Annex C
(normative)

Standard floors for measuring the improvement of impact sound insulation by floor coverings

C.1 Standard reference elements

Corresponding to the application of floor coverings, the constructions described in this annex may be used as standard reference elements. In this annex, the constructions are described and the standardized values of the impact sound pressure level, L_n, of the standard reference elements are given together with the corresponding weighted impact sound pressure level, $L_{n,w}$, and spectrum adaptation term, C_I, in accordance with ISO 717-2.

NOTE Table C.1 gives the typical smoothed values for the normalized impact sound pressure level of these reference elements used in the determination of the single-number rating; the measured values of the actual reference element are used to evaluate the improvement by floor coverings.

C.2 Heavyweight reference floor

C.2.1 General

The floor on which the test coverings are installed shall consist of a reinforced concrete slab of thickness 120^{+40}_{-20} mm, preferably 140 mm for the construction of new laboratories. It should be homogeneous and shall be of uniform thickness. The surface area viewed from the receiving room shall be at least 10 m^2.

C.2.2 Condition of floor surface

The surface of the test floor shall be flat to ± 1 mm in a horizontal distance of 200 mm, and sufficiently hard to endure the impacts of the tapping machine. If a screed is applied to the surface of the test floor, it shall be ensured that it adheres perfectly at all points, and that it does not chip, crack or become pulverized.

C.3 Lightweight reference floors

C.3.1 General

The floor on which the test covering is installed shall be chosen from the lightweight reference floors described in this annex; see Annex G for an alternative.

The surface area, viewed from the receiving room, shall be at least 10 m^2.

C.3.2 Condition of floor surface

The surface of the test floor shall be flat to ± 2 mm in a horizontal distance of 200 mm, and sufficiently hard to endure the impacts of the tapping machine.

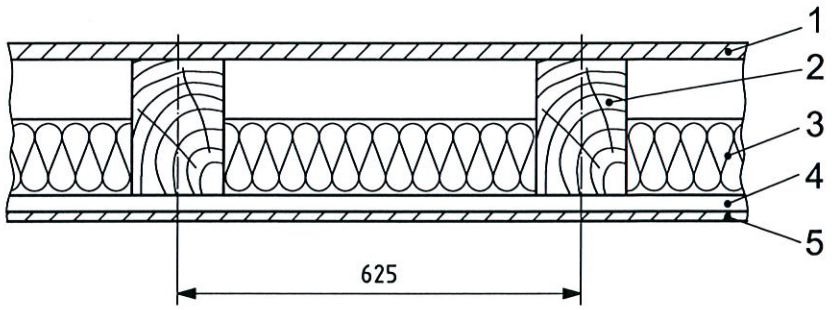
C.3.3 Types of lightweight reference floors

C.3.3.1 General

The following types of floors shall be chosen as lightweight reference floors for the measurement of the reduction of impact sound pressure level in accordance with ISO 10140-3.

Different kinds of lightweight floor constructions are used in the world. The following three types of floor (see C.3.3.2, C.3.3.3 and C.3.3.4) are generally representative of these floors. It is recommended that the reference floor be chosen according to the aim of the measurement.

C.3.3.2 Lightweight reference floor C1



Key

1 subfloor
- thickness: (22 ± 2) mm
- fastening: screwed to the joists, distance of screws: (300 ± 50) mm
- material: wooden chipboard with a mass density of (660 ± 20) kg/m^3

2 wooden joists
- dimensions: 120 mm width and 180 mm height
- spacing: 625 mm centres

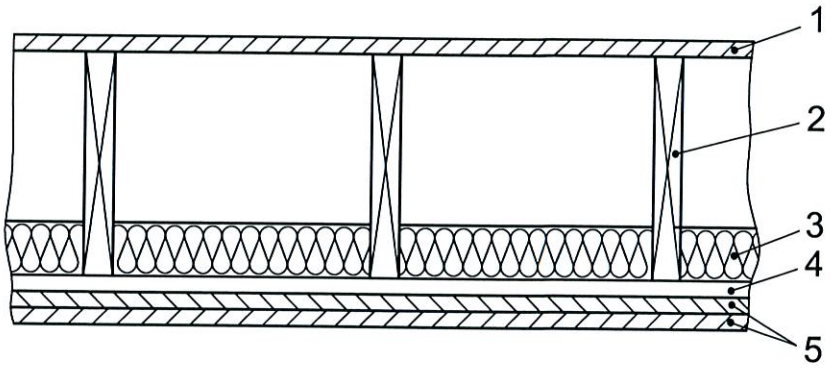
3 absorbent
- material: mineral wool
- thickness: 100 mm
- airflow resistivity: 5 kPa s/m^2 to 10 kPa s/m^2 according to ISO 9053

