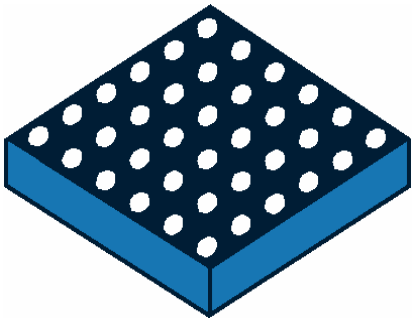
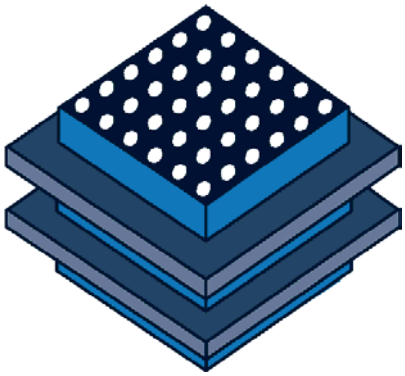
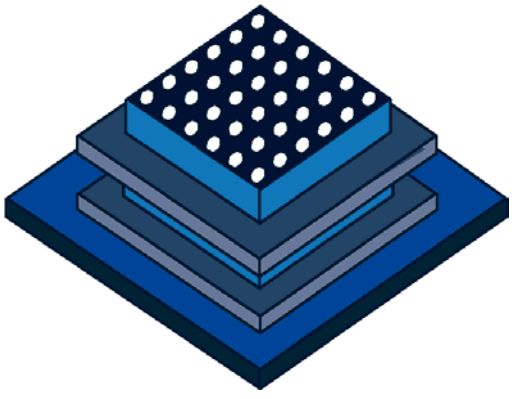
Official Certificate

No. P-852.0290-1

Calenberg
Perforated Bearing 205







Extension of validity
of
Official Testing Certificate

Certificate No.	P-852.0290-1
Subject:	**Calenberg Perforated Bearing 205, unreinforced** **Calenberg Perforated Bearing 205, steel reinforced** **Calenberg Perforated Sliding Bearing 205, steel reinforced** **in different dimensions**
Date of first issue:	13.03.2003
Now valid till:	31.12.2014
Intended Purpose:	Supports according to DIN 4141 part 3, Sept. 1984 Support in civil engineering Support for building construction Support class 2

This extension includes 1 page and is valid only in connection with the actual version of certificate P-852.0290-1
(1. issue: 13.03.2003, 1. extension: 26.03.2008)

Garbsen, 14.01.2010

RD Dr.-Ing. Seidel
Head of Testing Institute

Dipl.-Ing. Robert Witte
Deputy

Materialprüfanstalt für Werkstoffe
und Produktionstechnik
An der Universität 2
D-30823 Garbsen

Tel. +49(0)511-762 43 62
Fax +49(0)511-762 30 02
info@mpa-hannover.de
www.mpa-hannover.de

Landesbetrieb gemäß
§ 26 Nds. LHO

Vorstand:
Prof. Dr.-Ing. Bernd-Arno Behrens · Sprecher
Dr.-Ing. Andreas Kinzel · Geschäftsführer
Dr.-Ing. Hans-Joachim Seidel · Geschäftsführer

MPA HANNOVER

Official Certificate

Certificate No. P-852.0290-1

Subject: **Calenberg Perforated Bearing 205, unreinforced**
Calenberg Perforated Bearing 205, steel reinforced
Calenberg Perforated Sliding Bearing 205, steel reinforced
in different dimensions
Data of manufacturer and of chemical compounds are deposited at the Material Testing Institute

Intended Purpose: Supports according to DIN 4141 part 3, Sept. 1984
Support in civil engineering
Support for building construction
Support class 2

Applicant: Calenberg Ingenieure
planmäßig elastisch lagern GmbH
Am Knübel 2-4
D-31020 Salzhemmendorf
Germany

Date of issue: first: 13.03.2003
prolongation: 26.03.2008

Valid till: 26.03.2010

Due to this certificate the above mentioned subject is applicable to the state's building regulations.

This certificate includes 12 pages and 22 enclosures.

Materialprüfanstalt für Werkstoffe
und Produktionstechnik
An der Universität 2
D-30823 Garbsen

Tel. +49(0)511-762 43 62
Fax +49(0)511-762 30 02
info@mpa-hannover.de
www.mpa-hannover.de

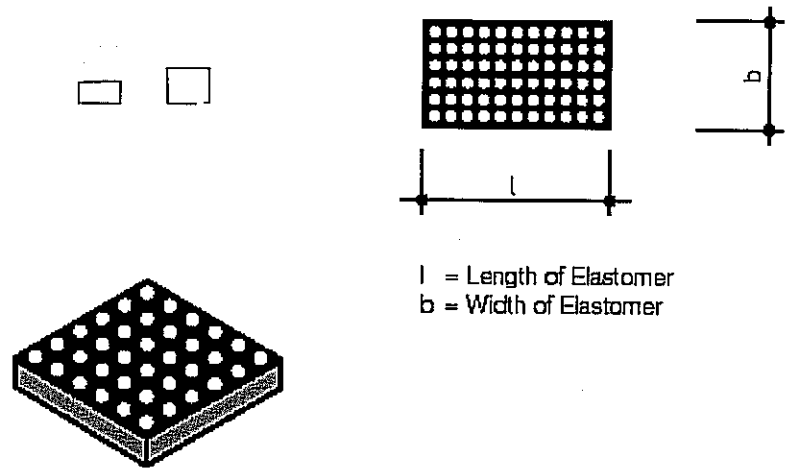
Landesbetrieb gemäß
§ 26 Nds. LHO

Vorstand:
Prof. Dr.-Ing. Bernd-Arno Behrens · Sprecher
Dr.-Ing. Andreas Kinzel · Geschäftsführer
Dr.-Ing. Hans-Joachim Seidel · Geschäftsführer

1. Subject and Field of Application:

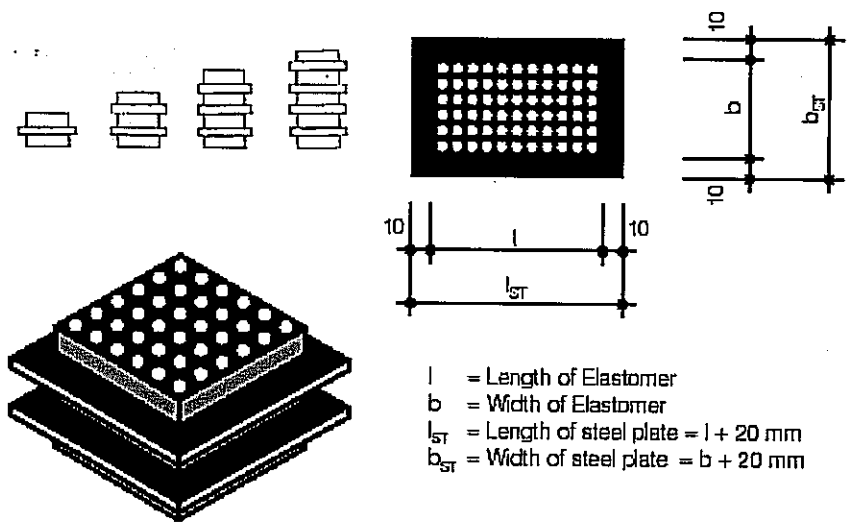
1.1 Subject:

Calenberg Perforated Bearing, unreinforced as well as steel reinforced and Calenberg Perforated Sliding Bearing, steel reinforced according to Pictures 1 - 3.
The Perforated Bearing, unreinforced, consists of an elastomer plate with an even grid of round holes over the total area (diameter of holes 5 mm; distance between the centres of the holes 10 mm).



Picture 1: Calenberg Perforated Bearing, unreinforced

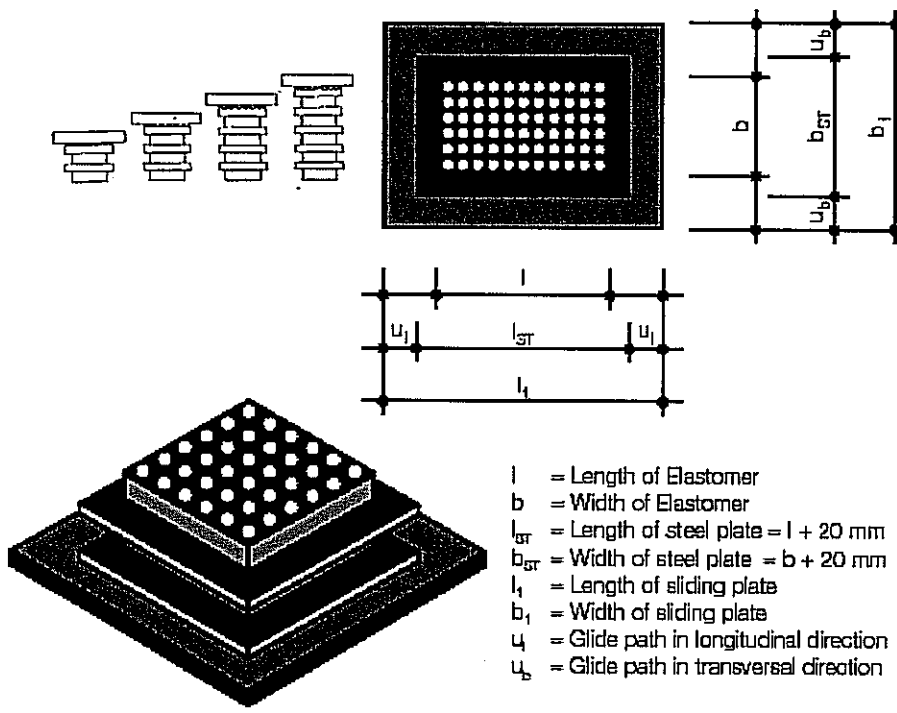
The steel reinforced Perforated Bearing consists of elastomer plates of the unreinforced Perforated Bearing which are connected with intermediate layers of weather proof steel (according to data of applicant: WTSt 52-3) to a spring package.



Picture 2: Calenberg Perforated Bearing, steel reinforced

The steel reinforced Perforated Sliding Bearing consists of elastomer plates of the unreinforced Perforated Bearing which are connected with intermediate layers of weather

proof steel (according to data of applicant: WTSt 52-3) to a spring package. The external steel layer is covered with polytetrafluorethylene (PTFE). The sliding plate with a thickness of 5 mm consists of glass fibre reinforced plastic (GRP) according to "K"-proof of use (RAL) "glass fibre polyester plates".



Picture 3: Calenberg Perforated Sliding Bearing, steel reinforced

The Calenberg Perforated Bearings, unreinforced as well as steel reinforced are manufactured in the following thicknesses and structures:

Bearing thicknesses in mm	5 and 8
Table 1: Calenberg Perforated Bearing, unreinforced	

Single thickness of elastomer layer in mm	Number of elastomer layers	Number of reinforcement layers	Total thickness in mm
5	2	1	14
5	3	2	22
5	4	3	30
5	5	4	38
8	2	1	20
8	3	2	31
8	4	3	42
8	5	4	53
Table 2: Calenberg Perforated Bearing, steel reinforced			

Single thickness of elastomer layer in mm	Number of elastomer layers	Number of reinforcement layers	Total thickness in mm including GRP-sliding plate

5	1	1	14
5	2	2	22
5	3	3	30
5	4	4	38
8	1	1	17
8	2	2	28
8	3	3	39
8	4	4	50

Table 3: Calenberg Perforated Sliding Bearing, steel reinforced

The length and width are variable. They conform to the particular bearing stresses of the case of application considering the below mentioned bearing reactions.
The elastomer plates on the base of synthetic rubber chloroprene (CR) according to DIN 4141, part 150 have a Shore-A-hardness of 60 ± 5. The material data of the chemical compound and the physical properties deposited at the Material Testing Institute.

1.2 Field of Application

The Calenberg Perforated Bearing, unreinforced as well as steel reinforced and Calenberg Perforated Sliding Bearing, steel reinforced can be used for supports of components and structures in building construction according to support class 2 of DIN 4141 part 3, Sept. 84.
Basic requirement for the application is that the adjacent components are only stressed irrevantly by other bearing reactions. The stability of the structure must not be endangered by excessive stress of the bearing or failure of the bearing function.
This certificate is only valid if demands on sound protection have not to be met.
Due to the declaration of the applicant there was no reason to test the effects of the installed building product regarding to demands on health and environmental protection.
The bearings are shape dependant applicable up to a maximal vertical compression stress and rotation according to enclosure 4.
The length and width are variable. They conform to the particular bearing stresses of the case of application considering the below mentioned bearing reactions. The data of the defined bearing areas in the following chapters may be used for the interpolation of the bearing reactions of bearing areas differing from these bearing areas.

2. Requirements on the Building Product

2.1 Characteristics, Characteristic Values and Composition of the Calenberg Perforated Bearing, unreinforced as well as steel reinforced and Calenberg Perforated Sliding Bearing, steel reinforced

2.1.1 Characteristics

2.1.1.1 Physical Characteristics

The physical characteristics of the elastomer have to be proved according to chapter 4.1 of DIN 4141 part 150, 1991-01.

The characteristics of the reinforcement layers have to be proved according to the WTSt52-3 classification.
The characteristics of the GRP-sliding plate have to be proved according to the classification "glass fibre reinforced plastic (GRP)" to "K-proof of use (RAL) glass fibre-polyester plates"

2.1.1.2 Bearing Reactions

The essential characteristics restricting the application are the bearing reactions on

- the transmission of vertical loads (compression spring reaction)
- shear stress (determination of the shear modulus) respectively

- sliding stress (of the sliding bearing)
- unplanned bearing load beyond the defined vertical load (compression stress overload)
- creeping of the bearing under long-term load (long-term durability)

2.1.1.2.1 Vertical Loads

The bearing reactions due to transmittable vertical loads have to be proved on bearing dimensions according to table 4.

Type of bearing	Single thickness of elastomer layer in mm	Number of elastomer layers	Number of reinforcement layers	Total thickness in mm	Bearing area in mm²
Perforated Bearing, unreinforced	5	1	1	5	100 x 200
	8	1	1	8	150 x 150
Perforated Bearing, steel reinforced	5	2	1	14	
		3	2	22	
		4	3	30	
		5	4	38	100 x 100
	8	2	1	22	150 x 150
		3	2	31	200 x 200
		4	3	42	
		5	4	53	
Perforated Sliding Bearing, steel reinforced	5	1	1	14	
		2	2	22	
		3	3	30	
		4	4	38	100 x 100
	8	2	1	17	150 x 150
		3	2	28	200 x 200
		4	3	39	
		5	4	50	

Table 4: Test scope for the compression test

2.1.1.2.2 Shear Stress

The bearing reactions due to transmittable shear loads have to be proved on bearing dimensions according to table 5.

