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**ISO 2446:2008**

**Milk —**
**Determination of fat content**

прийнято як національний стандарт
методом підтвердження за позначенням

**ДСТУ ISO 2446:2019**
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INTERNATIONAL STANDARD

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**IDF 226**

Second edition
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# Milk — Determination of fat content

*Lait — Détermination de la teneur en matière grasse*

Reference numbers
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# Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 2446 | IDF 226 was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 5, *Milk and milk products*, and the International Dairy Federation (IDF). It is being published jointly by ISO and IDF.

This second edition of ISO 2446 | IDF 226 cancels and replaces the first edition (ISO 2446:1976), of which it constitutes a minor revision.

# Foreword

**IDF (the International Dairy Federation)** is a non-profit organization representing the dairy sector worldwide. IDF membership comprises National Committees in every member country as well as regional dairy associations having signed a formal agreement on cooperation with IDF. All members of IDF have the right to be represented at the IDF Standing Committees carrying out the technical work. IDF collaborates with ISO in the development of standard methods of analysis and sampling for milk and milk products.

Draft International Standards adopted by the Action Teams and Standing Committees are circulated to the National Committees for voting. Publication as an International Standard requires approval by at least 50 % of the IDF National Committees casting a vote.

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All work was carried out by the former Joint ISO/IDF/AOAC Group of Experts (E40-E301) which is now part of the Joint ISO-IDF Action Team on *Fat*, of the Standing Committee on *Main components in milk*.

# Milk — Determination of fat content

## 1 Scope

This International Standard specifies the Gerber method for the determination of the fat content of milk and includes guidance on the determination of the appropriate capacity of the milk pipette and on the determination of the corrections to apply to the results if the milk is not of average fat content (see 6.1). The procedure for checking the capacity of the milk pipette is specified in Annex A.

The method is applicable to liquid milk, whole or partially skimmed, raw or pasteurized. With modifications, details of which are given, it is also applicable to:

a) milk containing certain preservatives (see Clause 11);

b) milk that has undergone the process of homogenization, in particular sterilized milk and ultra heat-treated (UHT) milk (see Clause 12);

c) skimmed milk (see Clause 13).

NOTE The result obtained by the procedure specified in Clause 12 (modified for milk that has undergone homogenization) may be slightly high.

## 2 Normative references

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 document (including any amendments) applies.

ISO 488 | IDF 105, *Milk — Determination of fat content — Gerber butyrometers*

ISO 1211 | IDF 1, *Milk — Determination of fat content — Gravimetric method (Reference method)*

## 3 Terms and definitions

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

**3.1**
**Gerber method**
empirical procedure which gives a value for fat content either as a mass fraction or as a mass concentration — depending on the capacity of the milk pipette used — that is the same as, or has a known relationship to, the value obtained by the reference method specified in ISO 1211 | IDF 1

NOTE The mass fraction is expressed in grams of fat per 100 g of milk and the mass concentration in grams of fat per 100 ml of milk.

# 4 Principle

The milk fat in a butyrometer is separated by centrifuging after dissolving the protein with sulfuric acid, the separation being aided by the addition of a small quantity of *iso*-amyl alcohol. The butyrometer is graduated to give a direct reading of fat content.

# 5 Reagents

Use only reagents of recognized analytical grade, unless otherwise specified, and only distilled or demineralized water or water of equivalent purity.

## 5.1 Sulfuric acid

### 5.1.1 Requirements

The sulfuric acid shall have a density at 20° C of (1,816 ± 0,004) g/ml, which corresponds to approximately (90,4 ± 0,8) % mass fraction $H_2SO_4$. The acid shall be colourless, or not darker in colour than pale amber, shall be free from suspended matter and shall be found suitable for use when tested as specified in 5.1.2.

### 5.1.2 Suitability test

#### 5.1.2.1 Purpose of test

Sulfuric acid can satisfy the specific requirements of 5.1.1 for density and appearance and yet be unsuitable for the Gerber method. Therefore, check the suitability of the acid before use by means of the following comparative test with a standard sulfuric acid.

