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PROSILENCE

Technical Documentation

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SENTRALT GODKJENT

AVshop AS

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AVshop AS confirms that

PROSILENCE decoupling system for walls, ceilings and floors

Suitability and certification

The ProSilence system is considered suitable **for use** in the specified applications and under the conditions specified in this document.

The system satisfies the requirements for:

1. **Mechanical strength** (see SINTEF test report 2018, attached in **Appendix 1**)
2. **Soundproofing function** in accordance with the specifications and measurement results documented in this white paper.

Holder of the approval

DreamScreen
https://dreamscreen.no

Producer

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Disclaimer / Legal Limitation of Liability

The information contained in this document has been prepared to the best of our knowledge and based on available technical knowledge and experience with the ProSilence concept. The document is intended as a guide, and DreamScreen / ProSilence assumes no responsibility for any errors or omissions that may arise as a result of the use or interpretation of this guide.

It is emphasized that **correct stiffness and anchoring of the joists are a prerequisite for successful installation**. When using decoupling systems such as U-boat directly on joists, it must be ensured that the joists are sufficiently braced in accordance with applicable regulations and building technical requirements, for example through the use of cubicles or other mechanical reinforcement. Lack of bracing can lead to structural failure and reduced performance of soundproofing measures.

Furthermore**, all components, including clips and associated screws, must be installed properly**. It is crucial that screws of **sufficient length, load-bearing capacity and quality** are used, adapted to the substrate in question. Incorrect sizing or selection of fasteners can lead to structural failure and reduced sound insulation effect.

ProSilence disclaims any liability for damage, incorrect assembly or impaired function as a result of lack of rigidity in joists, incorrectly assembled components, use of unsuitable fasteners, or deviations from recommended installation methods. It is the installer's responsibility at all times to ensure that measures are in accordance with applicable regulations, manufacturer recommendations and building technical standards.

Executive Summary

Introduction

This whitepaper introduces the **ProSilence decoupling system**, a specialized solution for high-performance sound insulation of floors, walls, and ceilings. Engineered to mitigate the transmission of vibrations and airborne noise, the system covers a wide frequency range from **10 Hz to 5000 Hz and above**, ensuring effectiveness in both low and high-frequency domains.

System Overview

1. **Floors:** Decoupling achieved using specially developed "U-boats" designed for timber battens.
2. **Walls and ceilings:** Vibration-damping materials mounted on metal rails, with no direct contact with the primary structure.
3. **System Tiers:**
    - **Level 1:** Standard solution for typical noise environments
    - **Level 2:** Enhanced solution for demanding acoustic conditions (e.g., gyms, music rooms, home cinemas)

Acoustic Measurement and Regulatory Requirements

Key Metrics

- **Airborne sound insulation (R′w):** Measured on site and reflects the sound reduction index adjusted for reverberation.
- **Impact sound insulation (L'n,w):** Measured in the field but evaluated against **laboratory standard** Ln,w values.

Recommended EU Reference Standards

ProSilence solutions are designed in accordance with **EN ISO 717-1** (airborne sound) and **EN ISO 717-2** (impact sound). While national requirements vary, many EU countries adopt similar classifications based on these norms.

Sound Class	R′w (Field Measured)	L´n,w (Field Measurement)
Class A	≥ 63 dB	≤ 48 dB
Class B	≥ 60 dB	≤ 53 dB
Class C	≥ 55 dB	≤ 58 dB
Class D	< 50 dB	> 58 dB

Important Considerations

1. **Results depend on installation quality**, construction method, and room geometry.
2. Measurement data provided by ProSilence is for guidance and **not legally binding** unless formally agreed.

Recommended Strategy

1. Begin with a **project-specific acoustic analysis**.
2. Prioritize **critical sound paths** based on use case and budget.
3. Combine structural decoupling with optimized room acoustics for best results.

Product Description

Overview

The **ProSilence decoupling system** isolates structural components using high-performance vibration-damping materials. This prevents noise transfer across structural connections and effectively attenuates sound from **10 Hz up to 5000 Hz and above**.

System Components

- **Floor System:**
  Custom U-shaped decouplers ("U-boats") fitting standard 50 mm timber battens.
- **Wall/Ceiling System:**
  Anti-vibration mounts and metal rails that suspend drywall panels without contact to the base structure.

Tiered Solutions

- **Level 1:** Standard for residential or light commercial environments
- **Level 2:** Reinforced for high-demand applications such as music studios, gyms, and media rooms

Measurement Protocols

Airborne Sound Insulation – R'w (Field Measurement)

Assessed using **ISO 16283-1**, reflecting performance in real-world scenarios including reverberation effects.

Impact Sound – L'n,w (Field Value) / Ln,w (Reference)

Field-measured with **ISO 16283-2**, and compared against the **field-based** standard **EN ISO 717-2**.

Regulatory Context

While building regulations differ across EU member states, the **EN 12354 series** and **ISO 717/16283 series** are widely accepted as harmonized frameworks for assessing and verifying building acoustics.

Sound Class	R′w (Field)	L´n,w (Field)
A	≥ 63 dB	≤ 48 dB
B	≥ 60 dB	≤ 53 dB
C	≥ 55 dB	≤ 58 dB
D	< 50 dB	> 58 dB

Acoustic Equipment and Legal Validity

- All acoustic measurements are performed with **Class 1, ISO-calibrated instruments** (e.g., from Norsonic), in compliance with **IEC 61672**.
- Measurement reports are **for informational use only**, and formal certification requires a separate legal agreement.

Influencing Factors on Sound Performance

1. Structural stiffness and resonance
2. Flanking noise through structural connections
3. Weak points such as doors, windows, and ducts
4. Room acoustics and reverberation time (RT60)

Summary

- The ProSilence system provides a **modular, scalable** approach to sound insulation.
- Designed to comply with **European acoustic measurement standards**.
- Effective in reducing both airborne and impact noise.
- Ideal for both residential and commercial applications.
- Actual performance will depend on **installation**, **structure**, and **acoustic design**.

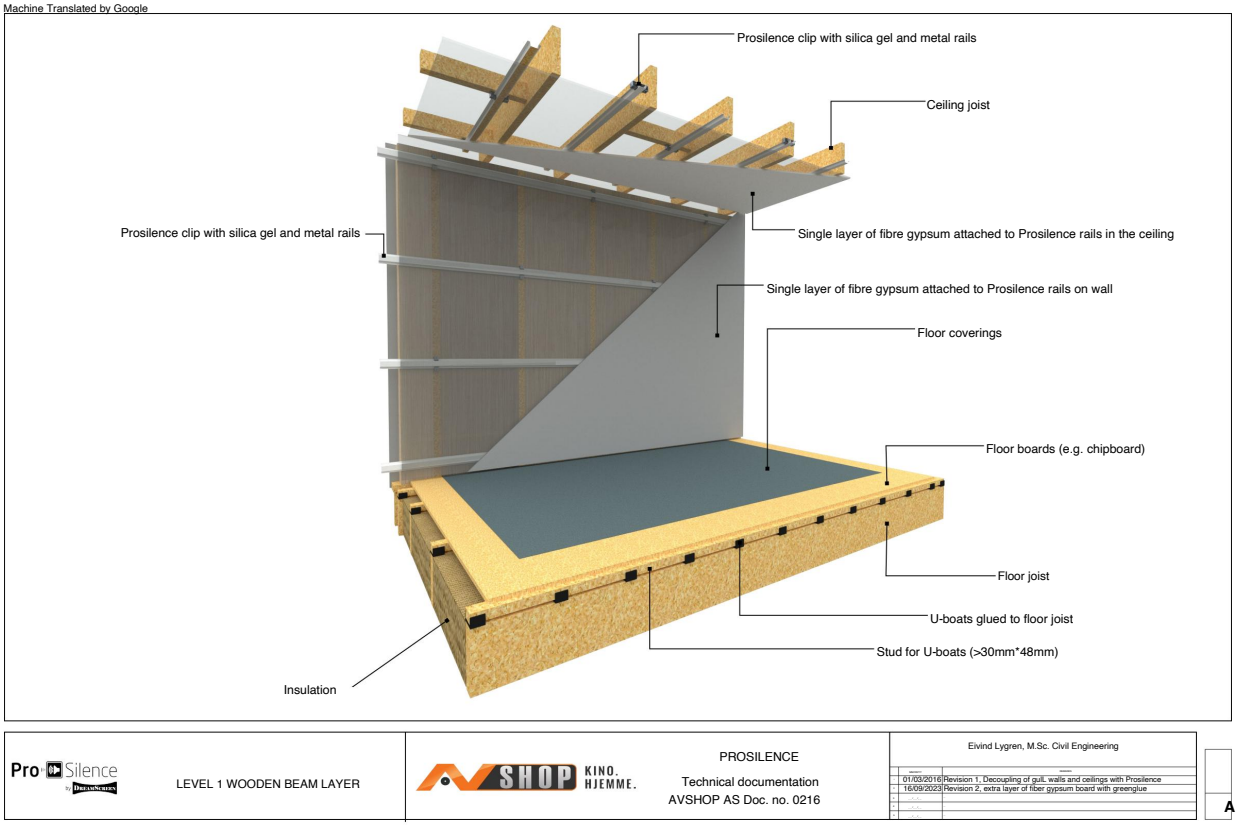


Figure 1: Level 1 decoupling with floor dividers based on wooden beams.

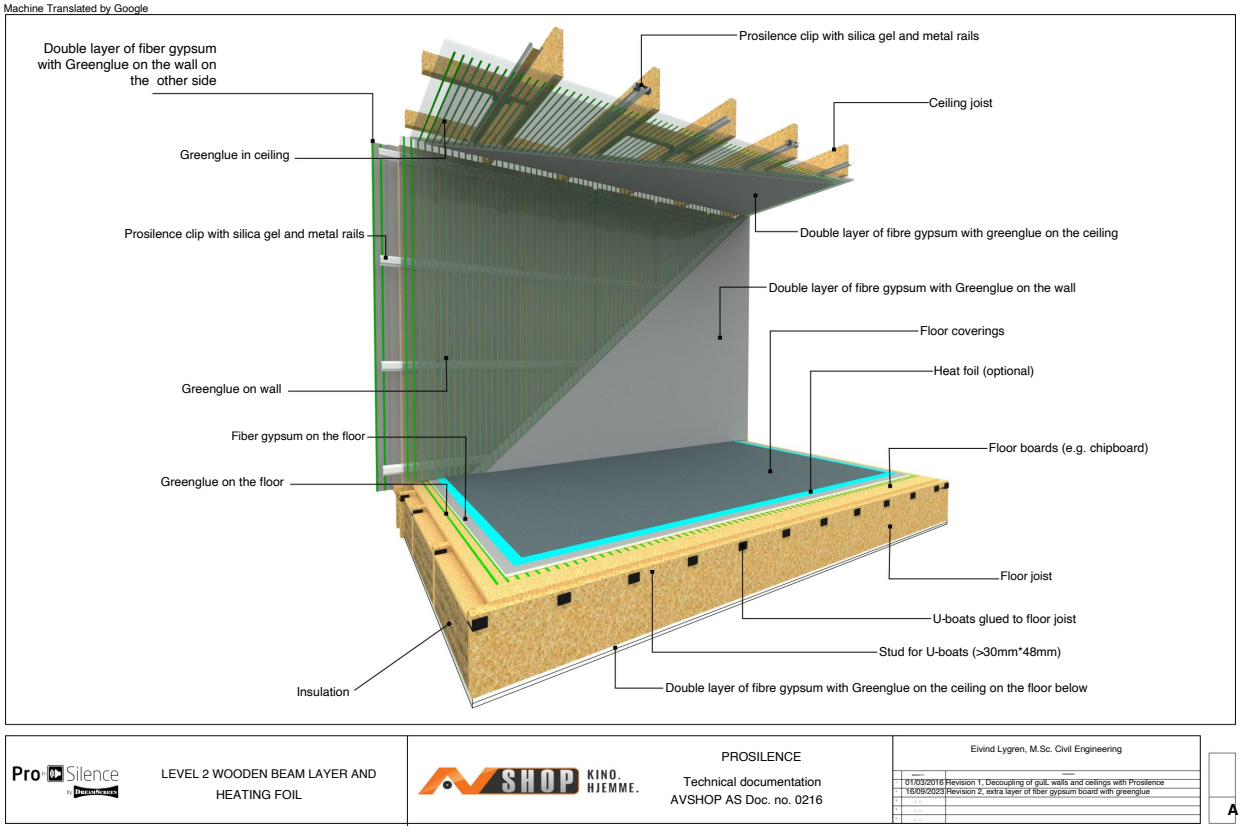


Figure 2: Decoupling with level 2 with floor dividers based on wooden beams.

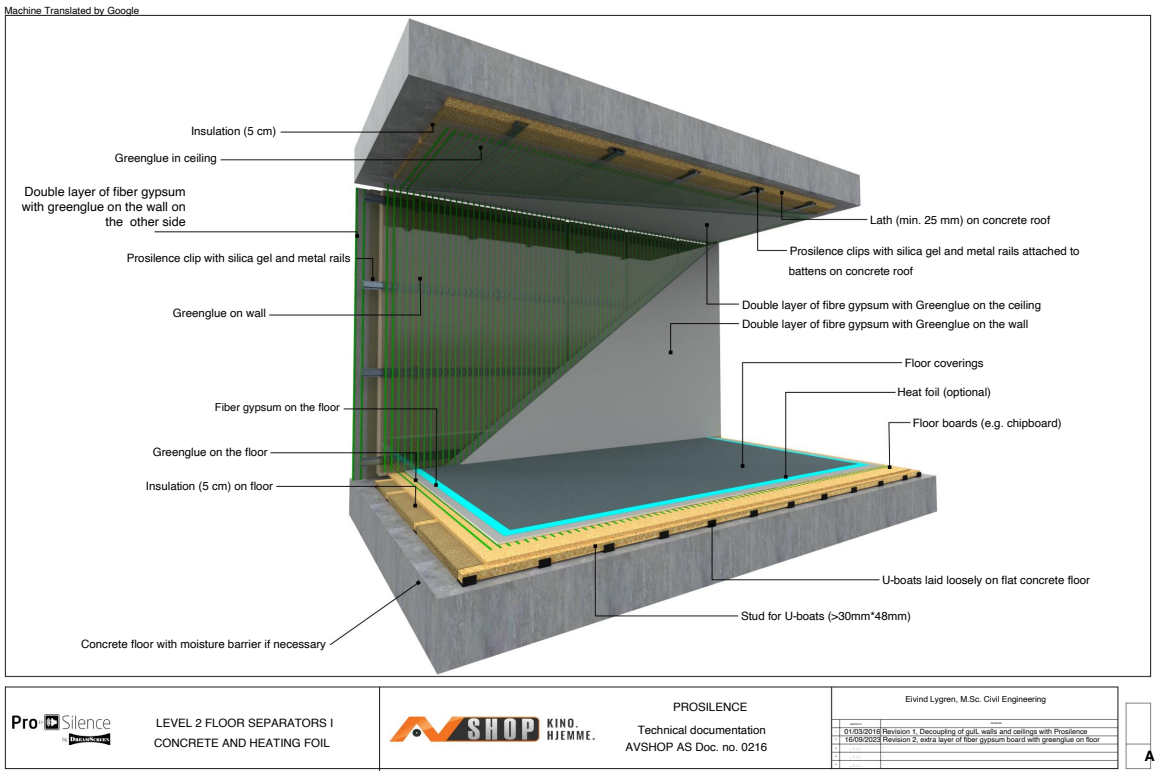


Figure 3: Decoupling with level 2 with floor dividers based on concrete, as well as the use of heating foil on the top layer.

