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Stroji za predelavo hrane - Hladilniki za shranjevanje namolzenega mleka - Zahteve za naļ rtovanje, delovanje, namensko uporabo, varnost in higieno

Food processing machinery - Bulk Milk Coolers on Farms - Requirements for construction, performance, suitability for use, safety and hygiene

Nahrungsmittelmaschinen - Behältermilchkühlanlagen für Milcherzeugerbetriebe - Anforderungen für Konstruktion, Leistung, Gebrauchstauglichkeit, Sicherheit und Hygiene

Machines pour les produits alimentaires - Refroidisseurs de lait en vrac à la ferme - Prescriptions pour la construction, les performances, l'aptitude à l'emploi, la sécurité et l'hygiène

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Food processing machinery - Bulk milk coolers on farms - Requirements for construction, performance, suitability for use, safety and hygiene

Machines pour les produits alimentaires - Refroidisseurs de lait en vrac à la ferme - Prescriptions pour la construction, les performances, l'aptitude à l'emploi, la sécurité et l'hygiène

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This European Standard was approved by CEN on 26 August 2002 and includes Amendment 1 approved by CEN on 24 June 2005 and Amendment 2 approved by CEN on 7 March 2009.

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Contents

page

Foreword 3

Introduction 4

1 Scope 5

2 Normative references 5

3 Terms and definitions 6

4 List of significant hazards 9
4.1 General 9
4.2 Mechanical hazards 9
4.3 Electrical hazards 10
4.4 Hazards generated by materials and substances used 10
4.5 Hazards generated by neglecting hygiene principles in design 10
4.6 Hazards generated by neglecting ergonomic principles 10
4.7 Hazard arising from unexpected start-up 10

5 Requirements 11
5.1 General 11
5.2 Mechanical hazards 11
5.3 Electrical hazards 12
5.4 Hazards generated by materials and substances used 13
5.5 Hygiene 14
5.6 Ergonomics 18
5.7 Unexpected start-up 18
5.8 Other general requirements for tanks 18
5.9 Additional requirements for special tanks 21

6 Verification and tests 23

7 Information for use 27
7.1 General 27
7.2 Instruction handbook for the user 27
7.3 Instructions check list 28
7.4 Installation and maintenance instructions 29
7.5 Dismantling instructions 30
7.6 Minimum marking 30

Annex A (normative) Noise test code (Grade 2 of accuracy) 32

Annex B (normative) Test for cooling, thermal insulation, mixing tests 35

Annex C (normative) Test for cleanability 47

Annex D (normative) Sampling methods for milk mixing tests 55

Annex E (normative) Equipment and installation for the tests for cleanability required in annex C 56

Annex ZA (informative) A2 Relationship between this European Standard and the Essential Requirements of EC Directive 98/37CE A2 61

Annex ZB (informative) A2 Relationship between this European Standard and the Essential Requirements of EC Directive 2006/42/CE A2 62

Bibliography 63

Foreword

This document (EN 13732:2002+A2:2009) has been prepared by Technical Committee CEN/TC 153 "Machinery intended for use with foodstuffs and feed", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2005-06-24 and Amendment 2, approved by CEN on 2009-03-07.

This document supersedes EN 13732:2002.

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1⟩ ⟨A1] and [A2⟩ ⟨A2].

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives.

[A2⟩ For relationship with the EU Directives, see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A2]

In this European Standard the annexes A, B, C, D and E are normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This document is a type C standard as stated in EN 1070:1998.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

1 Scope

1.1 This European Standard specifies requirements for design, construction, performance, suitability for use, safety and hygiene of refrigerated bulk bovine milk coolers and the related methods of test.

It applies to refrigerated bulk milk tanks with air cooled condensing units and automatic control intended for installation on farms or at milk collecting points. It applies to tanks for two milkings (24 h), four milkings (48 h) and six milkings (72 h), in which the cooling takes place totally or partially within the tank.

Performance requirements in 5.4.1.2.1 and 5.4.1.2.2 do not apply to tanks where cooling does not take place totally within the tank nor where the tank is associated with a continuous system of milking (e.g. milking with robot).

