

COMPRESSION TESTING MACHINE

BE 45

Compression Testing Machines are designed for rugged durability and user-friendly operation, allowing even non-technical personnel to use them reliably. Portable units, being compact, sturdy, and lightweight, enable quality control testing in areas lacking commercial facilities, where transporting larger, heavier machines is challenging.

Compression Testing Machines conforming to IS 14858 (2000) meet the calibration accuracy of $\pm 1\%$ as per IS 1828 (Class A). They can also comply with BS 1881 and other international standards. Available capacities include 50kN, 100kN, 500kN, 1000kN, 2000kN, 3000kN, 5000kN. For further details or specific applications, please provide additional context or requirements.

Below is a detailed breakdown of the key classifications, including the ones you mentioned. This is based on standard engineering practices and manufacturer specifications.

Classification	Description	Key Features	Typical Applications	Capacity Range
Portable Models BE 45-01	Compact, lightweight machines designed for on-site testing where lab access is limited. Often hand-operated with a manual pump	Sturdy, small dimensions (e.g., horizontal clearance ~220 mm, platen size ~165 mm). - Integral double-acting pumping unit. - Easy to transport; no power supply needed. - Basic load gauge for readings.	Field quality control in remote construction sites; testing small samples like cubes or cylinders.	50 kN to 3000 kN (10 - 1000 kN hand-operated)
Analogue Models BE 45-02	Traditional machines using mechanical gauges and dials for load display. Can be hand-operated or electrically operated.	Manual or electric pumping unit. - Calibrated load gauge (in kN or N/mm ²). - Requires skilled operator for pace control. - Rugged welded frame for stability.	Routine lab testing of concrete, bricks, and cement; cost-effective for basic needs.	50 kN to 5000 kN (manual or electric)
Digital Models with Pace Rate Indicators BE 45-03	Electronically controlled machines with digital displays for load and rate of loading. Includes manual pace control with auto-stop on failure.	Digital readout for load (kN, N/mm ²) and pace rate. - Auto calculation of stress. - Thermal printer for results in some models. - Limitations in precise pace control; semi-automatic.	Accurate lab testing requiring digital precision; concrete cube/cylinder compression.	100 kN to 5000 kN (electrically operated).
Fully Automatic Models BE 45-04	Advanced, closed-loop systems with full automation, including servo or micro-controller based pace rate control.	Touch screen or LCD interface for data acquisition. - Automatic test cycle (enter parameters, press start). - Real-time graphing (load vs. time/stress). - High stiffness frame; complies with international	High-volume, precise testing in labs; automated for repeatability and minimal operator intervention.	1000 kN to 5000 kN (e.g., 2000 kN servo-controlled).

ADDITIONAL NOTES

- **Other Variants:** Some classifications extend to micro-controller based models (with automatic pace controllers), servo-controlled (for stress/strain precision), and touch-screen hybrids.
- **Common Capacities:** Machines range from low (50 kN for small samples) to high (5000 kN for large structures).
- **Advantages across Classes:** All models feature high-stability frames (4-pillar welded construction) and safety features like piston limits and relief valves. Automation levels reduce human error and improve throughput.
- **Selection Criteria:** Choose based on site needs (portable for field), budget (analogue for basic), or precision (digital/automatic for labs).

FOLLOWING STANDARD

IS : 14858 (2000), IS:516 EN 12390-4, ASTM C39, AASHTO T22, EN 12390-5, EN 12390-6, EN 1338, EN 1340, EN 196, BS 1881

PORTABLE COMPRESSION TESTING MACHINE

BE 45-01

A portable compression testing machine is a compact, hand-operated hydraulic device primarily used in civil engineering and materials testing to determine the compressive strength of concrete cubes, cylinders, or other specimens. It is designed for field or laboratory use, offering mobility without sacrificing accuracy. The machine applies controlled hydraulic pressure to the specimen via a loading frame, with load readings captured on a calibrated gauge. It complies with standards like IS 14858 (India) or ASTM C39 (international), ensuring reliable results for quality control in construction.

Your description aligns closely with a standard hand-operated model (often rated at 1000 kN or 1500 kN capacity), such as the "Deluxe Model". These machines emphasize ease of operation, with features that reduce effort during high-load testing.

