ROLLCE™
ENGINEERING
PTE LTD
COMMITTED TO EXCELLENCE

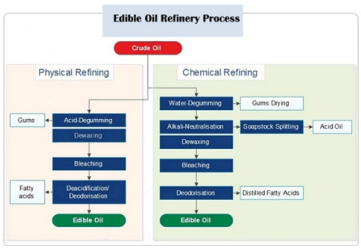
EDIBLE OIL REFINERY TECHNOLOGY

COMPANY PROFILE

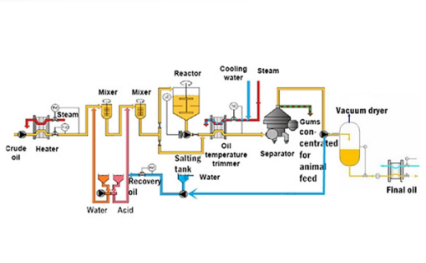
ROLLCE

As an agile-minded organisation, Rollce Engineering is always looking to improve our services and solutions as a multi-disciplinary engineering and construction company. With our integrated solutions on smart energy in the field of Energy & Environment Conservation, Rollce is creating a new statement on sustainability and conservation practices. Our innovative solutions and cutting-edge products help many companies to create a New Tomorrow using our technology, proven solutions, and collaborating with our network of partners. Motivated by the desire to deliver our best because of your trust in Rollce, every project's success story is also our success story.

