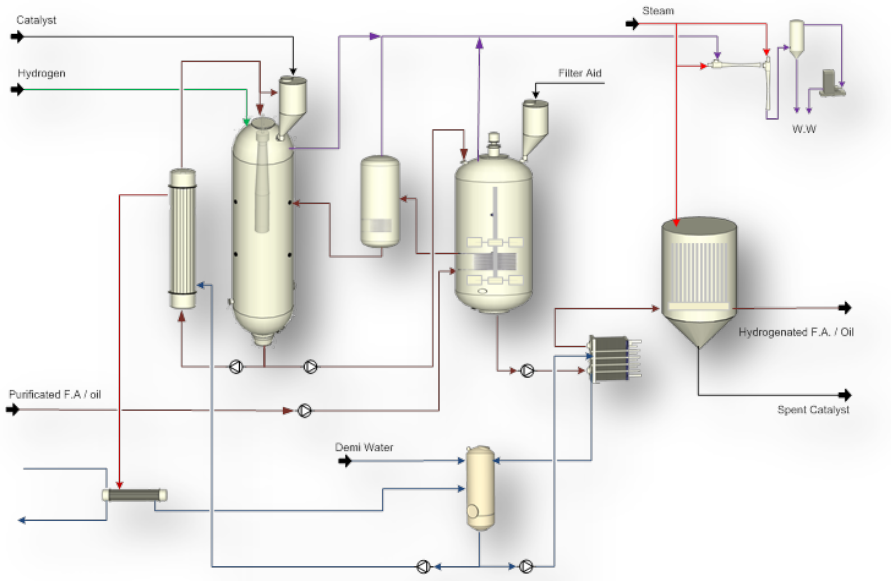
Oleochemicals

Complementary Processing Plant



Fractionation
Hydrogenation

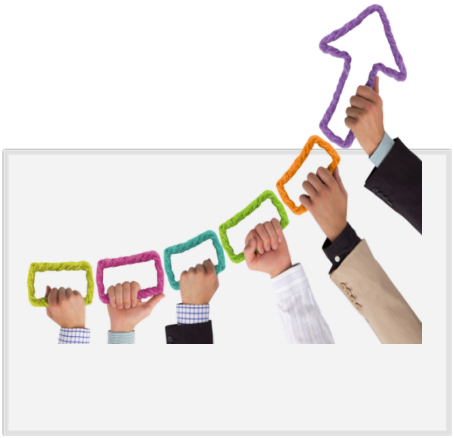
IPS Engineering

BASIC INFORMATION

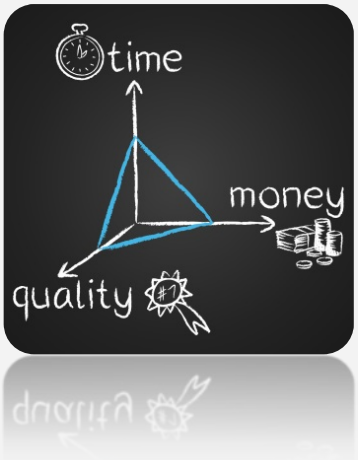
General

Excellent experience gained over the last years on Edible oil refining and oleochemical plants further reinforces our commitment to offer innovative and eco sustainable solutions for both edible and inedible oil processing plants.
Our ability to design in this field is represented in the following pages which show our concepts of single unit or multi purpose unit.

Our specific solutions for specific projects are the activities that are carried out in close collaboration with the customer in order to identify the best applicable technology and optimize investment profitability. This is our best and innovative proposal to our partner.
We are actively investing in upgrading and expanding our knowledge, while enhancing our design capabilities.

