

# ROTARY FILM EVAPORATOR

2 TO 100 LITERS



## INTRODUCTION

Rotary Film Evaporator is essentially a thin film evaporator. The rotating flask continuously covers a large surface area with a thin film which is ideal for rapid heat transfer. Fortuitously, the thin film also ensures uniform heat distribution without local heating. The facility to work the unit under full vacuum further facilitates evaporation at as low temperature as possible. That is to say, both boiling point and residence time are significantly reduced. These features combined, renders rotary film evaporator to be ideally suited for evaporation of heat sensitive material. It is equally successful for evaporation of suspension in crystallization processes, drying of powder/granules etc.

Rota Evaporator finds wide use from small scale laboratory set-ups to industrial operation. Goel Rotary Film Evaporator (GRFE) is preferred by both research and production facilities and has been used by laboratory and chemical, pharmaceutical and biotechnological industries.

# ROTARY FILM EVAPORATOR

## 5 TO 100 LITERS

### SALIENT FEATURES

1. Universal corrosion resistance.
2. Auto controlled digital display of rotational speed and bath temperature.
3. Digital display of process time.
4. Automatic bath lifting.
5. Automatic bath lowering in case of power failure.
6. Withstands full vacuum.
7. Ideally suited for heat sensitive material.
8. Maintenance free working - Operational reliability.
9. Available in large sizes upto 400 Litre.

### CONSTRUCTION

Goel Rotary Film Evaporators are completely self-contained units consisting mainly of:

G An electrically heated SS heating bath with facility for raising and lowering the height.

G Rotating flask of corrosion resistant borosilicate glass which is connected to drive by a coupling.

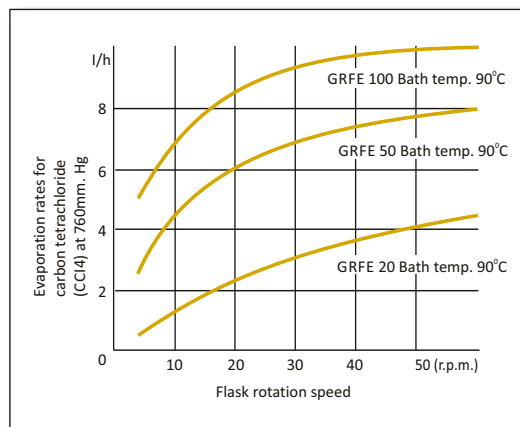
G The drive is a hollow GFT glass shaft which also acts as vapor off-take pipe. The drive shaft is sealed on condenser/receiver with Teflon seal. Power is transmitted to the shaft by a motor driven gear with provision for varying speed.

G Condenser/receiver arrangements are of standard design depending on the model/size.

G **GOEL'S Specialty: Mechanical Seal Arrangement and T shaft (Made from GFT) with Ceramic Seal plate which results optimum vacuum Without Breakage.**

### PERFORMANCE DATA

The performance of Rota-evaporator depends on various parameters such as temperature differential between bath and contents of flask, RPM, flask capacity and working pressure. An indicative comparison of boil-up of CCl<sub>4</sub> rates for 20L, 50L and 100L is given in adjacent figure



Technical informations related to various models are furnished below :

Model	Rotating Flask Cap. (Ltrs.)	Rotating Speed (rpm)	Electric Motor Rating	Condenser Cooling Area M <sup>2</sup>	Receiver Flask Cap. (Ltrs.)	Power Supply (Volt/Hz)	Bath Rating KW
GRFE 5	5	20-280	180 Watt	0.2	2	230 V, 50 Hz 1 Phase	2
GRFE 20/ GRFE 10	10	20-135	0.25 HP	0.5	10	415 V, 50 Hz 3 Phase	4
GRFE 50	50	20-135	0.50 HP	1.5	20	415 V, 50 Hz 3 Phase	6
GRFE 100	100	20-90	1 HP	2.5	50	415 V, 50 Hz 3 Phase	12

GOEL brand is associated with quality & reliability and as a company is trend-setter in this business in India.

# ROTARY FILM EVAPORATOR

5 TO 100 LITERS

## 5, 10, 20, 50, 100 Ltrs.

### Salient Features:

- \* all GRFE can comply GMP And Non GMP norms according to customer requirement.
- \* Attractive Vertical Orientation
- \* Digital RPM indicator & VFD based speed control.
- \* Digital Temperature Indicator & Controller
- \* Digital Process Time Indication
- \* Digital vapor temperature indicator
- \* Motorized VFD based UP & down of bath.
- \* S.S. bath with insulated & electrical heaters with overflow nozzle & drain valves.
  
