GREASE PLANTS
Turn Key Plants for Manufacturing Greases

- Lithium
- Calcium
- PTFE, Silicone and Molybdenum modified greases
- Non soap and mixed soap
- Speciality Greases
- Complex
- Synthetic

Total package from a single source

- Concepts
- Basic and detailed engineering
- Tank farm design
- Building design
- Equipment supply
- Intrumentation and Automation
- Erection and commissioning
- Training and Lab set up
- Formulations
- Vendor development

Plants offered by Frigomoires are designed and tailor made to suit local conditions and customer requirements. Basic plants can range from simple manually operated plants to highly sophisticated automated plants.

Introduction

Grease is a fine dispersion of an oil-insoluble thickening agent—usually soap— in a fluid lubricant which is generally mineral lubricating oil. The soap is made up of fatty acid, tallow or vegetable oil saponified with alkali which can be hydrated lime, caustic soda, lithium hydroxide or aluminum hydroxide. The lubricating oil component is refined base oil-naphthenic, of medium viscosity index, or cylinder oil stock. Structurally grease is a “water-in-oil” emulsion. Its appearance is smooth, mostly translucent, soft or hard.

Grease manufacturing procedure

Grease manufacturing can be described as an art as well as a science. It is akin to cooking food. In spite of detailed recipes the cooks personal attention and supervision at critical stages only can give best results.

Manufacturing of Greases

The manufacture of Greases therefore involves the following steps, some of which may be accomplished simultaneously:

1. Saponification
2. De-hydration
3. Cut—back
4. Milling
5. Decoeration
6. Filtration
The operations are carried out in vessels known as Grease Kettle, which is equipped with some form of agitation and with heating facility. The rate of cooling is very important in the development of the proper structure for many types of Grease, hence, close temperature control is required to manufacture grease of desired properties. The structure of the grease can be modified by milling which can be carried out in the kettle itself during the cooling period or may be done outside the kettle. For outside milling, a high shear Homogenizer or Colloid mill is normally used. Depending upon the types of grease, the total time required for manufacture of a grease batch in a kettle varies from 10 / 20 hours.

### Laboratory

Frigmaire assists in setting up the complete laboratory and provide training for carrying out tests and meeting specifications as required by NLGI. Some important tests to be conducted are:
- Copper strip corrosion test
- Cone penetration
- Dropping point
- Scop content % by wt.
- Water content
- EP Test

#### NLGI grade numbers

<table>
<thead>
<tr>
<th>NLGI grade no.</th>
<th>Penetration worked at 25°C</th>
<th>Typical method of application</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>310 – 340</td>
<td>Used in grease gun, Centralized systems</td>
</tr>
<tr>
<td>2</td>
<td>265-295</td>
<td>Used in grease gun, Centralized systems</td>
</tr>
<tr>
<td>3</td>
<td>220 – 250</td>
<td>Used in grease gun, Centralized systems</td>
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</tbody>
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### Pressure kettle

Pressurized Grease reactors are like conventional grease kettles, except they are pressurized. The pressure speeds up the soap-forming reaction, the batch time can be reduced by 30 - 40% depending on the raw materials used. The batch is inaccessible and invisible during this time as the reactor is closed. The kettles can be designed to withstand a pressure of 5-10 bar meeting ASME codes. The design of the agitator can be single-directional, which is very inefficient or dual directional (counter rotating). For potentially much better mixing, some kettles are equipped with a high-speed impeller driven through the bottom, which imparts dispersion agitation to the batch being cooked.

### Atmospheric kettle

Atmospheric kettles remain at atmospheric pressure during the cooking process. The kettle is open from the top and raw materials can be added at any time during the process. These kettles can be used as a soap forming as well as finishing kettle. The batch can be observed and adjustments can be made easily. Recirculation of the mass is possible during the process to attain proper homogenization. The reaction products, such as water, are removed by pulling scavenging air through the kettle top during cooking. The heating and cooling action is achieved by means of a heating jacket or limpet coils welded around the shell of the kettle. These kettles can have a very positive effect on grease thickening, stability, smoothness and quality. A high-performance atmospheric reactor should have an efficient agitator to attain product quality.
Milling system with deaerator

This system ensures a higher yield per kg of soap used thus reducing the manufacturing cost. The unit is designed for online milling, deaerating and filtering in a single operation. Frigomaires milling cum deaerating system is fitted with a self cleaning filter. Thick greases with outputs ranging from 1000 to 10,000 kgs/hr can be processed in these units. Entrapped air and undesired particles below 30 microns are removed during the milling process. Pockets of entrapped air in product results in oxidation which causes oils and fats to get rancid. This leads to discoloration and change in odor of the product. It also affects the specific weight of the product which results in incorrect packing.

Advantages: Smooth and glossy appearance, foam free surface, chemically stable product, increased shelf life, denser product resulting in improved dosage allowing packing volumes to be reduced.

Lab plant

Frigomaires lab plants are offered to produce small batches of grease ranging from a minimum of 10 kgs to 100 kgs per batch. The units are provided with a single closed kettle provided with electrical heaters to heat upto 250c. The system comprises of a Grease kettle, Transfer pump, Milling machine, Interconnecting pipelines, Valves and Instruments. An PLC control electric panel to operate the motors and monitor temp is provided. The entire unit is mounted on a skid and can be moved around the plant.

Packing

Packing machines offered range from filling of small cans from 500 gms to 20 kgs with capacity ranging from 1-5mt/hr. The units provided work on the Auger principle and are semi automatic PLC controlled. For filling of Grease in barrels we offer Barrel filling machines which work on the load cell principle with a capacity of filling 5-10mt/hr.

Automation

Autolube has been designed for controlling flow of lube oils and additives into the kettles. Every project is designed to meet specific customer requirements and budgets. we offer distributed software solutions for basic applications as well as for complex plant wide control up to product dispatch. Autolube helps the user to achieve total production control of the plant from raw material reception and storage right up to product dispatch. PLC and Scada based systems using hardware from reputed firms such as Siemens/Allen Bradley or equivalent are incorporated in the package.