Component	Description	Function
Loading Unit	A sturdy frame (often four-column or two-column design) with base, platens (upper and lower), and side supports. The lower platen is fixed to the base, and the upper platen features self-aligning spherical seating for even load distribution.	Houses the specimen and applies compressive force. Ensures stability and prevents misalignment during testing.
Integral Double-Acting Manually Operated Pumping Unit	A hand-operated hydraulic pump (e.g., multi-plunger type with booster arrangement) fitted directly to the base of the loading unit. It includes an oil tank (typically 7 liters capacity) and is powered by manual effort. The double-acting design allows pressure buildup in both directions.	Generates hydraulic pressure to raise the ram/jack. The "double-acting" feature enables efficient filling of gaps without load and automatic disconnection once contact is made, making pumping lighter as load increases.

Calibrated Load Gauge	A Bourdon tube-type pressure gauge (often angled for easy reading) mounted on top of the loading unit. Calibrated against certified standards (NPL or NCCBM dynamometers) with accuracy of $\pm 1\%$. It includes a maximum red pointer alongside the live pointer, marked in 5 kN divisions.	Measures and displays applied load in kN or lbf. Provides real-time monitoring and peak load recording for calculating compressive strength (load/area).
Detachable Hydraulic Jack	A precision-ground hydraulic cylinder (ram) that can be detached for maintenance or portability. Placed on the base of the loading unit, it connects to the pumping unit via hoses.	Delivers the compressive force to the specimen. Detachability enhances portability and allows for quick replacement or use in confined spaces.

BE 45-02

An analogue compression testing machine (CTM) is a specialized piece of laboratory equipment used primarily in civil engineering and materials science to measure the compressive strength of materials like concrete, bricks, cement mortar, rocks, and other building components. Unlike digital versions, it relies on mechanical gauges (such as Bourdon tube pressure gauges) to display load readings, providing a direct analog readout of the applied force. These machines are typically hydraulic or electro-hydraulic in operation, applying a controlled compressive load to a specimen until failure.

KEY COMPONENTS AND WORKING PRINCIPLE

An analogue CTM generally consists of:-

- **Load Frame:** A rigid, four-column welded structure for stability, with upper and lower platens (hardened and polished) to hold the specimen. The vertical space is adjustable (often via an electric screw) to accommodate different sample sizes.
- **Hydraulic Pumping Unit:** Electrically or hand-operated pump that generates pressure. It includes a micro-switch to auto-stop the motor near the rated capacity for safety.
- **Analogue Gauge:** A large-diameter (e.g., 8-inch) pressure gauge with a maximum red pointer for peak load indication. Accuracy is typically $\pm 1\%$.
- **Accessories:** Spacers with centering pins for small specimens, and optional attachments for bending, shear, or Brinell hardness tests.

SPECIFICATIONS (TYPICAL FOR 1000 KN MODEL)

- **Capacity:** 1000–1500 kN (250, 500, 1000 kN available & also adjustable for different models).
- **Specimen Sizes:** Supports 70.6 mm, 100 mm, 150 mm cubes or cylinders.
- **Weight:** 200–300 kg (portable via wheels or handles).
- **Oil:** Supplied with hydraulic oil tank capacity 7 liters or sufficient required Oil capacity.
- **Accessories:** Often includes spacer blocks, test platens, and carrying case.

These machines are cost-effective for on-site testing, with hand operation eliminating the need for electricity. For electric variant also available. If you need calibration details, a diagram, or supplier contacts, provides more specifics!



ANALOGUE MODELS

COMMON SPECIFICATIONS AND CAPACITIES

Analogue CTMs are available in various capacities and configurations. Here's a comparison of typical models based on manufacturer data

Capacity (kN)	Specimen Types Supported	Vertical Clearance (mm)	Piston Travel (mm)	Pump Type
100–300	Small cubes (up to 50 mm), mortar	150–200	50–80	Hand-operated
250–1000	Cubes (up to 150 mm), cylinders (up to 160x320 mm)	300–350	100–150	Electric
1000–2000	Standard cubes (150–200 mm), cylinders (150x300 mm)	350–400	150–200	Electro-hydraulic
2000–3000	Large cubes/cylinders, structures	400–500	200–250	Electric
Up to 5000	Heavy-duty specimens, rocks	500+	250+	Electro-hydraulic



mandate uniform loading (e.g., 0.2–0.4 MPa/sec for concrete). This prevents inaccurate test results due to overly rapid or slow loading. Digital models often include manual or automatic pace rate controllers for better precision.

