



## Granab Subfloor System 9000

A structure-borne noise insulating system for premises with strict requirements, e.g. concert halls, theatres, cinemas, studios, music rehearsal rooms, gyms, dance venues and server rooms.



**GRANAB** manufactures subfloor systems for homes, offices, schools and public buildings. Granab subfloor systems have been installed in over 4,500,000 m<sup>2</sup> of flooring. The steel subfloor system has damping elements for effective impact sound damping and airborne sound insulation. The system is patented and meets the requirements of EKS, the European construction standards. It is type-approved by the SP Technical Research Institute of Sweden and technically approved by SINTEF in Norway with respect to sound-damping properties, dynamic loads and strength. GRANAB is a leading developer of subfloor systems, and is now presenting new solutions for even better sound insulation. There is no project too small or too large for us. Welcome to GRANAB!



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# The systems

Granab subfloor systems are available in three options: 3000N, 7000N and 9000N. All systems are designed with galvanised steel girders with damping elements. The choice of system is determined by the height that the floor is to be built to and the sound insulation required.

## Granab subfloor system 9000N

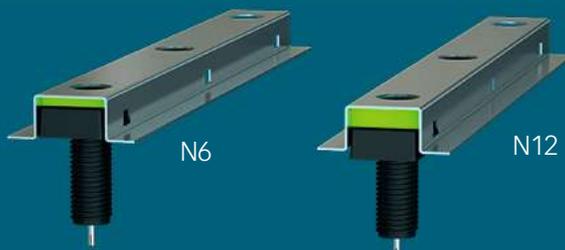
Flexible construction heights from 70 to 420 mm



SEE MAIN CATALOGUE

## Granab Subfloor System 3000N

Flexible construction heights from 30 to 140 mm



## Granab subfloor system 7000N

Flexible construction heights from 50 to 420 mm



For Granab subfloor systems 3000N and 7000N, please refer to our main brochure or visit our website: [granab.se](http://granab.se)





## About Granab Subfloor System 9000

Many premises have more stringent requirements for structure-borne sound insulation than that of residential buildings. This includes premises which require freedom from disturbances and disruptions or activities that generate a great deal of vibrations and noise through the supporting slab and structure.

In these cases, normal solutions may be room-in-room construction or the casting of liquid screed floors.

We have developed an innovative, flexible system offering new possibilities. System 9000. We have based this on requirements established by acousticians on natural frequency in floor systems.

With a unique range of Sylodyn damping elements, you can customise your floating floor or room-in-room construction based on floor loads and preferences for natural frequency.

Examples of areas of use:

- Concert halls, theatres and cinemas
- Studios and music rehearsal rooms
- Gyms and dance venues
- Server rooms

# Advantages

Granab subfloor systems provide a number of advantages: constructed with non-deformable, galvanised steel floor girder and an effective sound-damping spring system. The subfloor system is secured to the substructure and set at the desired height. The Granab system 9000 improves the quality of auditoriums, hotels, sports facilities and public buildings, and making them more environmentally friendly.

With 20 years' experience and a strong focus on sound, we are market leaders in this type of flooring. Our systems are type-approved by the SP Technical Research Institute of Sweden and technically approved by SINTEF in Norway with respect to sound-damping properties, dynamic loads and strength.

Dampening elements are specified from our range of options to achieve different sound properties depending on the type of substructure used.





**Effective vibration and structure-borne sound insulation.**

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**Simple designing** based on preferences of acousticians for natural frequency.

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Large load area with **the possibility of adapting to load variations on the same premises.**

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**Flexible construction heights** with the possibility of controlling and **adjusting the acoustic air resonance** (air cushion).

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**Fast and dry installation method.** Installed directly on untreated substructure without wet surface levelling.

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**Effective impact sound damping and airborne sound insulation.**

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Provides **comfortable, creak free and sustainable floors.**

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**Environmentally certified**, consists entirely of **inorganic materials**, and is not affected by variations in humidity or temperature.

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**Lightweight system** at 5kg/m<sup>2</sup>.

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**50 % less CO<sub>2</sub> impact** than concrete.

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**The customised**, prefabricated system offers **more efficient, on-site** logistics.

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**Adjustable construction heights from 70 to 420 mm**, excluding floor covering. Special heights up to 1000 mm.

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All parts are **recyclable.**

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**No wastage.** Effective planning eliminates wastage and the need for **supplementary orders.**

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Dynamic **shock absorption.**

# System 9000

## 1. Sylodyn®

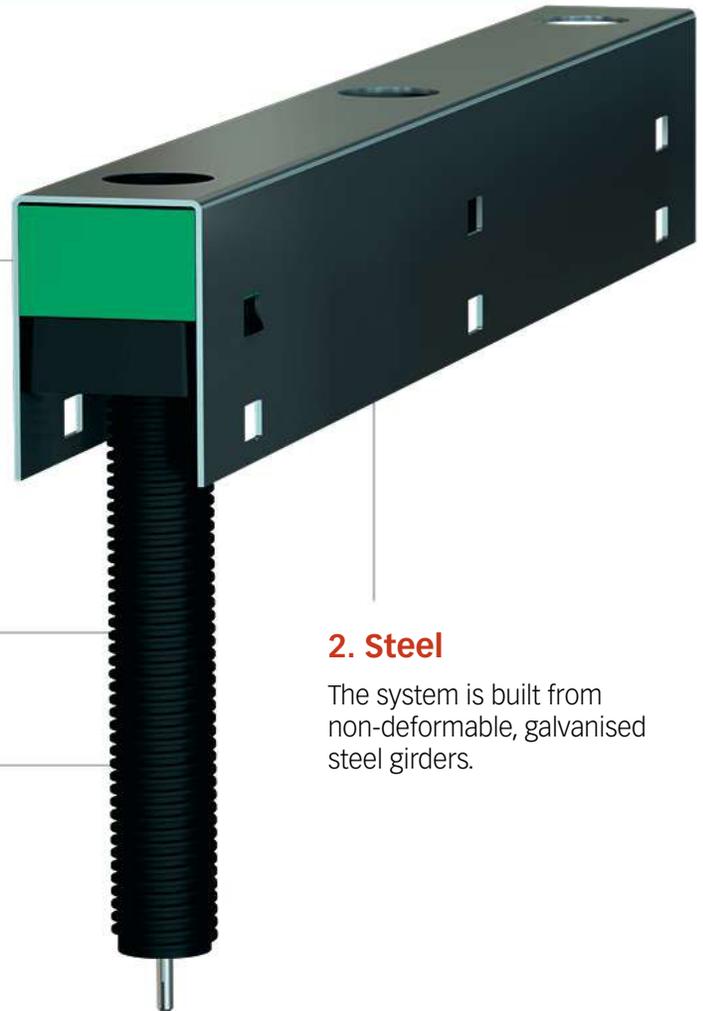
Damping element for vibration insulation when requirements are very high. 25 and 50 mm dampener option.

