TENSA

VOLUME	PRODUCTS CATALOGUE
07	SEISMIC ISOLATORS

YOUR CHALLENGES,
OUR SOLUTIONS


TENSA

01

COMPANY PROFILE

Our mission is to constantly improve the methods
and the quality of construction processes
through research, innovation and cooperation
with designers, engineers and contractors worldwide.

TENSA

Tensacciai, now renamed TENSA, was founded in 1951 with headquarters in Milan, Italy.
It is now active in over 50 countries with a direct presence in 14 countries. TENSA is a leader in stay cables, post-tensioning, anti-seismic devices, structural bearings and expansion joints. TENSA has extensive references and numerous certifications for its products worldwide.

HISTORY

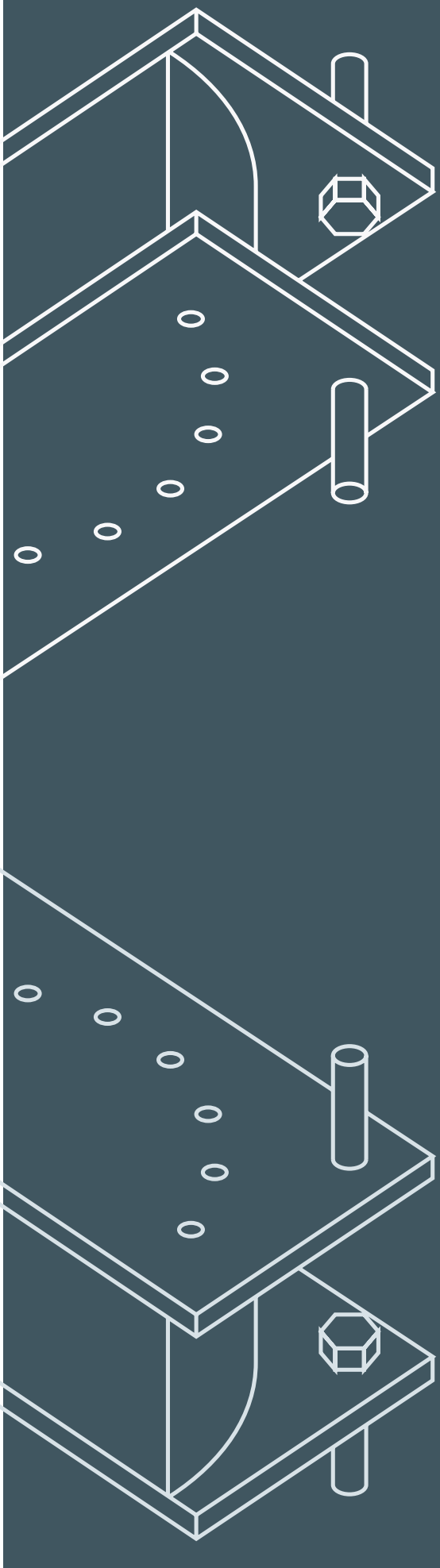
1951: Beginning of activity
1964: In the sixties Tensacciai undergoes a phase of remarkable growth in Italy. Post-tensioning is just at the beginning of its history and its application is still experimental.
1970: A programme of technological renewal begins with the adoption of the steel strand.
1980: Tensacciai develops new tensioning systems and equipment in the field of ground anchors, combining innovation with versatility and ease of use.
1990: New subsidiaries established in Brazil, India and Australia and in Europe sister companies in Portugal, Greece and the Netherlands.
2000: The internationalization process of Tensacciai continues unabated.
2010: The company becomes directly involved in projects in all five continents.
2011: Tensacciai is acquired by Deal - world leading solutions provider in the field of bridge construction - and becomes part of De Eccher Group. Tensacciai is now member of an organisation capable of designing, manufacturing and installing systems everywhere in the world, thanks to specialised technicians, engineers in the technical department and quality control. All production and delivery processes are attested by the ISO9001 certification.
2012: Tensacciai merges with Tesit, another successful concrete specialist contractor with international experience in post-tensioning, steel bars, structural bearings and expansion joints becoming a prominent player in the field of specialised subcontracting.
Tensacciai enters into a Worldwide Exclusive License Agreement with Rome-based TIS (Tecniche Idraulico-Stradali S.r.l.) - a leading company with experience in designing and producing structural bearings, expansion joints and anti-seismic devices since 1973.
2014: TIS is acquired by Tensacciai.
2015: TENSA is formed from the merging and development of the three important companies mentioned above: Tensacciai, Tesit, TIS.

MISSION

Our mission is to constantly improve the methods and the quality of construction processes through research, innovation and cooperation with designers, engineers and contractors worldwide. A strong commitment to quality is the only way to ensure safe and long-lasting structures. We support the design from the initial stage, challenging standards to develop custom solutions. We value timely execution and service as keys to building long-term relationships.

Our core knowledge lies within stay-cables and post-tensioning systems, anti-seismic devices, structural bearings and expansion joints as well as all the related accessories, equipment and services.
TENSA strives to push its vast experience towards new methods and variations of applications, developing ingenious solutions for building new structures, whether they are buildings or infrastructures, as well as the rehabilitation of existing ones.

PRODUCT CATALOGUES

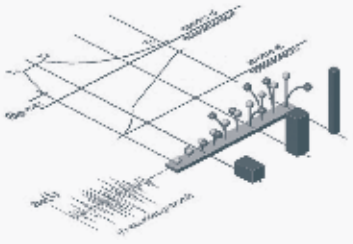


San Marco Hospital, Catania (Italy)

02

SEISMIC PROTECTION

Base isolation represents an important and innovative tool to reduce the seismic hazards and protect constructions and human lives.

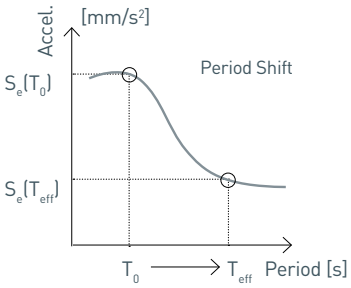


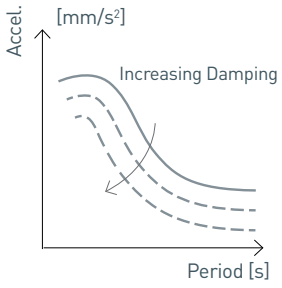
BASE ISOLATION

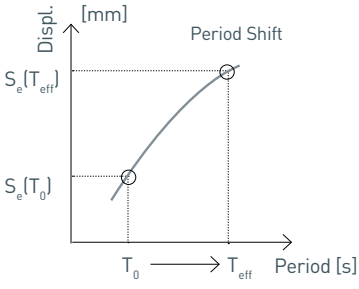
The range of variables upon which one can act to influence the behavior of structures is quite large. In addition to acting on the stiffness (structural geometry), it is in fact feasible to intervene on the seismic response by acting also on the damping matrix (ductility of materials and sections) and on inertia (structural mass and its distribution). Otherwise, in a more effective and less laborious manner, it is also possible to act by simply distancing the structure's own frequencies from those where one receives the seismic responses with the highest energy content (seismic isolation).

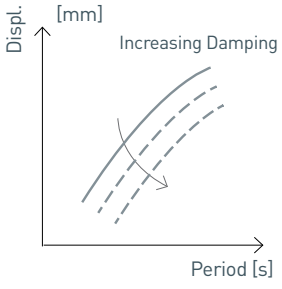
Base seismic isolation represents an important tool in the hands of the designers to protect the structural and non-structural components of a construction, not to mention protecting human lives. An important aspect to be considered is that a base isolated structure remains functional even after experiencing seismic events of high intensity. The lesser input acceleration to which the object is subjected protects both the building and its contents (securing for instance the continuation of operations in critical places such as hospital ICUs, server farms, nuclear power plants, military installations, cold storages etc.). In addition to these considerations, the psychological aspect must be emphasized: a reduced perception of the seismic intensity translates into a reduced probability of panic reactions by occupants, which in crowded places often results in stampedes and fatalities.

The isolation system is generally located below the structure's prevailing mass. This technology consists of interposing devices featuring high horizontal deformation capacity and high vertical stiffness between foundation and superstructure. The base isolation consists in reducing the input acceleration and increasing the structure's fundamental period, by modifying the shape of its fundamental mode and increasing the damping effect as clearly shown in the following charts.
In this way, the structure's movement becomes almost a rigid translation, featuring very low accelerations and limited inter-storey drifts, without causing damages. The base isolated buildings may be designed as non-dissipative with ductility class "L". This way the building is designed to remain within the elastic field without drawing from the plastic field, thus preventing damages to the structure as resulting from a seismic event. Moreover seismic isolation is a viable design strategy for seismic rehabilitation of older buildings: its installation, fabrication and design costs are more than offset by the reduced requirement for structure stiffening and strengthening.









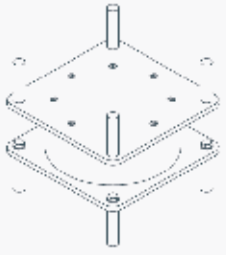

TENSA

Unicredit building, Milan (Italy)

03

RUBBER ISOLATORS

Our devices can adapt to the large horizontal displacement produced by seismic events, supporting at the same time the gravity load of a structure.



RUBBER COMPOUNDS

There are three proposed high damping rubber compounds which are most frequently used. In addition we can also propose G modulus 0.5 and 0.9 N/mm² to increase designers' options thus ensuring the selection of the most suitable and cost-effective technical solution.

Soft compound: the elastomers have a nominal G modulus equal to 0.4 N/mm² and an equivalent viscous damping ξ equal to 10/15%

Normal compound: the elastomers have a nominal G modulus equal to 0.8 N/mm² and an equivalent viscous damping ξ equal to 10/15%

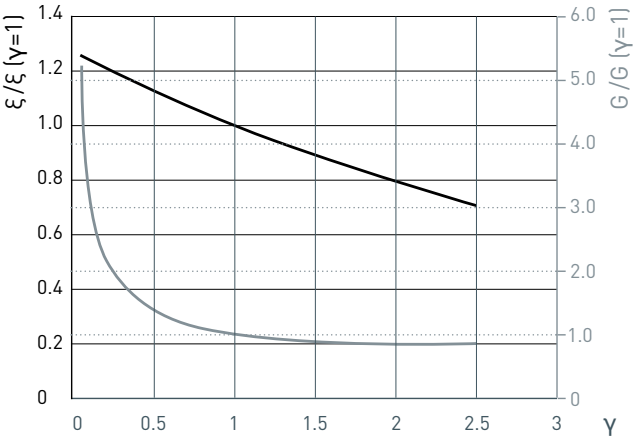
Hard compound: the elastomers have a nominal G modulus equal to 1.4 N/mm² and an equivalent viscous damping ξ equal to 15%

The mentioned characteristics (G modulus / Damping) are calculated at a level of 100% rubber shear deformation. Special low-damping rubber compounds (ξ (100%)≤ 6%) are also available on request.
Rubber compounds have been fully analysed and described by accredited third party testing laboratories, in compliance with requirements of EN15129. In particular within the characterization process the following parameters have been investigated:

- Variation of shear modulus and damping with strain amplitude
- Variation of shear modulus and damping with frequency
- Variation of shear modulus and damping with temperature
- Variation of shear modulus and damping with ageing
- Variation of shear modulus and damping with repeated cycling
- Shear bond strength on un-aged and aged specimens
- Resistance to slow crack growth

PROPERTY		COMPOUNDS		
		SOFT	NORMAL	HARD
Shear moduls[a]	MPa	0.4	0.8	1.4
Hardness	Shore A	40	60	75
Viscous damping[a]	%	10/15	10/15	15

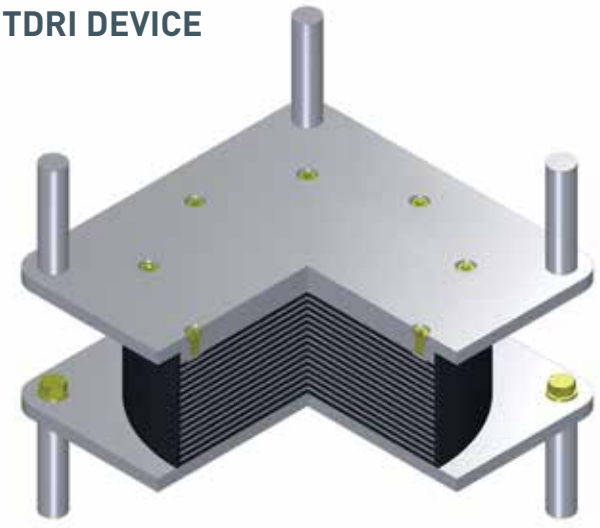
a) Measured at 100% shear strain amplitude at 23°C



HIGH DAMPING RUBBER BEARINGS/TDRI

The TDRI (Tens Damper Rubber Isolators) consist of alternating layers of rubber and steel properly vulcanised together. The inner reinforcing steel plates are fully embedded into the rubber so that they are totally protected against corrosion. The elastomers shown in this catalogue are characterized by a high viscous damping (ξ (100%)>6%), but we can propose low damping compounds (ξ (100%)≤ 6%) as an alternative. One or two thick endplates are vulcanized outside the isolator. The same plates are safely connected via a mechanical anchor to the external steel mounting plates, which ensure that isolators are fixed to the structure (by means of dowel anchor bars, screws or pins). Isolators support the gravity load of a structure and resist horizontal seismic and non-seismic actions (wind, thermal variation, shrinkage, creep, etc). These devices, thanks to their limited horizontal stiffness, are capable of accommodating the large horizontal displacements produced by seismic action, thus limiting the horizontal force transmitted to the structure. Compounds (characterized by different G modulus between 0.4 & 1.4 N/mm^2 at 100% shear deformation) allow a nominal dissipation ξ in the range of 10-15% at 100% rubber shear deformation, with resulting limitation and reduction of displacement vectors.

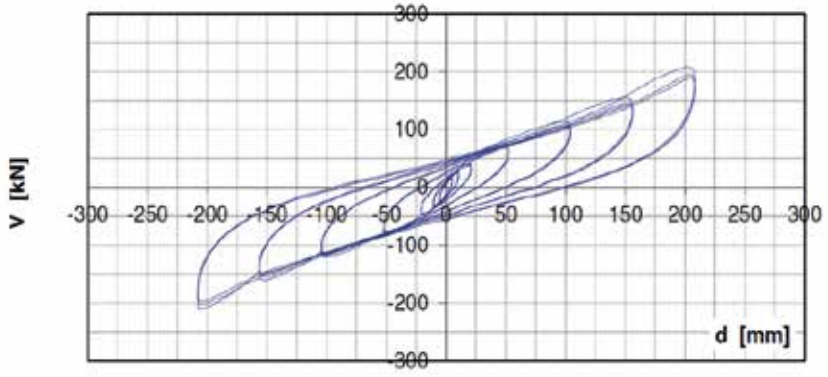
TDRI DEVICE



The aforementioned devices are considered self re-centring as the possible minor residual movements are recovered in time by the rubber.

EFFECTIVE HORIZONTAL STIFFNESS

The picture above shows an isolator under testing, and to the right the chart shows the hysteretic cycles, which correspond to different horizontal deformation values. As the chart shows, the effective stiffness value decreases by the increase of the deformation amplitude. This is a positive aspect in respect of wind or low intensity seismic events in that a greater isolation reaction is obtained.

