

LEAD

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COURTESY CATA, INC.
Making a lead mould for casting rods of thermosetting plastic. Lead sheath is clearly shown adhering to the steel pattern which has just been dipped into the molten lead.

Lead Industries Association New York 17, N. Y.

LIA25771

Thermosetting Plastics Cast in Lead Moulds

TODAY the word plastic has become a noun and is generally regarded as meaning any one of an endless variety of synthetic materials the uses of which may vary from shoe soles to motor car bodies, fabric waterproofing, or a replacement for window glass. However, in its original usage the word plastic means "capable of being moulded", and the property of being mouldable is generally a characteristic of all of the large group of substances commonly referred to as plastics.

Moulding methods vary with different types of these materials. Certain procedures such as "injection moulding" or "compression moulding" require heavy machinery and considerable power. However, some materials known as thermosetting plastics, can be poured into open moulds in a process roughly similar to that used in casting iron or bronze. The moulds, like those used for casting metals, may be draw moulds, split moulds or cored moulds. Here the similarity to metal casting ends because the mould must be of a material which has a surface as nearly perfect as is possible in order that there may be a minimum of finishing required on the moulded article.

For this purpose lead has been found to be an excellent material. It is sensitive enough to receive the smallest, most delicate impressions from the pattern. It is soft enough to



Pouring liquid plastic into lead moulds where it will remain during a curing period of 3 to 5 days.

be easily removed from the casting, yet it is sufficiently strong to retain its shape during the casting process.

For straight draw moulds a steel pattern of the exact size and shape of the plastic object to be made is dipped into and quickly withdrawn from a bath of molten lead. The lead is chilled by the pattern and adheres to it in a thin sheath. After cooling in water the pattern is withdrawn, leav-



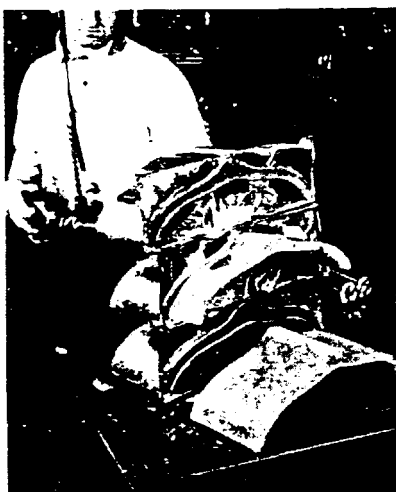
Dipping a steel pattern in molten lead to form mould for plastic material. After cooling in water lead will be stripped from pattern.

ing a perfect mould into which the liquid plastic material is poured. After a period of cooling and curing the casting is removed from the mould by driving it out with an air hammer and the crumpled mould is returned to the melting pot for re-use.

Moulds for the exterior surfaces of hollow shapes are made in the same way and then accurately positioned over metal cores leaving a space into which the liquid plastic is poured. Split moulds for articles with compound curves are formed of hard lead by die casting. These moulds may be single or multiple but in either case they are recast after each use.

The faithfulness with which the lead mould imparts the form and finish of the pattern to the casting extends even to the polish of the surface. Many cast articles can be used just as they come from the moulds with little treatment but trimming and cleaning.

This use of lead is a direct utilization of some of the characteristics of the metal which have in many cases been considered incidental advantages. Namely, ease of casting and malleability. It also demonstrates the ease with which lead can be salvaged for re-use by the simple operation of remelting. It suggests that there may be many cases where lead can be used for forms and moulds which must be destroyed in removing them from the articles which they help to make.



Removing cured castings with an air hammer. These blanks will be cut into slices, polished and fitted with hooks to become smart colorful coat hangers for milady's wardrobe as shown at left.

PHOTOS, COURTESY CATALIN CO.

Lead Water Services in Ohio FPHA Project

LAKESHORE Village Housing Project at Euclid, Ohio, just outside of Cleveland is now nearing completion. This village will house 800 families in 432 buildings which are now mostly completed, many of them being occupied. Construction was started in August 1942. The project was designed by Associated Architects of Cleveland, George B. Meyer, Coordinating Architect. The buildings are neat and trim, of wood construction. Some are painted white and some grey with white trim, thus avoiding the monotony so often a characteristic of the appearance of war housing.

