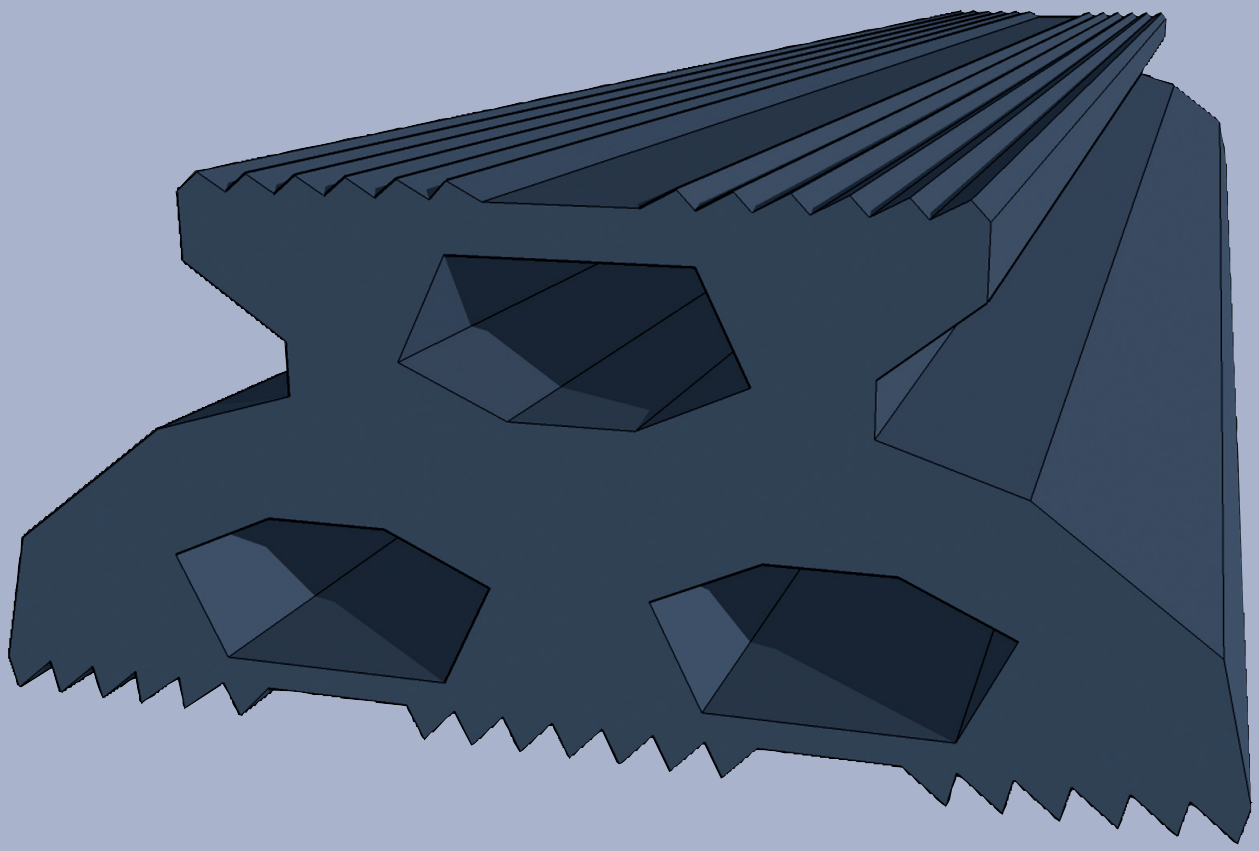
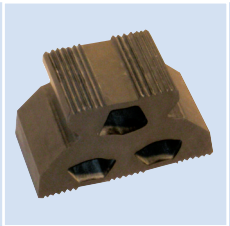
CALENBERG INGENIEURE

# CITELBRONG®





*Vibration isolation and structure-borne noise insulation for machines supported on strips*