Type of bearing	Single thickness of elastomer layer in mm	Number of elastomer layers	Number of reinforcement layers	Total thickness in mm	Bearing area in mm²
Perforated Bearing, unreinforced	5	1	1	5	100 x 100
	8	1	1	8	

Perforated Bearing, steel reinforced	5	2	1	14	100 x 100
		3	2	22	
		4	3	30	
		5	4	38	
	8	2	1	22	
		3	2	31	
		4	3	42	
		5	4	53	
		2	2	22	
		3	3	30	
		4	4	38	
	8	2	1	17	
		3	2	28	
		4	3	39	
		5	4	50	

Table 5: Test scope for the shear test

2.1.1.2.3 Stress caused by sliding

The bearing reactions due to transmittable loads caused by sliding have to be proved on bearing dimensions
according to table 6.

Type of bearing	Single thickness of elastomer layer in mm	Number of elastomer layers	Number of reinforcement layers	Total thickness in mm	Bearing area in mm²
Perforated Sliding Bearing, steel reinforced	5	1	1	14	100 x 100
		4	4	38	
	8	1	1	17	100 x 100
		4	4	50	

Table 6: Test scope for the sliding test

2.1.1.2.4 Compression stress overload

The bearing reactions due to transmittable compression stress overloads have to be proved on bearing dimensions according to table 7.

Type of bearing	Single thickness of elastomer layer in mm	Number of elastomer layers	Number of reinforcement layers	Total thickness in mm	Bearing area in mm²
Perforated Bearing, unreinforced	5	1	none	5	100 x 100
	8			8	
Perforated Bearing, steel reinforced	5	2	1	14	
Perforated Sliding Bearing, steel reinforced	5	1	1	14	

Table 7: Test scope for the compression stress overload

2.1.1.2.5 Creep

The bearing reactions due to long term transmittable vertical loads according to DIN 4141 part 150 have to be proved of an imperforated bearing section with a dimension of 100 x 100 x 10 mm³.

2.1.2 Charactetristic Values

2.1.2.1 Bearing Reaction at Vertical Load

The compression stress at deflection due to vertical load must correspond to the nominal values of the deflection-dependent compression stress in the diagrams
enclosure 1, diagram 1
enclosure 2, diagrams 1-6
enclosure 3, diagrams 1-6
with a compressive stress tolerance of ± 20 % related to the particular deflection.

2.1.2.2 Bearing Reaction at Shear Stress

The shear modules of the bearing at horizontal shear stress and simultaneous vertical stress must correspond to the nominal values in the diagrams
enclosure 1, diagram 2
enclosure 2, diagrams 7 and 8
with a tolerance of the shear modulus at the particular vertical load of ± 20 %.

2.1.2.3 Bearing Reaction at Vertical Overload

The vertical compression stress at a deflection higher than the one maximally permitted must correspond to the nominal values of the vertical compression stress according to the enclosed diagrams
enclosure 1, diagrams 3 and 4
enclosure 2, diagram 9
enclosure 3, diagram 7
with a tolerance of ± 25 %.
After the compression failure test the bearing should neither show visible abrasion nor any beginning cracks or damage.

2.1.2.4 Long-Term Durability

The creep value must be less than 30 %. The obvious damaged bearing surface must be less than 25 % of the total surface.

2.1.2.5 Sliding Stress

The static friction value γ (PTFE layer/GRP Plate) must be ≤ 0,045.

The static friction values at the end of halt periods as well as the sliding friction values, each dependant on the number of cycles respectively on the added up slide path must correspond to the maximum friction values γ according to

- enclosure 3, diagrams 8 and 9

plus a tolerance of the friction value γ of max. +20 rel.-%, which is related to the particular slide path.

2.1.2.6 Physical Characteristics

The physical characteristics of the elastomer have to meet the guidelines of DIN 4141 part 150.

2.1.2.7 Dimensional Tolerances

The dimensional tolerances of the bearing are according to DIN 7715 part 2, class M4.

2.1.3 Compound

The elastomer material consists of a CR based vulcanizate according to the requirements of DIN 4141 parts 140 and 150. The data of the chemical compound are deposited at the Material Testing Institute Hannover.

The components according to table 8 have to be proved.

Component
Rubber content and proof
Soot content
Auxiliary material
Glow residue (mineralic components)

Table 8: Proof of Chemical Compound

2.2 Applied Test Methods

2.2.1 Physical Characteristics of the Elastomer

The physical characteristics of the elastomer are determined according to the requirements of DIN 4141 parts 140 and 150.

2.2.2 Compound

The compound of the elastomer will be determined according to the requirements of DIN 4141 parts 140 and 150.

2.2.3 Bearing Reactions

2.2.3.1 Determination of Bearing Reaction due to Vertical Load

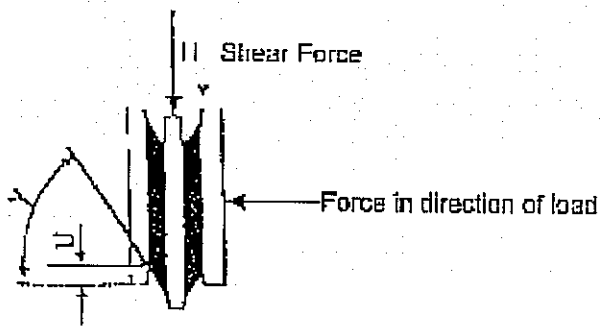
The static load deflection curves are determined between formed concrete plates according to DIN 4141 part 150.

Three load and relief graphs a time will be completed. The test velocity is 10 mm/min.
The third compression loading will be registered as graph.

The test scope is according to the data in table 4.

2.2.3.2 Shear Deformation Test

The shear deformation graphs will be determined according to picture 4 following DIN 4141 part 150 between corundum-covered steel plates with a deformation speed of 1.5 mm/s.
On this occasion bearings with three different preloads according to the beginning, the middle and the end of the complete load (0-15 N/mm²) area of table 5 will be tested.
The third loading will be registered and analysed regarding the shear deformation modulus according to picture 4.



$$G = \frac{\Delta\tau}{\Delta\tan\gamma} \quad \tau = \frac{H}{A} \quad \tan\gamma = \frac{u}{t_0}$$

$$\tan\gamma_1 = 0.2 \rightarrow u_{0,2} = 0.2 \times t_0$$

$$\tan\gamma_2 = 0.2 \rightarrow u_{0,9} = 0.9 \times t_0$$

$$G = \frac{H_2 - H_1}{2A\left(\frac{u_2}{t_0} - \frac{u_1}{t_0}\right)} = \frac{H_2 - H_1}{2A \times 0{,}7}$$

A = Ground area of the bearing
u = Shear deformation
H = Shear force
t_0 = Bearing thickness

Picture 4: Scheme of the Shear Modulus Test

2.2.3.3 Compression Failure Test

The compression failure test will be done up to a top load of 1000 kN, equivalent to a compression stress of 100 N/mm². The test speed is 10 mm/min.

The bearing will be loaded once.
The test scope follows the data of table 7.
The compression failure test is done between rough rolled steel plates.

Through evaluation of the force-deflection-diagram as well as a visual examination of the free side areas and the surfaces, the bearing will be examined regarding possibly occurring failure features (cracks, scaling).

2.2.3.4 Durability Test

The durability test is done to an imperforated bearing section according to the data of DIN 4141 part 150.

2.2.3.5 Sliding Test

The static friction value and the slide values depending on the slide path respectively of the cycles of movement as ratio of horizontal to vertical force are determined by analogy with the test method as used for the determination of the shear modulus. Pairs of bearings with a velocity of 0.4mm/sec are moved cyclically within a deformation -and slide path interval of ± 10 mm related to point zero of the horizontal force. At both, the upper and lower corner points of the slide path the movement comes to a halt each for 4 seconds.
The slide path of one cycle is 40 mm. In total 105 cycles are performed.
The 1., 3., 10., 20., 50., 75., 100. and 105. cycle are documented graphically. The following friction coefficients are deducted:

- Static coefficient of friction at the beginning of the test
- Static coefficients of friction at the end of the halt periods as function of the covered slide path respectively the number of cycles.
- Coefficients of sliding friction during the sliding as function of the covered slide path respectively the number of cycles.

2.3 Design and Calculation

For design and calculation of the Calenberg Perforated Bearing, unreinforced as well as steel reinforced and the Calenberg Perforated Sliding Bearing, steel reinforced, DIN 4141 is

decisive in its actual valid edition under the extended consideration of the maximum area load and distortions according to enclosure 4 of this Official Certificate.
In this connection the above mentioned bearing reactions

- compressive spring reaction
- shear reaction
- creep
- sliding

and the bearing characteristics

- physical properties
- creep tendency
- ageing behaviour

have to be considered specifically in regard to its proof scope, -kind and –magnitude whenever used.

For the application the following standards, including their hints indicating other rules and documents have to be considered additionally in their respective valid edition regarding this certificate's date of issue.

- DIN 1045 Concrete and Steel reinforced Concrete Construction, Design and Execution
- DIN 1055 Design Loads for Structures

- German Committee for Steel reinforced Concrete, Booklet 339, Column Joints in Precast Steel reinforced Concrete Structures with unreinforced Elastomer Bearings

- DIN 18800 Steel Construction
- DIN 1052 Timber Construction
- DIN 1053 Brick Construction (masonry)

The Calenberg Perforated Bearing, unreinforced as well as steel reinforced and the Calenberg Perforated Sliding Bearing, steel reinforced is manufactured in thicknesses and design varieties as shown in table 1 – 3. Length and width are variable. They conform to the particular bearing stress due to the intended purpose under consideration of the bearing reactions.
The data about characteristics and nominal values in the above mentioned chapters for defined bearing areas can be used for the interpolation of bearing reactions if bearing areas of different size to the defined ones are used.

2.4 Execution

The above mentioned bearing reactions and bearing characteristics regarding their proof scope have to be considered specifically when using the bearings.
For the application the following standards, including their hints indicating other rules and documents have to be considered additionally in their respective valid edition regarding this certificate's date of issue.

- DIN 4141 Structural Bearings
- DIN 1045 Concrete and Steel reinforced Concrete Construction, Design and Execution

- DIN 1055 Design Loads for Structures

- German Committee for Steel reinforced Concrete, Booklet 339, Column Joints in Precast Steel reinforced Concrete Structures with unreinforced Elastomer Bearings

- DIN 18800 Steel Construction
- DIN 1052 Timber Construction
- DIN 1053 Masonry

2.5 Use, Maintenance

For use and maintenance the instructions of the standards listed in chapter 2.4 – so far described as necessary – have to be considered additionally in their respective valid edition regarding this certificate's date of issue.
In this context the above mentioned bearing reactions and bearing characteristics have to be considered regarding their proof scope, -kind and –magnitude.

3. Conformity Procedure

According to the A-list of building rules part 2, the procedure of the conformity proof follows the "ÜH" regulations – conformity declaration of the manufacturer – based on a "P"-proof of use – Official Certificate P-852.0290-1, dated 28.10.2002, of the Testing Institute for Mechanical Engineering Materials and Plastics.
The manufacturer has to supervise the production as described in table 9:

Method of Test	**Relation to the Official Certificate P-852.0290-1**	**Frequency**
Chemical compound of the elastomer	chapter 2.2.2	each mixture charge
Physical properties of the elastomer	chapter 2.2.1 Table 6	each mixture charge
Load deflection graph; For each type of bearing (Calenberg Perforated Bearing, unreinforced as well as steel reinforced and Calenberg Perforated Sliding Bearing, steel reinforced)	chapter 2.2.3.1	each thickness once a year
Shear modulus For each type of bearing (Calenberg Perforated Bearing, unreinforced as well as steel reinforced)	chapter 2.2.3.2	each thickness once a year
Sliding friction value (Calenberg Perforated Sliding Bearing, steel reinforced)	chapter 2.2.3.5	one format once a year

Table 9: Scope of the Company-conducted Production Control

4. Conformity Brand

The building products Calenberg Perforated Bearing, unreinforced as well as steel reinforced and Calenberg Perforated Sliding Bearing, steel reinforced has to be marked by the manufacturer with the conformity brand (Ü-brand) to conformity brand regulation of the countries. The Ü-brand has to be affixed with the prescribed data on the building product "Calenberg Perforated Bearing, unreinforced" or "Calenberg Perforated Bearing, steel reinforced" or "Calenberg Perforated Sliding Bearing, steel reinforced" or on its packing (an add packing note is also valid) or if this is not possible on the delivery note.

5. Legal Basis

This Official Certificate is granted on base of §§ 25a of the building code of Niedersachsen in connection to the standard construction list A, part 2.

6. Legal Remedy Instruction

Against this Official Certificate can be contradicted within one month after publication. The contradiction has to be lodged by letter or writing down at the Material Testing Institute of Mechanical Engineering and Plastic.

7. Common Hints

7.1 The Official Certificate does not replace the legally prescribed approvals, agreements and certifications.

7.2 The Official Certificate is granted without prejudice of the rights of thirds, especially private protective rights.

7.3 The contractor has to hold ready the general supervisory certification on the jobsite.

7.4 The Official Certificate is only to be duplicated completely. A publication in extracts needs the agreement of the Material Testing Institute of Mechanical Engineering and Plastics. Sketches of advertising brochures are not allowed to contradict to the Official Certificate. Translations of the Official Certificate must include the hint: "Translation of the original German issue not examined from the Material Testing Institute of Mechanical Engineering and Plastics ".

