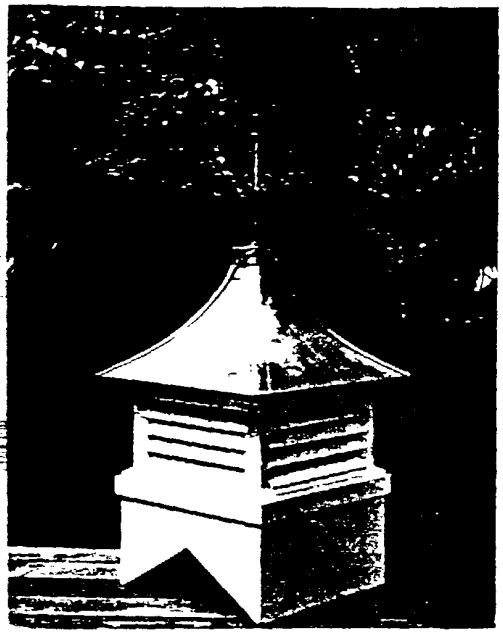
Easily Worked Sheet Lead Ideal For Ornamental Roofs



A close-up of the complete cupola with lead roof. The pleasing gray patina of the lead will blend with any color scheme.

LEAD is an ideal material for small ornamental roofs on such details as bay windows, doors, cupolas and the like which add distinction to almost any type of home. It is easily worked and installed, is long lasting, blends beautifully in color with almost any other building materials that may be used with it, has a beautiful dark to silvery gray color of its own depending upon the kind of exposure, and will not itself stain or stain adjacent materials.

The little cupolas shown here is an excellent case in point. It is on a one-car detached garage at a small home in a New York City suburb in Westchester County. Cupolas of this type may either be built specifically for the particular job, may be purchased in knocked-down condition and assembled, or may be bought completely pre-fabricated with only the metal roof to install. The size varies with the structure which it is to surmount, in this case 18 in. square at the base, 21 in. square at the roof line, and 33 in. high, which is about right for a one-car garage. The roof of the cupola itself may be slightly dished to form a pagoda roof, as in this case, or may have a straight slope. It is a little easier to apply the metal to the latter but the former has a little more distinctive character for many installations.

In this instance, the cupola roof was a framework of wood to which fiber board was applied to the desired shape. The lead was cut from a paper pattern, allowing 3/4 in. at each of the sides to turn back for a lock and enough extra at the bottom to turn under the overhang. The pieces for the four sides were nailed in place at the top. Then the upstands were turned back and a lead cap slipped over the flanges thus formed, sliding it up from the bottom. This method was used to add the interest of corner seams. The wood block at the top was also covered with sheet lead by fold-

Cupola ready for positioning the last side of the roof shown on bench. Note upstands at sides for locks and fold along lower edge to turn under overhang.

Roof sheets are in place with side edges turned back and folded cap being slid into place to cover corners. The cap to cover the top may be seen on the bench.

The lead-roofed cupola blends beautifully with the surroundings of this suburban New York City home.

ing the corners. This covers the nails that hold the roof sheets.

Actually on lead roofs this size, no special provisions need be made for expansion and contraction, allowing the installer the choice of several methods for applying the lead. When dimensions exceed 4 to 6 ft., lead should be fastened with cleats instead of nails, and loose-locks used between sheets to provide for freedom of movement resulting from expansion and contraction. For small roofs of this type, 2½- or 3-lb. antimonial lead sheet or 3- or 4-lb. soft lead sheet may be used. For larger roofs, 3-lb. antimonial lead is recommended.

Birchwood Park Homes Use 6,600 Lead Water Closet Connections

ANOTHER major residential one-family house development on Long Island, N. Y., is now underway in Birchwood Park, Jericho, L. I., N. Y., with 835 homes of a projected 2,600 already completed. The architects and builders, Sosnow and Schwartz, are offering eight different designs, including split level and ranch style, equipped with many modern innovations, such as air conditioners, built-in ovens and wall refrigeration.