1.2 This European Standard does not cover:

— mobile tanks;

— tanks intended to be tilted for drainage;

— equipment for delivering the milk to the tank;

— equipment for pre-cooling or instant cooling of the milk.

1.3 This standard covers significant hazards at machines falling within this scope when used as intended by the manufacturer and as identified by risk assessment (see EN 1050:1997).

Noise is not considered to be a significant hazard for bulk milk coolers. This standard includes information in 7.1 and in annex A concerning the manufacturer's declaration of the noise emission level of the cooler.

1.4 This standard does not cover the calibration requirements for the tank to be used as a system for payment purpose.

1.5 This standard applies primarily to the machines which are manufactured after its date of issue.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 292-1:1991, *Safety of machinery - Basic concepts, general principles for design – Part 1: Basic terminology, methodology. (Identical with ISO/DIS 12100-1:2000)*

EN 292-2:1991, *Safety of machinery - Basic concepts, general principles for design – Part 2: Technical principles and specifications. (Identical with ISO/DIS 12100-2:2000)*

EN 378-1:2000, *Refrigerating systems and heat pumps - Safety and environmental requirements – Part 1: Basic requirements, definitions, classification and selection criteria.*

EN 378-2:2000, *Refrigerating systems and heat pumps - Safety and environmental requirements – Part 2: Design, construction, testing, marking and documentation.*

EN 378-3:2000, *Refrigerating systems and heat pumps - Safety and environmental requirements – Part 3: Installation site and personal protection.*

EN 378-4:2000, *Refrigerating systems and heat pumps - Safety and environmental requirements – Part 4: Operation, maintenance, repair and recovery.*

EN 1005-3:2002, *Safety of machinery - Human physical performance – Part 3: Recommended force limits for machinery operation.*

EN 1070:1998, *Safety of machinery - Terminology.*

EN 1088:1995, *Safety of machinery – Interlocking devices associated with guards – Principles for design and selection.*

EN 1672-2:1997, *Food processing machinery - Basic concepts – Part 2: Hygiene requirements.*

EN 10088-2, *Stainless steels – Part 2: Technical delivery conditions for sheet/plate and strip for general purposes.*

EN 50087:1993, *Safety of household and similar electrical appliances, particular requirements for bulk milk coolers.*

EN 60204-1:1997, *Safety of machinery - Electrical equipment of machines – Part 1: General requirements (IEC 60204-1:1997).*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

EN 60947-2:1995, *Low voltage switch gear and control gear – Part 2: Circuit-breakers (IEC 60947-2:1995).*

EN ISO 3744:1995, *Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994).*

EN ISO 4287, *Geometrical product specifications (GPS) – Surface texture: profile method – Terms, definitions and surface texture parameters (ISO 4287:1997).*

EN ISO 4871, *Acoustics – Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996).*

EN ISO 11201, *Acoustics – Noise emitted by machinery and equipment – Measurement of emission sound pressure levels at a work station and at other specified positions – Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995).*

ISO 2446:1976, *Milk - Determination of fat content (Routine method).*

ISO 2852, *Stainless steel clamp pipe couplings for the food industry.*

ISO 2853, *Stainless steel threaded couplings for the food industry.*

3 Terms and definitions

For the purpose of this European Standard, the terms and definitions given in EN 1070:1998, EN 378-1:2000, EN 1672-2:1997 and the following definitions apply.

3.1
refrigerated bulk milk tank
equipment for refrigeration, and bulk storage of refrigerated raw milk freshly milked

In following text, referred to as "Tank".

