

2025

BESMAK

SERVO HYDRAULIC

EARTHQUAKE

ISOLATION TEST MACHINE



BMT-EI

Seismic isolation testing focuses on the rubber bearings, friction pendulum-type bearings and dampers used to protect structures from damage during earthquakes and other seismic events, revealing important information about how these devices perform under different frequencies.

Typically, bearings undergo a biaxial test with a high-force dynamic load applied vertically and a cyclic load applied horizontally. Dampers are generally tested only in one direction. In both cases, forces range from 1,000 kN to 20,000 kN and more, making these tests demanding to perform accurately.

With more than 25 years of experience developing high-force and high-performance special test systems for civil structural applications, BESMAK® provides both the expertise and technology to conduct successful seismic isolation tests.

FOCUSES ON:

- RUBBER BEARINGS
- FRICTION PENDULUM-TYPE BEARINGS
- DAMPERS USED TO PROTECT STRUCTURES

The system is capable of loading biaxially (horizontal and vertical at the same time). The system is capable of performing tests up more than 3 (three) cycles with a maximum horizontal loading test speed of at least 1000 mm/s (we design different test speeds according to customer requirements) within the limits determined according to the EN 15129 standard.

The system can perform the test procedures in accordance with EN-15129 and EN-1337 standards. Horizontal and vertical axial actuators can be tested and applied in linear loading, step loading, ramp loading, sinusoidal loading, triangular loading, rectangular loading, cyclic and user-defined universal structure (tensile and compression directions) with load and displacement control.

It can reach 100% loading capacity within 10 minutes to 25 minutes, depending on the characteristics of the specimen in the vertical direction, within 2 minutes and perform a vertical 100% capacity creep test.

Horizontal and vertical actuators are dynamic and move synchronously. Thanks to this feature, the load and/or pressure on the sample is kept constant in the vertical axis, despite the dynamic effect applied on the horizontal axis. (The system is not affected by field change or sliding motion.)

✓ EN-15129

✓ EN-1337

FRAME FEATURES:

- The test body has a rigid and screwed column structure.
- It ensures homogeneous distribution of the vertical load to be applied to the columns forming the system.
- The system has been designed in a structure that will allow testing and monitoring of the insulator types placed between the upper and lower steel plates, both horizontally and vertically, under the desired load levels.
- In the system, the upper steel block moves in the vertical direction and is fixed in the horizontal direction, and the bottom plate is fixed in the vertical direction, moving in the lateral direction.
- Horizontal and vertical actuators are mounted on the above-mentioned top and bottom tables.



TECHNICAL FEATURES

Vertical Load Capacity:	1000 kN – 20000 kN
Horizontal Load Capacity:	250 kN – 2500 kN
Frame Type :	Rigid frame in column type construction
Electronic Unit:	New generation EDC Electronic Control Unit with 2,5 kHz (2500 data/sec) data acquisition and control system
Control:	<ul style="list-style-type: none"> • Servo Hydraulic • EDC Controller • RMC 7 Handheld Unit • Besmak Universal Testing Software (Load and Deformation/Displacement Control)
Accuracy:	$\pm 0,5\%$
Load Measuring:	Class 0.5 according to EN ISO 7500-1
Resolution:	20 bit
Displacement Resolution:	0,001 mm
Moveable Table Dimensions:	1x1m **
Vertical Actuator Stroke :	≥ 600 mm **
Horizontal Actuator Stroke	$\geq (\pm) 500$ mm (1m in total) **
Software:	Besmak Universal Testing Software
Power Requirement:	380 V, 50/60Hz

* select capacity according to your requirements ** contact us for other dimensions

PRODUCT CODE	PRODUCT NAME
BMT-4000/250EI	Servo Hydraulic Earthquake Isolator Test System, 4000 kN Vertical, 250 kN Horizontal Capacity
BMT-4000/1000EI	Servo Hydraulic Earthquake Isolator Test System, 4000 kN Vertical, 1000 kN Horizontal Capacity
BMT-4000/2000EI	Servo Hydraulic Earthquake Isolator Test System, 4000 kN Vertical, 2000 kN Horizontal Capacity
BMT-5000/1000EI	Servo Hydraulic Earthquake Isolator Test System, 5000 kN Vertical, 1000 kN Horizontal Capacity
BMT-6000/1000EI	Servo Hydraulic Earthquake Isolator Test System, 6000 kN Vertical, 1000 kN Horizontal Capacity
BMT-10000/2000EI	Servo Hydraulic Earthquake Isolator Test System, 10000 kN Vertical, 2000 kN Horizontal Capacity
BMT-12000/1200EI	Servo Hydraulic Earthquake Isolator Test System, 12000 kN Vertical, 1200 kN Horizontal Capacity
BMT-15000/1500EI	Servo Hydraulic Earthquake Isolator Test System, 15000 kN Vertical, 1500 kN Horizontal Capacity
BMT-15000/2000EI	Servo Hydraulic Earthquake Isolator Test System, 15000 kN Vertical, 2000 kN Horizontal Capacity
BMT-20000/2000EI	Servo Hydraulic Earthquake Isolator Test System, 20000 kN Vertical, 2000 kN Horizontal Capacity
BMT-20000/2500EI	Servo Hydraulic Earthquake Isolator Test System, 20000 kN Vertical, 2500 kN Horizontal Capacity



