

SINTEF confirms that

Separating floors with Hunton Silencio® 36 / Hunton Silencio Thermo®

has been found to be fit for use in Norway and to meet the provisions regarding product documentation given in the regulation relating to the marketing of products for construction works (DOK) and regulations on technical requirements for building works (TEK), with the properties, fields of application and conditions for use as stated in this document

1. Holder of the approval

Hunton Fiber AS
 P.O. Box 633
 NO-2810 Gjøvik, Norway
www.hunton.no

2. Product description

This approval regards the use of Hunton Silencio® 36 and Hunton Silencio® Thermo as supporting layer and damping material in separating floor constructions.

Hunton Silencio® 36 is wood fibre softboards with a thickness of 36 mm, made of three 12 mm sheets glued together with water glass adhesive. The boards have rebated edges or tongue and groove on all four sides. Board density is approximately 250 kg/m³, corresponding to a sheet weight of approximately 9 kg/m².

Hunton Silencio® Thermo is the same product as Hunton Silencio® 36, but is supplied with slotted grooves for pipes combined with heat distribution plates of aluminium for waterborne floor heating.

The standard board format is 600 mm x 1800 mm. The boards have the following tolerances in compliance with EN 324-1:

Thickness: ± 0.5 mm
 Length/width: ± 2 mm / ± 1 mm
 Perpendicular alignment: $\leq \pm 1.5$ mm per board width

Hunton Silencio® Thermo is supplied as standard elements, bend elements and distribution elements, with grooves for pipes with 16 mm or 17 mm diameter spaced c/c 200 mm or 300 mm, and for pipes with 20 mm diameter spaced c/c 300 mm.

3. Fields of application

Hunton Silencio® is used as a damping layer under parquet or building board subfloors in floor constructions to reduce the impact sound pressure level, and to increase the airborne sound insulation for rooms below. See fig 1 and 2.

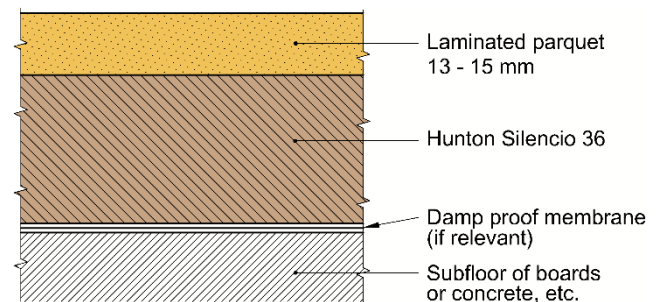


Fig. 1
Use of Hunton Silencio® 36 under parquet flooring

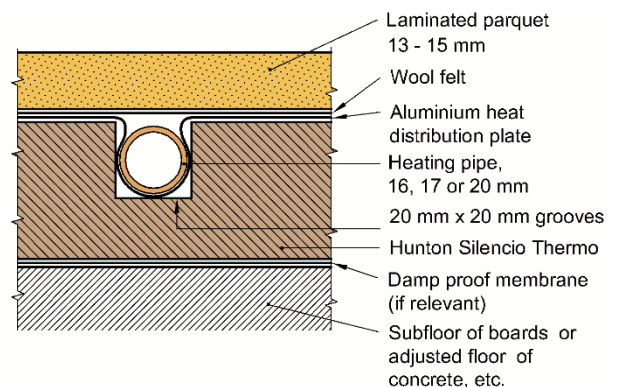


Fig. 2
Use of Hunton Silencio® Thermo with pipes for waterborne heating under parquet flooring.

The use is restricted to floors with design loads in category A and B in compliance with NS-EN 1991-1-1 with definition of user category A-D and associated payload.

Category A has distributed load 2 kN/m² and concentrated load 2 kN. Category B has distributed load 3 kN/m² and concentrated load 2 kN.

Hunton Silencio® may also be used under wooden floors fastened with screws. The boards are then combined with wooden laths in the joints as shown in fig. 3.

