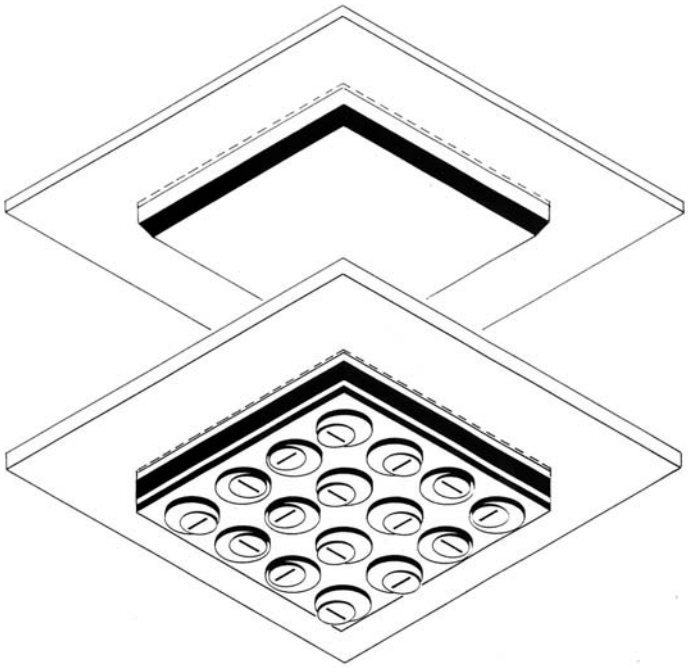
Official Certificate

No. P-852.0290-4

Calenberg
Ciparall® - Sliding Bearing

cross tensile reinforced elastomere
deformation sliding bearing



Extension of validity
of
Official Testing Certificate

Certificate No.	P-852.0290-4
Subject:	**Calenberg Ciparall Sliding Bearing** of different designs and dimensions
Date of first issue:	06.11.2002
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-852.0290-4.
(1. issue: 06.11.2002, 1. corrected version: 04.03.2003, 1. extension: 26.03.2008).

Garbsen, 14.01.2010

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Landesbetrieb gemäß
§ 26 Nds. LHO

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Dr.-Ing. Andreas Kinzel · Geschäftsführer
Dr.-Ing. Hans-Joachim Seidel · Geschäftsführer

MPA HANNOVER

Official Certificate

Certificate No.	P-852.0290-4
Subject:	**Calenberg Ciparall Sliding Bearing** of different designs and 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:	04.03.2003 (substitutes the version of the same contents dated 6.11.2002) 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 10 pages and enclosures.

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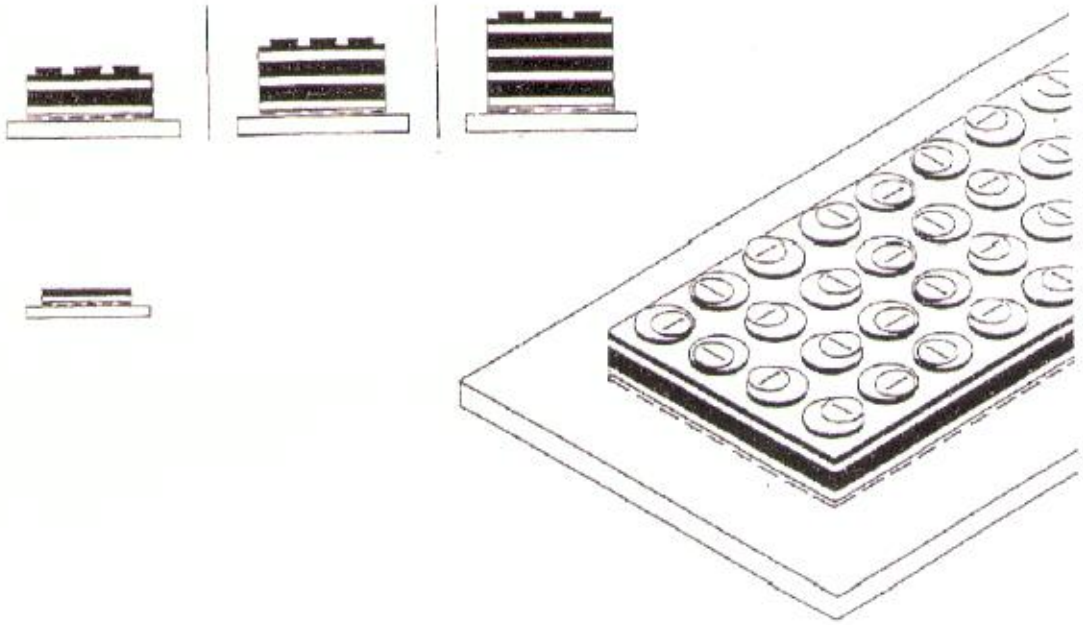
1. Subject and Field of Application:

1.1 Subject:

The Ciparall Sliding Bearing, steel reinforced (ST) consists of a WTST 52-3 steel plate, covered with a 0,5 mm PTFE layer, one or more compact elastomer pads (thickness 8 mm), intermediate reinforcement layers of steel WTST 52-3 (thickness 2 mm) and a profiled outer layer of 4 mm elastomer. Exception: Bearings of 11 mm thickness: Here an unprofiled outer layer of 5 mm elastomer and a reinforcement layer of steel WTST 52-3 (thickness 3 mm) is used.

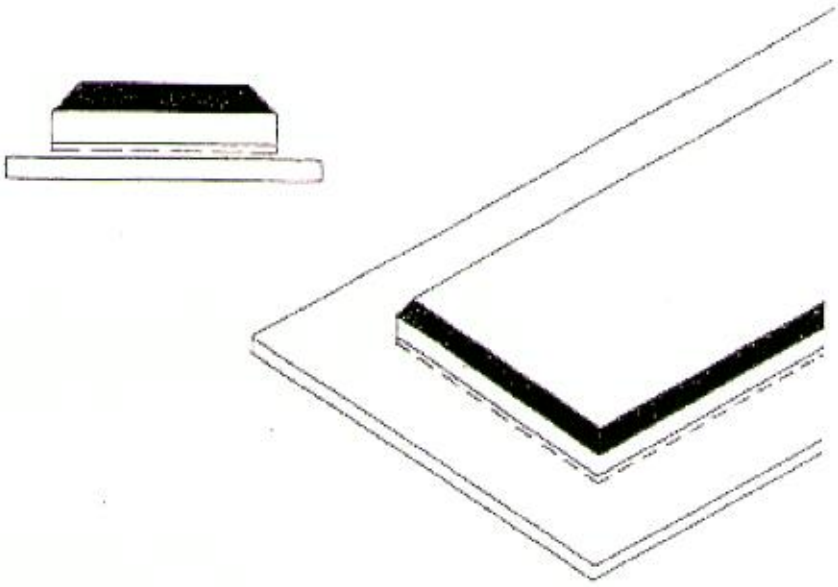
The Ciparall Sliding Bearing, GRP-reinforced, consists of a GRP plate according to sign K (RAL) "Glass fibre polyester plates", covered with PTFE (thickness GRP plate 4,8 mm, thickness PTFE layer 0,5 mm) and a compact, unprofiled outer elastomer layer (thickness 5 mm). The elastomer plates are made of synthetic chloroprene rubber (CR) according to DIN 4141, part 150 and show a hardness of 60 +- 5 Shore-A. The data of the chemical compounds are deposited at the Material Testing Institute.



