

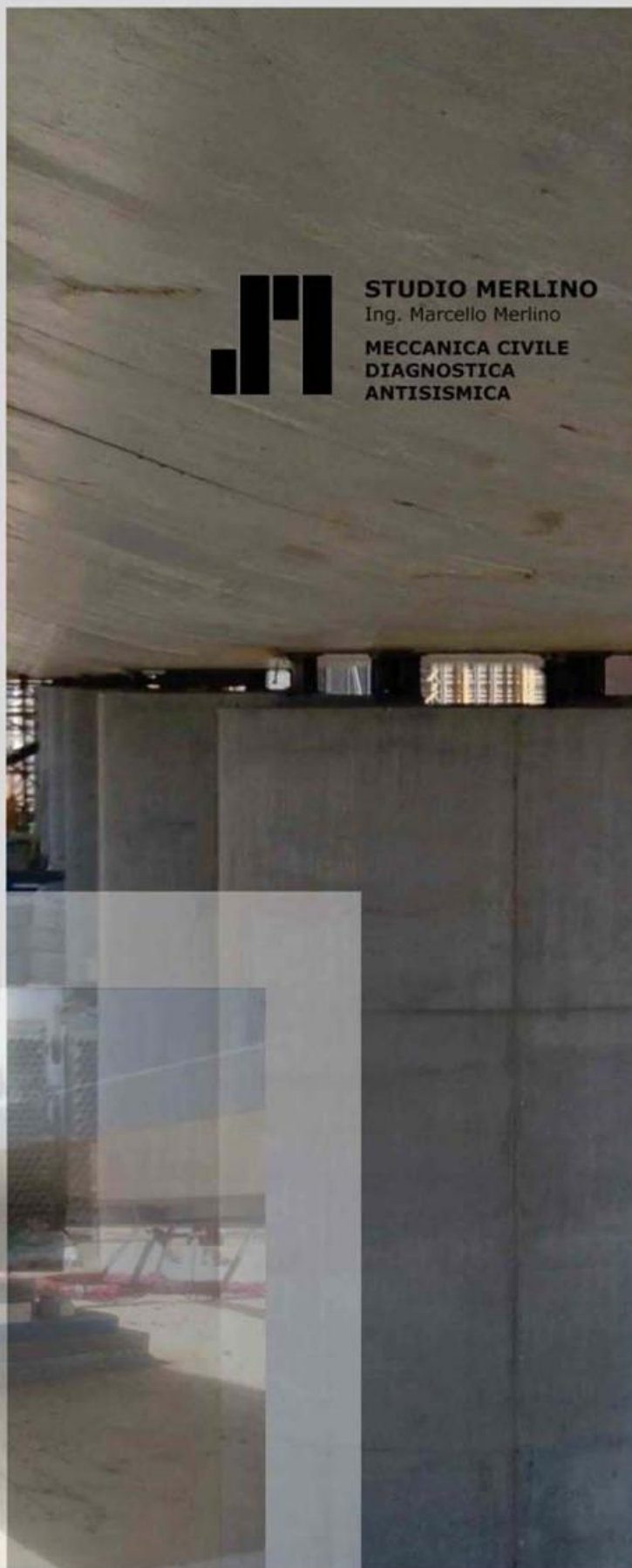
Kaltha s.r.l.

Project Management
& Engineering Services

CE MARK OF CONSTANCY OF PERFORMANCE



STUDIO MERLINO
Ing. Marcello Merlino
MECCANICA CIVILE
DIAGNOSTICA
ANTISISMICA



KALTHA is a company which provides engineering services and is specialized in seismic design and realization in new buildings and retrofit operations. The technical know-how of the company comes from the ten-year experience in this sector of its charter members (STUDIO MERLINO) and it extends from the analysis of imbalance and seismic problems to the site operations to improve, adapt and seismically isolate bridges and viaducts, infrastructures and buildings, with interventions aimed to the restoration and earthquake protection by means of proven procedures of uplifting, strengthening and insertion of new devices at the base or through the cutting of the existing structure.