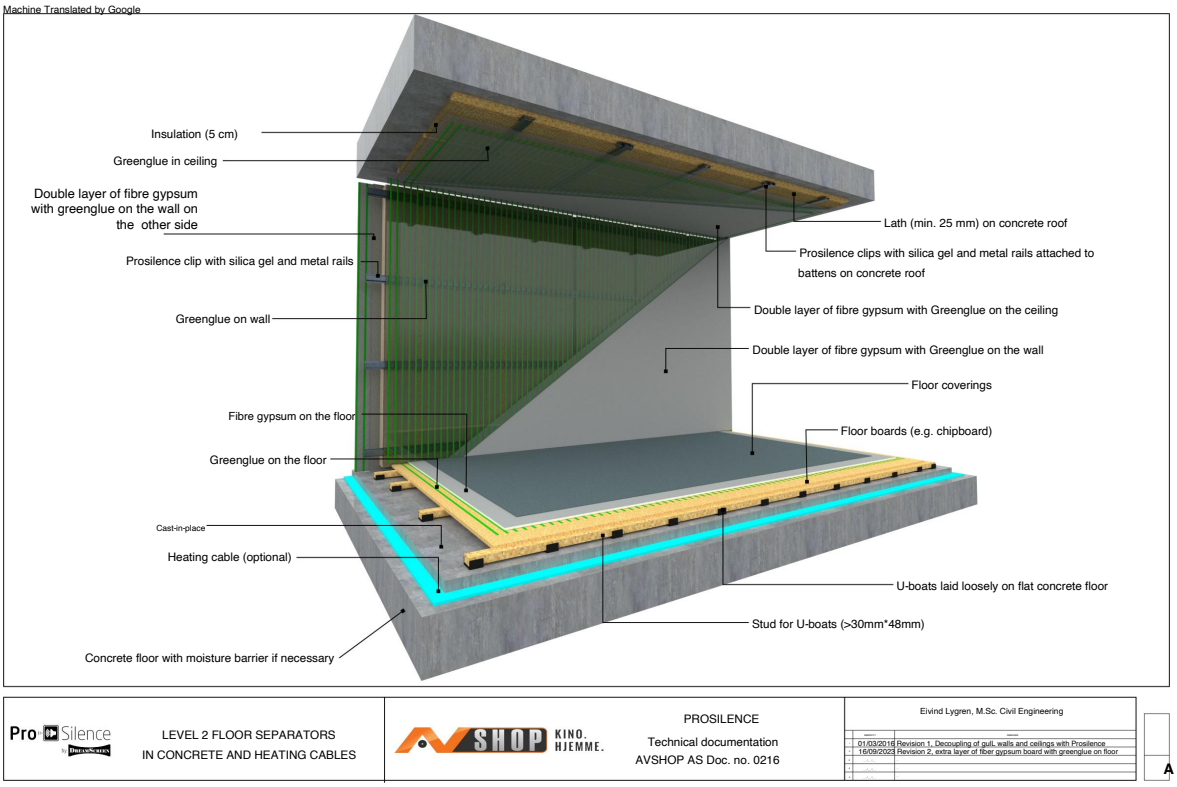


Figure 4: Decoupling with level 2 with floor dividers based on concrete, as well as the use of heating cables in the slab. Note that no insulation is used in the U-boat made in this case.

ProSilence on the floor

Installation on the floor

🔧 *Important information when installing on wooden floor dividers*

When installing U-boats on wooden joists, it is important to be aware that this entails a weakening of the structural connection between the floor and the joists, which would normally result in stiffness and reduced flex. The responsibility for assessing **sufficient stiffness in the joists** therefore lies with **the developer** or **the responsible designer**.

Rigidity in the construction can be improved through, among other things:

1. **Cubing (transverse bracing)** between the beams
2. Reduced span
3. Increased beam dimension
4. Increased weight and stiffness in the top layer itself

The reason why floor **chips are not installed directly on the joists** in sound-decoupling structures is to **avoid the so-called "triple leaf effect",** which causes significant deterioration of sound insulation – especially in the low-frequency range. In some cases, however, it will be difficult to avoid this completely.

If it is necessary to mount floor chips directly on the joists to achieve the required rigidity, **the triple leaf effect can be partially reduced** by perforating the chipboard (e.g. by drilling scattered holes) so that it does not behave as an acoustically dense layer. U-boats + battens are then mounted on top of the perforated floor chips.

To ensure optimal stiffness of the liquid top layer, it is always recommended to use:

1. **One layer of 22 mm floor chips**, glued and screwed to batten / U-boat
2. **One layer of fibre gypsum**, mounted over the floor chips with **Green Glue** in betweenThis combination provides both high mass and increased flexural stiffness, especially when used in conjunction with correctly executed kubbing in the joists.

The main element of the floor construction consists of a **U-boat** – a molded module made of soft silica gel with sufficient mechanical load-bearing capacity to handle a normally dimensioned floor structure.

One U-boat is dimensioned to carry a **payload of up to 3.0 kN/m²**, assuming a density of **7 U-boats per square meter**.

At higher loads, the number of U-boats should be increased proportionally; for example, a payload of 6.0 kN/m² requires about **14 U-boats per m²**.

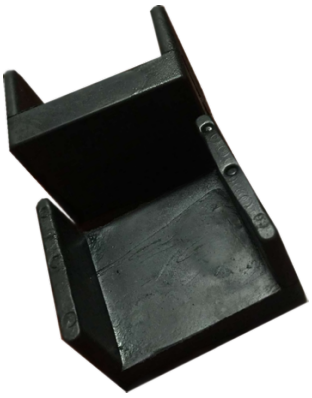


Figure 5 shows the design of a typical U-boat.

The U-boat is specially adapted to beams with a width of **48 mm**, which is standard for wooden structures.

To ensure sufficient rigidity, it is recommended that the beam height is at least **38 mm**. This provides good load-bearing capacity for the board layer (e.g. chipboard) while also providing space for a **50 mm insulation layer** under the floor, which will contribute positively to sound attenuation.

When using **heating cables with screeds** (see Figure 4), insulation should **not** be used in the floor. In such cases, the beam height can be reduced to **30 mm**, provided that the floor plate layer has sufficient rigidity. This solution can also be chosen if you want to limit the total building height.

There is nothing wrong with using higher beams if desired.

Figures **6, 7 and 8** show examples of cross-sections of different floor installations.

When mounting U-boats directly on floor sleepers, it is recommended, for practical reasons, to **glue the modules** to ensure stability during installation.

Figure **9** shows a 3D drawing of a U-boat installed on a concrete slab.

The standard **distance between U-boats** is set to **30 cm** when the beam distance (C-C) is **60 cm**.

This enables efficient installation of standard insulation mats of **60 cm width**.

At a beam spacing of **30 cm,** the distance between U-boats can be increased to **60 cm**, so that the total number of U-boats is reduced.

To achieve **level 2 decoupling,** it is recommended to use an extra layer of **fibre gypsum** and **GreenGlue** between the board layers, as illustrated in the figures.

At **level 1 decoupling,** the additional fibre gypsum layer of GreenGlue can be omitted for a more affordable solution, which still provides good sound dampening effect according to moderate requirements.

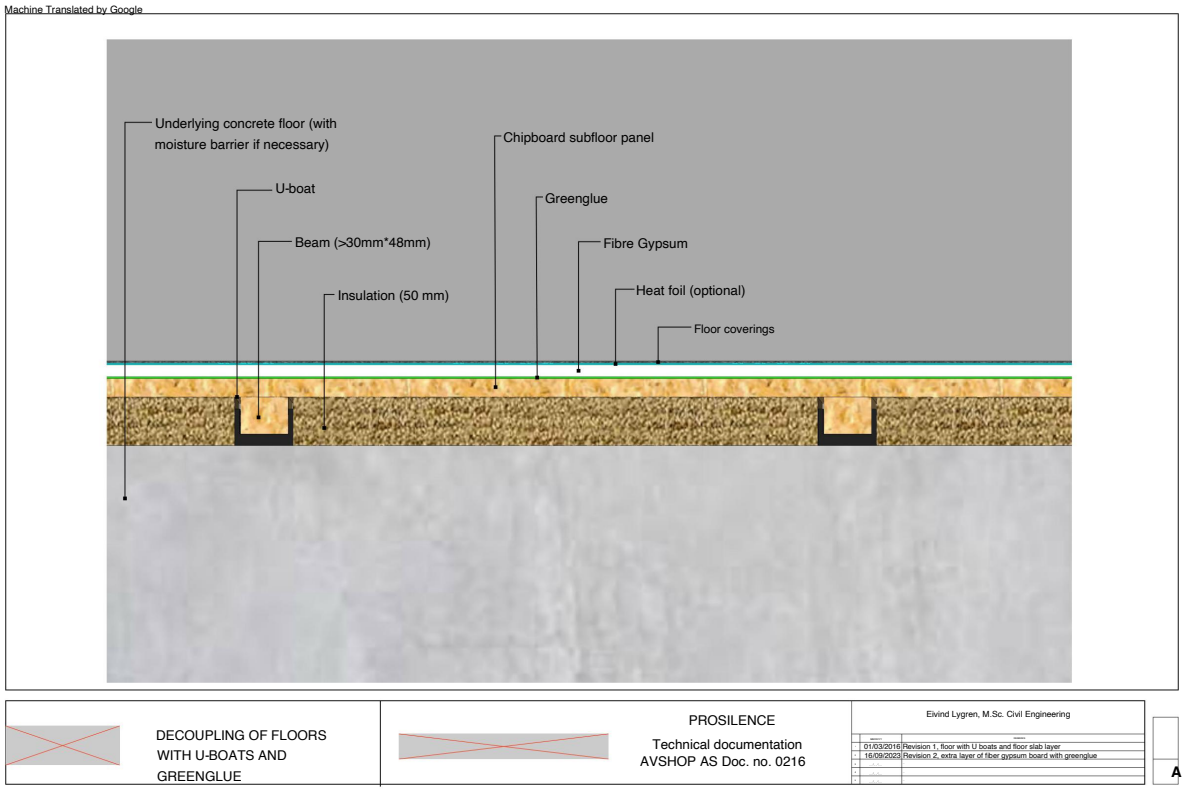


Figure 6: Cross-section of decoupling with level of floor dividers based on concrete, as well as the use of heating foil.

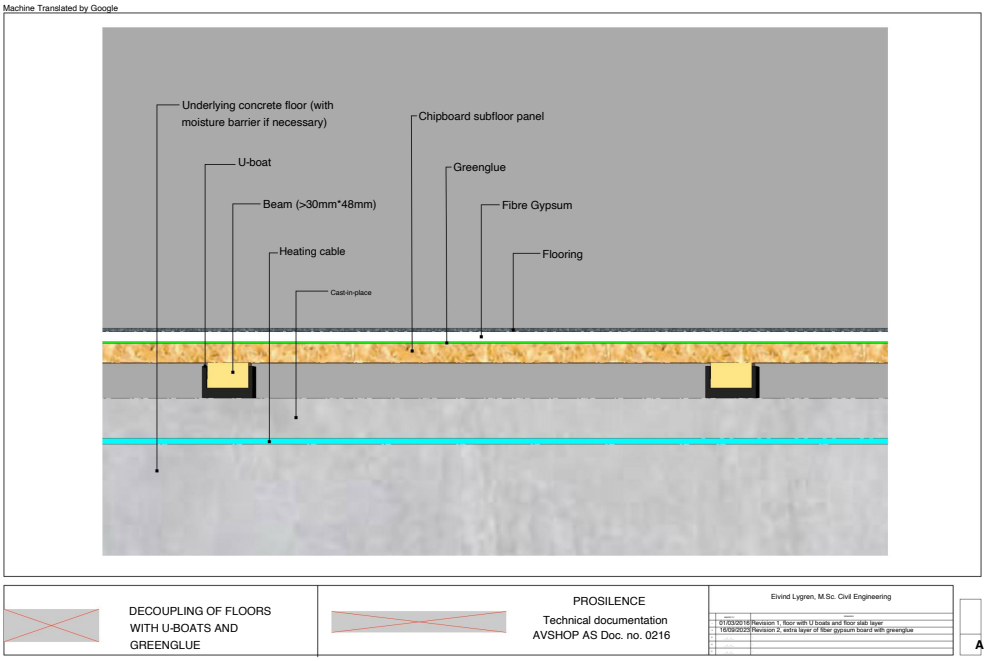


Figure 7: Cross-section of decoupling with level 2 with floor dividers based on concrete, as well as the use of heating cables. Note that no insulation is used in the U-boat made in this case.

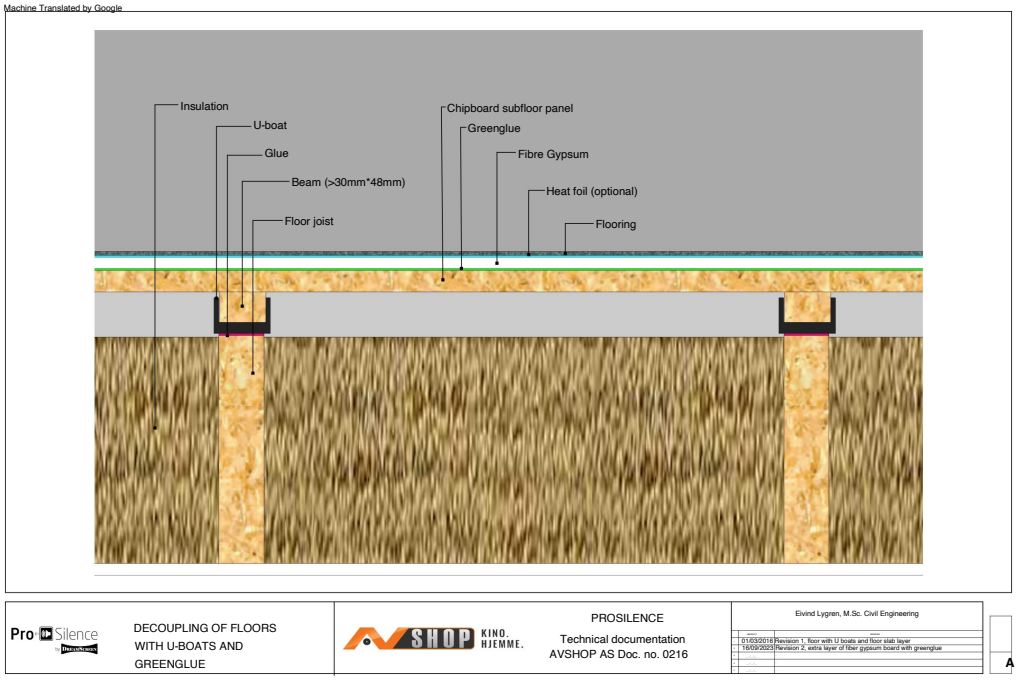


Figure 8: Cross-section of decoupling with level 2 with floor dividers based on wooden beams. It is recommended to glue the U-boats to the joists for practical reasons. For best effect, it is recommended to use two layers of fibre plaster with GreenGlue also on the ceiling on the floor below. This will also help to stiffen the joists.

