All-Lead UNIT PLUMBING
A Forward Step In Construction Methods

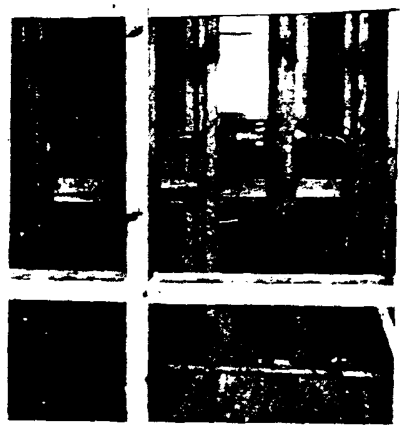
THERE is a growing conviction among the members of the building industry that one of the means of speeding up building and reducing costs will be the use of unit construction of sub-assemblies. This practice can be adapted to many phases of building construction and actual examples of its usefulness are already appearing to demonstrate the ingenuity of the men of the building industry.

Of particular interest is the adaptation of lead plumbing to unit construction, an example of which, illustrated in our November-December, 1945 issue, showed the entire all-lead roughing in for a complete bath room, shop constructed, ready to be set in place. Two additional examples from a different city are shown herewith which illustrate a different but equally successful application of the idea of unit plumbing. In these installations the all-lead under floor assembly was constructed complete on the bench and the lead stack and vent unit was wiped in place on the job. This procedure provides supports for the entire assembly in the form of flange joints at the floor plate.

The procedure in utilizing the advantages of all-lead unit plumbing may be varied to suit the individual job or to coordinate the work of the plumber with that of other trades. Whatever method is used there are numerous advantages to be gained. The overall speed of building construction can be accelerated because the plumbers' work is done largely in the shop where it is accessible and working conditions are of the best. Also the use of a single material eliminates the necessity of assembling a number of dissimilar items, some of which may be scarce or hard to obtain. The work is assembled with a minimum of joints since changes of direction are made with bends instead of fittings. What joints are required actually bond the parts together into a single unit which cannot loosen.

In addition the flexibility of lead permits movement or settling to occur without damaging piping or plumbing fixtures. Lead pipe has a smooth bore which does not easily become clogged. It is extremely durable and is therefore almost universally accepted by city and state plumbing codes.

On single installations Unit Plumbing can provide the advantages of all-lead plumbing at costs which do not exceed those of other construction methods. In cases where the identical bathroom arrangements are to be used in several locations, substantial savings should be possible through the use of assembly jigs. In either case construction time can be saved and confusion on the job avoided. The use of all-lead unit plumbing has definitely proved its worth as a time and money saver.

