

SEISMOLINK™

innovative seismic restraint

SPEKTRAL
SEISMIC SOLUTIONS

The prototype of the seismic restraint SEISMOLINK™ was developed at the University of Ljubljana, Faculty of Civil and Geodetic Engineering, within the frame of European research project SAFECLADDING.

The responsibility for the distribution and development of the SEISMOLINK™ lies with the spin-out company from University of Ljubljana, SPEKTRAL d.o.o.

SPEKTRAL has been granted the rights to disseminate and advance the product through a licensing agreement, denoted as Agreement Nr. 821-18/2021-6.

UNIVERSITY OF LJUBLJANA
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ETA Nr. 24/0891

SEISMOLINK™



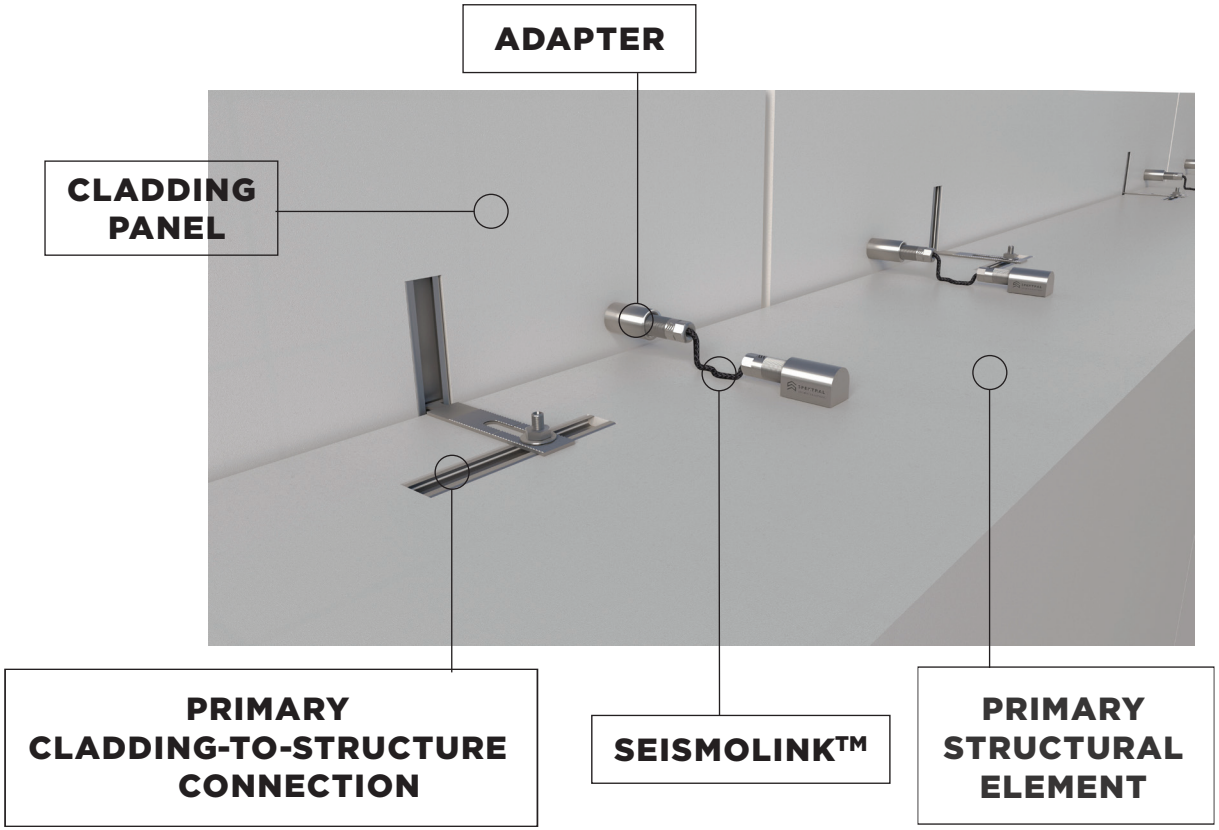
01

The seismic restraint SEISMOLINK™ represents an innovative solution for seismic retrofitting of vulnerable buildings. Its main function is the protection of non-structural elements (e.g., claddings, isolated pipes, ducts, electrical systems, and other suspended equipment) during an earthquake. The restraint is a tension component and was designed to be activated upon failure of the existing connections between structure and non-structural element, thus preventing the non-structural element from collapsing.

The device guarantees additional protection that can effectively prevent human casualties, equipment damage, damage to stored products, or other direct and indirect losses.

