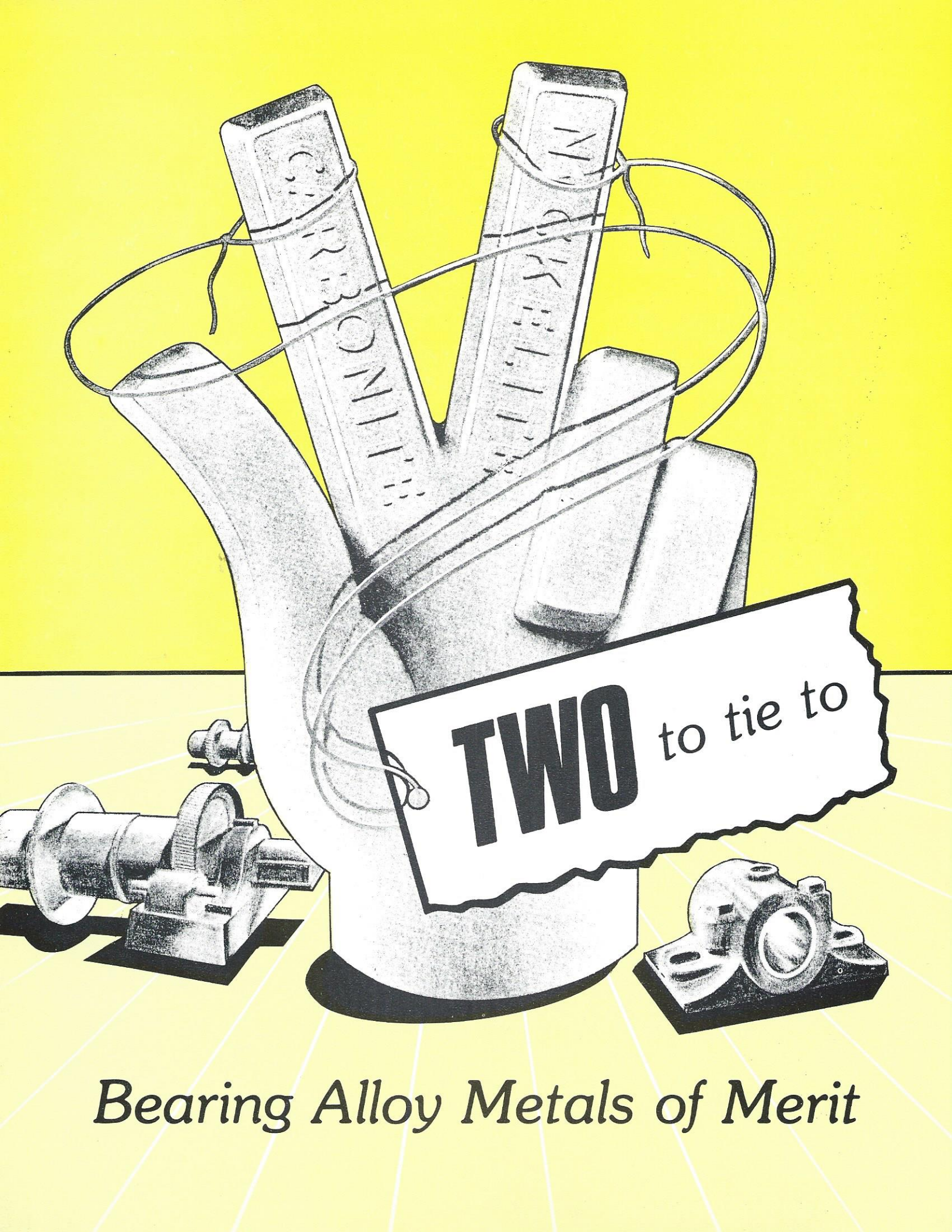
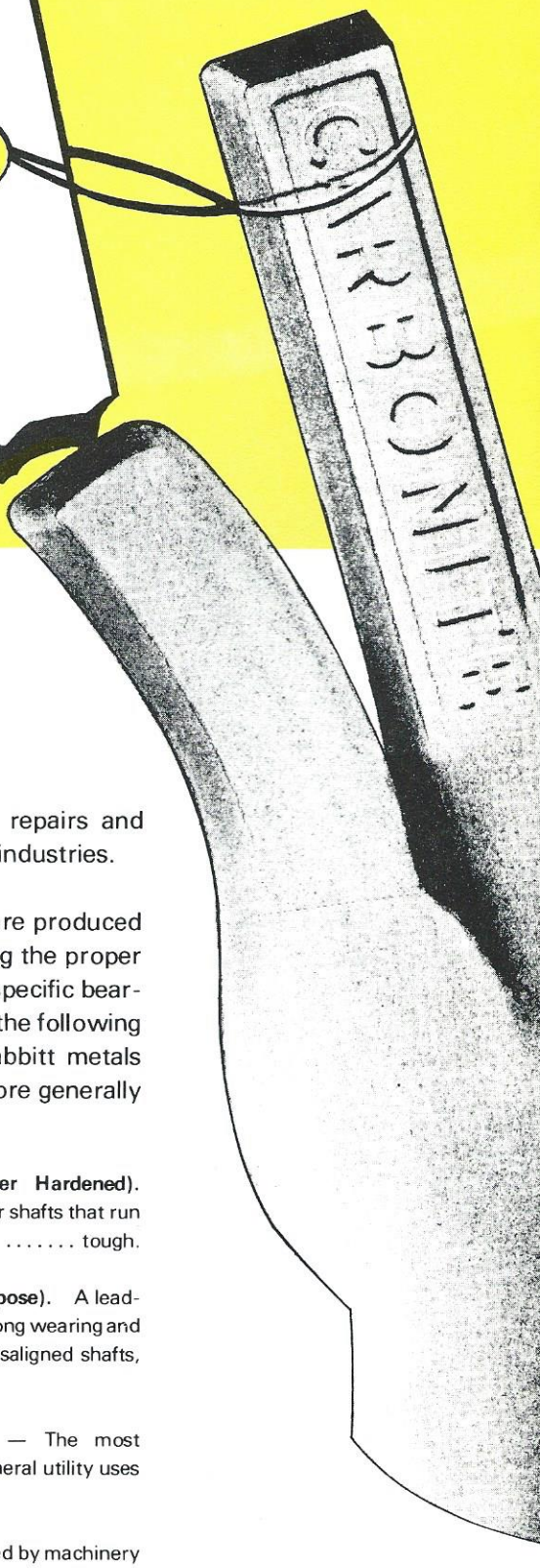


