

LEAD

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One of many barns painted with white lead, built by the Farm Security Administration.

COURTESY FARM SECURITY ADMINISTRATION

LEAD INDUSTRIES ASSOCIATION

Graybar Building • 420 Lexington Avenue • New York



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Improved Machinability Claimed for Lead-Bearing Steel

THE recent development of Ledloy, new lead bearing, free cutting, open hearth steel, marks another forward step in the progress of the steel and metal working industries. For years the development of a material combining the good qualities of open hearth steel, with the economy of easy machinability, has puzzled industry. Ledloy 1120, according to reports, has solved this problem, improving machinability from 30 to 60 per cent over standard SAE 1120, and machines more easily, even, than high sulphur Bessemer screw stock (SAE-X1112).

Ledloy is the Inland Steel Company's copyrighted name for steel of any composition which has been alloyed with lead and in which the lead is uniformly dispersed. According to the manufacturers, the lead is usually added in amounts from .15 to .30 per cent by a special process which assures the uniform distribution of the lead throughout the steel. By this process, the state of dispersion is so fine that the lead can not be seen under a microscope and has no effect on the physical properties of the steel, but greatly increases the machining rate. Within the limits of accuracy in testing, the strength, ductility and resistance to impact are apparently unchanged by the addition of lead.

The improved machinability claimed for lead-bearing steel is reported in figures, shown in Table 2, based on actual production runs on cold-finished Ledloy by leading cold drawing companies.

Cold drawn Ledloy machines, it is

TABLE 1—REPORTED PHYSICAL PROPERTIES OF LEDLOY

	Yield Strength lbs. per sq. in.	Ultimate strength	Elong. 2 in.	Per cent red. area	Charpy impact ft. lbs.
Regular SAE 1120...	43,300	61,790	37.2	65.1	36.4
Ledloy 1120.....	44,080	62,280	36.5	63.7	35.0
(In the natural hot rolled condition)					
Regular SAE 1045...	61,550	94,350	28.5	50.6	22.8
Ledloy 1045.....	64,750	97,900	28.5	52.0	23.8

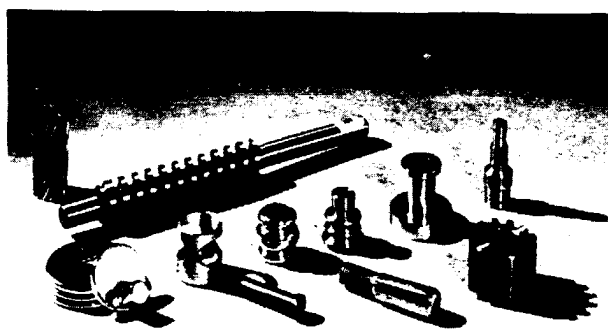
reported, more rapidly than .35 per cent carbon screw stock SAE X1335. Also, according to tests, the improved machinability on the addition of lead is not confined to regular or cold drawn screw stock, but increased production can be obtained with higher carbon grades, as shown in Table 3.

It is further claimed that tool life is increased from 50 to 200 per cent with Ledloy, despite the increased machining speeds permitted, and that it may also be carburized and treated similarly to ordinary carbon steel.

The presence of lead has no effect on the "normality" of the steel and full case hardness and tough, durable cores are developed by heat treatment. In welding, the strength and ductility of the welds are apparently not affected by the addition of lead. Also, Inland Ledloy forges the same as other steel of similar analysis. It fills the dies well and gives clean, sharp impressions with flash that is easily trimmed, another quality of advantage in many of the uses to which this new steel may be put.

TABLE 2—MACHINABILITY

	Time per Part
Case 1: Form, thread, drill, ream and chamfer.	
High sulphur Bessemer screw stock (SAE-X1112)	43 seconds
Ledloy 1120	33 "
(Increased production 29.4 per cent.)	
Case 2: Form, drill, knurl and chamfer.	
High sulphur Bessemer screw stock (SAE-X1112)	9 "
Ledloy 1120	6.7 "
(Increased production 34.3 per cent.)	
Case 3: Box mill, center, tap, form, cut-off.	
High sulphur Bessemer screw stock (SAE-X1112)	80 "
Ledloy 1120	60 "
(Increased production 33.3 per cent.)	
Increase in tool life	more than 200 per cent.



Typical parts which benefit in machining by using leaded steel

COURTESY INLAND STEEL CO.