3.2
freshly milked
milk less than 2 hours after being milked

3.3
automatic control
arrangement by which the equipment functions under normal operating conditions, without requiring action by the operator

3.4
atmospheric tank
tank of which the inner vessel is designed to operate at atmospheric pressure

3.5
vacuum tank
tank of which the inner vessel is designed to operate at a pressure below atmospheric pressure

3.6
agitator
device to mix the milk to promote heat transfer and to ensure uniform distribution of butterfat

3.7
reference position
position specified by the manufacturer for correct installation and operation of the tank

3.8
maximum volume (V_m)
volume to which the inner vessel in its reference position and without agitation can be filled without overflowing (expressed in litres)

3.9
rated volume (V_r)
volume of the maximum permissible filling of the tank under operating conditions as stated by the manufacturer (expressed in litres)

3.10
direct cooling system
cooling system in which the evaporator of the refrigerating system is in direct thermal contact with the milk or the inner vessel

3.11
indirect cooling system
cooling system in which the heat is transferred from the milk to the refrigerant through a cooling medium

3.12
ice bank tank
tank with an indirect cooling system in which the cooling medium is water and ice is built on the evaporator

3.13
milking
quantity of milk (or testwater) which is equivalent to 50 % of the theoretical maximum daily milk production

3.14
tank for two milkings
tank intended to be emptied for milk collection each day and designed for cooling and storing its rated volume every 24 h

3.15
tank for four milkings
tank intended to be emptied for milk collection every two days and designed for cooling and storing its rated volume every 48 h

3.16
tank for six milkings
tank intended to be emptied for milk collection every three days and designed for cooling and storing its rated volume every 72 h

3.17
operating conditions
state during which the tank is in use for the cooling and storage of milk in accordance with its design requirements and all accessories are functioning effectively

3.18
ambient atmosphere
atmosphere surrounding the tank and in front of the air-cooled condenser of the refrigerating system

3.19
mean temperature
calculated average of the different temperatures (in Celsius degrees) of a medium (air, test water, milk) measured at different measuring points, at the same time

3.20
ambient temperature
mean temperature of the ambient atmosphere (in Celsius degrees) (see B.1.3)

3.21
performance temperature (PT)
ambient temperature (in Celsius degrees) to be used when measuring the milk cooling time

3.22
safe operating temperature (SOT)
highest limit of the range of ambient temperatures (in Celsius degrees) at which the equipment is required to function

3.23
initial temperature (IT)
mean temperature (in Celsius degrees) of the milk to be cooled at the time of the commencement of the cooling test

3.24
storage temperature
mean temperature (in Celsius degrees) to which the milk to be cooled is reduced for storage

3.25
cooling time
time (in hours) required to cool a milking from initial temperature to + 4 °C

3.26
cooling cycle
period between two successive milk collections. For tanks for two milkings the cooling cycle is 24 h. For tanks for four milkings the cooling cycle is 48 h. For tanks for six milkings the cooling cycle is 72 h

3.27
specific energy consumption
energy consumption in watt-hours per litre of cooled milk, measured as the mean consumption of all components (excluding cleaning) during a cooling test under the test conditions appropriate to the performance class

3.28
milk
bovine mammary secretion obtained from one or more milkings without either addition thereto or extraction therefrom, untreated and not standardised, complying with Code of principles concerning milk and milk products,

international standards and standard methods of sampling and analysis for milk products of the Joint FAO/WHO Food Standards Programme

3.29
water
water, suitable for human consumption, meeting the requirements specified in the EC Directive 80/778/EEC

3.30
testwater (TW)
water used for test purpose in place of milk

NOTE The cooling time for water is nearly the same as that for milk.

3.31
filling
volume of the milk (or TW) in the tank

3.32
temperature of the milk (or TW)
mean temperature of the milk (or TW) at a particular moment (see B.1.5)

3.33
compact and plug in tank
tank where the condensing unit(s) is (are) mounted on the tank which leave(s) the manufacturer in a fully working condition

4 List of significant hazards

4.1 General

This clause contains the hazards and hazardous situations based upon EN 1050:1997 as far as they are dealt with in this European Standard, identified by a risk assessment significant for this type of machinery and which require action to eliminate or reduce risk.

Before using this standard it is important to carry out a risk assessment of the bulk milk cooler to check that it has the hazards identified in this clause.

4.2 Mechanical hazards

4.2.1 Hazards arising from operation of lids

Hazards of impact and crushing

Hazard of trapping inside the vessel: possibility of drowning.

