

| TYPE OF INSTALLATION                                     | Tin<br>Base<br>Alloy | Lead<br>Antimony<br>Tin<br>Alloy | Lead<br>Antimony<br>Arsenic<br>Alloy |
|----------------------------------------------------------|----------------------|----------------------------------|--------------------------------------|
| <b>AIRPLANE ENGINES (Gasoline)</b>                       | ●                    |                                  | ●                                    |
| <b>BLOWERS</b>                                           |                      |                                  |                                      |
| 1. <b>Blowing Engines</b>                                |                      |                                  |                                      |
| a. Reciprocating                                         |                      | ●                                | ●                                    |
| b. Turbo                                                 |                      | ●                                | ●                                    |
| 2. <b>Centrifugal</b>                                    | ●                    |                                  | ●                                    |
| 3. <b>Fans, Ventilating</b>                              |                      |                                  |                                      |
| a. High Speed                                            | ●                    |                                  | ●                                    |
| b. Low Speed                                             |                      | ●                                | ●                                    |
| 4. <b>Rotary</b>                                         |                      |                                  |                                      |
| a. Sliding Vane Type                                     | ●                    |                                  | ●                                    |
| b. Gear or Cam                                           | ●                    |                                  | ●                                    |
| <b>CEMENT MILLS</b>                                      |                      |                                  |                                      |
| 1. <b>Dryers, Rotary</b>                                 | ●                    |                                  | ●                                    |
| 2. <b>Kilns</b>                                          |                      |                                  |                                      |
| a. Bearing Rolls                                         | ●                    |                                  | ●                                    |
| b. Reduction Gear                                        | ●                    |                                  | ●                                    |
| 3. <b>Mixers</b>                                         |                      | ●                                | ●                                    |
| 4. <b>Rock Graders</b>                                   |                      | ●                                | ●                                    |
| 5. <b>Screens</b>                                        |                      |                                  |                                      |
| a. Revolving                                             |                      | ●                                | ●                                    |
| b. Pulsating                                             | ●                    | ●                                | ●                                    |
| 6. <b>Shafting</b>                                       |                      |                                  |                                      |
| a. High Speed                                            |                      | ●                                | ●                                    |
| b. Low Speed                                             |                      | ●                                | ●                                    |
| 7. <b>Winches</b>                                        |                      | ●                                | ●                                    |
| <b>CENTRIFUGAL MACHINERY (Extractors and Separators)</b> |                      |                                  |                                      |
| 1. <b>Pedestal Bearings</b>                              | ●                    |                                  | ●                                    |
| 2. <b>All Other Bearings</b>                             |                      | ●                                | ●                                    |
| <b>CLAY WORKING</b>                                      |                      |                                  |                                      |
| 1. <b>Auger Machines</b>                                 | ●                    |                                  | ●                                    |
| 2. <b>Blunger</b>                                        |                      | ●                                | ●                                    |
| 3. <b>Conical Mill</b>                                   | ●                    | ●                                | ●                                    |
| 4. <b>Cutting Machines</b>                               |                      | ●                                | ●                                    |
| 5. <b>Disintegrators</b>                                 | ●                    |                                  | ●                                    |
| 6. <b>Granulator</b>                                     | ●                    |                                  | ●                                    |
| 7. <b>Lawns</b>                                          |                      | ●                                | ●                                    |
| 8. <b>Pug</b>                                            | ●                    |                                  | ●                                    |
| 9. <b>Repress Machines</b>                               | ●                    |                                  | ●                                    |
| 10. <b>Ship Car and Hoist</b>                            | ●                    | ●                                | ●                                    |
| 11. <b>Slip Pumps</b>                                    | ●                    | ●                                | ●                                    |