TABLE 3

Time per Part		
SAE 1045	68 seconds	Both samples oil quenched and drawn at 1000° F.
Ledloy 1045	51 "	
(Increased production 33.3 per cent.)		
SAE 1085	72 seconds	Both samples annealed.
Ledloy 1085	56 "	
(Increased production 28.6 per cent.)		

Lead Plumbing Proved Best in San Diego Hospital



San Diego County Hospital. The old buildings at the left have lead plumbing that has never given trouble, while the new buildings, at right, have had trouble with newer plumbing that is not lead

A STRIKING example of the serviceability and long-time economy of lead plumbing is given by the San Diego County Hospital, San Diego, Cal. The original buildings of this hospital were constructed 32 years ago. All wastes, traps, toilet bends and vents in these buildings are lead. Water services and supplies are also lead. All the original lead plumbing is still in service and has never given any trouble to date.

New additions to the hospital were built in 1928. The plumbing in the new group is not lead, nor are the water services and supplies. In this

unit, despite only 10 years of service, the plumbing has given continuous trouble and requires constant repairs.

Durability and freedom from trouble are important factors for architects to consider when specifying plumbing materials. In this respect, rarely does such a direct comparison come to light wherein two systems of plumbing are installed in the same group of buildings under similar conditions. It gives conclusive evidence



that in the long run lead is more economical and less subject to stoppage or corrosion that may result in unsanitary or troublesome conditions for architects' clients.

It is only natural that lead pipe should give better service. It has thick walls made of the most durable common metal. Its flexibility takes care of ground and building settlement without damage or strain to pipe or joints. It does not clog with corrosion product or discolor water, and the smooth inner bore of both pipe and joints minimize danger of stoppages resulting from lint, hair, or other solids in the water. Its advantages are many and the San Diego County Hospital plumbing brings them out admirably. Such excellent service means much to the public and is of great benefit to architects specifying lead plumbing. They are assured of durable, trouble-free installations that bring good will and increased business. We are indebted to Gordon Taylor, business manager and superintendent of the hospital, for the facts about its plumbing.

Lead Makes Durable, Non-Staining Chimney Flashing

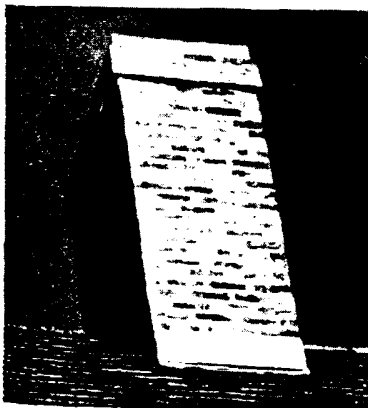
ONE of the important advantages of lead for flashing and other sheet metal applications is the fact that it does not discolor adjacent materials. Rainwater running down the lead does not take into solution compounds which produce permanent, unsightly stains on paint, brick, stucco,

and other building materials. Even the most perfectly designed home may soon appear tacky and unattractive due to such staining.

This possibility has been definitely ruled out by flashing with lead the chimneys of the Long Island residence shown in the photographs. The flash-

ing was installed according to the standard practice for fine lead work, as described in LEAD, July, 1938.

Thus, this home, designed by Frank C. Farley, of New York, is assured of permanent, water-tight joints at the chimney intersections, at the same time eliminating ugly discoloration.

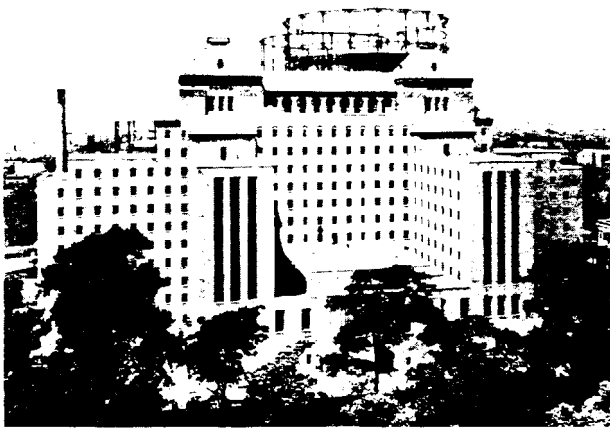


Close-up view of lead chimney flashing

General view of Long Island home where chimneys were flashed with non-staining lead



Many Applications of Fine Lead



View of the new Nurse's Home at the Kings County Hospital, which incorporates many applications of lead work.