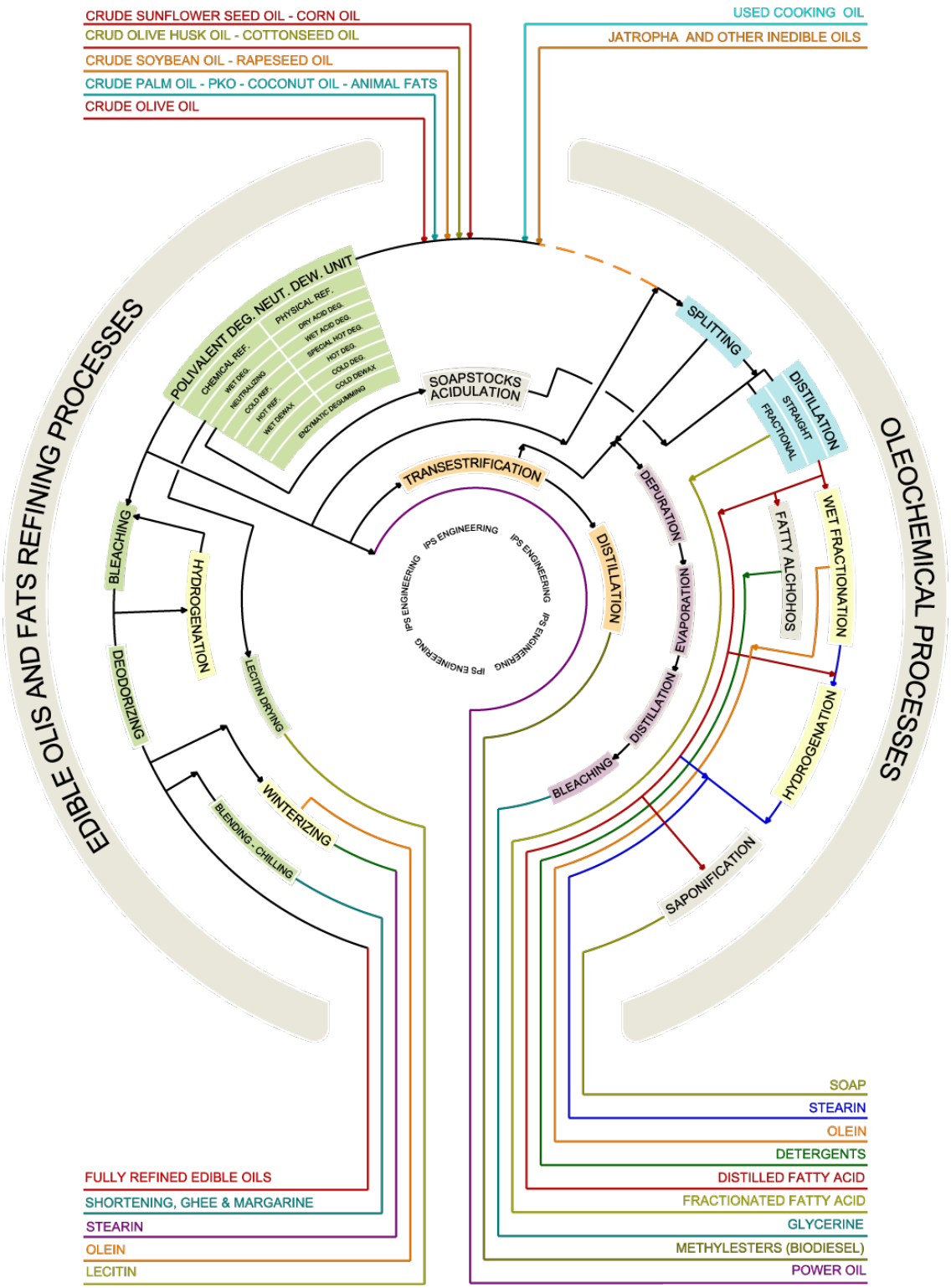


We can develop your idea.



We assist customers in the project development and realization process – from the preliminary research, feasibility study, conceptual design, technology selection, assignment of tasks specification to the detailed engineering design, procurement, construction, commissioning & start-up, maintenance & optimization and personnel training.
This unique focus allow us to develop services to trigger process improvement, providing a range of " Services to Compete". In this manner, with market conditions ever changing, we offering the engineering services at an extremely affordable price.

