KLM Technology Group

RECOGNIZED EXPERT

Process Equipment Design & Supply

DEMISTER PAD MIST ELIMINATOR

KLM Technology Group

KLM is a technical consultancy group, providing specialized services and equipment to improve process plant operational efficiency, profitability and safety.

A leading Process Equipment Design Group

General Distillation Design Guideline – 147 pages

Tray Hydraulics Design Guideline – 50 pages

Packing Hydraulic Design Guideline – 68 pages

Heat Exchanger Design Guideline – 176 pages

Reboiler Design Guideline – 70 pages

Demister Pad Design Guideline - 89 pages

Separator Design Guideline – 120 pages

Coalescer Design Guideline – 120 pages

Over 100 Guidelines on most Process Equipment and Unit Operations

1995

Offices in Texas and Malaysia

1997

Providing Engineering Solutions in USA

2005

Providing Engineering Solutions in Asia

Core Business

Training (75+ Training Classes)
Engineering Design Guidelines
Process Optimization Studies
Process Energy Studies
Process Safety Management
- * HAZOP Facilitation
- * Facility Siting Studies

Engineering Support
- * Basic Design Packages
- * Detailed Design Packages

Process Equipment
- * Random Packing
- * Structured Packing
- * Demister Pad
- * Heat Exchangers

Marketing
- * Engineering Practice Magazine

Unit Commissioning
Distillation Equipment Inspecting and Correct Instillation
Evaluation of Process Units

Karl Kolmetz
Managing Director
KLM Technology Group

Editor for Engineering Practice Magazine
Editor for Handbook of Process Equipment Design

Your Equipment Supplier of Choice

1. KLM is a recognized expert in Process Equipment Design. We have experience in Ammonia Plants, Refineries, Ethylene Plants, EB/Styrene Plants, EG/EO Plants, Methanol Plants, Gas Processing Plants, Palm Oil Plants, Sulphuric Acid Plants, Butadiene, BTX, Solvents and others.
2. Only partners with high quality suppliers, often from the same factories as the Original Equipment Manufactures (OEM).
3. The Kolmetz Handbook of Process Equipment Design is highly rated for the design of process equipment. Detailed theory of equipment design with examples.
4. As Process Equipment Simulation and Installation experts, we can provide Process Guarantees, including capacity and purity. Most vendors will only provide hydraulic guarantees, not capacity and purity guarantees. A Process Study can provide a large return on investment.
5. KLM has low overhead leading to cost savings to your team.
    * The advantage for the end user is that KLM's overhead cost is significantly lower than other EPC companies and / or other equipment providers, leading to significantly lower equipment cost with the potential of higher quality, leading to the best of both worlds; high quality at a very competitive cost. Our Overhead Cost is low, and we pass the savings to your team.
    * Many companies have multiple offices with 100's of salespeople. This overhead can be as high as 15% of equipment quote.
    * A good engineer or purchasing manager would bid to KLM just to set the proper cost of the process equipment. Often KLM may want a small fee to bid as there are engineering hours in the bidding process – but you could save 15 to 25% on the equipment cost netting Return On Investment of thousands even if you do not purchase from KLM.
    * You now know from reading this presentation most bids are at least 15% or more higher than KLM might bid. Many times, the OEM will bid below cost just to keep a small company like KLM from wining the job, good for your company, and great ROI on your bidding to KLM.
6. KLM has senior inspectors to ensure your equipment is installed correctly.
7. Higher Reliability designs gained from years of experience.
8. Higher Efficiently which leads to Better Products at Lower Energy Cost.
9. Basic and Detailed Engineering Packages.

Process Equipment

DISTILLATION EQUIPMENT

Towers Shells and Vessels
Random Packing
Structured Packing
Trays
Demister Pads and Coalescer Elements