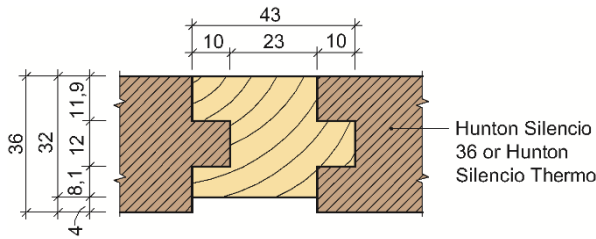


Fig. 3
Use of wooden lath in the joints of Hunton Silencio®. Floorboards of solid wood can be attached to the laths with screws. The wooden lath is designed so that attaching the flooring does not impair the sound insulation.

4. Properties

Load-carrying capacity

The boards are sufficiently strong and rigid for the intended use as specified in clause 4.

Properties related to fire

The boards used on floors are classified as E_n in compliance with EN 13501-1.

Sound insulation, dynamic stiffness

The dynamic stiffness for Hunton Silencio® 36 is 8 MN/m³ measured according to ISO 9052-1 (EN 29052-1).

Sound insulation, heavy-weight floor decks

Table 1 shows the expected weighted reduction of impact sound pressure level $\Delta L_{n,w}$ og expected weighted improvement of the airborne sound insulation, ΔR_w by use of 13-15 mm laminated parquet on 36 mm Hunton Silencio® on heavy floor decks . The weighted reduction of impact sound pressure level are in compliance with EN ISO 10140-3 (laboratory measurements) or EN ISO 16283-2 (field measurements) including evaluation according to EN ISO 717-2 The expected, weighted improvement of the airborne sound insulation are in compliance with EN ISO 10140-2 (laboratory measurements) or EN ISO 16283-1 (field measurements) including evaluation according to EN ISO 717-1.

Table 1

Expected range of variation of impact sound pressure level improvement and airborne sound insulation improvement for various types of flooring on Hunton Silencio® on heavy floor decks.

Construction	Impact sound pressure level improvement $\Delta L_{n,w}$, dB	Improvement of airborne sound insulation ΔR_w , dB
13-15 mm laminated parquet on Hunton Silencio® 36 - Massive concrete floors - Concrete hollow core decks	22-24 26-30	3-5
13-15 mm laminated parquet, on Hunton Silencio® - Massive concrete floors - Concrete hollow core decks	23-25 24-32	3-5

Table 2 states the expected, weighted, apparent sound reduction index, R'_w and the expected, weighted, normalized impact sound pressure level, $L'_{n,w}$ for complete floor constructions in finished buildings with Hunton Silencio® 36 or Hunton Silencio® Thermo (example in fig. 4).

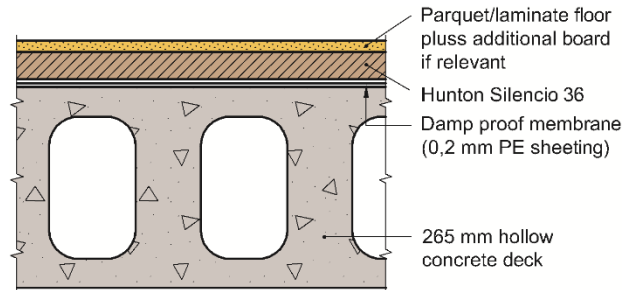


Fig. 4
Example of a heavy weight floor construction with Silencio® Hunton.

Sound insulation characteristics applies to heavy weight floors with normally good flanking transmission properties. The weighted, apparent sound reduction index, R'_w are in compliance with EN ISO 16283-1 / EN ISO 717-1. The weighted, normalized impact sound pressure level, $L'_{n,w}$ are in compliance with EN ISO 16283-2 / EN ISO 717-2.

Table 2

Expected sound insulation characteristics of heavy weight floors with Hunton Silencio® measured in finished buildings.

