



**P**ACKED  
TOWER  
INTERNALS

# HISTORY

- **1970**
  - 1971. 07** Founded as "Hanbal Metalworking Company"
  - 1976. 07** Renamed as "Hanbal Metalworking Industry"
- **1980**
  - 1984. 07** Established a branch in Seoul
  - 1989. 05** Incorporated technology with Norton Chemical Process Product Corporation in U.S.
- **1990**
  - 1995. 06** Renamed as "Norton Hanbal Korea"
- **2000**
  - 2000. 04** Renamed as "Hanbal Masstech"
  - 2004. 01** Changed as "Hanbal Masstech Limited"
  - 2005. 11** Awarded "10 Million Dollars" Export Tower (KITA)
- **2010**
  - 2011. 01** Established a branch in Dubai as "Hanbal General Trading(L.L.C)"
  - 2012. 12** Awarded "30 Million Dollars" Export Tower (KITA)
  - 2013. 11** Incorporated technology with Enhanced Industrial Technologies LLC in U.S.



# INTRODUCTION

Hanbal Masstech Limited[HMT] is a leading company which designs and manufactures Tower Trays, Internals, Packings, Reactor Internals, Wire Mesh Demisters, Mist Eliminators, etc. Our company has been providing these products for Chemical Companies, Oil Refineries, Petrochemical Plants, etc., as well as Engineering and Construction Companies since being founded in 1971.

We joined Norton Chemical Process Products Corporation in 1979 as Sales Representatives and worked with them as the manufacturer, Joint Venture Partner[Norton Hanbal Korea Inc.], design/manufacturer and Licensee until April 2002.

We conducted R&D with the Korea Institute of Energy Resource [KIER]. Especially noteworthy has been the R&D undertaken with the KIER, Ruhr University in Germany, and Hanbal, as a Fractional Research Inc, [FRI] member for five years under government assistance. Our R&D with KIER continues every year.

We have learned most of the design fabrication technologies from Norton CPPC, but we have some of our own that will meet our customer's specific requirements.

Since we know what and how Norton has tested, we built an indoor test facility, 12 meter indoor facility, for distribution quality tests. What we have designed is unquestionable, we conduct tests to make sure our products are perfect.

We also design and produce traditional style internals which are good for easy towers and those costs are about 30% less compared to the high performance towers.

We thank you all for your help and concerns rendered to us so far and wish to do the same in the future.

Sincerely, President & CEO

# PACKED TOWER INTERNALS



## Typical Packed Tower Layout/Internals

06,07

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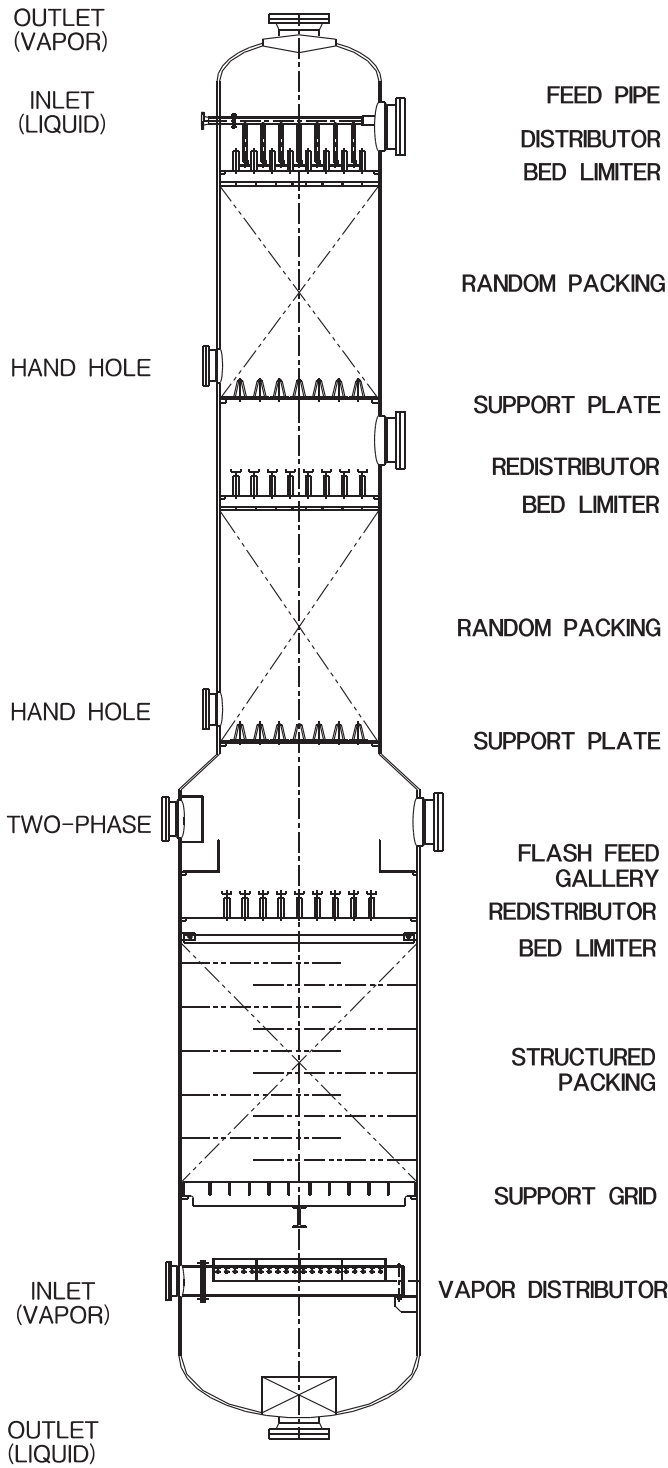
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This brochure is intended to serve as a selection guide only and other types to meet specific requirements are also available. Please ask us information for design and application.

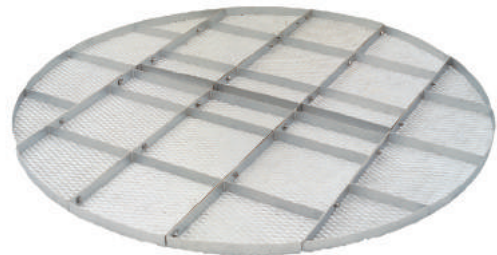
# TYPICAL PACKED TOWER LAYOUT



**GAS INJECTION SUPPORT PLATE**



**MULTI-BEAM GAS INJECTION SUPPORT PLATE**

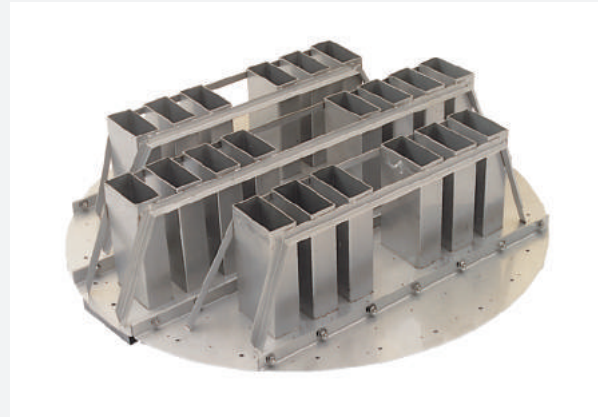


**BED LIMITER**

# TYPICAL PACKED TOWER INTERNALS



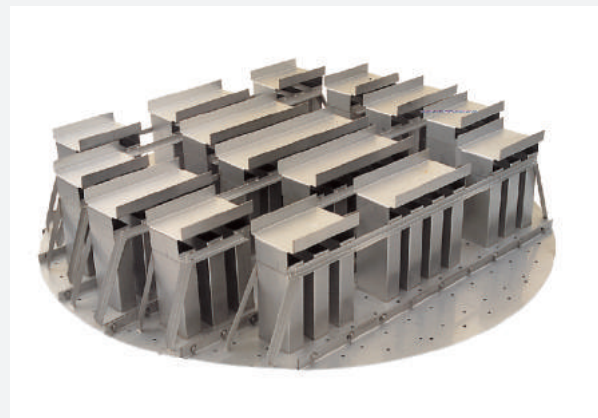
TROUGH TYPE DISTRIBUTOR



DECK TYPE DISTRIBUTOR



TROUGH TYPE REDISTRIBUTOR



DECK TYPE REDISTRIBUTOR



LIQUID ONLY FEED PIPE



LATERAL TYPE DISTRIBUTOR

# INTERNAL SELECTION GUIDE

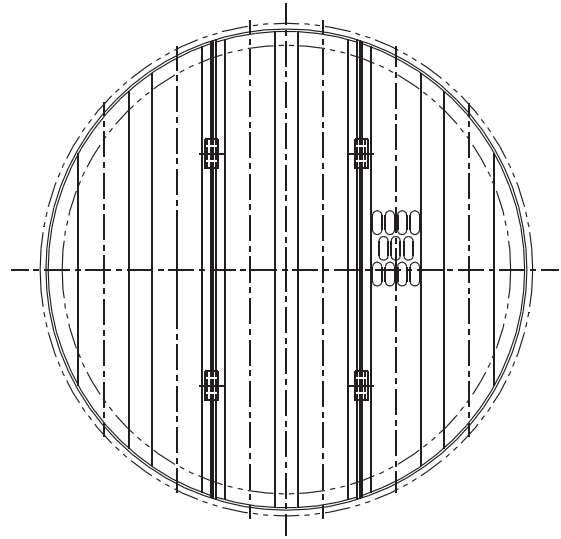
## TYPE 2818

### Gas Injection Support Plate

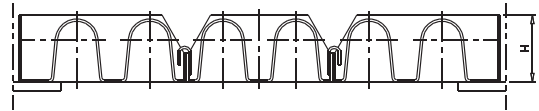
This type has high free area and the best mechanical strength. Most often used for small towers as 12~48.62 in. (305~1235 mm)ID.

Available in any weldable sheet metal or Thermoplastic materials.

Please ask us for more information regarding design and application.