Picture 1: Calenberg Ciparall Sliding Bearing, steel reinforced

The Calenberg Ciparall Sliding Bearing, steel reinforced, is supplied in variations as follows::

Number of elastomer layers	Number of reinforcement layers	Total thickness in mm incl. GRP sliding plate	Thickness of the GRP sliding plate in mm
1	1	11	2,6
2	2	20	4,8
3	3	30	4,8
4	4	40	4,8



Picture 2: Calenberg Ciparall Sliding Bearing, GRP reinforced

The Calenberg Ciparall Sliding Bearing, GRP reinforced, is supplied as follows:

Numbers of elastomer layers	Numbers of reinforcement layers	Total thickness in mm incl. 2,6 mm GRP sliding plate
1	1	14

Table 2: Design of Calenberg Ciparall Sliding Bearing, GRP reinforced

1.2 Field of Application

Calenberg Ciparall Sliding Bearings 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 irrelevantly 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 only is valid in the case that 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.
Ciparall Sliding Bearings, steel reinforced, are format dependent useable up to a maximum vertical compressive stress according to table 3.
Ciparall Sliding Bearings, GRP reinforced, can be loaded up to a permissible compressive stress "perm. σm" as follows:

perm. σm = 1,2 (18,8 – 0,0002 x l x b) ≤ 15 N/mm²

perm. $\sigma m = 1{,}2\ (18{,}8 - 0{,}0002 \times l \times b) \leq 15\ N/mm^2$

Bearing length l resp. width b in mm	Permissible compressive stress perm. σ_m (N/mm^2)
50	7,5
60	9,0
70	10,5
80	12,0
90	13,5
100 and morer	15,0

Table 3:
Design of Calenberg Ciparail Sliding Bearing, steel reinforced

Bearing 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 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 Ciparail Sliding Bearing, steel reinforced and Calenberg Ciparail Sliding Bearing, GRP 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 plates have to be proved according to the "glass fibre reinforced plastic" (GRP) classification "K-sign (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)
- stress (of the sliding bearings) caused by sliding
- unplanned bearing load beyond the defined vertical load (compressive stress overload)
- creeping of the bearing under long-term load (long-term durability)

2.1.1.2.1 Vertical loads

Bearing reactions caused by transmission of vertical loads have to be proved by testing bearing specimen according to tables 4 and 5

Bearing area length x width in mm²	Number of elastomer layers	Number of reinforcement layers	Total thickness in mm incl. GRP sliding plate
100 x 100 150 x 150 250 x 250	1	1	11
	2	2	20
	3	3	30
	4	4	40

Table 4: Specimen for compression tests Calenberg Ciparall Sliding Bearing , steel reinforced

Bearing area length x width in mm²	Number of elastomer layers	Number of reinforcement layers	Total thickness in mm incl. GRP sliding plate
100 x 100 150 x 150 250 x 250	1	1	14

Table 5: Specimen for compression tests Calenberg Ciparall Sliding Bearing, GRP reinforced

2.1.1.2.2 Stress caused by sliding

The bearing reactions due to loads caused by sliding have to be proved by using test specimen of 100 x 100 x 11 mm².

2.1.1.2.3 Compressive stress overload

The bearing reactions due to the transmission of compressive stress overloads have to be proved by testing a Ciparall Sliding Bearing, steel reinforced, of 100x100x11 m³

2.1.1.2.3 Creep

The creep behaviour of the elastomer has to be tested according to the requirements of DIN 4141, part 150, by using an elastomer pad of 100x100x10 mm³. The test has to be performed under a constant load of 40 N/mm² between formed concrete plates according to DIN 4141 during a time period of 100 days.

2.1.2 Characteristic Values

2.1.2.1 Bearing Reaction due to vertical load

The compressive stress at deflection due to vertical load must correspond to the nominal values of the deflection-dependent stress in the diagrams of the enclosure with a compression stress tolerance of +- 20 % related to the particular deflection.

2.1.2.2 Bearing Reaction due to Vertical Overload

The vertical compressive stress at a deflection higher than the one maximally permitted must correspond to the nominal values of the vertical compressive stress according to the enclosed diagram with a tolerance of +- 25 %.
After the compression failure test the bearing should neither show visible abrasion nor any beginning cracks or damage.

2.1.2.3 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.

2.1.2.4 Stress caused by sliding

The static coefficient of friction γ (PTFE layer / GRP plate) must be $\leq 0{,}045$.

The static coefficients of friction at the end of the test period, as well as the slipping coefficient, both in relation to the summed up slide path, must correspond to the nominal values of the maximum friction coefficients γ according to the enclosed diagrams plus a tolerance of the friction coefficient γ of max. + 20 rel.-%, which is related to the respective slide path.

2.1.2.5 Physical Characteristics

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

2.1.2.6 Dimensional Tolerances

The dimensional tolerances of the bearing are according 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 6 have to be proved.

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

Table 6: 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 is 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.

2.2.3.2 Compression Failure Test

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

The bearing will be loaded once.
The test scope is according to the data as shown in chapter 2.1.2.2.
The compression failure test is done between formed concrete plates according to DIN 4141 part 150.

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

2.2.3.3 Durability Test

The durability test is done to an elastomer pad according to the data of DIN 4141 part 150.

2.2.3.4 Sliding Test

The static coefficient of friction and the sliding coefficients as ratio of horizontal to vertical force, depending on the cycles of movement, are determined by analogy with the test method as used for the determination of the shear modulus. Pairs of bearings with a velocity of 0,4 mm/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 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 tests
- Static coefficients of friction at the end of the halt periods as function of the slide path covered respectively the cycle number.
- Coefficients of sliding friction during the sliding as function of the slide path covered respectively the cycle number.

2.3 Design and Calculation

For design and calculation of the Calenberg Ciparall Sliding Bearing, steel reinforced as well as GRP reinforced, DIN 4141 is decisive in its actual valid edition under the extended consideration of the maximum area load of 15 N/mm² and the data of paragraph 1.2 as part of this Official Certificate.
In this connection the above mentioned bearing reactions

- compression spring 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 Masonry

Calenberg Ciparall Sliding Bearings are manufactured with dimensions and design varieties as shown in tables 1 and 2. Length and width can vary. They depend on the respective stress put on the bearing under use, considering the bearing reactions. The data on properties and characteristics for defined bearing areas as shown in the chapters above, can be used for 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 1045 Concrete and SteelRreinforced 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 –magnituce.

