
**Rubber sheets for livestock — Dairy
cattle — Specification**

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

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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;

— lying area.

5 Requirements

5.1 General

Under visual inspection, the rubber sheets shall be free from any visual defects such as foreign materials, holes, blisters, porosity and indentations that may adversely affect performance and appearance.

5.2 Dimensions

The length, width and thickness of the rubber sheets shall be agreed between the interested parties. The tolerances of all dimensions shall conform to ISO 3302-1, class M4.

At least three measurements of each dimension shall be determined, and the median value of each dimension reported.

5.3 Physical properties

The physical properties of rubber sheets shall comply with the requirements given in [Table 1](#).

The nominal hardness of the rubber sheets shall be as agreed between the purchasers and the manufacturers with tolerance ± 5 Shore A.

Table 1 — Physical property requirements

Physical properties	Requirement		Test method
	Walking area	Lying area	
Hardness, Shore A	50 to 80	50 to 80	ISO 48-4
Tensile strength, MPa, min.	3	3	ISO 37, dumbbell type 1
Elongation at break, %, min.	80	80	ISO 37, dumbbell type 1
After accelerated-ageing test			ISO 188:2011, method A, (70 $\pm$ 1) °C, (72 $\pm$ 2) h
— Change in hardness, Shore A, max.	± 5	± 5	
— Change in tensile strength, %, max.	± 20	± 20	
— Change in elongation at break, %, max.	± 30	± 30	
Abrasion resistance, mm ³ , max.	300	300	ISO 4649:2017, method A
Compression set, %, max.	40	25	ISO 815-1:2019, method A (70 $\pm$ 1) °C, 24 $\frac{0}{-2}$ h
Liquid resistance, %, max.			Annex A
— Change in hardness	± 20	± 20	
— Change in mass	± 20	± 20	
Deformability, mm	1,0 to 9,0	$\geq 5,0$	Annex B
Slip resistance, coefficient of friction (both wet and dry conditions)	$\geq 0,40$	$\geq 0,40$	Annex C

6 Labelling

The product label shall contain the following information:

- product name;
- 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.

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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