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| <b>COMPRESSION IGNITION ENGINES (Diesel)</b>          |                      |                                  |                                      |
| 1. High Speed. Over 700 R.P.M.                        |                      |                                  |                                      |
| a. Main Crank Shaft                                   | ●                    |                                  | ●                                    |
| b. Connecting Rods                                    | ●                    |                                  | ●                                    |
| c. Camshafts                                          |                      | ●                                | ●                                    |
| d. All Others                                         |                      | ●                                | ●                                    |
| 2. Marine Main Propulsion                             |                      |                                  |                                      |
| a. Main Crank Shaft                                   | ●                    |                                  | ●                                    |
| b. Connecting Rods                                    | ●                    |                                  | ●                                    |
| c. Crossheads                                         | ●                    |                                  | ●                                    |
| d. Camshafts                                          |                      | ●                                | ●                                    |
| e. All Other Bearings                                 |                      | ●                                | ●                                    |
| 3. Stationary Ignition Engines under 700 R.P.M.       |                      |                                  |                                      |
| a. Main Crank Shaft                                   | ●                    |                                  | ●                                    |
| b. Connecting Rods                                    | ●                    |                                  | ●                                    |
| c. Camshafts                                          | ●                    |                                  | ●                                    |
| d. All Other Bearings                                 |                      | ●                                | ●                                    |
| <b>COMPRESSORS (Large, Heavy Duty and High Speed)</b> |                      |                                  |                                      |
| 1. Main Crank Shaft                                   | ●                    |                                  | ●                                    |
| 2. Connecting Rod Big-ends                            | ●                    |                                  | ●                                    |
| 3. Auxiliary Bearings                                 |                      | ●                                | ●                                    |
| 4. All Other Bearings                                 |                      | ●                                | ●                                    |
| <b>CRUSHING MACHINERY</b>                             |                      |                                  |                                      |
| 1. Ball Mill                                          | ●                    |                                  | ●                                    |
| 2. Breaker Roll Type                                  | ●                    |                                  | ●                                    |
| 3. Gyratory Type                                      |                      |                                  |                                      |
| a. Countershaft                                       | ●                    |                                  | ●                                    |
| b. Eccentric                                          | ●                    |                                  | ●                                    |
| c. Thrust                                             | ●                    |                                  | ●                                    |
| 4. Jaw Type                                           |                      |                                  |                                      |
| a. Backing-up Jaws                                    |                      | ●                                | ●                                    |
| b. Bearings                                           |                      | ●                                | ●                                    |
| 5. Pan Type                                           |                      |                                  |                                      |
| a. Thrust Bearings                                    | ●                    |                                  |                                      |
| b. Other Bearings                                     | ●                    |                                  | ●                                    |
| 6. Rod Mill Type                                      | ●                    |                                  | ●                                    |
| 7. Roll Hammer Type                                   | ●                    |                                  |                                      |
| 8. Roll Type                                          | ●                    |                                  | ●                                    |
| 9. Stamp Mill                                         |                      |                                  |                                      |
| a. Cam Shaft                                          | ●                    |                                  | ●                                    |
| b. Guides                                             |                      | ●                                | ●                                    |
| 10. Tube Mill                                         | ●                    |                                  | ●                                    |

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| <b>DREDGERS</b>                                               |                      |                                  |                                      |
| 1. Bilge Pumps                                                |                      | ●                                | ●                                    |
| 2. Centrifugal Main Pumps                                     | ●                    |                                  | ●                                    |
| 3. Compressors                                                | ●                    |                                  | ●                                    |
| 4. Conveyors and Stackers                                     |                      | ●                                | ●                                    |
| 5. Hoist Sheaves                                              |                      | ●                                | ●                                    |
| 6. Revolving Screens                                          |                      | ●                                | ●                                    |
| 7. Shafting                                                   |                      | ●                                | ●                                    |
| 8. Sluice Pumps                                               | ●                    |                                  | ●                                    |
| 9. Tumblers                                                   |                      |                                  |                                      |
| a. Upper                                                      | ●                    | ●                                | ●                                    |
| b. Lower                                                      |                      | ●                                | ●                                    |
| 10. Winches                                                   |                      | ●                                | ●                                    |
| <b>ELECTRIC MOTORS AND GENERATORS</b>                         |                      |                                  |                                      |
| 1. Traction Motors (Subways & Street Railways)                |                      |                                  |                                      |
| a. Main Rotors                                                | ●                    |                                  | ●                                    |
| b. Armatures & Axles                                          |                      | ●                                | ●                                    |
| c. All Other Bearings                                         |                      | ●                                | ●                                    |
| 2. Stationary Motors and Generators,<br>1500 R.P.M. and above |                      |                                  |                                      |
| a. Main Rotors                                                | ●                    |                                  | ●                                    |
| b. Armatures & Axles                                          |                      | ●                                | ●                                    |
| c. All Other Bearings                                         |                      | ●                                | ●                                    |
| 3. Stationary Motors and Generators,<br>below 1500 R.P.M.     |                      |                                  |                                      |
| a. All Bearings                                               | ●                    |                                  | ●                                    |
| <b>ELEVATING, CONVEYING AND EXCAVATING</b>                    |                      |                                  |                                      |
| 1. Belt Conveyors                                             |                      |                                  |                                      |
| a. Carrier Bearings                                           |                      | ●                                | ●                                    |
| b. Return Rolls                                               |                      | ●                                | ●                                    |
| c. Gravity Take-Ups                                           |                      | ●                                | ●                                    |
| 2. Drive Ends                                                 | ●                    | ●                                | ●                                    |
| 3. Take-Up End                                                |                      | ●                                | ●                                    |
| 4. Bucket Elevator and Conveyor                               |                      |                                  |                                      |
| a. Drive End                                                  | ●                    | ●                                | ●                                    |
| b. Take-Up Guides                                             |                      | ●                                | ●                                    |
| c. Pit Bearings                                               |                      | ●                                | ●                                    |
| 5. Cableways                                                  |                      |                                  |                                      |
| a. Sheaves                                                    |                      | ●                                | ●                                    |
| b. Drum Shafts                                                |                      | ●                                | ●                                    |
| c. Reduction Gears                                            |                      | ●                                | ●                                    |
| 6. Car Dumpers                                                |                      |                                  |                                      |
| a. Reduction Gear                                             |                      | ●                                | ●                                    |
| b. Trunnions                                                  |                      | ●                                | ●                                    |
| 7. Car Journals                                               |                      | ●                                |                                      |
| 8. Cranes                                                     |                      |                                  |                                      |
| a. Reduction Gears                                            | ●                    |                                  | ●                                    |
| b. Drum Shafts                                                | ●                    |                                  | ●                                    |
| c. Trolley Journals                                           |                      | ●                                | ●                                    |
| 9. Screw Conveyors                                            |                      | ●                                | ●                                    |
| 10. Trippers                                                  |                      | ●                                | ●                                    |

