Exporter kit: USDA probes and cold treatment in reefer containers

For exporters and reefer technicians. Contents: 1) who does what · 2) probe installation · 3) verify and calibrate · 4) brand sheets · 5) what to do if something goes wrong.
Who does what, how the probes are installed and verified, and how cold treatment is activated on Carrier, Thermo King, Star Cool and Daikin.

Before you start. Cold treatment is an official quarantine treatment. Probe calibration, installation in the fruit and cold treatment programming on the controller are done by the **reefer technician** before shipment. The **official** (in the US program, an APHIS-authorized official) checks the calibration values, the probe locations and the loading. This kit helps exporters and technicians prepare and check each step; **it does not replace the destination protocol or the carrier's instructions**.

1. Who does what

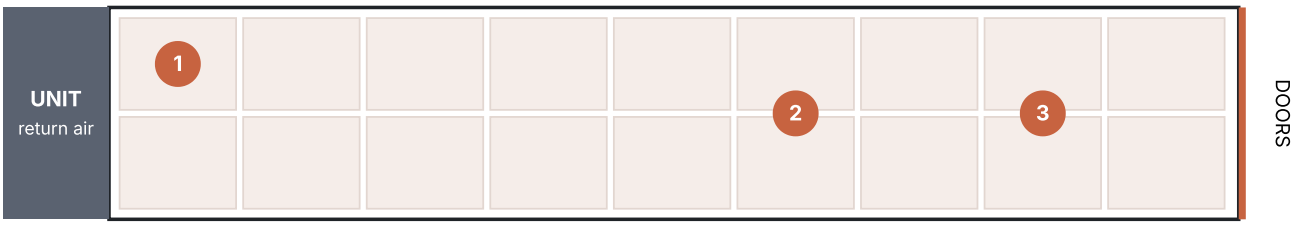
Step	Exporter	Reefer technician (carrier or depot)	Official (APHIS or NPPO)
Book the container for cold treatment	**Requests** in the booking: cold treatment, destination, setpoint and days	The carrier assigns a unit with USDA channels; the technician does the **PTI**	—
USDA probes	Checks that the 3 probes are there and the cable is sound	**Inspects** the probes before and after fitting and after the PTI [5]	—
Calibration in an ice bath	—	**Calibrates** each probe, enters the correction factor and fills in the record	**Checks** the values in the calibration record [2]
Precooling the fruit	**Does it**: pulp at schedule temperature before loading [1]	—	**Measures** pulp and rejects warm pallets [2]
Loading the container	**Does it**: one fruit and one carton type; even load [2]	—	**Approves** the loading [1]
Installing the probes in the fruit	Prepares the cartons for the probes	**Installs** the 3 probes in the protocol positions	**Checks** number and location [1]
Programming cold treatment on the controller	Confirms the values against the booking	**Programs** ACT / CT and leaves the count running	Checks the values entered
Seal and documents	Keeps copies: calibration, locations, seal	**Hands over** the calibration record and probe locations	Signs the records [2]
Clearance at destination	—	The carrier provides the unit's record	**Reviews** the hourly readings and releases or rejects [2]

This is the usual split. In some countries the inspector places the probes [6]: confirm with the carrier and the official body before booking. Sources on the last page.

2. Installing the probes in the load

At least **3 pulp probes** per container, connected to the controller's USDA 1, 2 and 3 channels [1]. More probes than the minimum reduce the risk of repeating the treatment if one fails [2].

Where each probe goes (US program, 40 ft container)



Top view, 18 pallets. USDA PROBE diagram based on the text of the APHIS Treatment Manual; not to scale.

Probe	US program (APHIS Treatment Manual) [2]	Carrier manual [7]
USDA 1	In a box at the top of the stack, as close as possible to the return air intake (next to the unit).	In the fruit next to the return air intake.
USDA 2	Slightly toward the doors from the middle of the container, halfway up the stack.	5 ft (1.5 m) from the end of the load (3 ft in 20 ft units), center carton, mid-height.
USDA 3	One pallet in from the doors, halfway up the stack.	Same distance, carton against the side wall, mid-height.

If the destination protocol sets other positions (for example Japan), the protocol rules. If in doubt, follow the official's instructions.