FINE lead work is an outstanding feature of the new Nurse's Home recently completed as part of the Kings County Hospital, Brooklyn, N. Y. This hospital, erected in 1932, incorporates in its design some of the largest and finest examples of modern architectural lead work in this country. (LEAD, Nov., 1932, Jan., 1933.) The lead work on the original buildings has been so outstanding in its appearance and performance that it was only natural and fitting to use the same metal on the Nurse's Home. As was the case before, the lead work includes spandrels, frames, flashing, gutters, downspouts, finials, cresting, flèches, louvres and dormer windows.

Most striking in this work are the spandrels and vertical frames. Made of 4 lb. hard lead stamped to the architect's design, the spandrels extend for six stories, three rows wide, on each of

the two front wings of the building.

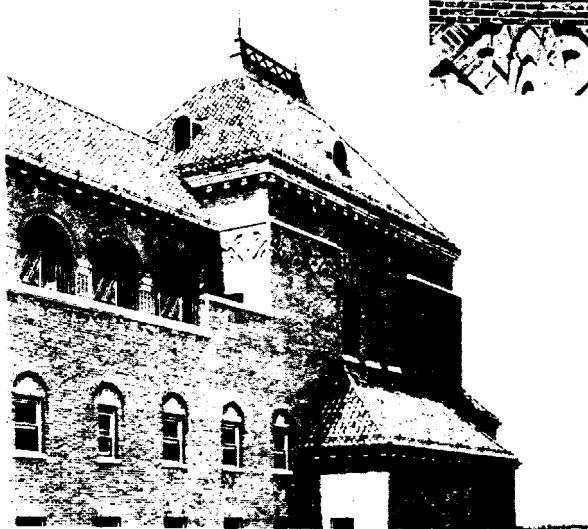
Drawings show the installation of these parts. The spandrels, 5½ ft. by 3 ft., were hung by lead cleats on welded iron frames. The completed unit was then set into place in the masonry. The ends of the vertical members of the iron frames were bent back and hooked over and under the ma-

sonry at the bottom and top of the windows and securely bolted. Spandrels were loose-locked into hard lead window flashing at top and bottom and let into folds in the continuous vertical frames on each side of the spandrel.

These vertical frames were run in 8 ft. lengths abutting one another, with a piece of lead-coated copper soldered in back of the upper end of the lower of two abutting sections, lapping behind the top section 3 in. This makes a water-proof joint without tying the two sections together. Hard lead flashing built into the masonry at the side was folded into the frames in

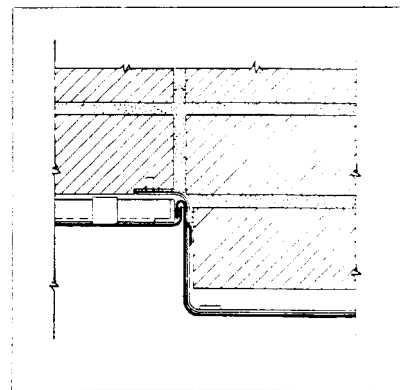
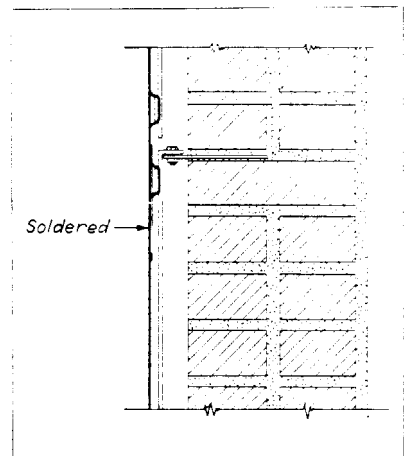


Detail of ornamental lead gutters on the new Nurse's Home



View showing lead cresting, ridging, flèches on the roof peak and also lead-covered dormers, lead flashing, gutters and leader-heads