SUPPLY OF DEVICES

➤ *BRIDGE BEARINGS*

KB

➤ *SEISMIC ISOLATORS*

KS

➤ *ANTISEISMIC DEVICES*

KD

➤ *STRUCTURAL JOINTS*

KJ

SITE WORKS and TECHNICAL SUPPORT

KA

➤ *INSTALLATION OF BEARINGS, ISOLATORS, RESTRAINTS, EXPANSION JOINTS*

➤ *RETROFIT OF BRIDGES AND BUILDINGS WITH INSERTION OF SEISMIC ISOLATORS*

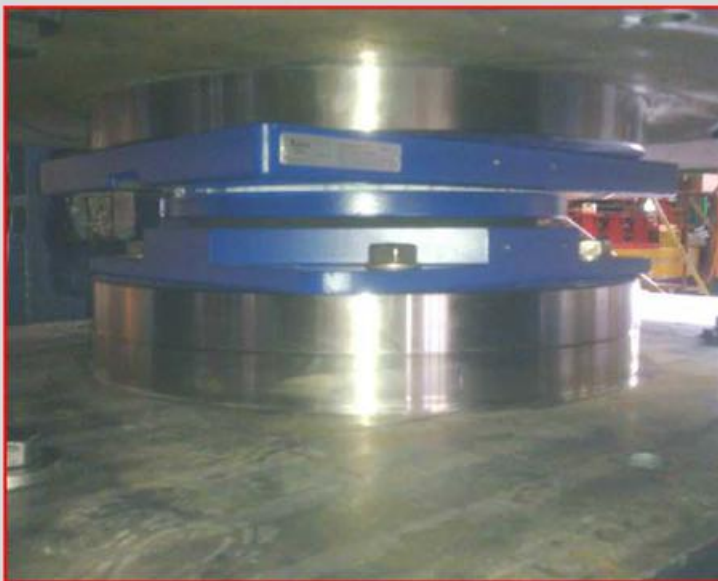
➤ *RESTORATION OF BRIDGES THROUGH EXTERNAL POST-TENSIONING SYSTEMS*

➤ *ANALYSES AND CHECKS OF SEISMIC ISOLATION SYSTEMS*

- POT BEARINGS - **KB**

Kaltha designs, supplies and installs POT BEARINGS having the following characteristics:

- Pot bearings (steel / PTFE) provided with an internal tested rubber disc that allow the rotations about all the plane axis thus determining a modeling of the bearing as a spherical hinge.
- They are provided in compliance with EN 1337 and CE marked
- They have a rigid behavior transmitting the loads in all the directions (fixed bearings **KBF**) or allowing the movement along one direction (sliding guided bearings **KBU**) or in all the plane directions (free sliding bearings **KBM**).

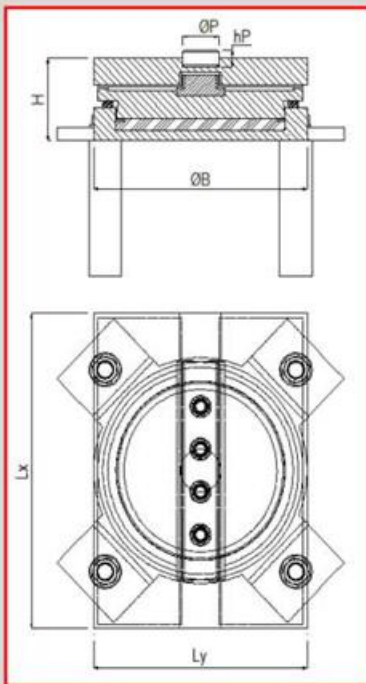
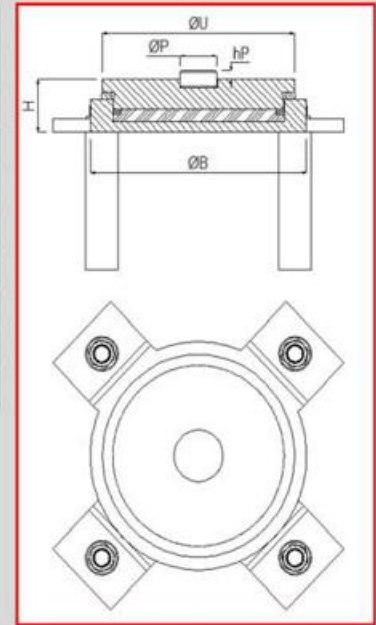


TECHNICAL CHARACTERISTICS

- vertical loads up to 50000 kN;
- horizontal loads up to 5000 kN and up to more than 100% of the corresponding vertical load;
- unlimited displacements;
- anchors to the structure and installation phases designed on the single applications.

