Salt Processes

GEA Crystallization

History

The activity in salt of GEA MESSO PT is anchored in the big number of references and power of expertise of its predecessors Standard-Messo Duisburg with solar salt based salt factories and ESCHER WYSS with their famous rock salt refineries.

ESCHER WYSS - The first contract to supply a multistage compressor for mechanical vapour recompression in a salt plant dates back to the mid-twenties. ESCHER WYSS manufactured the compressors in their own workshops and were also asked to fabricate the evaporator for this plant which recovered salt from brine on a continuous basis.

The first salt plant was followed by contracts for further salt plants as well as evaporation plants for other liquors, known frequently as concentrators. The scope of supply was limited to the main vessels, which were assembled in our own workshops exclusively until the mid-fifties. By installing a circulation pump in the center of the calandria type evaporator the forced-circulation system was created. This evaporator became famous for its excellent heat transfer rates and salt slurry handling characteristics. The drive was mounted at the top of the vapour dome and connected by a shaft to the propeller in the base.

Experience has grown from the widening range of applications in this special thermal separation technique. New technologies were established by R&D and ESCHER WYSS developed to a contractor and supplier of salt plant technology.

1924 to 1996	belonging to the ESCHER WYSS GROUP
1996 to 1999	belonging to the Voest AG
1999 to 2009	Messo GmbH, since 2004 under regime of GEA
since 2009	GEA CRYSTALLIZATION
	GEA Messo PT

STANDARD-MESSO DUISBURG - From the very early begin in 1953 the activities of Messo had been connected to the salt crystallization business. In opposite to the activities of EscherWyss these were concentrated solely on solar salt refinery worldwide. Thermally operated vacuum salt factories have been designed as multiple-effect plants as well as plants with vapor recompression. The produced salts were affected to the chloralkali and the table salt industry. Oslo-type crystallizers were designed for a special granular salt used in the market niche for dish washer regeneration.

Combined salt plants for the recovery of drinking water and salt together were developed by Messo engineers for the Gulf region (Kuwait and Abu Dhabi) fed with the concentrated sea water from the huge MSF desalination facilities for the table water generation. Seeding technologies had to be applied to resolve the scaling by Gypsum in the pre-concentration stages.

Beside the thermally operated salt plants Messo is designer and supplier of salt wash factories. These are characterized by large throughputs and mainly focusing on the chloralkali industry in countries basing on solar salt resources. The design is based on roller milling in order to keep the narrow particle size distribution of the harvested solar salt.

Salt factory - industrial grade vacuum salt from solar pond brine

GEA MESSO PT salt plants can be found around the world in nearly every area suited for solar pond activities. Countries with GEA Messo PT references are:

Abu Dhabi
Argentina
Croatia
Egypt
France
Greece
Indonesia
Iraq
Kuwait
Kuwait
Libya
Mexico
Pakistan
Saudi Arabia
Tunesia
Turkey
Venezuela
Yemen

Technical

Salt is dissolved in the oceans with 3 percent by weight amounting to a quantity of 4.10^{16} tons only, thus being an inexhaustible source. Additionally, enormous common salt deposits emerged from the evaporation of sea water millions of years ago. Common salt supply is effected by mining or leaching these deposits or, at climatically favorable points, by recovery of sale from sea water by means of solar evaporation. Quality of salt produced in that way does however no longer meet today's demands. Purity, whiteness, crystal habit, crystal size distribution and free flowing behavior are quality criterions for the different usages of salt. Such qualities can be met only by processing the crude material in mechanical or thermal refining plants.

