



# SLOVENSKI STANDARD

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### Stroji za predelavo hrane - Hladilniki za shranjevanje namolzenega mleka - Zahteve za zmogljivost, varnost in higieno

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

Nahrungsmittelmaschinen - Behältermilchkühlanlagen für Milcherzeugerbetriebe - Anforderungen an Leistung, Sicherheit und Hygiene

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

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65.040.10	Poslopja, naprave in oprema za živino	Livestock buildings, installations and equipment
67.260	Tovarne in oprema za živilsko industrijo	Plants and equipment for the food industry

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

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

Nahrungsmittelmaschinen - Behältermilchkühlanlagen  
für Milcherzeugerbetriebe - Anforderungen an  
Leistung, Sicherheit und Hygiene

This European Standard was approved by CEN on 10 January 2022.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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## iTeh STANDARD PREVIEW (standards.iteh.ai)

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**EN 13732:2022 (E)****European foreword**

This document (EN 13732:2022) 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 January 2023, and conflicting national standards shall be withdrawn at the latest by July 2025.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13732:2013.

In comparison with the previous edition, the following changes have been made:

- a) addition of continuous system of milking in the scope;
- b) updating of normative references;
- c) specification of stainless steel equivalence;
- d) new informative annex regarding estimation and measurement of energy consumption;
- e) technical and editorial modifications.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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

## Introduction

This document is a type-C standard as stated in EN ISO 12100:2010.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document. The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

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

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# EN 13732:2022 (E)

## 1 Scope

**1.1** This document specifies requirements for design, performance, safety and hygiene of refrigerated bulk milk coolers and the related methods of test.

NOTE The informative Annex K gives some elements regarding the estimation and calculation of energy consumption.

This document deals with all significant hazards, hazardous situations and events relevant to bulk milk coolers on farm, when they are installed, used and maintained as intended by the manufacturer (see informative Annex A).

It applies to refrigerated bulk milk tanks with air-cooled condensing units and automatic control intended for installation on farms or at milk collection 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 (non-pre-cooled milk) or partially (in case of pre-cooled milk) within the tank. It also applies to tanks in combination with a continuous system of milking (e.g. milking with robot).

**1.2** This document does not cover:

- mobile tanks;
- tanks intended to be tilted for drainage;
- equipment for delivering the milk to the tank;
- equipment for pre-cooling of the milk;
- the hazards due to the use of other energy than electrical energy;
- pressure aspect of vacuum tanks (tank of which the inner vessel is designed to operate at a pressure below atmospheric pressure);
- calibration requirements for the measurement of the milk volume.

**1.3** This document is not applicable to bulk milk coolers on farms which are manufactured before the date of its publication as EN.

## 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.

EN 378-1:2016+A1:2020, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 1: Basic requirements, definitions, classification and selection criteria*

EN 378-2:2016, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation*

EN 378-3:2016+A1:2020, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 3: Installation site and personal protection*

EN 378-4:2016+A1:2019, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 4: Operation, maintenance, repair and recovery*



EN 1005-3:2002+A1:2008, *Safety of machinery — Human physical performance — Part 3: Recommended force limits for machinery operation*

EN 1672-2:2020, *Food processing machinery — Basic concepts — Part 2: Hygiene and cleanability requirements*

EN 10088-2:2014, *Stainless steels — Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

EN 60204-1:2018, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

EN 60335-1:2012<sup>1)</sup>, *Household and similar electrical appliances — Safety — Part 1: General requirements*

EN 60335-2-34:2013, *Household and similar electrical appliances — Safety — Part 2-34: Particular requirements for motor-compressors*

EN 60529:1991<sup>2)</sup>, *Degrees of protection provided by enclosures (IP Code)*

EN 61310-1:2008, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals*

EN ISO 1211:2010, *Milk — Determination of fat content — Gravimetric method (Reference method) (ISO 1211:2010)*

EN ISO 3651-2:1998, *Determination of resistance to intergranular corrosion of stainless steels — Part 2: Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels — Corrosion test in media containing sulfuric acid (ISO 3651-2:1998)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11202:2010<sup>3)</sup>, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections (ISO 11202:2010)*

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1) As impacted by EN 60335-1:2012/AC:2014, EN 60335-1:2012/A11:2014, EN 60335-1:2012/A13:2017, EN 60335-1:2012/A1:2019, EN 60335-1:2012/A2:2019, EN 60335-1:2012/A14:2019 and EN 60335-1:2012/A15:2021.

2) As impacted by EN 60529:1991/A1:2000, EN 60529:1991/A2:2013 and EN 60529:1991/AC:2016-12.

3) As impacted by EN ISO 11202:2010/A1:2021.

