

WIPE FILM EVAPORATORS

Proven by Industry

The evaporator technology and systems produced by GMM Pfaudler can be found in the wide range of industries worldwide including:

- **Pharmaceuticals**
- **Chemicals**
- **Polymers and Resins**
- **Foods**
- **Fats and Oils**
- **Waste**
- **Solvents**
- **Biodiesel**
- **Lube Oil Refining**
- **Herbal Products**

Proven by Application

Companies within these industry sectors apply the technology for a variety of purposes:

- **Deodorization**
- **Distilling**
- **Concentration**
- **Reboiling**
- **Solvent Recovery**
- **Stripping**

GMM Pfaudler produces the widest range of evaporator systems to ensure we can meet specific market and customer needs. These ranges are based on thin film evaporators and tubular systems. GMM Pfaudler can advise on the best evaporator system for a given application. For example, a stratavap thin film evaporator is often used in conjunction with tubular evaporators

to concentrate solutions to near dryness.

Commitment to Adding Value

- **Design, manufacture and installation of complete systems**

Our highly experienced and creative project engineers will work closely with you to meet your specific process requirements and ensure effective systems performance. To enable the evaporators to perform their optimum capability, we can also help with the proper selection and installation of ancillary equipment and instrumentation.

- **Test plant facility available for trials**

Evaporator pilot plants are available for trials on your materials and are available for prolonged test work on customers premises. This means process requirements can be determined and evaporator systems tailored to suit. Process guarantees are based on test results.

Typical Applications

Simple to operate and with proven high performance, the range of wiped film evaporators is suited to processing high-boiling point, viscous and/or heat-sensitive materials

A worldwide leader in the manufacture of process equipment, Pfaudler has perfected the use of glassed-steel technology for glass lined evaporators, reactors, receivers, storage tanks and associated equipment.

with maximum efficiency. This technology involves separating volatile compounds by introducing a mechanically agitated thin film of feed material to a heated surface. Capable of concentrating solutions to greater than 95% total solids, the low running speeds and wiping action make the range of wiped film evaporators especially suited to liquors which show a tendency to foam.

Features and Benefits

- **Short retention times eliminate product degradation**

When processing a wide range of products heat fluxes are minimised eliminating the opportunities for spoiling the quality, taste or flavour of heat sensitive materials.

- **Vacuum operation improves unit efficiency**



Reducing vapour pressure also reduces boiling points which increases temperature differences.

- **Floating wiper elements maintain thin film**

Wipers create a turbulent fluid film on the evaporator wall giving the desired film thickness for effective evaporation of the process material.

- **Low maintenance, reduced downtime and optimal running costs**

Evaporation rates are achieved at low rotor speeds, results in reducing vibration and wear on seals and elimination of bottom bearing. On larger machines, wipers can be replaced by lifting rotor without disturbing seal and drive assembly. On smaller machines, rotor top seals and the gearbox are easily removed in one assembly for inspection and/or cleaning.

- **Energy saving features**

The use of low power motors is possible as the liquor process provides a lubrication effect for the wiper elements.

High Vacuum WFE

Typical applications

– For applications where the boiling point of the more volatile components is greater than 482°F (250°C), a High Vacuum Wiped Film Evaporator (WFE) should be considered.

With very high boilers, it may be impossible to achieve separation in a conventional multi-effect evaporators operating under vacuum.

Technical Data

Operating pressure –

Using vacuums as low as 0.01 torr (0.013 mbar) can make separation possible and /or reduce the area required.

Internal condenser –

U-tube type condensers are inserted inside the High Vacuum WFE (short path). Condenser surface areas are so the size that it take care of condensation and sub-cooling.

Entrainment separators

– Specially designed full-length internal entrainment separators for high vacuum operations effectively remove entrained droplets.

Expendable WFE sizes –

The moduler concept can help in providing additional heat transfer area to the original jacketed section at your plant site to provide increased capacity, with minimum modification.

