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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 27553.1-2011

**Specification for plastics-bronze-steel backing triple-layer
self-lubricating materials - Part 1: Plastic overlay with modified
PTFE**

塑料-青铜-钢背三层复合自润滑板材技术条件 第1部分：带改性聚四氟乙烯（PTFE）减摩层的板材

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Foreword

GB/T 27553 "Specification of plastics-bronze-steel backing triple-layer self-lubricating materials" consists of two parts. - Part 1. Plastic overlay with modified PTFE; - Part 2. Plastic overlay with modified POM. This Part is Part 1 of GB/T 27553. This Part was drafted in accordance with the rules given in GB/T 1.1-2009. This Part was proposed by China Machinery Industry Federation. This Part shall be under the jurisdiction of National Technical Committee on Sliding Bearing of Standardization Administration of China (SAC/TC 236). Main drafting organizations of this Part. China Machine Productivity Promotion Center, Zhejiang Shuangfei Oilless Bearing Co., Ltd. The drafting organizations of this Part. Zhejiang Changsheng Sliding Bearing Co., Ltd., Zhejiang Zhongda Bearing Co., Ltd., Beijing Chaoyang Jianhua Oil-free Lubricating Bearing Factory, Liaoyuan Steel Bearing Co., Ltd. Specification of plastics-bronze-steel backing triple-layer self-lubricating materials - Part 1. Plastic overlay with modified PTFE

1 Scope

China's national specification for the plastics-bronze-steel backing triple-layer self-lubricating strip whose sliding layer is modified PTFE. It is Part 1 of GB/T 27553 and specifies the structural features, the technical requirements and the test methods for the material, which is supplied as strip or plate and formed into wrapped bushes, thrust washers, sliders and guideways. The material is a sandwich, and each of its three layers does something the other two cannot. A steel backing carries the load and gives the part its strength and its press fit. A layer of porous sintered bronze is bonded to the steel and provides the mechanical key and the thermal path: the plastic on its own would not stay attached to steel under load, and it would not conduct away the heat generated at the sliding surface. And a thin overlay of modified PTFE fills the bronze pores and stands

slightly proud of them, giving a running surface with an exceptionally low coefficient of friction that requires no lubricant at all. That combination is why the material exists. A bearing made from it runs dry, which removes the lubrication system, the maintenance interval and the contamination that oil brings - and it does so where a plain bronze bush would seize: in oscillating motion, at low speed under high load, under shock, and in the presence of water, dirt or chemicals. Because the sliding layer is only a few hundredths of a millimetre thick, everything about the material's performance depends on how it was made rather than on what it nominally contains, which is what this specification exists to fix. Issued on 21 November 2011 and in force since 1 June 2012.

This Part of GB/T 27553 specifies the structural features, technical requirements, test methods for plastics(with modified PTFE)-bronze-steel backing triple-layer self-lubricating materials. This Part of GB/T 27553 applies to plastics(with modified PTFE)-bronze-steel backing triple-layer self-lubricating materials (hereinafter referred to as the plate). The plate can be processed into a product of a rolled sleeve, a thrust washer, a slider, a guide rail, etc.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 223.69, Iron, Steel and Alloy-Determination of Carbon Contents - Gas- volumetric Method after Combustion in the Pipe Furnace

GB/T 231.1, Metallic materials - Brinell hardness test - Part 1. Test method (GB/T 231.1-2009, ISO 6506-1.2005, MOD)

GB/T 3960, Plastics - Test method for friction and wear by sliding

GB/T 5121.2, Copper and copper alloys - Determination of phosphorus content (GB/T 5121.2-2008, ISO 4741.1984, MOD)

GB/T 5121.10, Methods for chemical analysis of copper and copper alloys - Part 10. Determination of tin content (GB/T 5121.10-2008, ISO 3111.1975, MOD)

GB/T 5121.11, Methods for chemical analysis of copper and copper alloys - Part 11. Determination of zinc content (GB/T 5121.11-2008,

ISO 4740.1985, MOD) intermediate sintered layer is greater than 2N/mm².

4.4.2 The bond of the intermediate sintered layer and the steel backing layer shall be tested in accordance with the method of 5.6.2, bent 5 times, cracks not allowed, no delamination or peeling.

4.5 Appearance quality The surface plastic layer is visually free of wrinkles, lack of material,

cracks, blisters, inclusions and other defects. The surface of the steel backing layer is free of defects such as black spots, rust spots, etc., and scratches that affect the use.

4.6 Thickness and limit deviation See Table 4 for thickness and limit deviation. Table 4 -- Thickness T and limit deviation mm Thickness range $0.75 \leq T \leq 1.5$ $1.5 < T \leq$

5 Test methods

5.1 Chemical composition analysis The carbon content of the steel backing is determined according to the method specified in GB/T 223.69. The chemical composition of the intermediate sintered layer is determined according to the method specified in GB/T 5121.2, GB/T 5121.10, GB/T 5121.11.

5.2 Thickness test of each layer

5.2.1 Thickness test of surface plastic layer Take a plate of 37mm x 37mm. Measure 3 times at the center of the plate with a wall thickness micrometer. Take the arithmetic mean. Then completely remove the plastic layer in the center of the plate according to

5.6.1 or other methods. Then use a wall thickness micrometer to measure 3 times in the center of the plate. Take the arithmetic mean. The difference in size before and after the removal of the surface plastic layer shall be the thickness of the surface plastic layer.

5.2.2 Thickness test of intermediate sintered layer Perform the test according to the provisions of GB/T 6642. Measure the thickest point in a field of view at a magnification of 70.

a) the temperature reaches the limit specified by the test;

b) the friction factor exceeds limit. Print out the friction factor and temperature curve over time by computer.

5.5.1.6 Friction and wear measurement method Before the start of the test, use a wall thickness micrometer to measure more than 4 points in the shaded area shown in Figure 3. Take the arithmetic mean. The difference between the wall thickness before and after wear is the amount of wear.

5.5.2 Ring friction and wear test In addition to the following ones, the test method for ring friction and wear shall meet the requirements of GB/T 3960.

5.5.2.1 Specimen thickness The specimen thickness is 2.0mm.

5.5.2.2 Specimen fixture Sample fixture groove depth is reduced by 2mm in standard fixture.

5.5.2.3 Load The test load of specimen is 196N.

5.5.2.4 Lubrication conditions Lubrication conditions for ring friction test have two forms. dry

friction and oil lubrication. Dry friction refers to the fact that the specimen does not contain any lubricant or grease during assembly and during testing. Oil lubrication means that at the start of the test, 5 drops of No. 32 mechanical oil shall be dropped on the outer diameter of the steel wheel.

5.5.2.5 Friction torque The friction torque value is based on the average value recorded in the second hour. If fluctuations occur, the maximum and minimum values in the second hour shall be recorded. Usually use A+B two hammers and 500N·cm ruler. In the oil lubrication test, an A weight and a 100N·cm ruler are used.