

Teatro Nacional de Cataluña Long Term Measurements

Teatro Nacional de Cataluña, Barcelona

Project description

Back in 1991 not only the preparations for the summer Olympic Games in Barcelona were underway, also the planning of the new Catalan theatre house (see: Fig. 1) was under full swing.

The theatre includes a repertoire theatre with 1000 seats (see: Fig. 2), an experimental theatre with 400 seats and an open air theatre also with 400 seats.

6 underground rail tracks pass close to the theatre (a four-track intercity railway line and two tracks of the metro). The proximity to the rail tracks requires high quality protection from vibrations and structure borne noise.

Approach

Isolation of the railway superstructure was not feasible and therefore the theatre had to be isolated.

Measurements showed that the influence of structure borne noise would be considerable in the 31 Hz – 63 Hz range. During the planning process different solutions to solve the problem were discussed. At the end a full surface decoupling with Sylomer® was in comparison the most economical solution.

Acoustic consultant Dr. Y. Xu defined a tuning frequency of 10-11 Hz for the bearings. This has led to 35 mm thickness for the horizontal layer (see: Fig. 3) and a thickness of 25 mm for the lateral bearings.



Fig. 1: Teatro Nacional de Cataluña
Source: <https://mapio.net/wiki/Q1320197-es/>



Fig. 2: Concert hall
Source: <https://mapio.net/wiki/Q1320197-es/>



Fig. 3: Installation of Sylomer® 1991/92
Source: Getzner Werkstoffe GmbH

Fact Box

Material	8600 m ² of different Sylomer® types
Thickness	35 mm horizontal 25 mm lateral

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Measurements 2018

In the year 2018 an external engineering office (AMJ14) has been tasked to check if the efficiency of the solution was still given.

For this, various measurements at different locations inside and outside the theatre as well as inside and outside comparable buildings were made (see: Fig. 4) and numerous events (train passings) were tracked.

At the end the collected data allowed it to get better picture about the solution and its efficiency over time.

Results

Comparison inside and outside by passing train

Inside: < 56 dB

Sidewalk: < 67 dB

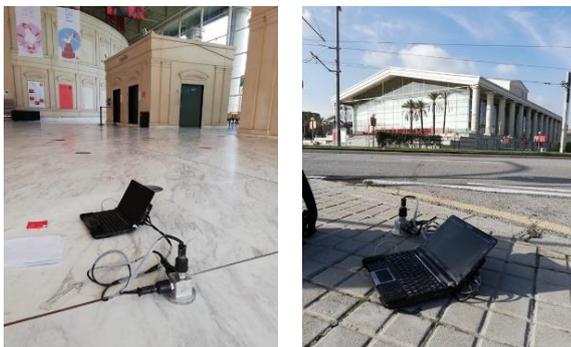


Fig. 5 + 6: Measurement setup 2018 – inside (left) sidewalk (right)
Source: AMJ14

Average insulation efficiency caused by Sylomer ~ 11 dB

Even after 27 years in use, it could be proved that the full surface decoupling of the building with Getzner's Sylomer® is still working perfectly and that all requirements for vibration isolation can still be met.



Fig. 4: Measuring points overview
Source: based on AMJ14

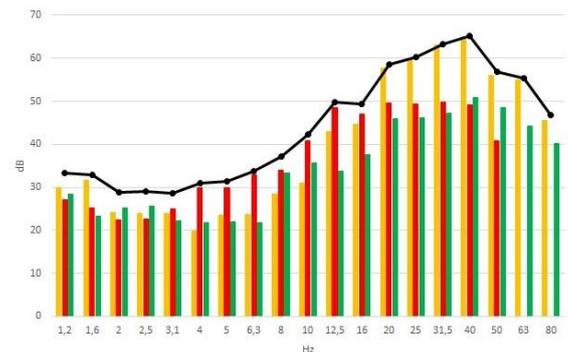


Fig. 7: Results for sidewalk Lwa (dB) 67,67
Source: AMJ14



Fig. 8: Results inside Lwa (dB) 55,13
Source: AMJ14

General Information

Year of installation	1991/92
Year of measurement	2018
Avg. insulation	11 dB