INTERNATIONAL STANDARD ISO 3928

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Sintered metal materials, excluding hardmetals — Fatigue test pieces

Matériaux en métal fritté, à l'exclusion des métaux-durs — Éprouvettes pour essais de fatigue

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3928 was drawn up by Technical Committee ISO/TC 119, *Powder metallurgical materials and products,* and was circulated to the member bodies in September 1975.

It has been approved by the member bodies of the following countries :

Australia	Italy	Sweden
Austria	Japan	Turkey
Brazil	Korea, Dem. P. Rep. of	United Kingdom
Canada	Mexico	U.S.A.
Czechoslovakia	Poland	U.S.S.R.
Egypt, Arab Rep. of	Romania	Yugoslavia
France	Spain	

No member body expressed disapproval of the document.

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Sintered metal materials, excluding hardmetals — Fatigue test pieces

1 SCOPE

This International Standard specifies

— the die cavity dimensions used for making fatigue test pieces by pressing and sintering, together with certain dimensions of the test piece obtained from such a die;

— the dimensions of fatigue test pieces machined from sintered materials.

2 FIELD OF APPLICATION

This International Standard is applicable to all sintered metals and alloys, excluding hardmetals.

3 REFERENCES

ISO 296, *Machine tools — Self-holding tapers for tool shanks.*

ISO/R 373, *General principles for fatigue testing of metals.*

ISO 2738, *Permeable sintered metal materials — Determination of density and open porosity.*

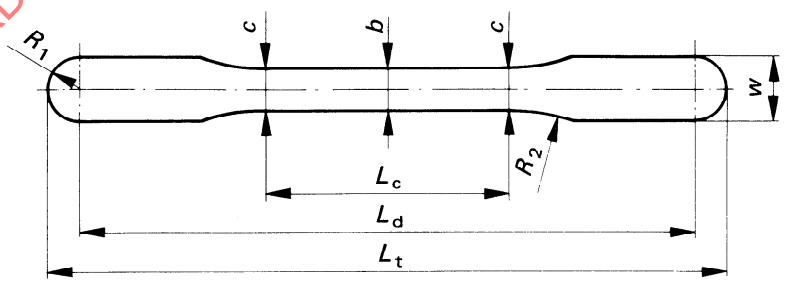
ISO 2740, *Sintered metal materials (excluding hardmetals) — Tensile test pieces.*

4 MANUFACTURE OF TEST PIECES

4.1 Pressed and sintered test pieces for fatigue test by reverse bend testing

4.1.1 *Die specifications*

The die cavity shall be the same as that used for making tensile test pieces, in accordance with ISO 2740. (See figure 1.)



Values in millimetres

b	c	L_c	L_d	L_t	w	R_1	R_2
5,70 ± 0,02	b + 0,25	32	81,0 ± 0,5	89,7 ± 0,5	8,7 ± 0,2	4,35	25

FIGURE 1

4.1.2 *Test piece specifications*

The fatigue test piece shall have a thickness between 5,4 and 6,0 mm. The test piece thickness shall not vary by more than 0,04 mm along a distance of 25 mm symmetrically about the centre line.

Any test pieces that show distortion after sintering shall be excluded from the test. Burrs shall be avoided.

The pressed and sintered test piece may also be subject to further treatment, such as sizing, polishing or heat treatment. If such treatments are applied, they shall be stated in the test report.

4.2 **Machined test pieces**

All types of test pieces may be used according to the different known procedures of fatigue testing (reverse bend, tension-compression, rotating bend, etc.).

Two examples of rotating bend test pieces, the Moore and the Schenck, are given in figures 2 and 3 respectively.

Such test pieces shall be ground on their active length, using a diamond wheel, and lapped longitudinally in order to remove all traces of circumferential scratches.

5 IDENTIFICATION OF TEST PIECES

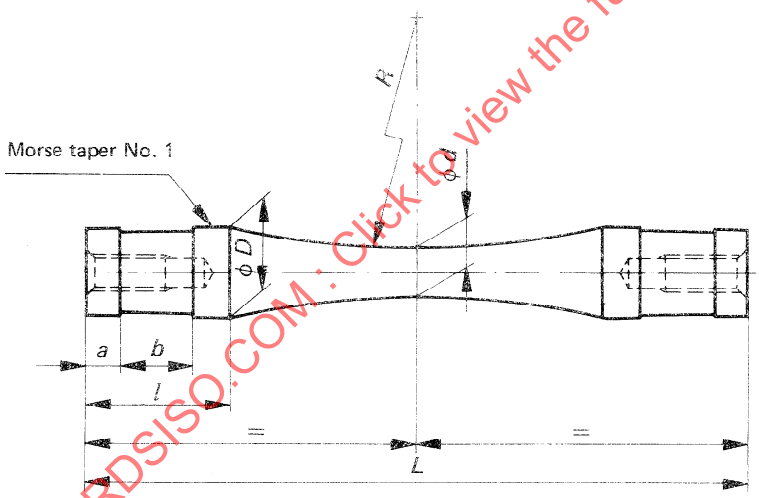
For the identification of test pieces, the following shall be stated :

— type of material;

— density of test piece;

— dimensions of test piece.

When pressed and sintered test pieces are made according to 4.1, the nature of any finishing treatment shall be stated and also, preferably, the material and surface finish of the compacting tool.



Values in millimetres

L	*l*	*D*	*d*	*a*	*b*
87,3	19,05	12,3	5,08 to 10,16	4,76	9,5

The relationship between *R* and other dimensions of the test piece is as follows :

$$R = \frac{D-d}{4} + \frac{\left(\frac{L}{2} - l\right)^2}{D-d}$$

FIGURE 2 – **Moore test piece**

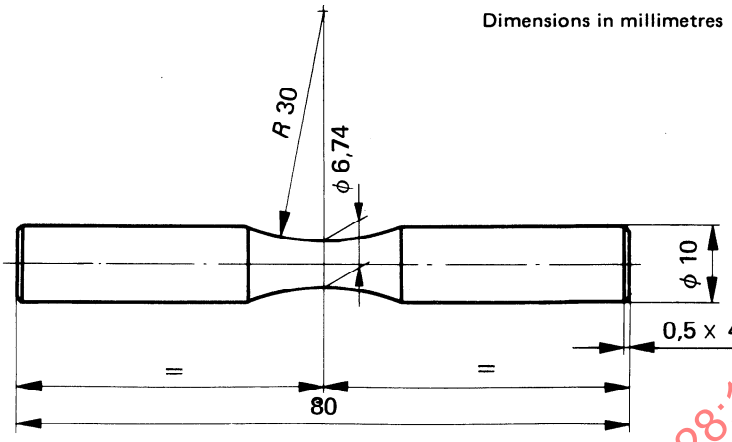


FIGURE 3 – **Schenck test piece**

ANNEX

REMARKS

ISO/R 373 defines the general principles of fatigue testing of metals. These principles are applicable also to sintered metals with the following remarks :

a) Sintered metals are characterized by the presence of pores, which act as unavoidable stress raisers.

b) Porosity reduces the actual cross-section of specimens to be tested; this means that the nominal stress values, as calculated with the usual formulas, are smaller than the true stresses.

c) In most cases, the presence of interconnected pores opening to the surface makes sintered test pieces much more sensitive to environmental conditions than pore-free materials; porous products can be affected by internal corrosion processes not only during the fatigue test but also before the test. Such test pieces must be stored more carefully than pore-free test pieces, and environmental conditions during the fatigue test must be detailed in the test report.

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