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**Dried milk and dried milk products —  
Determination of bulk density**

*Lait sec et produits laitiers en poudre — Détermination de la masse  
volumique*



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## Foreword

**ISO (the International Organization for Standardization)** is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 8967|IDF 134 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 edition of ISO 8967|IDF 134 cancels and replaces ISO 8967:1992, of which it constitutes a minor revision.

## Foreword

**IDF (the International Dairy Federation)** is a worldwide federation of the dairy sector with a National Committee in every member country. Every National Committee has the right to be represented on 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 IDF National Committees for voting. Publication as an International Standard requires approval by at least 50 % of the National Committees casting a vote.

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

ISO 8967|IDF 134 was prepared by the International Dairy Federation (IDF) and Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 5, *Milk and milk products*. It is being published jointly by IDF and ISO.

All work was carried out by the Joint ISO/IDF/AOAC Group of Experts on *Physical properties of dried milk products* (E701), under the aegis of its chairman, Mr J. de Vilder (BE).

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## Introduction

Different steps during production can influence the volume taken up by a certain mass of milk powder. The most important parameters affecting the volume of milk powder and hence its bulk density (see the definitions in Clause 2) are the dry matter content, the viscosity and the temperature of the concentrate. Also, homogenization of the concentrate and the spray-drying conditions, such as the inlet and outlet temperatures of the air and the peripheral velocity of the atomizer wheel or the pressure during nozzle atomization, are important steps. Special spray-drying conditions, such as recirculation of the fines to the wet zone in the spray drier (straight-through atomization), two-stage drying or rewetting for the production of instant milk powder, also have an influence on the volume.

In an interlaboratory study involving seven laboratories and nine samples, two methods for the determination of bulk density were tested. In one method the cylinder was dropped manually and in the other a mechanical apparatus was used for the tapping. The aim of this work was not only to establish the repeatability and reproducibility of the methods but also to determine the number of tappings needed to achieve reasonably constant volume. From this work it was clear that the mechanical operation gives far better results than the manual operation. For the mechanical test, the same apparatus as that specified in ISO 787-11 was used.

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# Dried milk and dried milk products — Determination of bulk density

## 1 Scope

This International Standard specifies a method for the determination of the bulk density of dried whole milk, dried partly skimmed milk and dried skimmed milk as defined in FAO/WHO Standard A-5<sup>1)</sup>, whether non-instant or instant.

The method is also applicable to dried whey, dried buttermilk and dried milk-based infant food, as well as to any of the dried products indicated above in which milk fat has been replaced by another fat, or which has been roller-dried instead of spray-dried.

## 2 Terms and definitions

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

### 2.1

#### **poured bulk density**

quotient of the mass and volume of a powder after transferring it to a specific cylinder

NOTE For dried milk and dried milk products, it is expressed in grams per millilitre.

### 2.2

#### **loose bulk density**

quotient of the mass and volume of a powder after 100 tapings under the conditions specified in this International Standard

NOTE For dried milk and dried milk products, it is expressed in grams per millilitre.

### 2.3

#### **bulk density**

quotient of the mass and volume of a powder after 625 tapings under the conditions specified in this International Standard

NOTE 1 For dried milk and dried milk products, it is expressed in grams per millilitre.

NOTE 2 In the *Système international d'unités* the concepts of density as defined above are expressed in kilograms per cubic metre. In commercial practice, however, these densities of dried milk and dried milk products are traditionally expressed in grams per millilitre.

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1) FAO/WHO Standard A-5 for whole milk powder, partly skimmed milk powder and skimmed milk powder, elaborated under the *Code of principles concerning milk and milk products*, 8th edition (1984), Rome: Food and Agriculture Organization, and the World Health Organization.