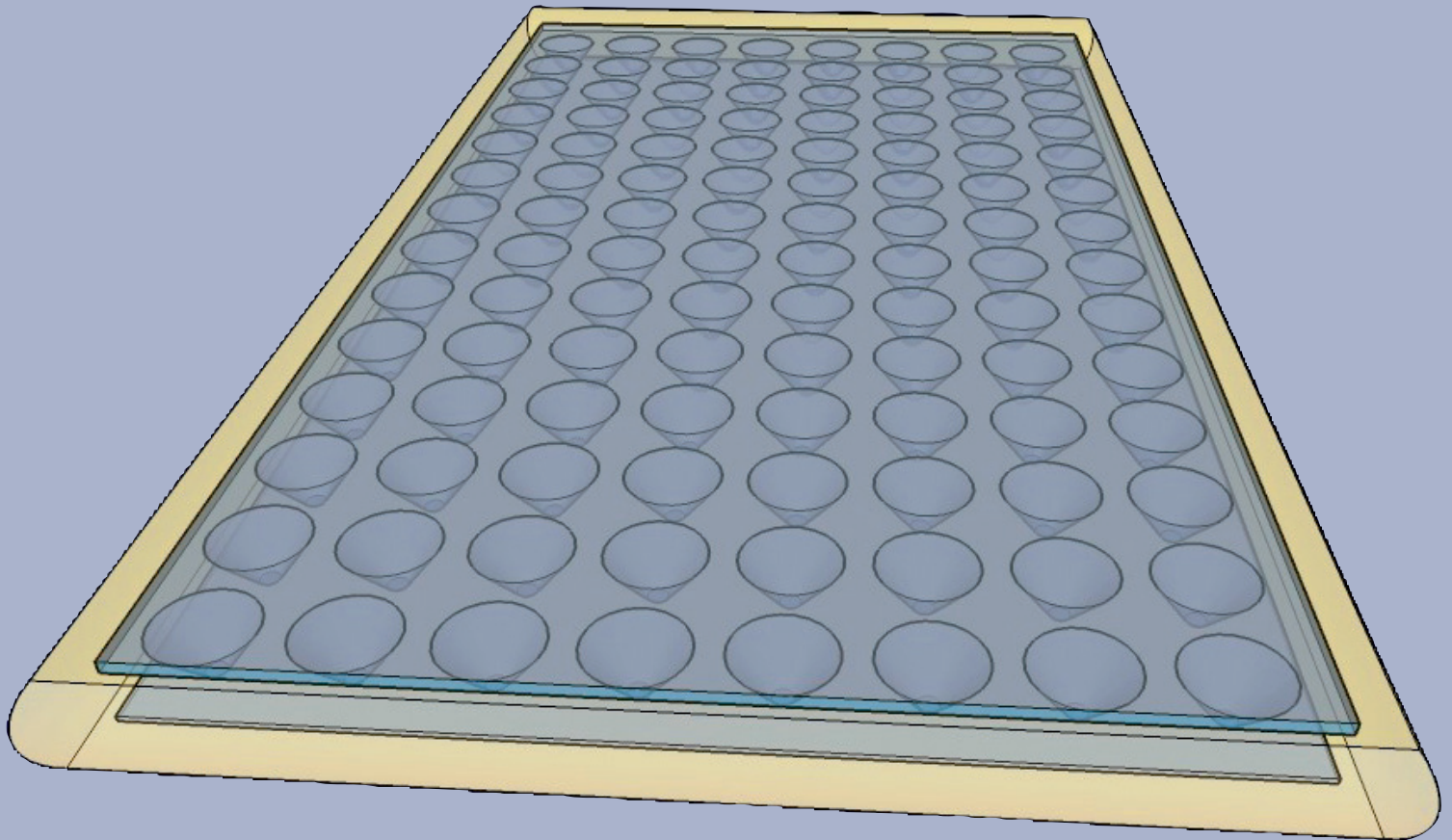


CIMAX

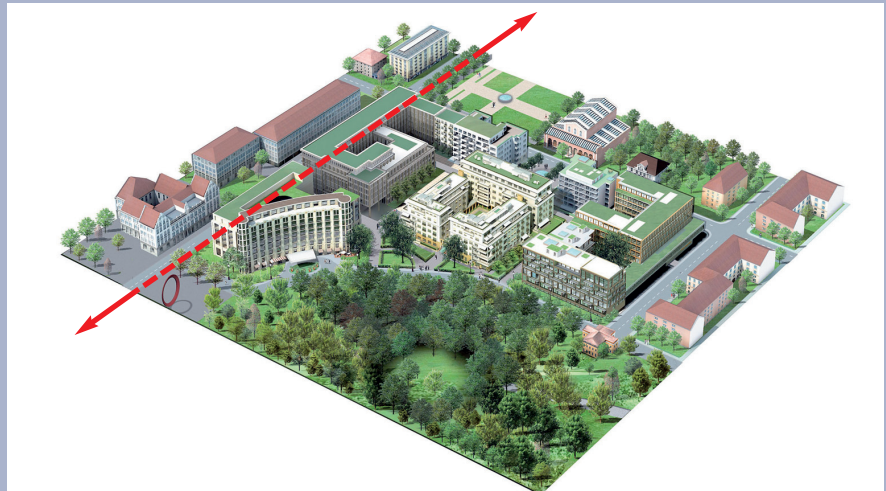


Vibration protection of buildings in groundwater

CIMAX application

CIMAX is a further development of the proven products for vibration protection by Calenberg Ingenieure. CIMAX was especially developed to resiliently mount a complex of buildings, the "Lenbachgärten" in Munich, on top of it. This ambitious project with a sum invested of about 300 Mio Euro comprises a 5-Star-Hotel (15.000 m²), two office buildings (23.000 m²) and freehold flats of high quality (24.000 m²) in the center of town. 2 underground lines with 4 tracks and 2 points are passing below the complex. Vibration impacts caused by the underground, would have considerably disturbed the operation of the high-class hotel. Whereas the claim of the investor was "hear nothing, feel nothing". Thus an elastic support of the building was indispensable. The elastomeric elements had to be installed in a depth of 12m and 6m below groundwater level respectively. These