



**Australian Government**  
**Department of Agriculture,  
Fisheries and Forestry**

# **Australian phytosanitary treatment application standard for cold disinfestation treatment**

Version 1.2



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# 1 Introduction

The objective of phytosanitary treatment is to prevent the introduction or spread of regulated pests. Effective phytosanitary treatments are critical to managing Australia's plant biosecurity risks and safeguarding trade. The Australian treatment application standards ensure that treatments:

- are carried out in a consistent and effective manner
- reach the required efficacy every time they are applied.

This treatment application standard applies to the use of cold disinfestation treatment (cold treatment) as a phytosanitary measure for imported product as well as exported and domestically traded product.

Cold treatment uses refrigerated air to lower the temperature of a product to, or below, a specific temperature for a specific period of time in order to mitigate the risks of infestations of certain pests. The entire consignment must reach the required temperature for the required period. This is verified by monitoring of the core temperature of the product.

Cold treatment is used primarily for products that are hosts of internally feeding pests such as fruit fly.

Responsible certifying authorities must ensure, through audit or verification, that treatment facilities can demonstrate that they meet requirements to effectively deliver cold disinfestation treatment. This may include registration, or approval arrangements by third parties.

## 1.1 Scope

This standard provides the requirements for applying an effective cold treatment as a phytosanitary measure for regulated pests on plant products for human consumption.

This standard is the baseline for the application of cold treatment in trade with and within Australia. Additional requirements may apply to trade with some countries.

The following is out of scope:

- specific import requirements
- target temperatures and durations for specific pests
- operational instructions including requirements for premises registration, certification, approval of arrangements, etc.

The import requirements for trade with Australia can be found on the department's website at [www.agriculture.gov.au](http://www.agriculture.gov.au). The Biosecurity Import Conditions (BICON) database contains the requirements for imports to Australia and the Manual of Importing Country Requirements (Micor) lists known conditions for exports from Australia. The specific state and territory department of agriculture websites for domestic trade can be found on the relevant state websites.

## 2 Requirements

### 2.1 Treatment chambers

2.1.1 Cold treatment can occur onshore in purpose built cool rooms and self-refrigerated (integral) containers, or during transport in self-refrigerated (integral) containers.

2.1.2 All cool rooms and containers used for phytosanitary cold treatments must have the following characteristics:

- be able to reach and maintain treatment temperatures for a required period
- be clean and pest free
- have a system in place to prevent insect infestation or reinfestation of consignments, which may include insect proof materials covering all openings
- doors that can be closed and secured using a numbered, tamper-evident seal
- contain secure automatic temperature recording equipment accessible from outside of the treatment chamber. Where approved by an importing authority, single-use, standalone temperature data loggers which are only accessible from inside the container, are permitted for in-transit treatments.

#### **Onshore cold treatment using cool rooms**

2.1.3 Cool rooms used for onshore treatment must be permanent structures with appropriate temperature monitoring equipment and phytosanitary security in place. They must be fit for purpose and have measures in place to prevent infestation of product.

2.1.4 The responsible certifying authority may require verification of temperature distribution through either:

- temperature mapping studies which characterise temperature distribution within the treatment chamber and the consignment
- records from use of the treatment chamber
- historical use of cold treatment with reference to the configuration of a treatment chamber and product.

#### **Onshore cold treatment in containers**

2.1.5 Shipping containers used for onshore cold treatment must be self-refrigerated (integral).

2.1.6 The responsible certifying authority may require verification of temperature distribution, through temperature mapping studies, which characterise temperature distribution within the treatment chamber and the consignment.

2.1.7 Phytosanitary security must be at carton or pallet level prior to treatment, to ensure phytosanitary security is maintained when the container is unloaded upon completion of treatment.

#### **In transit cold treatment**

2.1.8 In transit cold treatment is the process of applying cold treatment to a commodity as it travels to its destination. The treatment can be started onshore and completed in transit, or for some countries, completed on arrival. In transit cold treatment must be carried out within a self-refrigerated (integral) container.