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-852.0290-4, dated 04.03.2003, of the Testing Institute for Mechanical Engineering Materials and Plastics.
The manufacturer has to supervise the production as described in table 7:

Kind 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
Compression-spring-curve For each type of bearing (steel-, GRP reinforced) and thickness	Chapter 2.2.3.1	Once a year
Coefficient of sliding friction Ausführung (one type)	Chapter 2.2.3.5	Once a year
Table 7: Scope of Works Internal Production Control		

4. Conformity Mark

The building product "Calenberg Ciparall Sliding Bearing, steel reinforced as well as Calenberg Ciparall Sliding Bearing, GRP reinforced", has to be marked by the manufacturer with the conformity mark (Ü-mark) according to the conformity mark regulations of the federal states. The Ü-mark together with the prescribed data "Calenberg Ciparall Sliding Bearing, ST" resp. "Calenberg Ciparall Sliding bearing, GRP" , has to be attached to the building products or on their packing (a packing insert is equivalent) or, if this is not possible, to the delivery note.

5. Legal Basis

This Official Certificate is granted based on §§ 25a of the bylaws of the land Niedersachsen in connection with the A-list of building rules, part 2, edition 2002/1, No. 1.2.

6. Instructions on Rights of Appeal

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 Testing Institute for Mechanical Engineering Materials and Plastics.

7. Common Hints

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

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

7.3 The contractor has to have ready the Official Certificate on the building site.

7.4 The Official Certificate is only to be duplicated completely. A publication in extracts needs the agreement of the Testing Institute for Mechanical Engineering Materials 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 by the Testing Institute for Mechanical Engineering Materials and Plastics".

Garbsen, 26.03.2008

Managing Director:

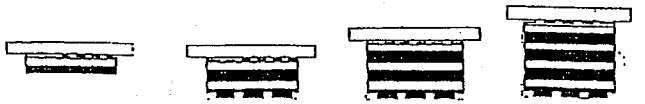
RD Dr.-Ing. Kinzel

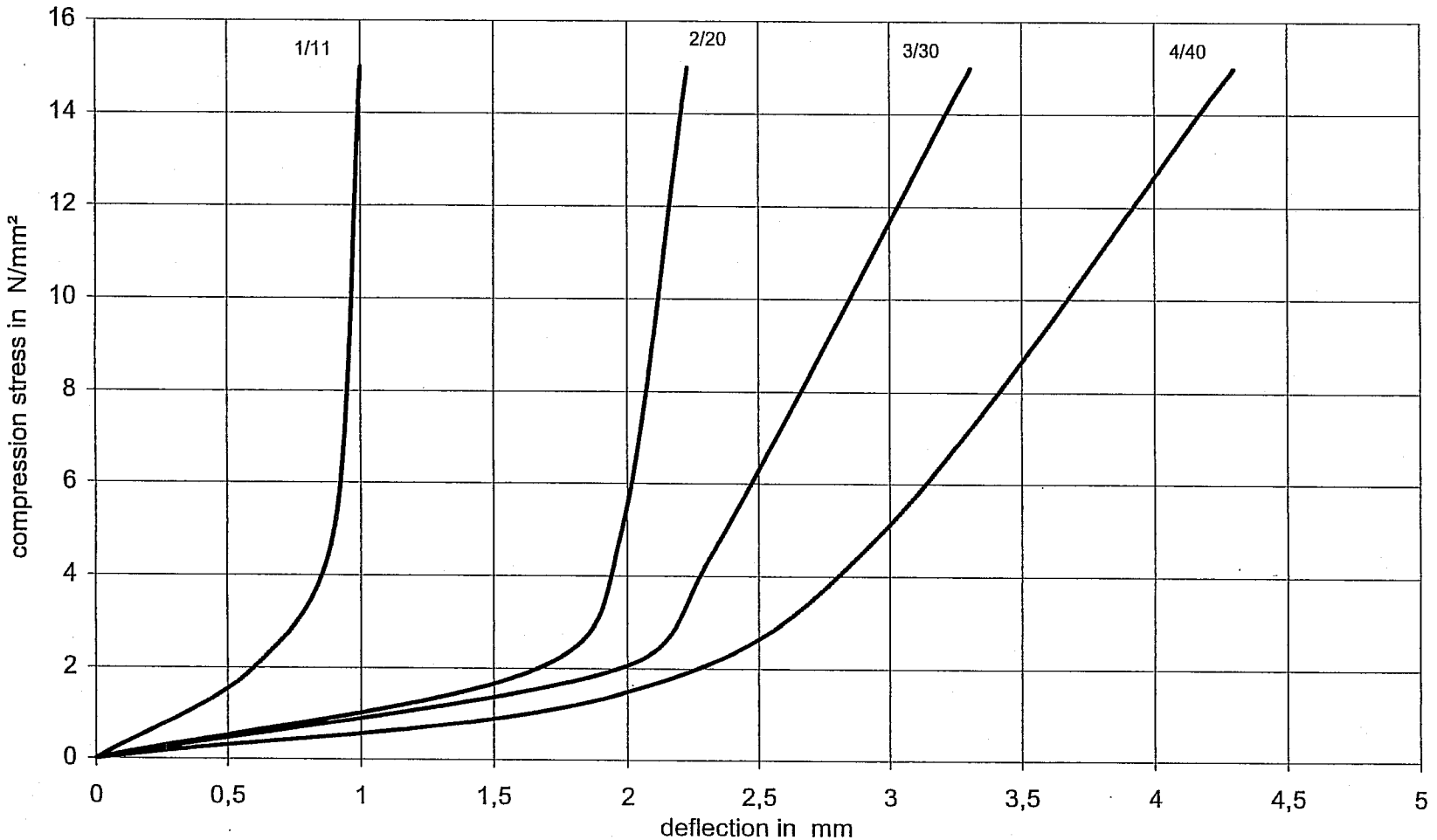
Official in charge:

Dipl.-Ing. Witte

enclosures: Diagrams

P-852.0290-4, compression spring curve,
Calenberg Ciparall Sliding Bearing, steel reinforced, 100 x 100 mm²
test incl. GRP sliding plate
identification: number of steel reinforced plates/thickness of the bearing incl. GRP sliding plate