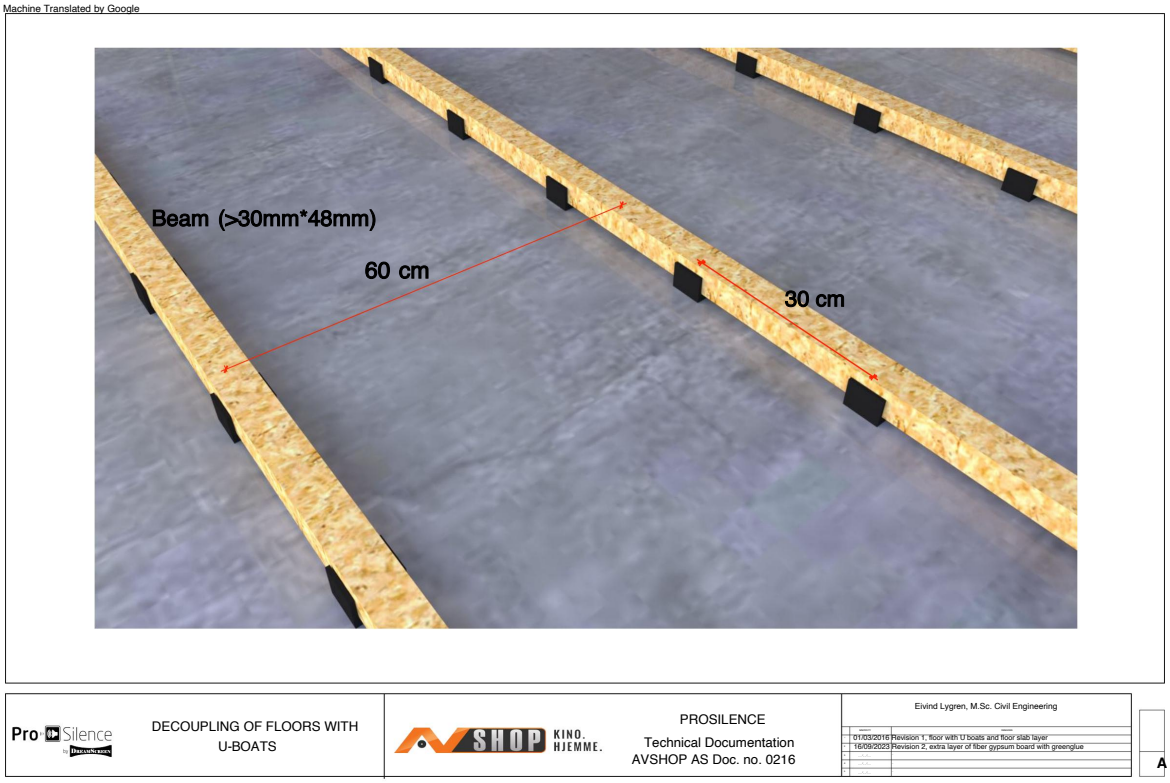


Figure 9: The distance between U-boats is set to 30 cm, if you have a C-C distance between the beams of 60 cm. C-C of 60 makes it easy to lay insulation between the beams.

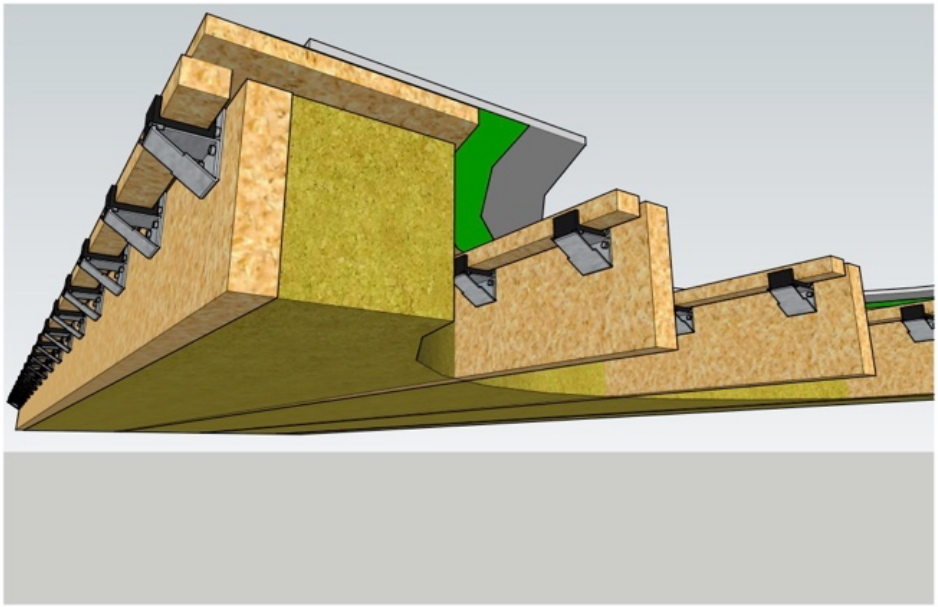


Figure 11: Metal holder for countersinking the U boat in wooden joists and possibly levelling floor joists.

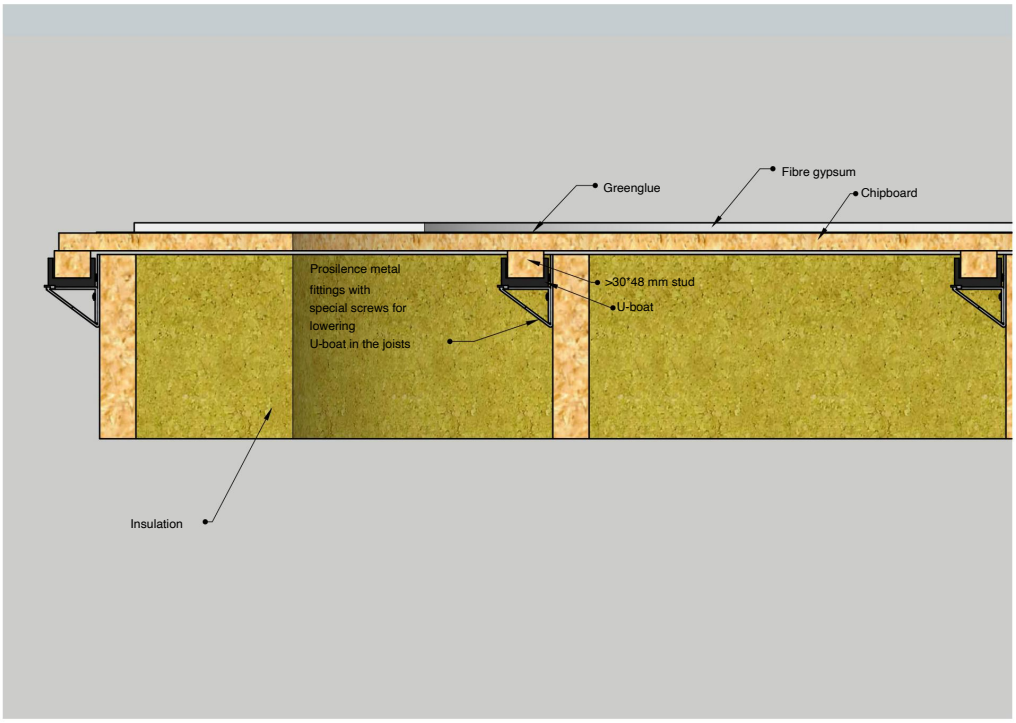


Figure 12: Metal holder for countersinking the U boat in wooden joists and possibly levelling floor joists. It can be advantageous to use battens with a higher depth than 36mm as in this example as this helps to stiffen the joists longitudinally.

Efficiency of sound attenuation on floors using U-boats for frequencies from 100 Hz and up

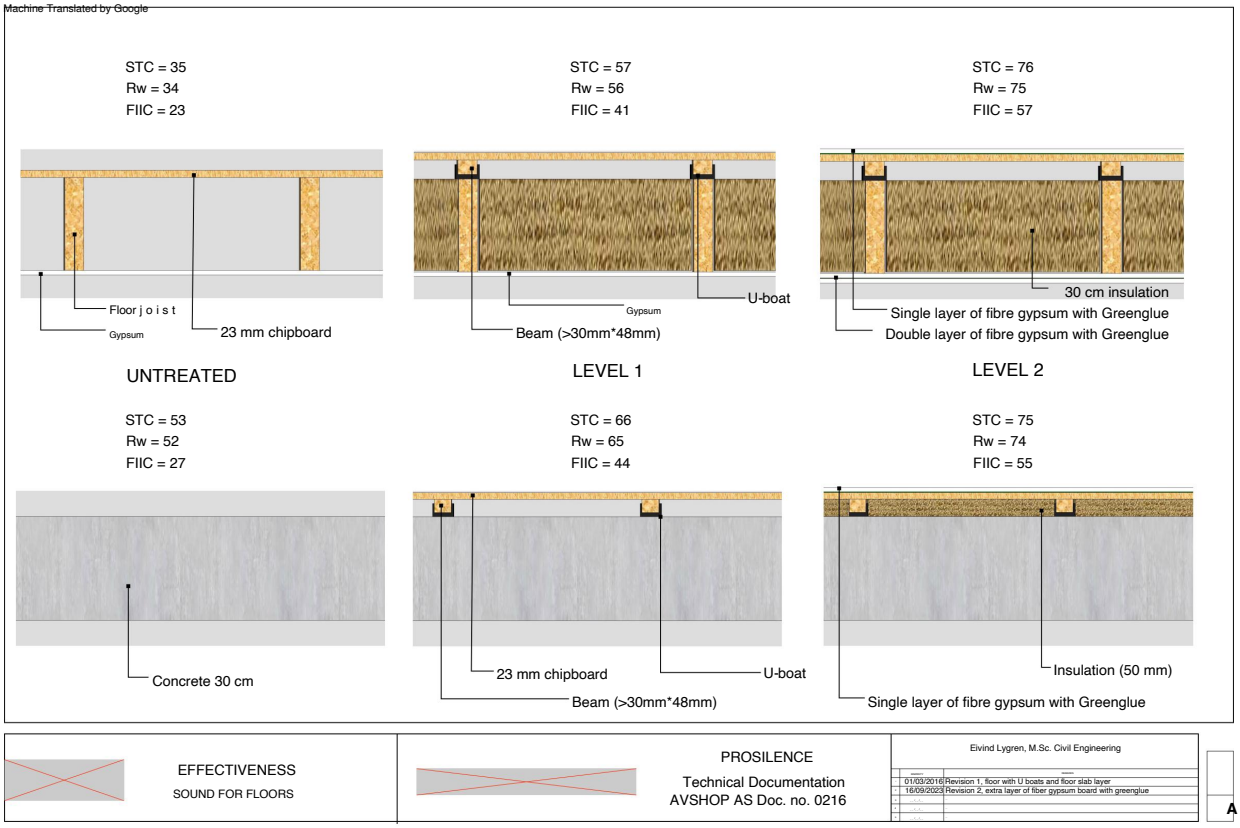


Figure 13: STC, Rw and FIIC for flooring. Untreated and levels 1 and 2 with ProSilence. To achieve sufficient stiffness in addition to better effect, level 2 is recommended for joists.

ProSilence on walls and ceilings

General

The main element of the ProSilence system for wall and ceiling decoupling is a specially developed **clip system**. Each clip consists of a **steel part** that holds a molded decoupling device made of **soft silica gel**. The cast silica gel is designed so that it can support a **steel rail**, on which wall or ceiling tiles are later mounted.

The first layer of wall and ceiling panels is screwed directly into the steel rail. The sound attenuation effect is achieved by completely disconnecting the steel rail **from the underlying structure** via the silica gel clip.

The design of clips and rails is shown in **Figure 11**.

The rails are supplied in **2-metre lengths** and are mounted **horizontally** on walls and ceilings with a centre distance of **60-80 cm between each rail. The clips are attached to the underlying structure with a distance of 120 cm** between each clip. The clips are mounted staggered in relation to the clips in the rail layers above and below the wall, or side-offset in the ceiling, to optimize strength and acoustic efficiency.

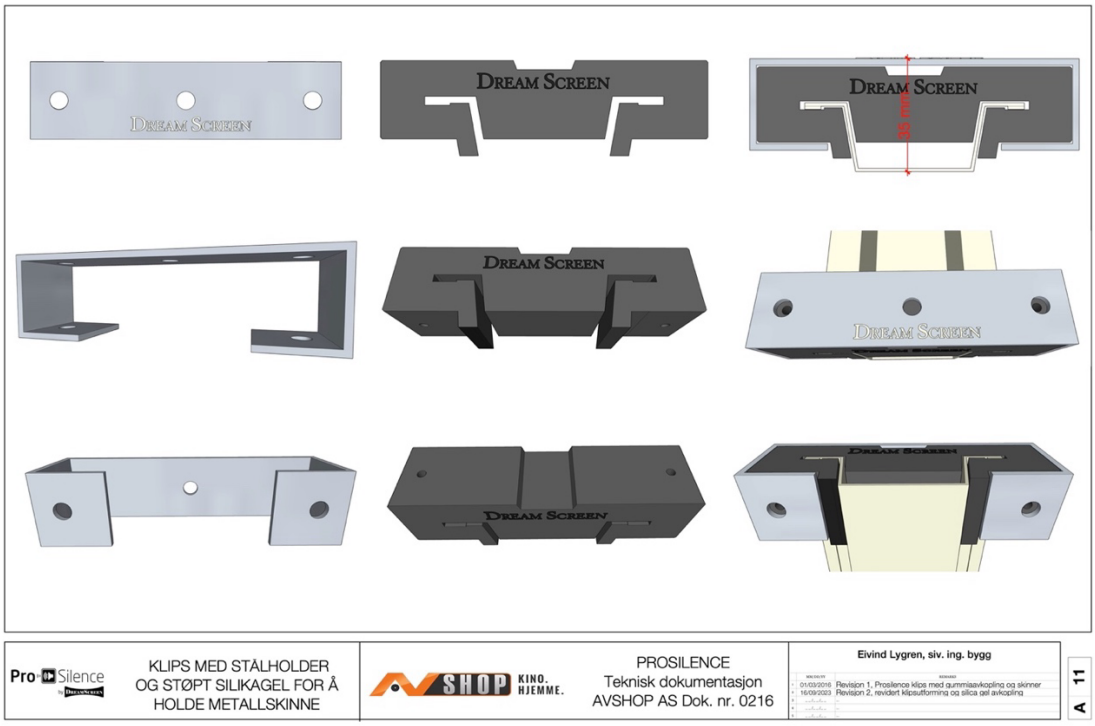


Figure 14: Design on metal clip and molded silica gel assembly customized metal rail.

Mounting on the wall

Mounting clips on the wall with wooden studs is illustrated in **Figure 12**.

For acoustic reasons, it is crucial that the clips are mounted **directly on the studs**. Any existing board layers, such as plasterboard or paneling, must be removed before installation. This prevents an unwanted acoustic effect known as **the "Triple Leaf Effect",** where resonances between multiple layers can amplify certain frequencies and thus **significantly reduce the sound attenuation effect**.

When installing on **a concrete wall**, it is recommended to **lay out with a minimum of 25 mm** wooden battens. This allows for at least **50 mm of insulation**, which is important for achieving optimal sound attenuation, while ensuring sufficient screw fastening for the clips.

As described earlier in **Figure 1** and **Figure 2**, the ProSilence system offers two different levels of wall installation:

1. **Level 1:**
    1. Clip
    2. Metal stud
    3. A layer of fibre gypsum
2. **Level 2:**
    1. Clip
    2. Metal stud
    3. Two layers of fibre plaster with **GreenGlue** applied between the layers for extra cushioning.

When installing in **level 2**, it is also recommended to use **two layers of fibre plaster with GreenGlue** on the opposite side of the inner wall, especially if the wall is built with **wooden studs** instead of concrete.

The second sheet metal layer must be screwed into the first layer, but **without** the screws contacting the rails or the underlying structure.

