An ISO 9001:2008, 18001:2007, 14001:2004 Certified Co.

CONSULTANTS DESIGNERS MANUFACTURERS

FOOD & BIOTECH

ENGINEERS (INDIA) PRIVATE LIMITED

www.foodbiotech.co.in

INTRODUCTION

FOOD & BIOTECH ENGINEERS (I) PVT. LTD (An ISO 9001:2008, 18001:2007, 14001:2004 Certified Co.) is a leading manufacturer and engineering Consultancy Company for designing, manufacturing, installation and commissioning of various sizes of evaporators for Industrial/Distillery effluent concentration.

FBE also design evaporators for other food products like Milk / Whey / Fruit juice / Starch / Malted milk etc. with a dedicated team of professional, and has successfully completed various installation world wide for evaporators and related equipments.

The company has well established facilities and expertise to support projects and to provide a wide range of engineering and construction services for clients. It has two fully equipped fabrication units at Palwal Haryana to fabricate multiple effects evaporating plant meeting the high quality with standard specifications.

FBE is backed by more than decades of experience in stainless steel fabrication field as well as the application of advance engineering and management system. The company is capable of executing the project on schedule time with competitive prices.

Moreover, with the co-operation of technical, administration and financial professional, the company has fast grown in continuity and has proven record among its clients world over.

QUALITY POLICY

We at Food & Biotech Engineers (India) Pvt. Ltd firmly believe that quality and safety in our products are the pillars to achieve consumer satisfaction and progressive improvement.

We strive to achieve these objectives of quality and safety in our products and services by

- Responding to the consumer needs through adaptation of needed technology.
- Providing innovative designs, giving the optimum benefits to its customer in their perspective.
- Following all applicable, statutory requirements.
- Maintaining the needed internal standards and process controls.
- Training to our employees in relevant areas.
- Interacting with consumers to strive to their aspirations and quality expectations.
- We will periodically review the quality policy at regular intervals for its effectiveness.

The methods of setting quality objectives and means of communication of policy across the organization are taken up as part of management commitment towards the system.

DISTILLERY EFFLUENT OR SPENT WASH

During the manufacturing process of ethanol, sugar cane molasses is fermented and distilled, which generates around 10 lit effluent (wash water) per lit of ethanol production. This effluent is called spent wash which is characterized by high content of ash, low PH, high percentage of suspended matter, high BOD and high COD value

Composition of Spent Wash Coming Out From Distillery Plant

Characteristics	Data
Temperature of effluent	50-80° C
Total Solids	87,000 mg/lit.
Total Suspended solid	1,400 mg/lit
PH	4-5
BOD	50,000-55,000 mg/lit
COD	1,10,000-1,35,000 mg/lit
Sulphate	15,000 mg/lit
Chloride	4,300 mg/lit
Total Kjeldahl Nitrogen	14 mg/lit
Ammonical Nitrogen	3 mg/lit
Ash Content	1.37 %
Fixed Carbon	0.87 %
Color	Dark brown

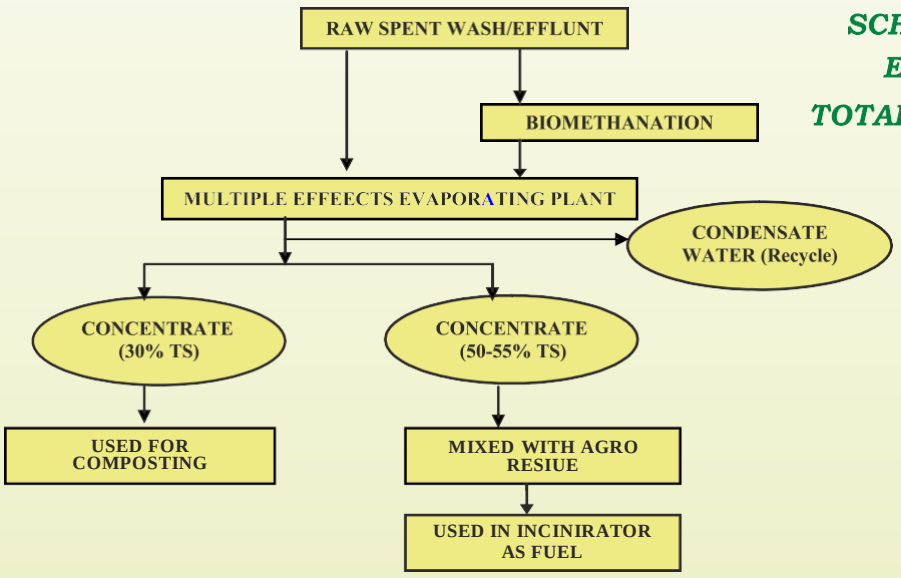
Distiller waste water poses a serious threat to water quality in several region of the country.