Garbsen. 26.03.2008

RD Dr.-Ing. Kinzel

Materialprüfanstalt für Werkstoffe und Produktionstechnik · MPA HANNOVER

Dipl.-Ing. Witte

22 Enclosures diagrams

MPA HANNOVER

Enclosures

Enclosure 1: Diagrams Calenberg Perforated Bearing, unreinforced

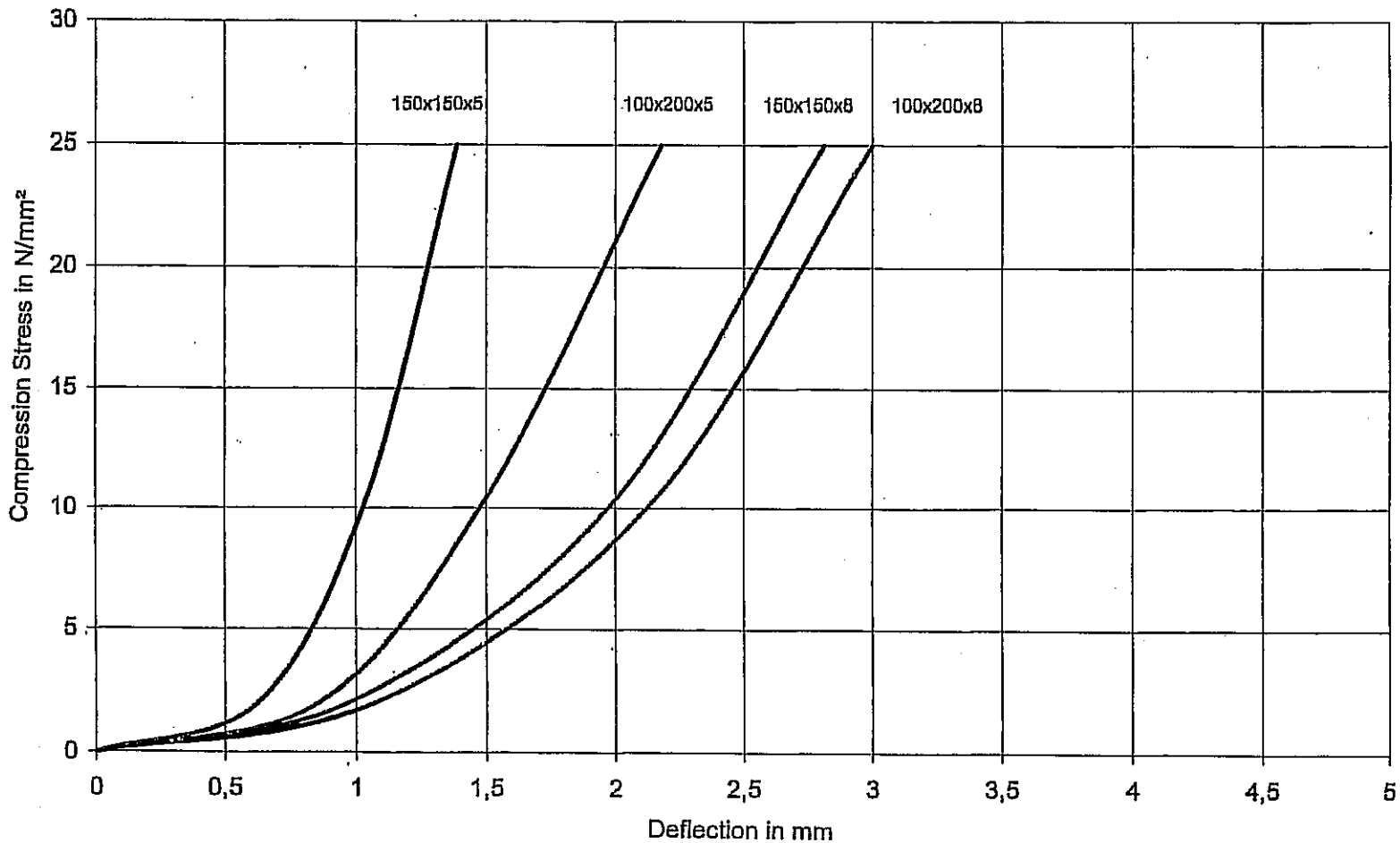
Enclosure 2: Diagrams Calenberg Perforated Bearing, Steel reinforced

Enclosure 3: Diagrams Calenberg Perforated Sliding Bearing, Steel reinforced

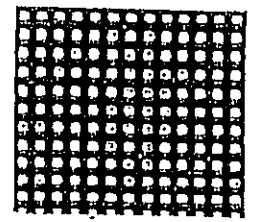
Enclosure 1: Diagrams Calenberg Perforated Bearing, unreinforced

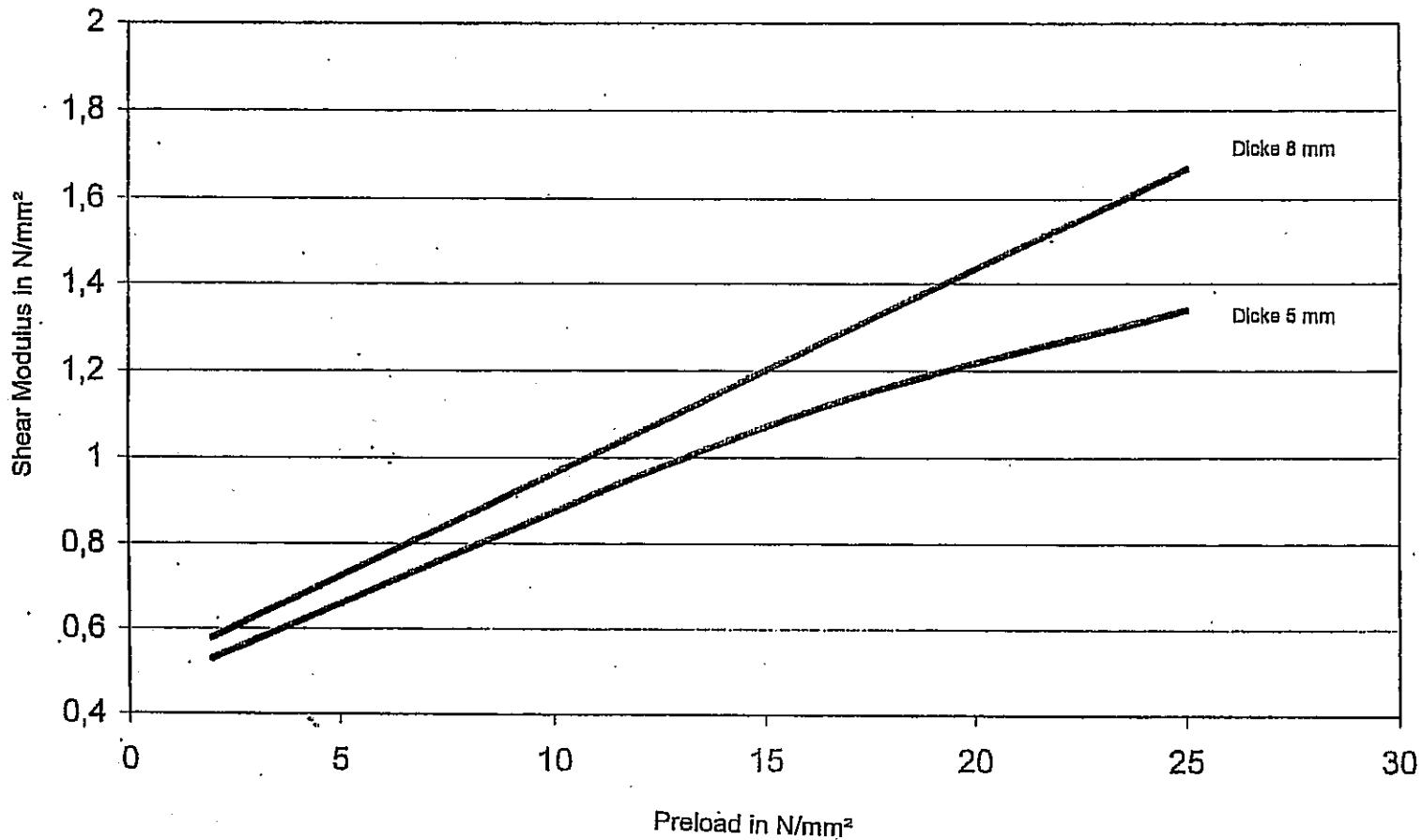
- Load Deflection Curves
- Shear Modulus
- Load Failure Curve, Thickness of the Elastomer 5 mm
- Load Failure Curve, Thickness of the Elastomer 8 mm

P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Bearing

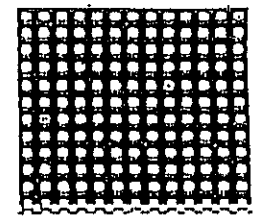


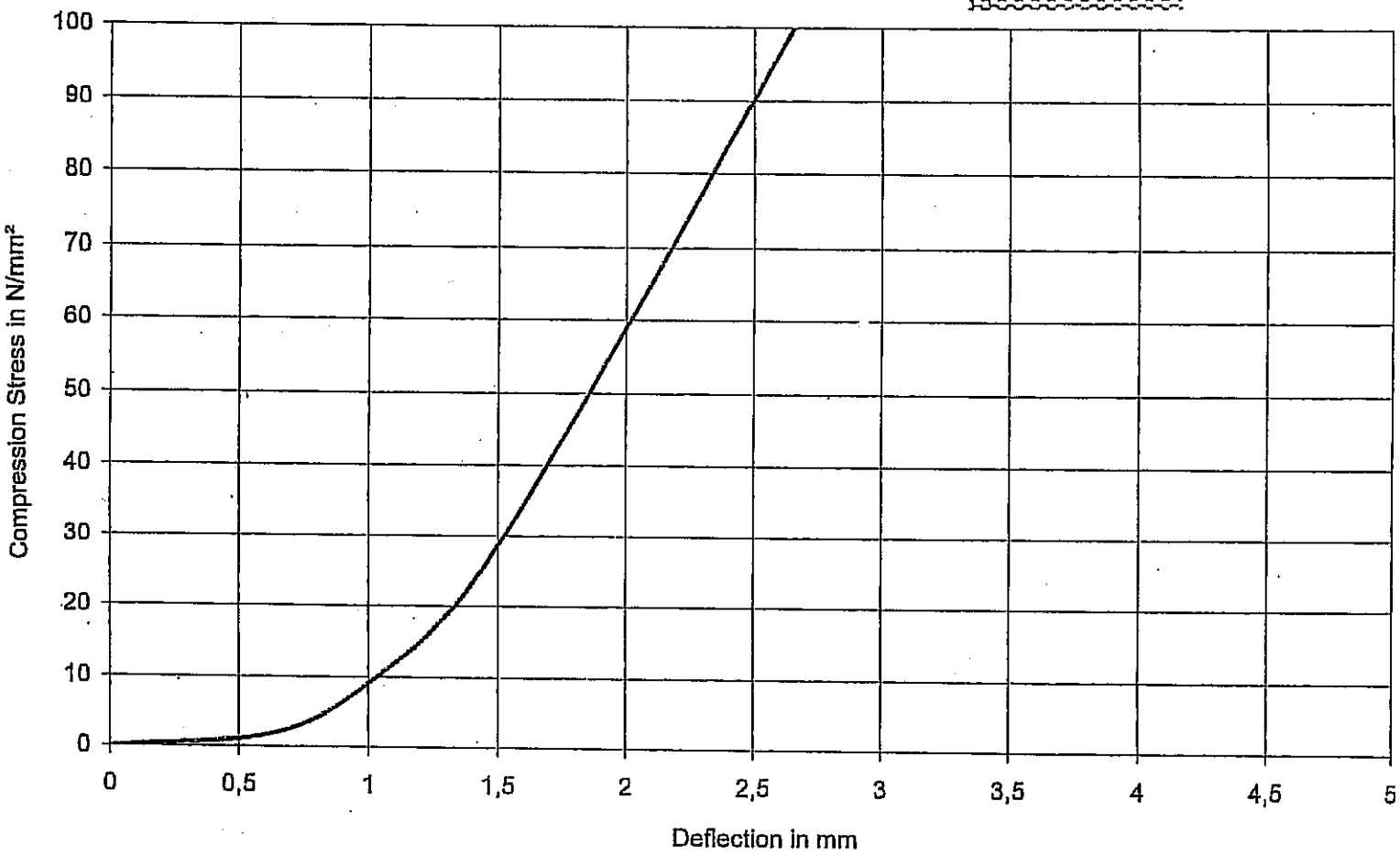
P-852.0290-1, Shear Modulus,
Calenberg Perforated Bearing



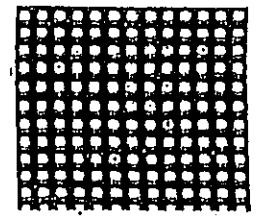


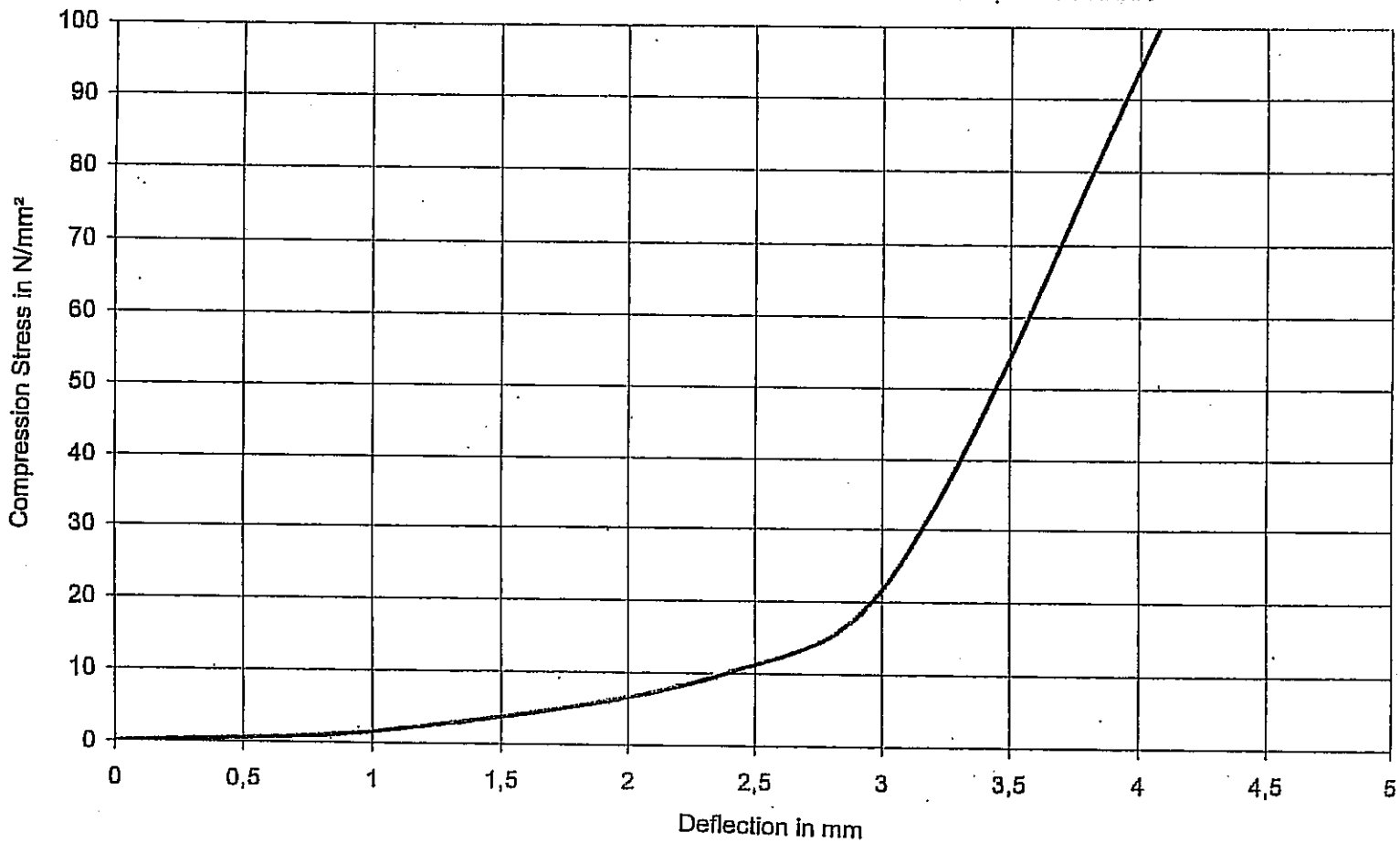
P-852.0290-1, Load Failure Curve,
Calenberg Perforated Bearing, 100 x 100 x 5 mm³