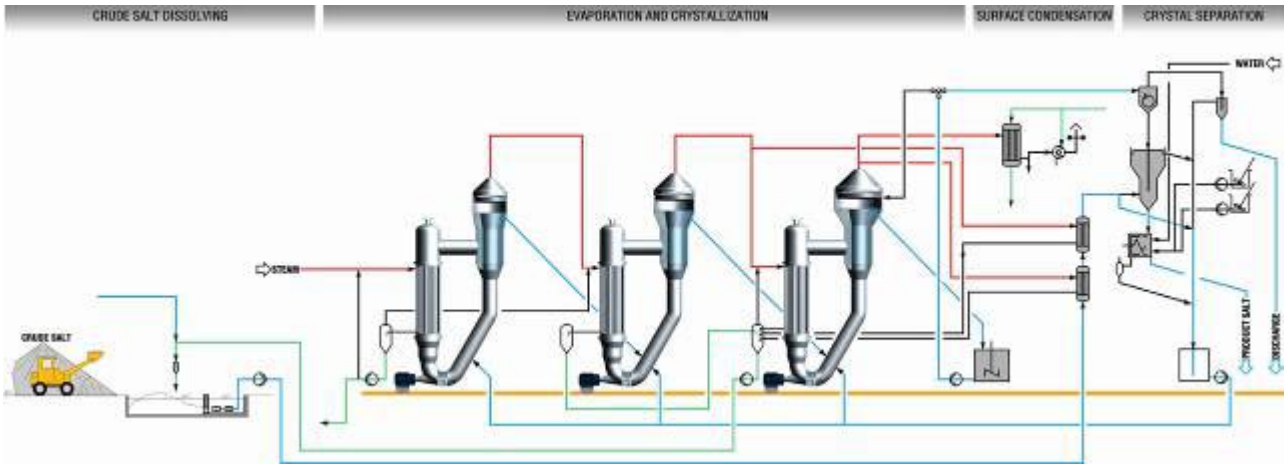
Economical

Salt is required by the human body with 5 to 7,6 g daily. The actual consumption for human food is about 15 million tons per year. Salt for food is the most 'taken for granted' commodity. It is available from many sources in many qualities as table, cooking and industrial salt for food production.

Salt, however, is one of the most essential basic materials of modern industries, too. More than 90% of the 200 million tons of NaCl consumed per year all over the world are for industrial use. The industry predominantly converts the salt into chlorine, caustic and soda ash for, amongst others, petroleum refining, petro chemistry, organic synthesis and glass production. Salt production on a large scale is an economical necessity. Higher standard of living entails the demand for improving salt qualities, too. More ecological responsibility compels to avoid purge streams from chemical processes and thus to higher purities of the crude material "salt". To meet today's requirements, continuous and largely automatically working, energy-optimized plants designed to the above effects are needed.

GEA Messo PT plants meet all requirements regarding salt quality combined with maximum economy. They are the product of careful planning and extensive experience in the field of modern technique in crystallization. The utilization of natural salt resources depends upon the geological characteristics, the requirements of the end users and economical aspects. These considerations are decisive in the selection of the most suitable technology to satisfy the quality requirements for vacuum salt.

Multiple-effect evaporation crystallization



Triple-effect salt plant for recrystallization of solar salt

Table salt of best quality (vacuum salt, free-flowing), industrial salt of highest purity to reduce purge streams from chemical processes. Our thermal plants are designed in such a way that specific demands on the product are met: moist or dry, fine-grained or coarse-grained, cubical or spherical or dendritic, white, free-flowing with additives (e.g. magnesium carbonate, potassium iodide), ready-packed in bags, bottles, sacks, etc…. Depending on crude material and plant design, purities over 99.9% of NaCl are achieved.