* Lowering of PH value of the stream, increase in organic load, depletion of oxygen content, destruction of aquatic life.
* Bad smell is some of the major pollution problems due to distillery Wastewater.
* The high BOD causes depletion of dissolved oxygen and proves very harmful to aquatic life.
* In some cases, the color problem is so acute that distilleries have to provide separately potable water to surrounding village.

TREATMENT OF DISTILLERIES EFFLUENT

With the ultimate aim for achieving zero liquid discharge, the treatment scheme shall be

1. Primary Stage (Objective: biogas generation)
   Biomethanation process can be done either by Mesophilic or Thermophilic route.
2. Secondary Stage (Objective: reducing volume)
   Multiple-effects Evaporator consumables steam and power.
3. Tertiary Stage (Objective: converting to useful solid).
   Alternative routes are:-
   * Bio-composting with press mud/agro residues for organic manure.
   * Spraying of Conc spent wash in boiler along with support fuel for generating steam & convert effluent to ash.



SCHEMATIC FLOW DIAGRAM FOR EFFLUENT TREATMENT FOR TOTAL POLLUTION CONTROL SYSTEM

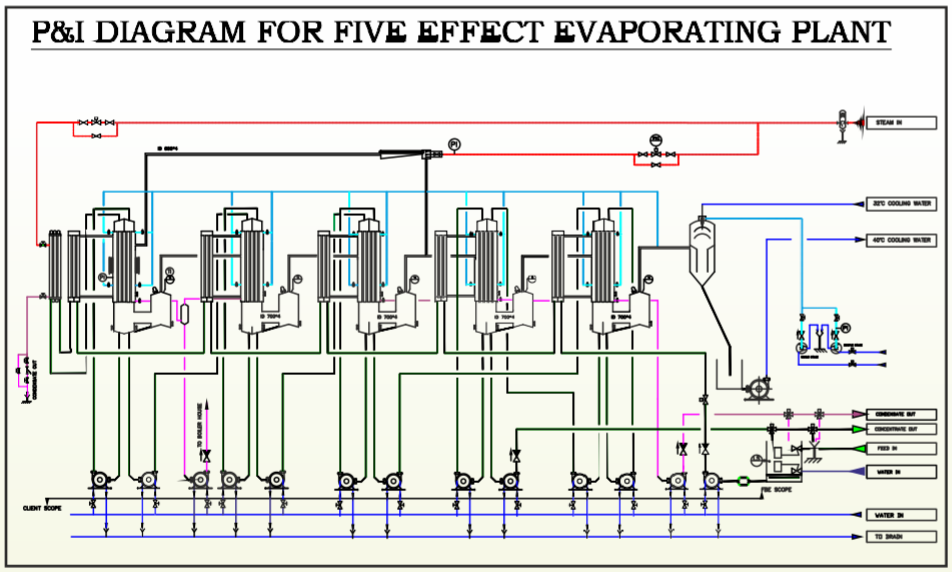
TYPES OF EVAPORATORS MANUFACTURED BY FBE

