

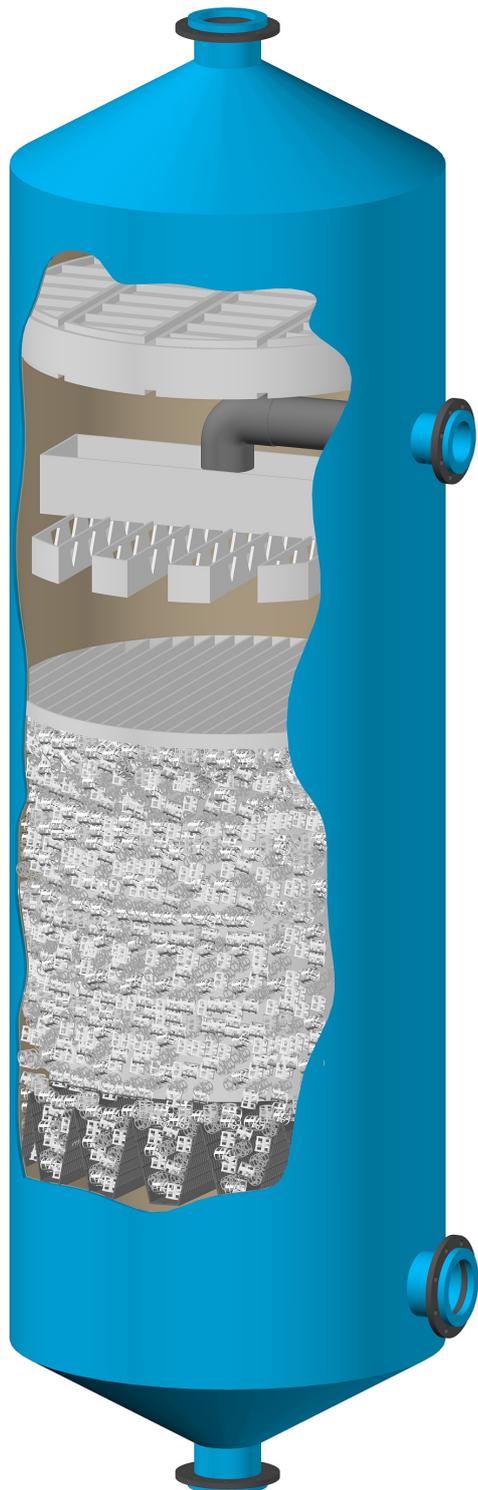


The
**PALL RING
COMPANY**

TOWER PACKINGS AND INTERNALS

COVER	1
INDEX	2
INTRODUCTION	3
PLASTIC PALL RINGS	4
P-Series 16 DATA	5
P-Series 25 DATA	6
P-Series 38 DATA	7
P-Series 50 DATA	8
P-Series 90 DATA	9
Volume Correction Factor	10
astraPAK®	11
astraPAK® DATA	12
METALLIC PALL RINGS	13
M-Series 16 DATA	14
M-Series 25 DATA	15
M-Series 38 DATA	16
M-Series 50 DATA	17
M-Series 90 DATA	18
ALTERNATIVE PACKINGS	19
PACKING SUPPORT PLATES	20
LIQUID DISTRIBUTION SYSTEMS	21
RE-DISTRIBUTORS	22
DEMISTERS	23
BED LIMITERS	24
TRANSPORT & PACKAGING	25
PLASTIC PACKINGS	25
METALLIC PACKINGS	26
PLASTIC & METALLIC INTERNALS	26
PROCESS DESIGN	27
PRECISION CNC ROUTING & MILLING	28
TERMS AND CONDITIONS	29
BACK COVER	30

The information and performance data contained in this brochure and technical leaflets including all information contained on our website has been proven over many years of successful operation. We believed this information and data to be accurate and reliable, however it is not to be construed as implying any form of contract, warranty or guarantee of performance. The Pall Ring Company reserve the right to modify designs and performance data. Please refer to our [Terms and Conditions](#).



At **The Pall Ring Company** we are able to provide our customers with an extensive range of products for mass transfer operations which include gas scrubbing, stripping, de-aeration, degassing, biological treatment, chemical processing and distillation columns.

We not only supply Pall Rings and other packings, but can also supply a complete range of tower internals manufactured from thermoplastics or metal to suit towers of any practical diameter.

Our unique and innovative products include:

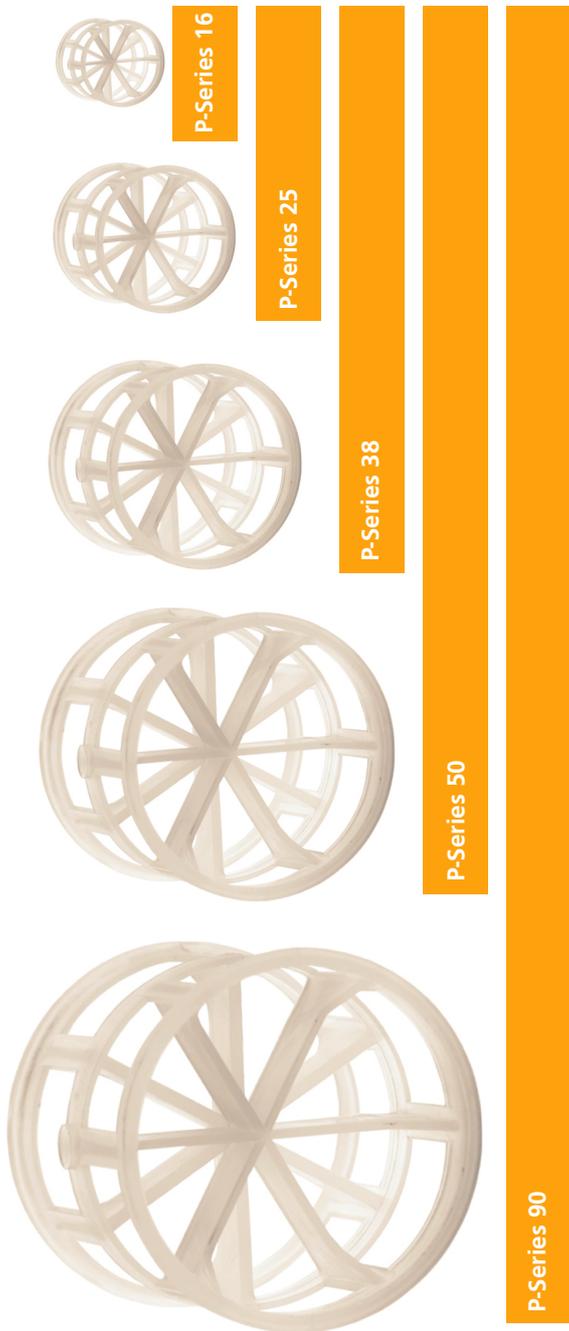
- ▶ **TOWER PACKINGS**
- ▶ **BIOLOGICAL /TREATMENT MEDIA**
- ▶ **PACKING SUPPORT PLATES**
- ▶ **LIQUID DISTRIBUTION SYSTEMS**
- ▶ **RE-DISTRIBUTORS**
- ▶ **DEMISTERS**
- ▶ **BED LIMITERS**
- ▶ **PROCESS DESIGN**
- ▶ **PRECISION CNC ROUTING & MILLING**

Manufactured in the UK to the highest standards, our stringent quality systems ensure full component traceability. With a wealth of experience and expertise, **The Pall Ring Company** has the ability to meet all your requirements for tower internals.

Our sales team are happy to discuss your specific requirements. Please contact us by phone on +44 (0)1366 389680 or email sales@pallrings.co.uk



PLASTIC PALL RINGS



PERFORMANCE CHARACTERISTICS:

An advancement on the Raschig Ring, the **Pall Ring** has similar cylindrical dimensions but has two rows of windows with webs within the cylinder, which significantly increases the performance of the packing, in terms of throughput, efficiency and pressure drop.

We are able to offer these in a variety of plastic: Polypropylene, PVC, PVDF, HDPE and glass filled and high temperature resistant Polypropylene.

As standard we offer our **Pall Rings** in a natural colour but if you need a different colour we are more than happy to help.

FEATURES:



CAPACITY vs PRESSURE DROP

Suited in low pressure drop, high capacity applications

A range of sizes allow the tower to operate at optimum efficiency and throughput

High degree of randomness

Consistent ratio of free and blocked passages, independent of orientation

Large Surface area: volume ratio augments the rate of liquid film surface renewal to improve mass transfer



HOLD-UP and TWO-PHASE CONTACT

Promotes highly efficient two-phase contact and distribution

A relatively high liquid hold-up promotes high absorption efficiencies, especially where the reaction rates are slow

Uninterrupted and consistent passages for gas and liquid flow



VERSATILITY

Open, cross linked design provides a highly efficient use of the ring's surface area

Robust to variations in liquid and vapour distribution



HIGH MECHANICAL STRENGTH

The cross structure of diametrical spars make it mechanically robust and suitable for use in deep packed beds

THERMOPLASTIC PALL RINGS – DATA TABLE

P-Series	Packing Size/mm	Free Space/%	Specific Surface Area/(m ² /m ³)	Number Per Unit Volume/(no./m ³)	Packing Factor/(m ⁻¹)	Specific Weight/(kg/m ³)		
						PP	PVDF	PVC
16	16	88	320	213,000	315	110	198	165
25	25	91	209	49,360	176	69	128	107
38	38	94	127	12,120	107	52	99	82
50	50	95	100	5,960	80	45	84	70
90	90	96	59	1,090	51	42	67	56