SUPPORT PLATE TYPE 2818



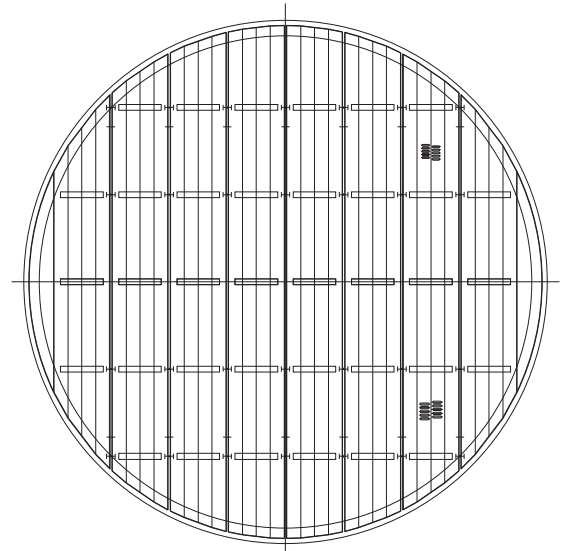
## TYPE 2804

### Multibeam Gas Injection Support Plate

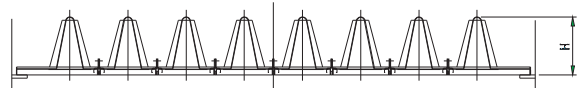
This type is used to support random packing for tower greater than 36 in. (900 mm) ID and has high open area and good mechanical strength as the support plate itself has beam(s). Recommended to use independent beam(s) as required.

Available in any weldable sheet metal or Thermoplastic materials.

Please ask us for more information regarding design and application.



SUPPORT PLATE TYPE 2804





# INTERNAL SELECTION GUIDE

## TYPE 2019

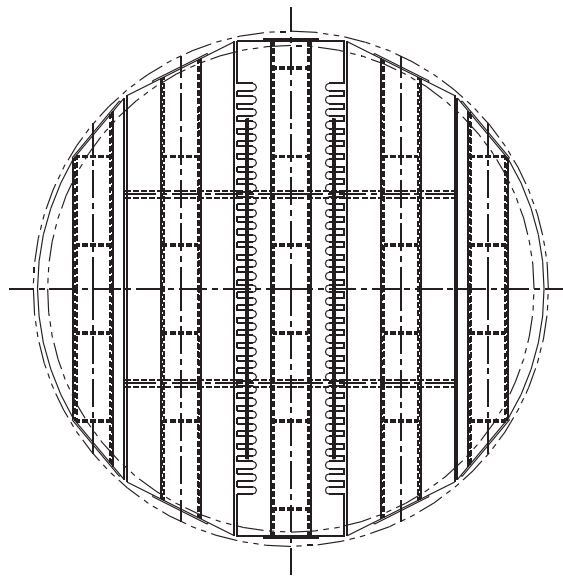
### FRP Gas Injection Support Plate

This is beam type construction and designed to support packed bed plus liquid hold-up.

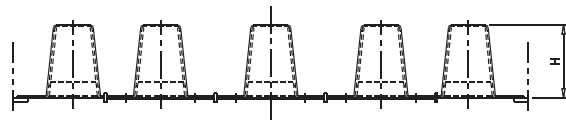
Special data and much experiences are required for optimum design.

Available in FRP or other similar material.

Please ask us for more information regarding design and application.



SUPPORT PLATE TYPE 2019



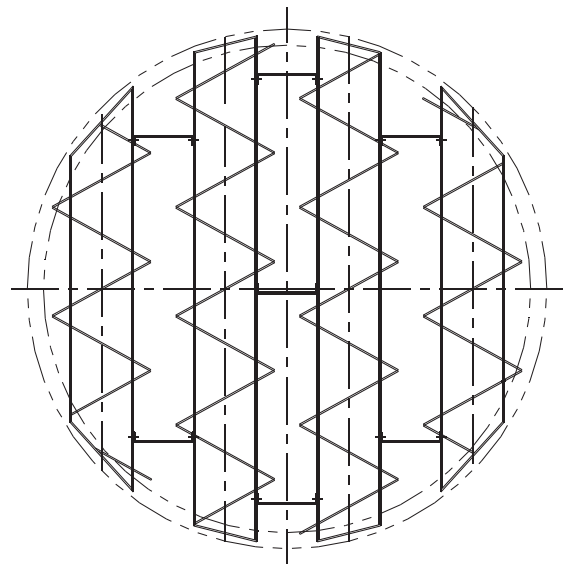
## TYPE 2134

### Support Grid for Structured or Wire Gauze Packings

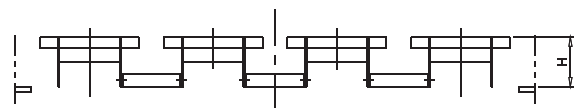
This type is used to support either structured or wire gauze packing, and the design itself allows free and uniform passage of liquid and gas for unlimited capacity.

Available in any weldable sheet metal.

Please ask us for more information regarding design and application.



SUPPORT GRID TYPE 2134



# INTERNAL SELECTION GUIDE

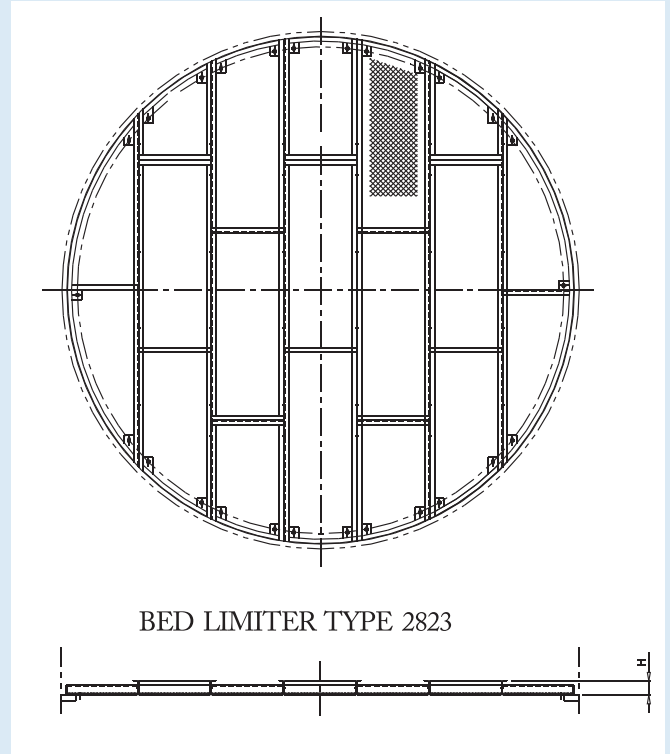
## TYPE 2823

### Bed Limiter for Random Packings.

This type is used for traditional metal or plastic random packing. This type is fixed to the tower wall by clamps to a ledge welded in the column.

Available in any weldable sheet metal or Thermoplastic material in sheet form.

Please ask us for more information regarding design and application.



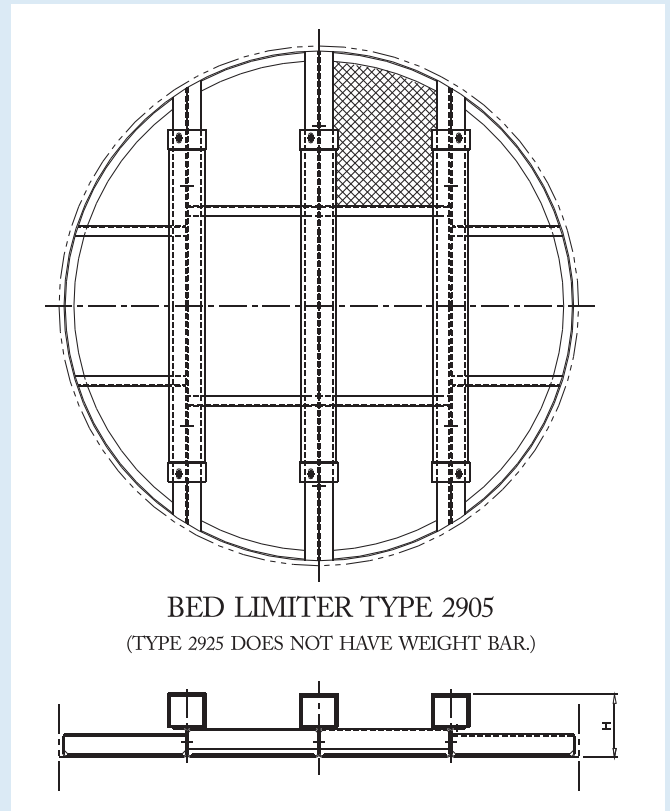
## TYPE 2905/2925

### Hold Down Plate for Ceramic or Carbon Packings

These types rest directly on the packing. Type 2905 must be attached Weight bar to get approximately 1,000 kg/m<sup>2</sup>

Available in any weldable sheet metal and most commonly used for carbon raschig ring or ceramic packings.

Please ask us for more information regarding design and application.



# INTERNAL SELECTION GUIDE

## TYPE 2103

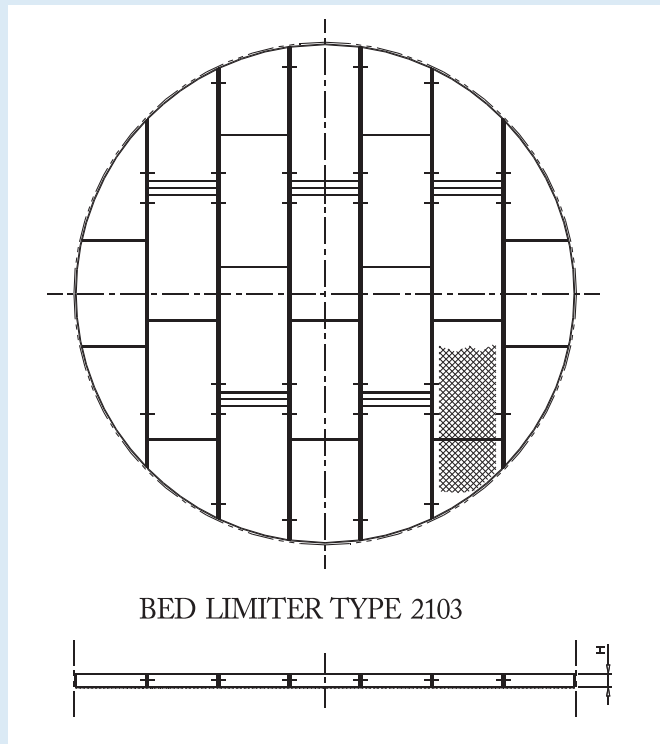
### *Non Interfering Bed Limiter for Random Packings*

This type is used for minimum interference of liquid distribution with liquid distributor below.