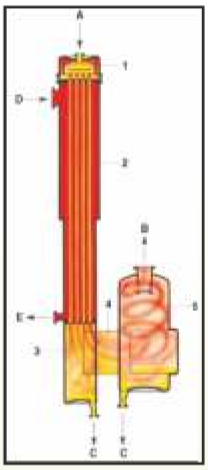
- Multiple effects falling film evaporator to concentrate the distillery effluent up to 30-40 % TS.
- Multiple effects forced recirculation evaporator to concentrate the distillery effluent up to 50-55%.
- Multiple effects evaporating plant in combination with falling film and forced recirculation calandrias to concentrate the product either up to 30% TS or up to 55% TS.

The salient features of evaporators manufactured by FBE

- Totally integrated pollution control plant.
- Continuous trouble free plant, reduces man power requirements
- Optimum steam consumption.
- Optimum power Consumption.
- Instrumentation and automation shall be provided which can be maintained very easily.
- Concentrate (TS 30%) shall be utilized as composting.
- Concentrate (TS 55%) after mixing with agro residues (Rice husk, Rice bran, Saw dust, Bagasse, Powder coal etc.) shall be utilized as fuel to give high gross calorific value in incinerator.
- Condensate water coming from evaporator can be used for make up cooling water in condenser, and can be recycled, washing of equipments, dilution of molasses/ fermentation.
- Less scaling in the tubes.

FALLING FILM EVAPORATOR





A: Product
B: Vapor
C: Concentrate
D: Heating Steam
E: Condensate
1: Head
2: Calandria
3: Calandria, Lower part
4: Mixing Channel
5: Vapor Separator

Concentration of highly sensitive material require a minimum time of exposure to the heated surface. This can be done in once through falling film evaporators. The tubes are vertical and the product forms a thin film on the inside of the tubes, which are surrounded by steam. The product is preheated to a temperature slightly above the temperature of generation in the evaporator. From the preheater, the product flows to the upper section of the evaporator.

By means of specially shaped nozzle, product is distributed over a spreader plate. The product is slightly superheated and therefore expands as soon as it leaves the nozzle. Part of the water is vaporized immediately.

The steam formed forces the product outwards against the inside of the tubes and it run down the walls of the tubes as thin film. The water content of the film evaporates rapidly as the product passes through the tubes. A steam separator is fitted under the evaporator and separates the steam from the concentrated product.

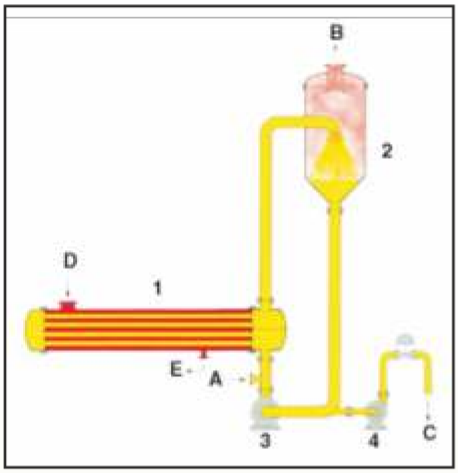
The resident time in the falling film evaporator is very short, as only a small amount of the product is treated at the same time.

