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# International Standard



# 6882

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

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## Asparagus — Guide to refrigerated transport

*Asperges — Guide pour le transport réfrigéré*

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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 6882 was developed by Technical Committee ISO/TC 34, *Agricultural food products*, and was circulated to the member bodies in May 1980.

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

Australia	Israel	Romania
Austria	Kenya	South Africa, Rep. of
Brazil	Malaysia	Spain
Czechoslovakia	Netherlands	Turkey
Egypt, Arab rep. of	Peru	USA
France	Philippines	USSR
Hungary	Poland	Yugoslavia
Ireland	Portugal	

No member body expressed disapproval of the document.

# Asparagus — Guide to refrigerated transport

## 1 Scope and field of application

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

It is not applicable to transportation over short distances or by air; in these cases, refrigeration does not govern the quality.

## 2 Reference

ISO 4186, *Asparagus — Guide to storage*.

## 3 Preparation of the asparagus shoots for transport

### 3.1 Harvesting

Asparagus should be harvested at a development stage corresponding to the quality requirements specified in the relevant product standards. They should have closed heads and tips.

### 3.2 Cleaning, cooling, packing

Asparagus shoots should be free from earth and sand. They may be washed if necessary. Asparagus is a highly perishable vegetable and if good quality is to be maintained it should be cooled as soon as possible after harvest to a temperature of + 7 °C or below. This precooling can be accomplished by hydrocooling to + 5 °C and then placing in refrigerated storage at + 1 °C to + 2 °C. Refrigerated storage eliminates surface moisture. Precooling can also be accomplished by placing the asparagus shoots into store at + 1 °C to + 2 °C as soon as possible after harvest. Rapid cooling is critically important. After precooling, the product can be submitted to grading and packing operations, according to marketing requirements. Asparagus is rarely stored except for short holding periods. The temperature can range from 0 to + 5 °C. When transported over long distances, the temperature of the product should be + 1 °C to + 2 °C at the outset.

Containers should be clean and free from dirt. The packing material should be new and should not contain any material harmful to humans. The packing should be such as to safeguard the quality of the asparagus. The cut ends of the bundled shoots may be wrapped in tissue-paper or the bundles may be placed in perforated plastic bags.

The relative humidity required during transport, i.e. 95 %, can only be maintained if containers holding the shoots are lined with perforated parchment paper or plastic film, or if waxed cardboard containers lined with plastic film are used. The shoots may be layered either with or without bundling. Completely closed containers or plastic bags preventing ventilation should not be used as uncontrolled build up of carbon dioxide and depletion of oxygen may cause damage to the shoots. The size of wooden or cardboard boxes should be sufficient for the shoots in bundles, but should prevent them from moving inside during transit. (For asparagus shoots packed according to the EEC product standard, a nailed wooden box of dimensions 26 cm × 50 cm × 24 cm, fitted with a lid, may be used.)

## 4 Transport

### 4.1 Optimum conditions for transport

At temperatures of + 1 °C and + 2 °C and at a relative humidity of 95 %, the asparagus shoots can only be kept for a maximum of three weeks in a condition suitable for consumption. During transport therefore, these conditions need to be very carefully controlled, or if this is not possible, the length of time from harvest to consumption should be as short as possible. During transit over 2 to 3 days, fluctuations of temperature between + 1 °C and + 5 °C are permissible, as these will not affect the quality.

To maintain the relative humidity, the method of packing described should be adequate. At higher temperatures or at low relative humidities arising from inadequate packing, the quality of the asparagus shoots quickly deteriorates during transit (toughening, decay, bacterial rot, process of senescence).

### 4.2 Means of transport

Refrigeration should be continuous for the asparagus. For this purpose, ice- or mechanically refrigerated railway trucks or refrigerated lorries may be used.

The vehicles and equipment used for transport shall not have previously carried material harmful to health (chemical substances, plant protection materials, fertilizers). It should be in good working condition i.e. fans should be operating, drains should be free within ice-refrigerated railway trucks and floor racks ensuring air circulation should be in position. Before loading, the loading space of the vehicles should be precooled either by icing the bunkers or by mechanical refrigeration.

#### 4.3 Loading

Wooden or cardboard boxes containing asparagus should be stacked lengthwise (facing forward). Only those boxes necessary for closing the spaces between the stacks, to prevent them from moving during transport, should be placed crosswise. Any gaps which remain should be filled with empty boxes or crates for the same purpose.

The ice bunker of ice-refrigerated railway trucks should be iced to capacity after loading.

#### 4.4 Transportation, handling on arrival

If as a consequence of warm weather or long transit periods the ice should melt during transport in ice-refrigerated railway trucks at an interim station, re-icing should be carried out to assure that, at the destination, the trucks arrive with their bunkers not less than one third full. After unloading, continuous cooling has to be maintained.

After cold storage, asparagus which has been refrigerated and transported has to be consumed or processed as soon as possible. When marketed, it can be kept at normal temperatures for no longer than 48 h.

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