## **2.2 Temperature sensors**

2.2.1 Temperature sensors must:

- have unique identification
- be distinguished as an air sensor or product sensor
- be able to be secured against movement or damage
- be accurate to  $\pm 0.3^{\circ}\text{C}$ , unless otherwise prescribed by the importing authority.

## **2.3 Temperature recording equipment**

2.3.1 Treatment recording equipment must:

- be secure and tamper-evident
- accommodate the required number of sensors
- not be affected by environmental conditions, including vibration
- record all temperature sensors at least a minimum once per hour with incremental readings of  $0.1^{\circ}\text{C}$
- record data continuously for the duration of the treatment
- store data for the duration of the treatment and as long as necessary after the treatment is complete to allow for verification
- produce reports which identify each sensor, time and temperature, as well as identify the chamber where the treatment was undertaken.

## 3 Procedures

### 3.1 Precooling

#### In transit cold treatment and onshore cold treatment in containers

3.1.1 Product for cold treatment should be pre-cooled to the treatment temperature or below before the treatment begins. The importing authority may require the product to be pre-cooled to the treatment temperature or below before allowing the product to be loaded into the container for treatment.

3.1.2 To verify precooling, the responsible certifying authority will conduct random product temperature sampling with a calibrated thermometer prior to loading.

#### Onshore cold treatment in cool rooms

3.1.3 Product for cold treatment must be at the treatment temperature or below before the treatment can begin. Precooling checks by the responsible certifying authority is not usually required.

### 3.2 Number of sensors

3.2.1 If there are no specific import requirements then the number of sensors in the treatment chamber must be as follows:

- onshore cool room
  - four (4) product sensors
  - two (2) airflow sensors
- refrigerated (integral) containers
  - three (3) product sensors.

3.2.2 If additional sensors are used, there is an expectation that they must measure the correct temperature/time combination. They may not provide alternative assurance in the event of a sensor failure.

### 3.3 Calibration of sensors

3.3.1 Calibration of temperature sensors must be undertaken by a suitably trained individual and supervision by the responsible certifying authority or their representative may be required.

3.3.2 The calibration of sensors must be conducted using a slurry of crushed ice and fresh water in accordance with procedures in [Annex A](#). A calibrated thermometer capable of reading to 0.1°C must be used when verifying ice slurry temperatures.

3.3.3 Onshore cool room air sensors must be calibrated at least twice annually.

### 3.4 Loading

3.4.1 When loading the treatment chamber, product must be packed in a manner which ensures an even airflow around pallets taking into account:

- density
- composition
- package shape
- size

- volume
- packing configuration
- dunnage

Note: where containers are only part loaded with product the remainder of the space is required to be filled to ensure the efficacy of the treatment.

3.4.2 The temperature of the precooled product must not rise significantly while loading.

### 3.5 Mixed product consignments

3.5.1 Unless specifically permitted by the relevant import requirements, treatment chambers must not contain more than one type of product.

3.5.2 Where more than one type of product is permitted in the treatment chamber at one time:

- there must be at least one probe in each different product
- the most stringent time and temperature requirements must be applied to the entire load. That is, the lowest temperature and longest time derived from the treatment schedules of the products being loaded.

### 3.6 Placement of temperature sensors

3.6.1 Sensors must be placed by a suitably trained individual. Supervision by the responsible certifying authority or their representative may be required.

