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LEAD

PRODUCTS



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LEAD

PRODUCTS



NATIONAL LEAD COMPANY

NEW YORK
515 Broadway
BALTIMORE
300 W. Monument St.
BUFFALO
110 Oak St.
CHICAGO
100 West 10th St.

CINCINNATI
609 Freeman Ave.
CLEVELAND
1212 W. Ward St.
ST. LOUIS
700 Chestnut St.
ATLANTA
Georgia Lead Works
Building 5 McClellan St.

BOSSON
National-Lead Lead Co.
500 Albany St.
PHILADELPHIA
John E. Limer & Sons Co.
Whitman Bldg.
PITTSBURGH
National Lead & Oil Co. of Pa.
305 Fourth Ave.

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THE DUTCH BOY TRADE-MARK

The original portrait of the Dutch Boy, reproduced above, was painted in 1907 by Lawrence Carmichael Earle. Mr. Earle, who died in 1921, was a distinguished portrait and character painter. His Dutch Boy is admired by art critics as a boy portrait of unusual merit.

To the American buying public, the Dutch Boy is a familiar figure. He has appeared in the national advertising and on many of the products of National Lead Company for more than a quarter of a century. Everywhere he is recognized as a symbol of quality and reliability.



THE USES OF LEAD

Men have used lead for a variety of purposes since the very earliest times. Every one of its familiar physical properties—color, weight, permanence, ease of working—has proved of practical value in one direction or another.

In the modern world, there is an ever-widening circle of uses for lead. In many instances, its less well-known characteristics, such as electrical and lubricating properties or the ability to absorb sound and radiant energy, are brought into play. Notable examples are the use of lead in lubricants, for anodes in plating processes, for protection against X-Ray or radium emanations, or its use in steel to increase machineability.

This catalog was prepared in the belief that many of the properties and uses of lead are not generally known. While primarily a buyer's guide, it may help also to introduce the reader to other ways in which lead can serve him.

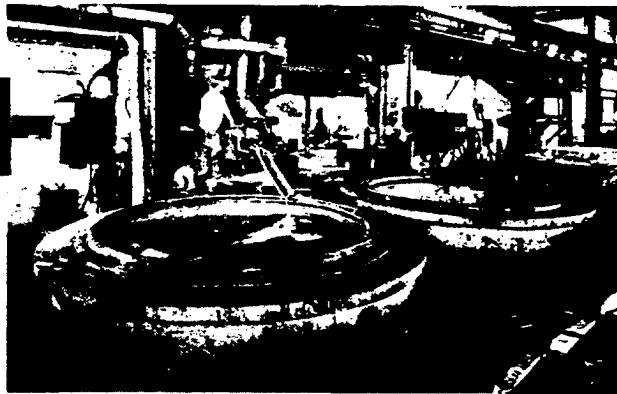
NATIONAL LEAD COMPANY

National Lead Company mines and smelts lead and is the largest manufacturer of lead products in the world. In addition to metallic lead and lead alloy products, it makes and sells a full line of paint materials as well as the dry lead pigments employed in various industrial processes. For many years, it has been the chief source of supply for a large section of American trade and industry.

National Lead Company maintains factories, warehouses or sales offices in many cities of the United States as shown on the map on the following page. An inquiry or an order addressed to the nearest sales office will receive prompt and courteous attention.



Mining



Smelting



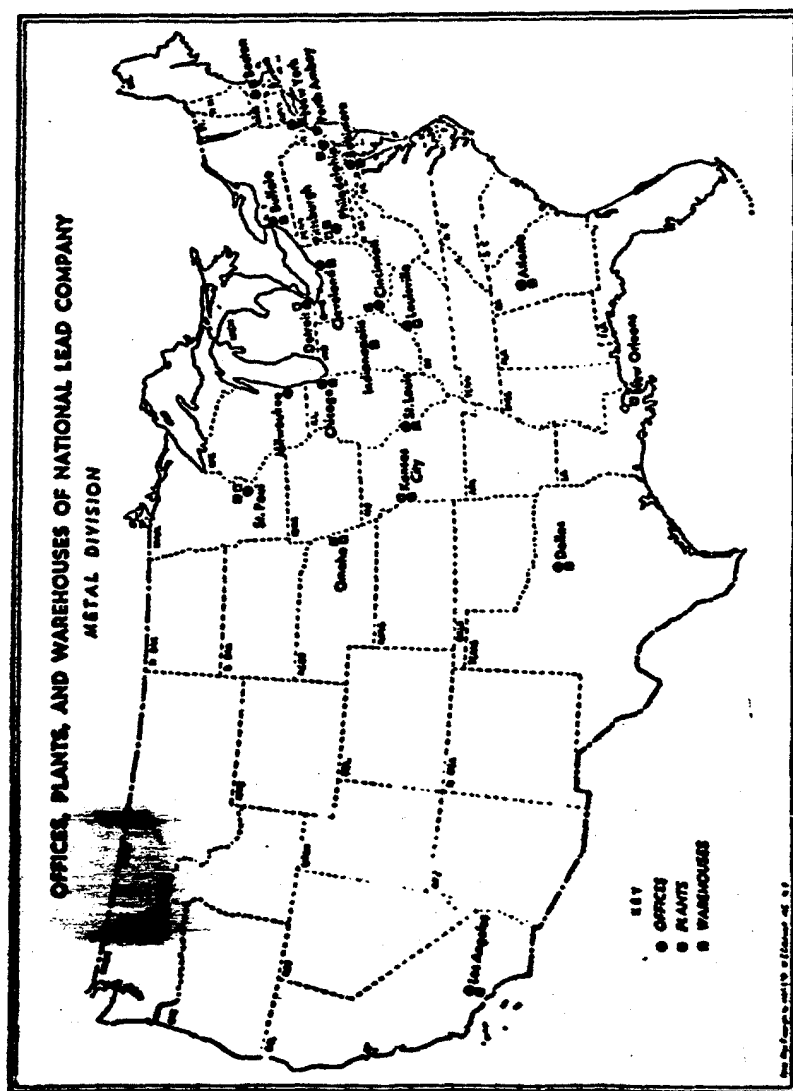
Manufacturing



Research

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LEAD FITTINGS

LEAD FITTINGS

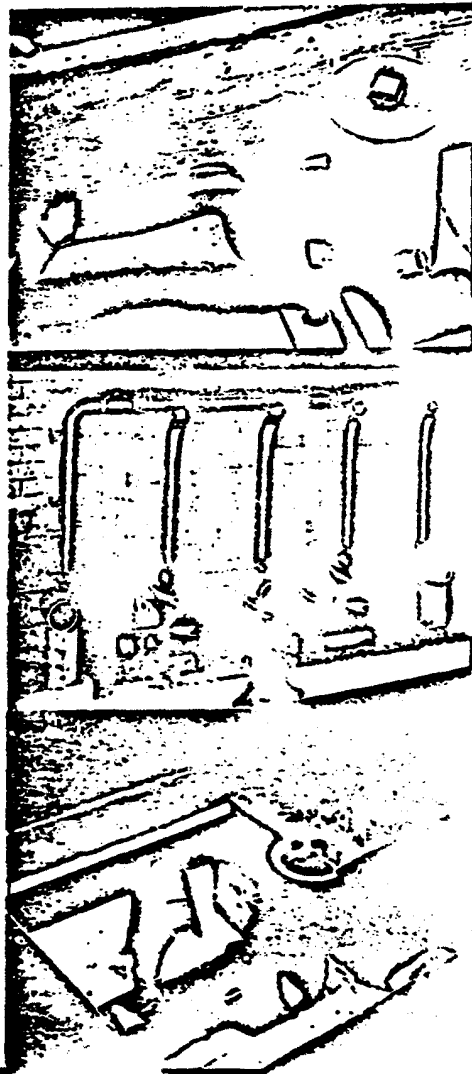
As shown on the following pages, we manufacture a full line of lead fittings and accessories for use in plumbing systems. The line includes traps of various designs in all standard patterns, short, long, and extension bends, combination ferrules, combination bends and ferrules and soldering nipples of various types.

In addition to these products which are stock items and can be supplied on short notice, we also manufacture closed-end bends and ferrules used by plumbers to test their roughing-in work, deep seal traps and ground joint vented traps, the special traps used in the Southern and New England districts, and lead or lead alloy fittings in special sizes, shapes and weights according to specification.

Our plumbing accessories can be depended upon to be of the highest quality in every respect. They are made from pure, refined lead only. The accuracy of our dies and the care and skill of our workmen insure correct shape and a uniform wall thickness throughout. Where a national weight standardization exists, such as in traps and bends, each product is stamped individually with the Lead Industries' "Seal of Approval," as well as with our name and trademark, and the size and weight.

To facilitate ordering, we have given as complete data as possible on the following pages. These include prices, details of construction, suggestions for ordering, methods of packing and prices for extras when differing from regular specifications. Any other information will gladly be furnished on request.

Trap Lead down trap with inlet and outlet connections rigid on. Note that both connections are made over the base of the trap at right angles, giving waste in the trap a vertical, and then a horizontal position. Center: Lead bends and piping for a battery of five wall-hung closets. "Chase," similar to the one under the center bend, will be revealed under the others for the permanent support of the closets. Bottom: Lead "T" trap with vent connection under a shower pan. A section of the pan has been cut away to show the installation.

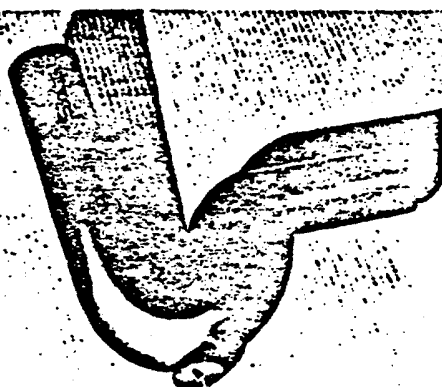


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LEAD FITTINGS

LEAD TRAPS



Our lead traps are carefully made from the best grade of pure refined lead. They are extruded under high pressure, insuring a smooth interior and uniformity in wall thickness throughout the entire length.

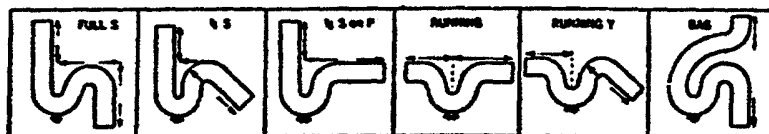
Lead traps in all the standard styles and sizes come either vented or unvented. Extra long designs in all sizes are furnished with either long inlet or long outlet.

In ordering drain traps, specify style, inside diameter and weight division. State whether vented or unvented is desired. Unless otherwise specified "standard weight" unvented will be furnished.

In ordering extra long traps, specify whether long inlet or long outlet is desired.

DIMENSION SCALE FOR REGULAR TRAPS

Note: Dimensions are taken on inlet, outlet, length over all and from center to ends.



Size	Full S		1/2 S		1/2 S or P		Flushing		Flushing Y		Bag
	Inside Diameter	Length Over All	Inside Diameter	Length Over All	Inside Diameter	Length Over All	Inside Diameter	Length Over All	Inside Diameter	Length Over All	
1/2"	1/2"	10"	1/2"	10"	1/2"	10"	1/2"	10"	1/2"	10"	1/2"
3/4"	3/4"	12"	3/4"	12"	3/4"	12"	3/4"	12"	3/4"	12"	3/4"
1"	1"	14"	1"	14"	1"	14"	1"	14"	1"	14"	1"
1 1/4"	1 1/4"	16"	1 1/4"	16"	1 1/4"	16"	1 1/4"	16"	1 1/4"	16"	1 1/4"
1 1/2"	1 1/2"	18"	1 1/2"	18"	1 1/2"	18"	1 1/2"	18"	1 1/2"	18"	1 1/2"
2"	2"	20"	2"	20"	2"	20"	2"	20"	2"	20"	2"
2 1/2"	2 1/2"	22"	2 1/2"	22"	2 1/2"	22"	2 1/2"	22"	2 1/2"	22"	2 1/2"
3"	3"	24"	3"	24"	3"	24"	3"	24"	3"	24"	3"

DIMENSION SCALE FOR EXTRA LONG TRAPS

Note: Dimensions are taken on inlet, outlet, length over all and from center to ends.

Size	Full S		1/2 S		1/2 S or P		Flushing		Flushing Y		Bag
	Inside Diameter	Length Over All	Inside Diameter	Length Over All	Inside Diameter	Length Over All	Inside Diameter	Length Over All	Inside Diameter	Length Over All	
1/2"	1/2"	20"	1/2"	20"	1/2"	20"	1/2"	20"	1/2"	20"	1/2"
3/4"	3/4"	24"	3/4"	24"	3/4"	24"	3/4"	24"	3/4"	24"	3/4"
1"	1"	28"	1"	28"	1"	28"	1"	28"	1"	28"	1"
1 1/4"	1 1/4"	32"	1 1/4"	32"	1 1/4"	32"	1 1/4"	32"	1 1/4"	32"	1 1/4"
1 1/2"	1 1/2"	36"	1 1/2"	36"	1 1/2"	36"	1 1/2"	36"	1 1/2"	36"	1 1/2"
2"	2"	40"	2"	40"	2"	40"	2"	40"	2"	40"	2"
2 1/2"	2 1/2"	44"	2 1/2"	44"	2 1/2"	44"	2 1/2"	44"	2 1/2"	44"	2 1/2"
3"	3"	48"	3"	48"	3"	48"	3"	48"	3"	48"	3"

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C-3

LEAD FITTINGS

REGULAR AND EXTRA LONG TRAPS U. S. STANDARD PRICE LIST

Wholesale Price Per Foot, Plus Service, Post, etc.	Standard (Common) Wholesaler					Specialty Wholesaler					Extra Heavy Wholesaler				
	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Drainage—Floor	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Full S	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
1/2 S	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
1/2 S or P	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Roaming	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Roaming V	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Box	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"

REGULAR AND EXTRA LONG VENTED TRAPS U. S. STANDARD PRICE LIST

	Standard (Common) Wholesaler					Specialty Wholesaler					Extra Heavy Wholesaler				
Wholesale Price Per Foot, Plus Service, Post, etc.	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Drainage—Floor	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Full size	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Full S	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
1/2 S	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
1/2 S or P	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Roaming	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Roaming V	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"
Box	1 1/2"	2"	2 1/2"	3"	4"	2 1/2"	3"	4"	5"	6"	2 1/2"	3"	4"	5"	6"

* Prices listed are for 1 1/2" and 2" traps. Prices for other sizes are as follows: 3" traps, add 10¢; 4" traps, add 15¢; 5" traps, add 20¢; 6" traps, add 25¢.

PACKAGES OF LEAD TRAPS

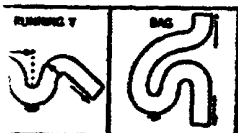
	1 1/2"	2"	2 1/2"	3"	4"
Standard Full S package	100	100	100	100	100
Standard 1/2 S package	100	100	100	100	100
Standard 1/2 S or P package	100	100	100	100	100
Standard Roaming package	100	100	100	100	100
Standard Roaming V package	100	100	100	100	100
Standard Box package	100	100	100	100	100

* Each package of extra long traps contains approximately 100', 200', 300' and 400'.

are carefully made from the refined lead. They are extruded and, insuring a smooth interior wall thickness throughout the

all the standard styles and sizes are or unvented. Extra long traps are furnished with either long

drain traps, specify style, inside right division. State whether vent desired. Unless otherwise specified, unvented will be furnished. Extra long traps, specify whether outlet is desired.



Style	Roaming V	Box
1 1/2"	100	100
2"	100	100
2 1/2"	100	100
3"	100	100
4"	100	100

Style	Roaming V	Box
1 1/2"	100	100
2"	100	100
2 1/2"	100	100
3"	100	100
4"	100	100

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LEAD FITTINGS

ULCO NON-SIPHON LEAD TRAPS

Ulico Non-Siphon traps are made of drawn lead. Both the inlet and outlet are extruded as in the ball or anti-siphoning feature which is then spun to size and lead-burned in place. These traps are ruggedly constructed and highly efficient.

In ordering, specify size, style and weight division. The dimension scale for these traps is the same as for regular traps.

PRICE LIST

ULCO NON-SIPHON LEAD TRAPS

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DRUM TRAPS



Our drum traps are made from pure, refined lead, drawn and then spun to insure a smooth, seamless wall of uniform thickness. They are furnished in a variety of patterns with screws of either plain brass, polished brass, nickel-plated or chromium-plated finishes.

In ordering drum hoops, state the style by number, the weight division, diameter and length of body and the screw finish.

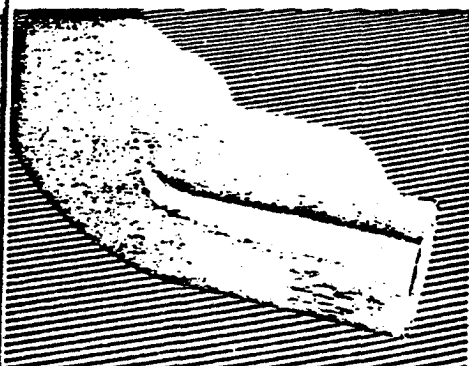


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LEAD FITTINGS

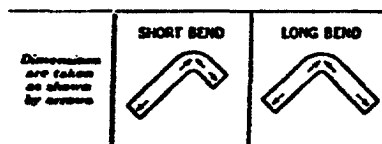
LEAD BENDS



We manufacture a complete assortment of lead bends to meet every modern building requirement. All bends are extruded under high pressure from refined lead only. They are uniform in wall thickness and true to size.

In ordering, specify weight division, inside diameter, type of inlet and length of outlet.

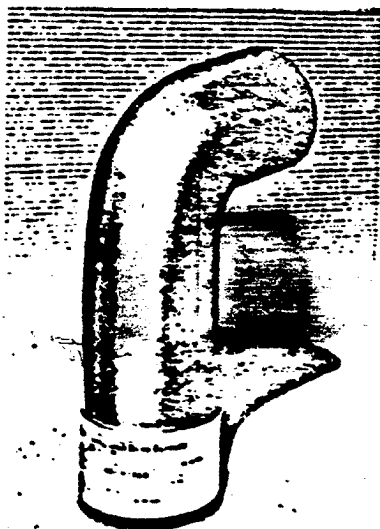
DIMENSION SCALE FOR LEAD BENDS



Size	Form to Feet	Form to Feet
1/2 in.	1/2 in.	1/2 in.
3/4 in.	3/4 in.	3/4 in.
1 in.	1 in.	1 in.
1 1/4 in.	1 1/4 in.	1 1/4 in.
1 1/2 in.	1 1/2 in.	1 1/2 in.
2 in.	2 in.	2 in.
2 1/2 in.	2 1/2 in.	2 1/2 in.
3 in.	3 in.	3 in.
3 1/2 in.	3 1/2 in.	3 1/2 in.
4 in.	4 in.	4 in.
4 1/2 in.	4 1/2 in.	4 1/2 in.
5 in.	5 in.	5 in.
5 1/2 in.	5 1/2 in.	5 1/2 in.
6 in.	6 in.	6 in.
6 1/2 in.	6 1/2 in.	6 1/2 in.
7 in.	7 in.	7 in.
7 1/2 in.	7 1/2 in.	7 1/2 in.
8 in.	8 in.	8 in.
8 1/2 in.	8 1/2 in.	8 1/2 in.
9 in.	9 in.	9 in.
9 1/2 in.	9 1/2 in.	9 1/2 in.
10 in.	10 in.	10 in.

COMBINATION (Lead and Iron) BENDS and FERRULES

Our combination bends and ferrules are carefully manufactured to insure ease of installation and a tight connection. They are fitted with a cast iron drive ferrule of the highest quality.



COMBINATION (Lead and Iron) FERRULES

Our combination ferrules come up to the same high standard as our bends and ferrules. Made only from first-grade metals, they can be depended upon to give long satisfactory service.

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LEAD FITTINGS

SHORT AND LONG BENDS - EXTENSION BENDS U. S. STANDARD PRICE LIST

	STANDARD (LARGEST) WEIGHT					SPECIAL (SMALLER) WEIGHT			EXTRA HEAVY WEIGHT				
Weights Per Hundred Feet In Pounds Diameter In Inches	1 1/2	2	3	4	5	1 1/2	2	3	4 1/2	5 1/2	6 1/2	7 1/2	8 1/2
Short Bend	20.25	30.50	40.75	51.00	61.25	20.25	30.50	40.75	51.00	61.25	71.50	81.75	92.00
Long Bend	20.25	30.50	40.75	51.00	61.25	20.25	30.50	40.75	51.00	61.25	71.50	81.75	92.00
Short Bend - 12" Radius	20.25	30.50	40.75	51.00	61.25	20.25	30.50	40.75	51.00	61.25	71.50	81.75	92.00
Short Bend - 15" Radius	20.25	30.50	40.75	51.00	61.25	20.25	30.50	40.75	51.00	61.25	71.50	81.75	92.00
Short Bend - 20" Radius	20.25	30.50	40.75	51.00	61.25	20.25	30.50	40.75	51.00	61.25	71.50	81.75	92.00
Long Bend - 12" Radius	20.25	30.50	40.75	51.00	61.25	20.25	30.50	40.75	51.00	61.25	71.50	81.75	92.00
Long Bend - 15" Radius	20.25	30.50	40.75	51.00	61.25	20.25	30.50	40.75	51.00	61.25	71.50	81.75	92.00
Long Bend - 20" Radius	20.25	30.50	40.75	51.00	61.25	20.25	30.50	40.75	51.00	61.25	71.50	81.75	92.00
For each inch of length over listed size, add	.04%	.04%	.04%	.04%	.04%	.04%	.04%	.04%	.04%	.04%	.04%	.04%	.04%

*Short bends are made dimensioned as listed on short bends of corresponding size; long bends are made as on long bends.

STOCK PACKAGES

A Barrel of Short Bend Contains	100	75	50	25	15	100	75	50	25	15	100	75	50	25	15
A Barrel of Long Bend Contains	100	75	50	25	15	100	75	50	25	15	100	75	50	25	15

COMBINATION (LEAD AND IRON) BENDS AND FERRULES U. S. STANDARD PRICE LIST

Lengths in Inches	12"	15"	20"	25"	30"	35"	40"	45"	50"	55"	60"	65"	70"	75"	80"
Standard Weight	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20	\$2.20
Extra Heavy Weight	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20

*Short bends are 1/2" long; the pipe end weighs 2 lbs. per standard foot.

*Long bends are 1/2" long; the pipe end weighs 2 lbs. per standard foot.

COMBINATION (LEAD AND IRON) FERRULES U. S. STANDARD PRICE LIST

	Lengths (In Inches)														
Standard Weight	4	6 1/2	8	10	12	14	16	18	20	22	24	26	28	30	32
Extra Heavy Weight	4	6 1/2	8	10	12	14	16	18	20	22	24	26	28	30	32

STOCK PACKAGES

A Barrel of Short Bend Contains	100	75	50	25	15	100	75	50	25	15	100	75	50	25	15
A Barrel of Long Bend Contains	100	75	50	25	15	100	75	50	25	15	100	75	50	25	15

*Short bends are 1/2" long; the pipe end weighs 2 lbs. per standard foot.

*Long bends are 1/2" long; the pipe end weighs 2 lbs. per standard foot.

ACCESSORIES

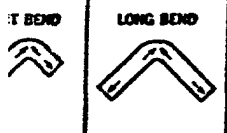
U. S. STANDARD PRICE LIST

Accessories	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	5 1/2"	6"	6 1/2"	7"	7 1/2"	8"	8 1/2"	9"	9 1/2"	10"	10 1/2"	11"	11 1/2"	12"
Standard Weight																										
Extra Heavy Weight																										

a complete assortment of
ery modern building require-
straded under high pressure
y. They are uniform in wall
size.

city weight division, inside
and length of outlet.

FOR LEAD BENDS



the End
Center to End
the End
Center to End



ION FERRULES

errules come up to the
our bends and ferrules.
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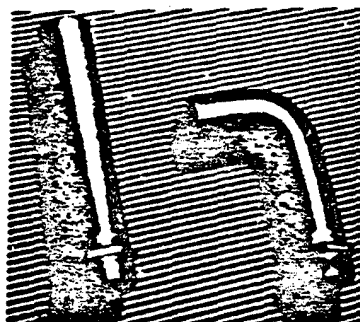
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NTI 113221

COMBINATION (Lead and Brass) SOLDERING NIPPLES

All loose parts on our combination heads and cutting nipples are accurately made from the best quality metal. The head portion is extruded and the two joined together in a neat, workmanlike manner.



COMBINATION (LEAD AND BRASS) SOLDERING NIPPLES U. S. STANDARD PRICE LIST

4	42500	5000	47500
5	43000	5000	48000
6	43500	5000	48500
7	44000	5000	49000
8	44500	5000	49500
9	45000	5000	50000
10	45500	5000	50500
11	46000	5000	51000
12	46500	5000	51500
13	47000	5000	52000
14	47500	5000	52500
15	48000	5000	53000
16	48500	5000	53500
17	49000	5000	54000
18	49500	5000	54500
19	50000	5000	55000
20	50500	5000	55500
21	51000	5000	56000
22	51500	5000	56500
23	52000	5000	57000
24	52500	5000	57500
25	53000	5000	58000
26	53500	5000	58500
27	54000	5000	59000
28	54500	5000	59500
29	55000	5000	60000
30	55500	5000	60500
31	56000	5000	61000
32	56500	5000	61500
33	57000	5000	62000
34	57500	5000	62500
35	58000	5000	63000
36	58500	5000	63500
37	59000	5000	64000
38	59500	5000	64500
39	60000	5000	65000
40	60500	5000	65500
41	61000	5000	66000
42	61500	5000	66500
43	62000	5000	67000
44	62500	5000	67500
45	63000	5000	68000
46	63500	5000	68500
47	64000	5000	69000
48	64500	5000	69500
49	65000	5000	70000
50	65500	5000	70500
51	66000	5000	71000
52	66500	5000	71500
53	67000	5000	72000
54	67500	5000	72500
55	68000	5000	73000
56	68500	5000	73500
57	69000	5000	74000
58	69500	5000	74500
59	70000	5000	75000
60	70500	5000	75500
61	71000	5000	76000
62	71500	5000	76500
63	72000	5000	77000
64	72500	5000	77500
65	73000	5000	78000
66	73500	5000	78500
67	74000	5000	79000
68	74500	5000	79500
69	75000	5000	80000
70	75500	5000	80500
71	76000	5000	81000
72	76500	5000	81500
73	77000	5000	82000
74	77500	5000	82500
75	78000	5000	83000
76	78500	5000	83500
77	79000	5000	84000
78	79500	5000	84500
79	80000	5000	85000
80	80500	5000	85500
81	81000	5000	86000
82	81500	5000	86500
83	82000	5000	87000
84	82500	5000	87500
85	83000	5000	88000
86	83500	5000	88500
87	84000	5000	89000
88	84500	5000	89500
89	85000	5000	90000
90	85500	5000	90500
91	86000	5000	91000
92	86500	5000	91500
93	87000	5000	92000
94	87500	5000	92500
95	88000	5000	93000
96	88500	5000	93500
97	89000	5000	94000
98	89500	5000	94500
99	90000	5000	95000
100	90500	5000	95500

**COMBINATION (LEAD AND BRASS) BENDS AND SOLDERING NIPPLES
U. S. STANDARD PRICE LIST**

[illegible]

STEEL PRINCE OF SOLIDERS TITLES

SECRET

LEAD PIPE

for water service and plumbing

LEAD PIPE for water service and plumbing

Lead pipe is widely used for water service and the waste and vent systems in plumbing. Among those responsible for the installation of such systems—water works engineers and the plumbing trade generally—lead pipe has long been recognized as ideal for the purpose.

For the underground piping which connects a residence or building with the water main, lead pipe has many advantages to recommend it. It resists soil corrosion and is less subject to perforation. Having smooth interior walls and a high hydraulic efficiency, it offers a minimum of resistance

to water flow. Being pliant and flexible, it adjusts itself to ground settlement and, if the water becomes, is less likely to burst because it can expand slightly with the expanding water.

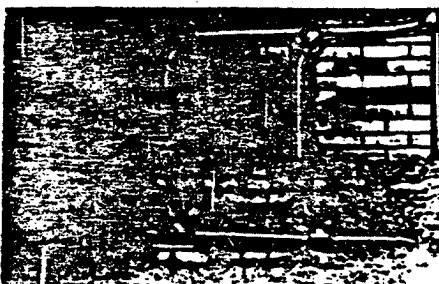
For the supply and waste systems inside a building, lead pipe is equally advantageous. Furnished in long continuous lengths, it is readily bent around corners and obstacles making fewer joints necessary. Frequent joints tend to impede water flow. Being flexible, lead pipe is less likely to be damaged by vibration or building settlement. Furthermore, lead pipe does not clog from rusting,

ADVANTAGES OF LEAD PIPE

- 1. Flexible**
Lead pipe bends readily.
- 2. Flexible**
Lead pipe is flexible . . . adjusts itself to building or ground settlement.
- 3. Fewer Joints Needed**
Lead pipe comes in long, continuous lengths . . . is readily bent around corners and obstacles. There are thus fewer joints to impede water flow.
- 4. Less Flexible From Pressure**
Lead pipe is less likely to burst lead pipe. It expands with the expanding water.
- 5. Hydraulic Efficiency**
Lead pipe offers less resistance to water flow than other types of metal pipe.
- 6. Non-Rusting**
Lead does not rust. Therefore lead pipe does not clog from this cause.
- 7. Longevity**
Water flowing through lead pipe does not corrode . . . will not stain expensive bath or toilet fixtures.
- 8. Resistant**
Lead pipe resists soil corrosion as well as the action of many acids and chemicals.
- 9. Long Service Value**
Standard lead installations have a high scrap value.
- 10. Low Cost Per Year**
The exceptional durability of lead pipe makes it cost per year of service lower than that of pipe made from any other material.



Above: Typical lead water service showing thousands of gallons of water flowing through the pipe. Below: Lead roughed-in for a battery of four houses.



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LEAD PIPE

for water service and plumbing

nor does it discolor water leading to the staining of expensive fixtures.

Many building codes require the use of lead pipe for the waste and vent systems. This is a satisfactory precaution based on the proven dependability of lead pipe—its record in countless installations of trouble-free service year in and year out.



Below: Uncoiling lead pipe in a trench before attaching to water main. Below: Banded lead pipe. Note the banding and spacing on the pipe. Right: A graphic illustration of lead's ductility and the advantage taken of it by a skilled plumber.



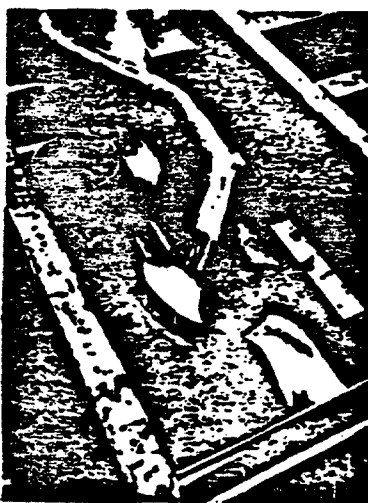
MANUFACTURE OF LEAD PIPE

Our lead pipe—sold under the Dutch Boy trademark—is manufactured by the extrusion process in modern hydraulic presses. In this process, the lead, at a carefully regulated temperature, is forced under heavy pressure through a die and around a core to form continuous lengths of seamless, smooth-bore pipe.

Only standard accepted brands of refined lead are used. Only skilled operators handle the presses. The result is lead pipe of the highest quality which can be depended upon to be uniform in wall thickness, of the correct weight per foot and free from imperfections which cause structural weakness.

SIZES AND WEIGHTS

Due to the nature of the extrusion process, lead pipe can be produced in a wide range of diameters and weights. A selected list of sizes is given on the second page following. This list conforms to the national standard of lead pipe sizes and weights.



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A-2

A-3

LEAD PIPE

for water service and plumbing

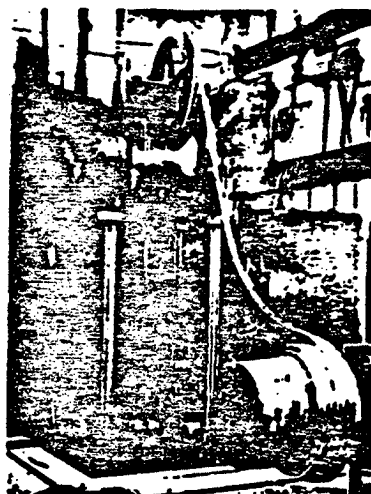
OF LEAD PIPE

is made under the Dutch Boy trademark by the extrusion process. In this process, fully regulated temperature, is pressure through a die and run continuous lengths of seamless.

Accepted brands of refined by skilled operators handle the is lead pipe of the highest quality—expanded upon to be uniform in the correct weight per foot and close which cause structural

CHITS

ture of the extrusion process, reduced in a wide range of diam. A selected list of sizes is given following. This list conforms to of lead pipe sizes and weights



Left: Modern hydraulic press extruding seamless, smooth-bore lead pipe. Above: This photo shows the marking which appears on lead pipe cast under the Dutch Boy trademark. Below: Coils of lead pipe before and after packing for shipment.



approved by the Lead Industries Association and adopted by most lead pipe manufacturers.

An outstanding feature of the approved list is that all sizes of pipe in the A, AA, and AAA classifications will easily withstand constant cold water pressures as follows:

A (or "Strong")	50 lbs.
AA (or "Extra Strong")	75 lbs.
AAA (or "Double Extra Strong")	100 lbs.

Moreover, the safe working pressures of these classified pipe often increased as the diameter increased.

MARKING

Markings shown on the accompanying list the 1/2" I.D. to 2" I.D., whether coiled or in length, is stamped as shown in the photograph above. This stamping, which includes the Lead Industries Association "Seal of Approval" and the National Lead Company name and trademark, appears approximately every thirteen inches. The I.D. and weight per foot are stamped on one end.

PACKING

Pipe, 1/2" I.D. to 1" I.D., and heavy wall pipe, 1 1/2" I.D. to 2" I.D., are shipped in coils, wrapped in straw and either burlap or heavy paper.

Light wall pipe, 1/2" I.D. to 2" I.D., and pipe above 2" I.D., are shipped in 10-foot lengths, unless otherwise specified.

Pipe, 1/2" I.D. to 2" I.D., is also furnished on reels. There is an extra charge for the reel which is refunded when the reel is returned.



NOTICE: If the film image is less clear than this notice, it is due to the quality of the document being filmed

LEAD PIPE

for water service and plumbing

LEAD PIPE SIZES AND WEIGHTS

The sizes and weights given in this table are those approved by the Lead Industries Association as standard for plumbing purposes.

Lead pipe in other weights and in sizes up to and including 12" I.D. can be furnished on short notice.

SIZE I.D.	CLASSIFICATION SAST	THICK. IN.	WGT. LBS.	WGT. PER FT. LBS.	SIZE I.D.	CLASSIFICATION SAST	THICK. IN.	WGT. LBS.	WGT. PER FT. LBS.
1/8"	E	.010	.000	0	1 1/2"	E	.010	1.700	5
	D	.010	.000	0		D	.010	1.700	5
	C	.010	.000	0		C	.010	1.800	6
	B	.010	.000	0		B	.010	1.800	6
	A	.010	.000	0		A	.010	1.800	6
	AA	.010	.000	0		AA	.010	2.000	8
	AAA	.010	.000	0		AAA	.010	2.272	11
1/4"	E	.010	.000	0	2"	D	.010	2.000	6
	D	.010	.000	0		C	.010	2.000	6
	C	.010	.000	0		B	.010	2.100	7
	B	.010	.000	0		A	.010	2.100	7
	A	.010	.000	0		AA	.010	2.400	10
	AA	.010	.000	0		AAA	.010	2.650	14
	AAA	.010	.000	0					
3/8"	E	.010	.000	0	2 1/2"	E	.010	2.300	7
	D	.010	.000	0		D	.010	2.300	7
	C	.010	.000	0		C	.010	2.300	7
	B	.010	.000	0		B	.010	2.400	8
	A	.010	.000	0		A	.010	2.400	8
	AA	.010	.000	0		AA	.010	2.700	11
	AAA	.010	.000	0		AAA	.010	3.000	15
1/2"	E	.010	.000	0	3"			2.50	8
	D	.010	.000	0				2.50	12
	C	.010	.000	0					
	B	.010	.000	0					
	A	.010	.000	0					
	AA	.010	.000	0					
	AAA	.010	.000	0					
5/8"	E	.010	.000	0	3 1/2"			2.70	9
	D	.010	.000	0				2.70	12
	C	.010	.000	0					
	B	.010	.000	0					
	A	.010	.000	0					
	AA	.010	.000	0					
	AAA	.010	.000	0					
3/4"	E	.010	.000	0	4"			2.90	10
	D	.010	.000	0				2.90	12
	C	.010	.000	0					
	B	.010	.000	0					
	A	.010	.000	0					
	AA	.010	.000	0					
	AAA	.010	.000	0					
1"	E	.010	.000	0	5"			3.20	12
	D	.010	.000	0				3.20	15
	C	.010	.000	0					
	B	.010	.000	0					
	A	.010	.000	0					
	AA	.010	.000	0					
	AAA	.010	.000	0					
1 1/4"	E	.010	.000	0	6"			3.50	14
	D	.010	.000	0				3.50	18
	C	.010	.000	0					
	B	.010	.000	0					
	A	.010	.000	0					
	AA	.010	.000	0					
	AAA	.010	.000	0					

LEAD
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NLI 113225

A-4

E-1

LEAD PIPE

for handling corrosive chemicals

LEAD PIPE for handling corrosive chemicals

See weights and in sizes up to 12" I.D. can be furnished on

PIPE SIZE	WGT. PER FT.	WGT. PER FT.	WGT. PER FT.
1/2"	1.740	3	
3/4"	1.770	3	8
1"	1.830	4	4
1 1/2"	1.932	5	
2"	1.990	6	6
2 1/2"	2.070	8	
3"	2.272	11	4
3 1/2"	2.404	14	
4"	2.490	15	8
4 1/2"	2.540	16	
5"	2.590	17	12
5 1/2"	2.690	19	8
6"	2.820	21	12
6 1/2"	2.900	22	
7"	2.940	23	12
7 1/2"	3.040	25	8
8"	3.140	26	12
8 1/2"	3.240	28	8
9"	3.340	29	12
9 1/2"	3.440	31	8
10"	3.540	32	12
10 1/2"	3.640	34	8
11"	3.740	35	12
11 1/2"	3.840	37	8
12"	3.940	38	12

Lead piping is standard equipment in industrial plants where the manufacturing process involves the use of corrosive chemicals or gases. Typical large users are the oil refineries, metal refineries, acid plants, chemical companies, pulp and paper mills, rayon plants and the like.

The special property of lead pipe which makes it virtually indispensable in industrial equipment is corrosion resistance. Its outstanding use, because of this property, is in the manufacture and transportation of sulphuric acid. However, lead pipe has been and is being used successfully to handle a large number of other industrial chemicals and gases, often under severe service and temperature conditions.

In addition to corrosion resistance, the pliability of lead pipe is an advantage in chemical equipment. It allows easy working, such as bending, and the fabrication of the pipe into coils or other special apparatus.

Since the cost of extruding lead pipe is not high, a major portion of the initial cost is for the metal itself. Thus discarded lead piping has a high scrap value, an economy factor which should not be overlooked when purchasing pipe.

GRADES OF LEAD PIPE

Several types of lead pipe are available for industrial use. All are made either of chemical lead or of chemical lead to which small amounts



Shows Lead pipe line for handling a salt solution. Pipes are insulated to facilitate temperature control. Shows discharge pipe on the inside of a circular concrete mixing tank.