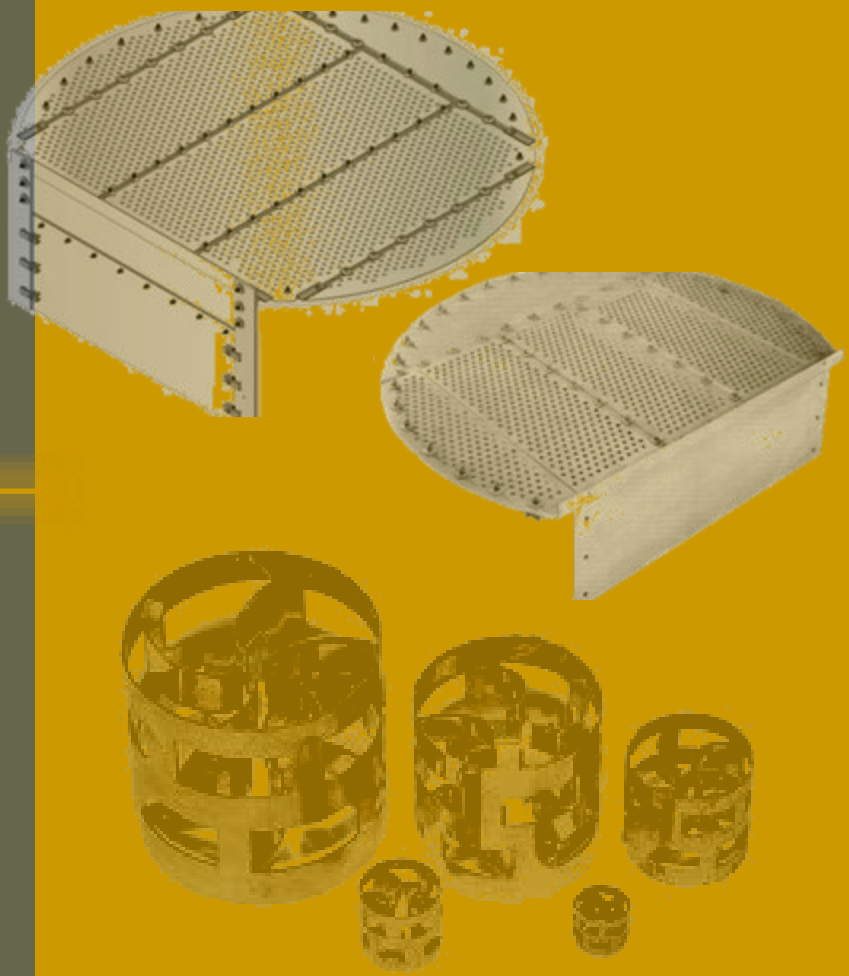
HEAT EXCHANGE EQUIPMENT

PUMPS AND COMPRESSORS

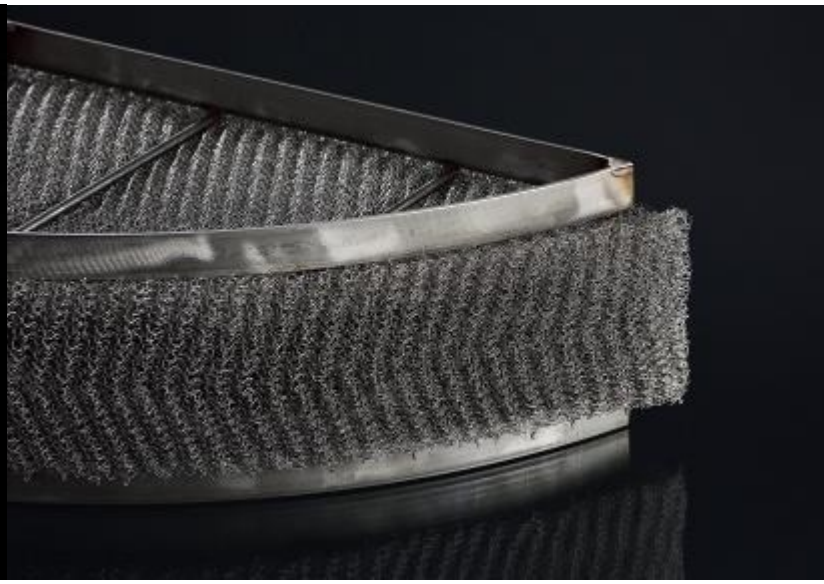
COALESCER SYSTEMS

We have the resources to order with normal lead time or source for immediate replacement

we help
manage and
work for you



Demister Pads and Coalescer Elements



Typically, demister pads are designed very basic with limited optimization. They are sold to an EPC company at cost, to build an installed base to be able to replace often at a much higher cost.

Replacement cost have 200 to 400% margin; therefore, the demister pad vendor has no incentive to make the demister pad reliable or fouling resistant.

A small demister pad might be quoted to an EPC firm for USD 2,000 but quoted to an operating company for USD 8,000.