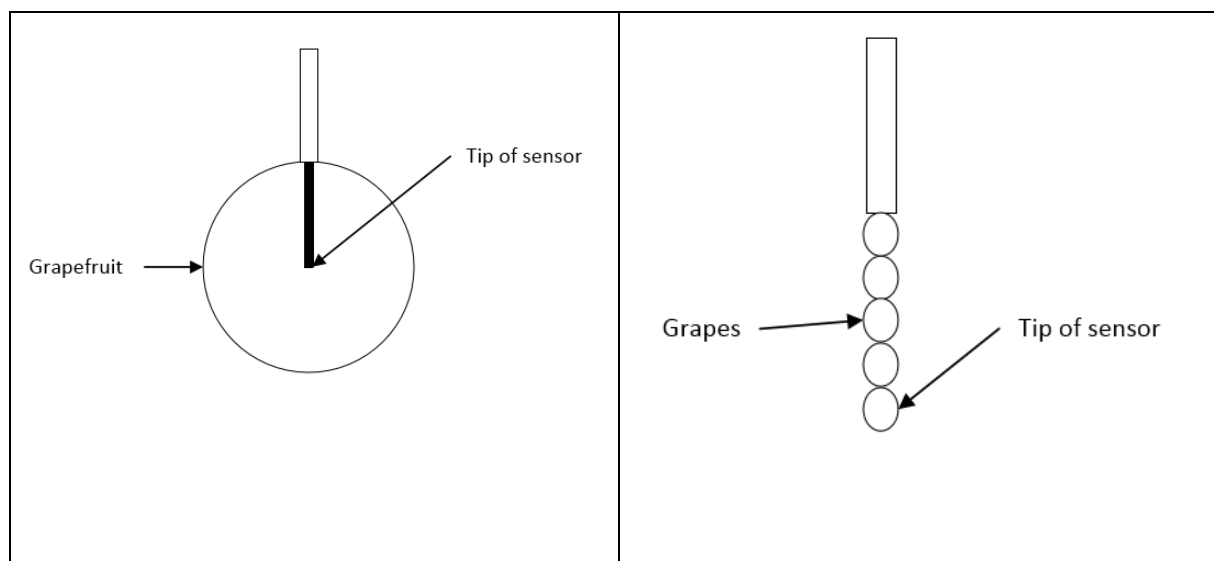
3.6.2 A diagram showing the location and identification of each sensor must be available.

3.6.3 Product sensors must be inserted into the product so as much of the sensor as possible is covered, making sure that the tip does not extend beyond the product. For fresh fruits, the probe must be placed into the flesh of the product and avoid contact with the seed.

3.6.4 Where the size of the product varies, the temperature sensors must be placed into the largest size product.

3.6.5 A coil of slack cable must be spooled either inside the carton or taped to the outside of the carton to mitigate against sensor dislodgement during treatment. The cable must also be secured to the carton to prevent the sensor being pulled out of the product.

**Figure 1 Correct placement of sensors for large and small product**





### **Onshore cold treatment in cool rooms**

3.6.6 Sensors must be placed as follows for onshore cold treatment:

- two airflow sensors are required, one each at the inlet (return air) and the outlet (supply air) points of cold air, to measure chamber temperature, and
- four product sensors
  - the centre of the stack in the warmest part of the treatment chamber
  - the corner of the top of the stack in the warmest part of the treatment chamber
  - further sensors will be placed in different areas in the treatment chamber where temperature or airflow may be impacted and placed from midway to the top height of the stack.

### **In transit cold treatment and onshore cold treatment in containers**

3.6.7 Three sensors must be placed as follows for in transit cold treatment:

- the top of the stack nearest to the air return intake
- slightly aft (towards the doors) from the middle of the container, halfway between the top and bottom of the stack
- one pallet stack in from the doors of the container, halfway between the top and bottom of the stack.

## **3.7 Treatment period**

3.7.1 Temperature recording may start at any time. However the cold treatment starts when all temperature sensors are at or below the prescribed treatment temperature for the nominated treatment schedule and the treatment chamber is sealed.

3.7.2 The duration of the cold treatment will be as required by the specified treatment schedule.

## **3.8 Sealing treatment chambers**

3.8.1 Loaded treatment chambers must be sealed with a numbered, tamper evident seal.

3.8.2 The treatment chamber details and seal number must be recorded.

## 4 Verification of treatment

4.1.1 After cold treatment, the product temperature sensor readings must be provided in a report to the responsible certifying authority. This may be provided in hard copy or electronically depending on the temperature recording equipment and any import requirements which apply.

