

● EVAPORATORS



PROVEN DESIGN AND COMPETITIVE SOLUTIONS

● EVAPORATORS

EVAPORATOR PRODUCTS

Amino Acids
Ammonium Sulfate
Barley Stillage
Beet Stillage
Betaine Caustic Stillages
Citric Acid and Salts
Corn Stillage
Corn Syrup / Glucose
Dextrose
Erythritol
Fructose
Gulonic Acid
Kaolin
Lactic Acid
Lysine
Maltodextrin
Molasses
MSG
Potassium Carbonate
Rendering Waste
Sodium Chloride
Sodium Thiocyanate
Sorbitol
Steepwater
Succinic Acid
Sucrose
Sugar Vinsasse
Tomato Sauce
Threonine
Vitamin C
Wheat Solubles
Wheat Stillage

DEDERT HISTORY

Dedert Corporation has enjoyed a rich history during its 50 years of existence, providing custom designed Evaporators and Dryers on a worldwide basis. The Dedert name has become synonymous with descriptors such as "Quality", "Dependability" and "Customer Satisfaction". Our experienced engineering staff averages over 20 years of service and strives every day to make Dedert our Customer's first choice for Evaporation and Drying Technology.

The Dedert Experience looks for the unique solution to custom design and engineer each Evaporator System. This solution routinely handles difficult liquors which have:

- Heat Sensitivity
- High Viscosity
- High Suspended Solids
- Organic or Inorganic Fouling

THE NEW INQUIRY

Every Evaporator inquiry receives the same arduous study to find the optimum solution in terms of:

- Energy Consumption
- Capital Outlay
- Building and Space Requirements
- Expansion Possibilities
- Project Payback

FABRICATION CAPABILITIES

Dedert manufacturing capabilities extend around the globe and incorporate all the major international standards. We source our fabrication in documented facilities that meet our high expectations and standards for mechanical quality and on time performance. This utilization of high quality shops allows us to provide our Customers with competitive pricing and quicker deliveries. Dedert is pleased to offer fabrication in accordance with the following list of international codes. Additional codes are available if required.

- ASME
- TEMA
- EUROCODE
- AD MERKBLÄTTER
- UDT
- CODAP
- GOST
- SQL
- JIS



TYPES OF HEAT TRANSFER

- Once Through Falling Film
- Recirculated Falling Film
- Natural Circulation
- Forced Circulation
- Crystallization

MATERIALS EXPERTISE

- Austenitic Stainless Steels
- High Nickel Alloys
- Duplex Stainless Steels
- Rubber Lined Steel
- Fiberglass

ENERGY SOURCES

- Steam Heated
- Thermal Vapor Recompression
- Mechanical Vapor Recompression
- Waste Heat
- Organic Vapor
- Hot Water

DEDERT SYSTEM ADVANTAGES

- Innovative Custom Design with Flexibility to Meet Customer Needs
- Energy Efficient
- Robust Construction for Long Life
- Low Maintenance
- Surpasses Capacity Requirements

DEDERT EXPERIENCE

- **Sugars from Starch:** Dextrose, Fructose, Glucose, Maltose and Sorbitol
- **Fermentation Broth:** Lysine, MSG, Citric Acid, Lactic Acid, Gulonic Acid, Itaconic Acid and Threonine
- **Breweries and Distilleries:** Press Water and Distillery Waste
- **Beet Sugar Industry:** Raffinate, Sucrose and SP Betaine
- **Minerals and Chemicals:** Calcium Carbonate, Kaolin Clay, Sodium Sulfate, Sodium Carbonate, Sodium Chloride, Ammonium Sulfate and Glycerin

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ENERGY ECONOMY

Process optimization has long been one of Dedert's specialties. Each Dedert Evaporator system is systematically configured to provide the Customer with the quickest return on their investment with the lowest operating cost.

