LEAD INDUSTRIES ASSOCIATION, INC.

292 MADISON AVENUE

NEW YORK, N. Y. 10017

TELEPHONE — AREA CODE 212

OR 9-0030

May 3, 1965

SUBJECT: NEW TANK LINING METHOD

To Members of the Lead Industries Association, Inc.:

Attached is a copy of an article describing a new method of applying lead linings to chemical tanks, which appeared in the March 15th issue of CHEMICAL ENGINEERING. It was based on information gathered by the Lead Industries Association staff and presented earlier in an issue of LEAD, which appeared in December, 1964.

The method described is more or less experimental, as we know of only one prior installation using this method. Since both of these installations have proved successful to date and since the method introduces rather substantial savings in applying lead linings, it may place lead in a better competitive position and offer opportunities for expanding the market for lead in chemical installations.

Members may obtain additional copies in quantities up to 25 free of charge and larger quantities at our cost of 8¢ per copy.

Very truly yours,

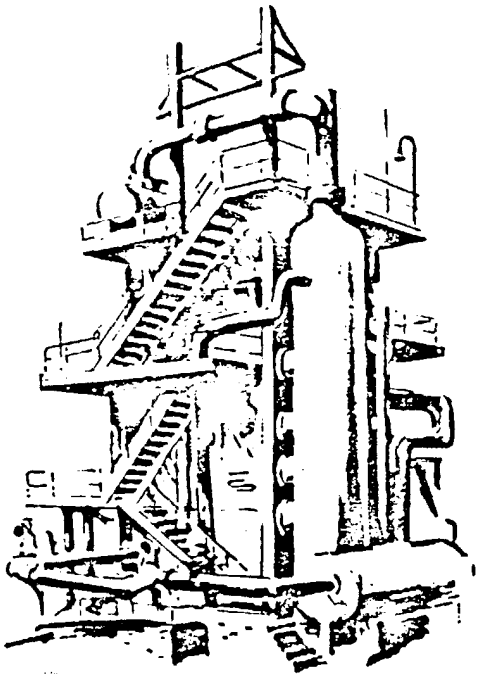
R. L. Zimmerman

RLZ:mk
Enc.

Executive Vice President

Look Ahead with Lead

CHEMICAL ENGINEERING REPRINT



Use Epoxies to Line Tanks with Lead

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Lead Industries Association, Inc.

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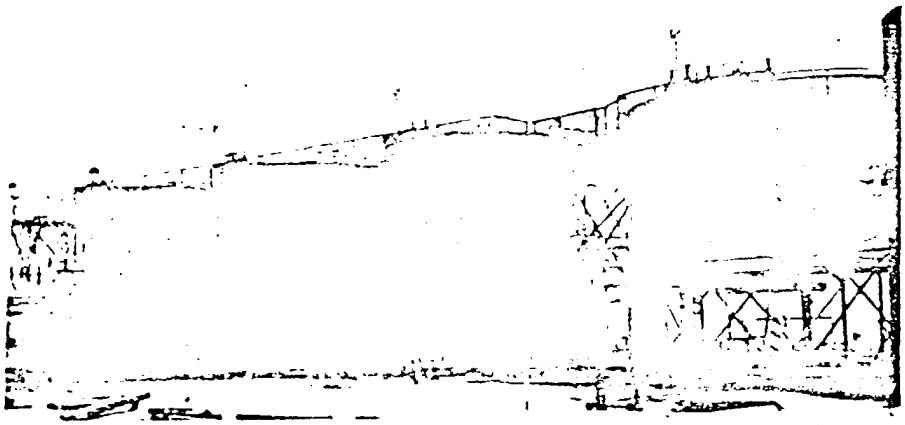


Lead-lined sulfuric acid storage tanks at Martinez, Calif. plant of Tidewater Oil Co., described in this article.

Use Epoxies to Line Tanks with Lead

When lead is bonded to tank walls with epoxy adhesives, lighter sheets can be employed and considerably less lead welding (lead burning) is required.

When tanks have to be lead-lined, a new technique that employs adhesive bonding may offer substantial savings.

In the conventional method of lining tanks with lead, the metal is supported on steel straps bolted to the inside of the tank. These straps are covered with lead strips, and the lead lining is welded (or "burned" in lead-worker's terminology) to the lead strips. Thus, the interior of the tank presents a surface that is entirely of lead.

However, since the lead lining is supported by the straps at intervals only, it must have sufficient structural strength to support itself in the spaces between the straps. When the lead sheet is bonded to the tank wall by an adhesive, the sheet need be only thick enough to meet corrosion requirements.

The installation of such a lining, pictured in this article, took place at the Tidewater Oil Co's refinery at Martinez, Calif. There, five storage tanks required relining after six and a half years of exposure to acid sludge. The sludge consisted of 98% sulfuric acid and hydrocarbon products, and came from the treatment of aromatic solvents, light lube oils and kerosene during the refining process.

