

# RELCO® Evaporator Systems

Trusted Evaporation for Dairy and Food Products



# Leading Separation Technology

KOVALUS SEPARATION SOLUTIONS™ (KSS) is transforming the landscape of separations by leveraging a synergistic approach using technologies such as membrane filtration, ion exchange, evaporation, and drying. Our solutions are tailored to improving product quality, increasing process efficiency, and driving down costs in dairy, food, beverage, life science, and industrial markets around the world.

The addition of RELCO® evaporation systems to our portfolio allows KSS to provide dairy and food producers with cutting-edge thermal technology to produce high-quality products. Our highly customized MVR and TVR evaporators are available in different configurations and are designed to process a range of flow rates in stand-alone processing or integrated into a larger operation that includes drying or other functions. Our systems are designed with a large degree of automation capabilities to optimize process startup, density control during operation, and CIP cycles. RELCO evaporators operate with high efficiency and produce stable final concentrations for a variety of products, including:

- Whey protein concentrate and isolate
- Permeate
- Milk protein concentrate and isolate
- Pro-cream
- Non-fat dairy milk powder & whole milk
- Codex skim
- Buttermilk
- Infant milk formulas
- Encapsulated powders
- Yeast
- Blood products
- Non-dairy ingredients



# Innovative and Collaborative Approach

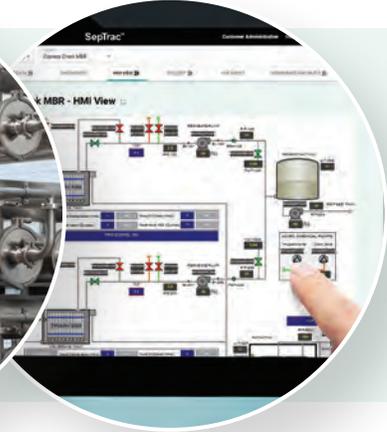
## Complete Process Solutions

KSS is a complete process solutions provider in the dairy and food industries, offering a suite of complementary separation technologies for a range of in-process applications and water and wastewater treatment. Our integrated, start-to-finish capabilities position KSS to be a preferred partner to a variety of manufacturers in these key industries, eliminating the need for multiple vendors. Aside from our leading technologies, customers benefit from long-lasting relationships with our engineering and field service teams for superior aftermarket services to maintain and optimize on their high-performing operations for years to come.



## Collaborative Innovation

We take a collaborative approach with our customers, combining our deep applications knowledge with their unique process expertise to develop the most transformative and value-added solutions. Through this approach and our wide selection of separation technologies, KSS is best positioned to offer customers a complete solution without the need to rely on multiple vendors.



### EARLY-STAGE DEVELOPMENT

- Understand challenge & identify desired outcomes
- Evaluation of separation properties & bench testing
- Access to Process and R&D experts

### FIELD TESTING

- Pilot testing
- Process optimization
- Full scale costing and design recommendation

### FULL-SCALE EXECUTION

- Project management & execution of capital projects
- Construction and installation
- Commissioning and operator training

### LONG-TERM SUPPORT

- Complete after-sales services
- System troubleshooting
- Performance optimization through remote digital monitoring program

# Evaporation Technology

## Evaporator (6 – 62% Total Solids)

The RELCO® Evaporator is specifically designed to evaporate milk products such as skim and whole milk, whey, and permeate. Pre-evaporators are designed for a feed concentration of 6 – 24% total solids and will concentrate up to 35 – 45% total solids, depending on the application. From there, a finisher is used to achieve higher concentrations up to 62% total solids. Operating temperatures of each stage are controlled to maintain optimum product quality. Mechanical vapor recompression (MVR) and/or thermal vapor recompression (TVR) technology can be applied for each stage of evaporation.



**RELCO Evaporator**



**RELCO Hi-Con Evaporator**

## Hi-Con Evaporator (60 – 75% Total Solids)

The RELCO Hi-Con Evaporator is specifically designed for use with the L-TECH Permeate Drying System. It is intended to concentrate permeate from feed solids of approximately 55 – 60% total solids to a discharge concentration of 75% total solids. The Hi-Con Evaporator utilizes TVR evaporation technology to minimize steam consumption.

