Packing & Internals

PANTAN

صنایع پنتان شیمی

PANTAN is a well-established leading designer and manufacturer of a vast range of equipment for the Oil, Gas and Petrochemical Industries.
For almost two decades, our company has developed a comprehensive range of products and services including:

PANTAN is a complete solutions provider in mass transfer and separation systems for oil, petrochemical, refining, gas processing and other chemical process industries. We can offer a comprehensive and efficient range of products and services for distillation, absorption, adsorption and multiphase separation processes.

Bussiness Segment

1. Process Vessel Internals
- Fractionation Trays
- Packing and Internals
- Separation Internals
- Reactor Internals

2. Process Packages
3. Miscellaneous Process Equipment

Today, the company is leading specialist in process vessel internals and modular separation systems (as turnkey process packages) for the chemical process industries in Iran's market.

Based on highly skilled professional experts, innovation & research center and modern production facilities, PANTAN is operating as “one-stop solution provider” for wide range of process applications.

Vision

We want to be the best company throughout the region for “Mass Transfer and Separation Technologies” demanded by the market.

Mission

PANTAN is a pioneer and knowledge-based company in designing, manufacturing, installation, and related services by utilizing cutting-edge technologies at a world-class level focused on “Mass Transfer and Separation Technologies” in Oil, Gas, and other process industries.

PANTAN is a professional designer and manufacturer company that offers a wide range of Packed Tower internals based on well established, tried and tested, industry standard design concepts with unique mechanical enhancements to ensure effective and reliable performance.

Our design expertise and manufacturing standards are obtained by many different successful projects in the field of separation for different customers including petrochemicals, refineries, food industries, power plants, steel manufacturing companies, etc.

Our professional well-trained engineers are ready to offer the best solution that is tailor-made for your specific separation requirement.

Packing **Fundamental**

A packed bed provides a mechanism for mass or heat transfer through which gas and liquid phases usually flow counter-currently in the column. The presence of tower packing elements provide a resistance to the flow of these fluids that is greater than it would be in an empty column shell.

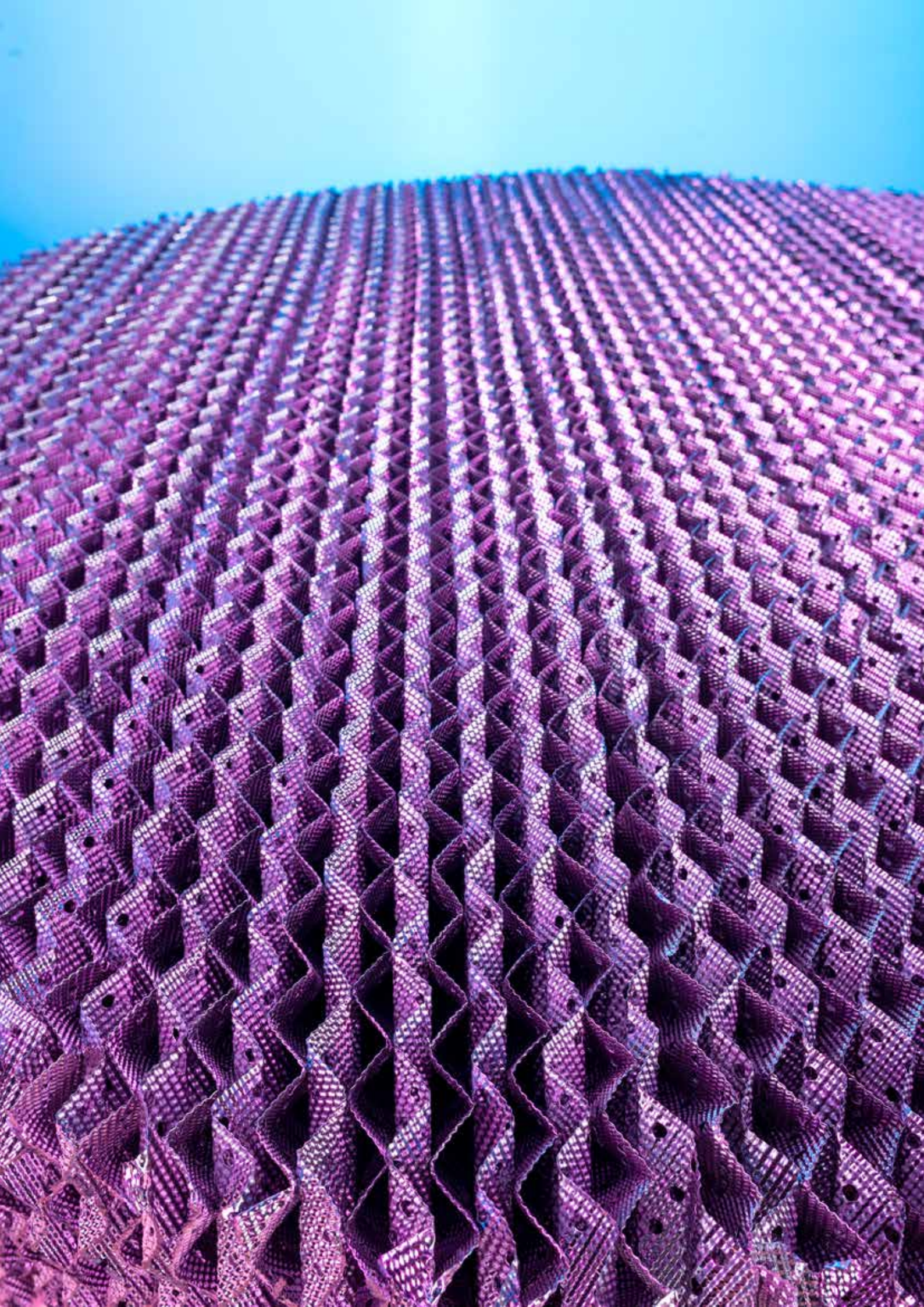
The modification of existing mass transfer columns with modern column packings can increase the number of available mass transfer stages. These additional stages permit greater product recovery through a reduction in losses of product in recycled or waste streams.

Packings are divided into two main categories;

Random or Dumped packing: These are discrete pieces of packing with a specific geometrical shape which are randomly packed into the column. Structured packing: These are corrugated sheets of thin gauge metal or wire gauze which are supplied in segments to form the packed bed.

