



BSI Standards Publication

Rubber sheets for livestock — Dairy cattle — Specification

National foreword

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Rubber sheets for livestock — Dairy
cattle — Specification

*Feuille de caoutchouc pour le bétail — Bovins laitiers —
Spécifications*



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Foreword

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This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products (other than hoses)*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Rubber sheets for livestock — Dairy cattle — Specification

1 Scope

This document specifies the characteristics of solid rubber sheets for dairy cattle. These sheets are used in a walking or lying area. This document does not include design of the product.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[ISO 37](#), *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

[ISO 48-4](#), *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 4: Indentation hardness by durometer method (Shore hardness)*

[ISO 188:2011](#), *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

[ISO 815-1:2019](#), *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

[ISO 1817](#), *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

[ISO 3302-1](#), *Rubber — Tolerances for products — Part 1: Dimensional tolerances*

[ISO 4649:2017](#), *Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device*

[ISO 5893](#), *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

walking area

passage or area where cattle walk through in housing and stand for milking

3.2

lying area

area where cattle rest in housing

4 Classification

A rubber sheet is classified into two types depending on the application:

- walking area;

6 Labelling

The product label shall contain the following information:

- a) product name;
- b) product type: walking area or lying area;
- c) size: width, length and thickness;
- d) manufacturer's or supplier's identification;
- e) date of manufacture and/or manufacturer's identifying lot number.

Annex A
(normative)

Liquid resistance

A.1 Chemical reagents

- A.1.1 Ammonia**, 2 % mass fraction aqueous solution.
- A.1.2 Stall disinfectant**, peracetic acid, 3 g/kg aqueous solution.

A.2 Procedure

The preparation and number of test pieces including test procedure shall comply with [ISO 1817](#). The test chemicals include ammonia ([A.1.1](#)) and stall disinfectant ([A.1.2](#)).

The immersion time shall be 7 days \pm 2 h at standard laboratory temperature.

The physical properties concerned in the service application should be mass change (in accordance with [ISO 1817](#)) and hardness change (in accordance with [ISO 48-4](#)).

Annex B (normative)

Deformability

B.1 Apparatus

B.1.1 Compression-testing machine, complying with the requirement of [ISO 5893](#), equipped with means of autographic recording of the force-deformation relationship to an accuracy corresponding to class 1 in respect of force.

B.1.2 Indentors, made of steel. For the walking area test, the indenter consisting of two mounted hoof segments with a standing area of $(75 \pm 5) \text{ cm}^2$ is employed (see [Figure B.1](#)). For the lying area test, the calotte shaped indenter is employed (see [Figure B.2](#)).

NOTE The standing area corresponds to that of a cow's foot.

B.1.3 Support, made of steel for holding the test piece.