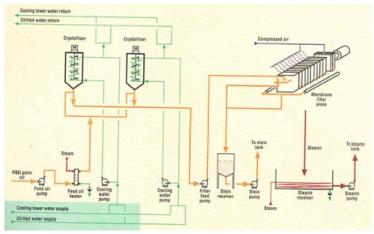
OIL & FAT PRODUCTS



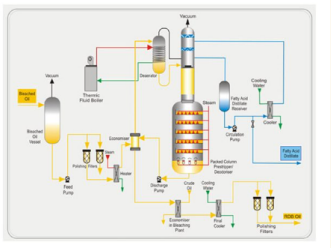
Edible Oil Refining



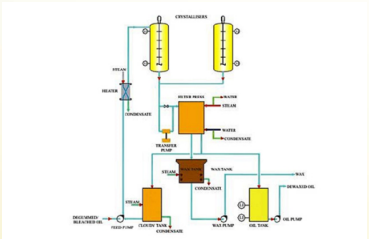
Degumming



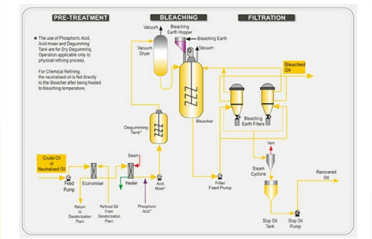
Dry Fractionation



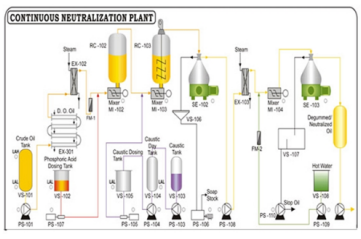
Deodorization



Dewaxing / Winterisation

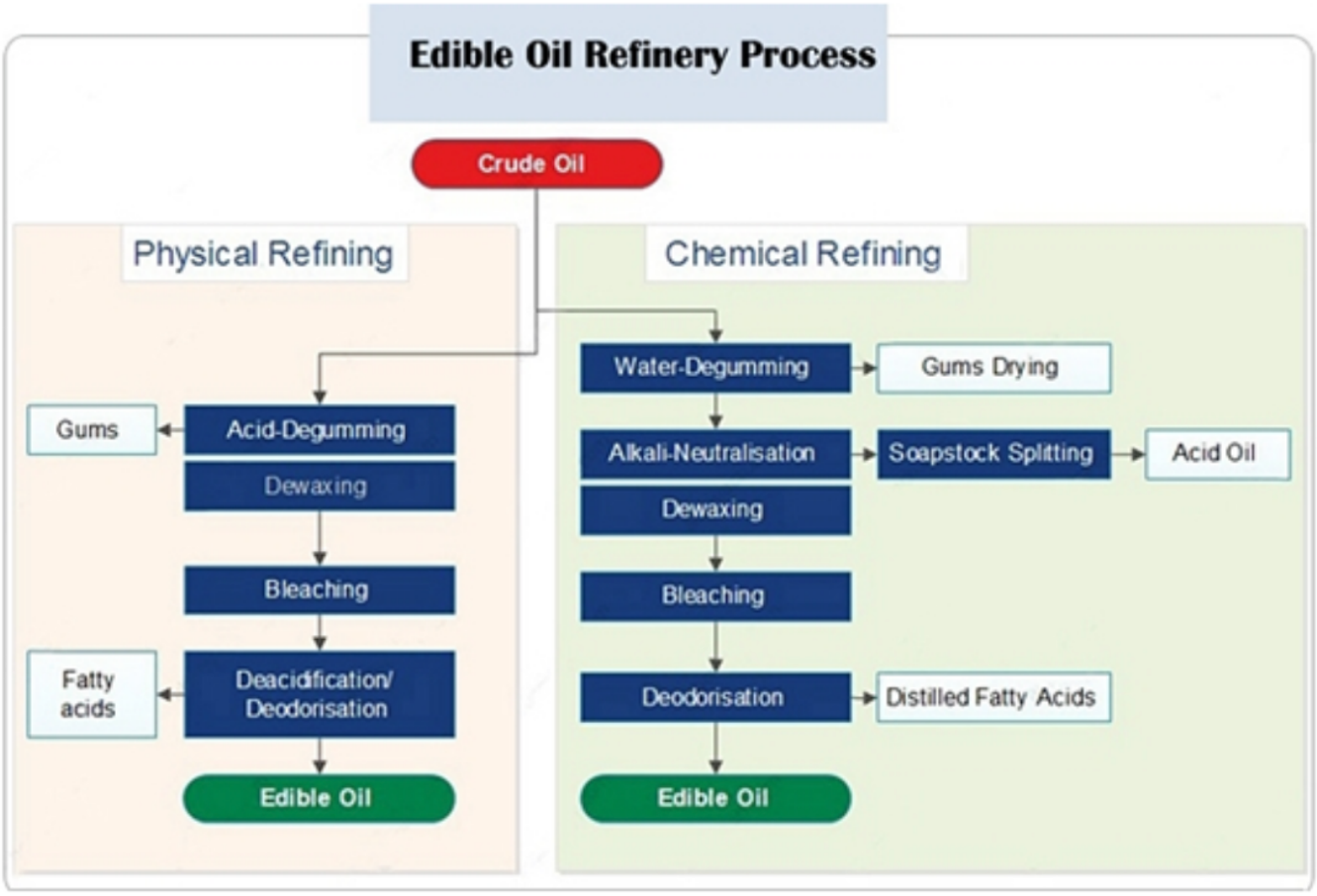


Bleaching



Neutralization

EDIBLE OIL REFINING



The process of EDIBLE OIL REFINING generally comprises Degumming, Neutralization, Bleaching, Deodorization, and Winterisation. Chemical refining is the traditional method whereby the free fatty acid of the crude oils is neutralized with Caustic Soda. The resultant Sodium Soaps are removed by Batch Settling or by means of Centrifugal Separators. The neutral oils are subsequently bleached and deodorized. This method can be used for reliably refining virtually all crude oils, including oils of low quality, with the exception of Castor Oil.

In all alternative methods of edible oil refining and Physical refining, the free fatty acids are removed by distillation in one stage of deodorizing. A fundamental criterion for using this method is that the crude oils should be degummed as effectively as possible. However, this is only possible to a limited extent with some crude oil qualities. Other oils, for instance, cottonseed oil or fish oils, are fundamentally not suitable for Physical Refining.