The outside diameter is expandable so that it can fit with tower wall and prevent packings from running away.

Available in any weldable sheet metal and most commonly used for metal packings

Please ask us for more information regarding design and application.



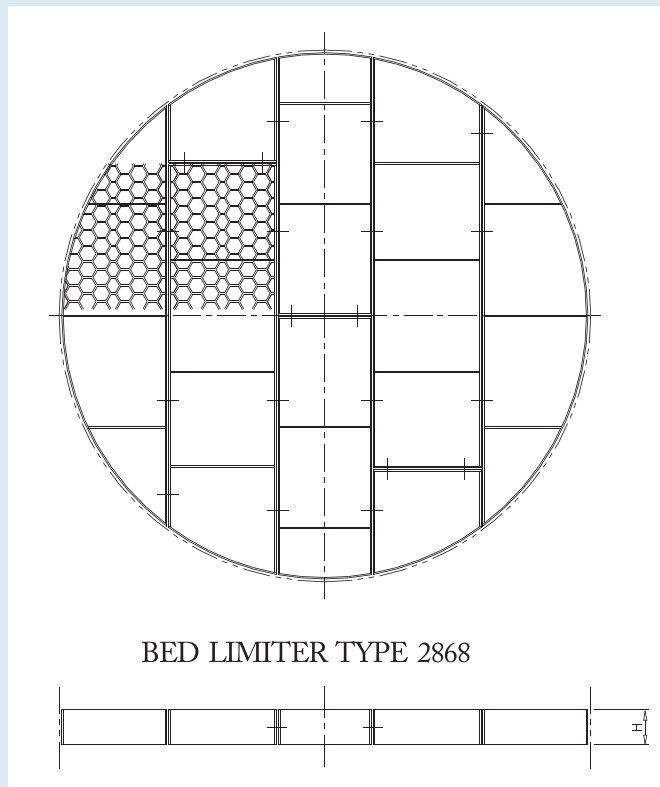
## TYPE 2868

### *P.P or P.V.C Bed Limiter for Random Packings*

This is a beam type and designed primarily for use plastic packing and must be fastened to the column wall. All sections or beams must be bolted together.

Available in any P.P or P.V.C sheet.

Please ask us for more information regarding design and application.



# INTERNAL SELECTION GUIDE

## TYPE 2133

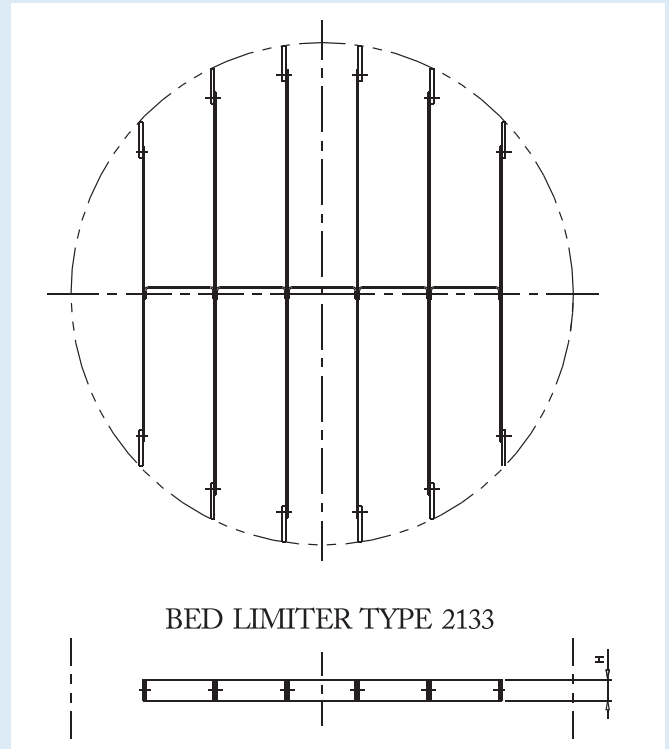
### Bed Limiter for Structured or Wire Gauze Packings

This type is designed to minimize interference with liquid distribution and is bolted to the vessel wall by vertical clips in case of large towers.

This type can be integrated with the distributor when the space has limitation.

Available in any weldable sheet metal. And used for structured packings.

Please ask us for more information regarding design and application.



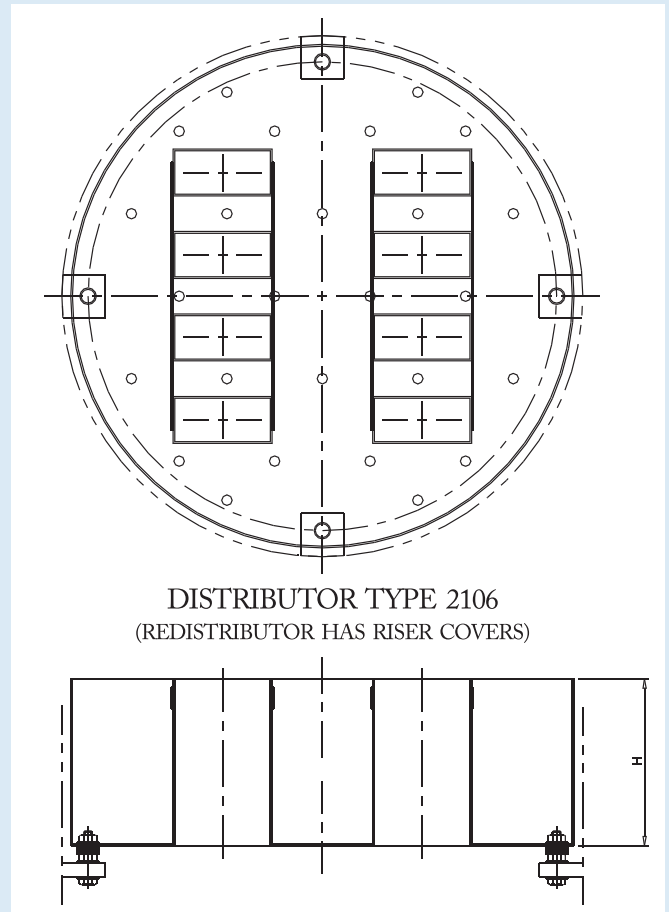
## TYPE 2106/2107

### Pan Distributor/Redistributor

These types are used for towers is less than 36 in.(900 mm) ID with minimum liquid rates is more than 2gpm/ft<sup>2</sup>(5m<sup>3</sup>/h·m<sup>2</sup>). This type of construction allows for easy liquid sealing and distributor leveling. The orifices are normally so large that can provide moderate fouling resistance.

Available in any weldable sheet metal or Thermoplastics or FRP.

Please ask us for more information regarding design and application.



# INTERNAL SELECTION GUIDE

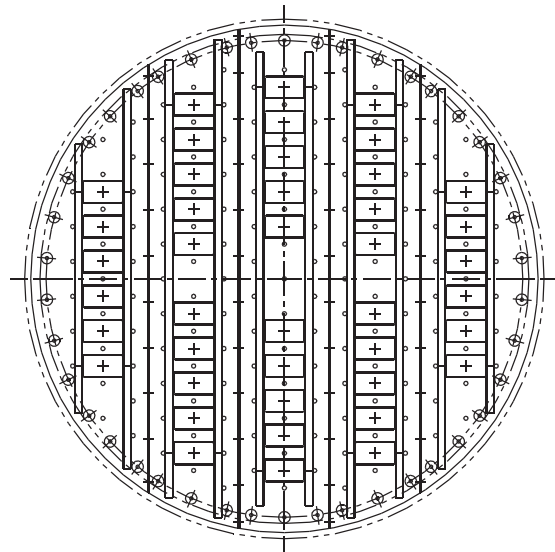
## TYPE 2116/2117

### Deck Distributor/Redistributor

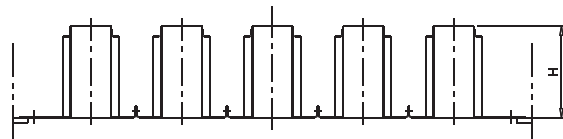
These types are used for towers with minimum liquid rates of  $12 \text{ gpm/ft}^2 (30 \text{ m}^3/\text{h}\cdot\text{m}^2)$ . The construction allows good liquid cross-flow.

Available in any weldable sheet metal. Carbon steel is not recommended except very high flow rates.

Please ask us for more information regarding design and application.



DISTRIBUTOR TYPE 2116  
(REDISTRIBUTOR HAS RISER COVERS)



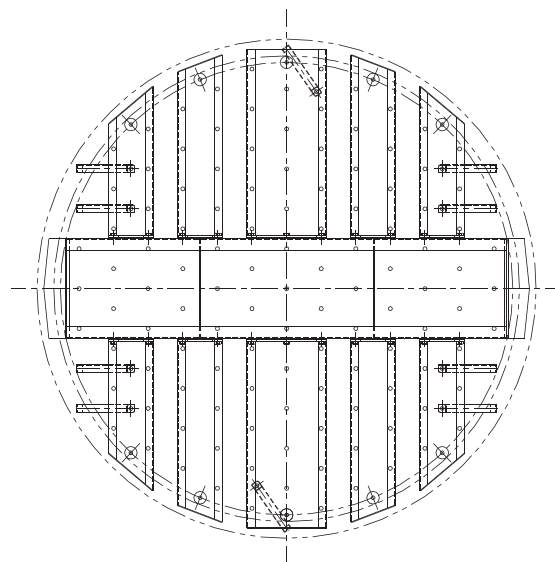
## TYPE 2126/2127

### Trough Distributor/ Redistributor

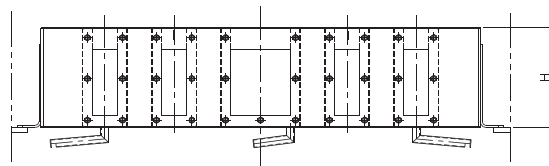
These types are used for towers greater than 55 in. (1400 mm) ID and have orifices in troughs. In case of liquid only feeds, a feed pipe and parting boxes may be used as required. Two phase feeds require flashing feed device to evenly separate phases.

Available in any weldable sheet metal, Thermoplastic or FRP materials.