Features:

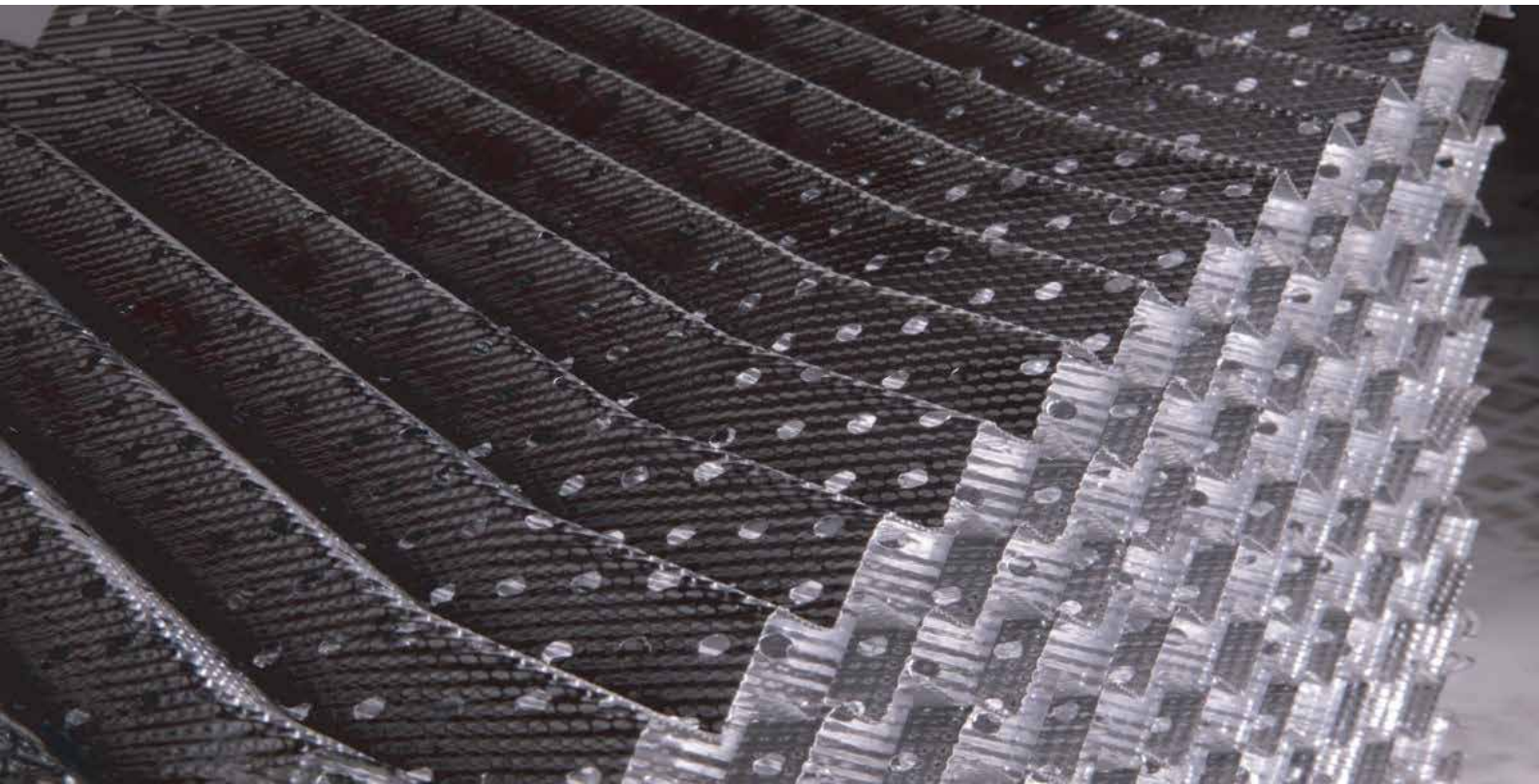
- Low pressure drop
- Operation flexibility
- Capacity enhancement
- Availability of material with high resistance against corrosion service



Structured **Packing**

Panta-Pack™ structured packing is formed from corrugated thin sheet metal as the angle of the corrugations reversed in adjacent sheets in order to create a very open honeycomb structure media.
Structured packing is ideal for difficult separations requiring a large number of theoretical stages, in low liquid rate absorption/ stripping systems or applications that require a wide operating range such as vacuum and atmospheric crude oil fractionators, FCC main fractionators and TEG contactors meanwhile it causes lower pressure drop than random packing.

Penta-Pak™ is a typical structured packing formed from corrugated sheets of perforated embossed metal (PS series) or wire gauze (PG series).



Panta Pak™ "PS" Series

"PS" series are an industry standard packing that is available with specific surface ranging from below 125 m^2/m^3 for high capacity to more than 750 m^2/m^3 for high efficiency applications. The standard angle of the corrugations is 45° (referred M1) and 60° (referred M2), also high capacity structured packing [referred MH] are also fabricated in PANTAN.

Metal Structured Packing provides high capacity, low pressure drop and good wettability in many process columns.

• Features

- Ideal for vacuum services
- Very low liquid loads (<100 L/m^2h) are possible
- Low pressure drop per theoretical stage
- High separation efficiency owing to larger mass transfer area
- Good wettability of the packing surfaces
- Superior compressive strength

Panta-Pak™ "PG" Series

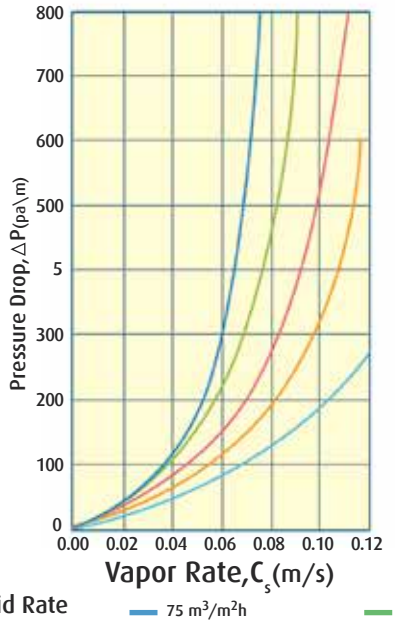
This type of Structured Packing is made of mesh type gauze woven by metal wire and is mainly used to enhanced separation characteristics for fine chemicals, perfumery, and pharmacy.
It is normally manufactured with very high surface area [500 m^2/m^3 and 750 m^2/m^3]

• Features

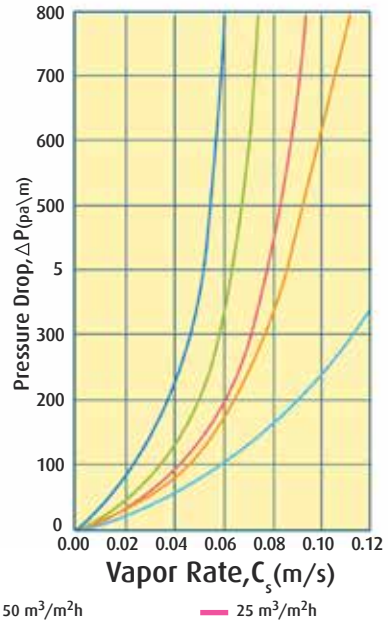
- Superior wetting ability owing to capillarity
- High separation efficiency/High number of theoretical stages
- Lower specific pressure drop
- Small liquid hold-up