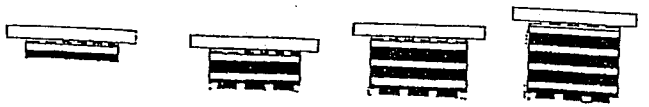
Hannover

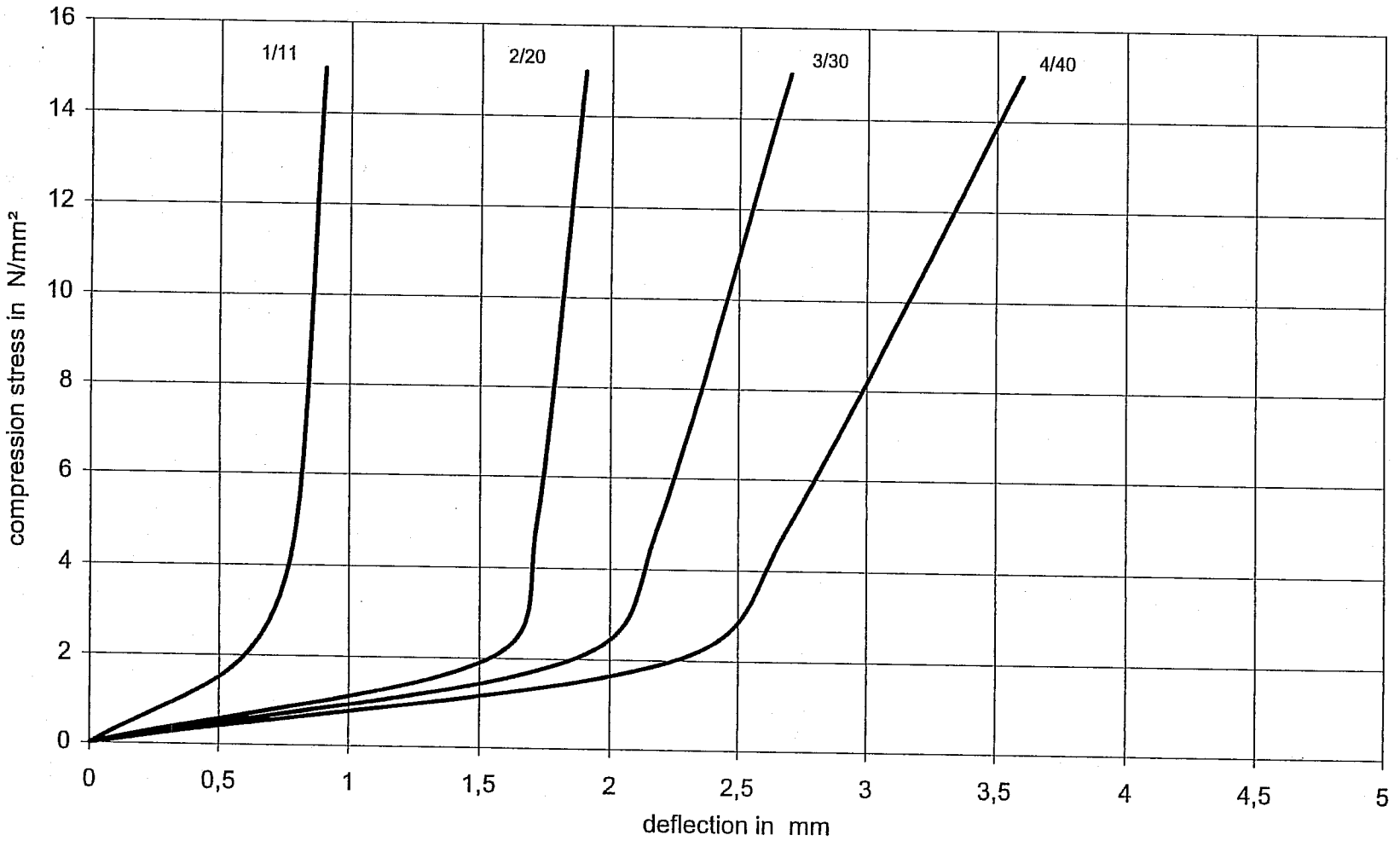
P-852.0290-4, compression spring curve,

Calenberg Ciparall Sliding Bearing, steel reinforced, 150 x 150 mm²

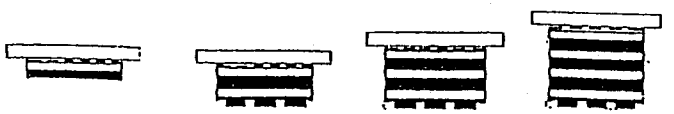
test incl. GRP sliding plate

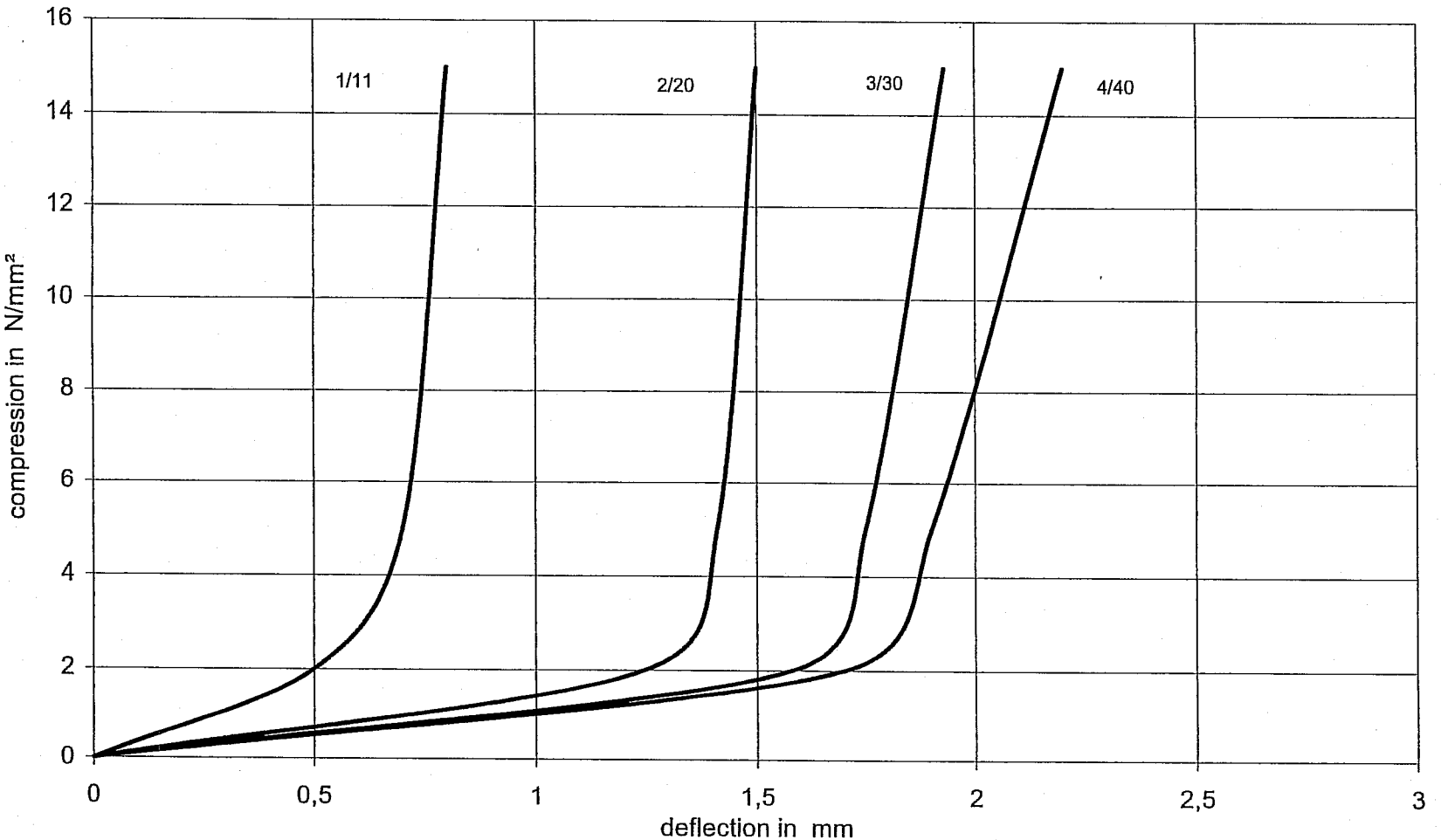
identification: number of steel reinforced plates/thickness of the bearing incl. (





