Lead Water Services Under Grueling Conditions In New York

The two excavations, one on each side of the street, having been completed, the lead service will be drawn underground between the two and connected to the 3-in. main and the house opposite.

PHOTOS BY F. A. RUSSO STUDIOS

THE Borough of Manhattan, New York City, probably provides the most grueling underground conditions for water service lines that may be found anywhere.

The constant and heavy auto, bus and truck traffic overhead and the continuous thundering of subway trains which are never very far away from practically any spot on the island, are just two of the conditions that the service line material must withstand. That lead is accomplishing this successfully is brought sharply into focus by the fact that practically all of the water service lines 2 in. and under now being installed in Manhattan are lead.

One of the more recent lead installations of a slightly different nature than those customarily installed was made on East 107th Street, New York, by the George W. Kaufman Co., plumbing contractors of New York City.

The building for which the lead service was installed is located on the opposite side of the street from the 3-in. cast-iron water main. Because of this, an extra long service was needed, as well as excavations on each side of the street joined by a small tunnel through which the lead service line could be pulled without disturbing a large part of the street surfacing or disrupting and halting street traffic. Connections between the cast-iron water main and the building supply line were made in place within each of the excavations.

The foresightedness of the owner and the plumber and incidentally the confidence they have in lead's ability to last a good many years are evidenced by the procedure followed in planning this installation.

The present demand for water necessitated only 1½-in. tap in the water main. However, they felt it desirable to make provisions in the most economical manner for additional water at a later date.

This was done by connecting a 5-ft. loop of 1½-in. lead pipe to the corporation cock and then continuing the service with a 2-in. Class 75 AA or XS) to the building. When the demand for water increases beyond the capacity of the present 1½-in. tap, all that will be necessary is a small excavation at the main to which a 1½-in. line can be tapped and wiped to the then existent 2-in. lead service.

This recent installation of a lead service line replaced the old service of another material that had failed causing a bad cave-in at the sidewalk. This rigid service had a lead gooseneck which was still in good condition. Had the entire service been of lead originally, it is safe to assume that no failure would have occurred.

It has been found from studies made in a number of cities that the cost of the service pipe is a minor item, amounting to around 10 per cent, when the overall installation charges are considered. Therefore, the original cost of a service pipe material with lead's proven durability, though it may be slightly higher than other materials, still adds only about 2 to 3 per cent to the overall cost.

However, one failure such as happened on this job considerably more than offsets the small initial material saving that was made because of the fixed charges that had to be repeated. These fixed charges include such items as tapping, corporation cock, digging and paving repair.

The plumber making the connection between the lead water service and cast-iron main. The gooseneck will absorb any movement caused by settlement of the service line thus preventing any strain at the tap.

Unique Properties of Lead Fittings Applied to Housing and Public Buildings

MANY architects and builders of large and small private housing projects and public buildings have taken advantage of the unique properties of lead fittings in the planning and installation of their plumbing systems. Two such projects now under construction are the 265 unit garden apartments in Hartsdale, N. Y., and the Riverside School in Greenwich, Conn.

Two of the properties of lead that are applicable to its selection and use in the plumbing system are its ability to withstand the corrosive acids and alkalis that enter the waste system and, also important, the "give" it provides between two rigid materials. This ability to take stress and strain without rupturing or causing damage to expensive fixtures and rigid pipe lines often means the difference between a lifetime of trouble free service from the plumbing system or constant expensive repairs not only to the plumbing system itself but also costly repairs caused by water leaks.

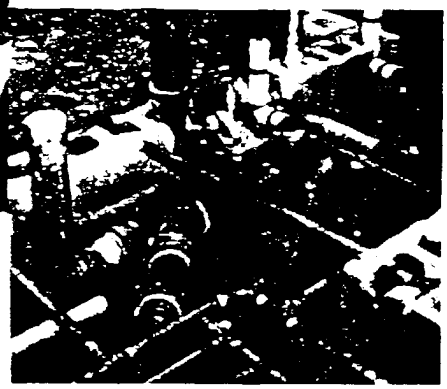
Lead's smooth inner surface and easy changes of direction are conducive to free-flowing, scouring action of the discharged wastes, thus minimizing the possibility of stoppages.