Construction	Weighted apparant sound reduction index, R'_w , dB	Weighted, normalized impact sound pressure level, $L'_{n,w}$, dB
13-15 mm laminated parquet, Hunton Silencio® 36 ¹⁾ , 10 mm filler levelling, 200 mm concrete hollow core deck	≥ 55	≤ 53
13-15 mm laminated parquet, Hunton Silencio® 36 ¹⁾ , 10 mm filler levelling, 265 mm concrete hollow core deck or 200 mm massive concrete deck	≥ 56	≤ 52

¹⁾ From experience the impact sound properties are 1 - 2 dB better with Hunton Silencio® Thermo

Sound insulation, light-weight floors

Table 3 states the expected, weighted, apparent sound reduction index, R'_w and the expected, weighted, normalized impact sound pressure level, $L'_{n,w}$ for complete floor constructions in finished buildings with Hunton Silencio® 36 or Hunton Silencio® Thermo on timber floor constructions with minimum 223 mm high joists, (see fig. 5 -7). As the figures show, it is normally necessary to use an additional board under the parquet layer to obtain the impact sound level given in table 3.

The sound insulation values vary with the degree of flanking transmission and are given for floors supported on respectively heavy-weight and light-weight load bearing walls.

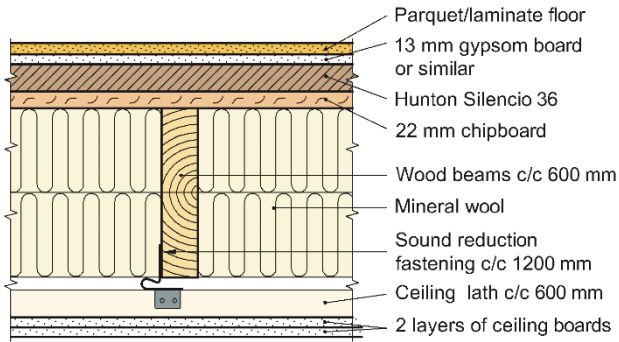


Fig. 5
Example of timber floor construction with Hunton Silencio®.

Table 3

Expected sound insulation characteristics of timber floor constructions with Hunton Silencio®, measured in finished buildings.

Floor construction ¹⁾	Weighted apparent sound reduction index, R'_w , dB	Weighted, normalized impact sound pressure level, $L'_{n,w}$, dB
On supporting walls of masonry or concrete	≥ 57	≤ 51
On supporting walls of timber construction with two layers of 13 mm plasterboard or similar on each side.	≥ 56	≤ 53

1) Floor construction as shown in fig. 5 (13-15 mm laminated parquet, 13 mm plasterboard, Hunton Silencio® 36/Thermo, 22 mm chipboard, joists with minimum 223 mm height, 150 mm mineral wool, ceiling of 2 x 13 mm plasterboards suspended in elastic brackets)

Fig. 6 shows construction detail for connection between timber floor construction and external timber wall.

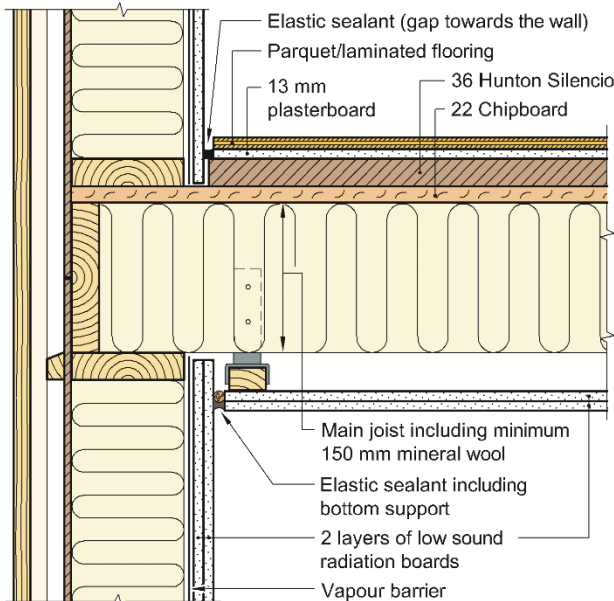


Fig. 6
Connection detail between external timber wall and timber floor construction. The top floor layers have a gap towards the wall. The gap may be filled with an elastic sealant.