Perhaps not an innovation but certainly a major convenience for the families who will live in these modern homes is that all will have at least 2 bathrooms, with 400 homes to be equipped with 3 baths and 1,000 with 2½ baths. Horowitz Bros. Inc. of Syosset, L. I., N. Y., are the plumbing contractors.

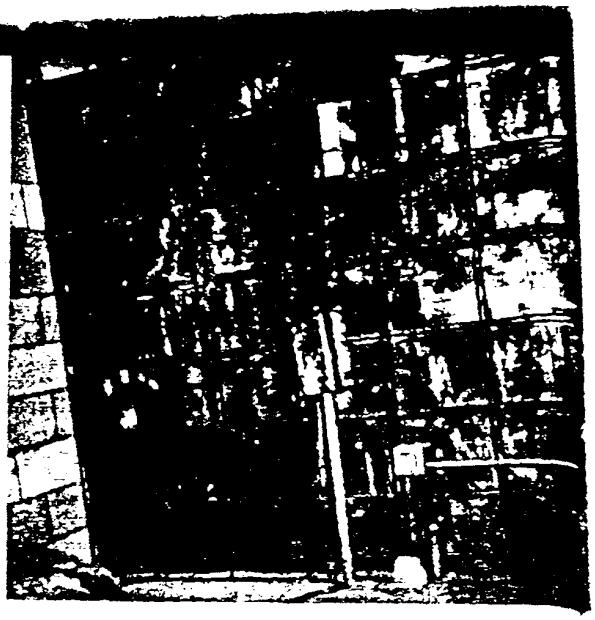
The more than 6,000 water closets that will be installed in this modern community project will be connected to copper drainage lines with 3-in. lead bends by means of wiped joints.

The use of lead bends generally facilitate the setting of water closets because of their ease of handling and their flexibility. These qualities permit adjustments to be made in any direction easily and simply by hand to compensate for inaccuracies in measurements made in the roughing-in for the job.

In consideration of this, many plumbers find lead connections to be most economical and further, such adjustments do not set up any stresses or strains that very often lead to early failure of more rigid installations.

Flexible lead bends are being installed to connect water closets to copper drainage lines in the 2,600 multiple bathroom, one-family homes development in Birchwood Park, Jericho, L. I., N. Y. At left is one of the 2,200—3-in. diameter, 8-in. by 12-in. lead bends in place and at right, one of the 4,400—3-in. diameter, 16-in. by 16-in. lead bends also installed.

Sheet Lead For Light Economical X-ray Shields



Construction method used for sheet lead X-ray shield in the new College of Medicine building at Ohio State University.

ONE of the functions of an X-ray shield is to contain or confine the dangerous rays emitted by the equipment. Since this depends to a large extent on the shielding material's density, lead, being the densest of the commonly available materials, is therefore most often used. Lead, surprisingly enough, is generally the lightest and most economical shielding material because it provides the greatest protection per unit of thickness.

In determining the necessary shield thickness for a specific installation, a number of factors must be considered. First and foremost is the rated voltage of the X-ray equipment and secondary considerations include the number of hours the equipment is operated each day, the distance between the X-ray source and the operator or other persons in the area, and scattered or secondary radiation given off by objects in the path of the X-ray beam. A more comprehensive treatment of this subject is included in a booklet entitled "Radiation Protection" available from the Association upon request.

There are any number of methods used to line X-ray rooms with sheet lead including prefabricated sections, such as lead bonded to plywood and wallboard or anchored in the center of concrete or gypsum blocks.

Another of the methods used is fabrication of the sheet lead lining on the job site such as was recently done by T. F. Pharham Co. of Cincinnati, Ohio, in the new College of Medicine building at Ohio State University, Garfield, Harris, Robinson and Shafer, Cleveland, Ohio, architects.

