

Components for mass transfer applications

Customized and efficient solutions

engineering for a better world

GEA Heat Exchangers



GEA 2H Water Technologies

One source for consulting, engineering and manufacturing

GEA Group Aktiengesellschaft is one of the largest system providers for food and energy processes. As an internationally operating technology group, the company focuses on process technology and components for demanding production processes in various end markets. The group generates about 70 percent of its revenue from the long-term growing food and energy industries. The GEA Group Aktiengesellschaft is currently present in more than 50 countries worldwide, and is active in all growth regions.

The GEA Group provides GEA 2H Water Technologies with a solid foundation and, through partnership with other Group members, allows a greater scope of supply. These close relationships with organisations that are themselves leaders in their fields provide GEA 2H Water Technologies with inspiration to stimulate its own development and maintain its market leading technology.

GEA 2H Water Technologies is part of the GEA Heat Exchangers segment of the GEA Group and specialises in plastic packings for water and effluent treatment, cooling towers and mass transfer.

GEA 2H MASSdek packings
Effective and economical

GEA 2H Water Technologies is one of the leading manufacturers of structured PP and PVC packings for mass transfer, cooling tower construction and water treatment. In order to meet the special demands involved in mass transfer applications GEA 2H Water Technologies has developed its MASSdek packings.

For the last 100 years components with defined and optimised contact surfaces have been used in thermal process engineering, and structured packings represent the most current state of the art. They are indispensable in distillation and have almost completely replaced random packings in special applications. This process has only just begun to be used in the exhaust air treatment sector.



Experience gathered from other fields of application has convinced GEA 2H Water Technologies that the inherent advantages of structured packings can also be exploited for thermal and chemical separation process engineering. This is why GEA 2H Water Technologies has developed the MASSdek packings.

Experiments have shown that structured packings can achieve better results compared with normal random packings and offer improved economy. Even the costs of retrofitting from random packings to structured packings can be amortised within only a short time.

Packings + Installations + Engineering = Complete offer

Your plant should provide a top level of performance. This is why we offer you ancillary equipment alongside the MASSdek packings, such as support grids, liquid distributors and droplet separators. All elements are harmonised, thus enabling the desired results to be achieved.

Advice and engineering

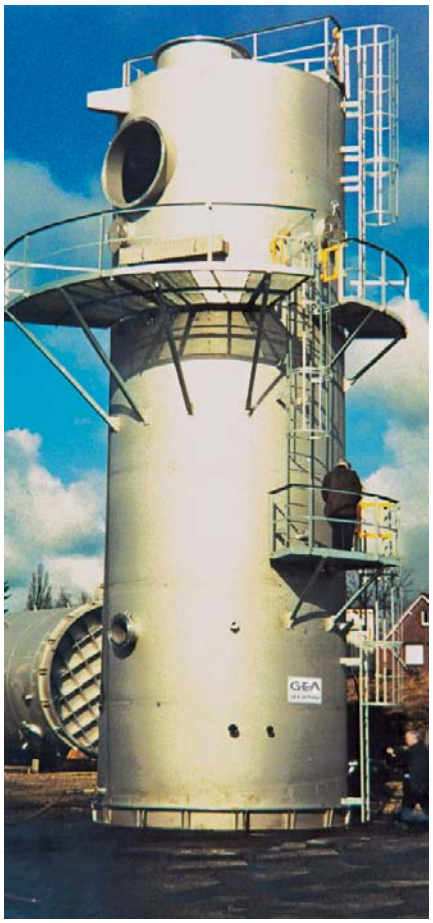
Naturally we also offer you our advice and engineering. From the selection of the material and the most suitable type of packing to the design including internals – our experts are able to provide you with the necessary support.

Quality

Your column is only able to achieve the required separation performance over a long period of time when the efficiency and quality of the packings is optimized. The MASSdek packings are exclusively manufactured in Germany and our own quality assurance process guarantees a consistent standard of quality from the raw material inspection on receipt of the material to running tests on the finished product. We will be pleased to provide you with certification related to a specific order if desired. And of course GEA 2H Water Technologies is certified to DIN EN ISO 9001.

