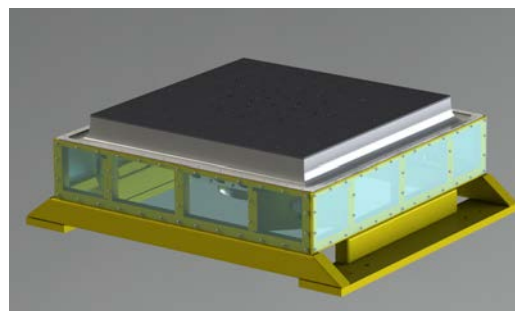
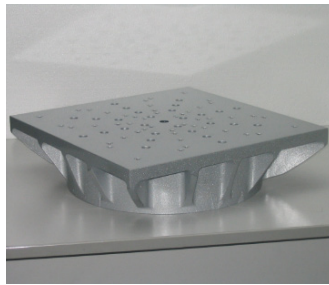


CENTROTECNICA S.r.l.

EXPANDERS

Shaker's ancillary equipment



The expanders

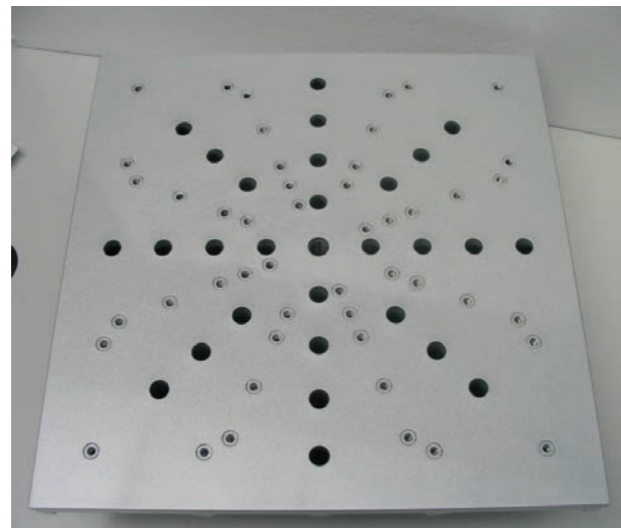
Head expanders are typical standard accessories which can maximize the versatility of vibration shakers; they are used for applications where larger vertical test mounting surfaces are required.

In a basic installation of a vibration system we have a predefined armature head mounted on the shaker; the round armature has a fixed size that can be a limit for the mounting of the item. Either the size of the item to be tested or the fixture itself are often larger than the armature.

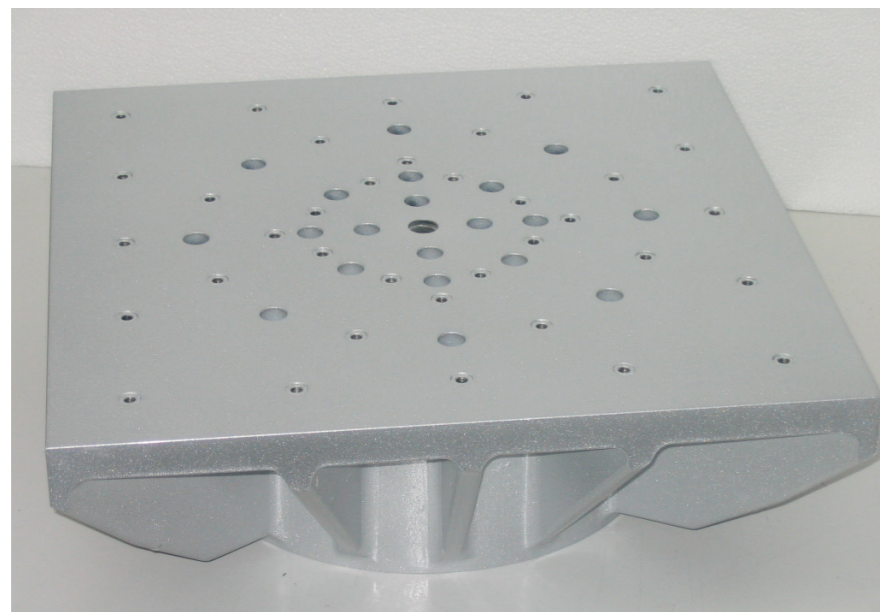
Head expander is the perfect solution: by the means of an expander, it's possible to enlarge the item mounting surface.