P-852.0290-1, Load Failure Curve,
Calenberg Perforated Bearing, 100 x 100 x 8 mm³



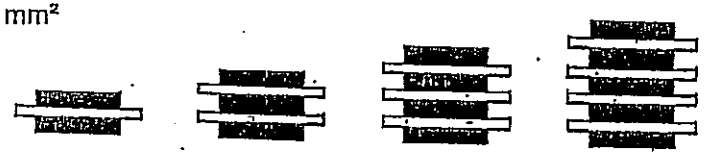


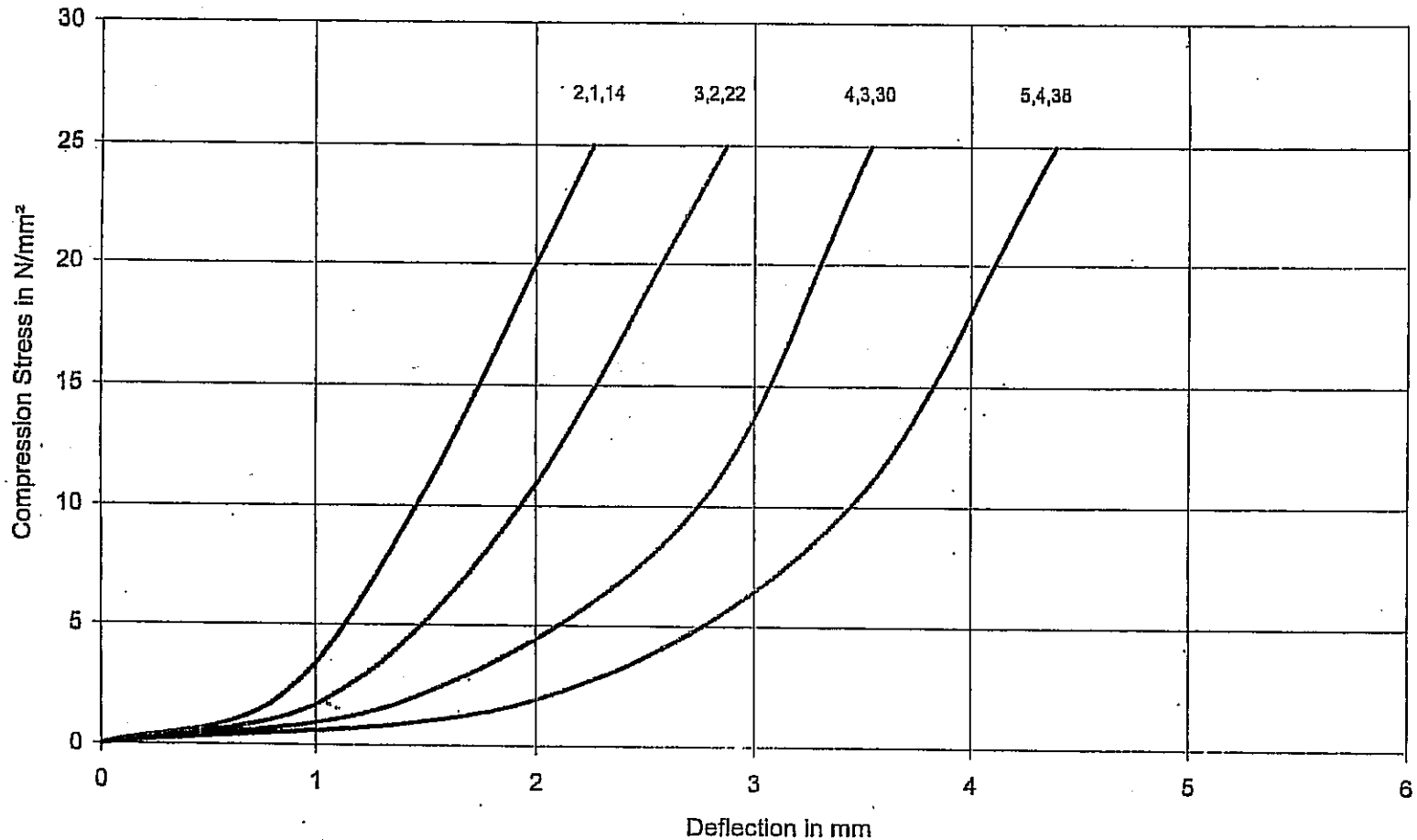
MPA HANNOVER

Enclosure 2: Diagrams of Calenberg Perforated Bearing, Steel reinforced

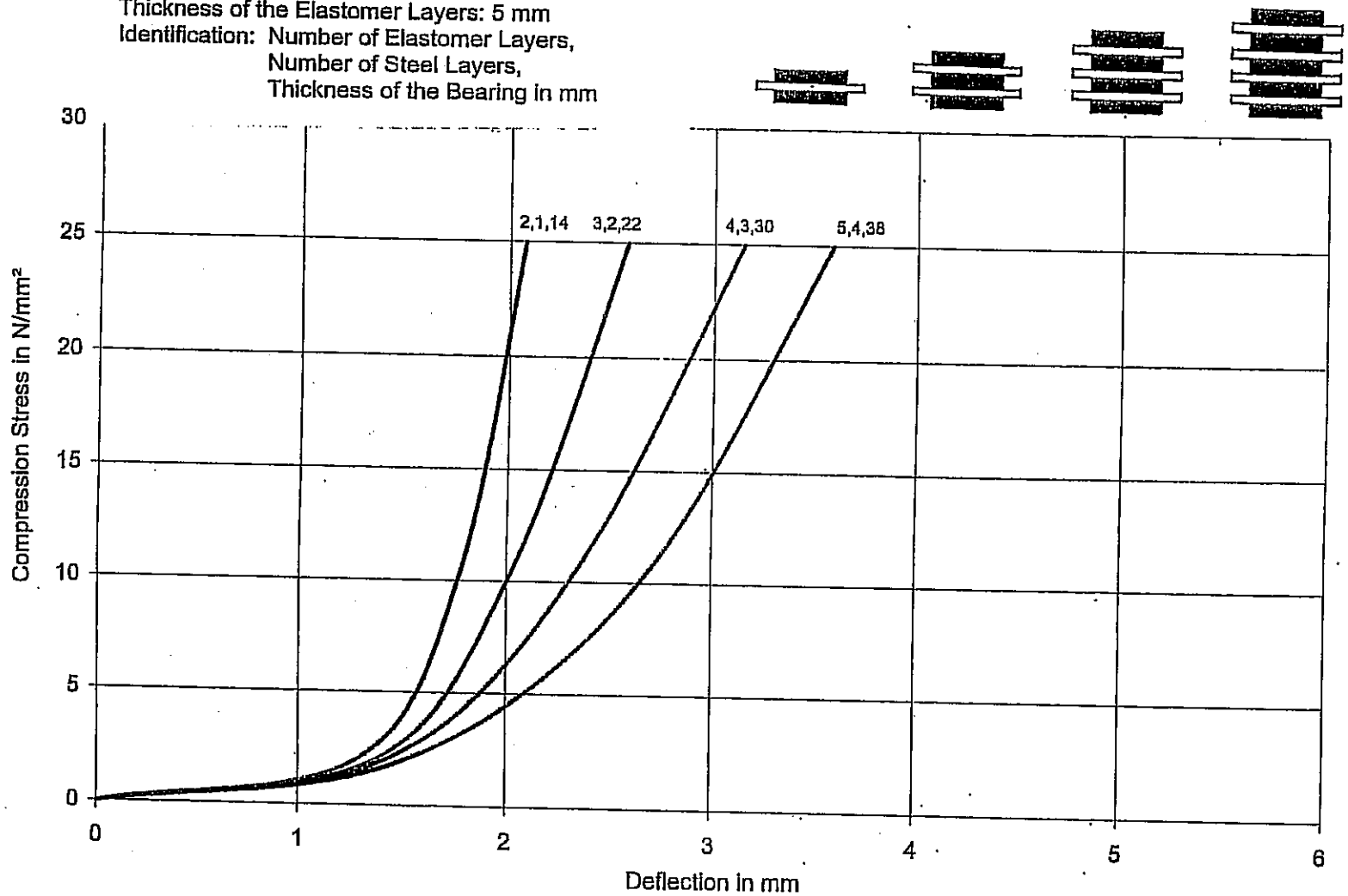
- 1. – 3. Load Deflection Curve, Thickness of the Elastomer Layers 5 mm
- 4. – 6. Load Deflection Curve, Thickness of the Elastomer Layers 8 mm
- 7. Shear Modulus, Thickness of the Elastomer Layers 5 mm
- 8. Shear Modulus, Thickness of the Elastomer Layers 8 mm
- 9. Load Failure Curve, Thickness of the Elastomer Layers 5 mm

P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Bearing, Steel reinforced, 100 x 100 mm²
Thickness of the Elastomer Layers: 5 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing in mm





P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Bearing, Steel reinforced, 150 x 150 mm²
Thickness of the Elastomer Layers: 5 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing in mm