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EN ISO 11463:2020, *Corrosion of metals and alloys — Guidelines for the evaluation of pitting corrosion (ISO 11463:2020)*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2015)*

EN ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2019)*

EN ISO 14119:2013, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection (ISO 14119:2013)*

EN ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards (ISO 14120:2015)*

EN ISO 14122-2:2016, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2016)*

EN ISO 14122-3:2016, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2016)*

EN ISO 21920-3:2022, *Geometrical product specifications (GPS) — Surface texture: Profile — Part 3: Specification operators (ISO 21920-3:2021)*

ASTM G48-11:2015, *Standard test methods for pitting and crevice corrosion resistance of stainless steels and related alloys by use of ferric chloride solution*

### **3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, EN 1672-2:2020 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

#### **3.1 refrigerated bulk milk tank**

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

Note 1 to entry: In the following text, "refrigerated bulk milk tank" is referred as "tank".

Note 2 to entry: Milk freshly milked is milk less than 2 h after being milked.

**3.2****silos tank**

vertical closed tank designed to be standing on a flat horizontal surface

Note 1 to entry: See Figure 1.

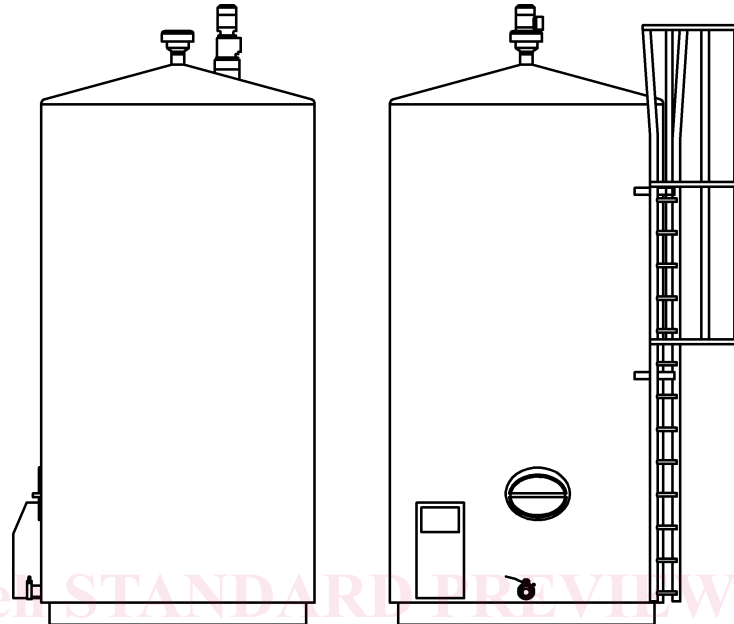


Figure 1 — Examples of silo tank

**3.3****open tank**

tank equipped with a lid which in the open position allows manual washing of the inner vessel

Note 1 to entry: See Figure 2.

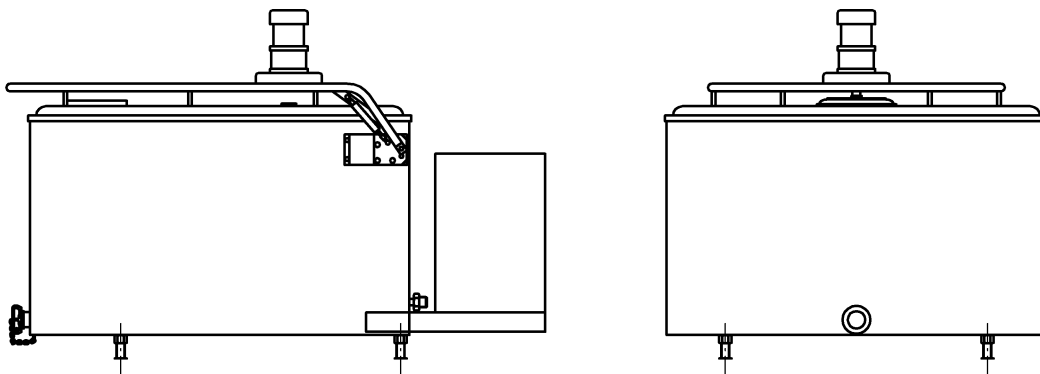


Figure 2 — Example of open tank

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### 3.4 closed tank

horizontal tank equipped with automatic washing of the inner vessel and manhole with a cover for inspection

Note 1 to entry: Access through the manhole is only for maintenance.

Note 2 to entry: See Figure 3.