# Natural Frequency

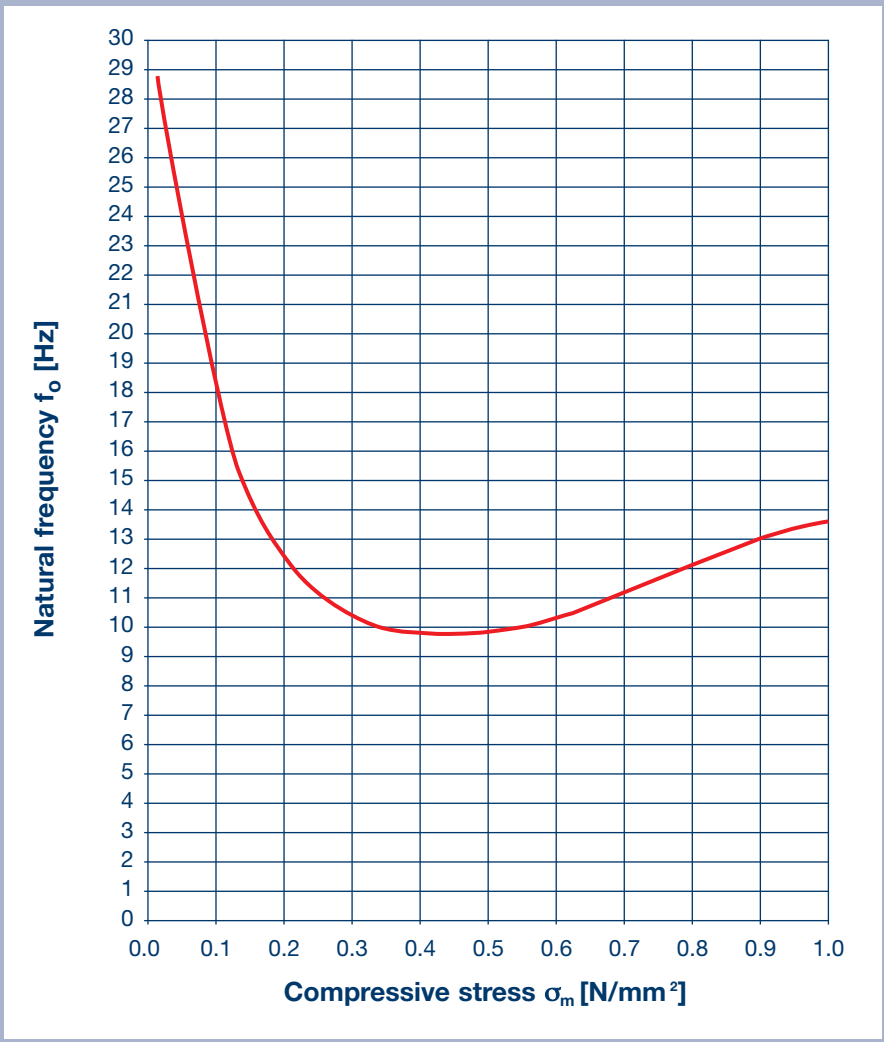
## Contents



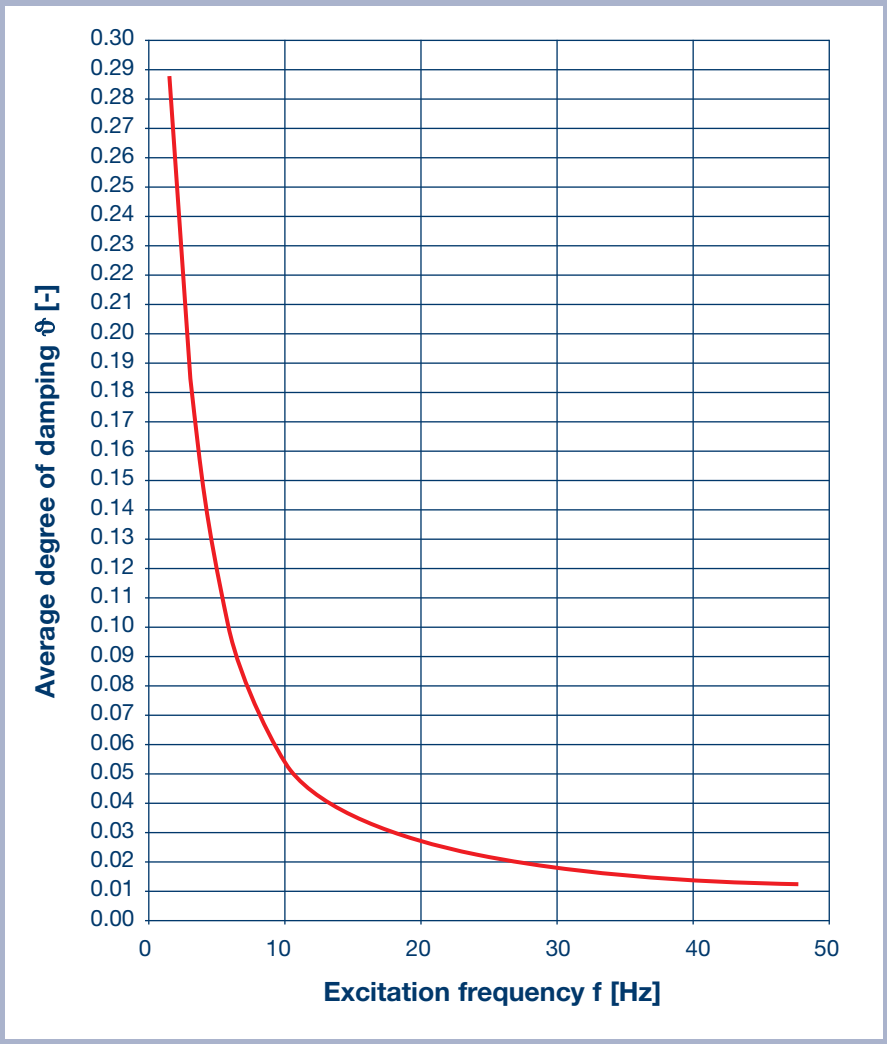
## Product Description

Calenberg Citelbrong® is a profiled resilient strip that is used for protection against vibration and structure-borne noise. Due to the favourable ratio of compression stiffness to shear stiffness Citelbrong® is almost as stiff in the shear direction as in the direction of compression which leads to an increased lateral stability. Even though the strip is not very high, its special shape allows large deflections which result in low natural frequencies.

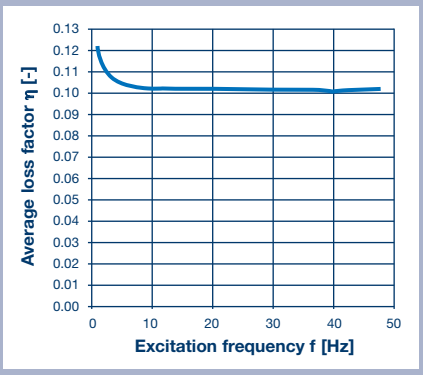
Note: The compressive stress given refers to a width of 150 mm.




*Vibration velocity 1 mm/s*




*Vibration velocity 1 mm/s*




## Degree of Damping

The damping ratio ϑ (often given as percentage) is a measure of how rapidly free oscillations die down.

In general: An increase in ϑ, leads to lower resonance amplifications $Ü_{max}$. The damping effect sets in at a frequency ratio of $f/f_o > 1.4$.