Please ask us for more information regarding design and application.



DISTRIBUTOR TYPE 2126  
(REDISTRIBUTOR HAS RISER COVERS)



# INTERNAL SELECTION GUIDE

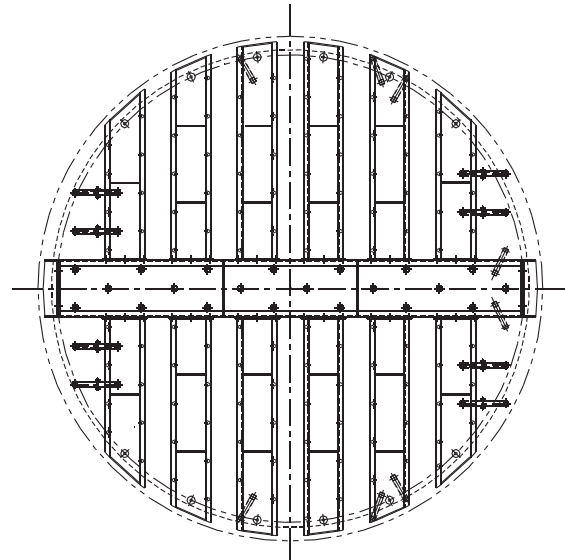
## TYPE 2136/2137

### Trough Distributor/Redistributor

These types are used for towers greater than 10 in. (250 mm) ID with liquid rates between 0.3 and 12 gpm/ft<sup>2</sup> (0.75-30 m<sup>3</sup>/h·m<sup>2</sup>) where fouling protection and /or high turndown is required.

Available in any weldable sheet metal. Carbon steel is not recommended except for very high liquid rates.

Please ask us for more information regarding design and application.



DISTRIBUTOR TYPE 2136  
(REDISTRIBUTOR HAS RISER COVERS)



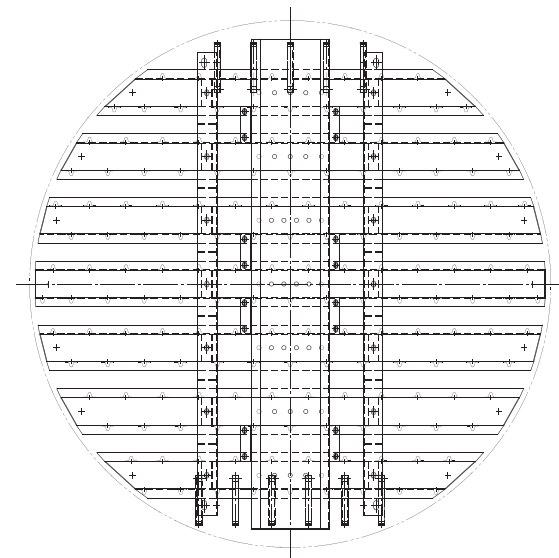
## TYPE 2186

### Trough Distributor

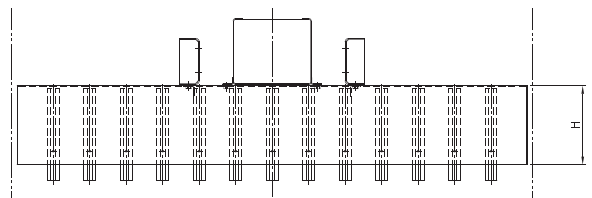
This type is used for towers greater than 36 in (900 mm) ID with liquid rates between 0.3 and 8 gpm/ft<sup>2</sup> (0.75-20 m<sup>3</sup>/h·m<sup>2</sup>) where fouling protection is required.

Available in any weldable sheet metal. Carbon steel is not recommended except for very high liquid rates.

Please ask us for more information regarding design and application.



DISTRIBUTOR TYPE 2186



# INTERNAL SELECTION GUIDE

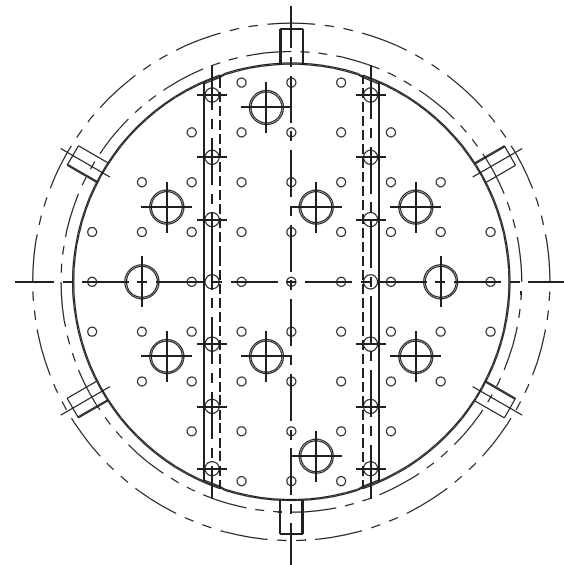
## TYPE 2845

### *Pan Distributor(Traditional)*

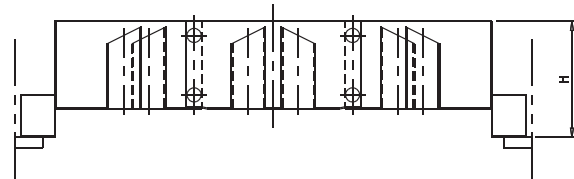
This is a traditional pan-type construction and used for towers less than 48 in. (1200 mm) ID with low liquid rates. For liquid only feeds, use a feed pipe to control feed velocity.

Available in any weldable sheet metal, Thermoplastics or FRP material.

Please ask us for more information regarding design and application.



DISTRIBUTOR TYPE 2845



## TYPE 2798

### *Pan Distributor(Traditional)*

This is a "weir riser" distributor used for high fouling services for towers less than 48 in. (1200 mm) ID.

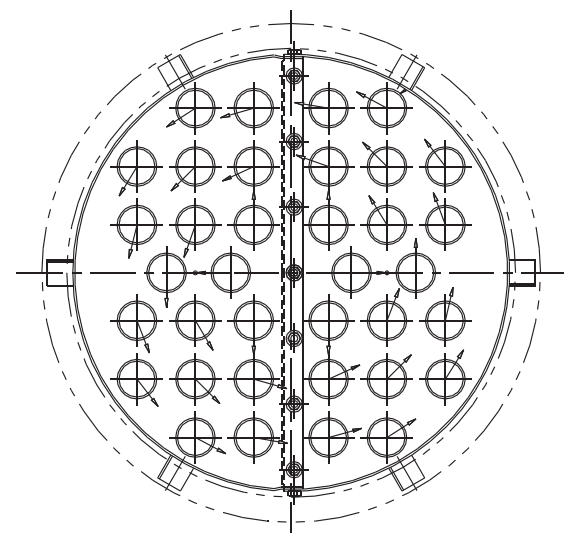
Cylindrical risers with "V" weirs are used as liquid downcomers and have wide turndown range.

For liquid only feeds use a feed pipe to control feed velocity.

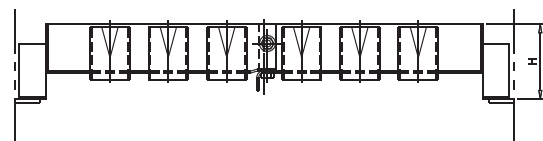
For liquid/vapor feeds require a flashing feed device. This type is not recommended for liquid redistributor.

Available in any weldable sheet metal.

Please ask us for more information regarding design and application.



DISTRIBUTOR TYPE 2798  
(REDISTRIBUTOR HAS RISER COVERS)



# INTERNAL SELECTION GUIDE

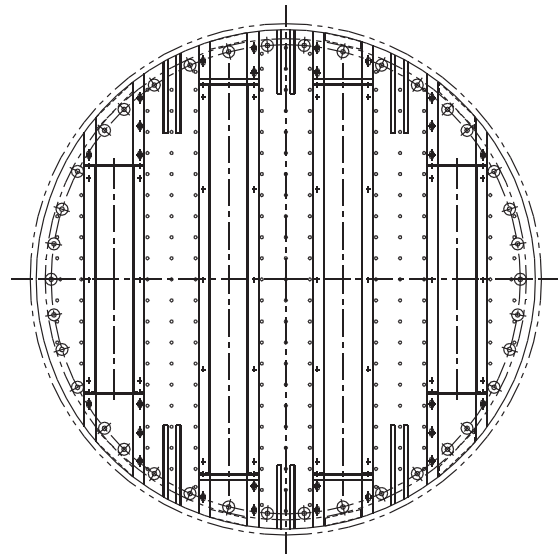
## TYPE 2816/2817/2916/2917 Deck Distributor/Redistributor (Traditional)

These types are traditional ones and used for towers from 10 in. (250 mm) ID with liquid rates of 0.8 and 50 gpm/ft<sup>2</sup> (2.0-120 m<sup>3</sup>/h·m<sup>2</sup>).

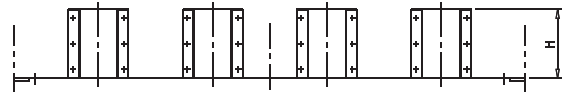
They all have identical features all except 2916 and 2917 give better distribution quality. The redistributors have gas riser covers to collect liquid falling from above.

Available in any weldable sheet metal, Thermoplastic or FRP material.

Please ask us for more information regarding design and application.



DISTRIBUTOR TYPE 2816  
(REDISTRIBUTOR HAS RISER COVERS)



## TYPE 2806 Trough Distributor (Traditional)

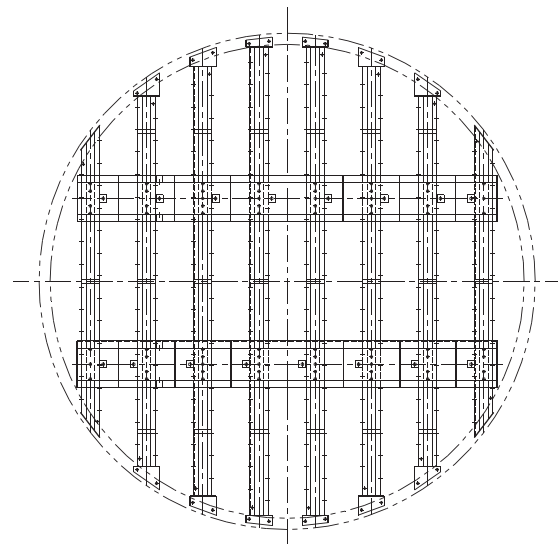
This is a weir-trough distributor for versatile liquid flow in towers larger than 36 in.(900 mm) ID.