4.2.2 Hazards arising from rotating parts of the agitator

Hazards of impact, drawing in and slipping

4.2.3 Hazards arising from the refrigerating system

Hazards arising from the refrigerating system are mentioned in the introduction of EN 378-1:2000, i.e.:

— injurious effects to persons caused by the generated low temperatures;

— bursting of pressurised parts by excessive pressure or temperature and by liquid expansion or liquid hammer;

— injuries from moving parts, fan blades, belts.

4.2.4 Hazards arising from loss of stability

Hazards of crushing and impact

4.3 Electrical hazards

Hazards of shocks by direct or indirect contact with live parts

4.4 Hazards generated by materials and substances used

4.4.1 Hazards arising from using chemical cleaning products and hot water

Hazards of skin or eye burns, suffocation, irritation from contact or inhalation or ingestion when handling hazardous cleaning products.

4.4.2 Hazards arising from refrigerant

Hazards arising from refrigerant are listed in the introduction of EN 378-1:2000.

4.5 Hazards generated by neglecting hygiene principles in design

4.5.1 Hazards arising from cooling and storage process of the milk in the tank:

— alteration of milk physical, biochemical, organoleptical properties;

— development of milk initial microbiological pollution.

4.5.2 Hazards arising from milk contamination

4.5.2.1 Physical and chemical contamination

Hazard of contamination of the milk and risks to the health of the consumer due to the presence of dust, insects and other animals, foreign solid parts, water from streaming or outside cleaning.

4.5.2.2 Bad cleaning

Hazard of contaminating milk causing injury to health due to the presence or retention of chemical products, of degraded milk, of microbiological pollution.

4.6 Hazards generated by neglecting ergonomic principles

Hazard of injury or chronic damage to the body resulting from awkward body postures, during operation, cleaning and maintenance.

4.7 Hazard arising from unexpected start-up

By unexpected start-up, above mentioned mechanical, electrical and chemical hazards can occur.

5 Requirements

5.1 General

Machinery shall comply with the safety requirements and/or protective measures of this clause. In addition, the machine shall be designed according to the principles of EN 292 for hazards relevant but not significant, which are not dealt with by this document.

NOTE 1 5.1 to 5.6 give the safety requirements and/or protective measures relevant to 4.1 to 4.6;
5.7 concerns other requirements;
5.8 concerns additional requirements for special tanks.

NOTE 2 For hazards which are to be reduced by the application of a standard such as EN 378-1:2000, EN 378-2:2000, EN 378-3:2000, EN 378-4:2000, EN 1672-2:1997, EN 60204-1:1997, etc, the manufacturer should carry out a risk assessment to establish the requirements of this standard which are to be applied. This specific risk assessment should be part of the general risk assessment of the machine.

Where the means of reducing the risk is by a safe system of working the machinery, the manufacturer shall include in the information for use details of the system and of the elements of training required by the operating personnel.

5.2 Mechanical hazards

5.2.1 Lids

The opening, closing and locking operations shall require a positive action (examples: gravity, spring, hook, balancing cylinder, …).

Hinged lids shall have a safe device to keep them in the open position.

It shall be clearly and visibly marked, adjacent to the manhole, that:

— before the closing of the cover, it shall be checked that nobody is in the vessel;

— before entering the tank, it shall be necessary to read the instruction handbook.

5.2.2 Agitators

5.2.2.1 General

No hazardous part of the agitator shall come into contact with the operator during the operation of the unit (see 5.2.2.2 and 5.2.2.3).

No projecting parts shall be present on the agitator shaft with the exception of the agitator blades and accessories for the cleaning system.

5.2.2.2 Agitators attached to the lid

For agitator attached to the lid of a tank, an interlocking device e.g. a mercury switch, a gravity switch with positive operation or a device complying with EN 1088:1995, shall be provided to automatically stop the agitator and disconnect the power of the agitator before the hazardous parts of the agitator can be reached on when opening the lid.

5.2.2.3 Agitators not attached to the lid

For agitators not attached to the lid, the tank shall be clearly and visibly marked to the lids to indicate that the electrical supply of the tank shall be disconnected before entering the tank (see 7.5.6).