#### 5.1.2.2 Standard sulfuric acid

Add sulfuric acid [e.g. $w(H_2SO_4) = 98$ % mass fraction; $\rho_{20} = 1{,}84$ g/ml] to water to obtain a solution with a density within the range specified in 5.1.1.

NOTE Approximately 1 l of standard sulfuric acid is obtained by adding 908 ml of 98 % mass fraction sulfuric acid to 160 ml of water, checking the density of the diluted acid with a suitable hydrometer and adjusting the density, if necessary, by adding a small volume of water or 98 % mass fraction acid.

#### 5.1.2.3 Comparison procedure

Determine in duplicate the fat content of four samples of whole milk with average fat content by the Gerber method specified, using butyrometers whose scale errors are less than 0,01 % and standard *iso*-amyl alcohol (5.2.6.2). In one of each pair of duplicates use 10 ml of the sulfuric acid under test and in the other use 10 ml of the standard sulfuric acid (5.1.2.2). Keep the butyrometers in a random order from the shaking stage onwards. Take the readings to the nearest 0,01 % fat (read by at least two persons). The mean fat content of the four milk samples obtained with the sulfuric acid under test shall not differ by more than 0,015 % fat from the mean value obtained using the standard sulfuric acid.

## 5.2 *Iso*-amyl alcohol

### 5.2.1 Composition

A volume fraction of at least 98 % of the "*iso*-amyl" alcohol shall consist of the primary alcohols 3-methylbutan-1-ol and 2-methylbutan-1-ol, the only permissible major impurities being 2-methylpropan-1-ol and butan-1-ol. It shall be free from secondary pentanols, 2-methylbutan-2-ol, furan-2-al (furfural, furan-2-carboxaldehyde,
2-furaldehyde), gasoline (petrol) and derivatives of benzene. Not more than a trace of water shall be present.

### 5.2.2 Physical appearance

The *iso*-amyl alcohol shall be clear and colourless.

### 5.2.3 Density

The *iso*-amyl alcohol shall have a density at 20 °C of 0,808 g/ml to 0,818 g/ml.

### 5.2.4 Furan-2-al and other organic impurities

When 5 ml of the *iso*-amyl alcohol is added to 5 ml of the sulfuric acid (5.1), no more than a yellow or light-brown colour shall develop.

### 5.2.5 Distillation range

When the *iso*-amyl alcohol is distilled at a pressure of 101,3 kPa[1)], a volume fraction of not less than 98 % shall distil below 132 °C and a volume fraction of not more than 5 % below 128 °C. There shall be no solid residue after distillation.

If the atmospheric pressure during the distillation is lower or higher than 101,3 kPa, the specified temperatures should be decreased or increased, respectively, by 0,3 °C/kPa.

### 5.2.6 Suitability test

#### 5.2.6.1 Purpose of test

An *iso*-amyl alcohol can satisfy the requirements of 5.2.1 to 5.2.5, yet be unsuitable for the Gerber method. Therefore, check the suitability of the *iso*-amyl alcohol before use by means of the following comparative test with a standard amyl alcohol.

#### 5.2.6.2 Standard *iso*-amyl alcohol

Distil an *iso*-amyl alcohol satisfying the requirements of 5.2.1 to 5.2.5, using a suitable fractionation column, and collect a fraction within a boiling range of 2 °C between 128 °C and 131,5 °C (see 5.2.5, paragraph 2). Apply the following tests to the fraction:

a) when analysed by gas-liquid chromatography, a volume fraction of at least 99 % shall consist of 3-methylbutan-1-ol and 2-methylbutan-1-ol — only traces of impurities other than 2-methylpropan-1-ol and butan-1-ol shall be present;

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1) 1 kPa = 10 mbar.

b) when fractionally distilled, the first 10 % and the last 10 % collected, when compared using the procedure specified in 5.2.6.3, shall give values for the fat content of milk that do not differ by more than 0,015 % fat.