# Degree of Damping

# Isolation Efficiency

## Field of Application

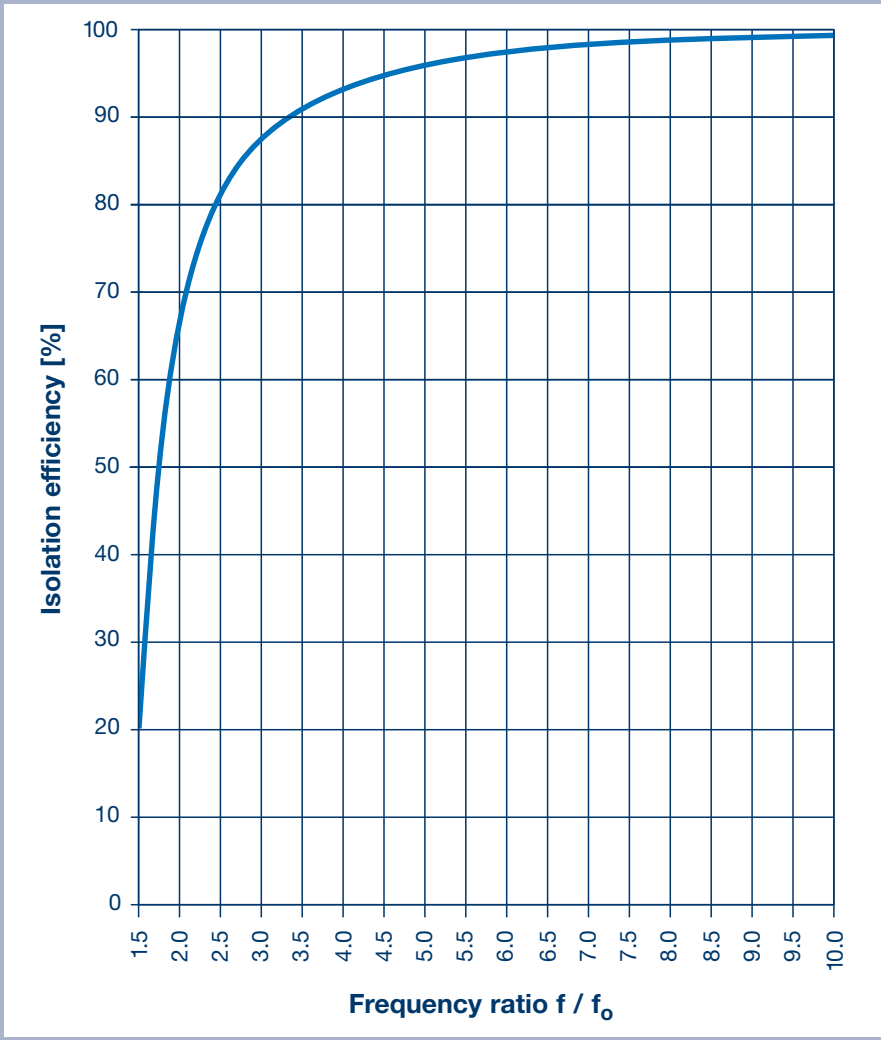
**Load ranges:**

**0.25 N/mm² – 0.80 N/mm²**
**37.50 kN/m – 120.00 kN/m**

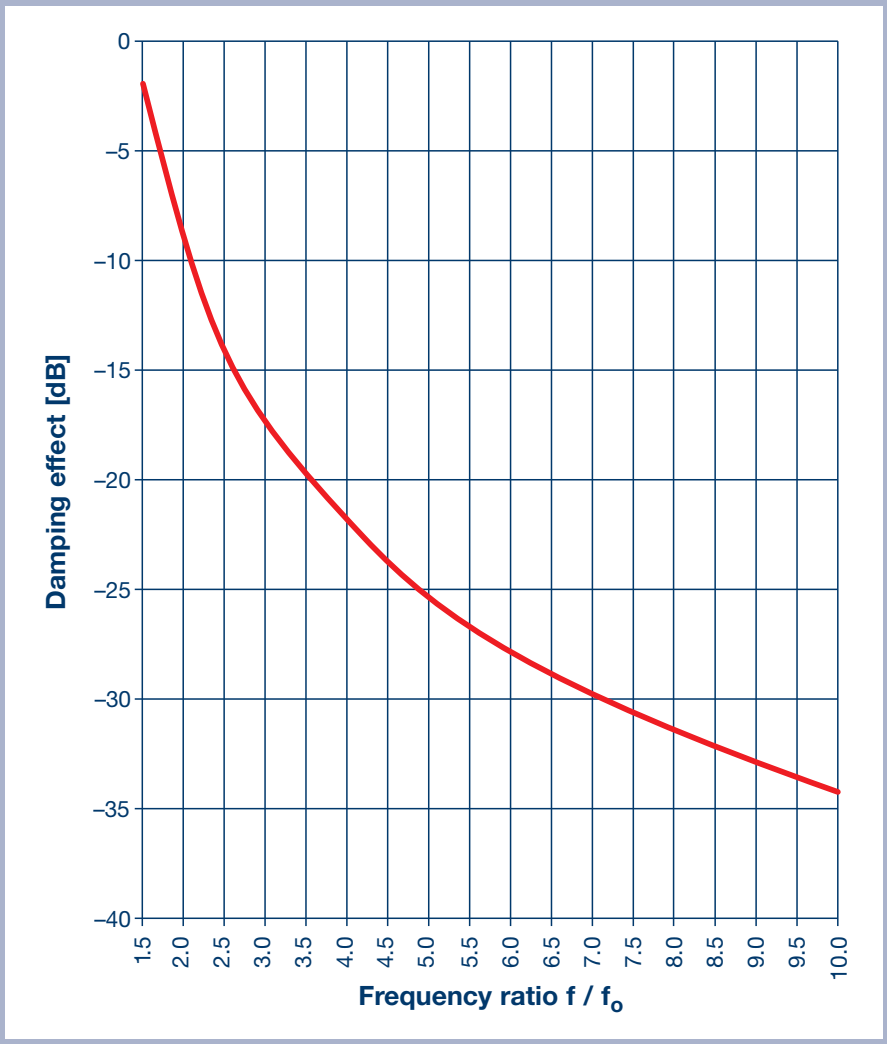
Machines, which due to their function emit vibration and structure-borne noise to the environment, require an effective isolation. When optimally configured Citelbrong® attains natural frequencies of 10 Hz and thereby achieves damping effects for excitation frequencies ≥ 14 Hz. Due to the small difference of 1.6 between compression and shear stiffness the bearing has good lateral stability.