In order to allow inspections without danger inside the tank, an electrical disconnecting device (see 5.3.5) shall be installed.

— For agitators with a mechanical power on the shaft $P_m \geq 200$ W, a mechanical locking of the supply connecting device e.g. a padlock or a key switch shall be provided.

— For agitators with a mechanical power on the shaft $P_m < 200$ W :

  — either a mechanical locking of the supply connecting device shall be provided;

  — or a warning panel shall indicate that it is forbidden to switch on the circuit breaking device while the machine is inspected.

NOTE See 5.7. The same protective measure can be used for both requirements.

5.2.3 Refrigerating system

The refrigerating system shall comply with EN 378-1:2000 and EN 378-2:2000.

5.2.4 Stability

Tanks with a mass of 75 kg or more when empty shall be so constructed that under normal operating conditions, it shall not tilt when subjected to an external force of 750 N applied at any accessible points, according to the test method given in clause 6.

If the tank is equipped with a step or a platform, it shall not tilt when subjected to an external force of 1200 N applied on this step or platform.

5.3 Electrical hazards

5.3.1 General

The electrical equipment shall comply with:

— either EN 50087:1993;

— or EN 60204-1:1997 and the following requirements 5.3.2 to 5.3.11.

5.3.2 Electromagnetic compatibility (see 4.4.2 of EN 60204-1:1997)

Where electrical/electronic components are used, the equipment shall not generate electromagnetic disturbances above the levels that are appropriate for its intended place of use. In addition, the equipment shall have an adequate level of immunity to electromagnetic disturbances so that it can correctly function in its intended place of use.

NOTE Additional measures would be required to meet the conditions of the EMC Directive 89/336/EEC modified by Directive 93/68/EEC.

5.3.3 Protection against electric shock (see clause 6 of EN 60204-1:1997)

The manufacturer shall pay attention to the possible wet conditions under which the equipment will be used and shall give information in the instruction handbook relevant to electrical/supply requirements by using circuit-breakers ensuring protection by residual differential current (RCD complying with annex B of EN 60947-2:1995).

For the degrees of protection: see 5.3.10.

5.3.4 Ambient air temperature (see 4.4.3 of EN 60204-1:1997)

Refer to the temperatures stated in 5.7.1 of this standard.

5.3.5 Supply disconnecting device (see 5.3 of EN 60204-1:1997)

A supply disconnecting device shall be provided.

If this device is not integrated to the machine, the instruction handbook shall precise clearly the conditions of installation (see 7.3).

5.3.6 Power circuits (see 7.2.3 of EN 60204-1:1997)

An over current detection or interruption device only in the phase conductor is acceptable for single phase machines.

5.3.7 Overload protection of motors (see 7.3 of EN 60204-1:1997)

For each motor rated at more than 0,5 kW, protection against motor overload shall be provided unless an analysis of the equipment design and its foreseeable operating conditions determine that such protection is not necessary.

5.3.8 Control circuit supply (see 9.1.1 of EN 60204-1:1997)

Transformers are not mandatory for the control circuit supply of the tanks.

5.3.9 Emergency stop devices (see 10.7 of EN 60204-1:1997)

An emergency stop device is not necessary.

5.3.10 Degrees of protection

The protection classes shall comply with a minimum degree of IP X4.

5.3.11 Markings of control equipment (see 17.4 of EN 60204-1:1997)

The markings of control equipment shall be in accordance with 7.6.

5.4 Hazards generated by materials and substances used

5.4.1 Cleaning products used and hot water

The manufacturer shall include in the instruction handbook recommendations for compatible and incompatible cleaning materials (see clause 7).

The design of automatic cleaning equipment shall ensure that no cleaning products and hot water can be splashed or sprayed against an operator either during "pick up" of concentrated product or during the cleaning cycle (e.g. hoses tightened (e.g. spanner) or tubing fastened (clips), shields over product dispensing units).

5.4.2 Refrigerants used

For the refrigerants used in the refrigerating system, EN 378-1:2000 to EN 378-4:2000 shall be applied.