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| <b>FANS</b>                                                                                 |                      |                                  |                                      |
| 1. All Bearings                                                                             | ●                    | ●                                | ●                                    |
| <b>GAS ENGINES (Vertical and Horizontal)</b>                                                |                      |                                  |                                      |
| 1. Main Crank Shaft                                                                         | ●                    |                                  | ●                                    |
| 2. Connecting Rod & Main Bearings                                                           | ●                    |                                  | ●                                    |
| 3. Cam Shaft                                                                                | ●                    |                                  | ●                                    |
| 4. All Other Bearings                                                                       |                      | ●                                | ●                                    |
| 5. G.M.B. 2 Cycle, V-Type Compressor Engines                                                | ●                    |                                  | ●                                    |
| <b>GASOLINE ENGINES</b>                                                                     |                      |                                  |                                      |
| 1. Main Crankshaft                                                                          | ●                    |                                  | ●                                    |
| 2. Connecting Rod Big Ends                                                                  | ●                    |                                  | ●                                    |
| 3. Cam Shafts                                                                               |                      | ●                                | ●                                    |
| 4. Subsidiary Drive (to Oil, Pump, Water Pump, Dynamo, etc.)                                |                      | ●                                | ●                                    |
| 5. Water Pump                                                                               |                      | ●                                | ●                                    |
| 6. All Other Bearings                                                                       |                      | ●                                | ●                                    |
| <b>GENERAL PROCESS AND PRODUCTION MACHINERY</b>                                             |                      |                                  |                                      |
| 1. Spindle Bearings carrying loads over 100 lbs./sq. in. and/or speeds 1000 R.P.M. and over |                      | ●                                | ●                                    |
| 2. Other Spindle Bearings                                                                   |                      |                                  |                                      |
| a. Woodworking                                                                              |                      | ●                                | ●                                    |
| b. Wire Drawing & Working                                                                   |                      | ●                                | ●                                    |
| c. Textiles                                                                                 |                      | ●                                | ●                                    |
| d. Laundry                                                                                  |                      | ●                                | ●                                    |
| e. Paper Making                                                                             |                      | ●                                | ●                                    |
| f. Printing                                                                                 |                      | ●                                | ●                                    |
| g. Dairy and Food Handling                                                                  |                      | ●                                | ●                                    |
| h. Mixing and Blending                                                                      |                      | ●                                | ●                                    |
| i. Agriculture (other than prime movers)                                                    |                      | ●                                | ●                                    |
| j. Brick and Tile Manufacture                                                               |                      | ●                                | ●                                    |
| k. Hydraulic Machinery                                                                      |                      | ●                                | ●                                    |
| l. Baking                                                                                   |                      | ●                                | ●                                    |
| m. Boot & Shoe Manufacture                                                                  |                      | ●                                | ●                                    |
| <b>LUMBER MILLS, SAW MILLS AND PLANING MILLS</b>                                            |                      |                                  |                                      |
| 1. Conveyors                                                                                |                      |                                  |                                      |
| a. Live Rolls                                                                               |                      | ●                                | ●                                    |
| b. Kickers                                                                                  |                      | ●                                | ●                                    |
| c. Log Carriage                                                                             |                      | ●                                | ●                                    |
| d. Shafting                                                                                 |                      | ●                                | ●                                    |
| e. Winches                                                                                  |                      | ●                                | ●                                    |
| f. Car Journals                                                                             |                      | ●                                |                                      |

