

Storage of cereals and pulses —

Part 2: Code of practice for the storage of cereals and pulses

[ISO title: Storage of cereals and pulses — Part 2: Essential requirements]

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Cooperating organizations

The Food and Agriculture Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

- Agricultural Co-operation and Marketing Services
- Agricultural Research Council (Meat Research Institute)
- British Food Manufacturing Industries Research Association
- British Industrial Biological Research Association
- Campden Food Preservation Research Association
- Consumer Standards Advisory Committee of BSI
- Department of Agriculture and Fisheries for Scotland
- Department of Agriculture (Government of Northern Ireland)
- Department of Industry (Laboratory of the Government Chemist)*
- Federation of Oils, Seeds and Fats Association Ltd.
- Flour Milling and Baking Research Association*
- Food Manufacturers' Federation Incorporated*
- Institute of Brewing
- Local Authorities Co-ordinating Body of Trading Standards
- Local Authorities Organization
- Ministry of Agriculture, Fisheries and Food*
- National Farmers' Union*
- National Farmers' Union of Scotland
- Royal Society of Chemistry
- Soap and Detergent Industry Association
- Tobacco Advisory Council
- United Kingdom Renderers' Association Ltd.

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

- Association of Public Analysts
- British Edible Pulse Association
- British Maize Refiners' Association
- Grain and Feed Trade Association Limited
- Home Grown Cereals Authority
- Incorporated National Association of British and Irish Millers
- Institute of Food Science and Technology
- National Association of Commodity Cargo Superintendents and Surveyors
- Society of Chemical Industry
- Ulster Farmers' Union
- United Kingdom Agricultural Supply Trade Association Ltd.

This British Standard, having been prepared under the direction of the Food and Agriculture Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 September 1982

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National foreword

This Part of this British Standard has been prepared under the direction of the Food and Agriculture Standards Committee and is identical with ISO 6322-2 “*Storage of cereals and pulses — Part 2: Essential requirements*”, published in 1981 by the International Organization for Standardization (ISO).

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Where the words “this part of ISO 6322” appear, referring to this standard, they should be read as “this Part of BS 6279”.

Cross-references

International Standards	Corresponding British Standards
ISO 6322-1:1981	BS 6279 <i>Storage of cereals and pulses</i> Part 1:1982 <i>Guide to particular problems encountered in the storage of cereals and pulses</i> (Identical)
ISO 6322-3:1989	BS 6279 <i>Storage of cereals and pulses</i> Part 3:1990 <i>Guide to control of attack by pests</i> (Identical)

Additional information. With reference to the mention of “asbestos-cement” in 5.2.3 and “asbestos-cement tiles” and “asbestos-cement sheets” in 5.2.4 as examples of materials used in construction, it should be noted that the use of these materials is deprecated because of the health risks associated with them. For information on agricultural buildings and structures it is recommended that reference be made to BS 5502 “*Buildings and structures for agriculture*”.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

The most important factors affecting the storage of grain are:

- a) the conditions of the surrounding atmosphere (with daily and seasonal variation in relative humidity and temperature);
- b) attack by pests (birds, rodents, insects and mites);
- c) attack by micro-organisms (mainly mould fungi);
- d) the condition of the storage building and method of handling.

In general, grain changes its condition only slowly while in storage, the extent of the change depending on the ambient conditions. Changes in moisture content and temperature are limited to the periphery of a bulk or to the outer bags of a stack, unless the storage period is prolonged or the grain mass is aerated. Heavy infestations of insects, however, cause a rise in temperature in a grain mass, and the temperature gradients produced may cause sufficient migration of moisture to cause mould damage, sprouting and damage by enzymic and chemical action. Mould development also causes grain to heat. The question of pests and their control is dealt with in ISO 6322-3.

It is therefore important when storing grain to put sound, dry¹⁾, clean, uninfested material into a sound, clean and uninfested storage container and to prevent subsequent deterioration by keeping it as cool and dry as possible.

Grain may be stored either in the open or in a specially constructed building or other container. The choice of the method of storage is often dictated by harvest and transport conditions, labour and materials available, cost, duration of storage and other factors.

A distinction should be made between grain stored in sacks and grain stored in bulk. Furthermore, for bulk grain there is a difference between grain stored in heaps in buildings, where it has a larger surface area exposed in relation to its volume, and grain stored in silos, where it has a smaller surface area exposed in relation to its volume.

1 Scope and field of application

This part of ISO 6322 gives guidance on the choice of a method of storage of cereals and pulses and on the essential requirements for good storage, according to the method chosen. Other aspects of the storage of cereals and pulses are dealt with in ISO 6322-1 and ISO 6322-3.

¹⁾ Except for special methods of storage (see clause 7).

2 References

ISO 6322-1, *Storage of cereals and pulses — Part 1: General considerations in keeping cereals.*

ISO 6322-3, *Storage of cereals and pulses — Part 3: Control of attack by vertebrate and invertebrate animals.*

3 Handling

Any storage system requires a means for moving the commodity into and out of the store. The means should be selected to minimize damage to or deterioration of the grain and the storage containers, and, as far as is practicable, should suppress dust.

4 Storage in the open

4.1 General

Storage in the open is the cheapest but the least satisfactory method. There is great danger of attack by birds, rodents, insects and mites (see ISO 6322-3), of attack by fungi, of damage by bad weather, of theft, of mechanical damage to bags and of other mishaps. Generally, such storage should be for short periods only.

4.2 Uncovered storage

Uncovered storage is less undesirable in dry countries, where a short, sharp shower will affect only the surface (to a depth of about 2 cm) and subsequent sunshine will dry out the grain again. Such exposure, however, may result in damage by “bleaching”. Storage under snow is also practicable because the low temperature restricts insect and mould development. Even so, a few toxin-producing fungi can grow at near-freezing temperatures on grain wetted by the snow, and therefore great care is needed if this method of storage is used.

Storage in the open may be:

- a) on the ground itself, in sacks or in bulk (storage of the unthreshed crop in stooks or ricks is becoming less common);
- b) on a “hard standing” or other prepared surface, in which the incorporation of a water-vapour barrier is desirable.

With bulk grain, artificial ventilation of the heaps is sometimes desirable but not always practicable.

4.3 Covered storage

Sometimes, a temporary roof, for instance of corrugated iron on a wooden frame, may be erected over a stack of bagged grain or a heap of bulk grain; “walls” of hessian curtains may be used to give additional protection against the weather.