Oil & Fat Processing



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Fractionation

Fatty Acid Fractionation

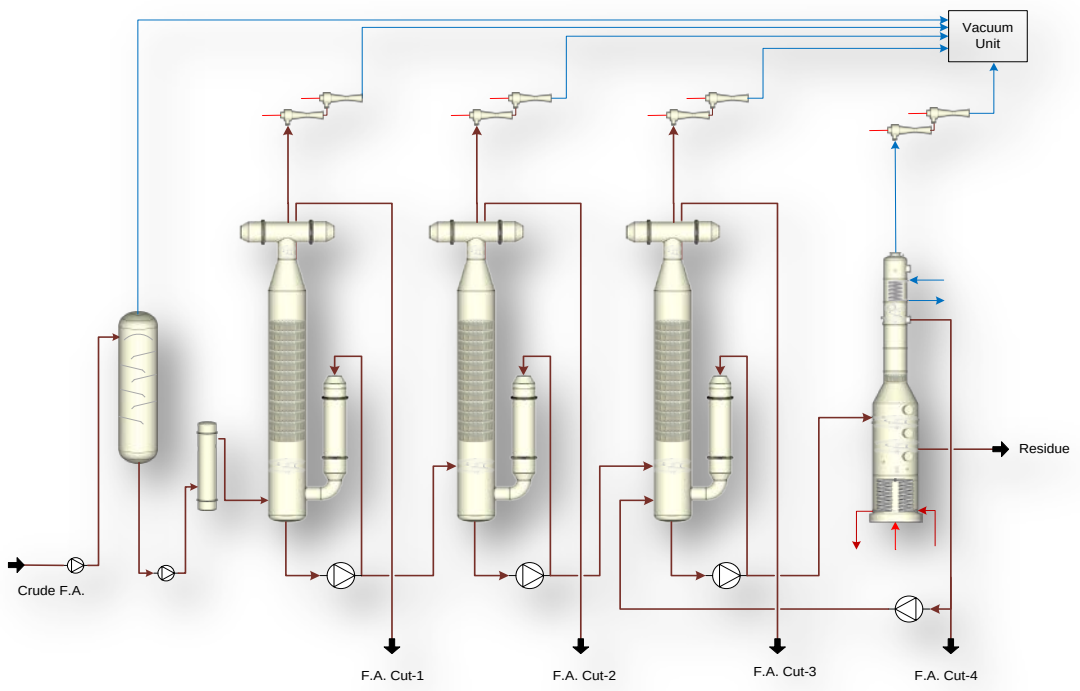
The fractionation techniques may be divided in two main categories. The first one, based on separation of different carbon chain lengths, is carried out in fractional distillation unit by means of rectification and the second one, based on separation of different degree of unsaturation, is carried out in Fractional crystallization unit .

The ordinary straight fatty acid distillation is merely a method of purification and leads to little separation of individual components. Nevertheless the single fractions for the acids C8 ÷ C14, followed by C16, C18, C20 and C22 can be separated from the fatty acid cuts according to their boiling range by rectification.

The purpose of the Fractional distillation is to obtain fractions of high purity of fatty acid cut from coconut oil, palm-kernel oil or rapeseed oil and so on.

Separation takes place in a unit equipped with deaerator in which the crude fatty acid is degassed and dried, several structured packing columns in series with falling-film evaporators, surface condensers, steam ejectors and vacuum system .

The final step is overhead distillation of the material from the bottom of the last column to improve the color.