Areas of application of the GEA 2H MASSdek packings:

- Exhaust air scrubbing
- Absorption + desorption
- Biotrickling filters for the elimination of volatile organic compounds (VOCs), hydrogen sulphide and ammonia
- Scrubbing systems with a high level of separation performance



Process gas cooler (© GEA Wiegand)

Structure brings efficiency
Functional principle and characteristics

The MASSdek packings have been developed especially for thermal and chemical separation processes and are used for applications such as gas scrubbing, the cleansing of exhaust air, rectification and desorption (stripping).

Design

Structured packings are characterised by their regular form, which ensures a defined distribution of gas and liquid throughout the pack. As the channels run in opposite directions, the gas and liquid flows are separated at their intersections and then re-mixed.

The MASSdek packings consist of special plastic compounds from which profile-shaped sheets are manufactured using an extrusion process. The sheets are welded together to form stable packages. These packages can be individually cut and, as a result, divided into single elements which are easier to handle. Upon customer request we also manufacture circular shapes and other forms.

Varied and powerful

The MASSdek packings are currently available in PE, PP, electrically-conductive PP, PVC and PVDF (further plastics available on request), with specific surfaces of between 80 and 240 m^2/m^3. The standard packings are suitable for gas capacity factors of up to 4.0 Pa^0.5 at a typical liquid loading rate of approx. 25 m^3/m^2*h. We offer special types of packings for higher hydraulic loadings.

Stable and yet adaptable

A patented procedure for reinforcing the sheets ensures that the MASSdek packings have particularly high stability. They can withstand extreme mechanical loads of several tonnes per square metre and can be accessed without external aids, which simplifies their handling and installation.

The MASSdek packings have high levels of compressive strength and do not settle, even when deposits are formed or at high temperatures - a significant advantage compared with random packings. Bed heights in excess of 10 m can thus be achieved.

However, the sheets in the MASSdek packings are also flexible and fit easily onto the column wall. The water does not leak down the interior wall of the tower but is fed back into the packing. Thus edge deflectors can be eliminated and the wall effect is nevertheless minimised.

Advantages of GEA 2H MASSdek:

- Improved throughput capacity
- Lower pressure drop
- Higher effective mass transfer surface
- Reduced tendency to clogging
- Bed heights significantly higher than 10 m possible
- Extremely high mechanical stability
- Less prone to contamination
- More efficient operation
- Can be used for revamps and retrofits
- Can be mounted at the vessel manufacturer's site

Technically outstanding – financially convincing

MASSdek - Energy saving through reduced pressure drop

Due to their optimised design MASSdek packings have proven to be outstanding compared with other mass transfer equipment – in particular random packings. This technical superiority also has its financial effects.

For the same separation performance MASSdek packings achieve better results in all cases with regard to throughput capacity and pressure drop than random packings. Depending on which random media is taken for comparison, MASSdek packings reach considerably higher values.

The use of special recipes optimises the packing's surface structure. In this way the separation performance of the MASSdek product range is highly increased. Even with relatively low specific liquid loadings the MASSdek packings achieve a comparatively high share of effective mass transfer area.

The excellent performance levels in separation, throughput capacity and pressure drop are supported by a low tendency to blocking. The special sheet structure of the MASSdek packings makes channels more resistant to deposits of solid materials and they remain hydraulically resilient for longer. This advantage particularly applies when compared with random media.

Savings potential

It has been shown that exhaust air scrubbers with structured packings can be constructed in a significantly more compact manner and can be operated more energy-efficiently. The lower specific pressure drop enables savings in fan power. Even a retrofit is amortised in a few years.

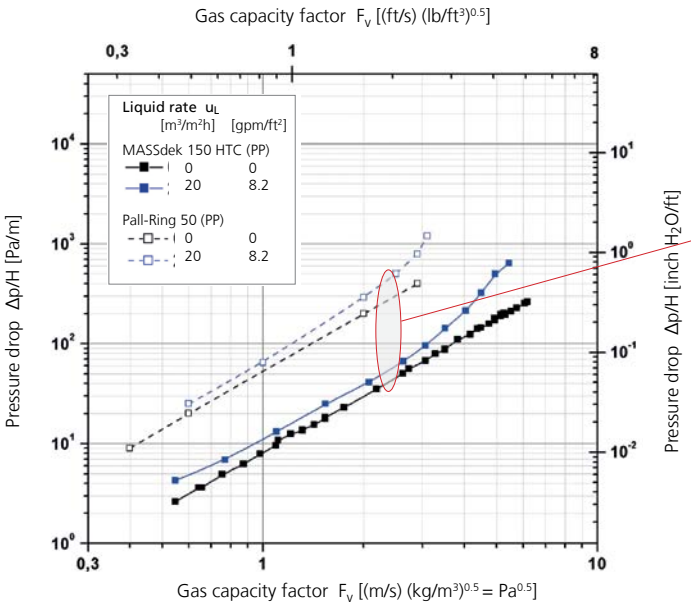


Surface and structure

The structure of our products forces the liquids to take a complex path through the separation column and together with the large contact surface this provides energy-efficient mass transfer performance.

