



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

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**Sintered metal materials, excluding hardmetals - Fatigue test
pieces**

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1 Scope

This document specifies the dimensions of the die cavity, which is used for the preparation of fatigue specimens, by pressing and sintering, the dimensions of the specimens, which are prepared using this die, the dimensions of the specimens, which are machined by sintering and powder forging materials.

This document applies to all sintered metals and alloys (excluding hardmetals).

2 Normative references

There are no normative references in this document.

3 Terms and definitions

There are no terms and definitions, that need to be defined, in this document.

4 Pressed and sintered specimens for reverse bending and

axial fatigue testing

4.1 General

The specimens, which are prepared by pressing and sintering, can be further processed, such as dimensional finishing, polishing or heat treatment. If these treatments are taken, they shall be noted in the test report. In the metallographic examination of the specimen section, there shall be no micro-cracks, which have a length exceeding 0.25 mm in the test

area. The pressing die shall be kept in good condition, to avoid burrs. The corners of the test area of the sintered specimen shall be ground, to remove burrs generated during the pressing process.

4.2 Requirements for unnotched specimens

The unnotched specimen is as shown in Figure 2a). Flatness and parallelism shall be 0.1 mm. Other dimensions are recommended values.

Appendix A (Informative) Supplementary instructions

ISO 1099, ISO 1352, ISO 1143 defines general principles for metal fatigue test specimens, which apply to the following sintered metals.

- a) Sintered metals are characterized by porosity, which inevitably leads to stress concentrations.
- b) Pores reduce the actual cross-sectional area of the specimen to be tested, which means that the theoretical stress value calculated according to the formula is smaller than the actual stress value.
- c) In most cases, sintered specimens with connected pores on the surface are more sensitive to the environment than dense materials. Porous products are not only affected by internal erosion, during fatigue testing, but also before testing; therefore, such specimens need to be stored with more care than dense material specimens.
- d) The surface state of the specimen or powder metallurgy part will significantly affect its fatigue performance, so in order to obtain suitable fatigue data from the fatigue specimen, to evaluate the fatigue performance of the powder metallurgy part, the surface state of the specimen and the part needs to be comparable.
- e) Milling or turning will cause surface densification and residual compressive stress, which will result in higher fatigue strength than that in the non-machined state (the grinding operation is gentler). Therefore, the surface of the specimen shall be machined, only if the critical parts of the powder metallurgy part are also machined. However, since most powder metallurgy parts have non-machined surfaces, the assessment of fatigue properties is best done, through the fatigue data obtained from non-machined surfaces.