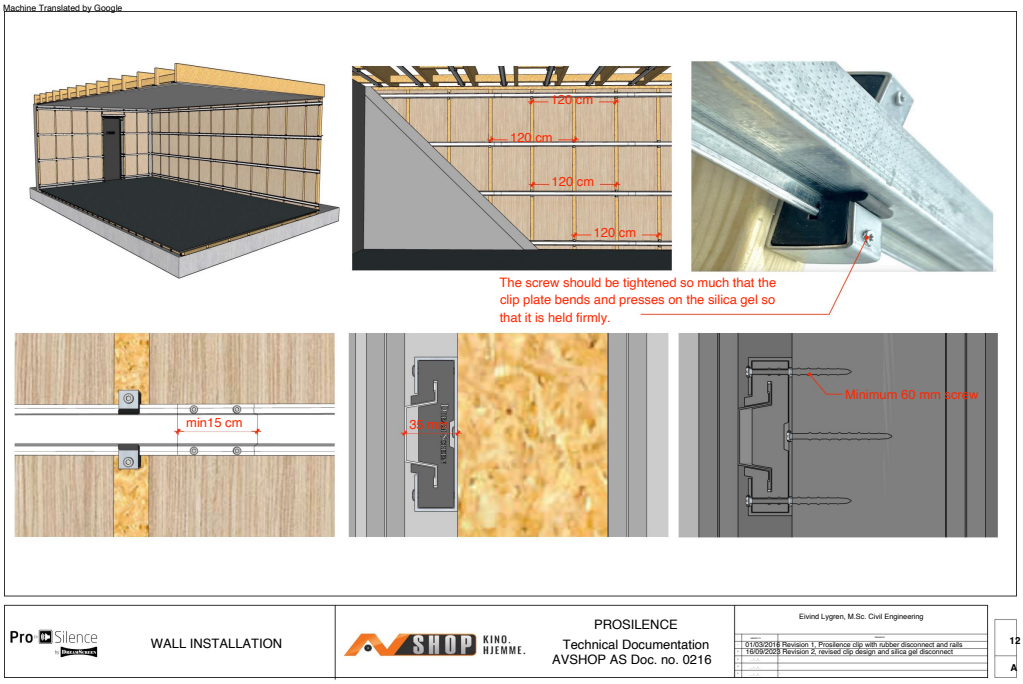


Figure 15: Details for installing ProSilence on wall.

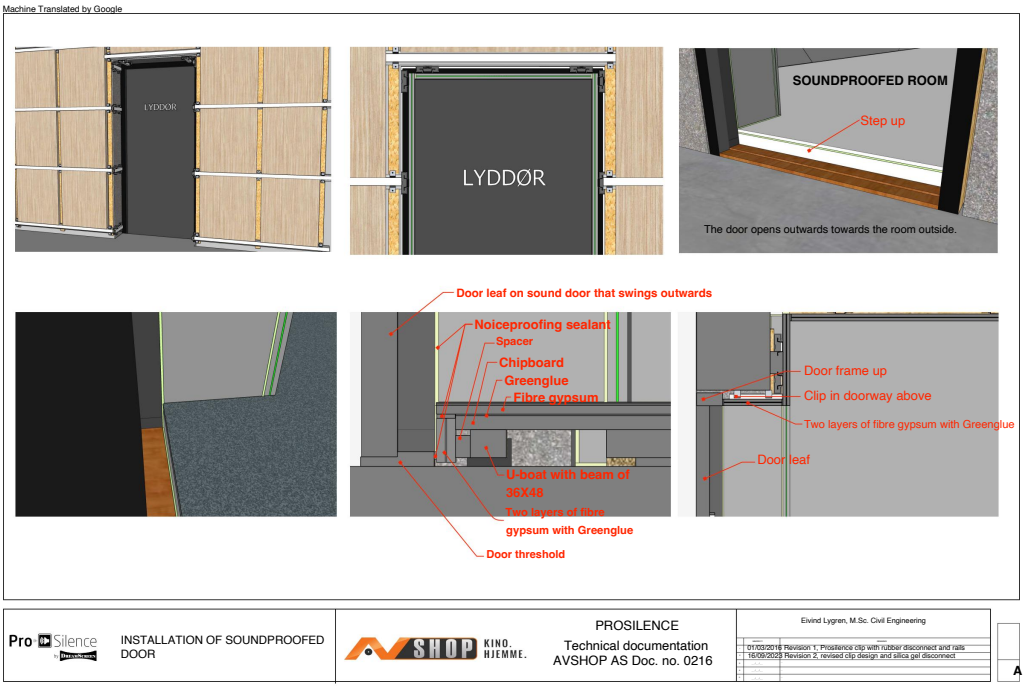


Figure 16: Details for installation of soundproof door and ProSilence.

Efficiency of sound attenuation on walls for frequencies from 100 Hz and up

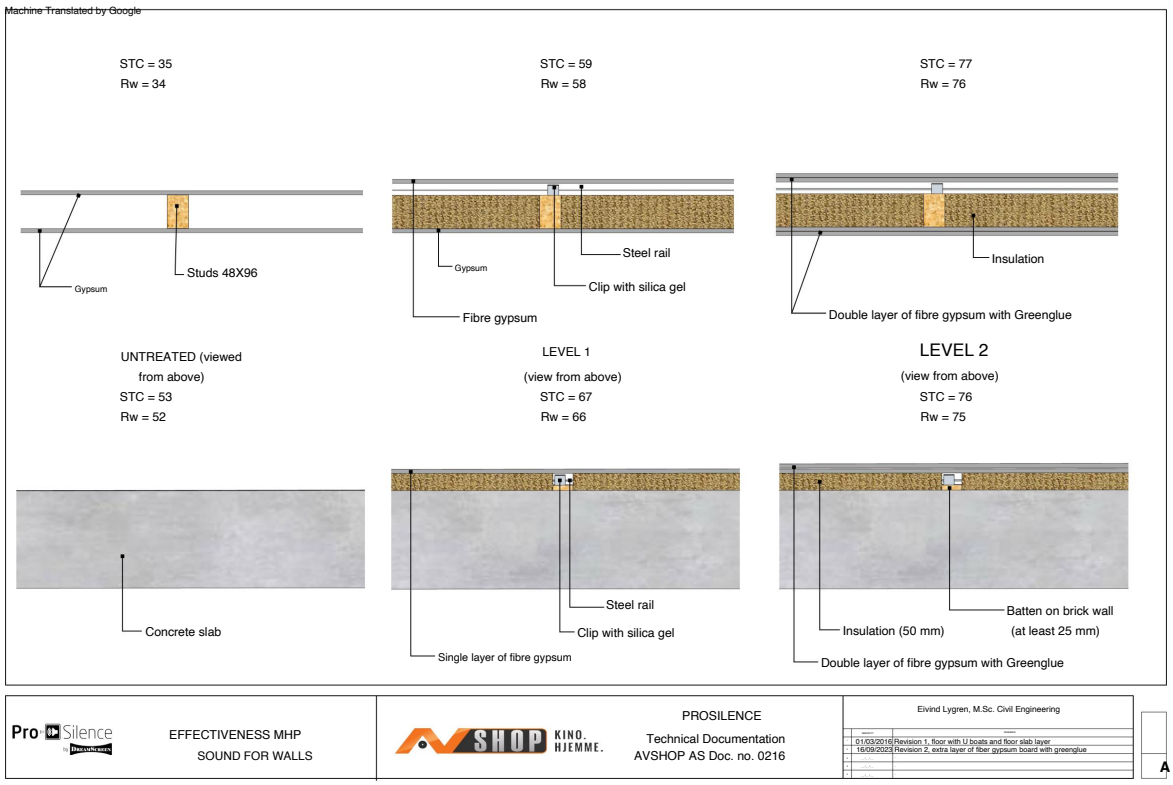


Figure 17: STC and Rw for wall. Untreated and levels 1 and 2 with ProSilence.

Ceiling mounting

When installing on ceilings, the clips, rails and ceiling tiles should be placed as **close to the underside of the ceiling as possible**, to minimize the reduction of room height. With this method, a height gain of about **3 cm** can be achieved compared to a standard installation.

If you do not want to build the system into the roof structure, the clips can be mounted **directly on the rafters**, with the rails mounted in **the opposite direction** to adapt the installation.

When installing on **concrete roofs**, it is recommended to **lay out with a minimum of 25 mm** wooden battens. This allows for at least **50 mm of insulation** – which is essential for optimal

sound attenuation – while also providing the necessary attachment for the clips.

As shown in **Figure 1** and **Figure 2**, the ProSilence system offers two different levels of ceiling installation:

1. **Level 1:**
    1. Clip

2. Metal stud
3. A layer of fibre gypsum

2. **Level 2:**
   1. Clip
   2. Metal stud
   3. Two layers of fibre plaster with **GreenGlue** between the layers.

When choosing **level 2**, it is recommended, if practicable, to use **an extra layer of fibre plaster with GreenGlue on the upper side** of the roof structure. This is especially important when the roof structure is based on **wooden rafters** instead of concrete, to further improve sound insulation.

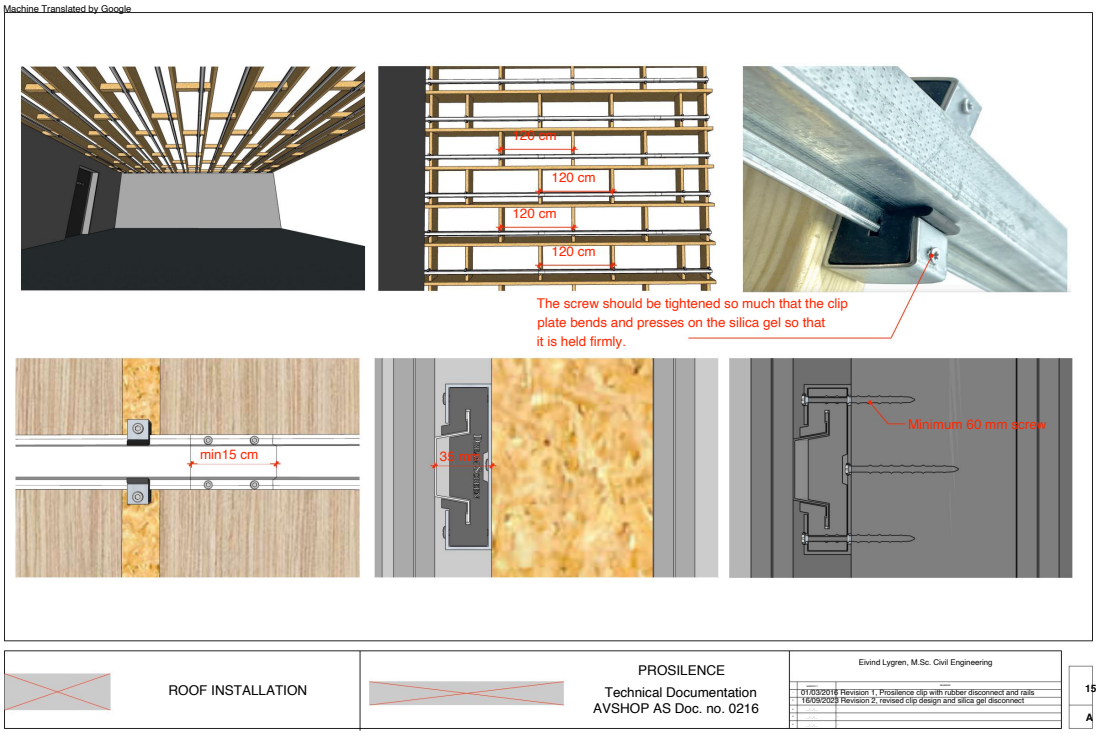


Figure 18: Details for embedding the ProSilence system in ceilings by blocking crosswise between the rafters.

We have specially designed a metal holder for the clips that can be screwed into the rafters. The roof tiles can then be laid at a level of only 5 mm below the rafters so that the finished roof will have a height that deviates little from a solution without decoupling. These holders can also be used to straighten old roofs if needed.

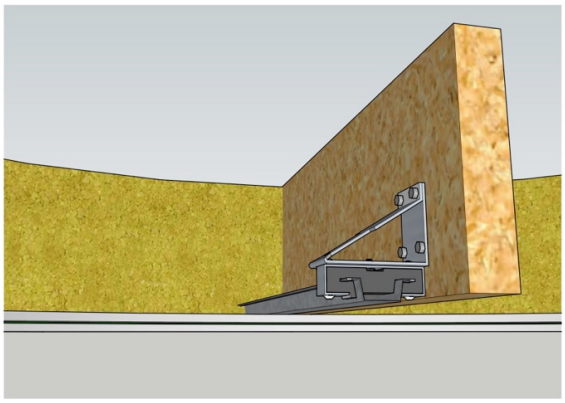


Figure 19: Metal holder for building the clip into wooden joists without having to log across.

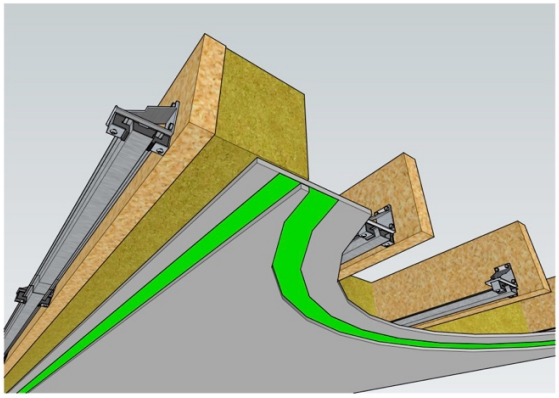


Figure 20: Metal holder for building the clip into wooden joists without having to log across.

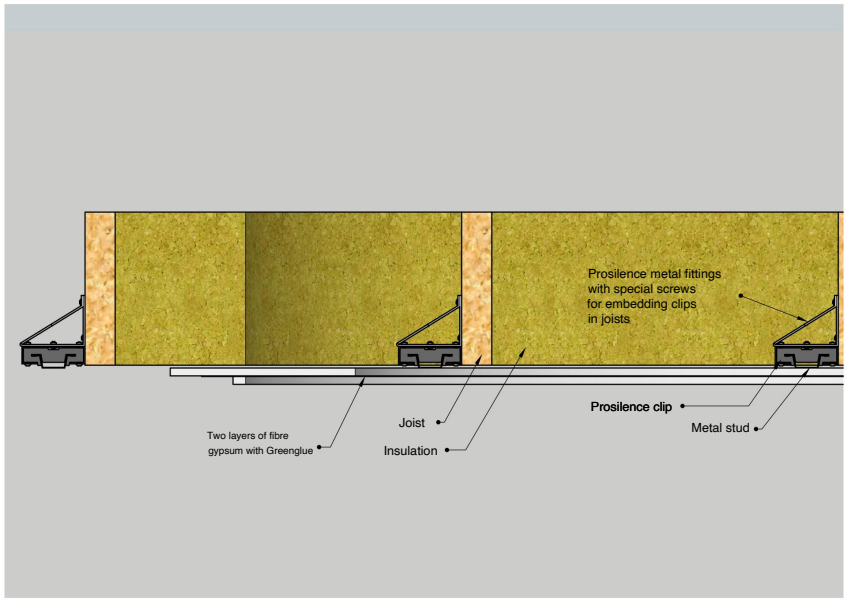


Figure 21: Metal holder for building the clip into wooden joists without having to log across.