CE MARK OF CONSTANCY OF PERFORMANCE

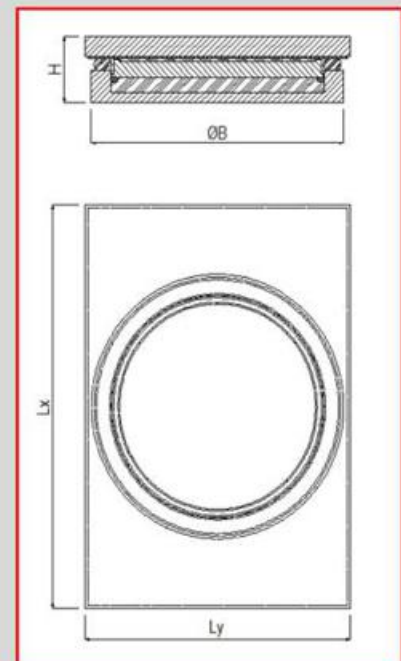
SIGLA	CARICHI ULS [kN]		ΦB [mm]	ΦU [mm]	H [mm]	ΦP [mm]	hP [mm]
	Vert.	Orizz					
KBF 500-75-75	500	75	160	150	51	40	10
KBF 1000-150-150	1000	150	220	210	51	50	10
KBF 2000-300-300	2000	300	300	270	62	55	15
KBF 3000-450-450	3000	450	380	330	75	85	15
KBF 5000-750-750	5000	750	490	430	82	100	20
KBF 7000-1050-1050	7000	1050	550	480	90	125	20
KBF 10000-1500-1500	10000	1500	670	570	108	145	25
KBF 15000-2250-2250	15000	2250	840	710	143	180	30



KB

SIGLA	CARICHI ULS [kN]		ΦB [mm]	Lx [mm]	Ly [mm]	H [mm]	ΦP [mm]	hP [mm]
	Vert	Orizz						
KBU 500/50-75	500	75	160	270	160	82	40	10
KBU 1000/50-150	1000	150	220	340	230	82	50	10
KBU 2000/50-300	2000	300	300	400	290	97	55	15
KBU 3000/50-450	3000	450	380	460	350	110	85	15
KBU 5000/50-750	5000	750	490	560	450	127	100	20
KBU 7000/50-1050	7000	1050	550	610	500	135	125	20
KBU 10000/50-1500	10000	1500	670	700	590	158	145	25
KBU 15000/50-2250	15000	2250	840	840	730	188	180	30

SIGLA	CARICO ULS	ΦB [mm]	Lx [mm]	Ly [mm]	H [mm]
	Vert [kN]				
KBM 500/50/20	500	170	250	220	65
KBM 1000/50/20	1000	250	330	300	69
KBM 2000/50/20	2000	280	350	320	71
KBM 3000/50/20	3000	340	410	380	81
KBM 5000/50/20	5000	450	500	470	95
KBM 7000/50/20	7000	500	570	540	109
KBM 10000/50/20	10000	610	660	630	118
KBM 15000/50/20	15000	760	800	770	151



NOTE: long. displacements. ± 25 mm, transv. displacements ± 10 mm; for more displacements it's necessary to increase the size of the bearing by the differences; the height of the bearing may vary slightly

- SPHERICAL BEARINGS - **KBS**

Kaltha designs, supplies and installs SPHERICAL BEARINGS having the following characteristics:

- Spherical bearings (steel / PTFE) provided with an internal spherical cap that allow the rotations about all the plane axis thus determining a modeling of the bearing as a spherical hinge.
- The rotations can be significant (up to 3) to allow the compensation of deck slopes and/or installation errors;
- They are provided in compliance with EN 1337 and CE marked
- They have a rigid behavior transmitting the loads in all the directions (fixed bearings **KBSF**) or allowing the movement along one direction (sliding guided bearings **KBSU**) or in all the plane directions (free sliding bearings **KBSM**).