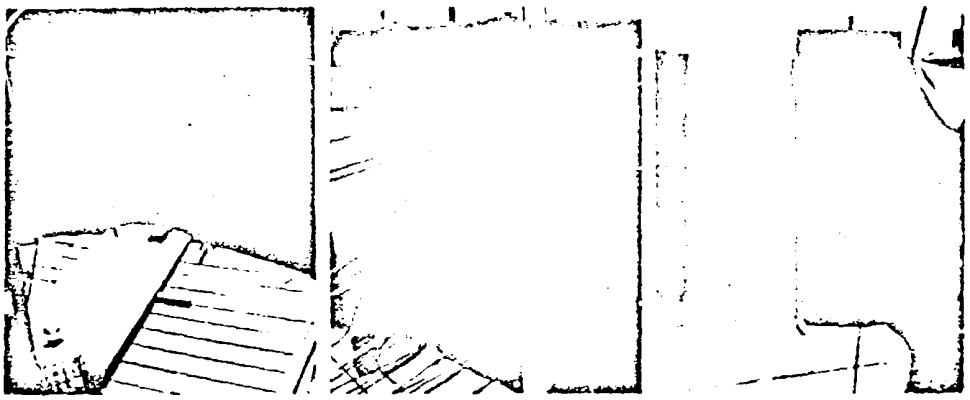
Previously the tanks (which were originally installed in 1941) had been lined in the conventional way with 10- and 12-lb./sq. ft. lead linings that were hung in the tanks by straps. Engineers at Tidewater decided to use a new technique of bonding the lead directly to the steel tank by employing an epoxy adhesive. The technique was used on three of the five tanks. (A similar installation was made several years before at the plant of Shell Chemical Co. at Wood River, Ill.)

Since the steel structure would support the weight of the lead, the designers determined that they could use lead sheet weighing 6 lb./sq. ft., instead of the previous 10- and 12-lb. weights. This thin, $\frac{1}{8}$-in. sheet saved almost 50% in the cost of the lead.

Installing the Lining

First, the steel shell was sandblasted to remove scale and oxide. In a new installation, the sand-

Reprinted from CHEMICAL ENGINEERING, *Mar.* 15, 1965



Adhesive is applied to lead sheet (on form) and to sandblasted steel-tank shell. Form is raised against tank wall and braced in place for curing period. After curing, braces are removed preparatory to removing form. Adjacent section of steel tank has been sandblasted and is ready for application of the next sheet.

blasting step would probably also be required to remove mill scale as well as rust.

Only a few sections of the tank were cleaned at one time, so that they would remain clean long enough for the lead bonding to be done.

Second, all the bolt holes remaining from the previously used straps were plugged with adhesive. Of course, such a procedure would not be required with new tanks.

Bonding the Lead Sheets

Preparatory to installing the lead, one side of a sheet was wire-brushed to prepare it for the adhesive. The adhesive applied was Shell Chemical Co.'s Epon 901-B. This is an epoxy that cures overnight at 75 F. and will withstand service temperatures up to 225 F.

Adhesive was applied while the sheet was lying on a specially prepared form, curved when needed to match the interior of the tank, and covered with foam rubber. Workmen then applied adhesive to the tank wall at the place the sheet was to be installed.

At this point, the form holding the sheet was raised so that the adhesive on the sheet came into contact with the adhesive on the wall. The form was braced in place, and the epoxy adhesive was cured for 24 hr. before the from and its braces were removed.

Welding the Seams

Each sheet was overlapped on the preceding one by 2 in. Finally, the long vertical seam at the overlap was welded by conventional leadburning techniques. The overlap was used to prevent the welding operation from damaging the adhesive bond.

The entire lead installation was handled by Western Leadburning Contractors, Concord, Calif. In addition to the vertical seams, lead welding was needed on the bottom sheets and at the juncture of the side and bottom.

Of the three tanks that were lined by this new method, one is 20 ft. dia. with 12-ft.-high walls and a lead surface of 1,120 sq. ft. The second is 30 ft. dia., with 10-ft.-high vertical walls and a 6-ft.-deep conical bottom. It has a surface area of 2,415 sq. ft. and was originally lined with 10 lb. sq. ft. lead on the vertical walls and 12-lb. lead on the cone. The third tank is rectangular, 20 ft. by 15 ft., has 6-ft.-high walls and contains 720 sq. ft. of lead.

Advantages

Several advantages are claimed for this new lead-lining procedure.

- Thinner lead sheet is needed since the lead is entirely supported by the steel shell.
- Much of the lead welding ordinarily required is eliminated.
- The adhesive bond cannot be damaged by weathering.
- The adhesive is sufficiently resilient to maintain the bond even under the differential expansion of the lead and steel caused by environmental and process temperature changes.

Key Concepts for This Article

Active (8)	Passive (8)	Means/Methods (10)
Installing	Lining	Adhesives
Fabrication	Lead	Cements
Applying		Epoxy resins

(Words in bold are role indicators; numbers correspond to AIChE system. Indexing details—as described in Chem. Eng., Jan. 7, 1963, p. 33—are available, use Reader Service Postcard.)