The expander is similar to a pyramid or cone and it's studied and optimized to be light and rigid; it can be either round or squared depending on the requested features.

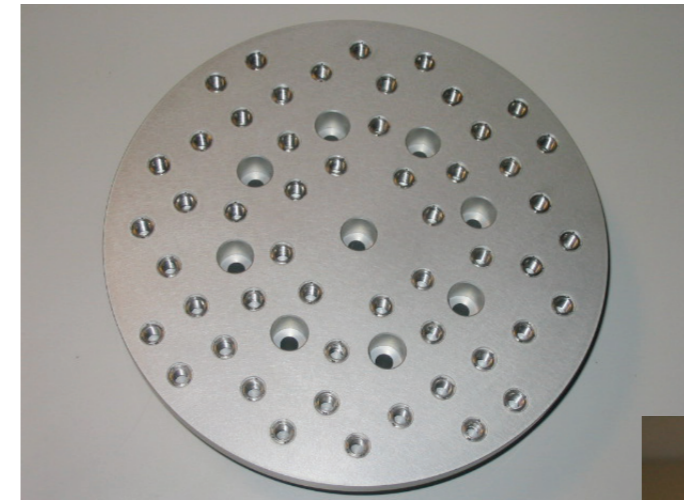
Centrotecnica supplies Customer with many types of standard (please see tables at pagg. 6 and 7) and fully customized head expanders as well (aluminium or optional magnesium version to special orders).



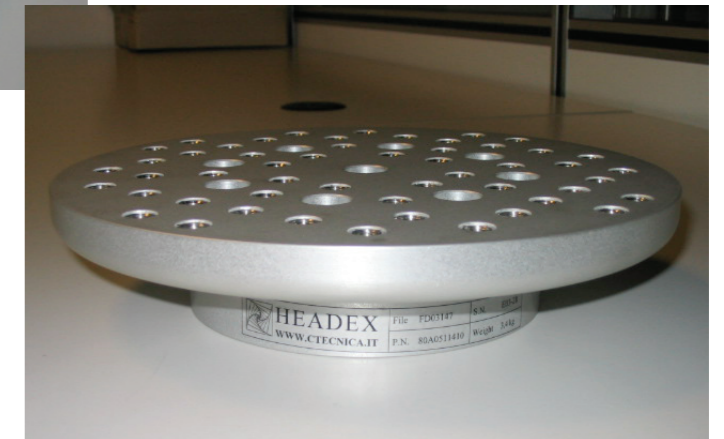
Squared expander with armature size 440 - table 500x500 mm
M8 inserts positioned on armature diameters and 100x100 mm grid



Squared expander with armature size 335 mm - table 500x500 mm
M8 inserts positioned on 152.4 PCD, 304.8 PCD and 100x100mm grid



Round expander with armature size 150 mm,
upper table diameter Ø254 mm - M8 inserts on a 25x25 mm grid



MAIN ADVANTAGES

All Centrotecnica's expanders:

- are designed using advanced finite element modelling techniques;
- are optimized by FEM analysis and tested before delivery;
- are supplied with a complete technical report and operating manual that explains the best method to control the expander during vibration;
- have a very effective damping treatment aimed at reducing unwanted resonances effects at high frequency;
- are high quality manufactured and assure high reliability;
- can be used with success over the usable range by a multi-point control strategy;
- can be provided with different inserts, "top hat washers", thermal barriers, **guidance and load support systems***. (Please refer to accessories catalogue).