- \* Durable S.S. gearbox cover, with motor encased into the Mechanical Assembly.
- \* Complete glass assembly as per the specs in the table
- \* Anti-splashing hood
- \* In non GMP model body will be M.S. Powder coated.
- \* The whole unit is mounted on lockable wheels.\*
- \* Fully tested & ready to use!!

### Optional:

- \* Chiller unit
- \* PTFE COATED DIAPHRAM / OIL SEALED Vacuum pump with setup

### Note:

20 Liter Unit can be supplied with adjustable 10Ltr. Main Flask in 20Ltr. Rotary Film Evaporator so it can be operated at lower volume as and when required.

5 Liter Unit can Accommodate Interchangeable 1, 2, 3, & 5 Liter Flasks. Main flasks will be 5 Liter. So, it can be operated at lower volume as and when required.



## Optional Utility Equipment for Rotary Film Evaporator VACUUM PUMP

DIAPHRAGM PUMP (Dry Pump)

Suitable For GRFE 5 and 20

**DryFast<sup>eco</sup>** is the latest range of the cost effective and chemical resistant diaphragm pump from WELCH Vacuum products.

This two stage diaphragm pump would be an excellent choice for a wide range of laboratory vacuum applications like distillation, drying, concentration, filtration and aspiration etc.

**DryFast<sup>eco</sup>** would be your ecological chemical resistant diaphragm pump for various lab-scientific applications. **DryFast<sup>eco</sup>** can provide turnable vacuum to <8 mbar.

### Functional Benefits:

- G Able to support a wide of chemical applications.
- G Uses extra coated layers of PTFE liner for diaphragm, thus making it more robust.
- G Dry running operation, Eco –friendly and low maintenance.
- G Lightweight, durable, most suitable for 24x7 of continuous operation.
- G Equipped with an adjustable control valve, precise settings of the flow and vacuum is easily achieved.

### Key applications:

- G 5-20 Liter Rotary Evaporation
- G Vacuum Oven
- G Vacuum Distillation
- G Vacuum Network
- G Vacuum Concentrator
- G Gel Dryer
- G Degassing Desiccation
- G Aspiration
- G Vacuum Filtration

PARAMETER	DRYFAST ECO
Free Air Displacement @50 Hz	33 L/min.
Ultimate Pressure	< 8 mbar
Tubing Needed (ID)	9 mm
Power	230 50/60 Hz
Weight	9 Kg



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### Oil Sealed VACUUM PUMP

These are oil-immersed, Rotary vane type pumps. The rotor, with two spring loaded vanes is mounted eccentric in the stator body, as the rotor rotates, the vanes sweep the crescent shape air space twice in each revolution. There is an in-built non-return valve which prevents backflow of air. Manufactured from graded material/ all moving parts are precisely machined/ ground and assembled with close tolerances. This results in increased efficiency and long trouble free operating life.

#### Accessories:

- G moisture trap. Inlet dust filter. Vacuum gauge with regulator. trolley for small pumps.
- G Use oil : ENCL-46 (HP) SAE-30 or equivalent, vacuum oil.
- G vacuum measured by mcLeod gauge at suction port of the pump.

#### Applications:

Distillation, dehydration and filtration processes existing electronic tubes, GLS lamps/ mercury vapor lamps and tubes, vacuum methodology, vacuum sublimation, vacuum impregnation, thin film coating, refrigerator and air conditioner servicing.

Rotary Evaporator Model	Vacuum Pump MODEL NO.	No. OF STAGES	FREE AIR DISPLACEMENT		ULTIMATE VACUUM mm of Hg.	DRIVE MOTOR REQD H. P.	APPROX. OIL FILLING Ltrs.
			Lt. / Min.	C.F.M			
GRFE 5	HL -50	2	50	1.8	0.005	0.25	2
GRFE 20 /GRFE 10	HL - 100	2	100	3.5	0.005	0.5	3
GRFE 50	HL - 150	2	150	5.3	0.005	1	4
GRFE 100	HL - 300	2	300	10.6	0.005	1.5	8

### Utility Equipment for Rotary Film Evaporator

#### CIRCULATING CHILLER WATER BATH

- The Specifications of Chiller Water Bath is as below

Rotary Evaporator Model	Chiller MODEL	Temp. range	Cooling Capacity		KW	Tank Capacity	Process Pump	DRIVE MOTOR REQD H. P.
			Ton of Refrigeration	Kcal/Hour				
GRFE 5	FRAC 600	+5°C to +25°C	0.5	1500	1.7	20	35 LPM @ 0.3 Bar	0.25
GRFE 20 /GRFE 10	FRAC 1000	+5°C to +25°C	1	3000	3.5	40	50 LPM @1.2 Bar	0.5
GRFE 50	FRAC 2000 3P	+5°C to +25°C	2	6000	7.0	75	50 LPM @1.2 Bar	0.5
GRFE 100	FRAC 5000	+5°C to +25°C	5	15000	17.5	150	100 LPM	1



