

NATIONAL LEAD COMPANY

Atlantic Branch
111 Broadway, New York, N. Y.

Acid Recovery Department

PRODUCTS

Vacuum Concentrators for
Spent Sulphuric Acid
Chamber Acid
Sludge Acid
Vacuum Still for Purification of Impure Acid
Vacuum Evaporators for
Weak Solutions of Sulphuric and Phosphoric Acid
Vacuum Coolers and Crystallizers for
Acid Solutions
Separating Plants for
Sludge Acid

PROCESS

In the Simonson-Mantius Vacuum Process, patented in the United States and foreign countries, the acid is concentrated with steam at from 5 lb. to 150 lb. pressure under a vacuum of from 27" to 29.8" so that the boiling temperature of the finished acid will rarely exceed 300° F. The high vacuum practically eliminates all foaming. The proper vapor speed and low boiling points reduce losses due to entrainment and distillation to less than one half of one percent. No fumes are given off by our concentrators.

Well separated sludge acid is usually concentrated to 60°, 65°, or 66° Be.; Spent Acid and Chamber Acid are usually concentrated to 93.2% H_2SO_4 but can also be brought up to 95% and 97% H_2SO_4 at reasonable cost.

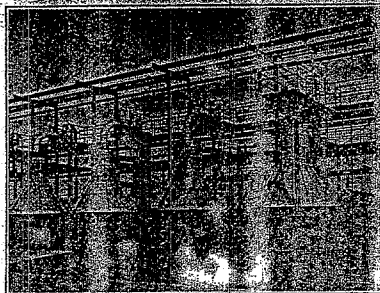
In all cases where the strength of the acid does not exceed 61° Be. the concentrators are equipped with multi-stage condensers of the barometric type, but for

higher strength acid it is necessary to add a vacuum booster which will create in the concentrator a vacuum of up to 29.8". To avoid contamination of the cooling water we have also used surface condensers instead of the barometric condenser.

CONSTRUCTION

All concentrators are of substantially the same design. The outside shell is made of cast iron for small sizes and steel plate for larger units. The inside is lined with sheets of chemical lead $\frac{1}{16}$ " to $\frac{1}{4}$ " thick; all vertical and horizontal joints are burned from the outside facilitating inspection and repairs. The lead lining is protected by a heavy layer of acid proof bricks laid in suitable cement. Openings are protected by high silicon iron sleeves. The heating surface consists of antimonial lead or chemical lead tubing for steam pressures up to 45 lbs., and of lead covered copper tubes or high silicon iron tubes for a pressure up to 150 lbs. Condensers and vacuum boosters are made of hard lead, special bronze or high silicon iron. Where necessary, concentrators are equipped with electric level indicators.

All concentrators, crystallizers and evaporators are



Concentrator at Extreme Right is of Type B Super Vacuum; Super Vacuum Concentrator Capacity 100 tons of 60° Be. Acid
Others are Regular Type Concentrators



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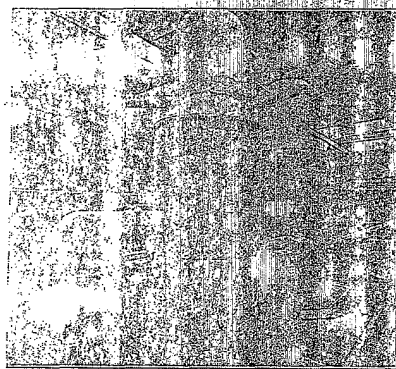
specially designed for the capacity and operating conditions for which they are to be used. We do not try to adapt one standard apparatus to all possible working conditions.

APPLICATION OF PROCESS

Spent Acid. Large quantities of sulphuric acid are used in the chemical industry for the concentration of nitric acid and the absorption and drying of alcohols. Such dilute acids are concentrated to 93% and 96% in our Super Vacuum Concentrators at low cost and high efficiency. There are no difficulties due to organic or inorganic impurities. Capacities vary from 10 tons to 100 tons of H_2SO_4 handled in one unit.

Some of the waste acids contain large quantities of sulphates which must be separated before the acid is fit for reuse. Sulphates of copper and nickel can be handled in our special Salting-Out Concentrators without difficulty and are separated from the finished acid by centrifugals or vacuum filters.

Ferrous Sulphate must be separated from the acid under strict control of concentration and temperature as otherwise the sulphate will be precipitated in the form of a slime which cannot be separated from the acid efficiently. After four years of extensive research work and experimentation we have developed a process, patents pending, whereby such waste acids are concentrated under vacuum to an acidity of about 56% so that the ferrous sulphate is separated in a granular form. The 56% acid, which now contains only about 1% of sulphates, is further concentrated to 80% or 93% and the precipitated sulphate is removed by settling or by centrifuging in a continuous solid bowl centrifugal. This sulphate residue is mixed with the granular sulphate precipitate of the 56% acid, and after being washed, the ferrous sulphate can be used for the production of sulphuric acid in a chamber or contact plant.



Types A and D Concentrators

Waste Pickling Acid can be recovered by concentrating in single or double effect to about 30% acidity and the ferrous sulphate is recovered in the form of copperas or monohydrate. All the acid in the waste liquor is again returned to the pickling tanks which makes it possible to maintain a uniform acidity in the pickling vats and reduce the time of pickling. This process can be used economically even in smaller mills and will show a good profit if a market can be found for the copperas.

Rayon and Cellophane Bath Acid. Our Type 'A' Rapid Circulation Evaporators are handling more than 4000 tons of Bath Acid per day. The construction is such that very little incrustation occurs on the heating surface which can, if necessary, be readily cleaned without entering the evaporator. Entrainment losses are less than one-half of one percent.

Sludge Acid is concentrated in some refineries from about 30° Be. to 60° Be. and then reformed with fuming acid or sulphur trioxide to the proper strength for treating oil. In other refineries the 60° acid is further concentrated to 65° or 68° Be. In our Super Vacuum Type Concentrator a well separated acid can be concentrated to 68° Be. without intermediate settling, and losses due to foaming are negligible.

SEPARATING PLANTS FOR SLUDGE ACID

We have designed and installed complete plants for the separation of sludge acid, where necessary, these plants are equipped with absorption towers to eliminate the fume nuisance.

ACID STILL

Sometimes the concentrated spent acid contains inorganic salts in solution, and where a technical pure acid is required for the process the impure acid can be distilled under vacuum at reasonable cost. The distillate will of course be absolutely free from these salts and the remaining sludge can be recovered so that there is no loss of acids.

VACUUM COOLERS AND CRYSTALLIZERS

We have furnished vacuum coolers of large capacity for impure acids to avoid troublesome incrustations of the cooling surface. We are prepared to furnish complete Vacuum Crystallizing Plants for the removal of Copperas, Glauber and other Salts from waste acids.

INSTALLATIONS

We have installed more than 100 Concentrators, many of them repeat orders, in the United States and foreign countries; several of these units have been in continuous operation for 14 years.

INQUIRIES

The National Lead Company has the exclusive rights to build and sell concentrating plants and give licenses for the Simonson-Mantius Vacuum Process. Inquiries should be directed to the National Lead Company, Acid Recovery Department, 111 Broadway, New York.