Bearing Alloy Metals of Merit

CARBONITE

The finest of lead-base bearing alloy metals with an unexcelled record for dependability and long service.



ABOUT CARBONITE:

Produced by specialists under strict laboratory control from carefully proportioned raw materials. Carbonite rates first in lead-base babbitts amoung Engineers and Maintenance men everywhere.

For years Carbonite lead-base babbitt metals have been recognized for their ability to ward off bearing failures. This excellent reputation is largely attributable to the know-how of Carbonite Metal Company engineers who have specialized for over 40 years in the application of babbitt metals to all kinds of service conditions.

It is this specialization factor, together with insistence on use of only the finest raw materials, scientific control of blending and proportioning to assure uniformity, that have provided Carbonite metals with unmatched performance and economy records — fewer repairs and shut-downs — in countless industries.

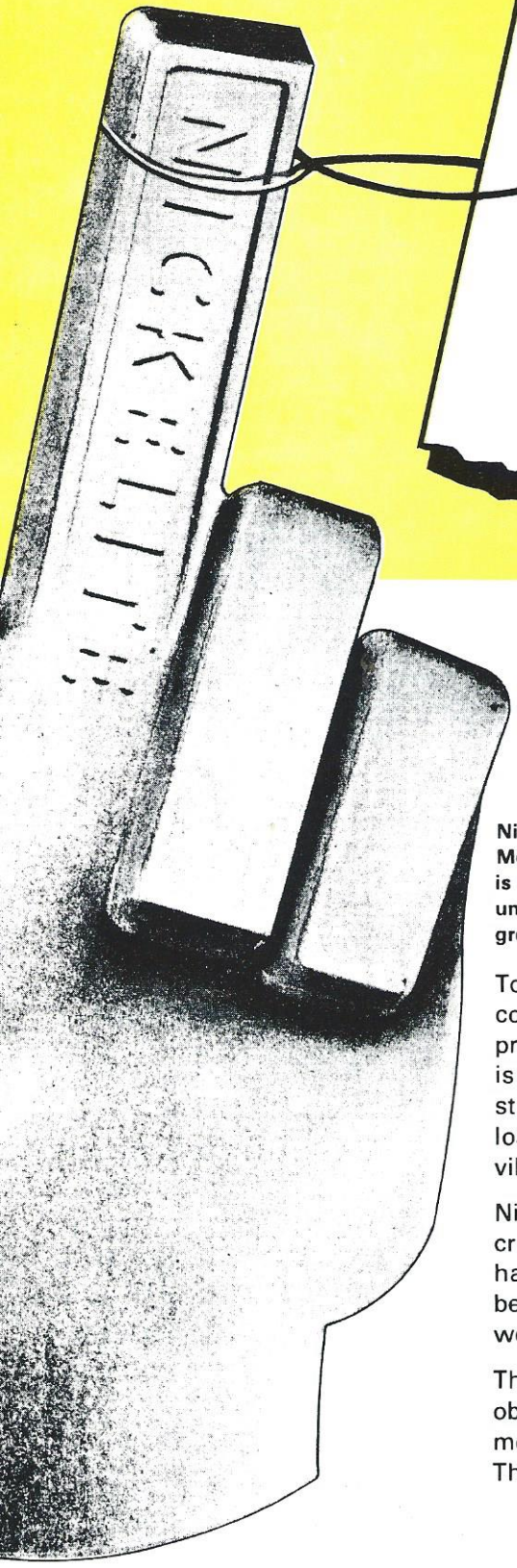
Carbonite lead-base metals are produced in various grades, each having the proper physical properties to serve specific bearing requirements. However, the following four lead-base Carbonite babbitt metals are the most popular and more generally used in industry:

No. 5 CARBONITE — (Copper Hardened). A heat resistant lead-base babbitt for shafts that run hot. It is hard, dense, close-grained ..... tough.

GP CARBONITE — (General Purpose). A lead-base babbitt metal that runs cool, is long wearing and resists scoring. It adapts itself to misaligned shafts, withstands heat and abrasion.

IDEAL NO. 10 CARBONITE — The most serviceable, low cost babbitt for general utility uses where abrasion is encountered.

IDEAL NO. 5 CARBONITE — Used by machinery manufacturers where low cost is paramount.



NICKELITE

Supreme tin-base babbitt metal for bearings subjected to high speeds, extremely severe shocks and loads.

ABOUT NICKELITE:

Nickelite is an achievement of Carbonite Metal Company babbitt metal engineers. It is expertly alloyed of virgin metals to serve under extraordinary conditions requiring great durability and abrasive resistance.

Top performance where operating conditions are unusally severe has proved the supremacy of Nickelite. It is especially produced to withstand stresses and strains due to great loads, shocks, high speeds, heavy vibrations, thrusts or impacts.

Nickelite strongly resists crushing, creeping, chipping, and spreading. It has remarkable durability wherever bearings are exposed to abrasive wear.

The superior quality of Nickelite is obtained by the care of scientific methods employed in its deoxidation. The coarse, granular structure that other tin alloys possess is replaced with solidity and improved hardness and ductility. The result is greater load value, increased heat conductivity and resistance to breakage.

Since the lead-base Carbonite babbitt metals on the opposite page have proved their dependability and service under heavy loads, the question often arises — when should Nickelite be used?

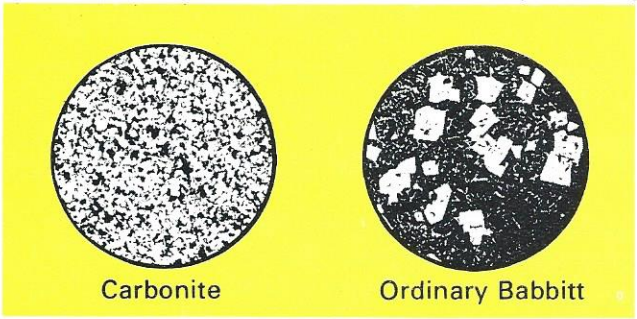
Shock is a determining factor. Because of its toughness and ductility, Nickelite will withstand the heavy shock transmitted by the shaft. Thus, it is more desirable in such bearings as are found in crushers, diesel engines and other severe applications. It also has advantages wherever there is poor anchorage.

A Babbitt Metal reference chart appears on page six. It lists various bearing applications and will serve as a guide in determining the right babbitt metal to use.

NO JOB TOO BIG or too small

Thorough study and research of the babbitt metal needs of industry by Carbonite Metal Company metallurgists have resulted in the specialized manufacture of the five babbitt metals described here. Other Carbonite bearing metals are made to supply unusual needs, but these five fill the requirements for high speed, impact, thrust, abrasion and heat resistance, as well as the many other conditions encountered in most bearing operations.