Panta-Pak	Surface Area (m^2/m^3)	Corrugation Angle	Relative HETP
PS-125M1	125	45⁰	2.05
PS-125M2	125	60⁰	4.05
PS-165M1	165	45⁰	1.5
PS-165M2	165	60⁰	2.35
PS-175M1	175	45⁰	1.25
PS-175M2	175	60⁰	1.85
PS-225M1	225	45⁰	1.1
PS-225M2	225	60⁰	1.65
PS-250M1	250	45⁰	1
PS-250M2	250	60⁰	1.55
PS-250MH	250	45⁰	1
PS-300M1	300	45⁰	0.9
PS-300M2	300	60⁰	1.2
PS-500M1	500	45⁰	0.7
PS-500M2	500	60⁰	0.9
PG-500M2	500	60⁰	0.8
PS-750M1	750	45⁰	0.6
PG-750M1	750	45⁰	0.33

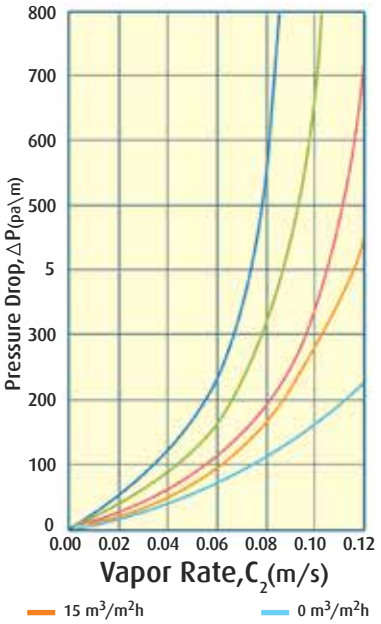
Panta Pak™ PS-250M2 Structure Packing Pressure Drop Data



Panta Pak™ PS-250M1 Structure Packing Pressure Drop Data

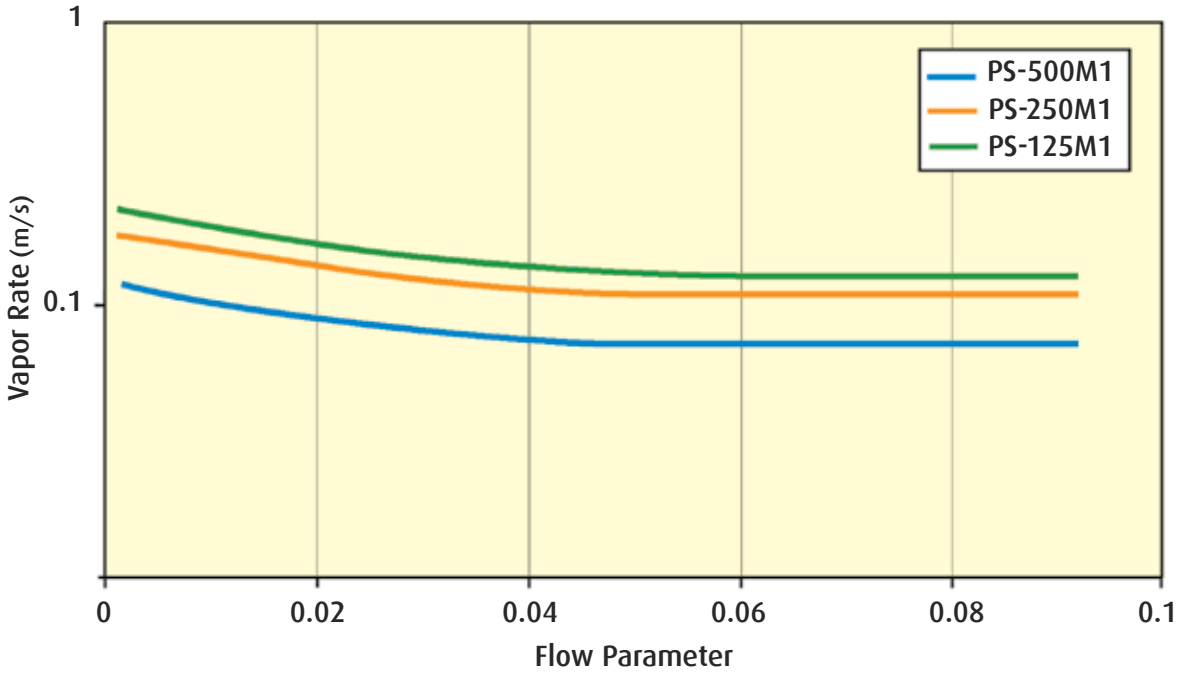


Panta Pak™ PS-250MH Structure Packing Pressure Drop Data

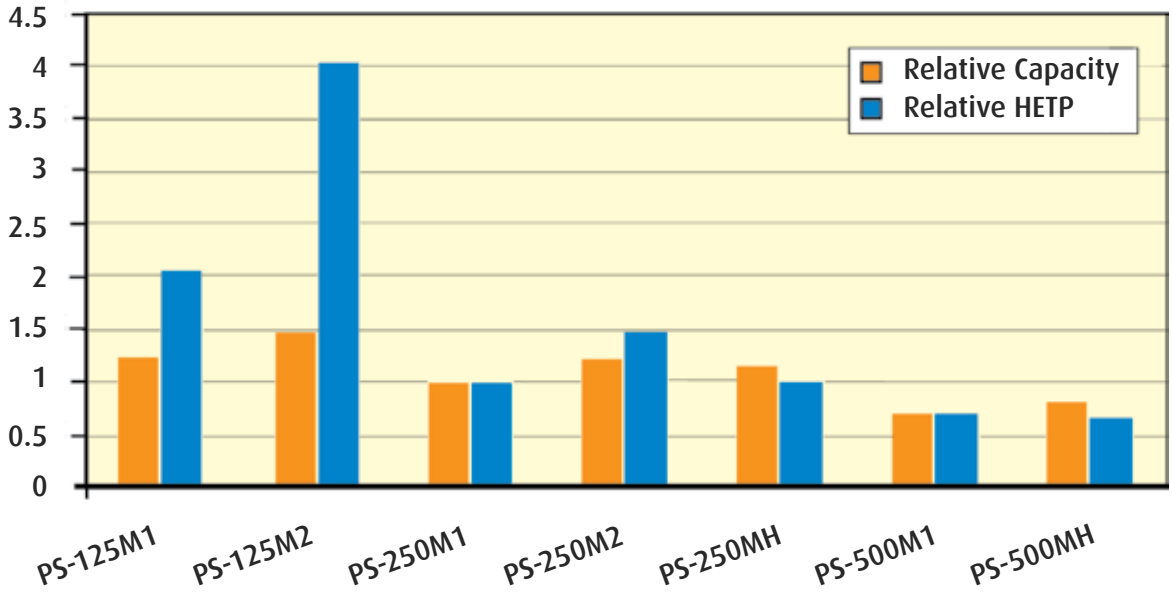


Liquid Rate

75 m^3/m^2h 50 m^3/m^2h 25 m^3/m^2h 15 m^3/m^2h 0 m^3/m^2h



• Flooding curves for Panta Pak™ structured packing



• Relative capacity & HETP for Panta Pak™ structured packing

Note: Relative capacity and HETP are only for estimation purposes and may vary according to actual column loads and service.