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| <b>LUMBER MILLS, SAW MILLS AND PLANING MILLS (Continued)</b> |                      |                                  |                                      |
| g. Hogs                                                      | ●                    |                                  | ●                                    |
| h. Saw Grinders                                              | ●                    |                                  | ●                                    |
| i. Mortiser                                                  | ●                    |                                  | ●                                    |
| j. Shaper                                                    | ●                    |                                  | ●                                    |
| k. Sizer                                                     | ●                    |                                  | ●                                    |
| l. Surfacers                                                 | ●                    |                                  | ●                                    |
| m. Tenoner                                                   | ●                    |                                  | ●                                    |
| 2. Saws                                                      |                      |                                  |                                      |
| a. Bandmill                                                  | ●                    |                                  | ●                                    |
| b. Resaws                                                    | ●                    |                                  | ●                                    |
| c. Edgers                                                    | ●                    |                                  | ●                                    |
| d. Trimmer                                                   | ●                    |                                  | ●                                    |
| e. Slasher                                                   | ●                    |                                  | ●                                    |
| f. Bolter                                                    | ●                    |                                  | ●                                    |
| g. Lath Mill                                                 | ●                    |                                  | ●                                    |
| h. Cleat Saw                                                 | ●                    |                                  | ●                                    |
| i. Rip Saw                                                   | ●                    |                                  | ●                                    |
| <b>MACHINE TOOLS</b>                                         |                      |                                  |                                      |
| 1. High Speed Grinding Machine                               | ●                    |                                  | ●                                    |
| 2. Stamps, Presses, or Drop Hammers                          | ●                    |                                  | ●                                    |
| 3. All Other Bearings                                        |                      | ●                                | ●                                    |
| 4. High Precision Grinding Machine                           | ●                    |                                  |                                      |
| <b>MINING</b>                                                |                      |                                  |                                      |
| 1. Agitators                                                 |                      | ●                                | ●                                    |
| 2. Car Wheel Journals                                        |                      | ●                                |                                      |
| 3. Classifiers                                               |                      | ●                                | ●                                    |
| 4. Concentrator Tables                                       |                      |                                  |                                      |
| a. Head Motion                                               | ●                    |                                  | ●                                    |
| b. Rockers                                                   |                      | ●                                | ●                                    |
| 5. Feeders                                                   |                      | ●                                | ●                                    |
| 6. Hoisting Engine Countershaft                              | ●                    |                                  | ●                                    |
| 7. Roasters                                                  |                      |                                  |                                      |
| a. Pinion Bearings                                           |                      | ●                                | ●                                    |
| b. Thrust Bearings                                           | ●                    |                                  | ●                                    |
| 8. Separation Machines                                       |                      | ●                                | ●                                    |
| 9. Screens                                                   | ●                    | ●                                | ●                                    |
| 10. Shafting                                                 |                      | ●                                | ●                                    |
| 11. Thickeners                                               |                      | ●                                | ●                                    |
| <b>OIL ENGINES (not Compression Ignition)</b>                |                      |                                  |                                      |
| 1. Main Crankshaft                                           | ●                    |                                  | ●                                    |
| 2. Connecting Rod Big Ends                                   | ●                    |                                  | ●                                    |
| 3. Cam Shafts                                                |                      | ●                                | ●                                    |
| 4. All Other Bearings                                        |                      | ●                                | ●                                    |
| <b>PAPER MILLS, PULP MILLS</b>                               |                      |                                  |                                      |
| 1. Agitators                                                 |                      | ●                                | ●                                    |
| 2. Barkers                                                   |                      |                                  |                                      |
| a. Drum Type                                                 |                      | ●                                | ●                                    |
| b. Disc Type                                                 | ●                    |                                  | ●                                    |
| 3. Beaters                                                   | ●                    |                                  | ●                                    |
| 4. Bleaching Engines                                         | ●                    |                                  | ●                                    |
| 5. Burners and Calciners                                     |                      | ●                                | ●                                    |

