

Constructions complying with tightened Danish sound insulation requirements for new housing

Rasmussen, Birgit; Hoffmeyer, Dan

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Constructions complying with tightened Danish sound insulation requirements for new housing

Birgit Rasmussen (1), Dan Hoffmeyer (2)

(1) SBI, Danish Building Research Institute, Aalborg University, DK; (2) DELTA Acoustics, DK

New sound insulation requirements in Denmark in 2008

New Danish Building Regulations with tightened sound insulation requirements were introduced in 2008. Compared to the Building Regulations from 1995, the airborne sound insulation requirements were 2 - 3 dB stricter and the impact sound insulation requirements 5 dB stricter. The limit values are given using the descriptors R'_w and $L'_{n,w}$ as before.

For the first time, acoustic requirements for dwellings are not found as figures in the Building Regulations. Instead, it is stated that the requirements are considered to be met, if the acoustic indoor climate in housing complies with sound class C in the Danish classification scheme DS 490:2007. The Danish Building Research Institute is preparing a guideline with examples of construction solutions to meet the tightened requirements. The examples on this poster are a foretaste of this guideline involving more building types with heavy and light-weight constructions. The solutions are mainly based on calculations in accordance with EN ISO 12354.

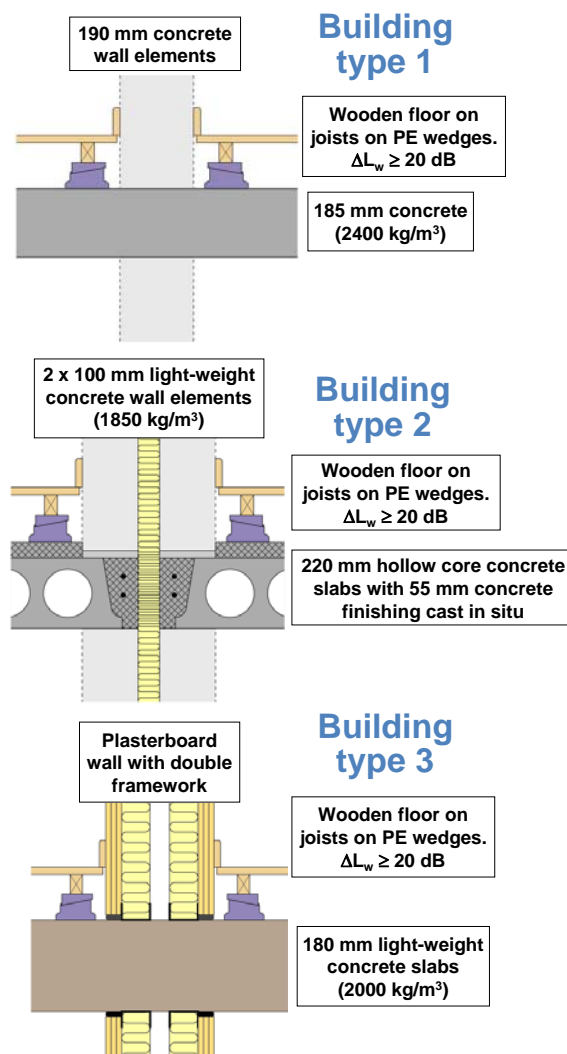


Sound insulation between dwellings Main class criteria in DS 490:2007			Characteristics of DS 490 sound classes for dwellings and occupants' expected evaluation Information compiled based on DS 490		
Class	Airborne	Impact	Sound class descriptions	Good or very good	Poor
A	$R'_w + C_{50-3150} \geq 63$ 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, "Lydklassificering 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.		

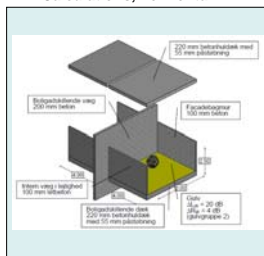
The construction examples are from a draft SBI-guideline "Lydisolering mellem boliger – Nybyggeri" (Sound insulation between dwellings – New build)". Publication expected in April 2011. The guideline is a part of a series of seven new SBI acoustic guidelines. The series shall replace the existing guidelines 1984-1992. Publication 2011ff.

Weight of constructions		Building type 1	Building type 2	Building type 3
Floors	Construction	Heavy	Heavy	Heavy
	Surface density, at least	440 kg/m ²	440 kg/m ²	310 kg/m ²
Walls	Construction	Heavy	Heavy, double	Light weight, double
	Surface density, at least	440 kg/m ²	2 x 185 kg/m ²	2 x 20 kg/m ²

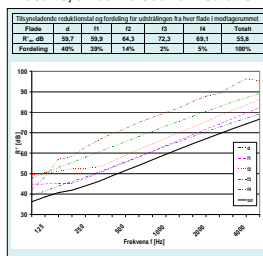
Examples of solutions are shown for sound class C for dwellings in multi-storey housing of three different building types.



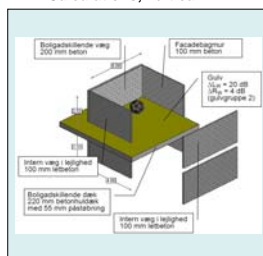
Calculations, horizontal



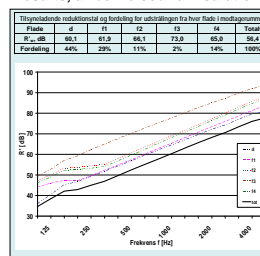
Results, airborne sound insulation



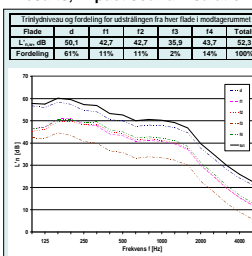
Calculations, vertical



Results, airborne sound insulation



Results, impact sound insulation



The calculations are made by Dan Brøsted Pedersen, DB Akustik, using Building Acoustics software BASTIAN and detailed models in EN 12354-1 (airborne) and EN 12354-2 (impact)