extreme requirements were successfully met by using CIMAX. This protection measure is the only one worldwide, which also grants full protection under water without needing to use expensive waterproof concrete for the floor and side walls of the basement.

The resilient support was designed by the engineering office imb-dynamik who were also consulting in terms of all vibration relevant concerns. Precise calculation methods made it possible for the investor to significantly reduce costs as in the end not the complete building had to be mounted elastically on CIMAX but only a certain part of it.



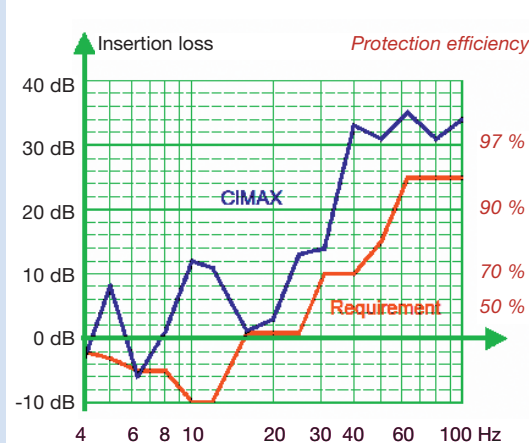
View of construction-complex "Lenbachgärten" in Munich with course of the underground



Installation of CIMAX

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Basic technical data of CIMAX for elastic support of buildings

Natural frequency: 10 Hz
Load: 0,1-0,4 N/mm²
Total height: 35 mm

Diagram:
Achieved effect of CIMAX
(insertion loss) at "Lenbachgärten"
project in Munich