4 wooden ceiling battens
- dimensions: 24 mm width and 48 mm height
- spacing: 625 mm centres

5 plaster board ceiling
- thickness: 12,5 mm
- mass density: (800 ± 50) kg/m^3
- fastening: screwed to the battens, distance of screws: (300 ± 50) mm

Figure C.1 — Lightweight reference floor C1

C.3.3.3 Lightweight reference floor C2



Key

1 subfloor

thickness:	(20 ± 2) mm
fastening:	(50 ± 10) mm screws spaced (150 ± 10) mm along butt joints supported by the joists and (300 ± 10) mm elsewhere
material 1:	tongued and grooved oriented strand board or plywood with a mass density of (580 ± 100) kg/m^3
material 2:	tongued and grooved chipboard with a mass density of (680 ± 100) kg/m^3

NOTE Select either subfloor material 1 or 2 depending on the availability of materials.

2 joists

material:	solid soft wood (e.g. spruce, pine or fir)
dimensions:	(42 ± 8) mm width and (225 ± 25) mm height
mass density:	(400 ± 75) kg/m^3
spacing:	(610 ± 10) mm between centre planes and, if necessary, (405 ± 10) mm between centre planes

3 absorbent

material:	mineral wool (e.g. glass fibre batts)
dimensions:	(100 ± 10) mm thickness, completely filling the width and length of the cavity (placed immediately above the resilient channels)
airflow resistivity:	5 kPa s/m^2 to 10 kPa s/m^2 according to ISO 9053

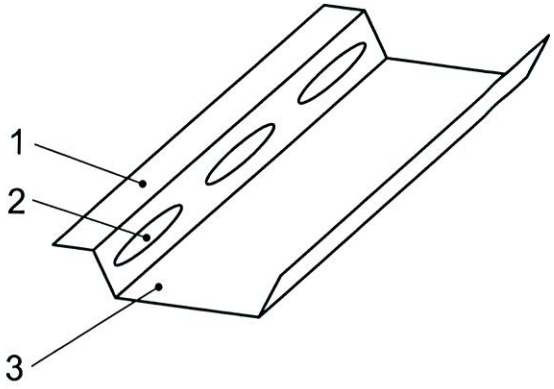
4 resilient metal channels

material:	cold-rolled steel of thickness (0,5 ± 0,1) mm having a "Z" profile (see Figure C.3).
spacing:	(405 ± 10) mm oriented perpendicular to the joists

5 plaster board ceiling

material:	two layers of plaster board, thickness: (13,5 ± 1,5) mm, mass density: (800 ± 50) kg/m^3
fastening:	screws spaced (305 ± 5) mm into each resilient channel. The screw pattern is selected such that the screws penetrate the flange of the resilient channel and do not touch the joists

Figure C.2 — Lightweight reference floor C2



Key

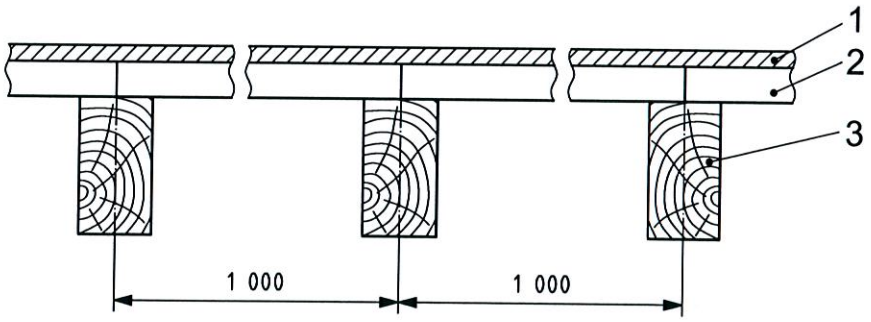
1 flange used to attach the channel to the framework
2 web
3 flange used to attach the gypsum board to the channel

Figure C.3 — Generic resilient channel used to isolate the gypsum board ceiling

Figure C.3 shows a sketch of the generic resilient channels used to isolate the gypsum board ceiling. Typical dimensions are: height 13 mm, gypsum board attachment flange 32 mm, framework attachment flange 11 mm. It is possible for the web to have cut-outs. The flange used to attach the gypsum board can have a more complicated profile (with bumps or ridges).