The lead water services are now being installed for the final group of houses. Each service runs from the cast iron main in the street back of the building to a point near the foundation. The lead services vary in length up to 27 ft. and are of $\frac{5}{8}$ inch or 1 inch lead pipe as required by the type and size of the building.

For water service use lead possesses, in addition to its durability, the characteristics which simplify installation. The complete service line can be cut to length and the end fittings attached in the shop. It can be laid in place around minor obstructions with a minimum of labor. The picture showing a lead pipe being pulled through a tunneled hole under a sewer is an excellent illustration of this.

While Lakeshore Village is a war



Placing lead water service in tunnel under sewer.



A street in the newly completed section of Lake Shore Village, Euclid, Ohio.

housing project, it is not of temporary construction. The houses are well built on concrete foundations and spaced to provide reasonable privacy. It will provide permanent housing for industrial workers and the use of lead service pipe is not only making use of a freely available metal at the present time but is insuring trouble free water supply for many years in

the future. Lead is also the jointing material for the cast iron water mains throughout the project.

General construction of Lakeshore Village was by the James McHugh Construction Co. of Cleveland. Utilities construction is being done by Dominic Nero Construction Co., also of Cleveland. Water services are being installed by the Cleveland Water Dept.

Sprayed Lead Coatings Resist Corrosion

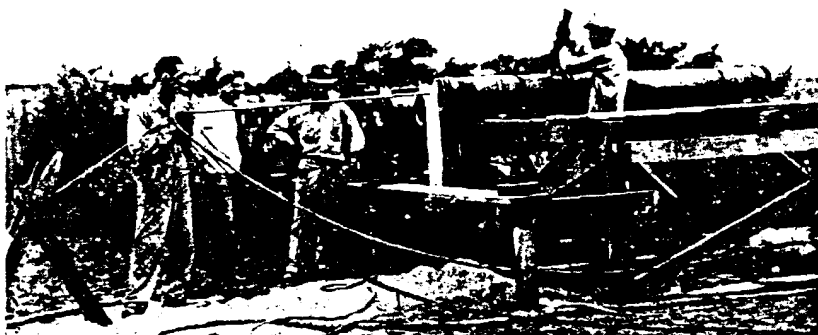
THE spray method of application of metallic coatings offers opportunities to make use of the corrosion resisting properties of lead in many fields. Conditions are not uncommon where the application of sheet lead coverings and linings or homogeneous bonded coatings can not be used for reasons of practicability or expense but where the durability of lead under corrosive conditions can

be the means of saving much equipment from rapid destruction.

Effective applications of sprayed lead coatings to such conditions have been made by the Libby Welding Company of Kansas City, Missouri. Of especial interest at the present time is the covering of ventilating equipment to be used over wash barrels in the pickling department of one of the midwestern small arms ammunition plants. This work included vent hoods, ductwork, fan housings, fan blades and drip pans for handling corrosive fumes given off by the pickling process. These parts were all made of comparatively light gauge steel which could not have been economically covered with lead by any other process but which provided ample support for the sprayed on coating.

The lead was applied in two coats each .025 inch thick over both inside and outside surfaces. The ductwork was made with flanged connections and was installed with tubular lead

Spray coating with lead the inside of a 10-in. discharge pipe for mine dewatering pumps. Note special long nozzle.



gaskets between flanges thus providing a continuous lead surface, proof against leakage of fumes or condensate as well as against corrosion.

Another interesting application by the Libby Welding Company of a sprayed lead coating to combat corrosion was done on the pumps and a 10 in. pipe line used to dewater a flooded mine in Baxter Springs, Kansas. Here the water was so highly corrosive that the pipes were destroyed before the mine could be emptied. A sprayed lead coating inside the pipe and pumps not only enabled the operators to put the mine back into production of lead and zinc but prolonged the life of the pumping equipment through several years. It is still in operation.

Lead coating a fan housing by means of the spray gun in the shop of the Libby Welding Co. Ventilator at left is completely lead coated inside and out.