MASSdek – At a glance
Data and facts

Type	Structure	Specific surface	Hydraulic capacity / specific pressure drop	Mass transfer performance	Resistance to scaling and fouling	Spec. pressure drop/ number of transfer units	Typical applications
MASSdek 250 HTE	cross	240 m²/m³	+	+++	+	++	Scrubbing systems with the highest levels of demand on separation performance
MASSdek 250 HTC	cross	240 m²/m³	++	++(+)	+	++	Standard use for the elimination of volatile organic compounds (VOCs), hydrogen sulphide and ammonia
MASSdek 150 HTC	cross	150 m²/m³	+++	++	++	+++	Standard uses for absorption and desorption
MASSdek 125 HTC	cross	125 m²/m³	+++	+	+++	++	Stripper, exhaust air scrubber, biotrickling filter
MASSdek 80 Grid	grid	80 m²/m³	+++	+	+++	+++	Exhaust air scrubber and biotrickling filter, desulphurisation columns



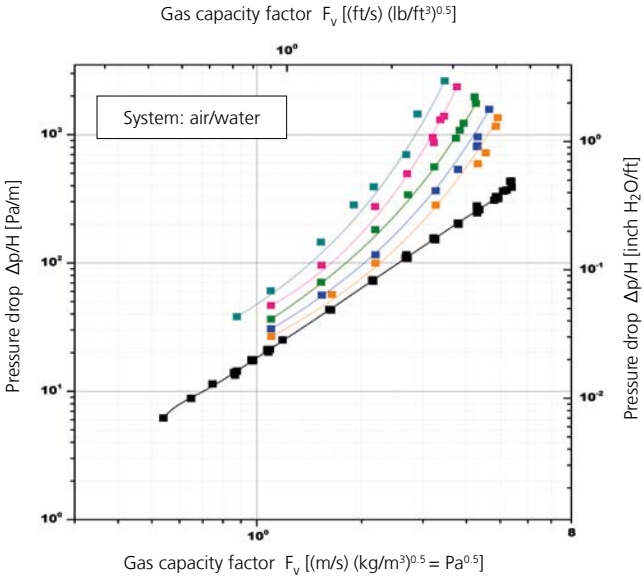
MASSdek 150 HTC

Comparison of pressure drop of MASSdek 150 HTC with 50 mm Pall Ring.

1/8 of 2" Pall Ring pressure drop (reduction by approx. 88%)

Currently no random packing is able to achieve a similarly high throughput or such a low pressure drop for the same mass transfer performance.