## 3. Fibreglass Reinforced Plastic

The support block and level adjustment screw allow for flexible construction heights 70 - 420 mm (excl. floor covering).

## 2. Steel

The system is built from non-deformable, galvanised steel girders.



## Sylodyn® options with varying stiffness for different load demands.

Green - Sylodyn ND

Static load range  
up to approx. 300 kg/m<sup>2</sup>



Blue - Sylodyn NE

Static load range  
up to approx. 600 kg/m<sup>2</sup>



Purple - Sylodyn NF

Static load range  
up to approx. 750 kg/m<sup>2</sup>



# A flexible and adaptable system.

## The system can be fully adapted to the needs of your premises.

You decide:

- The height of the system
- Requirements for natural frequency
- Design of floor surface
- Load type and requirements
- Floor covering above the system

## Weight of surface flooring and additional loads

By having relatively heavy surface flooring, you can achieve low natural frequency and you are able to retain capacity for additional loads.

If additional loads are significantly heavier in relation to the dead load of the floor, resonance frequency in empty premises may be more difficult to bring down to the preferred natural frequency. A solution for this can be heavier loaded flooring.

**Example** (c/c distance is determined based on local category and acoustic requirements)

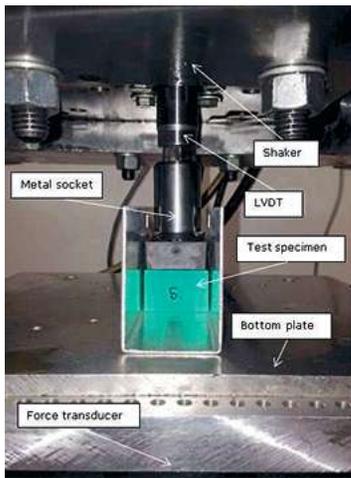
Floor	Load & C/C	Sylodyn®	Natural frequency		Hz
14 parquet 2x13 gypsum 22 chipboard	46 kg/m <sup>2</sup>	ND	ND25 = 18 Hz ND50 = 13 Hz		24 22 20 18 16 14 12 10 8
14 parquet 50 concrete 22 chipboard	144 kg/m <sup>2</sup>	NE	NE25 = 13 Hz NE50 = 10 Hz		
14 parquet 100 concrete 22 chipboard	264 kg/m <sup>2</sup>	NF	NF25 = 12 Hz NF50 = 9 Hz		

Natural frequency is the first resonance frequency obtained in a mass spring system with one degree-of-freedom on a stiff substructure.



# We provide you with established data pertaining to natural frequency, deflection and impact sound improvement

We have performed measurements for deflection and natural frequency with 25 and 50 mm Sylodyn installed in Granab Subfloor System 9000. ÅF-Infrastructure AB has carried out measurements on our behalf in test rigs for vibration insulation. The results were presented in the report titled "Measurements of natural frequency and static deflection of Granab 9000". The report supports the calculation models used for the Granab Subfloor System 9000, and detailed data were presented for each pad subjected to varying loads. SP performed laboratory testing with respect to impact sound improvement.

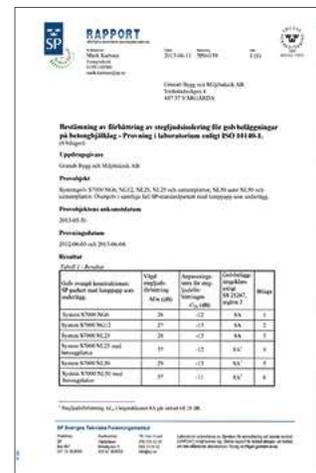
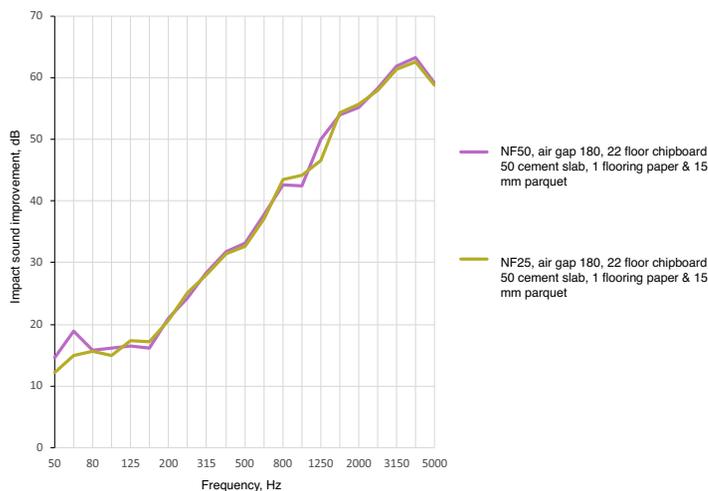