Fractional distillation unit block diagram

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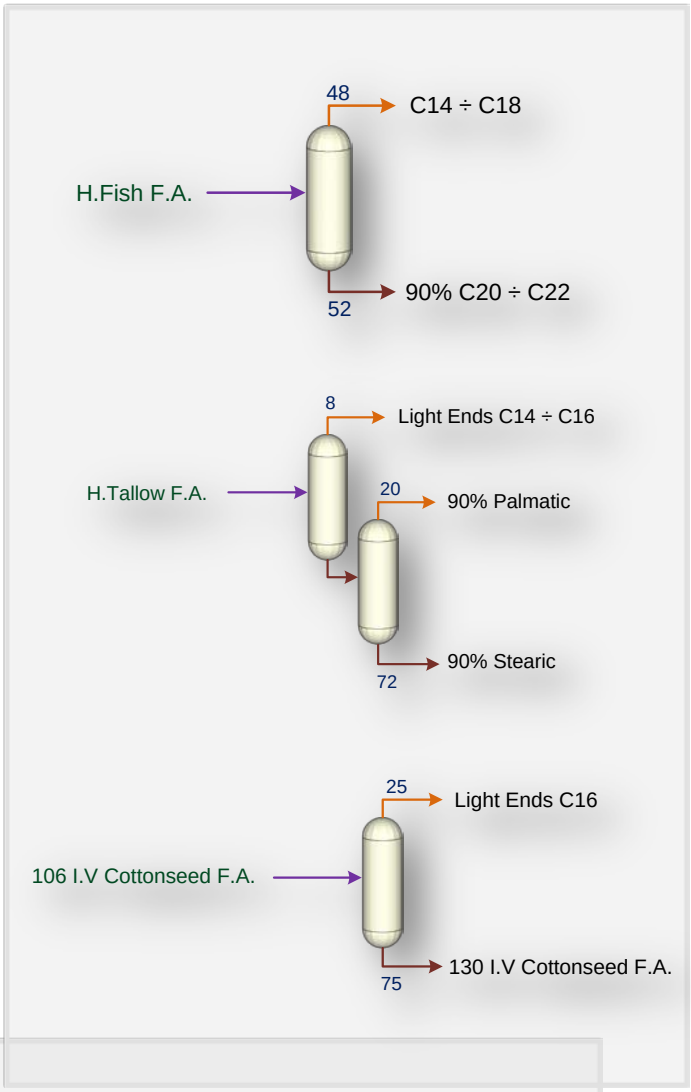
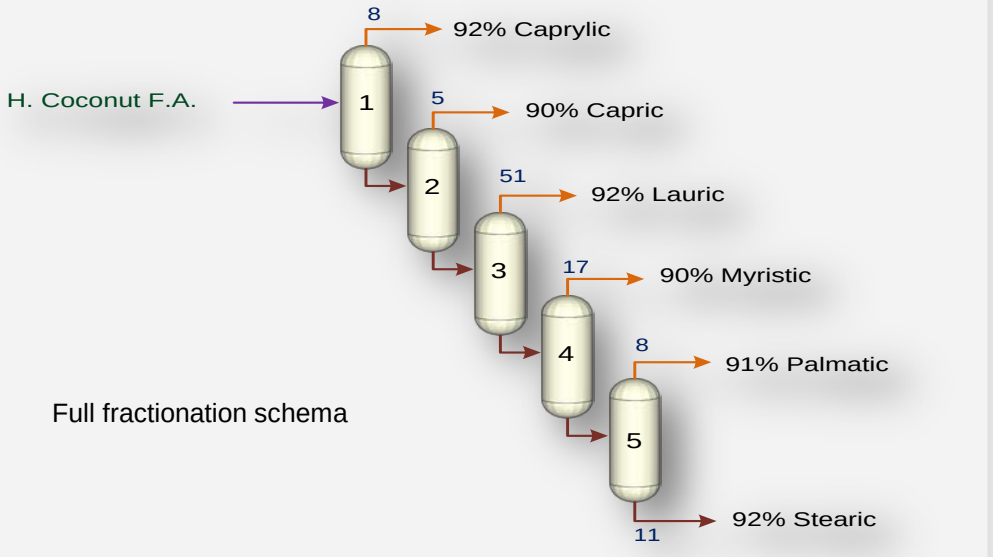
Fractionation

Capability & Performance

Basically, fractional distillation is carried out in the same manner as continuous simple distillation with a series of fractionator. The quality of cuts and the efficiency of unit depend on several variable which makes it possible to give an indicative figure only after conceptual design step. The diagram below shows an idea of capability of fractionation unit.