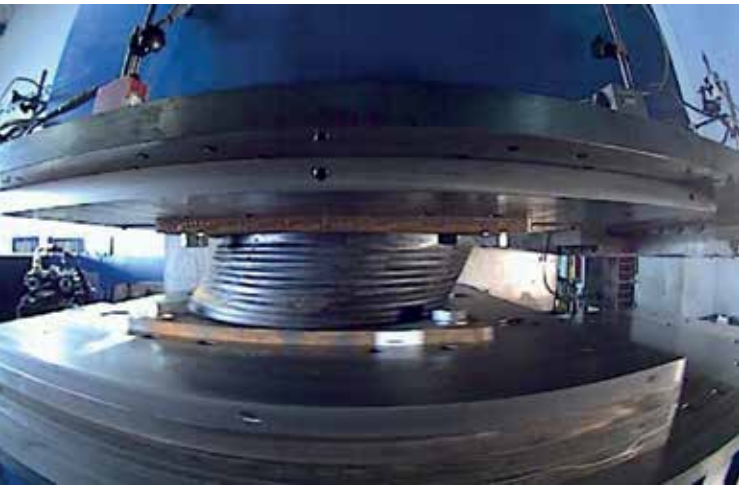


The typical behavior of TDRI devices is linear- elastic

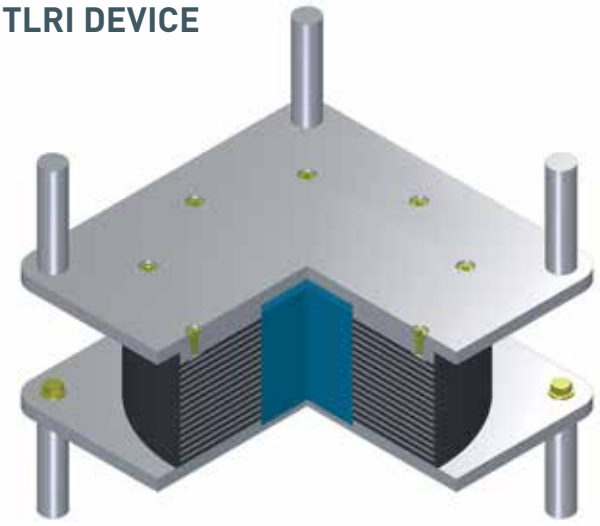
LEAD RUBBER BEARINGS/TLRI

TLRI (Tens Lead Rubber Isolators) devices are similar to the TDRI devices both in terms of design concept and production. In addition they feature one (centrally located) or more (evenly distributed) lead plugs (pure lead 99.9%), which are designed to change the device behavior from "linear" to "bi-linear". Thanks to its higher stiffness (as compared to rubber) the lead first takes the horizontal force generated by the earthquake. Once the yielding effect of the lead gives way, the rubber starts to bear with its properties on the global behavior. Lead has the characteristic of re-crystallizing at room temperature, after being subject to plastic deformation cycles, so in theory it can withstand unlimited deformation cycles without having to be replaced after seismic events. The equivalent force reached at the design displacement is given by the sum of the lead's yield force and the elastic force supplied by the rubber. The lead cored devices are thus characterized by two levels of stiffness, which are usually referred to as "first branch stiffness" (lead) and "second branch stiffness" (rubber), while the comprehensive behavior is described by the "equivalent effective stiffness" (secant connecting the origin of reference axis with the point individuated by the force reached at the design displacement). This system is capable of achieving global damping effects of nearby 30%.

Real time dynamic testing on a rubber isolator

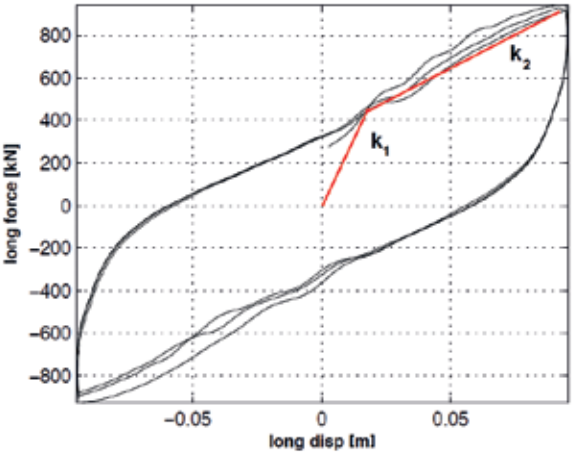


TLRI DEVICE



Based on a typical force – displacement diagram, one can immediately notice the higher damping properties of lead cored devices compared to high-damping rubber bearings (note: the damping is represented by the area of the hysteretic cycle). Furthermore, the scragging so typical in rubber based devices, becomes negligible in lead cored Isolators.

EFFECTIVE HORIZONTAL STIFFNESS



The typical behavior of TLRI devices is "bi-linear"

MARKING, FIRE & CORROSION PROTECTION, INSPECTION AND MAINTENANCE

MARKING

Tens Damping Rubber Isolator

High Damping Rubber Bearings

Each Isolator is identified by the acronym TDRI (Tens Damping Rubber Isolator). The first number identifies the isolator diameter whereas the second number indicates the total rubber height.

	Isolator diameter (mm)		Degree of elastomer deformation (M-H)		
TDRI	**400**	**S**	**M**	**/**	**80**
Tens Damping Rubber Isolator		Type of elastomer (S-N-H)			Height of elastomer (mm)

Tens Lead Rubber Isolator

Lead Rubber Bearings

Each Isolator is identified by the acronym TLRI (Tens Lead Rubber Isolator). The first number represents the isolator diameter, while the second the total rubber height, and the third the lead core diameter.

	Isolator diameter (mm)		Degree of elastomer deformation (M-H)				Lead diameter (mm)
TLRI	**400**	**S**	**M**	**/**	**80**	**/**	**90**
Tens Lead Rubber Isolator		Type of elastomer (S-N-H)			Height of elastomer (mm)		

MAINTENANCE AND DURABILITY

The rubber compound (NR) is protected against chemicals and ageing, while the exposed steel surfaces are protected with a type of a paint of which the durability depends highly on the service environment of the device. For this reason, during the periodical inspection, one must check the protection conditions of the steel surfaces and if needed, proceed with the maintenance to restore it. Device connections to the structure are designed to allow their future replacement in compliance with Euro Code provisions.

CORROSION PROTECTION

Steel parts of the devices are protected by a suitable coating cycle in compliance with requirements of UNI EN ISO 12944 foreseen for the particular environment and in compliance with expected protection established by the designer.

INSPECTION

The Standard protocol calls for the first inspection after one year from the installation. Subsequent inspections shall be performed every 5 years unless in the meantime the structure experiences seismic events. In this case an additional inspection is required. The inspection form prepared by TENSA has to be filled with care and in the case of any deviation from the acceptable parameters the supplier shall be immediately informed for a more accurate check of the isolator.

FIRE PROTECTION

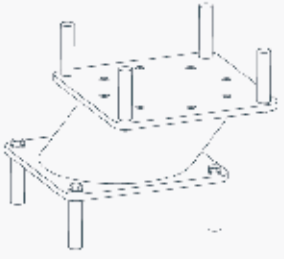
If fire load is foreseen at the seismic isolation interface then isolators shall be accordingly protected. It is possible to design special fire resistant elements (plaster boards, calcium silicate panels etc.). Alternative seismic isolators can work in parallel with additional structural elements which are capable of transmitting loads to the substructure replacing the isolator damaged by fire. For more information please contact the TENSA technical department.

Arch bridge over the Dambovita river
Mihai Bravu passage, Bucharest (Romania)

04

QUALITY AND TESTING

Testing and control are fundamental processes that guarantee our clients the quality and efficiency of our devices.



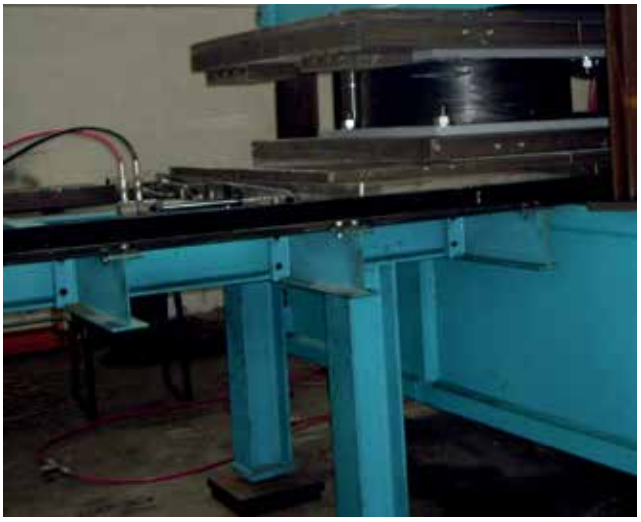
REGULATORY STANDARDS

The TDRI and TRLI can be designed by TENSA's technical department in accordance with any applicable international code and specification (European Standard EN 15129, AASHTO, ASCE, FEMA, ISO etc.). The standard sizes proposed in this technical catalogue comply fully with European Standard EN15129. TENSA's technical department can study different sizes, characteristics or shapes (rectangular or circular) in order to adapt them to specific design requirements.

Isolator under vertical loading test

Isolator under dynamic shear deformation testing

TENSA and its suppliers work under strict quality assurance procedures in compliance with ISO 9001. TENSA guarantees the full quality of its devices and the quality-compliance of their whole production process.
The certification of the TDRI / TLRI isolators takes place through appropriate "prototype tests" performed dynamically according to European Standard EN 15129 on full scale samples at the real load, displacement and frequency. The isolators ready for delivery and installation beneath the structure are quality-tested under "Factory Production Control" testing (FPC) aimed at checking the conformity of their response in relation to the design demand. FPC testing covers the random sampling of 20% of the produced isolators in accordance with EN15129, while with reference to different codes and specifications a higher number of tests may be requested. Devices are supplied with the CE mark along with the declaration of consistent performance.



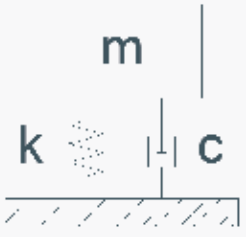

TENSA

Arch bridge over the Dambovita river
Mihai Bravu passage, Bucharest (Romania)

05

MODELLING OF TDRI AND TLRI

The design of the devices is carried out by using proven dynamics equations and models.



MODELLING OF TDRI AND TLRI

TDRI

The behavior of each single TDRI is considered linear-equivalent and characterized by two parameters:
$k_{eff,i}$ Effective stiffness of each isolator;
$\xi_{eff,i}$ Effective Damping of each isolator.

Where:
i = 1, 2,...,5,...N
N = nr. of isolators
Basing on the elastic response spectrum of the considered site
Considering the global mass (M) of the superstructure and the centre of mass
Assuming that the superstructure is a rigid solid with a single degree of freedom (SDOF) characterized by mass (M) and stiffness equal to the total effective stiffness of the isolation system ($K_{eff} = \Sigma_i K_{eff,i}$=1,2,...5,...N $_{\text{- isolators-}}$)

Where:
k_{eff} is the effective horizontal stiffness of the isolation system, the vibration period is:

$$T_{eff}=2\pi\sqrt{\frac{M}{k_{eff}}}$$

Fixing the isolation period Teff and considering the given response spectrum in acceleration, one can calculate the global effective stiffness keff and displacement of the isolation system.

$$k_{eff}= M\left(\frac{2\pi}{T_{eff}}\right)^2$$

$$d(T_{eff};\xi_{eff})=S_e(T_{eff};\xi_{eff})\cdot\left(\frac{T_{eff}}{2\pi}\right)^2$$

Where:
$S_e(T_{eff};\xi_{eff})$ is the spectral acceleration

The horizontal components of the seismic action are applied simultaneously, so the displacement in each isolator unit can be considered equal to:

$$d_{db}=d_x(T_{eff};\xi_{eff})\sqrt{(1^2+0.3^2)}$$

In compliance with EN15129 an increased reliability is requested of the isolation system. For buildings this safety coefficient γ_x is equal to 1.2 (recommended value).
$d_{Ed}=\gamma_x\cdot d_{bd}$

For bridges the d_{Ed} is defined as d_{max} and include all non-seismic actions (permanent actions – long term deformation, i.e. post tensioning; shrinkage, creep – 50% of the thermal actions) and the seismic actions interested by the safety coefficient γ_{Is} equal to 1.5 (recommended value):
$d_{Ed}=d_{max}=d_{perm}+d_{long\text{-}term}+0.5d_{therm}+\gamma_{Is}\cdot d_{bd}$

Considering that:
- the sum of the single isolators horizontal stiffness ($k_{eff,i}$) is equal to the total stiffness of the isolation system (k_{eff});
- the positions of the isolators shall be selected in order to minimize torsional effects. To achieve this, the stiffness centre shall be as close as possible to the mass centre on the isolation interface. In order to reach the mentioned target, TENSA free sliding bearings can be used in parallel as their horizontal stiffness is null but they are capable to transmit the gravity loads, for instance devices type POT (named TP) or spherical bearings (named TS) or elastomeric bearings (named TR);
- the maximum displacement d_{bd} and d_{Ed} are known;
- the maximum vertical load acting on the device is known.

TDRI

Modelling of TLRI is performed in the same way as TDRI, but the non-linear behavior of the TLRI must be taken into account, so the effective device stiffness (k_{eff}) and equivalent viscous damping (ξ_{eff}) are referred exclusively to the dbd value. An iterative calculation is necessary at every considered limit state.

CONCLUSION

Isolators can be chosen from the catalogue.

In particular the analysis may show the following situations:
- Vertical loads obtained by the analysis are higher than the initially calculated and outside of the selected device performance. Solution: select another isolator from the catalogue with higher vertical capacity but with the same horizontal stiffness;
- Horizontal shear load in the structure is too high. Solution: select a larger isolation period and/or increase the damping of the isolation system;
- Unwanted torsional effects. Solution: Redistribute isolators and free sliding bearings.

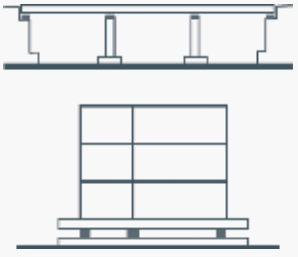
Arch bridge over the Dambovita river
Mihai Bravu passage, Bucharest (Romania)

Unicredit building, Milan (Italy)

06

INSTALLATION

The installation methods are conceived starting from the first phases of the device design.



INSTALLATION

1. Casting of the concrete plinth up to a height of a few centimetres lower than that of the final installation one, providing appropriate sheaths for the anchorages positioning of the device. These sheaths can be made of corrugated tubes used for post tensioning or simple polystyrene blocks may be used as an alternative.

2. 3. Formwork positioning up to the designed height and subsequent casting with levelling mortar. Subsequent removal of the formwork and cutting of corrugated tubes or elimination of polystyrene blocks.

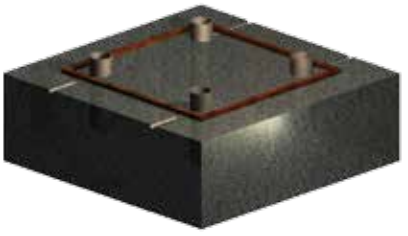
4. 5. 6. The isolator is placed in its correct final position paying attention to the longitudinal and transversal axes of the isolator and structure. Formwork positioning around the upper plate of the isolator for the subsequent casting of the superstructure. Final grouting of the lower anchorages with proper cement mortar.

Installation procedure may vary considerably according to the type of superstructure, the presence, or lack of presence of post tensioning, or the need to apply a wedge between the deck and device to compensate for the slope etc.
TENSA's technical department will provide a solution adapted to any design demand.
After installation it is necessary to check the isolator and its anti-corrosion protection. In case of local coating damages due to careless installation, please refer to TENSA's corrosion protection repair manual.

Pedemontana Motorway, Lura Viaduct (Italy)

1.

2.



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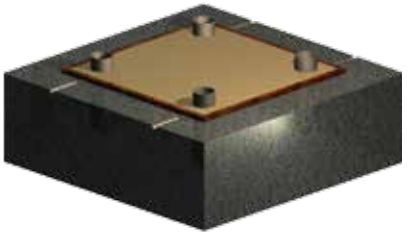

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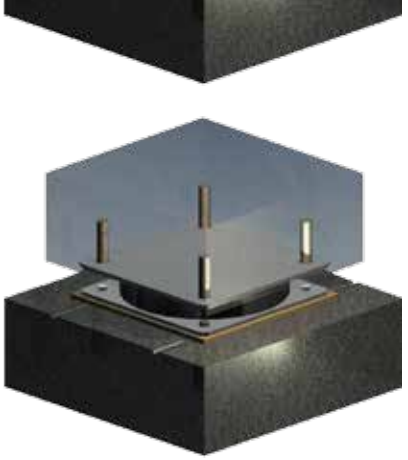


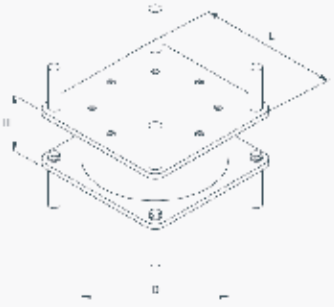
Pedemontana Motorway,
Lura Viaduct (Italy)

Unicredit building, Milan (Italy)

07

STANDARD SIZES

An overlook of all the properties listed in tables
for different movements and types of structures.



CATALOGUE PERFORMANCE HYPOTHESIS

The performance characteristics of standard isolators available for the seismic isolation of structures are as follows.