Report "Measurements of natural frequency and static deflection of Granab 9000"

## Impact sound improvement in the laboratory

Floor above the construction: Parquet with flooring paper as wadding.	Measured impact sound improve- ment (dB)
System 9000 NL25 with 50 mm concrete slabs	37
System 9000 NL50 with 50 mm concrete slabs	37

Source: SP Technical Research Institute of Sweden, Report no. 3P04159



Report "Determining improvement of impact sound insulation for floor coverings on concrete substructure - Laboratory testing in accordance with ISO 10140-1"

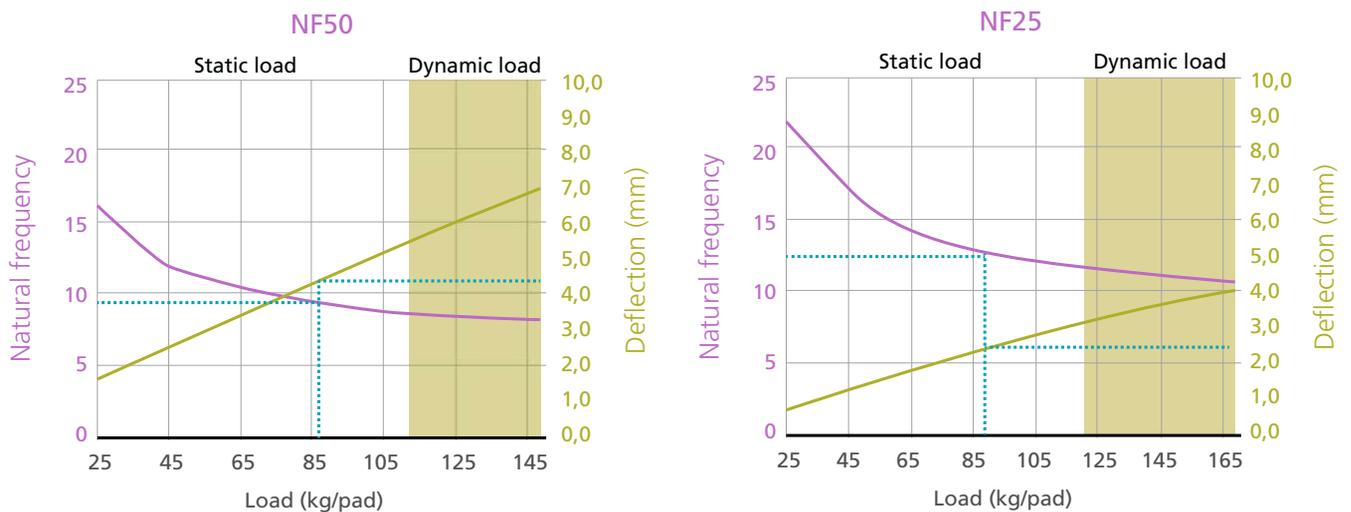


# Design Example - Sylodyn® NF25 and NF50

Floor	Load & C/C	Sylodyn®	Natural frequency	Deflection
14 parquet 100 concrete 22 chipboard	264 kg/m <sup>2</sup> c/c 600/600	NF	NF25 = 12 Hz NF50 = 9 Hz	approx. 2.4 mm approx. 4.2 mm

Design load: 264 kg/m<sup>2</sup> / 3 pads/m<sup>2</sup> = 88 kg/NF50 pads

Remaining load capacity (static and dynamic)



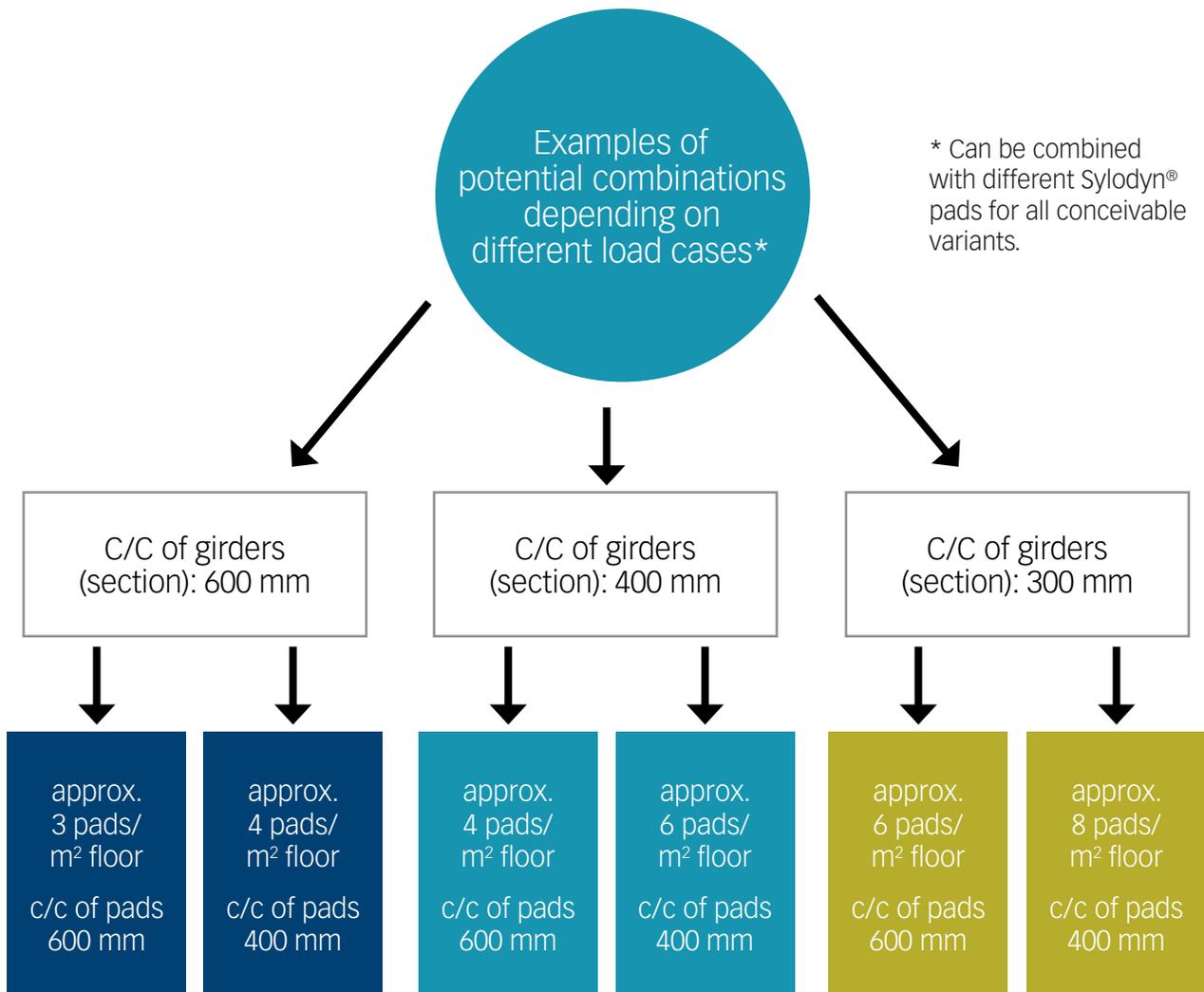
Static load: Permanent static load  
Dynamic load: Permanent static load limit + dynamic additional load