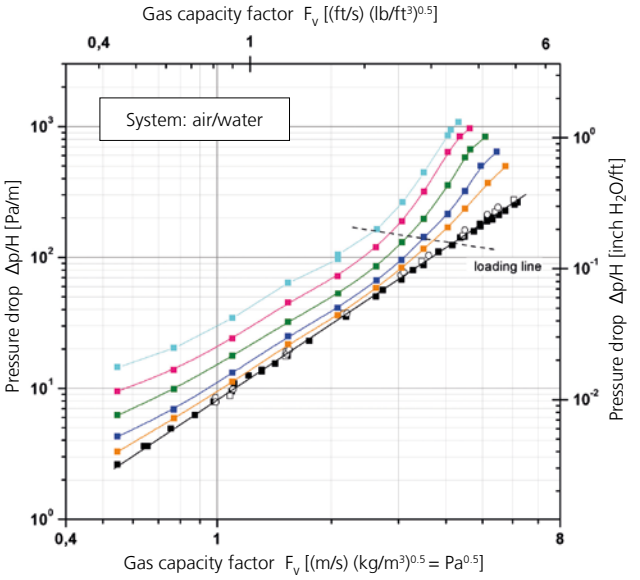
MASSdek 250 HTE



MASSdek 250 HTE (PP)
a = 240 m²/m³ (73.2 ft²/ft³)
ε = 96.0 %

Liquid rate u_L [m³/m²h]	[gpm/ft²]
0	0
10	4.1
20	8.2
40	16.4
60	24.6
80	32.8

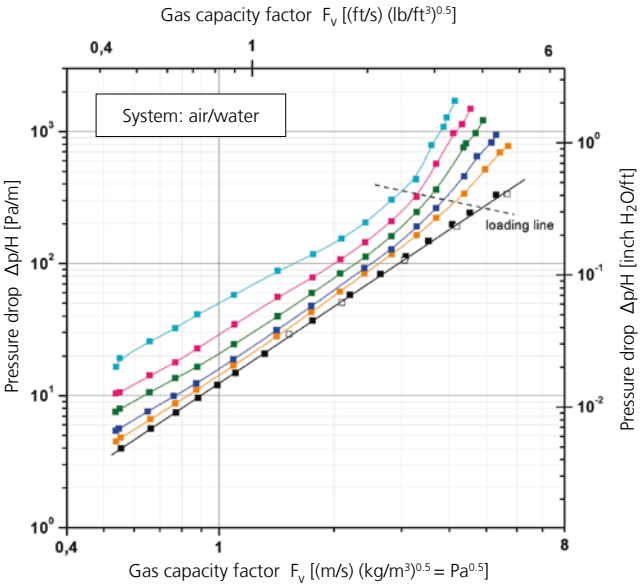
MASSdek 150 HTC



MASSdek 150 HTC (PP)
a = 150 m²/m³ (45.8 ft²/ft³)
ε = 94.5 %

Liquid rate u_L [m³/m²h]	[gpm/ft²]
0 (H=3.0 m)	0 (H=10 ft)
0 (H=1.2 m)	0 (H=4 ft)
0 (H=1.5 m)	0 (H=5 ft)
10	4.1
20	8.2
40	16.4
60	24.6
80	32.8

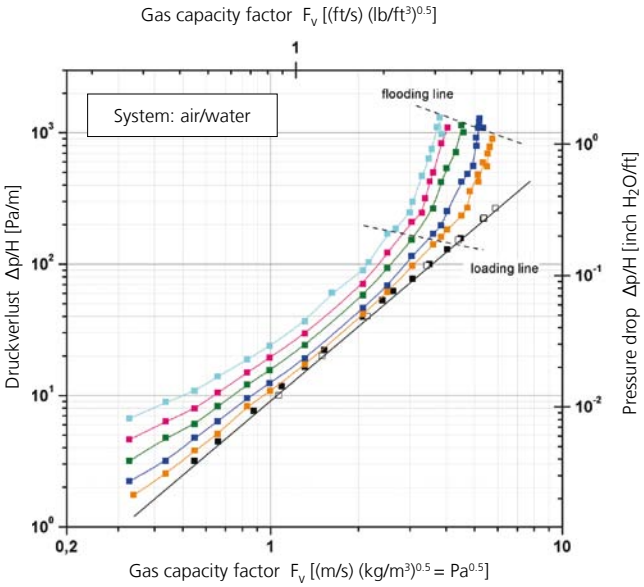
MASSdek 125 HTC



MASSdek 125 HTC (PP)
a = 125 m²/m³ (38.1 ft²/ft³)
ε = 94.5 %

Liquid rate u_L [m³/m²h]	[gpm/ft²]
0 (H=3.0 m)	0 (H=10 ft)
0 (H=1.5 m)	0 (H=5 ft)
10	4.1
20	8.2
40	16.4
60	24.6
80	32.8

MASSdek 80 GRID



MASSdek 80 GRID (PP)
a = 80 m²/m³ (24.4 ft²/ft³)
ε = 95.9 %

Liquid rate u_L [m³/m²h]	[gpm/ft²]
0 (H=3.2 m)	0 (H=10.5 ft)
0 (H=1.8 m)	0 (H=6 ft)
10	4.1
20	8.2
40	16.4
60	24.6
80	32.8

Design and engineering
Individuality and attention to detail guaranteed

The principle is always the same: Gas and liquid should come into close contact across an exchange area as large as possible. However, there are considerably varied detailed requirements which have to be taken into consideration in order to successfully and economically carry out the separation process in each case. For this, it helps to not just have the correct packings but also the associated equipment and the necessary technical design.