* When the item to be tested is very large and heavy maximum static load and momentum of the shaker can be overrun; in this case the expander can have an additional load support and guidance system to prevent damages to the shaker (please see page 8 for samples)

Manufacturing

Centrotecnica expanders are studied and manufactured mainly in 3 different ways:

CASTED

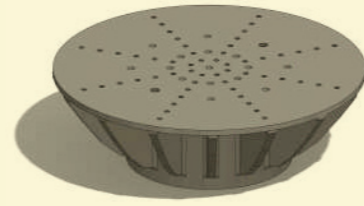
Casted by a standard or customized pattern in aluminium or magnesium alloy. High frequency performance.

MACHINED

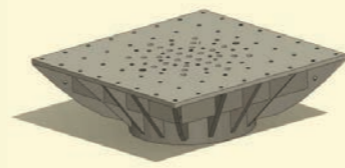
Machined out from an aluminium or magnesium solid plate. Method applied for all small round expanders and squared expander having the side length up to 800mm. A medium-size squared expander has a lower frequency range but saves a lot of weight compared to the casted one.

BOXED

Obtained by assembling aluminium or magnesium plates with a special technique. The best saving of weight for low frequency range.



Round expander with armature size 440 mm and upper table diameter Ø812mm



Squared expander with armature size 440 mm and table 750x750 mm

OPTIONS

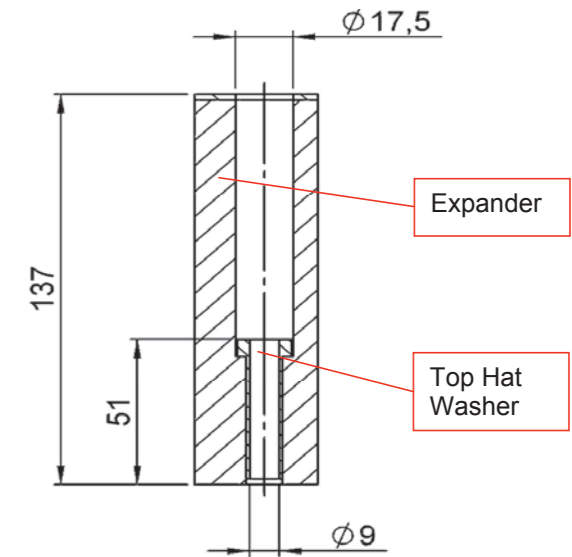
Top Hat Washers are made of Stainless Steel. They're forced into the fixing holes of the expander.

This solution prevents deformations of the material due to the fixing screws.

When installed, the use of washers is not necessary.

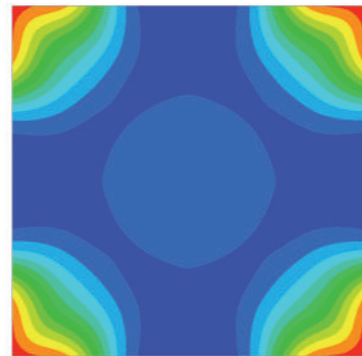
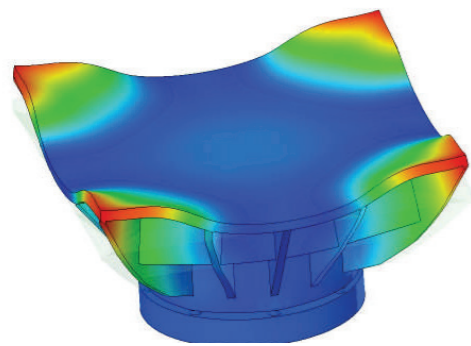
The technical report reproduces a similar drawing that helps the operator in choosing the correct length of the fixing screws.