On the comparatively small housing project located in Hartsdale, N. Y., the architects, Arlen and Lowenfish, New York City, specified extra-heavy [illegible] bends to connect the 310 water closets to the rigid soil pipe. Also specified were lead stubs for connecting the 100 stall showers to be installed. This work is being done by Frein, Schlosberg Co., plumbing contractors of New York City. The project, known as Country Club Garden Ridge, will, when completed, have 265 garden apartments.

On public buildings, lead fittings are finding wide acceptance and one of the more recent buildings of this type to use lead bends for water closets and P-traps for urinals, a particularly corrosive area, is the Riverside School, Greenwich, Conn., now under construction. The Greenwich Plumbing Co. is the contractor.

Large housing projects, such as those financed by the Metropolitan Life Insurance Co. in Manhattan, New York City, have also used lead bends to advantage. Over 12,500 of them were recently installed in three different projects. More complete details of these installations will be found in "Lead," Volume 17, No. 3.

Lead fittings have the added advantage of the ease in which they can be moved to conform to slight miscalculations in the construction, often saving possible relocation of the fitting.



Above, the plumber wiping a joint in a 4-in. lead bend for installation on the Country Club Ridge Apartments in Hartsdale, a N. Y. City suburb.

Right, lead traps and bends roughed in at the Riverside School, Greenwich, Conn.

Lead Tubing Aids Efficient Operation of Furnace Humidifier

FOR many years vapor diffusers have been used in hot-air furnaces to humidify the air upon leaving the furnace. An objectionable feature of many of these, however, has been the inability to properly control the water inflow, and hence the humidity of the inside air, under varying outside weather conditions. Another is the disposal of the overflowing lime-loaded water which has been a problem because of the tendency of the lime to settle out of the water and harden around the outlet and eventually block it.

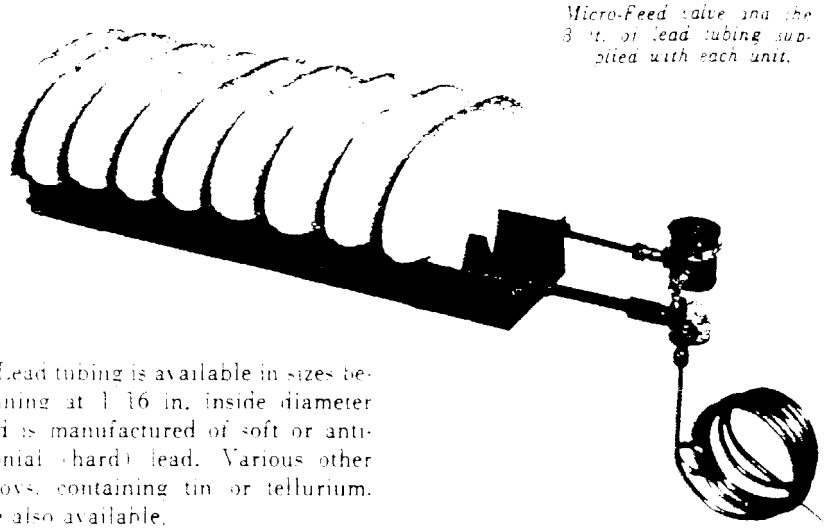
To overcome these weaknesses of home air humidifiers the Cleveland Humidifier Co. of Cleveland, Ohio, recently patented the "Micro Feed" humidity control valve that can be adjusted to weather conditions by controlling the amount of water, in drops per ten seconds, entering the vapor diffuser pan. The valve is easily operated and the rate of drip feed is plainly visible through the transparent cup that encases the valve.

The "Micro Feed" is so constructed and installed that as the water level of the pan rises a corresponding rise takes place in the valve. When the water reaches its highest working level any additional water supply, beyond the capacity of the vapor diffuser to evaporate, overflows into the open top of the vertical lead tubing inside the valve. Thus only clear water overflows and not the lime-loaded water of the pan.

The selection of lead tubing, ¼ in. inside diameter, for the important overflow piping was made by the manufacturer primarily because it is non-rusting. This property of lead avoids the possibility of clogging

from rust, which would destroy the efficiency of the entire valve. An added incentive for the use of lead tubing is its flexibility and ease of handling that makes it possible to install it easily without tools and innumerable joints to conform to the uneven surfaces found around furnaces. Each unit is supplied with 6 ft. of lead tubing.