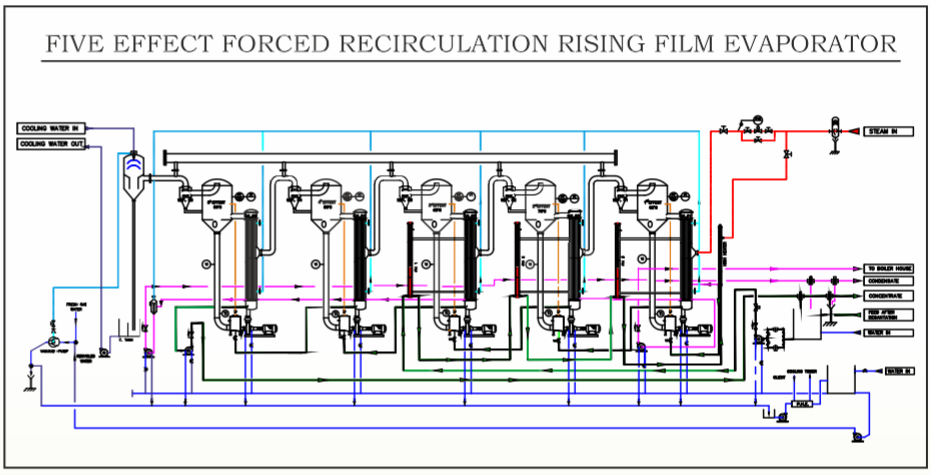
There is no hydrostatic increase in temperature in a falling film evaporator which means that the value of the saturated vapor pressure corresponds to the vacuum in the tubes. The vapor reaches its maximum velocity at the bottom of the tubes shortly before the discharge end.

Characteristics of multiple effects Falling Film Evaporator

- It can be operated at much lower ΔT (Difference between jacket and boiling temperature).
- The low ΔT, is favorable to vapor recompression and consequently, the energy consumption is low.
- Short holding time.
- Low power consumption.
- Can be operated at with or without TVR, with TVR efficiency is improved by 25%.
- Can be operated at high steam pressure at 9 bar and low steam pressure at 1.5- 3.5 bar on turbine steam exhaust.
- Suitable to concentrate the product up to 30-40% TS.
- CIP is required after every 20 hours of continuous running of plant.
- After every 20hrs of running start up of vacuum and steam is required.

FORCED RECIRCULATION EVAPORATOR





A: Product
B: Vapor
C: Concentrate
D: Heating System
E: Condensate

1:Calandria
2:Separator(FlashCooler)
3:CirculationPump
4:ConcentratePump

The forced circulation evaporator was developed for liquors, which are susceptible to scaling or crystallizing. Higher co-efficient are obtained in forced recirculation evaporator. Here a centrifugal pump forces the liquid product through the tubes at an entering velocity of 2-6 m/s and the heating medium surrounds the tubes carrying the liquid. Pressure drop and hydrostatic head in combination are frequently great enough to prevent the liquid from boiling in the tubes, so that the vapor generated is flashed as the liquid enters the vapor separator. Since the velocity of the flashing mixture is high, impingement deflector/baffles in the separator are important to minimize entrainment. Liquid returns to the pump inlet, where it meets incoming feed; vapor leaves the top of the evaporator body to a condenser. Part of the liquid leaving the separator is continuously withdrawn as concentrate.

Characteristics of multiple effects Forced Recirculation Evaporator

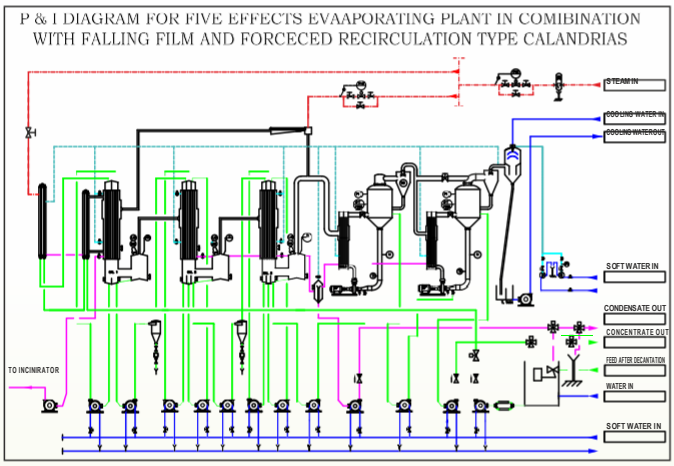
- High temperature difference between jacket and boiling temperature is required.
- High ΔT is necessary to obtain high concentration, due to increased viscosity of the product.
- Long holding time
- Suitable to concentrate the product up to 55% TS.
- The overall co-efficient is very high, which reduces the size of unit.
- CIP is required after 30-40 days of continuous running.
- No CIP chemicals are required on daily basis.
- Plant capacity shall be selected at lesser level as average plant operation is 22-23 hrs.
- Heavy power consumption.