P-852.0290-4, compression spring curve,
Calenberg Ciparall Sliding Bearing, steel reinforced, 250 x 250 mm²
test incl. GRP sliding plate
identification:number of steel reinforced plates/thickness of the bearing incl. GRP sliding plate





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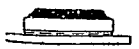
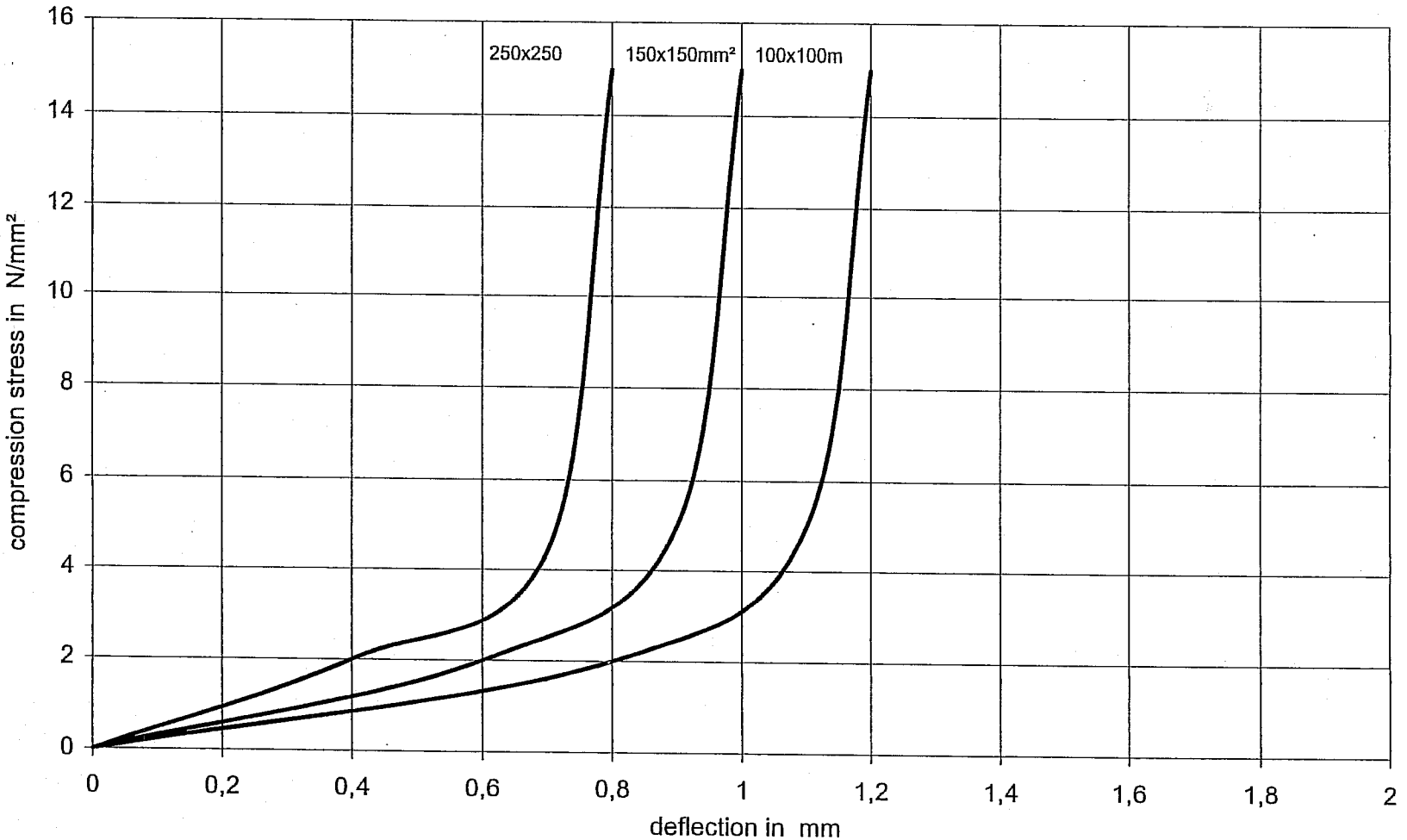
P-852.0290-4, compression spring curve,
Calenberg Ciparall Sliding Bearing GRP reinforced
one reinforcement layer, thickness incl. GRP sliding plate: 14 mm
test incl. GRP sliding plate