Capacity

25 TPD to 500 TPD

DEGUMMING

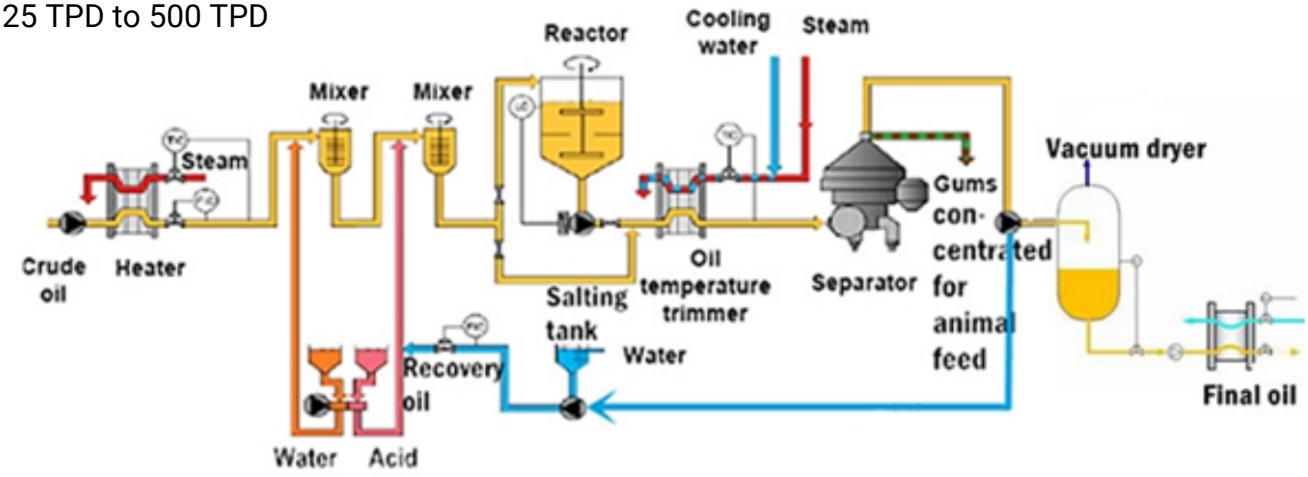
The Edible Oil Refining process depending on the types of Phosphatides, either water degumming, Acid Degumming, or Superdegumming, is carried out so as to yield Phosphorous contents of less than 10ppm.
In Neutralization, the pre-degummed oils or oils with very low phosphatide contents are saponified with Caustic Soda, and the Sodium Soap is separated. The oil is initially heated to the optimum process temperature. In order to condition the non-hydratable phosphatides, a small quantity of concentrated phosphoric acid is added and intensively mixed with oil.

Following a brief reaction time, diluted caustic soda is added in order to neutralize the free fatty acid and the phosphoric acid. After mixing with the oil, the mixture is either conveyed directly to the first separator or passes through a further reaction tank. The latter is recommended only for oils with a relatively high phosphatide content in the neutral oil is still too high for the subsequent process stages, and it must therefore be reduced further by one or two washings. For this purpose, hot water is added to the oil, and intensively mixed, and the soapy wash water is removed in a further separator.

In general, one wash stage is adequate. A second washing is only necessary if very low residual soap contents are required. Recently to reduce the water consumption in Edible Oil refineries, we have pioneered the use of Silica Adsorbents to remove residual soaps after neutralization. Up to 1000 ppm soaps are removed by sequential addition of silica adsorbent under the presence of moisture at 65 C. The dosage of the silica adsorbents may vary from 0.1 to 0.2%. The silica adsorbents further also pick up polar impurities in oil and also gums to give a better edible oil in subsequent processes.

Capacity

25 TPD to 500 TPD



DRY FRACTIONATION

The widespread use of the three oil modification processes – hydrogenation, inter-esterification and fractionation – extended the range of applications of triglyceride oils. These processes principally serve the purpose of modifying the melting properties of oils and fats in order to improve their functional properties in specific applications, but the processes are also used to improve the stability of the oils and fats thus processed.