In addition to conveying small amounts of water, lead tubing is used extensively in player pianos and organs for supplying small amounts of air under pressure. It is also used to tap chambers in which sulphuric acid is manufactured to convey small quantities of the acid to the laboratory tables where it can be tested for strength.



The Monmouth vapor diffuser assembly, showing the Micro-Feed valve and the 3 ft. of lead tubing supplied with each unit.

Lead tubing is available in sizes beginning at 1/16 in. inside diameter and is manufactured of soft or antimonial (hard) lead. Various other alloys, containing tin or tellurium, are also available.

Lead Sheathed Heating Cable Prevents Ice Dams on Roofs

THE proper maintenance of a home not only includes the upkeep of interior and exterior surfaces but should also take into account the area between these surfaces. It is here that most of the major destruction to homes by moisture originates.

In practically all cases the cause of this destruction can be traced to water seeping into this enclosed area. Some of the common ailments traced to this moisture are exterior and interior paint failures, destruction of plaster and worst of all, the rusting or rotting of supporting members.

Of course it is practically impossible to inspect this area periodically leaving no alternative but to be sure that every possible means of excluding this moisture is used in the construction and maintenance of the home. Some of the obvious seepage areas such as around chimneys, ridges, valleys and tops of window frames can easily and surely be protected by lead flashings.

However, a much more insidious type of danger occurring in the winter is the accumulation and subsequent melting and refreezing of snow on roofs. This is a common occurrence, especially at the critical temperature level, of slightly below freezing, wherein a combination of heat loss through the roof and the sun's rays melts the snow causing the water to run down to the eaves or point where the roof overhangs the side wall of the house. The eaves being colder as they are not affected by heat loss refreezes the water, setting up ice dams that hold back the water allowing it to seep under the shingles and into the house. Unfortunately, this seepage usually enters between the interior and exterior walls and the damage is done before any signs are visible.

To overcome this maintenance problem, the General Electric Co. experimented with their lead covered heating cable that had been used for other purposes for many years and found it very successful. Various methods of installation were tried and the saw tooth arrangement, shown in the accompanying photographs and drawing, was found to be of practical value.

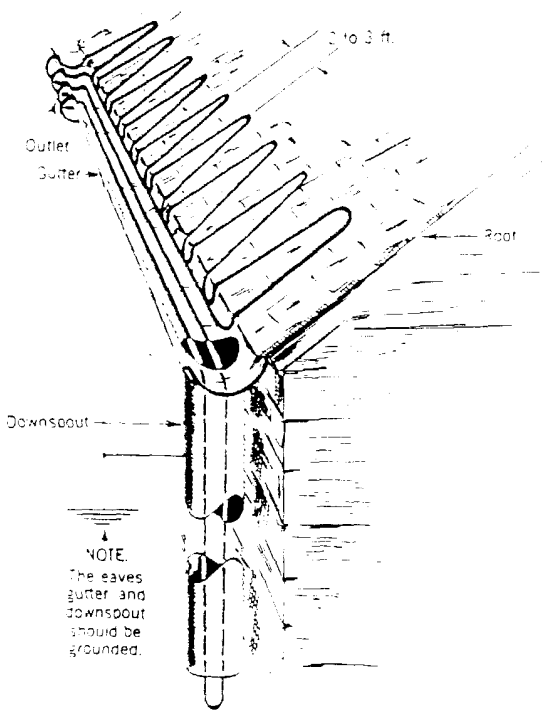
A typical installation of lead sheathed heating cable for snow melting purposes. The saw tooth pattern provides channels for complete drainage.

The lead covered heating cable is fastened to the roof by clamps at the upper edge of the saw tooth about 6 in. above the point where a vertically projected line from the interior wall would intersect the roof and with the lower edge of the saw tooth below the lowest point where ice may form. In this way the cable melts channels through the ice and snow, thus permitting free drainage of water.