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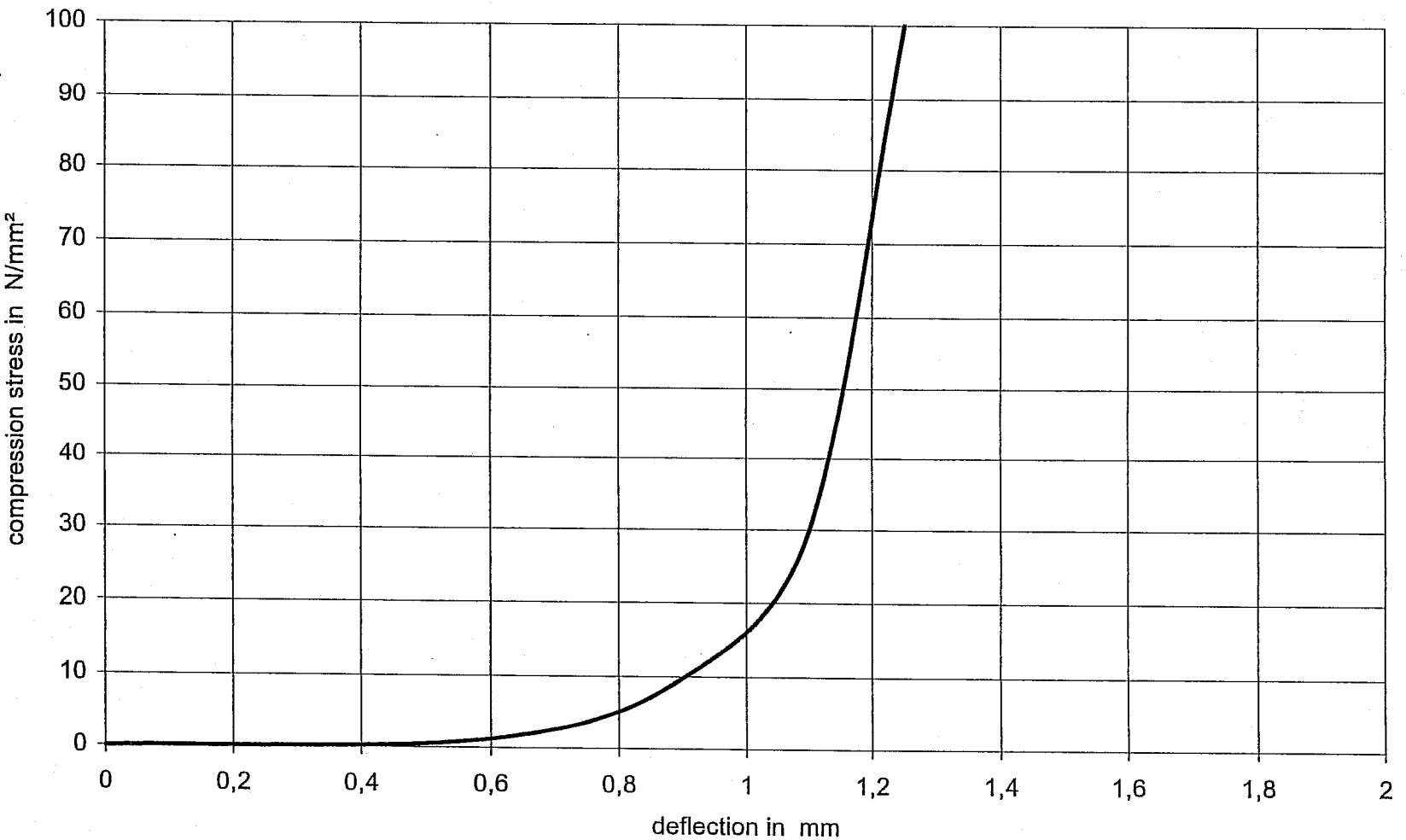
P-852.0290-4, compression failure - spring curve,
Calenberg Ciparall Sliding Bearing, steel reinforced, 100 x 100x 11 mm³
test incl. GRP sliding plate