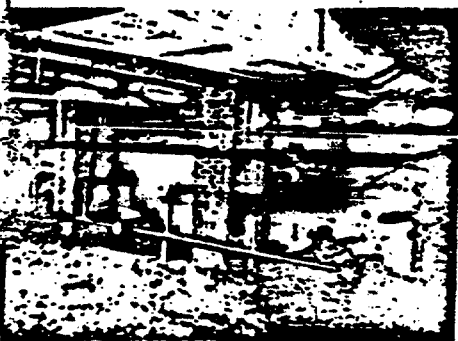
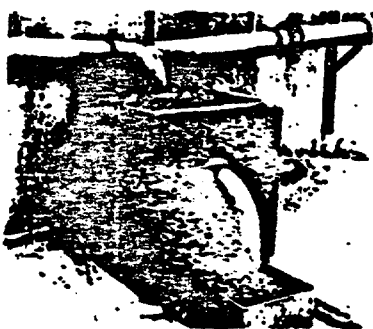
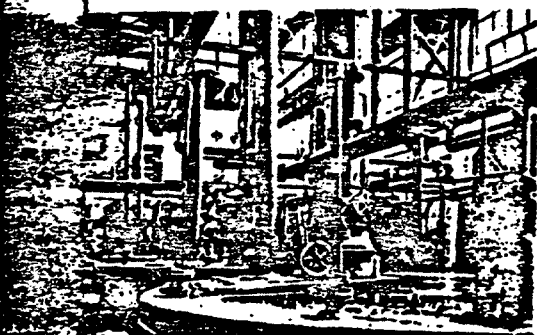


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NLI 113226

LEAD PIPE

for handling corrosive chemicals



of other metals have been added to induce hardness, higher acid-resistance under certain conditions, or some other desirable property. The term "chemical lead" refers to a grade of undensified lead containing small amounts of copper and nickel which practical experience has shown possesses unusual anti-corrosive properties.

The various types of lead pipe available differ greatly in mechanical strength, resistance to corrosion and other physical properties. If there is no previous service record to guide the selection for a particular installation, the industrial engineer should first determine, by means of tests or by consultation with the technical staff of National Lead Company, the most suitable type to use.

TELLURIUM LEAD PIPE*

This grade of pipe is made from prime chemical lead to which a small quantity of tellurium has been added. The addition is in the amount indicated by our extensive research on this alloy.

Lead containing tellurium has several outstanding properties. One is an improved corrosion resistance, particularly at the higher temperatures. Another is the capacity to work-harden. Tellurium lead—strengthened by bending, stretching or hammering—actually has a greater tensile strength than before. Still a third property is a greatly improved resistance to failure under vibratory stresses.

Tellurium lead pipe installations are successfully cutting costs in many industrial and chemical plants. A plotting concern recently reported that heating coils fabricated from tellurium lead lasted 100 per cent longer than the coils used previously. A chemical concern reported that a tellurium lead pipe line carrying alum liquor at 50 C. had performed satisfactorily for three years, whereas the type of pipe formerly used rusted and leaked after three months' service.

*See No. 1200,200

Top: Lead piping in connection with a battery of depolarizers at a large industrial plant. Center: Another view of the lead gas holder pipe shown on the preceding page. The carbon impurities are a dark green and with about lead. Bottom: Lead pipe line conveying a stream of lead-lime acid sludge and storage tanks.

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NLI 113227

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NLI 113228

B-2

B-3

LEAD PIPE

for handling corrosive chemicals

have been added to induce hard-
ness under certain condi-
tions. The term "lead pipe" refers to a grade of under-
standing small amounts of copper and
practical experience has shown
and anti-corrosive properties.

types of lead pipe available dif-
fer in mechanical strength, resistance to
other physical properties. If there
is no record to guide the selection
installation, the industrial engineer
must, by means of tests or by con-
sulting technical staff of National Lead
and suitable type to use.

LEAD PIPE

of pipe is made from prime chemi-
cal. A small quantity of tellurium has
been added in the amount indi-
cated in the amount of this alloy.

adding tellurium has several out-
comes. One is an improved corro-
sion resistance at the higher temper-
atures. Another is the capacity to work-hard-
en by stretching, stretching
actually has a greater tensile
strength. Still a third property is a
resistance to failure under vibra-
tion.

of pipe installations are occa-
sionally reported that tellurium lead
is superior to the lead used previously.
It is reported that a tellurium lead
pipe used for 50 C. had per-
sisted for three years, whereas the
lead used previously had failed after
one year.

TELLURIUM-ANTIMONIAL LEAD PIPE

Tellurium lead pipe is also available alloyed
with any specified antimonial content. As with
straight antimonial lead pipe, the standard is 6
per cent, and this alloy will be supplied unless
otherwise specified.

OTHER GRADES

Chemical Lead Pipe: Chemical lead pipe
is made only from standard accepted brands of
prime lead which conform to Grade II of the
A. S. T. M. standard specifications (B29-B39).

Antimonial Lead Pipe: Antimonial lead
pipe is made from prime chemical lead, alloyed
with any specified antimony content up to 10 per
cent. Most pipe of this grade contains 6 per cent
antimony which is standard in many plants.

Tin-Lined Lead Pipe: This grade, used
principally in brewing equipment, is made from
pure chemical lead with an adherent tin lining.
Stock sizes are 2" I.D. (10 cm. per foot) and 3/4"
I.D. (12 cm. per foot). Other sizes can be made
quickly on order.

SIZES AND WEIGHTS

Lead pipe, manufactured by National Lead
Company, is made in a wide range of sizes and
weights to fit every industrial need. A list of many
commonly used sizes and weights is given on pages
B-5 and B-6 following. All our pipe is guaranteed
to be of the exact composition specified, to be true
in size and weight and free from structural defects.

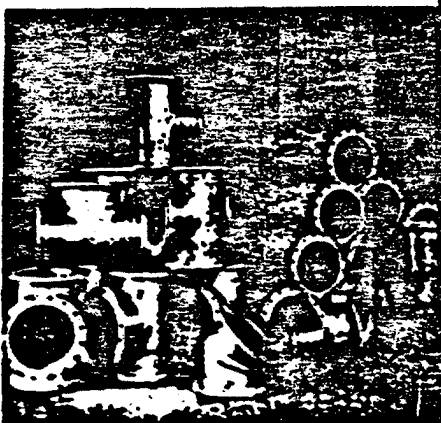
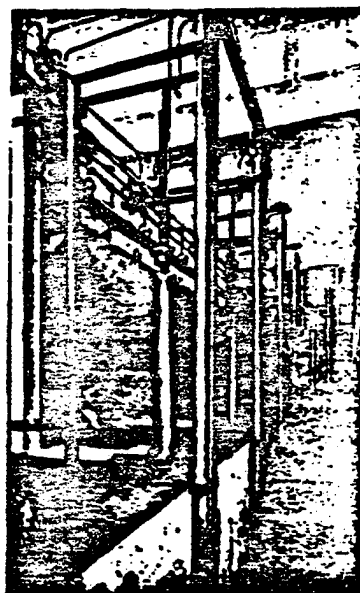
PACKING

Pipe, 1/2" I.D. to 1" I.D., and heavy wall pipe,
1 1/2" I.D. to 2" I.D., are shipped in coils, wrapped
in standard outer hush or heavy paper.

Light wall pipe, 1 1/2" I.D. to 2" I.D., and pipe
above 2" I.D., are shipped in 10-foot lengths, un-
less otherwise specified.

Lead pipe, 1/2" I.D. to 2" I.D., is also furnished on
stock.

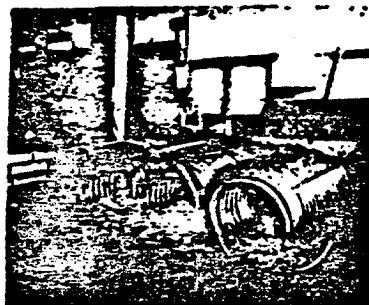
Top: A battery of lead-lined and moving tanks, together
with the lead piping and lead-lined valves necessary to
supply the system. Bottom: Six per cent antimonial
dressed pipe and fittings fabricated at one of our plants
for a southern paper company. The total shipment
weighed more than 25 tons.



connection with a battery of dis-
tributed plant. Center: Another view of
pipe when it is the providing pipe
in a drain system and with short
pipe line connecting a series of lead-
lined and storage tanks.

00055

for handling corrosive chemicals



Above: Special helical tread fastening rods coupled together for bracing. Below: Group of special fastening rods for use in an all-steel construction.

LEAD PIPE COILS



Lead Traps and Bonds: We manufacture lead traps and bonds, either of chemical lead or chemical lead alloyed with antimony. Lead bonds

Lead Spacer Blocks: For pipe ends erected in the field, it is a good plan to use fabricated lead spacer blocks or end supports. We manufacture lead spacer blocks in any size, composition or shape desired. In ordering, specify size, composition and shape.

DATA

WTJ 113229

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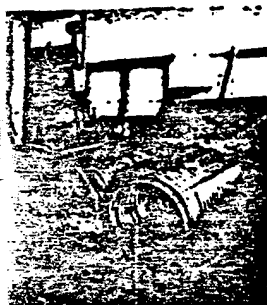
LEAD PIPE

for handling corrosive chemicals

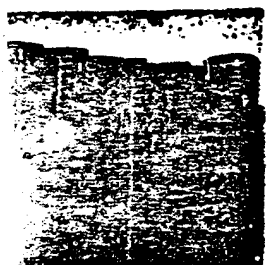
LEAD PIPE SIZES AND WEIGHTS

The sizes and weights given in this table are those used frequently in the chemical trade. Lead pipe in other sizes and weights can be furnished on short notice.

Size I.D.	Classification East West	Wt. O.D.	Av. Wt. per Ft. Lbs. Ozs.	Size I.D.	Classification East West	Wt. O.D.	Av. Wt. per Ft. Lbs. Ozs.		
1/2"	E AD .488 7 D XL .500 10 C L .500 12 B M .488 1 A S .488 4 AA XS .718 1 AAA XXS .744 1 SPEC. .744 2 SPEC. .744 2	1/2"	10 12 1 4 1 1 1 2	1 1/2"	A S 1.07 4 AA XS 1.24 5 AAA XXS 1.36 6	12 12 12	1 1/2"	E AD 1.34 3 D XL 1.70 5 C L 1.80 6 B M 1.87 6 A S 1.95 6 AA XS 2.04 7 SPEC. 2.04 7 AAA XXS 2.12 8	3 5 6 6 6 7 7 8
3/4"	E AD .60 .9 D XL .62 12 C L .72 1 B M .72 1 SPEC. .80 1 A S .80 1 AA XS .80 2 SPEC. .90 2 AAA XXS 1.00 3	3/4"	9 12 1 1 1 1 2 2 3	2"	D XL 2.00 4 C L 2.04 5 SPEC. 2.12 6 A S 2.10 6 AA XS 2.18 7 AAA XXS 2.26 8	9 12 6 6 7 8 8	2"	E AD 2.10 3 SPEC. 2.24 4 D XL 2.10 4 SPEC. 2.24 5 C L 2.30 6 B M 2.30 6 A S 2.40 7 SPEC. 2.40 7 AA XS 2.50 8 AAA XXS 2.54 8	3 4 4 5 6 7 8 8 8 8 8
1"	E AD .771 10 D XL .801 11 C L .801 12 B M .801 1 SPEC. .801 1 A S .801 1 AA XS .801 2 SPEC. .801 2 AAA XXS 1.00 3	1"	10 11 12 1 1 1 2 2 3	2 1/2"	E AD 2.10 3 SPEC. 2.24 4 D XL 2.10 4 SPEC. 2.24 5 C L 2.30 6 B M 2.30 6 A S 2.40 7 SPEC. 2.40 7 AA XS 2.50 8 AAA XXS 2.54 8	10 11 12 1 1 1 2 2 3	2 1/2"	E AD 2.10 3 SPEC. 2.24 4 D XL 2.10 4 SPEC. 2.24 5 C L 2.30 6 B M 2.30 6 A S 2.40 7 SPEC. 2.40 7 AA XS 2.50 8 AAA XXS 2.54 8	3 4 4 5 6 7 8 8 8 8 8
1 1/4"	E AD .900 1 D XL .900 1 C L .900 1 B M .900 1 SPEC. .900 1 A S .900 1 AA XS .900 1 SPEC. .900 1 AAA XXS .900 1	1 1/4"	1 1 1 1 1 1 1 1 1	3"	E AD 2.10 3 SPEC. 2.24 4 D XL 2.10 4 SPEC. 2.24 5 C L 2.30 6 B M 2.30 6 A S 2.40 7 SPEC. 2.40 7 AA XS 2.50 8 AAA XXS 2.54 8	1 1 1 1 1 1 1 1 1	3"	E AD 2.10 3 SPEC. 2.24 4 D XL 2.10 4 SPEC. 2.24 5 C L 2.30 6 B M 2.30 6 A S 2.40 7 SPEC. 2.40 7 AA XS 2.50 8 AAA XXS 2.54 8	3 4 4 5 6 7 8 8 8 8 8
1 1/2"	E AD 1.000 1 D XL 1.000 1 C L 1.000 1 B M 1.000 1 SPEC. 1.000 1 A S 1.000 1 AA XS 1.000 1 SPEC. 1.000 1 AAA XXS 1.000 1	1 1/2"	1 1 1 1 1 1 1 1 1	3 1/2"	E AD 2.10 3 SPEC. 2.24 4 D XL 2.10 4 SPEC. 2.24 5 C L 2.30 6 B M 2.30 6 A S 2.40 7 SPEC. 2.40 7 AA XS 2.50 8 AAA XXS 2.54 8	1 1 1 1 1 1 1 1 1	3 1/2"	E AD 2.10 3 SPEC. 2.24 4 D XL 2.10 4 SPEC. 2.24 5 C L 2.30 6 B M 2.30 6 A S 2.40 7 SPEC. 2.40 7 AA XS 2.50 8 AAA XXS 2.54 8	3 4 4 5 6 7 8 8 8 8 8
2"	E AD 1.200 1 D XL 1.200 1 C L 1.200 1 B M 1.200 1 SPEC. 1.200 1 A S 1.200 1 AA XS 1.200 1 SPEC. 1.200 1 AAA XXS 1.200 1	2"	1 1 1 1 1 1 1 1 1	4"	E AD 2.10 3 SPEC. 2.24 4 D XL 2.10 4 SPEC. 2.24 5 C L 2.30 6 B M 2.30 6 A S 2.40 7 SPEC. 2.40 7 AA XS 2.50 8 AAA XXS 2.54 8	1 1 1 1 1 1 1 1 1	4"	E AD 2.10 3 SPEC. 2.24 4 D XL 2.10 4 SPEC. 2.24 5 C L 2.30 6 B M 2.30 6 A S 2.40 7 SPEC. 2.40 7 AA XS 2.50 8 AAA XXS 2.54 8	3 4 4 5 6 7 8 8 8 8 8



Shows Special lead test furnace with special lead test furnace. Shows Group of special heating coils for use in an all ordinary furnace.



In any desired size from 1 1/4" I.D. up to 6" I.D. Tests are furnished in zinc.

Coiler: We fabricate lead pipe and of any composition desired. In all cases to submit a blueprint, to-center dimensions, number of between turns and position and outlet.

or Blocks: For pipe ends created a good plan to use fabricated lead or end supports. We manufacture also in any size, composition or in coloring, specify size, compo-

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LEAD PIPE

for handling corrosive chemicals

LEAD PIPE SIZES AND WEIGHTS (Continued)

Size I.D.	Size O.D.	Avg. Wgt. per Ft. Lbs. Ozs.	Size I.D.	Size O.D.	Avg. Wgt. per Ft. Lbs. Ozs.
3/4"	1.00	4 8	1 1/2"	1.75	30
	1.06	5 0		1.81	32
	1.12	5 2		1.87	34
	1.18	5 4		1.93	36
	1.24	5 6		1.99	38
	1.30	5 8		2.05	40
	1.36	6 0		2.11	42
	1.42	6 2		2.17	44
	1.48	6 4		2.23	46
	1.54	6 6		2.29	48
	1.60	6 8		2.35	50
	1.66	7 0		2.41	52
	1.72	7 2		2.47	54
	1.78	7 4		2.53	56
	1.84	7 6		2.59	58
	1.90	7 8		2.65	60
	1.96	8 0		2.71	62
	2.02	8 2		2.77	64
	2.08	8 4		2.83	66
	2.14	8 6		2.89	68
	2.20	8 8		2.95	70
	2.26	9 0		3.01	72
	2.32	9 2		3.07	74
	2.38	9 4		3.13	76
	2.44	9 6		3.19	78
	2.50	9 8		3.25	80
	2.56	10 0		3.31	82
	2.62	10 2		3.37	84
	2.68	10 4		3.43	86
	2.74	10 6		3.49	88
	2.80	10 8		3.55	90
	2.86	11 0		3.61	92
	2.92	11 2		3.67	94
	2.98	11 4		3.73	96
	3.04	11 6		3.79	98
	3.10	11 8		3.85	100
	3.16	12 0		3.91	102
	3.22	12 2		3.97	104
	3.28	12 4		4.03	106
	3.34	12 6		4.09	108
	3.40	12 8		4.15	110
	3.46	13 0		4.21	112
	3.52	13 2		4.27	114
	3.58	13 4		4.33	116
	3.64	13 6		4.39	118
	3.70	13 8		4.45	120
	3.76	14 0		4.51	122
	3.82	14 2		4.57	124
	3.88	14 4		4.63	126
	3.94	14 6		4.69	128
	4.00	14 8		4.75	130
	4.06	15 0		4.81	132
	4.12	15 2		4.87	134
	4.18	15 4		4.93	136
	4.24	15 6		4.99	138
	4.30	15 8		5.05	140
	4.36	16 0		5.11	142
	4.42	16 2		5.17	144
	4.48	16 4		5.23	146
	4.54	16 6		5.29	148
	4.60	16 8		5.35	150
	4.66	17 0		5.41	152
	4.72	17 2		5.47	154
	4.78	17 4		5.53	156
	4.84	17 6		5.59	158
	4.90	17 8		5.65	160
	4.96	18 0		5.71	162
	5.02	18 2		5.77	164
	5.08	18 4		5.83	166
	5.14	18 6		5.89	168
	5.20	18 8		5.95	170
	5.26	19 0		6.01	172
	5.32	19 2		6.07	174
	5.38	19 4		6.13	176
	5.44	19 6		6.19	178
	5.50	19 8		6.25	180
	5.56	20 0		6.31	182
	5.62	20 2		6.37	184
	5.68	20 4		6.43	186
	5.74	20 6		6.49	188
	5.80	20 8		6.55	190
	5.86	21 0		6.61	192
	5.92	21 2		6.67	194
	5.98	21 4		6.73	196
	6.04	21 6		6.79	198
	6.10	21 8		6.85	200
	6.16	22 0		6.91	202
	6.22	22 2		6.97	204
	6.28	22 4		7.03	206
	6.34	22 6		7.09	208
	6.40	22 8		7.15	210
	6.46	23 0		7.21	212
	6.52	23 2		7.27	214
	6.58	23 4		7.33	216
	6.64	23 6		7.39	218
	6.70	23 8		7.45	220
	6.76	24 0		7.51	222
	6.82	24 2		7.57	224
	6.88	24 4		7.63	226
	6.94	24 6		7.69	228
	7.00	24 8		7.75	230
	7.06	25 0		7.81	232
	7.12	25 2		7.87	234
	7.18	25 4		7.93	236
	7.24	25 6		7.99	238
	7.30	25 8		8.05	240
	7.36	26 0		8.11	242
	7.42	26 2		8.17	244
	7.48	26 4		8.23	246
	7.54	26 6		8.29	248
	7.60	26 8		8.35	250
	7.66	27 0		8.41	252
	7.72	27 2		8.47	254
	7.78	27 4		8.53	256
	7.84	27 6		8.59	258
	7.90	27 8		8.65	260
	7.96	28 0		8.71	262
	8.02	28 2		8.77	264
	8.08	28 4		8.83	266
	8.14	28 6		8.89	268
	8.20	28 8		8.95	270
	8.26	29 0		9.01	272
	8.32	29 2		9.07	274
	8.38	29 4		9.13	276
	8.44	29 6		9.19	278
	8.50	29 8		9.25	280
	8.56	30 0		9.31	282
	8.62	30 2		9.37	284
	8.68	30 4		9.43	286
	8.74	30 6		9.49	288
	8.80	30 8		9.55	290
	8.86	31 0		9.61	292
	8.92	31 2		9.67	294
	8.98	31 4		9.73	296
	9.04	31 6		9.79	298
	9.10	31 8		9.85	300
	9.16	32 0		9.91	302
	9.22	32 2		9.97	304
	9.28	32 4		10.03	306
	9.34	32 6		10.09	308
	9.40	32 8		10.15	310
	9.46	33 0		10.21	312
	9.52	33 2		10.27	314
	9.58	33 4		10.33	316
	9.64	33 6		10.39	318
	9.70	33 8		10.45	320
	9.76	34 0		10.51	322
	9.82	34 2		10.57	324
	9.88	34 4		10.63	326
	9.94	34 6		10.69	328
	10.00	34 8		10.75	330
	10.06	35 0		10.81	332
	10.12	35 2		10.87	334
	10.18	35 4		10.93	336
	10.24	35 6		10.99	338
	10.30	35 8		11.05	340
	10.36	36 0		11.11	342
	10.42	36 2		11.17	344
	10.48	36 4		11.23	346
	10.54	36 6		11.29	348
	10.60	36 8		11.35	350
	10.66	37 0		11.41	352
	10.72	37 2		11.47	354
	10.78	37 4		11.53	356
	10.84	37 6		11.59	358
	10.90	37 8		11.65	360
	10.96	38 0		11.71	362
	11.02	38 2		11.77	364
	11.08	38 4		11.83	366
	11.14	38 6		11.89	368
	11.20	38 8		11.95	370
	11.26	39 0		12.01	372
	11.32	39 2		12.07	374
	11.38	39 4		12.13	376
	11.44	39 6		12.19	378
	11.50	39 8		12.25	380
	11.56	40 0		12.31	382
	11.62	40 2		12.37	384
	11.68	40 4		12.43	386
	11.74	40 6		12.49	388
	11.80	40 8		12.55	390
	11.86	41 0		12.61	392
	11.92	41 2		12.67	394
	11.98	41 4		12.73	396
	12.04	41 6		12.79	398
	12.10	41 8		12.85	400
	12.16	42 0		12.91	402
	12.22	42 2		12.97	404
	12.28	42 4		13.03	406
	12.34	42 6		13.09	408
	12.40	42 8		13.15	410
	12.46	43 0		13.21	412
	12.52	43 2		13.27	414
	12.58	43 4		13.33	416
	12.64	43 6		13.39	418
	12.70	43 8		13.45	420
	12.76	44 0		13.51	422
	12.82	44 2		13.57	424
	12.88	44 4		13.63	426
	12.94	44 6		13.69	428
	13.00	44 8		13.75	430
	13.06	45 0		13.81	432
	13.12	45 2		13.87	434
	13.18	45 4		13.93	436
	13.24	45 6		13.99	438
	13.30	45 8		14.05	440
	13.36	46 0		14.11	442
	13.42	46 2		14.17	444
	13.48	46 4		14.23	446
	13.54	46 6		14.29	448
	13.60	46 8		14.35	450
	13.66	47 0		14.41	452
	13.72	47 2		14.47	454
	13.78	47 4		14.53	456
	13.84	47 6		14.59	458
	13.90	47 8		14.65	460
	13.96	48 0		14.71	462
	14.02	48 2		14.77	464
	14.08	48 4		14.83	466
	14.14	48 6		14.89	468
	14.20	48 8		14.95	470
	14.26	49 0		15.01	472
	14.32	49 2		15.07	474
	14.38	49 4		15.13	476
	14.44	49 6		15.19	478
	14.50	49 8		15.25	480
	14.56	50 0		15.31	482
	14.62	50 2		15.37	484
	14.68	50 4		15.43	486
	14.74	50 6		15.49	488
	14.80	50 8		15.55	490
	14.86	51 0		15.61	492
	14.92	51 2		15.67	494
	14.98	51 4		15.73	496
	15.04	51 6		15.79	498
	15.10	51 8		15.85	500
	15.16	52 0		15.91	502
	15.22	52 2		15.97	504
	15.28	52 4		16.03	506
	15.34	52 6		16.09	508
	15.40	52 8		16.15	510
	15.46	53 0		16.21	512
	15.52	53 2		16.27	514
	15.				

SHEET LEAD

SHEET LEAD

Sheet lead is produced by rolling or milling. Its manufacture involves first the casting of large slabs, several inches thick, from pigs of pure lead or a desired lead alloy. These slabs are then rolled, either hot or cold depending upon the composition of the lead, between steel rollers to a specified thickness.

For many years, we have been the nation's leading supplier of high quality sheet lead. Our product is made only from standard accepted brands of prime lead and lead alloys. It is guaranteed to be exactly as specified with respect to thickness or v-right and to be free from irregularities, laminations and other defects.

SIZES AND WEIGHTS

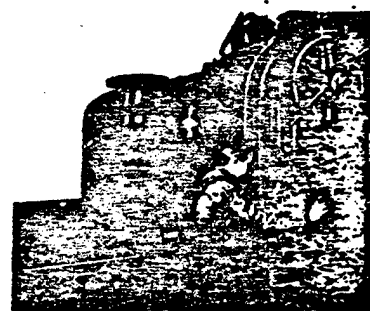
The standard size for milled sheet lead, weighing three pounds per square foot or over, is 36" wide by 20' long. The standard size for sheet lead weighing less than three pounds per square foot is 4' to 8' wide by 15' long. However, we are able to furnish sheets on short orders which are considerably larger in width and length than these standard sizes. The maximum sizes are given in the table on the following page.

Sheet lead may be specified either by its weight per square foot or its thickness. There is a rough mathematical correlation between the two. Pure lead sheet weighing one pound per square foot is $\frac{1}{4}$ " thick. Except in the larger sizes, each additional pound per square foot adds $\frac{1}{16}$ " to the thickness.

Commonly used weights of sheet lead are shown in the table on the next page. Other weights per square foot can be rolled on short notice.

DIRECTIONS FOR ORDERING

In ordering sheet lead, specify the type of lead wanted, the weight per square foot or the thickness and the number and size of the sheets. In ordering



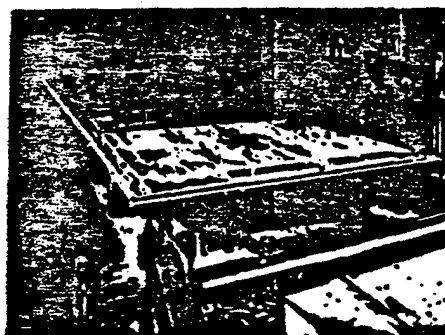
Our new manufacture process sheet lead of accurate thickness and weight.

sheet lead in other than regular stock sizes, please follow the instructions below:

If plain rectangular sheets are wanted, state clearly the width and length. In the case of irregular shape sheets, forward a sketch giving dimensions or send a drawing of the object to be lined or covered, stating clearly all dimensions.

PACKING

Unless otherwise specified, all sheet lead is shipped in rolls which are carefully packed in wooden slabs and fastened with steel straps, wires or rope.



View of a sheet lead rolling mill showing rollers which shape the lead, and cutting table in background.

Size (Inches)	Area Sq. Ft.	Weight Per Sq. Ft.
1/16	1.196	35
1/8	1.374	47
3/16	1.552	59
1/4	1.730	71
5/16	1.908	83
3/8	2.086	95
7/16	2.264	107
1/2	2.442	119
5/8	2.620	131
3/4	2.798	143
7/8	2.976	155
1	3.154	167
1 1/8	3.332	179
1 1/4	3.510	191
1 3/8	3.688	203
1 1/2	3.866	215
1 5/8	4.044	227
1 3/4	4.222	239
1 7/8	4.400	251
2	4.578	263
2 1/8	4.756	275
2 1/4	4.934	287
2 3/8	5.112	299
2 1/2	5.290	311
2 5/8	5.468	323
2 3/4	5.646	335
2 7/8	5.824	347
3	6.002	359
3 1/8	6.180	371
3 1/4	6.358	383
3 3/8	6.536	395
3 1/2	6.714	407
3 5/8	6.892	419
3 3/4	7.070	431
3 7/8	7.248	443
4	7.426	455
4 1/8	7.604	467
4 1/4	7.782	479
4 3/8	7.960	491
4 1/2	8.138	503
4 5/8	8.316	515
4 3/4	8.494	527
4 7/8	8.672	539
5	8.850	551

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SHEET LEAD

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SHEET LEAD SIZES AND WEIGHTS

The weights given below apply to common lead only. Other types of lead, such as anti-radiation or hard lead, weigh slightly less for a given thickness.

Thickness Per Sq. Ft.	Actual Thickness	Avg. Thickness in Inches		Manufacturers
		Decimal	Fraction	
1/8		.0157	1/64	4x4F
1		.0156	1/64	6x6F
1 1/2		.0234	3/128	6x6F
2		.0312	1/32	7x7F
2 1/2		.0391	5/128	9x9F
3		.0469	3/64	10x10F
3 1/2		.0547	7/128	10x10F
4		.0625	1/16	10x10F
5		.0781	5/64	10x10F
6		.0938	3/32	10x10F, 11x11F 11x11F, 11x11F
8		.1250	1/8	11x11F 11x11F
10		.1562	5/32	11x11F 11x11F
12		.1875	3/16	11x11F 11x11F
14		.2188	7/32	11x11F 11x11F
16		.2500	1/4	11x11F 11x11F
20		.3125	5/16	11x11F 11x11F
24		.3750	3/8	11x11F 11x11F
28		.4375	7/16	11x11F 11x11F
32		.5000	1/2	11x11F 11x11F
36		.5625	9/16	11x11F 11x11F
40		.6250	5/8	11x11F 11x11F
48		.7500	3/4	11x11F

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SHEET LEAD

in building construction

SHEET LEAD in building construction

SHEET LEAD FOR ROOFING

One of the most important and, incidentally, one of the oldest uses of sheet lead is for roofing and related building purposes such as flashings, cornice coverings, gutter linings and the like.

The chief advantage for this purpose is permanence. Lead is non-rusting and more resistant to atmospheric corrosion than any other non-ferrous metal. Consequently, properly installed, sheet lead roofing and flashings rarely require repair or replacement.

Another advantage lies in appearance. After exposure to the weather, lead takes on a soft, gray patina which goes well with any architectural style. Moreover, lead roofs and flashings do not stain other building materials.



Below: Construction detail of the lead-covered dome of the New Jersey State Reformatory at Rahway, N. J. All seams shown, including those where the sheets join the bottom edge, are lapped to provide for expansion and contraction.

Right: General view of the Reformatory and its lead-covered dome. Nearly 75,000 pounds of sheet lead were required for this job.

Below: This photograph shows a lead-covered cornice and through-wall flashing. The cornice sheeting has been attached to the flashing with a lead-bridged seam.



The type of sheet lead most frequently specified for roofing and flashing is hard lead—an alloy of common lead and antimony. The distinct advantage gained by using hard lead lies in the fact that its weight is less than that of soft or common lead for a given thickness. Six per cent antimonial lead is approximately five per cent lighter than

various types of lead, such as anti-

Thickness	Standard Size
1/8"	4'x12'
1/4"	6'x24'
3/8"	8'x36'
1/2"	10'x48'
5/8"	12'x60'
3/4"	14'x72'
7/8"	16'x84'
1"	18'x96'
1 1/8"	20'x108'
1 1/4"	22'x120'
1 1/2"	24'x132'
1 3/4"	26'x144'
2"	28'x156'
2 1/4"	32'x168'
2 1/2"	34'x180'
2 3/4"	36'x192'
3"	38'x204'
3 1/4"	40'x216'
3 1/2"	42'x228'
3 3/4"	44'x240'
4"	46'x252'
4 1/4"	48'x264'
4 1/2"	50'x276'
4 3/4"	52'x288'
5"	54'x300'
5 1/4"	56'x312'
5 1/2"	58'x324'
5 3/4"	60'x336'
6"	62'x348'
6 1/4"	64'x360'
6 1/2"	66'x372'
6 3/4"	68'x384'
7"	70'x396'
7 1/4"	72'x408'
7 1/2"	74'x420'
7 3/4"	76'x432'
8"	78'x444'
8 1/4"	80'x456'
8 1/2"	82'x468'
8 3/4"	84'x480'
9"	86'x492'
9 1/4"	88'x504'
9 1/2"	90'x516'
9 3/4"	92'x528'
10"	94'x540'
10 1/4"	96'x552'
10 1/2"	98'x564'
10 3/4"	100'x576'
11"	102'x588'
11 1/4"	104'x600'
11 1/2"	106'x612'
11 3/4"	108'x624'
12"	110'x636'
12 1/4"	112'x648'
12 1/2"	114'x660'
12 3/4"	116'x672'
13"	118'x684'
13 1/4"	120'x696'
13 1/2"	122'x708'
13 3/4"	124'x720'
14"	126'x732'
14 1/4"	128'x744'
14 1/2"	130'x756'
14 3/4"	132'x768'
15"	134'x780'
15 1/4"	136'x792'
15 1/2"	138'x804'
15 3/4"	140'x816'
16"	142'x828'
16 1/4"	144'x840'
16 1/2"	146'x852'
16 3/4"	148'x864'
17"	150'x876'
17 1/4"	152'x888'
17 1/2"	154'x900'
17 3/4"	156'x912'
18"	158'x924'
18 1/4"	160'x936'
18 1/2"	162'x948'
18 3/4"	164'x960'
19"	166'x972'
19 1/4"	168'x984'
19 1/2"	170'x996'
19 3/4"	172'x1008'
20"	174'x1020'
20 1/4"	176'x1032'
20 1/2"	178'x1044'
20 3/4"	180'x1056'
21"	182'x1068'
21 1/4"	184'x1080'
21 1/2"	186'x1092'
21 3/4"	188'x1104'
22"	190'x1116'
22 1/4"	192'x1128'
22 1/2"	194'x1140'
22 3/4"	196'x1152'
23"	198'x1164'
23 1/4"	200'x1176'
23 1/2"	202'x1188'
23 3/4"	204'x1200'
24"	206'x1212'
24 1/4"	208'x1224'
24 1/2"	210'x1236'
24 3/4"	212'x1248'
25"	214'x1260'
25 1/4"	216'x1272'
25 1/2"	218'x1284'
25 3/4"	220'x1296'
26"	222'x1308'
26 1/4"	224'x1320'
26 1/2"	226'x1332'
26 3/4"	228'x1344'
27"	230'x1356'
27 1/4"	232'x1368'
27 1/2"	234'x1380'
27 3/4"	236'x1392'
28"	238'x1404'
28 1/4"	240'x1416'
28 1/2"	242'x1428'
28 3/4"	244'x1440'
29"	246'x1452'
29 1/4"	248'x1464'
29 1/2"	250'x1476'
29 3/4"	252'x1488'
30"	254'x1500'
30 1/4"	256'x1512'
30 1/2"	258'x1524'
30 3/4"	260'x1536'
31"	262'x1548'
31 1/4"	264'x1560'
31 1/2"	266'x1572'
31 3/4"	268'x1584'
32"	270'x1596'
32 1/4"	272'x1608'
32 1/2"	274'x1620'
32 3/4"	276'x1632'
33"	278'x1644'
33 1/4"	280'x1656'
33 1/2"	282'x1668'
33 3/4"	284'x1680'
34"	286'x1692'
34 1/4"	288'x1704'
34 1/2"	290'x1716'
34 3/4"	292'x1728'
35"	294'x1740'
35 1/4"	296'x1752'
35 1/2"	298'x1764'
35 3/4"	300'x1776'
36"	302'x1788'
36 1/4"	304'x1800'
36 1/2"	306'x1812'
36 3/4"	308'x1824'
37"	310'x1836'
37 1/4"	312'x1848'
37 1/2"	314'x1860'
37 3/4"	316'x1872'
38"	318'x1884'
38 1/4"	320'x1896'
38 1/2"	322'x1908'
38 3/4"	324'x1920'
39"	326'x1932'
39 1/4"	328'x1944'
39 1/2"	330'x1956'
39 3/4"	332'x1968'
40"	334'x1980'
40 1/4"	336'x1992'
40 1/2"	338'x2004'
40 3/4"	340'x2016'
41"	342'x2028'
41 1/4"	344'x2040'
41 1/2"	346'x2052'
41 3/4"	348'x2064'
42"	350'x2076'
42 1/4"	352'x2088'
42 1/2"	354'x2100'
42 3/4"	356'x2112'
43"	358'x2124'
43 1/4"	360'x2136'
43 1/2"	362'x2148'
43 3/4"	364'x2160'
44"	366'x2172'
44 1/4"	368'x2184'
44 1/2"	370'x2196'
44 3/4"	372'x2208'
45"	374'x2220'
45 1/4"	376'x2232'
45 1/2"	378'x2244'
45 3/4"	380'x2256'
46"	382'x2268'
46 1/4"	384'x2280'
46 1/2"	386'x2292'
46 3/4"	388'x2304'
47"	390'x2316'
47 1/4"	392'x2328'
47 1/2"	394'x2340'
47 3/4"	396'x2352'
48"	398'x2364'
48 1/4"	400'x2376'
48 1/2"	402'x2388'
48 3/4"	404'x2400'
49"	406'x2412'
49 1/4"	408'x2424'
49 1/2"	410'x2436'
49 3/4"	412'x2448'
50"	414'x2460'
50 1/4"	416'x2472'
50 1/2"	418'x2484'
50 3/4"	420'x2496'
51"	422'x2508'
51 1/4"	424'x2520'
51 1/2"	426'x2532'
51 3/4"	428'x2544'
52"	430'x2556'
52 1/4"	432'x2568'
52 1/2"	434'x2580'
52 3/4"	436'x2592'
53"	438'x2604'
53 1/4"	440'x2616'
53 1/2"	442'x2628'
53 3/4"	444'x2640'
54"	446'x2652'
54 1/4"	448'x2664'
54 1/2"	450'x2676'
54 3/4"	452'x2688'
55"	454'x2700'
55 1/4"	456'x2712'
55 1/2"	458'x2724'
55 3/4"	460'x2736'
56"	462'x2748'
56 1/4"	464'x2760'
56 1/2"	466'x2772'
56 3/4"	468'x2784'
57"	470'x2796'
57 1/4"	472'x2808'
57 1/2"	474'x2820'
57 3/4"	476'x2832'
58"	478'x2844'
58 1/4"	480'x2856'
58 1/2"	482'x2868'
58 3/4"	484'x2880'
59"	486'x2892'
59 1/4"	488'x2904'
59 1/2"	490'x2916'
59 3/4"	492'x2928'
60"	494'x2940'
60 1/4"	496'x2952'
60 1/2"	498'x2964'
60 3/4"	500'x2976'
61"	502'x2988'
61 1/4"	504'x3000'
61 1/2"	506'x3012'
61 3/4"	508'x3024'
62"	510'x3036'
62 1/4"	512'x3048'
62 1/2"	514'x3060'
62 3/4"	516'x3072'
63"	518'x3084'
63 1/4"	520'x3096'
63 1/2"	522'x3108'
63 3/4"	524'x3120'
64"	526'x3132'
64 1/4"	528'x3144'
64 1/2"	530'x3156'
64 3/4"	532'x3168'
65"	534'x3180'
65 1/4"	536'x3192'
65 1/2"	538'x3204'
65 3/4"	540'x3216'
66"	542'x3228'
66 1/4"	544'x3240'
66 1/2"	546'x3252'
66 3/4"	548'x3264'
67"	550'x3276'
67 1/4"	552'x3288'
67 1/2"	554'x3300'
67 3/4"	556'x3312'
68"	558'x3324'
68 1/4"	560'x3336'
68 1/2"	562'x3348'
68 3/4"	564'x3360'
69"	566'x3372'
69 1/4"	568'x3384'
69 1/2"	570'x3396'
69 3/4"	572'x3408'
70"	574'x3420'
70 1/4"	576'x3432'
70 1/2"	578'x3444'
70 3/4"	580'x3456'
71"	582'x3468'
71 1/4"	584'x3480'
71 1/2"	586'x3492'
71 3/4"	588'x3504'
72"	590'x3516'
72 1/4"	592'x3528'
72 1/2"	594'x3540'
72 3/4"	596'x3552'
73"	598'x3564'
73 1/4"	600'x3576'
73 1/2"	602'x3588'
73 3/4"	604'x3600'
74"	606'x3612'
74 1/4"	608'x3624'
74 1/2"	610'x3636'
74 3/4"	612'x3648'
75"	614'x3660'
75 1/4"	616'x3672'
75 1/2"	618'x3684'
75 3/4"	620'x3696'
76"	622'x3708'
76 1/4"	624'x3720'
76 1/2"	626'x3732'
76 3/4"	628'x3744'
77"	630'x3756'
77 1/4"	632'x3768'
77 1/2"	634'x3780'
77 3/4"	636'x3792'
78"	638'x3804'
78 1/4"	640'x3816'
78 1/2"	642'x3828'
78 3/4"	644'x3840'
79"	646'x3852'
79 1/4"	648'x3864'
79 1/2"	650'x3876'
79 3/4"	652'x3888'
80"	654'x3900'
80 1/4"	656'x3912'
80 1/2"	658'x3924'
80 3/4"	660'x3936'
81"	662'x3948'
81 1/4"	664'x3960'
81 1/2"	666'x3972'
81 3/4"	668'x3984'
82"	670'x3996'
82 1/4"	672'x4008'
82 1/2"	674'x4020'
82 3/4"	676'x4032'
83"	678'x4044'
83 1/4"	680'x4056'
83 1/2"	682'x4068'
83 3/4"	684'x4080'
84"	686'x4092'
84 1/4"	688'x4104'
84 1/2"	690'x4116'
84 3/4"	692'x4128'
85"	694'x4140'
85 1/4"	696'x4152'
85 1/2"	698'x4164'
85 3/4"	700'x4176'
86"	702'x4188'
86 1/4"	704'x4200'
86 1/2"	706'x4212'
86 3/4"	708'x4224'
87"	710'x4236'
87 1/4"	712'x4248'
87 1/2"	714'x4260'
87 3/4"	716'x4272'
88"	718'x4284'
88 1/4"	720'x4296'
88 1/2"	722'x4308'
88 3/4"	724'x4320'
89"	726'x4332'
89 1/4"	728'x4344'
89 1/2"	730'x4356'
89 3/4"	732'x4368'
90"	734'x4380'
90 1/4"	736'x4392'
90 1/2"	738'x4404'
90 3/4"	740'x4416'
91"	742'x4428'
91 1/4"	744'x4440'
91 1/2"	746'x4452'
91 3/4"	748'x4464'
92"	750'x4476'
92 1/4"	752'x4488'
92 1/2"	754'x4500'
92 3/4"	756'x4512'
93"	758'x4524'
93 1/4"	760'x4536'
93 1/2"	762'x4548'
93 3/4"	764'x4560'
94"	766'x4572'
94 1/4"	768'x4584'
94 1/2"	770'x4596'
94 3/4"	772'x4608'
95"	774'x4620'

SHEET LEAD

in building construction

common sheet lead.