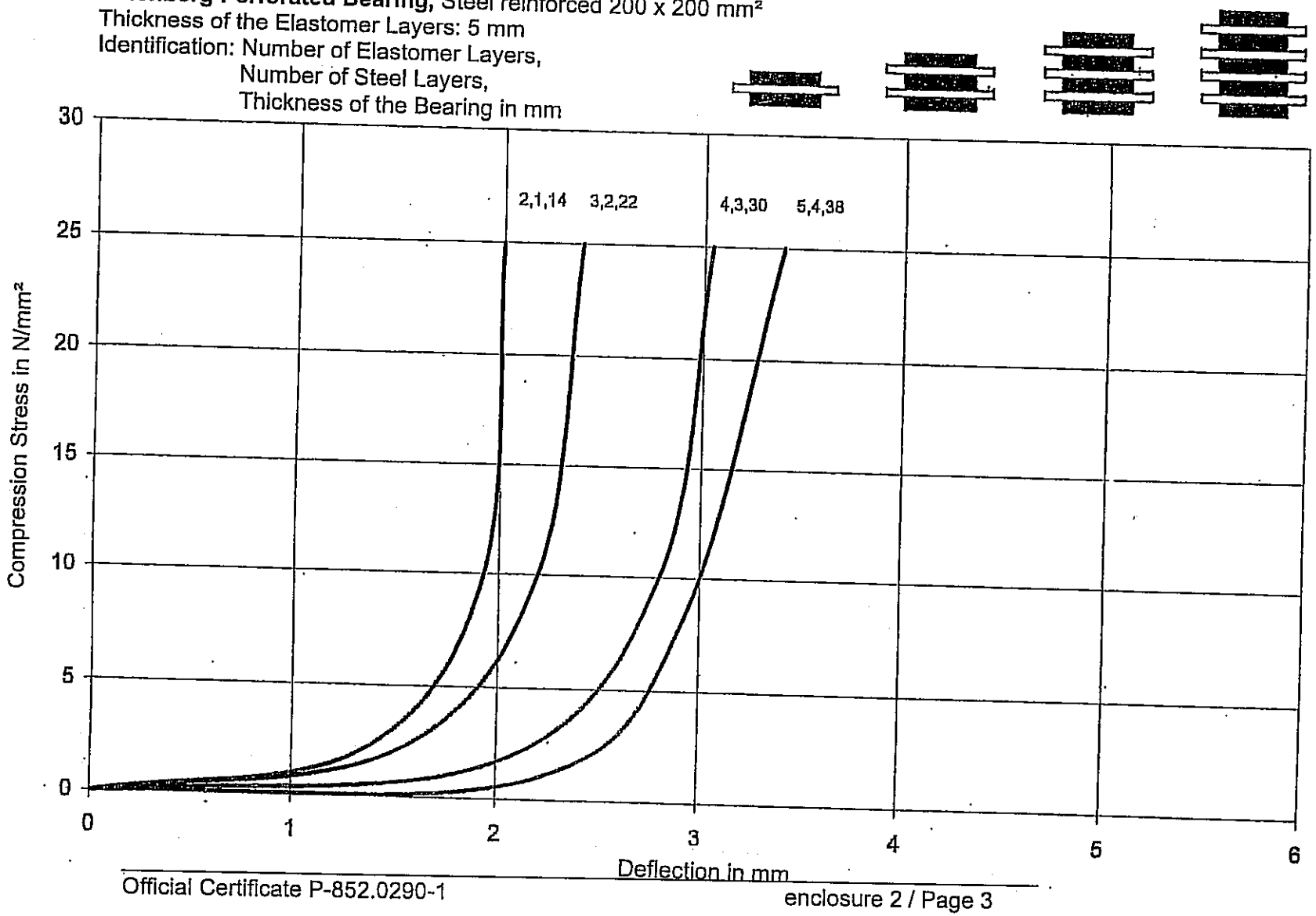


P-852.0290-1, Load Deflection Curve

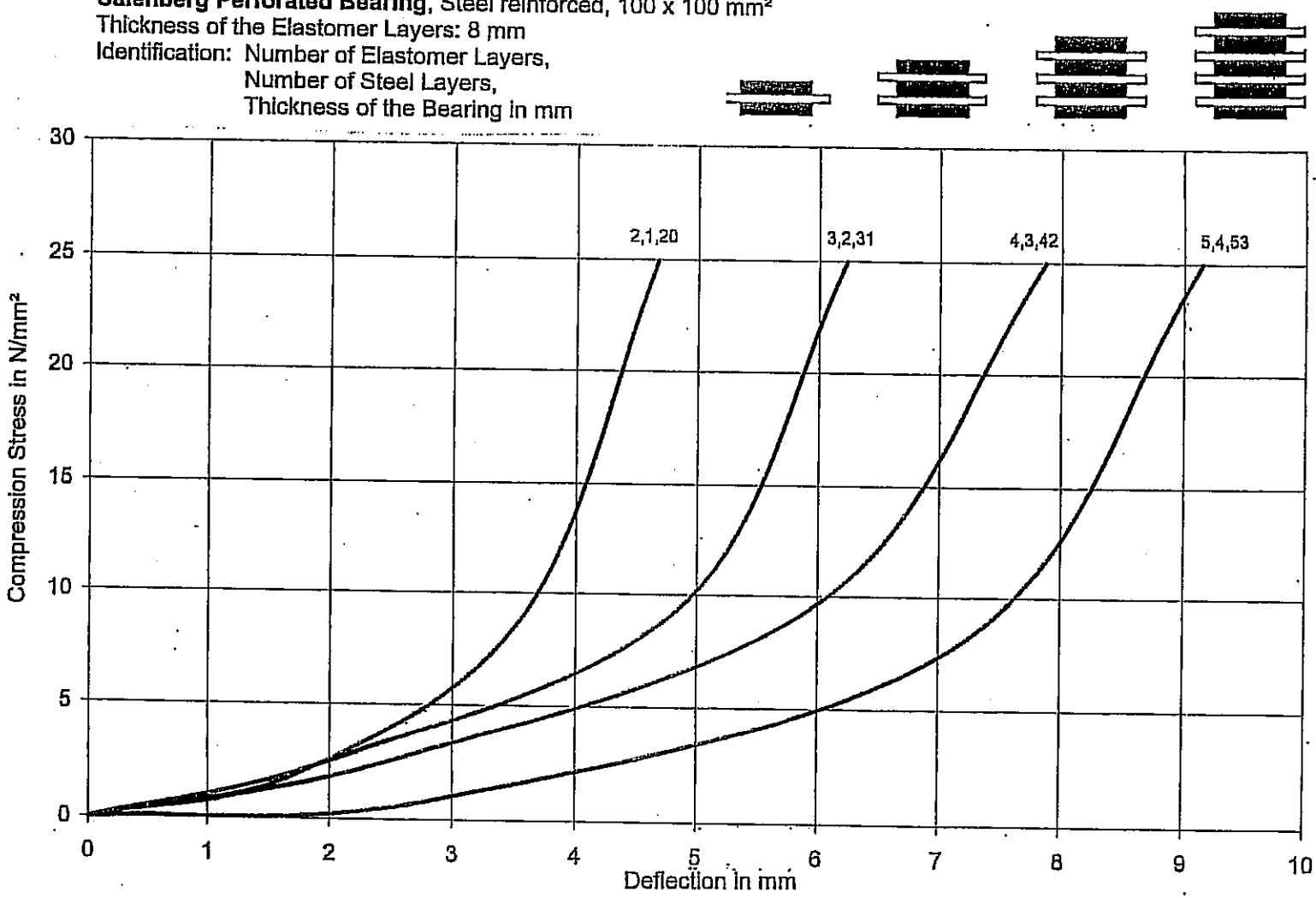
Calenberg Perforated Bearing, Steel reinforced 200 x 200 mm²

Thickness of the Elastomer Layers: 5 mm

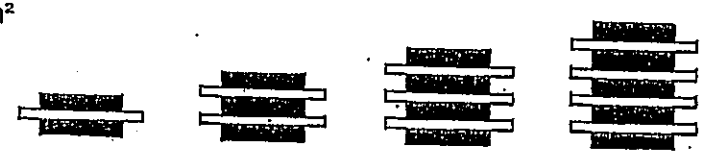
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing in mm

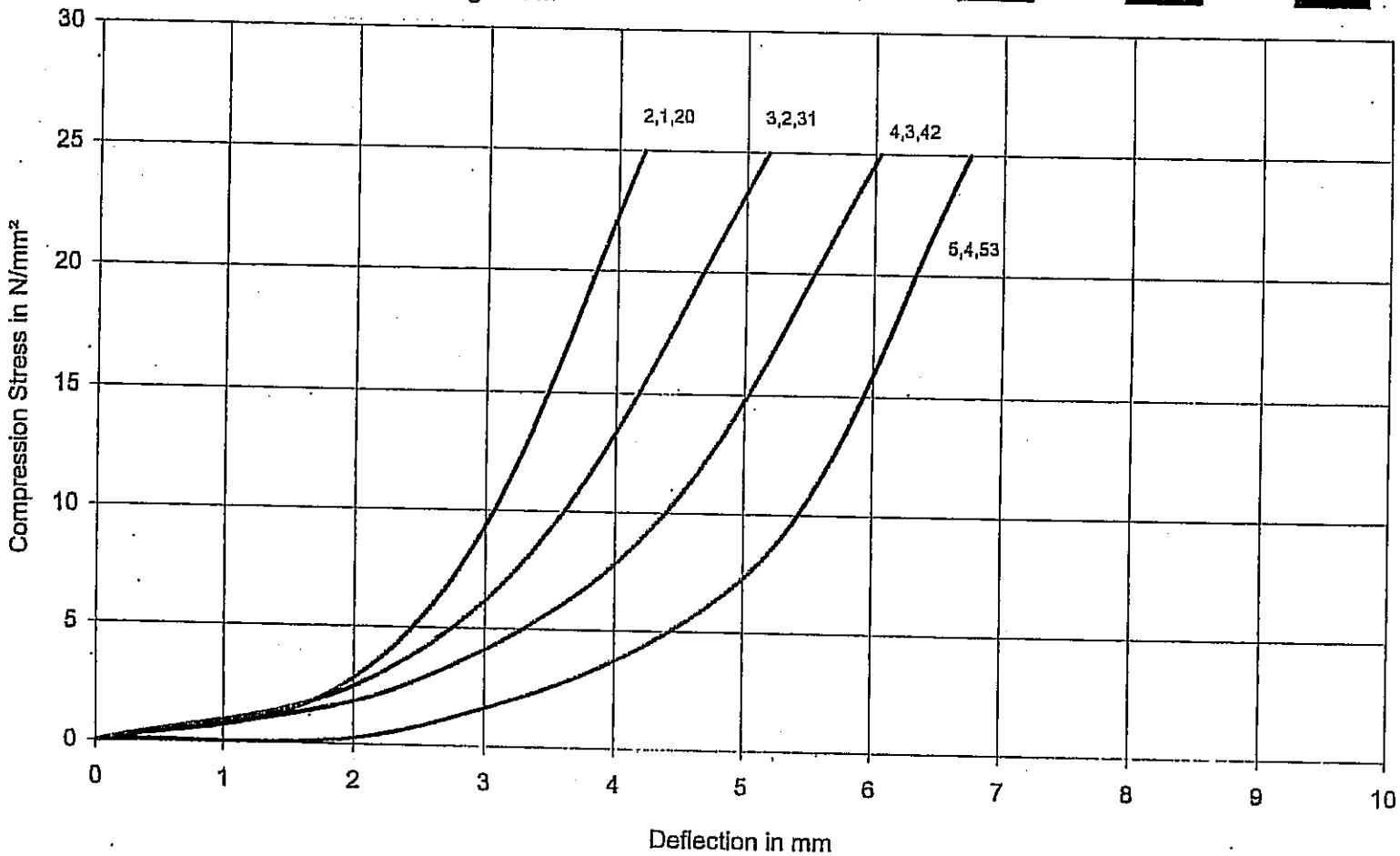


P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Bearing, Steel reinforced, 100 x 100 mm²
Thickness of the Elastomer Layers: 8 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing in mm

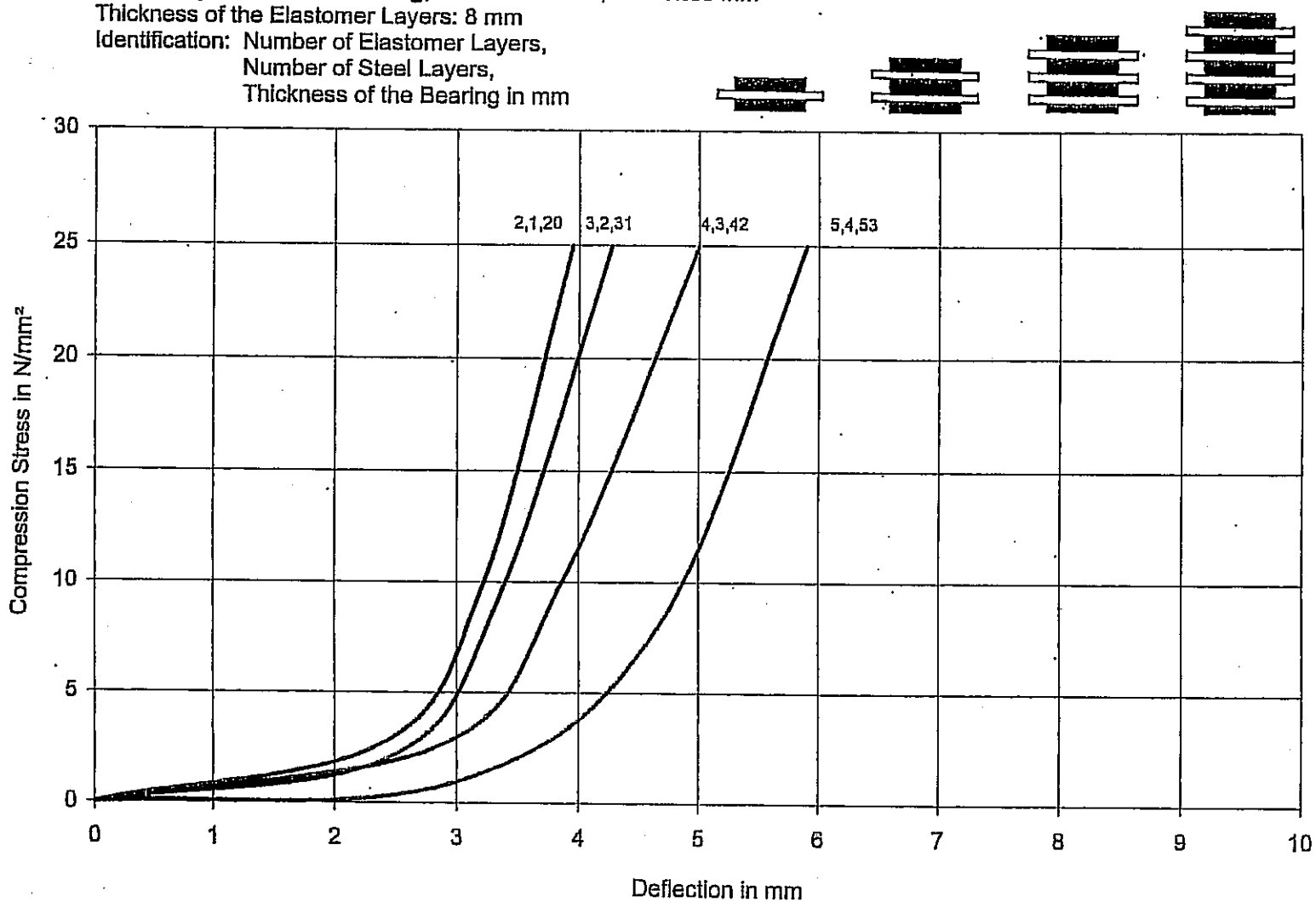


P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Bearing, Steel reinforced, 150 x 150 mm²
Thickness of the Elastomer Layers: 8 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing in mm

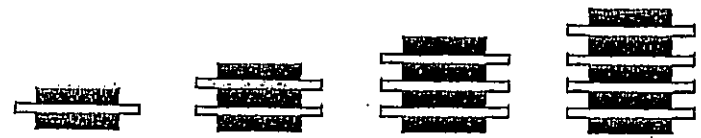


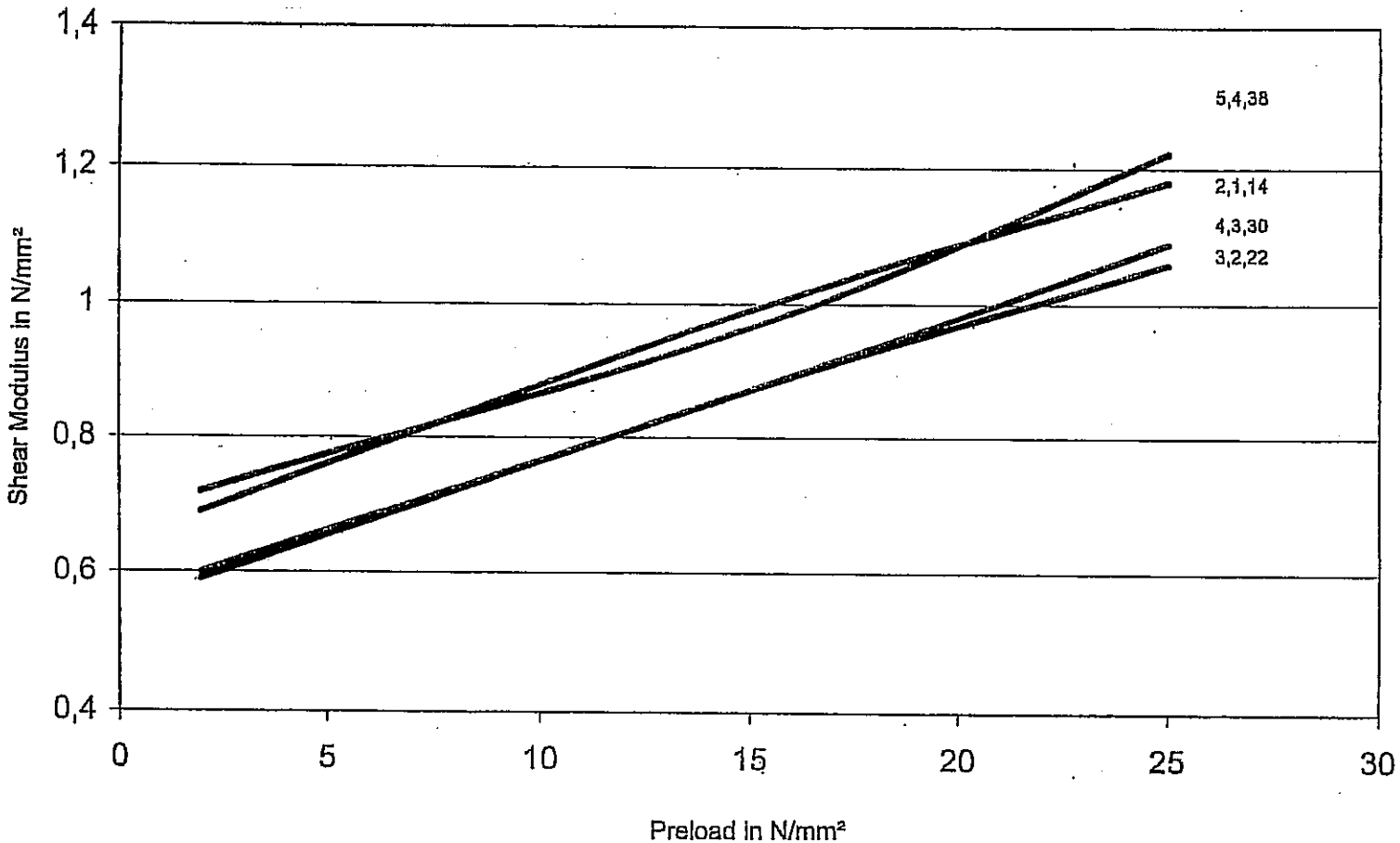


P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Bearing, Steel reinforced, 200 x 200 mm²
Thickness of the Elastomer Layers: 8 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing in mm

