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Forewords

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 5, *Milk and milk products,* and the International Dairy Federation (IDF), in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 302, *Milk and milk products – Methods of sampling and analysis,* in accordance with the Agreement of technical cooperation between ISO and CEN (Vienna Agreement). It is being published jointly by ISO and IDF.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

IDF (the International Dairy Federation) is a non-profit private sector organization representing the interests of various stakeholders in dairying at the global level. IDF members are organized in National Committees, which are national associations composed of representatives of dairy-related national interest groups including dairy farmers, dairy processing industry, dairy suppliers, academics and governments/food control authorities.

ISO and IDF collaborate closely on all matters of standardization relating to methods of analysis and sampling for milk and milk products. Since 2001, ISO and IDF jointly publish their International Standards using the logos and reference numbers of both organizations.

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Cheese — Guidance on sample preparation for physical and chemical testing

1 Scope

This document gives guidance on the sample preparation of fresh cheese, (semi)soft cheese, (semi)hard cheese, processed cheese and whey cheese for physical and chemical analysis, including analysis by applying instrumental methods.

This document describes the (sub)sampling, and sample preparation steps carried out after sampling according to ISO 707 | IDF 50 and prior to method-specific sample preparations, e.g. as with analytical methods listed in References [2] to [22].

NOTE Analysis on volatile substances, minor components or allergens can require additional precautionary measures in sample preparation in order to avoid loss of or contamination with one or more target analytes.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
cheese surface
outer layer or parts of the cheese, even in the sliced, shredded or grated form, including the outside of the whole cheese, disregarding whether a *cheese rind* (3.3) has been formed or not

[SOURCE: CODEX STAN 283-1978:2018, Appendix]

3.2
cheese coating
layer or film of non-cheese material which helps protecting the cheese against microorganisms and physical damage during retail handling and, in some cases, it contributes to the presentation of the cheese

[SOURCE: CODEX STAN 283-1978:2018, Appendix]

3.3
cheese rind
semi-closed layer of cheese with a lower moisture content at the outside of the cheese developed during ripening of the cheese

[SOURCE: CODEX STAN 283-1978:2018, Appendix]

3.4
non-edible part
part of the cheese that is specified as not intended for human consumption

4 Apparatus

The usual laboratory apparatus and, in particular, the following should be used.

The devices and tools to be used should be clean and dry. The devices and tools should not demonstrably influence the composition of the sample.

4.1 Knife or other suitable cutting device, constructed in a way that pressure on the sample is minimized to avoid loss of water and water-soluble components.

For samples used for spectrometry or visual analysis, contamination of the cut surface, with cheese rind or other residuals, should be prevented.

4.2 Peeling device, a razor blade planer has proven to be a suitable device.

4.3 Grinding machine, constructed in a way to produce a small and evenly grinded sample portion without demonstrably influencing the composition of the sample. The device should not produce undue heat.

EXAMPLE An apparatus with a rotating grater, provided with apertures of 1,2 mm to 2,0 mm in diameter, can be suitable for several types of hard and semi-hard cheese.

The optimal size of aperture can vary with the type of cheese and its maturation level.

4.4 Blending machine (with samples unsuitable for grinding), constructed in a way to produce a small and evenly blended sample portion without demonstrably influencing the composition of the sample portion. The device should not produce undue heat.

4.5 Spoons, spatulas or mortar and pestle, of a size matching the required sub-sample size and total sample size.

4.6 Mixing equipment, optional, any suitable equipment.

4.7 Container with a cover, of a suitable material, e.g. plastic, and of suitable size.

4.8 Sample containers for storage, of a material and construction, including for closures, that adequately protect the sample and do not bring about a change in the sample which can affect the results of subsequent analyses. Appropriate materials include glass, some metallic materials (e.g. stainless steel) and some plastics (e.g. polypropylene).

The containers should be opaque. If necessary, transparent filled containers should be stored in a dark place. Sample containers should be securely closed either by using a suitable stopper or a screw cap of metallic or plastics material.

Containers and closures should be dry and clean. Containers for solid products should be wide-mouthed. Suitable plastic bags, with appropriate methods of closure, may also be used. If critical for the analysis, light-excluding containers are advised.

