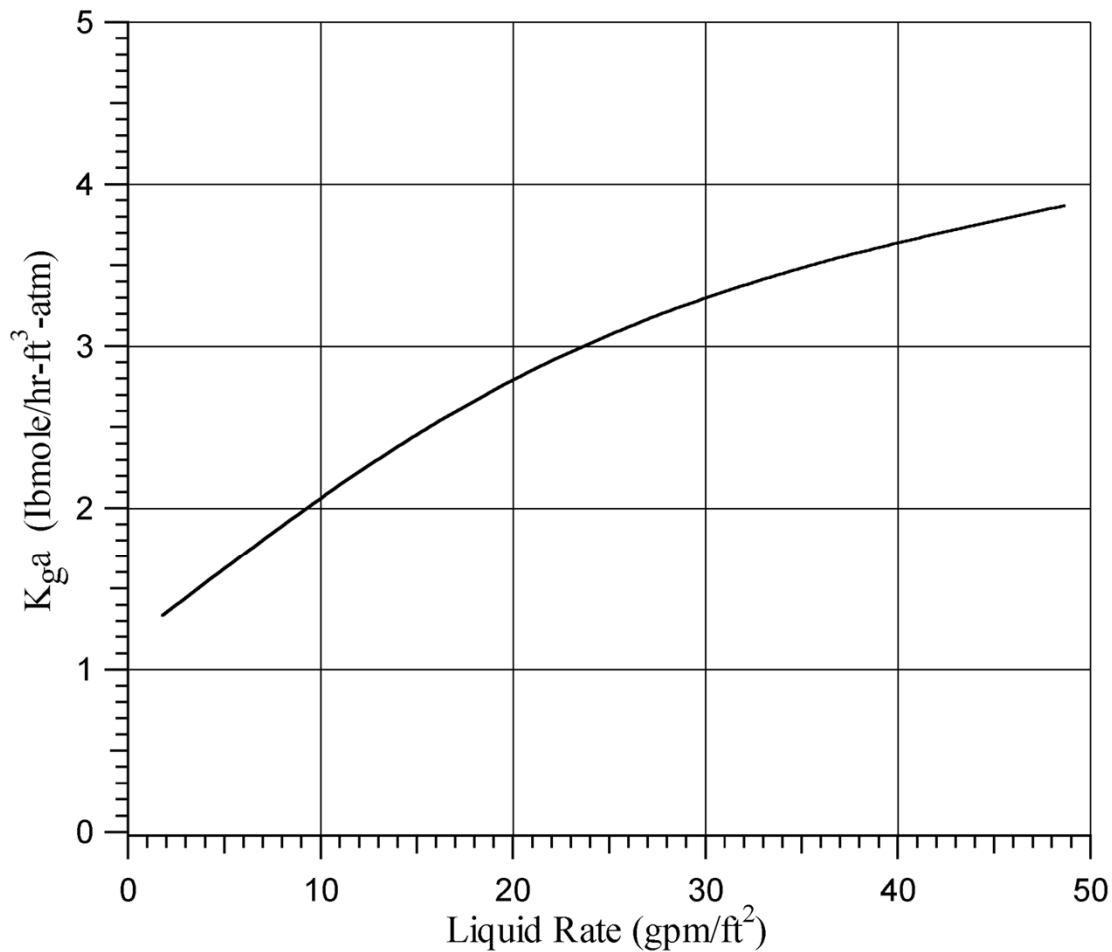
## 2A Plastic Low Profile Rings



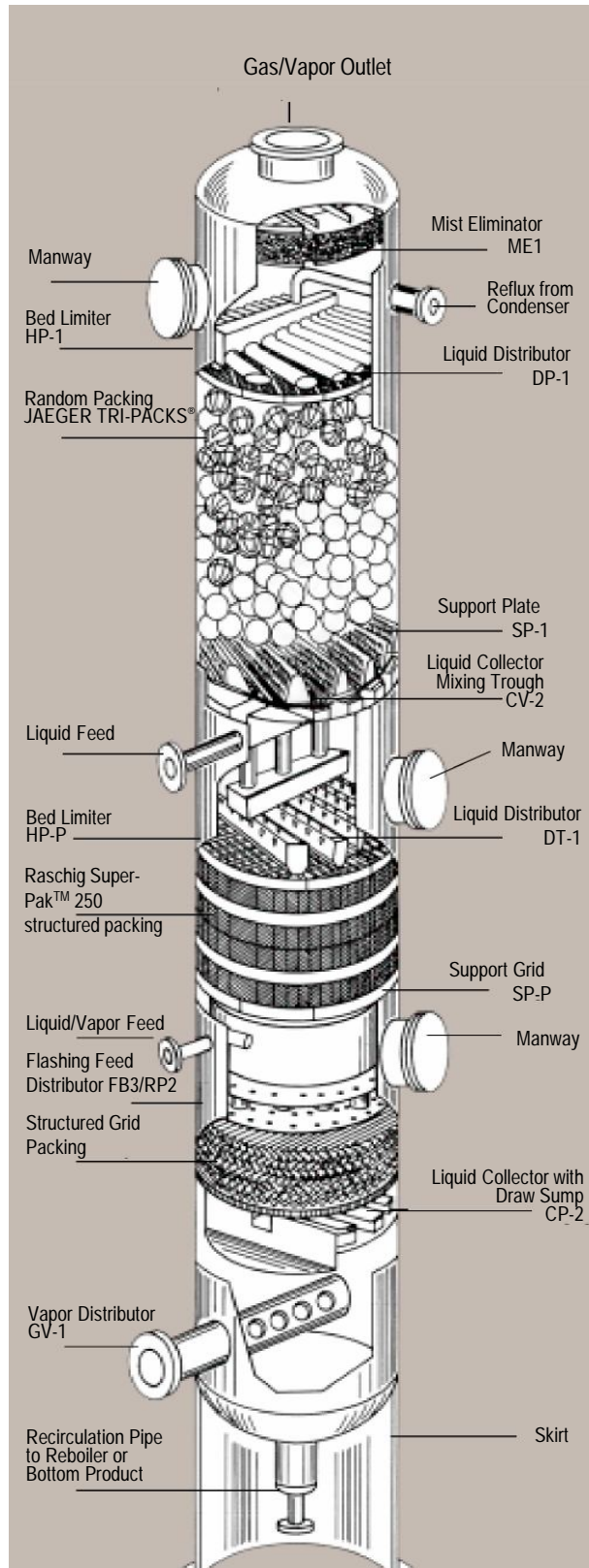
1% CO<sub>2</sub> in 4% aqueous NaOH system  
 $K_{ga}$  normalized to 25% conversion at 75°F  
with C-Factor = 0.12

# Mass Transfer Efficiency vs. Liquid Rate

## 3A Plastic Low Profile Rings



1% CO<sub>2</sub> in 4% aqueous NaOH system  
K<sub>ga</sub> normalized to 25% conversion at 75°F  
with C-Factor = 0.12



100 General Product Information

200 Metal Random - RSR

300 Mist Eliminators – Wire Mesh

400 Fractionation Trays and Hardware

450 High Capacity – Nye Trays

475 High Capacity – CoFlo Trays

500 Metal Structured Packing – RSR

501 Metal Structured Packing – Super-Pak

550 Plastic Structured Packing – RSP

600 Plastic Random – Raschig Tri-Pack/Hacketten

625 Plastic Random – RSR

650 Plastic Random – LPR

675 Plastic Random – Nor Pak

700 Plastic Random – Rings and Saddles

800 Ceramic Random Packing

900 Winsorp Software

1000 Process Information

1100 Column Internals

1200 Reactor Internals

### Locations / Production Sites

Ludwigshafen and Espenhain, Germany  
Arlington, Texas  
El Dorado, Kansas  
Monterrey, Mexico

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### Legal Notice

The information contained in this bulletin is believed to be accurate and reliable, but is not to be construed as implying any warranty or guarantee of performance.