Carbonite Metal Company metallurgists have developed these metals to a high degree of efficiency. With good lubrication, secure anchorage, and a babbitt wall that is not too thick, any bearing babbitted with Carbonite or Nickelite will give extended service . . . . longer life.



Magnified 50 Diameters

ENGINEERING SERVICE —

Solving troublesome bearing problems is one of the engineering services offered by our experienced technicians. Their specialized study and experience in bearing design, lubrication, and application of babbitt metals to various operating conditions are always available to you. Write, wire or phone us and one of our field engineers will be ready to help you achieve better, more economical bearing performance.

MICROSCOPIC PHOTOS OF BABBITT METALS

By definition, the grain of a metal is the size of its particles. These are of irregular shapes, with soft metal between them. Under the microscope this softer metal is seen to constitute a material portion of the metal's structure.

When the usual coarse grained babbitts are used, the load pressure causes this softer metal to creep. This amounts to the same thing as wear, since it reduces the liner's thickness, creates clearance, and hastens the time when a liner must be renewed. CARBONITE, being almost free from grain, creeps but little in service and requires babbitting less often.

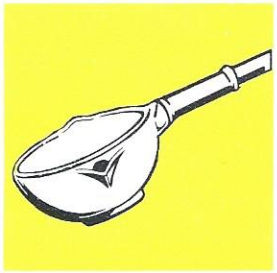
Re-Babbitting with Carbonite and Nickelite Babbitt Metals

In preparing a bearing shell for re-babbitting, it must be thoroughly cleaned of all old babbitt metal. This can be chipped or melted away with a torch. Grease, dirt, rust and scale can be removed by burning, wire-brushing or pickling. If the bearing has anchors, these must be cleaned to make certain the new metal will flow in and provide a strong anchor.

In the case of bronze shells, after the foreign materials have been removed, the surfaces should be further cleaned with a file or sandpaper to assure a clean metallic contact.

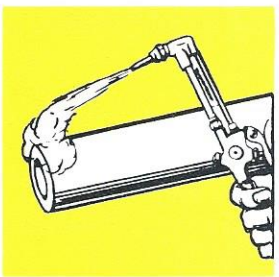
The shell must now be immediately fluxed and immediately tinned. This is especially important in regard to iron and steel shells, in order to avoid any oxide film which forms quickly on these metals.

If no tin is available, Nickelite can be used for tinning. It is lead-free and deoxidized so that it unites freely with a clean iron or steel surface. However, the melting point of Nickelite is 40°F. above that of tin so the temperature must be held higher.



The babbitt metal must be poured while the tinned surface is fresh, warm and tacky and at such temperature that it does not wash off the tin, but hot enough to unite with it. Nickelite and Carbonite will unite more easily with the tinning than will most babbitts for they are practically oxygen free.

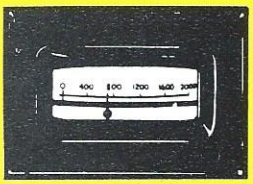
Although the babbitt metal can be poured with the shaft in place, it is better to substitute a mandrel that permits extra metal for finishing to size. Both the mandrel and shell should be heated to 200°F. so that mandrel, shell and babbitt metal shrink down together while cooling, thus assuring a better fit.



The mandrel is at the correct temperature when it causes water to evaporate quickly, but is too warm if it sizzles or spits when touched with a wet finger.

To keep the babbitt metal from adhering, the mandrel should be given a smoke coating by use of an acetylene torch, or similarly coated with chalk, or thin paper.

The babbitt metal should be melted in a pyrometer-controlled pot. Careful consideration must be given to the temperature. No one termperature is correct for all bearings. For small work, such as motor bearings, Carbonite is amply warm at 750°F. For larger bearings 800°F. may be required. For Nickelite, use temperatures approximately 50° cooler.



The pot and bearing should be close to each other in order to facilitate pouring the babbitt metal at the temperatures to which they have been heated.

The metal should not be stirred during the process of melting. When it is up to temperature stir gently but thoroughly. Stirring should be such that the bottom metal will be brought to the top. This is important, since babbitt metals will separate when left unstirred.

The best ladle for pouring is the bottom-pour type. It should be large enough to pour each liner complete in one operation . . . and the metal should be poured quickly. All air in the mold must be allowed to escape to avoid seams or blow holes from forming in the liner.

After the bearing has hardened, all excess babbitt must be removed and lubrication holes cleaned.