### 4.2 Sensor recalibration

4.2.1 Once the treatment is complete, the responsible certifying authority and/or importing authority may require recalibration of temperature sensors before confirming that the cold treatment schedule has been met. Any correction factor recorded will be applied against the temperature records.

4.2.2 Product sensors that exhibit a variation greater than the variation allowed in this standard or the import requirements, whichever is less, will be deemed to have failed recalibration and the treatment failed.

### 4.3 Treatment failure

4.3.1 The treatment may be deemed to have failed if any of the following occurs:

- if the treatment chamber seal has been tampered with
- if sensors are placed incorrectly in the product or in an incorrect location within the treatment chamber
- if one or more sensors fail to record for four (4) hours or more
- if temperature records show that the temperature and/or time required by the nominated treatment schedule has not been met
- if one or more product sensors fail recalibration, that is, any adjustment shows the nominated treatment schedule has not been met.

4.3.2 The responsible certifying body may determine if it is possible to restart a treatment following a failure.

## 5 Phytosanitary security measures

5.1.1 Treatment facilities must have a phytosanitary security system in place and the identity and integrity of each consignment must be maintained.

### 5.2 Phytosanitary security

5.2.1 Phytosanitary security must be maintained during and after treatment. The responsible certifying body may determine specific phytosanitary security measures. The most common methods of securing product against pests include:

- using a secure area with product segregation and traceability
- using secure packaging
- a combination of both.

For onshore cold treatment in containers, only secure packaging is permitted.

5.2.2 Procedures must be in place to identify and segregate treated product and allow for movement without the risk of it mixing with any other product.

5.2.3 The procedures must cover all practices that pose a phytosanitary security risk to the treated products including receivals, storage and dispatch. The procedures must enable consignments to be linked to a specific treatment and be traced back to a packhouse and grower, if required.

5.2.4 Treated product must be kept in secure conditions to prevent infestation by regulated pests when stored at the treatment facility.

5.2.5 After treatment all product must be identified as 'treated' for identification and traceability purposes.

5.2.6 If product is treated in bulk and packed post-treatment the entire pathway including transport and packhouse, must be established and maintained as free from regulated pests. No other product is to be in the packhouse at the same time.

# 6 Documentation

## 6.1 Procedures

6.1.1 The following documents must be kept by treatment providers and made available to the responsible certifying authority when requested:

- treatment procedures
- phytosanitary security procedures

## 6.2 Records

6.2.1 The following records must be kept and made available to the responsible certifying authority when requested:

- all records pertaining to cold disinfestation treatment including:
  - treatment chamber number or name where the treatment took place
  - recorder serial number (unique identifier of the recording equipment)
  - date and time (local) the sensors are calibrated
  - results from sensor calibration with a minimum of two temperature readings for each and correction factor if required
  - sensor placement
  - date and time treatment chamber was sealed
  - treatment chamber seal number
  - type of product treated
  - volume of product treated
  - temperature data.
- any additional records required by the importing authority.

6.2.2 All records must be retained for a minimum of two years, unless otherwise specified by the responsible certifying authority, import requirements or other regulations.