Dimensions have been obtained considering the following hypothesis:

Building:

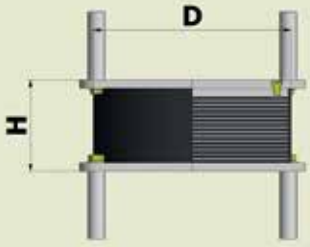
- Slow movements are ignored (creep, shrinkage, thermal motion...)
- Applied safety coefficient γ_x equal to 1.2
- Maximum rotation under static ULS combination ±0.003 rad
- Maximum rotation under seismic ULS combination ±0.003 rad
- Value of nominal G modulus calculated at 100% shear deformation at the third cycle
- Damping has been calculated at d_{bd} displacement but considering the damping properties measured at 100% shear deformation

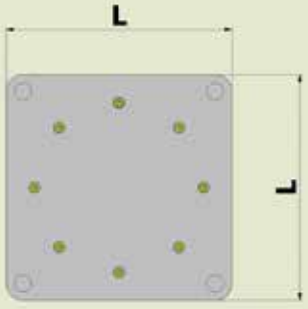
Bridge:

- Movements due to creep, shrinkage equal to 25 mm
- Thermal displacement equal to ±10 mm
- Maximum displacement under static ULS combinations 50 mm
- Applied safety coefficient γ_{IS} equal to 1.5
- Maximum rotation under static ULS combination ±0.003 rad
- Maximum rotation under seismic ULS combination ±0.003 rad
- Value of nominal G modulus calculated at 100% shear deformation at the third cycle
- Damping has been calculated at d_{bd} displacement but considering the damping properties measured at 100% shear deformation

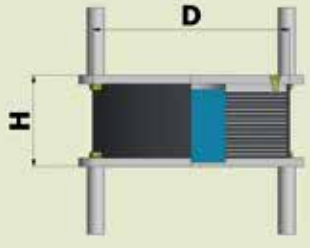
TENSA's technical department is available for evaluating and designing tailor-made solutions for buildings, bridges and any other type of structure or superstructure requiring seismic isolation.

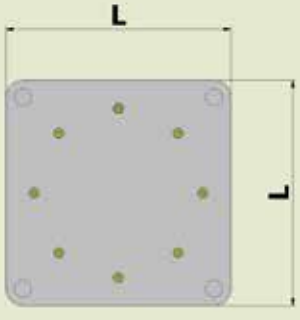
TDRI

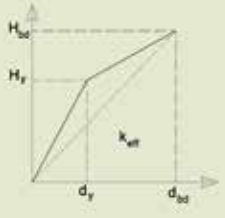




TLRI







TDRI BRIDGES
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 150mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TDRI-350-SM-75	350	162	400X400	75	17.0	461	0.51	80	0	1150	750
	TDRI-400-SM-75	400	162	450X450	75	19.5	746	0.67	80	50	2050	1450
	TDRI-450-SM-78	450	159	500X500	78	18.3	834	0.82	80	50	2650	2000
	TDRI-500-SM-77	500	167	550X550	77	17.5	976	1.02	80	50	4200	3250
	TDRI-550-SM-75	550	177	600X600	75	27.0	2189	1.27	80	100	5150	4100
	TDRI-600-SM-75	600	177	650X650	75	29.5	2884	1.51	80	100	6250	5050
	TDRI-650-SM-78	650	174	700X700	78	26.7	2914	1.70	80	100	7400	6150
	TDRI-700-SM-78	700	189	750X750	78	28.8	3688	1.97	80	150	8650	7300
	TDRI-750-SM-77	750	182	800X800	77	26.4	3905	2.29	80	150	10000	8550
RUBBER NORMAL G_{din}= 0.8 MPa* ξ_{eff}= 10%-15%*	TDRI-350-NM-75	350	162	400X400	75	17.0	754	1.03	80	50	1150	750
	TDRI-400-NM-75	400	162	450X450	75	19.5	1170	1.34	80	100	2600	1800
	TDRI-450-NM-78	450	159	500X500	78	18.3	1332	1.63	80	100	3350	2500
	TDRI-500-NM-77	500	167	550X550	77	17.5	1581	2.04	80	150	4200	3250
	TDRI-550-NM-75	550	177	600X600	75	27.0	3079	2.53	80	200	5150	4100
	TDRI-600-NM-75	600	177	650X650	75	29.5	3936	3.02	80	200	6250	5050
	TDRI-650-NM-78	650	174	700X700	78	26.7	4117	3.40	80	250	7400	6150
	TDRI-700-NM-78	700	189	750X750	78	28.8	5078	3.95	80	300	8650	7300
	TDRI-750-NM-77	750	182	800X800	77	26.4	5534	4.59	80	350	10000	8550
	TDRI-800-NM-77	800	182	850X850	77	28.2	6647	5.22	80	400	11450	9900
RUBBER HARD G_{din}= 1.4 MPa* ξ_{eff}= 15%*	TDRI-350-HM-75	350	162	400X400	75	17.0	1035	1.80	80	100	1900	1250
	TDRI-400-HM-75	400	162	450X450	75	19.5	1546	2.35	80	150	2600	1800
	TDRI-450-HM-78	450	159	500X500	78	18.3	1791	2.85	80	200	3350	2500
	TDRI-500-HM-77	500	167	550X550	77	17.5	2154	3.57	80	250	4200	3250
	TDRI-550-HM-75	550	177	600X600	75	27.0	3729	4.43	80	350	5150	4100
	TDRI-600-HM-75	600	177	650X650	75	29.5	4665	5.28	80	400	6250	5050
	TDRI-650-HM-78	650	174	700X700	78	26.7	5002	5.96	80	450	7400	6150
	TDRI-700-HM-78	700	189	750X750	78	28.8	6056	6.91	80	550	8650	7300
	TDRI-750-HM-77	750	182	800X800	77	26.4	6739	8.03	80	600	10000	8550
	TDRI-800-HM-77	800	182	850X850	77	28.2	7964	9.14	80	700	11450	9900

d_{Ed} Max displacement according to EN 15129 G_{din} Shear moduls * measured at 100% shear strain

TDRI BRIDGES
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 200mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TDRI-350-SM-100	350	202	400X400	100	17.0	346	0.38	113	44	1150	550
	TDRI-400-SM-100	400	202	450X450	100	19.5	559	0.50	113	57	1550	850
	TDRI-450-SM-102	450	195	500X500	102	18.3	638	0.62	113	71	2000	1200
	TDRI-500-SM-105	500	207	550X550	105	17.5	716	0.75	113	85	2500	1650
	TDRI-550-SM-100	550	217	600X600	100	27.0	1642	0.95	113	108	5150	3600
	TDRI-600-SM-105	600	225	650X650	105	29.5	2060	1.08	113	122	6250	4500
	TDRI-650-SM-108	650	219	700X700	108	26.7	2104	1.23	113	139	7400	5500
	TDRI-700-SM-108	700	234	750X750	108	28.8	2664	1.43	113	162	8650	6600
	TDRI-750-SM-105	750	222	800X800	105	26.4	2864	1.68	113	191	10000	7800
	TDRI-800-SM-105	800	222	850X850	105	28.2	3517	1.91	113	217	11450	9150
	TDRI-850-SM-104	850	215	900X900	104	26.3	3696	2.18	113	247	13000	10550
	TDRI-900-SM-104	900	230	950X950	104	27.8	4435	2.45	113	277	14650	12050
	TDRI-950-SM-104	950	230	1000X1000	104	29.4	5254	2.73	113	309	16400	13650
	TDRI-1000-SM-108	1000	231	1050X1050	108	27.5	5218	2.91	113	300	18250	15350
RUBBER NORMAL G_{din}= 0.8 MPa* ξ_{eff}= 10%-15%*	TDRI-350-NM-100	350	202	400X400	100	17.0	565	0.77	113	50	1900	900
	TDRI-400-NM-100	400	202	450X450	100	19.5	877	1.01	113	100	2600	1450
	TDRI-450-NM-102	450	195	500X500	102	18.3	1019	1.25	113	100	3350	2050
	TDRI-500-NM-105	500	207	550X550	105	17.5	1160	1.50	113	150	4200	2750
	TDRI-550-NM-100	550	217	600X600	100	27.0	2309	1.90	113	200	5150	3600
	TDRI-600-NM-105	600	225	650X650	105	29.5	2811	2.15	113	200	6250	4500
	TDRI-650-NM-108	650	219	700X700	108	26.7	2973	2.46	113	250	7400	5500
	TDRI-700-NM-108	700	234	750X750	108	28.8	3667	2.85	113	300	8650	6600
	TDRI-750-NM-105	750	222	800X800	105	26.4	4058	3.37	113	350	10000	7800
	TDRI-800-NM-105	800	222	850X850	105	28.2	4874	3.83	113	400	11450	9150
	TDRI-850-NM-104	850	215	900X900	104	26.3	5250	4.37	113	450	13000	10550
	TDRI-900-NM-104	900	230	950X950	104	27.8	6177	4.89	113	550	14650	12050
	TDRI-950-NM-104	950	230	1000X1000	104	29.4	7182	5.45	113	600	16400	13650
	TDRI-1000-NM-108	1000	231	1050X1050	108	27.5	7294	5.82	113	650	18250	15350
RUBBER HARD G_{din} =1.4 MPa* ξ_{eff}= 15%*	TDRI-350-HM-100	350	202	400X400	100	17.0	776	1.35	113	150	1900	900
	TDRI-400-HM-100	400	202	450X450	100	19.5	1160	1.76	113	150	2600	1450
	TDRI-450-HM-102	450	195	500X500	102	18.3	1370	2.18	113	200	3350	2050
	TDRI-500-HM-105	500	207	550X550	105	17.5	1580	2.62	113	250	4200	2750
	TDRI-550-HM-100	550	217	600X600	100	27.0	2797	3.33	113	350	5150	3600
	TDRI-600-HM-105	600	225	650X650	105	29.5	3332	3.77	113	400	6250	4500
	TDRI-650-HM-108	650	219	700X700	108	26.7	3612	4.30	113	450	7400	5500
	TDRI-700-HM-108	700	234	750X750	108	28.8	4374	4.99	113	550	8650	6600
	TDRI-750-HM-105	750	222	800X800	105	26.4	4942	5.89	113	650	10000	7800
	TDRI-800-HM-105	800	222	850X850	105	28.2	5840	6.70	113	750	11450	9150
	TDRI-850-HM-104	850	215	900X900	104	26.3	6404	7.64	113	850	13000	10550
	TDRI-900-HM-104	900	230	950X950	104	27.8	7426	8.56	113	950	14650	12050
	TDRI-950-HM-104	950	230	1000X1000	104	29.4	8522	9.54	113	1050	16400	13650
	TDRI-1000-HM-108	1000	231	1050X1050	108	27.5	8794	10.18	113	1150	18250	15350

TDRI BRIDGES
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 250mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TDRI-400-SM-125	400	242	450X450	125	19.5	448	0.40	147	59	1550	600
	TDRI-450-SM-126	450	231	500X500	126	18.3	516	0.50	147	74	2000	950
	TDRI-500-SM-126	500	237	550X550	126	17.5	596	0.62	147	91	2500	1350
	TDRI-550-SM-125	550	257	600X600	125	27.0	1313	0.76	147	112	5150	3050
	TDRI-600-SM-125	600	257	650X650	125	29.5	1730	0.90	147	133	6250	3900
	TDRI-650-SM-126	650	246	700X700	126	26.7	1804	1.05	147	155	7400	4900
	TDRI-700-SM-126	700	261	750X750	126	28.8	2283	1.22	147	179	8650	5950
	TDRI-750-SM-126	750	252	800X800	126	26.4	2386	1.40	147	206	10000	7100
	TDRI-800-SM-126	800	252	850X850	126	28.2	2931	1.60	147	234	11450	8350
	TDRI-850-SM-128	850	248	900X900	128	26.3	3003	1.77	147	260	13000	9700
	TDRI-900-SM-128	900	263	950X950	128	27.8	3604	1.99	147	292	14650	11150
	TDRI-950-SM-128	950	263	1000X1000	128	29.4	4269	2.22	147	325	16400	12700
	TDRI-1000-SM-126	1000	255	1050X1050	126	27.5	4472	2.49	147	366	18250	14350
	TDRI-1100-SM-130	1100	271	1150X1150	130	27.3	5200	2.92	147	429	22250	17950
	TDRI-1200-SM-130	1200	271	1250X1250	130	29.8	6829	3.48	147	510	26600	21950
RUBBER NORMAL G_{din}= 0.8 MPa* ξ_{eff}= 10%-15%*	TDRI-400-NM-125	400	242	450X450	125	19.5	702	0.80	147	118	2600	1050
	TDRI-450-NM-126	450	231	500X500	126	18.3	825	1.01	147	100	3350	1600
	TDRI-500-NM-126	500	237	550X550	126	17.5	966	1.25	147	150	4200	2300
	TDRI-550-NM-125	550	257	600X600	125	27.0	1848	1.52	147	200	5150	3050
	TDRI-600-NM-125	600	257	650X650	125	29.5	2361	1.81	147	250	6250	3900
	TDRI-650-NM-126	650	246	700X700	126	26.7	2548	2.11	147	300	7400	4900
	TDRI-700-NM-126	700	261	750X750	126	28.8	3144	2.44	147	350	8650	5950
	TDRI-750-NM-126	750	252	800X800	126	26.4	3382	2.80	147	400	10000	7100
	TDRI-800-NM-126	800	252	850X850	126	28.2	4062	3.19	147	450	11450	8350
	TDRI-850-NM-128	850	248	900X900	128	26.3	4265	3.55	147	500	13000	9700
	TDRI-900-NM-128	900	263	950X950	128	27.8	5019	3.98	147	550	14650	11150
	TDRI-950-NM-128	950	263	1000X1000	128	29.4	5836	4.43	147	600	16400	12700
	TDRI-1000-NM-126	1000	255	1050X1050	126	27.5	6252	4.99	147	700	18250	14350
	TDRI-1100-NM-130	1100	271	1150X1150	130	27.3	7292	5.85	147	850	22250	17950
RUBBER HARD G_{din}= 1.4 MPa* ξ_{eff}= 15%*	TDRI-400-HM-125	400	242	450X450	125	19.5	928	1.41	147	200	2600	1050
	TDRI-450-HM-126	450	231	500X500	126	18.3	1109	1.77	147	250	3350	1600
	TDRI-500-HM-126	500	237	550X550	126	17.5	1316	2.18	147	300	4200	2300
	TDRI-550-HM-125	550	257	600X600	125	27.0	2238	2.66	147	350	5150	3050
	TDRI-600-HM-125	600	257	650X650	125	29.5	2799	3.17	147	450	6250	3900
	TDRI-650-HM-126	650	246	700X700	126	26.7	3096	3.69	147	500	7400	4900
	TDRI-700-HM-126	700	261	750X750	126	28.8	3749	4.28	147	600	8650	5950
	TDRI-750-HM-126	750	252	800X800	126	26.4	4118	4.91	147	700	10000	7100
	TDRI-800-HM-126	800	252	850X850	126	28.2	4867	5.59	147	800	11450	8350
	TDRI-850-HM-128	850	248	900X900	128	26.3	5203	6.21	147	900	13000	9700
	TDRI-900-HM-128	900	263	950X950	128	27.8	6034	6.96	147	1000	14650	11150
	TDRI-950-HM-128	950	263	1000X1000	128	29.4	6924	7.75	147	1100	16400	12700
	TDRI-1000-HM-126	1000	255	1050X1050	126	27.5	7538	8.73	147	1250	18250	14350
	TDRI-1100-HM-130	1100	271	1150X1150	130	27.3	8812	10.23	147	1500	22250	17950