If the fraction satisfies both these tests, it can be regarded as standard *iso*-amyl alcohol. The standard *iso*-amyl alcohol can be used for several years, provided that it is kept in the dark in a cool place.

#### 5.2.6.3 Comparison procedure

Determine in duplicate the fat content of four samples of whole milk with average fat content by the Gerber method specified, using butyrometers whose scale errors are less than 0,01 % and standard sulfuric acid (5.1.2.2). In one of each pair of duplicates, use 1 ml of the *iso*-amyl alcohol under test, and in the other use 1 ml of the standard *iso*-amyl alcohol (5.2.6.2).

Keep the butyrometers in a random order from the shaking stage onwards. Take the readings to the nearest 0,01 % fat (read by at least two persons).

The mean fat content of the four milk samples obtained with the *iso*-amyl alcohol under test shall not differ by more than 0,015 % fat from the mean value obtained using the standard *iso*-amyl alcohol.

Instead of the *iso*-amyl alcohol specified, an artificial *iso*-amyl alcohol or an *iso*-amyl alcohol substitute, coloured if desired, may be used, provided that its use has been demonstrated by experiment not to lead to any significant differences in the results of the determination.

## 6 Apparatus

### 6.1 Milk pipette.

**6.1.1** The milk pipette shall be of the single graduation line, bulb type, and its capacity shall be defined as the volume, in millilitres, of water at 20 °C (27 °C in tropical countries) delivered by the pipette when emptied as specified in Annex A.

The capacity of the pipette, determined by the method specified in Annex A, shall not differ from the nominal capacity, established according to 6.1.3, by more than 0,03 ml.

**6.1.2** The capacity of the milk pipette shall be such that, when the pipette is used as specified in 9.2 (i.e. using the top of the milk meniscus when adjusting the milk to the graduation line) and whichever method of expressing the result is adopted (see Clause 3), the value for fat content obtained agrees with the value obtained by the reference method using whole milk having a fat content equivalent to the accepted average of the national milk supply.

Some milk pipettes are available which allow the bottom of the milk meniscus to be observed during pipetting. If such pipettes are used, their capacity should be such that when they are used with milk of average fat content the requirement of the preceding paragraph is satisfied.

**6.1.3** In each country, the appropriate capacity (see 6.1.1 and 6.1.2) of the milk pipette shall be established by carrying out comparative determinations using the Gerber method specified and the reference method specified in ISO 1211 | IDF 1 on a large number of whole milks covering a wide range of fat content. Statistical analysis of the results of these determinations, taken in conjunction with a knowledge of the national average fat content of milk shall be used to establish the appropriate capacity of the milk pipette. These comparative determinations on whole milk, together with similar determinations on partially skimmed milk and skimmed milk, will also provide the corrections to be applied, if desired or if necessary, to Gerber values when milk is not of average fat content. For these comparative determinations, butyrometers whose scale errors are less than 0,01 % shall be used, and the butyrometers read to the nearest 0,01 % fat.

**6.1.4** If the value for fat is to be expressed in grams of fat per 100 ml of milk, the basis of comparison with the reference method shall be stated.

**6.2 Butyrometer** and **stopper**, as specified in ISO 488 | IDF 105.

Use a butyrometer whose scale range is appropriate for the expected fat content of the sample. In the case of skimmed milk, use a 0 % to 0,5 % butyrometer.

With corrugated-neck butyrometers, either lock stoppers or solid single-ended or double-ended rubber stoppers may be used.

With plain-neck butyrometers, lock stoppers should preferably be used.

**6.3 Automatic measure**, or **safety pipette**, capable of delivering (10,0 ± 0,2) ml, and in the case of skimmed milk, (20,0 ± 0,2) ml, of sulfuric acid (5.1).