In edible oil processing, a fractionation process consists of controlled cooling of the oil, thereby inducing a partial, or 'fractional', crystallization. The remaining liquid (olein) is then separated from the solid fraction (stearin) by means of filtration or centrifugation. Natural oils and fats have different characteristics due to the fact that they are composed of a great number of different triglycerides. These contain fatty acids with carbon chains of different lengths and with different degrees of unsaturation.

Triglycerides with a high degree of unsaturation, indicated by a high iodine value, have a lower melting point than those containing more saturated fatty acids. If oil is cooled to a certain temperature, the high melting triglyceride (Stearin) will crystallize while the low melting ones will remain fluid. The stearin can then be separated from oil (Olein) by different methods, and the fat/oil is thus divided into two fractions: Stearin with a high melting point and olein with a low cloud and melting point. This technique is called fractional crystallization and is used to obtain oils or fats more suitable, for example, as cooking oils or for margarine/shortening production.
Three palm oil fractionation processes are in use:

1. Dry Fractionation:
Through batch crystallization of oil without using additives by controlled cooling and subsequent continuous filtration.

2. Solvent Fractionation:
Through continuous crystallization of the oil in a solvent followed by separation of the liquid and solid fractions through a continuous drum filter. Solvent fractionation involves using hexane or acetone to let the high-melting components crystallize in a very low-viscous organic solvent. This can be helpful with respect to the selectivity of the reaction but mainly offers advantages in the field of phase separation: much purer solid fractions can be obtained, even with vacuum filtration. Being a more expensive process, it is less common than dry fractionation and only comes into the picture when a very high added value of (at least one of) the resulting fractions makes up for the high cost.

3. Detergent Fractionation:
Through batch or continuous crystallization of the oil by controlled cooling and separation of the fractions either by gravity or centrifugation after adding a surfactant.

