The structural testing laboratory

ACCREDITED ACCORDING TO ISO/IEC 17025 – LABORATORY ACCREDITED ACCORDING TO IEC 60068 2-57

The independent laboratory with the **MASTER** (MultiAxes Shaking Table for Earthquakes Reproduction), one of the few 4000x4000 mm **six degree of freedom** shaking table in Europe.

The Laboratory is accredited for the execution of seismic tri-axial multifrequency tests according to IEC 60068 Part 2-57.

CESI's Structural Testing Laboratory has an extension of approx. 1200 m^2 with a maximum height of over 11 m to carry out structural tests on heavy and large scale components.
The Laboratory has been traditionally active at national and international level in all areas related to structural and dynamic engineering, its activity is characterised by:

- static and dynamic qualification tests on components;
- development of experimental and analytical studies concerning fundamental research;
- study of specific structures and assistance in the test plan preparation.

The main experimental facilities for laboratory tests include shaking tables, hydraulic actuators and material testing machines. Suitable software is used for control of test performance, data acquisition and processing. The laboratory is furnished of several transducers (acceleration, load cell, displacement, pressure cell, strain gauges) with wide possibility of measurements.

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

LAB N° 0030C
Signatory of EA, IAF and ILAC
Mutual Recognition Agreements

CESI
Trust the Power of Experience
Testing • Consulting • Engineering • Environment

Testing Laboratory

Dimensions		56 x 14 m
Bridge cranes		2 (200/100 kN)
Height under hook		11.35 m
Oleodynamic plant	flow rate	1000 l/min
	rated pressure	21 MPa

TPP Shaking Table

Weight of the table	15 kN
Max Spec. Weight	100 kN
Frequency Range	0-200 Hz
Max Stroke	200 mm
Max Force	250 kN
Max Acceleration	150 m/s^2 (bare table)

TPP Shaking Table

Specifically designed for HV bushings (seismic or short circuit stresses).

Compression Testing Hydraulic Machine "Losenhausenwerk"

Max Load		20 MN
Load Rate		10 ÷ 10000 kN/min
Max Spec.	height	6000 mm
	weight	78 kN

The machine can be assembled also for biaxial loads.

The Single Axis Shaking Table "Ariete" for Vibration and Shock Tests

Frequency Range		0 – 60 Hz
Max Stroke		200 mm
Max Acceleration	sinusoidal	25 m/s^2
	shock	400 m/s^2 7 ms; 120 m/s^2 20 ms
Max Force		160 kN
Weight of the movable part		50 kN
Table dimensions		4 x 2.5 m

"SISTEM (Seismic ISolator TEst Machine)" Machine

Direction of load	2 (vert./horiz. simultaneously)
Max. vert. load (compr./tens)	3 / 0.5 MN
Max. horiz. load	400 kN
Max. displ. (vert./horiz.)	90/1000 mm
Frequency range	0 ÷ 5 Hz
Friction coefficient	0.003
Max specimen dimensions	h 360 mm Ø 700 mm

Machine designed and realised by ENEA for HDRB tests.

Reaction Structure equipped with "Reaction Wall"

Tank dimensions		8 m x 8 m x 4 m
Reaction wall		8 m x 1 m x 8 m
Anchor channels (walls and floor)		JORDHAL profiles JTA W74/48/5,0
Load capacity of the channels	tension	N = 45 kN/250 mm
	shear	T = 45 kN/250 mm
Loading capacity of the reaction wall	moment	= 3000 kN at 5300 mm
	shear	= 3000 kN

Electro-Mechanical Exciter
(single axis sinusoidal force generator with two eccentric rotating masses or with a single inertial mass)

Model	20-20	2-50	V104
	mechanical	mechanical	hydraulic
Maximum force (kN)	200	20	73.5
Freq. Range (Hz)	> 0 – 20	2 – 50	> 0 – 80
Use (Vertical/Horizontal)	V / H	V / H	V
Weight (kN)	37.5	3.9	16.5

Electro-hydraulic actuators (high velocity/fatigue tests)

Max force (kN)	15 - 50 - 100 - 160 - 250
Frequency range	0 – 150 Hz
Max oil Flow (210 bar)	340l/min

Electro-hydraulic actuators (low velocity/fatigue tests)