4.9 Sieves, with an appropriate mesh size to remove excessive liquids such as oil, whey or brine.

5 Sample receipt

In case of receipt of partial samples from the same cheese, all received partial samples can be individually prepared for analysis or be commingled to one sample before grinding or blending. Make sure the commingled samples are properly mixed.

6 Procedure

6.1 General

The procedure as described below should be executed as swiftly as possible, so that the composition of the sample is not demonstrably affected.

If the mass of the sample is too large for analysis, it can be reduced to a smaller quantity, provided that it remains representative of the original cheese sample, see ISO 707 | IDF 50.

Ensure the sample is not contaminated with unwanted surface microflora or does not show signs of deterioration before sample preparation starts.

General descriptions on cheese-specific pre-preparation, optional removal of the outer part (cheese coating and/or cheese rind), cutting, grinding or blending and storage are given in 6.2 to 6.6. Guidance on appropriate conditions with each step for sample preparation per cheese type is summarized in Tables 1, 2 and 3.

6.2 Cheese-specific pre-preparation

6.2.1 Cheese packaged and stored in liquid (e.g. high moisture mozzarella in governing liquid, cheese in brine, cheese in oil)

The pre-package should be opened, and the cheese and liquid medium poured across the sieve (4.9). The cheese and liquid medium should be distributed over the surface of the sieve but without shaking the material on the sieve. All the solid product, or parts thereof, which have hollows or cavities if they fall on the sieve with the hollows or cavities facing up, should be carefully inverted by hand. The hollows or cavities in soft cheese should be drained by tilting the sieve.

For cheese in governing liquid or brine, after draining the liquid medium, the cheese sample should be placed on a cloth or on a sheet of absorbent paper or on a sieve (4.9) for 20 s to 30 s at room temperature (18 °C to 22 °C), in order to remove liquid in excess but to avoid drying of the sample.

For cheese in oil, cheese should be poured over the surface of the sieve and the oil allowed to drain for 3 min to 5 min. Then, the cheese surface should be gently dabbed with a sheet of absorbent paper to remove excessive oil, without pressing to avoid loss of moisture.

6.2.2 Blue veined cheese (e.g. stilton, gorgonzola, roquefort)

The amount of sample to be grinded should represent, as much as possible, the distribution of the mould in the body of the cheese. Thus, a complete angular slice of cheese should be sampled and grinded. If the cheese has a non-edible outer part, the procedure in 6.3 and 6.4 should be followed for its removal.

6.2.3 Cheese with included additions (e.g. herbs, spices, condiments, olives and nuts)

The amount of sample to be grinded or blended should represent, as much as possible, the distribution of the added ingredient (e.g. herbs, spices) present in the curd. Thus, a complete angular slice of cheese should be sampled and grinded or blended. If the cheese has a non-edible outer part, the procedure in 6.3 and 6.4 should be followed for its removal.

6.2.4 Fresh cheese (e.g. cottage cheese, fromage frais, cream cheese)

In fresh products where a visible separation of the whey is present, the cheese and whey should be mixed thoroughly with a spoon or spatula (4.5) or another type of mixing equipment (4.6) before proceeding with the sample preparation.

6.3 Removal of parts not objective to subsequent analysis

The objective(s) of the analysis should be determined after pre-treatment. All parts not objective to the analysis should be separated.

6.4 Removal of the non-edible outer part

The non-edible outer part (cheese coating, surface and/or if applicable non-edible cheese rind) of the cheese sample should be removed using a knife (4.1) and/or a peeling device (4.2), as indicated in Table 1. The thickness of the removed rind should be equivalent to the thickness of the outer part that is normally removed before consuming the cheese, i.e. edible parts are to be contained in the resulting sample portion. When preparing cheese with an edible outer part or processed cheese, the outer layer should not be removed.

Table 1 — Guidance on appropriate removal of the non-edible outer part per cheese type

Fresh cheese, including mixtures of cheese and curd	Soft and semi-soft cheese	Hard and semi-hard cheese	Processed cheese
Not applicable	The non-edible outer part (coating or if applicable non-edible rind) of the cheese sample should be removed, using a knife (4.1) and/or a peeling device (4.2).	The non-edible outer part (coating or if applicable non-edible rind) of the cheese sample should be removed, using a knife (4.1) and/or a peeling device (4.2).	The outer part should not be removed.