Partial fractionation schema



Full fractionation schema

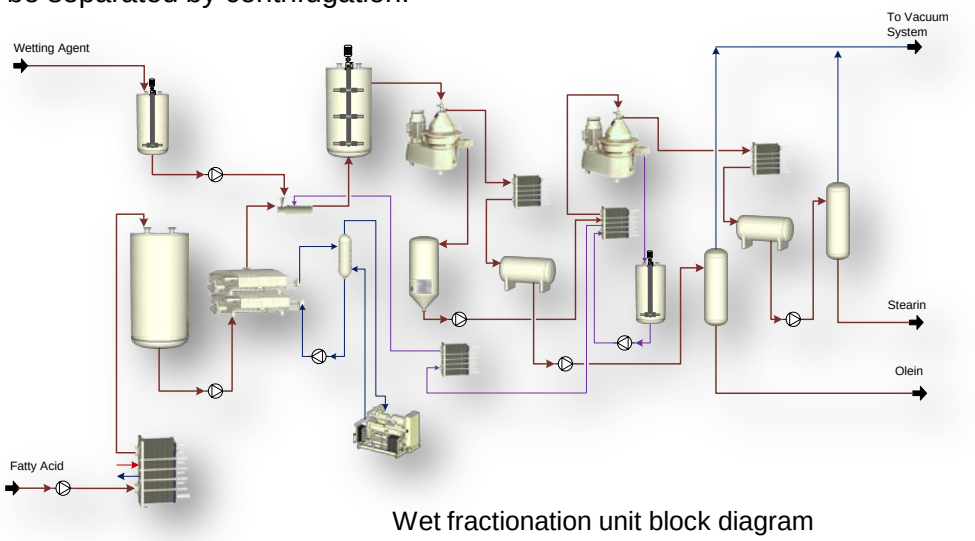
Fractionation

Fatty Acid Fractional Crystallization

The purpose of the unit is to isolate saturated F.A from a mixture of fatty acid according to their different melting points by crystallization.

Fractional crystallization can be carried out without Additives, by adding a Wetting Agent (Wet) or using solvents.

In Wet fractionation, the fatty acid mixture is cooled to ca. 20 °C. The stearin crystals are wetted by the wetting agent (e.g., magnesium sulfate) and form an aqueous suspension which is separated from the olein phase by centrifugation. After separation, by raising temperature, the crystals become liquid and immiscible again and can be separated by centrifugation.



Wet fractionation unit block diagram

Capability & Performance

We can supply hydrogenation units in a wide range of capacities, from 15 to 60 t/d.

The approximate utility consumption per ton of distillated tallow fatty acid with FFA > 98%, and I.V. >50 to obtain a 55% Stearin with I.V. about 20 is as follows:

Steam @ 4 bar	120 ÷ 150 kg
Cooling water@ 25°C	20 ÷ 30 m3
Process water@80°C	0.5 ÷ 1 m3
Electrical energy	40 ÷ 60 kWh
Wetting agent	2 ÷ 3 kg
Electrolyte	1 ÷ 2 kg

Fractionation

Fat & Oil Fractionation

In fat & oil refining processes to remove either undesirable components such as long chain alcohols and sugars commonly called wax or to isolate desired components with special properties such as Stearin, the distillative techniques cannot be employed. They are carried out by means of fractionation based on crystallization or liquid – liquid extraction.

Stearin crystal formation

For example edible oils can be cooled by removing waxes(Dewaxing) and saturated components (Winterizing).
Fractional crystallization can be subdivided into dry processes, processes employing solvents, and processes involving selective wetting of fat crystals.