The proper weight of sheet lead to use for roofing depends upon the nature of the installation. For gutter linings, cornice coverings, base

flashings and roofing purposes generally, three pound sheet is recommended. For cap flashings and bottom roofs where the battens are fairly close together, two and one-half pound sheet will suffice.

SHEET LEAD FOR X-RAY EQUIPMENT



Sheet Construction photo showing method of lining walls with sheet lead in room to be used for deep therapy X-ray work.
Left: View looking into the completed X-ray room showing general construction sheet.

A unique characteristic of lead is its ability to absorb short wave length radiations, such as X-rays and radium emanations. Because of this special quality, sheet lead is used extensively for wall and cabinet linings, protective aprons and other purposes in hospitals and laboratories where these powerful radiations are handled.

The proper thickness of lead to use varies, of course, with the quantity of radium present or the

voltage generated in the X-ray equipment. In a handbook dealing with X-ray protection issued by the U. S. Department of Commerce, sheet lead approximately 1/25" thick is recommended where peak voltages do not exceed 75 kv. As the voltage increases, the thickness increases in greater proportion, approaching 1 1/4" where 600 kv. are generated.

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E-2

E-3

SHEET LEAD

in building construction

For roofing purposes generally, three is recommended. For cap flashings on where the bottoms are fairly close and one-half pound sheet will suffice.

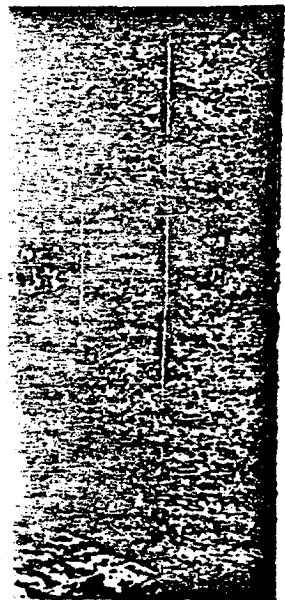


Photo showing method of lining of lead in seams to be used for shop through X-ray work. Lining into the completed X-ray room is under construction above.

used in the X-ray equipment. In a line with X-ray protection issued by the United States Department of Commerce, sheet lead—25" thick is recommended where do not exceed 75 kv. As the voltage thickness increases in greater protecting 1 1/4" where 600 kv. are

SHEET LEAD FOR SOUND-DEADENING AND VIBRATION ABSORPTION



Left: These doors to an N. Y. C. broadcasting studio, made from layers of wood and sheet lead, are said to reduce noise by an average of 20-25 decibels.

Above: Lead "anti-vibration pad" under a grillage in a New York hotel.

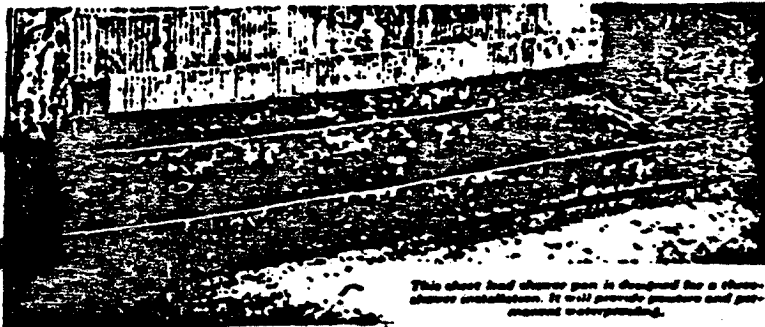
Lead does not ring when struck and is not easily set in vibration. This fact, combined with its mass, accounts for its successful use in deadening sound and vibration.

For vibration absorption, particularly under a building foundation, the sheet lead is usually formed into an "anti-vibration pad". These pads in most cases consist of two layers of eight pound sheet lead enclosing layers of asbestos board, the

whole being about an inch thick. Where leads are lighter, smaller pads are used. In some installations merely the sheet lead itself is sufficient.

For sound absorption, construction methods vary. In one installation—a broadcasting studio—the doors are laminated with three layers of wood and two layers of four pound sheet lead. In another, four pound sheet lead lines the walls, floor and ceiling of a laboratory interior.

SHEET LEAD FOR SHOWER BATH PANS



This sheet lead shower pan is designed for a shower installation. It will provide protection and permanent waterproofing.

In the time of antiquity, baths were lined with sheet lead to keep them water-tight. For the same reason, many modern shower stalls have a lead

pan at the base to keep water from seeping through the floor.

Lead shower pans are easy to install and per-

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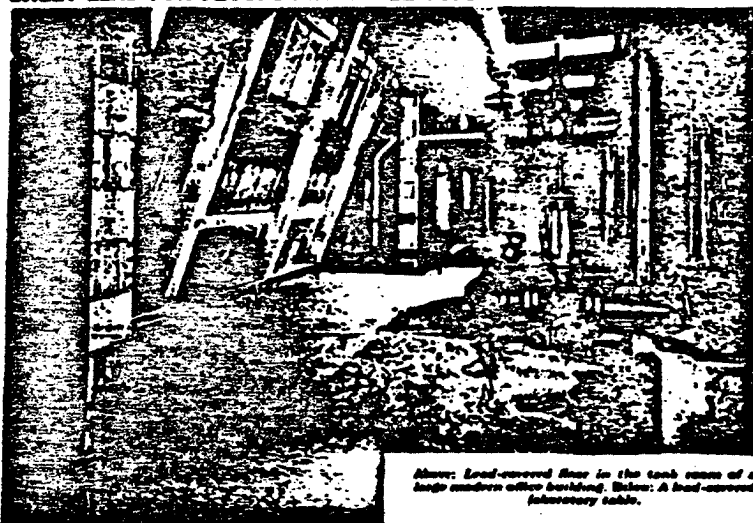
SHEET LEAD

In building construction

moment. The sheet lead dresses down evenly over the surface to be covered, leaving no voids to permit later settlement and possible damage to the finished tile floor. It is not damaged by building movement and permanently protects against the seepage of moisture.

For shower stall installation, six pound sheet lead is the usual specification. When placed in contact with concrete or mortar, the lead is painted with asphaltum or coated with tar to protect it during the initial period against attack by the fresh lime contained in those materials.

SHEET LEAD FOR FLOORS AND TABLE TOPS



Shown: Lead-covered floor in the tank room of a large modern office building. Below: A lead-covered laboratory table.

An interesting, although a rather specialized use of sheet lead is as a covering for floors and table tops in laboratories, hospitals and industrial plants.

Lead flooring has been found to give better and longer service where radioactive substances are handled. It has also been used successfully in plants handling toxic and explosive where it tends to prevent sparking. Lead table tops for industrial laboratories, besides being non-corrosive are said to reduce the breakage of glassware.



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L-4

F-3

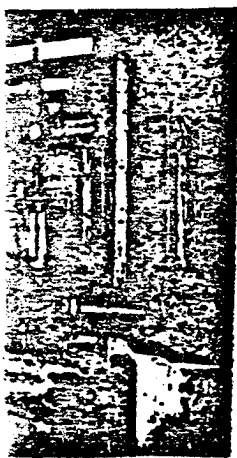
SHEET LEAD

for handling corrosive chemicals

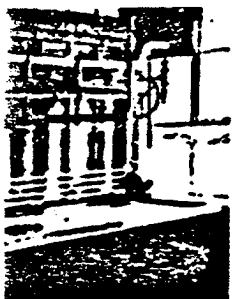
SHEET LEAD

for handling corrosive chemicals

shell installation, six pound sheet specification. When placed in concrete or mortar, the lead is painted or coated with tar to protect it from attack by the fresh concrete materials.

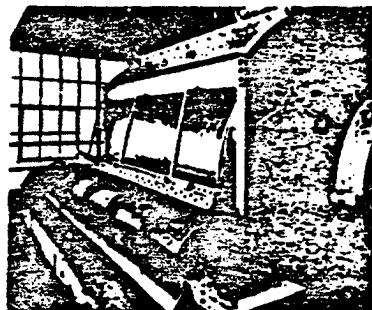


Lead lining in the tank room of a chemical plant. Below: A lead-covered laboratory table.



Because of its high corrosion resistance, sheet lead is virtually a standard material for the lining of vats, tanks, agitators and similar types of equipment in chemical and industrial plants. It is also employed extensively as a protective covering for apparatus subjected to corrosive fumes or acid splash.

Sheet lead has been used successfully with a wide variety of acids and chemicals. Of special note is its fine service record in the concentration and handling of sulphuric, phosphoric and hydrofluoric acids, for handling sulphite solutions in the



Above: Lead covered drum-type acid filter in a pigment manufacturing plant. The trough in the foreground is also formed from sheet lead. The rotating drum is made of perforated lead.



Left: Sheet lead lining being installed in a circular concrete settling tank. Note the vertical steel column which supports the lining. Three straps are being used to secure the lead. One strap has already been secured.

Below: Dehydrator stack connections in an acid plant. These flues, formed from sheet lead, carry steam containing sulphuric acid.

paper industry and for sulphation and chlorination processes in the organic chemicals industry.

In addition to corrosion resistance, sheet lead has other desirable properties which adapt it to industrial use. Being plastic and malleable, it is easily worked and can be readily shaped to conform to the interior or exterior of chemical apparatus. The low melting point of lead facilitates the "burning" of sheets to form continuous corrosion resistant surfaces. Finally, sheet lead's resistance to



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NLI 113238

NOTICE: If the film image is less clear than this notice, it is due to the quality of the document being filmed

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F-2

SHEET LEAD

for handling corrosive chemicals

very low initial cost and high salvage value make it more economical than many other materials that are commonly used.

GRADES OF SHEET LEAD

For construction purposes in chemical and industrial plants, we manufacture sheet lead of several different types. The standard grades furnished are chemical lead, tellurium lead, tellurium-antimony lead, antimonial lead, and crystalline lead, a reinforced chemical lead. Descriptions of these grades are given on the pages that follow.

Occasionally, sheet lead of a special composition

CHEMICAL LEAD SHEET

Chemical lead sheet is rolled from "chemical lead," a term used in the trade to designate a type of lead produced from refined Missouri ores.

Chemical lead is a practically pure lead, free from bismuth and characterized by the presence of about .05% copper. The copper is advantageous in several respects: it increases the normal corrosion resistance of lead; slows its recrystallization temperature; thus retarding grain growth; and gives lead a greater tensile strength and higher endurance limit or fatigue strength.

Large lead-sheet rolling mill. Inlet and outlet conveyors are also of lead.



tion is required for certain types of equipment. We are in a position to furnish these special leads, according to specifications, on short notice.

SELECTION OF SHEET LEAD

The various grades of sheet lead differ more or less widely in mechanical strength and corrosion resistance under a given set of conditions. If there is no previous service record to guide the selection of sheet lead for a particular installation, the industrial engineer should first determine, by means of actual plant tests or by consultation with the technical staff of National Lead Company, the grade which will best serve his purpose.

Chemical lead has been used successfully in the chemical industry for more than a generation. It may properly be called the base lead for acid handling purposes since virtually all other grades intended for industrial use are simply chemical lead, alloyed with varying quantities of other metals.

Our chemical lead sheet is rolled only from standard accepted brands of prime lead which conform to Grade II of the A.S.T.M. standard specifications (B29-35). It is furnished in any gauge from 1/8" up.

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F-3

SHEET LEAD

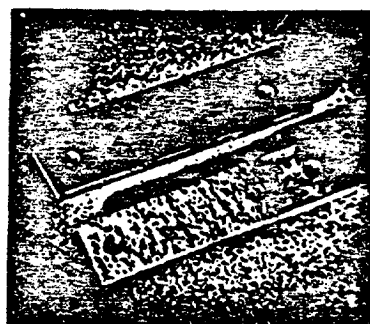
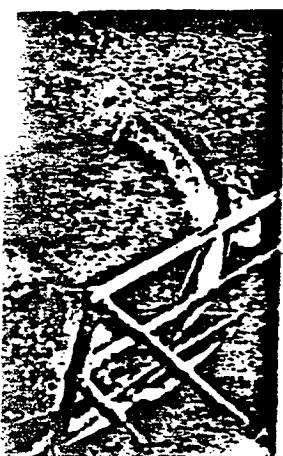
for handling corrosive chemicals

quired for certain types of equipment, a position to furnish these special leads, to specification, on short notice.

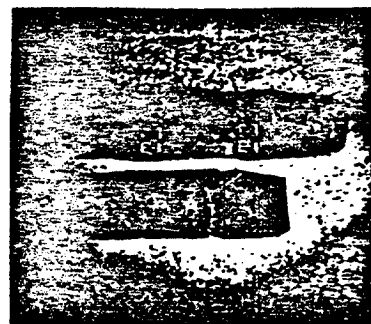
KNOWLEDGE OF SHEET LEAD
Various grades of sheet lead differ markedly in mechanical strength and corrosion under a given set of conditions. If previous service record to guide the sheet lead for a particular installation, the engineer should first determine, by actual plant tests or by consultation with all staff of National Lead Company, the lead which will best serve his purpose.

Lead has been used successfully in the chemical industry for more than a generation. It may be called the base lead for acid-resistance since virtually all other grades of industrial use are simply chemical lead, with varying quantities of other metals. Chemical lead sheet is rolled only from selected brands of prime lead which Grade II of the A.S.T.M. standard (B29-35). It is furnished in any size up to 12" wide.

There are also other grades of lead.



Strips of lead with and without tellurium content after immersion in 96% sulphuric acid at 305° C. for 3 minutes. Tellurium lead weight loss, 0.97%; other lead 5.11%.



Strips of lead, with and without tellurium content, stamped and then stretched. Stamping strengthened tellurium lead (top); weakened the other lead.

TELLURIUM LEAD SHEET

Tellurium lead sheet is rolled from a grade of lead obtained by adding a small quantity of tellurium (less than 0.1%) to primary chemical lead.

One outstanding feature resulting from the addition of tellurium is improved corrosion resistance—particularly under conditions where corrosion is most severe—at high temperatures, when vibration or mechanical strain is also present. In a flask test, specimens of tellurium lead and lead without tellurium were held at 305° C. in 96% sulphuric acid for three minutes. The lead containing tellurium showed a weight loss of only 0.97%; the other lead showed a weight loss of 5.11%.

Another quality which tellurium develops in lead is the capacity to work-harden—to strengthen under stress. Tellurium lead, toughened by mechanical action such as rolling, bending, stretching or hammering, actually has a greater tensile strength and resistance to fracture than before.

Tellurium lead's ability to strengthen itself has been of great practical value in plants where the nature of the operation or the design of the equipment puts an undue burden on the corrosion-resistant metal.

See, also, B29-35

SERVICE REPORTS ON TELLURIUM LEAD

An Explosives Manufacturer
"The rate of corrosion is about half that of ordinary lead."

A Chemical Company
"We estimate approximately 25 per cent longer life from tellurium lead as compared to other leads."

A Soap Manufacturer
"After 6 months' service, the tellurium lead lining in our tub shows no signs of cracking and very little if any corrosion, although subjected to 10 per cent boiling sulphuric acid."

A Paper Manufacturer
"Our tellurium lead lining—in service two years—still conforms to the tank shape as snugly as on installation. No bulging has occurred."

A Battery Manufacturer
"The 3-year old tellurium lead lining in our large sulphuric acid mixing tank is very smooth and uniform with no signs whatever of buckling, although the tank is used for cutting raw acid. Other linings have given us trouble by buckling and cracking."

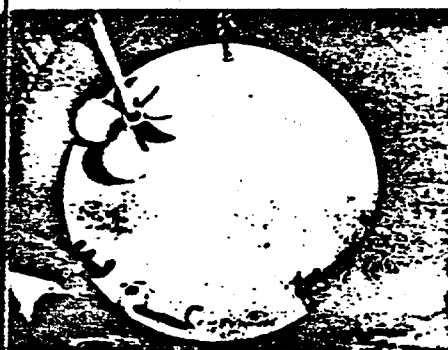
A Metal Refinery
"For the last two years, we have purchased all our lead requirements in tellurium lead. We had a considerable advantage in its stiffness and resistance to vibration crystallization."

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NLI 113240

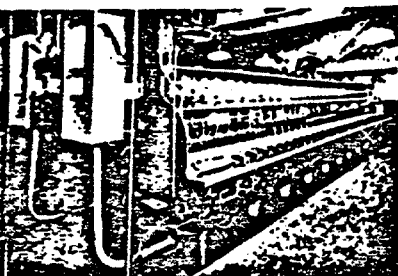
SWEET LEAD

for handling corrosive chemicals



resistant materials used. For example, tellurium lead tends to give longer service when employed as a lining in tanks where frequent and rapid heat changes occur. Movements of the lining due to expansion or contraction toughen the lead at the point of deformation. Subsequent movements due to expansion take place at other points over the lining, lessening the possibility of fatigue fracture.

Still another quality of tellurium lead—due in



Tellurium lead's longer life under vibratory stress makes it a suitable material for the linings of mixing tanks (left), for the coverings on pump operating machines (above), or for other equipment subject to vibration.

part to its capacity to work-harder—is a higher endurance limit and therefore a greatly improved resistance to fatigue under vibratory stresses. Where vibration exists, tellurium lead appears to set up an opposition to the vibration, toughening and strengthening itself to the point where it withstands considerable buckling or creeping.

Tellurium lead in sheet form is available in any gauge from $\frac{1}{16}$ " up.

TELLURIUM-ANTIMONIAL LEAD SHEET



Tellurium-antimonial lead sheet is made from tellurium lead, alloyed according to specification with various percentages of antimony. As in the case of straight antimonial lead sheet described in some detail on the opposite page, the antimony content usually specified is 6%.

In general, the addition of antimony to tellurium lead produces the same physical changes as those noted for straight antimonial lead. Harder and stiffer than straight tellurium lead, its better resistance to abrasion makes it suitable for linings subject to considerable erosion.

Tellurium-antimonial lead sheet is furnished in any gauge from $\frac{1}{16}$ " up.

Installing a tellurium-antimonial lead lining on an old machine requires in the particular installation, the depth of the tank and the relatively low expansion range indicated the use of a sheet lead hardened and softened with antimony.

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NLI 113242

SHEET LEAD

for handling corrosive chemicals

ANTIMONIAL LEAD SHEET

Antimonial or "hard" lead in sheet form is made from chemical lead, alloyed according to specification, with various percentages of antimony in order to obtain greater mechanical strength. The antimony contents usually specified range from 4% to 10%, 6% being specified in most cases.

The tensile strength of 6% antimonial lead is approximately twice that of chemical lead. This fact, combined with its greater hardness and stiffness, makes it a suitable material for use in tanks where the mechanical strain is severe or where linings are supported by a skeleton framework. Also antimonial lead has better abrasion resistance than chemical lead and is therefore better suited to installations where erosion is a problem. Finally, antimonial lead is more resistant to cutting or mechanical injury when hit or struck by harder

metals and tends to give better service as a lining in tanks where this condition exists.

Due to the fact that antimony lowers the melting point of lead from 620°F to 477°F, antimonial lead is more affected than is chemical lead by elevated temperatures. As the heat rises, it loses its mechanical strength more rapidly as well as its ability to resist acid attack. Antimonial lead is not recommended for use with temperatures above 220°F to 240°F.

Antimonial lead sheet is furnished in any gauge from 1/4" up. The specific gravity of antimonial lead is lower than that of chemical lead; consequently sheets of the same size and thickness are lighter. Antimonial lead sheet, containing from 4% to 6% of antimony, weighs approximately 3.3% less than chemical lead sheet.

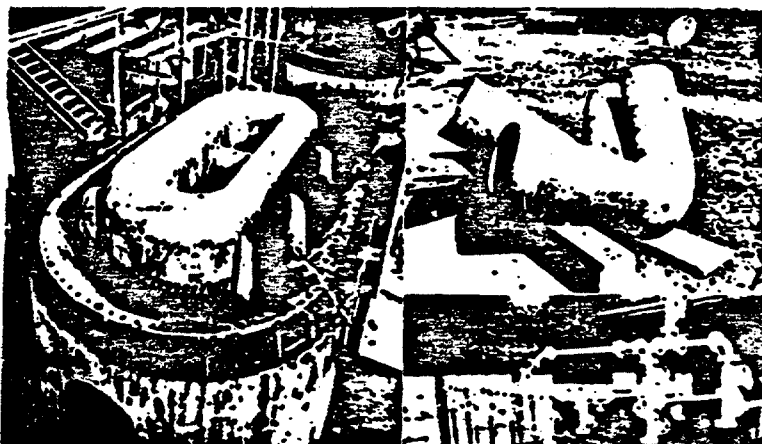


Diagram illustrating a tank in a refinery where antimonial lead sheet is used for lining. The tank is lined with antimonial lead sheet and the "water pipe" at center and the large diameter water pipe at right are shown in place of cover pipe, are located from heavy gauge antimonial lead sheet

Right: A battery of antimonial propeller tanks in a large mining plant. The tanks are lined with 6 gauge antimonial lead sheet



under life under vibratory stress makes ideal for the lining of mixing tanks, tanks on paper spinning machines, for equipment subject to vibration.

city to work-harder—is a higher and therefore a greatly improved class under vibratory stresses. exists, tellurium lead appears to stand to the vibration, toughening itself to the point where it will be buckling or creeping. of in sheet form is available in any

HEET

Antimonial lead sheet is made from red according to specification ranges of antimony. As in the antimonial lead sheet described in opposite page, the antimony added is 6%.

In addition of antimony to tellurium the same physical changes as wrought antimonial lead. Harder weight tellurium lead, its better use makes it suitable for linings of tanks.

Antimonial lead sheet is furnished in 1/4" up.

Antimonial lead sheet is an alloy of lead and antimony, the antimony being added in the form of antimony oxide, and the antimony being added in the form of antimony oxide, and the antimony being added in the form of antimony oxide.

SHEET LEAD

for handling corrosive chemicals

F-8

CRAWLPROOF SHEET LEAD

In tanks, vats or agitators where linings are subjected to a relatively severe strain, crawlproof sheet lead provides a greater measure of freedom from buckling, crawling and stailer movements than does chemical sheet lead.

Crawlproof lead is chemical sheet lead reinforced in the center with antimonial lead bars.

The bars are placed exactly like steel rods in reinforced concrete and firmly embedded so that no separation can take place.

Crawlproof sheet lead is furnished in any gauge from $\frac{1}{16}$ " up and in any size not exceeding $7\frac{1}{2}$ " in width by 35' in length. Each sheet is marked showing the direction of the reinforcing bars.

BURNING BAR OR ROD LEAD

An important feature of lead construction in chemical equipment is the welding or "burning" operation. Lead sheets are joined together by fusing them at a well-cleaned joint by means of a torch and a strip of lead known as a "burning bar". The latter is usually of the same composition as the sheets to be joined.

We manufacture burning bar in any desired composition and any desired shape. Usually burning bar is furnished in circular wire form, $\frac{3}{8}$ " in diameter, and is shipped on reels.

ANTIMONIAL LEAD ANODES

Lead anodes containing 6% antimony are used successfully in chromium-plating equipment.

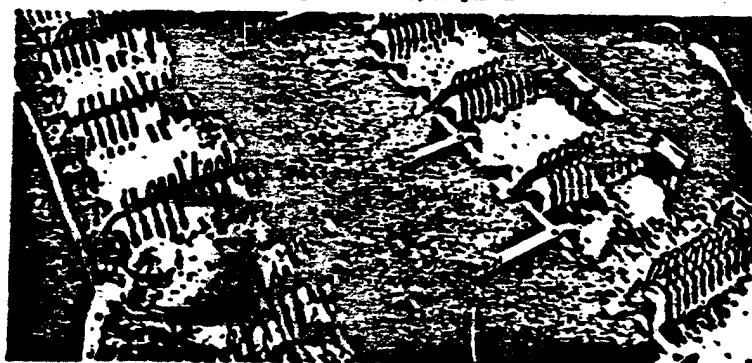
Experience has shown that they provide a uniform distribution of electrical current in the chromic acid bath and wear down evenly on both sides.

We manufacture antimonial lead anodes (or lead anodes of any other desired composition) in any size according to the customer's specification. The usual anode is in strip form, $\frac{1}{2}$ " to $\frac{3}{4}$ " thick, 4" to 6" wide and 20" to 36" long.

Our anodes are made only from pure metals, doubly refined. They are highly polished and free from all blemishes. They are packed flat, well protected for shipping.

In tanks where antimonial lead anodes are used, the tank lining should always be antimonial sheet lead, never chemical sheet lead.

Lead alloy anodes being used in a special process for silver-plating steel wire. The casting is applied on the wire leads through the lead-lead plating tanks.



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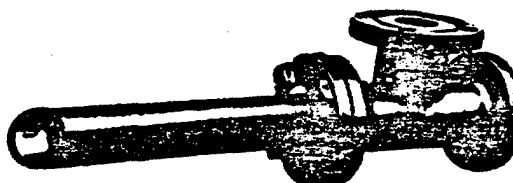
LEAD-LINED EQUIPMENT

LEAD-LINED EQUIPMENT

For some purposes in the chemical and acid industries, particularly where high pressure and temperatures, agitation or vacuum are involved, ordinary lead equipment lacks the mechanical

strength necessary for long service. For use under severe operating conditions of this nature, we manufacture a complete line of lead-lined and hard (i.e. antimonial) lead equipment.

LEAD-LINED PIPE AND FITTINGS



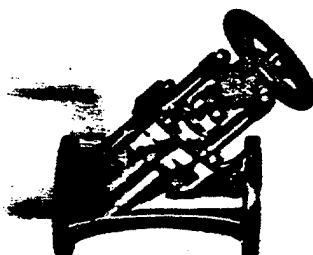
Lead-lined pipe is made either of steel or iron, lined with a seamless chemical lead tube, which has been extruded like ordinary lead pipe, and then inserted and bonded to the outer casing. This method insures a smooth interior in which friction is reduced to a minimum.

Our "United Tubed" chemical lead-lined pipe is a high quality product, guaranteed to have an absolutely uniform lining, free from pores or

defective spots. It is furnished in the same lengths as standard steel pipe, varying from 16 to 23 feet depending upon the diameter.

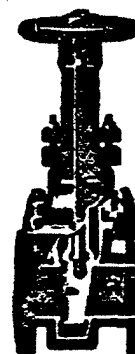
We also manufacture flanged lead-lined pipe and flanged fittings. These products are made up with a bonded chemical lead lining carried over the face of the recessed flange. This insures a positive lead-to-lead joint at each flange, eliminating any danger of leakage.

LEAD-LINED AND HARD LEAD VALVES



We manufacture acid valves of various types in both lead-lined and hard lead patterns. Our "United" lead-lined acid valves are

Left: "United" lead-lined chemical "Y" plug and seat flanged valve. Right: "United" chemical hard lead-lined valve type flanged and gate valve with carbon and steel to show inner construction.

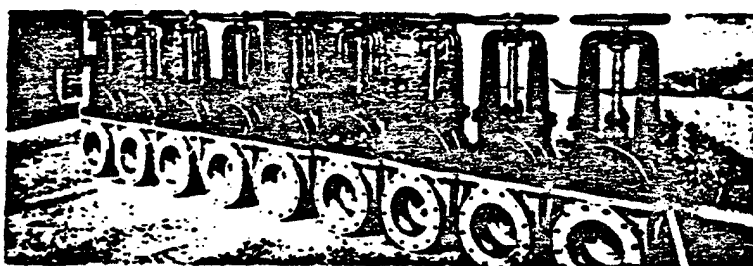


lined on all portions of the interior with hard lead and, being constructed of iron,

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NLI 113244

LEAD-LINED EQUIPMENT



A group of 10-inch hard lead wedge type gate valves for use in a sugar plant.

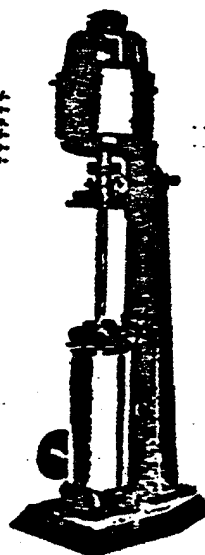
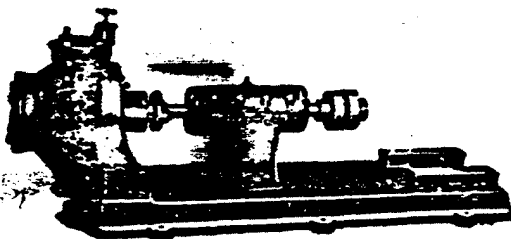
offer the strength of the cast iron valve with full acid resisting qualities. These valves are furnished in all required sizes and styles: gate, angle, check, diaphragm and free flow "T" type; also special valves according to specification.

"United" hard lead acid valves are furnished in the same patterns as lined valves. Each one has a body of hard lead with reinforcing line cast integral, affording maximum strength while reducing the weight to a minimum.

HARD LEAD ACID RESISTANT PUMPS

Where gravity flow is not available to convey solutions to succeeding stages of operation, acid resisting pumps must be used. We manufacture hard lead centrifugal pumps of two types, the open or "horizontal" pattern and the vertical shaft pump. An unusual feature of the vertical pump is the elimination of the packing gland. The host serves as both suction chamber and auxiliary supply tank. "United" horizontal pumps are self lubricating with large internal grease glands supplied by compression cups. The casing is of hard lead with the impeller of the same alloy cast around a reinforcing spider.

Below: "United" horizontal hard lead centrifugal acid pump. Right: "United" vertical hard lead centrifugal acid pump (pump-hoist type).



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LEAD-LINED EQUIPMENT



A battery of ten homogeneous lead-lined vertical steel blow down ready for shipment to a chemical plant.

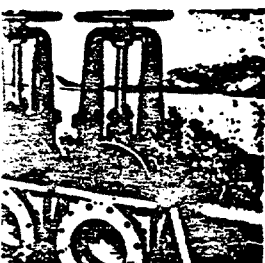
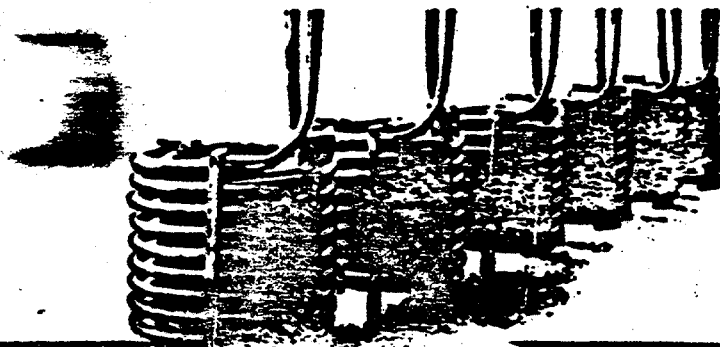
HOMOGENEOUS LEAD EQUIPMENT

Homogeneous lead-lined or lead-covered equipment, including such equipment as storage tanks, autoclaves, heating coils and jacketed pressure tanks of all descriptions, is designed for use under operating conditions where high steam pressure and vacuum are encountered, or where heat transfer is of importance. Equipment of this type manufactured by us is being successfully used by

many industrial plants throughout the country and time and again has demonstrated its superiority over the older types of loose lined equipment.

The outstanding feature of homogeneous lead or covered equipment is the firm adherence of the lead. By our method of manufacture, the lead lining or covering is inseparably bonded to the steel, copper or brass of which a particular piece of

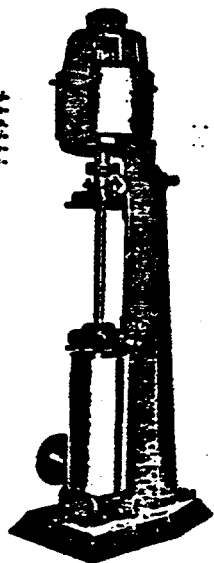
Six homogeneous lead-covered copper coils for use in a pigment manufacturing plant.



use in a copper plant.

hard lead acid valves are furnished in patterns as lined valves. Each of hard lead with reinforcing line affording maximum strength while weight to a minimum.

PUMPS



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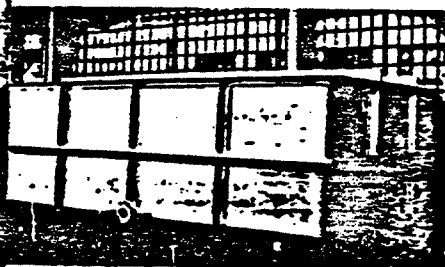
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LEAD-LINED EQUIPMENT

G-4



Above: Three homogeneous lead-lined steam apparatuses. Below: A homogeneous lead-lined tank. Homogeneous lead-lined units were installed in the tank.



apparatus is constructed. The handling of the lead approaches 100%. It will not separate or come off unless heat is applied close to the melting point of lead (620°F.) and is capable of withstanding shock, vibration, vacuum and rapid changes in temperature.

Besides its application for the lining of tanks, boilers, stills, drums and the like, the homogeneous process is used successfully for the covering of agitators, propellers, and mixing devices of all descriptions.

SERVICE

Lead equipment for chemical and allied plants usually varies according to the type of operation for which it is intended. In the case of homogeneous equipment, for example, it is necessary to fabricate the apparatus to meet individual requirements. Our engineering department offers its service to anyone having acid contact problems to solve. If blue prints and sketches are submitted, we will be pleased to offer suggestions in detail as to the most economical and satisfactory use of our products. Address inquiries to National Lead Company, Lead Products Department, 111 Broadway, New York City.

TYPICAL INSTALLATIONS OF HOMOGENEOUS EQUIPMENT

EQUIPMENT	PROCESS	CORROSION	TEMP.	PRESSURE	VACUUM
Tanks and Lead-Covered Cyls	Alum	65° to 100° Sulfuric Acid	250° F.	—	—
Distillation, Scrubbing, Separators	Sulfur Dioxide	—	250° F.	60 lbs.	—
Refractors	Chloride	25° Sulfuric	400° F.	100 lbs.	—
Tank	Chloride	14° Sulfuric	250° F.	120 lbs.	25"
Tank Cyls	Chloride	Remanufactured, 25° Sulfuric	250° F.	60 lbs.	—
Submerged Cyls	Lead Chloride	Sulfuric Acid Mat	250° F.	—	25"
Tank	Chloride	45° Sulfuric	250° F.	60 lbs.	—
Gas Tanks	Sulfuric Acid	65° to 100° Sulfuric Acid	250° F.	—	—

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ACID RECOVERY EQUIPMENT

ACID RECOVERY EQUIPMENT

extracted. The bonding of the lead Pb . It will not separate or come applied close to the melting point and is capable of withstanding vacuum and rapid changes in

application for the lining of tanks, one and the like, the homogeneous successfully for the covering of them, and mixing devices of all

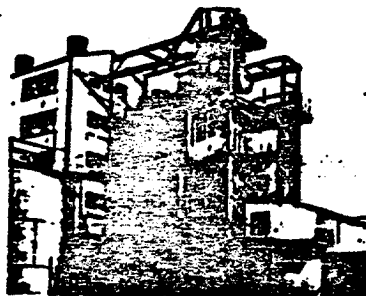
most for chemical and allied plants according to the type of operation intended. In the case of homogeneous, for example, it is necessary to custom to meet individual requirements engineering department offers the as having acid contact problems prints and sketches are submitted, id to offer suggestions in detail as control and satisfactory use of our is inquiry to National Lead Contacts Department, 111 Broadway,

The oil industry, chemical concerns and some rayon plants use large quantities of sulphuric acid, the disposal and recovery of which often proved in the past a difficult and expensive problem due to acid losses, obnoxious fumes, etc.

The development of the Simmon-Montie Vacuum Process, in which acids are recovered in a closed vessel under vacuum, has served to overcome many if not all of the difficulties involved in acid recovery by older methods.

For the application of this process, the Acid Recovery Department of National Lead Company builds and sells: concentrators for spent sulphuric acid, chamber acid and sludge acid; stills for the purification of impure acid; evaporators for weak solutions of sulphuric and phosphoric acid; columns and crystallizers for acid solutions and separating plants for sludge acid.