Buyer Beware

Reliability may be increased by choosing the correct metallurgy

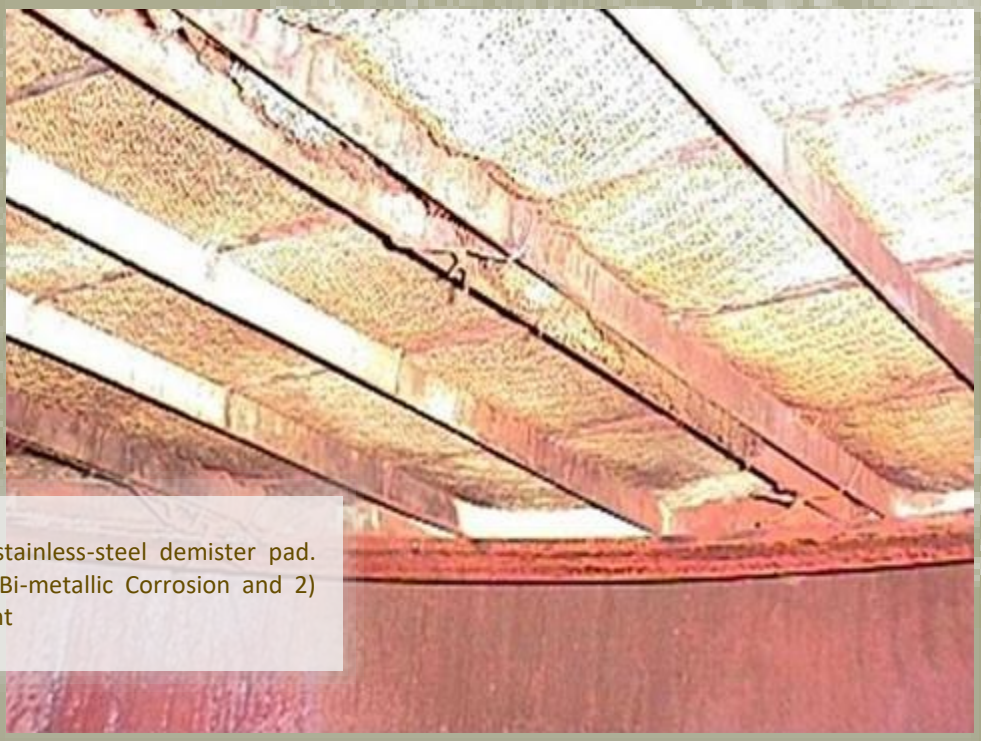
If you are going to replace a demister pad, as with most process equipment, you should not replace in kind because if was awarded to the lowest bidder and was designed to be replaced quickly. If you have a clean service, your demister pad should be designed to increase removal of entrained liquids as well as increased reliability.

Many vendors only supply stainless steel demister pads even though they know that this might be the wrong metallurgy for your application. If you have polar liquids (water, acids, caustics) and a carbon steel vessel, stainless steel demister pads will experience bi-metallic corrosion with reduced life. Good for the vendor, not so good for the plant operator.

Many caustic towers have stainless steel demister pads even though it is clear this is a poor metallurgy choice. A better choice may be a multifilament plastic

Failure Cases

It is important to understand the failure cases. KLM can provide equipment designed stronger, with a higher fouling resistance and longer run length. Demister Pads have a high failure rate due to being awarded to the low cost bidder. Good for the vendor with high replacement margins, not so good for the plant operator.
If you replace in kind to the original low-cost bidder vendor without a review of the best replacement you will be paying high margins, decreased plant reliability and product quality.



Ethylene Caustic tower with a stainless-steel demister pad. Two competing failure rates 1(Bi-metallic Corrosion and 2) Stainless-steel not caustic resistant

Ethylene plant caustic tower, with fouling. This pad will fail due to pressure drop increases.

Quality of Design

If you have a fouling service, your Demister Pad should be designed to be fouling resistance and improve removal of entrained liquids as well as increased reliability.

Current designs for fouling service utilize a larger mesh to reduce fouling potential, with a loss of the removal of entrained liquids. A better design might be to stage the mesh size. Install larger mesh in the bottom 1/3, where the fouling occurs, and a smaller mesh in the top to increase the removal of entrained liquids. For very fouling services a chevron might be installed below the demister pad.

Mist eliminators are made up from knitted materials with interlocking asymmetrical loops of metal or plastic with typical wire diameters of 0.1 – 0.3mm.

Through careful choice of wire diameter, knitted mesh mist eliminators with extremely high free volumes (typically 98-99%) along with very high removal efficiencies and low pressure drop.

Along with wire diameter and mesh density, another important parameter in design and operation is the vapor velocity. This can be controlled by careful selection of the mesh area.