PR-**Panta Ring**

This second generation of random packing is well known as Pall Ring which is one of the most common type of packing media.

Normal Size (mm)	Equivalent Size (inch)	Bulk Density (kg/m^3)	Quantity ($pieces/m^3$)	Surface Area (m^2/m^3)
# 25	1 "	385	51000	195
# 40	1 1/2"	250	14400	135
# 50	2 "	210	6600	105

IR-Panta Ring

This 3rd generation of random packing media is designed to give enhanced capacity and increased efficiency over the older style Pall Ring packing.

This type of packing combines the high void fraction and the well-distributed surface area of the Pall Ring with the low aerodynamic drag of the saddle shape. This kind of random packing is used widely in separation columns. By comparison to the PR Series, Panta Ring™, IR series provide more open shape and improved liquid spread, also produce adequate mechanical strength resistance. This type is a direct replacement of well known IMTP packing.

Normal Size (mm)	Equivalent Size (inch)	Bulk Density (kg/m^3)	Quantity ($pieces/m^3$)	Surface Area (m^2/m^3)
# 25	1 "	270	130000	230
# 40	1 1/2"	230	46000	145
# 50	2 "	140	14000	100
# 70	2 3/4"	110	4500	60

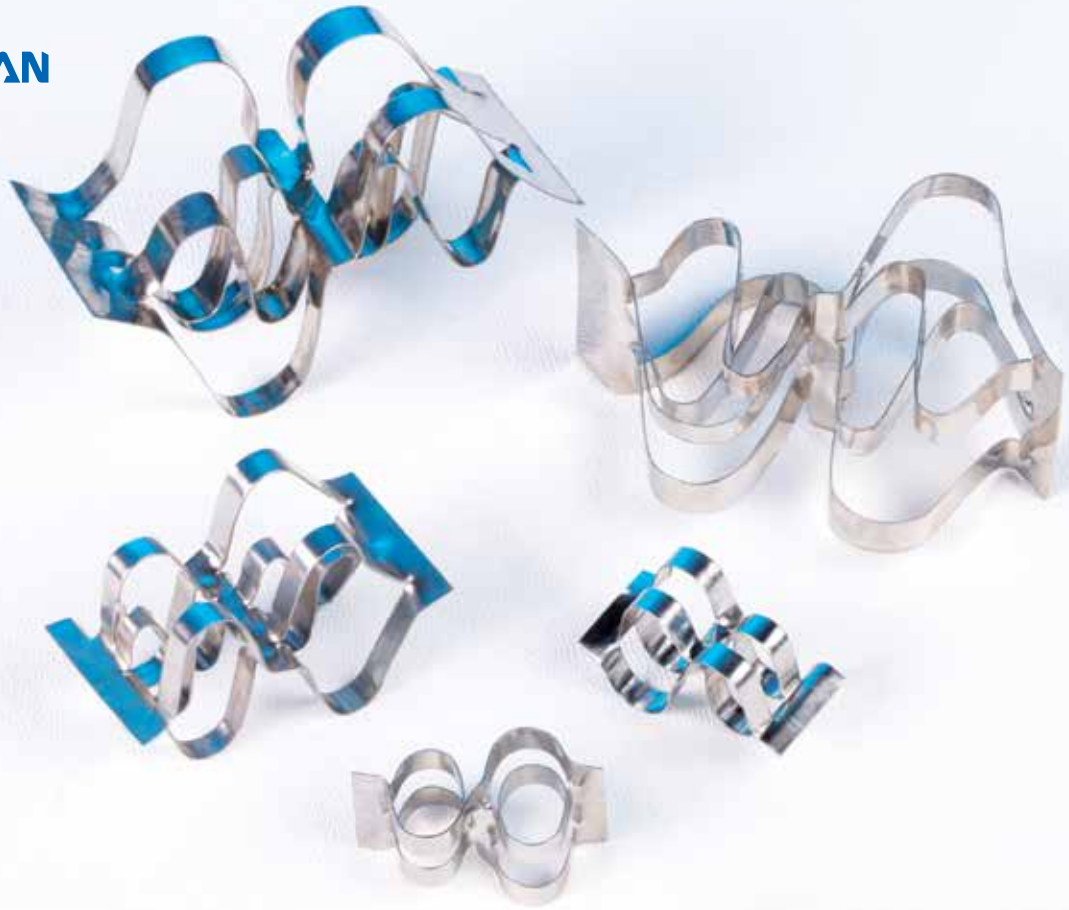
FL- **Panta Ring**

High performance random packing provides improved performance in efficiency, capacity and pressure drop relative to conventional random packings FL-Panta Ring™ has demonstrated capacity improvements of up to 15% with no loss of efficiency and efficiency improvement of up to 30% with no loss of capacity relative to conventional PALL Ring packing.

FL-Panta Ring™ superior mechanical integrity allows processors to specify deep beds without packing deformation. Available in various sizes and is constructed of virtually any metallic material, it is the most advanced random packing design available today.

This type is a direct replacement of well known Fleximax packing.

Item	Size	Material Thickness	Density
1	Fleximax#300	0.4 mm	230 Kg/m3
2	Fleximax#400	0.5 mm	166 Kg/m3
3	Fleximax#700	0.5 mm	92 Kg/m3



SR-**Panta Ring**

This type is the first fourth generation random packing compared to earlier designs like Raschig-Rings, Pall-Rings and third generation packings well knowns as Super Raschig Ring. Soon after this type was available to the industry it was a new reference line for packing comparisons in terms of pressure drop, capacity and efficiency which improve capacity and reduce pressure drop.

