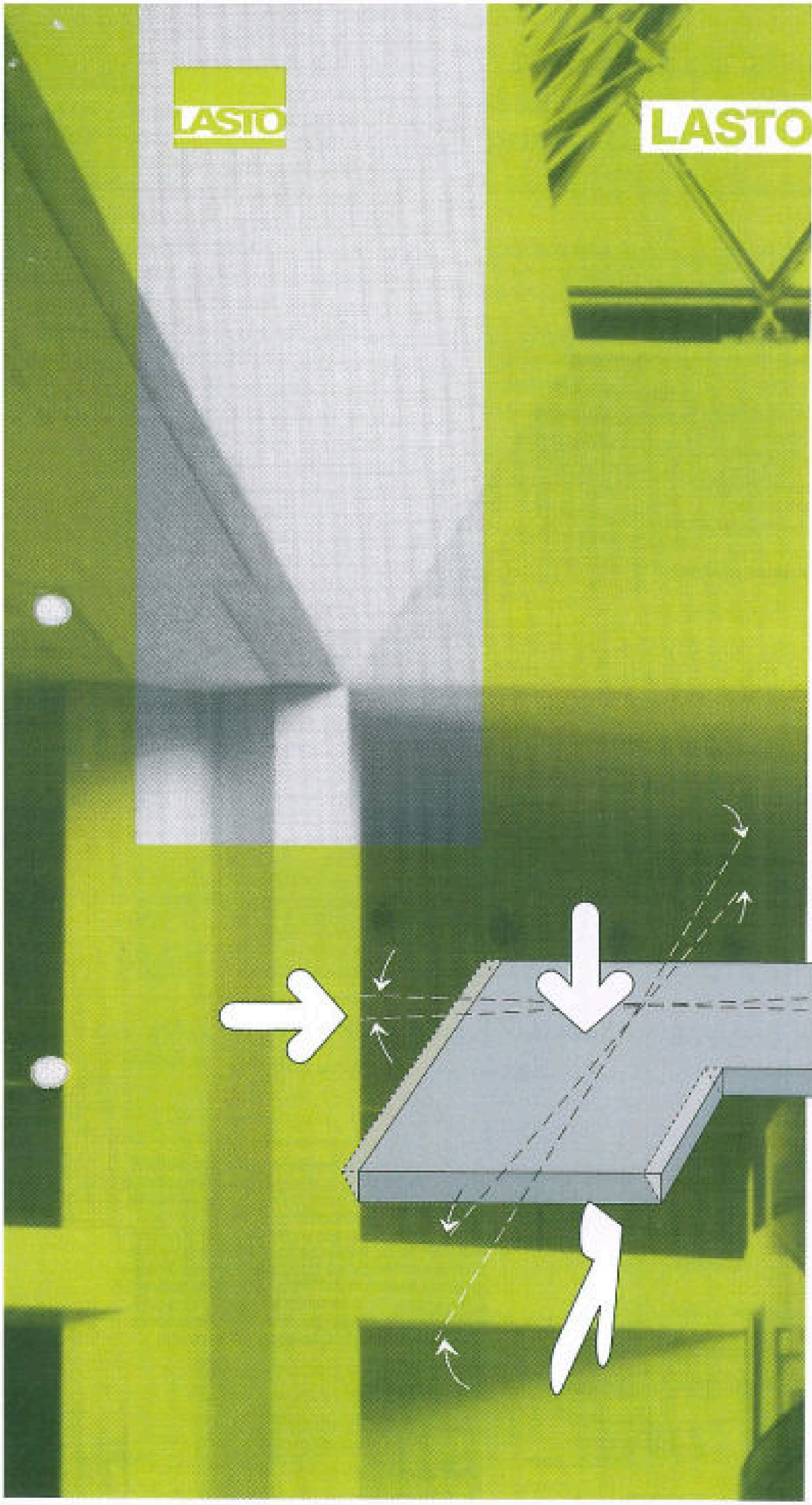


LASTO-PILE

Type NPu

LASTO-PILE Bearings, non-reinforced, consist of elastomer tiles of an especially high quality and are available in the following thicknesses: 5, 8, 10, 15, 20 and 24 mm. They are used in structural and civil engineering, including bridge-building.