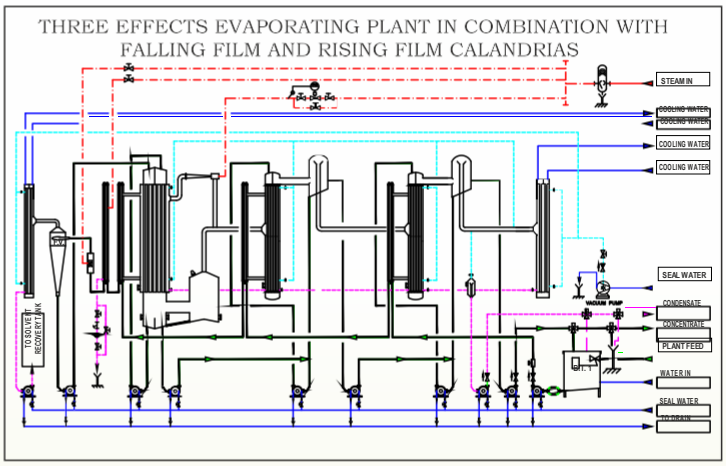
COMBINATION OF FALLING FILM AND FORCED RECIRCULATION EVAPORATOR

Due to lower concentration level achieved in falling film evaporator and heavy power consumption in forced recirculation evaporator, FBE has designed an evaporator using combination of both types of calandrias. By opting these combinations we can achieve concentration level of product up to 55% with less power consumption compared to forced recirculation evaporator.

Characteristics of multiple effects evaporating plant in combination with Falling Film and Forced Recirculation type calandrias

- High temperature difference between jacket and boiling temperature is required.
- High ΔT is necessary to obtain high concentration, due to increased viscosity of the product.
- Long holding time
- Suitable to concentrate the product up to 55% TS.
- The overall co-efficient is very high, which reduces the size of unit.
- CIP is required after 30-40 days of continuous running.
- No CIP chemicals are required on daily basis.
- Plant capacity shall be selected at lesser level as average plant operation is 22-23 hrs.
- Heavy power consumption.



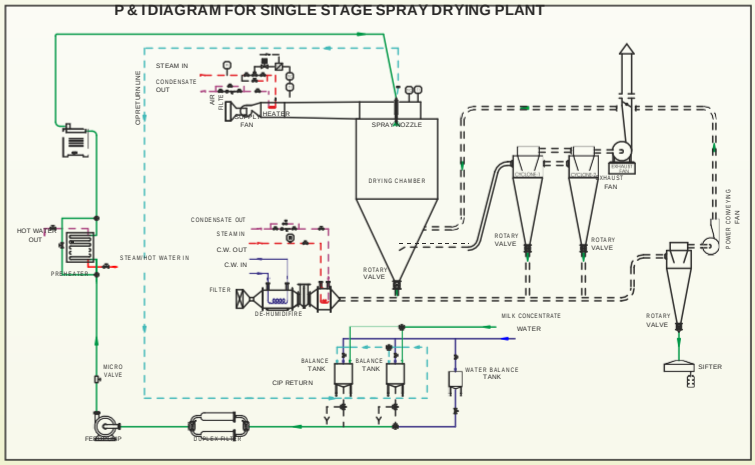


SPRAY DRYING PLANT

We are one of the best manufacturer and designer of spray drying plant. Spray drying is the transformation of feed from a fluid state into a dried particle form by spraying the feed into a hot drying medium. Spray drying method is applied to fluids of high moisture content and high viscosity or of a slightly paste like character.

The Salient Features of spray dryer manufactured by FBE

- High production rate
- Gentle drying
- Short drying period
- Continuous operation
- Uniform product production
- Fully automatic plant.
- High thermal efficiency.



