INTERNATIONAL STANDARD

IEC 60335-2-70

Second edition
2002-03

Household and similar electrical appliances – Safety –

Part 2-70: Particular requirements for milking machines

Appareils électrodomestiques et analogues – Sécurité –

Partie 2-70: Règles particulières pour les machines à traire

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-70: Particular requirements for milking machines

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This part of International Standard IEC 60335 has been prepared by sub-committee 61H: Safety of electrically-operated farm appliances, of IEC technical committee 61: Safety of household and similar electrical appliances.

This second edition cancels and replaces the first edition published in 1993. It constitutes a technical revision.

The text of this part of IEC 60335 is based on the following documents:

FDIS	Report on voting
61H/164/FDIS	61H/169/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above Table.

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the fourth edition (2001) of that standard.

NOTE 1 When “Part 1” is mentioned in this standard, it refers to IEC 60335-1.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert that publication into the IEC standard: Safety requirements for milking machines.

When a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

NOTE 2 The following numbering system is used:

– subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
– unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
– additional annexes are lettered AA, BB, etc.

NOTE 3 The following print types are used:

– requirements: in roman type
– *test specifications: in italic type*
– notes: in small roman type.

Words in **bold** in the text are defined in Clause 3. When a definition concerns an adjective, the adjective and associated noun are also in bold.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

The following differences exist in the countries indicated below:

– 25.7: Ordinary PVC sheathed supply cords are permitted (Australia, New Zealand).

INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features which impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY –

Part 2-70: Particular requirements for milking machines

1 Scope

This clause of Part 1 is replaced by the following.

This International Standard deals with the safety of **milking machines,** to be used in stalls and in the open, that are designed for milking farm animals, such as cows, the **rated voltage** of the **milking machine** being not more than 250 V for single-phase operation and 480 V for other operations.

NOTE 101 Examples of such machines are:

– bucket **milking machines**;

– direct-to-can **milking machines**;

– milking **pipeline machines**;

– recorder **milking machines**;

– independent air and milk transport **milking machines**.

NOTE 102 A detailed description of the types of **milking machines** covered by this standard is given in ISO 3918 and is indicated in Annex AA.

NOTE 103 The upper limit for the **rated voltage** of 250 V single-phase may be exceeded in cases where 480 V split-phase motors are required.

NOTE 104 This standard applies to milking **sub-assemblies** supplied by one manufacturer to form a complete **milking machine.** It can be used as guidance for the safety of **milking machines** formed from **sub-assemblies** supplied by different manufacturers.

NOTE 105 Attention is drawn to the fact that:

– for **milking machines** intended to be used in vehicles or on board ships, additional requirements may be necessary;

– in many countries, additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, the national water supply authorities and similar authorities.

2 Normative references

This clause of Part 1 is applicable.

3 Definitions

This clause of Part 1 is applicable except as follows.

3.1.9 *Replacement:*

normal operation

– **vacuum pumps** and those of a **pulsation system** are operated at **rated vacuum** during continuous operation;

– releaser milk pumps are operated with the vacuum system being operated at **rated vacuum** of the **vacuum pump**;

– during milking the **vacuum pump,** the **pulsation system** and the **releaser milk pump are** operated continuously according to the manufacturer's instructions,

– during cleaning the **vacuum pump,** the **pulsation system** and the **releaser milk pump** and cleaning system are operated continuously according to the manufacturer's instructions

3.101
sub-assembly
part that in association with other parts, forms a complete **milking machine**

3.102
milking machine
complete machine installation for milking, usually comprising vacuum and pulsation systems, one or more clusters and other components

3.103
milking unit
assembly of **milking machine** components that is replicated in an installation so that more than one animal may be milked at one time

3.104
vacuum pump
air pump that produces a vacuum in the system

3.105
pulsation system
system in which cyclic pressure changes, initiated either pneumatically or electrically, are produced in the chambers of the **milking units**

3.106
releaser milk pump
device for pumping milk out of the vacuum system

3.107
rated vacuum
vacuum assigned to the **vacuum pump** or pulsation system by the manufacturer

4 General requirement

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.2 *Addition:*

*The manufacturer shall provide a suitable test-assembly and installation instructions to enable the **milking machine** or its **sub-assemblies** to be tested.*

5.101 *Where tests are specified in this standard that require the **milking machine** to be operated under **normal operation,** the tests are to be carried out for each of the **normal operation** conditions given for milking and cleaning operations.*

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 *Replacement*

Milking machines or **sub-assemblies** shall be of **class I, class II** or **class III**. with respect to protection against electric shock.

Class III milking machines or **sub-assemblies** shall have a **rated voltage** not exceeding 24 V.