Highly viscous materials

– For highly viscous materials, the bottom cone can be heated and extruder blades can be fitted to mechanically aid the discharge of the bottom material. Spring mounted blades may be used for materials with viscosities above 2,000 cps. Maximum viscosity at operating temperature 20,000 cps.

Capacity – From less

than 1kg/hr to more than 4500 kg/hr of feed material.

Materials of

construction – Carbon steel, stainless steel 304/316, hastelloy, titanium, glass lined mild steel, monel and incoloy.

Rotor speed – Depending on the size of WFE. e.g. 280 rpm for 1 sq.m. to 60 rpm for 21 sq.m.

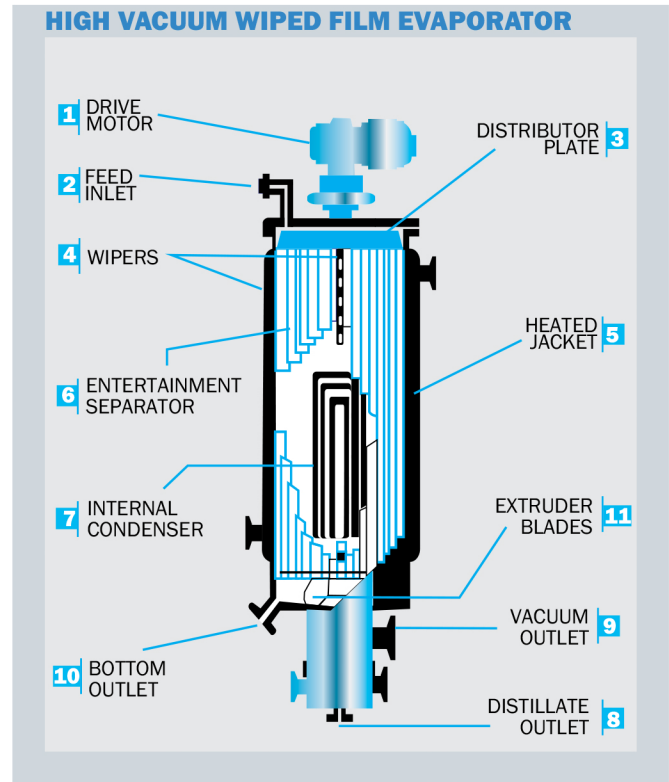
Low power motor – Low rotor speed significantly reduces motor power required e.g. the 103.4 sq.ft. WFE uses only a 5.5 kw motor.

Jacket temperature/pressure – Maximum pressure 8.6 bar dependent on process requirement. Maximum temperature using thermal oil is 357°C.

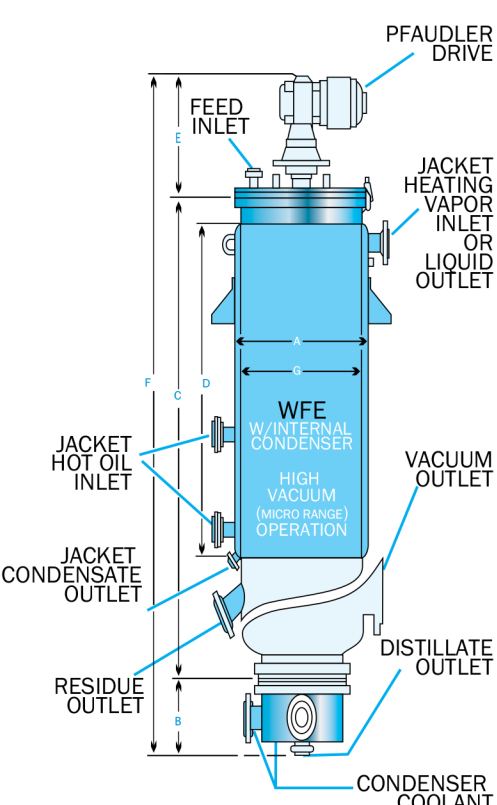
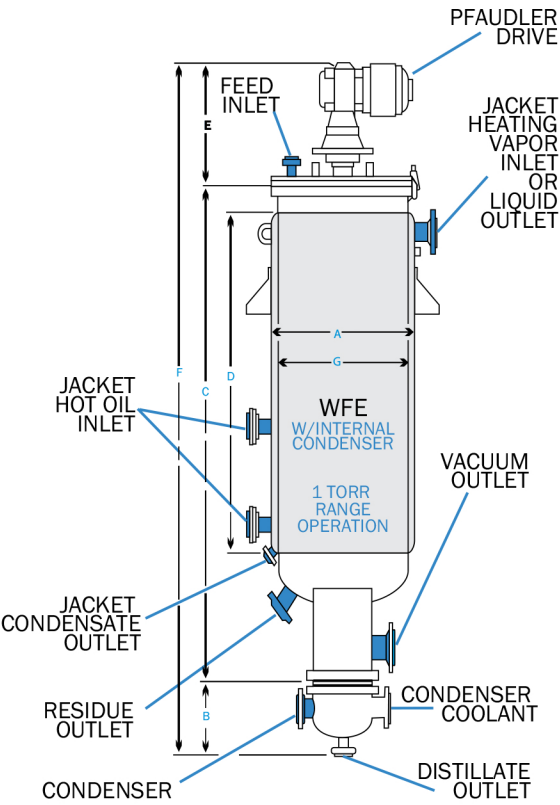
Range – Based on heated