TDRI BRIDGES
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 300mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TDRI-450-SM-150	450	267	500X500	150	18.3	434	0.42	180	76	1850	650
	TDRI-500-SM-154	500	277	550X550	154	17.5	488	0.51	180	92	2500	1050
	TDRI-550-SM-150	550	297	600X600	150	27.0	1094	0.63	180	114	5150	2500
	TDRI-600-SM-150	600	297	650X650	150	29.5	1442	0.75	180	136	6250	3350
	TDRI-650-SM-150	650	282	700X700	150	26.7	1515	0.88	180	159	7400	4250
	TDRI-700-SM-150	700	297	750X750	150	28.8	1918	1.03	180	185	8650	5250
	TDRI-750-SM-154	750	292	800X800	154	26.4	1952	1.15	180	207	10000	6350
	TDRI-800-SM-154	800	292	850X850	154	28.2	2398	1.31	180	235	11450	7600
	TDRI-850-SM-152	850	281	900X900	152	26.3	2529	1.49	180	269	13000	8900
	TDRI-900-SM-152	900	296	950X950	152	27.8	3035	1.67	180	301	14650	10300
	TDRI-950-SM-152	950	296	1000X1000	152	29.4	3595	1.87	180	336	16400	11800
	TDRI-1000-SM-153	1000	291	1050X1050	153	27.5	3683	2.05	180	370	18250	13400
	TDRI-1100-SM-150	1100	297	1150X1150	150	27.3	4507	2.53	180	456	22250	16900
	TDRI-1200-SM-150	1200	297	1250X1250	150	29.8	5918	3.02	180	500	26600	20750
RUBBER NORMAL G_{din}= 0.8 MPa* ξ_{eff}= 10%-15%*	TDRI-450-NM-150	450	267	500X500	150	18.3	693	0.85	180	150	3350	1200
	TDRI-500-NM-154	500	277	550X550	154	17.5	791	1.02	180	150	4200	1800
	TDRI-550-NM-150	550	297	600X600	150	27.0	1540	1.27	180	200	5150	2500
	TDRI-600-NM-150	600	297	650X650	150	29.5	1968	1.51	180	250	6250	3350
	TDRI-650-NM-150	650	282	700X700	150	26.7	2141	1.77	180	300	7400	4250
	TDRI-700-NM-150	700	297	750X750	150	28.8	2641	2.05	180	350	8650	5250
	TDRI-750-NM-154	750	292	800X800	154	26.4	2767	2.29	180	400	10000	6350
	TDRI-800-NM-154	800	292	850X850	154	28.2	3323	2.61	180	450	11450	7600
	TDRI-850-NM-152	850	281	900X900	152	26.3	3592	2.99	180	500	13000	8900
	TDRI-900-NM-152	900	296	950X950	152	27.8	4226	3.35	180	600	14650	10300
	TDRI-950-NM-152	950	296	1000X1000	152	29.4	4914	3.73	180	650	16400	11800
	TDRI-1000-NM-153	1000	291	1050X1050	153	27.5	5149	4.11	180	700	18250	13400
	TDRI-1100-NM-150	1100	297	1150X1150	150	27.3	6320	5.07	180	900	22250	16900
	TDRI-1200-NM-150	1200	297	1250X1250	150	29.8	8055	6.03	180	1050	26600	20750
RUBBER HARD G_{din}= 1.4 MPa* ξ_{eff}= 15%*	TDRI-450-HM-150	450	267	500X500	150	18.3	931	1.48	180	250	3350	1200
	TDRI-500-HM-154	500	277	550X550	154	17.5	1077	1.78	180	300	4200	1800
	TDRI-550-HM-150	550	297	600X600	150	27.0	1865	2.22	180	350	5150	2500
	TDRI-600-HM-150	600	297	650X650	150	29.5	2333	2.64	180	450	6250	3350
	TDRI-650-HM-150	650	282	700X700	150	26.7	2601	3.10	180	550	7400	4250
	TDRI-700-HM-150	700	297	750X750	150	28.8	3149	3.59	180	600	8650	5250
	TDRI-750-HM-154	750	292	800X800	154	26.4	3369	4.02	180	700	10000	6350
	TDRI-800-HM-154	800	292	850X850	154	28.2	3982	4.57	180	800	11450	7600
	TDRI-850-HM-152	850	281	900X900	152	26.3	4381	5.23	180	900	13000	8900
	TDRI-900-HM-152	900	296	950X950	152	27.8	5081	5.86	180	1050	14650	10300
	TDRI-950-HM-152	950	296	1000X1000	152	29.4	5831	6.53	180	1150	16400	11800
	TDRI-1000-HM-153	1000	291	1050X1050	153	27.5	6208	7.19	180	1250	18250	13400
	TDRI-1100-HM-150	1100	297	1150X1150	150	27.3	7637	8.87	180	1550	22250	16900
	TDRI-1200-HM-150	1200	297	1250X1250	150	29.8	9529	10.56	180	1900	26600	20750

TDRI BRIDGES
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 350mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TDRI-550-SM-175	550	337	600X600	175	27.0	938	0.54	213	116	4150	1600
	TDRI-600-SM-175	600	337	650X650	175	29.5	1236	0.65	213	138	6250	2750
	TDRI-650-SM-180	650	327	700X700	180	26.7	1263	0.74	213	157	7400	3600
	TDRI-700-SM-180	700	342	750X750	180	28.8	1598	0.86	213	182	8650	4600
	TDRI-750-SM-175	750	322	800X800	175	26.4	1718	1.01	213	215	10000	5650
	TDRI-800-SM-175	800	322	850X850	175	28.2	2110	1.15	213	245	11450	6800
	TDRI-850-SM-176	850	314	900X900	176	26.3	2184	1.29	213	275	13000	8050
	TDRI-900-SM-176	900	329	950X950	176	27.8	2621	1.45	213	300	14650	9400
	TDRI-950-SM-176	950	329	1000X1000	176	29.4	3105	1.61	213	300	16400	10850
	TDRI-1000-SM-180	1000	327	1050X1050	180	27.5	3131	1.75	213	350	18250	12400
	TDRI-1100-SM-180	1100	336	1150X1150	180	27.3	3755	2.11	213	450	22250	15800
	TDRI-1200-SM-180	1200	336	1250X1250	180	29.8	4932	2.51	213	500	26600	19600
RUBBER NORMAL **G_{din}= 0.8 MPa*** **ξ_{eff}= 10%-15%***	TDRI-550-NM-175	550	337	600X600	175	27.0	1320	1.09	213	200	5150	2000
	TDRI-600-NM-175	600	337	650X650	175	29.5	1687	1.29	213	250	6250	2750
	TDRI-650-NM-180	650	327	700X700	180	26.7	1784	1.47	213	300	7400	3600
	TDRI-700-NM-180	700	342	750X750	180	28.8	2200	1.71	213	350	8650	4600
	TDRI-750-NM-175	750	322	800X800	175	26.4	2435	2.02	213	400	10000	5650
	TDRI-800-NM-175	800	322	850X850	175	28.2	2925	2.30	213	450	11450	6800
	TDRI-850-NM-176	850	314	900X900	176	26.3	3102	2.58	213	550	13000	8050
	TDRI-900-NM-176	900	329	950X950	176	27.8	3650	2.89	213	600	14650	9400
	TDRI-950-NM-176	950	329	1000X1000	176	29.4	4244	3.22	213	650	16400	10850
	TDRI-1000-NM-180	1000	327	1050X1050	180	27.5	4376	3.49	213	700	18250	12400
	TDRI-1100-NM-180	1100	336	1150X1150	180	27.3	5267	4.22	213	900	22250	15800
	TDRI-1200-NM-180	1200	336	1250X1250	180	29.8	6712	5.03	213	1050	26600	19600
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TDRI-550-HM-175	550	337	600X600	175	27.0	1598	1.90	213	400	5150	2000
	TDRI-600-HM-175	600	337	650X650	175	29.5	1999	2.26	213	450	6250	2750
	TDRI-650-HM-180	650	327	700X700	180	26.7	2167	2.58	213	550	7400	3600
	TDRI-700-HM-180	700	342	750X750	180	28.8	2624	2.99	213	600	8650	4600
	TDRI-750-HM-175	750	322	800X800	175	26.4	2965	3.53	213	750	10000	5650
	TDRI-800-HM-175	800	322	850X850	175	28.2	3504	4.02	213	850	11450	6800
	TDRI-850-HM-176	850	314	900X900	176	26.3	3784	4.51	213	950	13000	8050
	TDRI-900-HM-176	900	329	950X950	176	27.8	4388	5.06	213	1050	14650	9400
	TDRI-950-HM-176	950	329	1000X1000	176	29.4	5036	5.64	213	1200	16400	10850
	TDRI-1000-HM-180	1000	327	1050X1050	180	27.5	5277	6.11	213	1300	18250	12400
	TDRI-1100-HM-180	1100	336	1150X1150	180	27.3	6364	7.39	213	1550	22250	15800
	TDRI-1200-HM-180	1200	336	1250X1250	180	29.8	7941	8.80	213	1850	26600	19600

TDRI BUILDINGS
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 150mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TDRI-350-SM-75	350	162	400X400	75	17.0	461	0.51	125	50	1800	1000
	TDRI-400-SM-75	400	162	450X450	75	19.5	746	0.67	125	50	2950	1800
	TDRI-450-SM-78	450	159	500X500	78	18.3	834	0.82	125	100	3800	2500
	TDRI-500-SM-77	500	167	550X550	77	17.5	976	1.02	125	100	4700	3250
	TDRI-550-SM-75	550	177	600X600	75	27.0	2189	1.27	125	150	5700	4100
	TDRI-600-SM-75	600	177	650X650	75	29.5	2884	1.51	125	150	6800	5050
	TDRI-650-SM-78	650	174	700X700	78	26.7	2914	1.70	125	200	8000	6150
	TDRI-700-SM-78	700	189	750X750	78	28.8	3688	1.97	125	200	9300	7300
	TDRI-750-SM-77	750	182	800X800	77	26.4	3905	2.29	125	250	10750	8550
RUBBER NORMAL **G_{din}= 0.8 MPa*** **ξ_{eff}= 10%-15%***	TDRI-350-NM-75	350	162	400X400	75	17.0	754	1.03	125	100	1800	1000
	TDRI-400-NM-75	400	162	450X450	75	19.5	1170	1.34	125	150	2950	1800
	TDRI-450-NM-78	450	159	500X500	78	18.3	1332	1.63	125	200	3800	2500
	TDRI-500-NM-77	500	167	550X550	77	17.5	1581	2.04	125	250	4700	3250
	TDRI-550-NM-75	550	177	600X600	75	27.0	3079	2.53	125	300	5700	4100
	TDRI-600-NM-75	600	177	650X650	75	29.5	3936	3.02	125	350	6800	5050
	TDRI-650-NM-78	650	174	700X700	78	26.7	4117	3.40	125	400	8000	6150
	TDRI-700-NM-78	700	189	750X750	78	28.8	5078	3.95	125	450	9300	7300
	TDRI-750-NM-77	750	182	800X800	77	26.4	5534	4.59	125	550	10750	8550
	TDRI-800-NM-77	800	182	850X850	77	28.2	6647	5.22	125	650	12250	9900
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TDRI-350-HM-75	350	162	400X400	75	17.0	1035	1.80	125	200	2250	1250
	TDRI-400-HM-75	400	162	450X450	75	19.5	1546	2.35	125	250	2950	1800
	TDRI-450-HM-78	450	159	500X500	78	18.3	1791	2.85	125	350	3800	2500
	TDRI-500-HM-77	500	167	550X550	77	17.5	2154	3.57	125	400	4700	3250
	TDRI-550-HM-75	550	177	600X600	75	27.0	3729	4.43	125	550	5700	4100
	TDRI-600-HM-75	600	177	650X650	75	29.5	4665	5.28	125	650	6800	5050
	TDRI-650-HM-78	650	174	700X700	78	26.7	5002	5.96	125	700	8000	6150
	TDRI-700-HM-78	700	189	750X750	78	28.8	6056	6.91	125	850	9300	7300
	TDRI-750-HM-77	750	182	800X800	77	26.4	6739	8.03	125	1000	10750	8550
	TDRI-800-HM-77	800	182	850X850	77	28.2	7964	9.14	125	1100	12250	9900

d_{Ed} Max displacement according to EN 15129 G_{din} Shear moduls * measured at 100% shear strain

TDRI BUILDINGS
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 200mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TDRI-350-SM-100	350	202	400X400	100	17.0	346	0.38	167	64	1350	550
	TDRI-400-SM-100	400	202	450X450	100	19.5	559	0.50	167	84	2350	1150
	TDRI-450-SM-102	450	195	500X500	102	18.3	638	0.62	167	104	3000	1650
	TDRI-500-SM-105	500	207	550X550	105	17.5	716	0.75	167	125	3750	2200
	TDRI-550-SM-100	550	217	600X600	100	27.0	1642	0.95	167	158	5700	3600
	TDRI-600-SM-105	600	225	650X650	105	29.5	2060	1.08	167	180	6800	4500
	TDRI-650-SM-108	650	219	700X700	108	26.7	2104	1.23	167	205	8000	5500
	TDRI-700-SM-108	700	234	750X750	108	28.8	2664	1.43	167	238	9300	6600
	TDRI-750-SM-105	750	222	800X800	105	26.4	2864	1.68	167	280	10750	7800
	TDRI-800-SM-105	800	222	850X850	105	28.2	3517	1.91	167	319	12250	9150
	TDRI-850-SM-104	850	215	900X900	104	26.3	3696	2.18	167	364	13850	10550
	TDRI-900-SM-104	900	230	950X950	104	27.8	4435	2.45	167	408	15550	12050
	TDRI-950-SM-104	950	230	1000X1000	104	29.4	5254	2.73	167	454	17300	13650
	TDRI-1000-SM-108	1000	231	1050X1050	108	27.5	5218	2.91	167	450	19200	15350
RUBBER NORMAL G_{din}= 0.8 MPa* ξ_{eff}= 10%-15%*	TDRI-350-NM-100	350	202	400X400	100	17.0	565	0.77	167	100	2250	900
	TDRI-400-NM-100	400	202	450X450	100	19.5	877	1.01	167	150	2950	1450
	TDRI-450-NM-102	450	195	500X500	102	18.3	1019	1.25	167	200	3800	2050
	TDRI-500-NM-105	500	207	550X550	105	17.5	1160	1.50	167	200	4700	2750
	TDRI-550-NM-100	550	217	600X600	100	27.0	2309	1.90	167	300	5700	3600
	TDRI-600-NM-105	600	225	650X650	105	29.5	2811	2.15	167	350	6800	4500
	TDRI-650-NM-108	650	219	700X700	108	26.7	2973	2.46	167	400	8000	5500
	TDRI-700-NM-108	700	234	750X750	108	28.8	3667	2.85	167	450	9300	6600
	TDRI-750-NM-105	750	222	800X800	105	26.4	4058	3.37	167	550	10750	7800
	TDRI-800-NM-105	800	222	850X850	105	28.2	4874	3.83	167	600	12250	9150
	TDRI-850-NM-104	850	215	900X900	104	26.3	5250	4.37	167	700	13850	10550
	TDRI-900-NM-104	900	230	950X950	104	27.8	6177	4.89	167	800	15550	12050
	TDRI-950-NM-104	950	230	1000X1000	104	29.4	7182	5.45	167	900	17300	13650
	TDRI-1000-NM-108	1000	231	1050X1050	108	27.5	7294	5.82	167	950	19200	15350
RUBBER HARD G_{din}= 1.4 MPa* ξ_{eff}= 15%*	TDRI-350-HM-100	350	202	400X400	100	17.0	776	1.35	167	200	2250	900
	TDRI-400-HM-100	400	202	450X450	100	19.5	1160	1.76	167	250	2950	1450
	TDRI-450-HM-102	450	195	500X500	102	18.3	1370	2.18	167	350	3800	2050
	TDRI-500-HM-105	500	207	550X550	105	17.5	1580	2.62	167	400	4700	2750
	TDRI-550-HM-100	550	217	600X600	100	27.0	2797	3.33	167	550	5700	3600
	TDRI-600-HM-105	600	225	650X650	105	29.5	3332	3.77	167	600	6800	4500
	TDRI-650-HM-108	650	219	700X700	108	26.7	3612	4.30	167	700	8000	5500
	TDRI-700-HM-108	700	234	750X750	108	28.8	4374	4.99	167	800	9300	6600
	TDRI-750-HM-105	750	222	800X800	105	26.4	4942	5.89	167	950	10750	7800
	TDRI-800-HM-105	800	222	850X850	105	28.2	5840	6.70	167	1100	12250	9150
	TDRI-850-HM-104	850	215	900X900	104	26.3	6404	7.64	167	1250	13850	10550
	TDRI-900-HM-104	900	230	950X950	104	27.8	7426	8.56	167	1400	15550	12050
	TDRI-950-HM-104	950	230	1000X1000	104	29.4	8522	9.54	167	1550	17300	13650
	TDRI-1000-HM-108	1000	231	1050X1050	108	27.5	8794	10.18	167	1650	19200	15350