C.3.3.4 Lightweight reference floor C3

Dimensions in millimetres



Key

1 subfloor
material: two layers of plywood, thickness: (15 ± 1) mm, mass density: (550 ± 50) kg/m³
fastening: 50 mm screws spaced 500 mm along the joists

2 joists
material: solid soft wood
dimensions: 45 mm width and 60 mm height
mass density: (525 ± 125) kg/m³
spacing: 300 mm centres

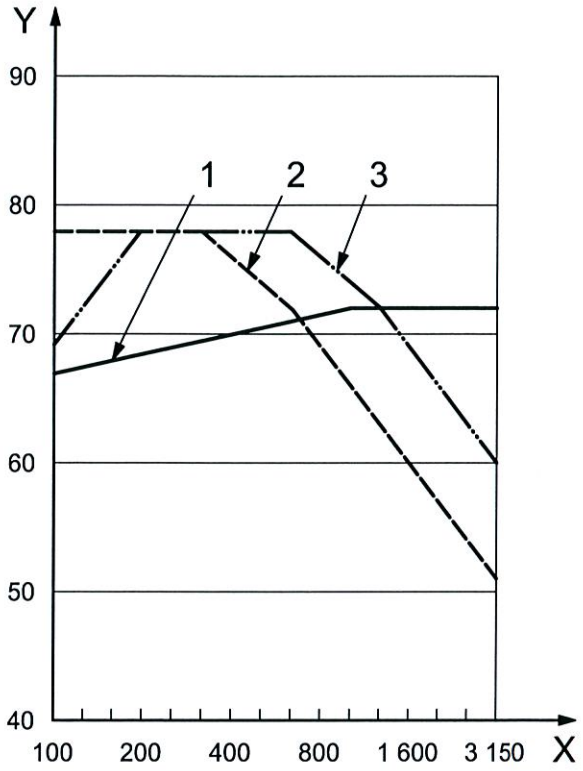
3 beams
material: solid soft wood
dimensions: 120 mm width and 240 mm height
mass density: (525 ± 125) kg/m³
spacing: 1 000 mm centres

Figure C.4 — Lightweight reference floor C3

Table C.1 — One-third octave band values of the reference curve for all reference floors with the corresponding single-number rating

Frequency Hz	$L_{n,r,0}$ for heavyweight floors dB	$L_{n,t,r,0}$[a] for lightweight floors C1 and C2 dB	$L_{n,t,r,0}$[a] for lightweight floors C3 dB
100	67	78	69
125	67,5	78	72
160	68	78	75
200	68,5	78	78
250	69	78	78
315	69,5	78	78
400	70	76	78
500	70,5	74	78
630	71	72	78
800	71,5	69	76
1 000	72	66	74
1 250	72	63	72
1 600	72	60	69
2 000	72	57	66
2 500	72	54	63
3 150	72	51	60
$L_{n,r,0w}$ or $L_{n,t,r,0w}$ dB	78	72	75
$C_{l,r,0}$ or $C_{l,t,r,0}$ dB	−11	0	−3

[a] The index, t, is used to distinguish results for lightweight floors from those for heavyweight floors; it originates from the word "timber".



Key

X frequency (Hz)

Y L_n (dB re 20 µPa)

1 heavyweight floor

2 lightweight floors C1 and C2

3 lightweight floor C3

Figure C.5 — Reference curves for standard reference floor elements

C.3.4 Values of $\Delta L_{t,w}$

Values of $\Delta L_{t,w}$ calculated with the lightweight reference floor C1 or C2 shall be designated as $\Delta L_{t,1,w}$ or $\Delta L_{t,2,w}$ respectively; values of $\Delta L_{t,w}$ calculated with the lightweight reference floor C3 shall be designated as $\Delta L_{t,3,w}$.