At need for internal support of the floor joists, we recommend use of hidden steel girder integrated in the floor construction so that the ceiling boards are continuously passing, see fig. 7. Use of exposed girder can't be used between different dwellings if the sound insulation requirements shall be fulfilled.

Support on internal load bearing wall may reduce the sound insulation values. If it is to be used, the dimension of the sill and studs must at least be 98 mm. In addition the cavity must be filled with mineral wool and the wall must have two layers of low sound radiation boards of 13 mm standard plaster board lining or similar on each side, see fig. 8.

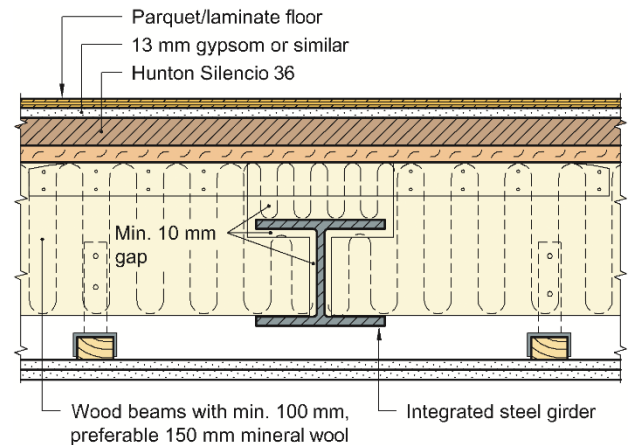


Fig. 7
Support on hidden steel girder

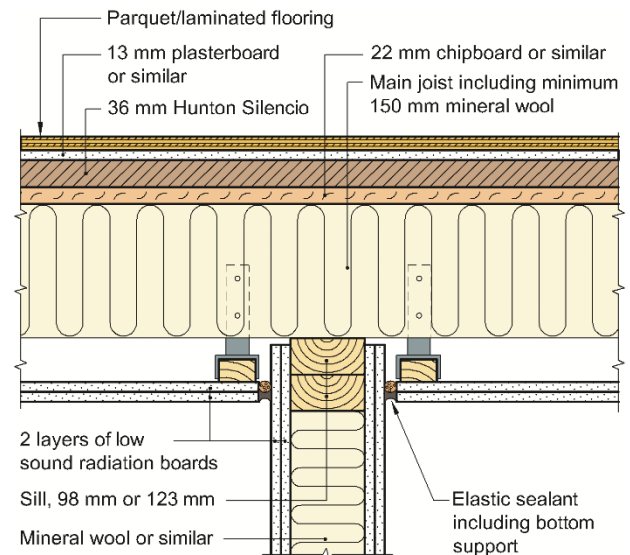


Fig. 8
Alternative support on insulated, load bearing internal wall with two layers of low sound radiation 13 mm standard plaster board lining or similar on each side.

Thermal insulation

The thermal conductivity for Hunton Silencio® is $\lambda_d = 0,05 \text{ W}/(\text{m}\cdot\text{K})$, and the thermal resistance is $R_d = 0.7 \text{ m}^2\text{K}/\text{W}$.

5. Environmental aspects

Substances hazardous to health and environment

Hunton Silencio® contains no hazardous substances with priority in quantities that pose any increased risk for human health and environment. Chemicals with priority include CMR, PBT or vPvB substances.

Effect on indoor environment

Hunton Silencio® is not regarded as emitting any particles, gases or radiation that have a perceptible impact on the indoor climate, or to have any significant impact on health.