In buildings equipped with gutters and downspouts, the saw tooth pattern can be used on the eaves with a double length of lead covered heating cable installed along the gutter and hanging in the downspout. In metal gutters, the cable should be layed on wooden strips or blocks so that it does not come into contact with the gutter. Otherwise, the metal gutter will dissipate most of the heat. The metal gutter and downspout should be grounded. On houses having valleys, the cable should extend 3 ft. or more up the valley depending on the extra amount of cable available after installation on the adjoining eaves.

To supply power to the heating cable, it is recommended that a weatherproof convenience outlet be installed on the outside of the building, preferably under the eaves. As a safety precaution during the off-season months, the cable should be unplugged at the weather-proof outlet.

The cable should never be used where the sheath temperature will exceed 165 deg. F.



Correct method of installing lead sheathed heating cable when gutter and downspout are to be kept open. The electrical outlet is located under the eaves.

The tabulation below shows the lengths of cable recommended for the more common voltages and the resultant wattages:

Length in Feet	Volts	Total Watts
60	110	400
120	220	800
240	440	1600

Shorter lengths should not be used with these voltages as such practice will increase the wattage and operating temperature and shorten the life of the cable. Longer lengths can be used, in which case the total wattage will decrease. When used in the length indicated, the sheath temperature in free air will be approximately 95 deg. F. above the surrounding air temperature.

The cable consists of a nickel-chromium alloy resistor wire 0.036 in. diam. insulated by felted asbestos 0.031 in. thick and two separate wraps of black varnished cambric, each wrap 0.008 in. thick and a lead sheath 0.047 in. thick. Total diameter is 0.240 in.

The lead covering provides toughness and durability not obtained with less rugged type of covering. Its flexibility also permits bends of a minimum diameter of 2 in.

The manufacturer, General Electric Co., Schenectady, N. Y., also suggests the use of lead heating cable for protecting water pipes, warming valves and pipe lines carrying viscous material, acid baths, freeing sidewalks from ice, soil heating and floor heating.

Close-up view of the heating cable in use. Approximately 4-in. of snow has been completely melted.

Lead Equipment in Dye Intermediate Manufacture

ENGAGED in the manufacture of dye intermediates, among other products, engineers at the Grasselli Works of the General Aniline & Film Corporation at Grasselli, New Jersey have found many applications where full advantage is taken of the corrosion resistance of lead.

An intricate, well-guarded science, the manufacture of dye intermediates incorporates many combinations of a variety of corrosive chemicals under various conditions of concentration, temperature and agitation. Because lead is resistant to many more corrosives and combinations of corrosives than any other comparable corrosives handling material, it successfully protects much of the processing and handling equipment in this important industry.

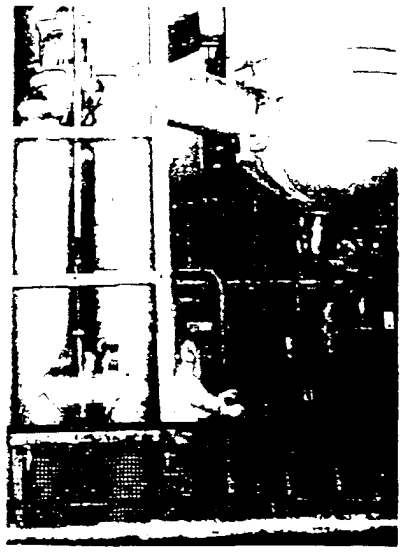
A few of the many interesting lead installations at the GAF Works are shown in the accompanying illustrations. The reaction vessel illustrated is equipped with an internal lead heating and cooling coil and an agitator that is 3/4-in. lead homogeneously bonded to steel. The reaction vessel itself is a steel shell lined with two courses of acid brick and a convex cover homogeneously bonded with lead. Of particular interest in this installation is the design of the all-lead coil support consisting of chemical lead cast in bars 3 x 4 1/2 in. in cross-section. The bars extend up the inside of the tank where the coil is fastened to the support by means of welded lead straps. All supporting bars converge at the hemispherical base of the tank. This method was developed at Grasselli as a replacement for homegeneous lead-bonded steel supports. According to R. C. Thiede, plant engineer, this method of construction "... permits uniform bonding between coil and supports; it facilitates construction and assembly; eliminates the possibility of iron contamination deleterious to dyestuffs manufacture and is easily maintained."

