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Solutions for improved sound insulation in old housing

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Improvement of sound insulation – Old housing

In connection with renovation or rebuilding of old housing in Denmark, improved sound insulation should be included as an objective. Projects concerning the possibilities of complying with sound class C in the Danish classification scheme DS 490:2007 have been carried out.

The projects “Better sound insulation in newly renovated homes” focused on old apartment buildings with typical Danish timber floor constructions. For these floor constructions an improvement of approx. 5 dB for the airborne sound insulation and 10 - 15 dB for the impact sound insulation is normally required. Different solutions have been tested in the laboratory as well as in the field during renovation of a block of flats in Copenhagen.

The projects were funded by the Danish Ministry of Housing and Building & The Danish Landowners Investment Fund, 1999-2006. Information about the projects and results are given on: www.ejendomsviden.dk/nabostoji

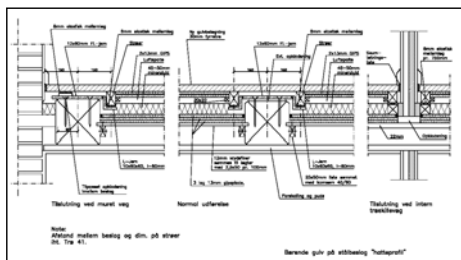


Existing floor construction in old housing:
Typical Danish timber floor construction with pugging

Sound insulation between dwellings Main class criteria in DS 490:2007			Characteristics of DS 490 sound classes for dwellings and occupants' expected evaluation Information compiled based on DS 490		
Class	Airborne	Impact	Sound class descriptions	Good or very good	Poor
A	$R'_{w} + C_{50-3150} \geq 63$ dB	$L'_{n,w} \leq 43$ dB and $L'_{n,w} + C_{1,50-2500} \leq 43$ dB	Excellent acoustic conditions. Occupants will be disturbed only occasionally by sound or noise.	> 90 %	
B	$R'_{w} + C_{50-3150} \geq 58$ dB	$L'_{n,w} \leq 48$ dB and $L'_{n,w} + C_{1,50-2500} \leq 48$ dB	Significant improvement compared to minimum in class C. Occupants may be disturbed sometimes.	70 to 85 %	< 10 %
C	$R'_{w} \geq 55$ dB	$L'_{n,w} \leq 53$ dB	Sound class intended as the minimum for new buildings.	50 to 65 %	< 20 %
D	$R'_{w} \geq 50$ dB	$L'_{n,w} \leq 58$ dB	Sound class intended for older buildings with less satisfactory acoustic conditions, e.g. for renovated dwellings.	30 to 45 %	25 to 40 %
Reference: DS 490:2007, “Lydklassifikation af boliger” (Sound classification of dwellings).			Note: Within each sound class the percentage of satisfied or dissatisfied occupants may depend on the type of criterion. The grouping is mainly based on the subjective assessments of airborne and impact sound from adjacent dwellings.		



Example of solution for improved floor construction:
3D and construction drawing. Timber flooring on joists
with elastic supports on iron mounting across beams.
Pugging replaced by plasterboard.



Timber floors	Typical Danish timber floor				Solution with joists on iron mounting			
	R_w	R'_w	$L_{n,w}$	$L'_{n,w}$	R_w	R'_w	$L_{n,w}$	$L'_{n,w}$
Laboratory	52 dB		65 dB		61 dB		56 dB	
In situ		50 dB		63 dB		58 dB		52 dB

Example of a solution for sound class C for old housing with typical Danish timber floor construction. Measurement results from building acoustic laboratory measurements and field measurements in an old apartment building before and after renovation.

Examples of different solutions tested in the laboratory and/or in the apartment building, some fulfilling sound class C, some only class D



Drawings and data available at www.ejendomsviden.dk/nabostoji