**6.4 Automatic measure**, or **safety pipette**, capable of delivering (1,0 ± 0,05) ml, and in the case of skimmed milk, (2,0 ± 0,2) ml, of *iso*-amyl alcohol (5.2).

**6.5 Protected stand**, for shaking the butyrometers (6.2).

**6.6 Centrifuge**, in which the butyrometers can be spun, provided with a rotational frequency indicator, graduated in revolutions per minute, with a maximum tolerance of ± 50 r/min, and preferably of the vertical-loading type rather than the horizontal-loading type.

The design of the centrifuge shall be such that the temperature of the butyrometer contents after the centrifuging (see 9.6) is between 30 °C and 50 °C.

When fully loaded, the centrifuge shall be capable of producing, within 2 min, a relative centrifugal acceleration of $(350 \pm 50)g$ at the outer end of the butyrometer stopper. This acceleration is produced by centrifuges with the effective radius (horizontal distance between the centre of the centrifuge spindle and the outer end of the butyrometer stopper) operated at the rotational frequency indicated in Table 1.

**Table 1 — Centrifuge effective radius and rotational frequency to produce centrifugal acceleration of** $(350 \pm 50)g$

| Effective radius<br>mm | Revolutions per minute<br>± 70 r/min |
|---|---|
| 240 | 1 140 |
| 245 | 1 130 |
| 250 | 1 120 |
| 255 | 1 110 |
| 260 | 1 100 |
| 265 | 1 090 |
| 270 | 1 080 |
| 275 | 1 070 |
| 300 | 1 020 |
| 325 | 980 |

NOTE The relative centrifugal acceleration produced in a centrifuge is given by Formula (1):

$$1{,}12rn^2 \times 10^{-6} \quad (1)$$

where

$r$ is the effective horizontal radius, in millimetres;

$n$ is the rotational frequency, in revolutions per minute.

**6.7 Water bath** for butyrometers, capable of being maintained at (65 ± 2) °C and such that the butyrometers (6.2) can be supported in a vertical position with their scales completely immersed.

**6.8 Thermometer**, suitable for insertion in the water bath (6.7).

**6.9 Water bath**, if necessary, for the preparation of the test sample (see 8.1).

## 7 Sampling

A representative sample should have been sent to the laboratory. It should not have been damaged or changed during transport or storage.

Sampling is not part of the method specified in this International Standard. A recommended sampling method is given in ISO 707 | IDF 50[1].

## 8 Preparation of test sample

**8.1** Adjust the temperature of the laboratory sample to 20 °C to 30 °C, using a water bath if necessary. Mix the milk thoroughly but gently by repeatedly inverting the sample bottle without causing frothing or churning of the fat. If there is difficulty in dispersing a cream layer, or if the milk shows evidence of slight churning, warm the milk slowly to 34 °C to 40 °C in a water bath and mix gently; if necessary, a suitable mixing device may be used to assist the dispersal of the fat. When a uniform distribution of the fat has been achieved, quickly adjust the temperature of the milk to approximately 20 °C (approximately 27 °C in tropical countries where the milk pipette is calibrated at this temperature). Allow the milk to stand after the final temperature adjustment, to let air bubbles rise. Normally 3 min to 4 min is sufficient but, if a mixing device has been used, up to 2 h may be required, followed by a further temperature adjustment.

NOTE If, after the preparation of the test sample, white particles are visible on the walls of the sample bottle, or liquid fat is visible on the surface of the sample, a reliable value for fat content cannot be expected.

**8.2** Immediately after the preparation of the test sample, the procedure specified in Clause 9, 11, 12 or 13, as appropriate, should be started and completed without interruption.

## 9 Procedure for whole milk and partially skimmed milk

**WARNING — Take suitable precautions, such as the wearing of a visor, against the accidental splashing of sulfuric acid.**

**9.1** Measure (10 ± 0,2) ml of sulfuric acid (5.1) into the butyrometer (6.2), using the automatic measure or safety pipette (6.3), in such a way that the acid does not wet the neck of the butyrometer or entrap any air.