In a spray drying operation, the milk is pumped to a nozzle or rotary disc atomizer which sprays the feed in fine droplets into a drying chamber. The droplets are subjected to a stream of hot air flowing either counter-currently or co currently in relation to the falling droplets. Thereby, the droplets of product are dried so the dry matter remains as powder particles, which fall down towards the bottom of chamber from where it is removed more or less continuously. On account of the large liquid surface created by atomization, the evaporation takes place very quickly, usually at a very low temperature, irrespective of whether drying air of a very high temperature is used.

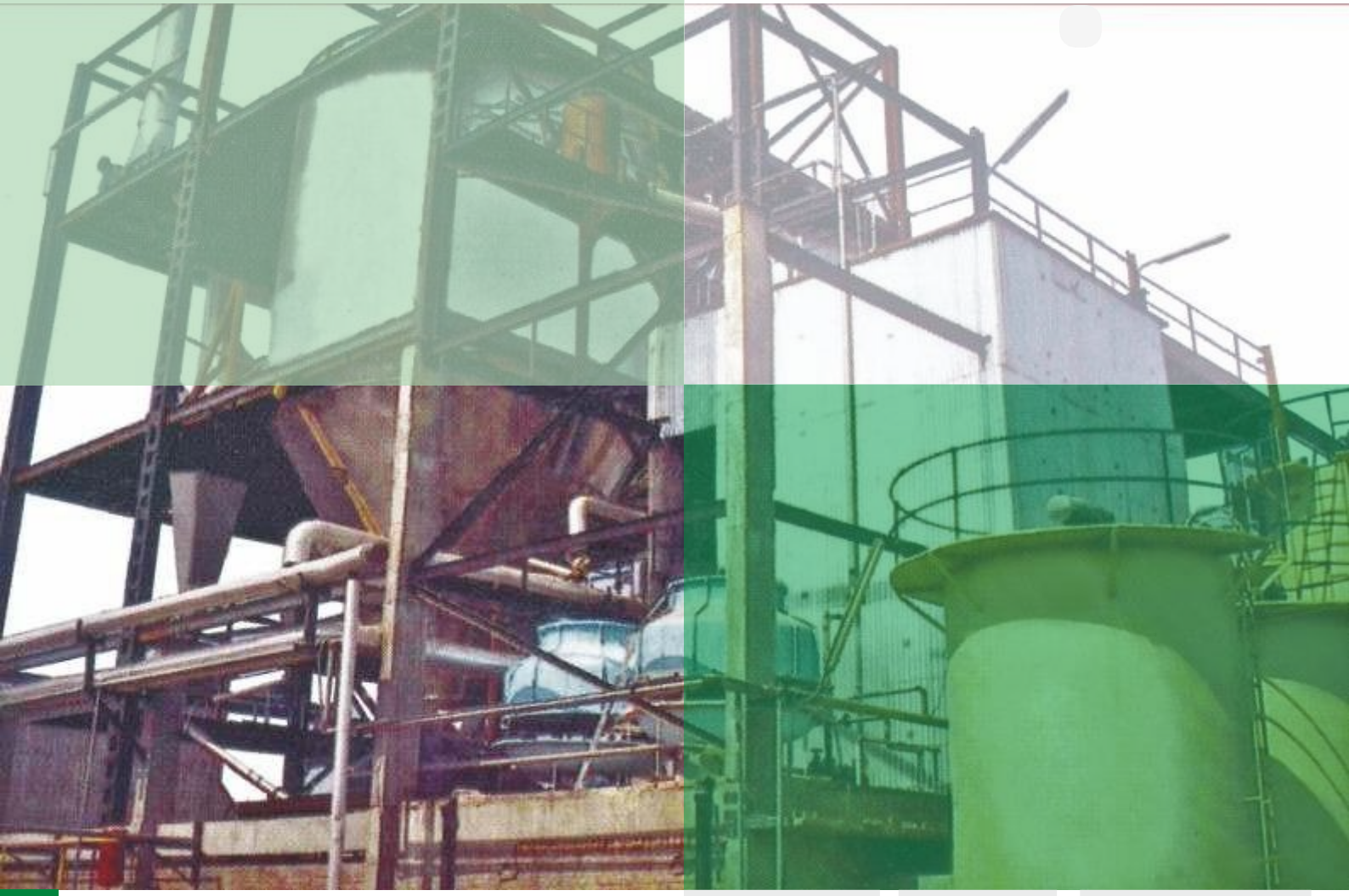
CUSTOMERS

CUSTOMER LIST (Evaporators For Distillery Waste Water)

Company Name	Equipment Supplied
M/s Doon Valley Distillers (Liquors Unit) Dehradun	Four effects falling film evaporating plant with finisher WE Capacity : 7,650 kg/hr
M/S Seksaria Biswan Sugar Factory Ltd., Biswan	Four effects evaporating plant in combination of falling film and forced recirculation type calandrias W.E. Capacity: 16,000 kg/hr
M/s Chandigarh Distiller & Bottlers Ltd. Chandigarh	Three effects falling film evaporating plant WE Capacity : 22,300 kg/hr
M/s Parabolic Drugs Ltd. Chandigarh	Three effects evaporating plant in combination with falling film and forced recirculation type calandrias WE Capacity : 3,600 kg/hr
M/s UFLEX Ltd Noida	Five effects evaporating plant followed with Single Stage Finisher W.E. Capacity: 40,000 kg/hr
M/s Tilaknagar Industries Ltd., Mumbai	Five effects forced recirculation evaporator with single stage Finisher, W.E. Capacity: 21,953kg/hr
M/s S.V.Distillers Pvt.Ltd. Karnataka	Five Effects Forced Recirculation Evaporating Plant With Single Stage Finisher, W.E Capacity:34,580 kg/hr