LASTO-PILE Bearings are available in any shape required and have the following advantages:

- Shape and thickness selectable as required
- Optimum sizing
- Easily installed
- No maintenance
- Long life

LASTO-PILE Bearings allow a wide range of loadings:

- Support of vertical loads
- Support of horizontal loads
- Horizontal displacement in longitudinal and transverse directions
- Rotation of bearing surfaces
- Footfall attenuation

mageba

Dimensions, load data and dimensioning formulae of LASTO-PILE Bearings

Notation

L	Bearing length	mm		v	Horizontal displacement, e.g. due to dimensional change of structure	mm
B	Bearing width	mm		γ	Angle of shear	
D	Bearing thickness	mm		β	Rotation angle of bearing surfaces	‰
d	Bearing diameter	mm		G	Shear modulus of elastomer	N/mm²
A	Central vertical load	kN		z	Scissive tensile force	N/mm
H	Horizontal forces	kN				
R	Restoring force of bearing	kN				

It has always to be checked:

1. Required minimum pressure

$$p_{min} = \frac{A_{min}}{L \cdot B} \geq 1.5\ \text{N/mm}^2$$

$$p_{min} = \frac{A_{min}}{\frac{\pi}{4} \cdot d^2} \geq 1.5\ \text{N/mm}^2$$

If the actual displacement is less than the safe figure, the required minimum pressure p_{min} may be reduced in the proportion

$\frac{\text{actual v}}{\text{safe v}}$ to a minimum of 0.5 N/mm².

2. Restoring force

$$R = \frac{v}{D} \cdot L \cdot B \cdot G$$

$$R = \frac{v}{D} \cdot \frac{\pi}{4} \cdot d^2 \cdot G$$

Shear modulus $G = 0.7 \pm 0.15$ N/mm²

At low temperatures stiffening of the bearings takes place, and if a temperature of −30°C persists for several days the shear modulus may rise to about twice the level for normal temperatures. In some cases the influence of stiffening on restoring force may have to be taken into account.

3. Scissive tensile force

$$z = 1.5 \cdot \frac{D}{2} \cdot p$$

The concrete adjoining the bearing surfaces must be reinforced to prevent cracking due to the effects of scissive traction.

4. Permissible mean vertical pressure stress

$D \leq 8$ mm → $p_{adm} = 12 \times S \leq 10$ N/mm² (circular bearings $p_{adm} = 3.5 \cdot d/D \leq 10$ N/mm²)

$D > 8$ mm → $p_{adm} = 10 \times S \leq 10$ N/mm² (circular bearings $p_{adm} = 2.9 \cdot d/D \leq 10$ N/mm²)

$S = \text{Shape factor}\ \frac{B \times L}{2\,D\,(B + L)}$ (rectangular bearings)

5. Rotation angle/Horizontal displacement/ Compressive deflection

Rotation angle over: $B = 2800 \cdot \left(\frac{D}{B}\right)^2$ in ‰

$L = 2800 \cdot \left(\frac{D}{L}\right)^2$ in ‰

$\text{circular} = 3800 \cdot \left(\frac{D}{d}\right)^2$ in ‰

Horizontal displacement: D · 0.5

Compressive deflection for rectangular bearings:

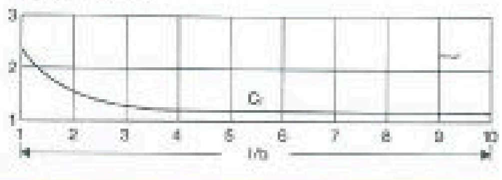
$$f = \frac{p \cdot D}{\frac{G}{C_1} \cdot \left(\frac{B}{D}\right)^2 + 3\,p}$$