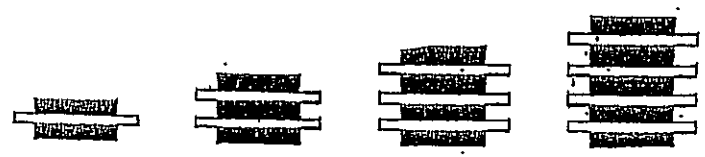


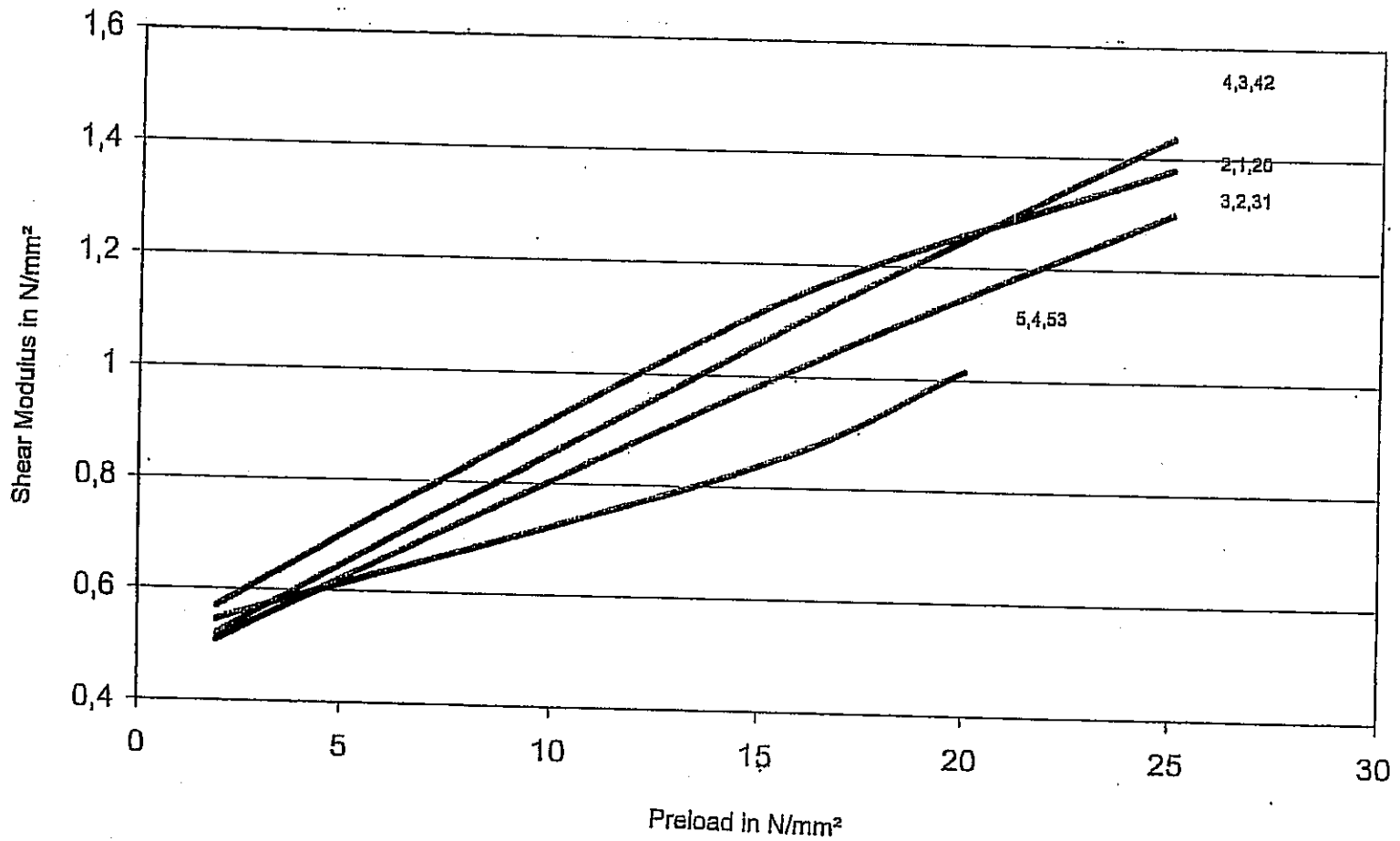
P-852.0290-1, Shear Modulus,
Calenberg Perforated Bearing, Steel reinforced,
Thickness of the Elastomer Layers: 5 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing in mm



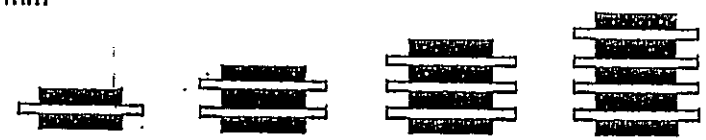


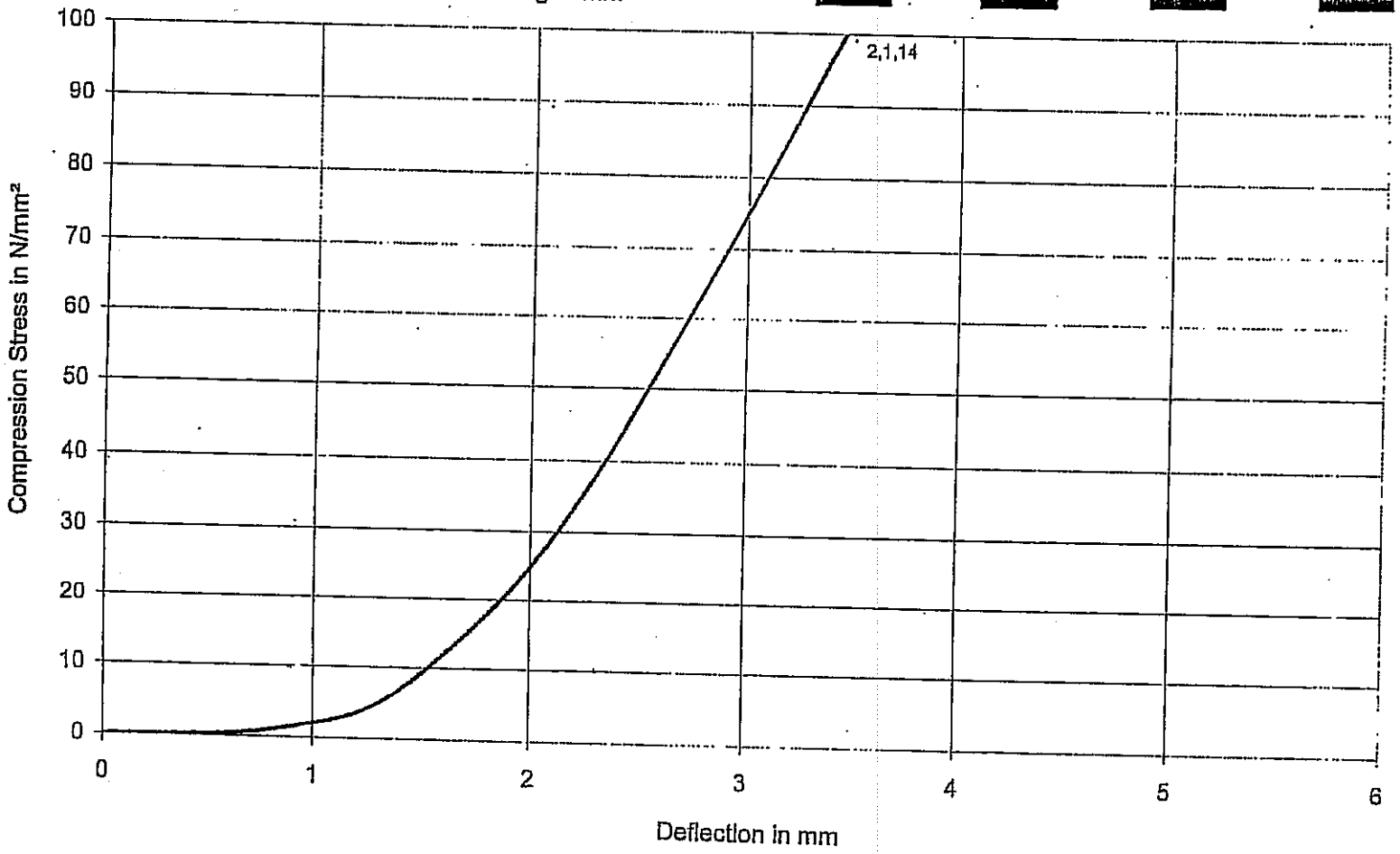
P-852.0290-1, Shear Modulus,
Calenberg Perforated Bearing, Steel reinforced,
Thickness of the Elastomer Layers: 8 mm
Identification: Number of Elastomer Layers, Number of Steel Layers,
Thickness of the Bearing in mm





P-852.0290-1, Load Failure Curve,
Calenberg Perforated Bearing, Steel reinforced, 100 x 100 mm²
Thickness of the Elastomer Layers: 5 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing in mm



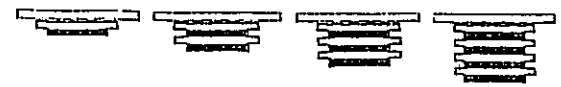


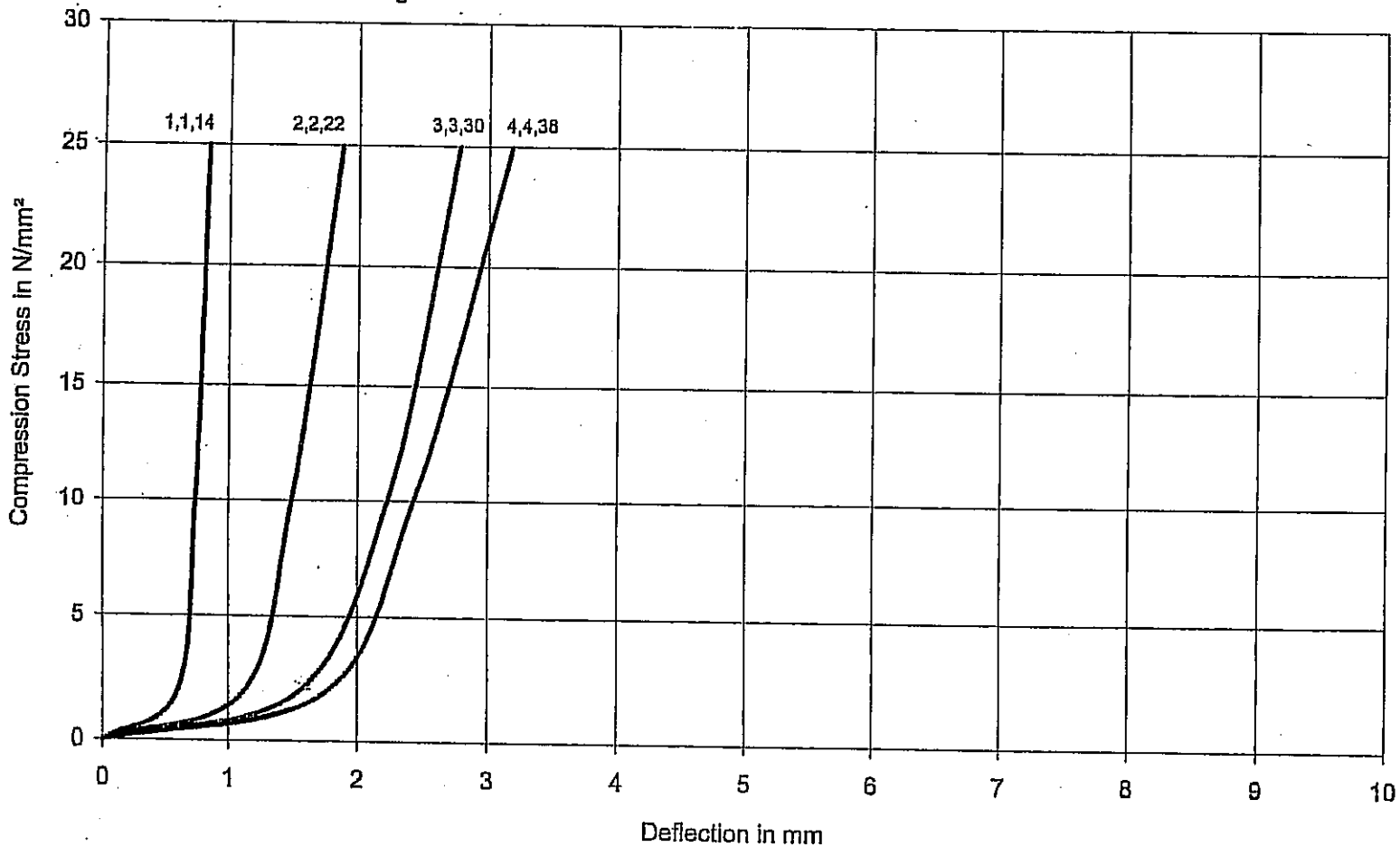
MPA HANNOVER

Enclosure 3: Diagrams of Perforated Sliding Bearing, Steel reinforced

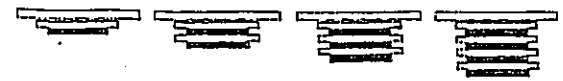
- 1. – 3. Load Deflection Curve, Thickness of the Elastomer Layers 5 mm
- 4. – 6. Load Deflection Curve, Thickness of the Elastomer Layers 8 mm
- 7. Load Failure Curve, Thickness of the Elastomer Layers 5 mm
- 8. Static Friction Values
- 9. Sliding Friction Values