Ceiling sound attenuation efficiency for frequencies from 100 Hz and above

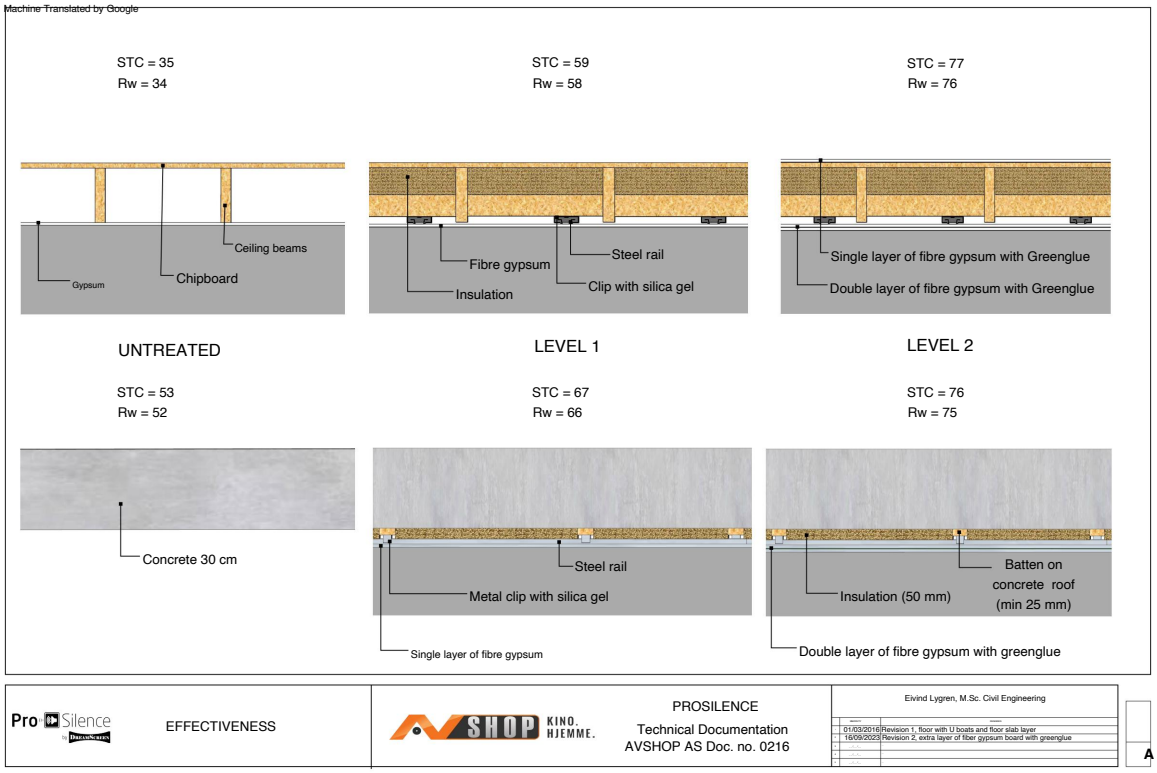


Figure 22: STC and Rw for ceilings. Untreated and levels 1 and 2 with ProSilence.

Sound attenuation efficiency for frequencies from 110 Hz down to 20 Hz

We have conducted **field measurements** in two of our on-site custom built soundproofed rooms to evaluate the sound attenuation effect of the ProSilence system in **the bass range**, from **110 Hz down to 20 Hz**. Reference equipment of Class A from Norsonic is used for measurements.

As shown in **Figure 17**, ProSilence provides a **significant improvement in low-frequency sound attenuation**.

The sound level is typically reduced by **30–38 dB** in the range between 20 Hz and 110 Hz (**red curve**).

Compared to a standard construction consisting of **simple plasterboard on each side of a wall without insulation** (**blue curve**), the ProSilence system achieves an improvement of **10-20 dB** in the bass range.

Furthermore, the measurements show that a **full Level 2 system** – consisting of ProSilence clips, double layers of fibre plaster on both sides of the wall and GreenGlue between the layers – **(red curve**) gives significantly better results than just using **GreenGlue** on a traditional wall (**green curve**).

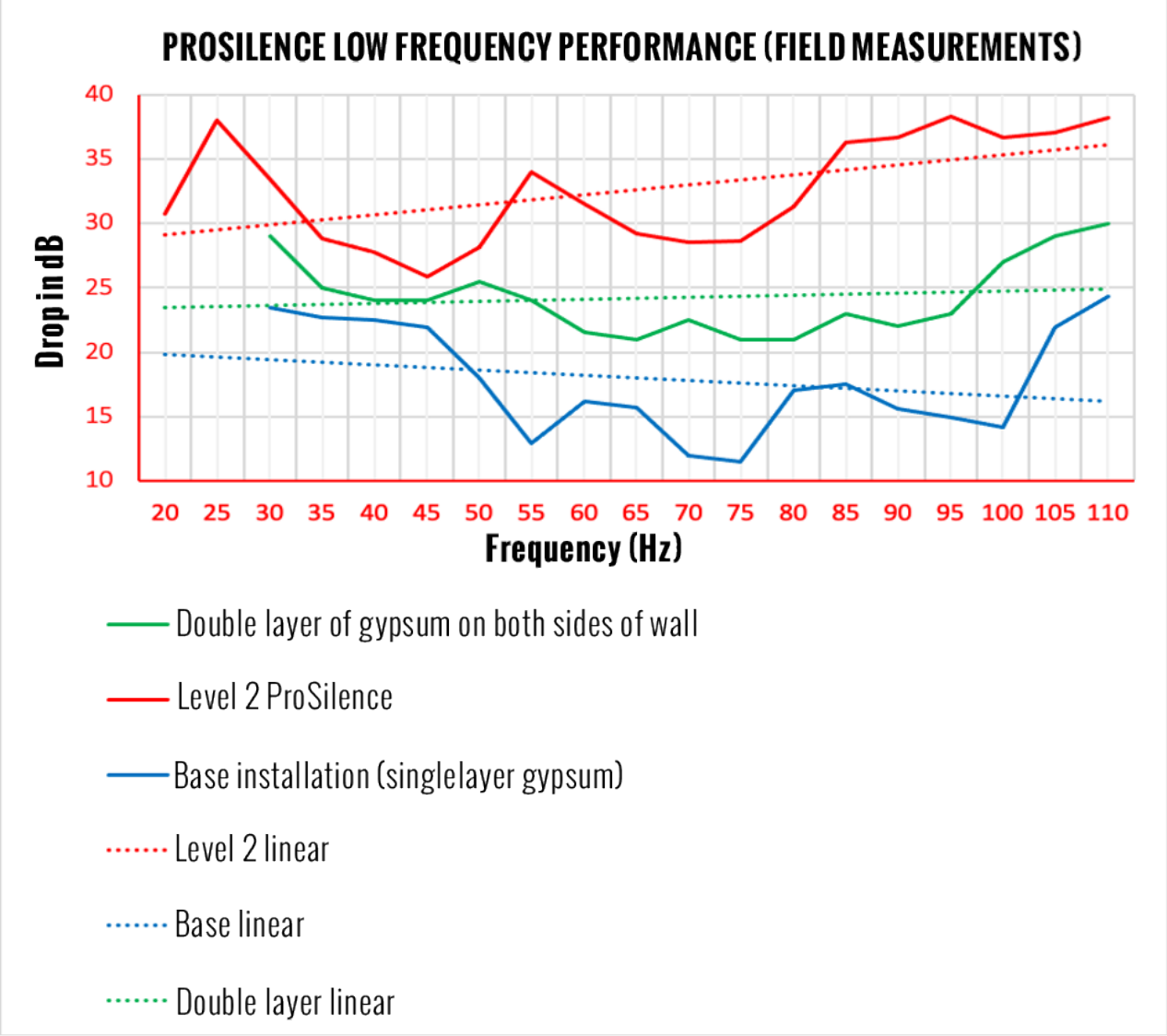


Figure 23: Attenuation with ProSilence. Decibel attenuation at frequencies from 20 to 110 Hz

Material properties of fire

1. **Silica gel** used in ProSilence clips and U-boats has a destruction temperature of approx. **300 °C**. The silica gel **does not withstand high fire temperatures**, but it only emits **water** when heated and will **melt before burning**. In other words, no harmful gases are released.
2. **The metal clips** that enclose the silica gel will, provided they are correctly mounted with screws in the wings, still be able to hold the metal rails, as well as wall and ceiling plates in place during a fire. This immediately prevents the fall of plates.
3. If walls and ceilings are built with one or two layers of **fibre gypsum**, this will further limit the spread of fire. Fibre gypsum is **non-combustible**, and delays the development of fires between rooms.

1. A possible fire in the room with ProSilence will therefore have **a reduced likelihood of spreading** to neighboring rooms, thanks to the use of fiber plaster and correctly mounted clips and rails.

Floor Constructions

When using **U-boats** in flooring, it is recommended to combine the system with:

1. **Fibre plaster boards** and
2. **GreenGlue** between the top layers.

This provides both **improved sound attenuation** and **increased fire safety**. Both fibre gypsum and GreenGlue have their own **fire safety certificates** that document their performance in fire situations.

Certificates and documentation

1. ProSilence clips and U-boats are delivered with **a full CE certificate** including **fire technical approval**.
2. Fire safety certificates for **fibre gypsum** and **GreenGlue** are available and should be considered as part of the overall safety assessment.

The certificates for U-boats and clips are attached in Appendix 1.

Summary

The overall fire technical assessment shows that:

1. The ProSilence system, when installed in combination with fibre gypsum and possibly GreenGlue, provides a **safe solution with a low risk of fire** spreading.
2. The choice of materials and installation methods ensure that sheet layers remain stable even under high heat loads.
3. Certifications support the assessments mentioned above.

Further developed tests with optimal installation

Based on SINTEF's tests, we also recommend using **screws in the stringers** on each side of the metal clip to further increase the strength.

We have therefore carried out our own additional tests, where the clips were mounted as follows:

1. Screws mounted both **centrally** and in **the wings**.

2. Clip mounted in rail to simulate realistic installation.

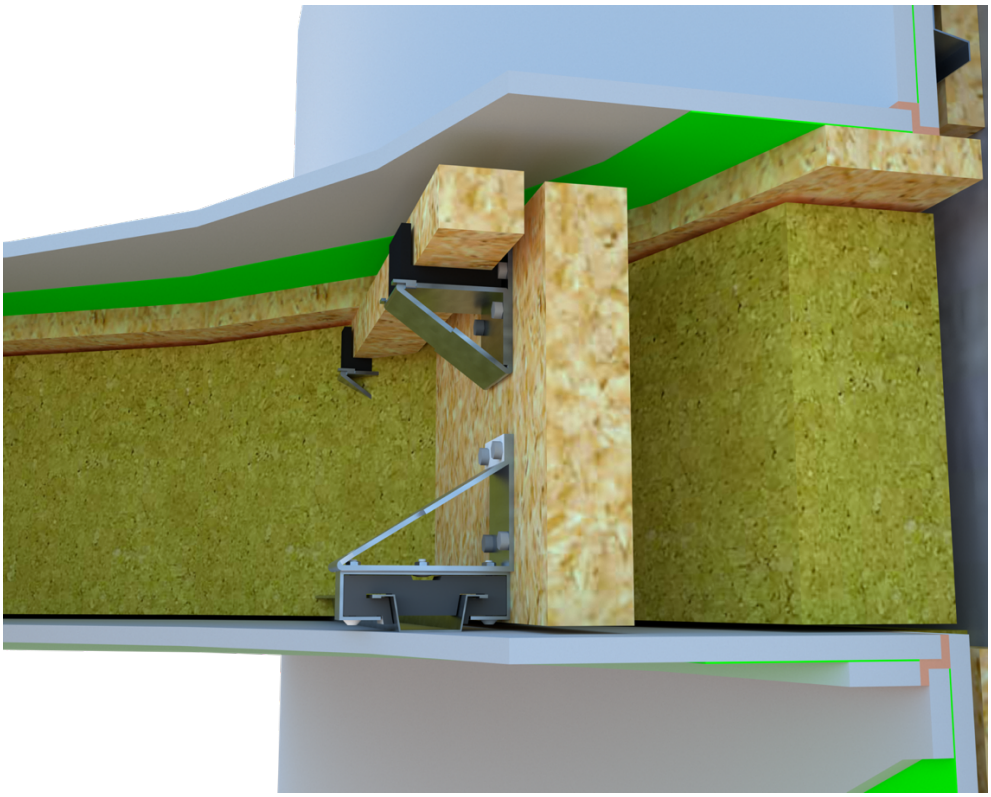
Results from our additional tests:

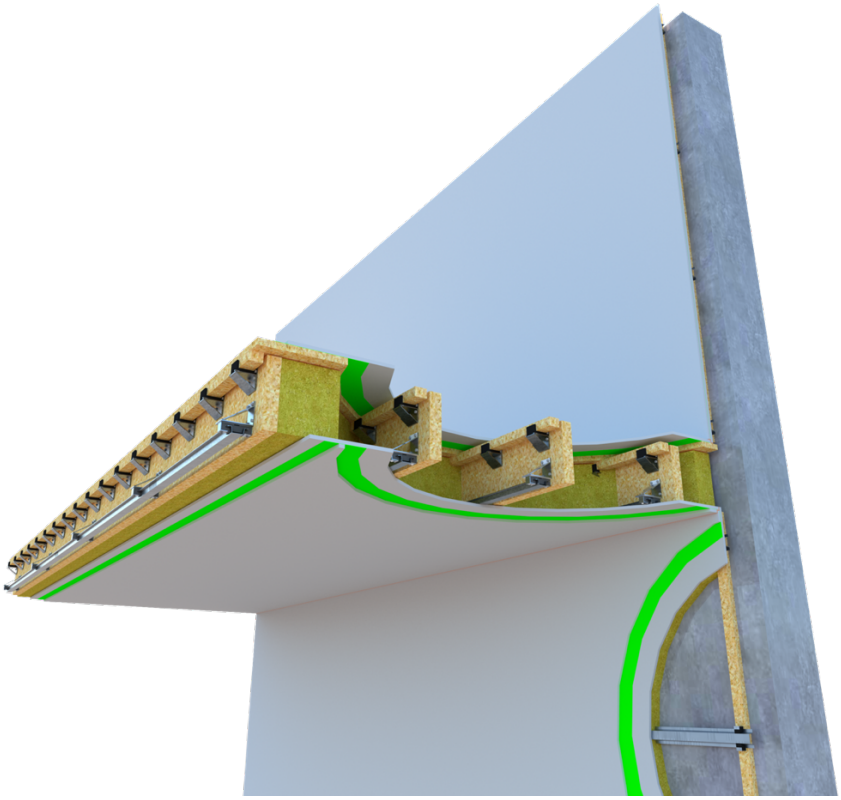
1. **Ceiling-mounted clip (pull-out):**
   We loaded the clip and rail with **96 kg** (limited by the maximum capacity of the test equipment) **without any failure of** the clip or rail.
2. **Wall-mounted clip (vertical displacement):**
   If a maximum vertical displacement **of the rail is required to be 3** mm, the clips could be loaded with **76 kg** before this displacement occurred. The displacement is due to the elasticity of the silica gel that encloses the metal rail.