A Type E Super Vacuum Concentrator for the recovery of waste acid containing volatile sulphates.



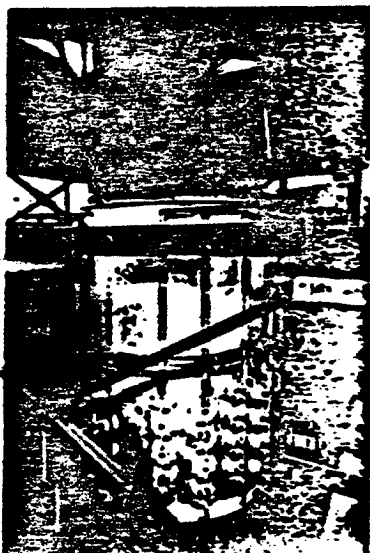
Two Type E Super Vacuum Concentrators producing 60° Ba. acid from de-sulfurized acid.

PROCESS

In the Simmon-Montie Vacuum Process, patented in the United States and foreign countries, the acid is concentrated with steam at from 5 Ba. to 150 Ba. pressure under a vacuum of from 27" to 29.8" so that the boiling temperature of the finished acid will rarely exceed 300° F. The high vacuum practically eliminates all foaming. The proper vapor speed and low boiling point reduce losses due to entrainment and distillation to less than one-half of one per cent. No fumes are given off by our concentrators.

Well separated sludge acid is usually concentrated to 60°, 65° or 68° Ba. Spent acid and chamber acid are usually concentrated to 51.5% H_2SO_4 , but can also be brought up to 95% and 97% H_2SO_4 at reasonable cost.

In all cases where the strength of the acid does not exceed 61° Ba., the concentrators are equipped with multi-jet condensers of the barometric type, but for higher strength acid it is necessary to add a vacuum heater which will create in the concentrator a vacuum up to 29.8". To avoid contamination of the cooling water, surface condensers, instead of the barometric condensers, have also been used.



TEMP.	STEAM PRESSURE	VACUUM
225° F.	—	—
250° F.	60 Ba.	—
275° F.	80 Ba.	—
315° F.	120 Ba.	29.5"
325° F.	140 Ba.	—
350° F.	—	29"
375° F.	140 Ba.	—
400° F.	—	—

CONSTRUCTION

All construction is of substantially the same design. The outside shell is made of cast iron for small sizes and steel plate for larger units. The inside is lined with sheets of chemical lead $\frac{1}{8}$ " to $\frac{3}{8}$ " thick. All vertical and horizontal joints are burned from the outside facilitating inspection and repairs. The lead lining is protected by a heavy layer of acid proof paint held in suitable cement. Openings are protected by high silicon iron sleeves. The heating surface consists of external lead or chemical lead tubing for steam pressures up to 45 lbs., and of lead-covered copper tubes or high silicon iron tubes for a pressure up to 130 lbs. Condensers and vacuum heaters are made of hard lead, special bronze or high silicon iron. Where necessary, concentrators are equipped with electric level indicators.

All concentrators, crystallizers and evaporators are specially designed for the capacity and operating conditions for which they are to be used. No attempt is made to adapt one standard apparatus to all possible working conditions.

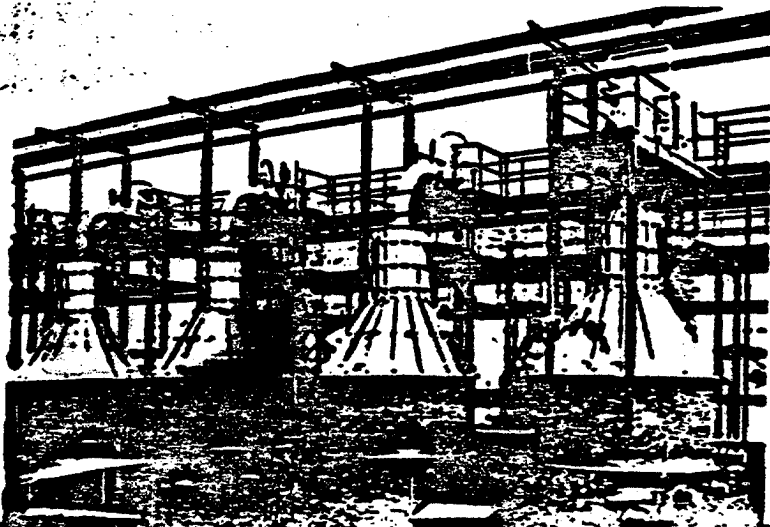
A battery of four Super Concentrators producing 95% and 98% H₂SO₄ acid from evaporated sulphuric acid in the oil refining industry.

APPLICATION OF PROCESS

Spent Acid. Large quantities of sulphuric acid are used in the chemical industry for the concentration of nitric acid and the absorption and drying of alcohols. Such dilute acids are concentrated to 93% and 98% in our Super Vacuum Concentrators at low cost and high efficiency. There are no difficulties due to organic or inorganic impurities. Capacities vary from 10 tons to 100 tons of H₂SO₄ handled in one unit.

Some of the waste acids contain large quantities of sulphates which must be separated before the acid is fit for re-use. Sulphates of copper and nickel can be handled in our special Soling-Out Concentrators without difficulty and are separated from the finished acid by centrifugals or vacuum filters.

Ferrous sulphate must be separated from the acid under strict control of concentration and temperature so otherwise the sulphate will be precipitated in the form of a slime which cannot be separated from the acid efficiently. After five years of extensive research work and experimentation a

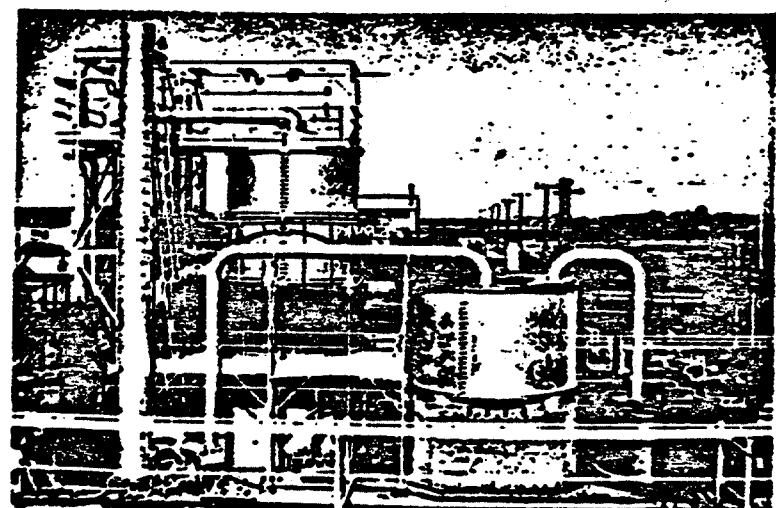


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ACID RECOVERY EQUIPMENT



A concentrating plant including a Type E Super Vacuum Concentrator and feed tank for the concentration of spent acid to 65° Ba.

OF PROCESS

Large quantities of sulphuric acid are used in the chemical industry for the concentration and the absorption and drying dilute acids are concentrated to our Super Vacuum Concentrator with efficiency. There are no dilution or isometric impurities, on 10 tons to 100 tons of H₂SO₄.

Acid contains large quantities which must be separated before re-use. Sulphates of copper and other salts are separated out efficiently and are separated out by centrifuging or vacuum

to must be separated from the acid of concentration and temperature the sulphate will be precipitated which cannot be separated efficiently. After five years of work and experimentation a new design could be the all refined

process has been developed, patents granted and pending, whereby such waste acids are concentrated under vacuum to an acidity of about 55% so that the ferrous sulphate is separated in a granular form. The 55% acid, which now contains only about 1% of sulphates, is further concentrated to 60% or 62% and the precipitated sulphate is removed by cutting or by centrifuging in a continuous solid level centrifuge. This sulphate residue is mixed with the granular sulphate precipitate of the 55% acid, and after being washed, the ferrous sulphate can be used for the production of sulphuric acid in a chamber or contact plant.

When pickling acid can be recovered by concentration through or double effect to about 30% sulphuric acid. Ferrous sulphate is recovered in the form of copper or monohydrate. All the acid in the waste liquor is again returned to the pickling tank which makes it possible to maintain a uniform acidity in the pickling vats and reduce the time of

pickling. This process can be used economically even to smaller mills and will show a good profit if a market can be found for the copper.

Rapen and Collaphane Bath Acid. Our Type "X" Rapid Circulation Evaporators are handling more than 5000 tons of both acid per day. The construction is such that very little incrustation occurs on the heating surface which can, if necessary, be readily cleaned without entering the evaporator. Start-up losses are less than one-half of one per cent.

Sledge acid is concentrated to some refrigeration from about 30° Ba. to 60° Ba. and then reinforced with fuming acid or sulphur trioxide to the proper strength for treating oil; in other instances the 60° acid is further concentrated to 65° - 66° Ba. In our Super Vacuum Type Concentrator a well-separated acid can be concentrated to 65° Ba. without intermediate settling, and losses due to heating are negligible.



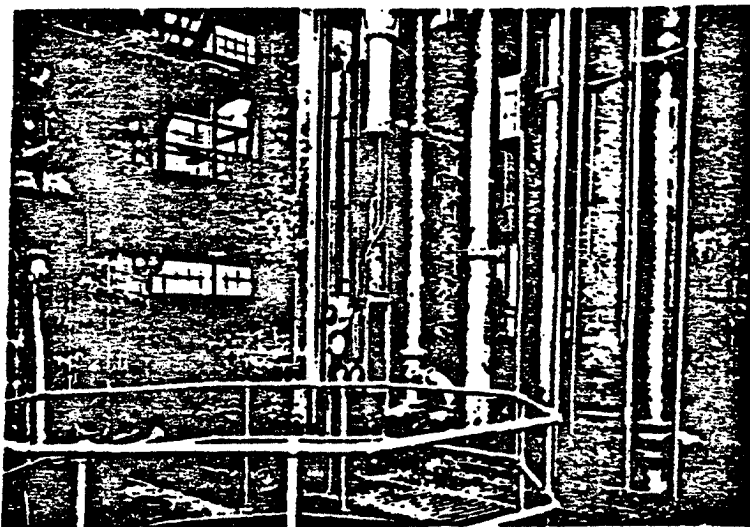
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ACID RECOVERY EQUIPMENT

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Three Type E Concentrators handling waste sulphuric acid containing ferrous sulphate, used in a plant manufacturing paint pigments.

SEPARATING PLANTS FOR SLUDGE ACID

National Lead Company has designed and installed complete plants for the separation of sludge acid; where necessary, these plants are equipped with absorption towers to eliminate the fumes.

ACID STILLS

Sometimes the concentrated spent acid contains inorganic salts in solution, and where a technically pure acid is required for the process the impure acid can be distilled under vacuum at reasonable cost. The distillate will of course be absolutely free from these salts and the remaining sludge can be recovered so that there is no loss of acid.

VACUUM COOLING AND CRYSTALLIZERS

The company has installed vacuum coolers of large capacity for impure acids to avoid trouble-

some incrustation of the cooling surfaces. It is also prepared to furnish complete Vacuum Crystallizing Plants for the removal of oxides, glassbead and other salts from waste acids.

INSTALLATIONS

More than 110 Concentrators have been installed, many of them repeat orders, in the United States and foreign countries. Several of these units have been in continuous operation for 15 years.

INQUIRIES

National Lead Company has the exclusive rights to build and sell concentrating plants and give licenses to the Sweeney-Martin Vacuum Process. Inquiries should be directed to National Lead Company, Acid Recovery Department, 115 Broadway, New York.

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CINCH ANCHORING SPECIALTIES

CINCH ANCHORING SPECIALTIES

Cinch anchoring specialties, which include the ring wedge Cinch anchor, Cinch drive sleeve expansion bolt and the Cinch cylinder, provide an economical and a sure way of securing fixtures of all types to masonry. They are being used successfully to anchor machinery, overhead shafting and sprinkler systems, guard rails, theatre marquees, signs, ornamental fixtures and the like.

Essentially, Cinch anchorages are expansion units consisting of an iron cone, a ring, and a lead composition member. One or more of the units are fitted over a bolt and coiled into place with a length of pipe or special caulking tool designed for the purpose. The caulking expands the lead member into all crevices and irregularities of the hole which has been drilled to receive it.

Properly installed, Cinch anchorages cannot pull out or work loose. Vibration does not lessen their grip. They provide an anchorage which is guaranteed to hold beyond the tensile and shearing strength of any wrought iron or steel bolt. In addition,



View of test made with one-inch three-unit plain Cinch anchors which held a yellow pine backing log, 12" x 12" x 22' 10", to a granite casing anchored on a concrete water-tight retaining wall. Despite a vertical pull estimated at 50,000 lbs., the anchors were undisturbed after the test.

Now, Cinch anchoring specialties are easy to set in place and require a hole of less depth than other expansion devices.

RING WEDGE CINCH ANCHOR

TYPE I



Shows two plain ring wedge Cinch anchor units with wedges cut away to show the three parts of each unit.

Two ring wedge Cinch anchor units, the one on the left threaded.

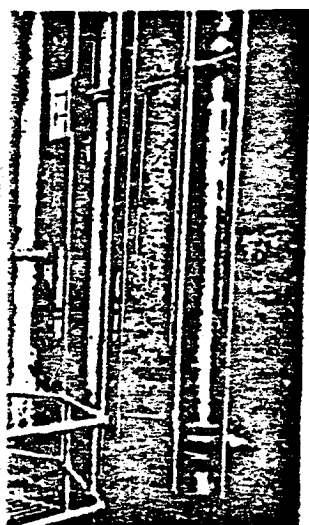


TYPE II

Each unit of the ring wedge Cinch anchor consists of three parts: a conical wedge of malleable iron, a lead composition part and an expanding lead metal ring. Under tension, the ring draws the lead preventing any possibility of the lead caulking, and also insures a tight hold in an concrete hole.

For anchorages of ordinary strength, two units are used. Three or more units provide anchorages of correspondingly greater strength. In installations where the head of the bolt is out of the hole, the unit first inserted has a malleable iron cone which is threaded. Where the head of the bolt is in the hole, the malleable iron cone is not threaded.

Ring wedge Cinch anchors are furnished in two or three-unit sets, plain or threaded.



ing furnace sulphates. Used in a plant manufacturing

tion of the cooling surface. It is also furnish complete Vacuum Crystallizing a removal of sulphates, glassmelt and can waste aside.

TUBES

on 110 Concentrators have been by of them repeat orders, in the United vein countries. Several of these units a continuous operation for 15 years.

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d Lead Company has the exclusive did and sell concentrating plants and as for the Smelter-Meritor Vacuum unit should be directed to National way, Acid Recovery Department, 115 New York.

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CINCH ANCHORING SPECIALTIES

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METHOD OF INSTALLING PLAIN RING WEDGE CINCH ANCHORS—TYPE I

(Used when the head of the bolt is in the hole.)



1. Place the first unit of the ring wedge Cinch anchor on the bolt and insert the head of the bolt in the hole.



2. Expand the anchor unit by wedging with a piece of pipe or with the special wedging tool illustrated on the second page following.



3. When a two-unit anchorage is being used, add another plain unit and expand with pipe or tool as before.

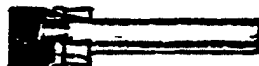


4. If more than a two-unit anchorage is required, add the additional units expanding each one in turn.

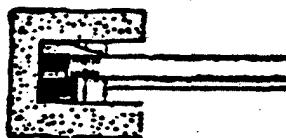
Note—For Cinch anchors up to and including one-half inch in size, use square-head bolts. For sizes above one-half inch, use hexagon-head bolts as bolts for these sizes will not take a square-head hole.

METHOD OF INSTALLING THREADED RING WEDGE CINCH ANCHORS—TYPE II

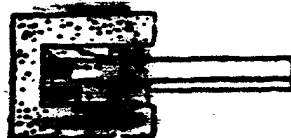
(Used when the head of the bolt is out of the hole.)



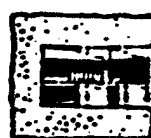
1. Assemble the first unit of the threaded ring wedge Cinch anchor on a dummy bolt as shown above.



2. Insert the unit with the dummy bolt in the hole and expand by wedging with a piece of pipe or special tool.



3. Slip the second unit of the Cinch anchor over the bolt into the hole. Expand this unit the same way as before.



4. Remove the dummy bolt. The work may now be attached to the anchorage by re-wedging the threaded unit at the bottom.

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CINCH ANCHORING SPECIALTIES

CINCH ANCHORS—TYPE I



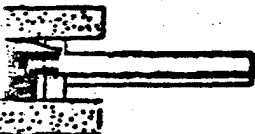
of the anchor unit by wedging with a piece of wood the special wedging tool illustrated on next page following.



When a two-unit anchorage is required, add second wedge expanding each unit in turn.

Use square-head bolts. For close shims use No. 6 square-head bolts.

CINCH ANCHORS—TYPE II



Use unit with the driving bolt in the hole and by wedging with a piece of pipe or spreader the bottom.



Use driving bolt. The unit may now be set in the anchorage by engaging the threaded top bottom.

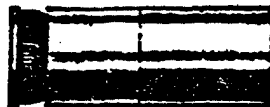
NET PRICE PER HUNDRED SETS OF RING WEDGE CINCH ANCHORS

Type With Two Wedges Included (One unit threaded and one unit plate; or both units plate.)				Type With One Wedge Included (One unit threaded and two units plate; or three units plate.)			
Diameter of Bolt Size	Price per 100 sets of 2 complete units	Weight of 100 sets of 2 complete units	Weight of 100 sets of 2 complete units	Diameter of Bolt Size	Price per 100 sets of 3 complete units	Weight of 100 sets of 3 complete units	Weight of 100 sets of 3 complete units
1/4"	25.00	12.50	12.50	1/2"	35.00	17.50	17.50
3/8"	30.00	15.00	15.00	5/8"	40.00	20.00	20.00
1/2"	35.00	17.50	17.50	3/4"	45.00	22.50	22.50
5/8"	40.00	20.00	20.00	7/8"	50.00	25.00	25.00
3/4"	45.00	22.50	22.50	1"	55.00	27.50	27.50
7/8"	50.00	25.00	25.00	1 1/8"	60.00	30.00	30.00
1"	55.00	27.50	27.50	1 1/4"	65.00	32.50	32.50
1 1/8"	60.00	30.00	30.00	1 1/2"	70.00	35.00	35.00
1 1/4"	65.00	32.50	32.50	1 3/4"	75.00	37.50	37.50
1 1/2"	70.00	35.00	35.00	2"	80.00	40.00	40.00
1 3/4"	75.00	37.50	37.50				
2"	80.00	40.00	40.00				

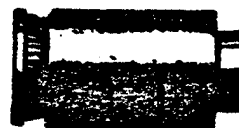
NOTE: If no 1/4" drill is available, a 1/2" drill can be used.

NOTE: If no 1/2" drill is available, a 3/4" drill can be used.

CINCH DRIVE SLEEVE EXPANSION BOLT



TYPE 22



TYPE 23

The Cinch drive sleeve expansion bolt (Type 22) consists of an extended, threaded cone, an expanding lead unit and a hard metal drive sleeve. The latter takes the place of a wedging tool when the bolt is installed in holes varying from 1/2" to 1 1/2" in depth.

The Cinch drive sleeve expansion bolt (Type 23) consists only of the threaded extension cone

with the expanding lead unit. The latter is expanded with a wedging tool in the regular manner.

NET PRICE PER HUNDRED OF TYPE 22

IN	Price per 100	Weight of 100	Weight of 100
1/2"	25.00	12.50	12.50
3/8"	30.00	15.00	15.00
1/2"	35.00	17.50	17.50
5/8"	40.00	20.00	20.00
3/4"	45.00	22.50	22.50
7/8"	50.00	25.00	25.00
1"	55.00	27.50	27.50
1 1/8"	60.00	30.00	30.00
1 1/4"	65.00	32.50	32.50
1 1/2"	70.00	35.00	35.00

PRICE PER HUNDRED OF TYPE 23

IN	Price per 100	Weight of 100	Weight of 100
1/2"	25.00	12.50	12.50
3/8"	30.00	15.00	15.00
1/2"	35.00	17.50	17.50
5/8"	40.00	20.00	20.00
3/4"	45.00	22.50	22.50
7/8"	50.00	25.00	25.00
1"	55.00	27.50	27.50
1 1/8"	60.00	30.00	30.00
1 1/4"	65.00	32.50	32.50
1 1/2"	70.00	35.00	35.00

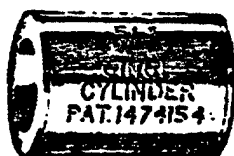
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NLI 113254

CINCH ANCHORING SPECIALTIES

1-4

CINCH CYLINDER



The Cinch cylinder is a two-unit anchor in one piece. Either end of the cylinder can be slipped over the bolt, quickly caulked into place and the work attached. The regular Cinch collar is present at the base of each cone to prevent the alloy from crawling when the bolt sustains its load.

Net Price Per Hundred Cinch Cylinders (Without Bolts)

Diameter of Bolt	1/2"	3/4"	1"	1 1/4"	1 1/2"
1/2"	17.00	17.00	17.00	17.00	17.00
3/4"	17.00	17.00	17.00	17.00	17.00
1"	17.00	17.00	17.00	17.00	17.00
1 1/4"	17.00	17.00	17.00	17.00	17.00
1 1/2"	17.00	17.00	17.00	17.00	17.00

CINCH BRAND FOUR-POINT DRILL



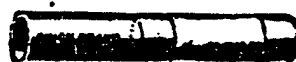
The Cinch brand four-point drill is made from high carbon steel in ten sizes ranging from 1/16" to 1 1/2" in diameter. The standard length of all drills is 12".

Net Price of Drills Per Dozen

Diameter of Drill	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"	1 1/2"
1/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1/4"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1/2"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3/4"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 1/4"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 1/2"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Note: The standard length of these drills is 12 inches. Price of larger drills on application. Shipping charges extra.

CINCH BRAND CAULKING TOOL

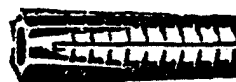


The Cinch brand caulking tool is used for expending all types of Cinch units. It is made in ten sizes to fit bolts ranging in diameter from 1/16" to 1 1/2".

Net Price of Individual Tools

Diameter of Bolt	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"	1 1/2"
1/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1/4"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1/2"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3/4"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 1/4"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 1/2"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

LEAD SCREW ANCHOR FOR WOOD SCREWS



This is the standard lead composition screw anchor for use with wood screws. The screw cuts its own thread.

Net Price Per Hundred Screw Anchors

No.	Size	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"	1 1/2"
1	1/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	3/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1/4"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	5/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	3/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	7/16"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1/2"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	5/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	3/4"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	7/8"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	1 1/4"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1 1/2"	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

INQUIRIES

Further information about Cinch Anchoring Specialties will gladly be furnished on request. Your inquiry, addressed to National Lead Company, Cinch Expansion Bolt Department, 111 Broadway, New York, N. Y. will receive prompt attention.

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NLI 113255

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BRAND CAULKING TOOL



Cinch brand caulking tool is used for all types of Cinch units. It is made in ten hole ranging in diameter from $\frac{1}{4}$ " to 1".

Net Price of Individual Tools

Net price each	Quantity of each	Net price each
0.00	1	0.00
.00	1	1.00
.00	1	1.00
.00	1	1.00

CREW ANCHOR JOD SCREWS



The standard lead competition screw with wood screws. The screw cuts

Per Hundred Screw Anchors

Name	Length in ft.	Weight in lbs.	Price per 100
0-7	1.00	1.00	0.00
0-10-11	1.00	1.00	0.00
0-10-11 Heavy	1.00	1.00	0.00
0-10-11	1.00	1.00	0.00
12-12-14	1.00	1.00	0.00
12-12-14	1.00	1.00	0.00
12-12-17-18	1.00	1.00	0.00
12-12-17-18	1.00	1.00	0.00
12-12-17-18	1.00	1.00	0.00

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Information about Cinch Anchoring can gladly be furnished on request, addressed to National Lead Company, Iron Sales Department, 111 Broadway, N. Y. will receive prompt attention.

J-1

CAULKING LEAD

CAULKING LEAD

For the caulking of joints, particularly in cast iron ball and spigot pipe, lead is the material most frequently used. One of its advantages lies in the fact that it is soft and yielding, thus permitting a certain amount of movement in the pipe without leakage. If a leak does occur, the joint is easily repaired.

For caulking purposes, we furnish lead in two forms—ingot lead for cast lead joints and lead wool which is worked cold. Both products carry the Lead Industries' Association Seal of Approval—indicating that the lead is of the required purity for caulking purposes.

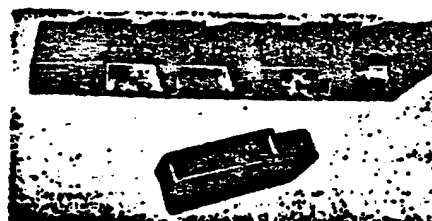
INGOT LEAD

Ingot lead is cast from selected grades of pig lead in 5-part sectional ingots, solid ingots or 25 lb. and 50 lb. pigs. The sectional ingots are specially designed for caulking purposes. Each section is easily detached from the others and fits the usual mallet put.

Since our ingot lead is made from selected metals, it is easy-flowing and soft which allows it to be readily caulked.



Workman putting section caulking lead into a joint in a cast iron water pipe.



APPROXIMATE QUANTITIES OF INGOT LEAD AND WOLF REQUIRED FOR C. I. PIPE JOINTS

Size of Pipe	Lbs. of Lead per joint 7 ft. Joints		Lbs. of Wolf per joint	
	Wool	Go	Wool	Go
3	0.00	0.00	0.00	0.00
4	7.00	0.00	0.00	0.00
6	10.25	12.25	0.00	0.00
8	12.25	14.25	0.00	0.00
10	14.25	16.25	0.00	0.00
12	16.25	18.25	0.00	0.00
14	18.25	20.25	0.00	0.00
16	20.25	22.25	0.00	0.00
18	22.25	24.25	0.00	0.00
20	24.25	26.25	0.00	0.00
22	26.25	28.25	0.00	0.00
24	28.25	30.25	0.00	0.00
26	30.25	32.25	0.00	0.00
28	32.25	34.25	0.00	0.00
30	34.25	36.25	0.00	0.00
32	36.25	38.25	0.00	0.00
34	38.25	40.25	0.00	0.00
36	40.25	42.25	0.00	0.00
38	42.25	44.25	0.00	0.00
40	44.25	46.25	0.00	0.00
42	46.25	48.25	0.00	0.00
44	48.25	50.25	0.00	0.00
46	50.25	52.25	0.00	0.00
48	52.25	54.25	0.00	0.00
50	54.25	56.25	0.00	0.00

*Based on 4 in. Lead Wool Standard (1917) published by the Lead Industries' Association.

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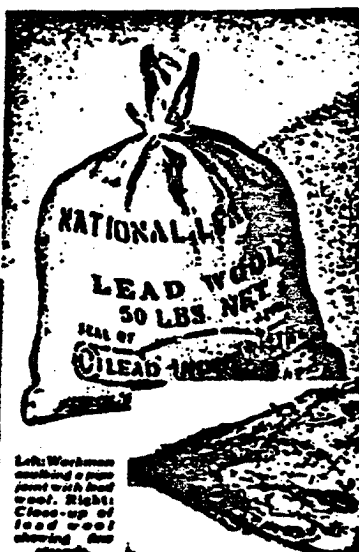
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CAULKING LEAD

LEAD WOOL

Lead wool is formed from strands of lead twisted loosely into rope form. Many prefer it to melted lead for caulking purposes because it requires no preheating and thus saves time and labor. Properly packed, lead wool makes a tighter and more flexible joint than a poured joint which tends to shrink slightly after casting. Also lead wool can be used under water, in wet ground or in other places where a cast joint is not practical.

Lead wool comes in 5 and 50 lb. bags or on rolls. It runs about 2½ feet to the pound.



APPROXIMATE QUANTITIES OF LEAD WOOL AND YARN REQUIRED FOR C. L. PIPE JOINTS
For Pressure up to 500 Lbs.

Lead Wool			Yarn	Lead Wool			Yarn
Size, or Pipe	Diameter-Inches	Weight-Lbs.		Size, or Pipe	Diameter-Inches	Weight-Lbs.	
2	2 1/4	2	2	10	10 1/2	10	2
3	3 1/4	3	2	15	15 1/2	15	2
4	4 1/4	4.5	2	20	20 1/2	20	2
5	5 1/4	5.5	2 1/2	25	25 1/2	25	2 1/2
6	6 1/4	6.5	2 1/2	30	30 1/2	30	2 1/2
8	8 1/4	8.5	2 1/2	36	36 1/2	36	2 1/2
10	10 1/4	10.5	2 1/2	42	42 1/2	42	2 1/2
12	12 1/4	12.5	2 1/2				
14	14 1/4	14.5	2 1/2				

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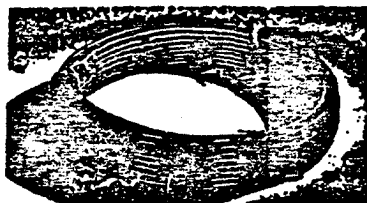
TUBING-WIRE

LEAD TUBING

Lead tubing is simply lead pipe of an extremely small bore and wall thickness. It is used for the compressed air lines in draught beer installations, gas stove connections, lightning-rod coverings, and in chemical plants. When hardened with antimony, it is employed extensively by player piano manufacturers and organ builders. For all these purposes, its chief advantages are flexibility and permanence.

We manufacture lead tubing, either from pure lead or from lead alloyed with tin or antimony. The stock sizes supplied are shown in the table below.

Lead tubing is usually shipped in coils or on reels. It is carefully packed or crated before shipment to guard against damage in transit.



STOCK SIZES OF LEAD TUBING

Pure Lead	Lead Alloyed with Tin	Lead Alloyed with Antimony	Pure Lead	Lead Alloyed with Tin	Lead Alloyed with Antimony
1/8 in.	1/8 in.	1/8 in.	1/8 in.	1/8 in.	1/8 in.
1/4 in.	1/4 in.	1/4 in.	1/4 in.	1/4 in.	1/4 in.
3/8 in.	3/8 in.	3/8 in.	3/8 in.	3/8 in.	3/8 in.
1/2 in.	1/2 in.	1/2 in.	1/2 in.	1/2 in.	1/2 in.
5/8 in.	5/8 in.	5/8 in.	5/8 in.	5/8 in.	5/8 in.
3/4 in.	3/4 in.	3/4 in.	3/4 in.	3/4 in.	3/4 in.
7/8 in.	7/8 in.	7/8 in.	7/8 in.	7/8 in.	7/8 in.
1 in.	1 in.	1 in.	1 in.	1 in.	1 in.

LEAD WIRE



Lead wire is used in a variety of ways. In the smaller sizes, it is employed for bearing alignment work, for welding, for electrical work and for spraying in applying metallic coatings. Because of its malleability, non-rusting and non-corrosive qualities, it is also made use of it for tying up vines and shrubbery. In the larger sizes it is usually referred to as burning bar or rod lead and is used in welding sheet lead. Alloyed with antimony, it is used by battery and truck-battery manufacturers. We sup-

APPROXIMATE NUMBER OF FEET PER POUND OF LEAD WIRE

Gauge No. or Size of Wire	Pure Lead		Lead Alloyed with Tin		Lead Alloyed with Antimony	
	Feet per Pound	Feet per Pound	Feet per Pound	Feet per Pound	Feet per Pound	Feet per Pound
1	100	100	100	100	100	100
2	100	100	100	100	100	100
3	100	100	100	100	100	100
4	100	100	100	100	100	100
5	100	100	100	100	100	100
6	100	100	100	100	100	100
7	100	100	100	100	100	100
8	100	100	100	100	100	100
9	100	100	100	100	100	100
10	100	100	100	100	100	100
11	100	100	100	100	100	100
12	100	100	100	100	100	100
13	100	100	100	100	100	100
14	100	100	100	100	100	100
15	100	100	100	100	100	100
16	100	100	100	100	100	100
17	100	100	100	100	100	100
18	100	100	100	100	100	100
19	100	100	100	100	100	100
20	100	100	100	100	100	100



USED FOR C. L. PIPE JOINTS

Size	Weight - Lbs.	Strength - Tons
10	10	10
12	12	12
14	14	14
16	16	16
18	18	18
20	20	20
22	22	22
24	24	24
26	26	26
28	28	28
30	30	30

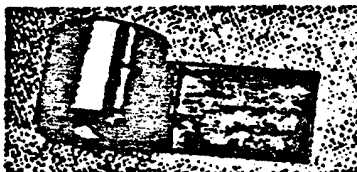
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TAPE—GASKETS—SHOT—HARDENING, PIG, PULVERIZED LEAD

K-2

ply lead wire in practically any gauge desired and of any specified composition. Our product is extruded under high pressure and is guaranteed to be uniform in diameter, true to gauge and free from irregularities or other defects. In addition to round wire, we also supply square, oval, half-round and other shapes on order. Lead or lead alloy wire is ordinarily furnished on reels. However, it will be cut into lengths and boxed, if desired.

TAPE LEAD



Tape or ribbon lead is an extruded product taking the form of long, thin strips of lead. It is used by manufacturers for stamping out products such as washers, drum weights, discs and the like. It is also used for caulking, flashing, patching and, in some instances, for tennis court markers.

Tape or ribbon lead is made up according to specification and is ordinarily furnished on reels. Our stock of dies is large enough to enable us to fill most orders for tape or ribbon lead without the necessity of making up new dies, thus insuring a lower cost and promptness in delivery.

LEAD GASKETS AND WASHERS

We can furnish lead gaskets in any thickness and outside diameter up to 11 feet. These are not a stock article and are made only on receipt of orders accompanied by blueprints, templates or full specifications as to thickness, inside diameter and outside diameter.

Our stock of dies and equipment is such that we can furnish lead washers in practically any size, both in the flat and the concave type.

HARDENING LEAD

Hardening lead is a pure lead, highly refined, for use in the hardening and tempering of steel. Our hardening lead is triple-refined to a purity of at least 99.995%; true metallic lead. All lots can be depended upon to be of uniform purity. The lead is furnished in a double pig weighing approximately 50 lbs. The two sections are easily separated.

BAR AND PIG LEAD

We can furnish lead in pig or bar form cast from standard accepted brands of prime metal. The pigs weigh approximately 100 lbs; the bars according to specification.

PULVERIZED LEAD

Pulverized or "granulated" lead is used in several industries but chiefly in rubber manufacture. Our pulverized lead is made from standard brands of commercially pure lead. It is available in three sizes—50 mesh, 100 mesh and 200 mesh. Packed in 50 lb. bags or in 450 lb. bags.

LEAD SHOT

We manufacture drop and chilled shot in all standard sizes from .04" diameter to 2 1/2" diameter. We also manufacture compressed buck shot and lead balls ranging in diameter from .24" to .58". For air rifles, we make a special size of shot known and branded as "Air Rifle Shot." Having a diameter of .175", it is designed for most makes of air rifles. Sold under the brand name "Tatham," our lead shot and lead balls are carefully manufactured to insure roundness, solidity, smooth polish and uniformity and accuracy as to size.

Drop and chilled shot and lead balls are packed in 5 and 25 lb. bags. Air Rifle Shot is sold in large or small tubes, packed 100 to the can. The large tube contains approximately 4 cm. of shot; the small tube approximately 2 1/2 cm. Air Rifle Shot is also furnished in 1 lb. cartons, packed 25 cartons to the case.

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ED LEAD H-2

RING LEAD

ing lead is a pure lead, highly refined, so hardening and tempering of steel. ing lead is triple-refined to a purity of 99.99%; true metallic lead. All lots can be seen to be of uniform purity. The lead is a double pig weighing approximately two sections are easily separated.

BIG PIG LEAD

furnish lead in pig or bar form out accepted brands of prime metal. The approximately 100 lbs; the bars are section.

IZED LEAD

d or "granulated" lead is used in trice but chiefly in rubber manu- uerially pure lead. It is available -50 mesh, 100 mesh and 200 mesh. lb. bag or in 450 lb. bags.

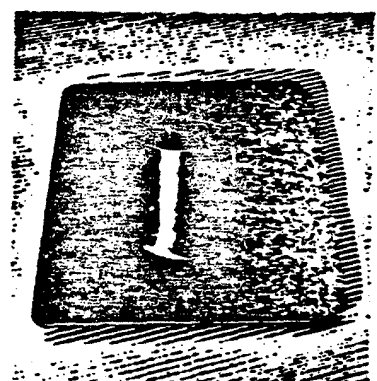
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ecture drop and chilled shot in all on .04" diameter to .21" diameter. ctive compressed buck shot and ng in diameter from .24" to .88". make a special size of shot known "Air Rifle Shot." Having a diam- is designed for most makes of air r the brand name "Tatham," our and balls are carefully manufac- roundness, solidity, smooth finish and conformity as to size.

chilled shot and lead balls are 125 lb. bags. Air Rifle Shot is sold in tubes, packed 100 to the case. contains approximately 4 cm. of tube approximately 2 1/2 cm. Air furnished in 1 lb. cartons, packed 1000.

L-1 FLANGES—WASHERS

LEAD ROOF FLANGES



Lead roof flanges are preferred by many contractors to flanges made from other materials because they are durable, easy to install and readily adjustable to the roof pitch.

Our flanges are one-piece, high pressure castings of pure lead. They are guaranteed against imperfections common to the average flange such as blow holes, blisters, etc. An exclusive feature is a slightly stiffener upon which guards against possible leakage as a result of wind pressure and consequent curling of the open away from the seal. These flanges are furnished in eight stock sizes as shown below.

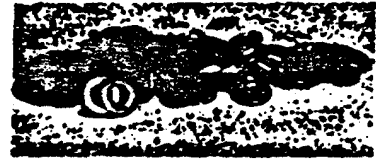
We are also in a position to furnish two-piece flanges made with extra long boots and longer also opens to conform to government specifications.

PRICES AND SIZES OF STOCK ROOF FLANGES

SIZE	Lead Price	Weight of Flange	Stock in Package	Shallow Length	Size of Hole
1/2" x 1/2"	1.00	2.00 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 3/4"	1.25	2.50 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 1"	1.50	3.00 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 1 1/4"	1.75	3.50 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 1 1/2"	2.00	4.00 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 2"	2.25	4.50 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 2 1/4"	2.50	5.00 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 2 1/2"	2.75	5.50 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 3"	3.00	6.00 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 3 1/4"	3.25	6.50 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 3 1/2"	3.50	7.00 lbs.	10	2 1/2"	1 1/2" x 1 1/2"
1/2" x 4"	3.75	7.50 lbs.	10	2 1/2"	1 1/2" x 1 1/2"

LEAD ROOFING WASHERS

We manufacture lead washers in practically any size and of any dimension desired. The stock sizes which we supply for roofing purposes are listed below. These washers are packed according to customer's order either loose or in 5 lb. cartons, in 50 or 100 lb. boxes. When ordering, state quantity and method of packing desired.