# Load Projection

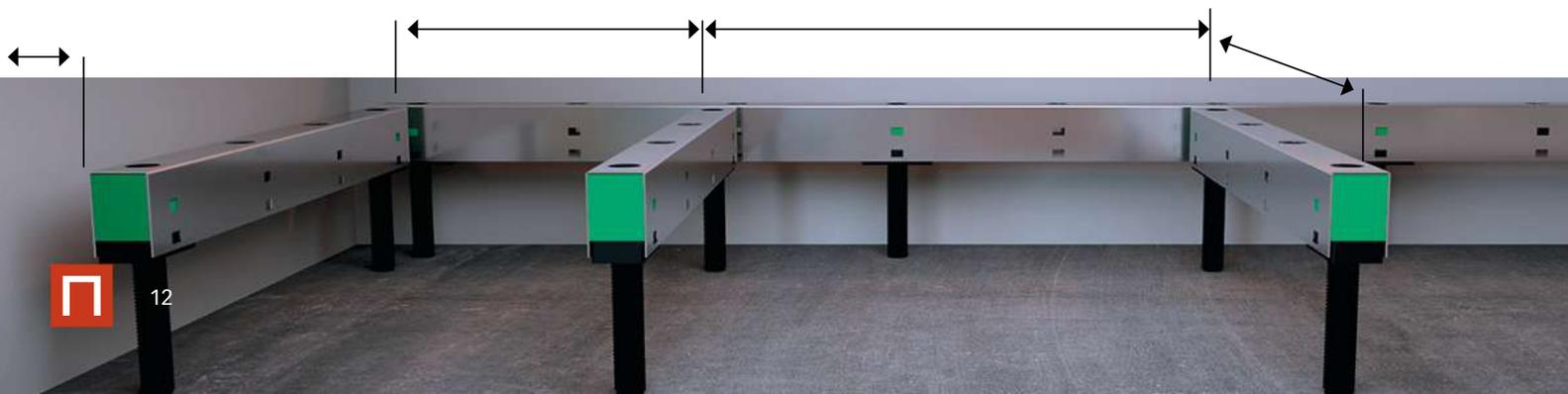
In practice, the system is designed based on a room's configuration.

The design load should be calculated as dead load + live load (such as fittings and machinery) for the maximum static load on system 9000. The dynamic load limit declared below can be utilised for varying loads and loads with a shorter duration, i.e. during the evacuation of a premises, a full sports hall, during a lecture or performance.

