

EST. - 1939



# Kumar Solvent Extraction Plants

In joint venture with Crown Iron Works Company, USA



**A STEP  
AHEAD**



# Superior performance



## **Lower electricity consumption:**

Precisely designed process piping manifolds, high efficiency process pumps and energy efficient electrical motors ensure lower electrical power consumption.

## **Lower steam consumption:**

Our Process is such that maximum heat is recovered by regeneration of heat in steam economizers, where the heat from hot vapor is utilized to heat the miscella to its evaporation temperature. Also, we insure that heating vessels are properly insulated so that the radiation losses are drastically reduced.

## **Lower hexane losses:**

We design the condenser with sufficient heat exchange area. The plant is also designed with zero vent system which reduces the hexane losses.

## **Minimal breakdowns:**

Kumar machinery and material handling equipments are assembled and running trials are taken to ensure perfect alignment which result in negligible breakdowns during the commissioning period.

## **Operator friendly and easy maintenance:**

We select superior quality hardware in our process plants. Construction of equipment is simplified for operation and maintenance. Operating as per the procedures given in the manual will ensure low operation and maintenance costs.

## **Lower manpower requirement:**

We supply premium quality and precise instruments for reliable, consistent and better process control that result in lower manpower requirements.

## **Safety:**

Kumar carries out systematical HAZOP study of Extraction plants and can provide documents for hazard analysis and essential safety requirements. Plant layouts are based on international safety standards.

## **International Certifications:**

As per applicable international norms, equipments and machinery are manufactured in compliance with ASME & EU DIRECTIVES.



# The Process

## Preparation

Being the most important step in the Solvent extraction process, different raw materials for solvent extraction plants are prepared in different ways. In case of seed they are first cleaned, de-stoned, cracked, cooked, flaked and passed through the expander/expeller. The cake is sent to the extractor to recover the remaining oil. If the seed is well cleaned and destoned it increases the life of the machine as well reduces down time. Properly flaked seeds produce good quality flakes which give desired extraction in the solvent extraction plant with less hexane losses.

### Salient Features :

- Highly efficient seed cleaning and de-stoning system.
- Well designed, seed crackers and flakers having dynamically balanced rolls and sturdy base frame with special heavy thrust roller bearings for trouble free and consistent performance.
- Taper lock pulleys for crackers enable easy maintenance.
- Factory assembled gearbox assembly with running trials are taken to ensure proper cooking of the seed in the cooker.
- Properly controlled removal of hulls from seeds in hull and seed separator to ensure predetermined protein content to suit market requirements.
- Porous collet formation in the expander for better percolation.
- Proper cake sizing in the cake preparatory.
- All our machines undergo strict quality norms which ensure negligible breakdowns during the commissioning period.

### Seed Cleaner / De-stoner

Seeds are cleaned to remove unwanted material like dust, leaf, etc. They are then sent to the de-stoner to remove stones and sand.

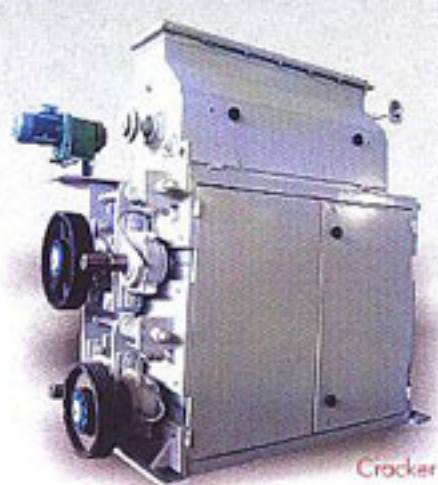
This removal of unwanted material increases the life of machines & reduces the down time.





## Cracker

Four roll cracker to break the seed into quarter and eight sized pieces comprising of extra strong carbon steel frame, chilled cast iron rolls, V- Belts drive motor & diverter gate. Hinge mounted permanent magnet.



