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# International Standard



# 4186

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Asparagus — Guide to storage

*Asperges — Guide pour l'entreposage*

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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 4186 was developed by Technical Committee ISO/TC 34, *Agricultural food products*, and was circulated to the member bodies in April 1978.

It has been approved by the member bodies of the following countries :

Australia	Iran	Romania
Austria	Israel	South Africa, Rep. of
Bulgaria	Korea, Rep. of	Spain
Canada	Mexico	Thailand
Czechoslovakia	Netherlands	Turkey
France	Poland	USA
Hungary	Portugal	Yugoslavia

The member body of the following country expressed disapproval of the document on technical grounds :

New Zealand

# Asparagus — Guide to storage

## 1 Scope and field of application

This International Standard describes methods for obtaining conditions for the successful keeping of shoots of the species *Asparagus officinalis* Linnaeus intended, after storage, either for direct consumption or for industrial processing.

## 2 Reference

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

## 3 Conditions of harvesting and putting into store

### 3.1 Harvesting

The asparagus shoots should be harvested at a development stage corresponding to the quality requirements specified in the relevant product standard.

### 3.2 Quality characteristics for storage

Asparagus shoots intended for storage should appear fresh, and should be clean, sound, firm, smooth, well formed, and free from bruises and visible damage caused by insects or diseases. The heads or tips should be closed.

Shoots of bleached asparagus should be fully etiolated.

According to the cultivar, the head or tip and sometimes the shoot may be white, pale yellow or lilac. The shoots of green asparagus should be uniformly green.

### 3.3 Putting into store

The asparagus shoots should be free from earth and other foreign matter. They may be washed if necessary. They should be put into store as soon as possible after harvesting. It is recommended that, to the extent permitted by the prevailing technical conditions, an initial refrigeration be effected to cool the asparagus shoots from field temperature to 7 °C, before they are put into store. This temperature is a transition to subsequent storage at a lower temperature. Efficient pre-cooling

can also be obtained using cold water or ice water; the asparagus shoots should not remain in water for more than 1 h.

Before storage, the asparagus shoots should be layered in boxes, without bundling; they should be put into store in this state (for example, 12 kg of shoots should be put into boxes of 15 kg capacity).

## 4 Optimum storage conditions<sup>1)</sup>

### 4.1 Temperature

Asparagus is a vegetable liable to be damaged by refrigeration; therefore, storage temperature and intended time of storage have to be carefully related.

During storage, the optimum temperature limits for keeping are from + 1 °C to + 2 °C. The minimum of + 1 °C is recommended because fluctuation of temperature may reach 0,5 °C, and practical experience has shown that shoots stored at a temperature below 0,5 °C are likely to be damaged.

If the intended period of storage is 10 days or shorter, the asparagus shoots may be kept successfully at 0,5 °C. However, at this temperature the period of 10 days should not be exceeded because of the likelihood of damage.

### 4.2 Relative humidity

The relative humidity should be kept at 90 to 95 %.

### 4.3 Air circulation

The boxes and the way in which they are stacked should allow the temperature and relative humidity to be maintained constant and uniform, within the limits mentioned in 4.1 and 4.2, by air circulation.

### 4.4 Storage life

It is recommended that asparagus shoots be stored for as short a period as possible. According to the cultivar, the quality and the temperature, the asparagus shoots should not be stored for longer than 10 to 20 days (time required for refrigerated transport and for distribution included).

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