Jintan - rock salt based salt recovery in China

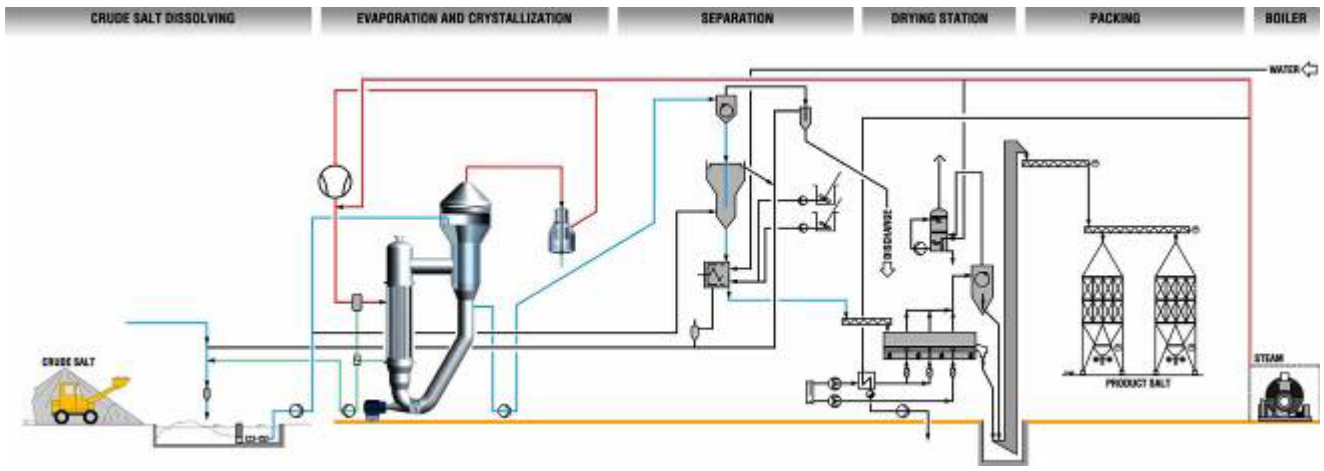
Pimai - rock salt based salt recovery in Thailand

Vapour re-compression

Apart from single or multistage evaporation plants for thermal salt production we also develop and supply plant designs suiting customer’s further specific requirements. In many cases plant technique has to be optimized with regard to the most favorable energy available at the place of installation, or in consideration of the crude salt composition.

Mechanical compression

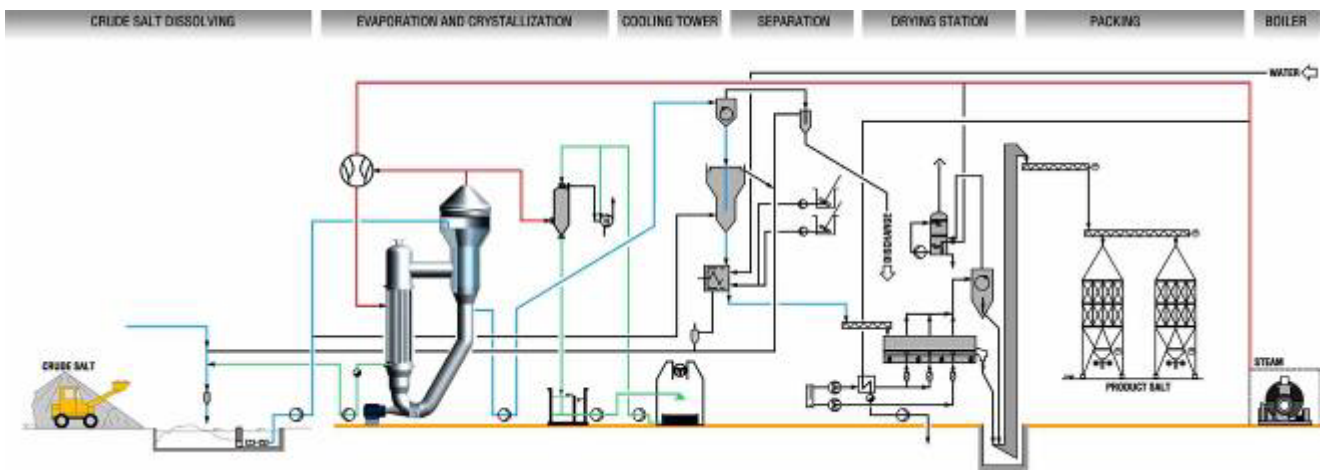
Whether a multistage evaporation plant or a thermo-compression system is employed is essentially to be decided from economical angles. If electric power is available from the grid system of the plant, or the same is attainable at a low price from the electric supply line, the plant can be run very economically with a mechanical vapor re-compressor (MVR). By using electric energy the vapors from the evaporator are compressed to a higher pressure, thus entailing rising temperature and are reused as heating medium for the heat exchanger. Heating steam is not required in case to operate the plant.