Construction involved the use of channel iron studs and horizontal steel members approximately one foot apart. The sheet lead weighing 6 lb. per sq. ft. was applied to the steel supporting frame, starting at the bottom, with the long dimension of the sheet running horizontally. The upper edge of the lead sheet was then folded around the horizontal steel support and tack welded on the back surface. Where the intersecting vertical steel supports prevented the lead from being folded, it was left standing running parallel to the vertical steel stud.

The second course was then applied in the same manner with the upper sheet lapping the lower sheet. Joints between horizontal sheets were also lapped. It is advisable to tack solder, or, as was done on this job, tack weld the laps on the face or X-ray side of the lead shield.

Before piping, electrical conduits, switch boxes or air vents penetrate the lead lining, they should be offset

Above, close-up of the back surface of the lead lining showing the method used to fasten the lining to the horizontal steel supports. At left and right are a back and front view of the same wall showing how the air vent and other utility boxes that pierce the lead lining are shielded.

Welding the joints between horizontal lead sheets. Note that the sheets are lapped.

as close to the outside of the lining as possible so that they can be backed with sheet lead of sufficient size so that the X-rays cannot pass through at any angle. A typical example of how this may be best accomplished is shown in the accompanying photographs.

In installing shielding for X-ray equipment, it is important that even the most minute opening exposed to the rays be protected. This would include such things as holes made with screws or nails, and cracks around doors or between floors and walls.

Lead Shielded Fork Lift Truck

THE increasing use of radioactive materials in industry is creating safety problems that are unique to say the least. This is particularly true of those plants equipped with irradiated material or the so-called "hot" laboratories.

In this new and complex field, many safeguards are necessary and have been developed, generally on the scene, to protect personnel from the dangerous gamma rays emitted by radioactive materials. All kinds of protective devices, from complicated remote control apparatus to simple containers, have been designed with this thought in mind.

One of the more unusual protective devices that have been developed is a lead shielded fork lift truck to transport "hot" bulky materials. Designed and fabricated by Convair, A Division of General Dynamics Corp., Fort Worth, Texas, the lead shielded truck is used by them to transport bulky items between the "hot" storage building and the irradiated materials laboratory.

Convair designed and fabricated this lead shielded truck for its own use and does not manufacture these vehicles for sale. The fork lift truck itself is a product of Towmotor, Inc., Cleveland, Ohio. Details of its shielding design and operation, however, may be of interest to those companies with a similar transportation problem.

The shielded fork-lift consists of a 2-in. lead shield supported on a framework of 2½-in. steel angles. The lead shield extends to the side and rear to form an enclosure around the operator. The shield is open at the rear. To accommodate the shield, the fork-lift required a minimum of alteration. The sloping floor plate support was removed and a horizontal sandwich, of lead covered with steel, was substituted. To retain the full back tilt of the lifting column, it was necessary to tilt the steering column back about 7 deg. No other changes in the original structure of the vehicle were required. The shield weight of 3,800 lb. reduced the useful load of the 6,000 lb. capacity "Towmotor" to 2,200 lb. Although the axle loading is the limiting factor in consideration of the permissible pay load, the lifting capability of the truck was not changed.

The shield has four viewing windows; two side and two front. The side windows are located so as to provide a slightly forward and downward view. The front windows are located to give both forward and downward view. To provide shielding equivalent to the 2 in. of lead, 6 in. of lead glass, specific gravity 3.3 covered with ¼ in. non-browning lime glass on the outside, and ¼-in. plate glass on the inside are used. The 6 in. thickness is obtained by use of two pieces, the outside piece is 4 in. and the inside piece is 2 in. thick. Koroseal gaskets and aluminum framework support the glass.

Lead-shielded fork lift truck with leaded glass viewing ports is used to transport radioactive materials within Convair's irradiated materials laboratory.

LIA26087

The steel work for one of Michigan's many highway bridges that are being protected against corrosion with red lead paints.