ANDERSON PHOTO

Other examples of sprayed lead coatings applied by the Libby Welding Company range from a 25,000 gal. acid storage tank for the Kansas City, Kansas, water department to small bakelite boxes to be used as

static shields for radio tubes. The painstaking cleaning and preparation necessary to insure a satisfactory application, as well as the actual lead spraying can be done either in the shop or in the field.

Lead Foil an Aid in Fuel Conservation

THROUGH the coming winter with its possible shortages of both fuel oil and coal it will be necessary to take every measure possible to conserve heat if homes are to be kept comfortable. Insulation is the first thing that comes to mind when heat conservation is mentioned and many property owners have taken advantage of this means to keep their homes comfortable in spite of fuel rationing. However, insulation is sometimes difficult to apply especially to sidewalls of existing construction. Thus a type

of inexpensive material which is easily applied by the home owner himself without special tools or equipment and which will produce noticeable results is of unusual interest.

Such a material has been produced and placed on the market. It consists of lead composition foil mounted on bond paper and its purpose is to be installed on the wall behind steam or hot water radiators to reflect radiant heat back into the room. The material comes in rolls and can be attached to the wall with thumbtacks or masking tape. Or it can be mounted on cardboard or plywood plaques which can be removed when the heating season is over.

The principle of reflective insulation is well known and has been used in many applications. Radiators, as their name implies, radiate heat on all sides. The heat radiated on the side next to the wall is absorbed by the plaster and transmitted through the wall to the outside. However, certain materials have the property of reflecting radiant heat and if placed between the radiator and the wall may turn back as much as 95 per cent of the radiant energy which would otherwise be absorbed by the wall.

The lead alloy foil which has a slight percentage of tin on the surface

is such a material. This means that radiators backed up with this material will be more effective in increasing the comfort of the rooms which they serve.

This is an unusual use of lead which is not usually considered as having reflective properties. However, appearance is not always an indication of the power of a material to reflect radiant heat. The manufacturers state that the slight dullness caused by oxidation will not seriously impair the reflective power of the material and that used as intended it will increase the effectiveness of radiators to a noticeable degree.

Lead Calked Joints for Cast-Iron Gas Pipe

LIKE many another industry the gas producing and distributing enterprises have found it necessary to request their domestic customers to avoid increasing their consumption. This request has been made necessary by the greatly increased industrial uses of gas and in some areas by increases in the numbers of domestic services required by war housing projects. At the end of 1943 the gas industry was serving more customers than ever before but while the number of outlets increased 3.4 per cent

Placing lead foil reflective insulation behind radiator.

DAYTON SNYDER



the amount of gas consumed increased 10 per cent. The metal industries form a large gas consuming group since they use gas extensively for melting, hardening, annealing, forging and other heat treating processes.

That the gas industry has been able generally to take care of increased demands has been due to foresight and to a policy of keeping their facilities built up in advance of current peace time needs.

A great deal of the piping used to convey gas is of lead calked cast iron. The illustrations show two views of the installation of 30 inch lead calked pipe in a large eastern gas plant. These pipes carry the gas from the producer to the purifier and from the purifier to the gas holder. They are under low pressures but the joints are all solidly calked with lead which will allow any slight movements due to expansion or settling without cracks or breaks which would result in leaks. This installation was part of a plant expansion program made necessary by the increased demands of war industries in the area served by the company. The company has also made several extensions to its mains with cast iron pipe calked with lead.

These plant expansions and distribution extensions, although done under pressure of emergency, are none the less permanent. They have made use of durable materials installed with the pressure-tight, yet flexible lead calked joints. They will be serviceable when the urgency of their installation is but a memory.



U. S. PIPER
Lead calked cast-iron gas lines from producer to purifier in an eastern gas plant.

Pouring lead joint in above gas line.



Lead Takes Wings

LEAD is playing its vital part in the United Nations' push to Victory. Lead now has its important place in aircraft production. It is used in pursuit ships, bombers and in the great transports now carrying men and materials to the fronts the world over.