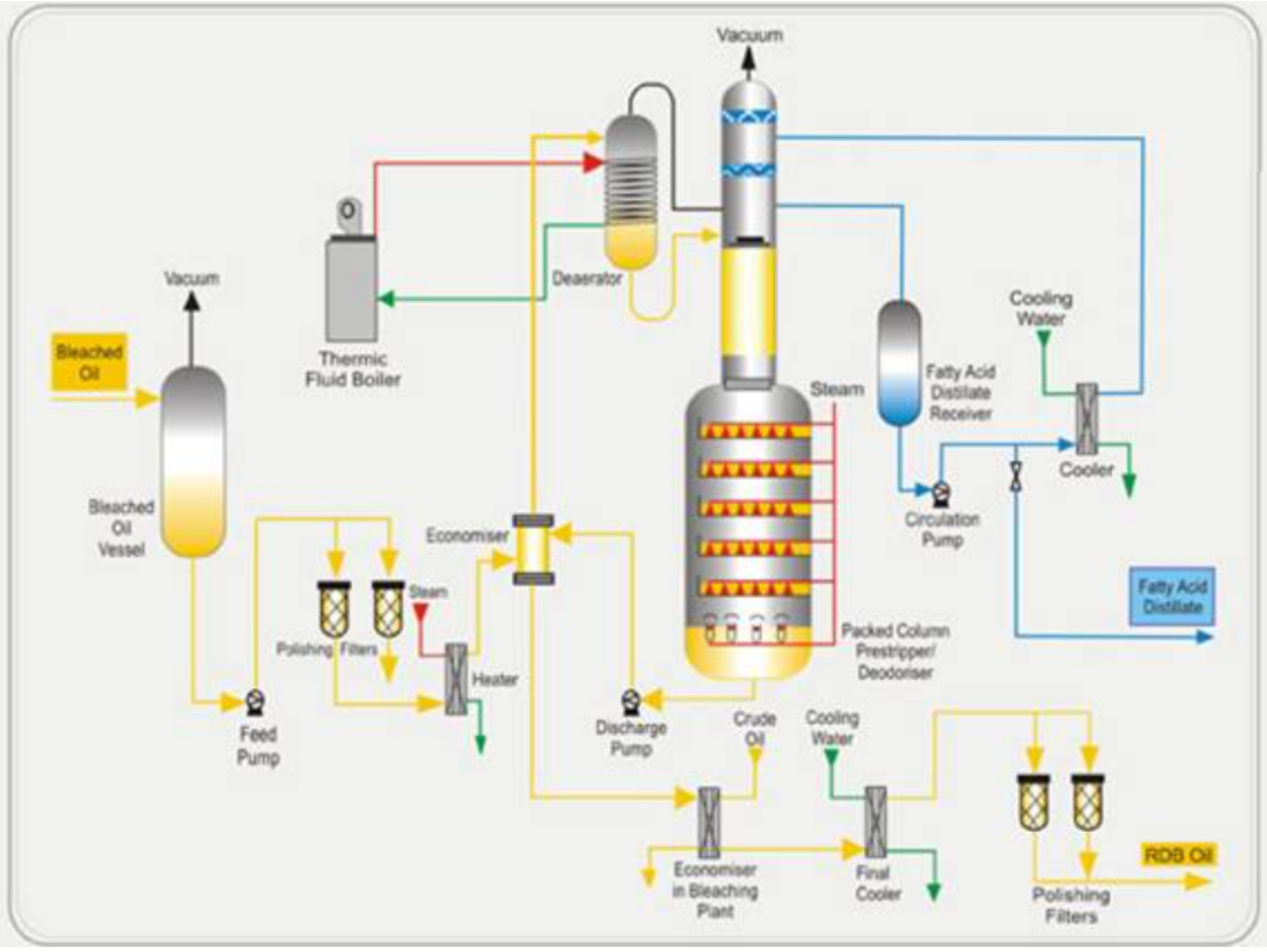
Capacity
25 TPD to 500 TPD

DEODORIZATION

The **“COMPACK DEODORISER”** is based on thin-film, counter-current distillation technology which drastically reduces steam consumption to less than half of what one would use in a conventional tray deodorizer. The **COMPACK DEODORISER** handles the most demanding processing needs for a variety of stocks in the most efficient manner besides being gentle on the oil. This ensures an extremely high steam-to-oil interfacial surface without build-ups or stagnant zones. Fatty acid removal occurs instantaneously, and hydrolysis is avoided. Lower temperatures and lower residence times result in lower trans-fatty acid formation. The **COMPACK DEODORISER** is available in variants like single column and split column design, whereby the packed column and tray column are in series or in parallel respectively. The advantage of the latter is the flexibility to use only the tray column bypassing the packed column if the need arises. Besides, the other option available is final heating and cooling under vacuum. The superior scrubbing equipment featuring structured packing and strategically placed demisters ensures minimal carry-over of the fatty acid to the hot well.

Capacity

25 TPD to 500 TPD



DEWAXING

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Dewaxing:

Separation of waxes, esters of long chain fatty acids and long chain primary alcohols present mainly in sunflower and maize oil.

Winterisation:

Separation of saturated triacylglycerols from e.g. cottonseed oil and partly hydrogenated oils. Some oils are dewaxed before packing so as to remove waxes, which are dissolved in the oil. Most of the oils do not need dewaxing as they contain little or no waxes. Only sunflower oil & Rice Bran oil contain appreciable quantities of wax to give a hazy appearance during the winter season due to the precipitation of dissolved waxes and hence require to be dewaxed. Dewaxing is carried out by chilling the oil up to 10-15°C followed by filtration of precipitated solids. The oil thus treated gives a sparkling appearance even in winter temperatures.