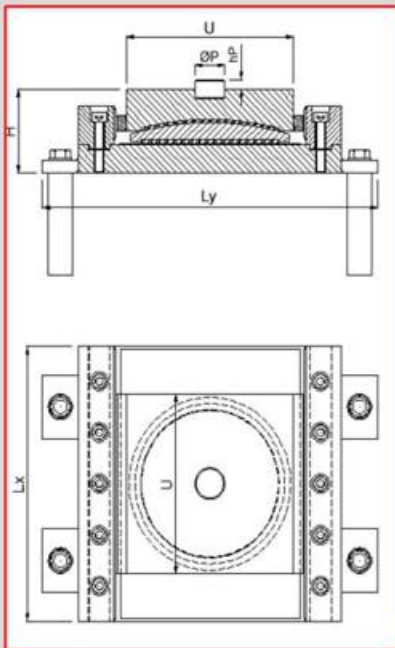
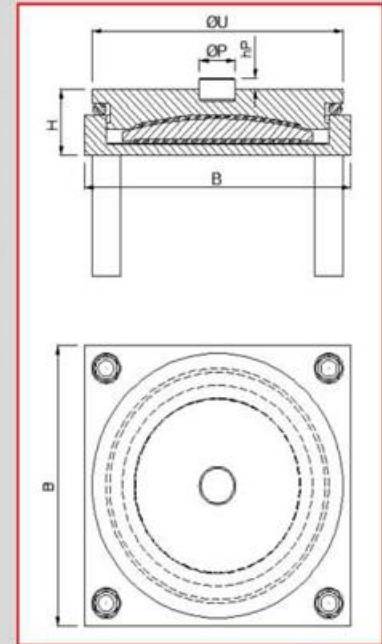


TECHNICAL CHARACTERISTICS

- vertical loads up to 50000 kN;
- horizontal loads up to 5000 kN and up to more than 100% of the corresponding vertical load;
- unlimited displacements;
- anchors to the structure and installation phases designed on the single applications.

CE MARK OF CONSTANCY OF PERFORMANCE

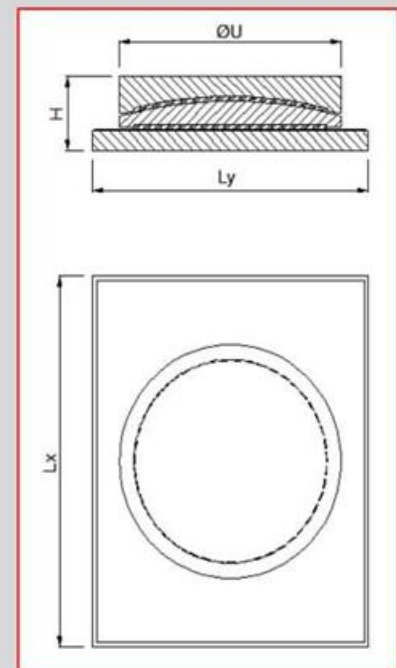
SIGLA	CARICHI ULS [kN]		B [mm]	ΦU [mm]	H [mm]	ΦP [mm]	hP [mm]
	Vert.	Orizz.					
KBSF 1000-150-150	1000	150	280	270	90	50	15
KBSF 2000-300-300	2000	300	350	340	90	55	15
KBSF 3000-450-450	3000	450	410	400	91	80	20
KBSF 4000-600-600	4000	600	470	450	96	100	20
KBSF 5000-750-750	5000	750	510	490	102	100	20
KBSF 7500-1125-1125	7500	1125	620	580	112	125	20
KBSF 10000-1500-1500	10000	1500	710	670	119	150	25
KBSF 15000-2250-2250	15000	2250	860	760	136	250	25



KBS

SIGLA	CARICHI ULS [kN]		U [mm]	Lx [mm]	Ly [mm]	H [mm]	ΦP [mm]	hP [mm]
	Vert.	Orizz.						
KBSU 1000/100-150	1000	150	220	370	350	94	50	15
KBSU 2000/100-300	2000	300	290	440	430	100	55	15
KBSU 3000/100-450	3000	450	350	500	500	106	80	20
KBSU 4000/100-600	4000	600	400	550	560	118	100	20
KBSU 5000/100-750	5000	750	440	590	610	126	100	20
KBSU 7500/100-1125	7500	1125	530	680	730	135	125	20
KBSU 10000/100-1500	10000	1500	610	760	830	142	150	25
KBSU 15000/100-2250	15000	2250	730	880	970	169	250	25