This distributor is particularly effective in handling high liquid flow rates in severely fouling services.

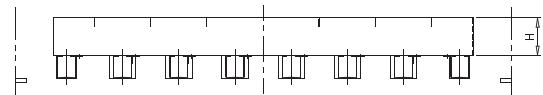
This distributor can not be used as redistributor.

Available in any weldable sheet metal, FRP or Thermoplastic material.

Please ask us for more information regarding design and application.



DISTRIBUTOR TYPE 2806





# INTERNAL SELECTION GUIDE

## TYPE 2016/2017

### Deck Distributor/Redistributor

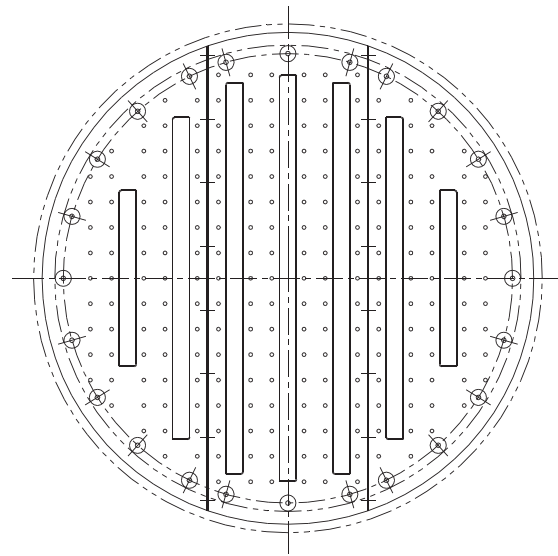
These types are used for deck types and used for towers larger than 55 in. (1400 mm) ID.

For liquid-only feeds use a feed pipe or parting boxes.

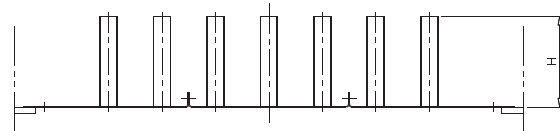
The redistributors have gas riser covers to collect liquid falling from above.

Available in any weldable sheet metal, Thermoplastic or FRP materials.

Please ask us for more information regarding design and application.



DISTRIBUTOR TYPE 2016  
(REDISTRIBUTOR HAS RISER COVERS)



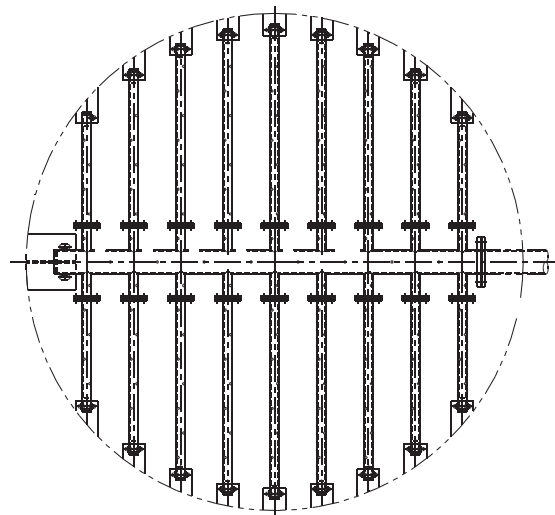
## TYPE 2844

### Pipe Arm Distributor

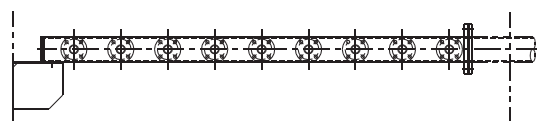
This type is used for towers larger than 17 in. (430 mm) ID and requires a little column elevation and provides high open area for high vapor flow and should be used for clean liquids only or with a filter designed to remove anything blocks the orifices. The laterals should be removable to go through vessel manways.

Available in any weldable metal or Thermoplastic material.

Please ask us for more information regarding design and application.



LIQUID DISTRIBUTOR TYPE 2844



# INTERNAL SELECTION GUIDE

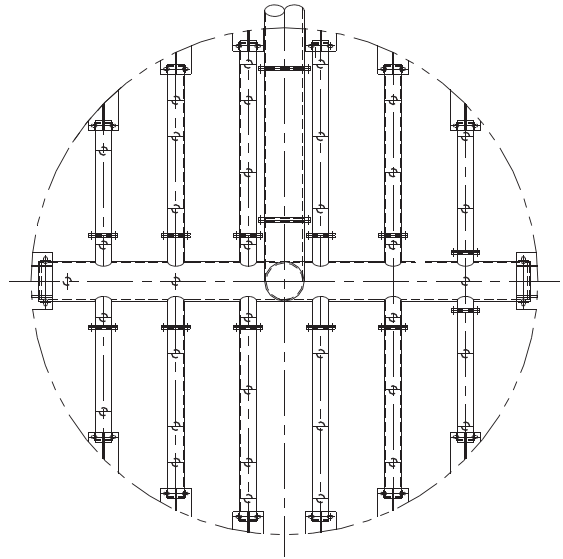
## TYPE 2044

### Spray-Type Liquid Distributor

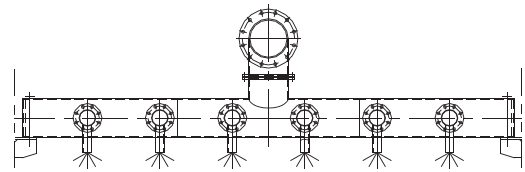
This type is an inexpensive distributor used for shallow beds of packing in heat transfer service. it can be used for very low liquid rates because each spray nozzle covers a large area of the tower.

Available in any weldable metal, pipe and flange must be used.

Please ask us for more information regarding design and application.



SPRAY DISTRIBUTOR TYPE 2044



## TYPE 2858

### "Rosette" Type Redistributor

This type is used as wall-wiper redistributor and best suitable for small columns.

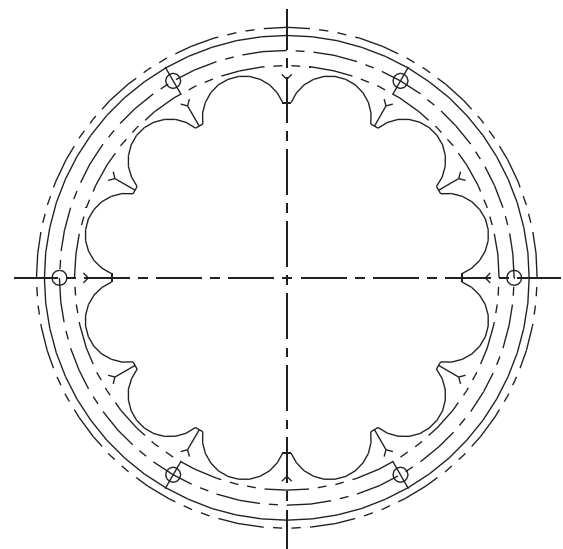
It offers

- (1) High liquid handling capacity,
- (2) Elimination of wall steaming,
- (3) Non fouling design,
- (4) Greater spacing between redistributors,
- (5) And a constant percentage of free space.

And assures uniform distribution to the bed below. This distributor must be sealed to the tower wall.

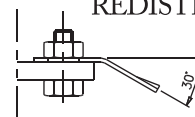
Available in any weldable sheet metal or Thermoplastic material.

Please ask us for more information regarding design and application.



"ROSETTE"

REDISTRIBUTOR TYPE 2858



# INTERNAL SELECTION GUIDE

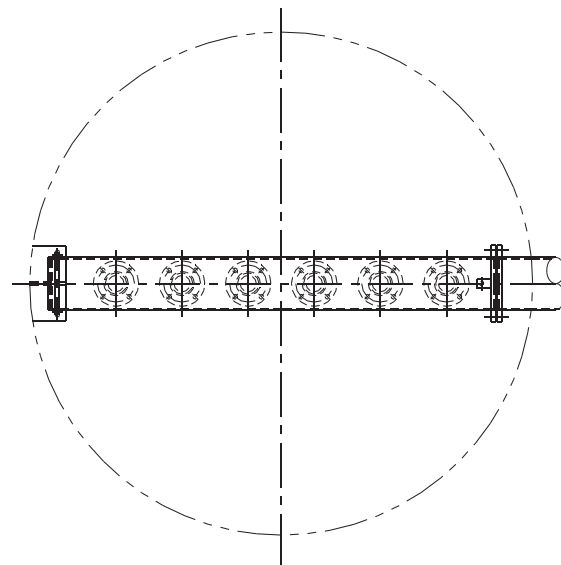
## TYPE 2119/2129

### Liquid Only Feed Pipe

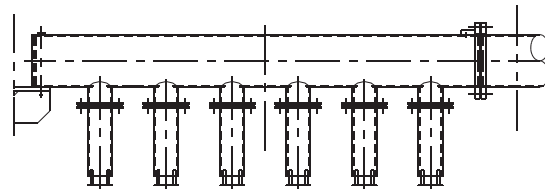
These types are for liquid only feed pipes used when liquid is fed from outside the column on to a distributor/redistributor. The type 2119 feed pipe is a piping system and while the type 2129 is a parting box or calming box system and handles much higher turndown ratio than type 2119, but requires more tower height.

Available in any weldable metal or Thermoplastic material.

Please ask us for more information regarding design and application.