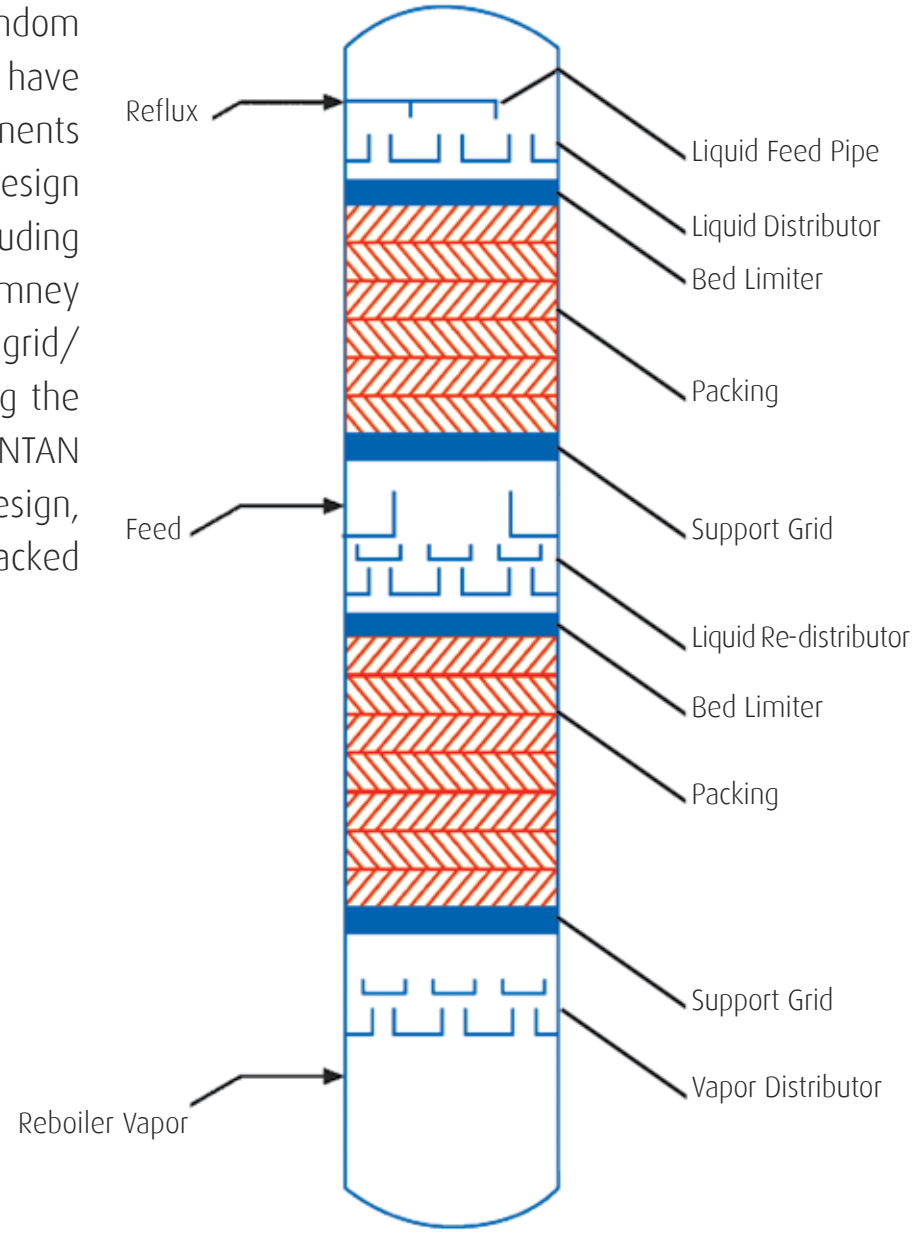
Features:

- High Loading Capacity
- Uniform Liquid and gas Distribution
- Effective Mass Transfer

Item	Size	Material Thickness	Density
1	Super Raschig Ring#0.5	0.3	238 Kg/m3
2	Super Raschig Ring#0.6	0.6	278 Kg/m3
3	Super Raschig Ring#0.7	0.7	232 Kg/m3
4	Super Raschig Ring#1	0.4	220 Kg/m3
5	Super Raschig Ring#2	0.4	155 Kg/m3
6	Super Raschig Ring#3	0.5	150 Kg/m3

Packed **Tower Internal**

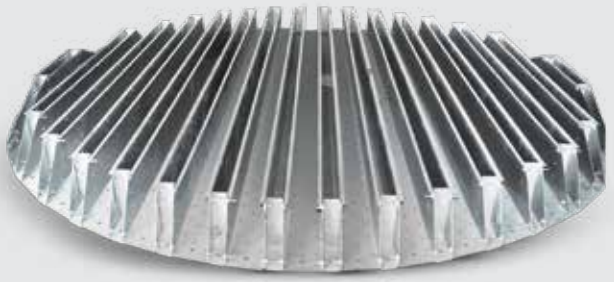
Packed columns including both random and structured packing must have several compatible internal components to function properly. Reliable design and selection of internals including liquid distributors, collector/chimney tray, support grid and hold down grid/ bed limiter are essential for gaining the specific service requirements. PANTAN has valued experiences in design, selection and manufacturing the packed column internals.

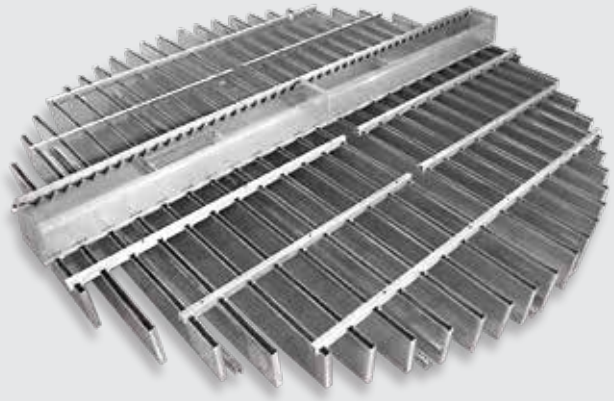


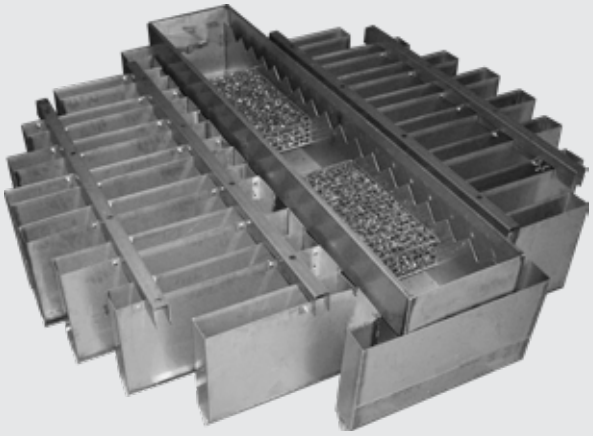
Liquid **Distributors**

Liquid distributors are essential components of a packed column that are installed above the packed bed to provide a uniform distribution of liquid. Poor liquid distribution is by far the most common cause of unexpected poor separation efficiency in packed columns. PANTAN designs and manufactures several types of liquid distributors. Pan or plate, trough, pipe, and spray distributors are the most general types. Selection of distributors mainly depends on liquid load and tower diameter.