The tellurium lead heating and cooling coil shown in this illustration is 2-in. inside diameter with a 3/8-in.

A reaction vessel in the Grasselli Works of the General Aniline & Film Corp. equipped with an internal lead heating and cooling coil and an agitator that is 3/4-in. thick lead homogeneously bonded to steel.

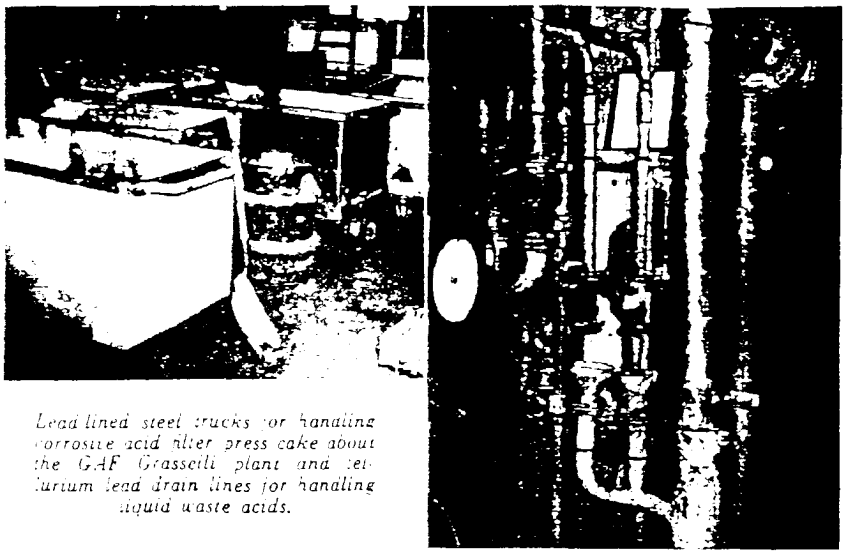
wall thickness. It handles 30-lb. steam pressure for heating and cold water for cooling. The sealed tanks are emptied by raising the air pressure and forcing the contents up and out through a lead pipe extending to the bottom of the tank. A lead-lined steel support plate (lower left corner) shows inlet and outlet of coil. This particular vessel is 18 ft. deep and 8 ft. in diameter and is used to handle 5 percent sodium bichromate and 20 percent sulphuric acid at temperatures ranging from 65 to 220 deg. F. It is typical of a number of similarly equipped tanks which are all giving excellent service. All vessels and vessel covers which were homogeneously bonded with lead from 1/4 in. to 5/16 in. thick have been performing successfully since their installation, which averages between 5 and 10 years ago. The same excellent service has also been given by lead coils and supports and bonded lead agitators. The use of lead in these vessels is particularly noteworthy inasmuch as the presence of even minute quantities of metallic salts would seriously effect the quality of the finished product. Lead's reaction with the corrosives handled does not result in the formation of any corrosion products which might hinder in any degree the success of the operation.

These lead ducts at the Grasselli Works are used to convey sulphur dioxide, sulphur trioxide, chlorine, bromine and nitrous oxide fumes to fume removal scrubbers.



During the reaction of the various chemicals in these vessels, corrosive fumes are given off. Different reactions in each vessel result in a variety of corrosive fumes which include sulphur dioxide, sulphur trioxide, chlorine, bromine and nitrous oxide. Any one of these gases, particularly in combination with the oxygen and moisture normally present, can constitute a serious corrosion problem. Consequently when all gases are combined, the only material that has been able successfully to withstand corrosive attack over a period of time is lead.

At Grasselli all reaction gases are



Lead lined steel trucks for handling corrosive acid filter press cake about the GAF Grasselli plant and tellurium lead drain lines for handling liquid waste acids.

exhausted from the individual vessels, collected in 10 and 12-in. diameter lead fume exhaust lines and carried to a 16-in. diameter lead duct from whence they are led into fume removal scrubbers. All of these lines which consist of chemical lead with ⅜-in. wall thickness have been in continuous service for about 12 years with little or no repairs—a remarkable record considering the nature of the corrosives. Also shown in the illustration are lead dampers used for by-pass arrangements. All fume ducts were fabricated on the plant premises from 24-lb. chemical sheet lead and are strapped to steel channels which provide a supporting framework. Horizontal sections are strapped on the upper halves with steel and covered with lead, the undersides resting on steel channels. Smaller diameter lines are simply laid in steel channels hung from above.