Solid stearin

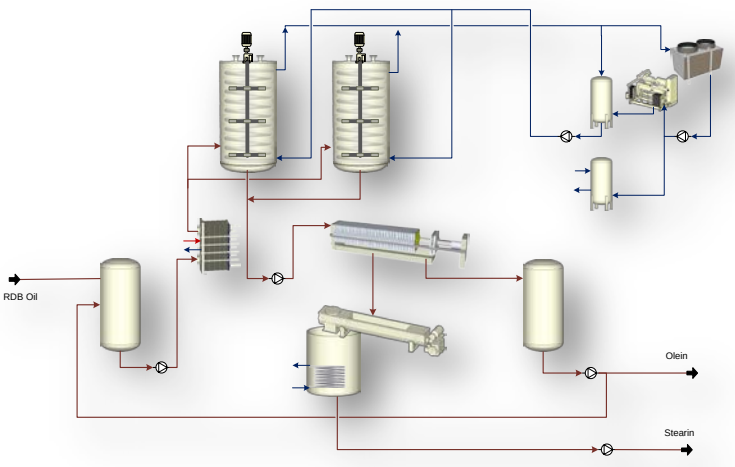
Dry Fractionation

The aim of this fractionation is to produce stearin crystals which can be separated from the liquid olein phase. The process is called dry fractionation, because there is no chemical additives or solvent added to the product, as in case of some fatty acid wet fractionations.

The process consists of two stages, the crystallization and the separation of the olein and stearin. The crystallization is a batch process, where the oil is first heated above the melting point and then is slowly chilled to the required temperature under controlled conditions in tempering vessels fitted with low-speed agitators, or in scraped coolers.
Relatively large crystals of the higher-melting glycerides, stearin, are obtained which can readily be filtered off in filter presses or drum filters.

Winterizing

In winterizing unit the oil is chilled in tanks with slow mixing to crystallize the higher melting point waxes, or TAG which are natural or produced by light hydrogenation to delay oxidation of the oil. A filter aid is added to assist filtration.



Dry fractionation schematic diagram

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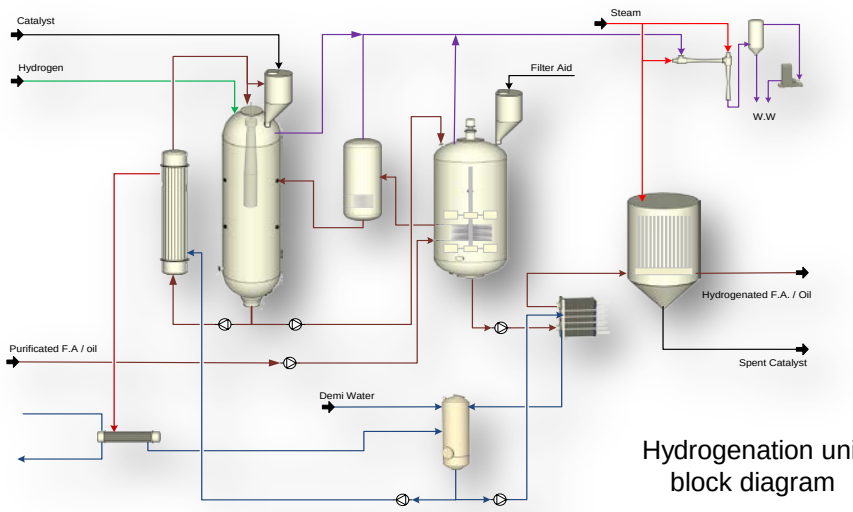
Hydrogenation

The hydrogenation of fatty acids usually is intended to complete saturation of the carbon-carbon double bonds down to an iodine value less than 1.

The hydrogenation unit is designed as semi-continuous and multipurpose unit, insofar as in the same plant also can be carried out the process of hardening of the refined oils.

H. Palm kernel oil

The reactor, which is constructed out of stainless steel and equipped with jet mixer, is designed for pressures up to ca. 25 bar. The financial efficiency of semi batch operation is–guaranteed by heat recovery systems and production of low pressure steam in an external exchanger.



Hydrogenation unit block diagram

Capability & Performance

We can supply hydrogenation units in a wide range of capacities, from 10 to 200 t/d.

depending on the unit configuration and in particular on the base of heat recovery equipment, each batch operation can be fully completed from 2 to 8 hours

The approximate utility consumption per ton of distilled fatty acid feed to be hydrogenated is as follows:

Steam @ 12 bar	0 ÷ 100 kg
Cooling water@ 25°C	1 ÷ 6 m3
Electrical energy	6 ÷ 14 kWh
Catalyst@ 20% Ni	1 ÷ 2 kg
Hydrogen@ 99,9%	1 ÷ 1,1 S. m3/I.V.

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