Dimensions in millimetres

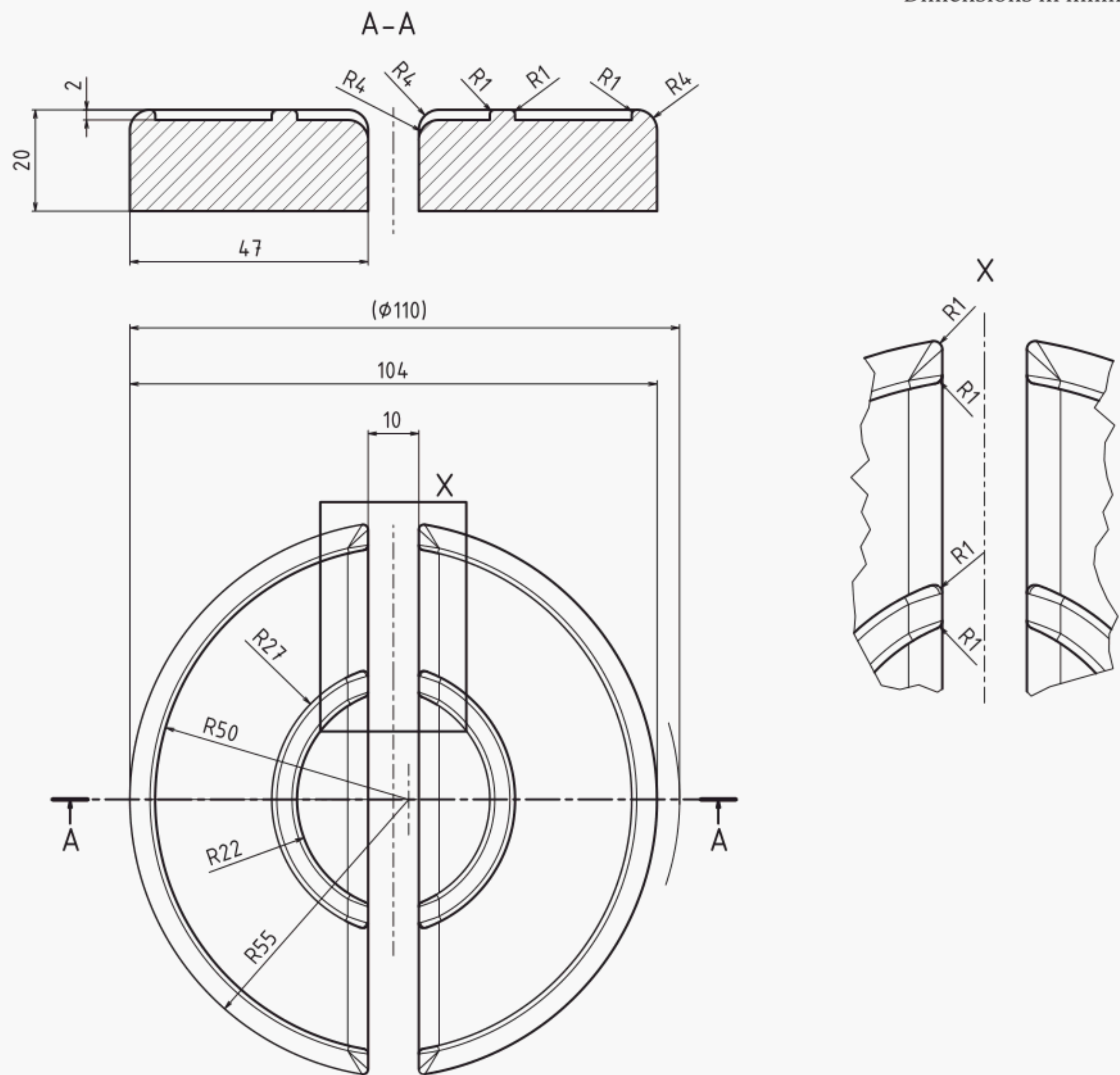


Figure B.1 — Indentor for walking area test

Dimensions in millimetres

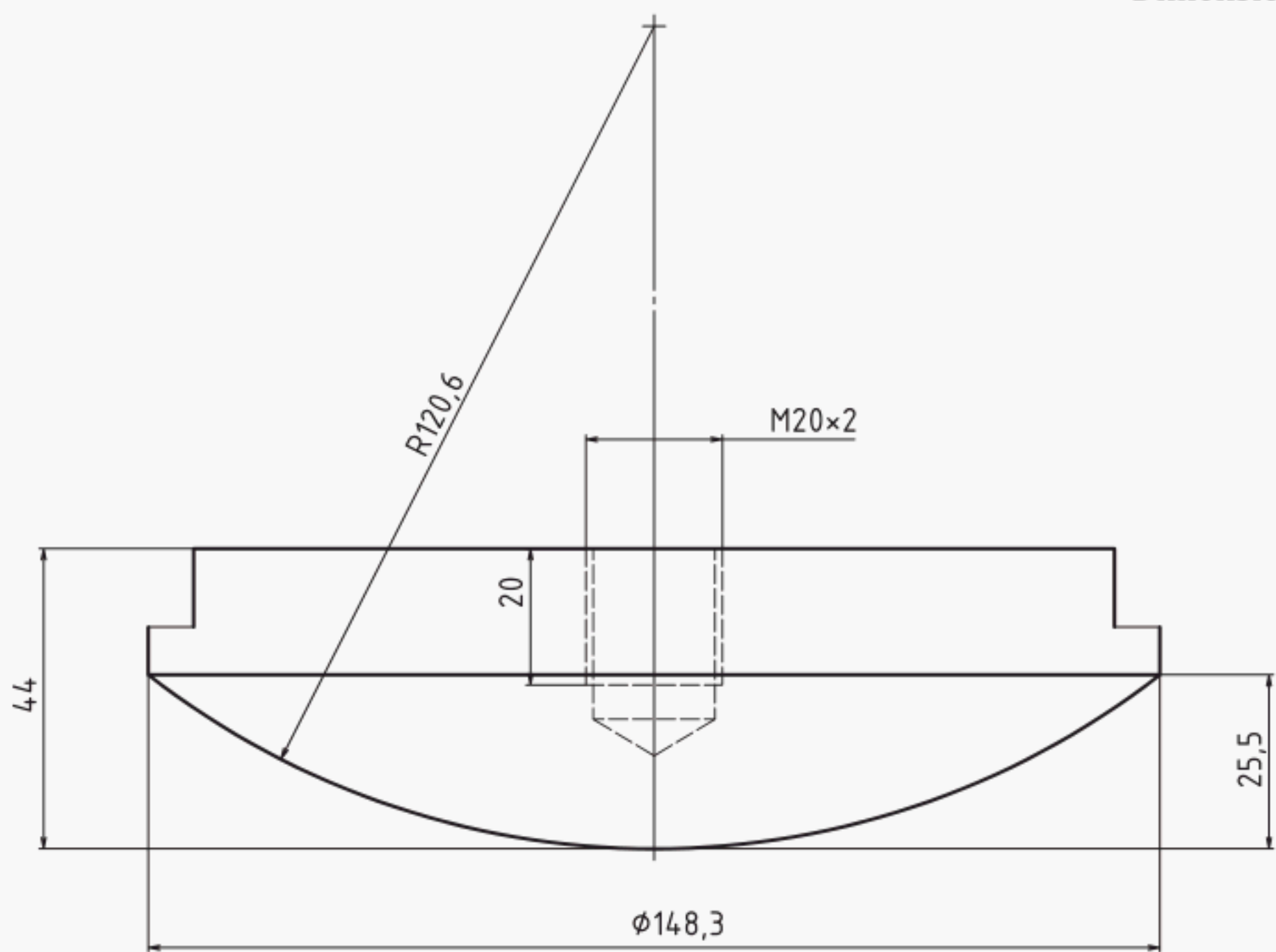


Figure B.2 — Calotte shaped indenter for lying area test

B.2 Test piece

A test piece shall be cut from the product with minimum width and length of 400 mm and 400 mm. At least three test pieces shall be tested.