PLASTIC PALL RINGS



P-Series

TECHNICAL DATA

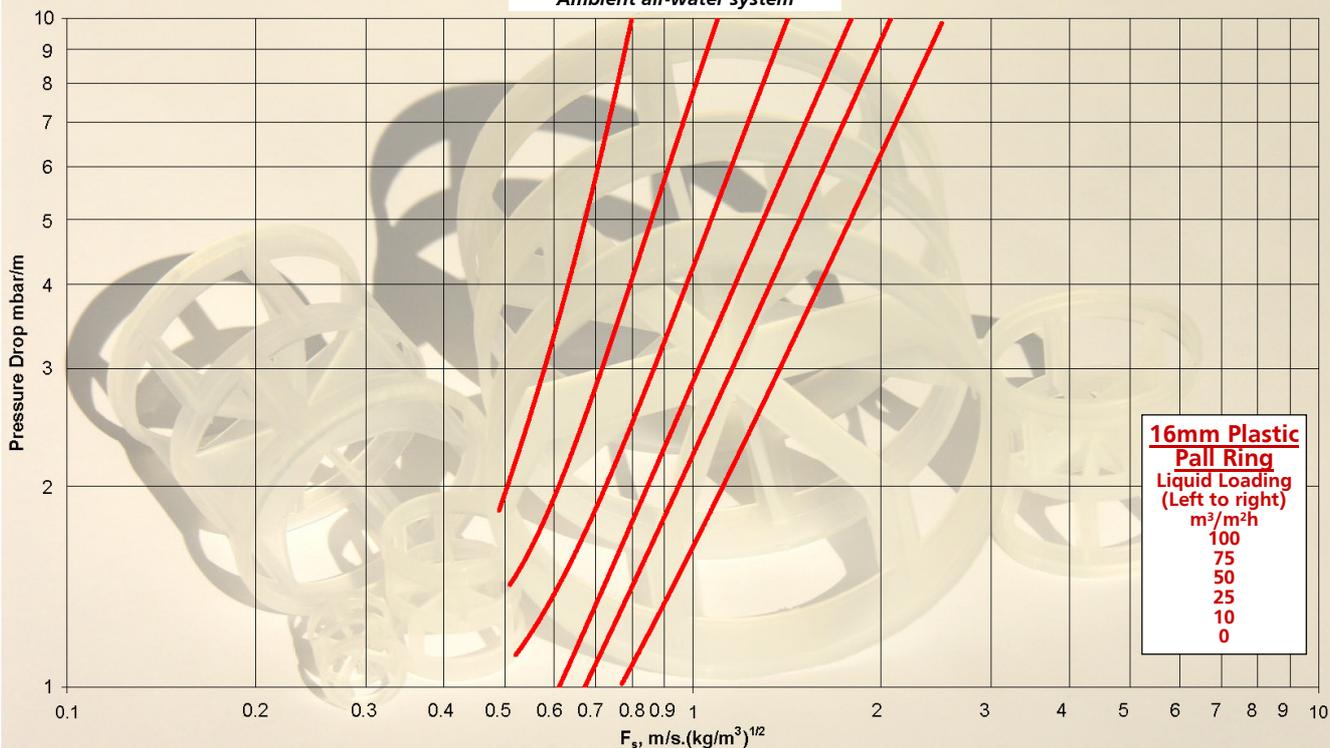
16mm Pall Ring

Free Space (%)	88
Specific Surface Area (m ² /m ³)	320
No. Per Unit Volume (m ³)	213,000
Packing Factor (m ⁻¹)	315

Available materials:
Polypropylene, PVC, PVDF, HDPE and glass filled Polypropylene.

PRESSURE DROP

16mm Plastic Pall Ring Ambient air-water system



16mm Plastic Pall Ring
Liquid Loading (Left to right)
m³/m²h
100
75
50
25
10
0



PLASTIC PALL RINGS



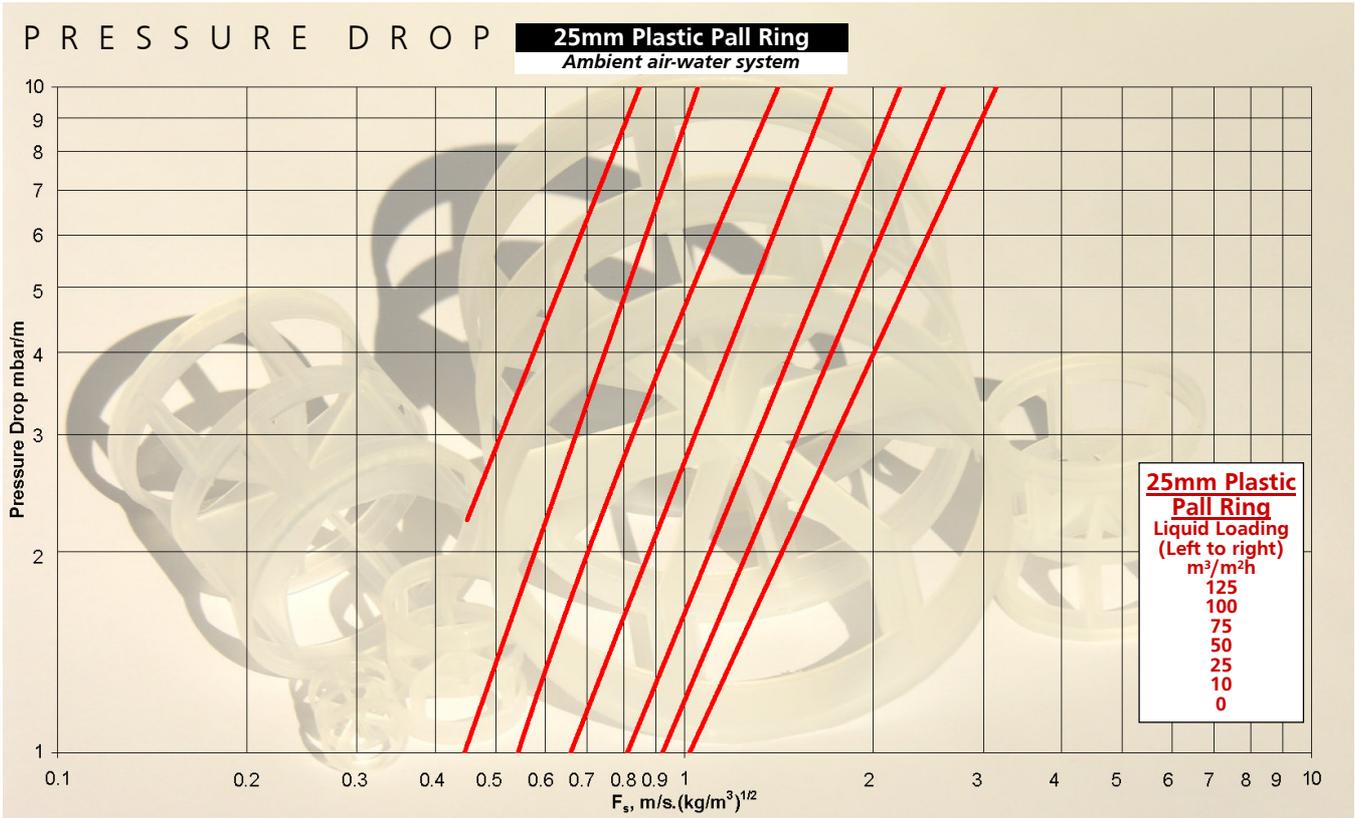
P-Series

TECHNICAL DATA

25mm Pall Ring

Free Space (%)	91
Specific Surface Area (m ² /m ³)	209
No. Per Unit Volume (m ³)	49,360
Packing Factor (m ⁻¹)	176

Available materials:
Polypropylene, PVC, PVDF, HDPE and glass filled Polypropylene.



PLASTIC PALL RINGS



P-Series

TECHNICAL DATA

38mm Pall Ring

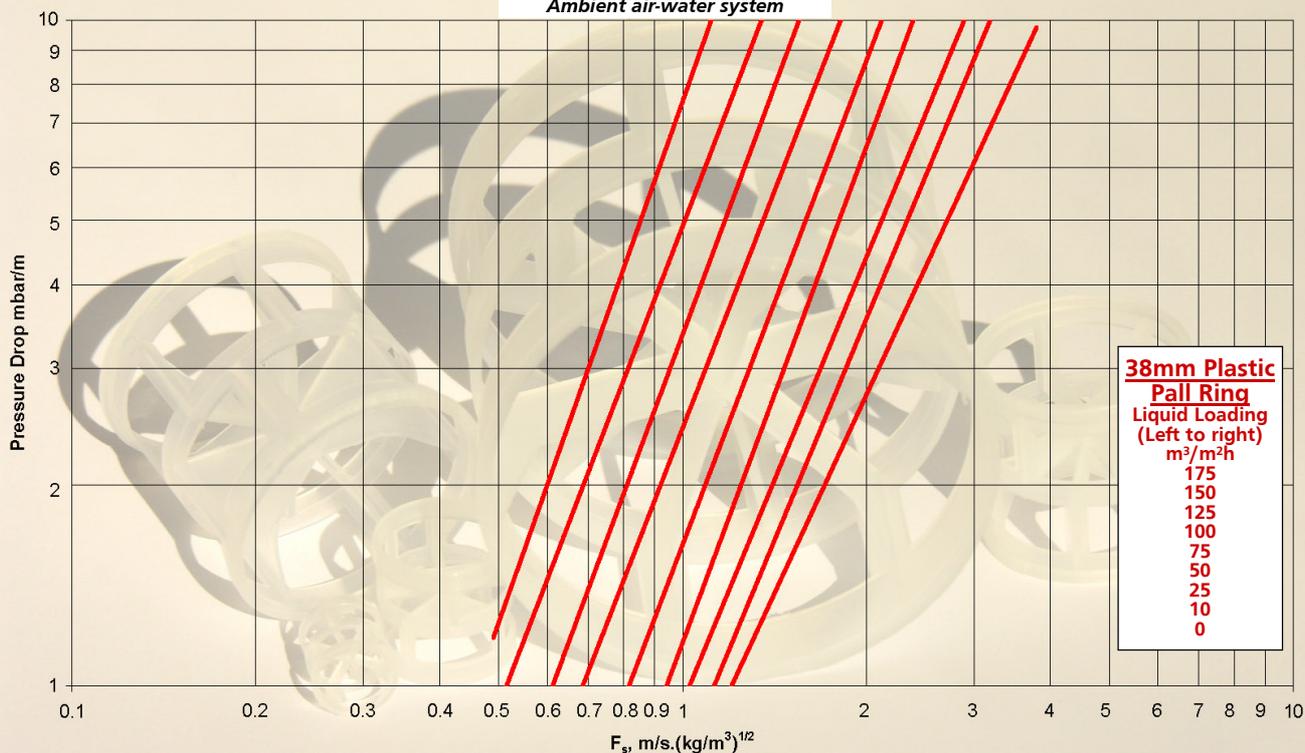
Free Space (%)	94
Specific Surface Area (m ² /m ³)	127
No. Per Unit Volume (m ³)	12,120
Packing Factor (m ⁻¹)	107

Available materials:

Polypropylene, PVC, PVDF, HDPE and glass filled Polypropylene.