Cracker

## Conditioner / Cooker

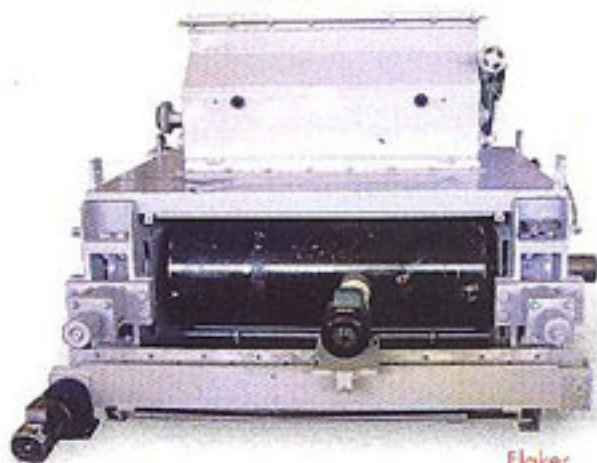
It is important to cook and condition the material before it passes through the flaker. The cooker is a vertical, multi-stage unit with fabricated shells and trays where heating is carried out by indirect steam. The gates are operated by a mechanical level system that automatically control the flow of material and maintain the level in each stage. A central shaft driven by a gearbox carrying agitator blades ensure a good mix. A homogenous treatment of the material prevents burning at the stage base. A vertical duct extracts vapors from each stage. Provision is made to adjust final moisture levels of the material by injecting water or direct steam.



Conditioning Cooker

## Flaker

To flake incoming material to appropriate thickness, carbon steel and cast iron machinery of heavy-duty construction is used. Fabricated and stress relieved frame adjustable scrappers ensure the rolls are continuously cleaned. Opening access doors ensure easy access to rolls and internals. An automatic hydraulic roll loading and releasing system enables to maintain exact gap between roll faces. Rotary feeder ensures an even feed across the full width of the rolls & V-belt drive with motors.



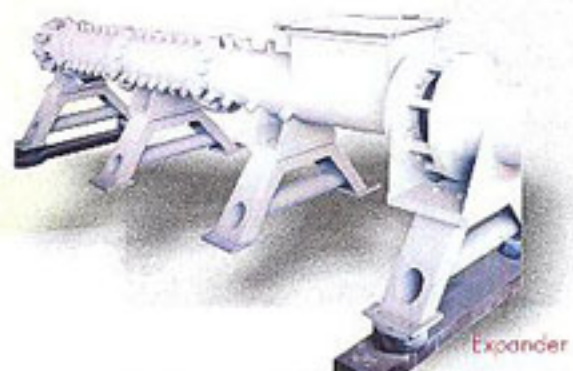
Flaker

## Expander

Expander is mainly used to prepare collets from soya flakes. Collets increase density and porosity which in turn increase percolation of hexane. This yields faster extraction of oil from collets.

### Salient Features:

- Increases plant capacity
- Reduces hexane consumption
- Excellent oil quality



Expander





## Kumar Continuous Extractor

The Kumar extractor is Direct Drive Type supplied with drum shaft, brush shaft and mesh cleaning arrangement. It is a horizontal model comprising of an articulated band conveyor assembly, which receives the material from the feed hopper and transports it at a very slow predetermined speed from the feed to the discharge end. The conveyor moves over the rails suitably located inside the extractor with specially constructed sprockets at either end. There is an adjustable damper for the regulation of the height of the bed of material on the chain conveyor. A series of spray breakers are present for the perfect spray of solvent on the moving bed with a counter-current effect which ensures maximum oil recovery. The band conveyor assembly is designed to act as a filter bed for eliminating fines by rotary brushes & a mesh cleaning system.

### Salient Features:

#### Drive

Kumar Extractor has a single piece hollow shaft gear box which is mounted on the main shaft of the extractor. This avoids the use of a big gear and pinion arrangement that is prone to frequent maintenance. The extractor motor is driven by a variable frequency drive that allows fine adjustment of speed as per processing rates and also allows data logging such as run time, stoppage, history etc.