M/s Oudh Sugar Mills Ltd. Sitapur	Five effects forced recirculation evaporator with single stage finisher, W.E. Capacity: 35,689 kg/hr
M/s Dalmia Sugars Limited New Delhi	Five effects evaporating plant in combination with falling film and forced recirculation calandrias WE Capacity : 21,000 kg/hr
M/S Simbhaoli Sugar Mills Ltd., New Delhi	Five Effects Forced Recirculation Evaporating Plant With Single Stage Finisher, W.E Capacity: 25,300 kg/hr
M/s Bajaj Hindusthan Ltd. Gola site & Palia site	Double effects falling film evaporator, W.E. Capacity: 15,000 Kg/hr

CUSTOMER LIST (Evaporators for other food products)

Company Name	Equipment Supplied
M/s Purechem Company Ltd, Thailand	Four effects falling film evaporator for fruit juice
M/s Fajar Gonbad Dairy Industries Company, Iran	Four effects falling film evaporator for milk
LCP Leuna carboxylation Plant GmbH, Germany	Three effects falling film evaporating plant for chemicals
Barmalt India Pvt. Ltd., Haryana	Five effects falling film evaporating plant for malt.
M/s Milkfood Ltd., Morradabad	Five effect falling film evaporator for milk
M/s Milkfood Ltd. , Patiala	Five effects falling film evaporating plant for milk and whey.
M/s Samainka Foods Ltd., Chennai	Three effects Falling film evaporator for milk
M/s. Hatsun Agro Products Ltd., Chennai	Five effects falling film evaporating plant for milk



CONSULTANTS DESIGNERS MANUFACTURERS

FOOD & BIOTECH

ENGINEERS (INDIA) PRIVATE LIMITED

Office & Works :
Chaprola Road, Prithla, Tehsil &
Distt. Palwal, Haryana - 121102

Ph. 01275-262157, 262158
+91- 9911701022/19
Telefax : +91-1275-262259
E-mail : info@foodbiotech.co.in
& enquiry@foodbiotech.co.in
Website : www.foodbiotech.co.in