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JAPANESE INDUSTRIAL STANDARD

**Testing method for impact
properties of carbon fibre
reinforced plastics by instrumented
3-point bending impact test**

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Testing method for impact properties
of carbon fibre reinforced plastics
by instrumented 3-point bending impact test

K 7084-1993

1. Scope This Japanese Industrial Standard specifies a testing method for impact properties of carbon fibre reinforced plastics (hereafter referred to as "CFRP") by instrumented 3-point bending impact test.

Remarks 1. This testing method is used to determine the impact flexural properties by one time strike in a similar manner as specified in JIS K 7077.

And this testing method is used to determine the impact flexural properties by applying bending impact in a similar manner as specified in JIS K 7074.

2. The standards cited in this Standard are shown as follows:

JIS B 0601 Surface roughness – Definitions and designation

JIS B 7502 Micrometer callipers for external measurement

JIS B 7507 Vernier, dial and digital callipers

JIS B 7739 Pendulum-type impact testing machines for non-metallic materials

JIS K 6900 Glossary of terms used in plastic industry

JIS K 7072 Preparation of carbon fibre reinforced plastic panels for test purpose

JIS K 7074 Testing methods for flexural properties of carbon fiber reinforced plastics

JIS K 7077 Testing method for Charpy impact strength of carbon fiber reinforced plastics

JIS K 7100 Standard atmospheres for conditioning and testing of plastics

JIS Z 8103 Glossary of terms used in instrumentation

JIS Z 8401 Rules for rounding off of numerical values

3. The units given in { } in this Standard are based on the traditional units and are appended for informative reference.

2. Definitions For the main terms used in this Standard, the definitions in JIS K 6900 and JIS Z 8103 apply, and the rest of the terms shall be as follows:

(1) weighted striker The block type weighted striker having loading nose (refer to Fig. 1).

(2) impact velocity The velocity just before the loading nose impacting the test specimen.

(3) height of fall The distance between the surface of the test specimen and the loading nose.

- (4) impact load The load applied to the test specimen with the passage of time during the test.
- (5) maximum load The maximum load in the load-deflection diagram.
- (6) deflection The distance over which the surface of the test specimen at mid-span under the load is deviated from the original plane of this surface after the loading nose hitting the test specimen.
- (7) maximum deflection The maximum deflection in the load-deflection diagram.
- (8) impact flexural strength The flexural stress at the moment the load has reached the maximum value (maximum flexural stress).
- (9) impact flexural modulus of elasticity The modulus of elasticity calculated from the initial gradient of the load-deflection diagram.
- (10) total energy The total energy corresponding to the area under the load-deflection diagram bounded by the origin, the maximum load and the maximum deflection.
- (11) elastic flexural energy The area under the load-deflection diagram bounded by the origin, the maximum load and the deflection at the maximum load.
- (12) energy index The value obtained by dividing the total energy by the elastic flexural energy.
- (13) tension side fracture The fracture mode starting the fracture of reinforcing fibres from the tension side surface layer successively.
- (14) compression side fracture The fracture mode starting the crack propagation from the compression side surface layer near the loading point.
- (15) interlaminar shearing fracture The fracture mode causing the interlaminar delamination.

3. Conditioning of test specimens and test temperature and humidity

3.1 Conditioning of test specimen The test specimen shall be conditioned at a standard temperature Grade 2 and a standard humidity Grade 2 [temperature $23 \pm 2^\circ\text{C}$ and relative humidity $50 \pm 5\%$] for 48 h or longer before test in accordance with JIS K 7100, unless otherwise specified.

3.2 Test temperature and humidity The test shall be conducted at the temperature specified in 3.1 [temperature $23 \pm 2^\circ\text{C}$ and relative humidity $50 \pm 5\%$], unless otherwise specified.

Remarks: It should be noted that the impact properties of CFRP may be affected by moisture absorption.

4. Testing machine and apparatus

4.1 Testing machine The testing machine shall be used specified in JIS B 7739 together with testing machine shall satisfy the conditions described below:

- (1) Impact testing machine The impact testing machine consists of the guide frame allowing the weighted striker to drop straight and the horizontal base attaching jig to support the test specimen, and has effective height of fall not less than 0.75 m.