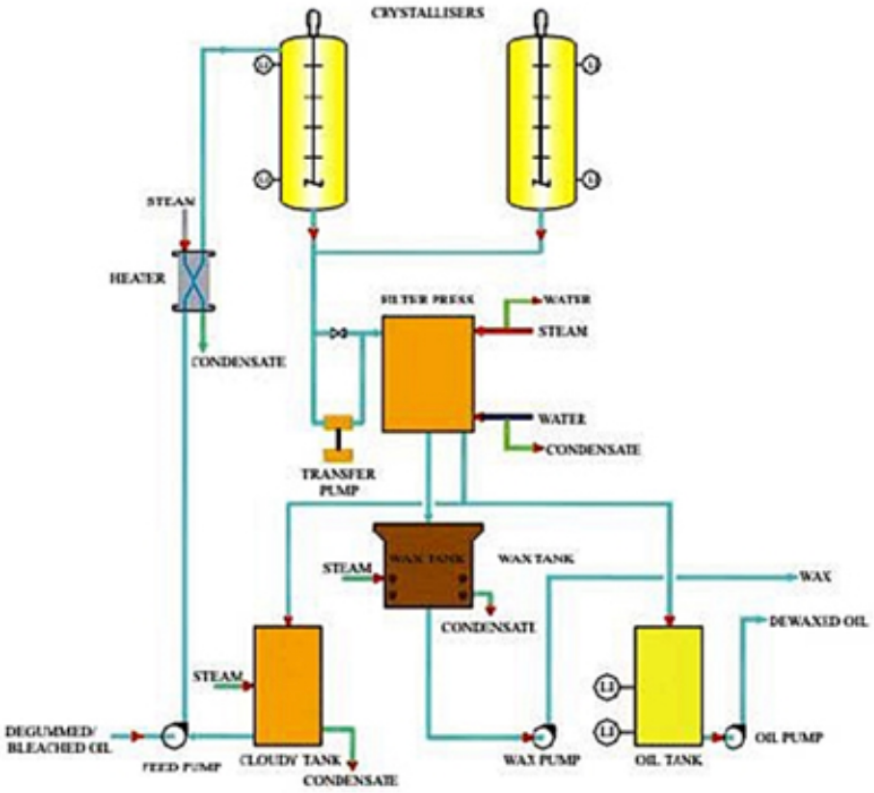
Winterisation is another name for the process of dewaxing. The name winterization appears during winter when the temperature is low, waxes present in the oil crystallizes, and give a hazy appearance to the oil.

Description:

Dewaxing (also called winterization) of sunflower oil is essential when the oil is to be used as salad oil. The presence of wax makes the oil appear cloudy at room temperature. The oil normally becomes cloudy in 5–6h, but with proper dewaxing, the oil remains clear after 24h of storage at 0˚C.