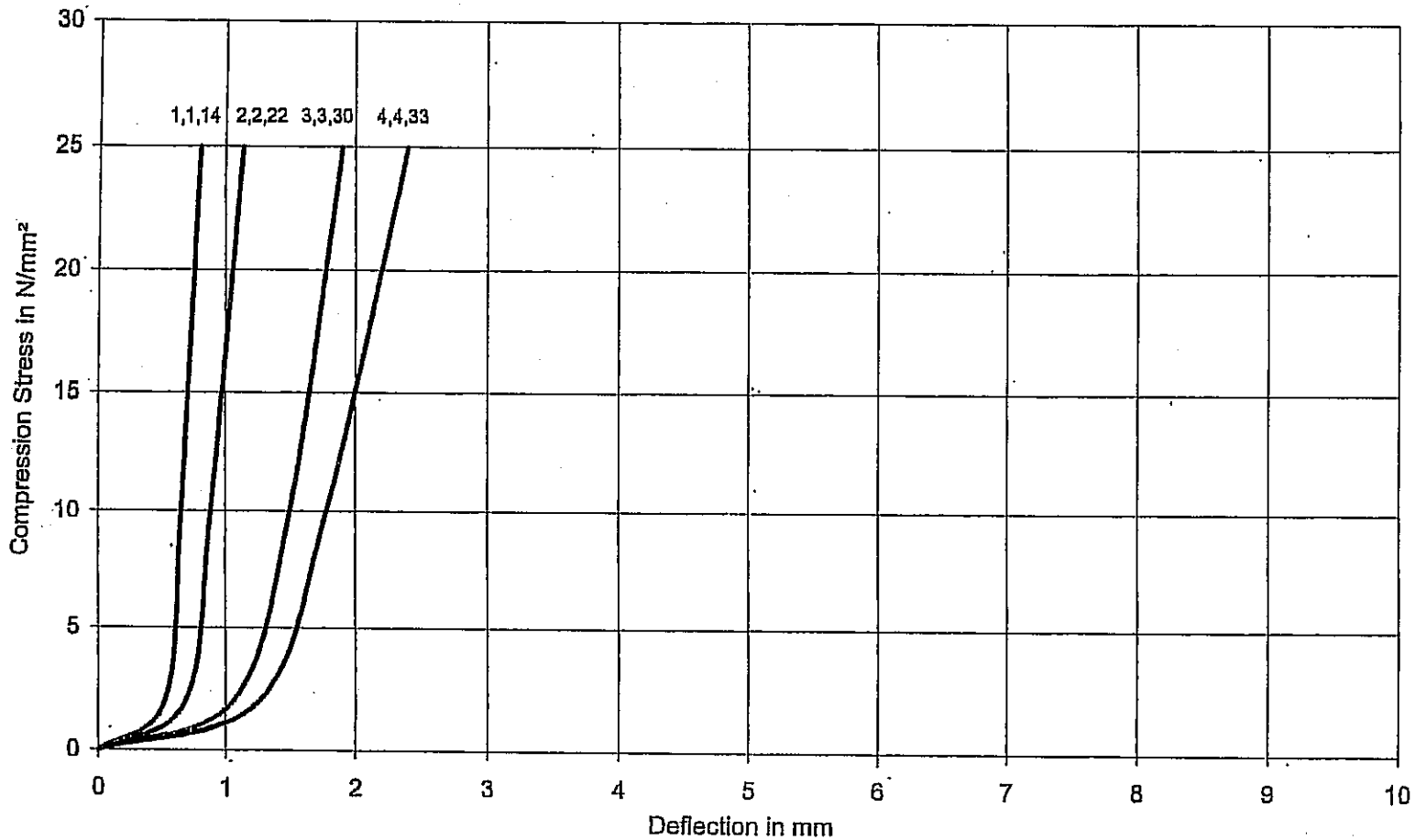
P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Sliding Bearing, Steel reinforced, 100 x 100 mm²
Thickness of the Elastomer Layers: 5 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers;
Thickness of the Bearing including
GRP-Sliding Plate in mm





P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Sliding Bearing, Steel reinforced, 150 x 150 mm²
Thickness of the Elastomer Layers: 5 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing including
GRP-Sliding Plate in mm



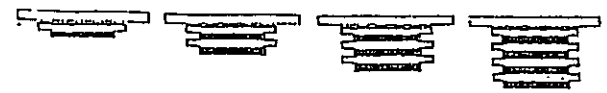


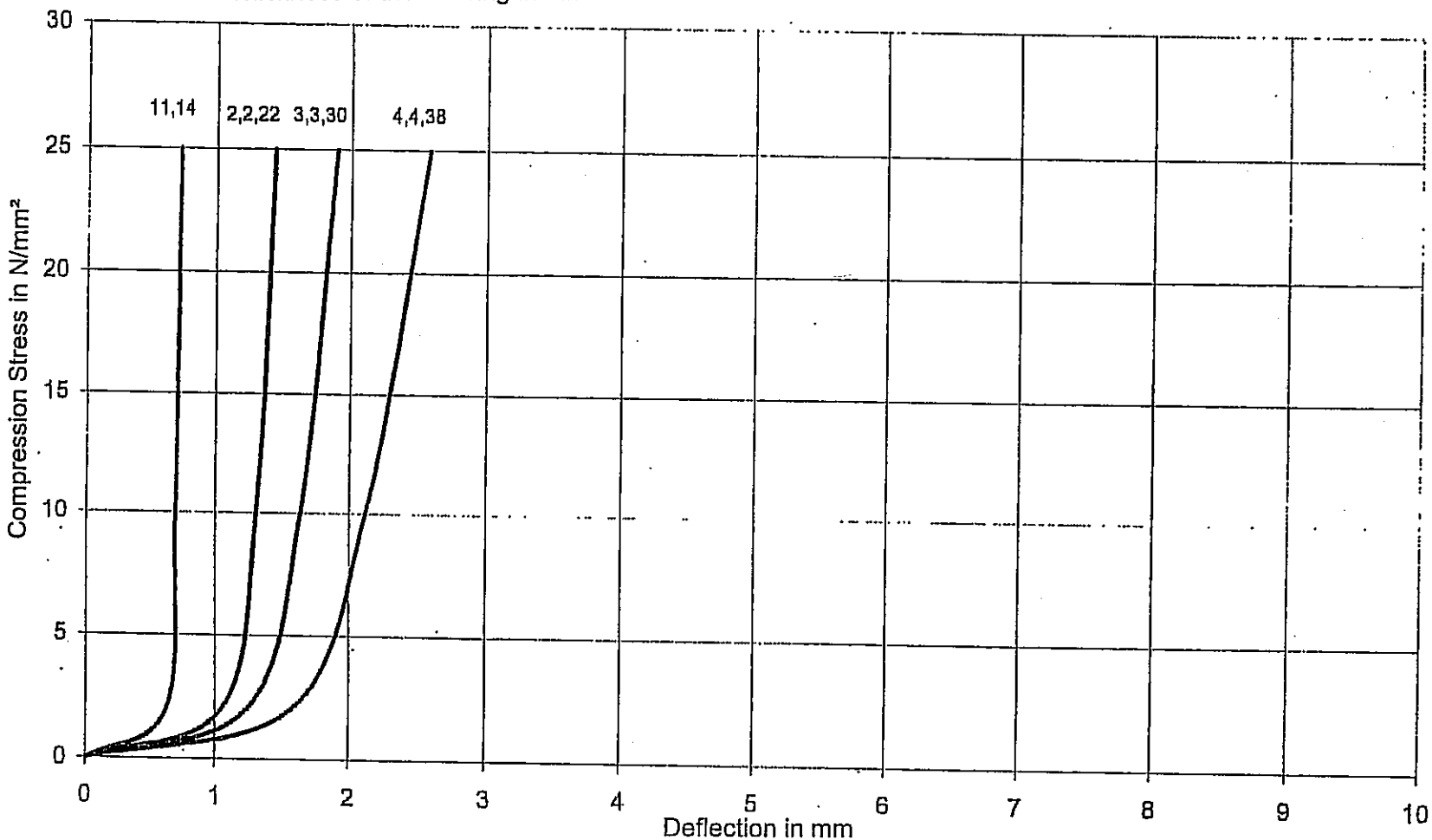
P-852.0290-1, Load Deflection Curve

Calenberg Perforated Sliding Bearing, Steel reinforced 200 x 200 mm²

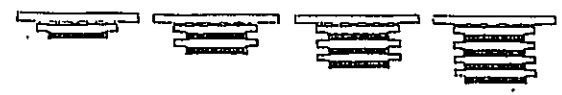
Thickness of the Elastomer Layers: 5 mm

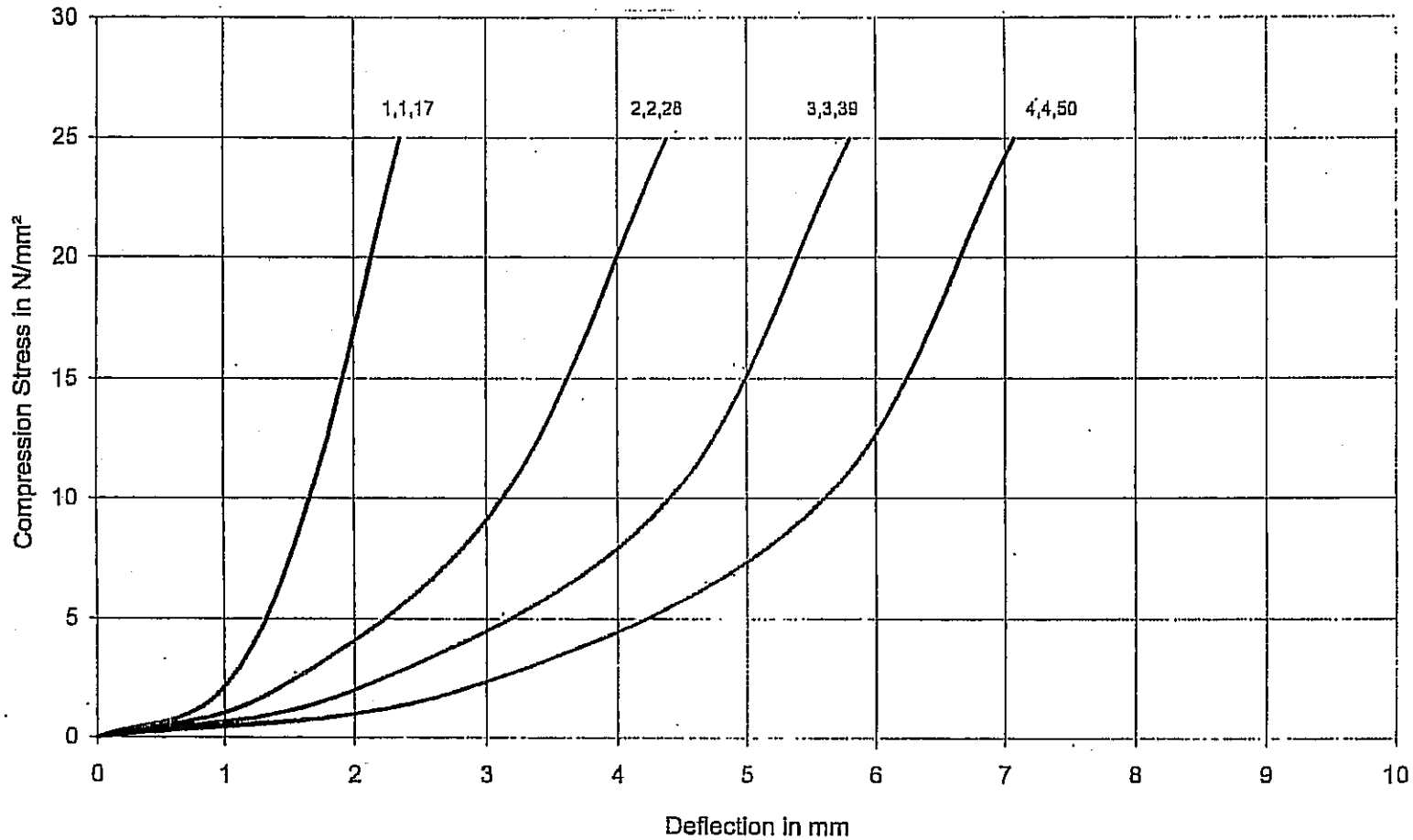
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing in mm



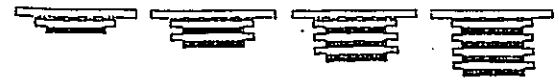


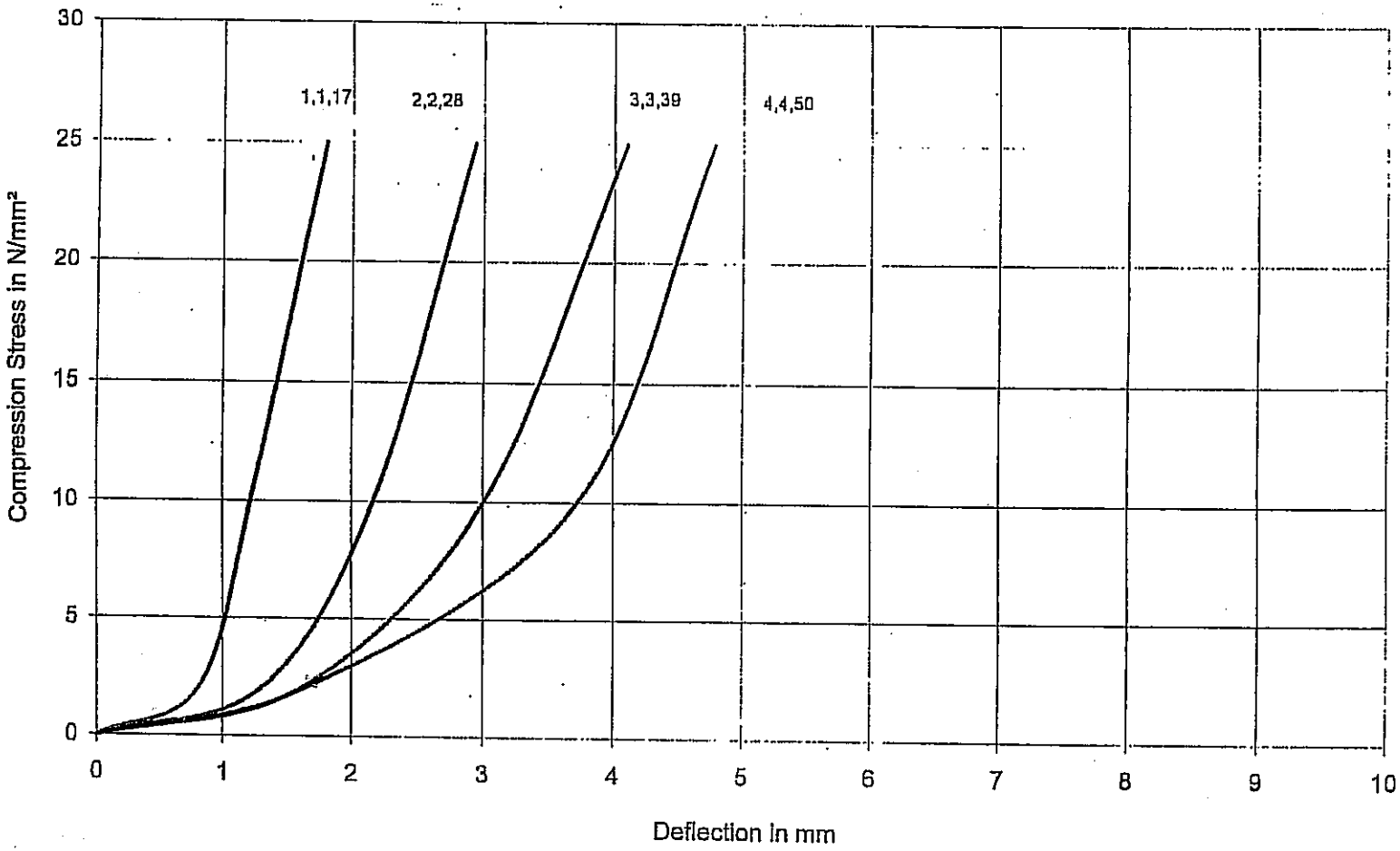
P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Sliding Bearing, Steel reinforced, 100 x 100 mm²
Thickness of the Elastomer Layers: 8 mm
Identification: Number of Elastomer Layers, Number of Steel Layers,
Thickness of the Bearing including GRP-Sliding Plate in mm