surface area – 1.2 sq.ft. (0.11 sq.m.) to 231 sq.ft. (21.5 sq.m.)

Wipers – Centrifugal wiper blades in PTFE are standard. Carbon and other materials are also used.

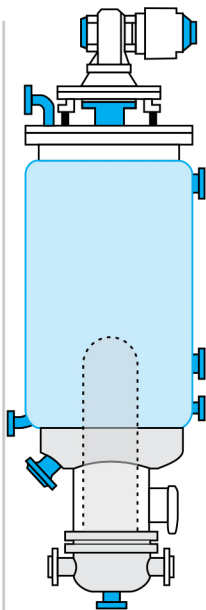


Specifications for Alloy Units



Evap. SurfaceNo. Area	Model Condenser	Internal Volume Area	Jacket Volume Litre	Dimensions (mm)						
				A	B	C	D	E	F	Nominal Dia G
0.1	1.2-6V - 3.7	0.34	2.65	220	135	505	230	240	880	150
0.4	4.2-12L - 7	0.65	7.5	375	236	890	380	860	2000	300
0.4	4.2-12V - 19	1.77	7.5	375	212	1000	380	860	2070	300
0.8	8.8-12L - 12	1.11	16.6	375	230	1300	800	860	2400	300
0.8	8.8-12V - 27	2.55	16.6	375	212	1425	1230	840	2500	300
1.2	13.4-12L - 16.7	1.55	16.6	375	230	1725	1230	1020	2975	300
1.2	13.4-12V - 35	3.25	25	375	212	1850	1230	1020	3100	300
2.3	25-36L - 075	3.5	98	1000	345	1425	810	720	2500	900
2.3	25-36V - 121	11.25	98	1000	325	2027	810	720	3100	900
4.75	51.2-36L - 75	7.0	200	1000	345	2275	1660	720	3340	900
4.75	51.2-36V - 172	16.0	200	1000	325	2885	1660	720	3930	900
7.2	77.3-36L - 113	10.5	300	1000	345	3125	2500	1300	4780	900
7.2	77.3-36V - 210	20	300	1000	325	3740	2500	1300	5370	900
9.5	103.4-36L - 150	14	400	1000	345	3975	3360	1645	5970	900
9.5	103.4-36V - 274	25.5	400	1000	325	4587	3360	1645	6560	900
16.2	175-60L - 265	24.6	840	1650	550	4225	3340	1600	6890	1500
16.2	175-60V - 450	41.8	840	1650	525	4825	3340	1600	7490	1500
21.5	231-60L - 350	32.5	1125	1650	580	5360	4470	2150	8090	1500

Wiped Film Evaporator Design Styles



Standard Vacuum Co-Current Design

Features:

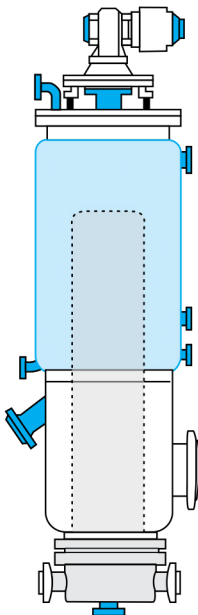
- Operating pressures to 0.5 Torr
- No bottom bearings
- Standard size removable internal condenser
- Full shell length louvered entrainment separator
- Low rotor speed due to direct contact wipers

Applications:

General chemicals and pharmaceuticals, solvent recovery, waste streams, food and oil re-refining.

Operations:

Stripping, concentration, dehydrating of moderately viscous and heat sensitive materials.



High Vacuum Co-Current Design

Features:

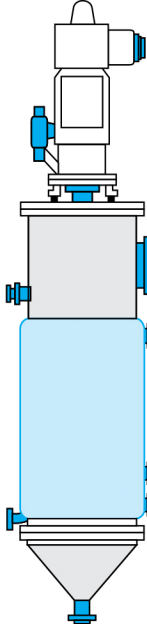
- Operating pressures to 0.01 Torr
- No bottom bearings
- Large high vacuum design internal condenser
- Large vapor outlet nozzle
- Full shell-length high vacuum chevron entrainment separator or open rotor
- Low horsepower requirements
- Low rotor speed due to direct contact wipers

Applications:

High purity chemicals, vitamin E, resins, waxes, plasticizers, and high boilers.

Operations:

Stripping, concentration, deodorization, separation and purification of moderately viscous and heat sensitive materials requiring high vacuum operations.



Top Vapor Outlet Counter-Current Design

Features:

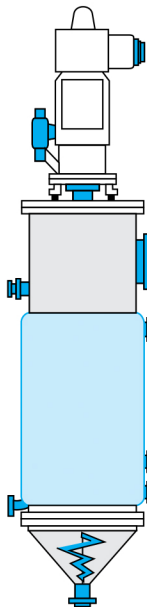
- Operating pressures to 1.0 Torr
- No bottom bearings
- Full shell length louvered entrainment separator
- Top vapor outlet
- Low horsepower requirements
- Low rotor speed due to direct contact wipers
- Cone bottom head with optional heat transfer jacket

Applications:

- General chemicals and pharmaceuticals, solvent recovery, waste streams, food
- Used as reboiler for fractionation columns

Operations:

- Distillation, concentration, dehydrating of delicate materials requiring complete removal of volatile phase to less than 1% remaining in product residues
- Steam or nitrogen stripping capability



High Viscosity Counter-Current Design

Features:

- Operating pressures to 1.0 Torr
- No bottom bearings
- Spring-mounted wipers and entrainment separator
- Top vapor outlet
- Heavy duty drive and motor assembly
- Cone bottom head for easy product discharge
- Auger assembly to assist bottoms discharge
- Low rotor speed due to direct contact

Applications:

High viscosity or hard-to-handle polymers, general chemical, coating, waste streams, and food.

Operations:

- Concentrations of moderate to very highly viscous products
- Steam or nitrogen stripping capability

Contact Us

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Typical Configuration:

All designs within the range are available as either single or multiple effect. GMM Pfaudler engineers will calculate the optimum number of effects and configurations based on the physical practicalities, capital and running costs.

Features and Benefits:

- **Tailored to suit particular applications**

The experience of GMM Pfaudler staff combined with an extensive

library of evaporator designs, means evaporators can be quickly matched to particular requirements.

- **Designing the most cost-effective solution**

At the design stage, factors such as capital cost, equipment's life and running costs are balanced to ensure an optimum solution.

- **Energy efficient**

The inclusion of a mechanical vapour recompressor enables

vapour from the process to be reused in heating, replacing for steam economy.

- **Comprehensive service**

A total turnkey solution is available encompassing design, engineering, procurement, fabrication, site construction, plant commissioning, operator training and project management.

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