

Summary

At Washington, lead has been replaced by brick for acid boil tanks in the Baltimore Water Department dilution plant. A test of lead has been made with a complete U. S. Government lining installation. The lining consists of a lead epoxide lead brick over brick. Lining concrete. Brick has a wide range of chemical usefulness and is apparently cheaper than natural or synthetic rubber.

However, lead will replace brick and bitumastic linings now in use in the dilution tanks at this plant. Lead pipe and valves are giving good service, as is a Duriron pump.

INTRODUCTION

Information on the preparation of acid alum for use in both the Baltimore and Washington waterworks has been given in Chemical Bulletin No. 1. This report brought out that in Washington lead lined dilution tanks give long life, but the boil tank had been recently relined using an asphalt layer between the steel tank shell and the brick inner lining. A recent trip to the Baltimore waterworks revealed that the process is unaltered though lead is no longer in use for boil or make tank linings.

EQUIPMENT DESCRIPTION

a. Boil Tanks - As shown in the drawing, a 45° conical bottom is now used in the newly constructed steel tank, built to replace the hemispherical bottom tank formerly used. The 8 ft. diam. steel tank, 15 ft. in diameter, now has an 11 ft. vertical side wall above the cone where formerly a 10 ft. vertical section was used. The conical section was installed here, only because of difficulty in getting steel plates shaped to form the hemispherical bottom. The plant engineer still prefers the curved bottom.

3. The Rosilon lining provides a cushioning effect which will add to the life of the ceramic lining.

4. Brick protection prevents mechanical injury to the Rosilon lining.

Rosilon will not resist chromic acid, strong oxidizing agents, oils, benzol, bisulfide, concentrated sulfuric and concentrated nitric acids. It is soluble in hydrocarbons and chlorinated solvents.

Partial Listing of the

Chemicals Rosilon Will Handle

Alums	Ferric Sulphate	Sodium Silicate
Aluminum Sulphate	Lead Acetate	Sulfur Dioxide
Ammonium Chloride	Magnesium Sulphate	Sulfur Trioxide
Ammonium Sulphate	Phosphoric Acid	Sulfuric Acid
Calcium Chloride	Plating Solutions	Sulfurous Acid
Chlorine	Sodium Bisulfate	Water (brine)
Copper Sulphate	Sodium Chloride	Zinc Chloride
Ferric Chloride	Sodium Hydroxide	

It is to be noted that the above chemicals are all safely handled in lead in competition with Rosilon.

For application as a tank lining a blow torch, a roller and two trowels are needed. Rosilon sheets are fused to the tanks with the blow torch flame. Manual troweling smooths out the molten layer of Rosilon while the roller is used to apply pressure to ensure a firm bond between the steel tank wall and the lining. Joints are welded with strips of Rosilon. No extra supports are required and pinholes are eliminated by heating and troweling. No curing or drying time is required. It is said to cost less than half the cost of rubber or synthetic rubber.

In the application of bulk Rosilon it must be melted and a possible explosion hazard exists. To prevent an explosion, "Never melt Rosilon in the container in which it is received or in any container in which the material has been allowed to solidify in mass."

Durite is an alkali and acid resistant cement of the Furane base resin type used to cement the bricks. It is useful up to 350° - 375° F. in resisting inorganic acids, organic acids, any degree of alkali concentration, oils and solvents. Durite is obtainable in liquid or powder form and is quick setting, within 20 - 30 min. at room temperature. It can be placed in service within two or three days after laying the last brick. Compressive strength is 12,000 psi and tensile strength is 1400 psi. One half pound of mortar is required per 9 in. brick buttered on three sides. The boil tank installation in Baltimore had a generous 3/4-in. plus between each brick.

* From Bulletin R-12 of the U.S. Stoneware Co., Akron, Ohio. Other data on Rosilon is given in Bulletin 1602.

Chemical Bulletin No. 16

- 4 -

May 1, 1947

PERFORMANCE OF LEAD LININGS

A Dardena plant has been in operation for 12 years with no replacements required. A "runner" is kept on hand to take the place of any pipe should fail but it has not as yet been put in use. Connections in the main line of lead pipe which give very good service. In the line from tank to tank, the pipe is 4" diameter and it is subject to heavy stresses and strains from changing liquid levels. The main line from each tank is roughly 10 in. dia. by 10 in. dia. and is usually replaced about once a week.

CONCLUSIONSa. Satisfactory Lead Service

Lead pipe is giving satisfactory service for handling the acid alum solutions. Lead linings for dilution tanks have given very good service in the Washington waterworks (see Bulletin No. 1) and plans are to line the Baltimore plant dilution tanks with lead as soon as feasible. For dilution tanks, lead linings are regarded as more resistant and more economical than either bitumastic linings or the 4-coat application of Tygon paint.

b. Performance of Competitive Materials

For boil tanks, lead linings have not given good service and are being replaced by a U. S. Stoneware lining of acid resistant brick and a Rosilon backing compound. The Rosilon will probably be impermeable to the alum solution that will in time seep between the bricks and will also give the bricks room for expansion - contraction occurring during heating cycles. This installation should have excellent life as long as the Rosilon layer remains impermeable and retains its flexibility.