TDRI BUILDINGS
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 250mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TDRI-400-SM-125	400	242	450X450	125	19.5	448	0.40	208	84	1750	600
	TDRI-450-SM-126	450	231	500X500	126	18.3	516	0.50	208	105	2250	950
	TDRI-500-SM-126	500	237	550X550	126	17.5	596	0.62	208	130	2800	1350
	TDRI-550-SM-125	550	257	600X600	125	27.0	1313	0.76	208	158	5700	3050
	TDRI-600-SM-125	600	257	650X650	125	29.5	1730	0.90	208	188	6800	3900
	TDRI-650-SM-126	650	246	700X700	126	26.7	1804	1.05	208	219	8000	4900
	TDRI-700-SM-126	700	261	750X750	126	28.8	2283	1.22	208	255	9300	5950
	TDRI-750-SM-126	750	252	800X800	126	26.4	2386	1.40	208	292	10750	7100
	TDRI-800-SM-126	800	252	850X850	126	28.2	2931	1.60	208	332	12250	8350
	TDRI-850-SM-128	850	248	900X900	128	26.3	3003	1.77	208	369	13850	9700
	TDRI-900-SM-128	900	263	950X950	128	27.8	3604	1.99	208	414	15550	11150
	TDRI-950-SM-128	950	263	1000X1000	128	29.4	4269	2.22	208	461	17300	12700
	TDRI-1000-SM-126	1000	255	1050X1050	126	27.5	4472	2.49	208	519	19200	14350
	TDRI-1100-SM-130	1100	271	1150X1150	130	27.3	5200	2.92	208	609	23300	17950
	TDRI-1200-SM-130	1200	271	1250X1250	130	29.8	6829	3.48	208	725	27800	21950
RUBBER NORMAL G_{din}= 0.8 MPa* ξ_{eff}= 10%-15%*	TDRI-400-NM-125	400	242	450X450	125	19.5	702	0.80	208	168	2950	1050
	TDRI-450-NM-126	450	231	500X500	126	18.3	825	1.01	208	200	3800	1600
	TDRI-500-NM-126	500	237	550X550	126	17.5	966	1.25	208	250	4700	2300
	TDRI-550-NM-125	550	257	600X600	125	27.0	1848	1.52	208	300	5700	3050
	TDRI-600-NM-125	600	257	650X650	125	29.5	2361	1.81	208	350	6800	3900
	TDRI-650-NM-126	650	246	700X700	126	26.7	2548	2.11	208	400	8000	4900
	TDRI-700-NM-126	700	261	750X750	126	28.8	3144	2.44	208	500	9300	5950
	TDRI-750-NM-126	750	252	800X800	126	26.4	3382	2.80	208	550	10750	7100
	TDRI-800-NM-126	800	252	850X850	126	28.2	4062	3.19	208	650	12250	8350
	TDRI-850-NM-128	850	248	900X900	128	26.3	4265	3.55	208	700	13850	9700
	TDRI-900-NM-128	900	263	950X950	128	27.8	5019	3.98	208	800	15550	11150
	TDRI-950-NM-128	950	263	1000X1000	128	29.4	5836	4.43	208	900	17300	12700
	TDRI-1000-NM-126	1000	255	1050X1050	126	27.5	6252	4.99	208	1000	19200	14350
	TDRI-1100-NM-130	1100	271	1150X1150	130	27.3	7292	5.85	208	1200	23300	17950
	TDRI-1200-NM-130	1200	271	1250X1250	130	29.8	9294	6.96	208	1400	27800	21950
RUBBER HARD G_{din}= 1.4 MPa* ξ_{eff}= 15%*	TDRI-400-HM-125	400	242	450X450	125	19.5	928	1.41	208	250	2950	1050
	TDRI-450-HM-126	450	231	500X500	126	18.3	1109	1.77	208	350	3800	1600
	TDRI-500-HM-126	500	237	550X550	126	17.5	1316	2.18	208	450	4700	2300
	TDRI-550-HM-125	550	257	600X600	125	27.0	2238	2.66	208	550	5700	3050
	TDRI-600-HM-125	600	257	650X650	125	29.5	2799	3.17	208	650	6800	3900
	TDRI-650-HM-126	650	246	700X700	126	26.7	3096	3.69	208	750	8000	4900
	TDRI-700-HM-126	700	261	750X750	126	28.8	3749	4.28	208	850	9300	5950
	TDRI-750-HM-126	750	252	800X800	126	26.4	4118	4.91	208	1000	10750	7100
	TDRI-800-HM-126	800	252	850X850	126	28.2	4867	5.59	208	1150	12250	8350
	TDRI-850-HM-128	850	248	900X900	128	26.3	5203	6.21	208	1250	13850	9700
	TDRI-900-HM-128	900	263	950X950	128	27.8	6034	6.96	208	1400	15550	11150
	TDRI-950-HM-128	950	263	1000X1000	128	29.4	6924	7.75	208	1600	17300	12700
	TDRI-1000-HM-126	1000	255	1050X1050	126	27.5	7538	8.73	208	1800	19200	14350
	TDRI-1100-HM-130	1100	271	1150X1150	130	27.3	8812	10.23	208	2100	23300	17950
	TDRI-1200-HM-130	1200	271	1250X1250	130	29.8	10995	12.18	208	2500	27800	21950

TDRI BUILDINGS
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 300mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TDRI-450-SM-150	450	267	500X500	150	18.3	434	0.42	250	106	2100	650
	TDRI-500-SM-154	500	277	550X550	154	17.5	488	0.51	250	127	2800	1050
	TDRI-550-SM-150	550	297	600X600	150	27.0	1094	0.63	250	158	5700	2500
	TDRI-600-SM-150	600	297	650X650	150	29.5	1442	0.75	250	188	6800	3350
	TDRI-650-SM-150	650	282	700X700	150	26.7	1515	0.88	250	221	8000	4250
	TDRI-700-SM-150	700	297	750X750	150	28.8	1918	1.03	250	257	9300	5250
	TDRI-750-SM-154	750	292	800X800	154	26.4	1952	1.15	250	287	10750	6350
	TDRI-800-SM-154	800	292	850X850	154	28.2	2398	1.31	250	326	12250	7600
	TDRI-850-SM-152	850	281	900X900	152	26.3	2529	1.49	250	373	13850	8900
	TDRI-900-SM-152	900	296	950X950	152	27.8	3035	1.67	250	419	15550	10300
	TDRI-950-SM-152	950	296	1000X1000	152	29.4	3595	1.87	250	466	17300	11800
	TDRI-1000-SM-153	1000	291	1050X1050	153	27.5	3683	2.05	250	513	19200	13400
	TDRI-1100-SM-150	1100	297	1150X1150	150	27.3	4507	2.53	250	634	23300	16900
	TDRI-1200-SM-150	1200	297	1250X1250	150	29.8	5918	3.02	250	750	27800	20750
RUBBER NORMAL G_{din}= 0.8 MPa* ξ_{eff}= 10%-15%*	TDRI-450-NM-150	450	267	500X500	150	18.3	693	0.85	250	200	3800	1200
	TDRI-500-NM-154	500	277	550X550	154	17.5	791	1.02	250	250	4700	1800
	TDRI-550-NM-150	550	297	600X600	150	27.0	1540	1.27	250	300	5700	2500
	TDRI-600-NM-150	600	297	650X650	150	29.5	1968	1.51	250	350	6800	3350
	TDRI-650-NM-150	650	282	700X700	150	26.7	2141	1.77	250	400	8000	4250
	TDRI-700-NM-150	700	297	750X750	150	28.8	2641	2.05	250	500	9300	5250
	TDRI-750-NM-154	750	292	800X800	154	26.4	2767	2.29	250	550	10750	6350
	TDRI-800-NM-154	800	292	850X850	154	28.2	3323	2.61	250	650	12250	7600
	TDRI-850-NM-152	850	281	900X900	152	26.3	3592	2.99	250	700	13850	8900
	TDRI-900-NM-152	900	296	950X950	152	27.8	4226	3.35	250	800	15550	10300
	TDRI-950-NM-152	950	296	1000X1000	152	29.4	4914	3.73	250	900	17300	11800
	TDRI-1000-NM-153	1000	291	1050X1050	153	27.5	5149	4.11	250	1000	19200	13400
	TDRI-1100-NM-150	1100	297	1150X1150	150	27.3	6320	5.07	250	1250	23300	16900
	TDRI-1200-NM-150	1200	297	1250X1250	150	29.8	8055	6.03	250	1500	27800	20750
RUBBER HARD G_{din}= 1.4 MPa* ξ_{eff}= 15%*	TDRI-450-HM-150	450	267	500X500	150	18.3	931	1.48	250	350	3800	1200
	TDRI-500-HM-154	500	277	550X550	154	17.5	1077	1.78	250	400	4700	1800
	TDRI-550-HM-150	550	297	600X600	150	27.0	1865	2.22	250	550	5700	2500
	TDRI-600-HM-150	600	297	650X650	150	29.5	2333	2.64	250	650	6800	3350
	TDRI-650-HM-150	650	282	700X700	150	26.7	2601	3.10	250	750	8000	4250
	TDRI-700-HM-150	700	297	750X750	150	28.8	3149	3.59	250	850	9300	5250
	TDRI-750-HM-154	750	292	800X800	154	26.4	3369	4.02	250	1000	10750	6350
	TDRI-800-HM-154	800	292	850X850	154	28.2	3982	4.57	250	1100	12250	7600
	TDRI-850-HM-152	850	281	900X900	152	26.3	4381	5.23	250	1300	13850	8900
	TDRI-900-HM-152	900	296	950X950	152	27.8	5081	5.86	250	1450	15550	10300
	TDRI-950-HM-152	950	296	1000X1000	152	29.4	5831	6.53	250	1600	17300	11800
	TDRI-1000-HM-153	1000	291	1050X1050	153	27.5	6208	7.19	250	1750	19200	13400
	TDRI-1100-HM-150	1100	297	1150X1150	150	27.3	7637	8.87	250	2200	23300	16900
	TDRI-1200-HM-150	1200	297	1250X1250	150	29.8	9529	10.56	250	2600	27800	20750

TDRI BUILDINGS
TENS DAMPING RUBBER ISOLATOR

HIGH DAMPING RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 350mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seismic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TDRI-550-SM-175	550	337	600X600	175	27.0	938	0.54	292	158	4550	1600
	TDRI-600-SM-175	600	337	650X650	175	29.5	1236	0.65	292	188	6800	2750
	TDRI-650-SM-180	650	327	700X700	180	26.7	1263	0.74	292	215	8000	3600
	TDRI-700-SM-180	700	342	750X750	180	28.8	1598	0.86	292	249	9300	4600
	TDRI-750-SM-175	750	322	800X800	175	26.4	1718	1.01	292	295	10750	5650
	TDRI-800-SM-175	800	322	850X850	175	28.2	2110	1.15	292	335	12250	6800
	TDRI-850-SM-176	850	314	900X900	176	26.3	2184	1.29	292	376	13850	8050
	TDRI-900-SM-176	900	329	950X950	176	27.8	2621	1.45	292	400	15550	9400
	TDRI-950-SM-176	950	329	1000X1000	176	29.4	3105	1.61	292	450	17300	10850
	TDRI-1000-SM-180	1000	327	1050X1050	180	27.5	3131	1.75	292	500	19200	12400
	TDRI-1100-SM-180	1100	336	1150X1150	180	27.3	3755	2.11	292	600	23300	15800
	TDRI-1200-SM-180	1200	336	1250X1250	180	29.8	4932	2.51	292	700	27800	19600
RUBBER NORMAL **G_{din}= 0.8 MPa*** **ξ_{eff}= 10%-15%***	TDRI-550-NM-175	550	337	600X600	175	27.0	1320	1.09	292	300	5700	2000
	TDRI-600-NM-175	600	337	650X650	175	29.5	1687	1.29	292	350	6800	2750
	TDRI-650-NM-180	650	327	700X700	180	26.7	1784	1.47	292	400	8000	3600
	TDRI-700-NM-180	700	342	750X750	180	28.8	2200	1.71	292	450	9300	4600
	TDRI-750-NM-175	750	322	800X800	175	26.4	2435	2.02	292	550	10750	5650
	TDRI-800-NM-175	800	322	850X850	175	28.2	2925	2.30	292	650	12250	6800
	TDRI-850-NM-176	850	314	900X900	176	26.3	3102	2.58	292	750	13850	8050
	TDRI-900-NM-176	900	329	950X950	176	27.8	3650	2.89	292	800	15550	9400
	TDRI-950-NM-176	950	329	1000X1000	176	29.4	4244	3.22	292	900	17300	10850
	TDRI-1000-NM-180	1000	327	1050X1050	180	27.5	4376	3.49	292	1000	19200	12400
	TDRI-1100-NM-180	1100	336	1150X1150	180	27.3	5267	4.22	292	1200	23300	15800
	TDRI-1200-NM-180	1200	336	1250X1250	180	29.8	6712	5.03	292	1450	27800	19600
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TDRI-550-HM-175	550	337	600X600	175	27.0	1598	1.90	292	550	5700	2000
	TDRI-600-HM-175	600	337	650X650	175	29.5	1999	2.26	292	650	6800	2750
	TDRI-650-HM-180	650	327	700X700	180	26.7	2167	2.58	292	750	8000	3600
	TDRI-700-HM-180	700	342	750X750	180	28.8	2624	2.99	292	850	9300	4600
	TDRI-750-HM-175	750	322	800X800	175	26.4	2965	3.53	292	1000	10750	5650
	TDRI-800-HM-175	800	322	850X850	175	28.2	3504	4.02	292	1150	12250	6800
	TDRI-850-HM-176	850	314	900X900	176	26.3	3784	4.51	292	1300	13850	8050
	TDRI-900-HM-176	900	329	950X950	176	27.8	4388	5.06	292	1450	15550	9400
	TDRI-950-HM-176	950	329	1000X1000	176	29.4	5036	5.64	292	1600	17300	10850
	TDRI-1000-HM-180	1000	327	1050X1050	180	27.5	5277	6.11	292	1750	19200	12400
	TDRI-1100-HM-180	1100	336	1150X1150	180	27.3	6364	7.39	292	2150	23300	15800
	TDRI-1200-HM-180	1200	336	1250X1250	180	29.8	7941	8.80	292	2550	27800	19600

Unicredit building, Milan (Italy)

Pedemontana Motorway, Lura Viaduct (Italy)

TLRI BRIDGES
TENS LEAD RUBBER ISOLATOR

LEAD RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 150mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TLRI-350-SM-75/55	350	162	400X400	75	16.6	431	0.8	25	6	30	80	64	1100	700
	TLRI-400-SM-75/60	400	162	450X450	75	19.0	703	1.0	24	6	36	80	81	2500	1400
	TLRI-450-SM-78/70	450	159	500X500	78	17.9	782	1.3	25	7	48	80	102	3250	1950
	TLRI-500-SM-77/75	500	167	550X550	77	17.1	919	1.5	24	6	56	80	124	4100	2550
	TLRI-550-SM-75/85	550	177	600X600	75	26.3	2073	1.9	24	6	72	80	156	5050	4000
	TLRI-600-SM-75/95	600	177	650X650	75	28.7	2730	2.4	25	7	89	80	188	6050	4950
	TLRI-650-SM-78/100	650	174	700X700	78	26.0	2761	2.6	25	6	99	80	211	7200	6000
	TLRI-700-SM-78/105	700	189	750X750	78	28.1	3510	3.0	24	6	110	80	241	8450	7100
	TLRI-750-SM-77/115	750	182	800X800	77	25.8	3701	3.5	24	6	131	80	283	9750	8350
RUBBER NORMAL **G_{din}= 0.9 MPa*** **ξ_{eff}= 10%-15%***	TLRI-350-NM-75/60	350	162	400X400	75	16.5	756	1.5	25	6	55	80	118	1500	950
	TLRI-400-NM-75/70	400	162	450X450	75	18.9	1166	1.9	25	7	73	80	155	2500	1750
	TLRI-450-NM-78/75	450	159	500X500	78	17.8	1339	2.3	24	6	86	80	187	3250	2400
	TLRI-500-NM-77/85	500	167	550X550	77	17.0	1588	2.9	25	6	110	80	235	4100	3150
	TLRI-550-NM-75/95	550	177	600X600	75	26.2	3050	3.7	25	6	137	80	292	5000	4000
	TLRI-600-NM-75/100	600	177	650X650	75	28.7	3741	3.9	25	7	149	80	313	6050	4950
	TLRI-650-NM-78/110	650	174	700X700	78	25.9	4090	4.9	25	6	183	80	393	7150	5950
	TLRI-700-NM-78/120	700	189	750X750	78	27.9	5028	5.7	25	7	216	80	458	8400	7050
	TLRI-750-NM-77/130	750	182	800X800	77	25.6	5486	6.7	25	7	252	80	533	9700	8300
	TLRI-800-NM-77/135	800	182	850X850	77	27.4	6597	7.5	24	6	279	80	600	11100	9600
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TLRI-350-HM-75/75	350	162	400X400	75	16.2	936	2.3	25	6	85	80	181	1800	1200
	TLRI-400-HM-75/85	400	162	450X450	75	18.6	1411	2.9	25	6	110	80	236	2450	1750
	TLRI-450-HM-78/95	450	159	500X500	78	17.5	1633	3.6	25	7	136	80	289	3200	2350
	TLRI-500-HM-77/105	500	167	550X550	77	16.7	1962	4.5	25	6	168	80	360	4000	3100
	TLRI-550-HM-75/120	550	177	600X600	75	25.7	3442	5.6	25	7	214	80	451	4900	3900
	TLRI-600-HM-75/130	600	177	650X650	75	28.1	4327	6.7	25	7	253	80	535	5950	4800
	TLRI-650-HM-78/135	650	174	700X700	78	25.5	4652	7.5	25	6	278	80	599	7050	5850
	TLRI-700-HM-78/150	700	189	750X750	78	27.4	5623	8.8	25	7	334	80	704	8250	6950
	TLRI-750-HM-77/160	750	182	800X800	77	25.2	6242	10.2	25	7	384	80	814	9550	8150
	TLRI-800-HM-77/170	800	182	850X850	77	26.9	7400	11.6	25	7	435	80	925	10900	9450

d_{Ed} Max displacement according to EN 15129 G_{din} Shear moduls * measured at 100% shear strain