FEED PIPE TYPE 2119



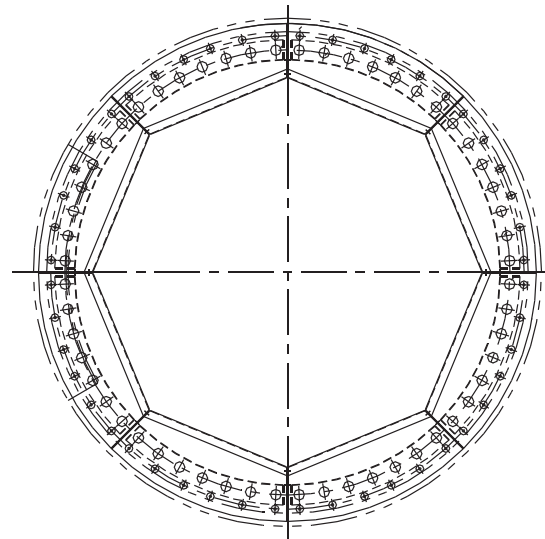
## TYPE 2755

### Flashing Feed Gallery

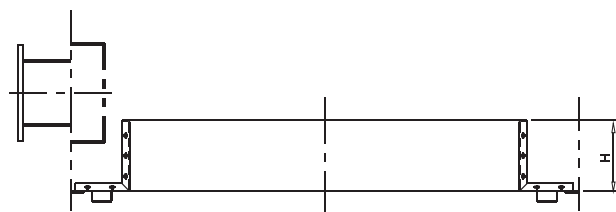
The flashing feed gallery is a two phase feed device fed by a tangential inlet tower or a radial nozzle with a flow deflector. The purpose of this type is to direct incoming flow tangentially into the tower wall. A gallery below the inlet collects liquid into a pool, making the vapor or gas disengage so that the liquid can fall directly to a distributor, a pre-distributor, or parting boxes.

Available in any weldable metal.

Please ask us for more information regarding design and application.



FLASHING FEED GALLERY TYPE 2755



# INTERNAL SELECTION GUIDE

## TYPE 2855

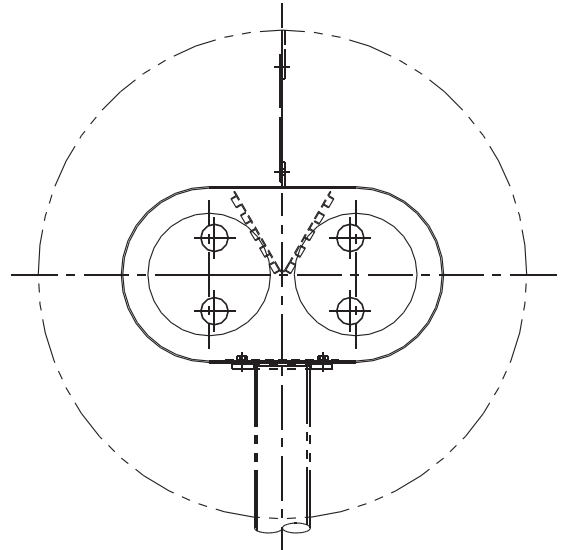
### Flashing Feed Chamber

This is a two-phase feed device with a radial inlet. The feed is in the chamber and separates the phase-vapor out of the top and liquid out the bottom to a distributor below.

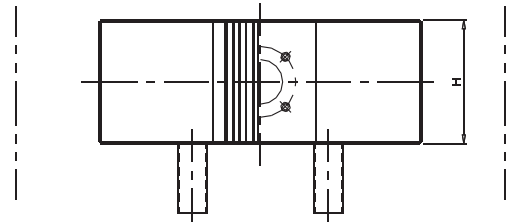
This can be used for traditional and new types.

Available in any weldable metal.

Please ask us for more information regarding design and application.



FLASHING FEED CHAMBER TYPE 2855



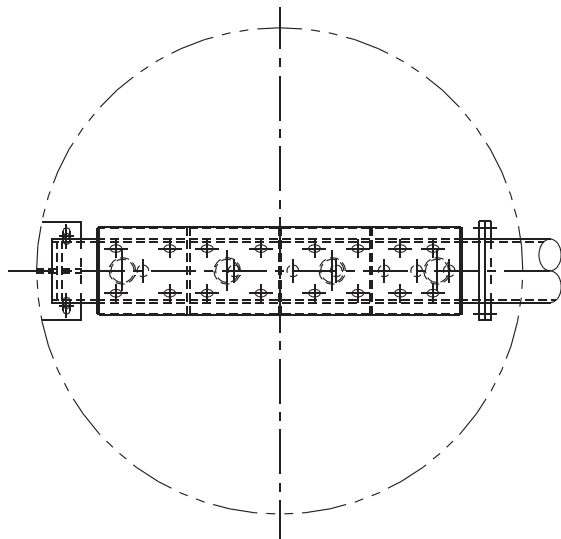
## TYPE 2955

### Flashing Feed Pipe

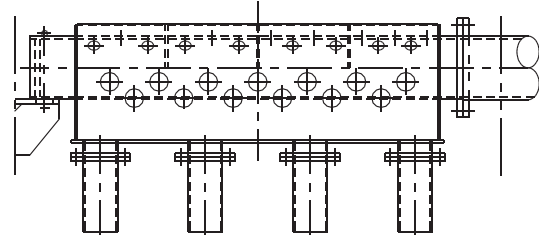
This is the type most commonly used for vacuum services when tower is larger than 48 in. (1200 mm) ID to separate two phase feed.

Available in any weldable metal.

Please ask us for more information regarding design and application.



FLASHING FEED PIPE 2955



# INTERNAL SELECTION GUIDE

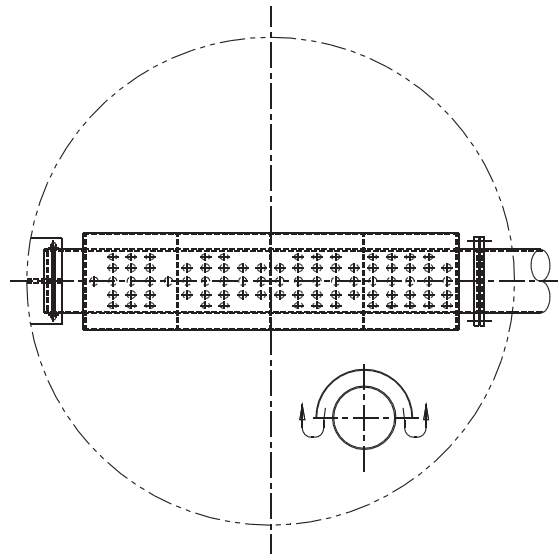
## TYPE 2196

### Vapor Diffuser

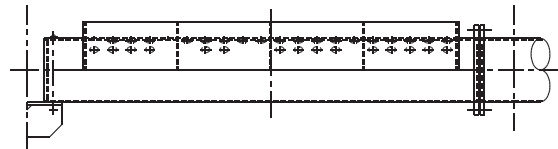
This type is used when the incoming flow is vapor only and the flow is excessive to prevent vapor maldistribution.

Available in any weldable metal.

Please ask us for more information regarding design and application.



VAPOR DIFFUSER TYPE 2196



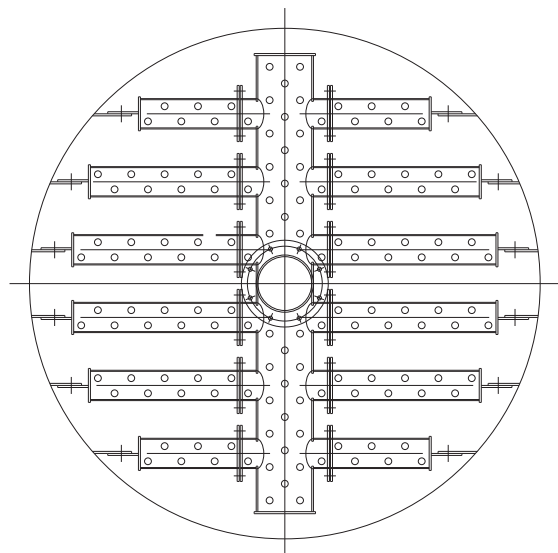
## TYPE 2198

### Vapor Distributor

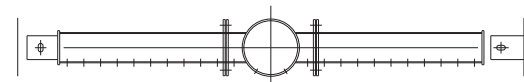
This is pipe arm type used for vapor distribution. And good for vapor feed at the bottom of the tower into a very tight space or the vapor has different composition or temperature.

Available in any weldable metal or Thermoplastic pipe material.

Please ask us for more information regarding design and application.



VAPOR DISTRIBUTOR TYPE 2198



# INTERNAL SELECTION GUIDE

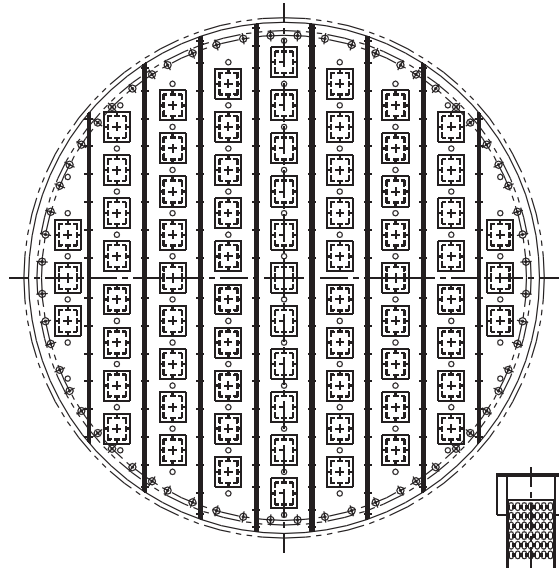
## TYPE 2896

### Vapor Distributor Plate for self anchoring

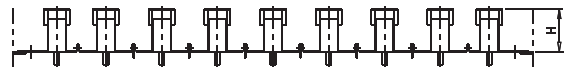
This is the type of distributor plate used above vapor-containing feeds to assure good vapor distribution to the packed bed above.

Available in any weldable sheet metal

Please ask us for more information regarding design and application.



VAPOR DISTRIBUTOR TYPE 2896



## TYPE 2633

### Chevron-Type Liquid Collector

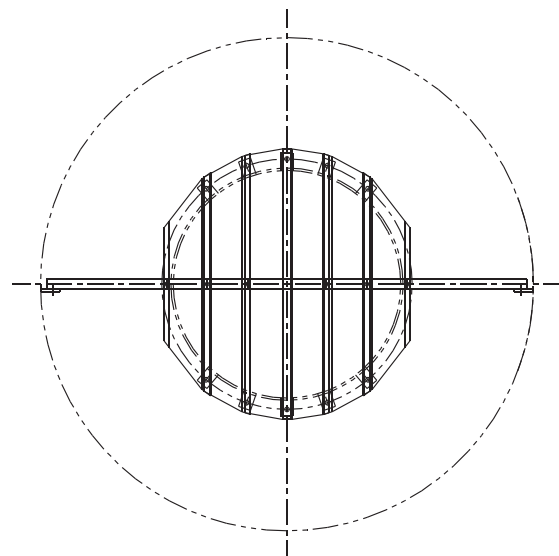
This is the type used for towers that are greater than 31.5 in.(800 mm) ID and that process high vapor loads and low liquid loads ( Vacuum service).

