ANSI/ASABE AD20966:2007 MAR2016
Automatic milking installations — Requirements and testing

American Society of Agricultural and Biological Engineers

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Automatic milking installations — Requirements and testing

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ISO 20966, Automatic milking installations — Requirements and testing, was created with consultation of US and ASABE experts to integrate with other milking machine standards. Adoption with deviations of the ISO document proposed by the ASABE Milk Handling Equipment Committee, approved by the Information and Electrical Technologies Division and adopted by ASABE January 2011; approved by ANSI February 2011; revised March 2016; revision approved March 2016.

Keywords: Automatic milking, Dairy, Milking, Milking machine, Robotic milking

0 Foreword

0.1 ANSI/ASABE AD20966:2007 MAR2016, Automatic milking installations — Requirements and testing, is an adoption with deviations of the identically titled ISO Standard ISO 20966:2007, Automatic milking installations — Requirements and testing. Deviations noted in the following Foreword sections pertain to those provisions where harmonization could not be achieved between ASABE and the International Standard.

0.2 ANSI/ASABE AD 20966:2007 MAR2016 specifies requirements for the construction of automatic milking installations (AMI), including specific safety and hygiene aspects and minimum performance requirements and testing, in addition to those described in ISO 5707 and ISO 6690. ISO 5707 has been adopted with deviations by ASABE as ANSI/ASABE AD5707:2007 and ISO 6690 has been adopted with deviations by ASABE as ANSI/ASABE AD6690:2007.

It does not contain requirements for the design of the building in which the milking installation is installed.

0.3 Twenty-one Normative references are listed in ISO 20966:2007. The responsible ASABE committee has reviewed these references and approves the following deviations:

0.3.1 Replace ISO 3918, Milking machine installations — Vocabulary; with ANSI/ASABE AD3918:2007, Milking machine installations — Vocabulary. Any reference to ISO 3918 in the printed portion of ISO 20966 shall be replaced by ANSI/ASABE AD3918:2007.

0.3.2 Replace ISO 5707, Milking machine installations — Construction and performance; with ANSI/ASABE AD5707:2007, Milking machine installations — Construction and performance. Any reference to ISO 5707 in the printed portion of ISO 20966 shall be replaced by ANSI/ ASABE AD5707:2007.

0.3.3 Replace IEC 60227-1, Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V — Part 1: General requirements; with National Electrical Code, published by the National Fire Protection Association.

0.3.4 Replace IEC 60245-1, Rubber insulated cables — Rated voltages up to and including 450/750 V — Part 1: General requirements; with National Electrical Code, published by the National Fire Protection Association.

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0.3.5 Replace IEC 60947-4-1, Low-voltage switchgear and control gear — Part 4-1: Contactors and motor starters — Electromechanical contactors and motor starters; with National Electrical Code, published by the National Fire Protection Association.

0.3.6 Replace IEC 61800-1, Adjustable speed electrical power drive systems — Part 1: General requirements — Rating specifications for low-voltage adjustable speed d. c. power drive systems; with National Electrical Code, published by the National Fire Protection Association.

0.3.7 Remove EN 13732, Food processing machinery — Bulk milk coolers on farms — Requirements for construction, performance, suitability for use, safety and hygiene.

0.3.8 Add the following Normative References:

- ANSI/ASAE S493.1, Guarding for Agricultural Equipment
- ANSI/ASABE AD6690:2007, Milking machine installations — Mechanical tests. NOTE: Defer to manufacturers recommendations for effective reserve calculations and test methods for AMI systems.
- 3-A Sanitary Standards, Inc. 3-A 63--, Sanitary Fittings for Milk and Milk Products
- 3-A Sanitary Standards, Inc. 3-A 33--, Sanitary Standards for Polished Metal Tubing for Dairy Products
- 3-A Sanitary Standards, Inc. 3-A 2--, Sanitary Standards for Centrifugal and Positive Rotary Pumps for Milk and Milk Products
- 3-A Sanitary Standards, Inc. 3-A 18--, Multiple-use Rubber and Rubber-like Materials Used as Product Contact Surfaces in Dairy Equipment
- 3-A Sanitary Standards, Inc. 3-A 20--, Multiple-use Plastic Materials Used as Product Contact Surfaces in Dairy Equipment
- NFPA-70, National Electric Code 0.3.9

  Informative references

  3-A Sanitary Standards, Inc. 3-A 606--, Accepted Practices for the Design, Fabrication and Installation of Milking and Milk Handling Equipment

0.4 This standard has been approved as an American National standard by ANSI (American National Standards Institute). ISO 20966, Automatic milking installations — Requirements and testing, was created with consultation of US and ASABE experts to integrate with other milking machine standards.

0.5 This standard deviates from ISO 20966:2007 as follows:

0.5.1 See Section 0.3 for Normative references deviations.

Text of ISO 20966:2007, Automatic milking installations — Requirements and testing, follows.

WARNING — Some of the tests specified in this International Standard involve procedures which could lead to a hazardous situation. The attention of any person performing tests in accordance with this International Standard is drawn to the need to be appropriately trained in the type of work to be carried out. It is left to the responsibility of the user to check all national regulatory conditions and health and safety requirements applicable for the relevant country.

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1 Scope

This International Standard specifies requirements for the construction of automatic milking installations (AMI), including specific safety and hygiene aspects and minimum performance requirements and testing, in addition to those described in ~~ISO 5707~~ ANSI/ ASABE AD5707:2007 and ~~ISO 6690~~ ANSI/ASABE AD6690:2007. It does not contain requirements for the design of the building in which the milking installation is installed.