6.5 Cutting

Ambient conditions, while performing cutting, should be constant and optimal based on the consistency of the sample. The sample should be cut in cubes with an appropriate size as indicated in Table 2. Processing time should be as short as possible to prevent change of composition of the sample.

If, due to the consistency of the sample, cutting is not possible, this step can be skipped.

The objective of this step is to minimize heterogeneity of the sample. Internal processes and conditions should be validated using an appropriate indicator. The chosen indicator may vary depending on the type of cheese.

Table 2 — Guidance on appropriate conditions for cutting cheese per cheese type

Fresh cheese, including mixtures of cheese and curd	Soft and semi-soft cheese	Hard and semi-hard cheese	Processed cheese
Not applicable	Cutting should result in cubes with a size that contributes to the minimization of heterogeneity of the sample.	Cutting should result in cubes with a size that contributes to the minimization of heterogeneity of the sample.	Not applicable

6.6 Grinding or blending

Ambient conditions, while performing grinding or blending, should be constant and optimal based on the consistency of the sample. The cubes should be mixed manually or by using adequate mixing equipment (4.6).

The complete cut sample should be carefully ground in a grinding machine (4.3) or blended in a blending machine (4.4) as indicated in Table 3. The ground or blended sample should be collected in a container

with a cover (4.7). The container with the cover should be closed and the sample mixed intensively. In case of grinding, if necessary, the grinding, collecting and mixing should be repeated.

If, due to the nature of the sample, it is not possible to grind or blend it in a satisfactory way, the sample should be mixed well in the sample container (4.8), altogether or by taking a part of it, using a spoon, spatula and/or mortar and pestle (4.5).

Equipment that has been in contact with the sample should be cleaned in between every sample.

The objective of this step is to minimize heterogeneity of the sample. Internal processes and conditions should be validated using an appropriate indicator. The chosen indicator may vary depending on the type of cheese.

If using a blender, prolonged mixing should be avoided as generated heat can cause modification of the sample and mashing of product.

Table 3 — Guidance on appropriate conditions for grinding or blending cheese per cheese type

Fresh cheese, including mixtures of cheese and curd	Soft and semi-soft cheese	Hard and semi-hard cheese	Processed cheese
The sample should be blended. If blending is not possible, the sample should be mixed thoroughly in the sample container (4.8) by intensive kneading, e.g. by using a spoon, spatula and/or mortar and pestle (4.5).	Soft cheese samples should be mixed in the sample container (4.8), altogether or by taking a part of it, by intensive kneading, e.g. by using a spoon, spatula and/or mortar and pestle (4.5). Semi-soft cheese should be blended.	Grinding or blending should result in a grainsize that minimizes heterogeneity.	Thoroughly mixing the sample with a spoon or spatula (4.5) is appropriate. If the sample contains solid inclusions, grinding or blending at an ambient temperature might be necessary.

6.7 Final preparation steps before analysis or storage

A representative quantity of the grinded or blended sample should be transferred immediately into the sample container (4.8) in such a way that it represents the sample after removing parts not objective to subsequent analysis (see 6.3) and non-edible outer parts (see 6.4). The mass-reduction method used should be validated using an appropriate indicator. The chosen indicator may vary depending on the type of cheese.

It should be ensured that the container is filled up to an appropriate level to minimize headspace and evaporation, and to keep mixing of the grinded or blended sample possible so that condensed water at the inside of the container will be included in the analysed sample.

If a bag is used, it should be filled up to 85 % and air should be removed from the bag. Vacuum packaging may be used if compression of the grinded or blended sample is reduced to the minimum.

It is preferable to start analysis immediately after sample preparation. A sample that cannot immediately be tested after the pre-treatment should be stored in a closed sample container (4.8). The storage conditions and shelf life of the sample should be validated using an appropriate method. If the grinded or blended sample is showing unwanted mould growth or beginning to deteriorate, it should not be examined.

7 Test report

The test report should indicate the information as described in ISO/IEC 17025:2017, 7.8.2. The test report should contain information, or link to accessible information, about the parts of the cheese sample removed (see 6.3 and 6.4), ambient conditions, and a clear description of the cutting (see 6.5) and grinding or blending (see 6.6) steps.