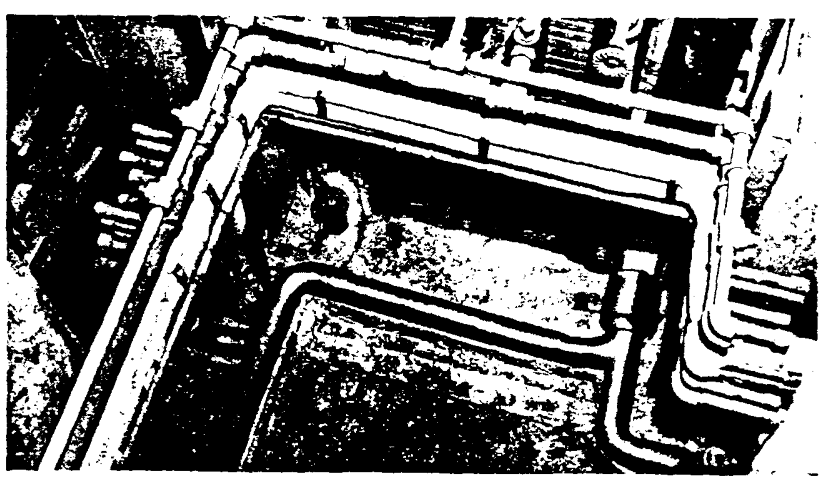


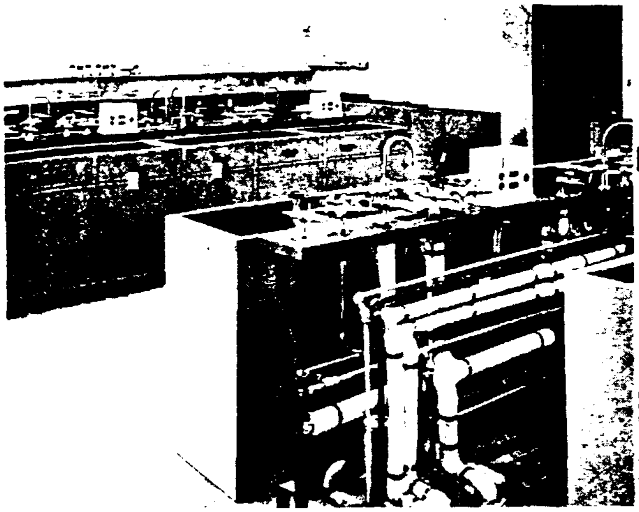
Another all-lead Unit Plumbing installation showing clean appearance as well as space saving.

All Laboratory Waste Lines of Lead Pipe In Firestone Research Building

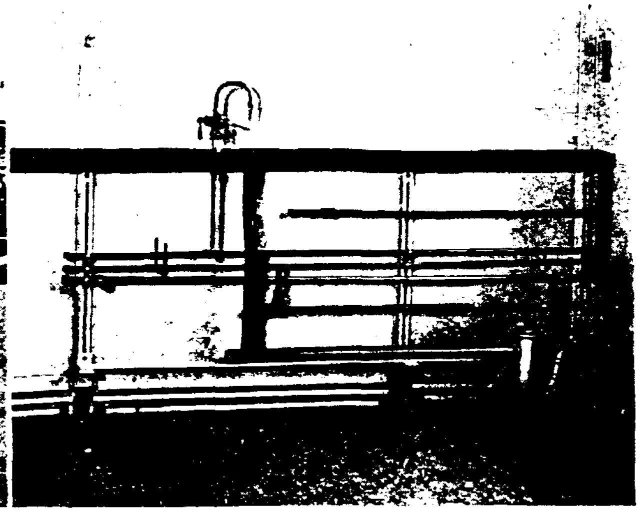
THE prime requisites of the materials used in the drainage system of a laboratory are durability under rigorous conditions of exposure and adaptability to fabrication practices which facilitate installation in connection with other equipment. Lead possesses these two attributes in combination to a remarkable degree. Lead is highly resistant to corrosive action of practically all of the active chemicals which enter laboratory waste lines and because it is flexible it can be formed to fit into spaces where rigid materials cannot conveniently be applied. In addition because lead is easily welded, all lines can be continuous of this most corrosion resistant metal without gaskets, sleeves or packings of other materials.

View of pipe shaft showing the 3-in. lead drain manifold at floor slab level.





Island tables in laboratory showing lead trap discharging into lead drain in floor trench.



Wall service cabinet showing lead waste and lead trap discharging directly into drain in pipe shaft.

Voorhies, Walker, Foley and Smith, Architects of the recently completed research laboratory for the Firestone Tire and Rubber Co. at Akron, Ohio, have taken full advantage of the workability of lead while making use of its corrosion resistant properties in the laboratory drains. A skillfully planned arrangement of floor trenches on 12-ft. centers connecting with pipe shafts at the column locations on 24-ft. centers provides means to bring a full complement of services such as gas, water, electricity, steam, air vacuum, etc., within a few feet of any location in the laboratory area. This arrangement combined with a system of movable steel partitions provides the completely flexible floor plan so necessary to an active laboratory.

All services including the waste stack are provided in the pipe shafts. At laboratory floor slab levels each shaft is traversed on three sides by a 3 in. lead drain connected to the stack and having stubs looking out at the floor trench locations which radiate from the shaft. These stubs provide connections for lead drains from sinks as required when the individual laboratories are fitted up.

In many cases laboratory arrangements make possible the location of service outlets in narrow cabinets along the walls, in which case the drains serve small basins under the water goosenecks. These drains are of 1½-in. lead pipe connected to drum traps which are in turn connected directly to the stubs above mentioned. Where island tables are required all sinks and basin wastes are served by a lead waste and a lead drum trap in the cabinet under the table. The trap discharges into a lead waste line which runs in the nearest pipe trench to the stub at the pipe shaft.

All lead pipe used in the laboratory drainage system is Class 100 (AAA or XXS) weight. All joints are welded so that no metal other than lead is exposed to the attack of any corrosive liquids or gases which may be introduced into the drainage system. Continuous support is provided for horizontal runs in the form of steel channels bolted to the cabinet structure. All of the leadwork was done by the plumbing contractor, Spohn Heating and Ventilating Co. of Cleveland, Ohio.