#### Construction

Kumar extractor has a single piece miscella hopper having no weld joints. This reduces the chance of leakages during operation. All body parts and internals are sandblasted and coated with zinc-based epoxy primer prior to manufacturing. This increases the equipment life by reducing chances of corrosion. The extractor is fabricated at our factory and running trials are taken to ensure trouble free running at site. Prefabrication reduces the time for erection and commissioning. The selection of size is such that the bed height is limited which reduces the chances of miscella channeling.



### The advantages of low bed height :

- Rate of mark feeding to DT is consistent. This ensures consistence vapour flow and control on hexane loss.
- Loading of extractor bed is low, i.e. weight per square metre is lesser compared to true deep bed extractors, this ensures low wear and tear of the band conveyor.

### The advantages of additional two hoppers :

- The extra miscella hopper at discharge end allows more hexane to drain before it is fed to the DT. Hence the load on DT is lesser ensuring little steam and hexane to evaporate and lower water circulation for condensation as well.  
Extra miscall hopper at feed end ensures the settling of miscella before it is transferred to the miscella tank. Major fines are settled in this hopper.  
The additional miscella spray on this hopper is used to soak the incoming flakes so that the miscella circulation sprays work effectively.
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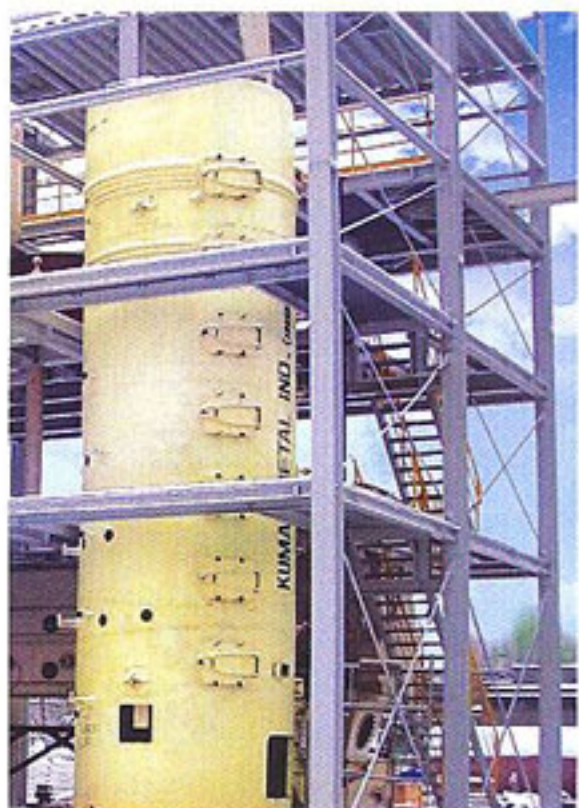


# Desolventising Toasting

Vapor tight construction in carbon steel for desolventising as well as toasting, specially designed for oilcakes. Fitted with level indicators, the DT comprises of a number of stages with bottoms jacked for the purpose of indirect heating. Centrally rotating shaft provided with scrapers along with sparge steam ensures uniform heating and movements of the material in all stages. The final discharge door is connected with the feeding, complete with a driving mechanism and pneumatic meal level controlling arrangement.

## Salient Features:

- Desolventiser toaster is provided with a hollow shaft with steam connections to the blades that facilitate injection of steam in the material. This ensures the intimate contact of steam with meal and effective transfer of latent heat to accelerate the evaporation of hexane. This system ensures the highest contact ratio between sparge steam and the meal to be desolventised.
- Another advantage of sparge steam through the blades is that it reduces the number of steam injection nozzles and allows free working space. Our operator friendly system allows precise controlling of quantity of steam by one valve.
- The DT outlet duct is designed to provide sufficient vapor velocity to cyclonic separation. Wet dust catcher is specially designed with an incorporated cyclone separator. The vapors are thoroughly washed with water sprays for removal of dust particles. This high efficiency cleaning provides trouble free running of heat exchangers.
- The provision of a plug-o-seal conveyor with variable speed drives at the outlet of the DT ensures sealing of system. This eliminates the possibility of air entry into the Desolventiser Toaster.
- The DT vapor outlet is routed through various heat exchangers. The condensers and economizers are designed to achieve minimum pressure drop.
- Kumar's unique **Zero Vent System** minimizes the loss of hexane in the atmosphere. In this system an additional in line steam jet ejector is incorporated to provide a pull to the vapors. This ensures the effective removal of vapors from the DT without any reflux. The exhaust of the final vent steam jet ejector is passed to the extractor through direct contact type condenser and exhausted to the atmosphere through the feed bin.