TOP HAT WASHERS



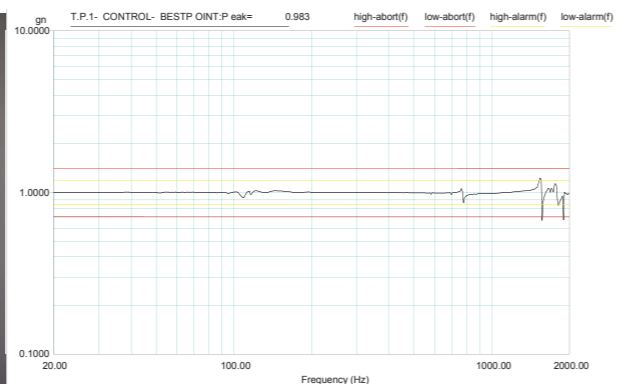
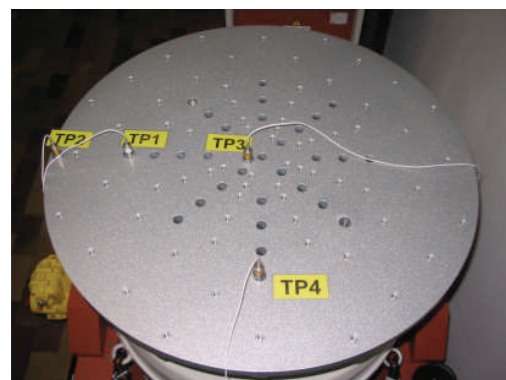
EXPANDERS ANALYSIS AND TEST

All Centrotecnica Expanders are studied with FEA analysis, to reach the best compromise between weight and first resonance.



Once the expander is ready, Centrotecnica technicians perform a sperimental modal analysis and a sine vibration test.

The frequencies found and the test plots, with the indications of the best control points, are reported in a technical report delivered with the expander.



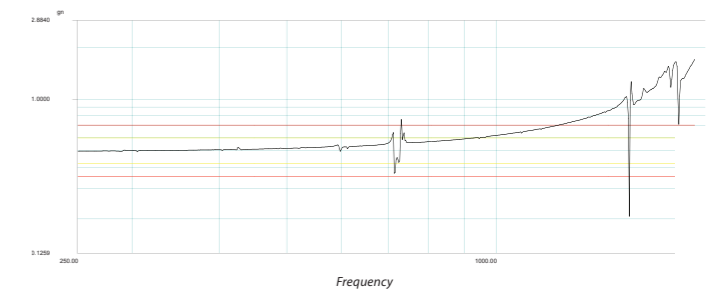
DAMPING TREATMENT

Damping treatment decreases the energy involved in the resonances, improving dynamical behaviour of the expander and getting better the control.

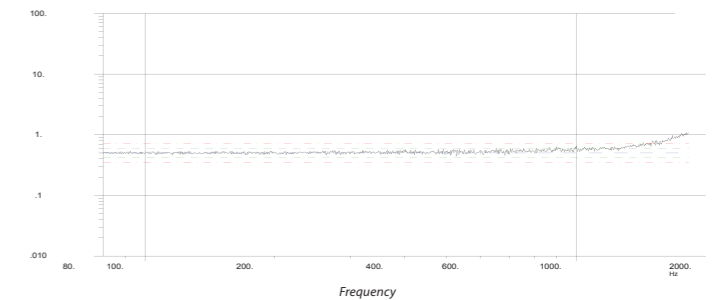
The expanders can be provided with the innovative **"ultra damp"** treatment giving to the expander a very high damping factor to kill unwanted resonances.

This is not just a foam under the expander, it is real treatment that involves the structure of the expander.