**NB:** The compressive stress given refers to a component width of 150 mm.

**Note:**
The tests were carried out at vibration velocities of 1 mm/s and 2 mm/s. However, for 2 mm/s the results deviate on average by a maximum of 10 % from the values shown.

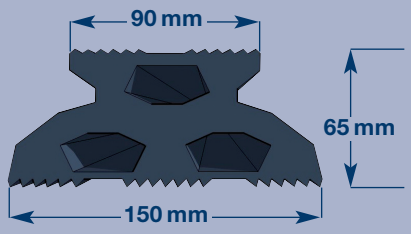



*Vibration velocity 1 mm/s*




*Vibration velocity 1 mm/s*

### Dimensions




**Weight: 5.65 kg/m**

## Tender Document

Type: Calenberg Citelbrong®, profiled, very ageing resistant EPDM-resilient element; ozone resistant, deliver and install according to manufacturer's installation instructions.

Quantity: ..... item

Bearing length l: ..... mm

Price: ..... €/item

Supplier:
Calenberg Ingenieure GmbH
Am Knübel 2–4
D-31020 Salzhemmendorf/Germany
Phone +49 (0) 51 53 / 94 00-0
Fax +49 (0) 51 53 / 94 00-49

# Damping Effect

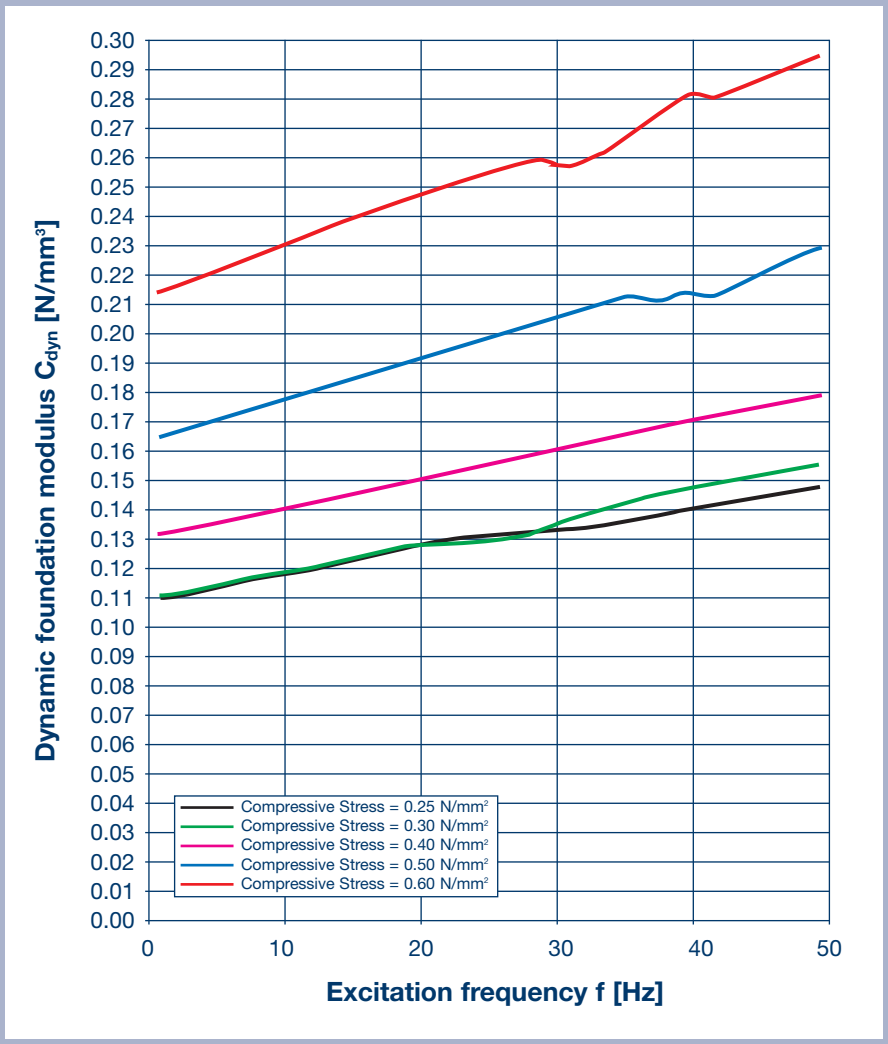