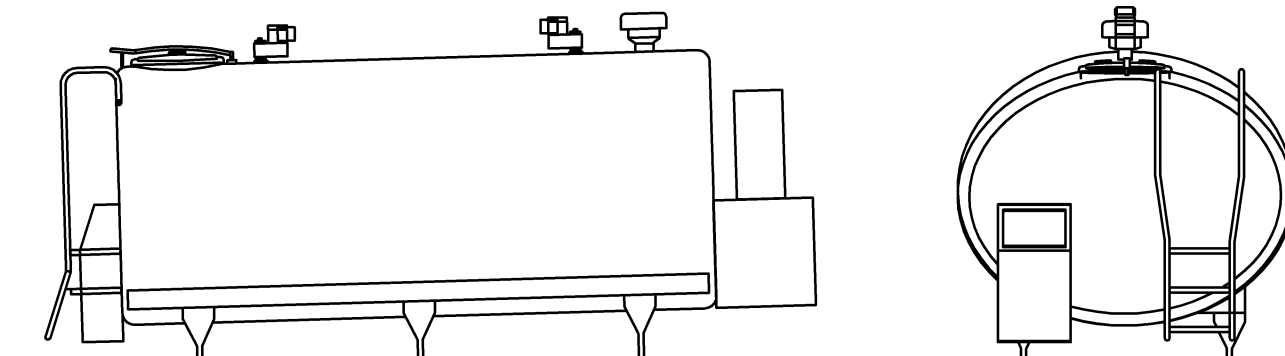


Figure 3 — Example of closed tank

### 3.5 pre-cooled milk

milk partially or completely cooled to storage temperature before entering the tank

### 3.6 automatic control

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

### 3.7 agitator

device to mix the milk to promote heat transfer and to ensure uniform distribution of butter fat

### 3.8 reference position

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

### 3.9 maximum volume

$V_m$   
volume to which the inner vessel in its reference position and without agitation may be filled without overflowing (expressed in l)

### 3.10 rated volume

$V_r$   
volume of the maximum permissible filling of the tank under operating conditions as stated by the manufacturer (expressed in l)

**3.11****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

**3.12****indirect cooling system**

cooling system in which the evaporator of the refrigerating system is not in direct thermal contact with the milk or the inner vessel and the heat is transferred from the milk to the refrigerant through a cooling medium

**3.13****batch filling tank**

tank intended to be filled by a number of milkings

**3.14****ice bank tank**

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

**3.15****milking**

batch of milk (or test water) which is added to the tank and cooled in a specific cooling time

**3.16****tank for two milkings**

tank intended for cooling and storing milk where the milk is added in two batches, each with a volume equal to 50 % of the tank rated volume

**3.17****tank for four milkings**

tank intended for cooling and storing milk where the milk is added in four batches, each with a volume equal to 25 % of the tank rated volume

**3.18****tank for six milkings**

tank intended for cooling and storing milk where the milk is added in six batches each, with a volume equal to 16,7 % of the tank rated volume

**3.19****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

**3.20****ambient atmosphere**

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

**3.21****mean temperature**

calculated average of the different temperatures (in °C) of a medium (air, test water, milk) measured at different measuring points, at the same time

**EN 13732:2022 (E)****3.22****ambient temperature**

mean temperature of the ambient atmosphere (in °C)

**3.23****performance temperature*****PT***

ambient temperature (in °C) to be used when measuring the milk cooling time

**3.24****safe operating temperature*****SOT***

highest limit of the range of ambient temperatures (in °C) at which the equipment is required to function

**3.25****initial temperature*****IT***

mean temperature (in °C) of the milk to be cooled at the time of the commencement of the cooling test

**3.26****storage temperature**

mean temperature (in °C) to which the milk to be cooled is reduced for storage

**3.27****cooling time**

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

**3.28****cooling cycle**

period between two successive milk collections

**3.29****specific energy consumption**

energy consumption in watt-hours per litre (Wh/l) 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

Note 1 to entry: The specific energy consumption may be also estimated as indicated in the informative Annex K.

**3.30****milk**

bovine mammary secretion 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

Note 1 to entry: Food and Agriculture Organisation (FAO)/ World Health Organisation (WHO).

**3.31****water**

water, suitable for human consumption, meeting the requirements specified in Directive 98/83/EC relating to the quality of water intended for human consumption

**3.32****test water****TW**

water used for test purpose in place of milk

Note 1 to entry: The cooling time for water is nearly the same as that for milk.

**3.33****filling**

volume of the milk (or TW) in the tank

**3.34****temperature of the milk**

mean temperature of the milk (or TW) at a particular moment

Note 1 to entry: See E.1.5.

**3.35****compact and plug-in tank**

tank where the condensing unit(s) is (are) mounted on the tank and the equipment which leave(s) the manufacturer and which does not require further refrigerant and installation work to be in full working condition

**3.36****tank for continuous flow**

tank designed for cooling milk when added continuously at a rate of  $x$  l/h where  $x$  is expressed in steps of 25 l/h

**3.37****minimum and maximum flow**

minimum and maximum average milk flow rates (expressed in l/h) at which a tank for continuous flow is designed to operate

**3.38****minimum cooling volume**

minimum quantity or flow rate at which the tank may operate without formation of ice:

- two milkings tanks:  $V_r \times 0,2$ ;
- four milkings tanks:  $V_r \times 0,1$ ;
- six milkings tanks:  $V_r \times 0,067$ ;
- continuous flow tank: according to the minimum flow given by the manufacturer

**4 Safety requirements and/or protective measures — Performance****4.1 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 ISO 12100:2010 for hazards relevant but not significant, and for hazards arising under the conditions of misuse which are reasonably foreseeable and which are not dealt with by this document.