Lead Water Services Reconnected to New Main Along Entire Block of New York Street

A RECENT change in the water main on 39th Street between Second and Third Avenues in New York City necessitated the extension of some forty lead water services to connect with the new 12-in. line which replaced the old 6-in. line. The new line was laid and all tappings made before the pressure was applied, leaving the plumbers free to handle the change-overs with a minimum of inconvenience to the property occupants.

This is one of the older sections of the city occupied largely by typical brownstone residences. Most of the services have been in place for many years but in the case of the smaller service lines the extension was accomplished by merely wiping a new section of lead pipe to the old water service and to a new corporation union. The existing services were in excellent condition and in spite of their age showed no indication of corrosion damage or other weakness.

The larger services were renewed from the curb stop to the corporation stop which called for the use of unions wiped on to both ends of the new lead pipe. In the case of these large lines, 13 of which were 2-in. and two were 1½-in., the flexibility of the lead pipe simplified the manipulation of the connection as well as provided future protection against breakage by settling or other movement. All of the lead pipe used on this project was Class 75 (AA or XS), as designated by the new Federal Specification WW-P-325.

The use of lead service pipe is ex-

tensive throughout the city of New York. The wisdom of this practice is demonstrated by the fact that all of the old lead lines involved in this large group of changeovers were, without exception, in perfect condition and were easily extended by merely attaching new sections of lead pipe.

Flexibility of 2-in. lead water service pipe facilitated facing up the union connection being tightened by the workman.

Extending these 1½-in. and ¾-in. service lines required only wiping on short length of lead pipe.

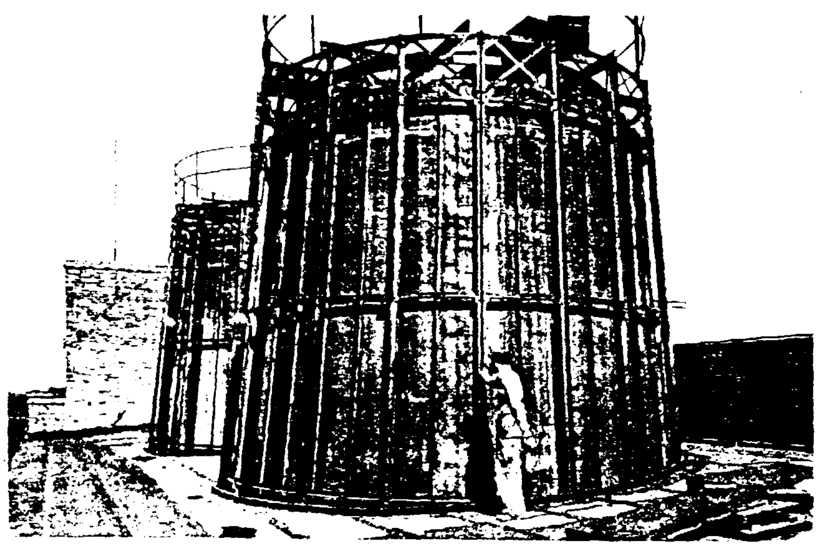
Two Lead Towers of Mills-Packard Design In Modernization Of Detroit Sulphuric Acid Plant

TWO new Mills-Packard water-cooled chambers for the production of sulphuric acid have recently been placed in operation in the plant of the Detroit Chemical Works, Detroit, Mich. These two new frustoconical shaped chambers are of lead and steel construction and are replacing three of the six conventional box chambers with which the plant was originally equipped. Despite the reduction in the number of chambers, the company expects production of 60 deg. Baumé sulphuric acid to be increased rather than decreased due to the greater efficiency of the Mills-Packard water cooled chambers. Andrew M. Fairlie, consulting chemical engineer of Atlanta, Ga., designed the installation. Mr. Fairlie is considered one of the foremost authorities on sulphuric acid-plant construction and operation and was the designer of the worlds largest Mills - Packard acid plant located 11 miles southeast of Tampa, Fla.*

The chambers just completed at the plant of the Detroit Chemical Works are 50 ft. high with a diameter of 28 ft. at the bottom and 18 ft. at the top constructed of lead supported by a free standing steel structure. Lead, because of its ability to withstand successfully the corrosive action of the acid, is the only material to come in contact with the chemical. The steel framework, erected first, consists of upright T bars approximately 5 ft. on center at the base set parallel to the slope of the chamber walls with circumferential spacer angles at vertical intervals of 7 ft. Attached to the angles are steel links to support clamping strips which will be bolted over lead fins burned to the chamber walls extending from bottom to top.