Finally, oilways and retainer grooves must be cut. The oilways should be placed just ahead of the load-bearing area so that oil will be fed into that part of the bearing on which the load is carried. Care should be taken to see that these oilways are properly chamfered so that they provide a smooth flow of oil to the bearing. The retainer grooves should be chamfered only on the inside edges so that they properly retain the oil and seal out abrasive materials. Do not put any oil ways in the load-bearing area.

The bearing is now ready to be fitted to the shaft.

Recommended Applications for Carbonite and Nickelite Babbitt Metals

Following is an index for selecting Carbonite and Nickelite babbitt metals for various types of equipment. These recommendations are the result of long experience and research and can be relied on as being completely satisfactory under average conditions. Where a machine must perform more than one service, alternate recommendations are given.

Carbonite Metal Company technicians have extensively studied the applications of babbitt metals on all kinds of equipment under all kinds of service conditions. If your equipment is not lised, write us, telling kind of machine, bearing size and thickness, weight it must carry, speed of shaft, location of load area, shock, vibration loads, surrounding heat conditions, type of lubrication, babbitt metal previously used, and if possible how it failed. We will then specify the right metal and supply instructions to give lasting performance.

AUTOMOTIVE

GP Carbonite if lead base is required.

Nickelite if tin base is required.

CEMENT MILLS

No. 5 Carbonite for Ball Mills, Compebs, Hardinge Mills, Kominuters, Speed Reducers, Tube Mills, etc.

Nickelite for Diesels, Heavy-duty Crushers, Motors, Shovels, etc.

CEREAL MILLS

GP Carbonite or No. 5 Carbonite for general use.

Nickelite for Ice Machines and Compressors.

COMPRESSORS

Nickelite

DIESEL ENGINES

Nickelite

FLOUR MILLS

GP Carbonite or No. 5 Carbonite for general use.

Nickelite for heavy shock loads.

FOOD PROCESSING

GP Carbonite or No. 5 Carbonite for general use.

Nickelite for Ice Machines and Compressors.

GYRATORY CRUSHERS

#5 CH Carbonite for soft and unabrasive rock.

Nickelite for medium hard or hard rock.

JAW—ROLL—HAMMERMILL CRUSHERS

Nickelite

MINES

COPPER	SILVER
GOLD	TUNGSTEN
IRON	ZINC
LEAD	ETC.
MOLYBDENUM	

GP Carbonite for general work.

Nickelite for Heavy-duty Motors, Shakers, and other bearings that get heavy shock loads.

MINES, COAL

GP Carbonite for Cars, Hoists, Motors and bearings with lesser shock loads.

Nickelite for heavy shock loads.

PLANTS

BRICK	GYPSUM
CHEMICAL	REFRACTORY
FERTILIZER	SAND
GLASS	TILE
GRAVEL	

GP Carbonite for general work.

Nickelite where shock and abrasion are encountered.

PULP and PAPER MILLS

No. 5 Carbonite for general use.

Nickelite for Beaters, Calenders (that receive shock), Chippers, Engine Quarter Boxes, Jordans, Press Rolls, Rag Cutters.

SAW MILLS

GP Carbonite for general use.

Nickelite for Band Mills, Edgers, Engine Quarter Boxes, Gangs, Hogs, Resaws.

Physical Characteristics of Carbonite and Nickelite as compared with ASTM Standards.

The physical characteristics of low melting alloys vary extensively with the rate they solidify. In the tables below, Carbonite Metal Company test samples were poured at 700°F. and then aged for 90 days at 150°F.

LEAD BASE BABBITTS

TYPE OF BABBITT	Tin Content	Ultimate Strength Lbs. Per Sq. In. at 68° F.	Ultimate Strength Lbs. Per Sq. In. at 212° F.	Brinell Hardness Number at 68° F.	Brinell Hardness Number at 212° F.	Yield Point Lbs. Per Sq. In. at 68° F.	Yield Point Lbs. Per Sq. In. at 212° F.
A.S.T.M. No. 6*	20%	14,550	8,050	21.0	10.5	3,800	2,050
A.S.T.M. No. 7*	10%	15,650	6,150	22.5	10.5	3,550	1,600
A.S.T.M. No. 8*	5%	15,600	6,150	20.0	9.5	3,400	1,750
No. 5 Carbonite	17%	16,500	8,250	27.5	16.6	8,350	2,150
GP Carbonite	12%	16,300	7,500	25.9	16.2	8,200	2,000
Ideal Carbonite	10%	15,900	7,200	25.0	16.0	8,000	2,000

*From A.S.T.M. Standards, Designation B23—26.