Michigan Specifies Red Lead For Highway Bridges

THE tremendous road building program just approved by the Federal Government will result, according to best estimates, in the construction and modernization of 40,000 miles of the Interstate Highway System. Expenditures will average almost 2½ billion dollars a year over the next 13 years, and according to the Bureau of Public Roads will require among other materials approximately 49 million tons of finished steel products. Slightly more than half of the total will be in structural shapes, much of which will be subject to atmospheric and soil corrosion. The selection of a coating to inhibit this corrosion is therefore of prime importance to highway engineers.

For almost a century, the standard protective coating for the protection of iron and steel against corrosion and rust has been red lead paint. Modern research in the light of today's exacting requirements has not only brought about improvements in red lead pigment and pure red lead paint but also has developed a variety of multiple pigment paints, containing red lead as the principal pigment, which are designed to meet specific conditions. While pure red lead and linseed oil paint gives outstanding service where there is ample time for drying, there are now available red lead paints which will meet exacting requirements for quick drying, low cost, light weight, salt or fresh water exposures, or other conditions as the formulator or specifier may desire.

It is this combination of past performance and modern research that has maintained red lead's superiority as a rust inhibitive paint pigment. As a result, it is preferred and used by a majority of the State Highway departments for primer and field coats on steel.

The Michigan highway department is one of the many that use red lead extensively. The specification used in this State for shop and field coats of paint for structural steel accompanies this article.

The accompanying photograph is an example of one of the many bridges that are being constructed in Michigan's highway program that will eventually total 3,100 miles of dual highways. On the average, these bridges will be about 100 ft. long and the steel in them will weigh around 100 tons each.

The shop coat for each of these bridges will require approximately 40 gal. of red lead primer paint which contains 18.5 lb. of dry red lead per gallon or 740 lb. per bridge. Because of red lead's low permeability to water and gases and high resistance to weather, a normal life of 10 to 12 years for the properly applied paint film can be expected in such applications.

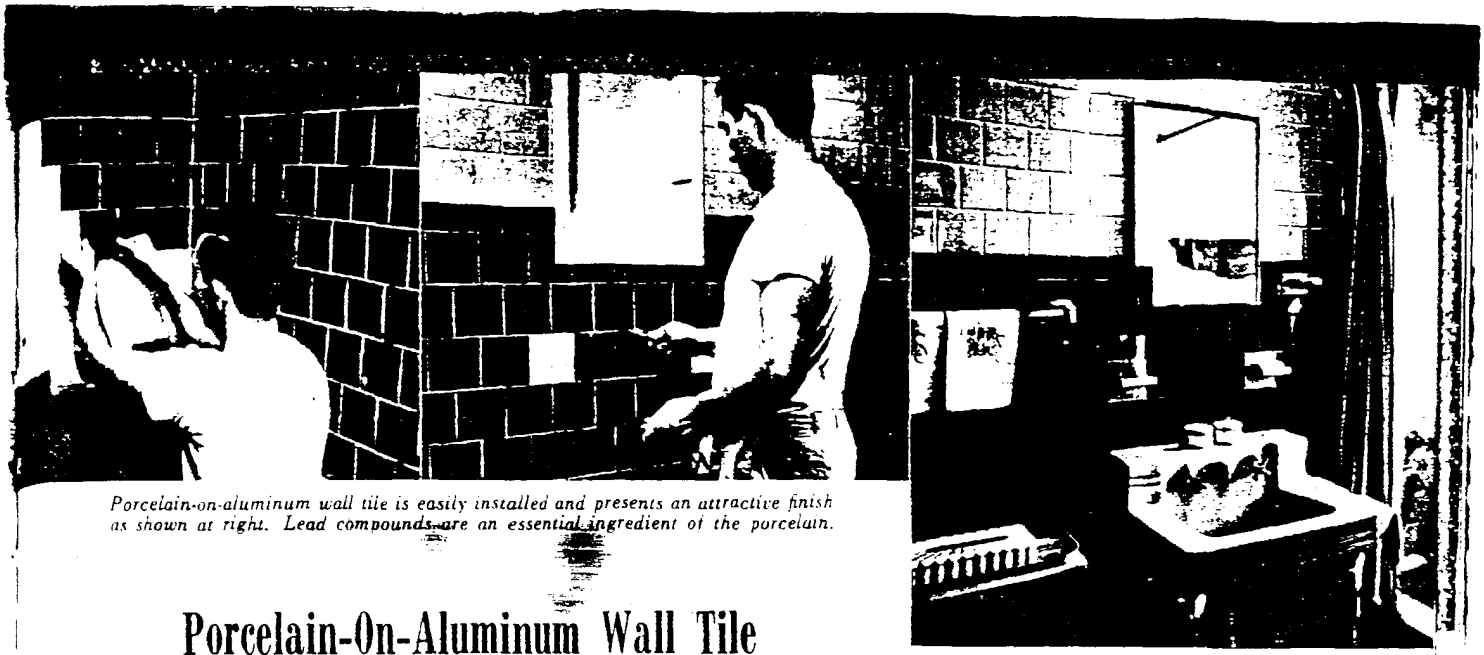
MICHIGAN STATE HIGHWAY SPECIFICATION No. 1