LEAD ROOFING WASHER SIZES

Size	Lead Price	Weight of Washer	Quantity	Approx. No. to Carton
1/2" x 1/2"	1.00	2.00 lbs.	10	100
1/2" x 3/4"	1.25	2.50 lbs.	10	100
1/2" x 1"	1.50	3.00 lbs.	10	100
1/2" x 1 1/4"	1.75	3.50 lbs.	10	100
1/2" x 1 1/2"	2.00	4.00 lbs.	10	100
1/2" x 2"	2.25	4.50 lbs.	10	100
1/2" x 2 1/4"	2.50	5.00 lbs.	10	100
1/2" x 2 1/2"	2.75	5.50 lbs.	10	100
1/2" x 3"	3.00	6.00 lbs.	10	100
1/2" x 3 1/4"	3.25	6.50 lbs.	10	100
1/2" x 3 1/2"	3.50	7.00 lbs.	10	100
1/2" x 4"	3.75	7.50 lbs.	10	100

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SASH WEIGHTS-CAMES-WEDGE LEAD

LEAD SASH WEIGHTS

Because lead combines great weight in a small area, it is effectively used for all types of counterbalancing. One of the most familiar forms is the lead sash weight. For this purpose, it has the additional advantage of being non-rusting and quieter in operation than weights cast from other metals.

We manufacture both cast and extruded lead sash weights. Any size, any weight and practically any style sash weight can be furnished. Below is a table of the approximate weights per foot of cast and extruded weights in square and round styles.

SQUARE-CAST		RECTANGULAR-CAST		RECTANGULAR-EXTRUDED		ROUND-EXTRUDED	
Size	Weight	Size	Weight	Size	Weight	Size	Weight
1/2"	1.1	1/2"	1.1	1/2"	1.1	1/2"	1.1
3/4"	1.7	3/4"	1.7	3/4"	1.7	3/4"	1.7
1"	2.2	1"	2.2	1"	2.2	1"	2.2
1 1/4"	3.3	1 1/4"	3.3	1 1/4"	3.3	1 1/4"	3.3
1 1/2"	4.4	1 1/2"	4.4	1 1/2"	4.4	1 1/2"	4.4
2"	7.3	2"	7.3	2"	7.3	2"	7.3
2 1/2"	11.1	2 1/2"	11.1	2 1/2"	11.1	2 1/2"	11.1
3"	15.0	3"	15.0	3"	15.0	3"	15.0
3 1/2"	19.6	3 1/2"	19.6	3 1/2"	19.6	3 1/2"	19.6
4"	24.2	4"	24.2	4"	24.2	4"	24.2
4 1/2"	28.8	4 1/2"	28.8	4 1/2"	28.8	4 1/2"	28.8
5"	33.4	5"	33.4	5"	33.4	5"	33.4
5 1/2"	38.0	5 1/2"	38.0	5 1/2"	38.0	5 1/2"	38.0
6"	42.6	6"	42.6	6"	42.6	6"	42.6
6 1/2"	47.2	6 1/2"	47.2	6 1/2"	47.2	6 1/2"	47.2
7"	51.8	7"	51.8	7"	51.8	7"	51.8
7 1/2"	56.4	7 1/2"	56.4	7 1/2"	56.4	7 1/2"	56.4
8"	61.0	8"	61.0	8"	61.0	8"	61.0
8 1/2"	65.6	8 1/2"	65.6	8 1/2"	65.6	8 1/2"	65.6
9"	70.2	9"	70.2	9"	70.2	9"	70.2
9 1/2"	74.8	9 1/2"	74.8	9 1/2"	74.8	9 1/2"	74.8
10"	79.4	10"	79.4	10"	79.4	10"	79.4
10 1/2"	84.0	10 1/2"	84.0	10 1/2"	84.0	10 1/2"	84.0
11"	88.6	11"	88.6	11"	88.6	11"	88.6
11 1/2"	93.2	11 1/2"	93.2	11 1/2"	93.2	11 1/2"	93.2
12"	97.8	12"	97.8	12"	97.8	12"	97.8
12 1/2"	102.4	12 1/2"	102.4	12 1/2"	102.4	12 1/2"	102.4
13"	107.0	13"	107.0	13"	107.0	13"	107.0
13 1/2"	111.6	13 1/2"	111.6	13 1/2"	111.6	13 1/2"	111.6
14"	116.2	14"	116.2	14"	116.2	14"	116.2
14 1/2"	120.8	14 1/2"	120.8	14 1/2"	120.8	14 1/2"	120.8
15"	125.4	15"	125.4	15"	125.4	15"	125.4
15 1/2"	130.0	15 1/2"	130.0	15 1/2"	130.0	15 1/2"	130.0
16"	134.6	16"	134.6	16"	134.6	16"	134.6
16 1/2"	139.2	16 1/2"	139.2	16 1/2"	139.2	16 1/2"	139.2
17"	143.8	17"	143.8	17"	143.8	17"	143.8
17 1/2"	148.4	17 1/2"	148.4	17 1/2"	148.4	17 1/2"	148.4
18"	153.0	18"	153.0	18"	153.0	18"	153.0
18 1/2"	157.6	18 1/2"	157.6	18 1/2"	157.6	18 1/2"	157.6
19"	162.2	19"	162.2	19"	162.2	19"	162.2
19 1/2"	166.8	19 1/2"	166.8	19 1/2"	166.8	19 1/2"	166.8
20"	171.4	20"	171.4	20"	171.4	20"	171.4
20 1/2"	176.0	20 1/2"	176.0	20 1/2"	176.0	20 1/2"	176.0
21"	180.6	21"	180.6	21"	180.6	21"	180.6
21 1/2"	185.2	21 1/2"	185.2	21 1/2"	185.2	21 1/2"	185.2
22"	189.8	22"	189.8	22"	189.8	22"	189.8
22 1/2"	194.4	22 1/2"	194.4	22 1/2"	194.4	22 1/2"	194.4
23"	199.0	23"	199.0	23"	199.0	23"	199.0
23 1/2"	203.6	23 1/2"	203.6	23 1/2"	203.6	23 1/2"	203.6
24"	208.2	24"	208.2	24"	208.2	24"	208.2
24 1/2"	212.8	24 1/2"	212.8	24 1/2"	212.8	24 1/2"	212.8
25"	217.4	25"	217.4	25"	217.4	25"	217.4
25 1/2"	222.0	25 1/2"	222.0	25 1/2"	222.0	25 1/2"	222.0
26"	226.6	26"	226.6	26"	226.6	26"	226.6
26 1/2"	231.2	26 1/2"	231.2	26 1/2"	231.2	26 1/2"	231.2
27"	235.8	27"	235.8	27"	235.8	27"	235.8
27 1/2"	240.4	27 1/2"	240.4	27 1/2"	240.4	27 1/2"	240.4
28"	245.0	28"	245.0	28"	245.0	28"	245.0
28 1/2"	249.6	28 1/2"	249.6	28 1/2"	249.6	28 1/2"	249.6
29"	254.2	29"	254.2	29"	254.2	29"	254.2
29 1/2"	258.8	29 1/2"	258.8	29 1/2"	258.8	29 1/2"	258.8
30"	263.4	30"	263.4	30"	263.4	30"	263.4
30 1/2"	268.0	30 1/2"	268.0	30 1/2"	268.0	30 1/2"	268.0
31"	272.6	31"	272.6	31"	272.6	31"	272.6
31 1/2"	277.2	31 1/2"	277.2	31 1/2"	277.2	31 1/2"	277.2
32"	281.8	32"	281.8	32"	281.8	32"	281.8
32 1/2"	286.4	32 1/2"	286.4	32 1/2"	286.4	32 1/2"	286.4
33"	291.0	33"	291.0	33"	291.0	33"	291.0
33 1/2"	295.6	33 1/2"	295.6	33 1/2"	295.6	33 1/2"	295.6
34"	300.2	34"	300.2	34"	300.2	34"	300.2
34 1/2"	304.8	34 1/2"	304.8	34 1/2"	304.8	34 1/2"	304.8
35"	309.4	35"	309.4	35"	309.4	35"	309.4
35 1/2"	314.0	35 1/2"	314.0	35 1/2"	314.0	35 1/2"	314.0
36"	318.6	36"	318.6	36"	318.6	36"	318.6
36 1/2"	323.2	36 1/2"	323.2	36 1/2"	323.2	36 1/2"	323.2
37"	327.8	37"	327.8	37"	327.8	37"	327.8
37 1/2"	332.4	37 1/2"	332.4	37 1/2"	332.4	37 1/2"	332.4
38"	337.0	38"	337.0	38"	337.0	38"	337.0
38 1/2"	341.6	38 1/2"	341.6	38 1/2"	341.6	38 1/2"	341.6
39"	346.2	39"	346.2	39"	346.2	39"	346.2
39 1/2"	350.8	39 1/2"	350.8	39 1/2"	350.8	39 1/2"	350.8
40"	355.4	40"	355.4	40"	355.4	40"	355.4
40 1/2"	360.0	40 1/2"	360.0	40 1/2"	360.0	40 1/2"	360.0
41"	364.6	41"	364.6	41"	364.6	41"	364.6
41 1/2"	369.2	41 1/2"	369.2	41 1/2"	369.2	41 1/2"	369.2
42"	373.8	42"	373.8	42"	373.8	42"	373.8
42 1/2"	378.4	42 1/2"	378.4	42 1/2"	378.4	42 1/2"	378.4
43"	383.0	43"	383.0	43"	383.0	43"	383.0
43 1/2"	387.6	43 1/2"	387.6	43 1/2"	387.6	43 1/2"	387.6
44"	392.2	44"	392.2	44"	392.2	44"	392.2
44 1/2"	396.8	44 1/2"	396.8	44 1/2"	396.8	44 1/2"	396.8
45"	401.4	45"	401.4	45"	401.4	45"	401.4
45 1/2"	406.0	45 1/2"	406.0	45 1/2"	406.0	45 1/2"	406.0
46"	410.6	46"	410.6	46"	410.6	46"	410.6
46 1/2"	415.2	46 1/2"	415.2	46 1/2"	415.2	46 1/2"	415.2
47"	419.8	47"	419.8	47"	419.8	47"	419.8
47 1/2"	424.4	47 1/2"	424.4	47 1/2"	424.4	47 1/2"	424.4
48"	429.0	48"	429.0	48"	429.0	48"	429.0
48 1/2"	433.6	48 1/2"	433.6	48 1/2"	433.6	48 1/2"	433.6
49"	438.2	49"	438.2	49"	438.2	49"	438.2
49 1/2"	442.8	49 1/2"	442.8	49 1/2"	442.8	49 1/2"	442.8
50"	447.4	50"	447.4	50"	447.4	50"	447.4
50 1/2"	452.0	50 1/2"	452.0	50 1/2"	452.0	50 1/2"	452.0
51"	456.6	51"	456.6	51"	456.6	51"	456.6
51 1/2"	461.2	51 1/2"	461.2	51 1/2"	461.2	51 1/2"	461.2
52"	465.8	52"	465.8	52"	465.8	52"	465.8
52 1/2"	470.4	52 1/2"	470.4	52 1/2"	470.4	52 1/2"	470.4
53"	475.0	53"	475.0	53"	475.0	53"	475.0
53 1/2"	479.6	53 1/2"	479.6	53 1/2"	479.6	53 1/2"	479.6
54"	484.2	54"	484.2	54"	484.2	54"	484.2
54 1/2"	488.8	54 1/2"	488.8	54 1/2"	488.8	54 1/2"	488.8
55"	493.4	55"	493.4	55"	493.4	55"	493.4
55 1/2"	498.0	55 1/2"	498.0	55 1/2"	498.0	55 1/2"	498.0
56"	502.6	56"	502.6	56"	502.6	56"	502.6
56 1/2"	507.2	56 1/2"	507.2	56 1/2"	507.2	56 1/2"	507.2
57"	511.8	57"	511.8	57"	511.8	57"	511.8
57 1/2"	516.4	57 1/2"	516.4	57 1/2"	516.4	57 1/2"	516.4
58"	521.0	58"	521.0	58"	521.0	58"	521.0
58 1/2"	525.6	58 1/2"	525.6	58 1/2"	525.6	58 1/2"	525.6
59"	530.2	59"	530.2	59"	530.2	59"	530.2
59 1/2"	534.8	59 1/2"	534.8	59 1/2"	534.8	59 1/2"	534.8
60"	539.4	60"	539.4	60"	539.4	60"	539.4
60 1/2"	544.0	60 1/2"	544.0	60 1/2"	544.0	60 1/2"	544.0
61"	548.6	61"	548.6	61"	548.6	61"	548.6
61 1/2"	553.2	61 1/2"	553.2	61 1/2"	553.2	61 1/2"	553.2
62"	557.8	62"	557.8	62"	557.8	62"	557.8
62 1/2"	562.4	62 1/2"	562.4	62 1/2"	562.4	62 1/2"	562.4
63"	567.0	63"	567.0	63"	567.0	63"	567.0
63 1/2"	571.6	63 1/2"	571.6	63 1/2"	571.6	63 1/2"	571.6
64"	576.2	64"	576.2	64"	576.2	64"	576.2
64 1/2"	580.8	64 1/2"	580.8	64 1/2"	580.8	64 1/2"	580.8
65"	585.4	65"	585.4	65"	585.4	65"	585.4
65 1/2"	590.0	65 1/2"	590.0	65 1/2"	590.0	65 1/2"	590.0
66"	594.6	66"	594.6	66"	594.6	66"	594.6
66 1/2"	599.2	66 1/2"	599.2	66 1/2"	599.2	66 1/2"	599.2
67"	603.8	67"	603.8	67"	603.8	67"	603.8
67 1/2"	608.4	67 1/2"	608.4	67 1/2"	608.4	67 1/2"	608.4
68"	613.0	68"	613.0	68"	613.0	68"	613.0
68 1/2"	617.6	68 1/2"	617.6	68 1/2"	617.6	68 1/2"	617.6
69"	622.2	69"	622.2	69"	622.2	69"	622.2
69 1/2"	626.8	69 1/2"	626.8	69 1/2"	626.8	69 1/2"	626.8
70"	631.4	70"	631.4	70"	631.4	70"	631.4
70 1/2"	636.0	70 1/2"	636.0	70 1/2"	636.0	70 1/2"	636.0
71"	640.6	71"	640.6	71"	640.6	71"	640.6
71 1/2"	645.2	71 1/2"	645.2	71 1/2"	645.2	71 1/2"	645.2
72"	649.8	72"	649.8	72"	649.8	72"	649.8
72 1/2"	654.4	72 1/2"	654.4	72 1/2"	654.4	72 1/2"	654.4

SOLDER

SOLDER

Solder is used in practically all trades and industries for the joining of metals such as tin, lead, copper, copper alloys, nickel, monel metal, iron, steel and stainless steel.

Soldering differs from welding in several respects. One of the chief distinctions between them is that in soldering, the metals to be joined are not heated to their melting points. Consequently, one of the requisites for a solder is that its melting point be lower than those of the metals it unites. Solder joins largely through its ability to adhere readily to the properly cleaned surfaces of other metals.

To insure adhesion in soldering, fluxes are necessary. Mild fluxes such as rosin, tallow or grease principally prevent oxidation of the metals being joined due to contact with the air or the hot solder. Active fluxes such as zinc chloride or some other chemical solution dissolve oxides already formed.

COMPOSITION

Solder is composed principally of lead and tin. Regardless of the proportions, it has a lower melting point than lead. When the tin content is 42½% or higher, it also has a lower melting point than tin.

When heated, solder does not change immediately from a solid to a liquid (except in the case of the eutectic alloy 62% tin—38% lead) but passes through an intermediate semi-liquid state. By varying the proportions of lead and tin, solders of different melting points and tensile strengths, and ranging from extreme fluidity to sluggishness during the semi-liquid state, are obtained.

Occasionally small quantities of other metals are added to solder to produce hardness, greater strength, brightness, a very low fusing point or some other special quality. The proper alloying of these other metals with lead and tin requires a high degree of manufacturing skill. Their presence in any considerable quantity in the average solder is usually considered a defect.

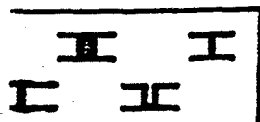


Shows: Pouring molten solder over a joint in a lead-covered telephone cable. As the solder cools to a plastic state, it is enabled to shape with the "catch cloth."

Shows: Finishing a wiped joint in lead pipe.



RES



as or glazier's lead are grooved and to support and hold together the in leaded glass windows. They are a extrusion process in a wide variety patterns.

where a full line of lead comes in a styles including round corner, oval corner, High Heart and T and slit reinforced corner; a style have the designer wishes to select. A steel strip running through the of the lead holds the work firmly in make comes in Antique, Rustic, matted and Frosted designs.

are made from a grade of lead dense to be the best for the possible so that the corner will take "vent leaks." Our come lead is of lengths packed in boxes which only 100 lbs., when packed.



EDGE LEAD SIZES

Lead	Size	Lead	Size
Lead	Size	Lead	Size
Lead	Size	Lead	Size
Lead	Size	Lead	Size
Lead	Size	Lead	Size
Lead	Size	Lead	Size

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NOTICE: If the film image is less clear than this notice, it is due to the quality of the document being filmed

SOLDER

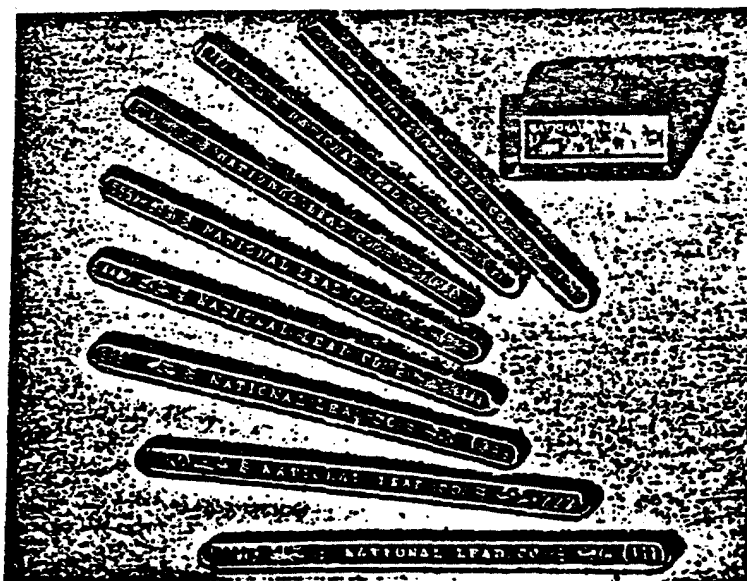
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SELECTION OF SOLDER

The selection of a solder depends largely on the method by which it will be applied, i.e. whether by wiping, sweating or the use of a blow-torch, soldering iron or solder bath. The method of application is, in turn, determined by the character of the metals to be joined, their size and position, the speed with which the operation must be com-

plots and the shape, tensile strength and appearance required in the finished work.

Where the buyer does not have past experience to guide the selection or where doubts exist as to the suitability and economy of the solder now being used, the technical staff of National Lead Company will be glad to recommend the proper grade of solder to use.



OUR LINE OF SOLDER

We manufacture under the Dutch Boy trademark a complete line of paints designed to meet a wide range of requirements. In addition to the line of colors shown above, we manufacture under two types of Box cans wire and cold body colors shown on a succeeding page. We also manufacture colors without trademark in practically any form or of any

composition desired by the user.

All solder we manufacture are guaranteed to be made only from pure, clean metals. They are carefully and accurately alloyed to insure uniformity at all times. They can be depended upon to be free of foreign substances tending to produce brittleness, discoloration or lack of adhesion.

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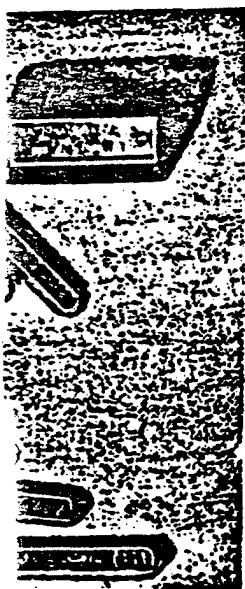
NTI 113263

ML-2

ML-3

SOLDER

shape, tensile strength and appearance of the finished work. Buyer does not have past experience or where doubts exist, the technical staff of National Lead is glad to recommend the proper tin.



ed by the user. no manufacturer are guaranteed to be pure, clean metal. They are merely alloyed to insure uniformity. They can be depended upon to be satisfactory in producing fusion or lack of adhesion.

DUTCH BOY BAR SOLDER

Dutch Boy bar solder is available in eight grades—each one of which is suitable for certain kinds of work and is designated by number. The grades with the lowest numerical designation contain the most tin.

DUTCH BOY 111

This is the highest grade solder sold under the Dutch Boy trademark. It is guaranteed to be made of new lead and new tin, carefully mixed in equal parts (50% tin and 50% lead). Its melting range is 361°F-414°F.

Dutch Boy 111 is bright, strong and has few impurities. It flows easily, covers more area and has superior adhesion. It is widely used for new roofing work and is popular among tinmiths, manufacturers and cannery. Sold in bars weighing approximately 1 1/4 lbs.

DUTCH BOY 222

Dutch Boy 222 is a smooth, free-flowing solder which contains slightly less tin than Dutch Boy 111. Its melting range is 361°F-424°F. It can be used wherever a bright, strong solder is wanted. Sold in bars weighing approximately 1 1/4 lbs.

DUTCH BOY 333

Dutch Boy 333 is a composition suitable and popular for the general run of galvanized iron and sheet metal work, roofing and ornices. Its melting range is 361°F-437°F. It is made only from carefully selected tin and lead and flows freely. Sold in bars weighing approximately 1 1/4 lbs.

DUTCH BOY 444

Dutch Boy 444 is a grade of solder which is known in the trade under the brand "Sixty Six" and "Sixty Eight" although it actually contains more lead than tin. With a melting range of 361°F-457°F, it is used for heavy coated work and is sometimes used for the reduction of better grades of solder. Sold in bars weighing approximately 1 1/4 lbs.

DUTCH BOY 555

Dutch Boy 555 is suitable for many special requirements and is particularly adapted for plumbing work where a bright showy job is required. It can be used with an iron. Dutch Boy 555 has a melting range of 361°F-467°F. It is sold in bars weighing approximately 1 1/4 lbs. and rectangular ingots weighing 5 lbs.



Shows solder being used on pipe. Below: Bars being removed from mold. Imperfect bars are discarded.



DUTCH BOY 666

Dutch Boy 666, with a melting range of 361°F-487°F, flows freely but not quite as well as the lower grades. In electrical construction, tin can facilitate and for work of a similar character, it is the most thoroughly reliable and economical solder that can

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SOLDER

ML-2

be used. It is also a first-class dipping solder. Sold in bars weighing approximately 1 1/4 lbs. and ingots weighing 5 lbs.

DUTCH BOY 777

Dutch Boy 777 contains an unusually large percentage of tin for solder of this grade. It has a melting range of 361°F-460°F. When used by plumbers for wiping it can be reduced slightly with

more lead. Sold in bars weighing approximately 1 1/4 lbs. and ingots weighing 5 lbs.

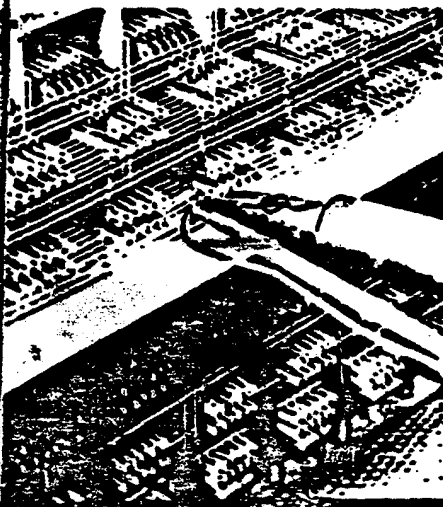
DUTCH BOY 888

Dutch Boy 888 is strictly a plumber's solder. It wicks a joint that will not sweat unless the solder is doped too heavily with lead. It has a melting range of 361°F-460°F and is sold in 1 1/4 lb. bars and ingots weighing approximately 5 lbs.

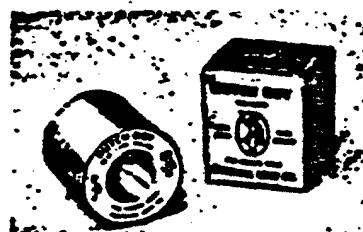
APPROXIMATE DATA ON THE PHYSICAL PROPERTIES OF DUTCH BOY SOLDERS

No.	Ultimate Tensile Strength (lb./sq. in.)	Elongation %	T Shear Strength (lb./sq. in.)	Impact Strength (ft.-lb.)	Brinell Hardness No.	Density	Logistics		Sales	
							Cost.	Fahr.	Cost.	Fahr.
221	6000	40	5000	15.0	12.7	0.85	212	400	100	200
222	6000	40	5000	15.0	12.7	0.90	216	420	102	200
223	6000	41	5000	15.0	12.6	0.80	220	430	102	200
400	6000	40	5025	15.2	12.3	0.80	225	435	103	200
500	6200	39	5125	14.8	12.3	0.81	234	400	103	200
600	7000	38	5470	14.5	14.0	0.79	230	400	103	200
777	7000	38	5375	14.3	12.9	0.84	230	400	103	200
888	7000	38	5275	13.7	12.9	0.84	242	400	103	200

DUTCH BOY FLUX CORE SOLDERS



Dutch Boy Flux Core Solder is hollow solder wire filled with either an acid flux or a resin flux. The former is suitable for general work whereas wire solder is considered the best form to use. The



Left: Soldering a strip into an assembly which is a telephone transmitter. For soldering work of this type, the wire solder furnishing solder and the transmitter parts is used.

Figure 2-2
Soldering Transmitter

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ML4

ML5

SOLDER

1. Sold in bars weighing approximately 3 lbs. each.

BOY 888

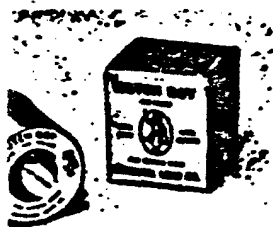
Boy 888 is strictly a plumber's solder, joint that will not sweat unless the solder is heavily with lead. It has a melting point of 465°F and is sold in 1 1/4 lb. bars and weighing approximately 3 lbs.

25 OF DUTCH BOY SOLDERS

Qty	Layments		Solders	
	Cust.	Fahr.	Cust.	Fahr.
25	212	414	145	244
12	215	420	145	244
16	225	437	145	244
12	225	437	145	244
1	231	444	145	244
7	236	449	145	244
1	236	449	145	244
3	242	456	145	244

25 OF DUTCH BOY SOLDERS

7 Flux Core Solder is hollow solder, either on acid flux or a resin flux, suitable for general work wherever considered the best form to use. The



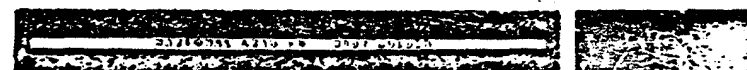
A strip wire on a circular switch in a furnace. For soldering wires of this type, Flux Core Solder and the equipment.

letter is especially fine for electrical work, including radio.

Both Dutch Boy Resin-Core Wire Solder and

Dutch Boy Acid-Core Wire Solder are supplied in three sizes—1/8", 1/16" and 1/32". They are furnished in 1, 5, 10, 15, 25 and 50 lb. spools.

AUTO BODY SOLDER



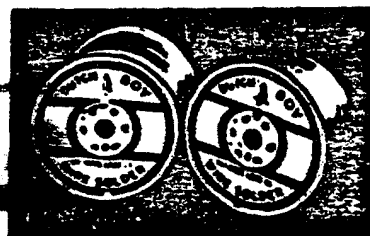
This grade is a special solder designed for auto repair work. Containing only pure, clean tin and lead, it has the plasticity necessary for the proper filling of dents but will not run. It contains no hard spots, molds smoothly under a paddle and can be worked readily into narrow crevices and corners. The finished work will be tough and strong.

Auto Body Solder is furnished in 4 or 8-ounce bars. The latter are 1/2" square and 13" long. Both are packed in 25 lb. cartons. It can also be supplied in 1 1/2 lb. bars, packed in 50 lb., 100 lb. or 250 lb. boxes, or in 1/8" round wire form cut in 13" strips for use in solder spray guns. The strips are packed in 25 lb. cartons.



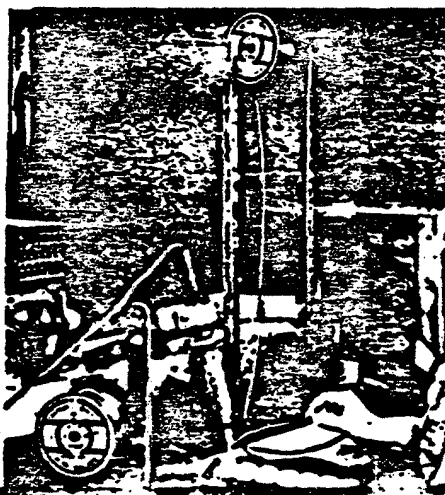
SPECIAL SOLDERS

In addition to the solders shown on the preceding pages which are designed in composition and shape to meet average requirements, we manufacture solder in practically any form desired by



Right: Soldering form with Dutch Boy wire solder. To insure continuous operation, the soldering gun is kept at the entire temperature by an electrical heating element.

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Dutch Boy



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SOLDER

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SOLDER WIRE GAUGES
(in Parts of an Inch)

NUMBER OF WIRE GAUGE	BOYD & SARGE		BIRMINGHAM OR SEVEN	
	Decimal	Fraction	Decimal	Fraction
22	.0154	$\frac{1}{64}$ F	.020	$\frac{1}{16}$ S
21	.0160	$\frac{1}{16}$ S	.022	$\frac{1}{8}$ S
20	.0170	$\frac{1}{8}$ S	.025	$\frac{1}{4}$ F
19	.0180	$\frac{1}{8}$ F	.032	$\frac{1}{4}$ S
18	.0200	$\frac{1}{4}$ S	.040	$\frac{1}{2}$ F
17	.0225	$\frac{1}{4}$ S	.050	$\frac{1}{2}$ S
16	.0250	$\frac{1}{2}$ F	.063	$\frac{1}{2}$ F
15	.0270	$\frac{1}{2}$ S	.072	$\frac{1}{2}$ S
14	.0300	$\frac{1}{2}$ F	.085	$\frac{1}{2}$ F
13	.0330	$\frac{1}{2}$ S	.095	$\frac{1}{2}$ F
12	.0360	$\frac{1}{2}$ F	.100	$\frac{1}{2}$ S
11	.0400	$\frac{1}{2}$ S	.11	$\frac{1}{2}$ S
10	.0450	$\frac{1}{2}$ F	.125	$\frac{1}{2}$ S
9	.0500	$\frac{1}{2}$ F	.140	$\frac{1}{2}$ S
8	.0560	$\frac{1}{2}$ F	.160	$\frac{1}{2}$ S
7	.0630	$\frac{1}{2}$ F	.18	$\frac{1}{2}$ S
6	.0700	$\frac{1}{2}$ F	.20	$\frac{1}{2}$ F
5	.0790	$\frac{1}{2}$ S	.22	$\frac{1}{2}$ F
4	.0880	$\frac{1}{2}$ F	.25	$\frac{1}{2}$ F
3	.1000	$\frac{1}{2}$ S	.28	$\frac{1}{2}$ S
2	.1125	$\frac{1}{2}$ F	.32	$\frac{1}{2}$ F
1	.1250	$\frac{1}{2}$ S	.36	$\frac{1}{2}$ F
0	.1400	$\frac{1}{2}$ F	.40	$\frac{1}{2}$ S
00	.1600	$\frac{1}{2}$ S	.50	$\frac{1}{2}$ F
000	.1875	$\frac{1}{2}$ F	.625	$\frac{1}{2}$ F
0000	.20	$\frac{1}{2}$ S	.75	$\frac{1}{2}$ F

the user and alloyed according to any specified formula. A number of frequently specified types are described on the following pages.

Because of the great variety of shapes and compositions which may be supplied, special solders—with the exception of the more commonly used forms of solder wire—are not ordinarily kept in stock. However, our facilities for manufacturing solder are so complete that any order can be filled promptly.

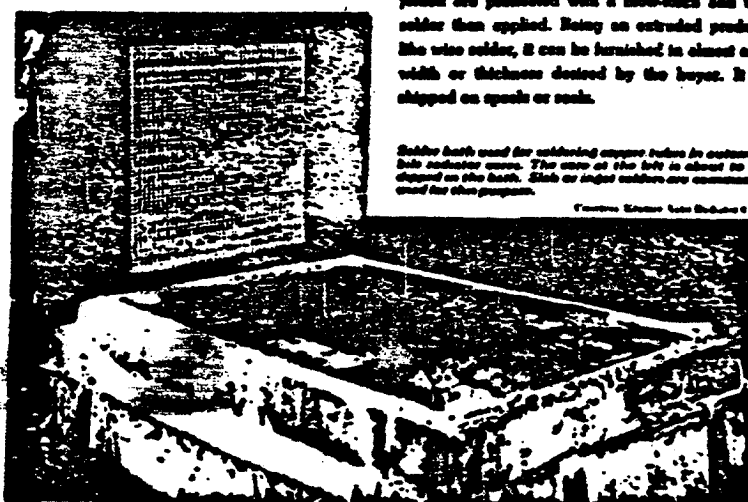
Wire Solder.—Wire solder is produced by an extrusion process. It can be supplied in practically any desired diameter from 1/64" to 29/64" and of any specified composition.

Our wire solder is carefully made to insure uniformity in gauge throughout the entire length. It is furnished on 1, 5, 10, 25, 50 and 65 lb. spools, or, if specified, in 2, 10, or 25 lb. coils, or, cut into segments. In ordering wire solder, use the gauge table at the left.

Tape or Ribbon Solder.—Tape or ribbon solder is commonly used where the parts to be joined are protected with a blow-torch and the solder then applied. Being an extruded product like wire solder, it can be furnished in almost any width or thickness desired by the buyer. It is shipped on spools or coils.

Solder bath used for soldering copper tubes in automobile engine. The size of the bath is about 10" by 10" by 10". Solder is kept in the bath. Solder is kept in the bath.

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SOLDER

Buyer according to any specified bar of frequently specified types are as following pages.

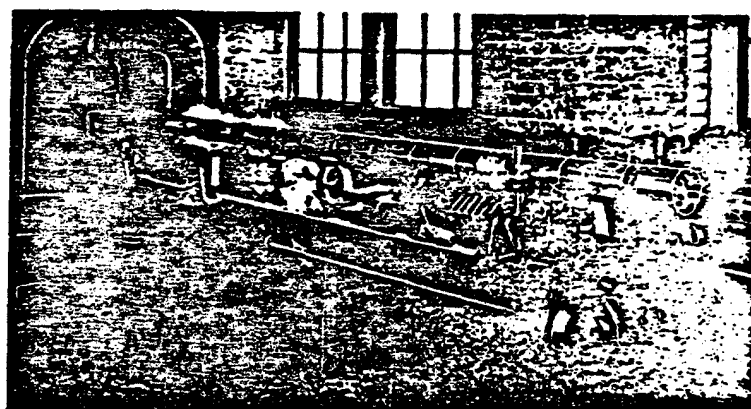
The great variety of shapes and which may be supplied, special exception of the more commonly sold wire—are not ordinarily kept on, our facilities for manufacturing complete that any order can be filled

or—Wire solder is produced by an ex. It can be supplied in practically meter from 1 40" to 29 64" and of proportion.

Solder is carefully made to insure tape throughout the entire length. in 1, 5, 10, 25, 50 and 65 lb. spools, in 5, 10, or 25 lb. coils, or, cut into desired wire solder, use the gauge

Ribbon Solder—Tape or ribbon only used where the parts to be joined with a blow-torch and the shed. Being an extruded product it can be furnished in almost any size desired by the buyer. It is a or such.

For soldering copper tubes in automatic. The use of this is about 10 to 15 lb. or larger amounts are occasionally used.



Triangular Bar Solder—Triangular bar solder gets its name from its triangular shape which is found useful in many specialized types of soldering work. The bars usually measure 14" in length with $\frac{1}{2}$ ", $\frac{3}{4}$ " and $1\frac{1}{2}$ " sides although other sizes are available. This form of solder is either cast or extruded according to the quantity ordered.

Drop Solder—Drop solder is triangular bar solder which has been cut into shape according to the specifications of the buyer. The slices can be cut to practically any thickness desired. When ordering drop solder, state the desired number of drops to the ounce or pound.

Timmer's Bar Solder—Timmer's bar solder is a cast product and is furnished in bars 12" to 14" long and usually $\frac{1}{2}$ " to $\frac{3}{4}$ " wide and $\frac{1}{2}$ " thick. It is a handy bar for soldering seams in certain kinds of work.

Motor Bar Solder—Motor bar solder is either extruded or cast according to the use of the order. It is rectangular in shape, usually about 14" long, $\frac{1}{2}$ " to $\frac{3}{4}$ " wide and $\frac{1}{2}$ " to $\frac{3}{4}$ " thick. It derives its name from the fact that it is widely used for seam soldering in the manufacture of gas motors.

Capping Bar Solder—This is a small cast bar

Above: Cast soldering machine. As the can bodies leave the forming machine at the extreme left, they pass over the solder bath whose short rolls apply solder to the seam. Below: Soldering top view on a gas motor.



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SOLDER

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about $\frac{1}{4}$ " x $\frac{1}{4}$ " and 12" long. It is sometimes used by craftsmen in place of deep or segment solder.

Solder Slabs—For solder baths, solder is usually supplied in slab form. The common sizes are 26" x 3" x 1", 24" x 3" x $\frac{3}{4}$ " and 18" x 3" x $\frac{3}{4}$ ". They vary in weight from 15 to 35 lbs.

Pulverized Solder—Pulverized solder is useful for fine, delicate soldering work. This form is available in 50% tin and 50% lead or 60% tin and 40% lead compositions. Comes 50, 100 or 200 meshes to the square inch.

Sheet Solder—Any solder formula is also available in sheet form. The sheets are flat cut and then rolled. It is available in sizes not larger than 24" x 36" and thicknesses from .010" to .100".

Low Melting Point Solder—Fusible alloys or low melting point solder usually contain in addition to lead and tin, various amounts of bismuth and cadmium. These alloys find important application in automatic safety devices for fire alarms, controlling free and heating equipment. They are

also useful in soldering materials easily damaged by heat or for joining metals and vitreous materials.

We are in a position to furnish fusible alloys in any desired composition. The table below gives a few of the more widely used alloys.

Melting Point		Composition	
° Cent.	° Fahr.		
43	110.6	Bi 40.9%—Pb 22.1%—In 16.1%—Sn 19.7%—Cd 0.5%	
70	158	Bi 49.4%—Pb 27.7%—Sn 12.9%—Cd 10%	
91.5	196.7	Bi 51.7%—Pb 40.7%—Cd 0.1%	
95	203	Bi 52%—Pb 32%—Sn 16%	
102.5	216.5	Bi 54%—Sn 20%—Cd 26%	
124.3	255.7	Bi 55.5%—Pb 44.5%	
130	266	Bi 56%—Sn 40%—Zn 4%	
130.5	264.9	Bi 57%—Sn 43%	
143	289	Sn 51.7%—Pb 30.4%—Cd 16.2%	
145	293	Bi 60%—Cd 39.5%—Zn 0.7%	
146	295	Bi 60%—Cd 40%	

MELTING POINTS OF LEAD-TIN ALLOYS

Composition		Melting Points				Composition		Melting Points			
Lead Per Cent	Tin Per Cent	Liquids		Solids		Lead Per Cent	Tin Per Cent	Liquids		Solids	
		Cent.	Fahr.	Cent.	Fahr.			Cent.	Fahr.	Cent.	Fahr.
100.0	0.0	327	620	322	620	47.5	52.5	206	403	193	386
97.5	2.5	320	608	316	608	45.0	55.0	200	392	188	368
95.0	5.0	306	597	300	572	42.5	57.5	194	380	183	364
92.5	7.5	298	566	290	560	40.0	60.0	188	359	178	352
90.0	10.0	292	554	273	527	37.5	62.5	183	348	173	340
87.5	12.5	276	526	260	502	35.0	65.0	178	336	168	328
85.0	15.0	270	514	225	437	32.5	67.5	173	325	163	316
82.5	17.5	268	508	200	392	30.0	70.0	168	314	158	304
80.0	20.0	268	506	183	350	27.5	72.5	163	303	153	292
77.5	22.5	224	435	163	316	25.0	75.0	158	292	148	280
75.0	25.0	240	464	160	304	22.5	77.5	153	281	143	268
72.5	27.5	242	466	161	306	20.0	80.0	148	270	138	256
70.0	30.0	238	460	162	306	17.5	82.5	143	259	133	244
67.5	32.5	232	446	163	306	15.0	85.0	138	248	128	232
65.0	35.0	227	437	161	306	12.5	87.5	133	237	123	220
62.5	37.5	220	428	161	306	10.0	90.0	128	226	118	208
60.0	40.0	220	428	161	306	7.5	92.5	123	215	113	196
57.5	42.5	220	428	161	306	5.0	95.0	118	204	108	184
55.0	45.0	220	428	161	306	2.5	97.5	113	193	103	172
52.5	47.5	220	428	161	306	0.0	100.0	108	182	98	160

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BEARING METAL

BEARING METAL

Bearing metal or babbit is a general term used to describe a group of alloys of widely varying composition which are used to line machinery bearings. Their function is to reduce friction and save the shaft from injury.