High Liquid Load







Low Liquid Load

Chimney Tray/**Liquid Collector**

Liquid Collector/Chimney tray is used in the columns to achieve one or more of following purposes:

- Vapor Distribution
- Liquid collection from above bed and conduction to below distributor
- Total or partial liquid draw-off

Open area, allowable pressure drop, height of collector, liquid and vapor loads, column diameter and quantity of Liquid draw-off are the main parameters in collector design.

Chimney Tray

Chimney Tray

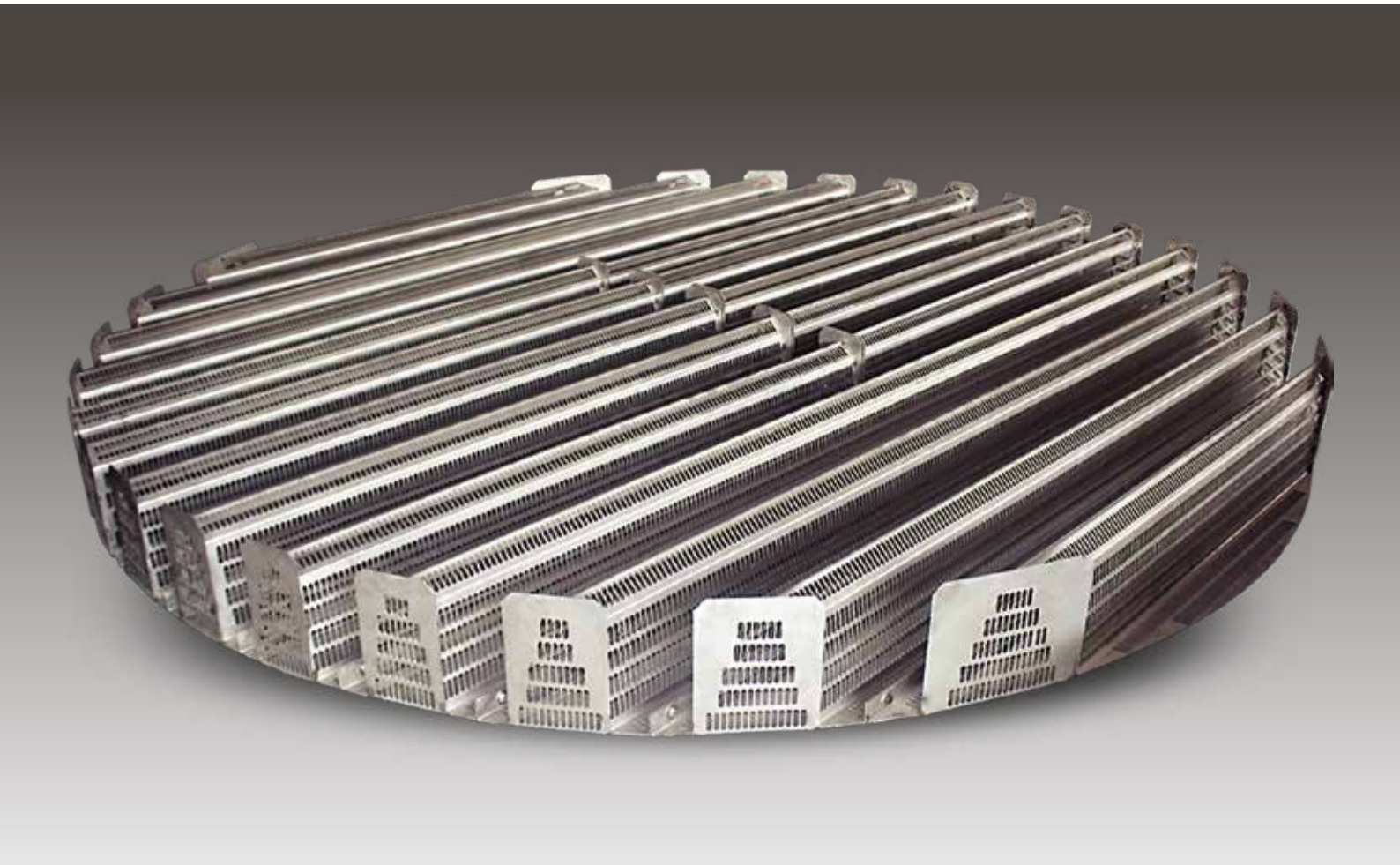
Vane Collector

Support Grid/**Hold Down Grid**

Packings are installed on support grids which are designed to provide sufficient strength to support packed beds under normal operating conditions without creating any capacity restriction in the column.

Criteria for selecting a support grid include :