PRESSURE DROP

38mm Plastic Pall Ring Ambient air-water system



PLASTIC PALL RINGS



P-Series

TECHNICAL DATA

50mm Pall Ring

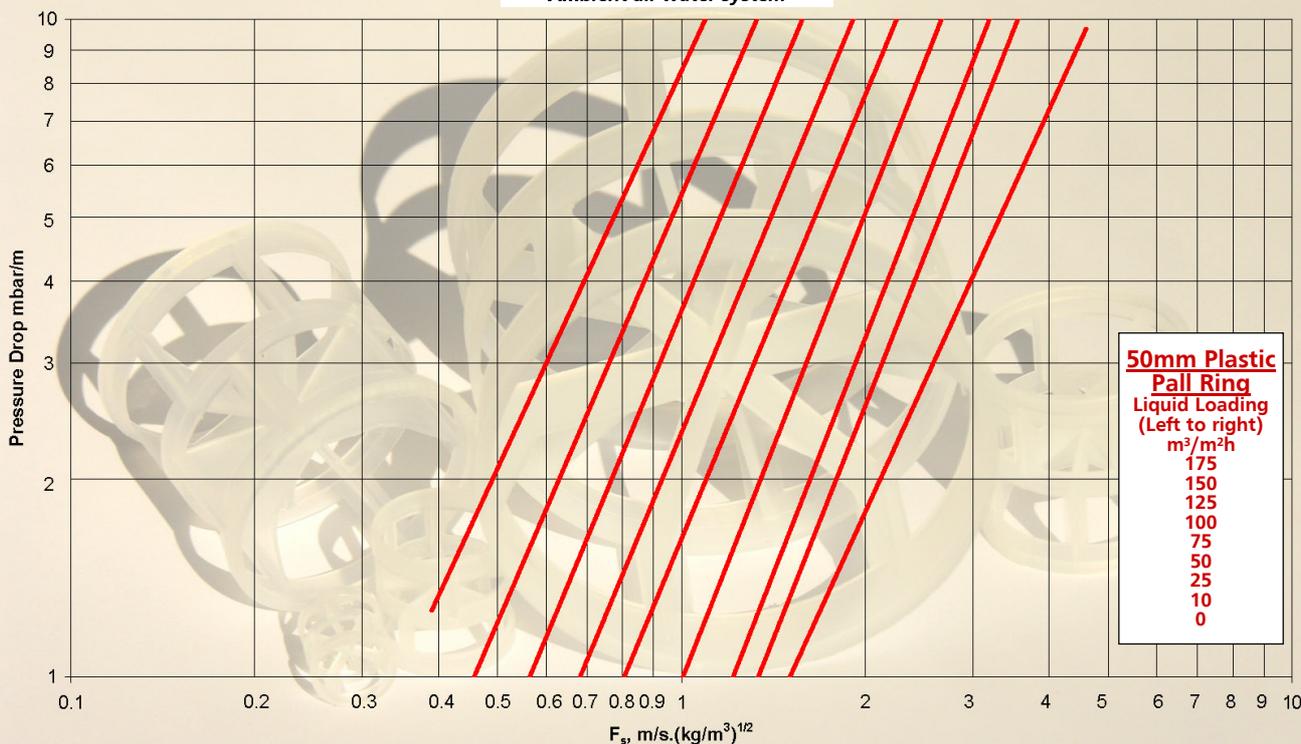
Free Space (%)	94.9
Specific Surface Area (m ² /m ³)	100
No. Per Unit Volume (m ³)	5,960
Packing Factor (m ⁻¹)	80

Available materials:

Polypropylene, PVC, PVDF, HDPE and glass filled Polypropylene.

PRESSURE DROP

50mm Plastic Pall Ring Ambient air-water system



PLASTIC PALL RINGS



P-Series

TECHNICAL DATA

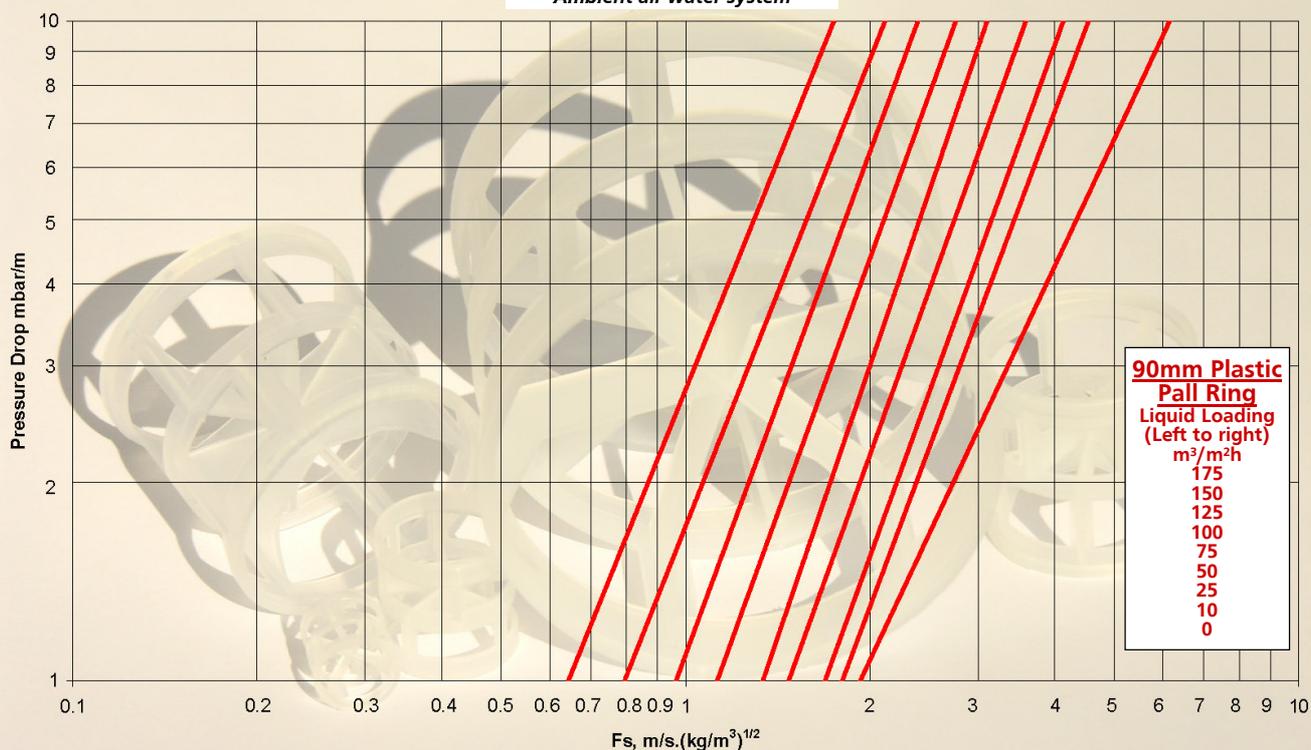
90mm Pall Ring

Free Space (%)	96
Specific Surface Area (m ² /m ³)	59
No. Per Unit Volume (m ³)	1,090
Packing Factor (m ⁻¹)	51

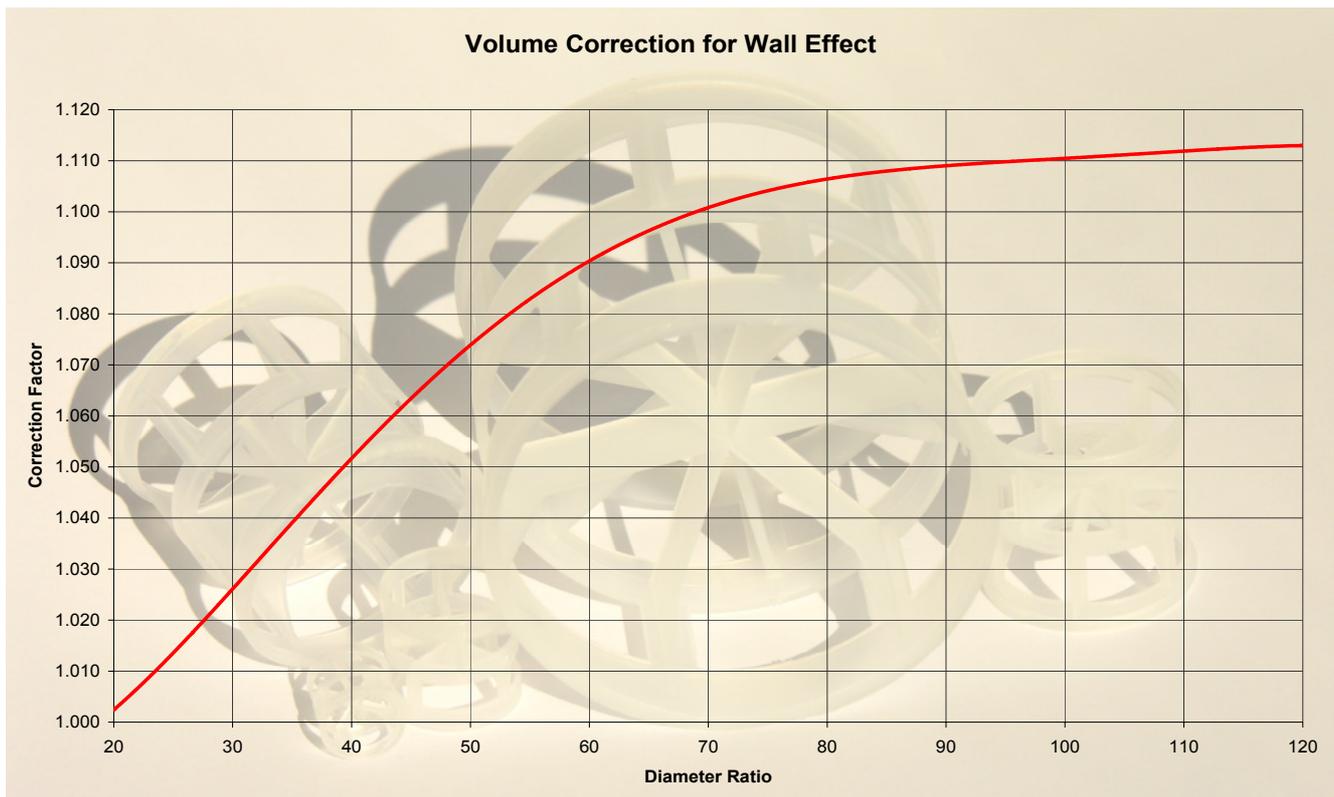
Available materials:
Polypropylene, PVC, PVDF, HDPE and glass filled Polypropylene.

P R E S S U R E D R O P

90mm Plastic Pall Ring Ambient air-water system



VOLUME CORRECTION FACTOR



The arrangement of packings at the vessel wall is less compact than in the interior of the bed, thus the number of packings per unit volume increases with the diameter ratio.

For diameter (D/d) ratios greater than 20, the Supply Volume (V_s) required to completely fill the media bed geometric volume (V_g) is calculated using the graph above and equation below:-

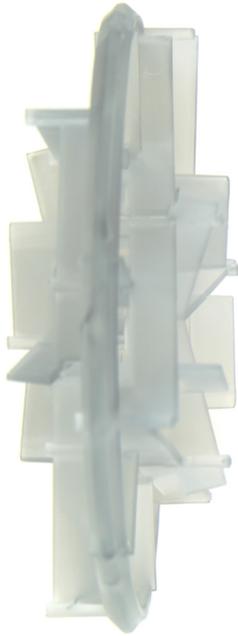
$$V_s = F \times V_g$$

NOTE!