As steel work proceeds, the lead burner (in this case Ross Anderson of Columbus, Ohio) prepares the lead sheets for erection. The lead sheets used for the side walls are tapered in width to conform with the decreasing diameter of the chamber with increase in height. Due to the greater corrosiveness of the acid at the bottom of the chamber heavier weights of sheet lead are used for the chamber pans then for the chamber walls or curtains. The bottom and lower 12-inches

The new Mills-Packard water cooled sulphuric acid chambers protecting through the roof of the chamber building of the Detroit Chemical Works, Detroit, Michigan.



* See Chemical and Metallurgical Engineering, September, 1943.

One of the 40-year old box chambers still in operation. Compare meagre supports with the method used on the new type chamber in picture at right.

View at bottom of Mills-Packard chamber showing method used to support lead walls. Note the lead fins stiffened with steel straps and attached to steel structure with links.

of the pan wall are made of 12-lb. lead, and the upper 12-inches of pan wall is of 9-lb. lead. The chamber curtain or side wall is of 7-lb. lead, which weight continues from the top of the pan wall to the top of the chamber. The three weights of lead (12-lb., 9-lb. and 7-lb.) are rolled at the lead mill as a continuous sheet about 50 feet long.

Sheet lead "fins," mentioned above, approximately 3-in. wide are then burned at right angles to the outer face of the lead side walls running from top to bottom. These are spaced to conform with the position of the links on the steel work. When the prepared lead sheet is hoisted to its proper position the sheet lead fins, made rigid by narrow steel clamping bars bolted to both sides are, in turn, bolted to the steel links. The individual lead sheets forming the chamber are lap jointed vertically and burned together in place. The top of the chamber is supported in essentially the same manner as the side walls. This method of construction allows a certain amount of movement of the lead independent of the steel frame.

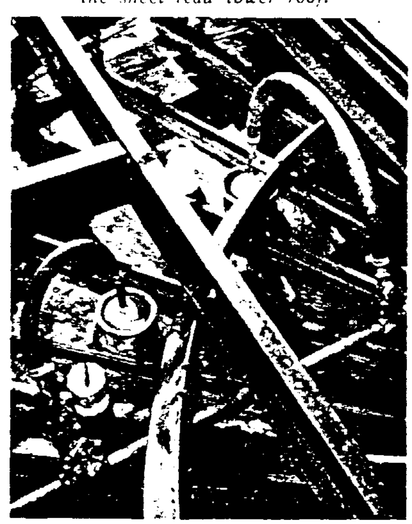
The sulphuric acid is discharged into the lead "boot" at lower left whence it is conveyed to storage tanks. The testing station and all equipment including cups and even the floor are of lead.

A fine spray of water necessary for the production of the acid is introduced into the chambers through atomizers inserted into luted openings called "lutes" in the top of the chamber. Each lute is made of two concentric lead upstands, one inside the other, and when not in use the lead nozzle can be taken out and a lead cover or "lute cap" placed over the opening.

The SO_2 gas, which enters the chamber at about 210 deg. F., is cooled to 170 to 190 deg. F. by means of water flowing down around the outside of the chamber. The flow of water evenly around the chamber is controlled by a circular sheet lead box, centered on the chamber top. The water runs continuously into the box, the upper edge of which is serrated. The serrations can easily be bent by hand to allow more or less water in any one direction. There is also a serrated gutter of sheet lead encircling the outer edge of the chamber at its top, this gutter further controlling the even distribution of the water.

The box chambers which were replaced by the Mills-Packard chambers had withstood the attack of sulphuric acid for a period of 40 years. This

Detail on top of a Mills-Packard chamber. The atomizers for water spray are shown in place in the "lutes." The lead "lute caps" stand beside them on the sheet lead tower roof.



excellent service was given despite the fact that they were not as well supported as the Mills-Packard chambers nor were they equipped with any cooling devices and therefore operated at higher temperatures. However, the company found that with the new type chambers production could be increased and both floor space and quantity of lead required per ton of acid per day could be reduced. The smaller ratio of chamber space to acid production per day would indicate that the new equipment operates more efficiently and more economically.

Lead Adds Brilliance to Fine Glassware

THE art of making fine glassware has for centuries been regarded as one of the most honored crafts, but until George Ravenscroft in 1676 successfully produced lead glass the maximum possibilities of the glassmakers art could not be realized. Ravenscroft discovered that by substituting lead for lime in the mix he could produce a glass of great clarity and brilliance which had vastly improved working qualities. Less than a dozen examples of the work of this great master survive today but the makers of fine glassware continue to benefit by his discovery of the properties imparted to glass by the addition of lead.