Compliance is checked by inspection and by the relevant tests.

6.2 *Addition:*

Parts of a **milking machine** or **sub-assembly** that contain electrical components and that may be cleaned with a water jet according to the instructions, shall be at least IPX6. Other electrical parts shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 *Addition:*

Milking machines or **sub-assemblies** that are not marked IPX6 and that are installed according to the manufacturer's instructions, in areas where water jet cleaning is likely, shall be marked with the following:

DO NOT HOSE

Vacuum pumps and pulsation systems shall be marked with the **rated vacuum** in kPa.

7.12 *Addition:*

The **milking machine** shall be furnished with instructions that contain all details necessary for maintaining and operating the machine and for replacing spare parts. In particular, details shall be given of:

– on how to clean the **milking machine** assembly on completion of installation;
– the frequency of maintenance procedures and details of all parts requiring replacement or adjustment;
– the reference numbers of all parts and, where applicable, **sub-assemblies** used in the installation.

The manufacturers of **sub-assemblies** shall provide appropriate instructions for user maintenance of their **sub-assemblies.**

7.12.1 *Addition:*

The manufacturer of the **milking machine** shall provide instructions that shall include the substance of the following:

– a wiring diagram;
– that the installation shall be integrate into an effective equipotential bonding system;

– that parts which are not marked IPX6 shall be installed in a location where they are not likely to be cleaned with the aid of a high pressure water jet;

– that the installation is to be installed according to the relevant section of the wiring rules.

NOTE 101 Attention is drawn to IEC 60364-7-705.

The manufacturers of **sub-assemblies** shall provide appropriate instructions for installation of their **sub-assemblies.**

7.15 *Addition:*

Each separate **sub-assembly** shall be marked with the relevant markings.

8 Protection against access to live parts

This clause of Part 1 is applicable.

9 Starting of motor-operated appliances

This clause of Part 1 is not applicable.

10 Power input and current

This clause of Part 1 is applicable.

11 Heating

This clause of Part 1 is applicable except as follows.

11.7 *Replacement:*

Appliances are operated as follows

– *during milking, until steady conditions are established;*

– *during cleaning, for the maximum time specified in the instructions.*

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable.

16 Leakage current and electric strength

This clause of Part 1 is applicable.

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

This clause of Part 1 is not applicable.

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.1 *Addition:*

The tests of 19.2 and 19.3 are replaced by the test of 19.101.

19.7 *Addition:*

*Moving parts of **vacuum pumps** are locked as long as is necessary to obtain steady conditions.*

19.101 *The **milking machine** is operated under **normal operation** and supplied at **rated voltage**.*

Any operation, or any defect that may be expected in normal use is applied. Only one fault condition is reproduced at a time, the tests being made consecutively. During the tests, the temperature of windings shall not exceed the values shown in Table 8.

NOTE 1 Examples of fault conditions are:

– a programme controller stopping in any position;
– disconnection and reconnection of one or more phases of the supply during any part of the programme;
– open-circuiting or short-circuiting of electrical components such as resistors, capacitors, inductors and the like;
– failure of magnetic valves;
– disconnection of the water supply;
– disconnection of the cleaning-water supply.

NOTE 2 In general, tests are limited to those cases *that* may be expected to give the most unfavourable results.

NOTE 3 For the purpose of these tests, thermal controls are not short-circuited.

20 Stability and mechanical hazards

This clause of Part 1 is applicable.

21 Mechanical strength

This clause of Part 1 is applicable except as follows.

21.1 *Modification:*

The impact energy is increased to 1 ± 0,1 J.

22 Construction

This clause of Part 1 is applicable except as follows.

22.1 *Addition:*

Enclosures of motors that are intended for installation in non-milking areas where a dusty environment exists shall be at least of IP4X construction. Enclosures of other electrical parts intended to be installed in such areas shall be at least of IP5X construction.

22.33 *Addition:*

NOTE 101 Liquids in **milking machines** are regarded as accessible conducting liquids.

23 Internal wiring

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable

25 Supply connection and external flexible cords

This clause of Part 1 is applicable except as follows.

25.7 *Replacement:*

Supply cords shall not be lighter than ordinary polychloroprene sheathed cord (code designation 60245 IEC 57).

Compliance is checked by inspection.

26 Terminals for external conductors

This clause of Part 1 is applicable.

27 Provision for earthing

This clause of Part 1 is applicable except as follows.