In addition to the lead fume disposal system, lead drain lines and lead floor drains are used for handling liquid waste acids and waste dye intermediates. The tellurium lead piping used for drain lines has a ⅛-in. wall thickness and has also been in service for about 12 years. Lead-lined valves are used throughout.

In addition to many other lead installations common to most chemical industries handling corrosives, the GAF Grasselli plant uses steel trucks for handling corrosive acid filter press cake. These trucks are loose lead lined with 8-lb., 6 percent antimonial sheet lead. The trucks are 2 x 4 ft. on top and 2 ft. high. The lead also serves another purpose in this particular installation, inasmuch as one of the constituents of dye intermediate processing is trinitrotoluene (TNT). Because of the explosive nature of this material, the steel shovels used for emptying the trucks would constitute a dangerous hazard if the non-sparking characteristics of lead were not used to advantage.

All of the lead work at this plant including the homogeneous bonding is done on the premises under the supervision of Mr. Martin Derrig.

Leaded Glass an Important Aid To Better Television Performance

THE qualities imparted to glass by the addition of lead to the raw material mix are used to advantage in the relatively new and rapidly growing television industry. Glass for television tubes is produced by the American Structural Products Co., subsidiary of the Owens-Illinois Glass Co. and some of it contains up to 30 percent lead, by weight. By this means, two very desirable characteristics for this particular product are imparted to the glass.

The first of these is the increase in the electrical resistivity of the glass made possible by the lead. Thus the tube safely withstands the terrific

The lead silicate shown added to the glass mix produces both the handsome goblet and the television bulb. The addition of lead adds brilliance to the goblet and electrical resistivity to the bulb.

surge of 3, 10 or 12 thousand volts which the "ion gun" shoots at the phosphor television screen in the form of electronic particles. These electrons are controlled by magnetic fields in the tube and are easily disturbed by stray currents. The electrical resistivity of the leaded glass prevents any current in one part of the tube from causing harmful disturbances in another part.

Also, lead in glass gives it a high light dispersion characteristic. This is the same principle that provides brilliance in fine table ware, stem and cut glass.

The lead is added to the glass mix in the form of a compound, lead silicate, and though this is a yellow color, it does not impart any of its color to the glass. In fact, it is one of the very few colored materials that can be added without tinting the glass to some extent.

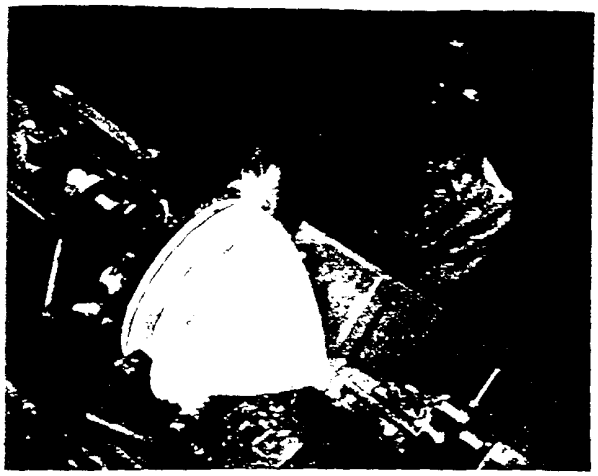
In addition to the performance factors, adding lead to glass is also of economic benefit during the manufacturing process though the leaded glass raw materials are more expensive. The furnace temperature necessary for the production of glass from silica sand alone is approximately 3100 deg. F., whereas the addition of lead, soda ash and lime to glass only requires temperatures somewhere around 2600 deg. F.

The bulb itself is made in three sections, face plate, funnel and neck, which are welded together on special lathes as shown in the accompanying photograph.

Thousands of leaded Kimble Glass television tubes, actually the heart of the instrument, are being produced monthly in 7, 10, 12½ and 16 in. sizes at the Columbus, Ohio, plant of the American Structural Products Company.

The use of leaded glass in television tubes is, of course, only a comparatively new application. However, leaded glass has been used for a great many years in producing fine glass tableware, optical glass of many kinds, and more recently for the protection of observing personnel against dangerous X-ray radiation.