TIN BASE BABBITTS

TYPE OF BABBITT	Copper Content	Ultimate Strength Lbs. per Sq. In. at 68°F.	Ultimate Strength Lbs. per Sq. In. at 212°F.	Brinell Hardness Number at 68°F.	Brinell Hardness Number at 212°F.	Yield Point Lbs. per Sq. In. at 68°F.	Yield Point Lbs. per Sq. In. at 212°F.
N.B.S. A**	3.7%	14,900	8,700	24.5	12.0	6,100	3,000
N.B.S. B**	4.5%	12,800	6,950	17.0	8.0	4,400	2,650
N.B.S. C**	8.3%	17,600	9,900	27.0	14.5	6,600	3,150
Nickelite	5.5%	17,500	11,500	30.3	16.6	12,000	3,300

**Test data from the National Bureau of Standards.

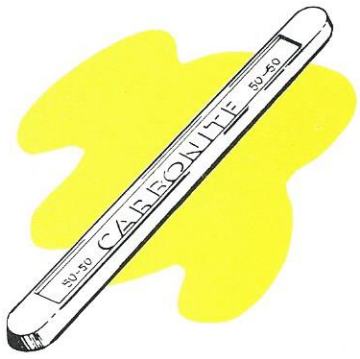
CARBONITE TINNING COMPOUND

A lasting bond is of major importance in making a thin lined babbitt bearing. In order that users of babbitt metals may be supplied with a good, dependable **fluxing and tinning** agent Carbonite Metal Company produces a tested and proved compound. It is equally serviceable for sheet metal, body work and general soldering uses. This compound is packaged in one-pound cans and obtainable from authorized distributors or direct from factory in Burlington, Wisconsin.

CARBONITE SOLDER

Carbonite Metal Company manufactures a line of standard solders under the name of Carbonite. These solders are known for their fine quality... flow freely, work easily and have excellent bonding properties.

All grades of solders are molded in 1½ pound bars and packaged 112 pounds to a box. They are obtainable from authorized Carbonite Metal Company distributors, or shipped direct from stock at our factory in Burlington, Wisconsin



Tips and Suggestions on Babbitt Metals and the Making of Babbitt Bearings—

Carbonite Metal Company babbitts are compounded to make friends by making good. They are sold on their merits, and when properly applied bearing wise will enable any operator to enjoy a new and higher performance standard.

The most accurate guide to buying babbitt is knowledge of net maintenance cost. This must include production lost by delays due to time required for bearing replacement. Through better performance, Carbonite Metal Company babbitt alloys reduce the need for bearing replacement.

Best anchorage is the wide, deep and well-tapered dovetail type. When anchorage is not satisfactory, well angled holes drilled into the shell can overcome anchorage difficulties.

In pouring a bearing, always work toward the principle of having metal no warmer than necessary, since it will cool faster. The faster it cools the finer will be the grain, thus producing a tougher and more ductile bearing.

The metal should be thoroughly but gently stirred just before pouring. In this way segregation is minimized and even texture is assured.

CARBONITE METAL COMPANY, INC.

E. J. Geittmann, President

A PARTIAL LIST OF THE MANY USERS OF CARBONITE AND NICKELITE BABBITT METALS —

Allis-Chalmers
The Anaconda Company
American Can Company
American Oil Company
Babcock & Wilcox
Bay Shipbuilding Corp.
Bearings, Inc.
Bethlehem Steel
Celotex Corporation
Champion Papers
Commonwealth Edison Co.
Container Corp. of America
CPC International
Dynamatron, Inc.
Envirex
Florida Portland Cement
General Abrasive Company
General Electric Company
General Mills, Inc.
General Portland Cement
Hercules Powder Company
Huron Cement Div.
Indiana Limestone Company
International Multifoods
Iowa Manufacturing Co.
John Morrell
Kennecott Copper Corp.
Kimberly-Clark Corp.
Lehigh Portland Cement
Lone Star Industries
M. A. Hanna Company
Manitowoc Engineering
The Mead Corporation
Medusa Portland Cement Co.
Monsanto Company
National Gypsum Company
Nordberg Machinery
Orion Corporation
Owens Corning Fiberglas
Pillsbury Mills
Scott Paper Company
Smith Engineering Works
South Dakota Cement Plant
Standard Oil Co. of Indiana
Swift & Company
Uniroyal, Inc.
Tennessee Eastman
Universal Atlas Cement Div.
Vilter Manufacturing Corp.
Weyerhaeuser Company
Wilson Foods

CARBONITE METAL COMPANY

Burlington, Wisconsin

Printed in U.S.A.