Our experts cover this range of tasks perfectly. Extensive experience in the engineering of structured plastic packings and plastic or metal installations enable us to advise our customers in the dimensioning of packed bed towers. This covers in particular the areas of mechanics, hydraulics and separation processes.

We refer to ideal systems and calculate the main column dimensions. Based on these values, we assume a warranty for the column hydraulics. Our advice also includes recommendations for additional column internals, which are perfectly adjusted to the packings. Upon request, we will also take on the static inspection of constructional interfaces, such as support rings or beams. We design and construct using the most modern 3D CAD software. This enables smooth communication with our customers right from the draft design stage.

Hydraulics
GEA 2H Water Technologies carries out extensive product tests, in part in our own test facility, but also under academic supervision at universities or in private companies. As such we have access to an extensive data pool which gives us reliable information on scale-up, flooding characteristics and pressure drop in a very wide load range.

Mechanics
Information about mechanical properties is continuously enhanced through regular monitoring of production. An individual design can thus be offered, while taking into account German DVS guidelines. As required, we verify the mechanical load bearing capacity of our packings for the various materials and packing densities through German TÜV inspection certificates.

Separation processes
Our tests also include the separation performance of newly developed MASSdek types. The results are evaluated according to recognised methods and enable a reliable design to be created. In individual cases we can also issue a warranty for this.

The most important planning specifications are:

- the selection of the material
- the selection of the packing type
- the load bearing capacity
- the pressure drop
- further hydraulic key data
- and the minimum required bed height



Optimization of individual design
Design software

For the individual design of our MASSdek packings we use software developed by our own IT specialists. It permits the hydraulic design of water-air systems and also freely defined systems. In addition, calculations on absorption and desorption for approx. 400 components are possible.

The simple operation and extensive data base of the software enables an experienced technician to quickly optimise the process design. On request, we will be happy to provide you with this planning tool.

Product development – also for tailor-made solutions

At GEA 2H Water Technologies GmbH the Engineering, Quality Assurance and Research & Development departments work closely together. The properties of our packings are constantly checked and improved where necessary.

For quality inspection we do not just use our own testing equipment but also have inspections carried out externally by independent institutes. Ideas for new products arise from the knowledge gained accordingly and these are tested out in our own pilot plant and developed until they are ready to go into production.

Where requested, we are pleased to work out tailor-made solutions for specific applications together with our customers. If necessary, we also include our raw materials suppliers in this work.



Column internals

Efficient mass transfer performance can only by achieved when all column internals perfectly fit together. Our MASSdek packings, droplet separators, liquid distributors, retention systems and support grids are well matched and assure an optimized separation.

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Column internals
A one-stop solution

In addition to structured packings GEA 2H Water Technologies also supplies the internals for your column. All elements fit together in these complete solutions and promise an optimum level of performance.

Droplet separators
Internals as well as turbulences in the packing bed create small droplets, which are carried along with the exhaust gas flow. The use of droplet separators at suitable positions prevents the droplets from being carried over. The GEA 2H MASSdek droplet separators are capable of separating up to 99.9% of the droplet entrainment with a limiting droplet size of 35 µm.

We adjust our droplet separator modules individually to the existing vessel geometry and calculate the perfect inflow cross-section for you as part of the process design.

Liquid distributors
The structured packing only reaches its full level of performance if the liquid is optimally distributed onto the packing. The correct type selection and individual design of the initial liquid distribution are therefore extremely important. GEA 2H can assist you in the selection of a suitable distributor and will design this especially for your application. We also supply special distributors for demanding separation situations.

Bed limiter (retention system):
In place of retention grids, a comparatively simple construction of cross bars with negligible pressure drop is sufficient to fix the packing elements.

Support grids
Normally the transition from the support system to the fill involves a hydraulic bottleneck. Whereas elaborately constructed, and therefore expensive, multi beam packing supports have to be used for random packings in these cases, even gratings are sufficient for structured packings.

We will assist you in the selection of a suitable support system. In addition to the hydraulic conditions for the design, we also take into account the influence of temperature and mechanical load. On request, we can provide the necessary constructional support design. We can also create individual solutions for special applications.

Optimum and efficient system solutions for the industry:

- individual design
- state-of-the-art manufacturing methods
- variety of products
- permanent quality controls
- highly motivated team
- many years of experience
- continuous improvements

Excellence Passion Integrity Responsibility GEA-versity

GEA Group is a global mechanical engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX Europe 600 Index.

GEA Heat Exchangers

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