The above correction factor (F) accounts for the "wall effect" only. Bed height reduction caused by vertical compaction of the bed will require separate consideration.



astraPAK®

HIGH PERFORMANCE
RANDOM PLASTIC PACKING

astraPAK®'s distinctive shape provides a high separation efficiency, while maintaining an extremely low pressure drop, which greatly reduces unit running costs.

astraPAK® is manufactured in copolymer polypropylene as standard but we can also offer in homopolymer Polypropylene, PVDF, HDPE, glass filled and high temperature resistant Polypropylene.

PERFORMANCE CHARACTERISTICS:

The astraPAK® provides the lowest pressure drop of all **The Pall Ring Company's** random plastic tower packing types

The low DP / unit height of packed beds allows:

- a high tower capacity, which in turn allows for smaller column diameters and fans in new bespoke designs
- a significant reduction in the unit's energy consumption

The highly efficient 2-phase contact, even at low throughputs yields a high separation performance and facilitates a reduced packed height

The high liquid volumetric capacity allows for smaller column diameter in new bespoke designs

FEATURES:



INCREASED EFFICIENCY

Exceptional wetting properties permit large variation in liquid flow rates

High gas flows and high liquid irrigation rate with exceptionally low pressure drop



REDUCED ENERGY CONSUMPTION

Low pressure drops facilitate smaller fans and lower power consumption



EXCEPTIONAL CHEMICAL RESISTANCE

Moulded in virgin polymers to give exceptional robustness. Also available in other engineering thermoplastics for critical applications

OUTSTANDING STRENGTH &
DURABILITY

Thanks to its distinctive structure astraPAK® is extraordinarily robust exhibiting unbeatable qualities of stability and resilience

APPLICATIONS:

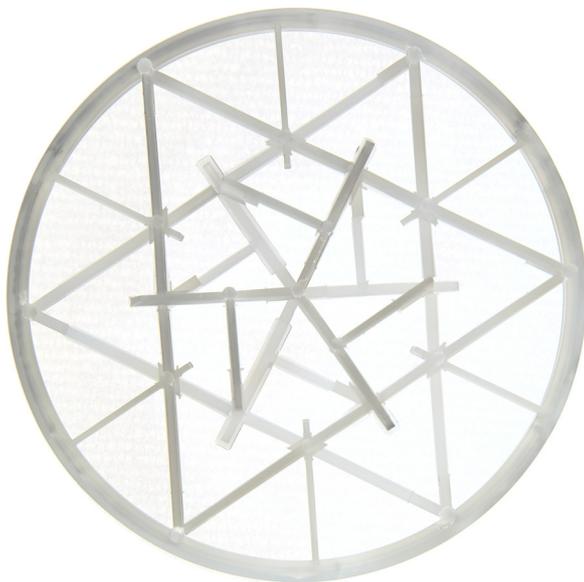
High flow random tower packing is ideal for environmental applications such as:

LARGE ODOUR & FUME SCRUBBERS

NO_x & HCl SCRUBBING TOWERS

STRIPPING TOWERS

including the removal of VOC from groundwater



astraPAK®



TECHNICAL DATA astraPAK®

Free Space %	97
Specific Surface Area (m ² /m ³)	102
No. Per Unit Volume (m ³)	5,050
Specific Weight (kg/m ³) in polypropylene	53
Diameter (mm)	90

When calculating the volume of the random packing to suit the volume of the packed tower, it is important to consider the wall effect & vertical compaction. astraPAK® being of an unusual design has different compaction rates depending on the diameter of the tower and how the tower is loaded and consolidated. Due to the diameter & design configuration of astraPAK® it is not commonly used in towers with a diameter of less than 1000mm. A portion of the astraPAK® media will interlock during loading thus requiring more than the normal volume correction factor compared to pall rings. As a guide a minimum of 12% extra should be allowed. If the tower is large and is loaded with the maximum amount of compaction, figures between 15% and 18% should be considered. Your process design is normally calculated using the design data given for astraPAK® which is based on one cubic meter bag of astraPAK® containing 5,050 units. If compaction takes place during and after loading and the depth of bed reduces slightly, theoretically the performance will not be affected as the Kga & hydraulic data are based on the number of units in a standard cubic meter.

P R E S S U R E D R O P

astraPAK® (Plastic)
Ambient air-water system



METALLIC PALL RINGS



PERFORMANCE CHARACTERISTICS:

An advancement on the Raschig Ring, the **Pall Ring** has similar cylindrical dimensions but has two rows of punched out holes with fingers or webs turned into the center of the cylinder, which significantly increases the performance of the packing, in terms of throughput, efficiency and pressure drop.

We are able to offer our **Pall Rings** in a variety of materials such as grade 304, 316, or 430 Stainless Steel, Carbon Steel, Copper or special alloys.

FEATURES:

CAPACITY vs PRESSURE DROP

High loading and throughput/low pressure drop
Good liquid/gas distribution and high mass transfer efficiency

VERSATILITY

Easily wettable
High resistance to fouling
High temperature

HIGH MECHANICAL STRENGTH

High temperature applications
Mechanically robust, lesser probability of breakage

APPLICATIONS

Various separation and absorption applications at atmospheric pressure and under vacuum, where a low pressure drop is critical

- H₂S, NH₃ & SO₂ absorption and stripping
- Steam stripping
- Quench towers
- Direct contact cooling
- Reaction Towers
- Distillation Columns



METALLIC PALL RINGS-DATA TABLE

M-Series	Packing Size/mm	Free Space/%	Specific Surface Area/(m ² /m ³)	Number Per Unit Volume/(no./m ³)	Specific Weight/(kg/m ³) STAINLESS STEEL								
					0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
16	16	93	316	210,000	400	535	N/A						
25	25	94	209	49,500	N/A	322	403	483	564	644	N/A	N/A	
38	38	95	122	13,450	N/A	200	250	300	350	400	N/A	N/A	
50	50	96	100	6,000	N/A	N/A	196	235	275	314	354	N/A	
90	90	97	54	1,000	N/A	N/A	N/A	N/A	144	165	180	206	

OTHER METALS ON REQUEST



METALLIC
PALL RINGS

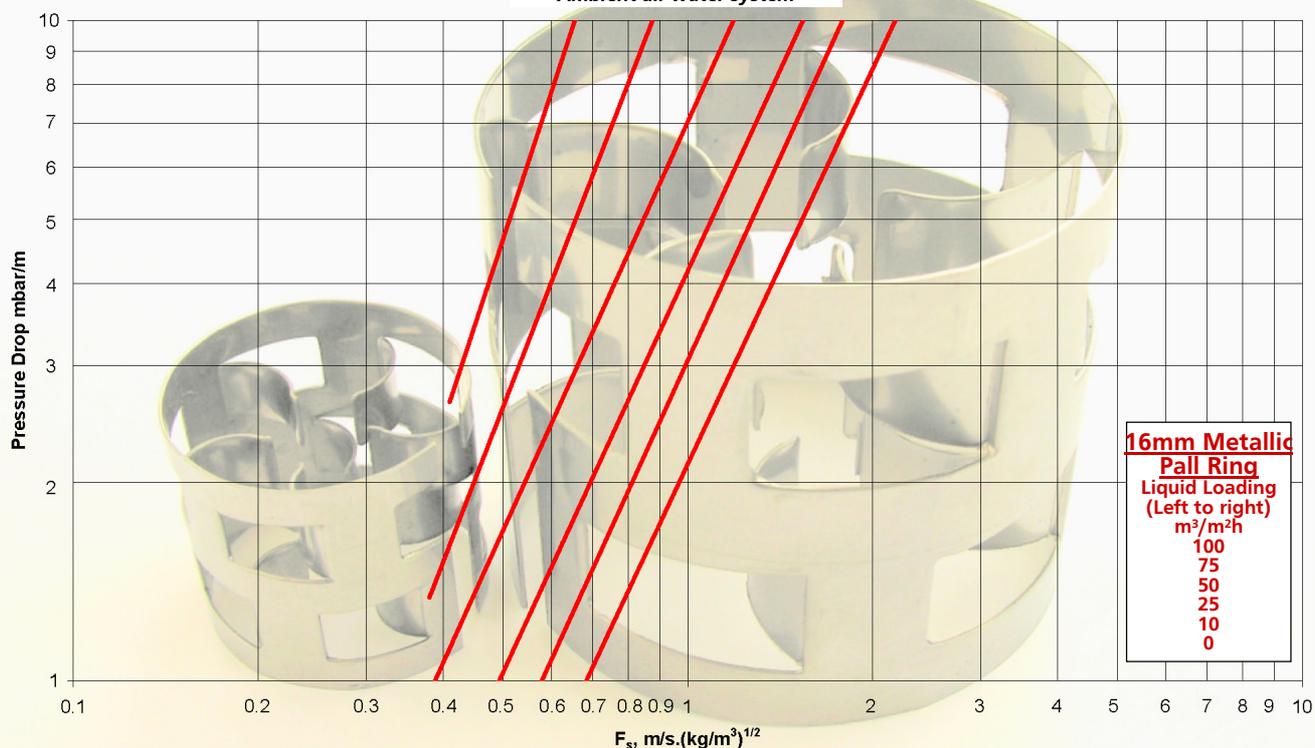
M-Series

TECHNICAL DATA

16mm Pall Rings

Free Space (%)	93
Specific Surface Area (m ² /m ³)	316
No. Per Unit Volume (m ³)	210,000
Packing Factor (m ⁻¹)	315
Specific Weight (kg/m ³) <i>Stainless Steel</i>	400 – 535
Dimensions (mm)	16 x 16
Thickness (mm)	0.3 – 0.4