27.2 *Addition:*

Milking machines and their **sub-assemblies** shall be provided with a terminal for the connection of an external equipotential bonding conductor. This terminal shall be in effective contact with all fixed exposed metal parts of the **milking machine** or **sub-assembly,** and shall allow the connection of a conductor having a cross-sectional area of up to 10 mm². It shall be located in a position convenient for the connection of the bonding conductor after installation of the **milking machine** or its **sub-assemblies.**

NOTE 101 Small fixed exposed metal parts, for example name plates and the like, are not required to be in electrical contact with the terminal.

28 Screws and connections

This clause of Part 1 is applicable.

29 Clearances, creepage distances and solid insulation

This clause of Part 1 is applicable.

30 Resistance to heat and fire

This clause of Part 1 is applicable except as follows.

30.2.2 Not applicable

31 Resistance to rusting

This clause of Part 1 is applicable.

32 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

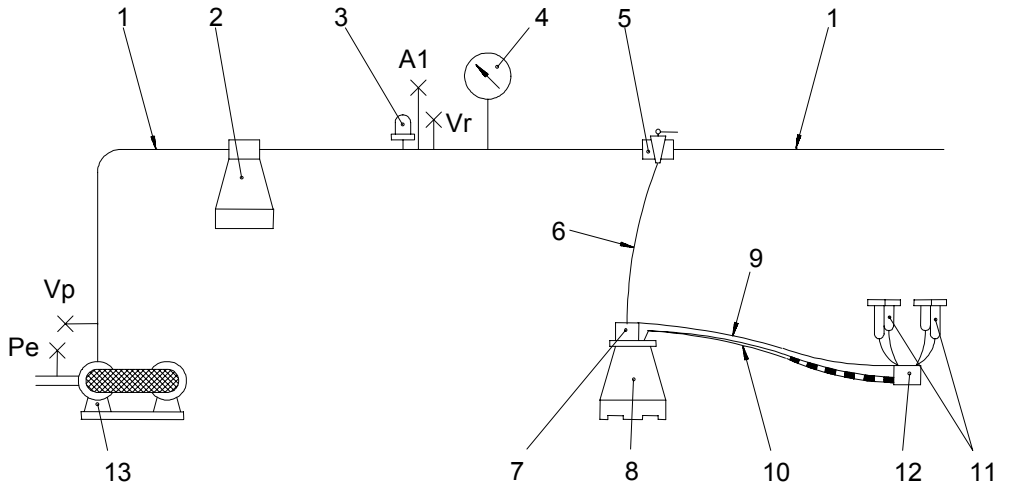
Annexes

The annexes of Part 1 are applicable except as follows.

Annex AA
(informative)

Examples of milking machines

Extract from ISO 3918.

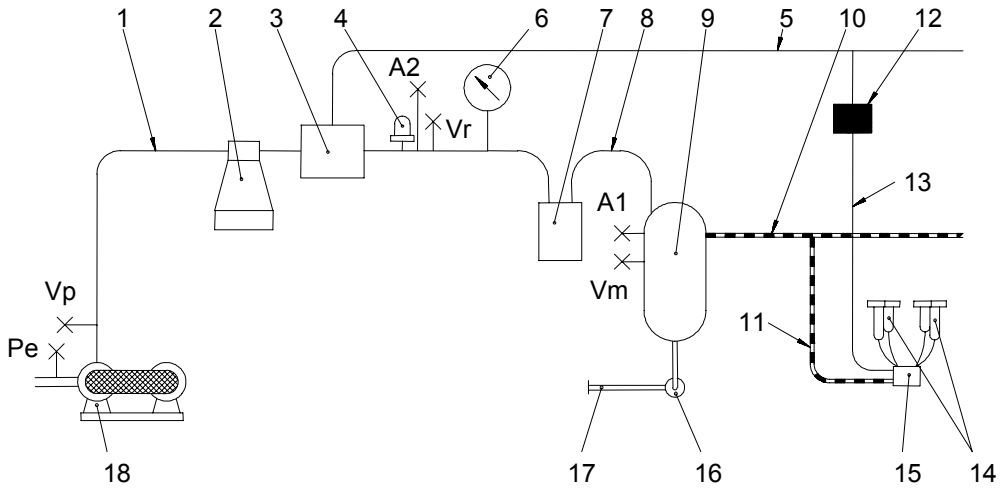


Key

1 Airline
2 Interceptor
3 Regulator
4 Vacuum gauge
5 Vacuum tap
6 Vacuum tube
7 Pulsator
8 Bucket or transport can
9 Long pulse tube
10 Long milk tube
11 Teatcups
12 Claw
13 Vacuum pump

A1 Connection point for air flow meter
Vr, Vp Connection points for measuring vacuum
Pe Connection point for measuring exhaust pressure

