



SLOVENSKI STANDARD
SIST EN 12505:2002+A1:2010
01-februar-2010

Stroji za predelavo hrane - Centrifugalni stroji za predelavo jedilnega olja in masti - Varnostne in higienske zahteve

Food processing machinery - Centrifugal machines for processing edible oils and fats - Safety and hygiene requirements

Nahrungsmittelmaschinen - Zentrifugen zur Verarbeitung von eßbaren Ölen und Fetten - Sicherheits- und Hygieneanforderungen

Machines pour les produits alimentaires - Centrifugeuses pour le traitement des huiles et des graisses alimentaires - Prescriptions de sécurité et d'hygiène

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67.260

Tovarne in oprema za
živilsko industrijo

Plants and equipment for the
food industry

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EUROPEAN STANDARD

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English Version

Food processing machinery - Centrifugal machines for processing edible oils and fats - Safety and hygiene requirements

Machines pour les produits alimentaires - Centrifugeuses pour le traitement des huiles et des graisses alimentaires - Prescriptions de sécurité et d'hygiène

Nahrungsmittelmäschinen - Zentrifugen zur Verarbeitung von eßbaren Ölen und Fetten - Sicherheits- und Hygieneanforderungen

This European Standard was approved by CEN on 21 April 2000 and includes Amendment 1 approved by CEN on 23 July 2009.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 12505:2000+A1:2009) 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of an identical text or by endorsement, at the latest by April 2010, and conflicting national standards shall be withdrawn at the latest by April 2010.

This document includes Amendment 1, approved by CEN on 2009-07-23.

This document supersedes EN 12505:2000.

The start and finish of text introduced or altered by amendment is indicated in the text by tags \square_{A1} \square_{A1} .

This European Standard 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 Directive(s).

\square_{A1} For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. \square_{A1}

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EN 12505:2000+A1:2009 (E)**Introduction**

[A1] This document is a type C standard as stated in EN ISO 12100.

The machinery concerned and the extent to which hazard, hazardous situation and hazardous event 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 C standard.

This European Standard is independent of EN 12547 because it deals specifically with the requirements of the processing of edible oils and fats. EN 12547 is included in the Annex D "Bibliography". **[A1]**

1 Scope

This European Standard covers all significant hazards as identified by risk assessment (see EN 1050), which are listed in clause 4 of this standard, relevant to centrifuges for processing edible oils and fats, when they are used as intended and under the conditions foreseen by the manufacturer.

It specifies safety and hygiene requirements for the design, manufacture, use, maintenance and cleaning of centrifugal machines.

The normal operating methods are described in 3.2.

This standard does not apply to machines using solvent extraction and ancillary machines (e.g. conveyors, hoppers, etc.).

It is not applicable to basket centrifuges.

This European Standard is applicable primarily to machines which are manufactured after the date of approval by CEN.

2 Normative references

[A1] 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 documents (including any amendments) applies. **[A1]**

[A1] *deleted text* **[A1]**

EN 294:1992, *Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs*

[A1] EN 614:2006, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles* **[A1]**

[A1] *deleted text* **[A1]**

EN 953:1997, *Safety of machinery - General requirements for the design and construction of guards fixed, movable)*

A1 deleted text **A1**

A1 EN 1005-2:2003, *Safety of machinery — Human physical performance — Part 2: Manual handling of machinery and component parts of machinery* **A1**

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

EN 1037:1995, *Safety of machinery - Prevention of unexpected start-up*

EN 1050:1996, *Safety of machinery - Principles of risk assessment*

A1 EN 1672-2:2005, *Food processing machinery — Basic concepts — Part 2: Hygiene requirements* **A1**

A1 EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements* **A1**

A1 deleted text **A1**

EN 60529:1991, *Classification of degree of protection provided by enclosures (code IP)*

EN ISO 3744:1995, *Acoustic - Determination of sound power levels of noise sources – Engineering method employing and enveloping measurement surface in an essentially free field over a reflecting plane*

EN ISO 4871:1996, *Acoustic - Verification and declaration of noise emission values of machinery and equipment*

EN ISO 11201:1995, *Acoustic - Noise emitted by machinery and equipment - Measure of emission sound pressure levels at the work station and at other specified positions – Engineering method in an essentially free fields over a reflecting plane*

EN ISO 11688-1, *Acoustic - Recommended practice for the design of low noise machinery and equipment, Part 1: Planning*

A1 EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

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

EN ISO 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)* **A1**

A1 deleted text **A1**

ISO 468:1982, *Surface roughness - Parameters, their values and general rules for specifying requirements*

A1 ISO 1940-1:2003, *Mechanical vibration — Balance quality requirements for rotors in a constant (rigid) state — Part 1: Specification and verification of balance tolerances* **A1**

A1 deleted text **A1**

IEC 60651:1979, *Sound level meters and Amendment 1:1993*

IEC 60804:1985, *Integrating-averaging sound level meters*

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and Amendment 1:1989
and Amendment 2:1993

3 Definitions and descriptions

For the purposes of this Standard, the definitions given in **EN ISO 12100-1:2003** apply and also the following.