Capacity

25 TPD to 500 TPD



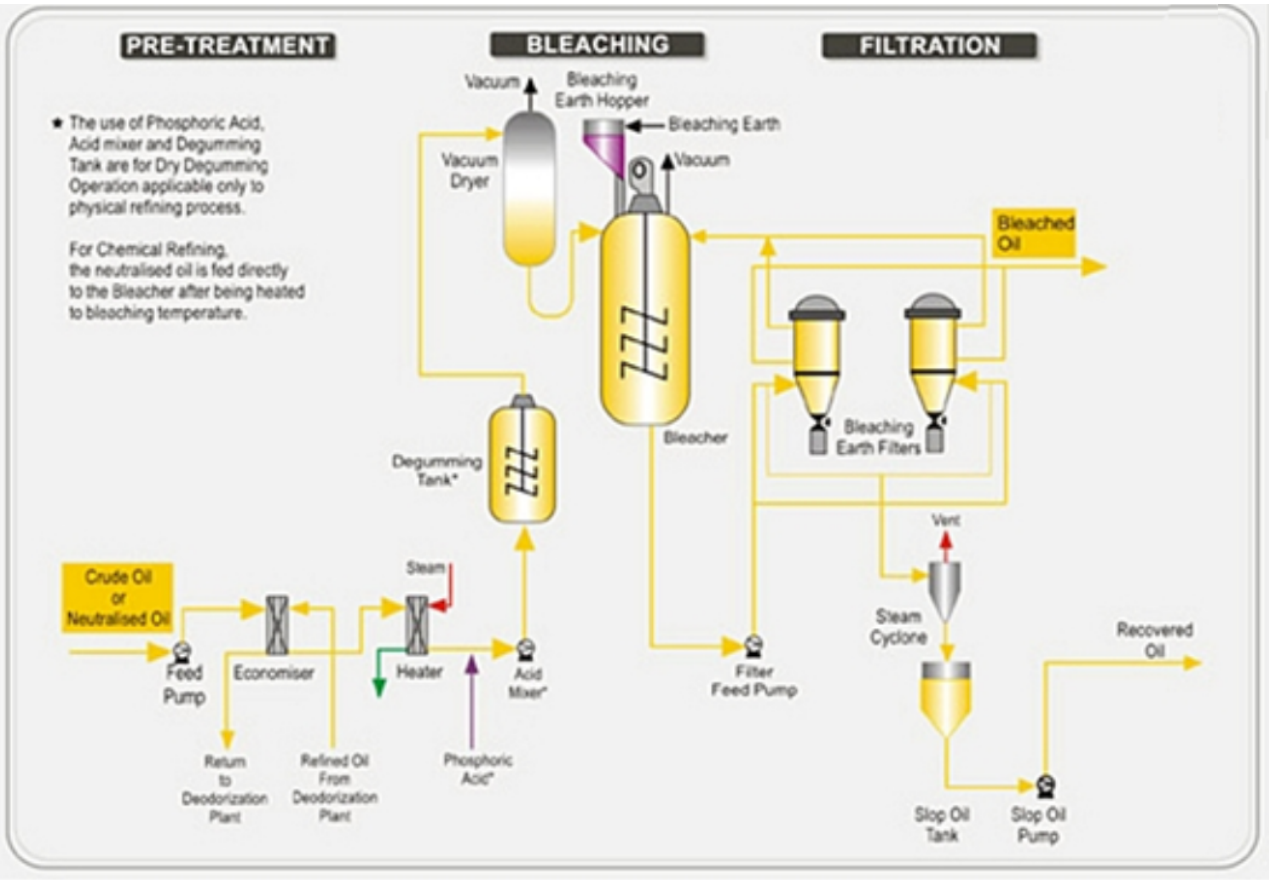
BLEACHING

The unique “SOFTBLEACH” bleaching system gently removes residual phosphatides, metals, soaps and oxidation products in addition to colouring matters. The feedstock is heated up in the Crude/Neutral Oil Economiser or Crude/Neutral Oil Heater to a degumming or bleaching temperature. When there is a need for acid pre-treatment, phosphoric acid is mixed vigorously with the oil in an Acid Mixer to ensure efficient mixing. The resultant mixture is then held in a Retention Tank to allow for the precipitation of gums before going to the Bleacher through the cascade vacuum dryer.

When acid pre-treatment is not required, the feedstock is fed directly to the Bleacher after heating through the cascade vacuum dryer. Bleaching Earth and Activated carbon is added to the oil through a dosing unit which is controlled by PLC. The Bleacher is proprietary and designed with internal partitions and a set of high-efficiency turbine agitators to avoid short cycling and provide the necessary retention time before filtration. The conjunction of a vacuum dryer with a Bleacher is what is unique about “SOFTBLEACH” whereby oil going to the Bleacher is thoroughly dried and deaerated in the cascade vacuum dryer beside the fugitive particles from the Bleacher are counter currently scrubbed by the downcoming oil and hence bleaching earth going to the hot well is avoided. The bleached oil from the Pressure Leaf Filters is transferred to the Bleached oil tank for intermediate storage.