The plate collects overhead liquid drawn from the tower or feed to a distributor below.

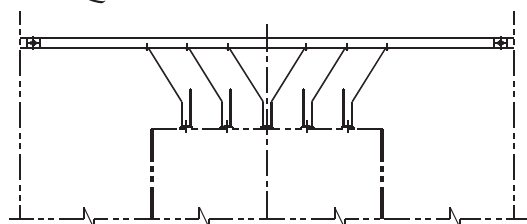
The plate consumes minimal pressure drop and avoids entrainment even at vapor rates high enough to cause entrainment from conventional gas risers.

Available in any weldable sheet metal

Please ask us for more information regarding design and application.



LIQUID COLLECTOR TYPE 2633



# INTERNAL SELECTION GUIDE

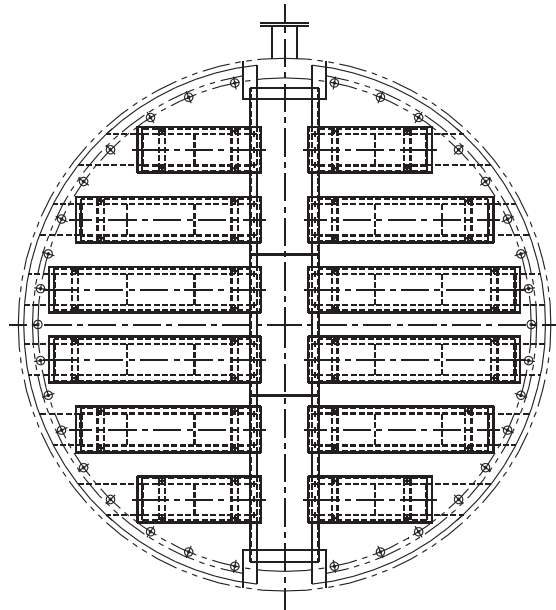
## TYPE 2733

### *Trough Liquid Collector*

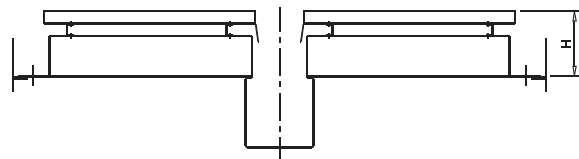
This is the type used for a wide variety of applications in towers greater than 55 in. (1400 mm) ID and generally is the best choice in larger towers where thermoexpansion is a concern. The trough arrangement minimizes welding to the vessel wall. The troughs are free to expand because they rest on the ledge.

Available in any weldable sheet metal, Thermoplastic or FRP material.

Please ask us for more information regarding design and application.



LIQUID COLLECTOR TYPE 2733



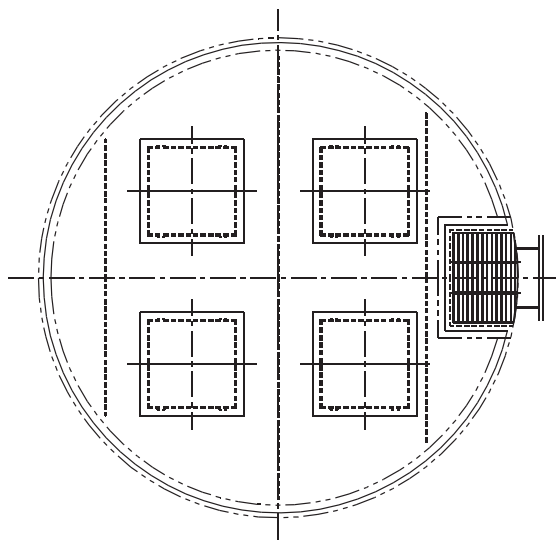
## TYPE 2833

### *Deck Liquid Collector*

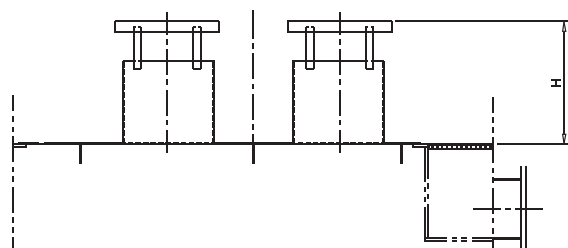
This is the type that can be used for towers of all sizes. Tall risers can be provided to allow a large volume of liquid on the deck. Sumps can be added on one side, both sides or across the center.

Available in any weldable sheet metal, Thermoplastic or FRP material.

Please ask us for more information regarding design and application.



LIQUID COLLECTOR TYPE 2833



# INTERNAL SELECTION GUIDE

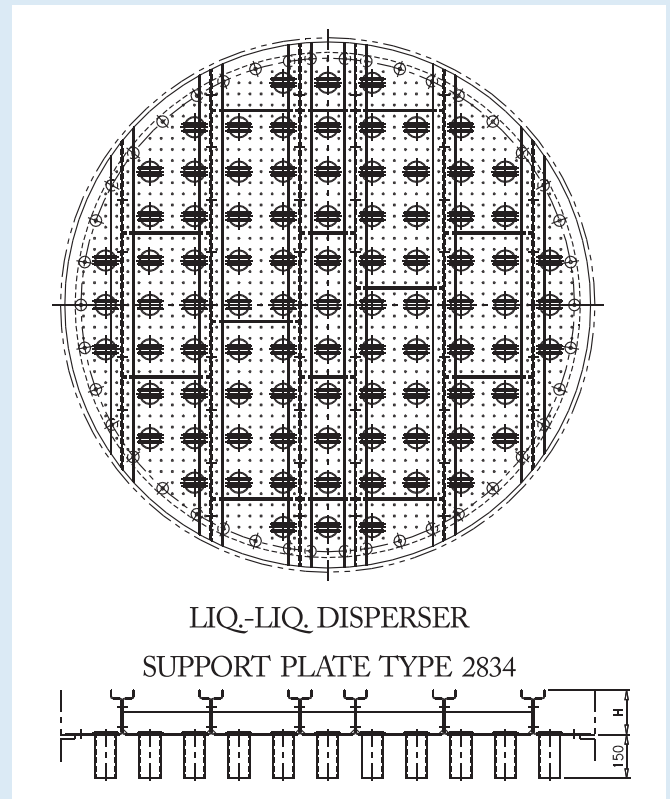
## TYPE 2834

### Liquid-Liquid Disperser Support Plate

This type is used 1). to support the packed bed and 2). to disperse the light phase into the continuous heavy phase. Dump tubes allow the heavy phase to travel downward through the plate as the orifices generate droplets. The plate design depends on interfacial surface tension, viscosity and differential densities. This plate acts also as a re-disperser in multi - bed towers.

Available in any weldable sheet metal.

Please ask us for more information regarding design and application.



LIQ.-LIQ. DISPERSER

SUPPORT PLATE TYPE 2834

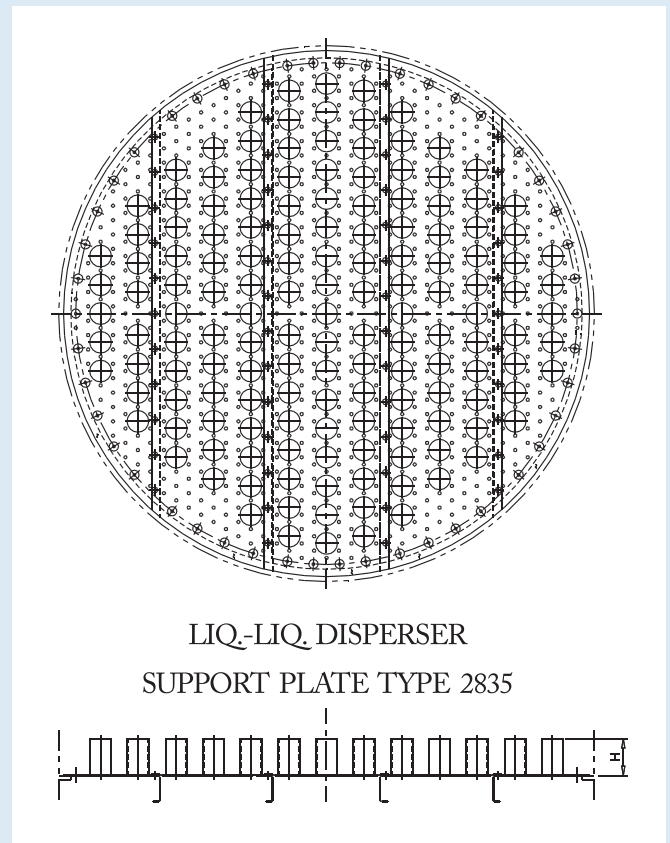
## TYPE 2835

### Liquid-Liquid Disperser Support Plate

This type disperses heavy phase into the continuous light phase. Riser tubes allow the light phase to pass up through the plate. The heavy phase forms a head on the top of the plate and orifices generate droplets. The plate design depends on interfacial surface tension, viscosity and differential densities.

Available in any weldable sheet metal.

Please ask us for more information regarding design and application.



LIQ.-LIQ. DISPERSER

SUPPORT PLATE TYPE 2835



# INTERNAL SELECTION GUIDE

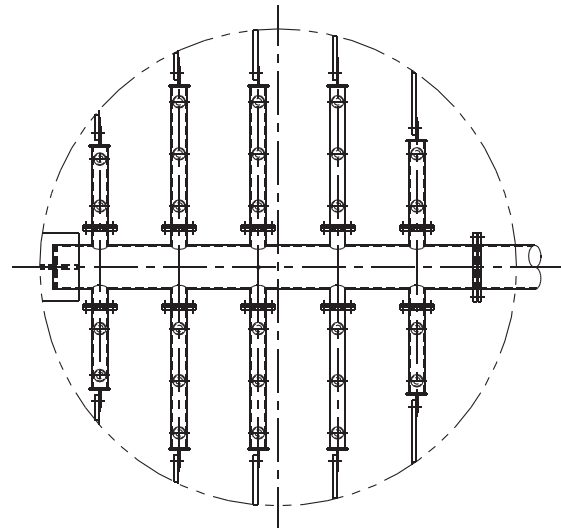
## TYPE 2644

### Liquid-Liquid Disperser-Phase Feed Pipe

This type controls velocity of the dispersed phase.  
This type controls feed velocity and correctly positions the discharge points to minimize disturbance.