TLRI BRIDGES
TENS LEAD RUBBER ISOLATOR

LEAD RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 200mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TLRI-350-SM-100/55	350	202	400X400	100	16.6	323	0.6	24	9	30	113	66	750	500
	TLRI-400-SM-100/65	400	202	450X450	100	19.0	522	0.8	25	9	42	113	89	1500	800
	TLRI-450-SM-102/70	450	195	500X500	102	17.9	598	0.9	24	9	49	113	107	1950	1200
	TLRI-500-SM-105/80	500	207	550X550	105	17.0	668	1.2	25	9	63	113	133	2450	1600
	TLRI-550-SM-100/90	550	217	600X600	100	26.3	1544	1.5	25	9	80	113	168	5050	3500
	TLRI-600-SM-105/95	600	225	650X650	105	28.7	1950	1.7	25	9	89	113	190	6050	4400
	TLRI-650-SM-108/100	650	219	700X700	108	26.0	1994	1.9	24	9	99	113	215	7200	5350
	TLRI-700-SM-108/110	700	234	750X750	108	28.0	2523	2.2	25	9	119	113	253	8450	6450
	TLRI-750-SM-105/120	750	222	800X800	105	25.7	2701	2.6	25	9	142	113	299	9750	7600
	TLRI-800-SM-105/125	800	222	850X850	105	27.5	3333	3.0	24	9	155	113	334	11150	8900
	TLRI-850-SM-104/135	850	215	900X900	104	25.6	3489	3.4	25	9	180	113	384	12650	10250
	TLRI-900-SM-104/145	900	230	950X950	104	27.1	4187	3.8	25	9	207	113	435	14250	11700
	TLRI-950-SM-104/150	950	230	1000X1000	104	28.6	4979	4.2	25	9	223	113	478	16000	13300
	TLRI-1000-SM-108/155	1000	1000	1050X1050	108	26.8	4946	4.5	25	9	238	113	510	17800	14950
RUBBER NORMAL **G_{din}= 0.9 MPa*** **ξ_{eff}= 10%-15%***	TLRI-350-NM-100/60	350	202	400X400	100	16.5	567	1.1	24	9	56	113	124	1850	900
	TLRI-400-NM-100/70	400	202	450X450	100	18.9	874	1.4	24	9	75	113	163	2500	1400
	TLRI-450-NM-102/80	450	195	500X500	102	17.7	1015	1.8	25	9	96	113	204	3250	2000
	TLRI-500-NM-105/85	500	207	550X550	105	17.0	1165	2.1	24	9	112	113	242	4100	2700
	TLRI-550-NM-100/100	550	217	600X600	100	26.1	2274	2.8	25	9	149	113	313	5000	3450
	TLRI-600-NM-105/105	600	225	650X650	105	28.6	2775	3.1	25	9	166	113	353	6050	4350
	TLRI-650-NM-108/110	650	219	700X700	108	25.9	2954	3.5	24	9	185	113	399	7150	5350
	TLRI-700-NM-108/120	700	234	750X750	108	27.9	3632	4.1	25	9	218	113	466	8400	6400
	TLRI-750-NM-105/130	750	222	800X800	105	25.6	4023	4.8	25	9	256	113	549	9700	7600
	TLRI-800-NM-105/140	800	222	850X850	105	27.3	4819	5.5	25	9	295	113	627	11100	8850
	TLRI-850-NM-104/150	850	215	900X900	104	25.4	5195	6.3	25	9	338	113	716	12600	10200
	TLRI-900-NM-104/160	900	230	950X950	104	26.9	6099	7.1	25	9	382	113	805	14200	11650
	TLRI-950-NM-104/165	950	230	1000X1000	104	28.5	7101	7.8	25	9	414	113	888	15900	13200
	TLRI-1000-NM-108/175	1000	231	1050X1050	108	26.6	7218	8.5	25	9	455	113	960	17700	14850
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TLRI-350-HM-100/75	350	202	400X400	100	16.2	702	1.7	24	9	87	113	190	1800	850
	TLRI-400-HM-100/90	400	202	450X450	100	18.5	1046	2.2	25	9	120	113	253	2450	1350
	TLRI-450-HM-102/100	450	195	500X500	102	17.4	1236	2.8	25	9	149	113	314	3150	1950
	TLRI-500-HM-105/110	500	207	550X550	105	16.6	1425	3.3	25	9	180	113	377	4000	2600
	TLRI-550-HM-100/120	550	217	600X600	100	25.7	2582	4.2	25	9	220	113	472	4900	3400
	TLRI-600-HM-105/130	600	225	650X650	105	28.1	3091	4.8	25	9	254	113	540	5950	4250
	TLRI-650-HM-108/140	650	219	700X700	108	25.4	3341	5.5	25	9	293	113	619	7050	5250
	TLRI-700-HM-108/150	700	234	750X750	108	27.4	4061	6.3	25	9	338	113	716	8250	6300
	TLRI-750-HM-105/165	750	222	800X800	105	25.1	4554	7.5	25	9	404	113	849	9500	7450
	TLRI-800-HM-105/175	800	222	850X850	105	26.8	5402	8.5	25	9	457	113	964	10900	8700
	TLRI-850-HM-104/185	850	215	900X900	104	25.0	5912	9.6	25	9	515	113	1094	12350	10000
	TLRI-900-HM-104/195	900	230	950X950	104	26.5	6878	10.8	25	9	574	113	1224	13950	11450
	TLRI-950-HM-104/210	950	230	1000X1000	104	27.9	7885	12.1	25	9	654	113	1375	15600	12950
	TLRI-1000-HM-108/215	1000	231	1050X1050	108	26.2	8153	12.9	25	9	692	113	1464	17400	14600

TLRI BRIDGES
TENS LEAD RUBBER ISOLATOR

LEAD RUBBER BEARING

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d_{Ed} 250mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TLRI-400-SM-125/65	400	242	450X450	125	19.0	418	0.6	24	12	42	147	91	1500	600
	TLRI-450-SM-126/70	450	231	500X500	126	17.9	484	0.8	24	11	49	147	111	1950	950
	TLRI-500-SM-126/80	500	237	550X550	126	17.0	557	1.0	24	11	64	147	139	2450	1300
	TLRI-550-SM-125/90	550	257	600X600	125	26.3	1235	1.2	25	12	80	147	172	5050	2950
	TLRI-600-SM-125/100	600	257	650X650	125	28.7	1628	1.4	25	12	99	147	208	6050	3800
	TLRI-650-SM-126/105	650	246	700X700	126	25.9	1700	1.6	24	12	109	147	237	7200	4750
	TLRI-700-SM-126/115	700	261	750X750	126	28.0	2151	1.9	25	12	131	147	278	8400	5750
	TLRI-750-SM-126/120	750	252	800X800	126	25.7	2251	2.1	24	11	143	147	314	9750	6900
	TLRI-800-SM-126/130	800	252	850X850	126	27.5	2765	2.5	24	12	167	147	361	11150	8100
	TLRI-850-SM-128/140	850	248	900X900	128	25.5	2822	2.8	25	12	193	147	407	12650	9450
	TLRI-900-SM-128/145	900	263	950X950	128	27.1	3402	3.1	24	12	208	147	449	14250	10850
	TLRI-950-SM-128/155	950	263	1000X1000	128	28.6	4031	3.4	25	12	237	147	505	15950	12350
	TLRI-1000-SM-126/165	1000	255	1050X1050	126	26.7	4209	3.9	25	12	269	147	570	17750	13950
	TLRI-1100-SM-130/180	1100	271	1150X1150	130	26.5	4898	4.6	25	12	319	147	672	21650	17450
	TLRI-1200-SM-130/195	1200	271	1250X1250	130	29.0	6454	5.4	25	12	375	147	796	25900	21350
RUBBER NORMAL **G_{din}= 0.9 MPa*** **ξ_{eff}= 10%-15%***	TLRI-400-NM-125/70	400	242	450X450	125	18.9	699	1.1	24	11	76	147	167	2500	1000
	TLRI-450-NM-126/80	450	231	500X500	126	17.7	822	1.4	24	12	98	147	212	3250	1550
	TLRI-500-NM-126/90	500	237	550X550	126	16.9	962	1.8	25	12	123	147	263	4050	2200
	TLRI-550-NM-125/100	550	257	600X600	125	26.1	1819	2.2	25	12	151	147	321	5000	2950
	TLRI-600-NM-125/110	600	257	650X650	125	28.5	2318	2.6	25	12	181	147	384	6000	3800
	TLRI-650-NM-126/120	650	246	700X700	126	25.7	2506	3.1	25	12	214	147	449	7150	4700
	TLRI-700-NM-126/125	700	261	750X750	126	27.8	3098	3.5	25	12	239	147	513	8350	5750
	TLRI-750-NM-126/135	750	252	800X800	126	25.5	3337	4.0	25	12	276	147	591	9650	6850
	TLRI-800-NM-126/145	800	252	850X850	126	27.3	3999	4.6	25	12	317	147	674	11050	8050
	TLRI-850-NM-128/155	850	248	900X900	128	25.4	4204	5.1	25	12	358	147	754	12550	9350
	TLRI-900-NM-128/160	900	263	950X950	128	26.9	4955	5.7	25	12	390	147	836	14200	10800
	TLRI-950-NM-128/170	950	263	1000X1000	128	28.4	5750	6.4	25	12	437	147	935	15850	12300
	TLRI-1000-NM-126/180	1000	255	1050X1050	126	26.6	6166	7.2	25	12	491	147	1051	17650	13900
	TLRI-1100-NM-130/200	1100	271	1150X1150	130	26.3	7186	8.5	25	12	593	147	1247	21500	17350
	TLRI-1200-NM-130/215	1200	271	1250X1250	130	28.8	9156	10.1	25	12	694	147	1475	25750	21200
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TLRI-400-HM-125/90	400	242	450X450	125	18.5	837	1.8	25	12	122	147	260	2450	1000
	TLRI-450-HM-126/100	450	231	500X500	126	17.4	1000	2.2	25	12	152	147	325	3150	1550
	TLRI-500-HM-126/110	500	237	550X550	126	16.6	1187	2.7	24	12	185	147	400	4000	2150
	TLRI-550-HM-125/125	550	257	600X600	125	25.6	2051	3.4	25	12	233	147	493	4900	2900
	TLRI-600-HM-125/135	600	257	650X650	125	28.0	2580	4.0	25	12	274	147	584	5900	3700
	TLRI-650-HM-126/145	650	246	700X700	126	25.3	2847	4.6	25	12	318	147	679	7000	4600
	TLRI-700-HM-126/155	700	261	750X750	126	27.3	3463	5.4	25	12	366	147	785	8200	5650
	TLRI-750-HM-126/170	750	252	800X800	126	25.0	3775	6.2	25	12	431	147	910	9450	6700
	TLRI-800-HM-126/180	800	252	850X850	126	26.7	4481	7.0	25	12	486	147	1032	10850	7900
	TLRI-850-HM-128/190	850	248	900X900	128	24.9	4781	7.8	25	12	541	147	1148	12350	9200
	TLRI-900-HM-128/200	900	263	950X950	128	26.4	5565	8.8	25	12	603	147	1284	13900	10600
	TLRI-950-HM-128/215	950	263	1000X1000	128	27.8	6382	9.8	25	12	686	147	1442	15550	12050
	TLRI-1000-HM-126/225	1000	255	1050X1050	126	26.1	6936	11.0	25	12	760	147	1613	17300	13600
	TLRI-1100-HM-130/245	1100	271	1150X1150	130	25.9	8120	12.9	25	12	897	147	1898	21100	17050
	TLRI-1200-HM-130/265	1200	271	1250X1250	130	28.3	10184	15.3	25	12	1058	147	2251	25300	20850

TLRI BRIDGES
TENS LEAD RUBBER ISOLATOR

LEAD RUBBER BEARING

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d_{Ed} 300mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TLRI-450-SM-150/75	450	267	500X500	150	17.8	403	0.7	25	15	56	180	118	1300	700
	TLRI-500-SM-154/80	500	277	550X550	154	17.0	456	0.8	24	14	64	180	140	1600	1050
	TLRI-550-SM-150/90	550	297	600X600	150	26.3	1029	1.0	24	14	80	180	175	4000	2450
	TLRI-600-SM-150/100	600	297	650X650	150	28.7	1357	1.2	25	15	99	180	210	6050	3250
	TLRI-650-SM-150/105	650	282	700X700	150	25.9	1428	1.3	24	14	110	180	242	7200	4150
	TLRI-700-SM-150/115	700	297	750X750	150	28.0	1807	1.6	24	14	131	180	284	8400	5100
	TLRI-750-SM-154/125	750	292	800X800	154	25.7	1832	1.8	25	15	154	180	324	9700	6200
	TLRI-800-SM-154/130	800	292	850X850	154	27.5	2262	2.0	24	14	167	180	362	11150	7350
	TLRI-850-SM-152/140	850	281	900X900	152	25.5	2377	2.3	25	14	194	180	415	12650	8650
	TLRI-900-SM-152/150	900	296	950X950	152	27.0	2853	2.6	25	15	222	180	470	14250	10000
	TLRI-950-SM-152/155	950	296	1000X1000	152	28.6	3394	2.9	24	14	238	180	516	15950	11450
	TLRI-1000-SM-153/165	1000	291	1050X1050	153	26.7	3466	3.2	25	15	269	180	573	17750	13000
	TLRI-1100-SM-150/185	1100	297	1150X1150	150	26.5	4231	4.0	25	15	337	180	712	21600	16400
	TLRI-1200-SM-150/200	1200	297	1250X1250	150	28.9	5577	4.7	25	15	395	180	842	25850	20200
RUBBER NORMAL **G_{din}= 0.9 MPa*** **ξ_{eff}= 10%-15%***	TLRI-450-NM-150/80	450	267	500X500	150	17.7	690	1.2	24	14	99	180	217	3250	1150
	TLRI-500-NM-154/90	500	277	550X550	154	16.9	787	1.5	25	14	123	180	263	4050	1750
	TLRI-550-NM-150/100	550	297	600X600	150	26.1	1516	1.8	25	14	152	180	327	5000	2450
	TLRI-600-NM-150/110	600	297	650X650	150	28.5	1932	2.2	25	15	183	180	390	6000	3200
	TLRI-650-NM-150/120	650	282	700X700	150	25.7	2105	2.6	25	15	216	180	459	7150	4100
	TLRI-700-NM-150/130	700	297	750X750	150	27.7	2590	3.0	25	15	253	180	534	8350	5050
	TLRI-750-NM-154/135	750	292	800X800	154	25.5	2731	3.3	25	14	277	180	593	9650	6150
	TLRI-800-NM-154/145	800	292	850X850	154	27.3	3272	3.8	25	15	317	180	677	11050	7300
	TLRI-850-NM-152/155	850	281	900X900	152	25.4	3540	4.3	25	15	363	180	773	12550	8600
	TLRI-900-NM-152/165	900	296	950X950	152	26.9	4157	4.8	25	15	409	180	869	14150	9950
	TLRI-950-NM-152/175	950	296	1000X1000	152	28.4	4825	5.4	25	15	458	180	970	15850	11400
	TLRI-1000-NM-153/185	1000	291	1050X1050	153	26.5	5061	6.0	25	15	509	180	1072	17600	12900
	TLRI-1100-NM-150/205	1100	297	1150X1150	150	26.3	6208	7.3	25	15	626	180	1321	21450	16300
	TLRI-1200-NM-150/220	1200	297	1250X1250	150	28.7	7914	8.7	25	15	731	180	1561	25700	20050
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TLRI-450-HM-150/100	450	267	500X500	150	17.4	840	1.8	24	14	154	180	333	3150	1100
	TLRI-500-HM-154/110	500	277	550X550	154	16.6	972	2.2	24	14	186	180	401	4000	1700
	TLRI-550-HM-150/125	550	297	600X600	150	25.6	1709	2.8	25	15	235	180	501	4900	2400
	TLRI-600-HM-150/135	600	297	650X650	150	28.0	2150	3.3	25	14	277	180	594	5900	3150
	TLRI-650-HM-150/150	650	282	700X700	150	25.2	2377	3.9	25	15	335	180	705	7000	4000
	TLRI-700-HM-150/160	700	297	750X750	150	27.2	2893	4.5	25	15	384	180	814	8200	4950
	TLRI-750-HM-154/170	750	292	800X800	154	25.0	3089	5.1	25	15	432	180	913	9450	6050
	TLRI-800-HM-154/180	800	292	850X850	154	26.7	3666	5.8	25	15	487	180	1035	10850	7200
	TLRI-850-HM-152/195	850	281	900X900	152	24.8	4008	6.6	25	15	565	180	1190	12300	8400
	TLRI-900-HM-152/205	900	296	950X950	152	26.3	4667	7.4	25	15	629	180	1330	13900	9750
	TLRI-950-HM-152/215	950	296	1000X1000	152	27.8	5374	8.2	25	15	695	180	1478	15550	11150
	TLRI-1000-HM-153/225	1000	291	1050X1050	153	26.1	5712	9.0	25	15	763	180	1626	17300	12700
	TLRI-1100-HM-150/250	1100	297	1150X1150	150	25.8	7013	11.1	25	15	942	180	2005	21050	16000
	TLRI-1200-HM-150/275	1200	297	1250X1250	150	28.2	8772	13.3	25	15	1131	180	2394	25200	19650