Fine glassware or "crystal" glass should be absolutely transparent, colorless and free of imperfections. Only by the use of lead and through the utmost care in manufacture can these qualities be achieved. Such glass is heavy, durable, absolutely transparent and so highly refractive that it seems to be alive with light. It rings like a bell when struck lightly with a pencil.

The lead in the form of lead oxide (litharge) is mixed with sand, potash and cullet (broken glass) in a dry state and melted in specially prepared clay pots. The glass is worked at a temperature of about 1800 deg. F. It is a thick viscous fluid, incandescent red in color, which is dipped from the pot in a glowing blob on the end of a blowpipe. It is fashioned into graceful glittering shapes by skilled workmen using a few simple tools. As it cools it loses its incandescence and assumes the colorless brilliance for which the lead content is responsible.

A lead glass goblet by George Ravenscroft (circa 1676), the only one of the seven known signed pieces which is in the United States. Now in the collection of the Steuben Glass Co.

As in the days of Ravenscroft fine glassware is still made by individual skilled craftsmen to the designs of trained artists. The modern pieces shown on this page are from the studios of Steuben Glass, a subsidiary of Corning Glass Co. of Corning, New York. This company maintains a staff of creative artists headed by John Montieth Gates, an architect, and Sidney Waugh, a sculptor, as well as a group of highly skilled workmen.

Fine glassware has long had an important place in the American scene. The cut glass of grandmother's day owed its brilliance and clarity to its lead content. The most beautiful tableware and decorative glass of today likewise owes much of its lustre and transparency to the high proportion of lead used in its composition.

A table service of lead glass stemware. Only by including lead in the composition of the glass can such clarity and brilliance be achieved.

The Gazelle Bowl designed by Sidney Waugh, now in the Metropolitan Museum of Art. The delicate sculpture is carved in the glass by hand using abrasives on copper wheels.

DAYTON SNYDER

The Clapp House built in 1789 is reputed to be the oldest house in Wiscasset. The white lead painted walls are a pleasing background for the luxuriant lilac bushes which give the house its name of "Lilac Cottage."

The Lee-Smith house, built in 1792 by Judge Silas Lee and acquired in 1831 by Governor Samuel E. Smith. The exceptionally fine woodwork of cornices and balustrades has been perfectly preserved by pure white lead paint.

Ledges Inn, built in 1845, carries the tradition of fine workmanship well into the 19th century. It has also carried the tradition of the best painting practice up to the actual present. It is today protected by pure white lead paint.

A Portfolio of American Landmarks

No. 35

Wood Built Houses In Wiscasset, Maine

WISCASSET, Maine, incorporated in 1760, had grown into a moderately prosperous community by the beginning of the 19th century through the export of forest products. During the Napoleonic Wars, however, Wiscasset was an important shipping point for the trade which was carried on with the belligerant countries under the neutral United States flag and the early eighteen hundreds were years of great prosperity for the town.

The landmarks shown on this page represent substantial early Wiscasset as well as the wealthy prosperous days of the shipping boom. The Clapp house, now known as "Lilac Cottage," is a charming but plain utilitarian home characteristic of the thrifty hard-working New England merchant of the early days. The Lee-Smith house and Ledges Inn are both more pretentious and show evidences that their owners had expensive tastes and also had the money to gratify them.

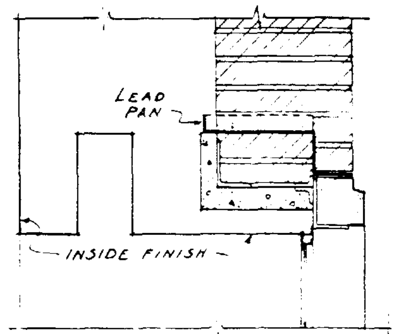
All of these houses, the plain as well as the ornate, have been kept in excellent repair by owners who fully appreciate the importance of their architectural treasures. They are all still under the protection of pure white lead paint which has played an important part in preserving so many of the Landmarks of American Architecture.

THIS IS NO. 35 OF A SERIES REPRESENTATIVE OF THE MANY AMERICAN LANDMARKS IN VARIOUS SECTIONS OF THE COUNTRY THAT ARE PRESERVED FOR THE FUTURE WITH PURE WHITE LEAD AND OIL PAINT. MANY OF THEM HAVE ALWAYS BEEN PROTECTED WITH THIS RELIABLE MATERIAL ACCORDING TO AVAILABLE RECORDS.

