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JAPANESE INDUSTRIAL STANDARD

Testing method for Charpy impact strength of glass fiber reinforced plastics

JIS K 7061—1992

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Testing method for Charpy impact strength
of glass fiber reinforced plastics

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1. Scope

This Japanese Industrial Standard specifies the method for Charpy impact test (hereafter referred to as an impact test) of glass fiber reinforced plastics (hereafter referred to as GFRP).

Remarks 1. The test by this method is a type of impact bending test. The test is as follows: When the center of the specifically sized test piece, which has been held as a simply supported beam, is impacted at specified speed and with a specified energy that is larger than that required for fracture, the energy needed for its fracture by impact shall be measured, and then such as impact resistance, brittleness, and toughness of the test piece, GFRP, shall be measured.

2. 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 7011-Glass Fibre Reinforced Plastics for Structural Use

JIS K 7100-Standard Atmospheres for Conditioning and
Testing of Plastics

JIS Z 8401-Rules for Rounding off of Numerical Values

3. The units put in { } in this standard are based on conventional units and appended as only reference.

2. Definition of terms

The definition of main terms used in this standard shall be as follows except those defined in JIS K 6900.

- (1) Charpy impact test The test to measure Charpy impact value by the operation as follows: Hold horizontally both ends of a test piece on two test-piece supporting bases separated by specified distance, give an impact to the center of the test piece held between bases by the hammer of an impact machine and fracture it by one blow.
- (2) absorbed energy The energy needed to fracture a test piece (J) {kgf·cm}.
- (3) Charpy impact value The value (kJ/m²) {kgf·cm/cm²} obtained by dividing an absorbed energy (J) {kgf·cm} with original central sectional area of the test piece.

- (4) fracture The separation of a test piece into two or more pieces owing to one impact by the hammer of an impact machine.

Remarks: When one impact gives no complete separation of glass fiber in the test piece, it might be regarded as being separated if the bending toughness is judged to be completely lost by trying quietly to bend it to the direction of impact.

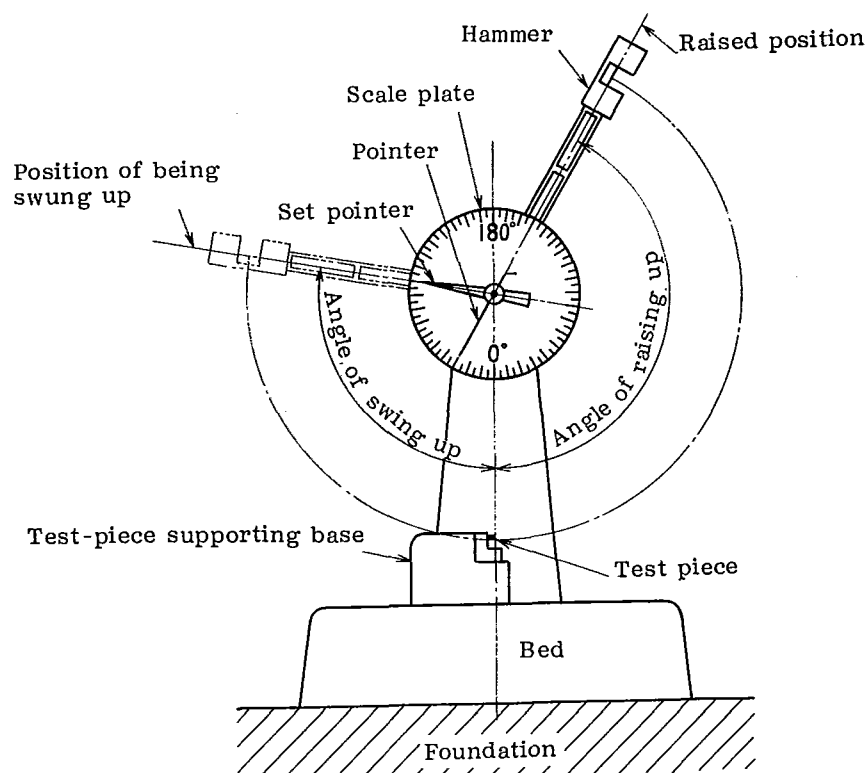
- (5) flat impact Giving an impact at the center of the test piece, which has been held at both ends, perpendicularly to the surface of its original plate.
- (6) edge impact Giving an impact at the center of the test piece, which has been held at both ends, in parallel with the surface of its original plate.
- (7) capacity of impact testing machine Nominal capacity which is potential-energy difference between the impacting position and raised position of the hammer of an impact testing machine.
- (8) horizontal surface of test-piece supporting base The surface of a test-piece supporting base on which a test piece is set.
- (9) distance between of test-piece supporting bases The minimum distance between two ends of supporting bases which are horizontally set for a test piece.
- (10) crest of impact edge The straight part of an edge crest, which is equipped on a hammer of the impact testing machine and gives the impact to a test piece.
- (11) center of impact Point at which whole mass of a hammer is concentrated when the hammer of the impact testing machine swings around center line of a horizontal rotation axis.
- (12) velocity of impact Linear velocity of impact center of a hammer given the instant the hammer of the impact testing machine strikes the test piece.
- (13) blank swinging Swinging downward of the hammer of the impact testing machine from the raised position, without setting of a test piece, to opposite side by letting the hammer swing up freely.
- (14) energy loss of testing machine When making the hammer carry blank swinging with the set pointer, the difference of potential energy which is calculated from the measured positions of being originally raised and of being swung up to the opposite side.
3. Conditioning of test piece and temperature and humidity for test
- 3.1 Conditioning of test piece Test piece should principally be kept for 48 h or longer under the second class standard temperature condition and the second class standard humidity condition [temperature $23 \pm 2^\circ\text{C}$, and relative humidity $(50 \pm 5) \%$] specified in JIS K 7100 prior to the test.

3.2 Temperature and humidity for test Test shall principally be carried out in the room of temperature and humidity conditioned [temperature $23 \pm 2^\circ\text{C}$, and relative humidity $(50 \pm 5) \%$] the same as shown in 3.1.

4. Testing machine and measuring tools

4.1 Testing machine The testing machine for impact test shall comply with the Charpy impact testing machine specified in JIS B 7739. An example of impact testing machine is shown in Fig. 1.

Fig. 1. Example of Charpy impact testing machine



- Remarks 1. Impact testing machine, when either being decomposed, reconstructed, remodeled, or being replaced, shall be tested on its precision and, prior to use, be confirmed if it meets the requirements in JIS B 7739.
2. Even when no applicable to above case, it shall be necessary to carry out the reconfirmation of precision at every decided interval according to the frequency of its employment.
3. Velocity of impact shall be 3.8 ± 0.38 m per second.

Carry out levelling of the bed to let the pointer give just 180° of angle when the hammer of a impact testing machine is freely suspended. Prior to use it should be firmly mounted so as not to cause troubles such as vibration when a test piece is fractured.

Before and after testing, the impact testing machine shall be preferably tested on the energy loss of a testing machine specified in (2) in 6.9 of JIS B 7739.