$G = 0.7 \pm 0.15$ N/mm²

p = pressure in N/mm²

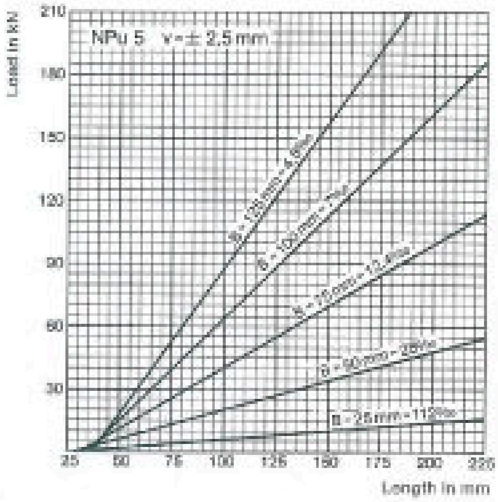
By contrast to the on-site concreting method, where the bearing is always kept from rotating during pouring, it must be expected when the erection method is used (prefabricated concrete elements, steel-work) that rotation forces will start to be imparted to the bearing as soon as the prefabricated concrete element or steel girder is positioned. This is caused by tolerance differences. To take account of this, at least an additional 5‰ must be added to the theoretical angle of rotation to allow for erection tolerances.

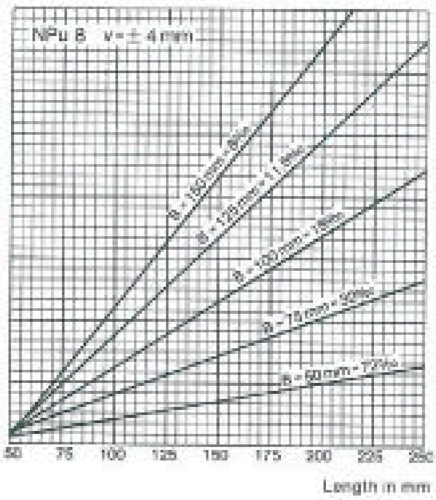
Coeffizient C_1

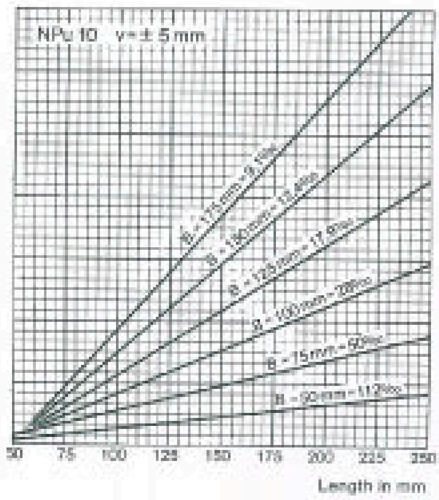


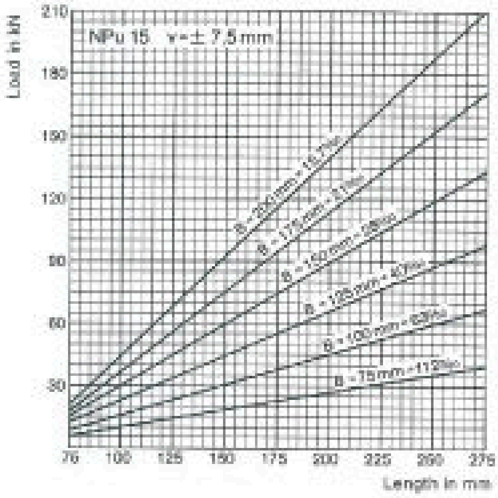
Dimensioning diagrams of LASTO-PILE Bearings