P R E S S U R E D R O P

16mm Metallic Pall Ring
Ambient air-water system

METALLIC PALL RINGS



M-Series

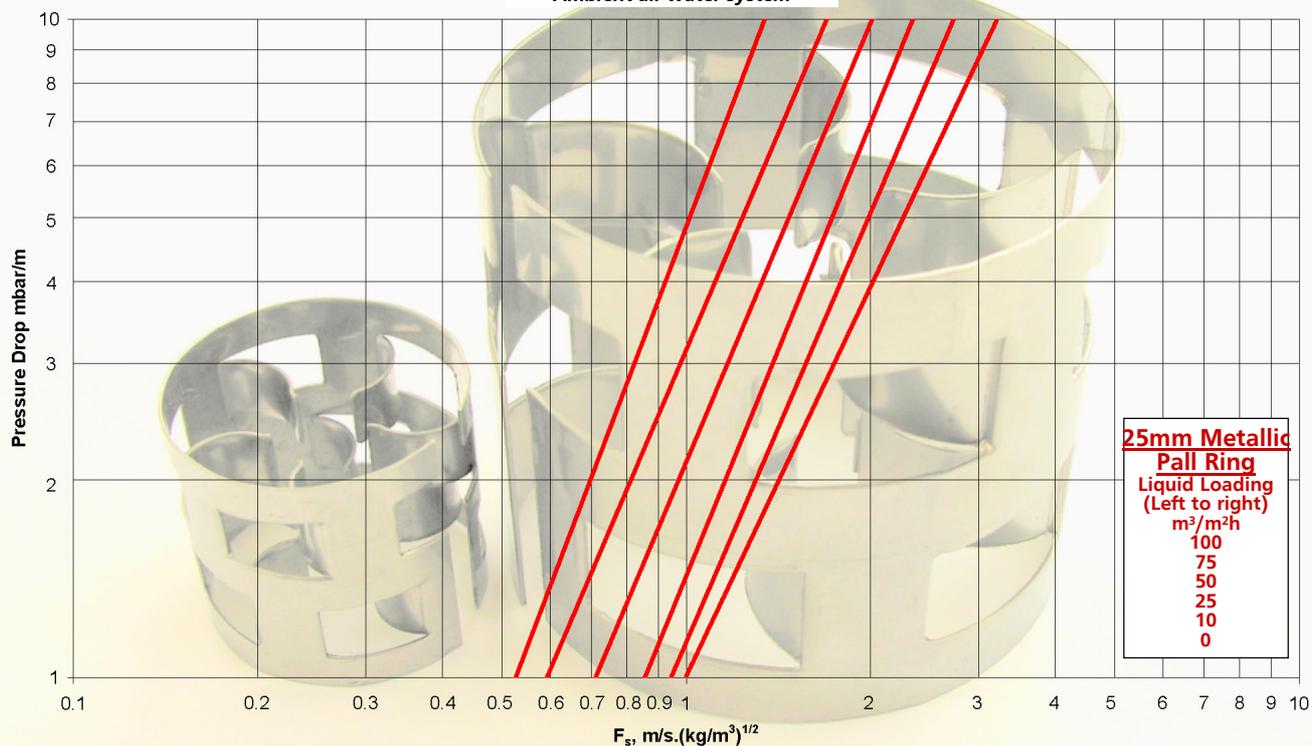
TECHNICAL DATA

25mm Pall Rings

Free Space (%)	94
Specific Surface Area (m ² /m ³)	209
No. Per Unit Volume (m ³)	49,500
Packing Factor (m ⁻¹)	176
Specific Weight (kg/m ³) <i>Stainless Steel</i>	322 – 644
Dimensions (mm)	25 x 25
Thickness (mm)	0.4 – 0.8

P R E S S U R E D R O P

25mm Metallic Pall Ring
Ambient air-water system



METALLIC PALL RINGS



M-Series

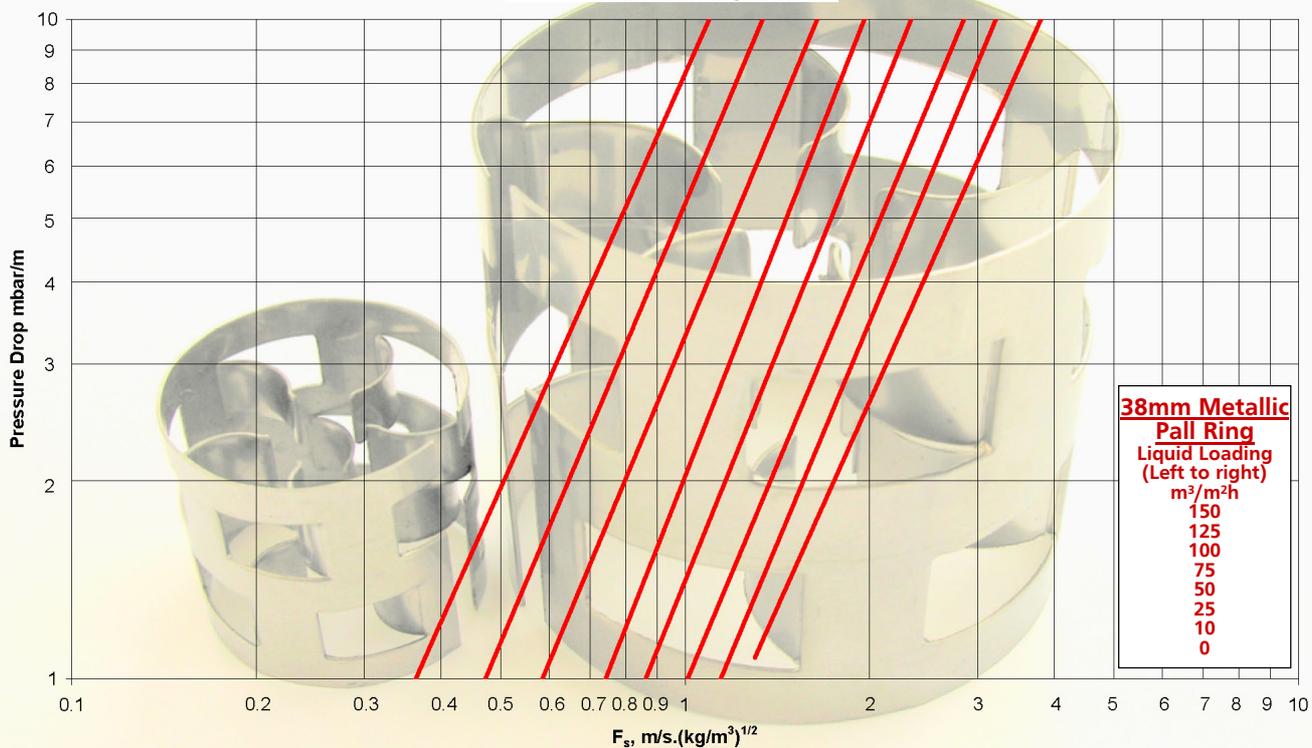
TECHNICAL DATA

38mm Pall Rings

Free Space (%)	95
Specific Surface Area (m ² /m ³)	122
No. Per Unit Volume (m ³)	13,450
Packing Factor (m ⁻¹)	107
Specific Weight (kg/m ³) <i>Stainless Steel</i>	200 – 400
Dimensions (mm)	38 x 38
Thickness (mm)	0.4 – 0.8

P R E S S U R E D R O P

38mm Metallic Pall Ring
Ambient air-water system



METALLIC PALL RINGS



M-Series

TECHNICAL DATA

50mm Pall Rings

Free Space (%)	96
Specific Surface Area (m ² /m ³)	100
No. Per Unit Volume (m ³)	6,000
Packing Factor (m ⁻¹)	107
Specific Weight (kg/m ³) <i>Stainless Steel</i>	196 – 354
Dimensions (mm)	50 x 50
Thickness (mm)	0.5 – 0.9

P R E S S U R E D R O P

50mm Metallic Pall Ring
Ambient air-water system



METALLIC PALL RINGS



M-Series

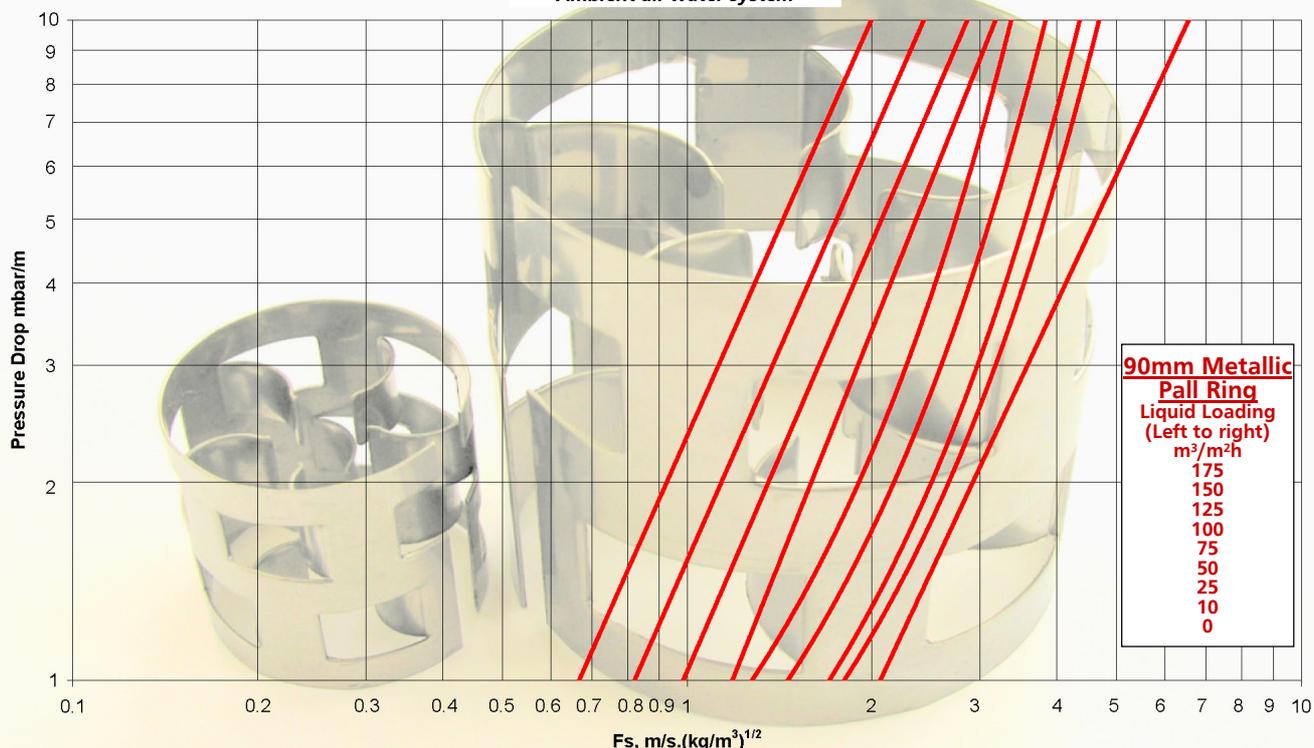
TECHNICAL DATA

90mm Pall Rings

Free Space (%)	97
Specific Surface Area (m ² /m ³)	54
No. Per Unit Volume (m ³)	1,000
Packing Factor (m ⁻¹)	50
Specific Weight (kg/m ³) <i>Stainless Steel</i>	165 – 206
Dimensions (mm)	90 x 90
Thickness (mm)	0.7 – 1.0

P R E S S U R E D R O P

90mm Metallic Pall Ring
Ambient air-water system



ADDITIONAL PACKINGS

BIOLOGICAL MEDIA



C-RINGS



I-RINGS



BIOLOGICAL MEDIA

In biological processes, the main concern is to maximise the surface area of the packing on which the bacteria inhabit, whilst maintaining open access for two-phase contact. Much of the random media currently in use is based on the original Raschig Ring. Even though this packing is cost-effective to produce, the internal surface contact is poor and it is susceptible to blockages, thereby reducing the flow through the bed. Other more open media have been developed with internal webs and ribs to provide additional surface area but these produce notches and crevices where dead bacteria and debris can form.