ENERGY SOURCES FOR EVAPORATION

Steam Heated Multiple Effect

The energy source is steam at a condensing temperature above that which exists on the process side of the heat transfer surface. For cases where evaporation requirements are small or steam is relatively inexpensive, single effect evaporators are used. In this case, the vapors produced are rejected to a condenser. For higher evaporative duties or when steam is relatively expensive, additional "effects" are used and the process vapors are condensed in subsequent effects operating at lower pressures. Evaporation rate, steam cost, layout area and product characteristics are used to determine the economy and ultimately the optimum number of effects.

Mechanical Vapor Recompression

Dedert originally introduced mechanical vapor recompression to the corn wet milling industry decades ago.

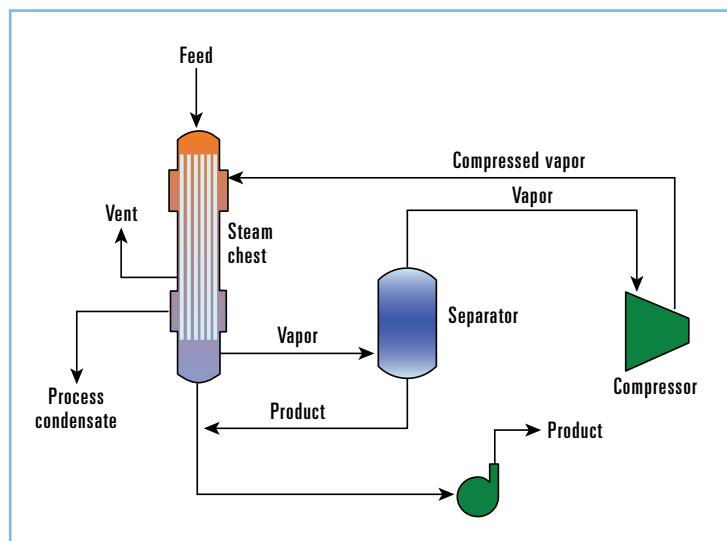
These evaporator components are similar to steam driven machinery with the addition of a mechanical compressor. Mechanical energy supplied via a compressor or fan compresses the process vapor to a higher pressure (and condensing temperature) where it is reused as the heating steam. Steam and cooling water requirements are significantly reduced and are eliminated in many cases. MVR evaporators are generally more costly than steam driven evaporators, but because the operating economy is greatly improved, operating costs are significantly less. Fewer vessels are



required than in steam powered multiple effect systems; therefore, installation costs are lower. The replacement of required steam with recycled vapor results in lower operating costs making this a viable choice in many applications. This is a very attractive option for larger evaporation rates.

Thermal Vapor Recompression

As a way to reduce energy consumption, a thermocompressor which uses high pressure steam as a motive fluid is added to a typical steam heated evaporator. The motive steam at approximately 150 psig enters the thermocompressor and expands as it passes through a diffuser. This in turn entrains recycled vapor and discharges it at an intermediate pressure while providing a steam rate reduction. Steam is once again the source of energy. Economics and product characteristics determine the suitability of thermal vapor recompression operation. This design provides improved steam economy with less costly equipment than straight steam heated designs but requires higher pressure steam.



Mechanical Vapor Recompression

ENERGY RECOVERY

As the price of energy has risen over the years so have efforts increased to find reusable energy. Dedert has long been a pioneer in waste heat recovery and was granted the US patent for an evaporator chest with built in scrubber for the corn wet milling industry.

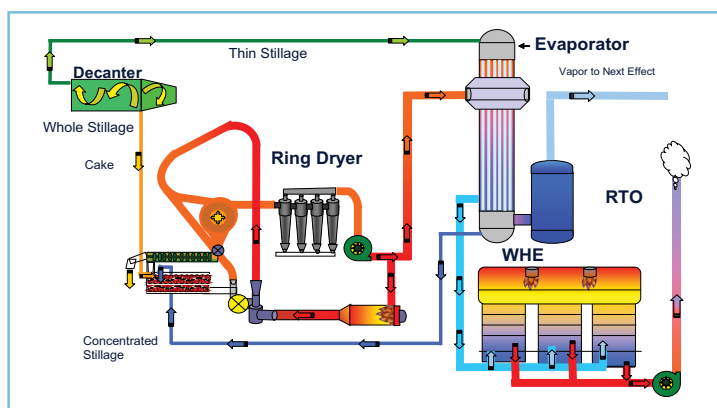
Gas Heated

In many cases, off-gases from existing plant operations such as dryers or scrubbers contain valuable energy which may be recovered as the energy sources for gas heated evaporators. This essentially “free” energy provides for very low operating cost. Also, with the reduction of the waste gas stream exiting the evaporator, energy requirements are reduced downstream for the emissions handling equipment as well.

