# International Standard 7561

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

# Cultivated mushrooms — Guide to cold storage and refrigerated transport

*Champignons de couche — Guide pour l'entreposage et le transport réfrigérés*

**First edition — 1984-04-01**



**UDC 635.82 : 664.8.037.1** **Ref. No. ISO 7561-1984 (E)**

**Descriptors** : agricultural products, mushrooms, cold storage, packages, humidity, transportation.



Price based on 2 pages

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (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 authorized 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 7561 was developed by Technical Committee ISO/TC 34, *Agricultural food products*, and was circulated to the member bodies in September 1982.



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

Austria
Czechoslovakia
Egypt, Arab Rep. of
Ethiopia
France
Hungary
India
Iran
Iraq
Israel
Kenya
Korea, Dem. P. Rep. of
Malaysia
Mexico
Netherlands
Philippines
Portugal
Romania
South Africa, Rep. of
Spain
Sri Lanka
Turkey
USA
USSR
Yugoslavia

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

Ireland



Printed in Switzerland

# Cultivated mushrooms — Guide to cold storage and refrigerated transport

## 1 Scope and field of application

This International Standard describes methods for obtaining conditions for the successful cold storage and long distance refrigerated transport of cultivated mushrooms (*Agaricus bisporus* L.), intended 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 packing



### 3.1 Harvesting

Cultivated mushrooms should be harvested at a stage of development corresponding to the quality requirements (see 3.2), because the veil under the cap soon opens, thus reducing the quality. Mushrooms should be harvested daily during the main period of cultivation and if grown in rooms with high temperatures (16 to 20 °C). Towards the end of the cultivation period and in rooms with lower temperatures (10 to 20 °C), they can be harvested every second day.

Cultivated mushrooms easily discolour, even at low temperature, as a result of pressing or rubbing. They should, therefore, be carefully handled between harvesting and consumption. The fruit body should be removed from the bed by twisting so that the stem is not broken and the least amount of covering soil and mycelium is removed. Residues of broken stones should be rubbed off the stem. If soil is used as the covering material, the end of the stem should be cut off with a sharp knife at right angles to the length of the stem. To maintain the quality of cultivated mushrooms, it is recommended that they be placed, after harvest, in a package where they can remain until consumption or processing.

The mushrooms may be washed, if necessary, but they should be dried within a few minutes with spongy absorbents, as persistent surface moisture causes brown discoloration or mucosity. Forced ventilation is not suitable for drying mushrooms because it favours wilting.

### 3.2 Quality requirements

The mushrooms should be carefully handled, and should be fresh, of good quality, and of uniform white, cream or light buff colour, according to the variety. The cap should be spherical or hemispherical. The veil under the cap should be closed or open, according to market requirements. The stem should be plump, and the end may be cut or whole. The body should be elastic, free from abnormal surface moisture and should be free from mechanical damage, spoilage and holes caused by insect attack.

### 3.3 Grading and packing

The mushrooms should be graded according to the quality standards of the country concerned or, in the case of international trade in accordance with accepted international standards. The best results are obtained by using packages that have rigid sides. The mushrooms should be tightly packed without being compressed. A loose pack leads to abrasion from movement, and excessively tight packing results in pressure bruises. Both types of damage lead to discoloration and loss of quality.

Mushrooms may be packed in wooden boxes or fibreboard containers lined with silk-paper, and on trays of fibreboard or plastics placed in wooden boxes. The packages should be covered with perforated film or plastic stretch film in order to avoid loss of moisture. Packages and other materials used for this purpose should be new, clean and made of a material which will not affect the product, either internally or externally.

## 4 Optimum conditions for storage and transport

### 4.1 General

Cultivated mushrooms are the most sensitive to storage of all horticultural products. They should be consumed as soon after harvesting as possible and only stored in special cases. If storing or transporting cultivated mushrooms, however, precooling of the product, immediately after harvesting and before packaging, to a temperature which should not drop below 2 °C, is recommended.

### 4.2 Temperature

The temperature depends on the duration of storage and transport. Mushrooms can be stored for 4 to 5 days at + 2 °C and for 2 to 3 days at + 5 °C.

### 4.3 Relative humidity

The relative humidity is 90 %. A higher relative humidity may result in condensation, causing discoloration and mucosity. At a lower relative humidity, the mushrooms wilt, losing their elastic character.

The relative humidity can be obtained by covering the containers of mushrooms intended for storage or transportation with perforated film or plastic stretch film of suitable porosity for the given conditions, thus delaying wilting, and avoiding the formation of condensation.

## 5 Storage

The package should be placed on pallets and put into the cold store. Piles should be formed according to the nature of the packages. Air circulation at too high a rate is unfavourable to quality, as it increases the loss of humidity. When transported over long distances, mushrooms should be kept in cold stores only until they have cooled to the required temperature; they should then be placed in the refrigerated transport vehicle.

## 6 Requirements for transport vehicles and loading

During the transport of mushrooms, refrigeration should be continuous. For this purpose, ice- or mechanically refrigerated railway trucks or refrigerated lorries may be used. Equipment should be in good technical condition, for example fans should be in working condition, drains should be free in ice-refrigerated railway trucks, and floor racks assuring the circulation of air should be in position. Before loading, the temperature of the loading space in the vehicles should be adjusted to that required, either by icing the bunkers or by mechanical refrigeration.

Wooden or fibreboard boxes containing mushrooms should be stacked lengthwise (facing forward), and only boxes necessary for filling spaces between the stacks, to prevent them from moving during transport, should be placed crosswise. Similarly, remaining gaps should be filled with empty boxes or crates for the same purpose.

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

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

## 7 Operations on arrival

After unloading, either continuous refrigeration should be maintained or the mushrooms should be consumed or processed as soon as possible.