INTERNATIONAL STANDARD

ISO
949

Second edition
1987-06-01

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

Cauliflowers — Guide to cold storage and refrigerated transport

Choux-fleurs — Guide pour l'entreposage et le transport réfrigérés

Reference number
ISO 949 : 1987 (E)

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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 949 was prepared by Technical Committee ISO/TC 34, *Agricultural food products.*

This second edition cancels and replaces the first edition (ISO 949 : 1978), the scope of which has been expanded to include the refrigerated transport of cauliflowers.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Printed in Switzerland

Cauliflowers — 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 cauliflowers of various varieties derived from *Brassica oleracea* Linnaeus var. *botrytis* Linnaeus subvar. *cauliflora* A.P. Decandolle, intended either for direct consumption or for industrial processing.

2 References

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

ISO 6661, *Fresh fruits and vegetables — Arrangement of parallelepipedic packages in land transport vehicles.*

3 Conditions of harvesting and packing

3.1 Harvesting

Cauliflowers intended for storage shall be harvested before maximum development of the curds. They shall preferably be harvested in the morning.

The date of harvesting shall be determined according to the state of maturity of the curds. In hot weather, a delay of even one day in harvesting may cause yellowing, splitting and spreading of the curds.

3.2 Quality requirements

The curds shall be fresh in appearance, whole, sound, clean, free from defects such as evidence of attack by rodents or insects, and free from visible signs of disease, frost damage or bruising. Curds showing blemishes from any source shall be excluded. As far as possible, the cauliflowers shall be free from surface water.

It is not recommended that the cauliflowers are washed before storage but it is recommended that they are trimmed to leave a few protective leaves and that the stalk is cut short.

3.3 Packages

The most common type of package is a wooden crate of open construction but waxed corrugated paperboard cartons are also used successfully.

Parchment paper or plastics wraps (polyethylene, polyvinyl chloride, etc.) may be used to retard the loss of moisture. These materials may be used to line the boxes, to wrap individual heads or to cover a stack of crates. The packages used shall protect the product but have adequate air vents to provide for product cooling during transport and storage.

4 Optimum storage and transport conditions[1)]

4.1 Putting into store

The cauliflowers shall be precooled as soon as possible after harvesting because even after 48 h at a temperature of 15 °C, the curds begin to yellow and changes due to bacteria or fungi become evident. These changes are irreversible. If transport between the place of harvesting and the cold store requires several days, the cauliflowers shall be cooled before transport.

4.2 Temperature

The optimum temperature for storage and transport of cauliflowers is in the range 0 to 4 °C. Temperatures below 0 °C lead to changes due to frost. The temperature chosen shall be kept constant throughout the whole period of storage and transport to avoid surface condensation.

4.3 Relative humidity

It is recommended that the relative humidity is in the range 90 % to 95 %. Lower relative humidities lead to withering of the curds and the leaves, and consequently to a shorter storage life. Certain packages may help to reduce loss of moisture from the product (see 3.3).

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

4.4 Air circulation

During storage and transport, the air circulation shall be so arranged that the temperature and relative humidity indicated in 4.2 and 4.3 can be maintained constant and uniform.

4.5 Storage

It is recommended that the cauliflowers are arranged in two layers at most, subject to a sufficient quantity of outer leaves being left. The upper layer shall be arranged in such a way as not to injure the curds of cauliflowers in the lower layer. Cauliflowers which have lost their protective leaves shall be arranged in one layer only, with their curds upwards.

It is preferable to pack cauliflowers with the curds downwards to protect them against excessive humidity, bruising and dirt during transportation. Packing in this way also allows the elimination of any traces of free water resulting from harvesting and washing.

4.6 Storage life

By adopting the above conditions, a storage life of 3 to 6 weeks can be obtained, according to the variety of cauliflower.

Quality control should be carried out on a daily basis to prevent deterioration.

5 Requirements for transportation and loading

5.1 Transportation

During the transport of cauliflowers, refrigeration shall be continuous. For this purpose, ice- or mechanically refrigerated railway trucks or refrigerated lorries may be used.

Equipment shall be in good technical condition, for example roof vents shall be in working condition, drains shall be free in ice-refrigerated railway trucks, and floor racks assuring the circulation of air shall be in position. Before loading, the temperature of the loading space in the vehicules shall be adjusted to that required, either by icing the bunkers or by mechanical refrigeration.

The ice bunker of ice-refrigerated railway trucks shall 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 shall be carried out at an interim station to ensure that the trucks arrive with their bunkers not less than one-third full.

5.2 Arrangement of packages

The arrangement of packages in land transport vehicles shall be carried out according to the specifications given in ISO 6661.

6 Operations at the end of storage or refrigerated transport

After storage, the cauliflowers shall be inspected and any yellowed or otherwise affected leaves shall be removed. The stems shall also be re-cut.

After transport and unloading, either continuous refrigeration shall be maintained or the cauliflowers shall be consumed or processed as soon as possible.

Annex

Limits of application

(This annex does not form an integral part of the standard.)

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 circumstances may make it necessary to specify other conditions of harvesting or other physical conditions in the store.

This International Standard does 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 material and may vary considerably, the application of the recommendations contained in this International Standard should enable much wastage in storage to be avoided and satisfactory storage to be achieved in most cases.

This page intentionally left blank

This page intentionally left blank

This page intentionally left blank

UDC 635.35 : 664.8.037

Descriptors : agricultural products, vegetables, cauliflower, storage, cold storage, transportation.

Price based on 2 pages