ELECTRONIC CONTROL SYSTEM

1. BESMAK BMT- E Series Universal Testing Machine is controlled by NEW GENERATION EDC ELECTRONIC CONTROL UNIT

EDC electronic control system is world's one of the sensitive electronic control systems and used since 1975. It controls hydraulic and/or electromechanical systems by closed-loop control method. The electronic control unit stores all sensors, closed loop loop (PID adjustments) and user-defined parameters in the actuator it is connected to. Eventhough user will change the computer all these data will keep and transfer easily.

Electronic control units used in the system have Closed-loop control (PID) and this Closed-loop control (PID) can be made over every sensor and every channel (except for the internal communication channel) to be integrated into the system.



Test can be done with both load and displacement/deformation control mode with closed loop control technology. With displacement/deformation control, user can obtain much more accurate and sensitive readings. Load of failure, strain of failure, max load, max strain, etc. can be obtained real-time at least 2500 data per second.

Load cell, video extensometer, automatic extensometer, etc. can be connected automatically to electronic control units. Besmak Universal Testing Software and EDC controller can recognize these sensors automatically due to sensor Eeprom connectors, and calibration can easily be done with the software.

4-CHANNEL STRUCTURE

Thanks to the 4 channel structure of the electronic control unit, up to 4 sensors can be connected and controlled with a single control unit.

The electronic control unit can operate at high and low pressure of the system. Thanks to the highly advanced PID or Closed Loop control (PID), the system's Sensor - Frame- Actuators and Sample synchronization can be precisely controlled.

Loads on horizontal and vertical axes can be adjusted to user-defined desired values between 0.1 kN/sec and 60 kN/sec. Electronic control unit have 1 internal channel, 3 external channels and 1 RS232/485 slot and a communication channel that allows communication between electronic control units.

It can be connected automatically to :

- LOAD CELL
- VIDEO EXTENSOMETER
- AUTOMATIC EXTENSOMETER
- ETC,...

**Controller has the
excessive load
protection system and
can detect the failure
automatically. Also, user
can reset the load at the
beginning of the test
which gave easiness in
daily tests.**

User can control test, adjust device settings and can control hydraulic grip by PC software and/or Remote control panel. Tests can be carried out by a single button. Controller can detect indirect loads before the test (these loads can occur because of grips and mechanical system, etc.) and can prevent them affecting the test results. *Sample protection feature. Return of piston can be done automatically by electronic controller unit and Remote control panel. Besmak Universal Testing Software has all SI and metric units of sensors.

Electronic control unit can be connected to computer via USB or Ethernet. Machine has emergency button which stops the test immediately when activated. User can use the button whenever an unwanted situation occurs.



2. REMOTE CONTROL UNIT

With the help of Remote Control Unit user can perform test, can control speed of actuator for sample adjustment, grips control, load/deformation/displacement and strain values display in real time, adjust and control movement / positioning of grips, assign max.-min. limit etc. The most important feature provided by Remote Control console unit is the user does not have difficulty when placing the specimen on the grips because of the flexibility / mobility of device.



**In an emergency case,
test can be stopped
immediately by pushing
the **emergency button**
on the Remote Control
console.**

Features of Remote Console:

- Remote Control console for machine controlling via keys and DigiPoti (Smart Key)
- OLED monochrome display to show real time values and status LEDs
- Magnetic rear for clipping to testing machine chassis
- Connecting cable length 3 m for easy and flexible use

BESMAK UNIVERSAL TESTING SOFTWARE

Tests can be carried out on computer by Besmak Universal Testing Software. Real time data, test graphs and results can be observed on software. Results and graphs can be saved on computer and printed. User can personalize the software and report format according to company/corporation etc. Besmak Universal Testing Software is compatible with Windows7 and higher operating systems. Universal Testing Software provides solutions to all type of test applications.



BESMAK

MATERIAL TESTING MACHINES



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