Waste treatment/recycling

Hunton Silencio® shall be sorted as wood and metal materials on the building/demolition site. Hunton Silencio® shall be delivered to an authorized waste treatment plant for energy and material recovery.

Environmental declaration

No environmental declaration has been worked out for Hunton Silencio®.

6. Special conditions for use and installation

Design considerations

The substrate should have evenness according to tolerance class PA according to NS 3420-1 when using a floating parquet floor. This corresponds to a maximum surface deviation of ± 2 mm over a measurement length of 2 m for decks and subfloors. The requirement is stricter than the recommended normal class PB as described in NS 3420-1 pt. 4 d2.2.

Laminated parquet laid directly on the boards must have a minimum thickness of 14 mm.

Min. 15 mm boards for load distribution, e.g. chipboard with tongue and groove, shall be placed between Hunton Silencio® and thin floor coverings, carpets and thin laminated flooring. Alternatively, 13 mm floor plasterboard can be used under thin laminate flooring, which is particularly relevant in combination with Silencio® Thermo and floor heating systems.

The characteristic sound insulation values stated in table 3 are valid as long as both external walls and internal load bearing walls have two layers of internal boards, see fig. 6 and 7. If the load bearing beam is replaced by a internal load bearing wall the wall dimension, insulation and number for boards be in accordance with the principle given in fig. 8.

Installation

The boards must be conditioned at the building site before installation, and the relative humidity of the air must not exceed 60 % during installation.

The boards shall be placed staggered, with at least 200 mm side displacement. Pieces less than 150 mm should be avoided. There should be at least 5 mm clearance to walls, floor openings etc.

A damp-proof membrane of 0.2 mm polyethylene sheet under the boards shall be used when installation is made on concrete or light weight concrete decks. A wool felt should be placed on Hunton Silencio® Thermo between the heat distribution plates and the top floor.

Transport and storage

The boards must be protected against precipitation during transport and storage.

7. Factory production control

Hunton Silencio® is produced by Hunton Fiber AS, NO-2810 Gjøvik, Norway.

The holder of the approval is responsible for the factory production control in order to ensure that Hunton Silencio® is produced in accordance with the preconditions applying to this approval.

The manufacturing of Hunton Silencio® is subject to continuous surveillance of the factory production control in accordance with the contract regarding SINTEF Technical Approval.

The floor construction on site must be controlled in each building project as a part of the ordinary building control.

8. Basis for the approval

The approval is primarily based on verification of characteristics documented in the following reports:

- Norwegian Building Research Institute, report O 3952-46 dated 15.03.99. Measurement of thermal conductivity on wood fibre boards
- Norwegian Building Research Institute, report O 7978 dated 16.04.97. Measurement of dynamic stiffness
- Norwegian Building Research Institute, report N 7866 dated 17.09.99 and provisional report 08.02.01 on strength and stiffness of parquet and laminated floors on elastic foundation.
- SP Technical Research Institute of Sweden. Emission measurement Hunton Silencio® 36. Report 3F 00 2441 av 05.03.2013.
- SINTEF Building and Infrastructure. Strength and stiffness of floors supported on 36 mm Hunton Silencio®, version 2. Base for assessment of increased load class. Test report SBF 20160055. 09.02.2016

In addition, the approval is based upon several assignment reports from the Norwegian Building Research Institute for Hunton Fiber AS et. al. concerning sound insulation measurements of floors with Hunton Silencio® 36 and Hunton Silencio® Thermo.

9. Marking

All boards shall be labelled with the manufacturer's product designation and date of production. The approval mark for SINTEF Technical Approval No. 2330 may also be used.



Approval mark

10. Liability

The holder/manufacturer has sole product responsibility according to existing law. Claims resulting from the use of Hunton Silencio® cannot be brought against SINTEF beyond the provisions of Norwegian Standard NS 8402

for SINTEF Byggforsk

A handwritten signature in blue ink that reads "Hans Boye Skogstad".

Hans Boye Skogstad
Approval Manager