FACTS ABOUT BEARING METAL

There are two varying requirements in a bearing metal. The first is an adequate resistance to pressure so that it may properly sustain the load put upon it in service. The second is the ability to (1) conform to irregularities in the shape or alignment of the shaft and (2) return readily to a smooth surface after being cut or roughened by foreign substances which may get into the bearing. The first requirement is met by a proper degree of hardness and crushing strength. The second is met by a proper degree of malleability.

Other important requirements of a bearing metal are: a low frictional coefficient, a relatively

high melting and softening point, and the ability to resist the corrosive action of acids which may form in the lubricating oil at high temperatures.

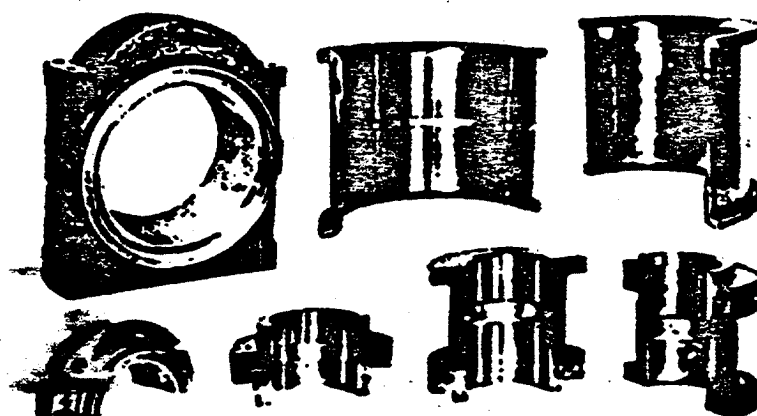
COMPOSITION

The chief constituents of babbit metal are tin, lead, antimony and copper. The alloys commonly used range from those having a high percentage of tin, with small amounts of copper and antimony and no lead, through intermediate grades containing all four metals to the lower grades which have a high lead content and no tin.

SELECTION OF BEARING METAL

The selection of a babbit metal depends entirely on the nature of the service it must perform in the bearing.

Where bearings are subjected to heavy loads, high speeds and high temperatures, the use of a better grade "tin-base" babbit is called for. These alloys are comparatively hard and have a high



Several types of babbit-lined machinery bearings.

Composition

Bi 40.9%—Pb 22.1%—Sn 10.1% Cu 10.1%—Cd 0.1%
Bi 49.4%—Pb 27.3%—Sn 12.9% Cd 10%
Bi 51.3%—Pb 40.3%—Cd 0.1%
Bi 52%—Pb 32%—Sn 16%
Bi 54%—Pb 20%—Cd 20%
Bi 55.5%—Pb 44.5%
Bi 56%—Sn 40%—Zn 4%
Bi 57%—Sn 43%
Bi 51.3%—Pb 20.6%—Cd 12.3%
Bi 60%—Cd 20.5%—Zn 0.5%
Bi 60%—Cd 40%

Mechanical Properties

Liquidus		Solidus	
Cent.	Fahr.	Cent.	Fahr.
200	400	103	200
200	392	103	200
200	381	103	200
200	370	103	200
163	343	103	200
102	230	103	200
102	200	103	200
104	203	103	200
106	207	103	200
109	212	200	390
112	220	103	200
105	203	103	200
100	200	103	200
101	200	103	200
100	190	103	200
113	203	103	200
110	200	103	200
122	242	103	200
122	240	100	200
122	230	100	200

BEARING METAL

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compressive strength, but are tough and not brittle. Furthermore, while tin has a lower melting point than lead, the tin-base alloys are always hardened with a fairly high percentage of copper which means they are never completely fluid until subjected to a temperature 200°-300° above the solidification point. In consequence they retain their hardness better at high frictional heats.

Where bearings are subjected to high speeds but little strain, an intermediate alloy, composed of more nearly equal parts of tin and lead, is satisfactory. These alloys melt at a lower temperature

than either the tin-base or the lead-base alloys and, therefore, lose their hardness and strength to a greater degree with rise of temperature and under friction. In this respect, they are not such good bearing metals as the other alloys, although they find use in very thin linings where their superior fluidity combined with their property of adhering firmly to a tinned bronze or steel backing is of advantage and where lack of strength is not objectionable.

For bearings operating at low speed and carrying little weight, a lead-base alloy will suffice.

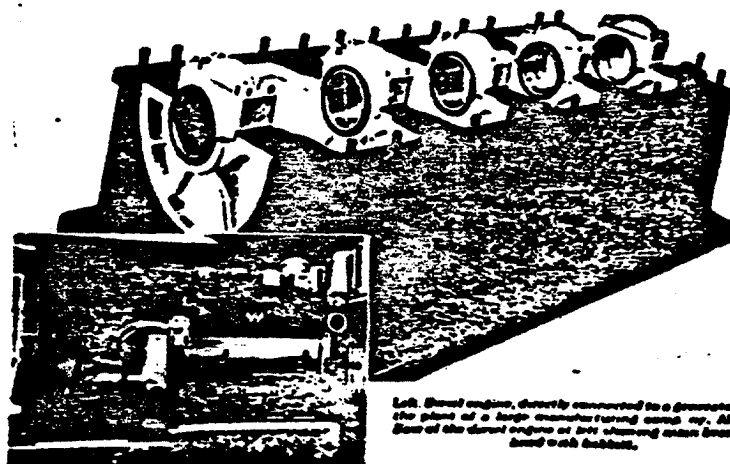
OUR LINE OF BEARING METAL

Under the Dutch Boy and Hoyt Metal Co. trademarks, we manufacture a complete line of bearing metals designed to fill most bearing requirements. The approximate physical properties of these alloys as well as a general indication of the types of bearings in which they are commonly used will be found on the following pages.

In addition to our branded metals, we are

equipped to furnish special alloys in accordance with customers' formulas. We also make analyses of samples and furnish bearing metals which duplicate these analyses.

Our bearing metals are ordinarily furnished in an easily handled ingot form. However, we can supply babbit in any shape desired, either cast or extruded in wire form for use in spray guns.



Left, Steam engine, directly connected to a generator, in the plant of a large manufacturing concern. Above, View of the steam engine at 100 showing action bearings lined with babbit.

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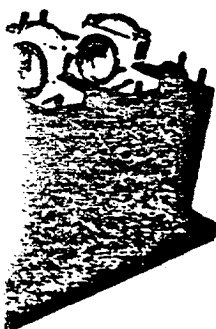
BEARING METAL

the base or the lead-base alloys and their hardness and strength to a with rise of temperature and under aspect, they are not such good as the other alloys, although they y thin linings where their superior ed with their property of adhering ed bronze or steel backing is of ad- here lack of strength is not objec-

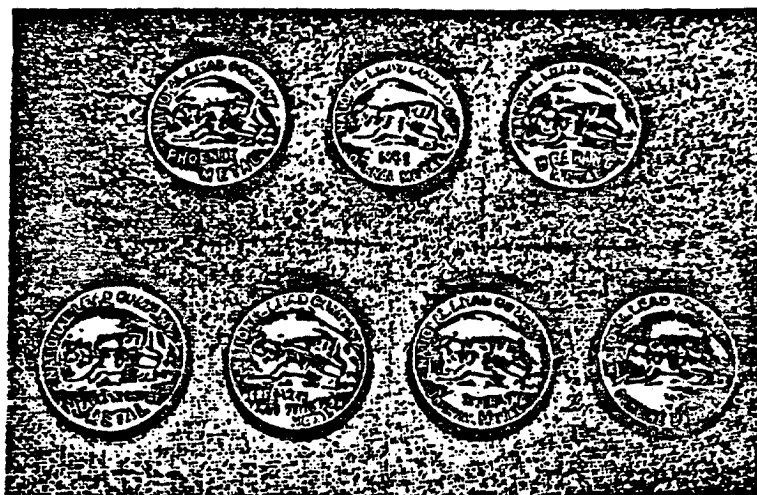
operating at low speed and carry- a lead-base alloy will suffice.

with special alloys in accordance formulae. We also make analyses watch bearing metals which dupli-

g metals are ordinarily furnished died ingot form. However, we can in any shape desired, either cast die form for use in spray guns.



directly connected to a generator, in a manufacturing company. Above shown are two different sizes bearings and with lubricant.



DUTCH BOY BEARING METALS

The bearing metals sold under the Dutch Boy trademark cover a wide range of uses and needs. They are carefully and expertly alloyed from pure, clean metals. All the grades are cast in round-bottom molds. The ingots fit an ordinary lathe.

DUTCH BOY PHOENIX METAL

This bearing metal is the top grade in our Dutch Boy line. It is recommended for heavy work and high speed machinery.

When melted, Phoenix Metal is very fluid and can readily be run into the smallest bones. It is tough, hard and elastic. Where great ductility is required—for example, in cases where the hammering action caused by the play of the shaft may bring about fracture in the lining material—Dutch Boy Phoenix is distinctly superior. Phoenix Metal is especially adapted for crank pins, crank-ends, main bearing and pillow-blocks of large shafts, in automobiles, dynamos, marine engines, gang saws, rock crushers, etc.

DUTCH BOY HEAVY PRESSURE METAL

This alloy, like Dutch Boy Phoenix, is designed for the highest grade work and, like Phoenix, contains no lead. Its special characteristic is great resistance to crushing strain. It will stand the most severe pounding without squaring out. It is harder than Phoenix, and for that reason is to be preferred for some purposes.

Because it contains no lead and has a high percentage of copper, Dutch Boy Heavy Pressure Metal melts at a high temperature, is easily chilled, and retains its hardness at the highest temperatures at which bearings operate.

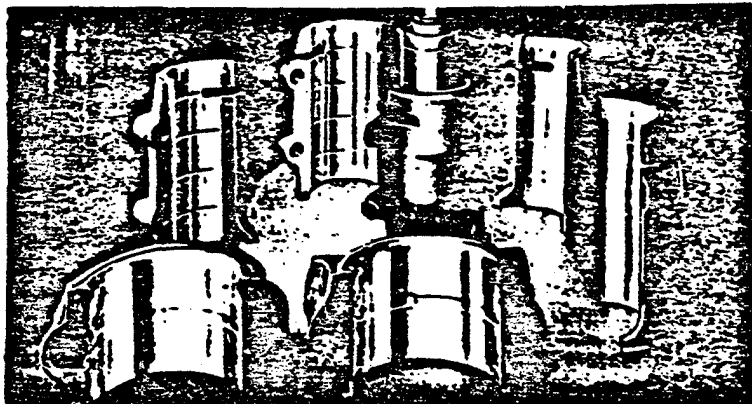
In melting, Heavy Pressure requires more heat than Phoenix to bring it to a perfectly fluid condition. Consequently, it cannot be so readily poured into a very thin bearing. Heavy Pressure is preferred to Phoenix where the design of bearings is such that an excessive pressure per square inch of bearing surface is developed. In such cases it be-

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BEARING METAL



Babbitt-lined machinery bearings grouped around a jig and mold set-up for casting bearings.

quently pays to sacrifice the greater fluidity and malleability of Phoenix for the sake of the extra resistance to unusually severe pressure.

DUTCH BOY GENUINE BABBITT METAL

Dutch Boy Genuine Babbitt Metal is made exactly according to Isaac Babbitt's formula patented in 1838. It analyzes as follows: tin 88.9 per cent, antimony 7.4 per cent, copper 3.7 per cent. The Dutch Boy trademark on this alloy constitutes a definite guarantee that its composition is as stated. This is important because the term "genuine babbitt" has been applied at times to alloys which vary more or less widely from the original formula.

DUTCH BOY NO. 1 JOURNAL METAL

This metal is compounded especially for large bearings with the pressure, though heavy, is steady—on heavy engine and general mill work, for instance.

While Dutch Boy No. 1 Journal will stand practically as much crushing strain as Dutch Boy Phoenix or Dutch Boy Heavy Pressure, its making point is much lower and it will not do the work of Phoenix or Heavy Pressure when subjected to con-

secutive speed. However, it retains a high degree of hardness at 212°F, a temperature often reached by bearings in operation, being exceeded in this respect only by Heavy Pressure.

Dutch Boy No. 1 Journal is easily poured, with very little shrinkage. It is good for use in steam winches and other hoisting machinery.

DUTCH BOY STERLING JOURNAL METAL

This is a copper-hardened metal, high in tin, capable of resisting considerable crushing strain. It is the grade used largely in stationary gas engines and for other equipment in many fields where a lower-priced metal than Dutch Boy Phoenix is desired, and yet one that will do satisfactory work, except under the most severe service. Its desirable qualities are fluidity superior to the tin-base alloys containing more copper, and the property of adhering better than the alloys containing more lead.

DUTCH BOY PERFECTION ANTI-FRICTION METAL

Perfection Anti-Friction Metal is a copper-hardened alloy which sells at a popular price. It has an unusual resistance to crushing strain for this

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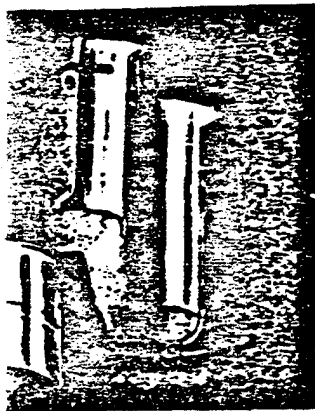
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N.5

BEARING METAL



and could set-up for casting bearings.

speed. However, it retains a high degree of strength at 2127, a temperature often reached by bearings in operation, being exceeded in this respect by Heavy Perfection.

Dutch Boy No. 1 Journal is easily poured, with little shrinkage. It is good for use in steam engines and other bearing machinery.

BOY STEELING AL METAL

is a copper-hardened metal, high in the grade of resisting considerable crushing strain. It is used largely in stationary gas engines for other equipment in many fields where a strong metal than Dutch Boy Perfection is not yet one that will do satisfactory work, after the most severe service. Its desirable properties are fully superior to the tin-base alloys of more copper, and the property of resistance to cracking exists for this

BOY PERFECTION ANTI-FRICTION METAL

Perfection Anti-Friction Metal is a copper-alloy which sells at a popular price. It has resistance to cracking exists for this

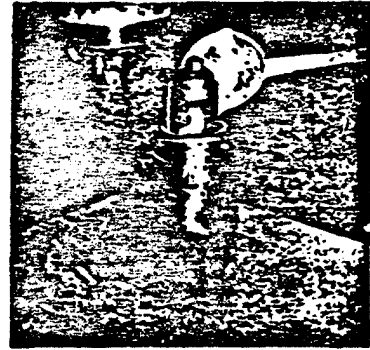
grade of metal, and its hardness at 2127 is ample for normal requirements.

Due to its low melting and liquefaction points, Perfection Anti-Friction will be found to be an easy handling metal, flowing freely at less than 5007. It pours easily and oil clings tightly to its surface.

Except where the most excessive strains and the highest speeds are developed, this alloy is recommended for all types of machinery.

DUTCH BOY BEARING METAL

This metal is used satisfactorily on many kinds of machinery and general mill work. It is the exact equivalent of many anti-friction metals sold at double its price. Dutch Boy Bearing Metal is adapted for pulleys, hangers, line shafting and slow-moving machinery.



Feeding a hollow lining. This method, used in many machine shops, is usually employed for the smaller bearings.

APPROXIMATE DATA ON THE PHYSICAL PROPERTIES OF DUTCH BOY BEARING METALS

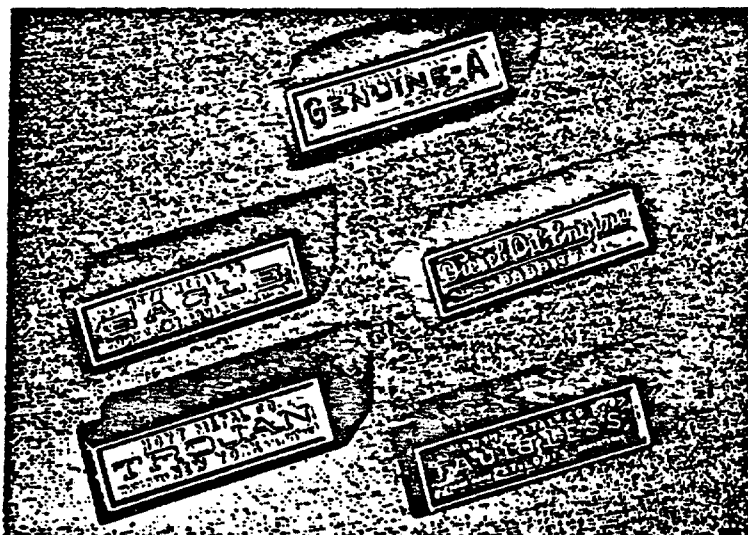
GRADE	PERFECTION	HEAVY PERFECTION	CANON HARDNESS	No. 1 JOURNAL	PERFECTION JOURNAL	PERFECTION ANTI-FRICTION	BEARING METAL
Specific Gravity.....	7.420	7.530	7.427	7.420	7.530	7.420	7.516
Wgt. Lbs. Per Cu. In.....	.320	.322	.300	.300	.300	.307	.300
Solids—Cast.....	230	230	230	230	230	230	230
—Tide.....	450	450	450	450	450	450	450
Liquids—Cast.....	370	370	370	370	370	370	370
—Tide.....	700	700	700	700	700	700	700
Pouring Temp. (°F.).....	425	425	425	425	425	425	425
Temple Test.....							
70 Lbs. Lbs. Sp. In.....	9,000	12,000	10,000	12,000	9,000	12,000	9,000
Elongation %.....	10.0	0.0	10.0	2.0	2.0	2.0	2.0
Compressive Strength (App. Determination of Cyls. 2" Dia. x 2" High at 20 F.).....							
At 1,000 Lbs. Sp. In.....	2000"	2000"	2000"	2000"	2000"	2000"	2000"
At 2,000 Lbs. Sp. In.....	2000"	2000"	2000"	2000"	2000"	2000"	2000"
At 3,000 Lbs. Sp. In.....	2000"	2000"	2000"	2000"	2000"	2000"	2000"
Small Machine.....							
At 200° - 400°.....	20.0	20.0	20.0	20.0	20.0	20.0	20.0
200° - 1200°.....	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1000° - 1200°.....	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1000° - 1200°.....	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1000° - 1200°.....	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Small No. at 20° C. after casting.....	20.0	20.0	20.0	20.0	20.0	20.0	20.0

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NLI 113274

BEARING METAL

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HOYT BRAND BEARING METALS

Babbitt metals carrying the name "Hoyt Metal Co." have been known and used in the trade for more than a half century. Carefully made from pure, clean metals, these alloys are recognized as standard, high grade babbitts everywhere. Several of the more popular brands are described on this and the following pages.

GENUINE-A BABBITT METAL

Hoyt's Genuine-A has been the standard for many years in all types of machinery where a high grade babbitt is necessary. It is being successfully used in babbitting the bearings of electrical machinery, locomotives, steam shovels, concrete mixers and other machinery where a heavy load is distributed over a comparatively small bearing surface or where extremely high speeds are developed.

DIESEL OIL ENGINE BABBITT

This grade of babbitt is especially alloyed with a view to withstanding the extreme pressure caused by impact in the largest of the diesel type engines. Due to its extreme toughness and low coefficient of friction, it is a reliable babbitt for use in marine or industrial installations of internal combustion engines. It is also well suited to give dependable service under the high speed and the heavy pressures encountered in aircraft and automotive motors. It may be used in the form of a poured or die cast bearing or the lining of a bronze shell.

TROJAN BABBITT METAL

Trojan Babbitt has been used successfully as a substitute for genuine babbitt in steam engines, motors, internal combustion engines or other types of equipment where the service required is not excessive.

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M-7

BEARING METAL



It is also used extensively in holding engines, dredging machinery, tractors and harvesting machinery.

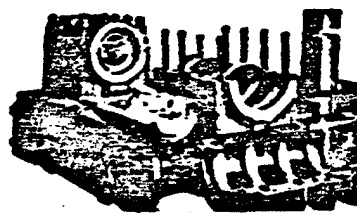
FAULTLESS-A BABBITT

This bearing metal is a scientifically alloyed mixture of lead, tin, antimony and copper. It is designed for use in sawmill and other woodworking machinery subject to sudden and intermittent strain.

The extreme fluidity of Faultless-A Babbitt insures better adherence to either a bronze or steel backing than is possible with the ordinary lead-base babbitt. This is true when even very thin linings are being cast.

EAGLE-A BABBITT

Eagle-A Babbitt is a popular priced lead-base bearing metal suitable for many types of general service. It has been used with complete satisfaction in machine shops, cotton gins, harvesting and woodworking machinery, under comparatively



Above: Ring fitted minus shaft bearings on a hardened power pump (bearing in foreground removed to show ring.)

heavy loads and high speed. On the basis of its performance, this alloy can safely be called superior to many other brands which call for a higher price.

HOYT'S STANDARD NO. 4

This grade is a standard utility babbitt made from selected metals and suitable for line shaft and other installations where the load is not excessive and the bearing is not subjected to sudden strain.

APPROXIMATE DATA ON THE PHYSICAL PROPERTIES OF HOYT BRAND BEARING METALS

Grade	Cast-A-Babbitt	Union Oil Engine	Tropax Babbitt	Faultless-A Babbitt	Eagle-A Babbitt	Standard No. 4
Specific Gravity.....	7.30	7.26	7.25	9.000	10.00	10.00
Wgt. Co. Per Cu. In.....	4.30	4.26	4.25	5.20	5.5	5.5
Tensile - "Cast".....	225	220.5	217	100.5	200	200
"Yield".....	410	402	399	200	400.5	400.5
Elongation - "Cast".....	30	410	200	200.5	200	200
"Yield".....	600.5	700.5	500.5	500	500	500
Range Pouring Temp. (°F.).....	600	600	500	600	600	600
Compressive Strength (4" Sq. Dimensions - 4" x 4" x 4") At 1,000 Lbs. Per Sq. In.....	2000	2000	2000	2000	2000	2000
At 1,500 Lbs. Per Sq. In.....	200	200	200	2000	2000	2000
At 2,000 Lbs. Per Sq. In.....	200	200	200	2000	2000	2000
Brinell Hardness At 30° C. - 100° F.....	20.0	20.0	20.0	20.0	20.0	20.0
100° C. - 212° F.....	12.0	12.0	12.0	12.0	12.0	12.0

ENGINE BABBITT

of babbitt is especially alloyed with adding the extreme pressure caused a largest of the diesel type engines. no toughness and low coefficient of reliable babbitt for use in marine applications of internal combustion too well suited to give dependable the high speed and the heavy pressure in aircraft and automotive use used in the form of a poured or as the lining of a bronze shell.

BABBITT METAL

that has been used successfully as a pressure babbitt in steam engines, of combustion engines or other types where the service required is not

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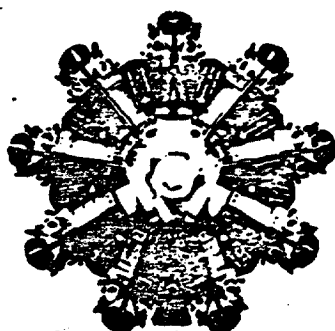
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BEARING METAL

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HOYT NUMBER ELEVEN METAL



Hoyt Number Eleven Metal is being successfully used on bearings of the "Bristol" engines which power Great Britain's Imperial Airways flying boats.

Hoyt Number Eleven Metal is a high-grade babbit, specially designed for use in equipment where the service is exceptionally severe—for example, in aircraft engines, where fairly heavy loads must be sustained for long periods at high speeds.

Hoyt Number Eleven Metal has high anti-frictional qualities and exceptional toughness. It retains its hardness and resistance to crushing strain to a considerable degree even at elevated temperatures.

This alloy is being successfully used, not only in aircraft engines, but in marine engines, steam turbines, and other large equipment where bearings are subjected to high speeds and other constant or intermittent loads.

SATCO-LINED BEARINGS

National Lead Company, through its subsidiaries, the Magnus Metal Corporation and the American Bearing Corporation, manufactures and sells bearings lined with Satco Metal for use in diesel engines, steam and electric locomotives and cars, and for various types of machinery.

The lining metal used in these bearings is a patented alloy developed especially to meet most, even service conditions where bearings are subjected to unusually high speeds and heavy loads. It is being used successfully in railway work as a lining for truck and trailer frames, car journal bearings, cross-head gibs, etc. It has also proved superior to standard composition alloys in internal combustion engines and for various other types of machinery.

Satco Bearing Metal combines the hardness of the most costly white metal alloys with the advantage of an initial melting point 100° F. higher. It has a solidification temperature of 363° F. and a complete liquefaction temperature of 788° F. This

quality is important as it greatly increases the resistance of the lining to failures due to a breakdown of lubrication in service.

Another outstanding characteristic of Satco Bearing Metal is its high resistance to transverse stresses, a quality which minimizes the tendency of the lining to crack or delaminate under heavy loads.

DATA ON SATCO BEARING METAL

	Brinell	Tensile Strength	Yield Point
As Cast	100-110	15,000-16,000	10,000-11,000
After Heat Treatment	120-130	18,000-19,000	12,000-13,000

What you will experience today

The U. S. Pat. 48.

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TYPE METALS

TYPE METALS

ber Eleven Metal is a high-grade alloy designed for use in equipment where exceptionally severe—for craft engines, where lately heavy sustained for long periods at high

ber Eleven Metal has high anti-rust and exceptional toughness. It has resistance to crushing under considerable degree even at elevated

being successfully used, not only in, but in marine engines, steam her large equipment where heat- to high speeds and other com- ent loads.

and as it greatly increases the re- ing to failures due to a breakdown service.

standing characteristic of Seta its high resistance to transverse which minimizes the tendency of to deform under heavy loads.

BEARING METAL

Grade	For Best Results	A. S. S.
100-1000	100-1000	100-1000
100-1000	100-1000	100-1000
100-1000	100-1000	100-1000
100-1000	100-1000	100-1000
100-1000	100-1000	100-1000
100-1000	100-1000	100-1000
100-1000	100-1000	100-1000
100-1000	100-1000	100-1000
100-1000	100-1000	100-1000

see bearing.

Type metals—the group of lead-base alloys used by job printers, publishers and trade compositors for the casting of type and printing plates—are unique among metal products in one respect. Constantly being melted and reused, they require intelligent servicing. The working stock must be “tuned up” with new metal from time to time. Periodic analyses of composition are necessary.

For this reason, the experienced buyer of type metal usually prefers to buy from a concern which not only furnishes high grade metal but is able and willing to help him care for the metal properly.

National Lead Company has been supplying type metal to the printing trade for a good many

years. Its sales and technical staffs are thoroughly familiar with printing equipment and the proper care of type metal. They are ready and willing at all times to render advice and assistance in the solution of metal problems.

Furthermore, a complete type metal service plan is available. When desired, customers' metal stocks are carefully analyzed at regular intervals, dress exchanged and the correct tuning metal sent to maintain an efficient, properly proportioned working supply.

As described on this and the following pages, National Lead Company manufactures a complete line of type metal designed to fill every type or plate casting requirement. Each alloy is made from pure, clean metals to insure that it will be free-flowing, have good casting qualities and a low rate of dressing. Moreover, National Lead Company's type metals can be depended upon to be always uniform in quality and composition.

LINE TYPE METAL

Linotype metal contains lead, tin and antimony. The tin contributes toughness, and the antimony contributes hardness. Good Linotype metal must be made from absolutely clean metals. It should be free-flowing and have desirable surface tension. The presence of all these qualities insures the casting of sharp, clean type.

While Linotype metal is used principally on Linotype, Intertype and Ludlow machines which cast a single slug, it is also used on Monotype Slugg Material and Dred machines, casting either sub leaders or spacing material. In some newspaper plants, it is also used for the casting of flat printing plates from mats.

Linotype metal is carried in stock in three-ounce and eight-ounce bars and is packed in 250-lb. cases. It is also available in bins, suitable for use in automatic ladles.



The good casting quality of our Linotype metal insures sharp, clean type.

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TYPE METALS

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Above: Casting ends of the monotype typesetting machine delivering type. Below: Casting and cutting stereotypes. The metal is heated in the muffle furnace just out of the background.

MONOTYPE METAL

Monotype metal is alloyed from the same metals as linotype metal although it contains a larger percentage of tin which increases its strength, and a larger percentage of antimony which makes it harder. This alloy is used principally on monotype machines which cast single letters or characters.

However, our monotype metal is sufficiently hard to be used, not only on monotype machines, but also on the Monotype Sorts Center for casting hard type, usually in the larger sizes, for hand assembly.

Monotype metal is furnished in ingot form. The ingots weigh approximately 1¹/₂ lbs. each and are packed in 250-lb. cases.

STEREOTYPE METAL

Stereotype metal is alloyed from the same metals as linotype and monotype metal. Ordinarily its hardness is about midway between the two.

The principal use for stereotype metal are in casting the curved plates used in newspaper printing and in casting flat plates from the mats supplied to newspapers. However, many printers are now buying stereotype equipment for the casting of plates in general work. Stereotyping is a simple process and, where repeat orders are contemplated, from small catalogs, letterheads, etc., the stereotype matrix is kept in stock, avoiding the



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ELECTROTYPE METAL—TYPE METALS

PE METAL

pe metal is alloyed from the same monotype metal although it contains a percentage of tin which increases its and a larger percentage of antimony is it harder. This alloy is used principally in monotype machines which cast single characters.

pe, our monotype metal is sufficiently used, not only on monotype machines, the Monotype Sorts Caster for casting usually in the larger sizes, for hand

pe metal is furnished in ingot form, weigh approximately 1 1/4 lbs. each and in 250-lb. cases.

TYPE METAL

pe metal is alloyed from the same type and monotype metal. Ordinarily is about midway between the two.

incipal uses for stereotype metal are in curved plates used in newspaper printing and flat plates from the mats supplied to. However, many printers are now type equipment for the casting of seal work. Stereotyping is a simple where repeat orders are common—small catalogs, letterheads, etc., the this is kept in stock, avoiding the

necessity of tying up expensive foundry type awaiting further orders. Some magazines are now using nickel-faced stereotypes for long runs.

Stereotype metal comes cast in pigs weighing from 50 to 65 lbs. each. For the customer with small stereotype equipment, we will cast smaller ingots if desired.

Sorts CASTER METAL

Sorts Caster metal is a hard monotype metal which contains, in addition to tin and antimony, a small percentage of copper. It is widely used in Monotype and other Sorts Casters. The type produced is in every way comparable to foundry type.

Sorts Caster metal comes cast in ingot form and packed in 250-lb. cases.

COMBINATION METAL

Combination metal is a special alloy midway between linotype metal and stereotype metal. It is designed particularly for use in shops where it is not considered desirable or feasible to maintain two smelting pots—one for Linotype and the other for Stereotype.

Combination metal is furnished in ingot form.



Our Sorts Caster metal produces type comparable in all respects to foundry type.

ELECTROTYPE METAL



Electrotype metal is a "backing" metal and is used to give body to a copper or nickel-based electrotype. While it is alloyed from the same ingredients as the type metals—lead, tin and antimony—the latter two are present only in small quantities.

In commercial electrotype plants, the metal, of course, is not reused. In publishing houses and among large job printers, however, the backing metal is frequently melted from the nickel or copper shell and used over again. Concerns following this practice should have their working stock analyzed before ordering new metal. Electrotype metal becomes rich in tin after successive runnings.

Electrotype metal is furnished in pig form.

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NLI 113280

IMPRESSION LEAD—ELECTROTYPE CASES—LEAD PLATES



Molding press for use in molding impression lead.

IMPRESSION LEAD

In many electrotyping foundries, impression lead, rather than wax, is used as the molding material for the reproduction of very fine halftones and the plates used in multi-color printing. The use of impression lead obviates imperfections and distortions which frequently occur in wax molding because of dimensional changes in the wax.

National Lead Company manufactures three grades of impression lead: plain impression lead; ready-to-mold impression lead; and tin-coated impression lead.

Plain impression lead is simply a pure grade of lead in sheet form of uniform thickness and width. Ready-to-mold impression lead is a lead sheet which has been smooth-brushed after rolling

and sprinkled with graphite. The protective coating of graphite prepares the surface for the electroplating bath and retards corrosion. Tin-coated impression lead is so made to prevent corrosion.

Impression lead sheets are furnished in any size according to specification. Maximum size sheets measure 24" x 36".

ELECTROTYPE CASES

Electrotype cases are lead alloy sheets used by electrotypers for wax molding. They can be supplied $\frac{1}{16}$ " thick (or heavier, if desired) and in any width and length specified. One side of the sheets has been wire-brushed to insure close adhesion of the wax. The maximum size for electrotype cases is 22 $\frac{1}{2}$ " x 33 $\frac{1}{2}$ ".

MUSIC PLATES

Music plates are made of an alloy of lead and used by printers of sheet music. The engraver first rules the plates with a special five-pronged fork and then stamps on the notes with steel dies. A proof is taken and printing plates are made from the proof.

We manufacture music plates in various compositions of tin, lead, antimony and copper. The plates are uniform in thickness and rolled to a high luster. They are rectangular in shape and usually measure 6 $\frac{1}{2}$ " x 9 $\frac{1}{2}$ ", 8" x 11", or 9 $\frac{1}{2}$ " x 13". Larger or smaller sizes can also be furnished.

TINT PLATES

Tint plates are used for color work by many large printing houses. They are also used for printing names, trademarks and designs on fabrics by bag companies, cotton mills, etc.

Tint plates are cast from varying proportions of lead, tin and antimony. They are planed on a planer and shaved on one side to a high luster with a shaving knife. Our tint plates are very accurate in measurement. Maximum thickness supplied is .130"; maximum size 22 $\frac{1}{2}$ " x 33 $\frac{1}{2}$ ". Smaller sizes are furnished on request.

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NLI 113281

YES

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BLATCHFORD SYSTEM

led with graphite. The protective coating prepares the surface for the electroplated surface corrosion. Tin-coated impression lead sheets are furnished in any size to specification. Maximum size was 24" x 36".

ROTYPE CASES

otype cases are lead alloy sheets used types for wax molding. They can be $\frac{1}{8}$ " thick (or heavier, if desired) and in any length specified. One side of the sheet is wire-brushed to insure close adhesion. The maximum size for electrotype is 22 $\frac{1}{2}$ " x 33 $\frac{1}{2}$ ".

3 PLATES

plates are made of an alloy of lead and copper of sheet metal. The engraver first plates with a special five-pronged fork stamps on the notes with steel dies. A clean and printing plates are made from

engraving plates in various sizes of tin, lead, antimony and copper. The uniform in thickness and rolled to a high 7 are rectangular in shape and usually $\frac{1}{8}$ " x 9 $\frac{1}{2}$ ", 6" x 11", or 9 $\frac{1}{2}$ " x 13". smaller sizes can also be furnished.

PLATES

plates are used for color work by many big houses. They are also used for printing trademarks and designs on labels by canner, cotton mills, etc.

plates are cast from varying proportions of tin and antimony. They are plated on a sheet of one side to a high finish with brass. Our best plates are very accurate recent. Minimum thickness supplied to custom size 22 $\frac{1}{2}$ " x 33 $\frac{1}{2}$ ". Smaller sizes had on request.

BLATCHFORD PLATE MOUNTING SYSTEM

The Blatchford System for mounting printing plates has been scientifically designed and then perfected by printers themselves to meet the requirements of all classes of printing production.

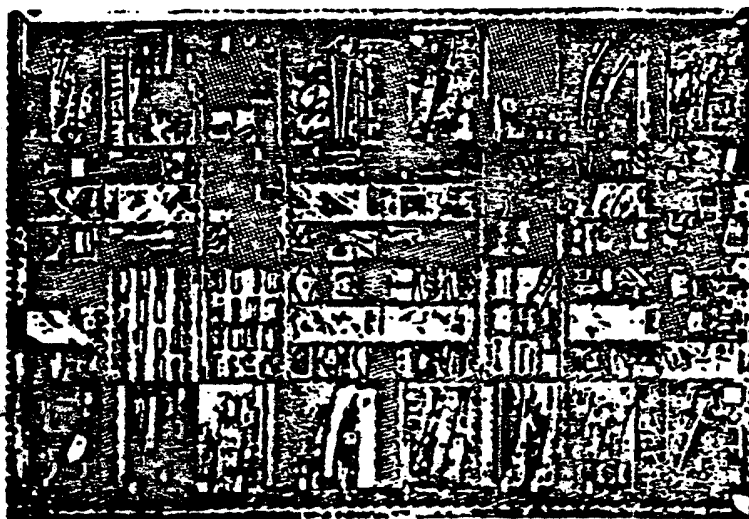
Its advantages are many. It is simple in construction. It provides a uniform support for every square inch of printing surface of every printing plate. Hair line register is obtained with a minimum of time and effort. Plates cannot move on the base during the longest runs once they are properly positioned and locked. By virtue of the unusual shape of the sectional unit, a "straight line of break" is eliminated.

The unit of the Blatchford System is a divided, L-shaped section, well-riddled with holes,

and the working surface of which is ruled in quarter-inch squares, providing a fractional-inch, rather than a pic, gauge for the make-up men.



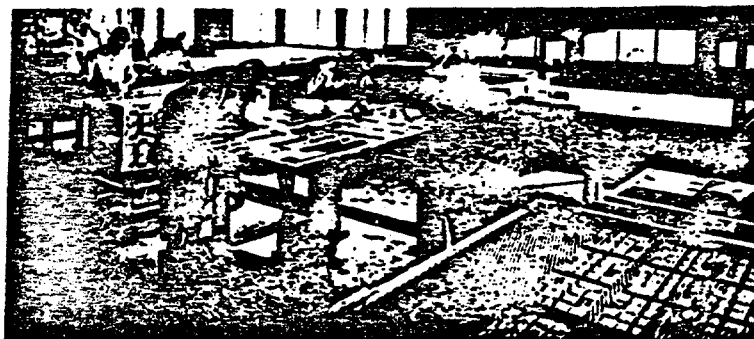
Shown: "L" shaped units of the Blatchford base. Below: A few examples of intricate plates mounted by the Standard Press of New York City. It is the "red" form of a four-color process job printing on a 40 $\frac{1}{2}$ " x 70" sheet. There are 127 separate plates in this form. It would have been impossible to mount these plates on any other base with sufficient catches to properly hold and register them.