**9.2** Gently invert the bottle containing the prepared test sample (Clause 8) three or four times and immediately measure the required volume of milk into the butyrometer in the following manner.

Aspirate a portion of the test sample into the milk pipette (6.1) until the milk level is slightly above the graduation line and wipe any milk from the outside of the delivery jet. With the pipette held vertically, the graduation line at eye level and the tip of the jet touching the inside of the neck of the inclined sample bottle, allow the milk to flow from the pipette until the top of the milk meniscus (not the bottom of the meniscus, which is difficult to see) is coincident with the graduation line (see 6.1.2, paragraph 2).

Remove the jet from contact with the sample bottle and then, with the butyrometer in a vertical position and the pipette held at an angle of about 45° with the tip of the jet just below the bottom of the neck of the butyrometer, allow the milk to flow gently down the inside of the butyrometer to form a layer on top of the acid, preventing as far as possible any mixing with the acid. When the outflow has ceased, wait 3 s, touch the tip of the pipette against the bottom of the neck, and then remove the pipette. Care should be taken not to wet the neck of the butyrometer with milk.

**9.3** Measure (1,0 ± 0,05) ml of the *iso*-amyl alcohol (5.2) into the butyrometer, using the automatic measure or safety pipette (6.4). Do not wet the neck of the butyrometer with the *iso*-amyl alcohol and at this stage avoid mixing the liquids in the butyrometer.

**9.4** Securely stopper the butyrometer without disturbing its contents. When a double-ended stopper is used, screw it in until the widest part is at least level with the top of the neck. When a lock stopper is used, insert it until the rim is in contact with the neck of the butyrometer.

**9.5** Shake and invert the butyrometer, in the protected stand (6.5) in case of breakage or loosening of the stopper, until its contents are thoroughly mixed, and until the protein is completely dissolved, i.e. until no white particles remain.

**9.6** Immediately place the butyrometer in the centrifuge (6.6), bring the centrifuge to the operating speed required to give a relative centrifugal acceleration of (350 ± 50)$g$ within 2 min, and then maintain this speed for 4 min.

**9.7** Remove the butyrometer from the centrifuge and, if necessary, adjust the stopper to bring the fat column on to the scale. Place the butyrometer, stopper downwards, in the water bath (6.7) at (65 ± 2) °C for not less than 3 min and not more than 10 min; the water level shall be above the top of the fat column.

**9.8** Remove the butyrometer from the water bath and carefully adjust the stopper to bring the bottom of the fat column, with the minimum movement of the column, to the top edge of a graduation line, preferably a main graduation line. When a solid rubber stopper is used, the adjustment should preferably be done by slightly withdrawing the stopper and not by forcing it further into the neck. When a lock stopper is used, insert the key and apply sufficient pressure to raise the fat column to the required position.

Note the scale reading coincident with the bottom of the fat column and then, taking care that the fat column does not move, as quickly as possible note the scale reading coincident with the lowest point of the fat meniscus at the top of the fat column. Take the reading at the top of the column to the nearest half of a smallest scale division. While readings are being taken, hold the butyrometer vertically with the point of reading at eye level. Record the difference between the two readings (see 10.1).

NOTE If the fat is turbid or dark in colour, or if there is white or black material at the bottom of the fat column, the value for fat content will not be reliable.

**9.9** If a check of the value obtained is desired, replace the butyrometer in the water bath (6.7) at (65 ± 2) °C for not less than 3 min and not more than 10 min, and then remove it from the bath and again take readings as specified in 9.8.

**9.10** Periodic comparative determinations by the Gerber method specified in this International Standard and by the reference method specified in ISO 1211|IDF 1 should be made to ensure that the Gerber method satisfies the definition given in 3.1.

## 10 Expression of results

### 10.1 Method of calculation

The fat content of the milk is

$$B - A$$

where

$A$ is the reading at the bottom of the fat column;

$B$ is the reading at the top of the fat column.

