

Technical Specification of Drop Weight Impact Testing Machine:

To characterize and measure impact energy absorption properties of materials, structures, end products and test geometries.

SI No		
1	Drop Height	Minimum height: 50 mm or lower Maximum height: 1500 mm or higher
2	Drop Height Accuracy	at least ± 1 mm
3	Drop Height Resolution	1 mm or lower
4	Drop Masses	1 kg to 10 kg (two 0.5 kg, one 1 kg, two 2 kg, one 5 kg)
5	Drop Mass Increments	0.1 kg
6	Drop Mass Accuracy	at least $\pm 0.5\%$
7	Maximum Drop Velocity:	4.65 m/s or higher
8	Maximum Drop Energy	100 J or higher, capable of accelerating 10 kg mass up to 4.65m/s
9	Minimum impactor mass	300 grams or lower
10	Force Measurement	Up to ± 50 kN or higher, with piezoelectric dynamic load measurement system
11	Strikers	Hemispherical: 9mm, 12mm, 15mm, 18mm, 25mm; Flat plate: 80mm \times 80mm; Conical: 30 ⁰ and 45 ⁰ , Ogive: 9mm, 12mm, 15mm, 18mm, 25mm
12	Data Acquisition System	8 Analog Input, 4 Digital Input, 4 Digital Output, USB Type Communication or higher
13	Compressor	10 bar pressure or higher, 160 litre volume tank or higher
14	Fixture Design	Fixture design should be such that it can accommodate Minimum size of sample: 30 mm \times 30 mm Maximum size of sample: 150 mm \times 150 mm
15	Sample dimension	Minimum size: 30 mm \times 30 mm Maximum size: 150 mm \times 150 mm
16	Desktop Computer	Core -i5 processor/ 16GB RAM/ HD resolution
17	Software a: Markers: b: Units:	a: Markers to identify points within the captured data. Markers are initially to be positioned automatically by the software and may be repositioned manually. Arbitrary number of markers may be defined, for example, peak force, peak displacement. b: The software should have - (i) SI and CGS units along with user defined units. (ii) All numeric quantities (measured data, results and documentation information) are to be recorded as well as calculated along with their units.

<p>c: Documentation:</p> <p>d: Graphs:</p> <p>e: Data Export:</p> <p>f: Filtering:</p> <p>g: Auto Save:</p> <p>h: Upgrades:</p>	<p>c: Documentation information are to be saved along with the test data: automatically recorded documentation (for example, data acquisition parameters)</p> <p>d: Graphs are to be used for displaying measured data and calculated curves. Multiple tests and multiple quantities to be displayed on the same graph. Highly configurable appearance including colours, automatic or manual axis scaling, linear or logarithmic scaling, user-defined or automatic labelling. Graphs may be zoomed to examine the data in detail. Markers are to be displayed on graphs and to be used to extract quantitative information.</p> <p>e: Data exported to Microsoft Excel should be in native file format. There should also be the facility to export data in CSV (comma separated values) format, compatible with almost all numeric analysis packages.</p> <p>f: The software should include powerful filtering to remove noise and resonances.</p> <p>g: An auto-save facility to ensure that data from a test is never lost, and also impose a consistent naming scheme for data files. Data to be automatically saved to files or to the test database.</p> <p>h: Free upgrades released within the five year period after the supply and installation of the equipment.</p>
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ACCEPTANCE TEST PROCEDURE:

Following are the acceptance test procedure to be demonstrated during the installation by the vendor.

- a. Maximum velocity of 4-5 m/s of drop mass needs to be demonstrated by the vendor. The velocity needs to be also measured using a High-Speed Camera or any other means.
- b. Tolerance of the drop velocity should be within +/- 1% and same needs to be demonstrated.
- c. Vendor should demonstrate full working of the setup. The values of the parameters, e.g., impact force, impact energy, energy absorbed and energy ratio should be in line with the data obtained from literature.
- d. Vendor should bring samples with known parameters to demonstrate at site and validate the results with published literature.
- e. Physical characteristics (dimensions, density, strength, modulus of elasticity, hardness and finish, straightness of machine components) and chemical characteristics (chemical alloying composition of indenters and other machine components) shall be provided as a certificate and should meet the requirement put in the specification.
- f. Should be able to test samples of both brittle and ductile materials and samples of porous cellular solids (e.g. 3D-printed lattice structure).

General Terms & Conditions:

1. The Drop Weight Impact Testing Machine quoted by the vendor should accommodate up-gradation to higher velocity/ integration of high speed camera and high temperature chamber in the future.
2. Vendors should have supplied similar systems involving high strain rate impact to minimum three reputed government research laboratories or government educational institutions (e.g. IIT/IISc/NIT) in past 5 years.
3. Vendor should have minimum annual turnover of 50 lakhs in the past three Financial Years. Audited Certificate of the accounts confirming the same needs to be provided.
4. Vendors should provide AMC once the warranty period is completed.