Desolventiser toaster



# Distillation Section



## Salient Features:

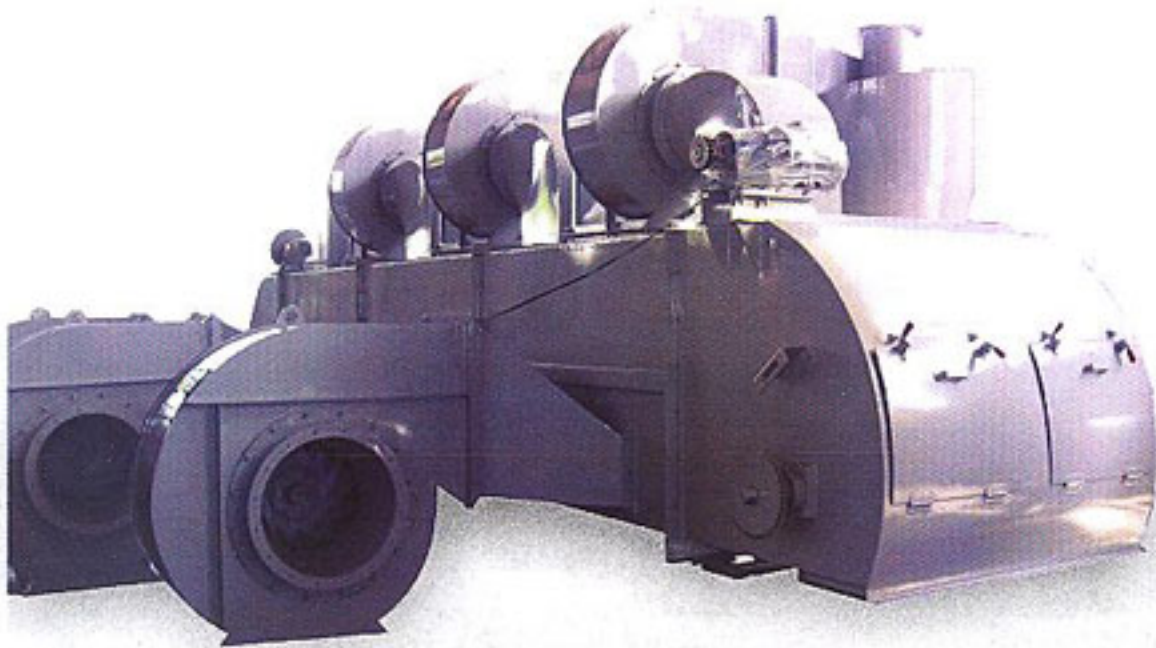
- The suction load data of each steam jet ejector is precisely calculated which ensures the lowest possible consumption of steam, thus reduces recurring expenses along with a reduction in heat load on the condensation system. Vacuum in the final oil stripper allows the distillation to produce good quality oil.
- Distillation is carried out in four stages of vacuum, thereby achieving incremental concentration of miscella at a predetermined rate. Furthermore, each stage is differentiated by the incorporation of a precisely designed U-type siphon pipe, eliminating the use of centrifugal pump. This ensures continuous flow of miscella, & reduces power consumption.
- The Economizer is specially designed having a built-in flasher, which makes it compact in design. This design itself provides high efficiency flashing which increases the miscella concentration.
- The final stage stripping is carried out in the presence of steam under higher vacuum. This allows lower temperature distillation resulting in undamaged crude oil without color fixation.