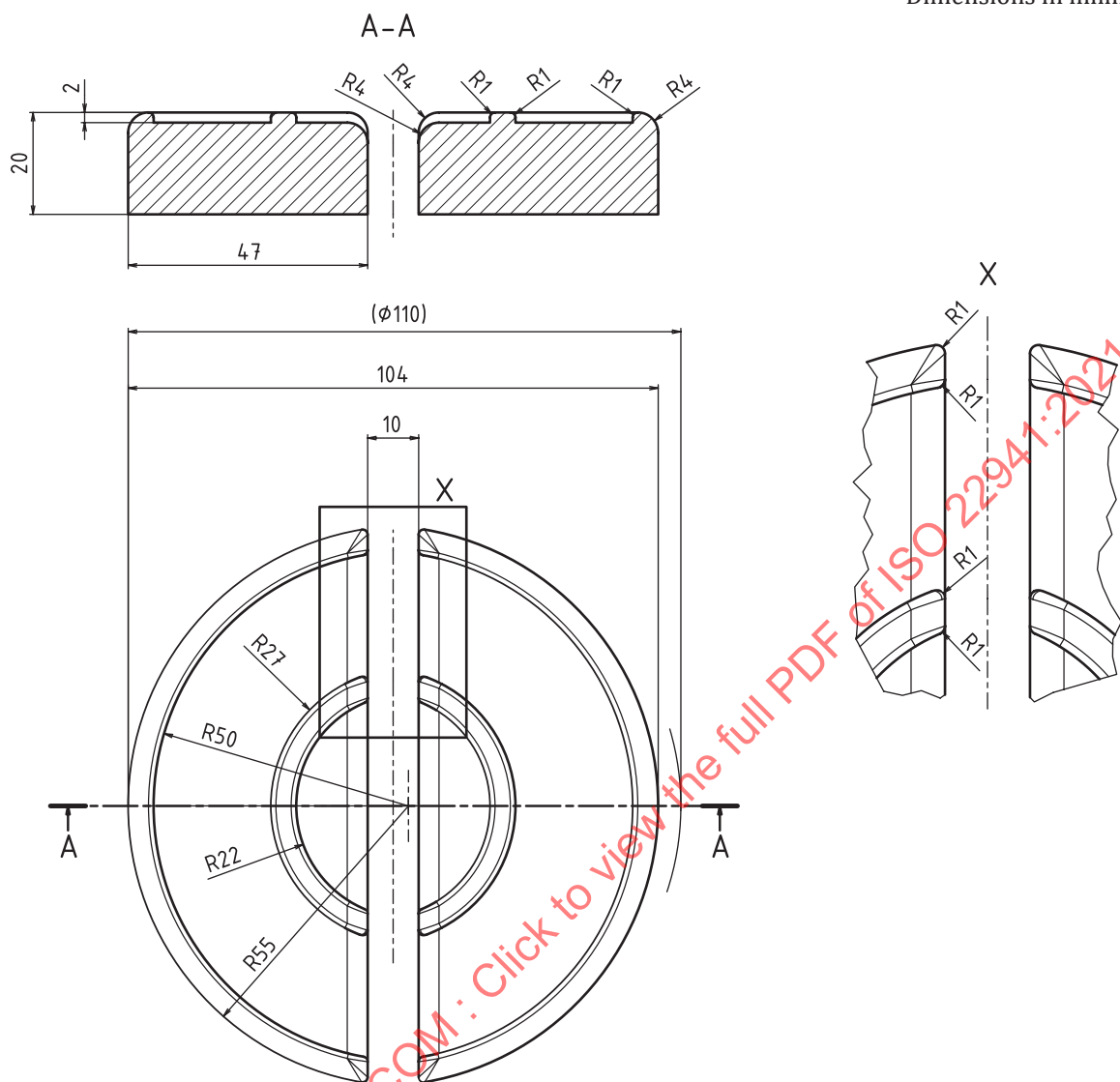


Figure B.1 — Indenter for walking area test



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.

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.

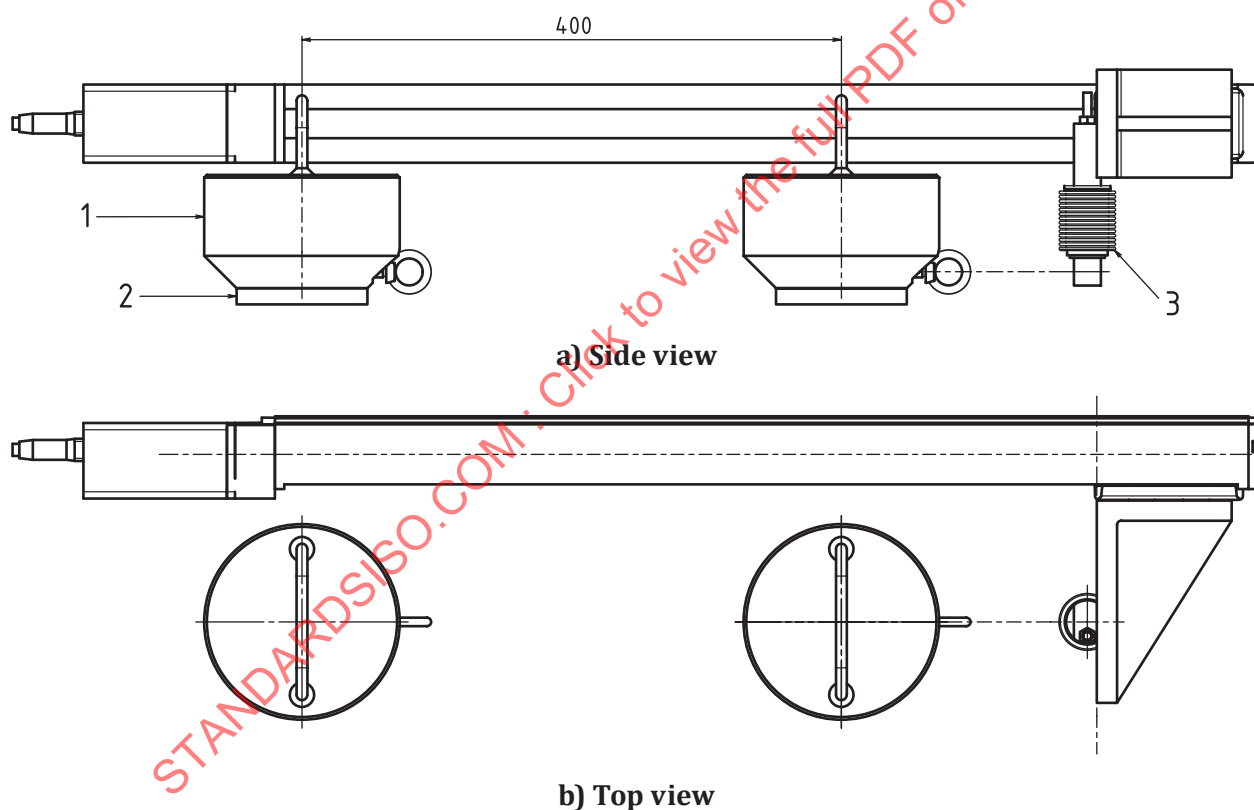
Annex C (normative)

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.

Dimensions in millimetres



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