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d_{Ed} 350mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TLRI-550-SM-175/90	550	337	600X600	175	26.3	882	0.8	24	17	81	213	176	4000	1950
	TLRI-600-SM-175/100	600	337	650X650	175	28.7	1163	1.0	25	17	99	213	213	6050	2700
	TLRI-650-SM-180/105	650	327	700X700	180	25.9	1190	1.1	24	17	110	213	240	5750	3500
	TLRI-700-SM-180/115	700	342	750X750	180	28.0	1506	1.3	25	17	131	213	281	8400	4450
	TLRI-750-SM-175/125	750	322	800X800	175	25.7	1613	1.6	25	17	155	213	332	9700	5500
	TLRI-800-SM-175/135	800	322	850X850	175	27.4	1981	1.8	25	17	180	213	381	11100	6600
	TLRI-850-SM-176/140	850	314	900X900	176	25.5	2053	2.0	24	17	194	213	422	12650	7850
	TLRI-900-SM-176/150	900	329	950X950	176	27.0	2464	2.2	25	17	223	213	477	14250	9150
	TLRI-950-SM-176/160	950	329	1000X1000	176	28.5	2920	2.5	25	18	253	213	535	15950	10550
	TLRI-1000-SM-180/165	1000	327	1050X1050	180	26.7	2946	2.7	25	17	269	213	576	17750	12050
	TLRI-1100-SM-180/180	1100	336	1150X1150	180	26.5	3538	3.2	24	17	321	213	693	21650	15400
	TLRI-1200-SM-180/200	1200	336	1250X1250	180	28.9	4647	3.9	25	18	395	213	835	25850	19050
RUBBER NORMAL **G_{din}= 0.9 MPa*** **ξ_{eff}= 10%-15%***	TLRI-550-NM-175/100	550	337	600X600	175	26.1	1299	1.5	24	17	153	213	331	5000	1900
	TLRI-600-NM-175/110	600	337	650X650	175	28.5	1656	1.9	25	17	184	213	395	6000	2650
	TLRI-650-NM-180/120	650	327	700X700	180	25.7	1754	2.1	25	18	215	213	455	7150	3500
	TLRI-700-NM-180/130	700	342	750X750	180	27.7	2159	2.5	25	18	251	213	529	8350	4400
	TLRI-750-NM-175/140	750	322	800X800	175	25.5	2392	2.9	25	18	294	213	622	9650	5450
	TLRI-800-NM-175/150	800	322	850X850	175	27.2	2867	3.3	25	18	336	213	709	11050	6550
	TLRI-850-NM-176/160	850	314	900X900	176	25.3	3044	3.7	25	18	380	213	798	12550	7750
	TLRI-900-NM-176/165	900	329	950X950	176	26.9	3590	4.1	25	17	413	213	885	14150	9100
	TLRI-950-NM-176/175	950	329	1000X1000	176	28.4	4167	4.6	25	17	463	213	988	15850	10500
	TLRI-1000-NM-180/185	1000	327	1050X1050	180	26.5	4302	5.1	25	18	510	213	1078	17600	12000
	TLRI-1100-NM-180/200	1100	336	1150X1150	180	26.3	5190	6.1	25	17	606	213	1294	21500	15300
	TLRI-1200-NM-180/220	1200	336	1250X1250	180	28.7	6595	7.2	25	17	728	213	1546	25700	18950
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TLRI-550-HM-175/125	550	337	600X600	175	25.6	1465	2.4	25	17	237	213	507	4900	1900
	TLRI-600-HM-175/135	600	337	650X650	175	28.0	1843	2.8	24	17	279	213	601	5900	2600
	TLRI-650-HM-180/145	650	327	700X700	180	25.3	1993	3.2	25	17	320	213	688	7000	3450
	TLRI-700-HM-180/160	700	342	750X750	180	27.2	2411	3.8	25	18	382	213	806	8200	4350
	TLRI-750-HM-175/170	750	322	800X800	175	25.0	2718	4.4	25	17	439	213	942	9450	5350
	TLRI-800-HM-175/185	800	322	850X850	175	26.7	3211	5.1	25	18	511	213	1081	10800	6450
	TLRI-850-HM-176/195	850	314	900X900	176	24.8	3461	5.7	25	17	571	213	1211	12300	7600
	TLRI-900-HM-176/205	900	329	950X950	176	26.3	4030	6.3	25	17	635	213	1354	13900	8900
	TLRI-950-HM-176/220	950	329	1000X1000	176	27.8	4623	7.1	25	18	720	213	1518	15500	10250
	TLRI-1000-HM-180/230	1000	327	1050X1050	180	26.0	4836	7.7	25	18	785	213	1650	17250	11750
	TLRI-1100-HM-180/250	1100	336	1150X1150	180	25.8	5844	9.3	25	17	937	213	1986	21050	15000
	TLRI-1200-HM-180/275	1200	336	1250X1250	180	28.2	7310	11.1	25	18	1125	213	2372	25200	18550

d_{Ed} Max displacement according to EN 15129 G_{din} Shear moduls * measured at 100% shear strain

TLRI BUILDINGS
TENS LEAD RUBBER ISOLATOR

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d_{Ed} 150mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TLRI-350-SM-75/65	350	162	400X400	75	16.4	419	0.8	24	9	42	125	95	1700	950
	TLRI-400-SM-75/75	400	162	450X450	75	18.8	680	1.0	24	9	56	125	125	2850	1750
	TLRI-450-SM-78/85	450	159	500X500	78	17.6	758	1.2	24	10	72	125	155	3650	2400
	TLRI-500-SM-77/95	500	167	550X550	77	16.8	885	1.6	24	10	89	125	194	4500	3100
	TLRI-550-SM-75/105	550	177	600X600	75	26.0	2013	1.9	24	10	110	125	239	5500	3950
	TLRI-600-SM-75/115	600	177	650X650	75	28.4	2659	2.3	24	10	131	125	285	6550	4900
	TLRI-650-SM-78/125	650	174	700X700	78	25.6	2676	2.6	25	10	154	125	328	7700	5900
	TLRI-700-SM-78/135	700	189	750X750	78	27.6	3396	3.0	25	10	180	125	381	8950	7000
	TLRI-750-SM-77/145	750	182	800X800	77	25.4	3583	3.5	25	10	208	125	441	10300	8200
RUBBER NORMAL G_{din}= 0.9 MPa* ξ_{eff}= 10%-15%*	TLRI-350-NM-75/100	350	162	400X400	75	15.5	661	1.7	25	10	99	125	211	1650	900
	TLRI-400-NM-75/85	400	162	450X450	75	18.6	1127	1.9	25	10	110	125	237	2800	1750
	TLRI-450-NM-78/95	450	159	500X500	78	17.5	1287	2.3	25	10	136	125	290	3600	2350
	TLRI-500-NM-77/105	500	167	550X550	77	16.7	1531	2.9	25	10	168	125	361	4450	3100
	TLRI-550-NM-75/120	550	177	600X600	75	25.7	2947	3.6	25	10	215	125	453	5400	3900
	TLRI-600-NM-75/120	600	177	650X650	75	28.3	3655	3.8	24	10	220	125	475	6550	4850
	TLRI-650-NM-78/135	650	174	700X700	78	25.5	3977	4.8	24	10	279	125	601	7650	5850
	TLRI-700-NM-78/150	700	189	750X750	78	27.4	4876	5.7	25	10	335	125	706	8900	6950
	TLRI-750-NM-77/160	750	182	800X800	77	25.2	5324	6.5	25	10	385	125	817	10200	8150
	TLRI-800-NM-77/170	800	182	850X850	77	26.9	6395	7.4	25	10	436	125	928	11650	9450
RUBBER HARD G_{din}= 1.4 MPa* ξ_{eff}= 15%*	TLRI-350-HM-75/90	350	162	400X400	75	15.8	893	2.2	24	10	126	125	273	2100	1150
	TLRI-400-HM-75/105	400	162	450X450	75	18.1	1341	2.9	25	10	168	125	360	2750	1700
	TLRI-450-HM-78/115	450	159	500X500	78	17.1	1560	3.5	24	10	203	125	437	3500	2300
	TLRI-500-HM-77/130	500	167	550X550	77	16.3	1861	4.4	25	10	256	125	549	4350	3000
	TLRI-550-HM-75/145	550	177	600X600	75	25.1	3310	5.4	25	10	319	125	681	5300	3800
	TLRI-600-HM-75/160	600	177	650X650	75	27.3	4153	6.5	25	10	384	125	814	6300	4700
	TLRI-650-HM-78/170	650	174	700X700	78	24.8	4448	7.4	25	10	434	125	921	7450	5700
	TLRI-700-HM-78/185	700	189	750X750	78	26.7	5398	8.6	25	10	509	125	1072	8650	6750
	TLRI-750-HM-77/200	750	182	800X800	77	24.5	5963	10.0	25	10	593	125	1247	9950	7900
	TLRI-800-HM-77/210	800	182	850X850	77	26.2	7105	11.3	25	10	663	125	1410	11350	9200

d_{Ed} Max displacement according to EN 15129 G_{din} Shear moduls * measured at 100% shear strain

TLRI BUILDINGS
TENS LEAD RUBBER ISOLATOR

LEAD RUBBER BEARING

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d_{Ed} 200mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TLRI-350-SM-100/65	350	202	400X400	100	16.4	315	0.6	24	12	42	167	95	850	500
	TLRI-400-SM-100/75	400	202	450X450	100	18.8	510	0.8	24	13	56	167	125	1700	1100
	TLRI-450-SM-102/85	450	195	500X500	102	17.6	579	0.9	24	13	72	167	157	2900	1550
	TLRI-500-SM-105/95	500	207	550X550	105	16.8	649	1.1	25	13	89	167	191	3600	2100
	TLRI-550-SM-100/105	550	217	600X600	100	26.0	1510	1.4	24	13	110	167	239	5500	3450
	TLRI-600-SM-105/115	600	225	650X650	105	28.4	1900	1.7	25	14	131	167	277	6550	4300
	TLRI-650-SM-108/120	650	219	700X700	108	25.7	1946	1.9	24	13	143	167	311	7750	5300
	TLRI-700-SM-108/130	700	234	750X750	108	27.7	2468	2.2	24	13	167	167	362	9000	6400
	TLRI-750-SM-105/145	750	222	800X800	105	25.4	2628	2.6	25	14	207	167	435	10300	7500
	TLRI-800-SM-105/150	800	222	850X850	105	27.2	3253	2.9	24	13	223	167	485	11800	8800
	TLRI-850-SM-104/165	850	215	900X900	104	25.2	3389	3.4	25	14	268	167	564	13300	10100
	TLRI-900-SM-104/170	900	230	950X950	104	26.8	4095	3.7	24	13	287	167	620	14950	11600
	TLRI-950-SM-104/180	950	230	1000X1000	104	28.3	4859	4.2	24	13	321	167	693	16700	13150
	TLRI-1000-SM-108/190	1000	231	1050X1050	108	26.5	4812	4.5	25	14	356	167	751	18500	14750
RUBBER NORMAL **G_{din}= 0.9 MPa*** **ξ_{eff}= 10%-15%***	TLRI-350-NM-100/75	350	202	400X400	100	16.2	544	1.1	25	13	85	167	182	2150	850
	TLRI-400-NM-100/85	400	202	450X450	100	18.6	845	1.4	25	13	110	167	237	2800	1350
	TLRI-450-NM-102/95	450	195	500X500	102	17.5	984	1.8	25	13	137	167	294	3600	1950
	TLRI-500-NM-105/105	500	207	550X550	105	16.7	1123	2.1	25	14	166	167	355	4450	2650
	TLRI-550-NM-100/120	550	217	600X600	100	25.7	2210	2.7	25	14	215	167	453	5400	3400
	TLRI-600-NM-105/125	600	225	650X650	105	28.2	2710	3.1	25	13	238	167	509	6500	4300
	TLRI-650-NM-108/135	650	219	700X700	108	25.5	2872	3.5	25	14	274	167	584	7650	5250
	TLRI-700-NM-108/145	700	234	750X750	108	27.5	3542	4.1	25	14	317	167	677	8900	6300
	TLRI-750-NM-105/160	750	222	800X800	105	25.2	3904	4.8	25	14	381	167	803	10200	7450
	TLRI-800-NM-105/170	800	222	850X850	105	26.9	4690	5.5	25	14	432	167	913	11650	8700
	TLRI-850-NM-104/180	850	215	900X900	104	25.0	5058	6.2	25	14	487	167	1036	13200	10050
	TLRI-900-NM-104/190	900	230	950X950	104	26.5	5952	7.0	25	14	545	167	1160	14800	11500
	TLRI-950-NM-104/200	950	230	1000X1000	104	28.0	6920	7.7	25	13	605	167	1291	16550	13000
	TLRI-1000-NM-108/210	1000	231	1050X1050	108	26.3	7037	8.3	25	14	658	167	1389	18350	14650
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TLRI-350-HM-100/90	350	202	400X400	100	15.8	670	1.6	24	13	126	167	273	2100	850
	TLRI-400-HM-100/105	400	202	450X450	100	18.1	1005	2.2	25	13	168	167	360	2750	1300
	TLRI-450-HM-102/120	450	195	500X500	102	17.0	1177	2.7	25	14	214	167	451	3500	1900
	TLRI-500-HM-105/130	500	207	550X550	105	16.3	1365	3.2	25	14	254	167	540	4350	2550
	TLRI-550-HM-100/145	550	217	600X600	100	25.1	2483	4.1	25	13	319	167	681	5300	3300
	TLRI-600-HM-105/155	600	225	650X650	105	27.5	2989	4.7	25	14	363	167	775	6350	4200
	TLRI-650-HM-108/165	650	219	700X700	108	24.9	3236	5.3	25	13	413	167	885	7500	5150
	TLRI-700-HM-108/180	700	234	750X750	108	26.8	3924	6.2	25	14	486	167	1031	8700	6150
	TLRI-750-HM-105/195	750	222	800X800	105	24.6	4401	7.3	25	14	571	167	1214	10000	7300
	TLRI-800-HM-105/210	800	222	850X850	105	26.2	5210	8.3	25	14	657	167	1386	11350	8500
	TLRI-850-HM-104/225	850	215	900X900	104	24.4	5677	9.5	25	14	752	167	1582	12850	9750
	TLRI-900-HM-104/235	900	230	950X950	104	25.9	6630	10.6	25	14	830	167	1764	14450	11200
	TLRI-950-HM-104/250	950	230	1000X1000	104	27.3	7620	11.8	25	14	933	167	1971	16100	12650
	TLRI-1000-HM-108/260	1000	231	1050X1050	108	25.6	7857	12.7	25	14	1004	167	2113	17900	14250