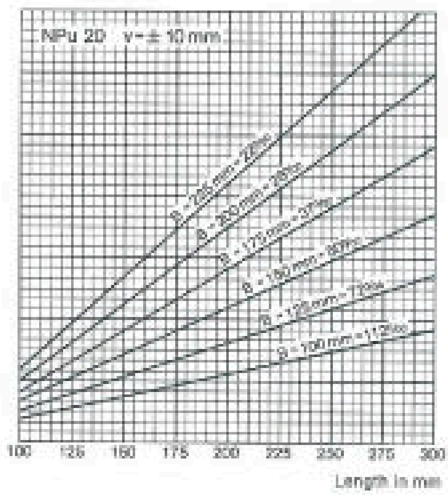
Rectangular bases

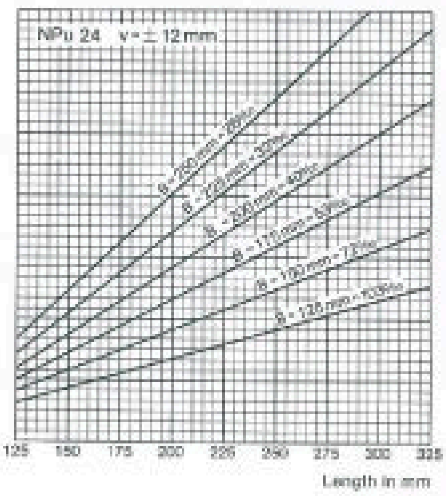




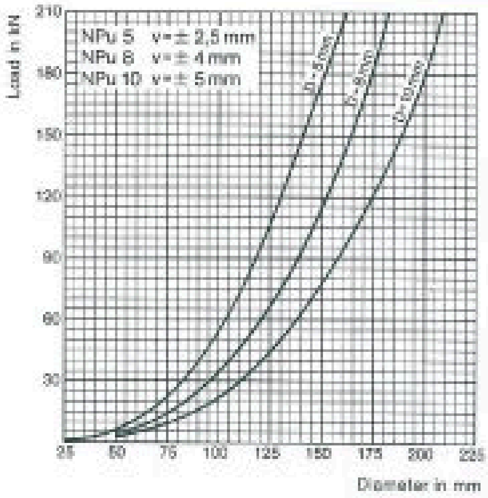


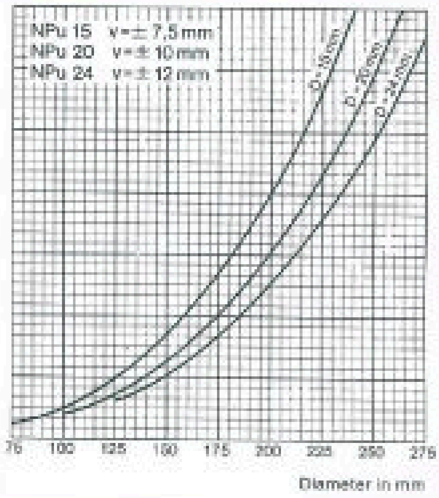






Circular bases





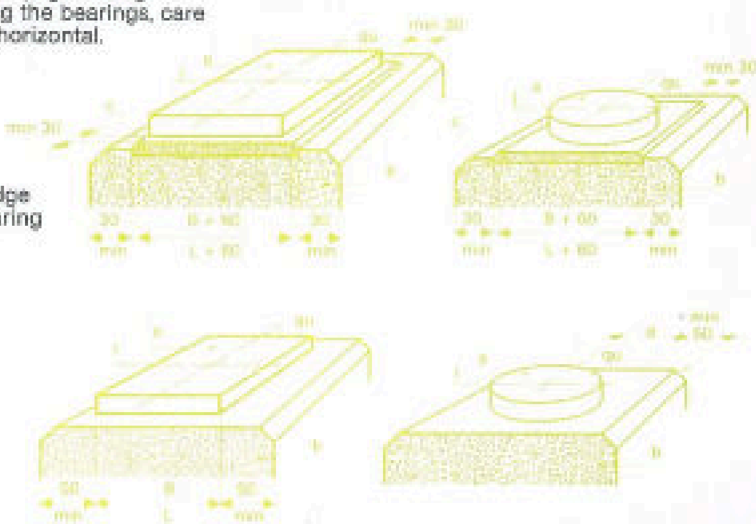
Type	Thickness mm	Displacement mm	Angle of rotation in ‰ for Elastomere dia. in mm ø mm	60	80	100	120	140	160	180	200	220	240
NPu 5	5	2.5	‰	26.4	14.8	9.5	6.5	4.8	3.7	2.9	2.4	2.0	
NPu 8	8	4.0	‰	67.5	38.0	24.3	16.9	12.4	9.5	7.5	6.1	−5.0	
NPu 10	10	5.0	‰	105.0	59.4	38.0	26.4	19.4	14.8	11.7	9.5	7.8	
NPu 15	15	7.5	‰		134.0	85.5	59.4	43.6	33.4	26.4	21.4	17.7	14.8
NPu 20	20	10.0	‰		238.0	152.0	106.0	77.6	59.4	46.9	38.0	31.4	26.4
NPu 24	24	12.0	‰		342.0	219.0	152.0	112.0	85.5	67.5	54.7	45.2	38.0