MEASURE BEFORE INSTALLING DAMPING TREATMENT



MEASURE WITH DAMPING TREATMENT



STANDARD ALUMINIUM EXPANDERS

Technical data

ARMATURE	UPPER SIZE (mm)	HEIGHT (mm)	WEIGHT (kg)	MANUF. ¹	TOOLS ²		FIRST RESONANCE ³ (Hz)	MAX USEABLE FREQUENCY RANGE ⁴ (Hz)	INS. N.	INS. TYPE	CT PART NUMBER	DEL. TIME (WEEKS)
110	300x300	110	10	C	D	THW	4500	3287	40	M8	80A3501201	8
156	254	55	3,5	M	--	--	>2000	2000	52	M8	80A0511410	6
180	305	55	5	M	--	--	>2000	2000	64	M8	80A0611610	6
180	250x250	68	6	M	--	--	4265	3000	28	M8	80A3401601	6
180	330x330	132	12,5	C	D	THW	2290	3000	25	M8	80A3601801	6
180	350x350	132	13,5	C	D	THW	2260	3000	32	M8	80A3601602	8
180	700x300	100	23	M	D	THW	853	1000	20	M8	80A7301601	8
240	400x400	137	20,5	C	D	THW	1840	2000	24+4	M8+M6	80A3702003	8
240	500x500	165	32,5	C	D	THW	1625	2000	32	M8	80A3902010	8
240	750x750	322	102	C	D	THW	1600 tbc	2000	76	M8	80A4402001	8
335	610	177	46	C	D	THW	2480	2000	108	M8	80A1212220	8
335	700	187	60	C	D	THW	2060	2500	56	M8	--	8
335	500x500	162	38	C	D	THW	2400	2000	108	M8	--	8
335	500x500	87	24	M	D	THW	1460	2000	24	M8	80A3902201	8
335	600x600	252	74	C	D	THW	2330	2000	40	M8	80A4102210	8
335	600x600	100	41	M	D	THW	1000	1000	40	M8	80A4102220	8
335	800x800	122	90	M	D	THW	610	500	52	M8	80A4502220	8
370	700	187	59	C	D	THW	2060	2000	40+16	M8+M10	80A1407401	8
440	610	112	42	C	D	THW	2900	2000	116	M8	80A1213002	8
440	812	260	101	C	D	THW	2260	2000	72	M8	80A1623210	8
440	812	260	101	C	D	THW	2260	2000	64	M10	80A1622610	8
440	900	247	110	C	D	THW	1890	2000	112	M8	80A1802810	8
440	1000	307	168	C	D	THW	1370	2000	68	M10	80A2003001	8
440	500x500	127	38	C	D	THW	2764	2000	48	M8	80A3903010	8
440	600x600	200	73	C	D	THW	1838	2000	56	M8	80A4105410	8
440	600x600	100	43	M	D	THW	1185	1000	56	M8	80A4103010	8
440	750x750	255	98	C	D	THW	1420	2000	84	M8	80A4403003	8
440	812x812	280	120	C	D	THW	1257	2000	64	M8	80A4622810	8
440	905x300	152	36	W	D	THW	957	1000	40	M8	80A7803010	10
440	925x600	230	91	C	D	THW	1097	2000	62	M8	80A7802810	8
440	1000x1000	357	220	C	D	THW	1060	1000	120	M8	80A4903001	8
440	1000x1000	205	160	B	D	THW	730	500	100	M8	--	10
440	1000x1200	387	285	C	D	THW	927	2000	112	M8	80A8302802	10
440	1200x1200	392	282	C	D	THW	770	900	156	M8	80A5302801	10
440	1600x900	346	199	C	D	THW	>200	200	108	M8	80A9103010	10
440	1800x440	206	130	B	D	THW	292	200	64	M8	80A9503001	10
640	812	194	103	C	--	--	1600	2000	72	M8	80A1623901	8
640	910	195	118	C	D	THW	1490	2000	80	M8	80A1815810	8
640	750x750	157	74	C	D	THW	1550	2000	84	M8	80A4403810	8
640	812x812	157	98	C	D	THW	1130	2000	84	M8	80A4503810	8
640	1000x1000	322	248	C	D	THW	1100	1000	120	M8	80A4903810	8
640	1000x1000	322	248	C	D	THW	1100	1000	112	M8	80A4903910	10
640	1200x1200	360	248	C	D	THW	800	1000	156	M8	80A5303910	10
640	1500x1500	360	318	C	D	THW	560	500	124	M12	80A5903910	10
640	1600x900	302	296	C	D	THW	659	700	124	M8	80A9103810	10
640	1800	675	1150	C	D	THW	>400	500	144	M8	--	12
hydraulic	1050x1050	220	170	C	D	THW	862	500	36	M8	80A5000010	10

¹ MANUFACTURING

C = casted
M = machined
B = boxed
W = welded

² TOOLS

D = damping treatment
THW = Top Hat Washers

³ FIRST RESONANCE means the frequency of the first resonance measured on the bare expander.