STANDARD DETAILS



Lead Work on Kings County Nurse's Home



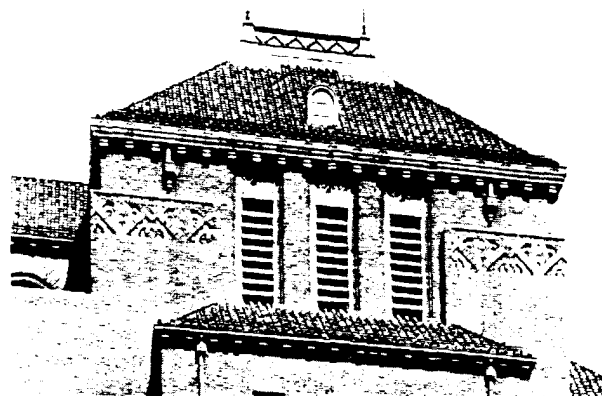
Close-up of the lead work.

the same way as the spandrels and frames were joined. All joints were filled with Vulcatex Non-Hardening Compound.

By thus allowing the spandrels and frames to move freely in all directions, there is adequate provision for expansion and contraction of the metal.

The attractive hanging gutters on the Nurse's Home are of 4 lb. hard lead. The leader-heads are cast hard lead. Flashing is 4 lb. soft lead and in no case do lengths exceed 8 ft. Hard lead was also used to cover the ventilating louvres in the towers and to cover copings. Lead copings should be in

Side view of the Nurse's Home showing the lead-covered louvres and other lead work.



lengths not greater than 8 ft., with loose-locked seams, and should be locked into continuous cleats secured in the masonry along both edges so that the lead coping can expand and contract independently.

On the peak of each tower is a handsome lead ridging and cresting, topped by two slender lead flèches.

Dormer windows, covered completely with lead, are built into the roofs.

Lead, renowned for centuries for its durability and beauty, is an ideal material for sheet metal work of all types. Its economy, ease of application and fabrication into varied shapes and designs, and the beauty of the gray patina attained by weathering are outstanding factors that have made lead so widely recognized. Its use on the Kings County Hospital buildings is a tribute to the keen foresight of the architect, for fine lead work is always serviceable and decorative.

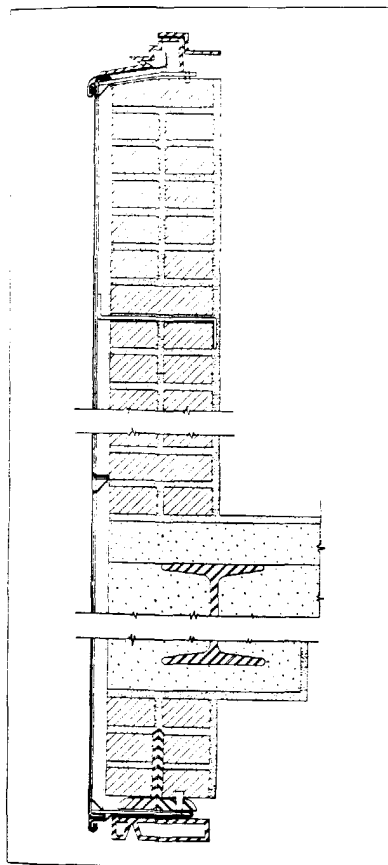
The architect for the Nurse's Home was LeRoy P. Ward, of New York. Miller and Doing, of Brooklyn, N. Y., did the ornamental stamping, and the Brooklyn Roofing Co., Brooklyn, N. Y., were the sheet metal contractors.

LEAD SPANDREL INSTALLATION

Section of the lead spandrel.

Detail of the lead spandrel.

Section of the lead spandrel.



Detail of one of the cast lead ornamental leader-heads.

Angle view of the Nurse's Home showing six stories of ornamental lead spandrels on one side.



White Lead Paint for F.S.A. National Housing Program



An attractive white lead painted home built by the F. S. A. in Longview, Wash.

Another of the Longview group of farm houses, completed in the nation-wide program

COURTESY
FARM SECURITY
ADMINISTRATION



OVER 35,000 farm houses and out-buildings built by the Farm Security Administration have been painted with pure white lead and oil paint in accordance with the Federal specifications for this material.

Operating under the Department of Agriculture, the Farm Security Administration was created in January, 1937, to take over the work of the Resettlement Administration, that of resettling and rehabilitating distressed farm families. Confronted with increased demands for economy in government expenditures, the new agency

decided to engage in a low-cost construction program in which expenditures for improvements on farm units could be amortized in full over a period of forty years without any form of subsidy. Existing construction work was to be completed and strict limitations were laid down for new low-cost construction, in general \$2,200 for houses in the north, and \$1,500 in the south.