Optimal area will depend on operating temperature, pressure and pressure drop. Under normal operating conditions, 99% + removal efficiency can be achieved with a low pressure drop of less than 250 Pascals.

Demister Pads can also be manufactured using plastics for highly corrosive environments. Ethylene Tetrafluoroethylene (ETFE) mist eliminators can withstand high temperatures of up to 260 degrees Celsius. ETFE's chemical resistance promotes uses in corrosive environments such as fertilizer production or sulfuric acid.

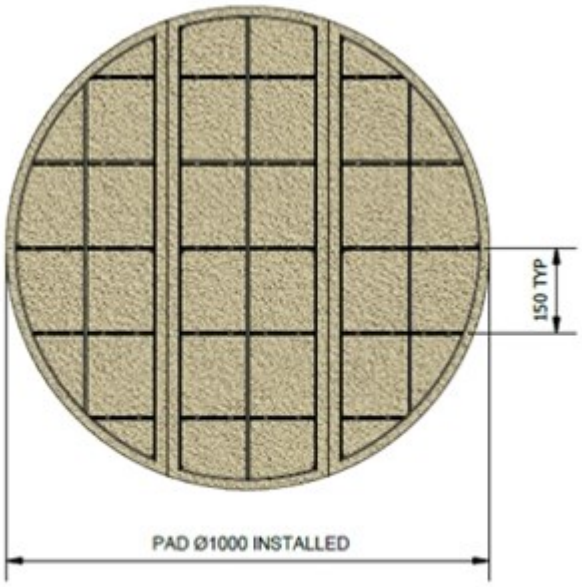
Demister Pads can also be manufactured using plastics for highly corrosive environments. Mist Eliminators may also be manufactured from other plastics, such as Polypropylene, Polyvinylidene Fluoride (PVDF) and Perfluoroalkoxy (PFA), in both a monofilament and a multifilament.

A Wide Range of Wire Mesh Demister Mist Eliminator Pads Suitable for Any Application

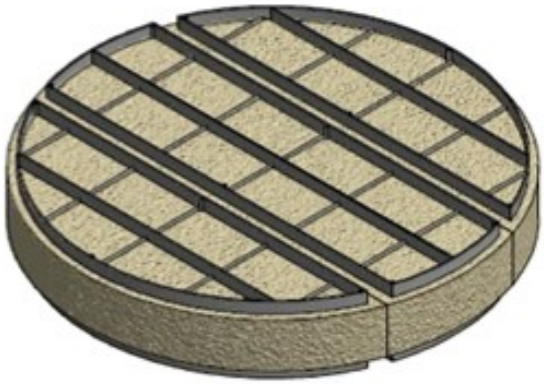
Mist Eliminator	Surface Area m2 / m3	Free Volume %	Density kg / m3	Typical Application
Type 1	1650	95	450	Very High Efficiency
Type 2	1300	95.5	350	High Efficiency
Type 3	600	97.5	195	Very High Efficiency and Clean Service
Type 4	400	97.5	195	Heavy Duty
Type 5	350	97.75	170	Heavy Duty
Type 6	300	98	145	General Purpose
Type 7	250	98.5	125	High Velocity
Type 8	200	98.75	100	Light Fouling
Type 9	90	99.4	50	Heavy Fouling
Type 10	150	99	75	Moderate Fouling
Type 11	445	98	145	High Efficiency Fine Entrainment
Type 12	400	98.5	120	Fine Entrainment
Type 13	1200	98	600	High Efficiency Fine Entrainment

Budgetary Pricing with Frame

Metallurgy	Kg	Density kg / m3	Cost USD (1 meter diameter by 150mm height)
316 L	17	145	$ 2,338.00
316 L	23	195	$ 2,718.50
304 SS	17	145	$ 2,060.10
304 SS	23	195	$ 2,524.50
Polypropylene	8	69	$ 2,156.17



Size of Demister Pad



MESH PAD:

PAD THK :300mm, MESH DENSITY: 144 kg/m³
SURFACE AREA: 257 m²/m³ FREE VOLUME: 98.1%
MATERIAL: 316L

SUPPORT GRID CONSTRUCTION
PERIMETER RAILS: 25 x 3
INTERMEDIATE SUPPORT RODS: Ø6
INTERLINKING POSTS: Ø6
GRID MATERIAL: 316L

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MANUFACTURING DRAWINGS TO BE PREPARED ON ORDER

PRACTICAL ENGINEERING SOLUTIONS

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