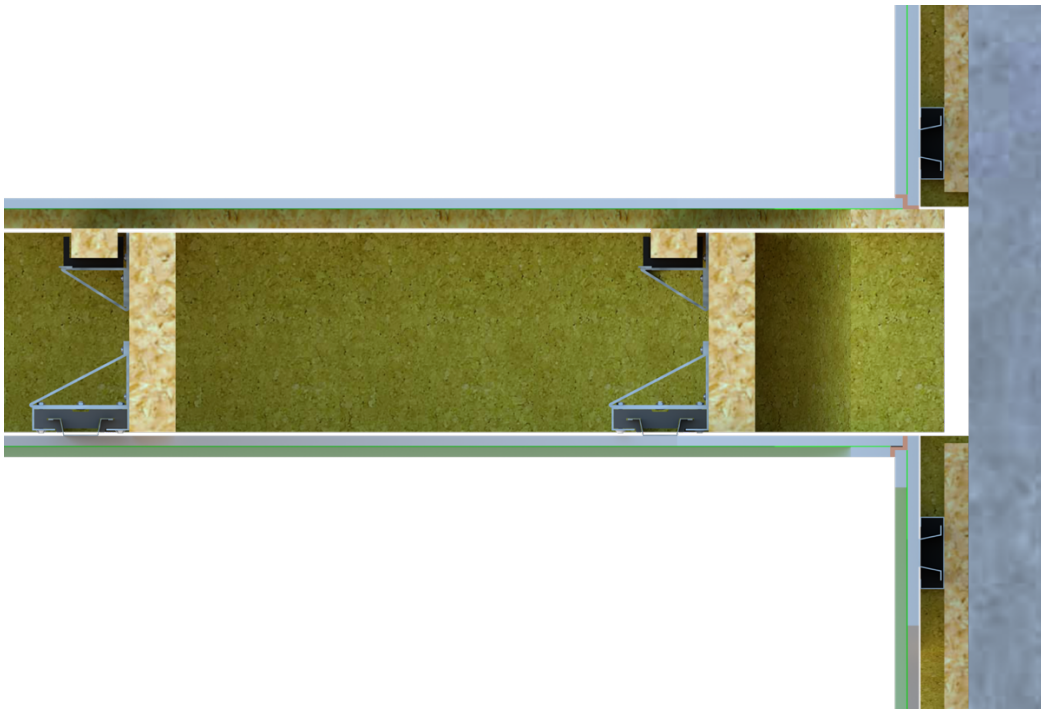
Conclusion

1. The ProSilence clip and rail system has a proven high load-bearing capacity, even in demanding load situations.
2. The use of extra screws in the stringers provides a significantly increased safety margin.
3. The system meets the requirements for use in both wall and ceiling applications, even in structures where high loads or large sheet masses are involved.

Sample models







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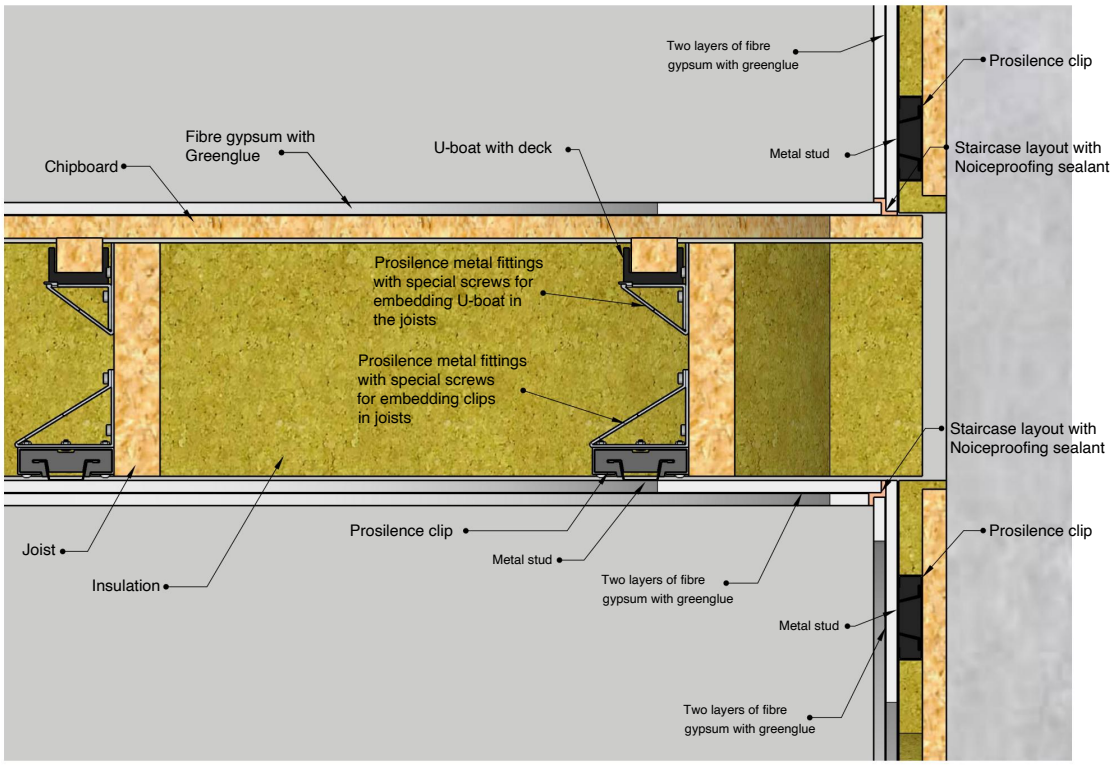

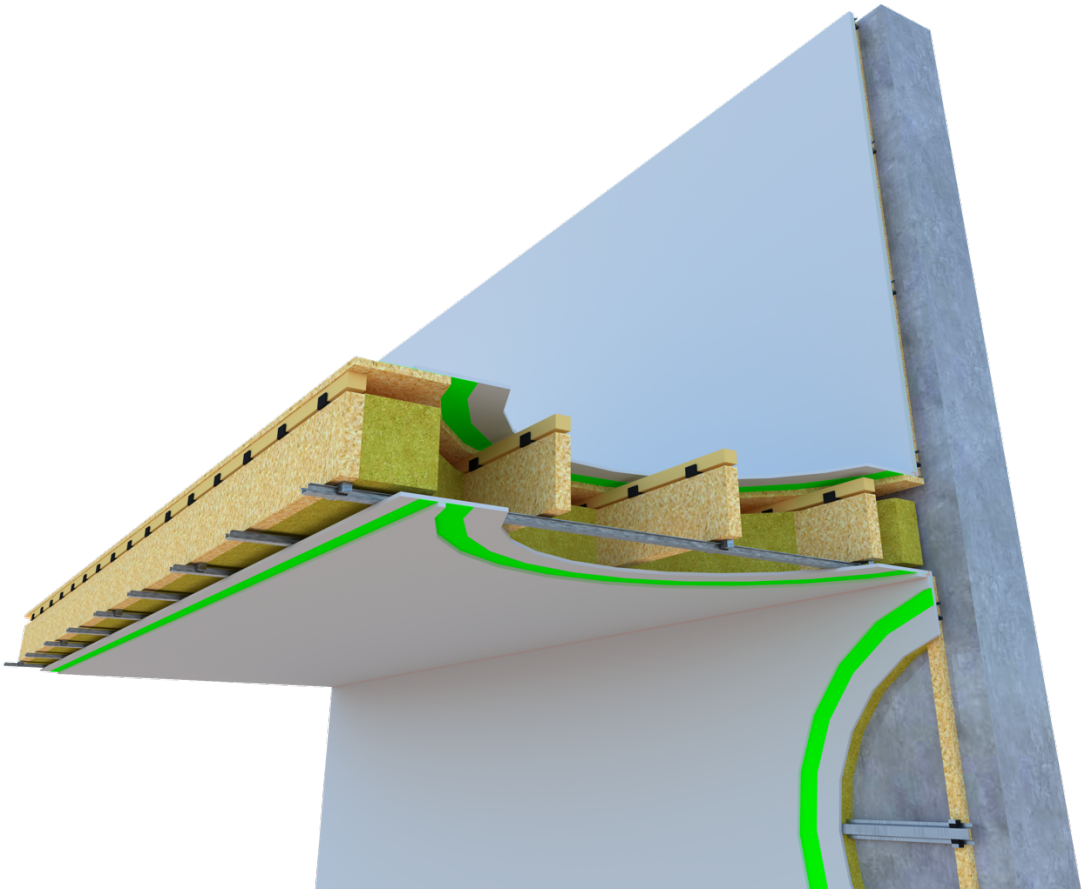

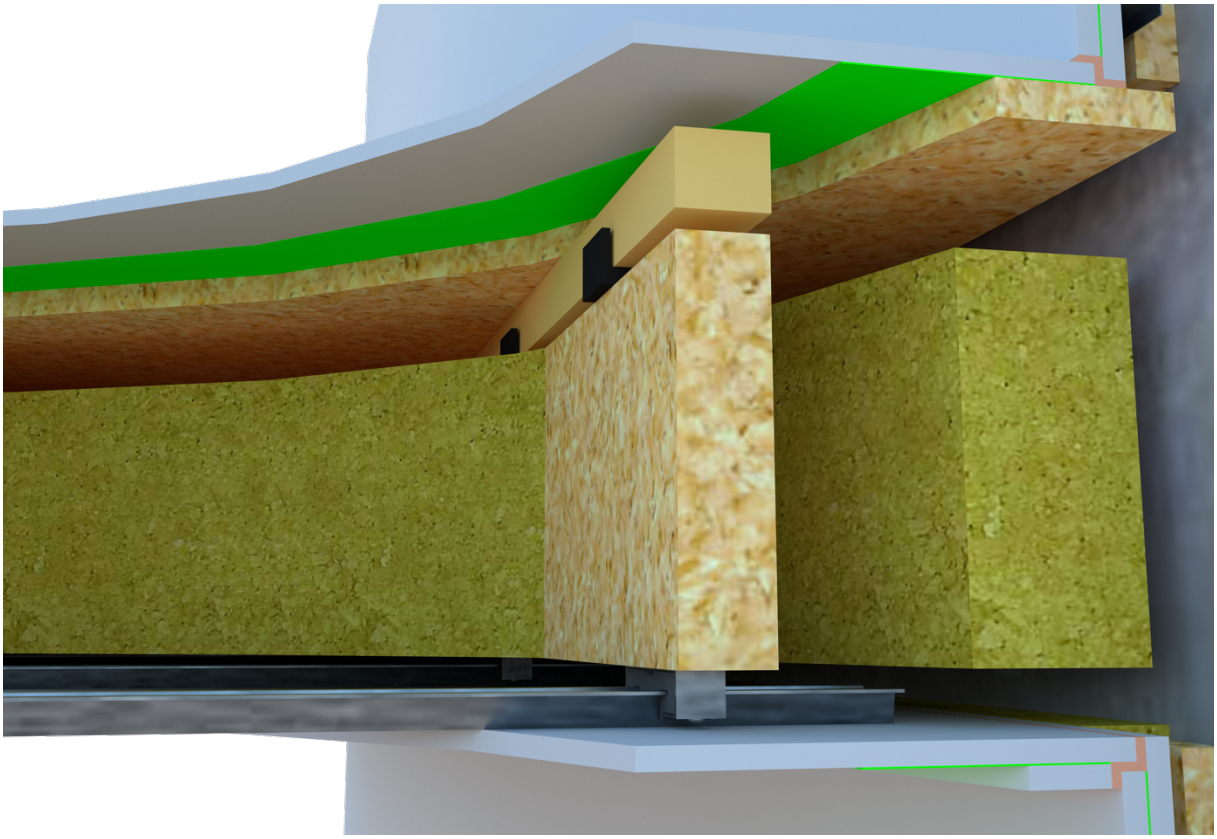

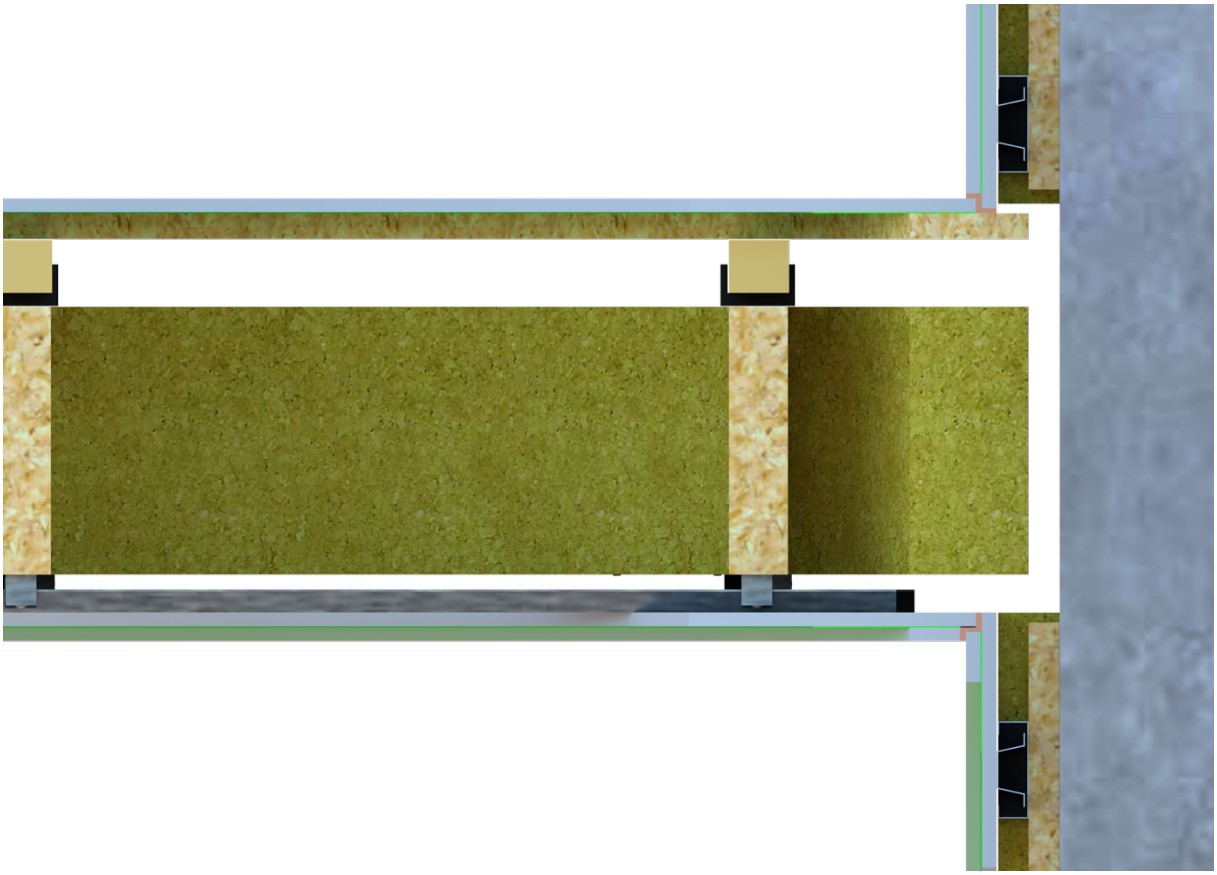

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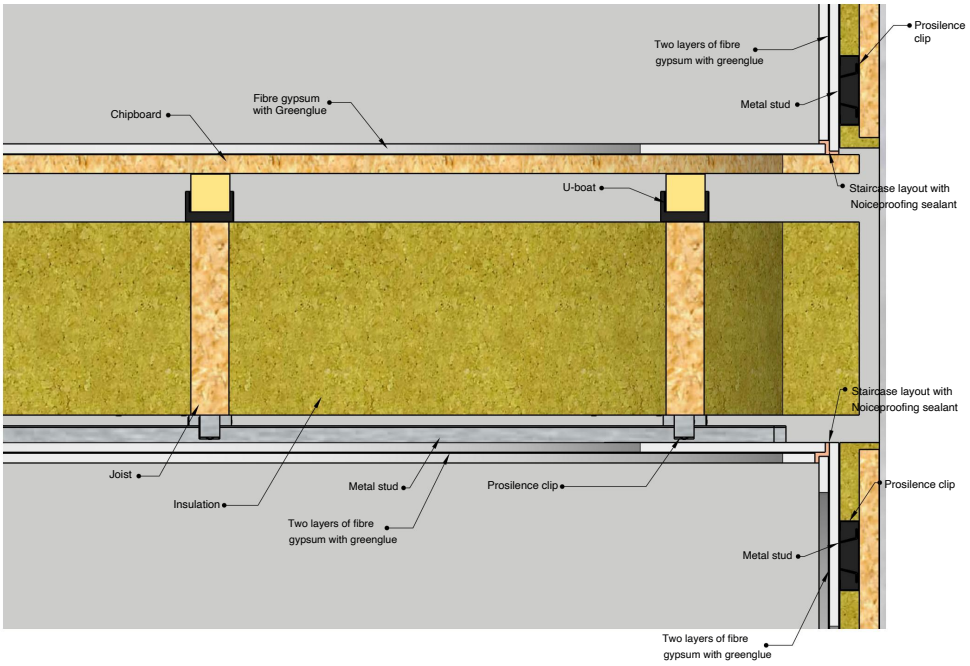


APPENDIX 1. CE certificates with fire technical certification for U-boats and Klips

TEST REPORT

Report No.: ATS230912036ER Page 1 of 10

Applicant : AVSHOP AS
Address : SMALVOLLVEIEN 61 0667 OSLO NORWAY

Manufacturer's name : AVSHOP AS
Address : SMALVOLLVEIEN 61 0667 OSLO NORWAY

Report on the submitted samples said to be:

Sample Name : U boat
Trade Mark : DreamScreen
Tested model : U001
Series model : /

Testing Period : Sept. 12,2023 ~ Sept. 20,2023
Date of issue : Sept. 20,2023
Results : Please refer to next page(s).