# Annex A: Calibration of temperature sensors

- 1) Check individual sensors to verify that they are properly labelled and correctly connected to the temperature recorder. If necessary this can be accomplished by hand warming each sensor when its number appears on the visual display panel of the recording instrument. A temperature change, which can be observed on the instrument, should occur. If the instrument fails to react, the sensor is incorrectly connected or malfunctioning and should be corrected by the instrument representative.
- 2) Prepare a mixture of clean ice and fresh water in a clean insulated container.
- 3) Crush or chip the ice to completely fill the container.
- 4) Add enough water to stir the mixture.
- 5) Stir the ice and water for a minimum of 2 minutes to ensure the water is completely cooled and good mixing has occurred. Generally, the ice will occupy approximately 80-85% of the total volume of the container, with the water occupying the remaining space.
- 6) Add more ice as the ice melts.
- 7) Stir the ice water slurry to maintain a temperature of 0°C.
- 8) Submerge the sensors in the ice water slurry without touching the sides or bottom of the container.
- 9) Stir the slurry mixture again.
- 10) Continue testing of each sensor in the ice water slurry until the temperature reading stabilises.
- 11) Allow at least a 1 minute interval between two consecutive readings for any one sensor; however, the interval cannot exceed 5 minutes. The difference between the two readings cannot exceed 0.1°C.
- 12) Record at least two consecutive readings on the calibration report. If the two readings are different, test the sensors again and record the temperature.
- 13) Contact an instrument company representative/technician immediately if the time interval exceeds the normal amount of time required to verify the reading and accuracy of the sensor and recorder system. The recorder used with the sensors must be capable of printing or displaying on demand and not just at hourly intervals.
- 14) The instrument company representative/technician can correct any deficiencies in the equipment before certification.
- 15) Replace any sensor that reads more than plus or minus 0.3°C from the standard 0°C (after adjustment and re-calibration).
- 16) Replace and recalibrate any sensors that malfunction.
- 17) Determine the calibration factors to the nearest 0.1 of 1°C (i.e. 0.1°C, 0.2°C).

- 18) If the temperature recorder microprocessor can be zeroed, tared, or if the calibration factors can be otherwise entered into the recorder microprocessor for automatic adjustment this must be done. In this case, verify that the adjustment factors have been entered or that the recorder was zeroed or tared by the instrument company representative. Enter zero as the calibration factor for each individual sensor in the written calibration report that is submitted with the consignment.
- 19) If the temperature recorder microprocessor cannot be zeroed, tared, or if the calibration factors cannot be entered into the recorder microprocessor memory (so that they are sustained in memory and can be viewed again after all the factors are entered), the calibration factors for each individual sensor must be recorded on the written calibration report that is submitted with the consignment.
- 20) After the calibration factors have been accounted for, no other changes should be made to the temperature recorder microprocessor.

Source: USDA Treatment manual s3-7-4

# Glossary

Import Requirements	Specific phytosanitary measures prescribed by an importing authority, concerning consignments moving into that territory.
Integral container	A refrigeration container which has an integrated refrigeration unit that is secured to the end wall of the container. These containers are operated using three-phase electric power.
Product	The plant product to be treated.
Responsible certifying authority	The National Plant Protection Organisation (NPPO) and State/Territory Departments of Agriculture responsible for certifying the treatment. It may also include any other party approved under the authority of the NPPO or State/Territory Departments of Agriculture.
Sensor	Equipment/probe for monitoring the product/air temperature.
Treatment	Official procedure for the killing, inactivation or removal of pests, or for rendering pests infertile or for devitalization. [FAO, 1990, revised FAO, 1995; ISPM 15, 2002; ISPM 18 2003; ICPM, 2005].
Treatment chamber	Any enclosure where cold treatment takes place. This includes cool rooms and self-refrigerated containers.

# References

ISPM 5. (2016) *Glossary of phytosanitary terms*. Rome, International Plant Protection Convention (IPPC), Food and Agriculture Organisation of the United Nations (FAO)

[www.ippc.int/en/publications/622/](http://www.ippc.int/en/publications/622/)

ISPM (2016) *Draft Requirements for the use of temperature treatments as phytosanitary measures*. Rome, IPPC, FAO

[www.ippc.int/en/publications/82641/](http://www.ippc.int/en/publications/82641/)

USDA (2016) Treatment Manual

[www.aphis.usda.gov/import\\_export/plants/manuals/ports/downloads/treatment.pdf](http://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/treatment.pdf)