⁴ USEABLE RANGE means the maximum frequency a sinusoidal sweep can be performed by the use of just one accelerometer (mounted in a proper position) without abort occurring.

OTHER ARMATURES' SIZES AVAILABLE ON REQUEST

STANDARD MAGNESIUM EXPANDERS

Technical data

ARMATURE	UPPER SIZE (mm)	HEIGHT (mm)	WEIGHT (kg)	MANUF. ¹	TOOLS ²		FIRST RESONANCE ³ (Hz)	MAX USEABLE FREQUENCY RANGE ⁴ (Hz)	INS. N.	INS. TYPE	CT PART NUMBER	DEL. TIME (WEEKS)
110	300x300	110	5,5	C	D	THW	3287	4500	40	M8	80M3501201	8
156	254	55	2,4	M	--	--	>2000	2000	52	M8	80M0511410	6
180	305	55	3,3	M	--	--	>2000	2000	64	M8	80M0611610	6
180	250x250	68	4	M	--	--	4265	3000	28	M8	80M3401601	6
180	330x330	132	8,3	C	D	THW	2290	3000	25	M8	80M3601801	8
180	350x350	132	8,3	C	D	THW	2260	3000	32	M8	80M3601602	8
240	400x400	137	13,5	C	D	THW	1840	2000	24+4	M8 + M6	80M3702003	8
240	500x500	157	19	C	D	THW	1625	2000	32	M8	80M3902010	8
240	750x750	322	68	C	D	THW	1600 TBC	2000	76	M10	80M4402001	8
335	610	185	30	C	D	THW	2480	2000	108	M8	80M1212220	8
335	700	187	40	C	D	THW	2060	2500	56	M8	--	8
335	500x500	162	25	C	D	THW	2400	2000	108	M8	80M3902201	8
335	600x600	252	52	C	D	THW	2330	2000	40	M8	80M4102210	8
370	700	187	39	C	D	THW	2060	2000	40+16	M8+M10	80A1407401	8
440	610	112	28	C	D	THW	2900	2000	116	M8	80M1213002	8
440	812	252	73	C	D	THW	2260	2000	72	M8	80M1623210	8
440	812	260	73	C	D	THW	2260	2000	64	M10	80M1622610	8
440	900	247	74	C	D	THW	1890	2000	112	M8	80M1802810	8
440	1000	307	115	C	D	THW	1370	2000	68	M10	80M2003001	8
440	500x500	170	25	C	D	THW	2764	2000	42	M8	80M3903010	8
440	600x600	192	47	C	D	THW	1838	2000	56	M8	80M4105410	8
440	750x750	258	67	C	D	THW	1420	2000	84	M8	80M4403210	8
440	812x812	282	82	C	D	THW	1257	2000	64	M8	80M4622810	8
440	925x600	230	60	C	D	THW	1097	2000	62	M8	80M7802810	8
440	1000x1000	357	146	C	D	THW	1060	1000	120	M8	80M4903001	8
440	1000x1000	205	105	B	D	THW	730	500	100	M8	--	10
440	1000x1000	313	142	C	D	THW	1060	1000	88	M8	80M4902801	10
440	1000x1200	387	190	C	D	THW	927	2000	112	M8	80M8302802	10
440	1200x1200	205	136	B	D	THW	566	500	156	M8	80M5302810	10
440	1200x1200	392	190	C	D	THW	770	900	132	M8	80M5302801	10
440	1800x440	206	90	B	D	THW	292	200	64	M8	80M9503001	10
640	812	194	68	C	D	THW	1600	2079	72	M8	80M1623901	8
640	910	200	83	C	D	THW	1490	2000	80	M10	80M1815810	8
640	750x750	157	53	C	D	THW	1550	2000	84	M8	80M4403810	8
640	812x812	157	59	C	D	THW	1130	2000	84	M8	80M4503810	8
640	1000x1000	322	161	C	D	THW	1100	1000	120	M8	80M4903810	10
640	1000x1000	322	161	C	D	THW	1100	1000	112	M8	80M4903910	10
640	1200x1200	354	197	C	D	THW	800	1000	164	M8	80M5303910	10
hydraulic	1050x1050	220	120	C	D	THW	862	500	36	M8	80M5000010	10