B.3 Procedure

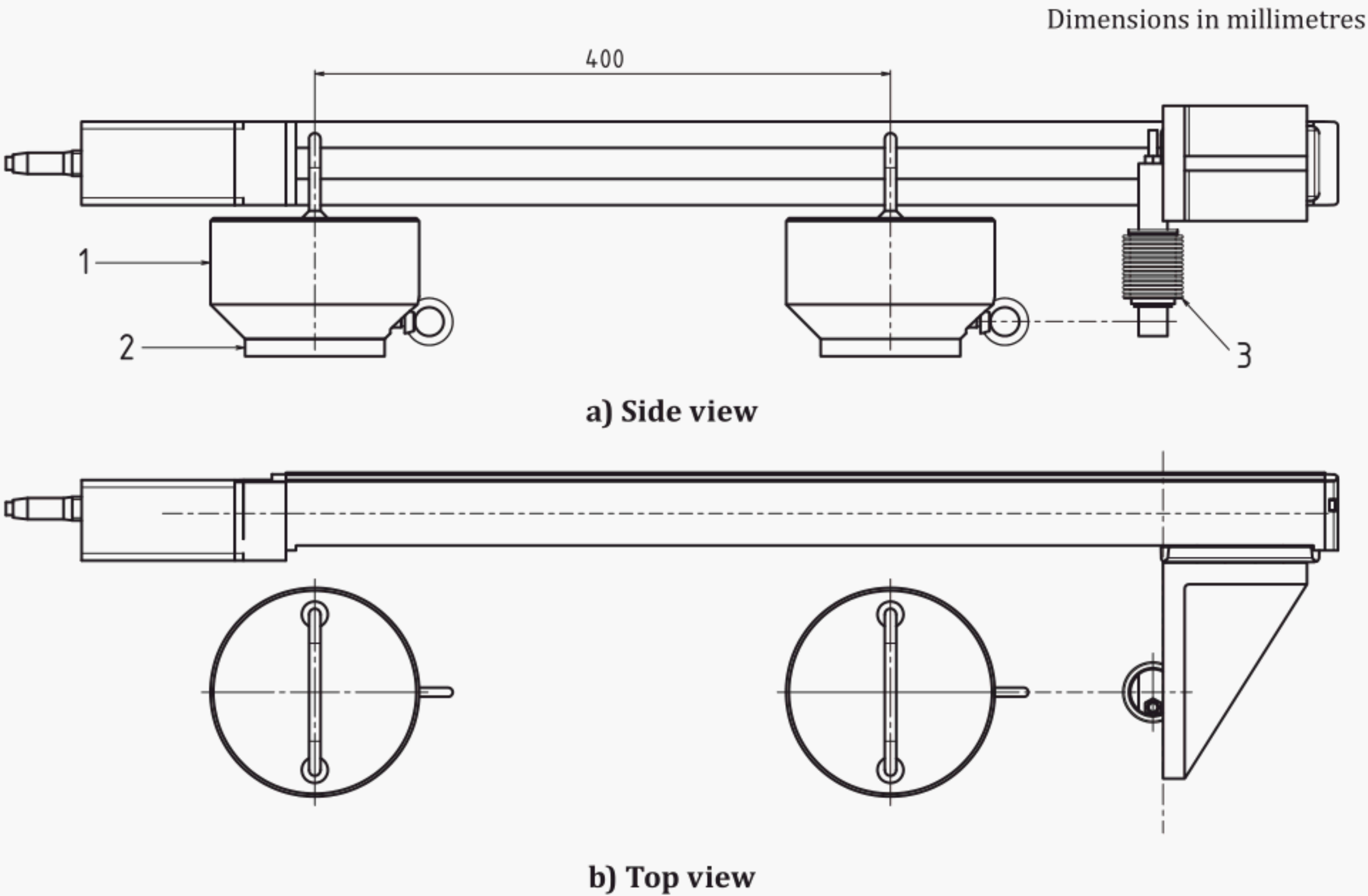
Place the test piece centrally on the support (lower compression platen). Compress the test piece using the indenter (B.1.2) at a speed of 10 mm/min until a compression force of 2 500 N is reached and record the force-deformation curve. Release the strain at the same speed of 10 mm/min and repeat the compression and release cycle three more times. Record the deformation at a compression force of 2 000 N of the fourth cycle. Measurements shall be made at least 125 mm from any edge of the test piece. The median value of three test pieces is reported.

Annex C
(normative)

Slip resistance

C.1 Apparatus

C.1.1 Test device, in accordance with [Figure C.1](#), comprised of a linear unit driven by a servomotor located in a metal frame. A load cell is located on the carriage of the linear unit, which drags the test weight with installed slide over the test piece. The complete measuring electronics for data logging and control are located in a separate housing. This is connected to a PC control and evaluation. The linear unit shall be designed to provide measuring length of 400 mm. The test weight with a mass of 10 kg, having a plastic foot attached to it, is located on the linear unit.



- Key**
- 1 dead load
 - 2 plastic foot
 - 3 driving unit

Figure C.1 — Apparatus for measuring coefficient of friction

C.1.2 Plastic foot, a circular disc with diameter of (97 ± 2) mm and standing area of $(7\,400 \pm 200)$ mm² made from polyamide with hardness (80 ± 2) Shore D. On its edge, a 3 mm wide ring with outer diameter

equal to the diameter of the disc is protruded 1 mm over the remaining area. The weight of this polyamide foot shall be $0,10 \text{ kg} \pm 0,02 \text{ kg}$.

NOTE A supporting edge similar to a cow's hoof is simulated by the ring.

C.2 Test piece

A test piece shall be cut from the product with minimum width and length of 600 mm and 600 mm. Testing may also be carried out on permanently laid/installed products.

C.3 Procedure

The plastic foot is drawn horizontally over the test piece while loaded with a mass of 10 kg at a speed of 20 mm/s. This process shall be carried out in dry and wet conditions. In the wet condition, the test piece shall be fully wetted with water. If necessary, the surface shall be degreased beforehand by using suitable aids. At least three measurements shall be carried out in the dry and wet conditions. The force acting horizontally on the foot is recorded with a load cell.

C.4 Expression of results

The coefficient of friction, μ , is calculated as the root mean square measured force on the horizontal plane divided by the normal force. The coefficient of friction is indicated as a dimensionless number, rounded to 0,01. The median value shall be reported.

Bibliography

[1] [ISO 23529](#), *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

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