In contrast, **The Pall Ring Company's** random media for biological processes mirrors the original Raschig Ring, in that it is a smoothly shaped ring but with a corrugated surface, free from internal protrusions, thereby giving good access to its open, inner surfaces and excellent flow through characteristics. This media is manufactured from polypropylene and will float in a flooded filter, clear of bottom inlet and outlet ports, and, it requires only minimal upward retention. Also, since it floats, the movement caused by liquid flowing over the media, will deter solids built-up. There is a small external ledge around the corrugations giving an area for bacterial colonies to develop without blockages.

The Pall Ring Company's BIOLOGICAL MEDIA is available sized 300, 200, 150 and 100 m²/m³.



C-RINGS *in metals including stainless steel & special alloys*

PERFORMANCE CHARACTERISTICS:

CAPACITY Vs PRESSURE DROP

Lower aspect ratio increase capacity and reduces pressure drop

Its preferential orientation in a packed bed with the cylindrical axis in the vertical plane, allows a free passage for gas to flow through it

The lower pressure drop and higher throughput enables a smaller column diameter and fan size to be specified in new installations

The highly exposed internal and external surfaces provide an efficient vehicle for liquid-gas contact, by multiple drip-points

Lower tendency to nest, which means less channelling and fewer dry spots.

FOULING

More resistant to fouling because a combination of its vertical alignment and open sides, allow any solids present to be flushed downwards through the packed bed.

MECHANICAL STRENGTH

It possesses good mechanical strength, which allows its use in deep packed beds that have a higher hydraulic capacity.



I-RINGS *in metals including stainless steel & special alloys*

PERFORMANCE CHARACTERISTICS:

30% lower pressure drop than Pall Rings

Low liquid hold-up

It's physical shape permits maximum randomness and minimum alignment

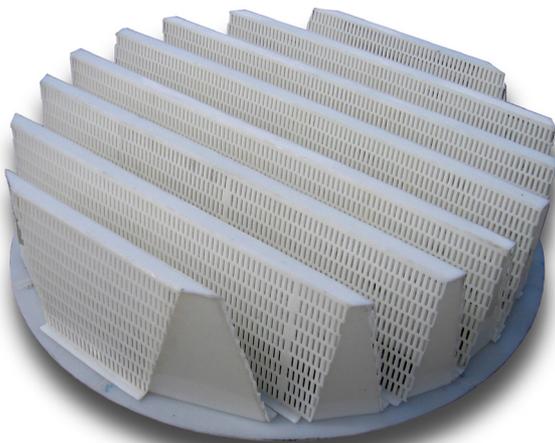
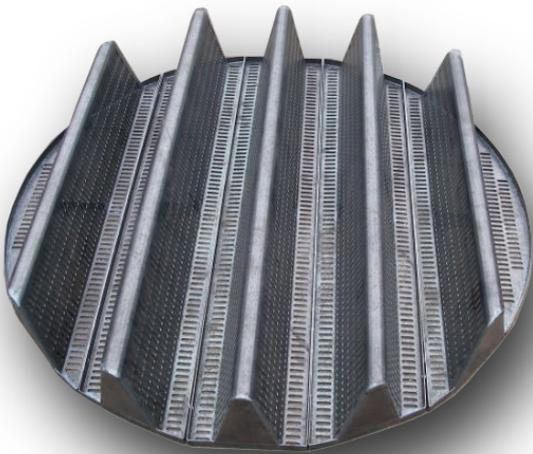
Advanced design gives it a high rate of liquid film surface renewal producing a high mass transfer rate, leading to a greater capacity and efficiency compared to other random packings

Large number of contact points for homogenous distribution of liquid and gas

Facilitates shorter packed bed heights.



PACKING SUPPORT PLATES



A random packed bed is held on a **Multi Beam Packing Support Plate**, whose essential attributes are to have a high percentage of open area so as to not inhibit the capacity of the tower and to allow the unrestricted counter-current flow of both liquid and vapour through it. This is achieved by providing separate passageways for the gas and the liquid. A series of slotted or perforated beams allow the gas to flow upwards through those openings that are located physically higher than the ones which the liquid flows downwards through, at the base of the plate.

Typically, this type of **Support Plate** will offer an open area equivalent to 100% of the cross-sectional area of the tower.

Also, the plate must have sufficient strength to retain and support the packed bed above it, including any liquid hold-up and trapped solids or fouling.

The **Random Packing Gas Injection Support Plate** is designed to retain tower packings from 16mm to 90mm.

Multi Beam Support Plates can be supplied in sections to allow easy installation through access manways. It is usually installed on an internal ring or support ledge.

Additional support beams should be considered in larger towers to provide the necessary structural support. Advice on the support system will be given.

Support Plates can be fabricated and supplied in a range of thick thermoplastics or metals including stainless steels & special alloys.

We can fabricate **Support Plates** with diameters from as little as 300mm to almost any diameter.



LIQUID DISTRIBUTION SYSTEMS



At **The Pall Ring Company** we are able to provide our customers with an extensive range of **Liquid Distribution Systems**. Using our expertise in metals and plastics fabrication, we can provide a strong, dimensionally accurate product which can be manufactured in a range of different thermoplastics materials or from various metals. These distributors can be designed for tower of almost any diameter.

PRODUCT RANGE:

PAN/TRAY TYPE LIQUID DISTRIBUTION SYSTEMS

A **Pan/Tray/Deck Type Distributor** consists of a simple flat tray or pan with a series of orifices evenly spaced over its entire area. The liquid is fed directly onto the tray by a feed pipe, which then distributes the liquid evenly over the tower's packed bed.

These types of distributors are often fitted with riser tubes to allow the unhindered passage of the gas stream up through the tray, to provide a uniform flow of liquid down through it and to minimise hold-up and prevent over-flowing.

Pan/Tray/Deck Type Distributors are normally considered for towers with a diameter of up to 1.5 metres.

TROUGH TYPE LIQUID DISTRIBUTION SYSTEMS

A **Trough Type Distributor** consists of a pre-distribution parting-box mounted above a number of equally spaced, narrow troughs incorporating weirs or orifices designed by our computer models to suit various flows.

Initially, the liquid is fed into the 'parting-box', which in turn evenly feeds the troughs below. One 'parting-box' is usually sufficient for smaller diameter towers but multiple boxes may be required for larger diameter towers or for high liquid flow rates.

Additional trough support beams should be considered in larger towers to provide the necessary structural support.

Trough Type Distributors can be fabricated and supplied in a range of thermoplastics or stainless steel.

LADDER TYPE LIQUID DISTRIBUTION SYSTEMS

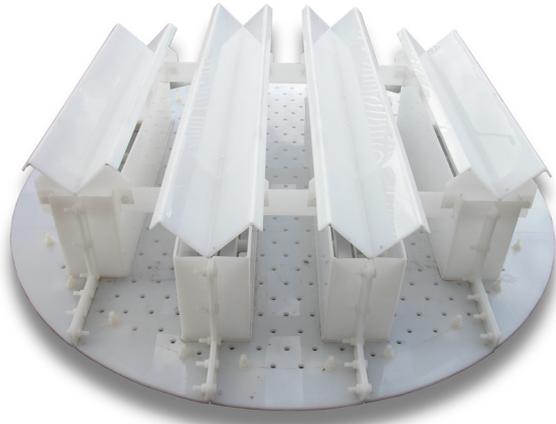
A **Ladder Type Distributor** consists of a main central feed pipe or 'header', with a number of equally spaced 'laterals' projecting horizontal from each side. Here, the liquid distribution is pressure driven, as liquid is delivered onto the tower's packed bed through a series of holes or downcomers in the underside of the lateral pipes.

Ladder Type Distributors are not usually recommended for use with low liquid flow rates or in systems where there may be suspended solids in the liquid, which could lead to the blocking of the distributor's holes.

Ladder Type Distributors can be fabricated and supplied in a range of thermoplastics or stainless steel.



RE-DISTRIBUTORS



A **Re-distributor** helps optimise the performance of towers with multiple packed beds. It collects the liquid leaving an upper bed and distributes it in an even pattern over the bed below.

It is similar in design to the orthodox perforated tray distributor with gas risers, comprising a flat, perforated plate with a number rectangular gas vents. These vents or chimneys have 'caps' over them to prevent liquid from bypassing the redistribution process. Sometimes bars are located across the bottom of the risers to prevent any fluidised packing migrating upwards from the bed underneath. This allows the plate to double-up as a bed limiter.

Depending on the application and the column, the **Re-distributor** can be supplied one piece or in sections to allow easy installation through an access manway.

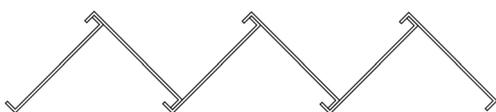
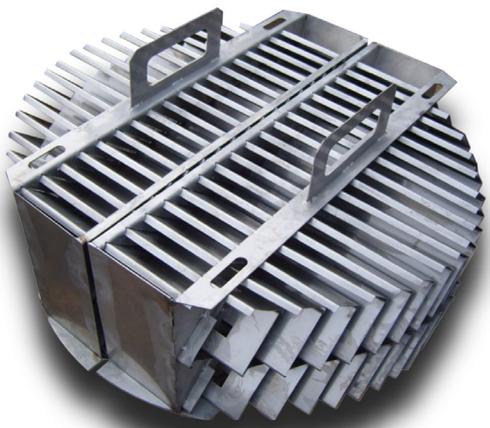
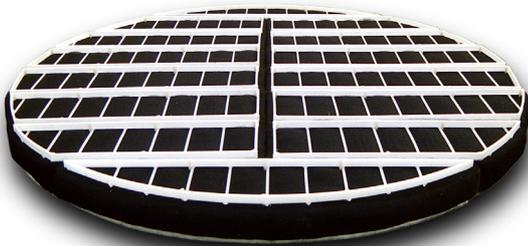
Additional support beams should be considered in larger towers to provide the necessary structural support.

For small diameter towers a **Rosette** type **Re-distributor** or 'Wall Wiper' should be considered. The **Rosette Distributor** offers high liquid handling capacity, elimination of liquid streaming down the column walls, non fouling design, greater spacing between re-distributors and a constant percentage of free space.

Re-distributors can be fabricated and supplied in a range of thermoplastics or various metals.



DEMISTERS /DROPLET ELIMINATORS



DETAIL OF CHEVRON VANE



In many process operations, the removal of liquid droplets entrained in vapour streams is essential in order to prevent process or environmental contamination. **The Pall Ring Company** can provide a wide range of **Demisters/Droplet Eliminators** suitable for any application.

In a mist/droplet eliminator, the principle behind its operation is based on having a large number of tiny obstacles to intercept entrained droplets of liquid in a vapour stream.

These obstacles must provide a minimum drop in pressure over the removal system.

