

ISO Standards Introduction ISO and ASABE Standards

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Last updated in 1997

- ☞ Widespread adoption of automatic milking installations (AMI) required reconsideration of standards
 - Many aspects of AMI are different than conventional milking machines,
 - Many aspects are also shared.
- ☞ Machine milking group of the international dairy federation (IDF) suggested simultaneous:
 - Development of new AMI standard, and
 - Revise the milking machine standards to allow seamless reference from the AMI standard.
 - Lead by Lars Innings, DeLaval

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ISO 5707 Milking machine installations: Construction and performance

- ☞ Minimum performance, information, certain dimensional requirements for satisfactory milking and cleaning function.
- ☞ Minimum requirements for materials, design, manufacture and installation.
- ☞ Cows, water buffaloes, sheep and goats
 - Milked and pulsation created by vacuum, and where milk is, at least partly, transported with help of air flow.
 - Qualitative requirements apply milking other mammals used for milk production.

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5707: Section Contents

- ☞ General
 - Tests for Compliance
 - Access for Measurements
 - Safety and Hygiene
 - Materials
 - User's Manual
- ☞ Vacuum system
 - Vacuum regulation
 - Vacuum pumps
 - Vacuum regulator
 - Vacuum gauge
 - Air lines
 - Interceptor
 - Sanitary trap
 - Leakage into the vacuum system
 - Vacuum taps for bucket milking units

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5707: Section Contents

- 🚚 Pulsation System
 - ❶ Design data
 - ❷ Pulsation air line
 - ❸ Pulsation rate, pulsator ratio and pulsation chamber vacuum phases
- 🚚 Milk System
 - ❶ Design of milk lines
 - ❷ Air leakage
 - ❸ Drainage
 - ❹ Milk inlets
 - ❺ Diversion of milk
 - ❻ Receiver
 - ❼ Releaser
 - ❽ Delivery line

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5707: Section Contents

- 🚚 Milking Unit
 - ❶ Teatcup
 - ❷ Teatcup attachment
 - ❸ Teatcup removal
 - ❹ Vacuum shut-off
 - ❺ Air vent and leakage
 - ❻ Vacuum in the milking unit
 - ❼ Milk recording equipment
 - ❽ Attachments to the milking unit
 - ❾ Long milk tubes
 - ❿ Bucket milking tubes
- 🚚 Cleaning

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5707: Section Contents

- 🚚 Annex A (normative)
 - ❶ Vacuum pump capacity – Effective reserve plus allowances for cows and water buffaloes
- 🚚 Annex B (informative)
 - ❶ Determination of the minimum internal diameter of air lines
- 🚚 Annex C (informative)
 - ❶ Determination of the minimum internal diameter of milk-lines for cows and water buffaloes
- 🚚 Annex D (informative)
 - ❶ Small ruminants

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5707: Changes

- 🚚 Buffalo and small ruminants
 - ❶ Effective Reserve
 - ❷ Vacuum pump capacity
 - ❸ Milkline Size



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User's manual shall state, for specified milk flows

- a) Desired **average liner vacuum** and/or the desired average liner vacuum during the **B and D phase**.
- b) The corresponding nominal **vacuum in the milkl ine**.
- 🚚 Milk flow rate tables also expanded for milkl ine sizing guidelines.
- | Peak Milk Flow (kg/min) | | Low Producing (LP) and High Producing (HP) animals | |
|-------------------------|----|--|--|
| Cows | LP | 3,0 | |
| | HP | 5,0 | |
| Buffalo | LP | 1,5 | |
| | HP | 2,5 | |
| Sheep | LP | 0,8 | |
| | HP | 1,5 | |
| Goats | LP | 1,0 | |
| | HP | 2,0 | |

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5707: Changes User Manual



📖 Information to be provided:

- ❶ Installation,
- ❷ Use
- ❸ Maintenance



📖 Specified in more detail



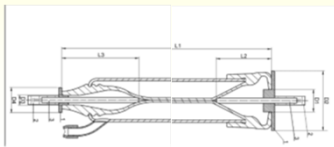
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5707: Changes

🚚 Additional specifications for the milking unit:

- ❶ Teatcup or cluster fall off air use
- ❷ Liner dimensions to assist in choosing the appropriate liner for a herd



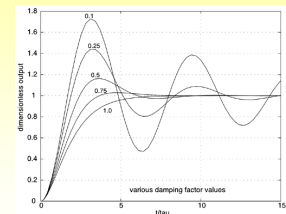
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5707: Changes Variable capacity vacuum pump control

🚚 Vacuum section modified to incorporate testing for:

- ❶ Pump capacity
- ❷ Effective reserve



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5707 Changes Regulation characteristics

- ☞ Specify that the individual components of
 - ❶ Vacuum Drop,
 - ❷ Undershoot, and
 - ❸ Overshoot

...Each To Be < 2kpa.