These machines are available in capacities from 50 kN to 5000 kN, suitable for lab or field use. They feature rugged, welded plate-type frames for stability, hydraulic pumping systems, and safety features like auto-stop on specimen failure.

Key Features of Digital CTM Models with Pace Rate Indicators

- **Load Application:** Hydraulic ram applies axial load; digital display shows real-time load (kN), stress (N/mm²), and peak values.
- **Pace Rate Control:** Manual (user-adjustable via knob, 1–40 kN/sec) or automatic (servo-motor based PID control for ±2% accuracy).
- **Data Handling:** USB/Ethernet connectivity for data transfer; storage for multiple tests; optional software for analysis.
- **Automation Levels:**
 - **Semi-Automatic:** Manual pace control with digital indication.
 - **Fully Automatic:** Auto pace rate, data logging, printing, and release on failure.
- **Safety & Usability:** Overload protection, emergency stop, and simple operation for non-technical users.
- **Standards Compliance:** Designed per international norms (e.g., EN 12390-4, BS 1881) for repeatability.

Capacity (kN)	Pace Rate Control	Key Features
100–300	Automatic (Servo PID)	Data logging, load hold, silent pump; stress auto-calculation.
Up to 2000	Manual (1–40 kN/sec)	Pace indication in kN/sec; auto-stop on failure; plate frame for stability.
1000–2000	Manual with microprocessor	Peak load storage; USB data transfer at 1-sec intervals; Ethernet option.
3000	Manual/Automatic	Selectable test types (e.g., flexural); pace rate in kN/sec; requires 3 kVA stabilizer.
3000	Manual/Automatic	Economic design; constant loading rate; results in kN and N/mm ² .

BALAJI ENTERPRISES

DIGITAL MODELS WITH PACE RATE INDICATORS

BE 45-03

Digital Compression Testing Machines (CTM), often abbreviated as "CTM" in the query, are specialized equipment used primarily in civil engineering and construction to measure the compressive strength of concrete cubes, cylinders, or other materials. These machines apply a controlled load to a test specimen until failure, recording key metrics like peak load, stress (in N/mm² or kg/cm²), and deformation. The "digital models" refer to versions with microprocessor-based displays for precise readings, data logging, and automated calculations, unlike traditional analog gauges.

A **pace rate indicator** is a critical feature in these machines. It monitors and displays the rate of load application (typically in kN/sec or N/mm² per minute) to ensure compliance with standards like IS 516 (Indian Standards) or ASTM C39, which



Servo Controlled Fully Automatic CTM	50–5000	Servo motor control, PID feedback for pace rate, EDI/software integration, auto reset, load resolution 0.002–0.2 kN, silent hydraulic pump
Servo Controlled Fully Automatic CTM	50–5000	High-precision servo hydraulics, auto stop/release on failure, flexural frame compatibility, touch screen display
Fully Automatic Digital CTM	100–2000	Closed-loop digital readout, auto test cycle, LCD graphics, removable safety doors, measures cubes/cylinders up to 160 mm dia.
Fully Automatic Pace Rate Controlled CTM	Up to 2000	Servo-driven hydraulics, touch screen for real-time data/graphs, manual/auto modes, overload/over travel protection



AUTOMATIC MODELS

BE 45-04

A Fully Automatic Compression Testing Machine (CTM) is an advanced piece of laboratory equipment used primarily in civil engineering and construction to measure the compressive strength of concrete cubes, cylinders, and other materials. Unlike manual or semi-automatic models, fully automatic CTMs feature closed-loop control systems, servo motors, and software integration for precise pace rate control, automatic test cycling (start, load application, failure detection, and reset), data acquisition, and reporting. They ensure compliance with standards like ASTM C39, EN 12390-4, BS 1881, and IS 516, with capacities typically ranging from 50 kN to 5000 kN. These machines minimize human error, enhance repeatability, and often include features like overload protection, thermal printers, and PC connectivity.



COMMON SPECIFICATIONS AND CAPACITIES

Model(s)	Capacity Range (kN)	Key Features
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