Demisters are made up from knitted materials with interlocking asymmetrical loops of metal or plastic, with typical wire diameters being 0.1 - 0.3 mm. They can be manufactured from a range of thermoplastic materials, (including Polypropylene and PVDF), as well as a various range of metals.

The Pall Ring Company can supply mist eliminators with extremely high free volumes (typically 98-99%) which have very high removal efficiencies and low pressure drops.

The vapour velocity through an eliminator is dependent on its cross sectional area, which in turn is set by the tower diameter. This area is dependent on the tower capacity, operating temperature and pressure and the allowable pressure drop. Under normal operating conditions, standard designs provide efficient separation for droplets down to 2 microns in size with a removal efficiency of over 99% achieved with a pressure drop of less than 250 Pascals.

Chevron Type Eliminators are also manufactured by **The Pall Ring Company** in plastics and metals. High efficiency design developed by the company incorporating special extrusions and profiles fabricated in plastics and metals.

B E D LIMITERS

A **Bed-limiter** is positioned inside the tower, directly above a randomly packed bed to confine any upward movement of packing. Maintaining a level top surface on the bed is important, especially if the vapour load is sufficient to fluidise the top of the bed under certain conditions. Packings lifted up towards the distributor affects both liquid and vapour distribution efficiently.

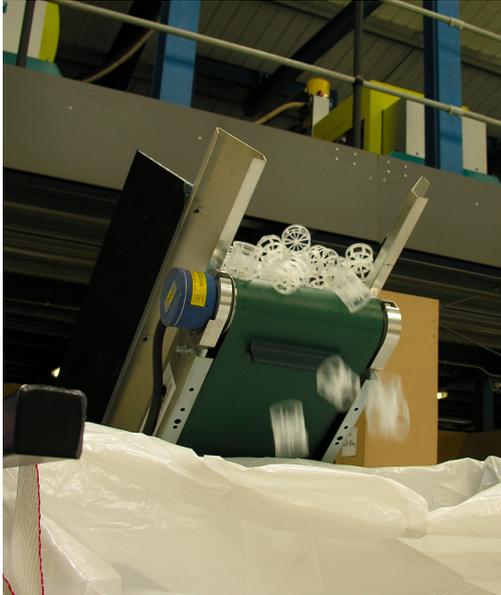
The **Bed-limiter**, in its simplest form, consists of a grid of flat bars welded to a ring or open mesh within a frame. The spacing of the bars determines the percent open area. The normal pressure drop across this type of **Bed-limiter** is less than 75 Pa.

All types of **Bed-limiters** can be supplied in sections to allow easy installation through access manways. Additional support beams should be considered in larger towers to provide the necessary structural support.

Bed-limiters can be fabricated and supplied in a range of thermoplastics or metals.



PACKAGING & TRANSPORTATION



PLASTIC PACKINGS

THE PALL RING COMPANY CUTS YOUR TRANSPORT COSTS BY CUSTOM SIZED PACKING

The Pall Ring Company, having invested very heavily in automation, manufactures some of the lowest cost quality random tower packings & internals available. To maintain our highly competitive pricing for the bulky and lightweight Random tower packings, transport can be expensive which will increase your delivered cost dramatically.

The Pall Ring Company have designed both bulk bags & palletised 100 litre bags to achieve the maximum possible load for both the standard articulated curtain sided vehicles and the ISO shipping containers; both being easy to load & handle.

The custom made Euro-bag will give you huge savings in transport costs. The special Pall Ring bulk Euro bags, being Euro pallet sizes, will completely fill shipping containers & the standard curtain side truck. When loading into the tower the bags can be lifted by the four lifting loops and have a pouring spout in the centre of the base to permit easy discharge.

With our shipping contacts worldwide, **The Pall Ring Company** arrange highly competitive shipping rates to all over the World. Allow us to remove the hassle and your shipping problems by delivering CIF to your nearest port. For road transport in UK & within European destinations, our highly developed transport network achieves very competitive rates.

STORAGE:

The shrunk wrapped palletised 100 litre bags may be stored outdoors for up to 18 months providing the black ultra violet resistant polythene shrink wrap remains in place. Precautions to be taken to ensure the packages do not blow over. If the shrink wrap is removed or damaged the 100 litre bags are not ultra- violet resistant and should be stored indoors if prolonged storage is expected.

The Euro bags are suitable for outdoor storage of 6 months only in northern regions and 3 months in tropical regions. Any prolonged storage must be indoors. Alternatively the bags must be covered to protect them for prolonged sunlight.

Both types of packaging are unaffected by rain. The Euro bags may retain a small amount of rainwater, which must be taken into consideration when discharging into the tower.

HANDLING:

Protective gloves to worn while handling.

DIMENSIONS (MM)	<i>(please note that all sizes are approximate)</i>	
Euro-bag (W x D x H)	(Single Bag)	1200 x 800 x 1100
	(2 Stacked)	1200 x 800 x 2200
	(2 Stacked on pallet)	1200 x 800 x 2400
100 litres (W x D x H)	(Single Bag)	800 x 400 x 400
	(Stacked on pallet)	1200 x 800 x 2400
	and shrink wrapped)	

The Pall Ring Company reserve the right to modify the sizes quoted within this packing. The above packing specifications may vary from batch depending on the product being packed. Please refer to our [Terms and Conditions](#).



METALLIC PACKINGS

The Pall Ring Company produces some of the lowest cost quality metal random tower packings & internals available. Metal packings are very much heavier than thermoplastic rings. These are packed in standard heavy duty bulk bags rated at one tonne capacity. Each bag has four lifting loops and has a pouring spout in the centre of the base to permit easy loading into your tower.

Depending on size of rings and thickness of metal, the bags may be stacked two high and palletised. Care must be taken to ensure there is no danger of a stacked bag falling and causing damage to personnel or equipment.

Packings are also available in 25 kg heavy duty woven bags.

Call **The Pall Ring Company** for assistance in achieving the best size & style of packing for shipment. With our shipping contacts worldwide, the Pall Ring Company arrange highly competitive shipping rates to all over the World. Allow us to remove the hassle and your shipping problems by delivering CIF to your nearest port. For road transport in UK & within European destinations, very competitive rates are achieved by our highly developed transport network.

STORAGE:

The bulk bags & 25 kg bags are suitable for outdoor storage of 6 months only in northern regions and 3 months in tropical regions. Any prolonged storage must be indoors. Alternatively the bags must be covered to protect them for prolonged sunlight.

Both types of packaging are unaffected by rain. The bulk bags may retain a small of rainwater which must be taken into consideration when discharging into the tower. Where the metal is prone to rusting, the consignment must be kept dry at all times.

HANDLING:

Protective gloves to worn while handling as product can have sharp edges.

DIMENSIONS (MM)	<i>(please note that all sizes are approximate)</i>	
Bulk bag (W x D x H)	(Single Bag)	1100 x 1100 x 1000
	(2 Stacked on pallet)	1100 x 1100 x 2050
100 litre (W x D x H)	(10 stacked on pallet)	1200 x 1100 x 1200
50 litre (W x D x H)	(20 stacked on pallet)	1100 x 1100 x 1600

The Pall Ring Company reserve the right to modify the sizes quoted within this packing. The above packing specifications may vary from batch depending on the product being packed. Please refer to our [Terms and Conditions](#).

METALLIC & PLASTIC INTERNALS

Internals such as distributors, support beam systems, decks, redistributors, demisters, etc can be packed in a variety of ways. Much depends on size, weight and destination. Packaging can range from strong cardboard boxes to open crates to the full wooden export boxes. Please talk to **The Pall Ring Company** to discuss the most suitable method for packing your order.

STORAGE:

The type of packing specified will determine whether the package is suitable for outdoor storage or not. Certain types of packaging must be kept dry.

HANDLING:

Protective gloves to worn while handling as product can have sharp edges.



PROCESS DESIGN



The Pall Ring Company is not only a manufacturer and fabricator of tower internals. The company offers process design and advice on material selection to customers who purchase their products. Our chemical engineers who specialise in both mass transfer technologies and material are able to offer customers a completely integrated service. This can encompass the design of tower internals, the manufacture of metal and plastic random packings, to tower design, manufacture and installation or project manage complete integrated process plant systems.

With a wealth of experience our chemical engineering team can assist you in the development of innovative and cost effective process designs to determine the most efficient type of random packings, the required bed depth, the design of liquid distributors and ancillary tower internals for your specific application.

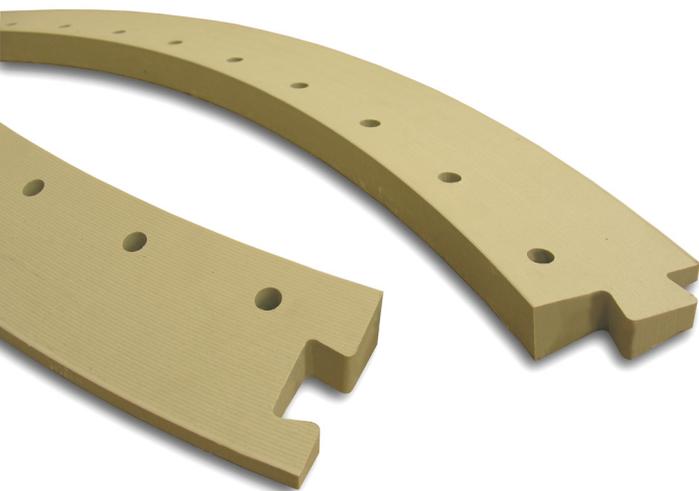
The Pall Ring Company has over the years developed numerous well proven computer models with proven track records for gas and fume scrubbing, odour control scrubbing, reaction towers, as well as carbon dioxide degassing from water and various stripping processes for the removal of a variety of gases and volatile organics compounds from liquid streams.



Please telephone or email our chemical engineering team for any technical assistance you require.