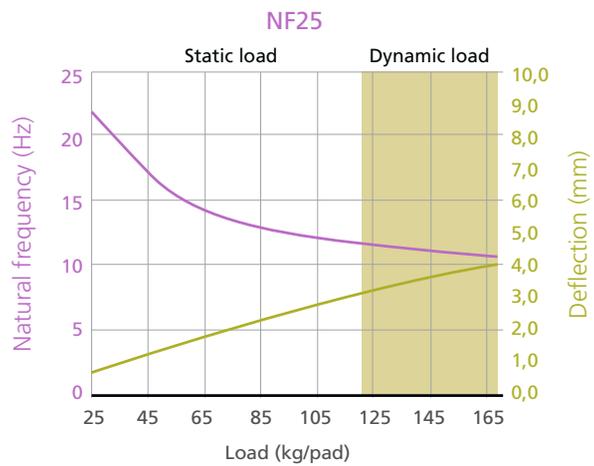
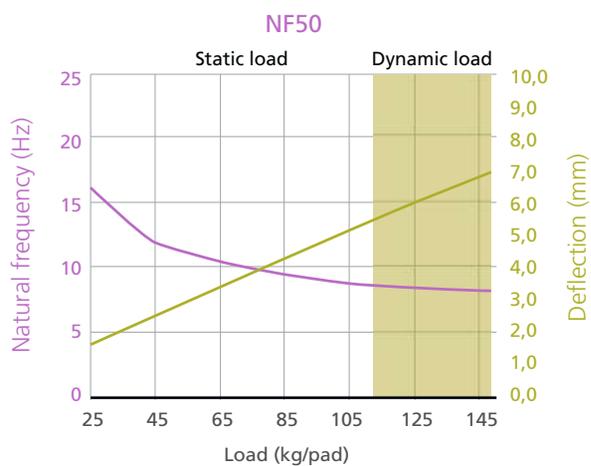
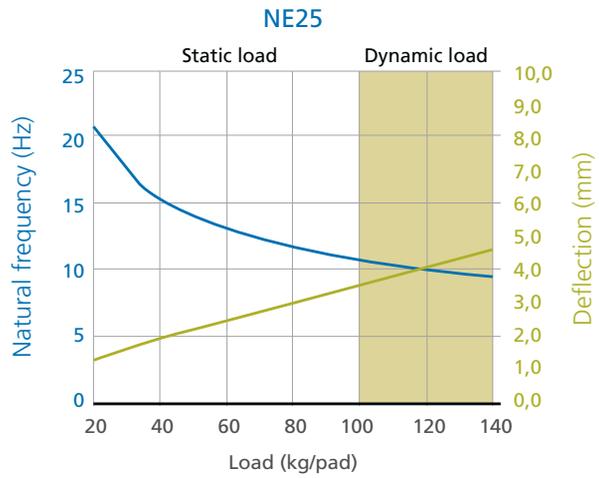
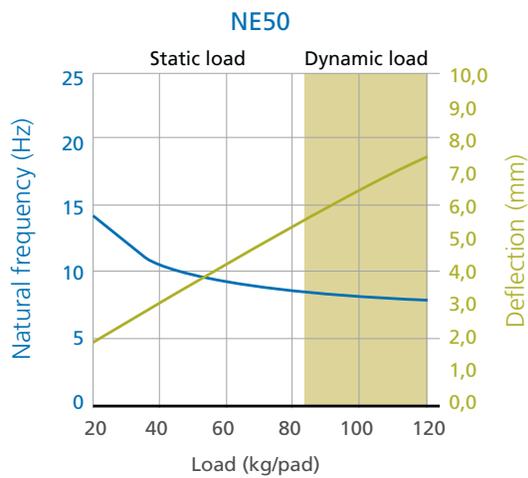
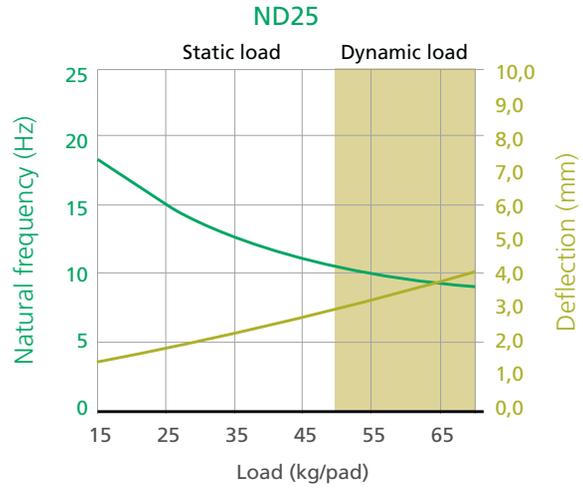
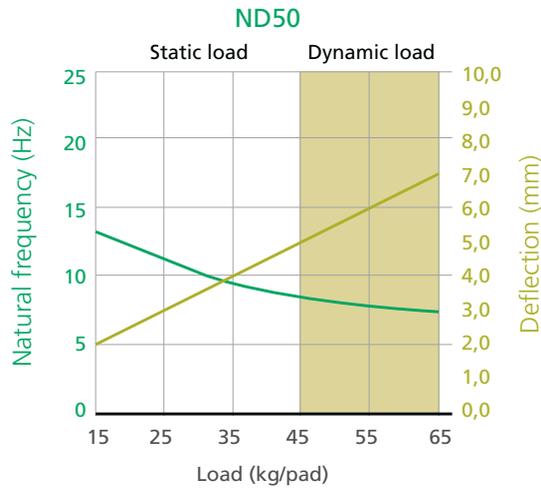


Depending on the c/c distance in the actual case, the natural frequency in the system may vary. In most cases, this variance is negligible in terms of the system's total performance.

Distance from wall, approx. 20 mm      1st – 2nd joists up to 600 mm      C/C distance between floor joists (sections) up to 600 mm      C/C distance between support blocks 200, 400 or 600 mm



# Design of Sylodyn® Pads



Static load: Permanent static load  
 Dynamic load: Permanent static load limit + dynamic additional load



## Load Plans and Design



We calculate the natural frequency and design the system specifically to that.

We assist you with all the technical support, calculations and optimisation of the system. We draw, cut, label, package and then deliver the system to you, all according to your needs.

Owing to the flexibility of the subfloor system, different loads in the same room can be placed on different damping element setups so as to achieve uniform deflection across the whole room.