****

TEST REQUEST	**CONCLUSION**
(1) For compliance with the European Standard on Safety Directive 2009/48/EC and Directive (EU) 2019/1922 Migration of certain element (19E).	**Pass**
EN 71-1:2014+A1:2018-Mechanical and Physical Properties	**Pass**
EN 71-2:2020-Flammability	**Pass**
EN 71-3:2019+A1:2021-Migration of Certain Elements	**Pass**

****

Signed for and on behalf of ATS

ATTESTATION OF CONFORMITY

Reference No.	:	ATS230912036E
Applicant	:	AVSHOP AS
Address	:	SMALVOLLVEIEN 61 0667 OSLO NORWAY
Manufacturer	:	AVSHOP AS
Address	:	SMALVOLLVEIEN 61 0667 OSLO NORWAY
Sample Name	:	U boat
Trademark	:	DreamScreen
Modal	:	U001
Test Report No.	:	ATS230912036ER

The submitted products have been tested by us with the listed standards and found in compliance with the following European Directives:

Directive 2009/48/EC

EN 71-1: 2014+A1:2018; EN 71-2: 2020; EN 71-3:2019+A1:2021

The tests were performed in normal operation mode. The test results apply only to the particular sample tested and to the specific tests carried out. This certificate applies specifically to the sample investigated in our test reference number only.

The CE markings as shown below can be affixed on the product after preparation of necessary technical documentation.

Other relevant Directives have to be observed.

CE

Max Wang/Technical Director

Sept. 20,2023

Shenzhen ATS Testing Technology Co., Ltd.
Floor 3, Building C, 6373 Baoan Avenue, Fuhai Street, Baoan District, Shenzhen, Guangdong, China.
Http: //www.ats-cert.com Email: admin@ats-cert.com Tel: 0755-23304558

TEST REPORT

Report No.: ATS230912035ER Page 1 of 10

Applicant	:	**AVSHOP AS**
Address	:	**SMALVOLLVEIEN 61 0667 OSLO NORWAY**
Manufacturer's name	:	**AVSHOP AS**
Address	:	**SMALVOLLVEIEN 61 0667 OSLO NORWAY**

Report on the submitted samples said to be:

Sample Name	: steel clip with rubber
Trade Mark	: DreamScreen
Tested model	: S001
Series model	: /
Testing Period	: Sept. 12,2023 ~ Sept. 20,2023
Date of issue	: Sept. 20,2023
Results	: Please refer to next page(s).

****

TEST REQUEST	**CONCLUSION**
(1) For compliance with the European Standard on Safety Directive 2009/48/EC and Directive (EU) 2019/1922 Migration of certain element (19E).	**Pass**
EN 71-1:2014+A1:2018-Mechanical and Physical Properties	**Pass**
EN 71-2:2020-Flammability	**Pass**
EN 71-3:2019+A1:2021-Migration of Certain Elements	**Pass**

****

Signed for and on behalf of ATS

Mark Wang

SHENZHEN ATS TECHNOLOGY CO., LTD *TESTING*

ATTESTATION OF CONFORMITY

Reference No.	:	ATS230912035E
Applicant	:	AVSHOP AS
Address	:	SMALVOLLVEIEN 61 0667 OSLO NORWAY
Manufacturer	:	AVSHOP AS
Address	:	SMALVOLLVEIEN 61 0667 OSLO NORWAY
Sample Name	:	steel clip with rubber
Trademark	:	DreamScreen
Modal	:	S001
Test Report No.	:	ATS230912035ER

The submitted products have been tested by us with the listed standards and found in compliance with the following European Directives:

Directive 2009/48/EC

EN 71-1: 2014+A1:2018; EN 71-2: 2020; EN 71-3:2019+A1:2021

The tests were performed in normal operation mode. The test results apply only to the particular sample tested and to the specific tests carried out. This certificate applies specifically to the sample investigated in our test reference number only.

The CE markings as shown below can be affixed on the product after preparation of necessary technical documentation.

Other relevant Directives have to be observed.

CE

Max Wang/Technical Director

Sept. 20,2023

Shenzhen ATS Testing Technology Co., Ltd.
Floor 3, Building C, 6373 Baoan Avenue, Fuhai Street, Baoan District, Shenzhen, Guangdong, China.
Http: //www.ats-cert.com Email: admin@ats-cert.com Tel: 0755-23304558

APPENDIX 2. SINTEF test report

SINTEF Byggforsk
Postadresse:
Postboks 124 Blindern
0314 Oslo
Besøksadresse:
Forskningsveien 3B
0373 Oslo
Sentralbord: 73593000
info@sintef.no
Foretaksregister:
NO 919 303 808 MVA

Prøvingsrapport

Prøving av bæreevne for klips til DreamScreen lydisoleringssystem for AVSHOP

Lab. mekanisk materialprøving, Oslo

Dato:
2018-09-17

Prosjektleder/forfatter(e):
Sigurd Hveem/
Jan-Fredrik Aasheim

Oppdragsgivere(e):
AVSHOP AS

Oppdragsgivers referanse:
Eivind Lygren

Prosjektnummer:
102019038

Antall sider og vedlegg:
10 inkl. vedlegg

Sammendrag:
SINTEF Byggforsk fikk i oppdrag å utføre mekanisk prøving av bæreevne for klips til DreamScreen lydisoleringssystem for oppdragsgiver AVSHOP AS. Prøvingen ble utført hos SINTEF Byggforsks laboratorier i Oslo den 23. og 27. august 2018.

Prøvene består av klips, gummikloss og skinne for lydisolering / metallisk avkobling av innendørs vegg- og himlingsplater til bruk i rom for blant annet hjemmekino.

Basert på 4 parallelle prøvinger, med to forskjellige prøvingsoppsett som beskrevet i denne rapporten, er laveste bæreevne (bruddlast) målt til følgende:

Takmonterte klips (uttrekk):	407 N
Veggmonterte klips (skjærbelastning):	336 N

Bøying av klips under montering ser ut til å påvirke bruddlastkapasiteten/bæreevnen noe.

Prosjektleder/forfatter:
Jan-Fredrik Aasheim

Signatur

Kontrollert av: FOR
Dag Henning Sæther

Signatur

Godkjent av:
Jørgen Tidemann Andersen

Signatur

Rapport nr:
2018:00922

Gradering:
Fortrolig

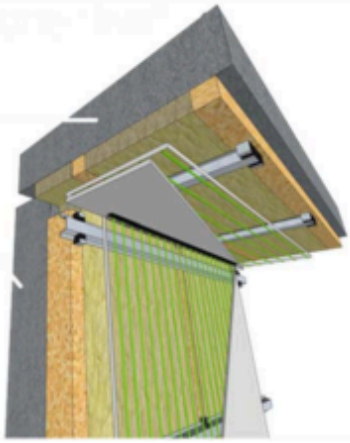
1 BAKGRUNN

SINTEF Byggforsk fikk i oppdrag å utføre mekanisk prøving av bæreevne for klips til DreamScreen lydisoleringssystem. Oppdragsgiver var AVSHOP AS og oppdraget ble gitt i mai 2018.
Prøvingen ble utført hos SINTEF Byggforsks laboratorier i Oslo den 23. og 27. august 2018 av Jan-Fredrik Aasheim.

2 PRØVER

Prøvene består av klips, gummikloss og skinne for lydisolering / metallisk avkobling av innendørs vegg- og himlingsplater til bruk i rom for blant annet hjemmekino. Klips er utformet av knekt stålplate med ytre mål ca. 88 x 25 x 25 mm. Godstykkelsen ble målt til ca. 1,2 mm. Skinnen består av stålplate formet til en kanal med ytre profiltverrsnittsmål ca. 67 x 21,5 mm. Godstykkelsen ble målt til ca. 0,85 mm. Gummiklossen er formstøpt med ytre mål tilpasset innsiden av klips og med en gjennomgående utskjæring tilpasset kanalprofilet. Se Figur 1 og Figur 2.
Prøvene ble gitt benevning H1 til H4 og V1 til V4 for henholdsvis horisontal og vertikal montering.

Figur 1. Klips, gummiavkobling og skinne. Foto er hentet fra https://dreamscreen.no.



Figur 2. Illustrasjon av lydisolert vegg og himling ved hjelp av gummiavkobling. Figur er hentet fra https://dreamscreen.no.

3 PRØVEMETODER

Klips ble skrudd fast til en 47 x 22 mm trelekt med 2 stk. 3,2 x 35 mm treskruer (fiberkutt). Kanalprofil ble skrudd fast til et 122 x 20 mm trebord med 2 stk. 4,2 x 45 mm selvborende, rustfrie skruer fra undersiden. Skruene var plassert langs senter i kanalen, med senteravstand 300 mm og med klips/gummikloss i midten. Klips, gummikloss og kanalprofil ble montert sammen som beskrevet på leverandørens nettsider (https://dreamscreen.no/collections/construction-products/products/dreamscreen-prosilence-clip-for-wall-and-ceiling-detachment); klips ble festet i underlaget og åpnet noe opp ved å bøye sideveggene. Gummikloss ble tredd inn på kanalprofil og klips bøyd tilbake til opprinnelig form ved å banke den fast rundt gummiklossen. Det ble også utført noen prøvinger hvor delene ble montert sammen uten å deformere klipsen. Se notater til resultatene i Tabell 1 og Tabell 2. Strekkprøvingen ble utført i Tinius Olsen 100 kN universalprøvemaskin (SINTEF utstyrsnummer MO5567). Pålastingshastigheten var 2 mm/min og kraft og deformasjon ble kontinuerlig avlest.

SINTEF

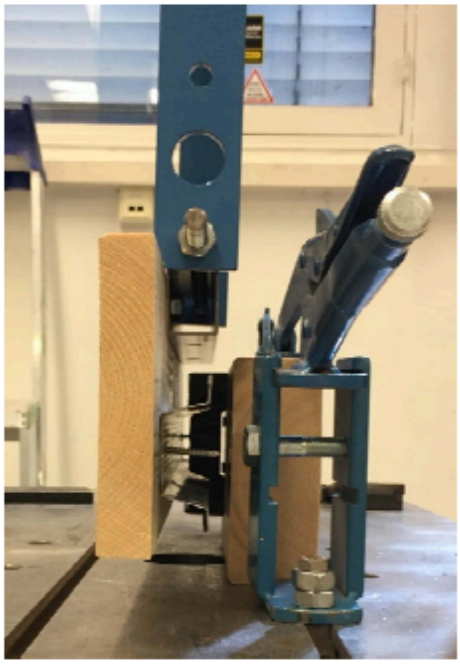
3.1 Montering i tak (uttrekk)

Kanalprofil ble fastspent og klips ble trukket rett ut fra kanalen, normalt på underlaget. Dette for å simulere innfesting til horisontale flater og belastning fra himlingsplater. Prøvingsoppsettet er vist i Figur 3.

3.2 Montering til vegg (skjærbelastning)

Klips ble fastspent og kanalprofil ble trukket parallelt med underlaget til klipsen. Dette for å simulere innfesting til vertikale flater og belastning fra veggplater. Prøveoppsettet er vist i Figur 4.

Figur 3. Prøvingsoppsett for takmontering (uttrekk).



Figur 4. Prøvingsoppsett for veggmontering (skjærbelastning).

4 RESULTATER

Det ble utført 4 parallelle prøvinger for hver av de to prøvingsoppsettene. Det ble montert nye klips, gummikloss og kanalprofil for hver enkelt prøving.

4.1 Horisontal montering og uttrekk (tak/himling)

Prøveresultatene er gjengitt i Tabell 1. Kraft- og deformasjonskurver er vist i Figur 7 til Figur 10 i VEDLEGG A.

Bæreevnen/bruddlast, F_{maks}, er angitt som største oppnådde motholdskraft mellom klips og kanalprofil. I alle fire prøvetilfeller åpnes klips opp ved økende belastning og maksimalbelastning oppnås i øyeblikket rett før gummiklossen glir over kanten av kanaprofilet på den ene siden. Oppgitt deformasjon inkluderer alle vertikale forskyvninger mellom kraftgiver og innspenning og bør kun betraktes som veiledende verdier. Figur 5 viser typisk deformasjon ved bruddlast.

SINTEF

Tabell 1. Prøveresultater, montering på horisontal flate og uttrekk normalt på underlaget (himling).

Prøve	F_{maks} [N]	F_{maks} [kg]	Def. ved F_{maks} [mm]	Notater
H1	407	41	8,5	Klips bøyd ut ca. 5 mm på begge sider og banket tilbake rundt gummikloss ved montering.
H2	493	50	12,1	Klips bøyd ut ca. 5 mm på en side og banket tilbake rundt gummikloss ved montering.
H3	469	48	9,9	Klips ikke bøyd før montering.
H4	486	50	11,2	Klips bøyd ut ca. 8 mm på begge sider og banket tilbake rundt gummikloss ved montering.
Gjennom-snitt	464	47	10,4	

4.2 Vertikal montering og skjærbelastning (vegg)

Prøveresultatene er gjengitt Tabell 2. Kraft- og deformasjonskurver er vist i Figur 11 til Figur 13 i VEDLEGG A.

Bæreevnen/bruddlast, F_{maks}, er angitt som største oppnådde motholdskraft mellom klips og kanalprofil, rett før klips og gummikloss glir over nedre kant av kanalprofilet. I alle fire prøvetilfellene øker deretter motholdskraften igjen ved videre pålastniing til ca. 420 - 470 N, før klips og gummikloss separeres fullstendig fra kanalprofilet. Avstand og vinkel mellom klips og kanalprofil, det vil si mellom vegg og underlag, er i dette tilfellet såpass stor at det ikke vurderes som en reell situasjon. Bruddlast er derfor definert som første belastningstopp. Oppgitt deformasjon inkluderer alle vertikale forskyvninger mellom kraftgiver og innspenning og bør kun betraktes som veiledende verdier. Figur 6 viser typisk deformasjon ved bruddlast.