Single effect with mechanical vapour recompression

Thermo compression

The thermocompression plant with a steam ejector instead of a mechanical thermo compressor involves less capital expenses but higher energy costs.



Single effect with thermal vapour recompression

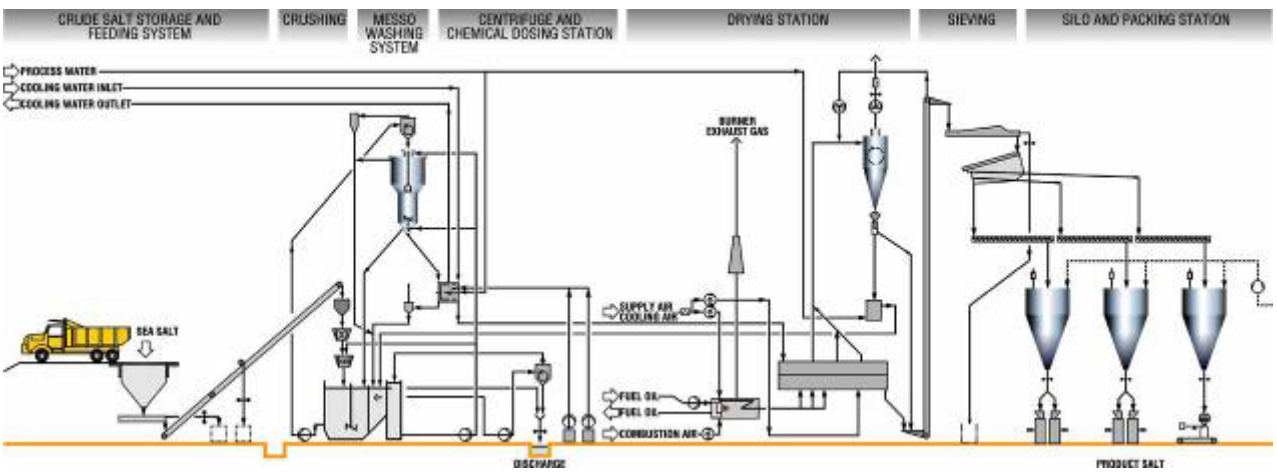
Brine purification

Most of the chloralkali plants worldwide are operated with brine prepared from local salt. GEA Messo PT's experts are consequently familiar with the particularities of the salts available in many different countries. They can thus optimize the concept for any particular brine preparation and purification plant. GEA Messo PT's vast experience will give optimum results independent of whether the feed stock is vacuum salt, solar salt or rock salt. Our specialists will evaluate the most economical alternates for some or all of the following process steps:

♣♣Primary brine de-chlorination
♣♣Secondary brine de-chlorination
♣♣Saturation
♣♣Chemical treatment
♣♣Clarification
♣♣Filtration
♣♣Ion exchange purification

Salt wash

Salt processed, washed and conditioned in the mechanical refining plant meets all demands on table salt or salt for animal use. It is also applied in the fish industry and in the chemical industry.



Salt wash plant

The produced wash salt can be moist or dry, coarse-grained or fine-grained and provided with additives it may be packed into bags, bottles or sacks. Depending on the composition of the crude salt, purities up to 99,5% can be achieved in the mechanical refining plant. By-products, too, contained in the discharge solution from the refining plant can, in many cases, be recovered economically.

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