
INTERNATIONAL STANDARD



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Fruit and vegetables — Ripening after cold storage

Fruits et légumes — Maturation à l'issue de l'entreposage réfrigéré

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FOREWORD

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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 3659 was developed by Technical Committee ISO/TC 34, *Agricultural food products*, and was circulated to the member bodies in October 1974.

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

Australia	Germany	Poland
Austria	Hungary	Romania
Chile	India	Spain
Czechoslovakia	Iran	Turkey
Egypt, Arab Rep. of	Ireland	Yugoslavia
France	Israel	

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

New Zealand

Fruit and vegetables — Ripening after cold storage

0 INTRODUCTION

The techniques described in this International Standard are given for information only; each country, within the framework of its national regulations, may decree measures intended to forbid the use of certain procedures listed in this document.

In addition, the ripening techniques taken into account in this document only apply, either immediately after harvesting, or after a more or less long storage time, to products picked at a sufficient stage of physiological development. Supplementary ripening should in no case be applied to fruit or vegetables harvested ahead of time.

1 SCOPE AND FIELD OF APPLICATION

This International Standard describes methods the application of which enable good ripening conditions for fruit and vegetables¹⁾ to be achieved following cold storage.

2 REFERENCE

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

3 AIM OF THE RIPENING FOLLOWING COLD STORAGE

Certain fruits are harvested and stored ripe (grapes, cherries, sweet chestnuts, raspberries, oranges, litchi) or at a stage close to full ripeness (apricots, strawberries, pineapples, peaches, plums). Others, on the other hand, are harvested and stored at a physiological stage very far from full ripeness (apples, pears, bananas).

The aim of the operation is therefore to improve the development of the fruit when this is insufficient and incomplete following cold storage, in order to obtain the optimum properties for consumption.

4 TEMPERATURE ZONES TO BE CONSIDERED

With regard to the fruit in the last category, when the behaviour of each species or variety in relation to the storage temperature is examined, it is apparent that there exist several temperature zones (or critical points) to be considered. Among these may be mentioned :

- an optimum cold storage temperature zone where the various phenomena characteristic of life are slowed down to the maximum without the appearance of physiological disorders;
- a ripening initiation temperature zone from and above which ripening begins to take place;
- a critical ripening temperature zone from and below which, when ripening does not normally take place, there appear physiological disorders.

When the optimum cold storage temperature and the ripening initiation temperature coincide, the fruits are ripe at the end of storage if the latter has been sufficiently long (for example apples kept at 4 °C). Ripening in this case is as often as not only necessary for fruit with insufficient colouring which may in this way acquire their ripe fruit colour (apples, lemons, mandarins, etc.).

On the other hand, when these two temperature zones are different, the fruits when taken from the cold room are not sufficiently developed and ripening following storage is then essential.

The treatments to be applied concern essentially either physical actions (temperature, humidity), or physical actions combined with chemical actions (ethylene, oxygen²⁾). Their nature, duration and results depend on the species, the ecological history of the fruit, its physiological state at the end of cold storage, and the cold storage technique employed.

1) With regard to vegetables, this technique seems to be limited to tomatoes only.

2) These two substances are only indicated as examples.