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NLI 113282

BLATCHFORD SYSTEM



Making up the form on a Blatchford base.

The odd shape of the unit gives the Blatchford System an exclusive advantage: when woven into a form or bed, each unit has six similar units holding it in place—instead of four as with square-shaped sections. By thus eliminating a "straight line of break", there is less possibility of springing or warping a form in lock-up.

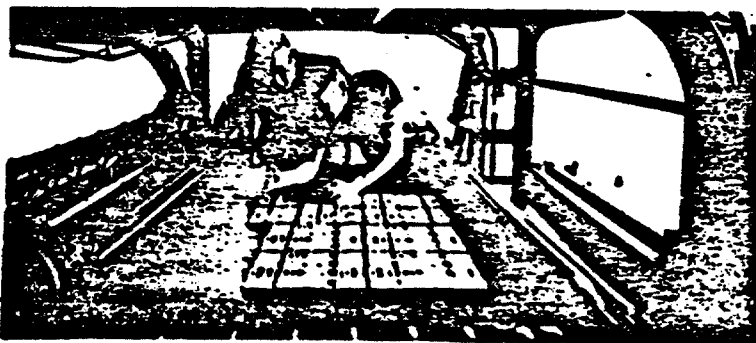
Furthermore, there are no restrictions in handling small plates in the Blatchford System. Plates as small as 1 1/2" x 1 1/2" or 2" x 2" can be registered and locked each with six hooks and with

margins of 1/4". A plate as narrow as a 6-point Linotype slug can be mounted and supported with a pair of catches opposite each other at 1 1/4" intervals.

INQUIRIES

Further information about the Blatchford Plate Mounting System will gladly be furnished on request. Address your inquiry to National Lead Company, E. W. Blatchford Co. Branch, 63 Park Row, New York City, or 900 W. 18th St., Chicago.

Registering a Blatchford-mounted form on the press.



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NLI 113283

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P.1

GRID METAL

GRID METAL

Grid metal is lead hardened with antimony. It is used by battery manufacturers for casting the frames or perforated plates which hold the lead oxides in a storage battery.

We manufacture grid metal of a uniformly high quality. The purity of the metals used as well as the exactness with which the alloy meets our customer's specification as to antimony content and tolerance of impurities is a primary consideration with our production department. Our grid metal is usually furnished in 60 lb. pigs although lighter weight pigs may be obtained if desired.

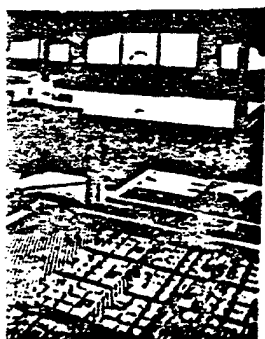
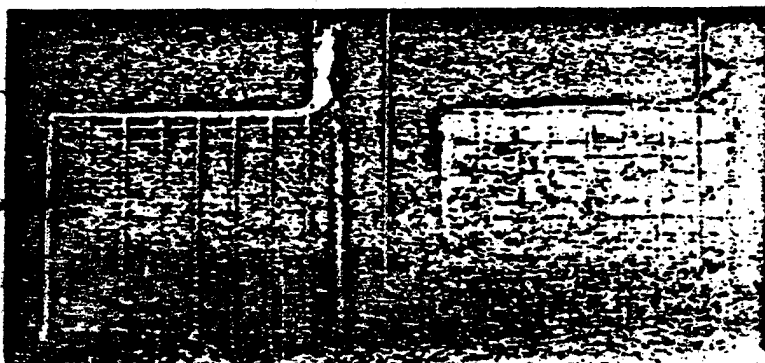
COMPOSITION

The antimony content of grid metal varies from 4% to 12% depending on the type of plate being cast. For automotive battery grids or all other grids which are thin and light in construction, the lead should contain between 9.5% and 12% antimony. An alloy of this composition imparts greater hardness and strength to the plate. At the same time, it facilitates casting because it possesses greater fluidity over a longer temperature range.

For casting heavy duty grids—those intended for farm-lighting, truck and stationary batteries—alloys containing 4% to 6% of antimony are satisfactory. Grids of this type are ordinarily of heavy construction and the usual practice is to cast them by hand rather than in casting machines.

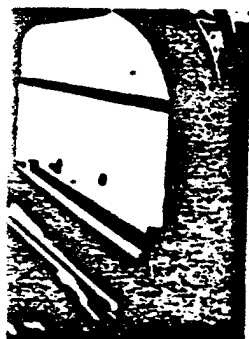


Shown: Storage battery cases in a large broadcasting station. Here the lead grid made the battery in the foreground. Below: Standard type of grid used in the automobile storage battery. The grid at the right is shown after pouring with lead oxide.



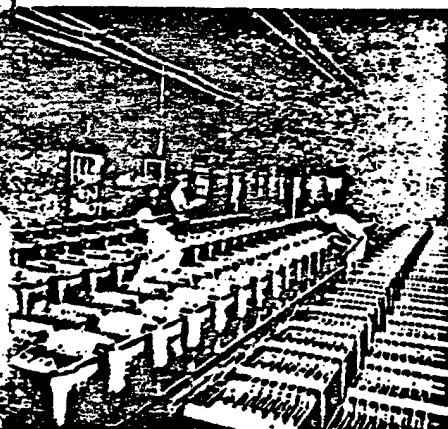
A plate as narrow as a 5-point can be mounted and supported with a as opposite each other at 1 1/4"

Information about the Blatchford Plate can will gladly be furnished on as your inquiry to National Lead Co. Blatchford Co. Branch, 63 Park City, or 900 W. 18th St., Chicago.



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NLI 113284



Interior of the storage battery house at a large mine. The workmen are inspecting the batteries and bringing up the acid level in cells where needed.

CASTING TEMPERATURE

A temperature of 800° to 830° F. is a proper one for the machine casting of grids from 2.5-12% antimonial lead. For hand casting, a temperature approximately 50° F. higher may be necessary. The alloys containing 4-6% antimony require a casting temperature of 850° to 900° F.

TREATMENT AND TEMPERATURE OF MOLD

An improper preliminary treatment of the casting molds, or their operation at temperatures which are too high or too low, are frequent causes for defective articles.

The inner surfaces of the molds should first be coated either with a layer of acetylene smoke or a liquid spray compound. A "lubricant" of this latter type is manufactured by National Lead Company and is known as "Moloney."

A temperature of 350° to 450° F., depending upon the grid size and mold construction, is a satisfactory working temperature for machine operated molds. Hand operated molds might require more external heat, especially in the early stages of casting, to obtain a good working temperature. Molds which are too hot delay solidification of the metal. Molds which are not hot enough may result in the production of grids with uneven ribs.

TREATMENT OF CRIMES

Grids crushably cast—even from 12% antimony lead—are quite soft. The usual practice is to "age" grids for three to six days before posting them. This is especially necessary with the thinner grids or those intended for machine posting. "Aging" is most readily accomplished by allowing the grids to stand at room temperature for the specified period.

GRID METAL SPECIFICATIONS OF VARIOUS BATTERY MANUFACTURERS

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NTI 113285

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NL1 113286

MANUFACTURERS

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ZINC BASE ALLOYS—C. T. METAL

Q-2

They are skillfully alloyed under ideal foundry conditions, designed to eliminate all danger of contamination thus insuring continued uniformity and strict

adherence to the proper and desired chemical composition. The alloys are furnished in 7 lb. bars packed in 500 lb. boxes.

APPROXIMATE DATA ON NATIONAL LEAD COMPANY DIE CASTING ALLOYS

	122-X	124-M	126-S	128-C
Tensile Strength—Lbs., Sq. In.	42,000	41,000	38,000	37,000
Impact Strength of Bars as measured on $\frac{1}{2}$ " x $\frac{1}{4}$ " bar	12.00	11.00	14.50	15.00
Elongation—% in 2 Inches	2.5	3.0	3.5	6.0
Compressive Strength—Lbs., Sq. In.	61,000	60,000	57,000	56,000
Brinell Hardness	85	82	78	71
Specific Gravity	0.734	0.664	0.623	0.777
Melting Point	234°F.	228°F.	227°F.	212°F.

C. T. METAL



C. T. Metal is a lead and cadmium alloy ideal for casting metallic novelties, lamp bases, clock cases, cabinet hardware, and ornamental metal objects of all descriptions.

Our C. T. Metal is an exceedingly clean alloy and flows freely at a low temperature. Dressing in use is reduced to a minimum. Superior in casting qualities, it produces a hard, tough casting with sharp outlines. It lends itself excellently to all types of plating.

C. T. Metal is furnished in 100 lb. pigs, 25 lb. pigs and ingot bars.

This workman, using a shell mold, is casting exactly duplicate bars from our C. T. metal.



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0762

NLI 113287

G-2

R-1

PEWTER

to the proper and desired chemical composition. The alloys are furnished in 7 lb. bars 500 lb. boxes.

DIE CASTING ALLOYS

124-M	124-S	124-C
11,000	10,000	17,000
11.00	10.00	15.00
3.0	3.5	0.0
60,000	57,000	91,000
62	73	71
0.441	0.423	0.717
125°F.	117°F.	121°F.

metal is a lead and antimony alloy ideal for metallic novelties, lamp bases, clock hardware, and ornamental metal decorations.

T. Metal is an exceedingly clean alloy cast at a low temperature. Dressing is reduced to a minimum. Superior in casting, produces a hard, tough casting with a lead finish excellent to all types.

metal is furnished in 100 lb. pigs, 25 lb. bars.

making a check mold, to casting novelties the same from our C.T. model.

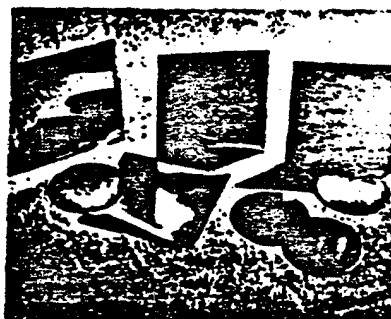


PEWTER

Pewter—sometimes called Britannia Metal—is a lead-free alloy, composed principally of tin with small amounts of antimony and copper. Considerably harder than pure tin, it is a highly ductile and malleable metal and can be readily fabricated, by casting, drawing, spinning or hand manipulation, into a variety of objects.

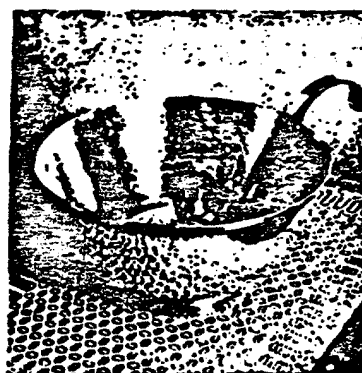
Pewter is widely used by manufacturers of flatware and hollow ware. Because of its easy working qualities, it is also used in large quantities by amateur metal craftsmen and students in art metal courses in schools and colleges.

One of the chief attractions of a fabricated



pewter object is its fine appearance. The alloy resembles silver and takes the same high polish, although, having a lower light-reflective property, it has a somewhat darker cast. Pewter articles are hard enough to withstand every-day use without becoming readily marked or dented.

Pewter is furnished in either rectangular sheets or circular discs. The discs range in diameter from 2" to 20" and come in gauges from 14 to 28. Rectangular sheets are obtainable in these same gauges in any size up to 24" x 36". A table showing the complete range of gauges and sizes is given on the following page.



Above and Below: Types of utensils commonly associated with pewter. The punch bowl and ladle above, the work of an amateur metal craftsman, was selected by the American Federation of Arts for exhibition at the 1917 World's Exposition in Paris, France. Left: Our pewter is supplied in rectangular sheets and discs as shown. Note the high polish.



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PEWTER GASKET METAL—ANTIMONY—ZINC

R-2

SIZES AND WEIGHTS OF PEWTER SHEETS* AND DISCS

Gauge.....	20 ga.	19 ga.	18 ga.	17 ga.	16 ga.	15 ga.	14 ga.
Thickness.....	.011 in.	.010 in.	.009 in.	.008 in.	.007 in.	.006 in.	.005 in.
Weights of Discs or Following Dimensions							
2 in.....	1/4 oz.	1/4 oz.	1/4 oz.	1/4 oz.	1/4 oz.	1/4 oz.	1/4 oz.
3 in.....	1 oz.	7/8 oz.	1 1/4 oz.	1 1/4 oz.	1 1/4 oz.	1 1/4 oz.	1 1/4 oz.
4 in.....	1 1/4 oz.	2 oz.	2 1/4 oz.	2 1/4 oz.	2 1/4 oz.	2 1/4 oz.	2 1/4 oz.
5 in.....	2 1/4 oz.	3 oz.	3 1/4 oz.	4 oz.	4 1/4 oz.	5 oz.	5 1/4 oz.
6 in.....	3 1/4 oz.	4 1/4 oz.	4 1/4 oz.	5 1/4 oz.	6 oz.	6 1/4 oz.	7 1/4 oz.
7 in.....	4 1/4 oz.	5 1/4 oz.	6 1/4 oz.	7 1/4 oz.	8 1/4 oz.	9 1/4 oz.	10 1/4 oz.
8 in.....	5 1/4 oz.	6 1/4 oz.	7 1/4 oz.	8 1/4 oz.	9 1/4 oz.	10 1/4 oz.	11 1/4 oz.
9 in.....	6 1/4 oz.	7 1/4 oz.	8 1/4 oz.	9 1/4 oz.	10 1/4 oz.	11 1/4 oz.	12 1/4 oz.
10 in.....	7 1/4 oz.	8 1/4 oz.	9 1/4 oz.	10 1/4 oz.	11 1/4 oz.	12 1/4 oz.	13 1/4 oz.
11 in.....	8 1/4 oz.	9 1/4 oz.	10 1/4 oz.	11 1/4 oz.	12 1/4 oz.	13 1/4 oz.	14 1/4 oz.
12 in.....	9 1/4 oz.	10 1/4 oz.	11 1/4 oz.	12 1/4 oz.	13 1/4 oz.	14 1/4 oz.	15 1/4 oz.
13 in.....	10 1/4 oz.	11 1/4 oz.	12 1/4 oz.	13 1/4 oz.	14 1/4 oz.	15 1/4 oz.	16 1/4 oz.
14 in.....	11 1/4 oz.	12 1/4 oz.	13 1/4 oz.	14 1/4 oz.	15 1/4 oz.	16 1/4 oz.	17 1/4 oz.
15 in.....	12 1/4 oz.	13 1/4 oz.	14 1/4 oz.	15 1/4 oz.	16 1/4 oz.	17 1/4 oz.	18 1/4 oz.
16 in.....	13 1/4 oz.	14 1/4 oz.	15 1/4 oz.	16 1/4 oz.	17 1/4 oz.	18 1/4 oz.	19 1/4 oz.
17 in.....	14 1/4 oz.	15 1/4 oz.	16 1/4 oz.	17 1/4 oz.	18 1/4 oz.	19 1/4 oz.	20 1/4 oz.
18 in.....	15 1/4 oz.	16 1/4 oz.	17 1/4 oz.	18 1/4 oz.	19 1/4 oz.	20 1/4 oz.	21 1/4 oz.
19 in.....	16 1/4 oz.	17 1/4 oz.	18 1/4 oz.	19 1/4 oz.	20 1/4 oz.	21 1/4 oz.	22 1/4 oz.
20 in.....	17 1/4 oz.	18 1/4 oz.	19 1/4 oz.	20 1/4 oz.	21 1/4 oz.	22 1/4 oz.	23 1/4 oz.
*Weights of Sheets per Sq. Ft.....	19 oz.	22 oz.	25 oz.	28 1/4 oz.	31 1/4 oz.	34 1/4 oz.	37 1/4 oz.

*When ordering specify quantity of discs or sheets and gauge. Sheets may be ordered any size not exceeding 24" x 24". A price list for pewter sheets and discs will be mailed upon request.

GASKET METAL

Gasket Metal is a special alloy designed for sealing joints in refrigerating machinery, particularly for the joints of compressors where carbon dioxide or some similar gas is used as the refrigerant.

Our special Hoyt No. 3 Gasket Metal was developed by us in close collaboration with the largest manufacturers of refrigerating machinery in the country. Of correct composition, it makes a gasket hard enough to resist compression yet not so hard as to be brittle. Gaskets cut from this metal can be used on either the worn or the cold end of the compressor.

Gasket Metal is furnished in the following thicknesses: .005", .010", .015", and .020". It is packed flat in special boxes to prevent damage in

shipment. In selecting this metal, it is a good plan to state size and number of gaskets to be cut. We will then send sheets of a size and shape that will cut with a minimum of waste.

ANTIMONY

Antimony possesses the property of increasing the hardness of metals with which it is alloyed and thus has a wide commercial use. We can furnish pure antimony of any brand desired. It comes in cakes varying from 40 lbs. to 65 lbs. depending upon brand.

SLAB ZINC (Spelter)

Prime zinc after smelting but before refining. Used widely for heating and galvanizing purposes. We supply this grade of zinc in slabs weighing approximately 65 lbs.

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NLI 113289

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0766

S-1

BLOCK TIN PRODUCTS

BLOCK TIN PRODUCTS

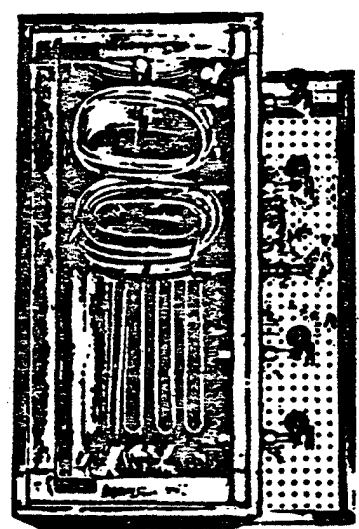
Block tin is a term used in the metal trade to refer to products made wholly from strictly pure high grade tin. As shown on this and the following page, we manufacture a full line of block tin products. All are made from accepted brands of pure, primary metal only.

TIN PIPE

While tin pipe has many and varied uses, its most important applications are in beer dispensing apparatus, soda fountain installations and for all types of equipment handling liquids intended for human consumption. Tin pipe does not rust, tarnish or corrode, and therefore does not contaminate most of the liquids regularly passed through it. The ease with which tin pipe can be bent or coiled is an additional advantage in this connection.

We manufacture tin pipe in a variety of sizes and weights. A selected list is given below. Other sizes and weights can be furnished on short notice. Our tin pipe can be depended upon to be uniform in wall thickness and free from hard and soft spots or other imperfections.

Block tin pipe is supplied in straight lengths, on coils or on reels as specified on the order.



Now dispensed with the top removed to show block tin pipe coiled ends.

SIZES AND WEIGHTS OF BLOCK TIN PIPE

I. D. (Inches)	O. D. (Inches)	Avg. Wt. per Lin. Ft.	I. D. (Inches)	O. D. (Inches)	Avg. Wt. per Lin. Ft.	I. D. (Inches)	O. D. (Inches)	Avg. Wt. per Lin. Ft.
1/2	3/4	2 1/2	1	1 1/4	3 1/2	1 1/2	1 3/4	4 1/2
3/4	1	3 1/2	1 1/4	1 3/4	4 1/2	1 3/4	2	5 1/2
1	1 1/4	4 1/2	1 3/4	2	5 1/2	2	2 1/4	6 1/2
1 1/4	1 3/4	5 1/2	2	2 1/4	6 1/2	2 1/4	2 3/4	7 1/2
1 3/4	2	6 1/2	2 1/4	2 3/4	7 1/2	2 3/4	3	8 1/2
2	2 1/4	7 1/2	2 3/4	3	8 1/2	3	3 1/4	9 1/2
2 1/4	2 3/4	8 1/2	3	3 1/4	9 1/2	3 1/4	3 1/2	10 1/2
2 3/4	3	9 1/2	3 1/4	3 1/2	10 1/2	3 1/2	3 3/4	11 1/2
3	3 1/4	10 1/2	3 1/2	3 3/4	11 1/2	3 3/4	4	12 1/2
3 1/4	3 1/2	11 1/2	3 3/4	4	12 1/2	4	4 1/4	13 1/2
3 1/2	3 3/4	12 1/2	4	4 1/4	13 1/2	4 1/4	4 1/2	14 1/2
3 3/4	4	13 1/2	4 1/4	4 1/2	14 1/2	4 1/2	4 3/4	15 1/2
4	4 1/4	14 1/2	4 1/2	4 3/4	15 1/2	4 3/4	5	16 1/2
4 1/4	4 1/2	15 1/2	4 3/4	5	16 1/2	5	5 1/4	17 1/2
4 1/2	4 3/4	16 1/2	5	5 1/4	17 1/2	5 1/4	5 1/2	18 1/2
4 3/4	5	17 1/2	5 1/4	5 1/2	18 1/2	5 1/2	5 3/4	19 1/2
5	5 1/4	18 1/2	5 1/2	5 3/4	19 1/2	5 3/4	6	20 1/2
5 1/4	5 1/2	19 1/2	5 3/4	6	20 1/2	6	6 1/4	21 1/2
5 1/2	5 3/4	20 1/2	6	6 1/4	21 1/2	6 1/4	6 1/2	22 1/2
5 3/4	6	21 1/2	6 1/4	6 1/2	22 1/2	6 1/2	6 3/4	23 1/2
6	6 1/4	22 1/2	6 1/2	6 3/4	23 1/2	6 3/4	7	24 1/2
6 1/4	6 1/2	23 1/2	6 3/4	7	24 1/2	7	7 1/4	25 1/2
6 1/2	6 3/4	24 1/2	7	7 1/4	25 1/2	7 1/4	7 1/2	26 1/2
6 3/4	7	25 1/2	7 1/4	7 1/2	26 1/2	7 1/2	7 3/4	27 1/2
7	7 1/4	26 1/2	7 1/2	7 3/4	27 1/2	7 3/4	8	28 1/2
7 1/4	7 1/2	27 1/2	7 3/4	8	28 1/2	8	8 1/4	29 1/2
7 1/2	7 3/4	28 1/2	8	8 1/4	29 1/2	8 1/4	8 1/2	30 1/2
7 3/4	8	29 1/2	8 1/4	8 1/2	30 1/2	8 1/2	8 3/4	31 1/2
8	8 1/4	30 1/2	8 1/2	8 3/4	31 1/2	8 3/4	9	32 1/2
8 1/4	8 1/2	31 1/2	8 3/4	9	32 1/2	9	9 1/4	33 1/2
8 1/2	8 3/4	32 1/2	9	9 1/4	33 1/2	9 1/4	9 1/2	34 1/2
8 3/4	9	33 1/2	9 1/4	9 1/2	34 1/2	9 1/2	9 3/4	35 1/2
9	9 1/4	34 1/2	9 1/2	9 3/4	35 1/2	9 3/4	10	36 1/2
9 1/4	9 1/2	35 1/2	9 3/4	10	36 1/2	10	10 1/4	37 1/2
9 1/2	9 3/4	36 1/2	10	10 1/4	37 1/2	10 1/4	10 1/2	38 1/2
9 3/4	10	37 1/2	10 1/4	10 1/2	38 1/2	10 1/2	10 3/4	39 1/2
10	10 1/4	38 1/2	10 1/2	10 3/4	39 1/2	10 3/4	11	40 1/2
10 1/4	10 1/2	39 1/2	10 3/4	11	40 1/2	11	11 1/4	41 1/2
10 1/2	10 3/4	40 1/2	11	11 1/4	41 1/2	11 1/4	11 1/2	42 1/2
10 3/4	11	41 1/2	11 1/4	11 1/2	42 1/2	11 1/2	11 3/4	43 1/2
11	11 1/4	42 1/2	11 1/2	11 3/4	43 1/2	11 3/4	12	44 1/2
11 1/4	11 1/2	43 1/2	11 3/4	12	44 1/2	12	12 1/4	45 1/2
11 1/2	11 3/4	44 1/2	12	12 1/4	45 1/2	12 1/4	12 1/2	46 1/2
11 3/4	12	45 1/2	12 1/4	12 1/2	46 1/2	12 1/2	12 3/4	47 1/2
12	12 1/4	46 1/2	12 1/2	12 3/4	47 1/2	12 3/4	13	48 1/2
12 1/4	12 1/2	47 1/2	12 3/4	13	48 1/2	13	13 1/4	49 1/2
12 1/2	12 3/4	48 1/2	13	13 1/4	49 1/2	13 1/4	13 1/2	50 1/2
12 3/4	13	49 1/2	13 1/4	13 1/2	50 1/2	13 1/2	13 3/4	51 1/2
13	13 1/4	50 1/2	13 1/2	13 3/4	51 1/2	13 3/4	14	52 1/2
13 1/4	13 1/2	51 1/2	13 3/4	14	52 1/2	14	14 1/4	53 1/2
13 1/2	13 3/4	52 1/2	14	14 1/4	53 1/2	14 1/4	14 1/2	54 1/2
13 3/4	14	53 1/2	14 1/4	14 1/2	54 1/2	14 1/2	14 3/4	55 1/2
14	14 1/4	54 1/2	14 1/2	14 3/4	55 1/2	14 3/4	15	56 1/2
14 1/4	14 1/2	55 1/2	14 3/4	15	56 1/2	15	15 1/4	57 1/2
14 1/2	14 3/4	56 1/2	15	15 1/4	57 1/2	15 1/4	15 1/2	58 1/2
14 3/4	15	57 1/2	15 1/4	15 1/2	58 1/2	15 1/2	15 3/4	59 1/2
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15 1/4	15 1/2	59 1/2	15 3/4	16	60 1/2	16	16 1/4	61 1/2
15 1/2	15 3/4	60 1/2	16	16 1/4	61 1/2	16 1/4	16 1/2	62 1/2
15 3/4	16	61 1/2	16 1/4	16 1/2	62 1/2	16 1/2	16 3/4	63 1/2
16	16 1/4	62 1/2	16 1/2	16 3/4	63 1/2	16 3/4	17	64 1/2
16 1/4	16 1/2	63 1/2	16 3/4	17	64 1/2	17	17 1/4	65 1/2
16 1/2	16 3/4	64 1/2	17	17 1/4	65 1/2	17 1/4	17 1/2	66 1/2
16 3/4	17	65 1/2	17 1/4	17 1/2	66 1/2	17 1/2	17 3/4	67 1/2
17	17 1/4	66 1/2	17 1/2	17 3/4	67 1/2	17 3/4	18	68 1/2
17 1/4	17 1/2	67 1/2	17 3/4	18	68 1/2	18	18 1/4	69 1/2
17 1/2	17 3/4	68 1/2	18	18 1/4	69 1/2	18 1/4	18 1/2	70 1/2
17 3/4	18	69 1/2	18 1/4	18 1/2	70 1/2	18 1/2	18 3/4	71 1/2
18	18 1/4	70 1/2	18 1/2	18 3/4	71 1/2	18 3/4	19	72 1/2
18 1/4	18 1/2	71 1/2	18 3/4	19	72 1/2	19	19 1/4	73 1/2
18 1/2	18 3/4	72 1/2	19	19 1/4	73 1/2	19 1/4	19 1/2	74 1/2
18 3/4	19	73 1/2	19 1/4	19 1/2	74 1/2	19 1/2	19 3/4	75 1/2
19	19 1/4	74 1/2	19 1/2	19 3/4	75 1/2	19 3/4	20	76 1/2
19 1/4	19 1/2	75 1/2	19 3/4	20	76 1/2	20	20 1/4	77 1/2
19 1/2	19 3/4	76 1/2	20	20 1/4	77 1/2	20 1/4	20 1/2	78 1/2
19 3/4	20	77 1/2	20 1/4	20 1/2	78 1/2	20 1/2	20 3/4	79 1/2
20	20 1/4	78 1/2	20 1/2	20 3/4	79 1/2	20 3/4	21	80 1/2
20 1/4	20 1/2	79 1/2	20 3/4	21	80 1/2	21	21 1/4	81 1/2
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20 3/4	21	81 1/2	21 1/4	21 1/2	82 1/2	21 1/2	21 3/4	83 1/2
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21 1/4	21 1/2	83 1/2	21 3/4	22	84 1/2	22	22 1/4	85 1/2
21 1/2	21 3/4	84 1/2	22	22 1/4	85 1/2	22 1/4	22 1/2	86 1/2
21 3/4	22	85 1/2	22 1/4	22 1/2	86 1/2	22 1/2	22 3/4	87 1/2
22	22 1/4	86 1/2	22 1/2	22 3/4	87 1/2	22 3/4	23	88 1/2
22 1/4	22 1/2	87 1/2	22 3/4	23	88 1/2	23	23 1/4	89 1/2
22 1/2	22 3/4	88 1/2	23	23 1/4	89 1/2	23 1/4	23 1/2	90 1/2
22 3/4	23	89 1/2	23 1/4	23 1/2	90 1/2	23 1/2	23 3/4	91 1/2
23	23 1/4	90 1/2	23 1/2	23 3/4	91 1/2	23 3/4	24	92 1/2
23 1/4	23 1/2	91 1/2	23 3/4	24	92 1/2	24	24 1/4	93 1/2
23 1/2	23 3/4	92 1/2	24	24 1/4	93 1/2	24 1/4	24 1/2	94 1/2
23 3/4	24	93 1/2	24 1/4	24 1/2	94 1/2	24 1/2	24 3/4	95 1/2
24	24 1/4	94 1/2	24 1/2	24 3/4	95 1/2	24 3/4	25	96 1/2
24 1/4	24 1/2	95 1/2	24 3/4	25	96 1/2	25	25 1/4	97 1/2
24 1/2	24 3/4	96 1/2	25	25 1/4	97 1/2	25 1/4	25 1/2	98 1/2
24 3/4	25	97 1/2	25 1/4	25 1/2	98 1/2	25 1/2	25 3/4	99 1/2
25	25 1/4	98 1/2	25 1/2	25 3/4	99 1/2	25 3/4	26	100 1/2
25 1/4	25 1/2	99 1/2	25 3/4	26	100 1/2	26	26 1/4	101 1/2
25 1/2	25 3/4	100 1/2	26	26 1/4	101 1/2	26 1/4	26 1/2	102 1/2
25 3/4	26	101 1/2	26 1/4	26 1/2	102 1/2	26 1/2	26 3/4	103 1/2
26	26 1/4	102 1/2	26 1/2	26 3/4	103 1/2	26 3/4	27	104 1/2
26 1/4	26 1/2	103 1/2	26 3/4	27	104 1/2	27	27 1/4	105 1/2
26 1/2	26 3/4	104 1/2	27	27 1/4	105 1/2	27 1/4	27 1/2	106 1/2
26 3/4	27	105 1/2	27 1/4	27 1/2	106 1/2	27 1/2	27 3/4	107 1/2
27	27 1/4	106 1/2	27 1/2	27 3/4	107 1/2	27 3/4	28	108 1/2
27 1/4	27 1/2	107 1/2	27 3/4	28	108 1/2	28	28 1/4	109 1/2
27 1/2	27 3/4	108 1/2	28	28 1/4	109 1/2	28 1/4	28 1/2	110 1/2
27 3/4	28	109 1/2	28 1/4	28 1/2	110 1/2	28 1/2	28 3/4	111 1/2
28	28 1/4	110 1/2	28 1/2	28 3/4	111 1/2	28 3/4	29	112 1/2
28 1/4	28 1/2	111 1/2	28 3/4	29	112 1/2	29	29 1/4	113 1/2
28 1/2	28 3/4	112 1/2	29	29 1/4	113 1/2	29 1/4	29 1/2	114 1/2
28 3/4	29	113 1/2	29 1/4	29 1/2	114 1/2	29 1/2	29 3/4	115 1/2
29	29 1/4	114 1/2	29 1/2	29 3/4	115 1/2	29 3/4	30	116 1/2
29 1/4	29 1/2	115 1/2	29 3/4	30	116 1/2	30	30 1/4	117 1/2
29 1/2	29 3/4	116 1/2	30	30 1/4	117 1/2	30 1/4	30 1/2	118 1/2
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30	30 1/4	118 1/2	30 1/2	30 3/4	119 1/2	30 3/4	31	120 1/2

BLOCK TIN PRODUCTS

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TIN SHEET

Tin in sheet form is used extensively by soda tank manufacturers and as the lining material in tanks and vats employed in the preparation and handling of drugs, food products and various chemicals. Tin sheet does not corrode nor does it contain toxic substances in contact with it. It is easily worked and thus easy to install.

We manufacture sheet tin by a milling process from specially refined, primary metal. It can be supplied in practically any thickness and size up to

a width of 8 feet. Small size sheets are shipped flat and carefully packed to avoid damage. Large size sheets are shipped on rolls.

TIN ANODES

Our tin anodes are made from the highest grade, refined metal only. Highly polished and free from imperfections, they provide uniform distribution in the acid bath and wear down evenly.

Anodes are supplied in any size and shape specified in the order. They are carefully packed for protection in shipping.

TIN WIRE

An important use for the wire is in spray guns for the application of metallic coatings. We can supply pure refined tin wire for this and other purposes in all standard wire gauges.

TIN TAPE

Tin tape is an extruded product and can be furnished in practically any width and thickness desired. It is furnished on spools or reels according to the weight of the shipment or the specification of the purchaser.

PULVERIZED TIN

Pulverized or powdered tin is used principally for the pre-tinning operation in delicate soldering work. We furnish pulverized tin in three meshes—50, 100 and 200. It is packed in tin or bulk containers.

BAR TIN

We furnish pure refined tin cast in bar form. These bars, which weigh approximately 1 lb. each, are widely used by plumbers for crutching solder. They are carefully packed in boxes of any weight desired by the customer.

INGOT TIN

Pure refined tin is also obtainable in rectangular ingot form. Each ingot weighs approximately 5 lbs.

PIG TIN

We also supply pure tin cast in pig form for large users. Pigs weigh approximately 100 lbs.

SIZES AND WEIGHTS OF SHEET TIN

1 lb. per sq. ft.	1.40 inch.
1 1/4 lb. per sq. ft.	1.27 inch.
2 lb. per sq. ft.	1.20 inch.
2 1/4 lb. per sq. ft.	1.16 inch.
3 lb. per sq. ft.	1.13 inch.
3 1/2 lb. per sq. ft.	1.11 inch.
4 lb. per sq. ft.	1.10 inch.
5 lb. per sq. ft.	1.08 inch.
10 lb. per sq. ft.	1.04 inch.
20 lb. per sq. ft.	1.02 inch.

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DUTCH BOY PAINT MATERIALS

DUTCH BOY PAINT MATERIALS

In addition to the metal products shown in this catalog, National Lead Company sells a full line of paint materials. These products—all carrying the Dutch Boy trademark—are described and illustrated on this and the following page.

THE DUTCH BOY LINE

The basic materials in the Dutch Boy line are white-lead and red-lead. White-lead is sold in paste form and reduced to painting consistency by the painter. It can be used for all coats on nearly all surfaces—interior or exterior. Red-lead is sold in either paste or liquid form. It is intended primarily for the protection of exterior or interior metal surfaces.

Pure white-lead and pure red-lead paints have been used for generations. Their durability and

economy are matters of record. Today, they are the paints which are most often used or specified by painting contractors, engineers, architects and others whose business it is to know the facts about paint.

Complementing white-lead and red-lead in the line are products designed for use with these basic materials—linseed oil, Lead Mixing Oil, colors in oil, liquid drier—and wall primer, a special first-coater for interior porous surfaces.

PAINT INFORMATION SERVICE

National Lead Company's Department of Technical Paint Service is ready at all times to answer any question you may have pertaining to paint or its application. Your inquiry addressed to that Department will receive prompt attention.



DUTCH BOY
WHITE-LEAD

Dutch Boy white-lead is available in two forms—heavy paste and oil paste. The two are identical in quality and make the same amount of paint. Oil paste, however, contains a small quantity of turpentine. It can be reduced to painting consistency more quickly.

Both forms of white-lead can be used for all jobs—interior as well as exterior—and for all finishes—flat, eggshell or gloss. They are sold in 100 lb. steel kegs; 50, 25 and 12½ lb. steel pails; and 1 and 5 lb. tins.

Two types of linseed oil are sold under the Dutch Boy trademark—raw and boiled. The raw oil is a carefully filtered oil obtained from the finest grade of flaxseed. Boiled oil is raw oil which has been heated and to which metallic compounds have been added to bring about quicker drying. Both types of linseed oil are sold in 1-gallon and 5-gallon factory-canned cans.



DUTCH BOY
LINSEED OIL

1 foot. Small size sheets are shipped flat by packed to avoid damage. Large size shipped on rolls.

ES
e anodes are made from the highest
ed metal only. Highly polished and free
fections, they provide uniform distri-
acid bath and wear down evenly.
ee supplied in any size and shape
the order. They are carefully packed
e in shipping.

erient use for tin wire is in spray gun
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refined tin wire for this and other pro-
standard wire gauges.

is an extruded product and can be
practically any width and thickness
mashed on spools or reels according
of shipment or the specification of
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3 TIN
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3). It is packed in tin or bulk con-

4 pure refined tin cast in bar form.
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d by plumbers for crutching solder.
lly packed in boxes of any weight
containers.

red tin is also obtainable in cast-
m. Each ingot weighs approximately

apply pure tin cast in pig form for
ge weigh approximately 100 lbs.

DUTCH BOY PAINT MATERIALS

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**DUTCH BOY
LEAD MIXING OIL**



Dutch Boy Lead Mixing Oil is a compound vehicle to Dutch Boy Keasol oil. It was developed for a special purpose—to provide an oil which would mix perfectly with white-lead for the sealing and decoration of porous surfaces, interior or exterior. Paint made with it dries to a practically flat finish which can be washed readily and as often as necessary.

Dutch Boy Lead Mixing Oil is sold in factory-sealed 1-gallon and 5-gallon cans.

Dutch Boy colors in oil are specially made for tinting white-lead paint. They come in a soft paste form and can be readily mixed into the paint without thinning. Dutch Boy colors in oil are sold in 1-gallon, 1-quart and 1/2-pint cans and 3-ounce tubes.



**DUTCH BOY
COLORS IN OIL**

**DUTCH BOY
WALL PRIMER**



Dutch Boy wall primer is a sealer and a paint coat combined. It is used for priming unusually porous plaster or wall board. It stops action effectively and hides discolored spots and smudgy surfaces. Dutch Boy wall primer makes a perfect foundation for later coats of white-lead paint. It is sold in 1-quart and 1-gallon cans and 5-gallon kts.

Dutch Boy liquid drier is a strong, dependable drier made especially for use with white-lead paint. It is a properly-balanced material designed to bring about a uniform, efficient drying action. It is sold in 1-gallon, 1-quart, 1-pint and 1/2-pint cans.



**DUTCH BOY
LIQUID DRIER**

**DUTCH BOY
RED-LEAD**



Dutch Boy red-lead is available in several forms: Paste Red-lead; Liquid Red-lead No. 1 (Orange Red); Liquid Red-lead No. 6 (Light Brown); Liquid Red-lead No. 7 (Dark Brown); Liquid Red-lead No. 8 (Black); and Quick-Drying Red-lead. (Orange Red.)

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GENERAL DATA

Lead Mixing Oil is a composition of Ray mixed oil. It was developed for use with white-lead for the sealing in of porous surfaces, interior or exterior, made with it dries to a practically non-porous surface and as often

Lead Mixing Oil is sold in factory 1 and 5-gallon cans.

DUTCH BOY COLORS IN OIL

Wall primer is a sealer and a paint. It is used for priming masonry or wall board. It stops surface efflorescence, discolors spots and erases masonry. Dutch Boy wall primer makes a perfect base coat of white-lead paint. It is sold in 1-gallon cans and 5-gallon kils.