Organic Vapor

There are cases in many plants where process vapors other than water vapor are generated. Rather than dissipating the latent heat of these vapors using cooling water in a condenser, they are often used as the energy source to drive evaporation.

In the Biofuel Industry, for example, ethanol vapor from rectification and molecular sieves is sometimes used as an energy source to drive the stillage evaporator. Given a sufficient quantity, flash vapors or turbine exhausts are also a welcome source of recoverable energy.



Dryer and Evaporation Integration

Hot Water

Another waste energy source that can exist in a plant environment is hot water (such as condensate). Dedert has designed and supplied evaporators that use the sensible heat from process streams as the energy source.



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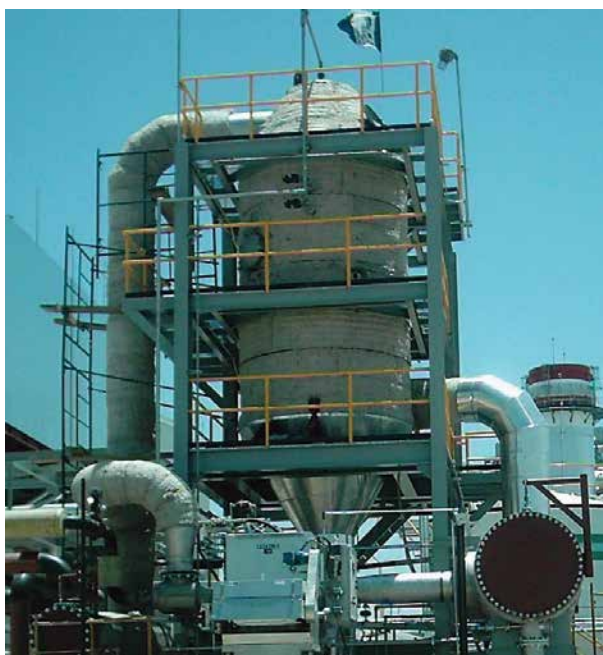
CRYSTALLINE PRODUCTS HANDLED

Amino Acids
Ammonium Sulfate
Citric Acid
Cyclodextrin
Dextrose
Glucosamine
Gluconic Acid
Itaconic Acid
Monosodium Glutamate
Potassium Carbonate
Potassium Citrate
Sodium Chloride
Sodium Citrate
Sodium Sulfate
Threonine
Vitamin C

CRYSTALLIZERS

Dedert provides evaporative crystallizers which produce solids from a wide range of process and waste solutions. Applications include precipitation and/or purification of crystalline solids and cost effective volume reduction of waste streams in chemical, pharmaceutical, food, utility and pollution control operations.

- Dedert has innovative ideas for handling solutions with high boiling point elevations.
- The majority of Dedert crystallizer installations are for Customers who have previously purchased Dedert Crystallizers.