3.1 extraction and separation
two methods of centrifugation, carried out by two different centrifugal machines: respectively decanter and disc stack centrifuges.

3.2 centrifugal machine
it is used for the extraction and separation of edible oils and fats in which, by means of centrifugal force, the incoming product ("feed") is separated into the different liquid and solid phases.

3.2.1 decanter centrifuge
it is used to extract the solid phase from the liquid (oil or oil and water) phase (see Figure 1)

The feed enters the machine through a fixed pipe (1) and is distributed on the internal surface of the bowl (2), by centrifugal force.

The scroll (3), which rotates at a slightly different speed from the bowl, conveys the solid residue to the outlet holes (4). The scraper (5), driven by an electric motor (6) removes the solid residue from the walls of the housing (7).

The normal operating method of this centrifuge is of the continuous feeding and discharging of the processed products.

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The liquids pass out from the bowl through special weir holes: for oil phase (8) and for water phase (9).

An electric motor (10) drives the bowl by a transmission device (11) (e.g.: pulleys, belts and hydraulic clutch). The scroll is rotated by means of a scroll driving device (12) (e.g.: pulleys, belts and gear box).

3.2.2 disc stack centrifuge
centrifugal machine with vertical axis. It is used to separate oil from water and small quantity of residual solid (see Figures 2 and 3).

The feed enters the machine through a fixed vertical pipe (1). Inside the bowl, under the effect of the centrifugal force, the feed is separated into three layers: residual solid (2), water (3), and oil (4). The feed passes through the discs (5). The liquids pass out from the bowl through weir rings: for oil (6) and for water (7). Oil and water are collected under a fixed bowl cover (8) which acts as a support for the feed pipe (1), and for oil (9) and water (10) outlet pipes.

The normal operating method of this centrifuge is of the continuous feeding and discharging of the processed liquid products.

On the self-cleaning disc stack centrifuge (see Figure 2) the residual solid can be discharged by a hydraulic discharging device (11) which permits its ejection, by centrifugal force, whilst the machine is operating.

On the manual disc stack centrifuge (see Figure 3) the residual solid can be discharged only when the machine is at rest and after the bowl has been opened.

The electric motor (12) drives the bowl by a transmission device (13) (e.g.: a mechanical clutch and gears).