# ROTARY FILM EVAPORATOR JUMBO RANGE

200 TO 800 LITERS



**The Largest Size In the World !!**

# ROTARY FILM EVAPORATOR JUMBO RANGE

## 200 TO 800 LITERS

### INTRODUCTION

**A brief Introduction of evolution of CYLINDRICAL SHAPED Rotary Film Evaporator made of Borosilicate Glass!! - ALL NEW Innovation from GOEL, INDIA.**

Rotary Film Evaporator is regularly used product in the R & D of chemical & pharmaceutical industry. It is also being used nowadays for manufacturing purpose for high value pharmaceutical & specialty chemical products. The existing rotary film evaporators, which are used, with spherical evaporating flasks. When the requirement of volume for process increases it is practically very difficult to handle the sizes beyond 50 Liters.

Chemical reactors are cylindrical in shape with a particular L/D ratio in general, which are given for a particular reaction surface area. The cylindrical vessel has a higher surface area than spherical vessel. This prompted us to think in the direction, why only spherical vessel is used when we can exploit the advantage of cylindrical shape evaporation flask in a rotary film evaporator.

***Thus the innovation for a better rotary film evaporator with better efficiency in terms of rate of evaporation was done.*** The results showed that the rate of evaporation was enhanced to 20 % as compared to conventional spherical shaped rotary film evaporator. Also the mechanical stability was far superior to spherical vessel, inclined drive rotary film evaporator.

Then we designed the largest Rotary Film Evaporator **Jumbo Rotary**, capacity 400 Ltrs made from Borosilicate Glass 3.3 Cylindrical

Evaporation flask. In spherical flask rotary film evaporator the drive is inclined and the flask is held from it's neck only. Thus a inclined cantilever type of loading happens on the rotating assembly. This is highly unstable mechanically as for the same neck size of flask, higher stresses develop in the flask neck compared to a horizontal drive simply supported flask as in the case of cylindrical rotary film evaporator. The cylindrical flask of the jumbo rotary evaporator is also held by the neck, but the drive centerline is not inclined, instead it is horizontal.

The rotating flask is also supported axially at two cross-sectional circumference over it's whole length, thus making the loading effectively a simply supported one and not a cantilever type. This reduces the stresses on the neck of the flask and is the only safer solution for making higher size rotary film evaporator. Another advantage of the cylindrical flask is it's lower diameter compared to a spherical flask for a particular volume, which is a very critical factor for glass MOC as the pressure rating goes down drastically with the increase in diameter. Also material removal & cleaning becomes easier from the cylindrical rotary film evaporator. It is simply opening the quick release coupling from one end. The material can be easily scooped out where as in spherical rotary film evaporator the whole flask is to be separated out & spherical flasks becomes too bulky and handling becomes very difficult for sizes above 200 Ltrs.

***This development has overcome the constraint of the size in Rotary Film Evaporators from laboratory scale applications to industrial applications for sizes above 100 Liters i.e.***

**Up to 800 Liters with a diameter of 800 mm !!**

### TECHNICAL SPECIFICATIONS

ITEM	MODEL : GRFE 200 J	MODEL : GRFE 400 J
Cylindrical Flask	200 Ltr.	400 Ltr.
Heating Bath	SS 304 6 Kw x 3 = 18 Kw Flameproof	SS 304 9 Kw x 3 = 27 Kw Flameproof
Canopy	Polycarbonate Canopy	Polycarbonate Canopy
Drive Motor	3 HP (Flame proof), 50 Hz 415 V, 3 phase motor RPM : 2-50 RPM, Variable, VFD Based	5 HP (Flame proof), 50 Hz 415 V, 3 phase motor RPM : 2-50 RPM, Variable, VFD Based
Glass Specification	All contact Parts are made of Borosilicate - 3.3 glass / PTFE Heat Exchanger - 1.5 m <sup>2</sup> x 2 Nos. Heat Transfer, 6" Small Diameter Receivers 20 Ltrs with Drain, Vacuum & Vacuum Release Valve Seals & Gasket PTFE & GFT Tubular Structure & Structure Parts SS 304	All contact Parts are made of Borosilicate - 3.3 glass / PTFE Heat Exchanger - 2.5 m <sup>2</sup> x 2 Nos. Heat Transfer, 6" Small Diameter Receivers 20 Ltrs with Drain, Vacuum & Vacuum Release Valve Seals & Gasket PTFE & GFT Tubular Structure & Structure Parts SS 304
Dimension (Approx)	2500(L) x 1200(W) x 2200(H) mm	3600(L) x 1500(W) x 2500(H) mm