PILOT RENTAL EVAPORATORS

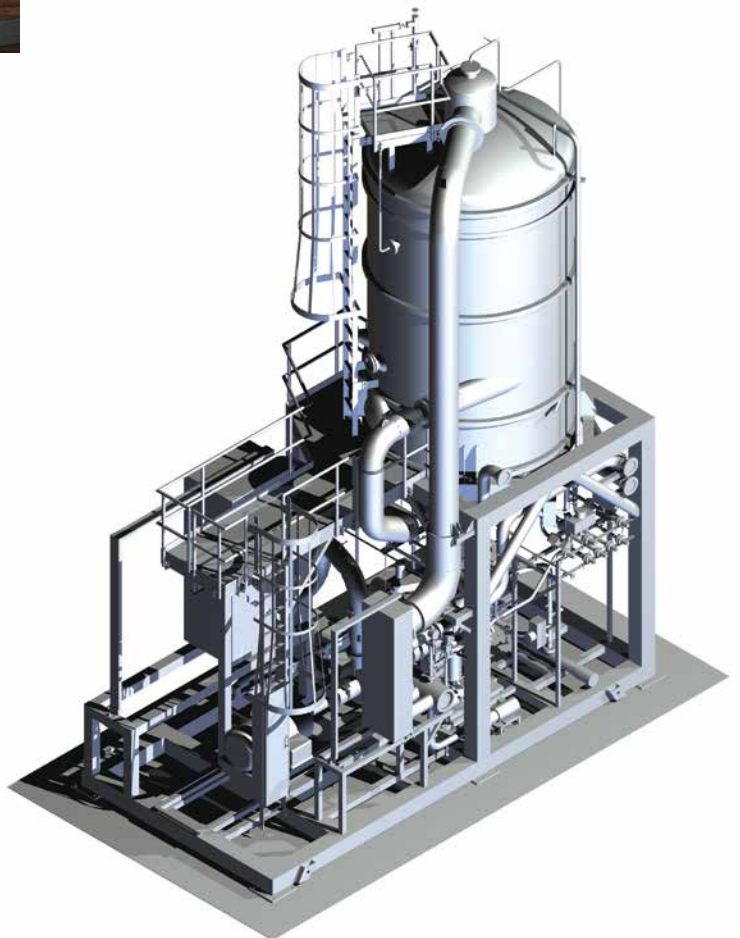
Dedert pilot systems are available as preassembled, skid mounted units and are suitable for installation and testing at operating plants or test sites. Our standard rental evaporator is a single effect, steam heated system, capable of operation as Falling Film, Recirculated Falling Film, or Forced Circulation. These units have a nominal evaporation capacity of 150 lb per hour and require user supplied steam, cooling water and electrical power for operation. The materials of construction for this industrial grade process system are type 316 stainless steel and include the required pumps and motors along with a vacuum system.



SKID MOUNTED EVAPORATORS

Project economics sometimes dictate the need for preassembled skid mounted equipment. Dedert engineers have the experience and expertise to custom design an economical turn-key system to meet the needs of our Customers. Preassembled skid mounted projects would typically offer:

- 3-D Modeling
- Tubular and/or Plate Type Heat Transfer Equipment
- Flexible Layout to Meet Building Constraints
- Structural Design and Assembly
- Code Stamped Pressure Vessels and B 31.3 Piping
- Pumps and Motors
- Instrumentation and Controls
- Motor Control Cabinet
- Insulation





Dedert Corporation Headquarters

17740 Hoffman Way
Homewood, Illinois 60430
United States of America
Phone: (708) 747-7000
Fax: (708) 755-8815
E-mail: info@dedert.com
www.dedert.com

Dedert (Canada) Inc.

135 Labelle Blvd., Suite 4
Rosemere, QC, Canada J7A 2G9
Phone: +1 (708) 747 7000
Fax: +1 (708) 755 8815
E-mail: info@dedert.com
www.dedert.com

**Dedert (Shanghai) Drying and
Evaporating Technology Co., Ltd**

28B, China Resources Times Square
No. 500 Zhangyang Road,
Pudong New Area
Shanghai, China 200122
Phone: +86 21 60450890
E-mail: info_ds@dedert.com
www.dedert.com.cn

Dedert International A/S

Borupvang 3
2750 Ballerup
Denmark
Phone: +45 28 12 00 10
E-mail: info@dedert.com
www.dedertintl.com

Dedert International (UK)

Unit 4.1, Switchback Office Park,
Gardner Road
Maidenhead, Berkshire
United Kingdom, SL6 7RJ
Phone: +44 1628 702675
E-mail: info@dedert.com
www.dedertintl.com