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| <b>PAPER MILLS, PULP MILLS (Continued)</b>  |                      |                                  |                                      |
| 6. Chippers                                 | ●                    |                                  | ●                                    |
| 7. Crushers and Rechippers                  | ●                    |                                  | ●                                    |
| 8. Cutters                                  | ●                    |                                  | ●                                    |
| 9. Cylinders and Val Machines               |                      | ●                                | ●                                    |
| 10. Deckle Pulleys and Dandys               |                      | ●                                | ●                                    |
| 11. Digestors                               | ●                    |                                  | ●                                    |
| 12. Drive Stands                            | ●                    |                                  | ●                                    |
| 13. Dusters                                 | ●                    |                                  | ●                                    |
| 14. Folders                                 |                      | ●                                | ●                                    |
| 15. Grinders                                | ●                    |                                  | ●                                    |
| 16. Jordans                                 | ●                    |                                  | ●                                    |
| 17. Lay Boys                                | ●                    |                                  | ●                                    |
| 18. Presses                                 |                      | ●                                | ●                                    |
| 19. Pulping Engines                         | ●                    |                                  | ●                                    |
| 20. Reels                                   |                      | ●                                | ●                                    |
| 21. Rolls                                   |                      |                                  |                                      |
| a. Breast                                   |                      | ●                                | ●                                    |
| b. Table                                    |                      | ●                                | ●                                    |
| c. Couch                                    |                      | ●                                | ●                                    |
| d. Press                                    | ●                    |                                  | ●                                    |
| e. Calender                                 | ●                    |                                  | ●                                    |
| 22. Save-Alls                               |                      | ●                                | ●                                    |
| 23. Saws                                    | ●                    |                                  | ●                                    |
| 24. Screens                                 |                      | ●                                | ●                                    |
| 25. Shaking Frame Gears                     |                      | ●                                | ●                                    |
| 26. Slithers                                |                      | ●                                | ●                                    |
| 27. Splitters                               |                      | ●                                | ●                                    |
| 28. Stackers                                |                      | ●                                | ●                                    |
| 29. Stock Chests                            |                      | ●                                | ●                                    |
| 30. Willows                                 | ●                    |                                  | ●                                    |
| 31. Winders                                 |                      | ●                                | ●                                    |
| 32. Thickeners                              |                      | ●                                | ●                                    |
| 33. Thrashers                               | ●                    |                                  | ●                                    |
| 34. Trimmers                                | ●                    |                                  | ●                                    |
| <b>PUMPS</b>                                |                      |                                  |                                      |
| 1. Reciprocating                            |                      |                                  |                                      |
| a. Crankshaft, Main and Big End             | ●                    |                                  | ●                                    |
| b. All Other Bearings                       |                      | ●                                | ●                                    |
| 2. Centrifugal                              |                      |                                  |                                      |
| a. Main Shaft                               | ●                    |                                  | ●                                    |
| b. All Other Bearings                       |                      | ●                                | ●                                    |
| <b>RAILROAD BEARINGS</b>                    |                      |                                  |                                      |
| 1. Engine, Cross Head, Truck, Trailer, etc. | ●                    | ●                                | ●                                    |
| 2. Car Journals                             |                      | ●*                               |                                      |
| <b>ROCK AND GRAVEL PLANTS</b>               |                      |                                  |                                      |
| 1. Cars                                     |                      | ●                                | ●                                    |
| 2. Grizzlies                                |                      | ●                                | ●                                    |
| 3. Screens                                  |                      | ●                                | ●                                    |
| 4. Scrubbers                                |                      | ●                                | ●                                    |
| 5. Washers                                  |                      | ●                                | ●                                    |
| *A.S.T.M. B67-38, AAR M-501-34              |                      |                                  |                                      |