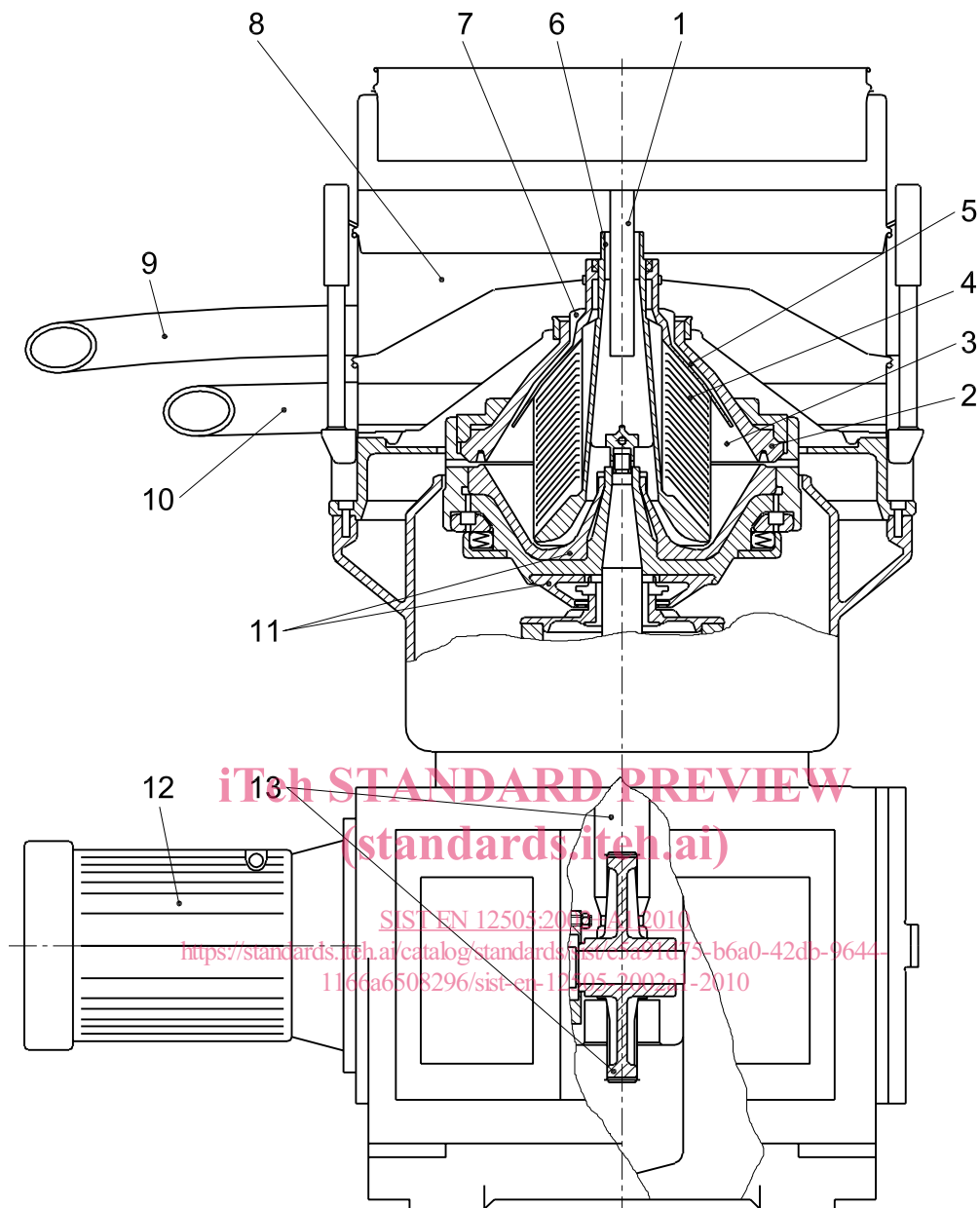


Figure 2 — Disc stack centrifuge - self cleaning discharge version (informative)

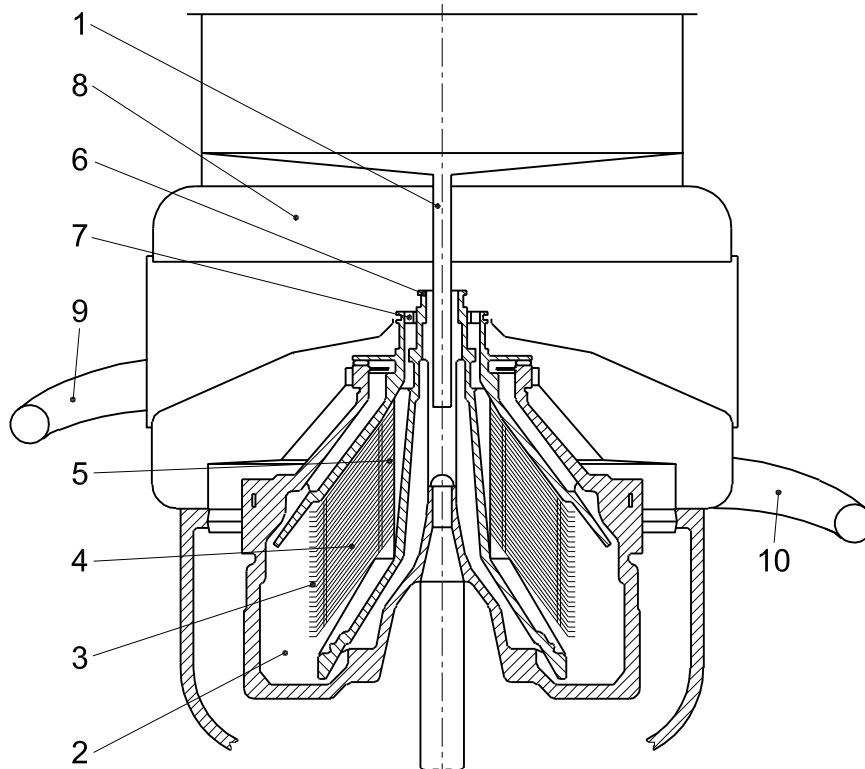


Figure 3 — Disc stack centrifuge - manual discharge version (informative)

3.3 feed: Material to be processed by the centrifugal machines.