In the early days of the airplane, the weight balance of the control surfaces was not a factor in its design. But as the size and speed of the airplane increased, and flutter characteristics of the movable surfaces were studied, balance weights were added to the surfaces until at the present time all surfaces (ailerons, rudder and elevators) on pursuit airplanes are completely balanced by weight. For those who know airplane construction, this means that the weight

of the surface tending to cause rotation about the hinge line in one direction, is resisted by a heavier balance weight at a relatively shorter distance from the hinge, until the two are in balance. The shape and size of the surface and the location of the hinge line are determined by aerodynamic considerations.

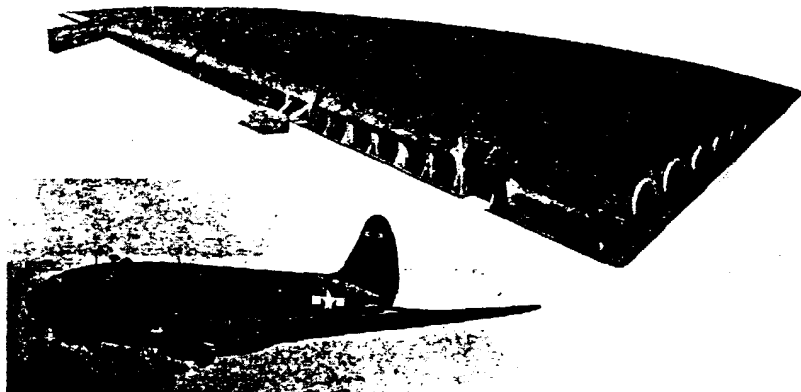
Lead can be moulded to the shape of the nose section so that its center of mass is at a maximum distance from the hinge line and thus results in most cases, in a saving in weight over other materials. The lead weight can easily be reworked on assembly to bring the control surface to its exact correct balance. Recent design trends dictate a considerable portion distributed along the leading edge of the control surface. More balance weight is thus required but better balance characteristics are secured.

It is difficult to learn how much lead is being used for this purpose at the present time. One company alone, the Curtiss-Wright Corp., designers and manufacturers of the famous P-40, Warhawk line and the C-46 Commando transport planes have used 160 tons to date.

Thus has lead joined the ranks. It is doing its part in maintaining United Nations' air supremacy by helping to improve the performance and increase the safety of all types of combat and transport planes.

Rudder of Curtiss C-46 troop transport plane showing lead weights added for balance and stability. Insert, a C-46 Commando in flight.

CURTISS-WRIGHT CORP.



You're money ahead when you paint with

White Lead



STROKES from the PAINT BRUSH

Wearing Characteristics of Paint Indicated by Condition of Surface

ALTHOUGH pure white lead paint can be depended upon to give long and satisfactory service, even this top quality paint is not everlasting. Indeed the very necessity of periodic renewal is one of the advantages of paint. Each repainting results in a revived "newness" of the building to which it is applied—a source of pride not enjoyed by the owner of a building with a permanent unchangeable exterior surface. Repainting also provides an opportunity for a change in style as the accepted ideas of good taste are altered with the passage of time.

Chalking a Natural Process

Like any material which serves its purpose by slowly wearing away its substance, paint ages in a manner characteristic of its composition. Good paint wears away slowly by the process known as "chalking" while poor paint may wash off rapidly or it may crack and scale off in flakes leaving a rough unsightly surface. The property of slow even wear with slight chalking is one of the well known characteristics of pure white lead paint. Its occurrence is indicated by the presence on the surface of a fine white powder which shows up when a dark cloth or the hand is rubbed across the surface.

The reason for the presence of this powder, which begins to show up about a year after painting, lies in the nature of the paint materials and their action on one another. White lead and linseed oil are used to make paint because they are chemically interactive. They not only mix together

but they actually unite. When the paint is spread out upon a surface the linseed oil dries, or more correctly solidifies by reason of the absorption of oxygen from the air, forming a tenacious film which is tough and elastic and has a measurable thickness. Since the white lead will not decompose or dissolve, this film can wear away only as the oil disintegrates. And, since the oil is actually compounded with the white lead, the rate of breakdown is very slow. However, some destruction of the organic matter of the oil does take place releasing the particles of white lead on the surface, thus producing the "chalk" or white dust that can be rubbed off slightly.