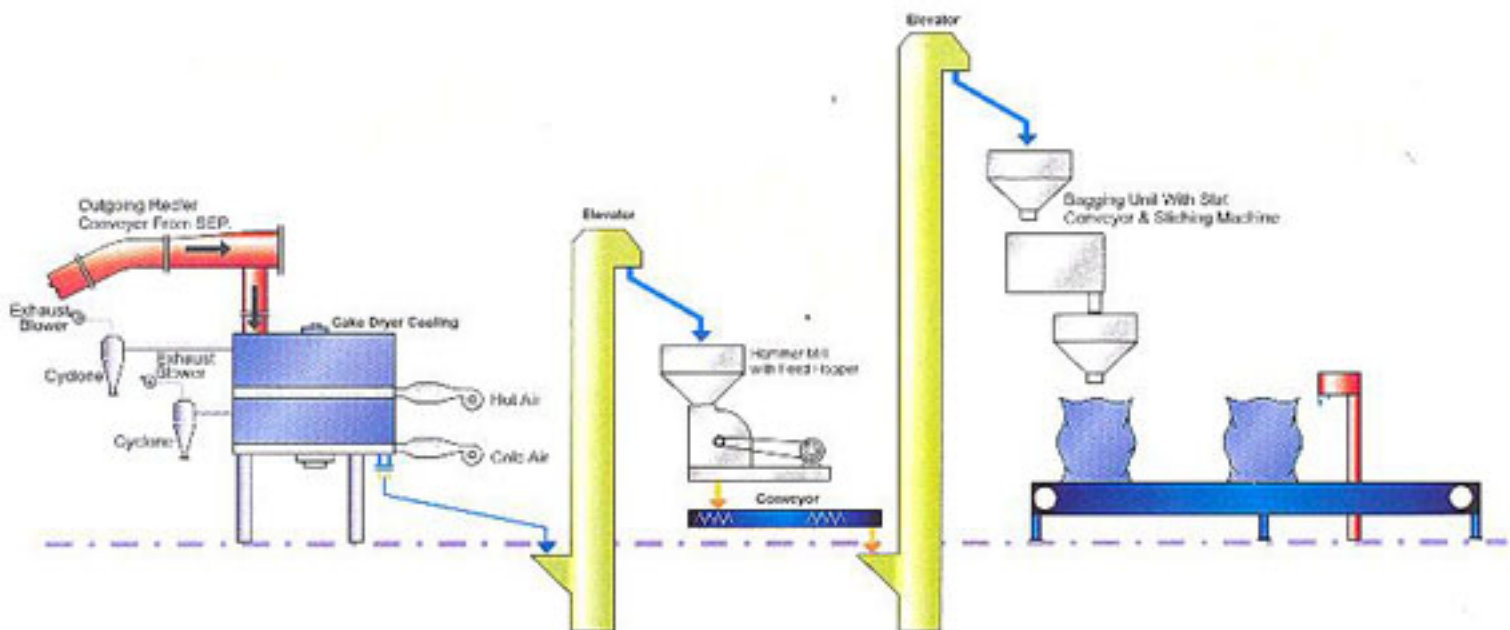


# Meal Cooling / Meal Conditioning



Purpose of the meal cooling section is for cooling the desolventised & toasted material from the extractor with help of an air draft, complete with air blowers, air cyclone, air lock and air ducting. The meal cooler is fitted with alloy steel straps, a special conveying chain, and perforated sheet for fluidization of meal complete with driving mechanism.

## Meal Cooling Section





# A Complete Package



Kumar is a global company. Not only do we serve customers around the world, we also use the best technology and supply resources to ensure that only the best is delivered to our customers. We have installed and commissioned several oil mills, solvent extraction plants and refineries around the world. Our vast experience and expertise to design, engineer and install complete process plants on turnkey basis has given us the competitive edge. We have our presence in over 30 countries and serve more than 500 clients.

**Process Control:** The control, operation and supervision of the plant can be handled by minimal staff. All main process parameters for example flow rates, temperatures, liquid levels etc. are automatically maintained from a control panel or, as an option, with the help of PID/PC based controls.

Our services also include:

- Installation design in compliance with international standards
- Complete process automation
- Skilled manpower for supervision of installation and commissioning
- Technical and manpower assistance to bring your new installation on line in minimum possible time
- We provide skilled operational staff and also train the local staff

## Your Partner In The Oil Industry





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GEARED FOR PROGRESS

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