SIGLA	CARICHI ULS	ΦU [mm]	Lx [mm]	Ly [mm]	H [mm]
	Vert [kN]				
KBSM 1000/100/20	1000	200	350	260	83
KBSM 2000/100/20	2000	260	410	320	88
KBSM 3000/100/20	3000	310	470	380	91
KBSM 4000/100/20	4000	350	520	430	99
KBSM 5000/100/20	5000	390	560	470	106
KBSM 7500/100/20	7500	470	640	550	118
KBSM 10000/100/20	10000	530	710	620	127
KBSM 15000/100/20	15000	640	830	740	150



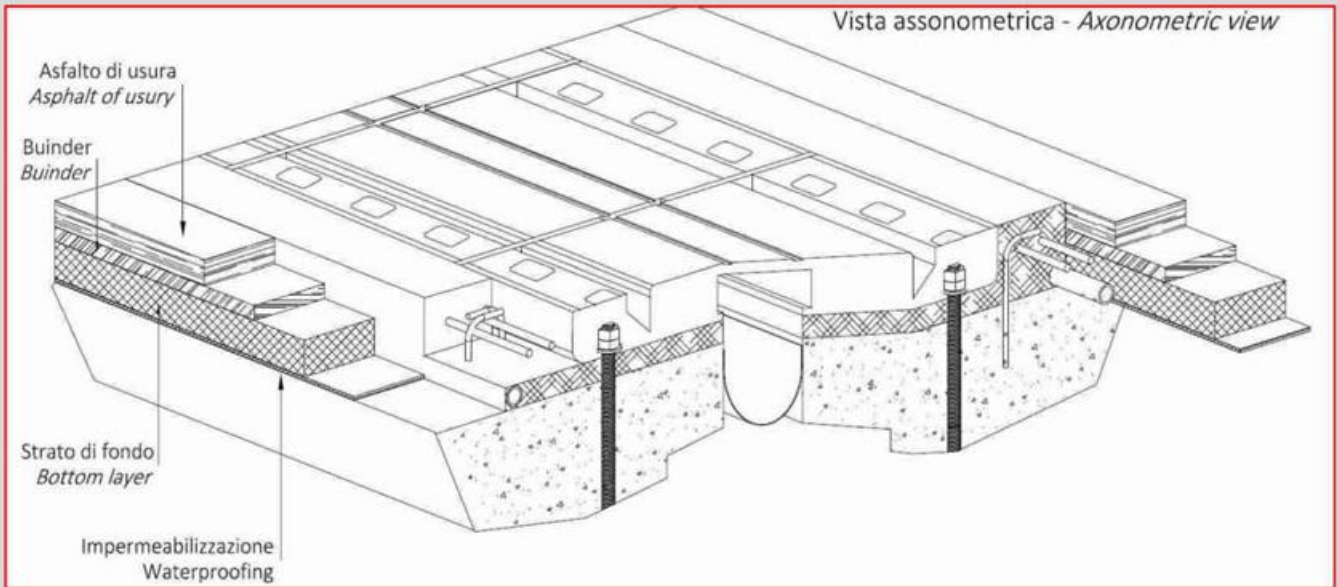
NOTE: long. displacements. ± 25 mm, transv. displacements ± 10 mm; for more displacements it's necessary to increase the size of the bearing by the differences; the height of the bearing may vary slightly

- EXPANTION JOINTS - KJ

Kaltha designs, supplies and installs STEEL-RUBBER-BRIDGE-PLATE EXPANTION JOINTS, with high demands of seismic excursion (with predominantly deck plate), or with only need to temperature range (prevailing in rubber elements), having the following characteristics:

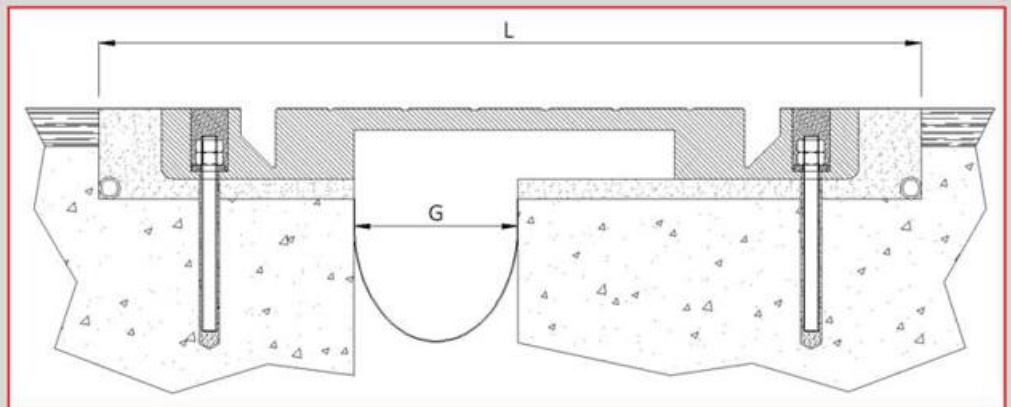
- They are available in modules (carpets) provided with male-female coupling components at both sides that help to cover sections of every length;
 - Each module is connected independently to the structure by means of anchor bars, making therefore easy the replacement, even partial, of the joint lines;
 - They are water tight since they feature a flashing and draining pipes inside the slab to collect water that is piped out of the deck;
 - Since they use the rubber shear deformation to realize the movements, they are able to resist displacements both transversal and longitudinal to the joint axis in the same way;
- 
- All the exposed steel parts are made by Corten S355J2W+N
 - Standard production includes joints with movements up to ± 600 mm, on request types with bigger movements can be designed and supplied.
 - They are provided in compliance with ETAG 032

DESIGN IN COMPLIANCE WITH ETAG 032



TYOLOGICAL COMPLETE JOINT

KJ



SIGLA	Escursione max [mm]	G (*) [mm]	L [mm]
KJ 70	± 35	45	405
KJ 100	± 50	60	536
KJ 160	± 80	100	712
KJ 200	± 100	110	752
KJ 240	± 120	130	856
KJ 300	± 150	160	992
KJ 360	± 180	190	1050
KJ 420	± 210	220	1092
KJ 500	± 250	260	1156
KJ 600	± 300	310	1252



(*) GAP - undeformed joint

- SEISMIC ISOLATION - KS

Kaltha designs, supplies and installs SEISMIC ISOLATION SYSTEMS with PENDULUM ISOLATORS or LEAD RUBBER BEARING ISOLATORS; Kaltha design of seismic isolation system and devices take always in particular account the following aspects:

- Sustaining the vertical loads of the structure with high safety coefficients, thanks to the dimensioning of the vertical devices strength
- Big increasing of the natural vibrating period of the structure where they are applied, by design of devices with low horizontal stiffness and big displacements capability, depending of the installation place characteristics.



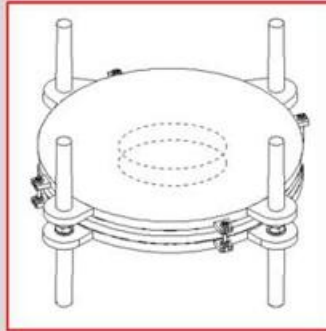
- High damping ratio, obtained by using high friction coefficient for pendulum isolators and lead core for rubber isolators.

TECHNICAL CHARACTERISTICS

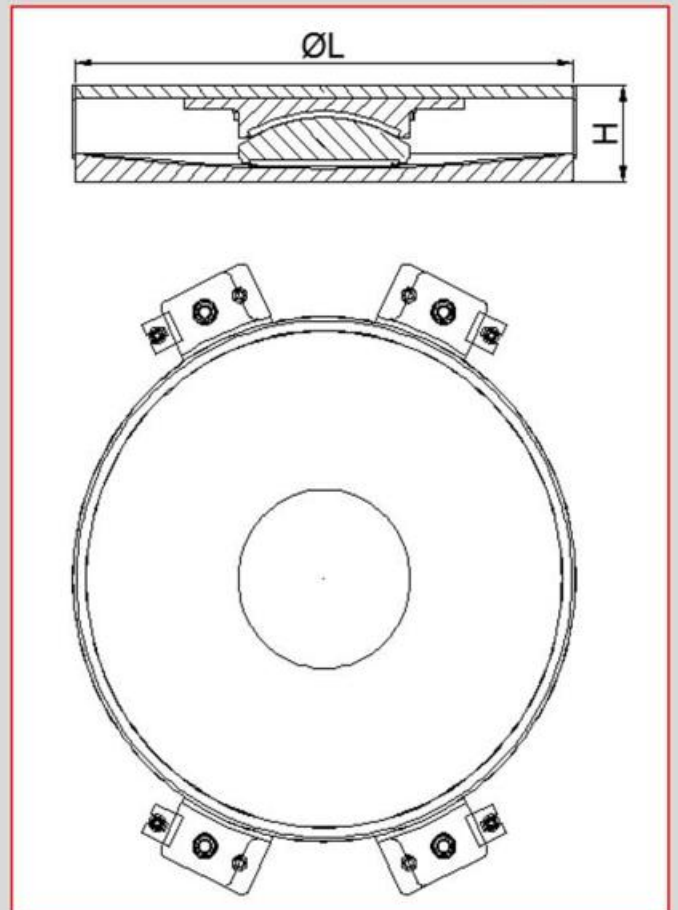
- vertical loads up to 50000 kN with horizontal displacement up to ± 450 mm
- anchors to the structure and installation phases designed on the single applications.