Express the fat content in grams of fat per 100 g of milk or in grams of fat per 100 ml of milk, according to the units used on the scale marked on the milk pipette.

### 10.2 Repeatability

The absolute difference between two independent single test results, obtained using the same method on identical test material in the same laboratory by the same operator using the same equipment within a short interval of time shall not exceed the value corresponding to one smallest scale division of the butyrometer. When butyrometers with scale errors less than 0,01 % are used (e.g. see 6.1.3) the difference between the results of two determinations obtained as specified should not exceed the value corresponding to half a smallest scale division.

### 10.3 Corrections of results

If the value obtained is outside the range in which the particular milk pipette used gives results in agreement with the reference method, the appropriate correction (see 6.1.3) may be applied if desired.

### 10.4 Special precision

For the comparative determinations mentioned in 9.10 and for other special purposes which require a Gerber value for fat that is as precise as possible, use a butyrometer whose scale errors are less than 0,01 %, and read the butyrometer to the nearest 0,01 % fat. If necessary, apply a correction as specified in 10.3.

## 11 Modified procedure for milk containing preservative

**11.1** The following procedure is applicable in certain instances to whole milk and partially skimmed milk, raw or pasteurized, to which preservative [e.g. potassium dichromate, mercury(II) chloride, or a mixture of the two] has been added. The procedure is applicable provided that the concentration of preservative in the milk and the duration and conditions of storage of the preserved milk are such that the result of the determination is the same as would have been obtained with the fresh milk not containing preservative.

If the milk containing preservative is milk that has gone through the process of homogenization, follow the procedure specified in Clause 12 but, if necessary, ensuring complete solution of the protein at the appropriate stage in the procedure as specified in 11.4.

If the milk containing preservative is skimmed milk, follow the procedure specified in Clause 13 but, if necessary, ensuring complete solution of the protein at the appropriate stage in the procedure as specified in 11.4.

**11.2** Use the reagents and apparatus specified in Clauses 5 and 6 respectively.

**11.3** Prepare the test sample as specified in Clause 8. Milk containing preservative will usually require slow warming to 35 °C to 40 °C to ensure complete dispersal of the cream layer.

**11.4** Follow the procedure specified in Clause 9. With milk containing preservative, there may be some difficulty in achieving complete solution of the protein (see 9.5). In this case, place the butyrometer, stopper downwards, in the water bath (6.7) at (65 ± 2) °C with occasional shaking and inversion of the butyrometer until no white particles can be seen. Then proceed as specified in 9.6 to 9.9 inclusive.

If the time required in the water bath to dissolve the protein exceeds 10 min, the method will not give an accurate result and is not applicable to the sample.

**11.5** Calculate the fat content as specified in 10.1. The requirements of 10.2, 10.3 and 10.4 apply.

## 12 Modified procedure for milk that has undergone homogenization (see Note to Clause 1)

**12.1** Use the reagents and apparatus specified in Clauses 5 and 6, respectively.

**12.2** Prepare the test sample as specified in Clause 8.

**12.3** Follow the procedure specified in 9.1 to 9.8 inclusive and obtain a first value for fat content.

When a number of samples is being examined simultaneously, begin to read the first of the series after 3 min. Replace each butyrometer in the water bath (6.7) at (65 ± 2) °C after reading. The number of butyrometers should not be more than can be read within the time limit given in 9.7.

**12.4** Repeat the procedure given in 9.6, 9.7 and 9.8, and obtain a second value for fat content. If the second value does not exceed the first value by more than half a smallest scale division, the second value shall be recorded as the fat content of the milk.

**12.5** If the second value exceeds the first value by more than half a smallest scale division, repeat the procedure specified in 9.6, 9,7 and 9.8 and obtain a third value for the fat content. If the third value does not exceed the second value by more than half a smallest scale division, the third value shall be recorded as the fat content of the milk.