It is an easy matter to add other ingredients to white lead paint to retard or even prevent chalking. However, such additions tend to produce a brittle inelastic paint which is inclined to crack as a result of expansion and contraction of the material to which it is applied. When cracks occur the paint can no longer perform the function of keeping water away from the underlying material.

Advantages of Chalking

Thus it can be seen that moderate chalking is not a defect of paint. It is a good indication that the paint is soft and elastic enough to expand with the base material. Actually chalking has several advantages. Not only does

it result in self cleaning by releasing collected dust and dirt along with the surface particles of lead but it gradually decreases the thickness of the paint film so that subsequent repaintings will not build up a coating too heavy to adhere to the construction materials.

The gradual wearing away of white lead paint is so uniform over the entire surface that it remains always smooth and repaintable. Even if conditions beyond the control of the property owner make it necessary to put off repainting far beyond the usual time no serious consequences will result. The property may look a little shabby but it will not have an unkempt appearance and, when repainting can be undertaken, a mere dusting with a dry brush will be sufficient preparation for the reception of the new white lead coats.

White Lead Lasts Longer

The slowness with which pure white lead paint wears away is the basic reason for its long life. The manner of its wearing away is the reason why it retains its attractive appearance. It is for these reasons that CONSUMERS' GUIDE, a publication of the United States Department of Agriculture can state of white lead paint, "This paint, if used exclusively, remains the best choice for home owners who wish to allow very long intervals, longer than the durability of any other white or tinted paints, to elapse between paint jobs. When worn out, a coating consisting wholly of white lead on woods that hold paint well, will still go through a long period of neglect during which it looks shabby but not unkempt. After such neglect, a white lead surface can easily be repainted without undue expense."

**WAR BONDS
Are Still the Best
Investment**

TRADE NAMES AND NAMES OF MANUFACTURERS OF ARTICLES DESCRIBED IN LEAD ARE OMITTED IN ACCORDANCE WITH LEAD INDUSTRIES ASSOCIATION POLICY. SUCH NAMES AND FURTHER DETAILS WHEN AVAILABLE, WILL BE GLADLY PROVIDED ON REQUEST



The Captain Charles Leonard House, Agawam, Mass. Built in 1805 has the jan-light in the center pediment characteristic of the houses of western Massachusetts. In a recent restoration for use by the Women's Club of Agawam it was repainted with pure white lead paint.



The General Moulton House in Hampton, New Hampshire. Built in 1764, the cheerful yellow and white of its pure white lead paint belies its local nickname the "Haunted House".



The Simon Colton House, Longmeadow, Mass. Built in 1735, a beautiful example of heavily tinted pure white lead paint. The white trim serves to bring out the richness of the red painted siding.

DAYTON SNYDER



No. 22

Landmarks in Colors

A COMMONLY accepted idea of the colonial house is that, to be true to style, it must be pure white with deep green blinds. Of course, a great many of the old houses were painted white, but our colonial forbears were by no means afraid of color nor did they hesitate to use it on the exteriors of their houses. Reds, yellows, blues, grays and greens were commonly used, usually with white trim and the monotonous effect sometimes achieved in modern housing groups of colonial precedent was thus avoided.

This month's portfolio shows an extreme range of color styles, all done in pure white lead paint tinted to the owners taste. The first is the traditional all white house, the solid color accenting the size and excellent proportions of the mass of the house. The second is a cheerful yellow with white on the quoins as well as on the finely executed trim of doors and windows. The third is a daring red, again with white trim, making cheery and friendly what might otherwise be a rather austere facade.

These three houses serve to illustrate a fact with which painters have long been familiar—that pure white lead paint is the ideal medium for the expression of color styling. It is so easily tinted to the exact shade desired. The colors stay fresh because the surface remains clean due to the natural self cleaning properties of white lead. The white lead serves to carry the tinting color just as white paper bears the delicate shades and tints of a fine color print.