# Dynamic Foundation Modulus

## Installation Details

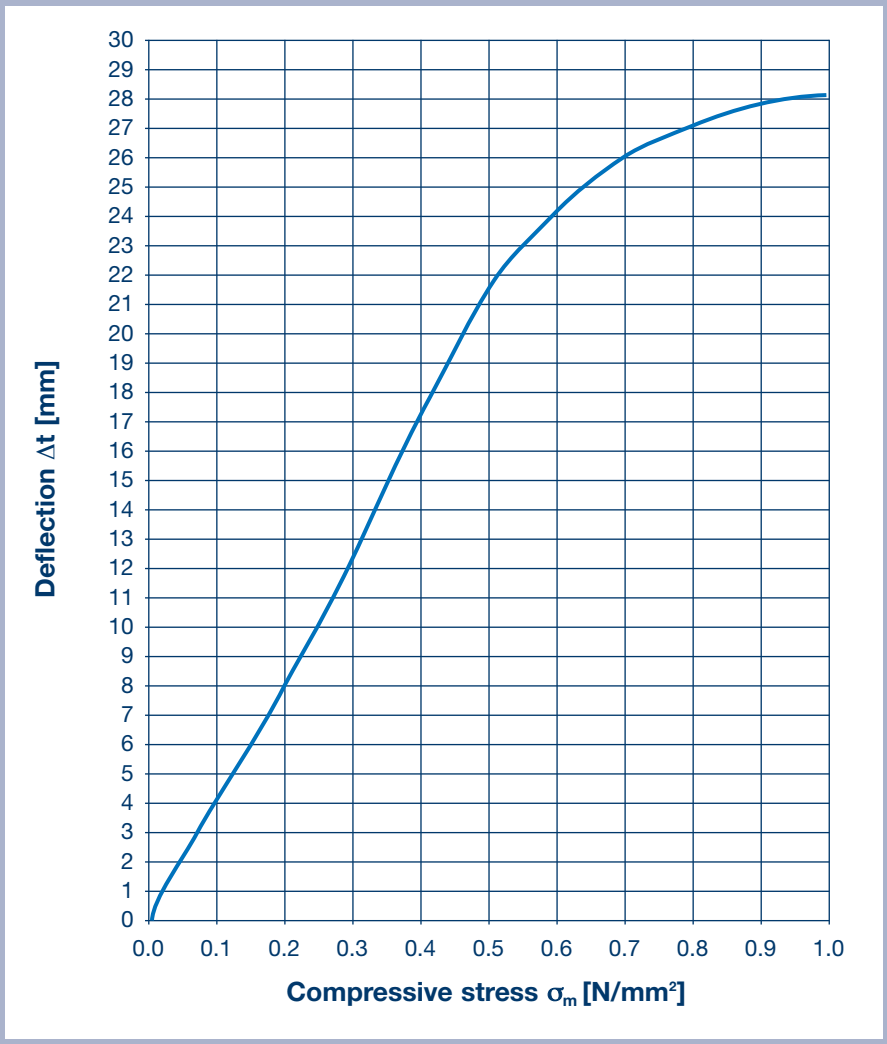
Citelbrong® may be laid loosely on a foundation having adequate load bearing capacity and a smooth surface. If required the strips can be fixed to or embedded in a metal sleeve or similar.

When used under cast in-situ concrete the joint has to be kept free to ensure the functionality of the resilient elements. It is important to ensure that the strips are installed according to the specifications of the designer.

Free movement of the bearing has to be guaranteed at all times so as to avoid the transmission of structure-borne noise.




*Vibration velocity 1 mm/s*




## Design Example

For design purpose a single degree of freedom system is used (translatory). For high isolation efficiency the compressive stress should be between 0.3 and 0.6 N/mm².