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| <b>STEAM ENGINES (Reciprocating)</b>                           |                      |                                  |                                      |
| 1. Marine                                                      |                      |                                  |                                      |
| a. Main Propulsion                                             | ●                    |                                  | ●                                    |
| b. Main—Crossheads & Connecting Rods                           | ●                    |                                  | ●                                    |
| c. All Other Bearings                                          |                      | ●                                | ●                                    |
| 2. Ordinary Marine Auxiliary                                   |                      |                                  |                                      |
| a. Main—Crossheads & Connecting Rods                           | ●                    |                                  | ●                                    |
| b. All Other Bearings                                          |                      | ●                                | ●                                    |
| 3. Stationary                                                  |                      |                                  |                                      |
| a. Main—Crossheads & Connecting Rods                           | ●                    |                                  | ●                                    |
| b. All Other Bearings                                          |                      | ●                                | ●                                    |
| <b>STEEL MILL BEARINGS</b>                                     |                      |                                  |                                      |
| 1. Air Compressor Connecting Rods                              | ●                    |                                  | ●                                    |
| 2. Armatures                                                   | ●                    |                                  | ●                                    |
| 3. Bar Mill Roll Necks                                         | ●                    |                                  | ●                                    |
| 4. Bar Mill Pinion and Drive                                   | ●                    |                                  | ●                                    |
| 5. Blooming Mill Roll Necks                                    | ●                    |                                  | ●                                    |
| 6. Blooming Mill Pinion and Drive                              | ●                    |                                  | ●                                    |
| 7. Gas Engine Crank Pins                                       | ●                    |                                  | ●                                    |
| 8. Gas Engine Main Shaft                                       | ●                    |                                  | ●                                    |
| 9. High Speed Fans                                             | ●                    |                                  | ●                                    |
| 10. Jack Shafts                                                | ●                    |                                  | ●                                    |
| 11. Marine Thrust Bearings, Seamless Tube Mills                | ●                    |                                  | ●                                    |
| 12. Plate Mills—Roughing Stands (aa)<br>Broadside Stands, etc. | ●                    |                                  | ●                                    |
| 13. Rod Mill—Roll Necks                                        | ●                    |                                  | ●                                    |
| 14. Rod Mill—Pinion and Drive                                  | ●                    |                                  | ●                                    |
| 15. Saws—Hot and Cold                                          | ●                    |                                  | ●                                    |
| 16. Scrap Shears—Main Bearings                                 | ●                    |                                  | ●                                    |
| 17. Slabbing Mill—Roll Necks                                   | ●                    |                                  | ●                                    |
| 18. Slabbing Mill—Pinion and Drive                             | ●                    |                                  | ●                                    |
| 19. Steam Engine Crank Pins                                    | ●                    |                                  | ●                                    |
| 20. Steam Engine Quarter Bearings                              | ●                    |                                  | ●                                    |
| 21. Steam Engine Main Shaft                                    | ●                    |                                  | ●                                    |
| 22. Structural Mill Roll Necks                                 | ●                    |                                  | ●                                    |
| 23. Structural Mill Pinions                                    | ●                    |                                  | ●                                    |
| 24. Tube Mill Welding Rolls                                    | ●                    |                                  | ●                                    |
| 25. Wheel Mill Roll Necks                                      | ●                    |                                  | ●                                    |
| 26. All Other Bearings                                         | ●                    |                                  | ●                                    |
| <b>SUGAR MILLS</b>                                             |                      |                                  |                                      |
| 1. Agitators                                                   |                      | ●                                | ●                                    |
| 2. Cane Knives                                                 | ●                    |                                  | ●                                    |
| 3. Centrifugals                                                | ●                    |                                  | ●                                    |
| 4. Conveyors                                                   |                      | ●                                | ●                                    |
| 5. Crushers                                                    | ●                    |                                  | ●                                    |
| 6. Crystallizers                                               |                      | ●                                | ●                                    |
| 7. Elevators                                                   |                      | ●                                | ●                                    |
| 8. Gear Drives                                                 | ●                    |                                  | ●                                    |
| 9. Grinding Rolls                                              | ●                    |                                  | ●                                    |
| 10. Lime Mixers.                                               |                      | ●                                | ●                                    |
| 11. Malaxeurs                                                  |                      | ●                                | ●                                    |