THIS IS NO. 22 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

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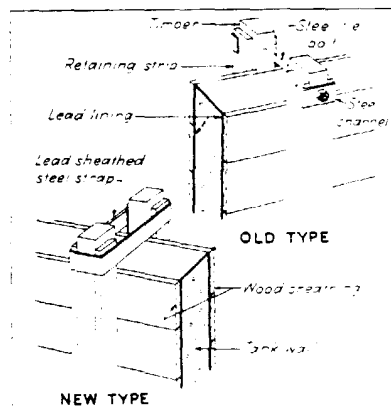
Employee's Suggestion Commended by WPB

A RECENT recipient of Honorable Mention from the War Production Board is Allen P. Rogers, repair man for the Inspiration Consolidated Copper Company of Inspiration, Arizona. Mr. Rogers' suggestion has effected, by the use of small amounts of lead, a considerable saving of steel tie rod material and a great reduction in the number of disagreeable small repair jobs on the leaching tanks operated by the company.

These tanks are lined with lead to withstand the corrosive action of the leaching solution which contains sulphuric acid, copper sulphate and ferric sulphate. The lead lining is protected from abrasion by a sheath of two inch boards held in place by vertical timbers which were tied at the

top with steel tie bolts through channel iron collars. These bolts and channels were continually subjected to the corrosive action of the leaching solution through splashing as well as capillary action through the wood and were quickly corroded to the point of failure. A broken tie bolt and the resulting loosened timber allowed the tank lining boards to slip down into the tank while the tailings were being removed and made it necessary for the repair crew to handle the acid impregnated wood to put it back in place.

Mr. Rogers, noting that the lead linings of the tanks withstood immersion in the leaching solution, suggested replacing the tie bolts with steel straps covered with sheet lead. This was tried out on a few locations



Sketch of Mr. Rogers' suggestion.

using materials salvaged from scrap and found to be far superior to the old method. The steel straps are bent and welded to size and covered with sheet lead, with "burned" or welded joints. Some of the strap ties have been in place for nearly a year whereas the old tie bolts sometimes lasted barely two weeks.



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, formulae and mixing and tinting instructions for exterior and interior use.

SOME PAINTING PROBLEMS AND THE ANSWERS

By Dr. F. L. Browne, Senior Chemist, Forests Products Laboratory, Madison, Wis.

Reprinted from the National Real Estate Journal, Sept., 1939.

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 the American Builder, July, 1939.

STOP DEMON RUST

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

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 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 of Metals Handbook."

WHITE LEAD PAINT FOR DEFENSE HOUSING

Reprint from Bulletin of the Producers' Council including specifications and graphic mixing instructions for exterior and interior White Lead Paint.

COMMERCIAL STANDARDS:

Calking Lead, CS94-41

Lead Pipe, CS95-41

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 PLUMBING FOR DEFENSE HOUSING

Reprint from Bulletin of the Producers' Council including information on the Emergency Plumbing Standards and the Defense Housing Critical List.

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 Products Engineering, May, 1943.

PARTIAL LIST OF USES OF LEAD NOT RESTRICTED BY CONSERVATION ORDER M-38

Anodes
Anti-knock treatment for motor fuels
Bearing metal
Calking lead, lead wool
Ceramics (Except as an ingredient of ornamental glass)
Chemical equipment—tanks, linings, piping, pumps, valves, filters, evaporators
Coatings on iron, steel and other metals
Collapsible tubes
Counterweights (except sashweights)
Die casting for process work
Fittings—traps, bends, floor flanges, ferrules
Flooring in chemical and explosives plants
Gaskets and packings
Insecticides and chemicals
Manufacturing equipment for synthetic fibres
Metal pickling tanks, spray nozzles and piping
Mould material for casting plastics
Name and instruction plates
Paint pigments—white lead, red lead, blue lead, litharge
Pipe—oil, waste, water service and chemical
Plating tank linings
Roofing, flashing, gravel stops, damp proofing
Safety treads
Scientific and experimental apparatus
Sheathing for electric cables
Shot—ammunition
Shower pans, floor safes, waterproofing
Solder
Storage batteries
Substitution for more critical metals
Varnish making—driers
Vulcanizing moulds
Window cames—glaziers lead
X-ray and radium protection

USE PERMITTED WITH CERTAIN RESTRICTIONS

Automobile body solder
Casket hardware—casket linings
Foil

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