What we need from you, our customer

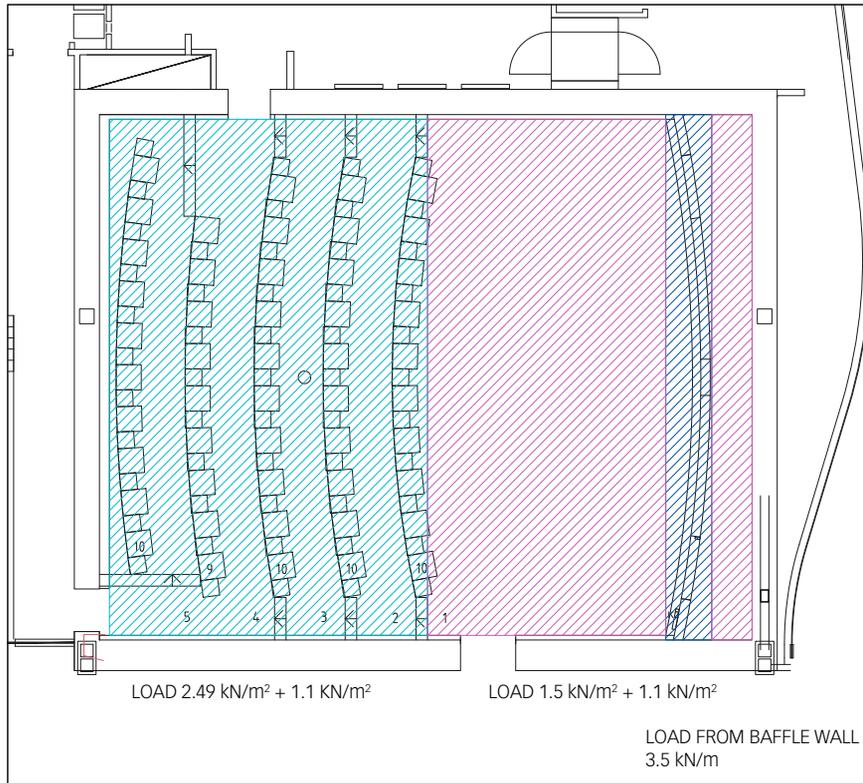
In a DWG file, draw in every unique load area above the upper floor, including the relevant loads. This enables us to draw in Granab Subfloor System 9000 at the correct place in the premises and to supply everything in the right dimensions and ready for installation.

Please include the following features in your drawing documentation:

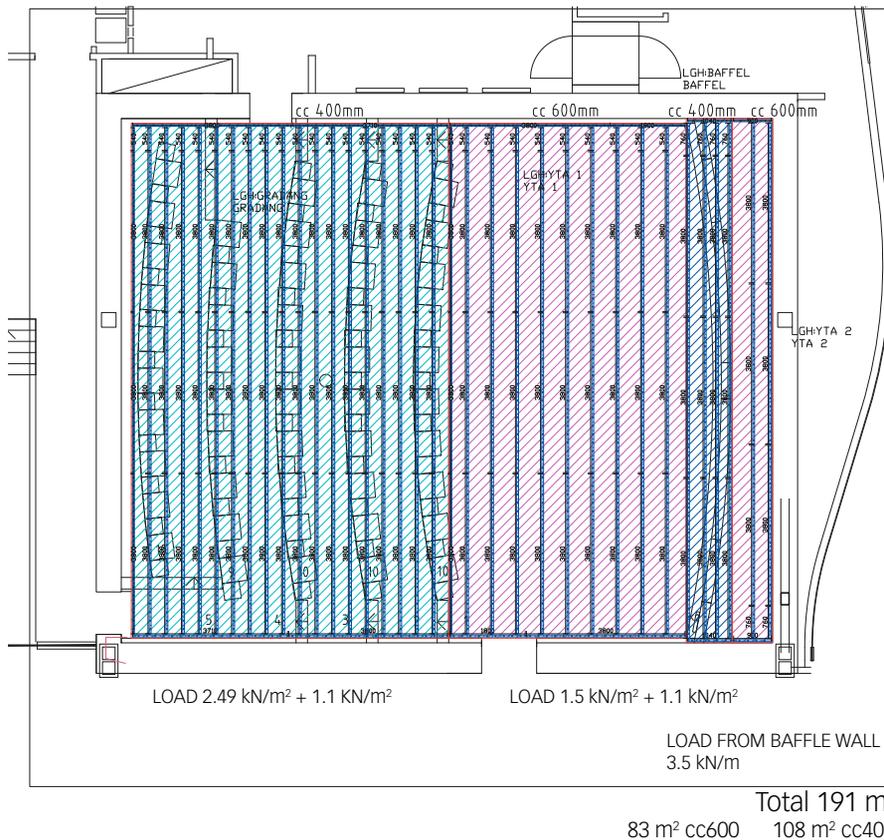
- Position of each load case in the premises, desired construction height, overlying floor joist.
- Services to run below the floor, including sizes and fall requirements.
- Dead load  $\text{kg/m}^2$  floor construction.
- Dynamic load  $\text{kg/m}^2$  on floor (additional load).
- Maximum load  $\text{kg/m}^2$  (e.g. loads during evacuation, loads with shorter duration).



