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JAPANESE INDUSTRIAL STANDARD

Test method for flexural properties of fiber reinforced metals

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Test method for flexural properties of fiber reinforced metals

H 7406-1993

1. Scope This Japanese Industrial Standard specifies the test method for flexural properties by three-point flexure (hereafter, referred to as "method A") and four-point flexure (hereafter, referred to as "method B"), which are carried out in the atmosphere at room temperature, of metal matrix composite reinforced by continuous fiber.

Remarks The following standards are cited in this Standard:

JIS B 0601	Definitions and designation of surface roughness
JIS B 7502	Micrometer callipers for external measurement
JIS B 7507	Vernier, dial and digital callipers
JIS H 7006	Glossary of terms used in metal matrix composites
JIS K 7074	Testing methods for flexural properties of carbon fiber reinforced plastics
JIS R 1602	Testing methods for elastic modulus of high performance ceramics
JIS Z 8401	Rules for rounding off of numerical values

2. Definitions For the main terms used in this Standard the definitions in JIS H 7006 apply, and the rest of the terms shall be as follows:

(1) test speed Is a speed wherein the crosshead of a testing machine moves in a test. Its unit is expressed by mm/min.

(2) flexural stress Is a value wherein, at an optional point of time, the product of a flexural load applied to a test piece and a distance between fulcrums is divided by the product of the width of the test piece and the square of the thickness of the test piece, and multiplied by a coefficient ($\frac{3}{2}$ for method A and 1 for method B). Its unit is expressed by MPa.

(3) flexural strength Is the maximum flexural stress applied to a test piece. Its unit is expressed by MPa.

(4) flexure Is a distance wherein a point at the central position between the fulcrums of a test piece having received a load is apart from the original position during a test. Its unit is expressed by mm.

(5) strain Is a tensile strain of a test piece having received a load, which is measured with a strain gage bonded at the central position between the fulcrums of a test piece.

(6) fracture strain Is a strain corresponding to a flexural strength.

(7) longitudinal elastic modulus under flexure Is a value obtained from the gradient of a straight line part at the origin of a flexural load – strain curve or a flexural load – flexure curve. Its unit is expressed by GPa.

(8) indenter Is a jig which applies a load to a test piece.

3. Test apparatus

3.1 Test machine A test machine can keep traveling speed of a crosshead constant in a test, which is composed of 3.1.1 and 3.1.2.

3.1.1 Loading fixture A loading fixture for method A shall be the basic structured one as given in Fig. 1 (a) and a loading fixture for method B shall be the basic structured one as given in Fig. 1 (b). A distance between fulcrums shall be able to be regulated, and radii of an indenter and the fulcrum shall be as given in Table 1.

Remarks: The indenter in contact with a test piece and respective fulcrums shall have a width sufficiently exceeding the width of a test piece. Further, its surface shall be at most 6.3 a in central-line mean roughness specified in JIS B 0601.

Fig. 1

(a) Example of an apparatus for method A

(b) Example of an apparatus for method B

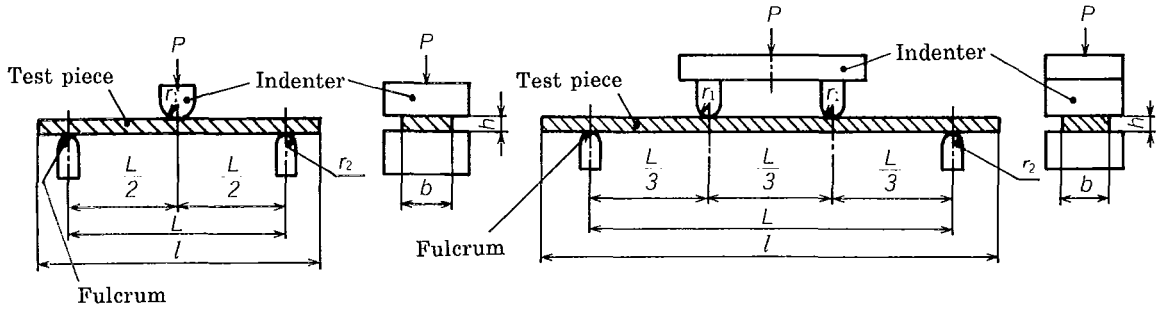

Table 1. Radii of indenter and fulcrum

Unit: mm

Test method	Radius of an indenter r_1	Radius of a fulcrum r_2
Method A	5.0 ± 0.1	2.0 ± 0.2
Method B	3.0 ± 0.2	3.0 ± 0.2

3.1.2 Load indicator A load indicator shall be able to record all flexural loads applied to a test piece during a test with the elapse of time and that with a mechanism capable of indicating a flexure value at a precision of ± 1 % of loaded value under the set test speed shall be used.

3.2 Displacement-measuring instrument

3.2.1 Deflectometer A deflectometer shall be capable of recording a variation in flexure of a test piece during a test with the elapse of time and that with a mechanism capable of indicating a flexure value at a precision of ± 1 % thereof under the set test speed shall be used.