**12.6** If the third value exceeds the second value by more than half a smallest scale division, repeat the procedure specified in 9.6, 9.7 and 9.8 and obtain a fourth value for the fat content. The fourth value shall be recorded as the fat content of the milk, but if this value exceeds the third value by more than half a smallest scale division, it should be regarded as of doubtful accuracy.

**12.7** Calculate the fat content as specified in 10.1. The requirements of 10.2, 10.3 and 10.4 apply.

NOTE If, after centrifuging several times, the fat is turbid or dark in colour, or if there is white or black material at the bottom of the fat column, the value for fat content will not be accurate.

## 13 Modified procedure for skimmed milk

**13.1** Use the automatic measures or safety pipettes (6.3 and 6.4) to deliver (20,0 ± 0,2) ml sulfuric acid (5.1) and (2,0 ± 0,05) ml *iso*-amyl alcohol (5.2), respectively, to the 0 % to 0,5 % butyrometer (6.2).

**13.2** Using the milk pipette (6.1), add a portion of the test sample of double the usual volume (2 × 10,77) ml, prepared as specified in Clause 8, at 20 °C, to the butyrometer.

**13.3** Follow the procedure specified in 9.1 to 9.7 inclusive. Then remove the butyrometer from the water bath, immediately centrifuge again (9.6) and adjust the temperature (9.7), and proceed as specified in 9.8 to 9.10.

**13.4** Calculate the apparent fat content as specified in 10.1. Apply the appropriate correction as determined by the statistical analysis of the results of comparative determinations on skimmed milks of differing fat content by the Gerber method (see 10.3) and the Röse-Gottlieb reference method ISO 1211 | IDF 1 (see 6.1.3).

If there is insufficient fat in the butyrometer to enable scale readings to be taken, the fat content cannot be calculated as specified in 10.1; in such a case, record the apparent fat content as (for example): “nil”, “trace”, “fraction of meniscus”.

## 14 Test report

The test report shall contain at least the following information:

a) all the information required for the complete identification of the sample;

b) the sampling method used, if known;

c) the test method used, together with reference to this International Standard;

d) all operating details not specified in this International Standard, or regarded as optional, together with details of any incident that may have influenced the result(s);

e) the test result(s) obtained;

f) the method of expression of "fat content" (either as mass fraction or mass concentration);

g) the capacity of the milk pipette;

h) the scale range of the butyrometer;

i) indication of whether the result is uncorrected or corrected as specified in 10.3 and whether the procedure of 10.4 has been followed;

j) any observation that indicates that the result is of doubtful accuracy (e.g. see notes to 8.1, 9.8, and 12.7, the second paragraph of 11.4, and 12.6).

# Annex A
(normative)

# Procedure for checking the capacity of the milk pipette

**A.1** Carry out the following operations at room temperature and with the water and the pipette at room temperature.

**A.2** Aspirate distilled water into the thoroughly cleaned milk pipette until the water level is a few millimetres above the graduation line, then wipe any water from the outside of the delivery jet. With the pipette held vertically and the graduation line at eye level, allow water to flow from the pipette until the lowest point of the meniscus is coincident with the graduation line. Remove any water adhering to the tip of the jet by momentarily bringing the tip of the jet into contact with the inside of an inclined glass beaker.

**A.3** With the pipette held vertically and the tip of the jet touching the inside of an inclined weighing bottle (previously weighed), allow the water to flow freely from the pipette until visible outflow ceases. Then, after 3 s, remove the weighing bottle from contact with the jet, stopper the bottle, weigh it and calculate the mass of water delivered by the pipette. Record the temperature of the water to the nearest 0,1 °C. Using appropriate tables for use in the calibration of volumetric glassware, calculate the capacity of the pipette as the volume, in millilitres, of water at 20,0 °C (27,0 °C in tropical countries) delivered by the pipette.

# Bibliography

[1] ISO 707 | IDF 50, *Milk and milk products — Guidance on sampling*

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