Sheet Lead Pan Lintel Flashings Protect Interior Finish From Wall Leakage

A PRACTICAL solution to the ever present problem of protection of inside window heads from wall leakage is used in the Firestone Research Laboratories building in Akron, Ohio. This detail, which could be used in any building where the interior finish is not applied directly to the exterior wall construction consists of a sheet lead pan set directly over the structural lintel and extending slightly past the inside face of the wall so that the upstanding lip of the pan is free of the wall surface. The outer edge of the pan is turned down over the lintel and extends to the outer face of the wall. The pan extends well over the ends of the lintel. Weep holes are provided by building greased rubber tubing into the first masonry joint on top of the pan. This tubing is pulled out after the mortar has set and the exposed joint between lead and architectural lintel is sealed with calking compound.

This detail from the office of Voorhies, Walker, Foley and Smith has proved to be satisfactory in a number of other installations and it was used throughout on the windows of the laboratory building. The construction of the pan is simple and requires no soldering since the corners can be formed by folding. The "pig ears" or folded corners can be turned on the ends where they will be held in place by the abutting masonry. Since some



Section through window head showing lead pan flashing extending back to receive possible leakage from wall above.

cement mortars are slow to carbonate completely and may therefore, for an appreciable time, create a corrosive condition, the pan should be given a heavy coat of asphalt paint before being covered with masonry.

This simple and inexpensive application of sheet lead will provide positive disposal of any water that may leak through the wall at any point above the window and eliminate the hazard of damage to blinds or drapes.

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.

RED LEAD FOR STRUCTURAL WORK
By Dr. L. L. Carrick, Director, Red Lead Research, Lead Industries Association
A discussion of the rust inhibitive qualities of red lead paint and the best means of making use of those qualities for the protection of structural metal. Reprinted from *Engineering News Record*, April 6, 1943.

LEAD CARRIES ITS WEIGHT
By Fred P. Peters
An interesting resume of many of the long established uses of lead plus information on a number of recently developed adaptations of the properties of lead to special purposes. Reprinted from *Scientific American*, June, 1944.

STAMFORD'S DOUBLE LIFETIME HOME
A complete analysis of hard lead flashing, white lead paint, lead plumbing, plywood and red cedar Certigrade shingle details and installation methods. Reprinted from *American Builder*, July, 1939.

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*

STOP DEMON RUST
Leaflet giving concise, simple instructions in the use of the rust preventing qualities of Red Lead Paint in protecting farm machinery.

FEDERAL SPECIFICATION WW-P-325
For Pipe, Bends and Traps, LEAD
Part 5 of Section IV of the Federal Standard Stock Catalog, official publication by the Government Printing Office.

LEAD EQUIPMENT USED IN INDUSTRY
By F. E. Wormser, Secretary of Lead Industries Association
A summary of the uses of lead in the production and handling of corrosive chemicals. Reprinted from "Metal Progress" to be included in the next edition of *American Society for Metals Handbook*.

NEW LEAD COATING PROCESS ELIMINATES USE OF ZINC ALLOYS
By W. Yonkman, Engineer, Western Electric Co.
A description of a successful hot dip lead coating process with complete instructions for changing over from hot dip galvanizing using the same equipment. Reprinted from *Product Engineering*, May, 1944.

COMMERCIAL STANDARDS:
Calking Lead, CS94-41
Lead Pipe, CS-95-41
Lead Traps and Bends, CS96-41
Official publications by the Government Printing Office of the above Commercial Standards as promulgated by the U. S. Department of Commerce through the National Bureau of Standards, effective June 25, 1941.

LEAD COATINGS ON STEEL
By Harold A. Knight, News Editor, Metals and Alloys
A thorough discussion of hot dip and electroplated coatings on steel sheet, wire and fabricated products including the technique of application, thickness of coatings, uses and advantages. Reprinted from the November, 1944 issue of *Metals and Alloys*.

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 giving methods of and graphs for computing required thickness of barriers, based on tube current and distance as well as tube voltage. Reprinted from *Industrial Radiography* Vol. IV, No. 2, Fall, 1945.

LEAD X-RAY SHIELDING
Graphic chart based on recommendations of the International Commission on X-Ray and Radium Protection giving thicknesses of lead for respective voltages in millimeters, inches and pounds per square foot.

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