The three separate parts of the television bulb are being welded on a special lathe by the operator. The bulb will then be annealed in cooling ovens.



The following articles and reprints contain information, drawings and specifications on the use of lead products helpful to architects, engineers and others in the construction industry. They are available, free of charge, upon request to the Lead Industries Association, 420 Lexington Avenue, New York 17, N. Y.

PROPERTY PROTECTION WITH WHITE LEAD PAINT

A 28 page booklet on the protective value, durability and beauty of pure white lead paint with quantity estimating tables, formulas and mixing and tinting instructions for exterior and interior use.

A STUDY OF PAINTS FOR ENCLOSED STRUCTURAL MEMBERS IN STEEL HOUSING CONSTRUCTION

By H. A. Pray and R. S. Peoples, Battelle Memorial Institute

A reprint of a paper which was read before the General Meeting of the American Iron and Steel Institute, May 25-26, 1949, which sponsored the work. The study included some 4 years of test exposure.

AN INVESTIGATION OF PRIMERS FOR MARINE ATMOSPHERIC ENVIRONMENTS

By C. J. Vander Valk, Technical Director, Red Lead Division, Lead Industries Association.

Results of an investigation of synthetic vehicle and red lead mixed pigment primers over an exposure period of three and one half years on a rigorous marine atmosphere. Reprinted from "Official Digest" published by The Federation of Paint and Varnish Production Clubs.

RED LEAD TECHNICAL LETTERS

A series of technical letters issued by the Red Lead Division, Lead Industries Association. The numbers and titles follow. (Available separately.)

Technical Letter No. 3—Red Lead Primers for Atmospheric Exposure

Technical Letter No. 4—Red Lead Paints for Marine Exposures

NEW MARINE PRIMERS

By K. H. Roll and C. J. Vander Valk, Lead Industries Association

An article on newly developed paint primers for metals exposed to marine atmosphere, written expressly for the person who is not a paint technologist.

Reprinted from "Marine Engineering and Shipping Review," March, 1949.

PHYSICAL AND CORROSION CHARACTERISTICS OF LEAD IN THE CHEMICAL INDUSTRY

By K. H. Roll, Lead Industries Association

A detailed discussion of the use of lead in the chemical industry presented before the National Association of Corrosion Engineers Conference, April 11-14, 1949.

DECORATIVE FINISHES FOR LEAD

By K. H. Roll, Lead Industries Association

A description of the various methods used to produce special surface effects on lead sheets for decorative uses. Reprinted from "Metal Finishing," January, 1949.

CORROSION FORUM

A series of one page articles on the use of lead as a material of chemical construction in contact with the following chemicals (available separately): Chlorine, Hydrochloric Acid, Hydrofluoric Acid, Industrial Alcohol, Sulphuric Acid, Sodium Chloride, Sulphur Dioxide, Phosphoric Acid.

Reprinted from "Chemical Engineering."

COMMERCIAL STANDARDS: Calking Lead, CS94-41

Official publications by the Government Printing Office promulgated by the U. S. Department of Commerce through the National Bureau of Standards, effective June 25, 1941.

FEDERAL SPECIFICATION WW-P-325 For Pipe, Bends and Traps, LEAD

Part 5 of Section IV of the Federal Specification Stock Catalog, official publication by the Government Printing Office.

SUMMARY OF NOTES ON LEAD ROOFING.

A brief description of the uses of lead for roofing and flashing purposes and the proper practices of its application. Reprinted from "Sheet Metal Worker."

LEAD WELDING

By Robert L. Ziegfeld and David M. Borrina

A concise discussion of the process and methods of welding lead sheet and pipe with descriptions of tools and procedure. Includes brief historical notes and a list of commonly used corrosive chemicals with notes on their reactivity with lead.

MATERIALS AND METHODS OF X-RAY PROTECTION

By George Singer, Acting Chief Radiation Section, National Bureau of Standards, Washington, D. C., and George C. Lawrence, Ph.D., National Research Council of Canada

A discussion of the materials suitable for use in shielding X-ray installations. Reprinting from *Industrial Radiography* Vol. IV, No. 2, Fall, 1945.

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