# Example

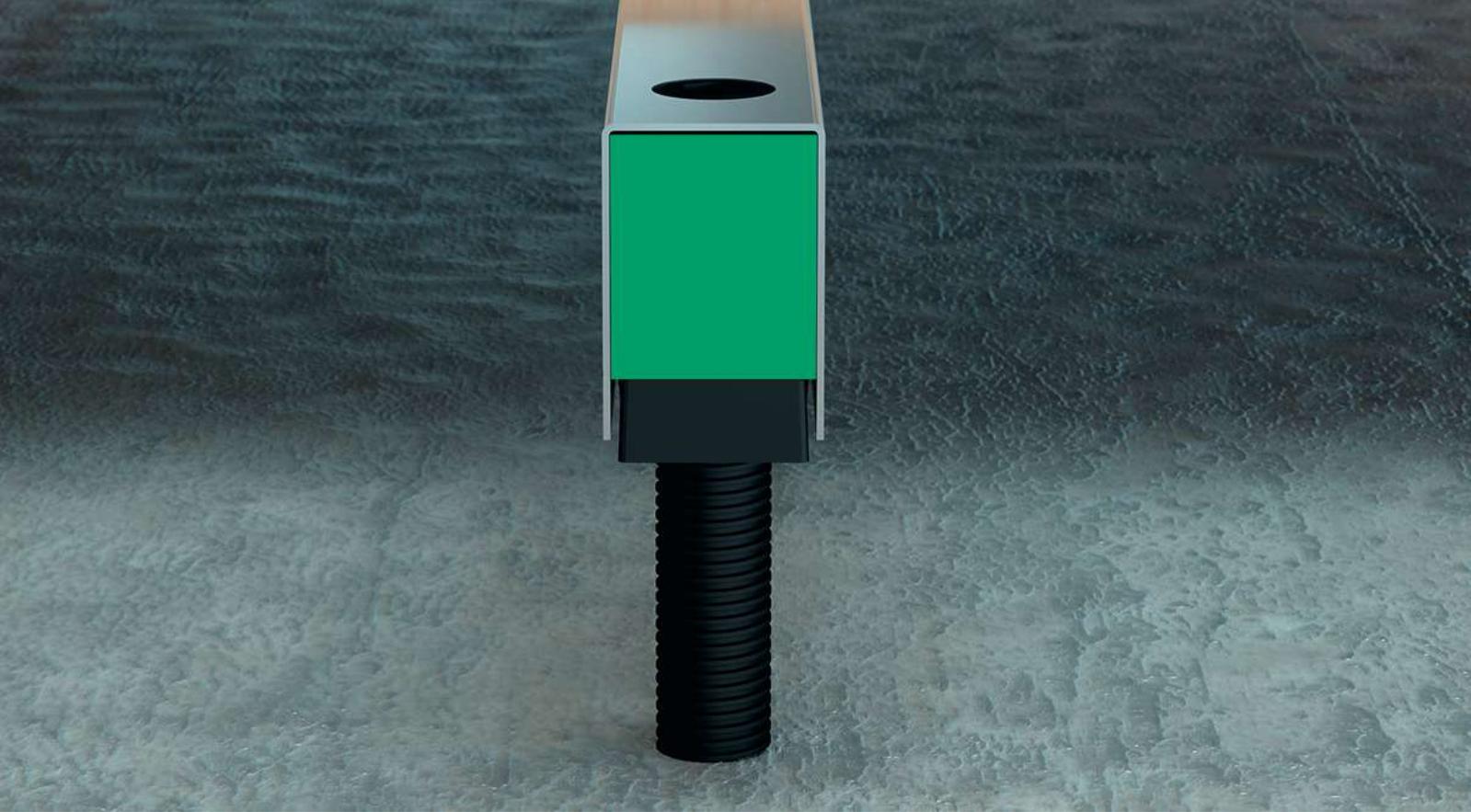


Load Plan  
The customer sends a drawing of the premises denoting loads and load requirements.



Drawing in Granab  
Subfloor System 9000  
We calculate and draw in the system according to your stipulated needs and requirements.





## Inorganic Materials - No Moisture Impact

Granab Subfloor System 9000 consists of floor joists, Sylodyn® damping elements, support blocks and level adjustment screws.

All parts are manufactured from inorganic materials, meaning they are not affected by moisture or temperature fluctuations.

### 1. Sylodyn® - damping elements

Sylodyn® is used when the requirements for vibration and impact sound insulation are very high.

The material is equally resilient both dynamically and statically and is frequently the only solution for applications with high loads and low resonance frequency requirements.

Environment: No environmental impact, recyclable into new polyurethane products. Sylodyn is highly resistant to short-term extreme overloads and the material springs back entirely if overloaded. The material's dynamic E-modules demonstrate no deterioration during long-term tests.

Functional durability: Sylodyn® has extremely long lifetime. Not affected by ozone, UV radiation or common chemicals.

Advantages: An effective and economical material. Good vibration insulation can be achieved even with little deflection and at minimal amplitudes. Good impact sound insulation even at high frequencies.

### 2. Steel - floor girders

Non-deformable, galvanised steel joists that retain their shape and are not affected by humidity or temperature variations.

Environment: Sheet metal is a part of the materials cycle and is processed into new steel in electro-steel works.

Functional durability: Galvanised steel has extremely long durability.

### 3. Fibreglass Reinforced Plastic - support block with level adjustment screw

The support block and level adjustment screw allows for flexible construction heights from 70 - 420 mm (excl. floor covering).

Material: Polypropylene

Environment: No environmental impact. Recyclable into new basic material.

Functional durability: Extremely long durability.



# Type Approval

Granab Subfloor Systems are type-approved by the SP Technical Research Institute of Sweden and SINTEF in Norway

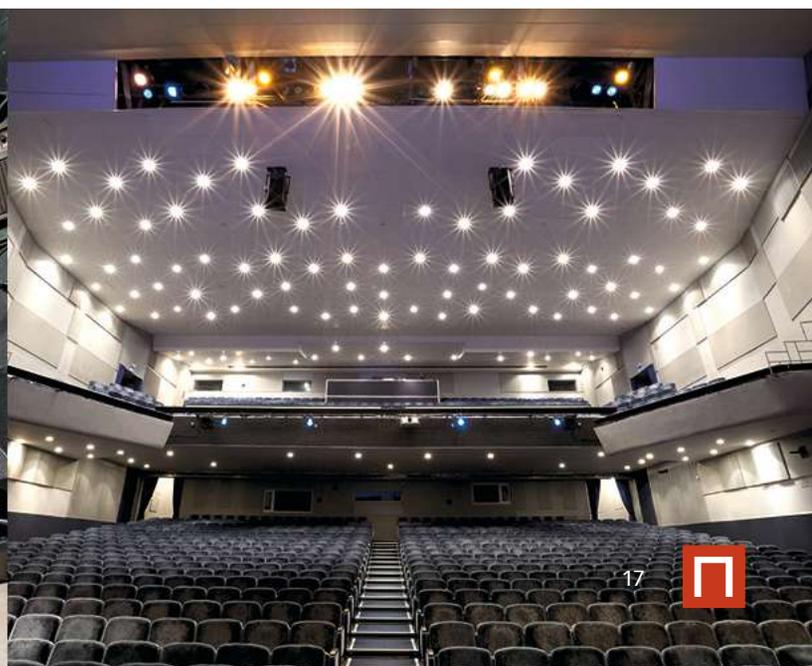
Granab Subfloor Systems 3000, 7000 and 9000 have been tested and certified by the SP Technical Research Institute of Sweden and SINTEF in Norway with respect to load capacity, stability and durability with verified values for sound-damping properties.