3.4 bowl: Rotating part of hollow and asymmetric shape containing the feed.

3.5 scroll: Helicoidal-shaped rotating part of the decanter centrifuge, situated inside the bowl.

3.6 bowl cover: An element which when closed prevents contact with the working parts and accidental emissions of the feed from the bowl.

3.7 operating speed: It is the working speed of the machine and is dependent on the specific application.

4 List of significant hazards

This clause contains all hazards identified by risk assessment as being specific and significant for centrifugal machines used for processing edible oils and fats and which require measures to reduce risk.

4.1 Mechanical hazards

The significant hazards are:

- crushing;
- shearing;
- entanglement;

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- drawing-in;
- abrasion;
- ejection of machine parts;
- ejection of processed product;
- loss of stability;

4.1.1 Decanter centrifuge

The example in figure 4 shows the hazard zones (for loss of stability hazard see 4.1.4).

Zone 1

- belts and pulley;
- static sensor and rotating cam of bowl speed indicator (if provided)

Entanglement for hands and other parts of body, also of clothes; abrasion for hands or other parts of body; ejection of cover due to incorrect attachment; ejection of machine parts.

Zone 2

- belts and pulleys;
- static sensor and rotating cam of gear box speed indicator (if provided);
- gear box for reduction speed between scroll and bowl.

Entanglement for hands and other parts of body, also of clothes; abrasion for hands or other parts of body; ejection of cover due to incorrect attachment; ejection of machine parts.

Zone 3

- chain and sprocket wheels (or gears).

drawing-in; entanglement; abrasion; ejection of machine parts.

Zone 4

- scraping, rotating (low speed) blades.

Shearing; ejection of processed product.

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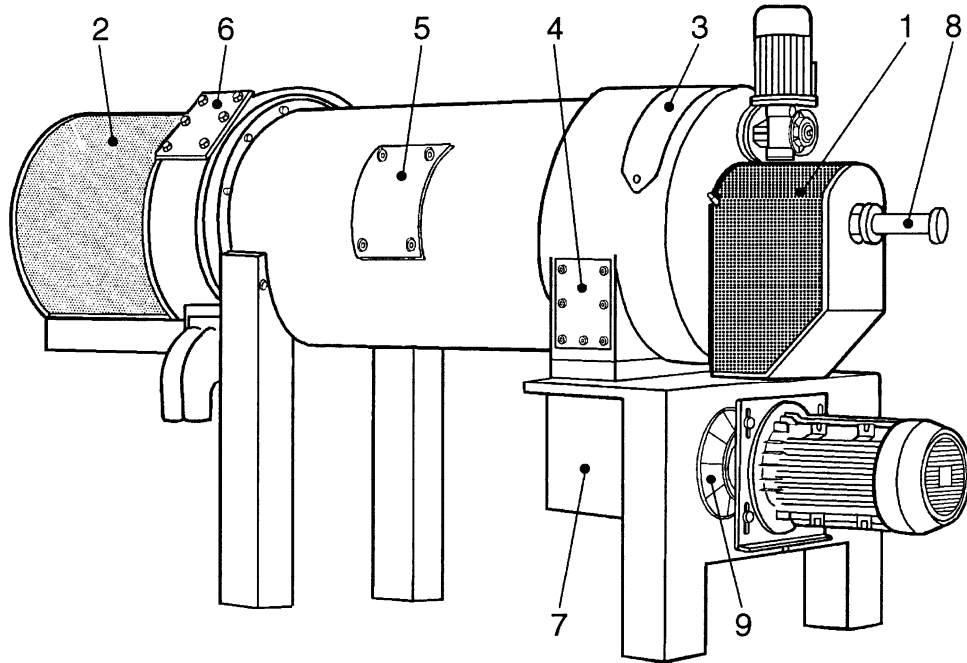


Figure 4 — Decanter centrifuge - Mechanical hazard zone (informative)

Zone 5

- bowl.

Entanglement; abrasion; ejection of machine parts which may be caused by: incorrect electrical supply (which may bring about a change in the direction of rotation or by the use of the wrong frequency); incorrect electrical connections to the electric motor. Ejection of processed product.

Zone 6

- end of the bowl, liquid outlet side.

Abrasion; ejection of processed product.

Zone 7

- end of the bowl, residual solid discharge side.

Shearing; ejection of processed product.

Zone 8

- feed pipe.

Entanglement through possible rotation of the feed pipe.

This hazard is a consequence of indirect friction between rotating parts and this feed pipe by way of the material being processed inside the bowl.

Zone 9

- rotating hydraulic clutch with external cooling fins;