2 Normative references

The following referenced documents are indispensable for the application 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 3600, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Operator's manuals — Content and presentation*

~~ISO 3918, *Milking machine installations — Vocabulary*~~
ANSI/ASABE AD3918:2007, *Milking machine installations — Vocabulary*

ISO 4413, *Hydraulic fluid power — General rules relating to systems*

ISO 4414, *Pneumatic fluid power — General rules relating to systems*

~~ISO 5707, *Milking machine installations — Construction and performance*~~
ANSI/ASABE AD5707:2007, *Milking machine installations — Construction and performance*

ISO/TR 11688-1, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning*

ISO/TR 11688-2, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 2: Introduction to the physics of low-noise design*

ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

ISO 13852:1996, *Safety of machinery — Safety distances to prevent danger zones being reached by the upper limbs*

ISO 14159, *Safety of machinery — Hygiene requirements for the design of machinery*

IEC 60204-1:2005, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

~~IEC 60227-1, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V — Part 1: General requirements*~~
National Electrical Code, published by the National Fire Protection Association.

~~IEC 60245-1, *Rubber insulated cables — Rated voltages up to and including 450/750 V — Part 1: General requirements*~~
National Electrical Code, published by the National Fire Protection Association.

IEC 60529:2001, *Degrees of protection provided by enclosures (IP code)*

IEC 60825-1:2001, *Safety of laser products — Part 1: Equipment classification, requirements and user's guide*

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~~IEC 60947-4-1, *Low-voltage switchgear and control gear — Part 4-1: Contactors and motor starters — Electromechanical contactors and motor starters*~~
National Electrical Code, published by the National Fire Protection Association.

IEC 60947-5-1, *Low-voltage switchgear and control gear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices*

~~IEC 61800-1, *Adjustable speed electrical power drive systems — Part 1: General requirements — Rating specifications for low-voltage adjustable speed d. c. power drive systems*~~
National Electrical Code, published by the National Fire Protection Association.

EN 1088, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

~~EN 13732, *Food processing machinery — Bulk milk coolers on farms Requirements for construction, performance, suitability for use, safety and hygiene*~~

ANSI/ASAE S493.1, *Guarding for Agricultural Equipment*

ANSI/ASABE AD6690:2007, *Milking machine installations — Mechanical tests. NOTE: Defer to manufacturers recommendations for effective reserve calculations and test methods for AMI systems.*

3-A Sanitary Standards, Inc. 3-A 63--, *Sanitary Fittings for Milk and Milk Products*

3-A Sanitary Standards, Inc. 3-A 33--, *Sanitary Standards for Polished Metal Tubing for Dairy Products*

3-A Sanitary Standards, Inc. 3-A 2--, *Sanitary Standards for Centrifugal and Positive Rotary Pumps for Milk and Milk Products*

3-A Sanitary Standards, Inc. 3-A 18--, *Multiple-use Rubber and Rubber-like Materials Used as Product Contact Surfaces in Dairy Equipment*

3-A Sanitary Standards, Inc. 3-A 20--, *Multiple-use Plastic Materials Used as Product Contact Surfaces in Dairy Equipment*

NFPA-70, National Electric Code 0.3.9

Informative references

3-A Sanitary Standards, Inc. 3-A 606--, *Accepted Practices for the Design, Fabrication and Installation of Milking and Milk Handling Equipment*

3 Definitions

For the purposes of this document, the terms and definitions given in ~~ISO 3918~~ ANSI/ASABE AD3918 and the following apply.

3.1

control system

assembly of hardware and software components to start, operate and stop the AMI

4 Safety and hygiene requirements

The safety requirements given in Annex A apply.

The hygiene requirements given in ISO 14159 apply.

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5 Functional requirements

5.1 General

The milking machine shall fulfill the requirements specified in ~~ISO 5707~~ ANSI/ASABE AD5707.

It shall be possible to operate the AMI both for milking and testing purposes.

5.2 Preparation before milking

5.2.1 Cleaning of teats

There shall be provision to clean the teats and the parts of the udder in contact with the liners without injuring the animal.

The result of the cleaning operation is checked by inspection of the teat and udder areas after operation.

NOTE Annex B presents an example of a method of evaluating the inspection of cleaning of teats and udders, although the ultimate result of cleaning is the milk quality in the bulk milk tank.

5.2.2 Foremilking

There shall be provisions for separation of the foremilk from the milk intended for human consumption.

Information shall be provided about the procedures regarding separation of foremilk, and how to inspect the performance.

The performance of the foremilk separation shall be verified during operation.

5.3 Milking

5.3.1 Accidental teatcup detachment

The system shall have provisions to detect accidental teatcup detachment so that the AMI can initiate corrective action to attempt to achieve a successful milking.

5.3.2 Milk yield measurement

The milk yield for each milking shall be measured. The accuracy of milk yield measuring systems shall be stated in the user's manual.

5.3.3 Detection of abnormal milk

Where an automatic milking unit has provisions to detect abnormal milk from an individual animal and prevent its milk from being mixed with milk intended for human consumption, the abnormal milk detection method together with recommended limit values shall be described in the user's manual.

NOTE Annex C presents an example of a method of evaluating detection systems for milk deemed as abnormal due to blood or changes in homogeneity with possible limits of blood levels.

5.3.4 Teatcup removal

There shall be provisions to limit the total machine-on time. Methods, procedures and limits shall be stated in the user's manual.

5.4 Post-milking teat applications

It is recommended that there be means to apply disinfectant and/or skin conditioner to the teats after milking.

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