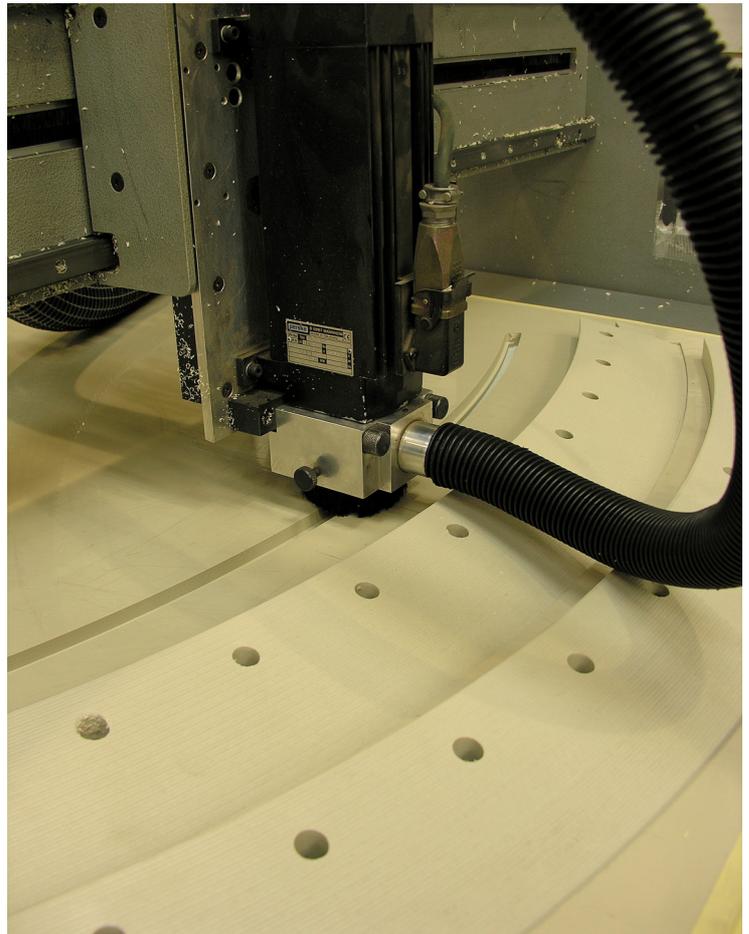


PRECISION CNC ROUTING & MILLING



The Pall Ring Company manufactures various types of launder trough & weir system in various thermoplastics by 3D CNC routing.

The Pall Ring Company has large high speed CNC routing & milling equipment ideally suited for the manufacture of our various tower internals in a variety of thicknesses. We also manufacture complex shaped components for a variety of applications. Specialising in the machining of engineering & high chemical resistant plastics **The Pall Ring Company** offers a custom manufacturing service. Items as large as 2 meters wide with lengths of up to 10 meters and a thickness up to 150mm are possible, down to small components of a few centimetres. Large diameter flanges up to 2 meters diameter & 150mm thick fully machined.



The information and performance data contained in this brochure and technical leaflets including all information contained on our website has been proven over many years of successful operation. We believed this information and data to be accurate and reliable, however it is not to be construed as implying any form of contract, warranty or guarantee of performance. The Pall Ring Company reserve the right to modify designs and performance data. Please refer to our Terms and Conditions.

TERMS AND CONDITIONS

1. General

Unless expressly agreed in writing by a Director of the Pall Ring Company ("Company" or "seller"), all goods are sold upon the following terms and conditions and no agent or representative of the Company has any authority to vary or omit these conditions or any of them. Any conditions printed in buyers order forms are binding only insofar as they are not at variance with these conditions. Any specially agreed Conditions or Terms must be in writing and confirmed by a Director of the Company

2. Prices

All prices are subject to change without notice, all goods being invoiced at the price ruling at date of despatch unless a fixed price has been agreed in writing by the Company.

3. Taxes

In addition to the price stated herein, the Purchaser shall reimburse the Seller for all taxes, excises or other charges or fees whatsoever the Seller may be required to pay to any Government (National State or Local), upon the sale, production or transportation of the goods sold hereunder.

4. Delivery

- Estimates of delivery are subject to revision when complete ordering information to the satisfaction of the Seller is received by the Seller.
- The Seller will use his best endeavours to deliver as estimated but shall not be liable in any respect whatsoever for the consequences of any delay.
- Deliveries may be wholly or partially suspended and the time of such suspension added to the original contract in the event of stoppage, delay or interruption of work in the establishment of either the Seller or Purchaser during the delivery period as a result of strikes, lockouts, trade disputes, breakdown, accident, inability to obtain material, equipment or transportation or other causes beyond the reasonable control of the Seller.
- In the event of an outbreak of hostilities (whether war is declared or not) in which the United Kingdom is involved, or in the event of a National Emergency or the Sellers works should become either directly or indirectly so engaged on Government orders or orders of priority direction as to prevent or delay work on other orders, the Seller shall be entitled at any time, on notice to the Purchaser, to make partial deliveries only or to determine the Contract, without prejudice in any case to rights accrued in respect of deliveries already made.
- Risk of loss or damage to the goods passes to the Purchaser on delivery before unloading.
- Notwithstanding delivery and the passing of risk to the Purchaser as at (e) above the title and property to the goods shall remain with the Seller until the Purchaser has paid all monies owed by it to the Seller under this or any other Contract or otherwise. The Purchaser will keep the said goods safe and undamaged until full payment when title and property will pass to it. The Purchaser is not the agent of the Seller.

5. Unloading

The responsibility of unloading goods at the point of delivery will be that of the Purchaser and no liability shall be incurred by the Seller in respect of any loss or damage that may occur during unloading whether or not the unloading is assisted by the agent or employee of the Seller who shall not be bound to assist. Such person or persons in such circumstances being deemed to be under the control and direction of the Purchaser.

6. Claims

- No claim for damage in transit, shortage of delivery or loss of goods will be entertained unless:
- A claim by the Purchaser in respect of an alleged defect in the goods must be notified in writing by the Purchaser to the Seller within 7 days of the date of the alleged defect becoming known to the Purchaser or of the date when such defect should become apparent to the Purchaser on reasonable inspection of the goods and the Seller must be granted facilities for inspection and/or testing of the goods on reasonable demand.
- In the case of damage in transit or shortage of delivery separate notice is given to the carrier concerned and to the Seller within 7 days of receipt of the goods or as may be stipulated in a Carriers conditions.

d) In the case of loss of goods notice in writing is given to the Carrier and to the Seller and a complete claim in writing made within 21 days from the date of delivery of the consignment which shall be notified by the Seller to the Purchaser. Where the goods are accepted from the Carrier without being checked the delivery book or form of the Carrier concerned must be signed 'Not Examined' and the Purchaser must adhere to the Carrier's conditions in such an event, it is the duty of the Purchaser to enquire as to the Carrier's conditions.

7. Except as may be the inalienable statutory right of the Purchaser or except as may be specifically provided herein or otherwise agreed in writing by the Seller no warranties are to be agreed or to be implied in the contract between Purchaser and Seller and without prejudice to the generality of this exclusion no warranty is to be given or to be implied as to the life or wear of the goods or as to their suitability for any particular purpose or for their use under any specific condition without such specific provision or agreement in writing by the Seller.

8. a) The Purchaser acknowledges the need for notification of alleged defects as a matter of urgency and agrees that failure to act in accordance with the provisions as to notification of claim set out in Clause 5 (b) hereof will prejudice the Seller and accordingly the Purchaser agrees that such failure on his part or failure to give the Seller facilities for inspection and/or testing of the goods without reasonable cause shall be deemed to be the abandonment by the Purchaser of his rights against the Seller which it might have had and which it could have enforced.

b) The liability of the Seller in respect of any claim of the Purchaser which the Purchaser is entitled to enforce shall be limited to the cost of the repair and replacement of the goods and the Seller shall not be liable for any consequential loss or damage whatsoever which the Purchaser may suffer in addition and the Purchaser acknowledges that having regard to the likely extent of such consequential loss or damages that would be suffered by the Seller in the event of a claim for which the Seller is liable it would not be reasonable for the Seller to carry such risk without special agreement in writing with the Purchaser so entitling the Purchaser to claim such consequential loss or damage.

9. If the Purchaser shall make default in or commit a breach of the Contract or any other of his obligations to the Seller, or if any distress or execution shall be levied upon the Purchaser's property or assets, or if the Purchaser shall make or offer to make any arrangement or composition with Creditors, or commit any act of bankruptcy or if any petition or receiving order in bankruptcy shall be presented or made against him, or if the Purchaser is a Limited Company and any resolution or petition to wind up such Company's business (other than for the purpose of amalgamation or reconstruction) shall be passed or presented, or if a receiver of such a Company's undertaking or property or assets or any part thereof shall be appointed the Seller shall have the right forthwith to determine any Contract then subsisting and upon written notice of such determination being posted to the Purchaser's last known address any subsisting Contracts shall be deemed to have been determined without prejudice to any claim or right the Seller may otherwise make or exercise.

10. Where goods are sold FOB. The responsibility of the Seller shall cease immediately the goods are placed on board ship and the Seller shall be under no obligation to give the Purchaser notice specified in UK - Section 32 (3) of the Sales of Goods Act 1893.

11. Where specifications are to be supplied the Purchaser shall supply such specifications sufficiently in advance as the Seller may deem reasonable to enable the Seller to complete delivery within the period named.

12. The Purchaser shall indemnify the Seller against all damages, penalties, costs and expenses to which the Seller may become liable as a result of work done in accordance with the Purchaser's specification, which involves the infringement of any letters patent or registered design or otherwise the legally enforced rights of a third party.

13. Payment of Accounts

Subject the Purchaser having written confirmation that they have an authorized credit account with the Company and to any special written arrangement between Seller and Purchaser and, in particular to any provision as to progress payments our Terms of Trading are '30 days nett from date of invoice'. Invoices unpaid after two months become subject to a credit surcharge of 5% per month of total value. All payments must be made in the agreed currency. **For customers outside the United Kingdom** without a fully approved credit account terms, the Contract to be subject to negotiations & agreement at the time of purchase, confirmed in writing.

14. Orders accepted by the Seller are not subject to changes or cancellation by the Purchaser except with the Seller's written consent. If the sale involves goods which are manufactured especially for the Purchaser and a change or cancellation is made the Purchaser shall take all completed goods at full price in progress at cost plus pro-rata profit and the Purchaser shall reimburse the Seller on materials purchased and on any Contract which may have been entered into by the Seller to assist in fulfilling the order of the Purchaser.

15. Storage

If by any reason of the specific instructions by the Purchaser or lack of instructions from the Purchaser, despatch in accordance with the Contract is delayed for 30 days after the Purchaser has been notified that the goods are ready for despatch the risk of loss of, or damage to, the goods shall therefrom pass to the Purchaser who shall be liable to take delivery or arrange for storage and for the purpose of payment the goods shall thereupon be deemed to have been delivered. If and for so long as the Seller's storage facilities permit, the Seller may without incurring any liability whatsoever, store the goods and the Purchaser shall pay a reasonable agreed charge therefore.

16. Any dispute between the parties to the Contract as to their respective right and liabilities thereunder, or the construction of any term hereof, or any matters arising out of the same or connected therewith shall be referred to a single Arbitrator as shall be agreed between them on the application of either party to the President for the time being of the Law Society, and shall be arbitrated in accordance with the provisions of the Arbitration Act 1950 or any statutory modification or enactment thereof for the time being in force and it is hereby declared that any Arbitration thereunder shall be conducted in accordance with the Laws of England.

17. Errors

Typographical and clerical errors are subject to correction.



January 2006



The Pall Ring Company Limited

NEW ROAD CRIMPLESHAM KING'S LYNN
NORFOLK UNITED KINGDOM PE33 9AS

T: +44 (0)1366 389680 F: +44 (0)1366 389681
E: sales@pallrings.co.uk W: www.pallrings.co.uk