Red Oil Paint for Structural Steel, Shop Coat

PIGMENT	PERCENT
Red-Lead 97% grade	100
VEHICLE	
Raw Linseed Oil (ASTM D 234)	70
Kettle Bodied Linseed Oil (Q Body; Acid No. 6-7)	7
Turpentine (ASTM D 13)	18
Driers (Fed. Spec. TTD 651(a)	5

Pigment	76.5-78.5%
Vehicle	21.5-23.5%
Wt./Gal.	Not Less than 21 lb.
Dry. Time	18 hours.

The field coat, No. 2A, is a brown oil paint for structural steel. It is the same as Michigan State Highway Specification No. 1, except that it contains 98 percent red lead and not over 2 percent carbon black.



Porcelain-on-aluminum wall tile is easily installed and presents an attractive finish as shown at right. Lead compounds are an essential ingredient of the porcelain.

Porcelain-On-Aluminum Wall Tile

PORCELAIN-ON-ALUMINUM wall tile is a relatively new material for finishing the walls of bathrooms, kitchens and other places where a bright, clean, beautiful and durable surface is desired. Here for example is illustrated a bathroom in a summer home near Danbury, Conn. The color scheme is coral and dubonnet selected from the twelve beautiful colors offered by the manufacturer, Vikon Tile Corporation, Washington, N. J. In this instance, the ceiling, too, was tiled. The installation was made by The Fricker Tile Works, Danbury, Conn.

The porcelain-on-aluminum tile was applied over shellacked wall board using a mastic made for the purpose by the manufacturer. It is light to handle and install, weighing, with the mastic, only about 18 oz. per sq. ft. It is available in a pillow bevel, the cavity being 0.05 in., a space saver. The tiles used here were 4¼ x 4¼ in., although 4¼ x 8½ in. and 8½ x 8½ in., as well as trim tile and necessary special shapes are also available.

This tile is stamped from aluminum 0.025 in. thick. The porcelain enamel is applied on both sides, 0.003 in. thick on the face and 0.002 in. on the back. Lead compounds are an ingredient of the enamels in substantial percentages. They help to make a porcelain enamel that can be fired onto the aluminum at the low temperatures necessary, that is tenaciously adherent, that has a lustrous gloss, the right coefficient of expansion, and that is highly resistant to soaps, detergents, fruit juices, and other substances commonly found around a house. The enamel can be struck a hard blow without chipping and this tile is not subject to cracking.