How to insert the probe

1. Open the chosen carton and push the probe **well into the fruit**, without the tip coming out the other side [2].
2. Large fruit (citrus, apples): tip in the center of the pulp.
3. Small fruit (grapes, blueberries, cherries): thread several pieces until at least two thirds of the tip is covered, under the top layer, in the middle of the pallet [2].
4. Reseal the carton with tape [2].
5. Record each probe's pulp reading after insertion.

Cable and closing

1. Route the cable without tension, away from the doors and the forklift path.
2. Tape the spare cable outside the carton so the probe does not pull out when the pallet moves.
3. Last row: lay cardboard on the floor from the second-to-last row to the doors and a second piece stapled upright to the cartons, to improve airflow [2].
4. Warmest fruit in the last quarter, near the doors; load even in floor coverage and height [2].
5. Numbered seal on the doors until clearance at destination [2].

3. Verify and calibrate in an ice bath

The reefer technician calibrates before shipment and the official checks the values in the record. **Verifying** means checking in ice that the probe reads 0 °C; **calibrating** means entering each probe's correction factor in the controller, done from the keypad or with a laptop and the manufacturer's software depending on the brand.

Verification step by step

1. Clean container filled with crushed ice (about 85 %) topped up with cold water. Stir [2].
2. Immerse the 3 probes in the center of the bath, not touching the bottom or the walls.
3. Take readings 1 to 5 minutes apart until two consecutive readings differ by no more than 0.1 °C [2].
4. **If a probe is more than ±0.3 °C from 0 °C, replace it** [2]. If it is within range, record its correction factor (to 0.1 °C) in the calibration record [2].
5. Record date, time, container number and each probe's number. The official checks and signs the record.

Probe	Reading 1	Reading 2	Reading 3	Correction factor	OK? (±0.3 °C)
USDA 1					
USDA 2					
USDA 3					

Container no. _____ Date and time _____ Reefer technician _____ Official _____

Who enters the factor on each brand

Brand	How it is calibrated	What the technician needs
Thermo King (MP4000)	From the keypad: CONFIG › Calibration › CALIBRATE PROBES, with all probes in ice, stable for 5 minutes and between +0.3 and −0.3 °C [9]	Only the controller keypad
Carrier	With DataLINE software connected to the controller, probes in a stabilized ice bath [8]	Laptop with the manufacturer's software and cable
Star Cool (CIM 6)	With StarView software (CalUs1, CalUs2, CalUs3). Maximum offset 3 K; if more is needed, replace the probe [11]	Laptop with the manufacturer's software and cable
Daikin	With a PC and DCCS software, USDA probe calibration option [12][13]	Laptop with the manufacturer's software and cable

Rule of thumb: if a probe is not within ±0.3 °C of 0 °C in the ice bath, do not load with it: replace it before shipment [2].

4.1 Carrier: activating ACT (code Cd51)

Before you start

- ☐ USDA probes 1, 2 and 3 connected and calibrated; ACT needs at least 3 detected probes [7].
- ☐ Automatic Setpoint Change (ASC, Cd53) off: it cannot run together with ACT [7].
- ☐ Check the software version (shown at power-up). **Do not use software 6332 with ACT**; Carrier approves OptimaLINE 7103 and PrimeLINE 5394 and asks to keep power-saving modes off (Cd34, Cd63, Cd50) [10].

A. Earlier software (classic menu)

1. Enter the cargo setpoint, **lower** than the treatment temperature.
2. `CODE SELECT` › `Cd51` › `ENTER`.
3. Select `On` › ENTER.
4. Treatment temperature (the probes must stay below it) › ENTER.
5. Treatment days › ENTER.
6. Confirm the probes shown (e.g. 1 2 3) › ENTER.
7. Setpoint after treatment (SPnEW) › ENTER.
8. Cd51 shows the days and hours left. The count starts once all probes reach the treatment temperature [7].

B. New software (PrimeLINE 6331 onwards)

Up to 3 sets of temperature limit and days, plus an adaptive setpoint [14]:

1. Enter `Cd51` and select `on`.
2. `LO SP`: lowest manifest setpoint (−4.9 to +29.3 °C).
3. `HOLd`: hold hours (1 to 99; default 5).
4. `nCt`: number of sets (1 to 3).
5. `trt 1` (temperature limit) and `dAy 1` (1 to 46 days); repeat for 2 and 3 if needed, each higher and longer.
6. `Probe`: calibrated probes (1, 2 or 3).
7. `SPnEW`: setpoint after treatment.