A machine that emits severe vibrations to the environment is to be mounted on a concrete foundation. The data given below is used for the design:

| | |
|---|---|
| **Foundation** | |
| Foundation length | 10 m |
| Foundation width | 4 m |
| Foundation height | 1.4 m |
| Reinf. concrete unit weight | 25 kN/m³ |
| Foundation weight (force) | 1,400 kN |
| **Machine data** | |
| Machine weight (force) | 400 kN |
| Machine rotational speed | 2,700 U/min |
| Machine frequency | 45 Hz |
| **Design force** | |
| Total weight (force) | 1,800 kN |
| **Bearing configuration** | |
| Number of strips | 4 item |
| Strip width | 150 mm |
| Strip length | 10,000 mm |
| Area | 6,000,000 mm² |
| Compression | 0.3 N/mm² |
| Natural frequency | 10 Hz |
| Frequency ratio $f/f_o$ | 4.5 |
| **Result** | |
| Damping effect | 23 dB |
| Isolation efficiency | 94 % |

# Static Deflection

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# Test Certificate

"Determining the static and dynamic material behaviour of Citelbrong® elastic bearings"
Research Report 29/08
Technical University of Dresden, 2008

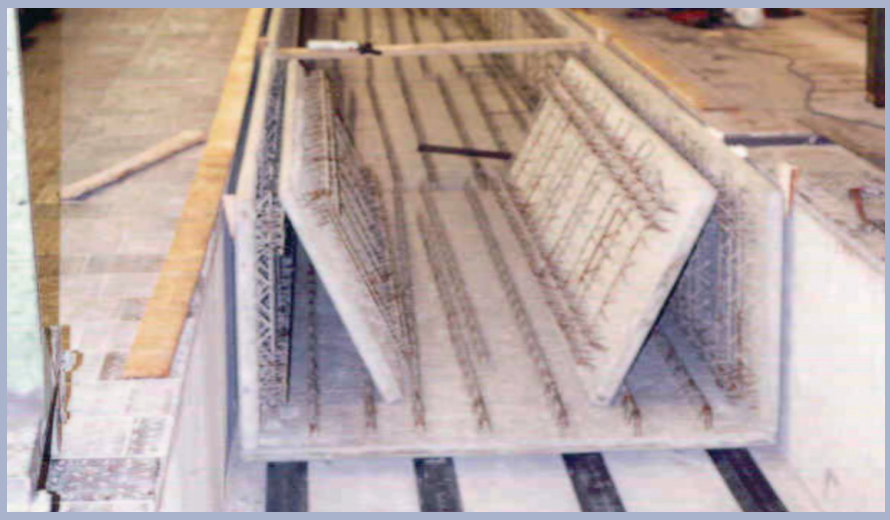

*Figure 1: Installation of bearing strips under foundation*

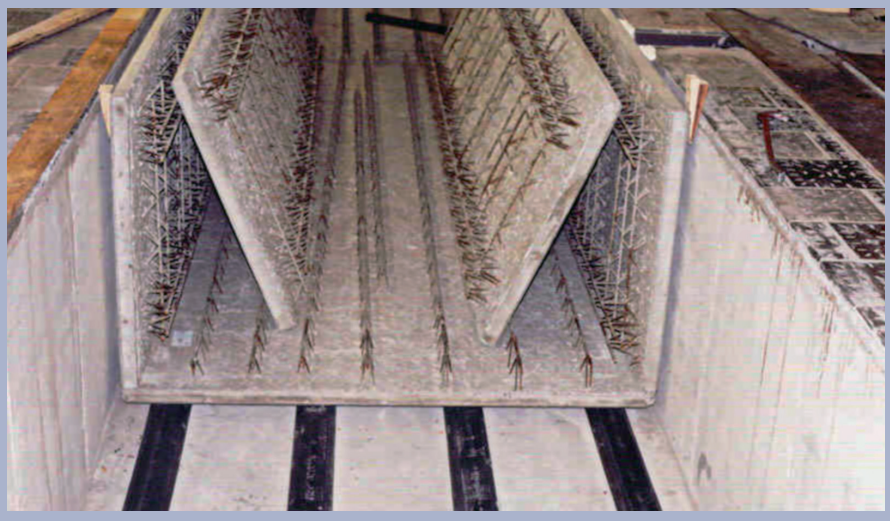

*Figure 2: Lateral fixing of the filigree slab construction*





**Calenberg Ingenieure,**
**planmäßig elastisch lagern GmbH**
Am Knübel 2-4
D-31020 Salzhemmendorf / Germany
Phone +49 (0) 51 53/94 00-0
Fax +49 (0) 51 53/94 00-49
info@calenberg-ingenieure.de
http://www.calenberg-ingenieure.de