Since structures built under the old program greatly exceeded these limitations, a complete revision of the methods of building design and field

operation was necessary. Faced with this problem of providing low-cost buildings meeting the large space requirements of farm families, Captain R. B. Lord, Coordinator and Director of Construction, effected a number of important changes. Architectural design was modified somewhat to make use of certain basic principles adopted to minimize construction costs. New designs made use of standard materials only, procurable in quantity, and of certain standard sizes, thus reducing waste to a minimum.

The careful attention given the problem of painting led to the adoption of pure white lead and oil as standard, for white lead meets adequately all the requirements for low-cost building. It is readily available, easily prepared and applied, effecting a saving in time and labor costs. Its excellent durability and high coverage bring the cost of painting to a very low figure over a period of years.

The use of white paint is a definite improvement over the traditional drab barn red. The fact that painting a structure a cheerful color tends to lift the morale of the family residing in the structure, is a salient point that few people realize. Light colored farm buildings are more attractive and agreeable to live in, a factor which has been definitely noted by the Farm Security Administration where farm families have taken a new lease on life and changed their mode of living sim-

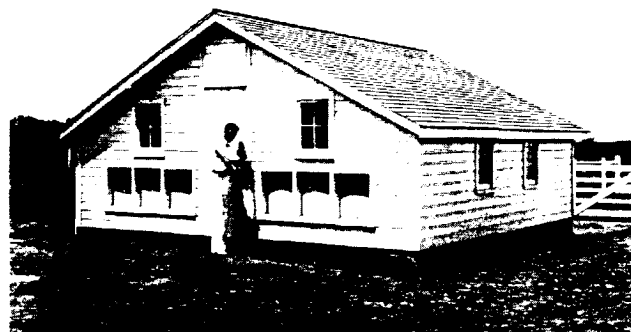


Rear view of a farm house painted with white lead in Sedalia, Mo., under the F. S. A.

ply because they are given a neat house in which to live. This seems to change the calloused and slovenly manners of a life-time and supplant them with a desire for neatness and good home management. In this way, white lead helps to further the social as well as economic welfare of the farmer.

These advantages of pure white lead and oil are effectively demonstrated by the great success attained in the painting of these thousands of farm houses and out-buildings.

A white lead painted poultry house in Sedalia, Mo., another F. S. A. building



Lead Alloy Increases Smoothness in Automobile Rides

LEAD-ANTIMONY spring inserts help to a large extent in solving the problems of the automotive "ride engineer", according to C. R. Paton, of the Packard Motor Car Co. It is the duty of the ride engineer to establish proper damping of the sprung masses in cars in order to develop a smooth and comfortable ride.

By making use of tip inserts of lead-antimony, lubricated bronze, and rubber, a new Packard spring, it is reported, can be given definite control calibration and remedies the disadvantageous features of conventional leaf design. The characteristics, X, Y and Z, of these materials are given in Table 1. X represents the static or breakaway value, a characteristic used to obtain tire absorption of minor road irregularities and for restraint of

pitching tendencies. Y and Z are two varieties of kinetic friction, both of which provide for low-frequency damping, up to 100 cycles per minute (sprung mass frequencies), while Y also provides for high frequency damping, 400 to 600 cycles per minute (wheel bounce). Characteristic Y is used to establish the jiggle-jolt compromise and to suppress wheel bounce. Z is used to control slow swings and to restrain pitching.

By changing the antimony content of the lead-antimony bearings, which is varied between 5 and 10 per cent, the value X can be readily changed. Although such inserts show nearly the same value, dry or lubricated, they are usually lubricated to prevent glazing of the surface.

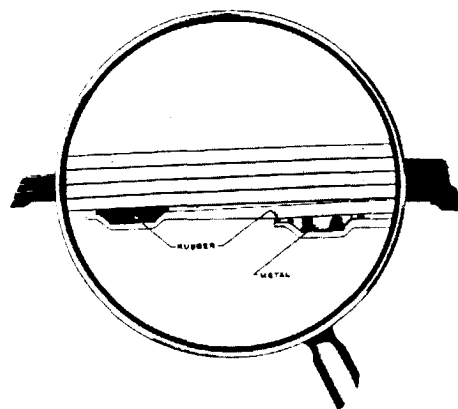
It will be noted from the table that

rubber has practically no X, Y or Z value. It is employed mainly to fill the remaining positions after the desired calibration of inserts and insert positions has been worked out. In starting control calibrations rubber inserts are used at all points and certain of them replaced by lead-antimony or bronze until the desired ride effect is obtained.