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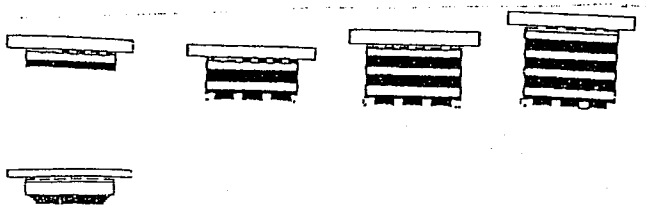
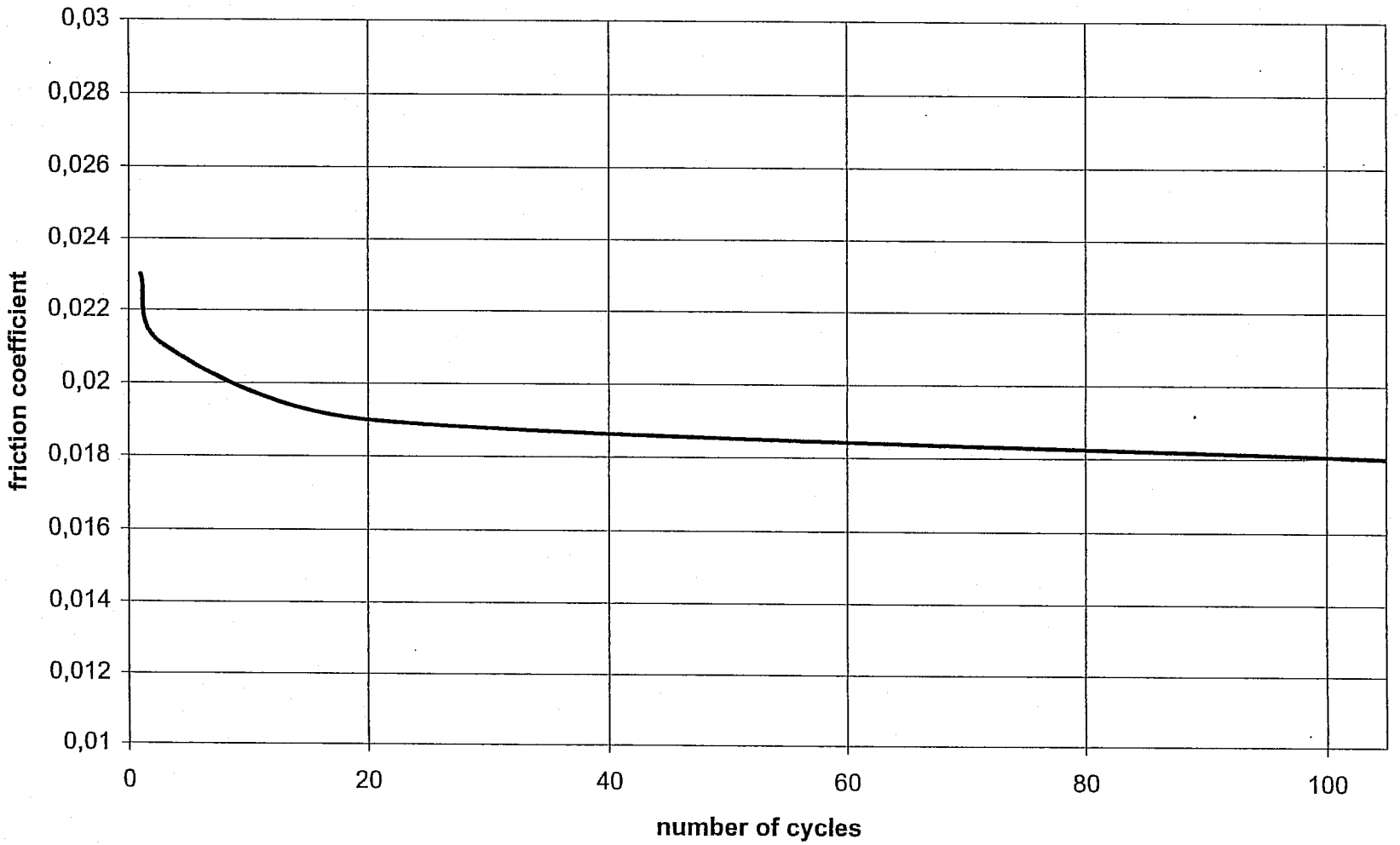
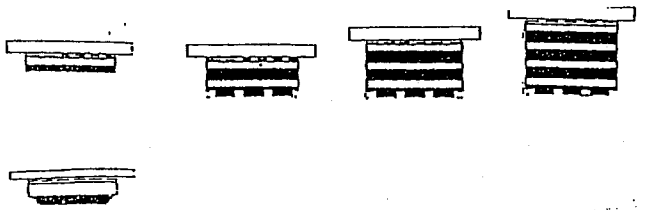
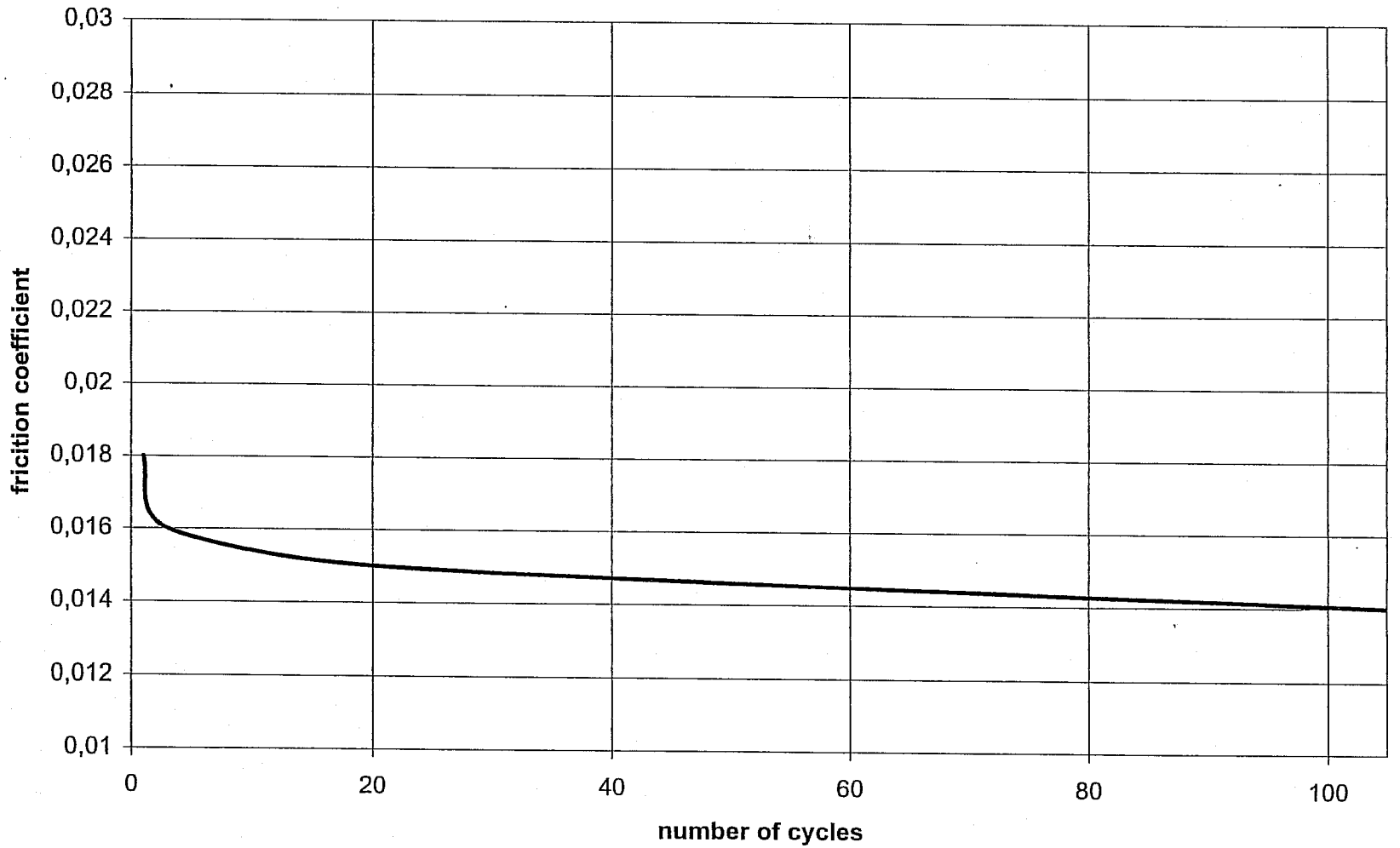


P-852.0290-4, **Calenberg Ciparall Sliding Bearing**
static coefficient of friction at the end of the halt periods
dependant on the number of cycles
(halt periods 4 seconds each, one cycle is 40 mm)





P-852.0290-4, **Calenberg Ciparall Sliding Bearing**
coefficient of sliding friction at the end of the halt periods
depending on the number of cycles
(halt periods 4 second each, one cycle is 40 mm)