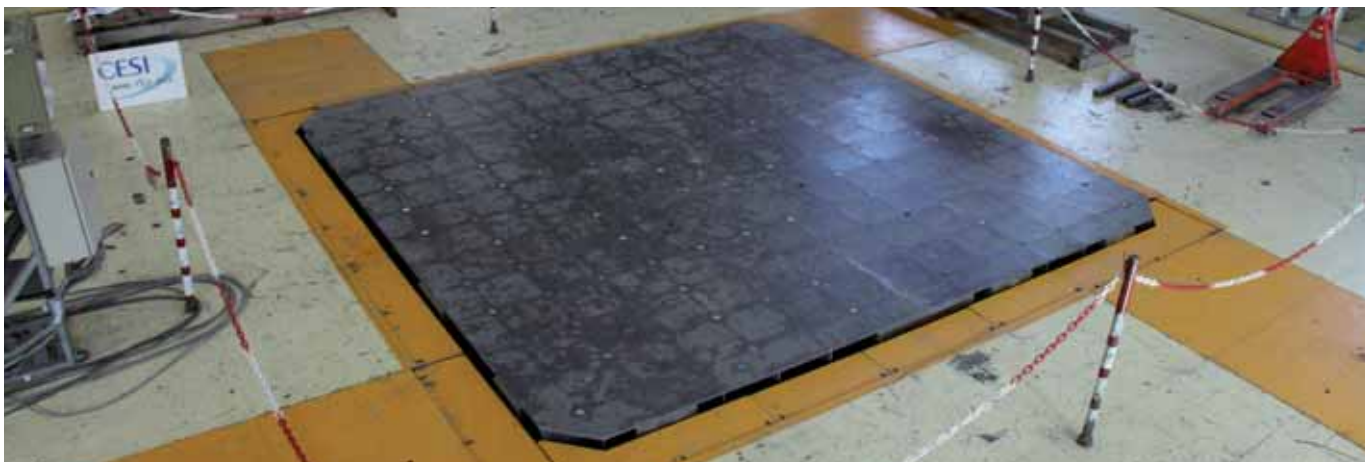
Max force (kN)	250 - 280 - 300 - 500 - 1000 - 1500 - 2500 - 6000
Max oil Flow (210 bar)	340 l/min

The shaking table MASTER (MultiAxes Shaking Table for Earthquakes Reproduction) is one of the most important installations in Europe for experimental studies in the structural dynamics. Besides the classical support of the earthquake engineering, the performances, dimensions and payload capacities of MASTER allow a wide range of applications both in civil and electromechanical fields. Aerospace, military, electrical transmission, transportation, nuclear equipment and civil construction industries are especially interested in the use of the shaking table. The table MASTER is operated both for research scopes and for the qualification and inspection of products. It is installed in the context of a Laboratory designed for structural testing and linked with the other engineering units supplying specialised and complementary services (design, numerical computations, engineering expertise). MASTER operates under a Quality System conforming to ISO 9001 (SQS n. 24295-01 IQNet CH-24295-01) and EN45000.

The six D.o.F Triaxial Shaking Table "Master"

Degree of Freedom	6	
(simultaneous control of Translation X – Translation Y – Translation Z – Yaw – Pitch – Roll)		
Table dimensions		4 x 4 m (holes M30 at 0.3 x 0.3 m)
Weight of the movable part		110 kN
Frequency range	sine tests	0 – 120 Hz
	random tests	0 – 120 Hz
Stroke		200 mm (static)
Max velocity (horiz/vert)		0.55/0.44 m/s
Max acceleration (bare table)	horizontal (sine/shock)	20/40 m/s^2
	vertical (sine/shock)	30/50 m/s^2
Yaw rotation		+ 3.80°
Yaw velocity		0.37 rad/s
Pitch/Roll rotation		+ 3.80°
Pitch/Roll velocity		0.30 rad/s
Max Force (horiz/vert)		500/600 kN
Max overturning moment		300 kNxm
Max Specimen Dead Weight		300 kN
Max compensated Dead Weight		300 kN
	Controlled dofs *	**Acq. channels**
Sine	1	32
Random	6	32
Shock	6	32
Seismic	6	32

(*) Translation X – Translation Y – Translation Z – Yaw – Pitch – Roll



CESI is worldwide leader in third party Conformity Assessment Services, Testing, Inspection and Certification of electromechanical components. Our certificates and reports are internationally recognized by first parties (manufacturers or seller) and second parties (purchaser or user). CESI is a well-recognized Conformity Assessment Body accredited according to ISO IEC 17025 in its laboratories and in the subsidiaries IPH and FGH, as well as a branded Certification Body accredited according to ISO / IEC 17020 and ISO / IEC 17065. Furthermore CESI is notified body for IECEx Certification Scheme and ATEX.

CESI's Business Areas:

- Testing, Inspection and Certification services for HV, MV and LV electrical components;
- Engineering and Consulting services for power systems and markets, transmission and distribution grids, generation plants, renewable and hydro plants;
- Environmental Consulting and Structural Engineering services for Energy, T&D, Industry and Transport sectors;
- Production of Solar Cells for Space and Terrestrial (CPV) applications.

For further information please visit **www.cesi.it**, e-mail at **info@cesi.it**.

CESI SpA
Via Rubattino, 54
I-20134 Milan – Italy

Piacenza Offices
Via Nino Bixio, 39
I-29121 Piacenza – Italy

Seriate Offices
Via Pastrengo, 9
I-24068 Seriate (BG) – Italy

IPH GmbH
Landsberger Allee, 378a
D-12681 Berlin – Germany

FGH Engineering & Test GmbH
Hallenweg, 40
D-68219 Mannheim – Germany

CESI Middle East FZE
Building 5WA – Office 326
Dubai Airport Freezone
Dubai – United Arab Emirates

CESI do Brasil Consultoria Ltda
Rua da Assembleia, 10 – Sala 2301
Centro – CEP 20011-000
Rio de Janeiro – RJ – Brazil