Plastic Random – LPR
Product Bulletin 650

Superior performance by design™
Raschig GmbH - Jaeger Products, Inc
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Raschig Jaeger Technologies – September 2006

In order to establish a new alliance in mass transfer business RASCHIG GmbH and its parent company PMC GLOBAL INC have acquired JAEGGER PRODUCTS INC., a Houston Texas based company, which is a major manufacturer of tower packings, column internals and speciality trays and very active in the Mass Transfer and Environmental Business.

RASCHIG JAEGER will be integrated into the PMC network of highly specialized, internationally operating companies and will therefore be better prepared to meet increased globalization and further improved customer orientation. Wherever in the world – in all continents – RASCHIG JAEGER is on the spot.

Synergies

This strategic acquisition combining RASCHIG and JAEGER into one larger group gives a great advantage to our customers giving them access to products of both entities in Europe, The Americas and in other parts of the world. 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. And: saving energy and investment cost is part of it.

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 JAEGER also includes traditional fractional trays as well as structured and random packing types that best fit the 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 12m in diameter at a maximum liquid load of 2400m3 per hour.

All products of RASCHIG JAEGER are the result of consistent development work long years 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.
Jaeger Low Profile Rings

**Features**

- Low Profile Rings (LRP) have an aspect ratio (height/diameter) of only 0.3
- Low pressure drop
- Corrosion resistant
- 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 (LRP) 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 (LRP) allow increased hydraulic capacity while maintaining a low pressure drop
Specifications

Materials. Thirteen standard, injection moldable plastics are available:
- Polypropylene - LTHA CPVC
- Polypropylene - (PP) PVC
- Polyethylene (PE) Kynar® (PVDF)
- Polypropylene - Halar® (ECTFE)
- Glass-Filled Tefzel® (ETFE)
- Noryl® (PPO)
- Ryton®
- Tefzel® Glass
- Teflon® (PFA)

Other plastics are available on request.

Sizes. Plastic Low Profile Rings 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 sq. ft./cu. ft. Wetting problems are observed most frequently with plastic packings, but generally become acute only at <2 gpm/sq. ft. 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 Jaeger before finalizing calculations.

Properties Table

<table>
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<tr>
<th>Type</th>
<th>Size</th>
<th>1A</th>
<th>2A</th>
<th>3A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometric Surface Area* (ft²/ft³)</td>
<td>85</td>
<td>50</td>
<td>40</td>
<td></td>
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<tr>
<td>Packing Factor (1/ft)</td>
<td>26</td>
<td>16</td>
<td>12</td>
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<tr>
<td>Void Space (%)</td>
<td>92</td>
<td>93</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>Weight (lb/ft³)</td>
<td>4</td>
<td>3.5</td>
<td>3.2</td>
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Reasonable Minimum Wetting Rates

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<th>Surface</th>
<th>gpm/sq.ft.</th>
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<tbody>
<tr>
<td>PVC/CPVC</td>
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</tr>
<tr>
<td>polypropylene</td>
<td>1.6</td>
</tr>
<tr>
<td>fluoropolymers</td>
<td>2.0</td>
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</tbody>
</table>
Column Packing Comparison
1A Jaeger Plastic Jaeger Low Profile Rings

Pressure Drop vs. C-factor

\[ C \text{-factor} = V_s\left(\frac{\rho_v}{\rho_L} - \frac{\rho_v}{\rho_L}\right)^{\frac{1}{2}} \]

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 Jaeger Low Profile Rings

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

\[
\Delta P \text{ (inches liquid/ft bed height)}
\]

\[
\text{C-factor}
\]

\[
C\text{-factor} = V_s \left[ \left( \frac{\rho_v}{\rho_L - \rho_v} \right) \right]^{1/2}
\]

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
2A Plastic Jaeger Low Profile Rings

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

\[ \Delta P \text{ (inches liquid/ft bed height)} \]

\[ - \]

\[ \text{C-factor} = V_s \left[ \frac{\rho_v}{(\rho_L - \rho_v)} \right]^{1/2} \text{ where} \]

- \( V_s \) = 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 Jaeger Low Profile Rings

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

ΔP (inches liquid/ft height)

C-factor

\[ C\text{-factor} = V_s[(ρ_V)/(ρ_L - ρ_V)]^{1/2} \] where

\[ V_s = \text{Superficial vapor velocity in ft/sec} \]

\[ ρ_L \text{ and } ρ_V = \text{Density of Liquid and Vapor in lb/cu. ft} \]
Mass Transfer Efficiency vs. Liquid Rate

1A Plastic Jaeger Low Profile Rings

$K_{ga}$ (Ibmole/hr-ft$^3$-atm)

Liquid Rate (gpm/ft$^2$)

1% 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 Jaeger Low Profile Rings

![Graph showing Mass Transfer Efficiency vs. Liquid Rate](image)

$K_{ga}$ (lb mole/hr-ft²-atm)

Liquid Rate (gpm/ft²)

1% CO₂ 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 Jaeger Low Profile Rings

1% CO$_2$ in 4% aqueous NaOH system
$K_{ga}$ normalized to 25% conversion at 75°C
with C-Factor = 0.12
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<th>General Product Information</th>
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<td>200</td>
<td>Metal Random - RSR</td>
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<tr>
<td>300</td>
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<td>Fractionation Trays and Hardware</td>
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<td>Reactor Internals</td>
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Locations / Production Sites

Ludwigshafen and Espenhain, Germany

Houston, Texas
El Dorado, Kansas
And Monterrey, Mexico.

Furthermore we co-operate with reliable partners all over the world

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