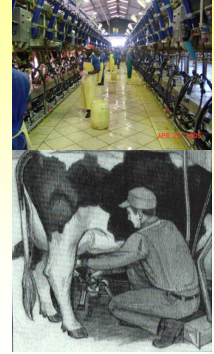
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5707: Changes Effective Reserve

One of the following requirements fulfilled:

- ☞ Vacuum drop, undershoot <2kpa
 - ❶ Large milking systems
- ☞ Minimum effective reserve
 - ❶ Smaller milking machines
 - ❷ Annex A for cows and buffaloes and in Annex D for sheep and goats



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ISO 6690 Milking machine installations – Mechanical tests

- ☞ Accuracy requirements for the measuring instruments
- ☞ Test methods for new installations and periodic checking of installations
 - ❶ Alternative test methods if shown to achieve comparable results
- ☞ Annex A primarily for laboratory testing

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6690: Section Contents

- ☞ Test equipment
 - ❶ Measurement of vacuum
 - ❷ Measurement of vacuum changing over time
 - ❸ Measurement of atmospheric pressure
 - ❹ Measurement of back pressure
 - ❺ Measurement of airflow
 - ❻ Measurement of pulsation characteristics
 - ❼ Measurement of pump rotational frequency
 - ❽ Teatcup plugs
- ☞ Vacuum System
 - ❶ General requirements and preparation
 - ❷ Vacuum regulation
 - ❸ Vacuum pumps
 - ❹ Vacuum regulator leakage
 - ❺ Vacuum gauge error
 - ❻ Vacuum drop in air line
 - ❼ Effective volume of interceptor
 - ❼ Effective volume of the sanitary trap
 - ❽ Leakage in vacuum system
 - ❾ Vacuum drop across vacuum taps for bucket milking units

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6690: Section Contents

- 🔊 Pulsation System
 - ❶ Airflow at stall taps
 - ❷ Pulsation rate, pulsator ratio, pulsation chamber vacuum phases and vacuum drop in pulsator air line
- 🔊 Milk System
 - ❶ Slope of milk-line
 - ❷ Milk system leakage
 - ❸ Effective volume of receiver
 - ❹ Leakage in releaser
- 🔊 Milking Unit
 - ❶ Mouthpiece depth and effective length of liner
 - ❷ Teatcup or cluster fall-off air inlet
 - ❸ Leakage through shut-off valves of milking units
 - ❹ Air vent and leakage into teatcup or cluster
 - ❺ Effective volume of buckets, transport cans and recording jars
 - ❻ Measuring the vacuum in the cluster
 - ❼ Measurement of the vacuum drop from accessories attached in the long milk tube
 - ❽ Airflow at the end of the long milk tube

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6690: Section Contents

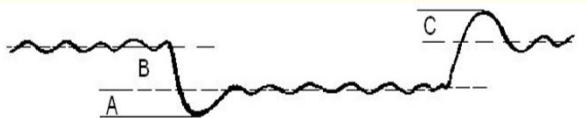
- 🔊 Annex A (normative)
 - ❶ Laboratory tests of vacuum in the milking unit
- 🔊 Annex B (informative)
 - ❶ Alternative method for the measurement of air inlet and leakages in clusters
- 🔊 Annex C (informative)
 - ❶ Examples of test procedure to reduce the test work

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6690: Changes

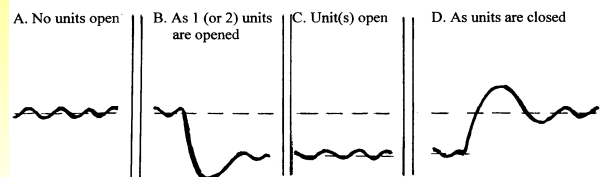
- 🔊 Methods for measuring vacuum regulation characteristics of undershoot (A), vacuum drop (B) and overshoot (C)
- 🔊 Milking unit falloff
 - ❶ With and without automatic shutoff valves
 - ❷ Quarter milking machines



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Falloff (Dry) Test



10-15 second sample

Working vacuum = Average of A

Vacuum drop = (Average of A) – (Average of C)

Under-shoot = (Average of C) – (Minimum of B)

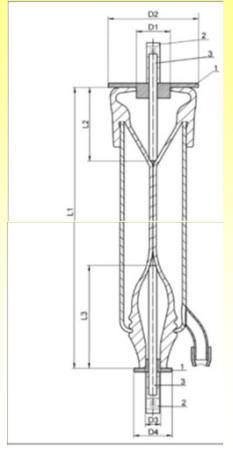
Over-shoot = (Maximum of D) – (Average of A)