| TYPE OF INSTALLATION                                        | Tin<br>Base<br>Alloy | Lead<br>Antimony<br>Tin<br>Alloy | Lead<br>Antimony<br>Arsenic<br>Alloy |
|-------------------------------------------------------------|----------------------|----------------------------------|--------------------------------------|
| <b>SUGAR MILLS (Continued)</b>                              |                      |                                  |                                      |
| 12. <u>Minglers</u>                                         |                      | ●                                | ●                                    |
| 13. <u>Mixers</u>                                           |                      | ●                                | ●                                    |
| 14. <u>Rakes</u>                                            |                      | ●                                | ●                                    |
| 15. <u>Shafting</u>                                         |                      | ●                                | ●                                    |
| <b>SUSPENSION BEARINGS (Vehicular)</b>                      |                      |                                  |                                      |
| 1. <u>All Types</u>                                         | ●                    |                                  | ●                                    |
| <b>TRANSMISSION BEARINGS</b>                                |                      |                                  |                                      |
| 1. <u>Reduction Gears</u>                                   |                      |                                  |                                      |
| a. <u>Turbine</u>                                           | ●                    |                                  |                                      |
| b. <u>All Other Bearings</u>                                | ●                    |                                  | ●                                    |
| 2. <u>Shafting Bearings</u>                                 |                      |                                  |                                      |
| a. <u>Marine Stern Tube Bearings</u>                        | ●                    |                                  |                                      |
| b. <u>Marine Line Shaft Bearings</u>                        | ●                    |                                  | ●                                    |
| 3. <u>Roller and Chain Conveyors</u>                        | ●                    |                                  | ●                                    |
| <b>TURBINES—STEAM (Main Ship Propulsion and Industrial)</b> |                      |                                  |                                      |
| 1. <u>Main Bearings</u>                                     | ●                    |                                  | ●                                    |
| 2. <u>All Other Bearings</u>                                |                      |                                  | ●                                    |



# A. S. T. M. SPECIFICATIONS

## Lining Metal for Car and Tender Journal Bearings

A. S. T. M. B67-38

A. A. R. M-501-34

Tin . . . . . as specified

Antimony . . . . . 8.0 min.

Tin plus Antimony . . . . . 10-14

Arsenic . . . . . .2 max.

Copper . . . . . .5 max.

Tin, Antimony, Lead and Arsenic 99.25 min.

Other impurities . . . . . .75 max.

# A. S. T. M. SPECIFICATIONS

A. S. T. M.: B23-26

| Grades | Tin      | Antimony  | Lead     | Copper   | Iron     | Arsenic  | Zinc | Aluminum |
|--------|----------|-----------|----------|----------|----------|----------|------|----------|
| 1      | 91       | 4.5       | .35 max. | 4.5      | .08 max. | .10 max. | none | none     |
| 2      | 89       | 7.5       | .35 max. | 3.5      | .08 max. | .10 max. | none | none     |
| 3      | 83.33    | 8.33      | .35 max. | 8.33     | .08 max. | .10 max. | none | none     |
| 4      | 75       | 12        | 10       | 3        | .08 max. | .15 max. | none | none     |
| 5      | 65       | 15        | 18       | 2        | .08 max. | .15 max. | none | none     |
| 6      | 20       | 15        | 63.5     | 1.5      | .08 max. | .15 max. | none | none     |
| 7      | 10       | 15        | 75       | .50 max. | ...      | .20 max. | none | none     |
| 8      | 5        | 15        | 80       | .50 max. | ...      | .20 max. | none | none     |
| 9      | 5        | 10        | 85       | .50 max. | ...      | .20 max. | none | none     |
| 10     | 2        | 15        | 83       | .50 max. | ...      | .20 max. | none | none     |
| 11     | ...      | 15        | 85       | .50 max. | ...      | .25 max. | none | none     |
| 12     | ...      | 10        | 90       | .50 max. | ...      | .25 max. | none | none     |
| 13*    | 2        | 15        | rem.     | .25 max. | ...      | ...      | ...  | 2.5 Ag   |
| 14*    | .75      | 12.75     | rem.     | ...      | ...      | 1.5-3.0  | ...  | ...      |
| 15*    | .90-1.25 | 14.5-15.5 | rem.     | .6 max.  | ...      | .8-1.1   | ...  | ...      |
| 16*    | 10       | 12.5      | rem.     | .4-.6    | ...      | ...      | ...  | ...      |
| 17*    | 6        | 10        | rem.     | .25 max. | ...      | ...      | ...  | ...      |
| 18*    | 1        | 17        | rem.     | .4-.6    | ...      | .8-1.4   | ...  | ...      |

\*Emergency alternate provisions EA-B23a

The following permissible variation in the percentages of the desired elements will be allowed, but shall not apply to the maximum percentages of impurities specified.

