

INTERNATIONAL
STANDARD

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Second edition
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Garlic — Cold storage

Ail — Entreposage réfrigéré

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Reference number
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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.

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.

International Standard ISO 6663 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Subcommittee SC 14, *Fresh fruits and vegetables*.

This second edition cancels and replaces the first edition (ISO 6663:1983), which has been technically revised.

Introduction

This International Standard provides guidance of a very general nature only. Because of the variability of the product according to the time and place of cultivation, local conditions may make it necessary to define other conditions for harvesting or other physical conditions during storage.

This International Standard does not apply unreservedly, therefore, to all varieties (cultivars) in all climates, and it will remain for each specialist to be the judge of any modifications to be made.

Subject to all restrictions arising from the fact that garlic is living material, the application of the guidance contained in this International Standard should enable much wastage in storage to be avoided and long-term storage to be achieved in most cases.

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Garlic — Cold storage

1 Scope

This International Standard gives guidance on conditions for cold storage for the successful keeping of garlic (*Allium sativum* Linnaeus) intended for consumption in the fresh state.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2169:1981, *Fruits and vegetables — Physical conditions in cold stores — Definitions and measurement*.

3 Conditions for harvesting and storage

3.1 Harvesting

Garlic intended for storage should be harvested when the tips or leaves begin to turn yellow, the neck tissue of the bulb begins to soften, and the mass of the bulb no longer increases. The bulbs should be well formed and physiologically at rest. The protective exterior scale should be dry and have a characteristic colour.

Harvesting should be carried out during dry weather over a short period of time.

3.2 Characteristics for storage

Only those varieties (cultivars) of garlic suitable for long-term keeping should be stored. Garlic intended

for cold storage should be of good commercial quality. It should be:

- clean, dry and whole;
- firm, ripe but not sprouting;
- healthy with a dry exterior scale;
- free from all field and store pests (nematodes and mites);
- free from sun or frost damage; and
- free of any foreign odour or taste.

3.3 Prestorage treatment

After harvesting, the garlic should be dried (cured). This operation begins in the fields and continues in the store rooms at temperatures of 20 °C to 30 °C for 8 or 10 days, or at temperatures of 35 °C to 40 °C for 1/2 to 1 day, with 60 % or 75 % relative humidity.

Disinfection of the bulbs with methyl bromide (bromomethane) is permissible only for garlic to be used for seed.

The storage life of garlic can be extended by using treatment with maleic hydrazide or other sprout inhibitors before harvesting. This treatment is effective for the control of sprouting and weight losses.

3.4 Sizing

Sizing of garlic bulbs should be carried out according to their diameters. The minimum diameter is 45 mm for garlic in the Extra Class, and 30 mm for garlic in Classes I and II. The differences in diameters of bulbs which are in the same package should not exceed 2,5 mm.

3.5 Packing

Garlic should be packed for storage in cases (boxes), box pallets (boxes which can be stored on pallets), metal-mesh containers or sacks which can be stored on pallets.

The packing material should be clean, new and of a quality to avoid causing any external or internal damage to the produce, but not prevent circulation of air around the product.

3.6 Putting into storage

With the exception of onions, garlic should not be stored with other produce. The stores should be filled within a short period of time.

3.7 Method of storage

Sacks should be filled in a manner that ensures circulation of air. Box pallets or sacks on post pallets may be stacked up to five or six high. For boxes which can be stored on pallets, stacking may be up to eight or nine high, leaving spaces to allow the circulation of air in all directions.

A space of about 0,5 m should be left both below and above the stacks.

4 Optimum storage conditions

For measurement of the physical quantities affecting storage, see ISO 2169.

4.1 Temperature

Garlic should be stored at 0 °C and temperature variations should not exceed $\pm 0,5$ °C.

4.2 Relative humidity

During storage the relative humidity of the air should be maintained between 65 % and 75 %.

4.3 Air circulation

Air should be circulated constantly to ensure a homogeneous temperature.

4.4 Storage life

The storage life varies with the variety (cultivar) and method of cultivation and ranges from 130 to 220 days. The condition of the stored product should be checked every 7 to 10 days.

4.5 Operations at the end of storage

When removed from cold store, garlic should be gradually rewarmed to avoid condensation forming on the surface of the product.

If required, garlic should be sorted according to quality.