The SEISMOLINK™ consists of a synthetic fibre rope and special threaded end-terminations that enable quick and simple installation. Compared to traditional steel wire ropes, SEISMOLINK has high strength-to-weight ratio, moderate stiffness, and improved damping characteristics, what makes it a unique and unparallelled solution for resisting impact loads.

APPLICATION EXAMPLE



02

The SEISMOLINK™ was primarily designed to protect heavy cladding panels in precast industrial and commercial buildings. Past significant earthquakes proved that the traditional cladding-to-structure connections do not possess sufficient strength or deformation capacity.

As a consequence, the upcoming generation of the European seismic codes – EUROCODES - will be much more rigorous in this regard. The stricter requirements call for designers and precast producers to provide novel solutions for secure attachment of the claddings to the main structural elements.

The SEISMOLINK™ presents an effective back-up safety device that prevents the collapse of heavy claddings in case of failure of the primary connections and follows the demands of the second generation of the EUROCODES.



Adhesive anchors are casted or post-installed into concrete parts.

STEP 1



Special adaptors are attached to the anchor.

STEP 2



The SEISMOLINK™ is attached to the adaptor.

STEP 3

03

INSTALLATION

The seismic restraint SEISMOLINK™ consists of a deformable rope with high strength-to-weight ratio and highly efficient end-terminations with exterior threads that enable quick and simple installation.

An effective anchorage into concrete elements is reached by means of cast in place or post-installed injectable adhesive anchors and special adaptors, which enable a reliable but simple connection between the anchor and the SEISMOLINK™ end-termination.

SEISMOLINK™ is currently available in three variations - R6, R8 and R10, which differ in breaking strength and size. The main mechanical properties of the SEISMOLINK™ are presented in the following table.

The values were obtained through extensive laboratory testing. Several monotonic and cyclic tests were performed. The values include the effect of low-cycling fatigue.

Type	Characteristic strength $R_{t,k}$ [kN]	Mean strength $R_{t,m}$ [kN]	Stiffness $k_{t,k}$ [kN/m]
R6	19.9	26.0	1496
R8	40.5	47.5	2264
R10	69.7	79.3	2985

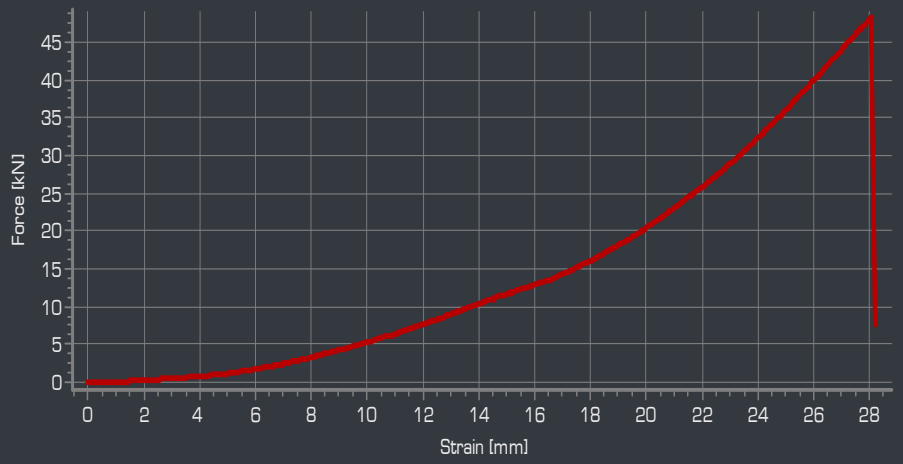
Note: The given stiffness corresponds to a total unloaded device length of 50 cm.

The design resistance of a single device should be determined as:

$R_{t,d} = R_{t,k} / \gamma_R$

where $R_{t,k}$ is the characteristic breaking strength, and γ_R is the material safety factor which should be equal to 1.5.

The value of material safety factor is determined considering the analogy to provisions in EN 1993-1-11: 2006: Design of structures with tension components.



04

TECHNICAL DATA AND DESIGN

DEVELOPMENT AND CERTIFICATION



05

The prototype of the seismic restraint SEISMOLINK™ was developed at the University of Ljubljana, Faculty of Civil and Geodetic Engineering, within the frame of European research project SAFECLADDING.

The technical adequacy of the restraint was confirmed by monotonic and cyclic tests performed both in the laboratory and in the industrial environment. The durability and reaction to fire tests were performed as well.

The restraint SEISMOLINK™ is a patented and fully certified product with an European Technical Assessment (ETA) and CE certification.

SEISMOLINK™

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