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SUMMARY OF TEST RESULTS
RELATED TO SOUND INSULATION OF THE WALL BETWEEN DWELLINGS
WITH CLADDING BOARDS MADE OF VOX FB 300 KERRABIO/KERRADECO PANELS

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1. Measuring methodology

The purpose of sound insulation measurements of the wall with cladding boards made of VOX FB 300 KERRABIO/KERRADECO panels was an assessment of application effectiveness of these cladding boards in the context of sound insulation improvement of walls between dwelling and suites.

Comparative measurements were carried out by the accredited test laboratory AkustiX (accreditation number PCA(ILAC-MRA): AB 1162).

Measuring procedure was based on a Polish Standard *PN-EN ISO140-4:2000* (Acoustics. Measurement of sound insulation in buildings and of building elements. Field measurements of airborne sound insulation between rooms). The Polish Standard *PN-EN ISO 717-1:1999* (Acoustics. Rating of sound insulation and sound insulation buildings, building elements. Airborne sound insulation) was used to determine single number ratings of sound insulation assessment of partitions.

The measuring methodology includes measurements in field conditions in which so called flanking transmission of sound has an impact on measurement results. In the field conditions, sound travelling between rooms takes place directly (through a tested partition) as well as through adjacent partitions (e.g. through walls, floors etc. adjacent to the tested partition). As a result of flanking transmission of sound, the achieved results of measurements describe not only sound insulation of the tested partition itself but also other sound propagation paths in the building. In other words, sound insulation achieved in the field conditions for the same sample is less by number than sound insulation achieved in laboratory conditions.

To distinguish the measurement results achieved by the field method, different measures are used:

- Field tests: weighted apparent sound reduction index $\boldsymbol{R'_W}$
- Laboratory tests: weighted sound reduction index $\boldsymbol{R_W}$
- Field and laboratory tests: spectrum adaptation terms $\boldsymbol{C}$ and $\boldsymbol{C_{tr}}$
- Field tests: weighted apparent sound reduction indexes: $\boldsymbol{R'_{A1}}$ and $\boldsymbol{R'_{A2}}$. Where $\boldsymbol{R'_{A1} = R'_W + C}$ and $\boldsymbol{R'_{A2} = R'_W + C_{tr}}$

- Laboratory tests: weighted sound reduction indexes: R_{A1}andR_{A2}. Where $R_{A1} = R_W+C$and$R_{A2} = R_W+C_{tr}$

The execution of sound insulation tests of the partition according to the methodology specified in ***PN-EN ISO 140-4:2000*** involves placing a sound source on one side of the tested partition (so called:*transmitting room*) and measuring microphones on the other side of the tested partition (so called: *receiving room*). The sound source is excited by an acoustic signal with appropriately high energy, uniformly distributed in 1/3 octave bands of frequency within a range of 50 Hz to 5 000 Hz. Measuring a level of this sound in the transmitting room and in the receiving room at the same time it is possible to determine sound insulation alongside a sound propagation path between the transmitting room and the receiving room, that mostly (however, in laboratory measurements almost in whole) takes place through the tested partition. Thus a sound energy "attenuation" measure by the tested partition is achieved, i.e. frequency characteristics of apparent sound insulation of the partition under test. Additionally, to make measurement results independent of reverberation in the receiving room, the sound pressure level result is corrected by taking sound absorption of this room into consideration.

In case of the tests carried out for the VOXpanels by AkustiX, the tested partition was a wall between dwellings in a new multi-family residential building. This wall was built with SILKA E24 silicate blocks by Xella. Additionally, to minimise flanking transmission of sound, a door opening leading to the receiving room was acoustically protected. As a result of this procedure, the achieved sound insulation of the partition without cladding boards is very close to the results of laboratory measurements what proves a very limited share of flanking transmission of sound in the achieved results of the measurements.

2. Summary of measurement results

The tests were carried out for the following variants of partition finishing:

1. Partition between dwellings without cladding boards. Measurement report, No. A-2014-03-24.
2. Partition between dwellings with reference cladding boards (plasterboards). Measurement report, No. A -2014-03-23
3. Partition between dwellings with tested VOX FB 300 KERRABIO/KERRADECO panels. Measurement report, No. A -2014-03-22

The single number ratings of sound insulation partition assessment for all finishing variants of the partition between dwellings are listed below.

Report	Description	R'_W	C	C_{tr}	R'_{A1}	R'_{A2}
		[dB]				
A-2014-03-22	**Partition between dwellings with tested VOX FB 300 KERRABIO / KERRADECO panels**	60	-2	-7	58	53
A-2014-03-23	Partition between dwellings with reference cladding boards (plasterboards)	61	-2	-7	59	54
A-2014-03-24	Partition between dwellings without cladding boards	56	-1	-6	55	50

The higher value of R'_W, $R'_{A1}=R'_W+C$ and $R'_{A2}=R'_W+C_{tr}$ ratings means better sound insulation of the partition – better sound separation of adjacent rooms. As a consequence, the higher value of R'_W, R'_{A1} and R'_{A2} ratings the higher sound comfort on both sides of the wall.

The spectrum adaptation terms C and C_{tr} are used to describe sound insulation of the partitions for specific sound sources:

- index C–for living activities noise (talking, music, radio, TV) and for some types of traffic noise (e.g.: railway traffic at medium and high speed, highway road traffic, medium and high frequency noise)
- index C_{tr}–for urban road traffic, railway traffic at low speeds, aircraft, propeller driven noise, jet aircraft noise, large distance, music with dominating low frequency sound content, low frequency noise

3. Conclusions

The field measurements of sound insulation carried out for VOX FB 300 KERRABIO/KERRADECO panels confirm their suitability to improve sound insulation of building partitions.

The efficiency of this panel is comparable to the efficiency of typical cladding made of full 12.5 mm thick plasterboard with mineral wool filling.

The VOX panel may be used successfully, provided that it is carefully mounted, to improve sound insulation of building partitions in which there are losses caused by e.g. electric, hydraulic or technical equipment installations.

The achieved increase of sound insulation is relevant for the base massive partition with insulation similar to the tested partition built with SILKA E24 silicate blocks. The tested base partition was intentionally selected as a wall with sound insulation corresponding to the requirements for the partitions between dwellings or between suites in public utilities, such as hotels and offices with increased sound requirements.

The achieved increases of sound insulation cannot be transferred to the cases where the tested cladding is used to light partitions and to massive partitions with sound insulation less than $\boldsymbol{R_W=50\ dB}$. In these cases better effectiveness is expected (in terms of sound insulation increase), however, these assumptions should confirmed by carrying out proper field or laboratory sound insulation tests for these types of base walls with VOX panels.