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TENS LEAD RUBBER ISOLATOR

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d_{Ed} 250mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TLRI-400-SM-125/75	400	242	450X450	125	18.8	408	0.6	24	16	56	208	125	1700	600
	TLRI-450-SM-126/85	450	231	500X500	126	17.6	469	0.8	24	16	72	208	158	2150	900
	TLRI-500-SM-126/95	500	237	550X550	126	16.8	541	0.9	24	16	90	208	196	2700	1300
	TLRI-550-SM-125/105	550	257	600X600	125	26.0	1208	1.1	24	16	110	208	239	5500	2950
	TLRI-600-SM-125/115	600	257	650X650	125	28.4	1596	1.4	24	16	131	208	285	6550	3750
	TLRI-650-SM-126/125	650	246	700X700	126	25.6	1657	1.6	24	17	155	208	334	7700	4700
	TLRI-700-SM-126/135	700	261	750X750	126	27.6	2102	1.9	25	17	180	208	388	8950	5700
	TLRI-750-SM-126/145	750	252	800X800	126	25.4	2190	2.1	25	17	208	208	446	10300	6800
	TLRI-800-SM-126/155	800	252	850X850	126	27.1	2696	2.4	25	17	238	208	509	11750	8050
	TLRI-850-SM-128/165	850	248	900X900	128	25.2	2753	2.7	25	17	269	208	569	13300	9350
	TLRI-900-SM-128/175	900	263	950X950	128	26.7	3311	3.1	25	17	302	208	639	14950	10750
	TLRI-950-SM-128/185	950	263	1000X1000	128	28.2	3930	3.4	25	17	337	208	713	16650	12200
	TLRI-1000-SM-126/195	1000	255	1050X1050	126	26.4	4106	3.8	25	17	375	208	798	18450	13800
	TLRI-1100-SM-130/210	1100	271	1150X1150	130	26.2	4791	4.5	25	17	436	208	933	22450	17300
	TLRI-1200-SM-130/230	1200	271	1250X1250	130	28.6	6309	5.3	25	17	523	208	1114	26750	21100
RUBBER NORMAL G_{din}= 0.9 MPa* ξ_{eff}= 10%-15%*	TLRI-400-NM-125/85	400	242	450X450	125	18.6	676	1.1	25	17	110	208	237	2800	1000
	TLRI-450-NM-126/95	450	231	500X500	126	17.5	797	1.4	24	17	138	208	297	3600	1550
	TLRI-500-NM-126/105	500	237	550X550	126	16.7	936	1.8	24	17	169	208	366	4450	2200
	TLRI-550-NM-125/120	550	257	600X600	125	25.7	1768	2.2	25	17	215	208	453	5400	2900
	TLRI-600-NM-125/130	600	257	650X650	125	28.1	2262	2.6	25	17	253	208	537	6500	3700
	TLRI-650-NM-126/140	650	246	700X700	126	25.4	2446	3.0	25	17	294	208	625	7650	4650
	TLRI-700-NM-126/150	700	261	750X750	126	27.4	3019	3.5	25	17	339	208	723	8900	5650
	TLRI-750-NM-126/160	750	252	800X800	126	25.2	3253	4.0	25	17	388	208	829	10200	6750
	TLRI-800-NM-126/170	800	252	850X850	126	26.9	3908	4.5	25	17	439	208	941	11650	7950
	TLRI-850-NM-128/180	850	248	900X900	128	25.0	4110	5.0	25	17	491	208	1048	13200	9250
	TLRI-900-NM-128/195	900	263	950X950	128	26.5	4814	5.7	25	17	564	208	1187	14800	10600
	TLRI-950-NM-128/205	950	263	1000X1000	128	28.0	5599	6.3	25	17	626	208	1320	16500	12100
	TLRI-1000-NM-126/215	1000	255	1050X1050	126	26.2	6007	7.1	25	17	695	208	1478	18300	13700
	TLRI-1100-NM-130/235	1100	271	1150X1150	130	26.0	7016	8.4	25	17	824	208	1742	22200	17100
	TLRI-1200-NM-130/255	1200	271	1250X1250	130	28.4	8943	9.9	25	17	975	208	2068	26500	20950
RUBBER HARD G_{din}= 1.4 MPa* ξ_{eff}= 15%*	TLRI-400-HM-125/105	400	242	450X450	125	18.1	804	1.7	25	17	168	208	360	2750	950
	TLRI-450-HM-126/120	450	231	500X500	126	17.0	953	2.2	25	17	215	208	455	3500	1500
	TLRI-500-HM-126/130	500	237	550X550	126	16.3	1137	2.7	24	17	258	208	557	4350	2100
	TLRI-550-HM-125/145	550	257	600X600	125	25.1	1986	3.3	25	17	319	208	681	5300	2850
	TLRI-600-HM-125/160	600	257	650X650	125	27.3	2492	3.9	25	17	384	208	814	6300	3600
	TLRI-650-HM-126/170	650	246	700X700	126	24.8	2753	4.5	25	17	440	208	943	7450	4550
	TLRI-700-HM-126/185	700	261	750X750	126	26.7	3341	5.3	25	17	516	208	1097	8650	5500
	TLRI-750-HM-126/200	750	252	800X800	126	24.5	3644	6.1	25	17	598	208	1264	9950	6550
	TLRI-800-HM-126/215	800	252	850X850	126	26.1	4317	6.9	25	17	686	208	1443	11300	7750
	TLRI-850-HM-128/225	850	248	900X900	128	24.4	4612	7.7	25	17	757	208	1600	12850	9000
	TLRI-900-HM-128/240	900	263	950X950	128	25.8	5359	8.6	25	17	855	208	1799	14400	10350
	TLRI-950-HM-128/250	950	263	1000X1000	128	27.3	6191	9.6	25	17	939	208	1994	16100	11800
	TLRI-1000-HM-126/265	1000	255	1050X1050	126	25.5	6703	10.8	25	17	1055	208	2242	17850	13350
	TLRI-1100-HM-130/290	1100	271	1150X1150	130	25.3	7843	12.7	25	17	1253	208	2644	21650	16700
	TLRI-1200-HM-130/315	1200	271	1250X1250	130	27.7	9849	15.1	25	17	1484	208	3142	25850	20400

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d_{Ed} 300mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT **G_{din}= 0.4 MPa*** **ξ_{eff}= 10%-15%***	TLRI-450-SM-150/85	450	267	500X500	150	17.6	394	0.6	24	19	72	250	159	1450	650
	TLRI-500-SM-154/95	500	277	550X550	154	16.8	443	0.8	24	20	89	250	194	1800	1050
	TLRI-550-SM-150/105	550	297	600X600	150	26.0	1006	1.0	24	19	110	250	239	4400	2400
	TLRI-600-SM-150/115	600	297	650X650	150	28.4	1330	1.1	24	20	131	250	285	6550	3200
	TLRI-650-SM-150/125	650	282	700X700	150	25.6	1392	1.3	24	20	155	250	336	7700	4100
	TLRI-700-SM-150/135	700	297	750X750	150	27.6	1766	1.6	24	20	181	250	390	8950	5050
	TLRI-750-SM-154/145	750	292	800X800	154	25.4	1792	1.8	25	20	208	250	441	10300	6100
	TLRI-800-SM-154/155	800	292	850X850	154	27.1	2206	2.0	25	20	237	250	503	11750	7300
	TLRI-850-SM-152/165	850	281	900X900	152	25.2	2319	2.3	25	20	269	250	573	13300	8550
	TLRI-900-SM-152/175	900	296	950X950	152	26.7	2788	2.6	25	20	302	250	643	14950	9900
	TLRI-950-SM-152/185	950	296	1000X1000	152	28.2	3310	2.9	25	20	338	250	717	16650	11350
	TLRI-1000-SM-153/195	1000	291	1050X1050	153	26.4	3382	3.2	25	21	375	250	792	18450	12850
	TLRI-1100-SM-150/215	1100	297	1150X1150	150	26.2	4135	3.9	25	20	457	250	972	22400	16200
	TLRI-1200-SM-150/235	1200	297	1250X1250	150	28.6	5448	4.6	25	20	545	250	1159	26700	19950
RUBBER NORMAL **G_{din}= 0.9 MPa*** **ξ_{eff}= 10%-15%***	TLRI-450-NM-150/95	450	267	500X500	150	17.5	669	1.2	24	20	138	250	299	3600	1150
	TLRI-500-NM-154/105	500	277	550X550	154	16.7	766	1.4	25	20	168	250	361	4450	1700
	TLRI-550-NM-150/120	550	297	600X600	150	25.7	1473	1.8	25	21	215	250	453	5400	2400
	TLRI-600-NM-150/130	600	297	650X650	150	28.1	1885	2.1	25	20	253	250	537	6500	3150
	TLRI-650-NM-150/140	650	282	700X700	150	25.4	2055	2.5	25	20	295	250	629	7650	4050
	TLRI-700-NM-150/150	700	297	750X750	150	27.4	2536	2.9	25	20	341	250	727	8900	5000
	TLRI-750-NM-154/160	750	292	800X800	154	25.2	2662	3.3	25	20	385	250	817	10200	6050
	TLRI-800-NM-154/170	800	292	850X850	154	26.9	3198	3.7	25	20	436	250	928	11650	7200
	TLRI-850-NM-152/185	850	281	900X900	152	25.0	3444	4.3	25	21	508	250	1069	13150	8450
	TLRI-900-NM-152/195	900	296	950X950	152	26.5	4054	4.8	25	21	567	250	1196	14800	9800
	TLRI-950-NM-152/205	950	296	1000X1000	152	28.0	4715	5.3	25	21	629	250	1330	16500	11250
	TLRI-1000-NM-153/215	1000	291	1050X1050	153	26.2	4947	5.9	25	21	692	250	1465	18300	12750
	TLRI-1100-NM-150/240	1100	297	1150X1150	150	25.9	6058	7.2	25	21	858	250	1810	22150	16050
	TLRI-1200-NM-150/260	1200	297	1250X1250	150	28.3	7725	8.6	25	20	1013	250	2148	26450	19800
RUBBER HARD **G_{din}= 1.4 MPa*** **ξ_{eff}= 15%***	TLRI-450-HM-150/120	450	267	500X500	150	17.0	801	1.8	25	20	216	250	458	3500	1100
	TLRI-500-HM-154/130	500	277	550X550	154	16.3	931	2.2	25	20	256	250	549	4350	1650
	TLRI-550-HM-150/145	550	297	600X600	150	25.1	1655	2.7	25	20	319	250	681	5300	2350
	TLRI-600-HM-150/160	600	297	650X650	150	27.3	2076	3.3	25	20	384	250	814	6300	3100
	TLRI-650-HM-150/175	650	282	700X700	150	24.7	2296	3.8	25	21	455	250	959	7400	3950
	TLRI-700-HM-150/185	700	297	750X750	150	26.7	2807	4.4	25	20	517	250	1104	8650	4900
	TLRI-750-HM-154/200	750	292	800X800	154	24.5	2981	5.0	25	21	593	250	1247	9950	5900
	TLRI-800-HM-154/210	800	292	850X850	154	26.2	3552	5.6	25	20	663	250	1410	11350	7050
	TLRI-850-HM-152/225	850	281	900X900	152	24.4	3884	6.5	25	20	760	250	1613	12850	8250
	TLRI-900-HM-152/240	900	296	950X950	152	25.8	4513	7.3	25	21	859	250	1813	14400	9550
	TLRI-950-HM-152/250	950	296	1000X1000	152	27.3	5214	8.0	25	20	943	250	2010	16100	10950
	TLRI-1000-HM-153/265	1000	291	1050X1050	153	25.5	5520	8.9	25	21	1050	250	2222	17850	12450
	TLRI-1100-HM-150/295	1100	297	1150X1150	150	25.3	6769	11.0	25	21	1298	250	2741	21600	15650
	TLRI-1200-HM-150/320	1200	297	1250X1250	150	27.6	8504	13.0	25	20	1535	250	3256	25750	19250

TLRI BUILDINGS
TENS LEAD RUBBER ISOLATOR

LEAD RUBBER BEARING

EN 15129:2009 (E) - cap. 8.2

d_{Ed} 350mm	ISOLATOR	Rubber diameter	Total overall height (including external plates)	Overall plate size	Total rubber thickness	Shape factor	Vertical stiffness	Effective horizontal stiffness at d_{bd}	Effective damping at d_{bd}	Yielding displacement	Horizontal Yielding load	Horizontal design displacement (EN 1998)	Horizontal design load	Max vertical static load SLU 25 MPa on rubber	Max vertical seis mic load
		D (mm)	H_{tot} (mm)	L x L (mmxmm)	T_q (mm)	S (-)	K_v (kN/mm)	K_{eff} (kN/mm)	X_{eff} (%)	d_y (mm)	F_y (kN)	d_{bd} (mm)	H_{dbd} (mm)	N_{SLU} (kN)	N_{SEISM} (kN)
RUBBER SOFT G_{din}= 0.4 MPa* ξ_{eff}= 10%-15%*	TLRI-550-SM-175/105	550	337	600X600	175	26.0	863	0.8	24	23	110	292	239	4400	1900
	TLRI-600-SM-175/115	600	337	650X650	175	28.4	1140	1.0	24	23	131	292	285	6550	2650
	TLRI-650-SM-180/125	650	327	700X700	180	25.6	1160	1.1	25	24	154	292	330	6150	3500
	TLRI-700-SM-180/135	700	342	750X750	180	27.6	1472	1.3	25	24	180	292	383	8950	4400
	TLRI-750-SM-175/145	750	322	800X800	175	25.4	1577	1.5	24	23	208	292	449	10300	5400
	TLRI-800-SM-175/155	800	322	850X850	175	27.1	1941	1.8	25	23	238	292	511	11750	6550
	TLRI-850-SM-176/165	850	314	900X900	176	25.2	2002	2.0	25	24	269	292	576	13300	7750
	TLRI-900-SM-176/175	900	329	950X950	176	26.7	2408	2.2	25	24	303	292	646	14950	9050
	TLRI-950-SM-176/185	950	329	1000X1000	176	28.2	2859	2.5	25	24	338	292	721	16650	10450
	TLRI-1000-SM-180/195	1000	327	1050X1050	180	26.4	2874	2.7	25	24	375	292	788	18450	11950
	TLRI-1100-SM-180/210	1100	336	1150X1150	180	26.2	3460	3.2	24	23	437	292	940	22450	15200
	TLRI-1200-SM-180/230	1200	336	1250X1250	180	28.6	4556	3.8	25	23	523	292	1122	26750	18850
RUBBER NORMAL G_{din}= 0.9 MPa* ξ_{eff}= 10%-15%*	TLRI-550-NM-175/120	550	337	600X600	175	25.7	1263	1.6	25	24	215	292	453	5400	1900
	TLRI-600-NM-175/130	600	337	650X650	175	28.1	1616	1.8	25	24	253	292	537	6500	2600
	TLRI-650-NM-180/140	650	327	700X700	180	25.4	1712	2.1	25	24	292	292	615	7650	3450
	TLRI-700-NM-180/150	700	342	750X750	180	27.4	2113	2.4	25	24	337	292	712	8900	4350
	TLRI-750-NM-175/160	750	322	800X800	175	25.2	2342	2.9	25	23	389	292	834	10200	5400
	TLRI-800-NM-175/175	800	322	850X850	175	26.8	2799	3.3	25	24	455	292	958	11650	6450
	TLRI-850-NM-176/185	850	314	900X900	176	25.0	2974	3.7	25	24	510	292	1075	13150	7650
	TLRI-900-NM-176/195	900	329	950X950	176	26.5	3501	4.1	25	24	569	292	1203	14800	8950
	TLRI-950-NM-176/205	950	329	1000X1000	176	28.0	4072	4.6	25	24	631	292	1338	16500	10350
	TLRI-1000-NM-180/215	1000	327	1050X1050	180	26.2	4205	5.0	25	24	689	292	1455	18300	11850
	TLRI-1100-NM-180/235	1100	336	1150X1150	180	26.0	5067	6.0	25	24	828	292	1756	22200	15100
	TLRI-1200-NM-180/255	1200	336	1250X1250	180	28.4	6459	7.2	25	24	980	292	2086	26500	18700
RUBBER HARD G_{din}= 1.4 MPa* ξ_{eff}= 15%*	TLRI-550-HM-175/145	550	337	600X600	175	25.1	1419	2.3	25	24	319	292	681	5300	1850
	TLRI-600-HM-175/160	600	337	650X650	175	27.3	1780	2.8	25	24	384	292	814	6300	2550
	TLRI-650-HM-180/170	650	327	700X700	180	24.8	1927	3.2	25	24	436	292	928	7450	3350
	TLRI-700-HM-180/185	700	342	750X750	180	26.7	2339	3.7	25	24	511	292	1081	8650	4250
	TLRI-750-HM-175/200	750	322	800X800	175	24.5	2624	4.4	25	24	600	292	1272	9950	5250
	TLRI-800-HM-175/215	800	322	850X850	175	26.1	3108	5.0	25	24	688	292	1451	11300	6300
	TLRI-850-HM-176/225	850	314	900X900	176	24.4	3355	5.6	25	24	762	292	1622	12850	7500
	TLRI-900-HM-176/240	900	329	950X950	176	25.8	3898	6.3	25	24	862	292	1823	14400	8750
	TLRI-950-HM-176/255	950	329	1000X1000	176	27.2	4481	7.0	25	24	967	292	2037	16050	10050
	TLRI-1000-HM-180/265	1000	327	1050X1050	180	25.5	4692	7.6	25	24	1047	292	2208	17850	11500
	TLRI-1100-HM-180/290	1100	336	1150X1150	180	25.3	5665	9.1	25	24	1259	292	2667	21650	14700
	TLRI-1200-HM-180/315	1200	336	1250X1250	180	27.7	7113	10.9	25	24	1491	292	3168	25850	18250

d_{Ed} Max displacement according to EN 15129 G_{din} Shear moduls * measured at 100% shear strain

TENSA

Job title		Job No.
Design by	Date	Sheet No.
Item		

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