

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 927
SELF-LUBRICATING BRONZE BEARING PLATES
APRIL 15, 2005

927.01 Description. This specification covers self-lubricating bronze plates for bridge bearing applications.

927.02 Material. Bronze plates shall conform to the requirements of ASTM B 22 Copper Alloy UNS No. C91100, or ASTM B 100.

927.03 Finishes and Tolerances. The surfaces of the bronze and steel plates that are to slide upon each other, shall have a surface roughness not exceeding 0.125 inches (3.2 mm) as measured in accordance with ANSI standards. The lay of the tool marks shall be in the direction of motion or shall be omni-directional.

The flat surfaces of the bronze and steel plates that bear upon each other shall be true within 0.0005 inch per inch (10 mm per 20 mm) of length and width.

Bearing plates having radial convex surfaces shall have a negative tolerance of 0.010 inches (250 mm) maximum and a positive tolerance of 0.000 inches (0 mm) on the specified radius. Concave radial surfaces of bearing plates shall have a positive tolerance of 0.010 inches (250 mm) maximum and a negative tolerance of 0.000 inches (0 mm) on the specified radius.

927.04 Lubricating Recesses. The recesses for the lubricant shall consist of either (1) concentric rings, with or without a central circular recess, with a depth at least equal to the width of the ring or diameter of the hole or (2) circular recesses approximately 5/16 inch (8 mm) in diameter and 3/16 inch to 1/4 inch (5 to 6 mm) deep. The recesses shall be arranged in a geometric pattern such that adjacent rows shall overlap in the direction of motion. The entire area of all bearing surfaces, which have provisions for motion, shall be lubricated by means of these lubricant-filled recesses. The total area of these recesses shall comprise not less than 25 percent nor more than 35 percent of the total bearing area of the plate.

927.05 Lubricant. The lubricant for filling the recesses shall be of the solid type and shall consist of graphite and metallic lubricants with a lubricating binder. The lubricant shall be compressed into the lubricating recesses under an hydraulic pressure of 12500 psi (85MPa) to form dense non-plastic inserts, which shall project not less than 0.010 inch (0.25 mm) above the surface of the bronze plate.

927.06 Testing. A self-lubricating bronze test plate measuring not less than 5 inches (125 mm) long by 5 inches (125 mm) wide shall be prepared in accordance with these specifications using the same bronze alloy chosen for project bearings.

An assembly consisting of the fixed self-lubricating test plate and a movable steel plate shall be subjected to a vertical unit loading of 2500 psi (17 MPa). The steel plate shall then be subjected to not

less than 100 cycles of horizontal movement at a speed not to exceed 30 cycles per minute. Each cycle shall consist of a forward and return movement of approximately 1/2 inch (13 mm) in each direction. The recorded horizontal force divided by the recorded vertical force shall be considered the coefficient of friction between the sliding surfaces.

The coefficient of friction determined by the foregoing method shall not exceed 0.10.

927.07 Assembly. Before assembly of bronze plates with mating steel plates to form a complete bearing assembly, the sliding surfaces of the mating steel plates shall be coated with lubricant similar to that used in the recesses. The complete bearing assembly shall then be banded together for shipment. Care shall be used to eliminate the possibility of dirt, dust or other foreign matter from contacting the sliding surfaces.

927.08 Certification. Certified copies of the chemical analysis and physical properties of the bronze used in the manufacture of the bearing plates shall be furnished for each project. The bearing manufacturer shall also furnish a certified copy of the friction test data showing that the bronze bearing material with lubricant, when tested as hereinbefore described, has a coefficient of friction not greater than 0.10.