Charpy and Izod Impact Tests

Summary
An impact blow is delivered to a test specimen by means of a pendulum-type hammer. The impact value of the material is determined from the energy required to break the specimen.

![Charpy impact test](image)

**Testing method**

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| Charpy impact  | Hammer capacity: 0.5, 1, 2, 4, 7, 5, 15 J  
                 Test temp.: -40 - 150°C  
                 Impact speed: 0.5 - 4 J: 2.9 (±5%) m/sec  
                 7.5 J, 15 J: 3.8 (±5%) m/sec  | 80.0 ± 2 x 10.0 ± 0.2 x 4.0 ± 0.2 mmt  
                 n=5  | Fracture energy (J)  
                 Impact strength (kJ/m²)  | JIS K7111-1  
                                                                                  (ISO 179-1)  
                                                                                  JIS K6745  
                                                                                  JIS K6911  |
| Izod impact    | Hammer capacity: 1.2, 7.5, 5.5 J  
                 40, 80, 150 kgs cm  
                 Test temp.: -40 - 150°C  
                 Impact speed: 3.5 (±10%) m/sec  | 80.0 ± 2 x 10.0 ± 0.2 x 4.0 ± 0.2 mmt  
                 63.5 ± 0.5 x 12.7 ± 0.1 mmt  
                 n=5  | Fracture energy (J)  
                 Impact strength (J/m, kJ/m²)  | JIS K7110  
                                                                                  (ISO 180)  
                                                                                  ASTM D256  |

**Charpy impact**
A test specimen having a V-shaped notch is placed on the holder in such position that the notched section is in the center of the holder, and the specimen is broken by striking the back of the notched section with the hammer. The fracture energy is determined from the swing-up angle of the hammer and its swing-down angle. The Charpy impact value (kJ/m²) is calculated by dividing the fracture energy by the cross-section area of the specimen.

**Izod impact**
A test specimen having a V-shaped notch is fixed vertically, and the specimen is broken by striking it from the same side as that of the notch by the use of the hammer. The fracture energy is determined from the swing-up angle of the hammer and its swing-down angle. The Izod impact value (J/m, kJ/m²) is calculated by dividing the fracture energy by the width of the specimen.

**Examples of test specimens**
Thermoplastic resins: PP, PC, PMMA, PS, ABS, PBT, NY, etc.
Composite materials: GFRP, CFRP, etc.

**What can be known?**
- The impact value can be used as a rule of thumb for determining the load bearing capacity of a material against momentary stress from impact strength and fracture energy.
- The higher the impact value of a material is, the higher the toughness or tenacity of the material is.