The lead-antimony inserts are especially useful in maintaining a flat pitch-free ride because of their peculiar difference in damping at low and high frequencies. The low frequency value is large, approximately twice that of lubricated bronze, but its high frequency damping is low. Another advantageous factor is the ease with which the X value may be changed by the antimony content.

Table 1—Characteristics and Effectiveness

Type of Bearing	X Static or Breakaway Friction	Y High Frequency Damping	Z Low Frequency Damping	Uses
Antimony-Lead	High: Adjustable by Antimony Percentage	Low	High: Twice That of Bronze	X and Z
Lubricated Bronze	Low to Medium	Medium	Medium	X, Y and Z
Rubber	Practically None	Practically None	Practically None	Zero Values of X, Y, Z



COURTESY PACKARD MOTOR CAR CO.

Magnified view of a typical spring, showing the position of spring tip inserts

New York City Adopts L.I.A. Calking Lead Standard

NEW YORK CITY has taken a constructive step in the revised specifications it is now using for the purchase of calking lead and lead wool. In this specification promulgated by the Board of Standardization, Department of Purchase, lead of a purity conforming with the Lead Industries Association calking lead standard is required. Other features of this standard are included, such as the requirement that the manufacturer's name, brand or trade mark must be cast in or legibly and indelibly stamped on each piece, or, in the case of lead wool, marked on the container.

It is now recognized by progressive cities and other specification buyers that detailed, rigid specifications for purchases best assure material of good quality. By adopting the Lead Industries Association standard, New York City has removed the element of chance from its purchases of calking lead and lead wool. This action follows shortly a similar one by another



Typical cast iron water main on which lead calking makes watertight, flexible and durable joints

important and unbiased body, the American Water Works Association, whose standard, adopted in April, 1938, also conforms with the Lead Industries Association standard. (LEAD, May, 1938.)

For architects, engineers and contractors who do not have the same testing laboratory facilities, the Lead Industries' Seal of Approval acts as the testing laboratory and assures highest quality. This Seal is stamped on calking lead meeting the Lead Industries Association standard and which also conforms to the American Water Works Association's and New York City's specifications, based on that standard. Thus, the individual buyer or specifier can have the same protection in his purchases of calking lead and lead wool as the large city. He has this same protection, too, through the Lead Industries' Seal of Approval, in his purchases of lead pipe, traps and bends, by requiring that this seal be stamped on all material.

SPECIFY  MATERIAL

SPECIFY  MATERIAL

Lead Pipe Perfect After Forty-Five Years' Service

FORTY-FIVE years ago, in 1893, a lead water service was laid to supply the 14th Street Bank in Pittsburgh, Pa. This year the street under which it was laid was regraded and repaved. Therefore, it was thought advisable to install a new service at this time, and the old one was removed. It was found to be in perfect condition, exemplifying the long life characteristic of lead services.

Now 45 years is not a particularly remarkable life for a lead service, but obviously this service had many more years of life left in it. Yet 45 years is longer than some newer service pipe

materials have been used and longer than some, based on experience, can be expected to last. It is particularly true in this instance where the lead service was installed under one of Pittsburgh's busiest corners, 14th and Carson Sts. The latter is the main traffic artery on Pittsburgh's South Side, traveled by heavy trucks and other types of vehicles practically 24 hours a day. This means considerable vibration and movement in the ground, something that permanently flexible lead pipe with its bonded wiped joints is especially suited to withstand.

Naturally, when the question of

what material to use for the new service came up, the excellent performance of the old service was full justification for replacing with the same material, lead.

This long recognized durability is but one of the many advantages that have enabled lead services to provide for years the ultimate in service pipe performance. In specifying lead, engineers, architects and contractors win the confidence of clients, and, by requiring the Lead Industries' Seal of Approval, are assured of highest quality material to realize to the utmost extent this superior performance.

UPON REQUEST, THE LEAD INDUSTRIES ASSOCIATION WILL BE GLAD TO MAIL "LEAD" REGULARLY, FREE OF CHARGE, TO THOSE INTERESTED, AND WILL COOPERATE, WITHOUT OBLIGATION, IN THE SOLUTION OF YOUR LEAD PROBLEMS

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