Granab subfloor systems meet the requirements of 8 chapter 4 sections 1 and 5 of the PBL (Swedish Planning and Construction Act) in regards and under the conditions specified in the type-approval and are therefore approved in accordance with the Swedish National Board of Housing, Building and Planning's Building Regulations (BBR) and general advice on the application of European construction standards (EKS).

Certified and type-approved SCO296-14  
Technical approval no. 20469

Evaluation documentation:  
Reports 4P02040, 3P04159-A, 3P04159-C, 3P04159-E, 4P02605-B, P302700C, 3P03903, P501330-1, P705473, PX05294A, PX05294B, 4P00999, 3P05281 and statement P503562 from the SP Technical Research Institute of Sweden.

Contact us for detailed documentation.  
[www.granab.se](http://www.granab.se)



# Reliable Planning and Efficient Logistics



## Supplied with pre-cut and dimension-adapted floor joists

The system is packaged and delivered with pre-cut and dimension-adapted floor joists and factory-fitted support blocks and damping elements.

Each joist is labelled with a room name and length that match the information in your installation drawing for easy handling and efficient installation.

The system is packaged in bundles on EUR pallets with a maximum length of either 2600 mm or 3800 mm.

Girders produced to a maximum length of 2600mm can be easily delivered and stored with sheets of plasterboard, placing on stands above the Granab girder packages.

## Deliveries during construction

Because the system consists of non-organic materials and is not affected by moisture or



temperature variations, it can be delivered while the building structure is still under construction.

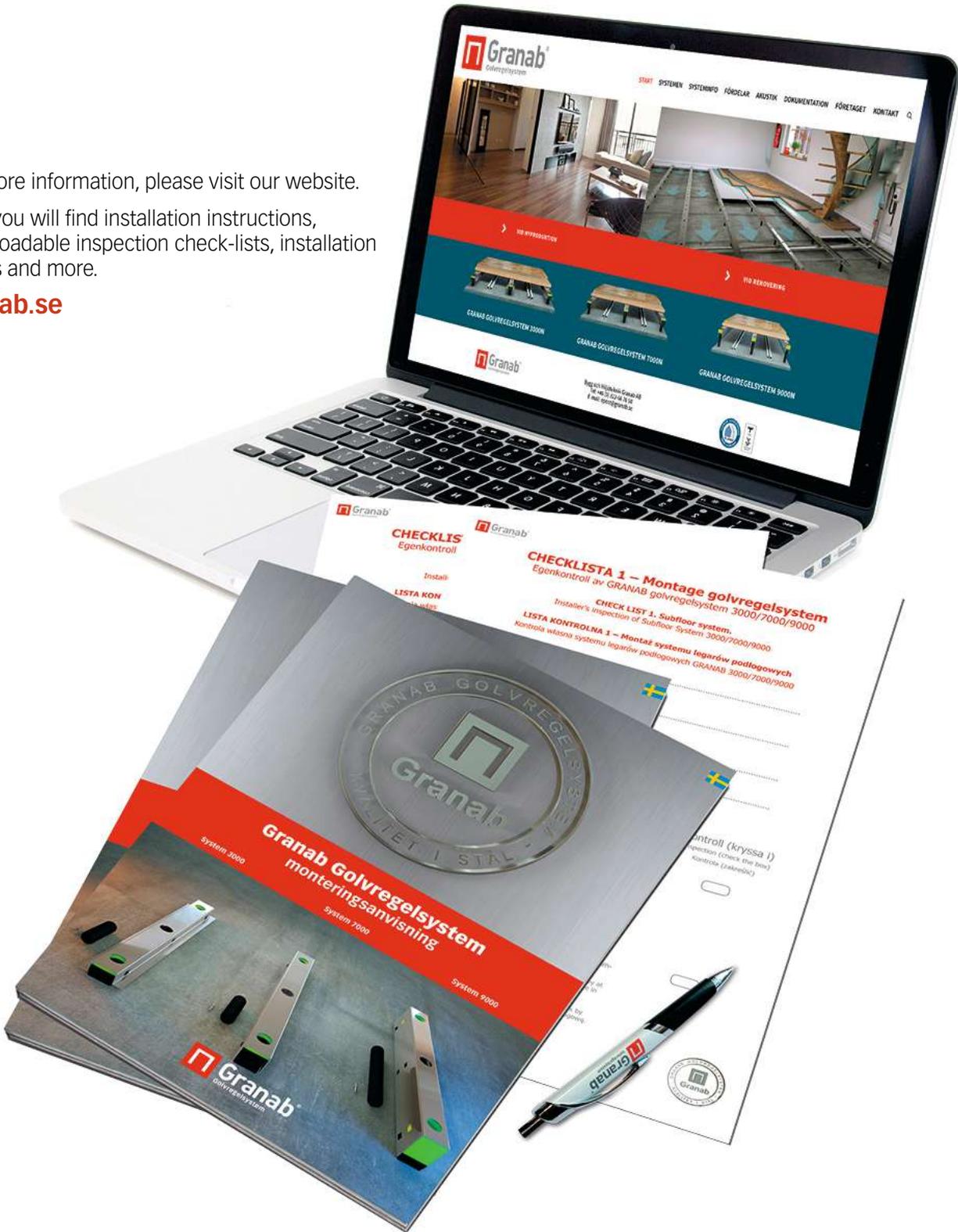
By lifting the materials into place during the construction of the building structure and erecting the interior walls above the system, production is more efficient and costs for logistics are minimised.



# Installation

For more information, please visit our website.  
Here you will find installation instructions,  
downloadable inspection check-lists, installation  
videos and more.

[granab.se](http://granab.se)





**Granab**<sup>®</sup>  
Golvregelsystem

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