

## LEAD INDUSTRIES ASSOCIATION

480 LEANSTON AVENUE

NEW YORK 17, N. Y.

METALLIC LEAD PRODUCTS DIVISION

October 10, 1950

GENERAL BUSINESS NO. 30

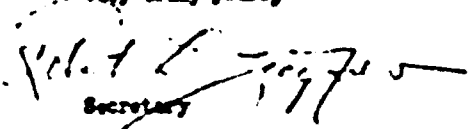
SUBJECT: REPRINT FROM  
"CHEMICAL ENGINEERING"

To Members of the Metallic Lead Products Divisions

Attached is a reprint from the Corrosion Forum Section of "Chemical Engineering," September, 1950, evaluating the services of lead as a construction material in the paper industry.

This is the first of three sections which will cover stock handling, bleaching and acid pulping. This initiates a new series of articles in the Corrosion Forum Section of "Chemical Engineering," which instead of discussing the use of lead with various corrosives, evaluate the use of lead in various industries handling corrosive materials.

Very truly yours,

  
Secretary



## Construction Materials in the Paper Industry

### Part I - Stock Handling

Part I of a presentation in which new design, Part II, III, and IV will be made of construction materials and construction methods for various sections in the paper mill, and also the paper mill design.

#### Lead

Kenneth H. Ross, Lead Industries Association, New York, N. Y.

One of the important chemicals utilized in the paper industry and, more particularly, in stock handling, is alum. Potentially there is a serious problem, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, 14.5 H<sub>2</sub>O, a chemical which is corrosive to practically all of the common materials of construction with the exception of lead and its alloys, antimonial lead and tellurium lead. It is used either in dry form or as a liquid solution 40 to 50 percent concentration at about 35 deg. Re (liquid alum).

Alum is introduced in the stock heater or Jordan, or both, to produce coagulation and flow coating. It is added along with a sizing agent consisting of either a soap made from saponifying rosin with alkali or a wax emulsion. Alum precipitates the size so that a gelatinous film is deposited on the fibre. After water of hydration is removed, the paper produced has a hardened surface that resists penetration by liquids. Alum is also used to neutralize alkalinity of pulp and water, to help prevent and later retention and to reduce pitch and sticking. Raw water is treated in the filter plant with alum to remove turbidity and color. In the pigment plant it is used with lime to make satin white.

Lead has for many years and continues to be used in both the manufacture of alum as well as the handling of the finished product in storage and in use. When contact with lead, alum immediately forms a thin protective film consisting essentially of lead sulphate. It is not responsible and merely permits any further reaction with the lead. It is important to note

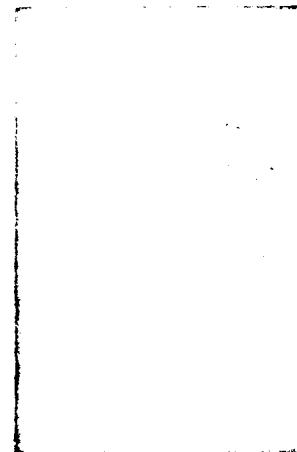
that alum is a very mild corrosive to lead. In fact, the corrosion of lead by alum is so slight that lead can be used for the construction of storage vessels and conveying lines by lead and pipe. The corrosion has almost entirely disappeared from the construction of storage vessels and conveying lines. The latter advantage is particularly significant in the handling of fine paper where absolute freedom from any chemical impurities is imperative.

#### HOW AND WHERE LEAD IS USED

Lead is used wherever liquid alum is encountered alone in (1) storage vessels, (2) conveying lines, (3) lead tanks and (4) measuring boxes.

Examining each of the above applications individually, storage vessels are lined with sheet lead. Vessel dimensions depend entirely upon the alum concentration of the particular plant and may be of lead lined vessels constructed of concrete, brick, wood or steel. Another type of construction may consist of a skeleton steel framework supporting sheet lead. Brick or concrete tanks are first lined with 4 to 6 in. asbestos sheet to protect the lead from abrasion and any effects of "green" concrete. Lead linings may vary in thickness from 8 to 12 in. (4 to 6 in.). For storage purposes where severe temperature fluctuations are not normally involved and where the vessels are not over 10 ft. high supporting struts for the lead are seldom required. The lead sheet is merely anchored around the top edge and hung over into the vessel in such a manner that the weight is supported by the lip and the bottom.

Alum conveying lines are of lead pipe whose size again depends upon the volume of alum being handled. 18 in. with 8 in. wall to 3 in. lead pipe



Liquid alum flows through the lead-lined measuring tank and lead pipe on its way to the heater.

with 8 in. wall is commonly used. Over long spans it is almost universal practice to lay the pipe in angle iron or channel iron supports. Cast solid lead valves and pumps or lead-lined valves and pumps may be used to control the alum flow. Joints between pipe sections may be of the Van Stone type or "lead joints" welded (burned) together by a properly qualified lead burner.

For storage the alum is usually pumped through lead pipe to an auxiliary storage or lead tank located at the high point of the heater room. A float switch is automatically installed to control the pump automatically to maintain proper alum level. A typical 50-gal capacity tank is constructed of steel lined with 8 in. sheet

(Continued)

last. Press the feed truck the same  
down by pulling through and pipe to  
the pump.

[illegible]

Newer systems such as the one illustrated use liquid alum at the outlet and thus entirely eliminate the necessity for handling and dissolving dry alum. A typical well receives the liquid alum delivered to the plant by tank truck through lead pipe and stores it in an 18,000-gal 10-ft. short lead-lined reservoir. From here it is pumped through 3 in. lead pipe to a

[illegible]

These solvents may be used as an alternative to benzene in the extraction of a compound from a mixture of solids and are then only used in the last plant. Lead is present wherever some solvent is encountered because this chemical is not only acid but also a conductor.

Sulphuric acid is another chemical used extensively in stock handling, which, of course, requires a lid for corrosion protection. Sulphuric acid is used for wet sorting, parchmentizing and oil adjustment.

Another application of lead is stock handling in covering agitator shafts found in stock chutes and "laotters." Agitator blades are made of cast iron which is sufficiently resistant to the acid sulphate stock (about pH of 5) but too brittle and too expensive to

be cast into shadow showing the  
shirts are made of cotton, but there  
and neck appear shiny and it has  
been necessary to clean the shirt half  
and 4 to 500 lbs. per sq. ft. and  
padding it. The weight is 3 to 4

[illegible]

It has proven to be one of the smartest materials to keep close; it gives extremely long service; it can be renewed in place.

The latter characteristic is especially important for where repairs are necessary they may be easily accomplished with a minimum of expense and shutdown time. In addition, lead is not valuable after its useful service life or obsolescence of the equipment; it may always be salvaged at the highest return of any of the common corrosion resistant materials.