# Evaporation Technology

Component	Function
Preheaters	Preheating is done with a combination of plate heat exchangers, tubular heaters, and/or direct steam injection (DSI).
Calandrias	The heart of the evaporator where evaporation occurs, featuring a falling film design. Calandrias are designed for each application to optimize surface area, tube wetting, and vapor velocities.
Vapor Separators	External vapor separators are offered as a standard and are sized to maximize evaporator condensate quality.
Turbofans	Turbofans are a form of mechanical vapor recompression (MVR), relying on electricity to evaporate water. The latest turbofan designs are utilized, which offer the highest efficiency and the most reliability. Turbofans are generally used for pre-concentration and can also be applied to the finisher.
Thermocompressors	Thermocompressors are used in thermal vapor recompression (TVR) evaporators, relying on plant steam to entrain and compress water vapor. This vapor mixture is used to concentrate incoming product.
Piping	Piping layout is uniquely designed for the Hi-Con Evaporator to allow for reliable operation at very high product concentrations.

## RELCO® Evaporator Features & Benefits

- Generous surface area and multiple passes in each calandria for greater tube wetting rates helps promote longer run times with increased efficiency
- Turbofans are selected for large pressure rise with oversized motor allowing for longer run times without wasting energy
- Evaporator balance tank is integrated into the calandria base for reduced equipment footprint
- 316L product contact surfaces are available
- Discharge solids are maintained automatically
- Advanced automation includes density control, forward flow capability for faster startups and CIP cycles, and water flushes which can be activated by time or plugged pipe detection
- Unique CIP configurations allow for higher liquid loading of the calandria tubes, decreasing CIP turnaround times
- Optional implementation of a small TVR at the end of the system for greater control of final product concentration (especially useful on larger multi-effect evaporators)

# Evaporation Technology

## CrystaLac Crystallizing Evaporator

The CrystaLac™ Crystallizing Evaporator sets the standard for lactose production. This evaporator is specifically designed to control crystal growth by recirculating a super-saturated lactose solution during evaporation and not batch cooling, as seen in traditional lactose manufacturing methods. This process substantially improves final lactose yield up to 91%, while reducing process variability for lactose drying systems downstream. A slurry containing larger crystals is continuously bled from the CrystaLac evaporator to the cooling crystallizers, increasing crystal size and maximizing lactose recovery in subsequent separation, washing, and drying operations. The CrystaLac evaporator can be configured with vapor recompression technology for improved energy efficiency.

## Features & Benefits

- Improved control of crystal size and fewer process variations ensure smooth downstream processing
- Simplified plant operation
- Minimized fouling on heat transfer surface results in fewer dryer upsets
- Increased lactose yields for same volume of permeate
- Less mother liquor used



# Evaporation Technology

## Sweetened Condensed Milk Evaporator

The RELCO® Sweetened Condensed Milk Evaporator System combines standardization of milk with sugar, evaporation, holding, cooling, lactose seeding and crystallization. Depending on customer requirements, we are able to dose sugar syrup after evaporation as opposed to sugar prior to evaporation.

### Features & Benefits

- Low temperature profile helps avoid product discoloration and reaches longer than 20-hour running times
- Equipped with tubular heaters
- Final heat treatment up to 120°C using direct steam injection reduces product damage
- Stable final concentration and temperature (using steam only; no ice water is required)
- Reprocess vessel collects and cools all water/milk interfaces to avoid product loss
- Lactose seeding dosage optimizes crystal formation in crystallizers
- Product viscosity control using agitation and temperature control in hold tank
- Sterilized processing through use of sterile tanks and a sterilization system for all equipment in contact with the final product
- Optional water recovery system





## KOVALUS SEPARATION SOLUTIONS

KOVALUS SEPARATION SOLUTIONS™ (KSS) is a global leader in separation technologies.

With best-in-class domain expertise, technologies and systems, KSS is uniquely positioned to help customers purify and recover valuable process streams and achieve sustainability goals across food and beverage, life science, and general industrial markets.

### Services & Support

After-Sales Services & Maintenance Programs • SepTrac™ Smart System



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