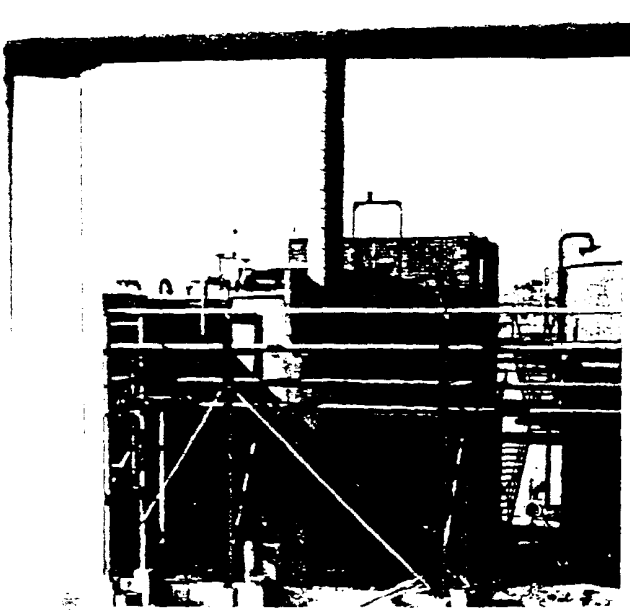
All in all, this new product, in which lead plays such an important part, is finding a useful place in the schemes of home owners, architects and builders. Likewise, lead compounds are finding new usefulness in ceramics of all kinds for their fluxing ability, index of refraction, electrical properties and many other qualities.

Lead In Tall Oil Manufacture

Welder applying sheet lead to baffle assembly used to promote turbulent mixing of soap, steam and other chemical reactants.

ALMOST as diverse as the products it helps produce, lead in its applications scores again. Tall oil, the name derived from the Swedish tallolja (literally "pine oil") identifies the natural mixture of rosin and fatty acids obtained by acidifying the black liquor skimmings of the alkaline paper pulp industry. The Rome Kraft Co., Rome, Ga., has recently completed a tall oil manufacturing installation making extensive use of lead acid tank linings. As always, the superior acid-handling features of lead dictated its use. Details of manufacture and purification of tall oil are trade secrets but it suffices to say that acid treatment involves addition of sulphuric acid in carefully controlled concentrations to produce the natural mixtures of rosin acids related to abeietic acid and of fatty acids related to oleic acid together with nonacidic bodies.

Uses for tall oil and its derivatives run the spectrum, including the preparation of adhesives, asphalt emulsions, binders, coil oils, detergents, driers, drying oils, emulsifiers, flotation agents, greases, linoleum, penetrating oils, printing inks, resins, rub-



Lead-lined reaction tank where paper mill sulphate soap is acidified to produce crude tall oil.

ber chemicals, soaps, textile oils, varnishes and wetting agents. Of these, the most important and rapidly growing uses are in the preparation of esters for use in drying oils; additives for lubricants such as extreme pressure greases and cutting oils; hydraulic fluids; surfactants such as wetting agents, and emulsifying and demulsifying agents; plasticizers and resins. And if this were not enough, together with phthalic or maleic acids and polyhydric alcohols, especially pentarythritols, tall oil esters form alkyd resins of superior weather resistant properties.

Fortunately, recent and continuous expansion in alkaline pulping of resinous woods especially in the southern United States assures plentiful supply of this versatile material which in some part owes its existence to lead.

The following articles and reprints contain information, drawings and specifications on the use of lead products helpful to architects, engineers and others interested. They are available, free of charge, except where otherwise indicated, upon request to the LEAD INDUSTRIES ASSOCIATION, 60 EAST 42nd STREET, NEW YORK 17, N. Y.

MATERIALS OF CHEMICAL CONSTRUCTION ANNUAL REVIEWS — LEAD AND LEAD ALLOYS

Up-to-date reports on new developments in the uses of lead and lead alloys in chemical construction including research progress, engineering applications, and technological advancements. With bibliography. 1956, 1955 and 1954 reviews (editions are not cumulative) available. Reprinted from "Industrial and Engineering Chemistry," September, 1956, October, 1955, and October, 1954.

LEAD REFERENCE SHEET (Parts 1 & 2)

A short outline of the types, grades, and chemical and physical properties of lead in chemical construction, with a summary of the corrosion characteristics of lead in use with a large number of common chemicals and solutions used in various industries. Reprinted from "Chemical Engineering Progress," January and February, 1955.