- Type of packing (random or structured)
- Maximum design load

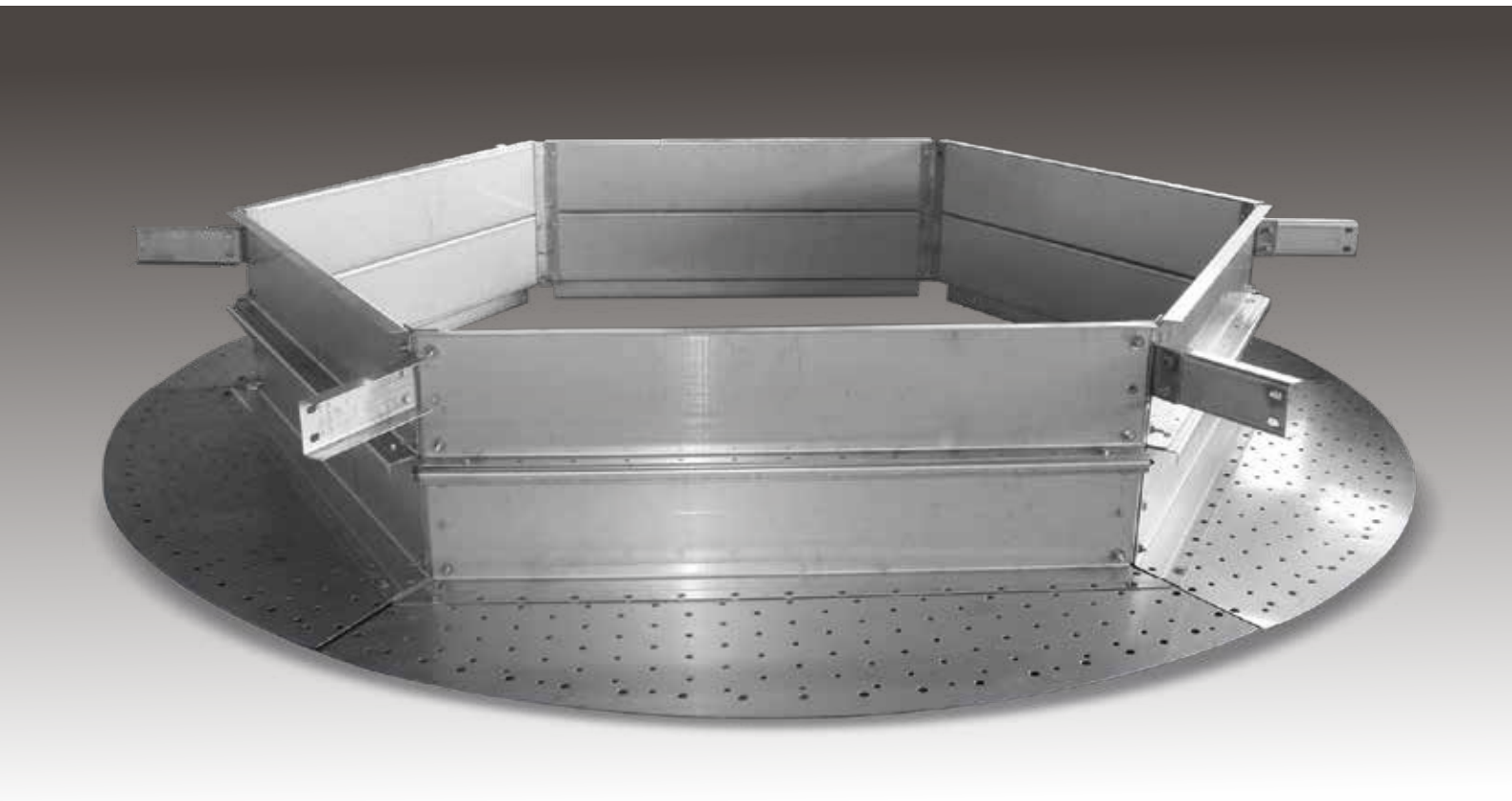


Flash **Gallery**

A uniform distribution plays essential roles in separation performance. PANTAN engineers choose proper inlet device based on below specification :

- Vessel configuration
- Vessel Size
- Fluid phase
- Fluid momentum

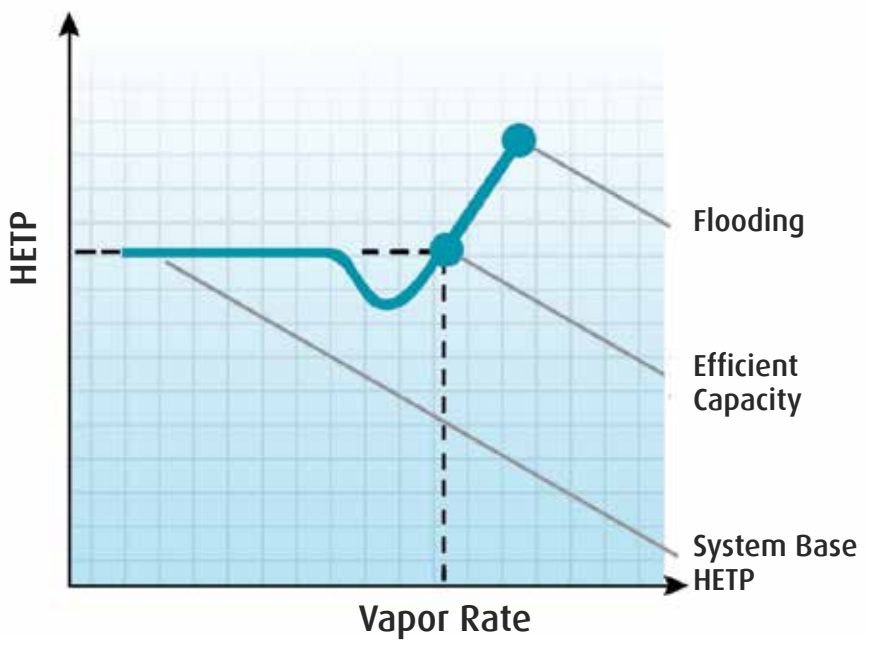
Flash Gallery is used to separate two phase feed.
The residence time on this device allows vapor to disengage from liquid. then clear liquid flows directly to below distributor, while vapor moves upward to top section.



Packing **Efficiency**

HETP as Packing Efficiency is determined to evaluate required height of packing to achieve specified number of theoretical equilibrium stages. Basic data such as number of theoretical stages, liquid-vapor loads and physical properties are derived from standard process simulation software. There are some direct parameters for HETP calculation such as liquid-vapor loads, physical and transport properties, packing type-size as well as indirect factors like liquid-vapor distribution quality.

Proper liquid distribution is the key parameter in order to achieve optimum performance with any high efficiency random or structured packing. Below curve shows a typical HETP versus vapor rates of typical packing.

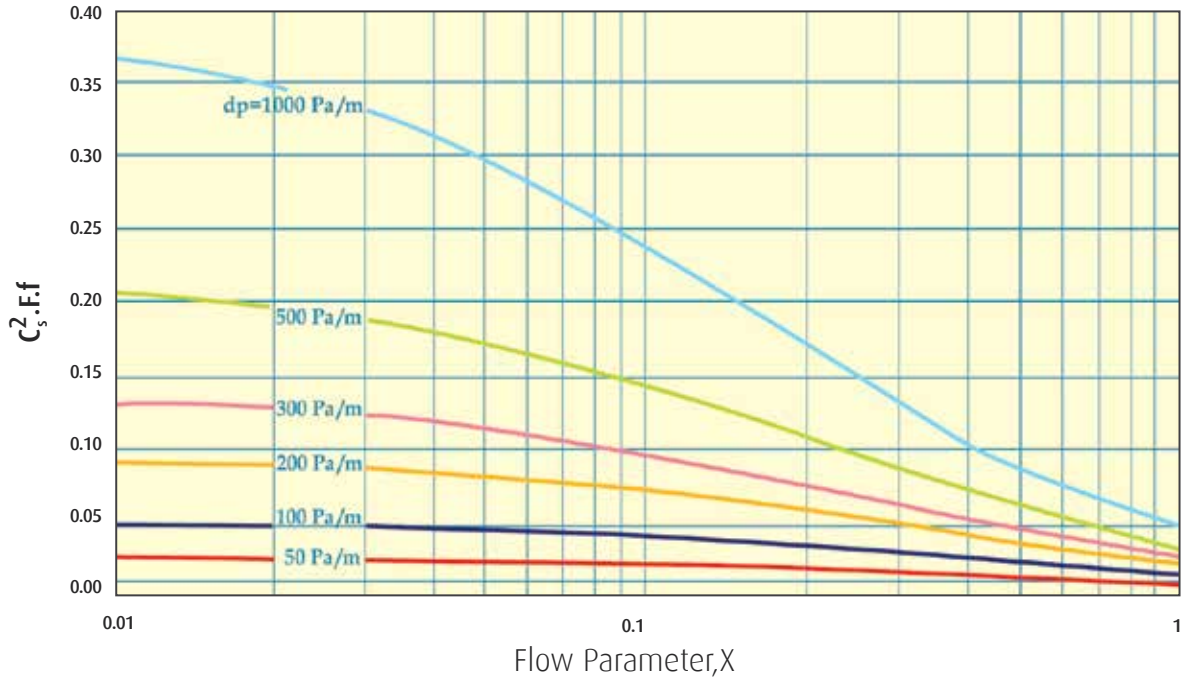


Packing **Pressure Drop**

Generalized Pressure Drop Correlation (GPDC) is a common method for estimating pressure drop and maximum capacity of most generic random packings.