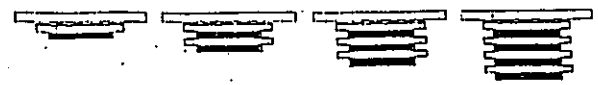


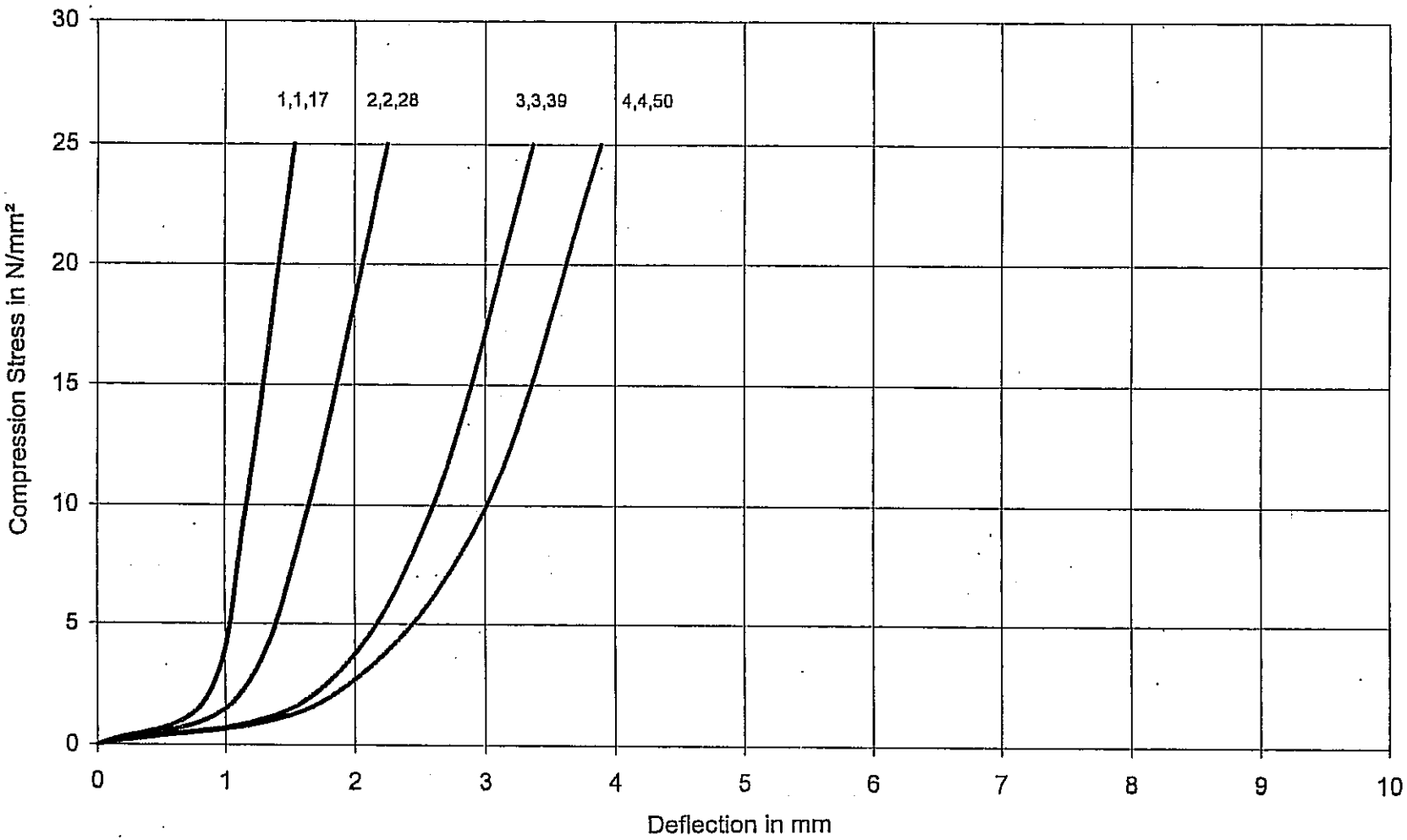
P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Sliding Bearing, Steel reinforced, 150 x 150 mm²
Thickness of the Elastomer Layers: 8 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing including
GRP-Sliding Plate in mm



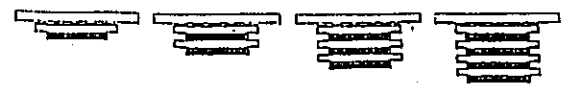


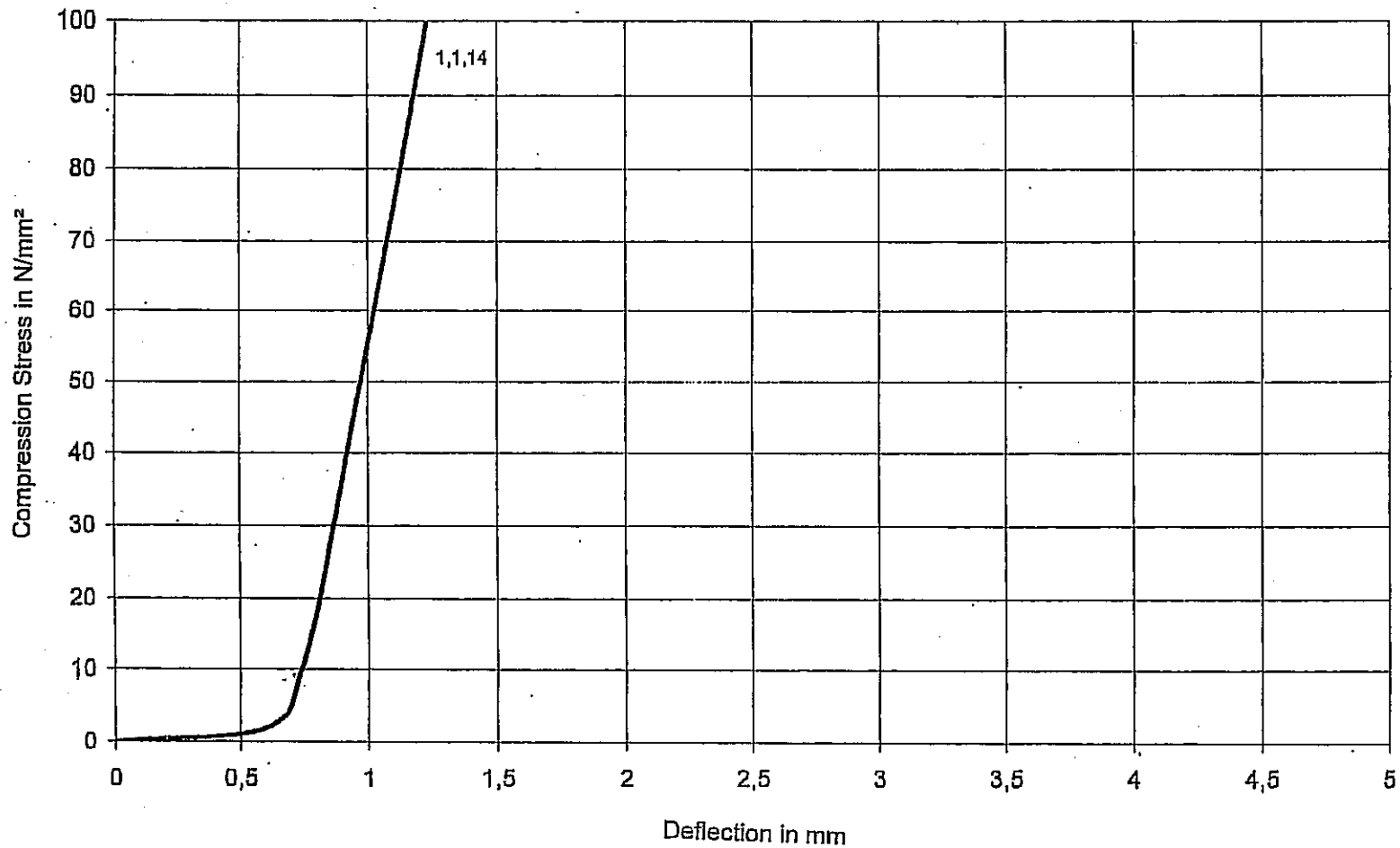
P-852.0290-1, Load Deflection Curve,
Calenberg Perforated Sliding Bearing, Steel reinforced, 200 x 200 mm²
Thickness of the Elastomer Layers: 8 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing including
GRP-Sliding Plate in mm



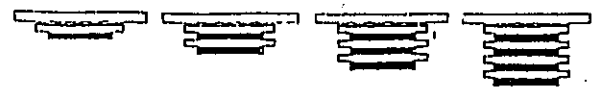


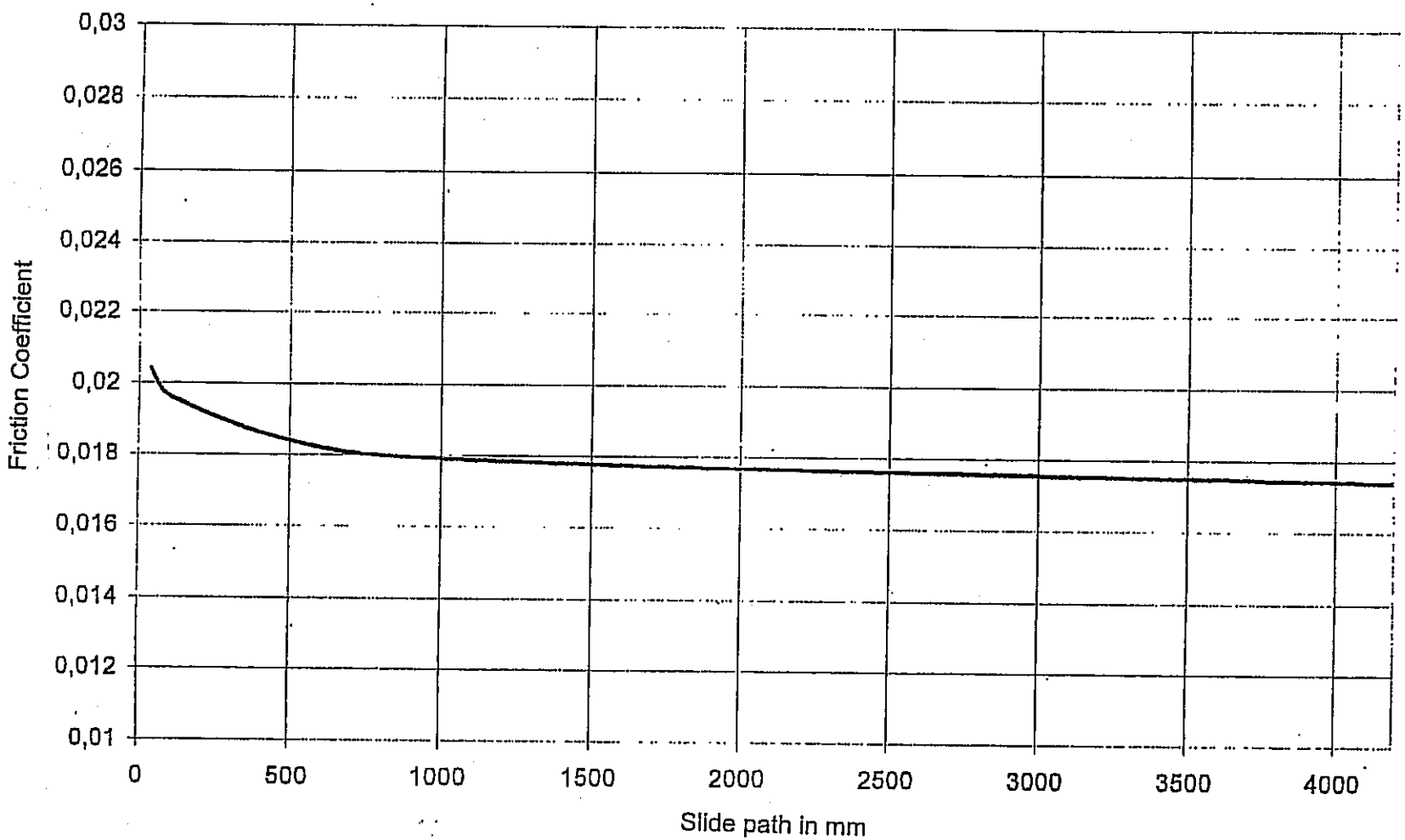
P-852.0290-1, Load Failure Curve,
Calenberg Perforated Sliding Bearing, Steel reinforced, 100 x 100 mm²
Thickness of the Elastomer Layers: 5 mm
Identification: Number of Elastomer Layers,
Number of Steel Layers,
Thickness of the Bearing including
GRP-Sliding Plate in mm





P-852.0290-1, **Calenberg Perforated Sliding Bearing**, Steel reinforced,
coefficients of static friction at the halt periods
depending on the added up slide path
(halt periods 4 seconds, each one cycle is 40 mm)





P-852.0290-1, **Calenberg Perforated Sliding Bearing**, Steel reinforced,
coefficients of sliding friction at the halt periods
depending on the added up slide path
(halt periods 4 seconds, each one cycle is 40 mm)