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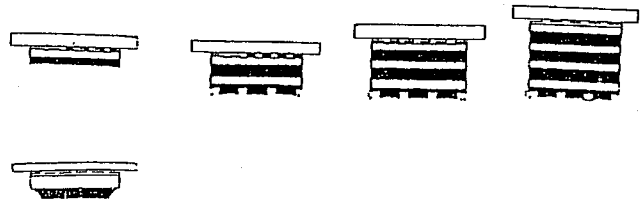
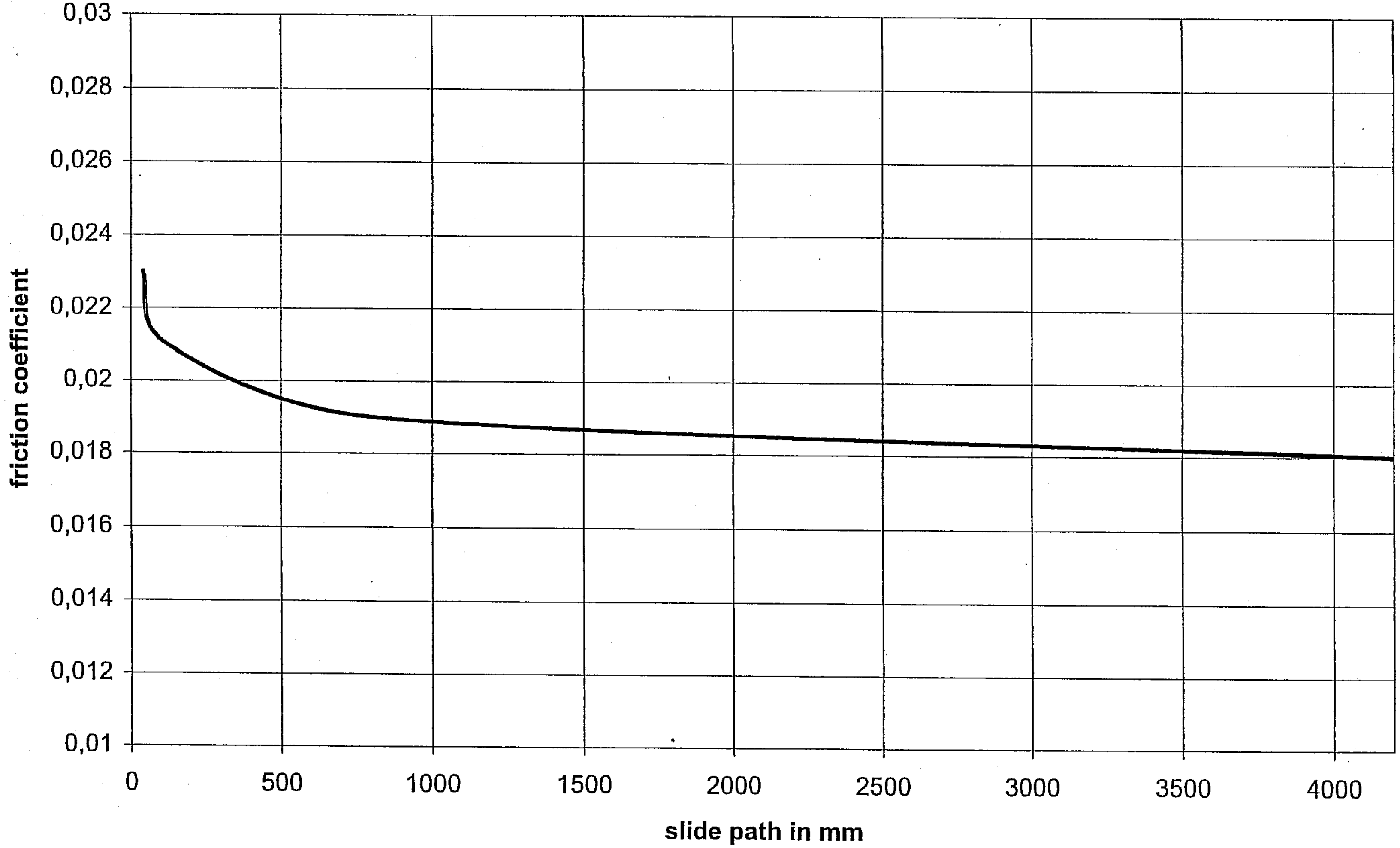
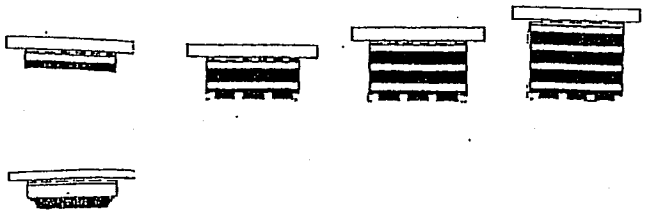
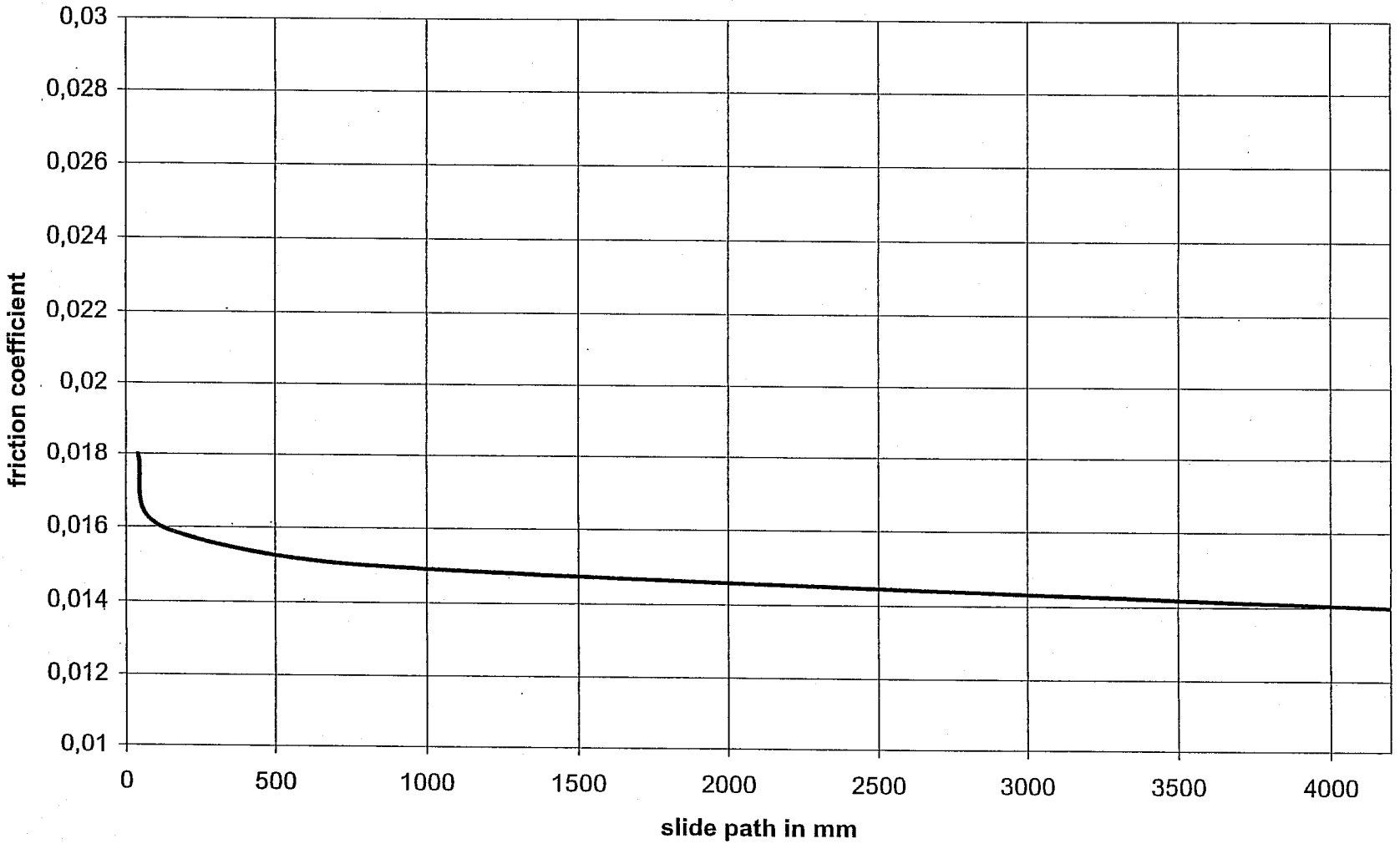
P-852.0290-4, **Calenberg Ciparall Sliding Bearing**
static coefficients of friction at the end of the halt periods
depending on the added up slide path
(halt periods 4 seconds each, one cycle is 40 mm)







P-852.0290-4, **Calenberg Ciparall Sliding Bearing**
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)



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