Not over 2%..... .25  
Over 2% to 5% inclu..... .50  
Over 5% to 10% inclu..... .75  
Over 10%..... 1.00

## S. A. E. SPECIFICATIONS

|          | S. A. E. 10 |            | S. A. E. 110 |           | S. A. E. 11 |            | S. A. E. 13 |            | S. A. E. 14 |             | S. A. E. 15 |             |
|----------|-------------|------------|--------------|-----------|-------------|------------|-------------|------------|-------------|-------------|-------------|-------------|
|          | Bearing     | Ingot      | Bearing      | Ingot     | Bearing     | Ingot      | Bearing     | Ingot      | Bearing     | Ingot       | Bearing     | Ingot       |
| Tin      | 90.0 min.   | 90.75 min. | 87.75 min.   | 89.0 min. | 86.0 min.   | 87.25 min. | 4.5-5.5     | 4.75-5.25  | 9.25-10.75  | 9.75-10.25  |             | .90-1.25    |
| Antimony | 4.0-5.0     | 4.25-4.75  | 7.0-8.5      | 7.25-8.25 | 6.0-7.5     | 6.5-7.0    | 9.25-10.75  | 9.75-10.25 | 14.0-16.0   | 14.75-15.25 |             | 14.50-15.50 |
| Lead     | .35 max.    | .35 max.   | .35 max.     | .35 max.  | .35 max.    | .35 max.   | 86.0 max.   | 85.5 max.  | 76.0 max.   | 75.25 max.  |             | rem.        |
| Copper   | 4.0-5.0     | 4.25-4.75  | 2.25-3.75    | 2.5-3.5   | 5.0-6.5     | 5.5-6.0    | .50 max.    | .50 max.   | .50 max.    | .50 max.    |             | .60 max.    |
| Iron     | .08 max.    | .08 max.   | .08 max.     | .08 max.  | .08 max.    | .08 max.   | ...         | ...        | ...         | ...         |             | ...         |
| Arsenic  | .10 max.    | .10 max.   | .10 max.     | .10 max.  | .10 max.    | .10 max.   | .60 max.    | .60 max.   | .60 max.    | .60 max.    |             | .80-1.10    |
| Bismuth  | .08 max.    | .08 max.   | .08 max.     | .08 max.  | .08 max.    | .08 max.   | ...         | ...        | ...         | ...         |             | ...         |
| Zinc     | None        | None       | None         | None      | None        | None       | None        | None       | None        | None        |             | None        |
| Aluminum | None        | None       | None         | None      | None        | None       | None        | None       | None        | None        |             | None        |

## MELTING RANGE OF TIN-LEAD ALLOYS

| Composition |        | Begins Melting At |        | Completely Liquid at |        |
|-------------|--------|-------------------|--------|----------------------|--------|
| 90% Pb      | 10% Sn | 268° C            | 514° F | 298° C               | 568° F |
| 80% Pb      | 20% Sn | 183° C            | 362° F | 275° C               | 527° F |
| 70% Pb      | 30% Sn | 183° C            | 362° F | 257° C               | 495° F |
| 60% Pb      | 40% Sn | 183° C            | 362° F | 238° C               | 460° F |
| 50% Pb      | 50% Sn | 183° C            | 362° F | 212° C               | 414° F |
| 40% Pb      | 60% Sn | 183° C            | 362° F | 188° C               | 371° F |
| 30% Pb      | 70% Sn | 183° C            | 362° F | 192° C               | 378° F |
| 20% Pb      | 80% Sn | 183° C            | 362° F | 203° C               | 397° F |
| 10% Pb      | 90% Sn | 183° C            | 362° F | 217° C               | 422° F |

## MELTING POINT OF METALS

|                         |         |         |
|-------------------------|---------|---------|
| Aluminum.....           | 659° C  | 1218° F |
| Antimony.....           | 630° C  | 1166° F |
| Arsenic (sublimes)..... | 630° C  | 1166° F |
| Bismuth.....            | 271° C  | 520° F  |
| Cadmium.....            | 321° C  | 609° F  |
| Calcium.....            | 851° C  | 1563° F |
| Copper.....             | 1083° C | 1981° F |
| Lead.....               | 327° C  | 621° F  |
| Magnesium.....          | 650° C  | 1202° F |
| Nickel.....             | 1452° C | 2646° F |
| Phosphorus.....         | 44° C   | 111° F  |
| Silver.....             | 961° C  | 1769° F |
| Sodium.....             | 98° C   | 208° F  |
| Tellurium.....          | 453° C  | 847° F  |
| Tin.....                | 232° C  | 450° F  |
| Zinc.....               | 419° C  | 788° F  |