Capacity

25 TPD to 500 TPD



NEUTRALIZATION

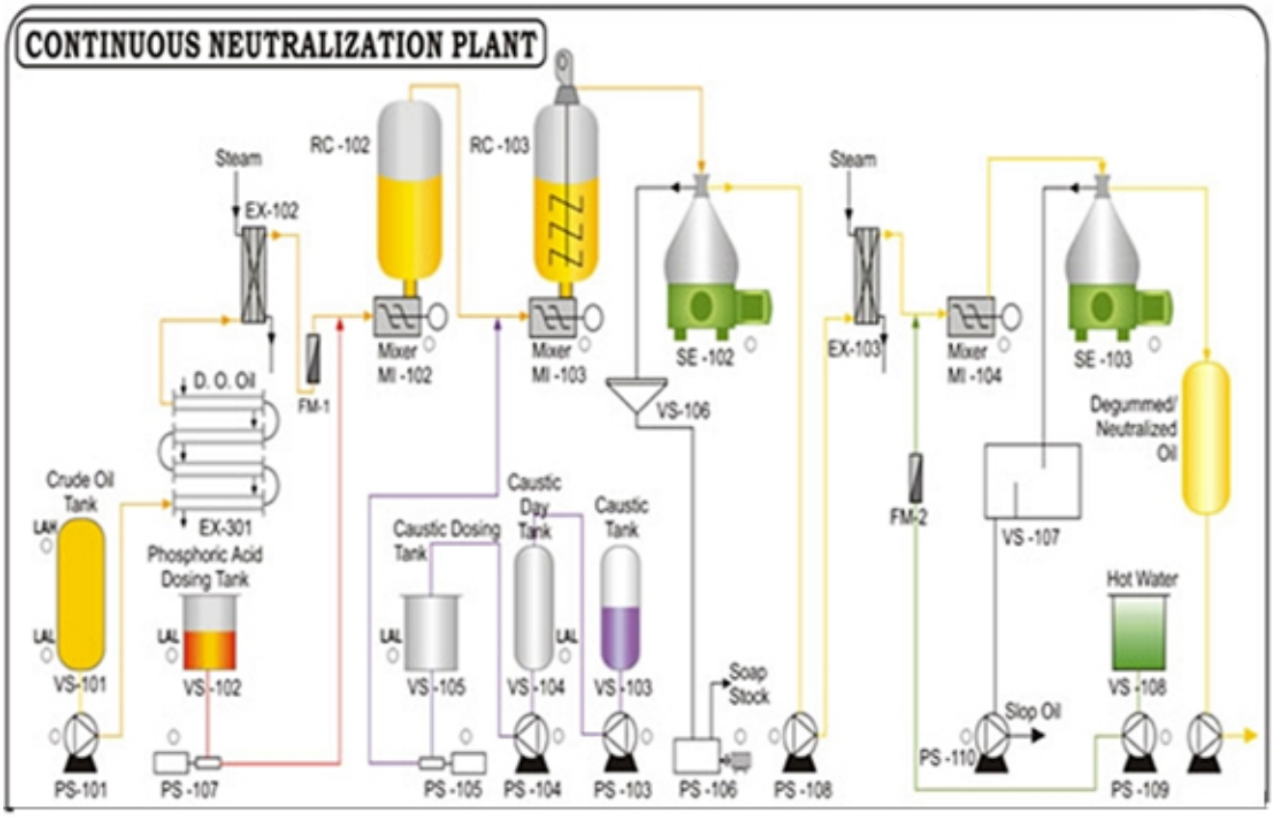
The oil phase free of hydratable gums flows to a Centrifugal mixer after heating in a plate heat exchanger, where it is added with phosphoric acid from an acid storage tank by a metering pump. The mixture is further taken to a Centrifugal mixer, where it is added with caustic lye from the lye solution service tank by a metering pump. The caustic solution circuit is completed with a storage tank and recirculation pump. The mixture is then taken to a centrifuge where the non-hydratable gums and soap stock are separated and pumped out of the system by a pump via a soap collecting tank.

Washing:

Oil free of gums and having traces of soapstock is pumped by a pump through a plate heat exchanger, where it is heated by steam. Then it is sent to the Centrifugal mixer to be mixed with water and further centrifuged in a centrifuge for water washing. The washed water is then further sent to the slop oil tank for collection and recovery of escaped neutral oil, which is then taken back to the system by a pump.

Capacity

25 TPD to 500 TPD



Our Production Facilities
ALL UNDER ONE ROOF

ROLLCE

Rollce has its very own manufacturing facilities in India and the Philippines to support our clients and meet market demands. Each manufacturing facility has its team of consultants and engineers, facilities and technology to provide comprehensive service and support for every client and project. Thus, ensuring our customers get to enjoy the benefits of cost, quality, efficiency and optimized methodology from conceptualisation and manufacturing to commissioning the products and works.

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