To change anything: Cd51 › Off › ENTER and set it again. Dashes mean a probe is missing: check dC 3-5 [14].

Check before closing

- ☐ Cd51 shows a countdown (not "Off" or dashes).
- ☐ The 3 USDA readings match the pulp measured at loading.
- ☐ The setpoint can no longer be changed from the keypad: ACT locks it [7].
- ☐ Starting a Pre-Trip or Trip Start turns ACT off: do not do it with cargo inside [7].

4.2 Thermo King: CT (Cold Treatment) function

Before you start

- ☐ USDA probes connected to their receptacles.
- ☐ Function enabled: `Configuration › Options › CT Feature › ON` [9].

Calibrate (possible from the keypad)

1. Immerse all USDA probes in an ice bath.
2. Menu `CONFIG › Calibration › CALIBRATE PROBES`.
3. Release the current offsets and accept the new ones once all probes read between +0.3 and −0.3 °C and have been stable for 5 minutes [9].

Activate

1. `Setpoint/Control › Cold Treatment (CT)`.
2. Enter: **CT setpoint** (during the period), **period** in days, **USDA max** (maximum allowed probe reading) and **final setpoint**.
3. Select `EXIT`. The display shows **"CT In Progress"** [9].

Manual example: CT setpoint 1.0 °C, USDA max 3.0 °C, 3 days and final setpoint 5.0 °C [9]. Always use the protocol values.

How it behaves

- The period starts once all probes are at or below USDA max; if any goes above it, the period is cancelled and restarts.
- When it ends, the setpoint rises 0.1 °C per hour up to the final setpoint.
- If one or more probes fail, the period continues and the failure is logged; if all three fail, it continues on time only [9].

Check before closing

- ☐ Display shows "CT In Progress".
- ☐ USDA readings match the pulp measured at loading.
- ☐ Values entered match the protocol and the booking (write them below).

CT setpoint _____ °C USDA max _____ °C Days _____ Final setpoint _____ °C

4.3 Star Cool: ACT program

Before you start

- ☐ USDA and cargo probes verified in ice (0 °C). Correction is done with StarView; maximum offset 3 K [11].
- ☐ Probes connected: ACT only starts if all of them work. A reading of −70 °C means a probe is not connected [11].
- ☐ Setpoints entered before activating the program [11].

How to change a value

Move to the line with the arrows › `Enter` › change with the arrows › **hold Enter for 3 seconds** to accept. `Cancel` discards [11].

Activate

1. `Operation` key › `PROGRAMS` › `Auto Cold Treatment`.
2. **B01 Duration:** 1 to 45 days.
3. **B02 Treatment limit** (maximum on the USDA probes): −4.7 to +30.0 °C.
4. **B03 Treatment setpoint:** from −4.9 °C up to 0.2 K below the limit.
5. **B04 New setpoint** after treatment: −1.5 to +30.0 °C.
6. In `P01 Active program` select **ACT** and hold Enter for 3 seconds. The display shows the ACT icon [11].

How it behaves

- The count starts once at least 3 USDA probes are below the limit; if one exceeds it and comes back, the count restarts.
- After activation, B02 and B04 are locked; B03 can be adjusted within range.
- It only ends if P01 is set to None, a PTI is started or the unit is without power for more than 48 h (168 h depending on prefix) [11].

Check before closing

- ☐ ACT icon on the display and B05 showing "Active".
- ☐ At the end of the trip: "ACT PASSED" if there were no failures; "ACT FAILED" if probes were out of range [11].

B01 _____ days B02 _____ °C B03 _____ °C B04 _____ °C

4.4 Daikin: ACT (Automatic Cold Treatment, optional)

Before you start

- ☐ USDA probes set to 3 or 4 (3 USDA + 1 cargo), as the protocol requires. With USDA OFF, or the ACT option disabled, ACT does not work [12].
- ☐ Probe type: 1 = ST9702-1, 2 = NTC (standard). A wrong type gives very different values at calibration [12].
- ☐ Probes calibrated before each trip with a PC and DCCS software [12].