¹ MANUFACTURING

C = casted
M = machined
B = boxed
W = welded

² TOOLS

D = damping treatment
THW = Top Hat Washers

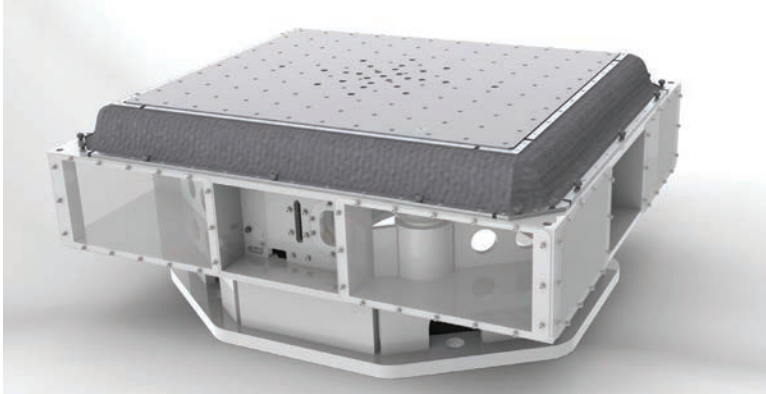
³ FIRST RESONANCE means the frequency of the first resonance measured on the bare expander.

⁴ USEABLE RANGE means the maximum frequency a sinusoidal sweep can be performed by the use of just one accelerometer (mounted in a proper position) without abort occurring.

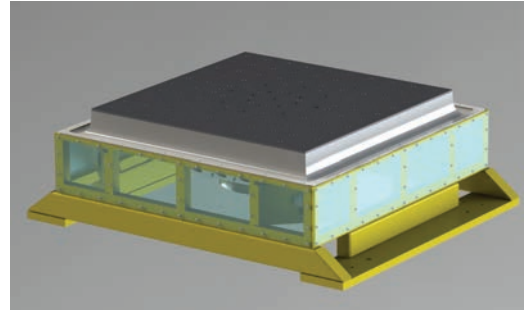
OTHER ARMATURES' SIZES AVAILABLE ON REQUEST

CENTROTECNICA' EXPANDERS CAN BE FULLY CUSTOMIZED UPON REQUEST!

GUIDED EXPANDERS SAMPLES



Rendering image: guided expander 1000x1000 mm with load support- armature 440 1000 Hz - to be mounted on the body of the shaker



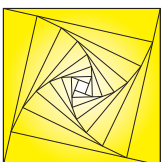
Rendering image: guided expander 1000x1000 mm with load support - armature 440 - 2000 Hz to be mounted on a trunnion



Guided expander 1000x1000 mm with load support armature 440 - 2000 Hz - to be mounted on a trunnion



Guided expander 1000x1000 mm with thermal barrier



CENTROTECNICA S.r.l.

Headquarter and Test House: Via N. Sauro, 1 - 20068 Peschiera Borromeo (MI) - ITALY

Production Unit and Test House: Via F. Confalonieri, 23 - 20060 Masate (MI) - ITALY

Tel: +39 02 55305888 - Fax: +39 02 45503582

Email: info@ctecnica.it - Website: www.centrotecnica.net



ISO 9001 - Cert. n. 2156/3