

LEAD INDUSTRIES ASSOCIATION

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METALLIC LEAD PRODUCTS DIVISION

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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,

W. L. ...
Secretary



Construction Materials in the Paper Industry

Part I -- Stock Handling

Part I of a presentation is entitled "Stock Handling." Parts II, III, and IV will be entitled "Construction Materials," "Construction Methods," and "Construction Equipment," respectively.

Lead

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One of the important chemicals utilized in the paper industry and, more particularly, in stock handling, is alum. Papermaker's alum is aluminum sulphate, $Al_2(SO_4)_3 \cdot 14.5 H_2O$, 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 jacket, or both, to produce coagulation and fibre 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 pigment and fiber 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 alum is in liquid, alum linings in storage tanks are a protective film against the corrosive action of lead sulphate. It is impermeable and strongly adherent film which resolutely prevents any further reaction with the lead. It is important to note

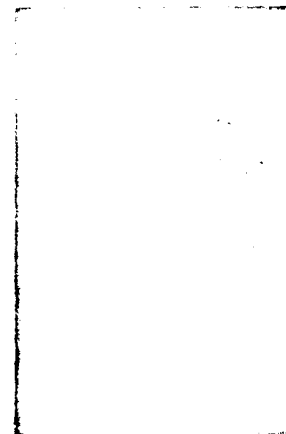
that if a new lead container is used, the alum must be applied before the container is filled with liquid alum. The alum must be applied in a uniform layer by hand and pump. The alum must be applied before the liquid alum is introduced in the container. The alum must be applied in a uniform layer by hand and pump. The alum must be applied before the liquid alum is introduced in the container. The alum must be applied in a uniform layer by hand and pump. The alum must be applied before the liquid alum is introduced in the container.

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 vessel 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 structure 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 and shape depends upon the volume of alum being handled. 12 in. with 1 in. wall to 1 in. lead pipe



Lead also lines through the lead-lined measuring tank and lead pipe on its way to the burner.

with 1 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 "rip joints" welded (burned) together by a properly qualified lead burner.

For storage the alum is usually poured through lead pipe to an alum storage or lead tank heated at the high point of the burner room. A float switch is sometimes installed to control the pump automatically to maintain proper alum level. A typical storage capacity tank is constructed of steel lined with 1 in. sheet (Continued)

load. From the feed tank the sludge flows by gravity through sand pipe to the filter.

[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 recovers 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 subjects may be used as a starting point for discussion. The teacher can assign students to the better end of a continuum and let them argue their point and come back the other side of the line. Good is found wherever some subjects are not encountered because this subject is not only good but also is excellent.

Sulphuric acid is another chemical used extensively in stock handling which, of course, requires care for corrosion protection. Sulphuric acid is used for wire sorting, parchmentising and oiling steels.

Another application of lead in stock handling is for covering agitator shafts found in stock chutes and "knotters." Agitator binders 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 therefore the
shades are made of wood and brass
and black enamel shading and it has
been necessary to cover the whole wall
with a thin layer of plaster and
paint it. Types of wood are 1 to 4
in diameter and 1 to 1/2 in thick.

Despite all the claims that the new Constitution would be a landmark victory of state socialism, it was a mere patchwork of old laws and regulations, and many of the provisions were contradictory and unworkable.

It has proven to be one of the easiest materials to keep clean; it gives extremely long service; it can be repaired 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 volatile 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.