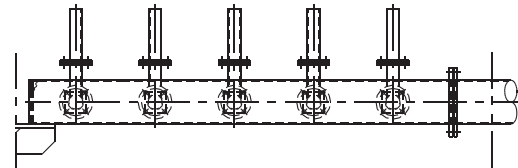
Available in any weldable metal in pipe.

Please ask us for more information regarding design and application.



LIQ-LIQ DISPERSER

PHASE FEED PIPE TYPE 2644



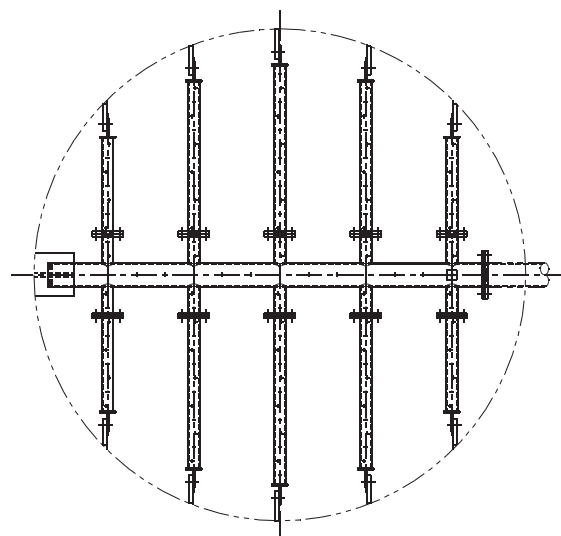
## TYPE 2744

### Liquid-Liquid Continuous-Phase Distributor

This type controls velocity of the continuous phase flow into the tower.  
Proper control of velocity is important to prevent excessive disturbance of the heavy/light interface.

Available in any weldable metal in pipe from.

Please ask us for more information regarding design and application.



LIQ-LIQ CONTINUOUS

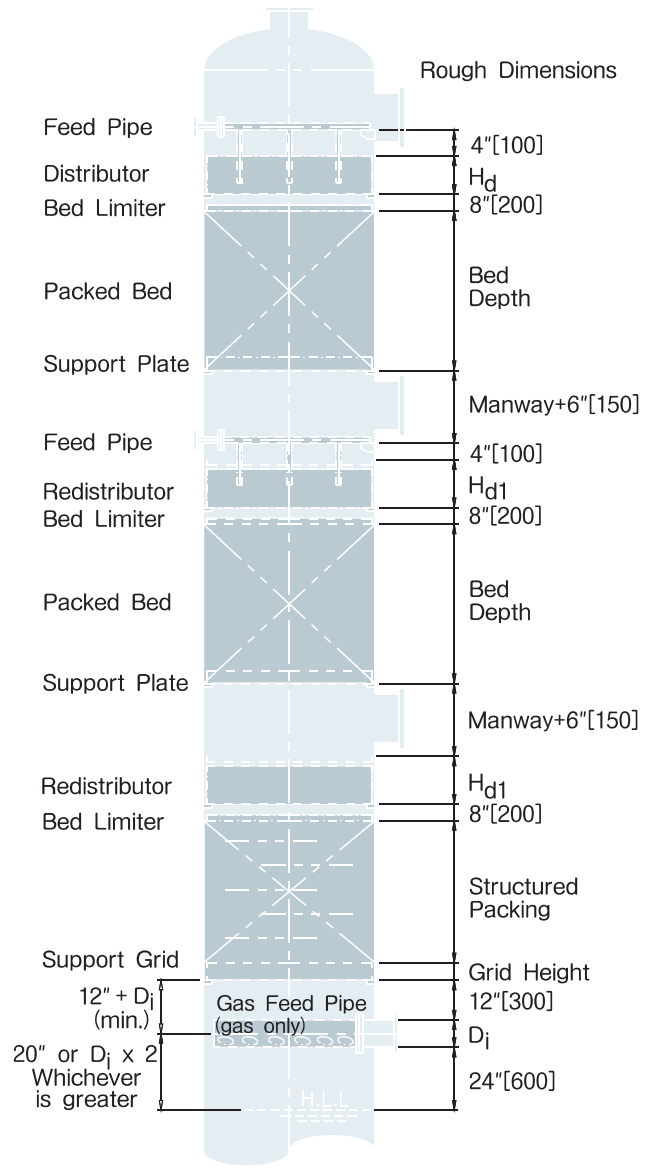
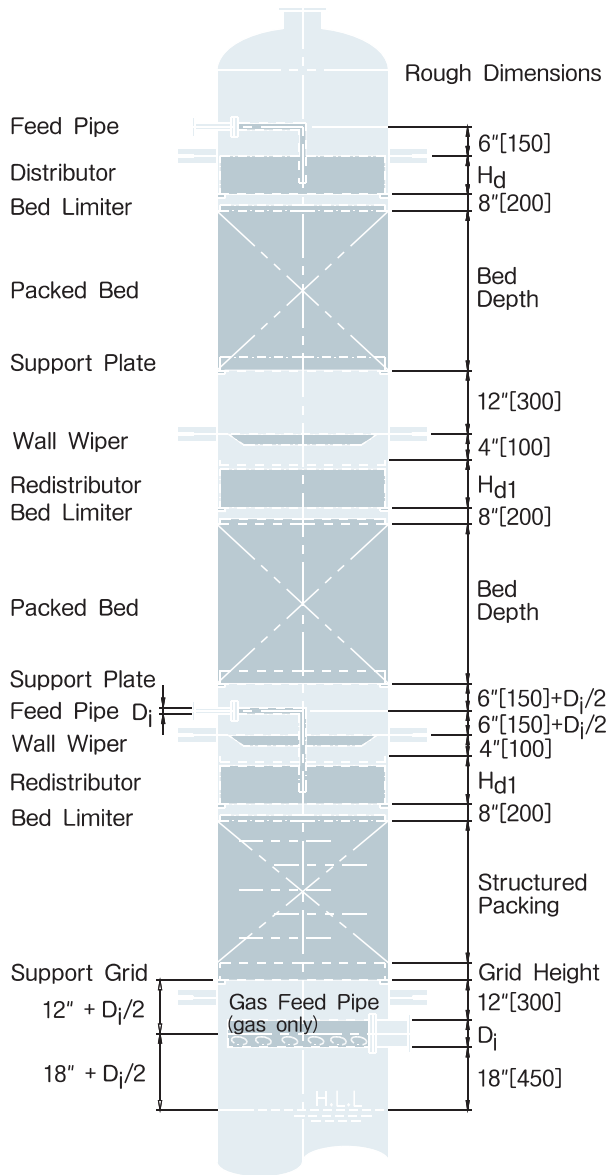
PHASE DISTRIBUTOR TYPE 2744



# TYPICAL TOWER LAYOUT

**Smaller Diameters**  
 (Flanged towers)

**Larger Diameters**  
 (Internals and packing pass through manways for installation)



\* Flash feed arrangement is not shown.

\* Typical dimensions are offered for rough estimating purposes.  
 Please contact Hanbal Masstech for exact dimension.

# ***INSTALLATION AND SUPERVISION***



HMT has experience in many countries such as, KOREA, THAILAND, MALAYSIA, BRAZIL, QATAR, IRAN, LIBYA, SAUDI ARABIA, INDIA, INDONESIA, EGYPT, AZERBAIJAN, CHINA, RUSSIA, and the U.S.A.[Providing complete products and components]

## **INSTALLATION SERVICES FOR:**

- \* BUBBLE CAP, VALVE, SIEVE, CARTRIDGE AND DUAL FLOW TRAYS
- \* PACKED TOWER AND REACTOR INTERNALS
- \* RANDOM, STRUCTURED, METAL, PLASTIC AND CERAMIC PACKINGS
- \* CONSULTATION AND SUPERVISION

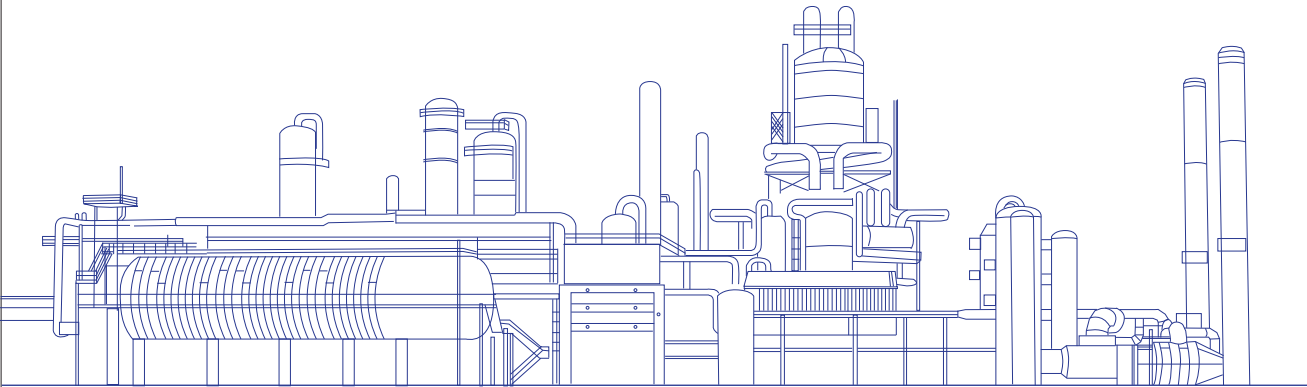
# ***QUALITY ASSURANCE AND CONTROL POLICY***

Our ultimate goal for quality assurance and control is to make sure we deliver the best in quality products with no missing parts at the exact time where they are required.

We have a long history, much experience, skilled designers, manufacturers, inspectors, supervisors, the best machines and have enough facilities to ensure our products go straight into boxes for the final shipment.

Our systems and machines fulfill most of the requirements that our customers wish us to accomplish to be their good supplier.

Please write or come see us to confirm what we say is true.



*HANBAL MASSTECH LIMITED*

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*MASS TRANSFER TECHNOLOGY*

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