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6690: Changes

- New section methods for measuring the depth of the mouthpiece and effective length of a liner
- Device developed by Esa Manninen, Finland

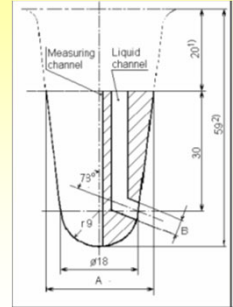


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6690: Changes

- Design of artificial teats for wet tests has been updated.
- Design by Eddy O'Callaghan from Ireland
- Dimensions**
 - Cows, water buffaloes and goats
 - A = 25 mm, B = 4.5mm
 - Sheep
 - A = 20 mm, B=3.5 mm



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6690: Changes

- Example test report and order of performing tests of a milking machine has been provided.

Test report for testing milking machine installations in accordance with ISO 6890

Installation No. _____ Date _____
 Name of owner _____ Test person _____
 Address _____ Reason for test _____
 Telephone _____
 Altitude _____ m Atmospheric pressure _____ kPa
 Suction milking machine _____ Pipeline milking machine _____ Suction line _____ Pulser _____
 Milking teat diameter _____ mm Maximum height _____ m Slope _____ mm/m Slope length 1 + 2 m
 Closed ended _____ Leaked _____ Swivel bridge _____ Rigid bridge _____
 Main valve _____ Inlet diameter _____ mm Length _____ m
 Pulsator valve Inlet diameter _____ mm Length _____ m
 No. of milking units _____ No. of milk inlet valves _____ No. of milking persons _____ No. of animals _____
 Pulsators Individual _____ Water control _____ Electric _____ Pneumatic _____ Alternate _____ Structureless _____
 Accessories Milking adaptor _____ ACR _____ Recorder _____ Milk meter _____ Other _____
 Vacuum pump(s) _____ Milk pump(s) _____ Cluster _____ Liner _____
 Brand _____
 Type _____

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ISO 3918 Milking machine installations — Vocabulary

- Defines terms to be used in
 - Research work
 - Official regulations
 - Design, manufacture, installation and use
- Milking machines (and AMI)
 - Cows
 - Water buffaloes
 - Sheep
 - Goats, or
 - Other mammals used for milk production



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ISO 20966 Automatic milking installations: Requirements and testing

- 📄 Worldwide demand for minimum specifications:
 - ❶ Effective, easy and safe to use and test
 - ❷ Physiology of the animal
 - ❸ Hygiene and milk quality
 - ❹ Minimize physical damage to milk fat
- 📄 Requirements introduced by the milking without the presence of a human observer

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ISO 20966 AMI: Scope

- 📄 Specifies requirements for construction
 - ❶ Safety and hygiene aspects
- 📄 Minimum performance requirements and testing for automatic milking installations (AMI)
 - ❶ In addition to those described in ISO 5707 and ISO 6690
- 📄 Does not contain requirements for the design of the building in which the milking installation is installed.

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Sections

- 📄 **Safety and hygiene requirements**
- 📄 **Functional requirements**
 - ❶ Preparation before milking
 - ❷ Milking: Accidental teatcup detachment, Milk yield measurement, Detection of abnormal milk, Teat cup removal
 - ❸ Post-milking teat applications
 - ❹ Milk transport: Diversion of milk, Delivery lines
 - ❺ Milk cooling and storage: Refrigerated bulk milk tank, Tank for temporary storage
- 📄 **Cleaning**
- 📄 **Instructions for use**
- 📄 **Management**
 - ❶ Alarms and notifications, Retrieval of information
- 📄 **Monitoring**
 - ❶ Animals, Sanitation, Stored milk

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Annex

- 📄 **A: Safety requirements with respect to humans and animals (Normative)**
 - ❶ Safety Requirements and measurements: Controls
 - ❷ Protection against non-mechanical hazards, Electricity
 - ❸ Pneumatic, Hydraulic, Heat, Laser,
 - ❹ Provisions in case of faults, Accesses and exits for the animals
 - ❺ Information for use: User's manual, Warning signs.
- 📄 **B: Example to evaluate cleaning of teats and udders (Informative)**
- 📄 **C: Example to evaluate detection systems for milk deemed as abnormal due to blood or changes in homogeneity (Informative)**
 - ❶ Detection at the quarter level, and animal level
 - ❷ Guideline for interpretation of results

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SI Units of Measure

Multiply	by	to get
kilopascals (kPa)	0.3	inches of Mercury ("Hg)
Meters (m)	3.3	Feet (ft)
meters/second (m/s)	3.3	Feet/second (ft/s)
Kilograms (kg)	2.2	Pounds (lb)
kilograms/minute (kg/M)	2.2	Pounds/minute
liters/minute (LPM)	0.035	Cubic feet/minute (CFM)