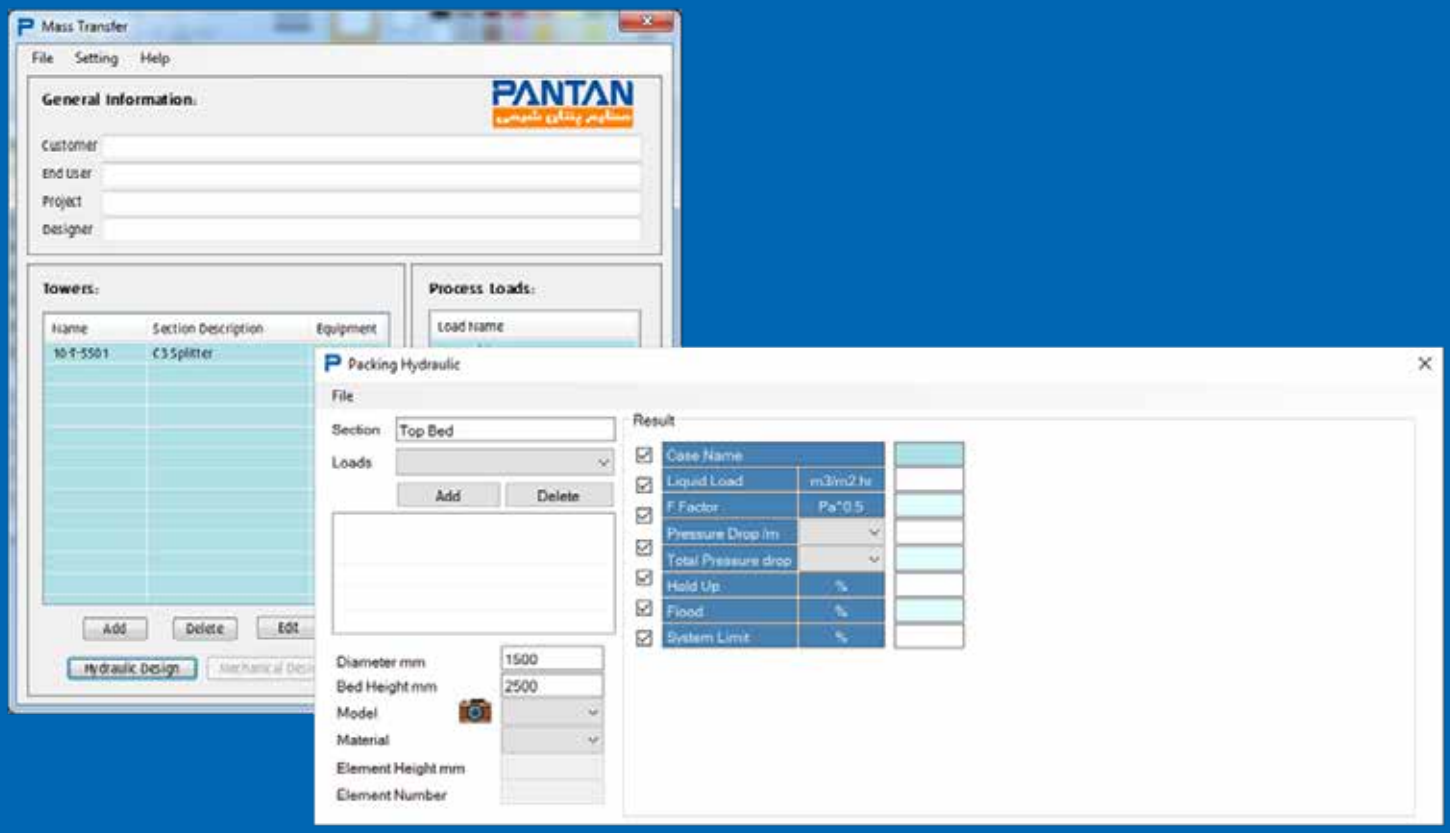
Pressure drop estimated by using this model are accurate to within ±20% for most random packing styles. Pressure drop for structured packing is calculated by related GPDC for rough estimation or by correlations and experimental data for more accurate evaluation.

Generalized Pressure Drop Correlation Random Packing



Pantan Packed **Bed Design**

PANTAN has its in-House hydraulic calculation and rating software for Different type of Structured & Random Packing



Engineering/Field **Services**

Apart from excellent products for mass transfer and separation systems, PANTAN can also offer complete engineering services for distillation plants, thus ensuring an exact planning and a comprehensive and professional project execution.

PANTAN provide below services to customers:

- Installation
- Installation Supervision

PANTAN also survey client problems and provide solution if it could be possible in revamp mode.

- Replacing and/or adding separation devices in existing vessels with modern/modified internals
- Planning and execution of modification works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R&D & Product **Development**

PANTAN uses different approaches to improve his product performance. It is believed that to fulfil market requirement and new operation demands, it is necessary to establish new product.
For these two goals, PANTAN uses field tests in “research & development center” located in PANTAN factory and even client site in small and large scales to check hydraulic performance of equipment.

The other ways to check performance is to maintain calculation and model with mathematical calculation. So Computational fluid dynamics “CFD” and process simulation could be so helpful and prevent in wasting capital cost and time.

The CFD uses to analyze products, key further and new products development whilst CFD reduces the volume of necessary experiments for design studies where would hardly be available.

PANTAN uses CFD to investigate the flow regime in wide range of products like Liquid Distributors. This approach allows to improve the separation efficiency and to optimize the design rules. PANTAN uses all these techniques to provide services to clients.


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مرکز نوآوری و تحقیقات
Innovation & Research Center

Catalyst Support Grid

Excellence in design

Process Technology

Engineered to Innovate

One Stop Solution Provider

Spent Caustic Treatment

Catalyst Support Grid

Packed Tower Internals

Reactor Internals

Static Mixer

Special Equipment

Seprator Internals

Vapor/Liquid Distributor

Wedge Wire Screens

Liquid Diffuser & Outlet Collector

PANTAN - Your Specialist

for Mass Transfer and Separation Technologies

Engineered Smarter

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