CE MARK OF CONSTANCY OF PERFORMANCE

Carico verticale ULS [kN]	Spostamento SLC [mm]	ΦL [mm]	H [mm]
300	± 100	310	75
	± 150	410	73
	± 200	510	75
	± 250	610	73
800	± 100	340	78
	± 150	440	78
	± 200	540	78
	± 250	640	80
1600	± 100	380	77
	± 150	480	78
	± 200	580	77
	± 250	680	78
2600	± 100	420	92
	± 150	520	93
	± 200	620	94
	± 250	720	95
5000	± 100	500	118
	± 150	600	119
	± 200	700	120
	± 250	800	120
11000	± 100	680	166
	± 150	780	168
	± 200	880	168
	± 250	980	169



KS



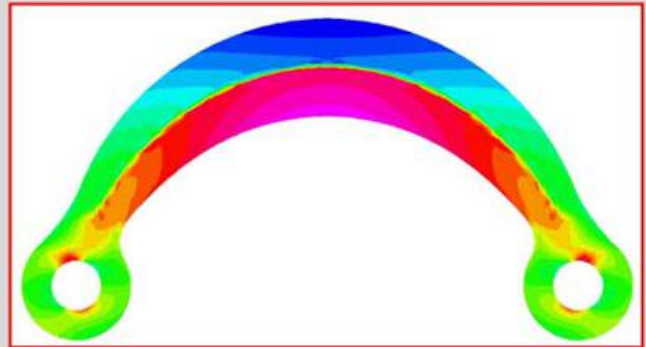
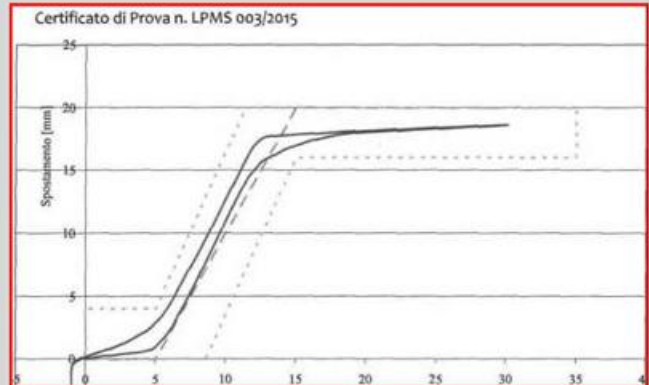
NOTE: above **PENDULUM ISOLATORS** with displacements of ± 250 mm; for more displacements it's necessary to increase the size of the bearing by the differences; the height of the bearing may vary slightly

- ANTISEISMIC DEVICES - KD

Kaltha designs, supplies and installs different kinds of SEISMIC DEVICES, they are a set of devices which introduce in the structures hysteretic or linear additional restraints of rigid type, to increase the structural resistance and stiffness, or with controlled deformation, with the aim to modify the structure behavior in both static and dynamic conditions and therefore to improve its response in seismic conditions and under the effect of distortions in static conditions.

DEVICES TYPES:

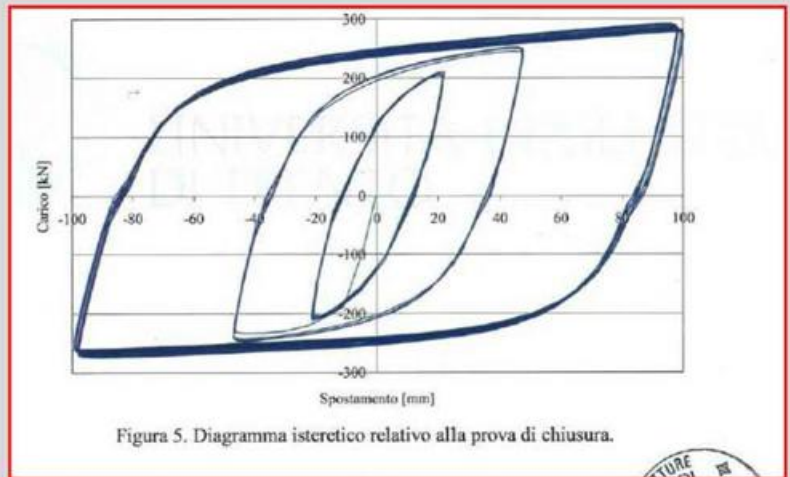
- Axial controlled stiffness devices: axial devices with elastic behavior for calculated ranges of load and deformation, with non linear elastic constitutive laws.
- Hysteretic restraints: axial devices with a hysteretic constitutive law, suitable with very strong earthquake and where it is required a low stiffness but a high damping ratio.



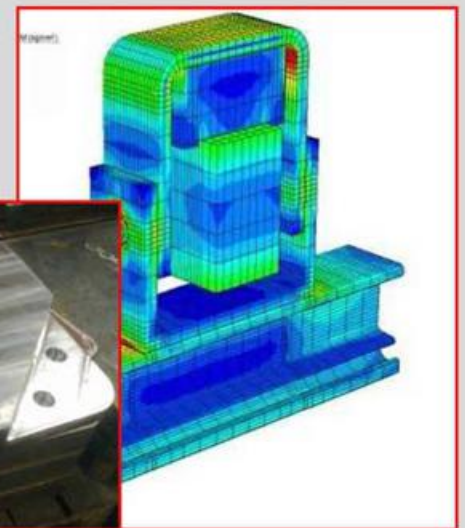
- Dissipative bracings: similar to the hysteretic restraints but with axial behavior, therefore suitable when applied as bracings in buildings retrofit where more resistance is required in the static condition but energy dissipation in the seismic one.

CE MARK OF CONSTANCY OF PERFORMANCE

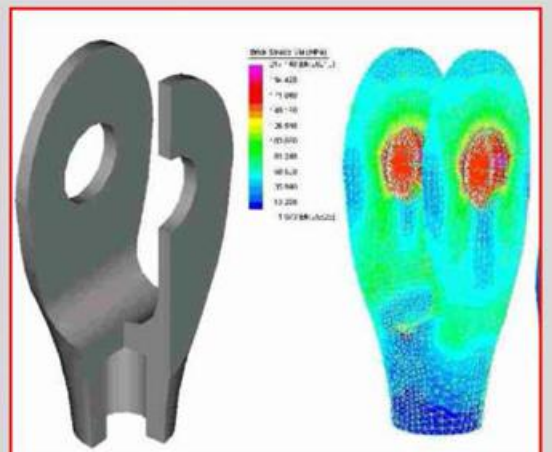
- Shear keys: similar to bearings but they transmit only horizontal loads.
- Ledge restraint: elements which provide an additional unilateral restraint when other devices are at their limit displacement.
- Fuses: they have a rigid behavior up to a their hold value beyond which it is permitted a movement previously restrained; they're suitable in isolated structures with high static horizontal loads.
- Single-effect or double-effect restraints: they have a behavior similar to the rubber isolator but with an axial operating principle.



KD



- Hanging devices: axial devices usually applied to arch decks with the aim of removing the bending moments in the decks at the device hanging point.



- SITE WORKS AND TECHNICAL ASSISTANCE - KA

In addition to the installations of bearings, isolators, restraints and expansion joints, Kaltha can arrange for the realization of interventions of

SEISMIC ISOLATION SYSTEMS AND RESTRAINTS SYSTEMS FOR VIADUCTS

RETROFIT WITH INSERTION OF SEISMIC ISOLATORS

RETROFIT AND RESTORATION THROUGH EXTERNAL POST-TENSIONING



both in buildings damaged by the earthquake and in bridges and viaducts, with insertion technique at the base or by cutting the vertical elements of the structures.



The assistance provided by Kaltha ranges from the calculation, in order to help designers in their design choices, with specific attention to the problems inherent the seismic analysis, to the operation of the devices or their executive aspects,



KA



to the study of the interface details between the device and structure, to analysis and verification of the whole building, to the solution of the issues of installation in existing or new structures.