Instructions for installing LASTO-PILE Bearings

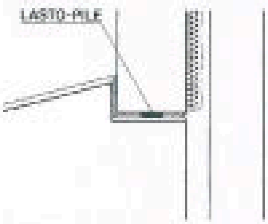
NPu

LASTO-PILE Bearings are normally installed on a smooth-graded mortar bed (high-strenght cement mortar). When laying the bearings, care must be taken that they lie horizontal.

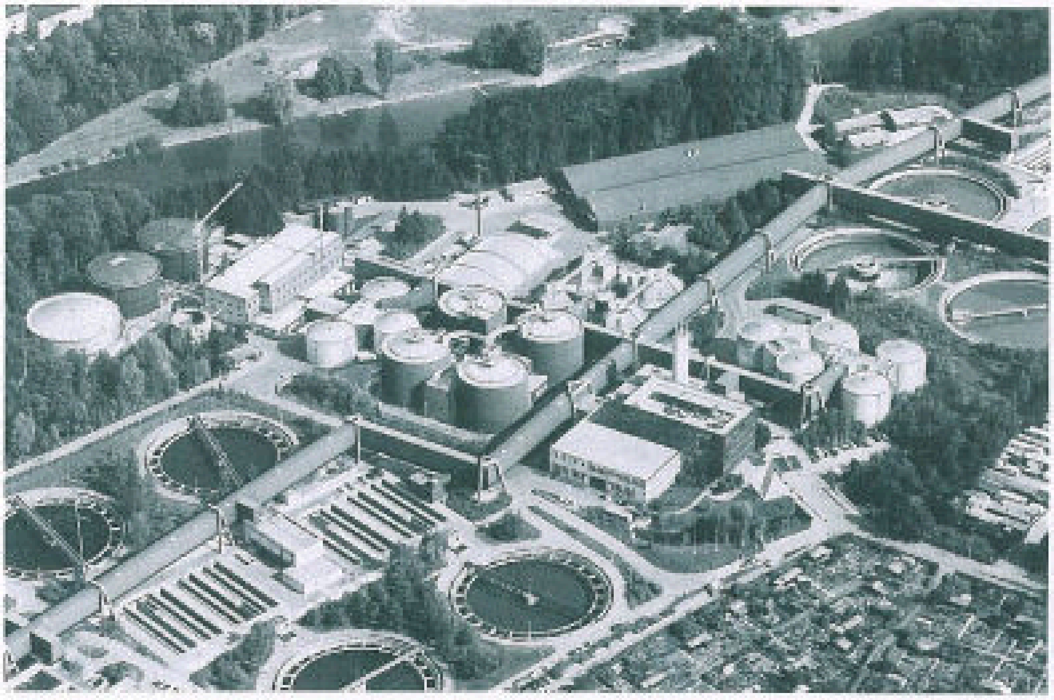
a = LASTO-PILE Bearing
L = bearing length
B = bearing width
b = support
c = mortar bed
l = longitudinal axis of bridge
qu = longitudinal axis of bearing



Europe's biggest sewage works stand on LASTO-PILE Bearings.



Detail drawing: Support of the opposite sludge digestion towers.



LASTO footfall attenuating bearings

Footstep sound on staircases, balconies and loggias is increasingly regarded as disturbing. The installation of LASTO-ISOTRITT elements results in an extensive reduction in these emissions. The structural unit to be separated is suspended in the above-ground walls by means of LASTO-ISOTRITT elements. Thank to this method of construction, the footstep noise is reduced to such an extent, that the presentday demands concerning increased noise protection are greatly exceeded.

We shall be happy to advise you on your footfall attenuation problems.

Subject to change

93 01 06 E

PROCEQ SA
Riesbachstrasse 57
CH-8034 Zürich
Telex 817 118 prc ch
Telefon 01/383 78 00
Fax 01/383 99 14

mageba