Activate

1. On the operation screen: `MENU` › `Mode Set` › `Automatic Cold Treatment`.
2. Select **ON** with ▲▼ and press `ENTER`.
3. **USDA CT days:** 1 to 99 days.
4. **USDA Max. Temperature** (maximum pulp): −4.9 to 30.0 °C.
5. **Setpoint** during treatment and **Final-SP** after: −4.9 to 30.0 °C.
6. At "Press Enter to Start" press `ENTER` (`ESC` cancels) [12].

Manual example: 10 days, max 1.0 °C, setpoint 0.0 °C and final 3.0 °C [12]. Always use the protocol values.

How it behaves

- The count starts once all probes drop below USDA max; if one exceeds it, the days are counted from zero when it comes back down.
- During ACT the setpoint and final setpoint can be changed, but not the days or USDA max.
- Power loss: under 1 h it continues; 1 to 48 h the count restarts; 48 to 72 h it continues at the final setpoint; 72 h or more it is cancelled [12].

Check before closing

- ☐ "ACT" in the SET-MODE area, alternating every 5 seconds with "USDA INFO".
- ☐ ▲▼ shows the remaining days and "ACTIVE" status [12].

LXE10E units (DECOS III): the number of probes (OFF, 3 or 4) is set in the optional function mode and confirmed by switching the breaker off; the "Au" option is not valid for cold treatment. Calibration and USDA report with DCCS [13].

Days _____ USDA max _____ °C Setpoint _____ °C Final-SP _____ °C

5. What to do if something goes wrong

Situation	What to do
A probe reads −70 °C, dashes or alarm	It is disconnected or damaged. Check the connector and cable before closing. Once at sea, notify the carrier: one failure may not void the treatment if the other probes work and were properly placed and calibrated [2].
A probe exceeds the limit	On Thermo King, Star Cool, Daikin and the new Carrier ACT the day count restarts when the probe comes back down [9][11][12][14]. Check whether the probe ended up in air or touching the carton.
A probe always reads high	Check it in ice. If it reads 0 °C within ±0.3 °C, the high reading is considered real and can lead to rejection [2].
Power loss or plug change	Each brand reacts differently (see the sheets).
Someone wants to run a PTI with cargo	No: on Carrier and Star Cool a PTI turns ACT off [7][11]; on Daikin a completed PTI cancels it [12].
Missing records	Records must be at least hourly; longer gaps can void the treatment [2].

Documents worth keeping

- ☐ Calibration record with each probe's factor (to 0.1 °C).
- ☐ Sketch or description of probe locations, with loading start and end date and time.
- ☐ Seal number, container number and a photo of the display with cold treatment active.
- ☐ Pulp measured at loading on each probe.

Sources

[1] 7 CFR 305.6 – Cold treatment requirements (USA), law.cornell.edu/cfr/text/7/305.6
[2] USDA APHIS PPQ – Treatment Manual, ch. 3-7 Cold Treatment (OIRSA copy, 2023), web.oirsa.org
[3] Australian Department of Agriculture – ITCT work instruction, agriculture.gov.au
[4] Commission Implementing Regulation (EU) 2022/959, eur-lex.europa.eu
[5] West P&I – The Carriage of Reefer Containers, westpandi.com
[6] Shipping and Freight Resource – Cold treatment (South African export process), shippingandfreightresource.com
[7] Carrier Transicold – T-383 OptimaLINE manual, sections 4 and 5 (ACT, Cd51); USDA sensor placement text
[8] Carrier Transicold – DataLINE, section 10 (probe calibration)
[9] Thermo King – MP4000 manual, Cold Treatment (CT) and USDA recording
[10] Carrier – Technical notice TL008-2026 (software 6332 and ACT)
[11] Star Cool – Operating and service manual 810900E, sections 11.13.2 and 22.11
[12] Daikin – Service manual TR 16-02, LX10F inverter (DECOS Va), sections 1.5.3 and 2.3
[13] Daikin – Service manual TR 08-03C, LXE10E, section 4.1
[14] Carrier – Technical letter TL005-2026, new Cd51 ACT logic (June 2026)
Full guide with links: usdaprobe.net/en/supply-return-air-usda-probes-cold-treatment/

Note. This kit summarizes public documentation from manufacturers, carriers and authorities as of November 2026. It does not replace the unit manual, the destination protocol in force or the instructions of the official body or the carrier. USDA PROBE is an independent manufacturer of USDA probes compatible with Carrier, Thermo King, Star Cool and Daikin controllers; it is not affiliated with USDA or these brands.