DUTCH BOY LIQUID DRIER

Red-lead is available in several grades: Liquid Red-lead No. 1 (Dark); Liquid Red-lead No. 6 (Light); Liquid Red-lead No. 7 (Dark Brown); and No. 8 (Black); and Quick-Drying Orange Red.

CHEMICALS WITH WHICH LEAD IS USED

The following is a partial list of the chemicals with which lead is commonly used in the process industries. It is offered as a general guide only. Because of the wide variation in operating conditions and the broad range of chemicals and combinations of chemicals used in modern industry, a more complete and more specific list would be impractical.

We welcome inquiries concerning the use of lead in chemical equipment. A complete report as to operating conditions and the nature of the reacting substances will enable us to determine the suitability of lead for your particular purpose.

ACETIC ACID. Concentrated for glacial and may be used with lead and is commonly stored in lead vessels. Dilute acid will damage lead in the presence of oxygen.

ACETONE. Used satisfactorily with lead.

ALCOHOL, ETHYL or METHYL. Used satisfactorily with lead.

ALUMINUM SULPHATE (or Alum). Can be used freely with all kinds of lead equipment. Hard lead is, of course, best in all cases.

AMMONIA. Lead is not affected by dry ammonia but is attacked by aqueous solutions.

AMMONIUM HYDROXIDE. As vapor or liquid, can be used satisfactorily with lead at practically all temperatures or concentrations.

AMMONIUM CHLORIDE. In concentrations of around 30%, may be used satisfactorily at ordinary temperatures. At elevated temperatures and where the concentration is more than 30%, some corrosion will take place.

AMMONIUM PHOSPHATE. Can be used satisfactorily with lead.

AMMONIUM SULPHATE. Used freely in all types of lead equipment.

ANTHRACENE CHLORIDE. Lead has been used with comparative immunity for obtaining the brightness to the product.

BENZYL CHLORIDE. Can be used satisfactorily with lead.

BLEACHING SOLUTION (Hydrogen Peroxide). Lead is widely used, particularly in the form of lead.

BLEACHING SOLUTION (Sodium Hypochlorite). Can be used with lead.

BORIC ACID. Lead is widely used in its manufacture.

BROMINE. Also Sodium Chloride.

BROMINE. Used with lead when cold and anhydrous.

CALCIUM CARBONATE. Occurs as natural carbonates and forms a good protective coating on lead pipe.

CHLORINE HYDROXIDE (Lead). Is used in small amounts to convert the natural carbonates of some very soft water on lead pipe. It is recommended that water so treated should not exceed an acidity of pH 9.

CARBON DIOXIDE. Is usually a protective influence on natural carbonates, except where there is a very high content of carbon dioxide in the water. Lead is also used in and carbonates of potassium CO₂.

CARBON TETRACHLORIDE. Has use at ordinary temperatures.

CHLORINE. Does not attack lead if dry. Moist chlorine may be used with lead up to about 105-115°C with slight corrosion.

CHLORINATED HYDROCARBONS. Have varying action on lead, from slight to severe, depending on load-down to HCl and presence of organic acids.

CHLORINATION PROCESSES. Lead equipment is used with comparative immunity in most cases. While slowly corroded at the temperatures usually found, lead will give an satisfactory life or other common metals and with greater economy.

CHROMIC ACID. Is used with lead in fairly high strengths. Antimonial lead is usually preferred in electrolytic. Chromates form a good protective coating on lead.

COAL TAR. Refining and recovery of many hydrocarbons.

CONCRETE (Cement or Mortar). Fresh lime in concrete or mortar will attack lead having a reddish concrete product which does not protect the lead. Aging of all concrete or an application of tar or asphalt is recommended, before contact with lead.

COPPER SULPHATE. Is used with lead. The lead is used either for anodes or as a lining for tanks for electrolytic lead sulphate solutions.

ETHER MANUFACTURE.

FORMALDEHYDE (or Formalin Acid). Attacks lead about the same as acid.

HYDROCHLORIC ACID. Lead is not generally recommended for commercial use of this acid, but has been used with some success in cases of acid concentrations up to 30% at room temperature, or in acid concentrations up to 20% at 100°C. A 12% antimonial lead is usually preferred over ordinary lead or one of lower antimony content. This holds for many chlorination processes. Lead is also quite frequently used where vapors are allowed to escape to the open air from reaction vessels.

HYDROFLUORIC ACID. Lead has few contacts to date with this acid. It is commonly used.

HYDROGEN CHLORIDE (Gaseous Hydrochloric Acid). Has little effect on lead.

HYDROGEN PEROXIDE. Will not corrode lead severely, but corrodes all and causes by its presence.

ISOPHORENE MANUFACTURE.

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GENERAL DATA

MAGNESIUM CHLORIDE. Is corrosive to lead as it is to other metals.

NAFTHALENE. Can be used with lead equipment.

NITRIC ACID. While lead nitrate is the soluble to recommend lead for nitric acid in general, concentrated acid of over 50% strength can be handled with very little corrosion. Dilute strengths can be used at ordinary temperatures (60°F and above) may be used at ordinary temperatures if the water present is under 25%. At higher temperatures the mixture becomes much more corrosive. At a certain combination known as nitro-sulphuric acid when a small amount of nitric acid is present in concentrated sulphuric at elevated temperatures, the combination is kept at its least corrosive condition in the chamber process for making sulphuric acid by careful control. Sulphate salts are considered inhibitors to corrosion by nitric acid.

NITROBENZOL or NITROCHLOROBENZOL. Are considered corrosive to lead.

NITROCELLULOSE. See Report.

NITROGLYCEROL. Lead is used for handling spent cells from the manufacture of this explosive and in the open industry for nitrocellulose.

ORGANIC ACIDS. Dilute organic acids in general tend to accelerate the corrosion of lead and solutions containing them should be questioned as to their effect. We will be glad to have you consult us in regard to sulphuric acid or other solutions containing such acids, these lead can be used effectively in some cases.

OSYGEN. Dry gas has no effect on lead other than a scratch. In the presence of water an initial attack occurs, usually followed by a good protective coating by action of oxide dissolved in natural waters such as carbonates, sulphates and silicates. In the absence of any protective salts, oxygen may well be removed by action on contact of the surface on all metals, particularly the hot water pipes.

PHENOL. Can be used satisfactorily with lead.

PHOSPHORIC ACID. May be used with lead up to a strength of 50% below 100°F with only slight corrosion. Inquiries in very small amounts decrease the corrosive effect markedly and improve acid to used up to 50% concentration.

PHOTOGRAPHIC SOLUTIONS. May be used with lead.

POTASSIUM PERMANGANATE. Will attack lead.

PYRENE. Has practically no effect on lead.

RAYON. Lead is used in all processes of manufacture.

SILICATES. Soluble silicates form a good protective coating on lead in small amounts in natural waters and it is recommended if treatment is necessary.

SILF MANUFACTURE.

SILVER CHLORIDE. Forms a protective coating to nitric acid. Dilute solutions have no effect on lead.

SILVER CHLORIDE. May be used in dilute solutions under 100°F. The acid of lead is commonly handled in untreated lead.

SODIUM HYDROXIDE. Can be handled in lead.

SODIUM HYDROXIDE. Is somewhat corrosive but can be recommended at strengths up to 25% under 50°F, where its attack is slight.

SODIUM SULPHATE SOLUTIONS. Can be used freely with lead.

SODIUM SULPHIDE SOLUTIONS. May be used up to 100°C.

SODIUM SULPHITE SOLUTIONS. Are used up to about 20% concentration at ordinary temperatures.

SOLLS. While salts vary in corrosive properties, the average type corrosion lead very little. Lead pipe is very widely used as service pipe and underground cable covering.

SULPHONATING PROCESSES.

SULPHUR DIOXIDE. Has little effect when dry and can be used moist up to about 200°C with lead.

SULPHUR TRIOXIDE. Can be used satisfactorily with lead.

SULPHURIC ACID. Lead is the favorite material for this acid in all its concentrations throughout the industry. It resists all concentrations up to 50% at room temperature, and up to about 50% at all temperatures up to about 200°C. For some purposes at even higher temperatures, up to 250°C, lead or lead-lined equipment will have comparatively good life. For the more drastic temperatures, titanium lead is commonly used. For heating and stronger than 50% for about 115°F and then is usually recommended although lead will handle this strength easily at room temperatures.

SULPHURIC ACID. Can be used freely up to about 200°C.

TANNIC ACID. Is somewhat similar to acetic acid.

TARTARIC ACID. Is somewhat similar to acetic acid.

THIONYL CHLORIDE. Can be used freely with lead up to about 100°C, and in some instances higher.

TITANIUM SULPHATE SOLUTIONS. Can be used satisfactorily with lead.

WATER, DISTILLED. Attacks lead very slowly in proportion to the amount of dissolved oxygen contained.

WATER, NATURAL. Usually has no corrosive attack on lead due to small amounts of dissolved salts which form a protective coating. Sometimes very soft waters or those having an excess from peaty sources containing organic acids have slight corrosive action. This may be corrected by small additions of carbon dioxide or lime. Waters particularly high in chlorides, as do to contain the chlorides of sodium and magnesium, are somewhat corrosive to all common metals.

WOODS. Seasoned wood has practically no corrosive effect on lead. A few cases of certain woods containing organic acids, such as green oak, have been reported as corrosive to lead. Small changes from forest conditions to the wood has also been reported, and all wood to be used with lead should be carefully inspected for the presence of known acids.

ZINC CHLORIDE. Can be used satisfactorily with lead.

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GENERAL DATA

DATA RELATIVE TO CHEMICAL LEAD PIPES FOR HEATING COILS

INNER DIAMETER OF PIPE IN INCHES	MAINTENANCE PRESSURE LBS. PER SQ. IN.	TEMPERATURE IN °F.	PIPE CLASSIFICATION	PIPE OUTSIDE DIAMETER IN INCHES	WEIGHT PER FT. LBS.	Sq. Ft. SURFACE AREA PER 100 FT. LENGTH
1/2	20	274	C	1.000	1 - 12	26.3
3/4	20	287	A	1.125	2 - 8	28.5
1	20	298	AA	1.312	3 - 6	34.35
1 1/4	20	270	B	1.688	3 - 4	35.5
1 1/2	20	287	AA	1.875	4 - 12	39.65
1 3/4	20	298	Special	2.062	6 - 2	42.35
2	20	270	A	2.250	4 - 12	45.3
2 1/2	20	287	AAA	2.625	7 - 12	49.4
3	20	298	Special	3.062	9 - 10	52.65

SAFE WORKING PRESSURES

For Calculating Safe Working Pressure of Pipe at Various Temperatures

TEMPERATURE °C.	TEMPERATURE °F.	EQUIVALENT STRESS IN LBS. PER SQ. IN.	MAINTENANCE PRESSURE IN LBS. PER SQ. IN.	
			TEMPERATURE IN °F.	PERCENTAGE
20	68	100	200	100
30	86	100	190	100
40	104	100	180	100
50	122	100	172	100
60	140	100	162	100
70	158	100	152	100
80	176	100	144	100
90	194	100	136	100
100	212	100	127	100
110	230	100	118	100
120	248	100	109	100
130	266	100	100	100
140	284	100	90	100
150	302	100	80	100
160	320	100	70	100
170	338	100	60	100
180	356	100	50	100
190	374	100	40	100
200	392	100	30	100

The formula to be used with the above values are $P = \frac{357}{D} \times T$ or $P = \frac{357}{D} \times T \times \frac{1}{100}$

When P is the safe working pressure in lbs. per sq. inch, D is the diameter in inches, T is the temperature in °F.

T is the temperature of pipe wall in inches, D is the diameter in inches.

Remember it is advisable to use wall thickness greater than that shown from the above equation for commercial or standard sizes. When a standard size is required, it is well to provide additional wall thickness.

TEMPERATURE CONVERSION

From Fahrenheit to Centigrade - Subtract 32, multiply by five-eighths.

HEATING COIL FORMULA

For Calculating Length of Lead Pipe Needed for Heating Solutions—Time 1 hour

$$\text{Mean temperature } (T_1 - T_2) - (T_1 - T_2) \text{ difference } T = 2.3 \log \frac{(T_1 - T_2)}{(T_1 - T_2)}$$

where T = Temperature of steam or heating medium in °F.
T₁ = Initial temperature of solution in °F.
T₂ = Final temperature of solution in °F.

Length of pipe required =

$$\frac{V \times W \times (T_1 - T_2) \times Sp \times 12}{H \times M \times D \times 144}$$

where V = Volume of solution in gallons
W = Weight of solution in lbs. per gal.
T₁ = Temperature to which solution is to be heated in °F.
T₂ = Initial temperature of solution in °F.
Sp = Specific heat of solution
H = Heat transfer in B.t.u./sq. ft./°F./hr.
M = 100
D = Mean temperature difference T.
D = Outside diameter of lead pipe in inches

NOTE: If water with the thermal conductivity of the solution, the density of the solution and the amount of stirring. As a general figure H = 100 where convection currents function well as there is mild stirring. For a more thorough examination of heat transfer problems, engineering books on the subject should be consulted.

From Centigrade to Fahrenheit - Multiply by nine-fifths, add 32.

HYDROXIDE. Is somewhat corrosive but not exceeded at strengths up to 25% under 80°C. attack is slight.

ULPHATE SOLUTIONS. Can be used freely.

ULPHIDE SOLUTIONS. May be used up to

ULPHATE SOLUTIONS. Are used up to about maximum of ordinary temperatures.

As salts vary in corrosive properties, the corrosive lead very little. Lead pipe is very used as service pipe and underground cable.

TING PROCESSES

OPHIDE. Has little effect when dry and can stand up to about 200°C with lead.

CHLORIDE. Can be used satisfactorily with

ACID. Lead is the favorite material for this in its modifications throughout the industry. It is recommended up to 80°C; at room temperature, about 80°C; at all temperatures up to about 100°C; at even higher temperatures, FC, lead or lead-lined equipment will have very good life. For the most drastic temperatures lead is commonly used. For boiling acid (see 80°C) for about 81.5°C and then is usually used although lead will handle this strength even temperatures.

IS ACID. Can be used freely up to about

IS. Is somewhat similar to acetic acid.

CHL. Is somewhat similar to acetic acid.

LORENE. Can be used freely with lead 250°C, and in some instances higher.

ULPHATE SOLUTIONS. Can be used with lead.

HALER. Attacks lead very slowly in presence of dissolved oxygen contained.

TEL. Usually has no corrosive attack on small amounts of dissolved salts which form a coating. Sometimes very salt water or those come from poorly treated water containing organic salts which attack. This may be corrected by use of carbon dioxide or lime. Water which is chlorinated, as is to contain the chlorides and magnesium, are somewhat corrosive to metals.

used used has probably no corrosive effect. A few cases of certain acids containing salts or gases out, have been reported as a result. Some damage from acids containing lead has been reported, and all used to be lead should be carefully inspected for the reason, etc.

RE. Can be used satisfactorily with lead.

GENERAL DATA

U-4

DENSITY DATA FOR LEAD, TIN AND THEIR ALLOYS

Material	Wt. in (Kilob-1)	Wt. in (Kilob-1)	Wt. in (Kilob-1)	Material	Wt. in (Kilob-1)	Wt. in (Kilob-1)	Wt. in (Kilob-1)
Lead	11.35	11.35	11.35	40% Tin 60% Lead	9.50	9.50	9.50
10% Tin 90% Lead	11.35	11.35	11.35	50% Tin 50% Lead	9.50	9.50	9.50
20% Tin 80% Lead	11.35	11.35	11.35	60% Tin 40% Lead	9.50	9.50	9.50
30% Tin 70% Lead	11.35	11.35	11.35	70% Tin 30% Lead	9.50	9.50	9.50
40% Tin 60% Lead	11.35	11.35	11.35	80% Tin 20% Lead	9.50	9.50	9.50
50% Tin 50% Lead	11.35	11.35	11.35	90% Tin 10% Lead	9.50	9.50	9.50
60% Tin 40% Lead	11.35	11.35	11.35	Antimony 90% Lead	10.75	10.75	10.75
70% Tin 30% Lead	11.35	11.35	11.35	Antimony 80% Lead	10.75	10.75	10.75
80% Tin 20% Lead	11.35	11.35	11.35	Antimony 70% Lead	10.75	10.75	10.75
90% Tin 10% Lead	11.35	11.35	11.35	Antimony 60% Lead	10.75	10.75	10.75

MINIMUM WEIGHTS RECOMMENDED FOR SOIL, WASTE, VENT OR FLUSH PIPES, BENDS AND TRAPS

Internal Diameter (Inches)	Weight per Foot (Lbs.)	Weight per Foot (Oz.)	Internal Diameter (Inches)	Weight per Foot (Lbs.)	Weight per Foot (Oz.)
1	2	32	2	6	96
1 1/4	3	48	3	7	112

FLOW OF WATER IN HOUSE SERVICE PIPES

(in cu. ft. per min.)
Thomas Motor Co.

Condition or Description	Flow (cu. ft. per min.)	Flow (cu. ft. per min.)	Flow (cu. ft. per min.)	Flow (cu. ft. per min.)	Flow (cu. ft. per min.)	Flow (cu. ft. per min.)
Through 1/2" of Service Pipe, No Back Pressure	1.00	1.00	1.00	1.00	1.00	1.00
Through 3/4" of Service Pipe, No Back Pressure	1.50	1.50	1.50	1.50	1.50	1.50
Through 1" of Service Pipe, No Back Pressure	2.00	2.00	2.00	2.00	2.00	2.00
Through 1 1/4" of Service Pipe, No Back Pressure	2.50	2.50	2.50	2.50	2.50	2.50
Through 1 1/2" of Service Pipe, No Back Pressure	3.00	3.00	3.00	3.00	3.00	3.00
Through 1 3/4" of Service Pipe, No Back Pressure	3.50	3.50	3.50	3.50	3.50	3.50
Through 2" of Service Pipe, No Back Pressure	4.00	4.00	4.00	4.00	4.00	4.00
Through 2 1/2" of Service Pipe, No Back Pressure	4.50	4.50	4.50	4.50	4.50	4.50
Through 3" of Service Pipe, No Back Pressure	5.00	5.00	5.00	5.00	5.00	5.00
Through 3 1/2" of Service Pipe, No Back Pressure	5.50	5.50	5.50	5.50	5.50	5.50
Through 4" of Service Pipe, No Back Pressure	6.00	6.00	6.00	6.00	6.00	6.00
Through 4 1/2" of Service Pipe, No Back Pressure	6.50	6.50	6.50	6.50	6.50	6.50
Through 5" of Service Pipe, No Back Pressure	7.00	7.00	7.00	7.00	7.00	7.00
Through 5 1/2" of Service Pipe, No Back Pressure	7.50	7.50	7.50	7.50	7.50	7.50
Through 6" of Service Pipe, No Back Pressure	8.00	8.00	8.00	8.00	8.00	8.00
Through 6 1/2" of Service Pipe, No Back Pressure	8.50	8.50	8.50	8.50	8.50	8.50
Through 7" of Service Pipe, No Back Pressure	9.00	9.00	9.00	9.00	9.00	9.00
Through 7 1/2" of Service Pipe, No Back Pressure	9.50	9.50	9.50	9.50	9.50	9.50
Through 8" of Service Pipe, No Back Pressure	10.00	10.00	10.00	10.00	10.00	10.00
Through 8 1/2" of Service Pipe, No Back Pressure	10.50	10.50	10.50	10.50	10.50	10.50
Through 9" of Service Pipe, No Back Pressure	11.00	11.00	11.00	11.00	11.00	11.00
Through 9 1/2" of Service Pipe, No Back Pressure	11.50	11.50	11.50	11.50	11.50	11.50
Through 10" of Service Pipe, No Back Pressure	12.00	12.00	12.00	12.00	12.00	12.00

NOTE: In the table it is assumed that the pipe is straight and smooth inside, that the bottom of the bend and meter are disregarded, that the water flows from the main in all ordinary character, sharp, not flowing or rounded, and that the water is the full diameter of the pipe. The exact details of the conditions given are made that in practice, consequently the quantities of the table may be expected to be somewhat greater than those shown, if the conditions are not, or if the pressure may be increased, etc.

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7. that the breach of the trust and error are
not of standing, and that the capital is the full
trust, management, the operation of the full
trust, to have power may be continued, etc.

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GENERAL DATA

U.S.

PHYSICAL PROPERTIES OF COPPER

Atomic number	29
Atomic weight	63.57
Density—20°C.	8.94
Melting point, °C.	1083
Boiling point, °C. at 760 mm. pressure	2325
Specific heat, per °C., cal. per g.	0.0919
Latent heat of fusion, cal. per g.	90.46
Electrical resistivity, microhm./cm.	1.682
Thermal conductivity, cal./cm. ² /cm./sec./°C.	0.923

PHYSICAL PROPERTIES OF METALS

Metals and Chemical Symbols	Density	Wt. Loss Per Ct. in.	Coefficient of Linear Expansion per °C. at Room Temperature	Melting Points		Boiling Points at 760 mm. Pressure	
				Fahr.	Cent.	Fahr.	Cent.
Aluminum, pure (Al).....	2.70	.0075	.000013	1220	689	3772	1980
Antimony (Sb).....	6.690	.2391	.000017	1166	630	2206	1198
Arsenic (As).....	5.73	.2600	.000014	1492	754	1110	615
Bismuth (Bi).....	9.80	.2541	.000012	520	271	2642	1450
Bronze, 90 Cu, 10 Sn.....	8.67	.2600	.000010	1620-1700	910-930		
Bronze, 80 Cu, 20 Sn.....	8.67	.2515	.000010	1700-1800	940-990		
Cadmium, cast (Cd).....	8.64	.2125	.000016	610	321	1600	762
Cadmium (Cd).....	1.86	.0040	.000010	1244	674	2232	1206
Chromium (Cr).....	7.190	.2579	.000012	2126	1169	3992	2200
Chromium (Cr).....	6.9	.2506	.000012	2140	1176	3232	1780
Cobalt, cast.....	6.94	.208	.000010	1900	1040	4217	2325
Copper, cathodic.....	10.3	.0023	.000010	1940	1065	4772	2650
Gold, pure, cast (Au).....	19.3	.200	.000012	1460	794	3090	1700
Iridium (Ir).....	22.4	.200	.000010	2700	1480	5000	2750
Iron, pure (Fe).....	7.8	.2600	.000010	2790	1530	5400	3000
Iron, cast, 4% Carbon.....	7.8	.2500	.000010	2800	1530		
Lead, cast (Pb).....	11.35	.200	.000010	625	327	2940	1620
Lead, rolled.....	11.37	.200	.000010	625	327	2940	1620
Magnesium (Mg).....	1.74	.0030	.000010	1200	650	3080	1700
Manganese (Mn).....	7.2	.200	.000010	2220	1240	3050	1700
Mercury (Hg).....	13.550	.200		-38.9	-39	676	360
Nickel, cast (Ni).....	8.8	.200	.000012	2600	1420	3200	1750
Nickel (Ni).....	10.48	.270	.000010	2200	1210	3720	2050
Potassium (K).....	0.86	.001	.000010	104.3	42	1490	810
Silver, pure (Ag).....	10.5	.20	.000010	1330	720	3042	1680
Sodium (Na).....	0.97	.200	.000010	207.3	97.3	1460	800
Steel, cast, 3% Carbon.....	7.8	.200	.000010	2642	1470	3070	1700
Titanium (Ti).....	4.5	.200	.000010	1660	900	3540	1950
Tin, cast (Sn).....	7.3	.200	.000010	450	230	2900	1600
Zinc, cast (Zn).....	7.1	.200	.000010	1070	580	2640	1450
Zinc, pure (Zn).....	7.14	.200	.000010	1070	580	2640	1450

*Data given, unless noted, are at ordinary pressure.

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GENERAL DATA

U-7

U-4

THERMAL DATA FOR COMMON METALS AND ALLOYS*

Metals	Mean Specific Gravity, 20°C	Mean Coefficient of Expansion, 20°C	Mean Linear Expansion, 20°C	Mean Area Expansion, 20°C	Mean Volume Expansion, 20°C	Mean Thermal Conductivity, 20°C	Mean Thermal Diffusivity, 20°C	Mean Thermal Capacity, 20°C	Mean Thermal Resistance, 20°C
Aluminum	2.70	23.6	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
Antimony	6.69	18.7	18.7	56.1	168.9	0.045	0.000045	0.050	0.000500
Bismuth	9.80	14.5	14.5	43.5	129.7	0.080	0.000080	0.030	0.000300
Chromium	7.19	11.5	11.5	34.5	103.5	0.115	0.000115	0.100	0.001000
Copper	8.93	16.6	16.6	50.0	149.9	0.092	0.000092	0.090	0.000900
Lead	11.34	28.9	28.9	86.7	259.1	0.067	0.000067	0.030	0.000300
Steel	7.85	11.7	11.7	35.1	105.3	0.117	0.000117	0.080	0.000800
Tin	7.29	22.5	22.5	67.5	202.5	0.065	0.000065	0.030	0.000300
Zinc	7.13	26.4	26.4	79.2	237.6	0.117	0.000117	0.080	0.000800

Metals	Mean Specific Gravity, 20°C	Mean Coefficient of Expansion, 20°C	Mean Linear Expansion, 20°C	Mean Area Expansion, 20°C	Mean Volume Expansion, 20°C	Mean Thermal Conductivity, 20°C	Mean Thermal Diffusivity, 20°C	Mean Thermal Capacity, 20°C	Mean Thermal Resistance, 20°C
Aluminum	2.70	23.6	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
Antimony	6.69	18.7	18.7	56.1	168.9	0.045	0.000045	0.050	0.000500
Bismuth	9.80	14.5	14.5	43.5	129.7	0.080	0.000080	0.030	0.000300
Chromium	7.19	11.5	11.5	34.5	103.5	0.115	0.000115	0.100	0.001000
Copper	8.93	16.6	16.6	50.0	149.9	0.092	0.000092	0.090	0.000900
Lead	11.34	28.9	28.9	86.7	259.1	0.067	0.000067	0.030	0.000300
Steel	7.85	11.7	11.7	35.1	105.3	0.117	0.000117	0.080	0.000800
Tin	7.29	22.5	22.5	67.5	202.5	0.065	0.000065	0.030	0.000300
Zinc	7.13	26.4	26.4	79.2	237.6	0.117	0.000117	0.080	0.000800

PHYSICAL PROPERTIES OF CAST LEAD-ANTIMONY ALLOYS

Alloys	Antimony, %	Lead, %	Linear Expansion, 20°C	Area Expansion, 20°C	Volume Expansion, 20°C	Thermal Conductivity, 20°C	Thermal Diffusivity, 20°C	Thermal Capacity, 20°C	Thermal Resistance, 20°C
100% Lead	0	100	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
90% Lead	10	90	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
80% Lead	20	80	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
70% Lead	30	70	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
60% Lead	40	60	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
50% Lead	50	50	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
40% Lead	60	40	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
30% Lead	70	30	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
20% Lead	80	20	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
10% Lead	90	10	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900

*From International Lead-Zinc Institute, "Lead-Antimony Alloys", 1964, p. 10.

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63.57
6.94
10.83
23.25
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80.46
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0.023

Metals	Mean Specific Gravity, 20°C	Mean Coefficient of Expansion, 20°C	Mean Linear Expansion, 20°C	Mean Area Expansion, 20°C	Mean Volume Expansion, 20°C	Mean Thermal Conductivity, 20°C	Mean Thermal Diffusivity, 20°C	Mean Thermal Capacity, 20°C	Mean Thermal Resistance, 20°C
Aluminum	2.70	23.6	23.6	72.5	217.7	0.172	0.000172	0.900	0.000900
Antimony	6.69	18.7	18.7	56.1	168.9	0.045	0.000045	0.050	0.000500
Bismuth	9.80	14.5	14.5	43.5	129.7	0.080	0.000080	0.030	0.000300
Chromium	7.19	11.5	11.5	34.5	103.5	0.115	0.000115	0.100	0.001000
Copper	8.93	16.6	16.6	50.0	149.9	0.092	0.000092	0.090	0.000900
Lead	11.34	28.9	28.9	86.7	259.1	0.067	0.000067	0.030	0.000300
Steel	7.85	11.7	11.7	35.1	105.3	0.117	0.000117	0.080	0.000800
Tin	7.29	22.5	22.5	67.5	202.5	0.065	0.000065	0.030	0.000300
Zinc	7.13	26.4	26.4	79.2	237.6	0.117	0.000117	0.080	0.000800

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GENERAL DATA

U-2

TABLE OF DECIMAL EQUIVALENTS

Fraction	Decimal	Fraction	Decimal	Fraction	Decimal	Fraction	Decimal
1/16	.0625	1/8	.125	1/4	.25	1/2	.5
3/16	.1875	5/16	.3125	3/8	.375	7/8	.875
1/4	.25	1/2	.5	3/4	.75	1	1.0
5/16	.3125	3/8	.375	1/2	.5	5/8	.625
3/8	.375	1/2	.5	5/8	.625	3/4	.75
7/16	.4375	5/8	.625	3/4	.75	7/8	.875
1/2	.5	3/4	.75	7/8	.875	1	1.0
9/16	.5625	5/8	.625	3/4	.75	7/8	.875
5/8	.625	3/4	.75	7/8	.875	1	1.0
11/16	.6875	5/8	.625	3/4	.75	7/8	.875
3/4	.75	7/8	.875	1	1.0		
13/16	.8125	5/8	.625	3/4	.75	7/8	.875
7/8	.875	1	1.0				
15/16	.9375	5/8	.625	3/4	.75	7/8	.875
1	1.0						

TABLE OF DECIMAL EQUIVALENTS—OUNCES AND POUNDS

Ounces	Pounds	Ounces	Pounds	Ounces	Pounds	Ounces	Pounds
1	.0625	2	.125	3	.1875	4	.25
5	.3125	6	.375	7	.4375	8	.5
9	.5625	10	.625	11	.6875	12	.75
13	.8125	14	.875	15	.9375	16	1.0

COMPARISON OF GAUGES

No.	Standard or Gauge	American or Gauge	British or Gauge	No.	Standard or Gauge	American or Gauge	British or Gauge
1	.0001	.0001	.0001	16	.0016	.0016	.0016
2	.0002	.0002	.0002	17	.0017	.0017	.0017
3	.0003	.0003	.0003	18	.0018	.0018	.0018
4	.0004	.0004	.0004	19	.0019	.0019	.0019
5	.0005	.0005	.0005	20	.0020	.0020	.0020
6	.0006	.0006	.0006	21	.0021	.0021	.0021
7	.0007	.0007	.0007	22	.0022	.0022	.0022
8	.0008	.0008	.0008	23	.0023	.0023	.0023
9	.0009	.0009	.0009	24	.0024	.0024	.0024
10	.0010	.0010	.0010	25	.0025	.0025	.0025
11	.0011	.0011	.0011	26	.0026	.0026	.0026
12	.0012	.0012	.0012	27	.0027	.0027	.0027
13	.0013	.0013	.0013	28	.0028	.0028	.0028
14	.0014	.0014	.0014	29	.0029	.0029	.0029
15	.0015	.0015	.0015	30	.0030	.0030	.0030

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AMERICAN ON TOWERS & MASTS.	Foreign Nations Masts and
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GENERAL DATA

U-38

DIAMETERS, CIRCUMFERENCES AND AREAS OF CIRCLES IN INCHES

including contents in gallons at one foot in depth.

DIAMETER INCHES	CIRCUMF. INCHES	AREA Sq. Ins.	GALLONS 1 Ft. Depth	DIAMETER INCHES	CIRCUMF. INCHES	AREA Sq. Ins.	GALLONS 1 Ft. Depth
1 in.	3.1416	.7854	.0004	67 1/2	212.57	11,603	1,723.32
1 1/8	3.5168	.9817	.0005	68	214.96	11,824	1,750.07
1 1/4	3.9270	1.2271	.0006	69	217.35	12,045	1,776.82
1 1/2	4.3332	1.4726	.0007	70	219.75	12,266	1,803.57
1 3/4	4.7353	1.7181	.0008	71	222.14	12,487	1,830.32
2 in.	6.2832	3.1416	.0016	72	224.56	12,708	1,857.07
2 1/8	6.6853	3.3919	.0017	73	226.97	12,929	1,883.82
2 1/4	7.0874	3.6422	.0018	74	229.38	13,150	1,910.57
2 1/2	7.4895	3.8925	.0019	75	231.79	13,371	1,937.32
2 3/4	7.8916	4.1428	.0020	76	234.20	13,592	1,964.07
3 in.	9.4248	7.0686	.0036	77	236.61	13,813	1,990.82
3 1/8	9.8269	7.3189	.0037	78	239.02	14,034	2,017.57
3 1/4	10.2290	7.5692	.0038	79	241.43	14,255	2,044.32
3 1/2	10.6311	7.8195	.0039	80 in.	243.84	14,476	2,071.07
3 3/4	11.0332	8.0698	.0040	81	246.25	14,697	2,097.82
4 in.	12.5664	12.5664	.0063	82	248.66	14,918	2,124.57
4 1/8	12.9685	12.8167	.0064	83	251.07	15,139	2,151.32
4 1/4	13.3706	13.0670	.0065	84	253.48	15,360	2,178.07
4 1/2	13.7727	13.3173	.0066	85	255.89	15,581	2,204.82
4 3/4	14.1748	13.5676	.0067	86	258.30	15,802	2,231.57
5 in.	15.7080	19.6350	.0098	87	260.71	16,023	2,258.32
5 1/8	16.1101	20.1353	.0100	88	263.12	16,244	2,285.07
5 1/4	16.5122	20.6356	.0101	89	265.53	16,465	2,311.82
5 1/2	16.9143	21.1359	.0102	90 in.	267.94	16,686	2,338.57
5 3/4	17.3164	21.6362	.0103	91	270.35	16,907	2,365.32
6 in.	18.8496	28.2743	.0157	92	272.76	17,128	2,392.07
6 1/8	19.2517	28.7746	.0158	93	275.17	17,349	2,418.82
6 1/4	19.6538	29.2749	.0159	94	277.58	17,570	2,445.57
6 1/2	20.0559	29.7752	.0160	95	279.99	17,791	2,472.32
6 3/4	20.4580	30.2755	.0161	96	282.40	18,012	2,499.07
7 in.	21.9912	38.7613	.0235	97	284.81	18,233	2,525.82
7 1/8	22.3933	39.2616	.0236	98	287.22	18,454	2,552.57
7 1/4	22.7954	39.7619	.0237	99	289.63	18,675	2,579.32
7 1/2	23.1975	40.2622	.0238	100 in.	292.04	18,896	2,606.07

These tables are theoretically correct, but variations must be expected in practice.

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GENERAL DATA

CIRCLES IN INCHES

DIAMETERS, CIRCUMFERENCES AND AREAS OF CIRCLES IN FEET

including contents in gallons at one foot in depth.

Area Sq. In.	Gallons 1 Ft. Depth
35.682	1.72532
36.671	1.76249
37.704	1.80097
37.122	1.83865
38.696	1.88617
39.691	1.93379
41.282	1.98146
43.716	2.02914
46.770	2.07682
48.646	2.12448
49.173	2.17219
46.787	2.21990
50.268	2.26762
51.696	2.31534
53.696	2.36306
56.000	2.41078
56.368	2.45850
56.704	2.50622
58.112	2.55394
60.302	2.60166
60.627	2.64938
60.396	2.69710
62.380	2.74482
62.690	2.79254
70.882	2.84026
72.790	2.88798
70.662	2.93570
70.396	2.98342
70.300	3.03114
70.300	3.07886
82.906	3.12658
82.304	3.17430
82.304	3.22202
82.304	3.26974
82.304	3.31746
82.304	3.36518
82.304	3.41290
82.304	3.46062
82.304	3.50834
82.304	3.55606
82.304	3.60378
82.304	3.65150
82.304	3.69922
82.304	3.74694
82.304	3.79466
82.304	3.84238
82.304	3.89010
82.304	3.93782
82.304	3.98554
82.304	4.03326
82.304	4.08098
82.304	4.12870
82.304	4.17642
82.304	4.22414
82.304	4.27186
82.304	4.31958
82.304	4.36730
82.304	4.41502
82.304	4.46274
82.304	4.51046
82.304	4.55818
82.304	4.60590
82.304	4.65362
82.304	4.70134
82.304	4.74906
82.304	4.79678
82.304	4.84450
82.304	4.89222
82.304	4.93994
82.304	4.98766
82.304	5.03538
82.304	5.08310
82.304	5.13082
82.304	5.17854
82.304	5.22626
82.304	5.27398
82.304	5.32170
82.304	5.36942
82.304	5.41714
82.304	5.46486
82.304	5.51258
82.304	5.56030
82.304	5.60802
82.304	5.65574
82.304	5.70346
82.304	5.75118
82.304	5.79890
82.304	5.84662
82.304	5.89434
82.304	5.94206
82.304	5.98978
82.304	6.03750
82.304	6.08522
82.304	6.13294
82.304	6.18066
82.304	6.22838
82.304	6.27610
82.304	6.32382
82.304	6.37154
82.304	6.41926
82.304	6.46698
82.304	6.51470
82.304	6.56242
82.304	6.61014
82.304	6.65786
82.304	6.70558
82.304	6.75330
82.304	6.80102
82.304	6.84874
82.304	6.89646
82.304	6.94418
82.304	6.99190
82.304	7.03962
82.304	7.08734
82.304	7.13506
82.304	7.18278
82.304	7.23050
82.304	7.27822
82.304	7.32594
82.304	7.37366
82.304	7.42138
82.304	7.46910
82.304	7.51682
82.304	7.56454
82.304	7.61226
82.304	7.66000
82.304	7.70772
82.304	7.75544
82.304	7.80316
82.304	7.85088
82.304	7.89860
82.304	7.94632
82.304	7.99404
82.304	8.04176
82.304	8.08948
82.304	8.13720
82.304	8.18492
82.304	8.23264
82.304	8.28036
82.304	8.32808
82.304	8.37580
82.304	8.42352
82.304	8.47124
82.304	8.51896
82.304	8.56668
82.304	8.61440
82.304	8.66212
82.304	8.70984
82.304	8.75756
82.304	8.80528
82.304	8.85300
82.304	8.90072
82.304	8.94844
82.304	8.99616
82.304	9.04388
82.304	9.09160
82.304	9.13932
82.304	9.18704
82.304	9.23476
82.304	9.28248
82.304	9.33020
82.304	9.37792
82.304	9.42564
82.304	9.47336
82.304	9.52108
82.304	9.56880
82.304	9.61652
82.304	9.66424
82.304	9.71196
82.304	9.75968
82.304	9.80740
82.304	9.85512
82.304	9.90284
82.304	9.95056
82.304	10.00000

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GENERAL DATA

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PRODUCTS OF NATIONAL LEAD COMPANY

PRODUCTS OF THE METAL DIVISION

SHEET LEAD

Antimonial
Cadmium
Copper
Copper-Nickel
Silver
Silver-Antimonial
Special Alloy

Thin, Lead or Thickened
Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

HEAVY METAL

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

LEAD PIPE

Antimonial
Cadmium
Copper
Copper-Nickel
Silver
Silver-Antimonial
Special Alloy

SOLDER

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

CHUCK ANCHORING SYSTEM

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

FITTINGS, PUMPS, VALVES

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

MATCHFORD PLATE

MOUNTING SYSTEM

HOMOGENEOUS LEAD

EQUIPMENT

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

TITE METALS

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

MISCELLANEOUS

PRODUCTS

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

OTHER PRODUCTS

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

Thin, Lead or Thickened
Thin, Lead-Covered Iron, Copper or
Aluminum

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NLI 113305

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FIELD

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