Figure AA.1 – Example of a bucket or direct-to-can milking machine



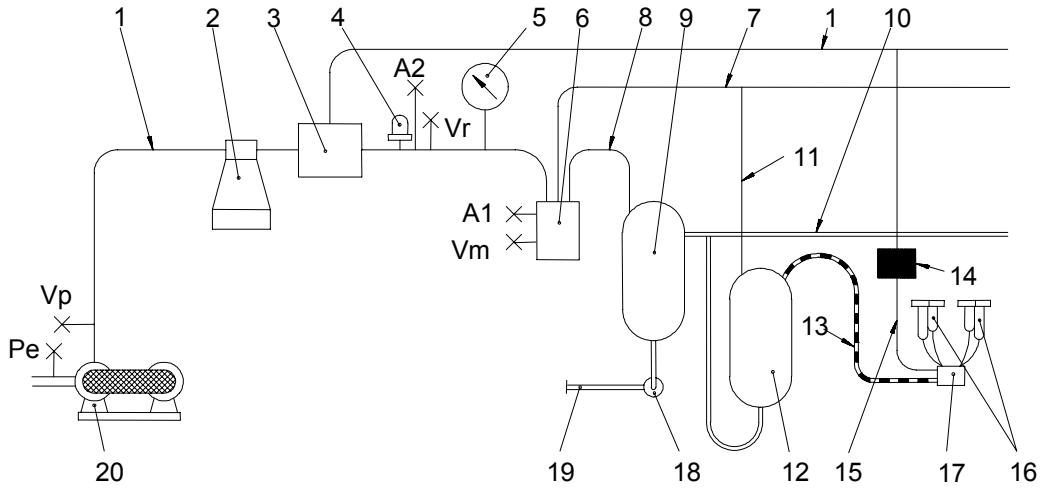
IEC 809/02

Key

1 Main airline
2 Interceptor
3 Distribution tank (optional)
4 Regulator
5 Pulsator airline
6 Vacuum gauge
7 Sanitary trap
8 Receiver airline
9 Receiver
10 Milkline
11 Long milk tube
12 Pulsator
13 Long pulse tube
14 Teatcups
15 Claw
16 Releaser milk pump
17 Delivery line
18 Vacuum pump

A1, A2	Connection points for air flow meter
Vm, Vr, Vp	Connection points for measuring vacuum
Pe	Connection point for measuring exhaust pressure

Figure AA.2 – Example of a pipeline milking machine



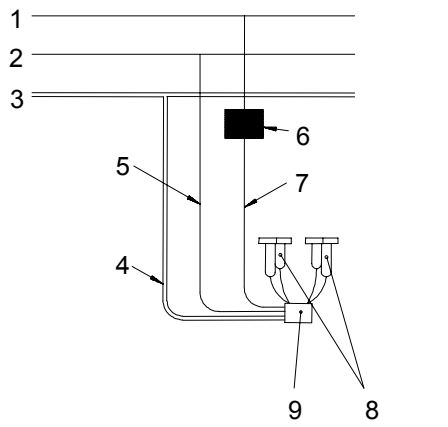
IEC 810/02

Key

1 Main airline
2 Interceptor
3 Distribution tank (optional)
4 Regulator
5 Vacuum gauge
6 Sanitary trap
7 Milking vacuum line
8 Receiver airline
9 Receiver
10 Milk transfer line
11 Milking vacuum tube
12 Recorder jar
13 Long milk tube
14 Pulsator
15 Long pulse tube
16 Teatcups
17 Claw
18 Releaser milk pump
19 Delivery line
20 Vacuum pump

A1, A2	Connection points for air flow meter
Vm, Vr, Vp	Connection points for measuring vacuum
Pe	Connection point for measuring exhaust pressure

Figure AA.3 – Example of a recorder milking machine



IEC 811/02

Key

1 Pulsator airline
2 Milking vacuum line
3 Milk transfer line
4 Long milk tube
5 Milking vacuum tube
6 Pulsator
7 Long pulse tube
8 Teatcups
9 Claw

Figure AA.4 – Example of an independent air and milk transport milking machine

Bibliography

The bibliography of Part 1 is applicable except as follows.

Addition:

IEC 60364-7-705:1984, *Electrical installations of buildings – Part 7: Requirements for special installations or locations – Section 705: Electrical installations of agricultural and horticultural premises*

ISO 3918:1996, *Milking machine installations – Vocabulary*

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not at all ❑
nearly ❑
fairly well ❑
exactly ❑

Q6 If you ticked NOT AT ALL in Question 5 the reason is: *(tick all that apply)*

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standard is incomplete ❑
standard is too academic ❑
standard is too superficial ❑
title is misleading ❑
I made the wrong choice ❑
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