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Ware potatoes — Guide to storage

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2165 was drawn up by Technical Committee ISO/TC 34, *Agricultural food products,* and circulated to the Member Bodies in November 1970.

It has been approved by the Member Bodies of the following countries :

Australia	Hungary	Romania
Austria	India	South Africa, Rep. of
Belgium	Iran	Sweden
Chile	Israel	Thailand
Czechoslovakia	Netherlands	Turkey
Egypt, Arab Rep. of	New Zealand	United Kingdom
France	Poland	U.S.S.R.
Germany	Portugal	

No Member Body expressed disapproval of the document.

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Ware potatoes — Guide to storage

1 SCOPE AND FIELD OF APPLICATION

This International Standard describes methods for obtaining conditions for the successful keeping, with or without artificial cooling, of potatoes of the species *Solanum tuberosum* Linnaeus intended for consumption, either directly or after industrial processing.

It does not apply to early (new) potatoes or to seed potatoes.

See also the limits of application given in the annex.

2 REFERENCE

ISO 2169, *Fruits and vegetables — Physical conditions in cold stores — Definitions and measurements.*

3 CONDITIONS OF HARVESTING AND PUTTING INTO STORE

3.1 Harvesting

The potato tubers should be harvested mature. The skin should be firm, should not peel off under mere rubbing and should be free from cracks.

3.2 Quality characteristics for storage

The lots to be stored must not contain tubers which are bruised, frozen, rotten, affected by fungal decay (mould) or which have sprouted. This may possibly be achieved by preliminary sorting, which needs to be carried out with care since it frequently causes bruises which may be more detrimental in storage than the presence of these defects.

3.3 Putting into store

The potatoes should be put into store as soon as possible after harvesting. For 10 to 14 days after putting into store, the tubers should be held at a temperature of + 13 to + 18 °C and high relative humidity for suberization and healing of wounds. After this period, the temperature must be lowered as quickly as possible.

3.4 Method of storage

The potatoes may be stored in containers, box pallets, boxes or stacking trays, bags, or in bulk.

When they are stored in bags or in bulk, and if no means are provided to prevent the lower layers from being crushed by the upper layers, the height of the tuber layer should be specified according to the hardness of the variety, the quality of the lot and the condition of the air-circulating device. The cases must be arranged so as to permit free circulation of the air.

Ware potatoes should be stored away from the light.

4 OPTIMUM STORAGE CONDITIONS[1)]

4.1 Temperature

The optimum temperature is between + 3 and + 6 °C.

However, in the case of potatoes intended for certain industrial processing operations, for example of the "crisps" type, it is recommended that this temperature be raised to between + 7 and + 10 °C, depending upon the variety. Moreover, it is recommended that for these potatoes the temperature be raised to between + 10 and + 14 °C — and possibly up to + 20 °C — during the last two weeks of storage.

4.2 Relative humidity

The optimum relative humidity is between 85 and 95 %.

4.3 Air circulation

The containers and the way in which they are stacked should permit free circulation of air.

4.3.1 *Mixing*

The mixing of air in a closed circuit makes it possible to render the temperature and relative humidity uniform. An air-circulation ratio of between 20 and 30 is recommended.

4.3.2 *Air change*

Stored potatoes produce an accumulation of carbon dioxide and of heat due to respiration, which should be removed. This is done by changing the atmosphere.

1) For definitions and measurement of the physical quantities affecting storage, see ISO 2169.

4.3.2.1 When natural cooling is used, and when it is no longer possible to effect ventilation by the admission of outside air, frequent changing of the atmosphere is necessary. A mixture of outside air and store air can be used if the temperature of this mixture is above 0 °C.

4.3.2.2 When artificial cooling is used, with closed-circuit mixing, the atmosphere should be changed at regular intervals throughout the storage period.

4.3.2.3 In the case of natural cooling, a flow of about 100 m^3 per cubic metre of product per hour is recommended; in the case of artifical cooling, a flow of about 50 m^3 per cubic metre of product per hour ought to be adequate. Nevertheless, the flow of air depends on the climatic conditions of the region.

4.4 Storage life

The expected storage life is 6 months in storage with natural cooling and 8 months in refrigerated storage. Storage life can, however, vary according to the cultivar and the climatic zone.

4.5 Operations at the end of storage

When the storage temperature has been below + 10 °C, progressive re-heating to + 10 °C is necessary at the end of the storage period, before the sorting and packing operations are carried out.

5 ADJUNCTS AND OTHER METHODS OF KEEPING

During long-term storage of potatoes, it is necessary to envisage the possibility that sprouting may begin; in countries where there are no restrictions on use, sprouting inhibitors of a chemical nature may be applied.

Interesting results have also been obtained by using ionizing radiation, of the order of 8 000 to 12 000 rad. However, this preservation technique may be subject to restrictions in some countries.

ANNEX

LIMITS OF APPLICATION

This International Standard gives guidance of a very general nature only. Because of the variability of the product according to the time and place of cultivation, local circumstances may make it necessary to specify other conditions of harvesting or other physical conditions in the store.

These recommendations do not apply unreservedly, therefore, to all varieties in all climates, and each specialist will himself decide any modifications to be made.

Moreover, this International Standard does not take into account the role played by ecological factors, and wastage during storage is not dealt with.

Subject to all possible restrictions arising from the fact that vegetables are living materials, 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.