

JIS

JAPANESE INDUSTRIAL STANDARD

Testing method for Charpy impact strength of carbon fiber reinforced plastics

JIS K 7077—1991

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**In the event of any doubt arising,
the original Standard in Japanese is to be final authority.**

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1. **Scope** This Japanese Industrial Standard specifies the testing method for Charpy impact strength (hereafter referred to as the "impact test") of carbon fiber reinforced plastics (hereafter referred to as the "CFRP").

Remarks 1. This testing method applies to one of the impact bending tests. More precisely, a test specimen of specified dimensions is supported in the state of a simple cantilever. An impact force is applied flatwise on the centre of thus supported specimen at specified velocity and a specified energy which is higher than the energy required to fracture the specimen. The impact resistance, brittleness, toughness of the CFRP is determined, from the energy absorbed in breaking a specimen in a single impact.

2. The units and numerical values given in { } in this Standard are based on the traditional unit system and are appended for informative reference.

3. The standards cited in this Standard are as follows.

JIS B 7502-Micrometer Callipers for External Measurement

JIS B 7507-Vernier 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 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

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) **Charpy impact test** A test for measuring the Charpy impact strength by fracturing a specimen placed on two test specimens support block of a Charpy impact tests in a single impact on the centre of the test specimen with a pendulum of the testing machine.
- (2) **absorbed energy** The value of energy (J) (kgf · cm) required to fracture a test specimen.



- (3) Charpy impact strength The value of absorbed energy (J) (kgf · cm) divided by the original cross sectional area of the central part of the test specimen (kJ/m^2) (kgf · cm/cm²).
- (4) fracture Complete breaks so that test specimens break into two or more pieces in a single impact. Some cases indicate, however, that the fracture fragments are connected together with a very thin surface layer (a skin layer created during moulding). Such breaks are acceptable as fracture.
- (5) flatwise impact An impact given perpendicular to the laminates of test specimens.
- (6) machine capacity A term of the potential energy of a pendulum at the starting position to that at the impact position.
- (7) horizontal base of test specimen support block The base of a test specimen support block on which a test specimen is placed.
- (8) distance between test specimen support blocks The shortest distance between the ends of two rear support blocks arranged at right and left sides (see Fig. 2).
- (9) striking edge of impact pendulum The linear part of the edge of the pendulum for impacting test specimens.
- (10) impact point The middle point of the contact area on the striking edge of an impact pendulum, when the striking edge contacts with a test specimen of an ideal geometry and dimensions placed on the normal position of the horizontal base of support blocks (see Fig. 2).
- (11) centre of impact The point at which the total mass of a pendulum is supposed to concentrate, when the pendulum moves with perturbation around the centre line of the horizontal rotation axis.
- (12) impact velocity Linear velocity of the centre of impact of a pendulum at moment of its impacting the test specimen.
- (13) blank swing To swing down a pendulum from the starting position (lift-up position) and allow it swing up the other way around, without placing any test specimen on the support blocks.
- (14) energy loss of testing machine The potential energy difference between the following two positions of the pendulum; one being the starting position with a pointer carried together, the other being the position where the pendulum reaches by upward swinging after a blank swing.
- (15) energy loss during impact test The energy loss due to air resistance and frictional resistance of a pendulum and a pointer, when the pendulum moves from the starting position to its swing-up position after impacting and then breaking a test specimen.

3. Conditioning of test specimens and test temperature and humidity

3.1 Conditioning of test specimens The test specimens shall be conditioned at a standard temperature Grade 2 and a standard humidity Grade 2 (temper-