INSPECTING AND TESTING LEAD LININGS

Methods of testing and inspecting sheet lead linings and bonded lead linings used in the chemical process industries are described. Reprinted from "Non-Destructive Testing," January-February, 1956.

BEST DESIGNS FOR LEAD INSTALLATIONS

A special report on the applications of lead and lead alloys in the chemical and metallurgical industries. Recommended practice for joining lead sheets, and the construction of wood stave tanks, launders, towers and flues where lead is involved are included. Reprinted from "Chemical Engineering," March, April and May, 1956.

PORTABLE RADIATION-SHIELDING MATERIALS

A special report on commercially available shielding forms that can be used to build readily assembled, hand stacked shielding walls. Prepared by the editors of "Nucleonics," Mar., 1955.

LEAD IN MODERN INDUSTRY

$1.50 Postpaid

A fully illustrated, 230 page, cloth bound book describing all phases of the production and use of lead, lead alloys and lead compounds.

LEAD WORK FOR MODERN PLUMBING

$1.50 Postpaid, $1.00 per copy in quantities of 10 or more

Profusely illustrated with over 140 photographs and drawings, this textbook presents clearly to the plumbing student the necessary tools, procedures and the methods required for lead work.

LEAD BUILDING CONSTRUCTION BULLETINS

A series of specifications for the use of lead in building construction. (Available separately.)

BULLETIN NO. 1

Specification for Lead Waste Connections for Plumbing Fixtures with Integral Traps (Water Closets—Pedestal Urinals—Service Sinks).

BULLETIN NO. 2

Specification for Lead Shower and Safe Pans.

SUGGESTED SPECIFICATIONS FOR CHEMICAL LABORATORY DRAINAGE SYSTEM

A complete guide to the selection and installation of drainage systems in chemical laboratories. Includes laboratory waste and vent piping, traps, sinks, acid trays, troughs, safe pans, neutralizing basins and other topics.

LEAD IN MODERN PLUMBING— WHY, WHERE, HOW IT IS USED

A 24 page booklet containing descriptive information as well as four pages of detailed drawings for plumbing installations in various type houses.

LEAD WELDING

An informative as well as practical guide to lead welding. Reprinted from the "Welding Handbook, Third Edition" published by the American Welding Society.

LEAD FLASHINGS IN MODERN CONSTRUCTION

Lead flashings as used in an ultramodern house in Randolph, Vt. Reprinted from "National Roofer," October, 1954.

THE STORY OF LEAD — MATERIALS THE RAILROADS BUY (Parts 1 and 2)

Lead from mine to finished product with special reference to its uses by the railroads. Reprinted from "Railway Purchases and Stores," December, 1954 and February, 1955.

RED LEAD TECHNICAL LETTERS

A series of technical letters containing red lead paint formulations. (Available separately.)

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

Technical Letter No. 5 — Red Lead Vinyl and Coumarone Type Paints

Technical Letter No. 6 — Red Lead Paint Formulations

Technical Letter No. 7—Paint Systems for Hydraulic Structures

Technical Letter No. 8—Primers for Railroad Structures and Rolling Stock

Technical Letter No. 9—Red Lead Paints for Galvanized Steel, Rusted, Weathered or Treated New

Technical Letter No. 10 — L.I.A. Formula 3-7, A Red Lead-Alkyd Vehicle Primer for Industrial and Marine Environments.

Technical Letter No. 11 — Recommended Surface Preparation of Steel for Red Lead Paints.

FEDERAL SPECIFICATION TT-P-86a Paint: Red-Lead-Base, Ready-Mixed

Covers four types of red-lead-base paints including two fast-drying formulations. Many intended applications listed.

PAINT GALVANIZED SURFACES?

Why galvanized surfaces should be painted, the kind of pretreatment that should be given, and the correct painting systems are discussed. Reprinted from "Factory Management and Maintenance," April, 1956.

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