Tabell 2. Prøveresultater, montering på vertikalt flate og skjærbelastning (vegg).

Prøve	F_{maks} [N]	F_{maks} [kg]	Def. ved F_{maks} [mm]	Notater
V1	396	40	14,0	Klips ikke bøyd før montering.
V2	370	38	11,6	Klips ikke bøyd før montering.
V3	336	34	14,6	Klips bøyd ut ca. 11 mm på begge sider og banket tilbake rundt gummikloss ved montering.
V4	353	36	12,0	Klips bøyd ut ca. 6 mm på begge sider og banket tilbake rundt gummikloss ved montering.
Gjennom-snitt	364	37	13,1	

Figur 5. Typisk deformasjon ved maksimalbelastning, horisontal montering og uttrekk (tak/himling).

Figur 6. Typisk deformasjon ved maksimalbelastning, vertikal montering og skjærbelastning (vegg).

5 KONKLUSJON

Basert på 4 parallelle prøvinger, med to forskjellige prøvingsoppsett som beskrevet i denne rapporten, er laveste bæreevne (bruddlast) målt til følgende:

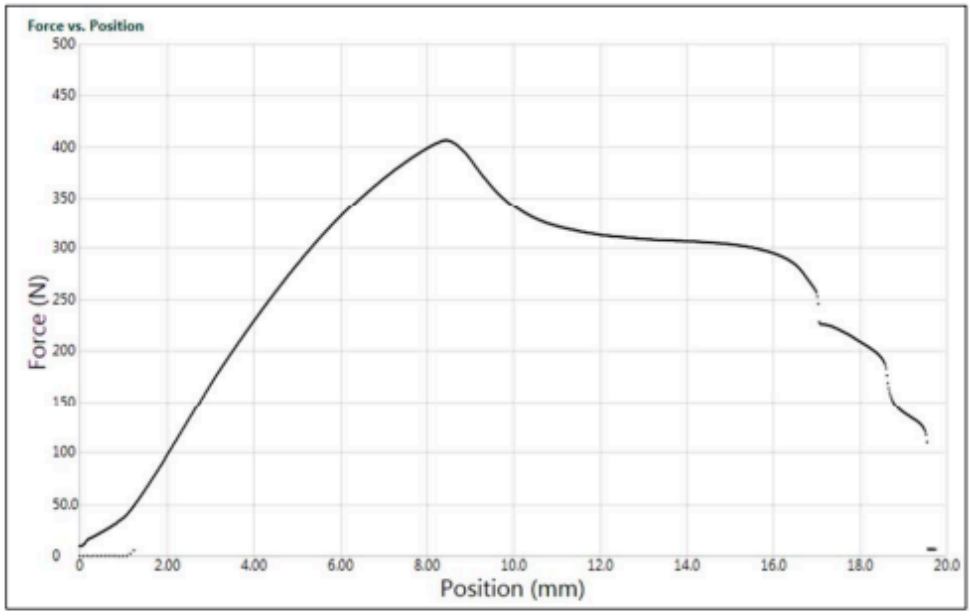
Takmonterte klips (uttrekk): 407 N

Veggmonterte klips (skjærbelastning): 336 N

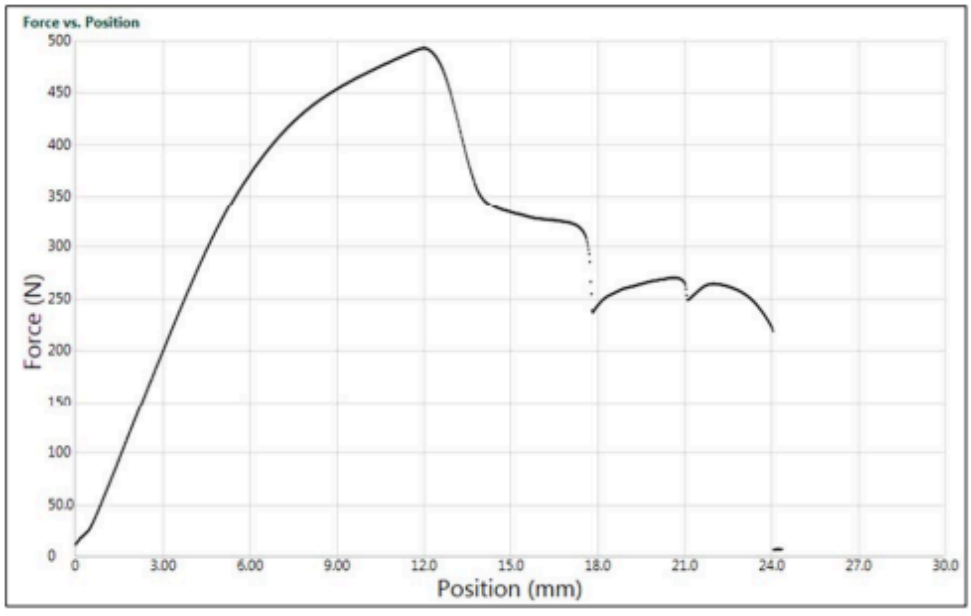
Bøying av klips under montering ser ut til å påvirke bruddlastkapasiteten/bæreevnen noe. Påvirkningsgraden av bøying kan ikke tallfestes eller konkluderes med sikkerhet på grunn av det relativt lave prøveantallet.

SINTEF

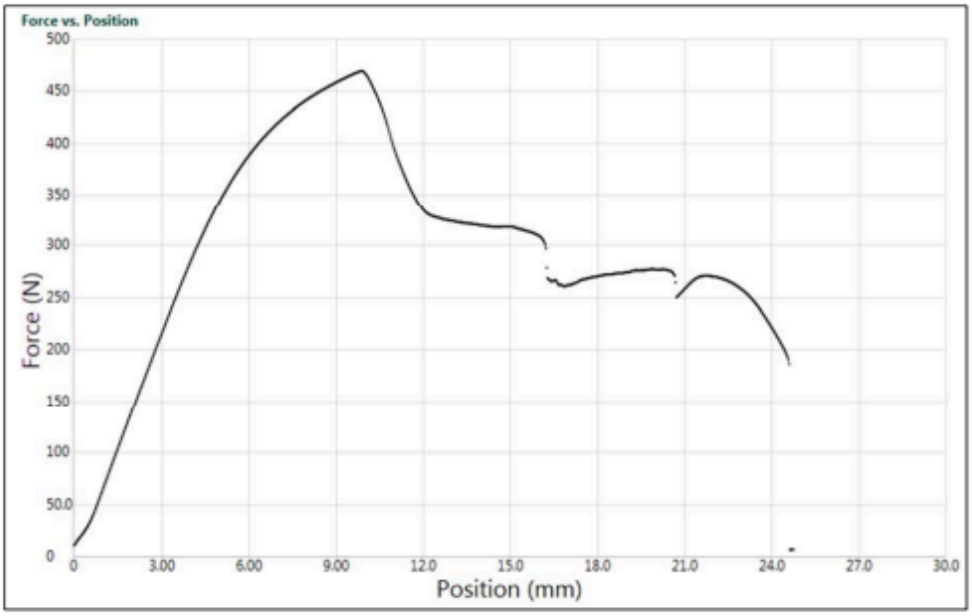
VEDLEGG A – KRAFT- OG DEFORMASJONSKURVER



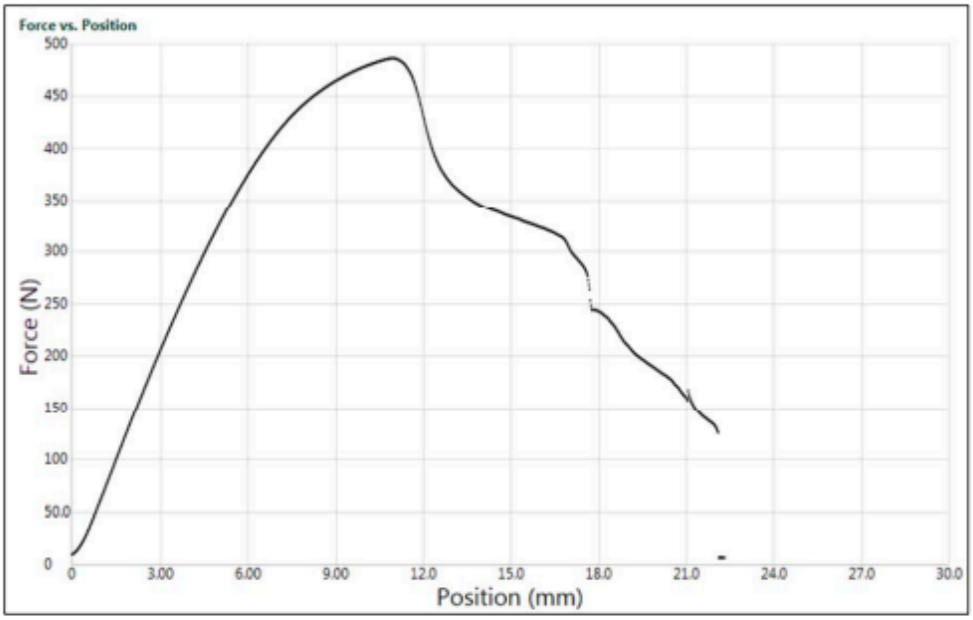
Figur 7. Kraft- og deformasjonskurve for prøve H1.



Figur 8. Kraft- og deformasjonskurve for prøve H2.

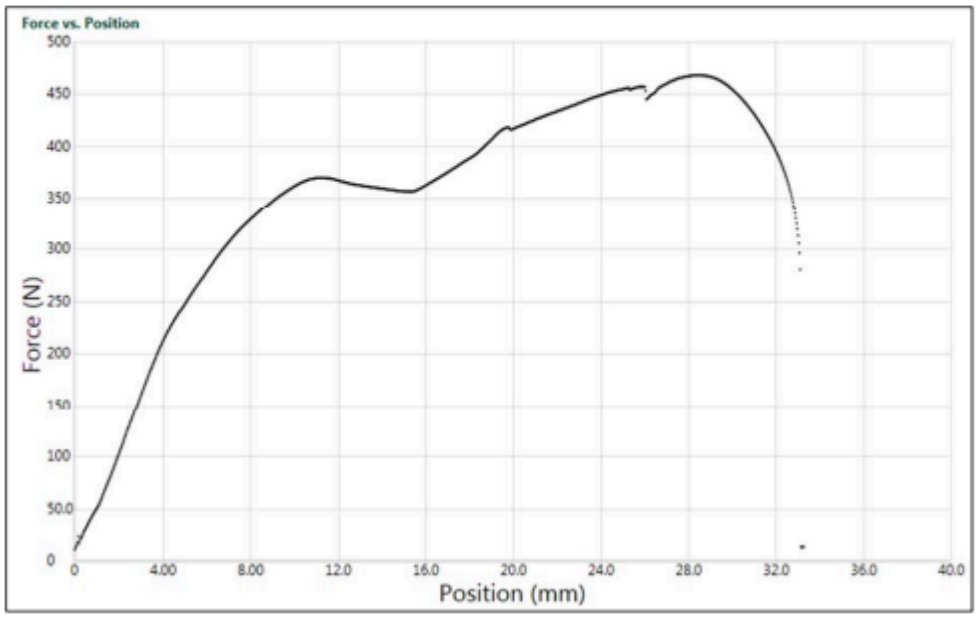


Figur 9. Kraft- og deformasjonskurve for prøve H3.

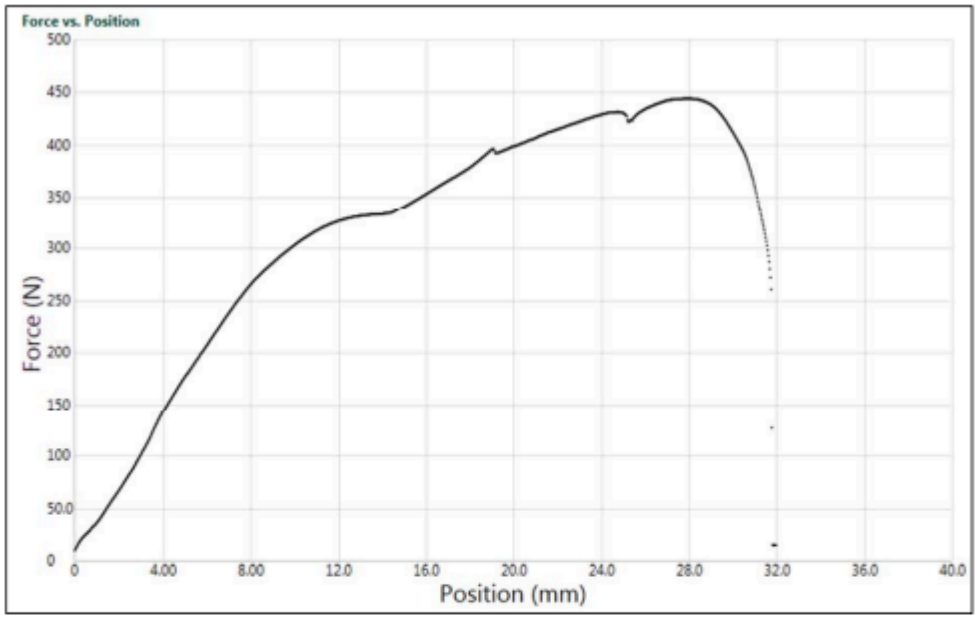


Figur 10. Kraft- og deformasjonskurve for prøve H4.

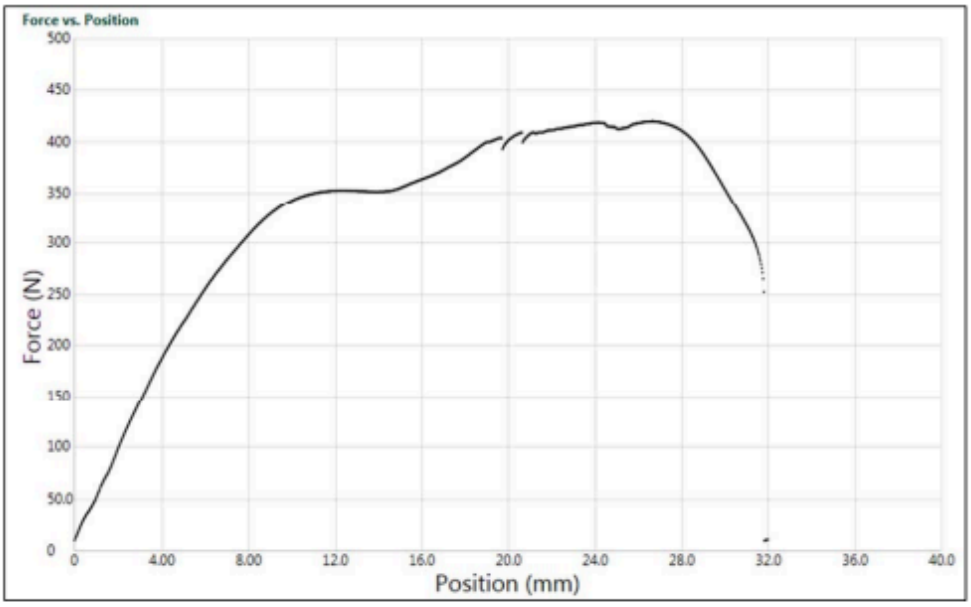
Resultater for prøve V1 ble avlest manuelt og kraft- og deformasjonskurve ble ikke generert.



Figur 11. Kraft- og deformasjonskurve for prøve V2.



Figur 12. Kraft- og deformasjonskurve for prøve V3.



Figur 13. Kraft- og deformasjonskurve for prøve V4.