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Treatment Manual

Treatment Schedules

T600-Controlled Atmosphere Temperature Treatment System

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Controlled Atmosphere Temperature Treatment System(CATTS)

Controlled atmosphere temperature treatment system (CATTS) combines forced moist or vapor hot air with controlled atmosphere (i.e. low oxygen, high carbon dioxide).

The treatments are conducted in a chamber similar to a vapor heat or forced hot air chamber that has the capability of introducing nitrogen and carbon dioxide. Once this atmosphere is established, temperature ramp-up begins. When the treatment target temperature is reached, it is sustained for a minimum treatment time.



All fruit must be at or above room temperature before treatment begins. Treating cold fruit will cause phytotoxicity.

All of the following treatments share several common factors:

- ◆ Air speed equivalent to 1.3—2.0 meters per second as measured by an anemometer
- ◆ Modified atmosphere equivalent to 1 percent O₂ and 15 percent CO₂
- ◆ Relative humidity greater than or equal to 90 percent



CATTS treatments are currently approved for commodities exported from the U.S. into certain countries. The treatments have **not** yet been approved for imported commodities or domestic movement of these commodities. Regulatory approval is pending.

For more information, contact PPQ Phytosanitary Issues Management Import Specialist, Paul Gadh at 301-734-5210.

T601-a

Nectarines and Peaches

Two alternative treatments.

Pest: *Cydia pomonella* (Codling moth) and *Grapholita molesta* (Oriental fruit moth)

Treatment: T601-a-1—CATTS

Units	Ramp-Up Rate (per hour) ¹	Final Temperature	Internal fruit (core) Temperature within 2.5 hours ²	Time at Core Temperature (minutes)	Total Treatment Time (hours)
°F	53.6	114.8	109.4	30	3
°C	12.0	46.0	43.0	30	3

- 1 The temperature ramp-up rate is the rate (in hours) at which the temperature changes in the chamber. Add 10 minutes to the total treatment time for every 10 minute increase in ramp-up time.
- 2 The core of the fruit must reach 109.4 °F (43.0 °C) within 2.5 hours.

Treatment: T601-a-2—CATTS

Units	Ramp-Up Rate (per hour) ¹	Final Temperature	Internal fruit (core) Temperature within 2.25 hours ²	Time at Core Temperature (minutes)	Total Treatment Time (hours)
°F	75.2	114.8	110.3	15	2.5
°C	24.0	46.0	43.5	15	2.5

- 1 The temperature ramp-up rate is the rate (in hours) at which the temperature changes in the chamber. Add 10 minutes to the total treatment time for every 10 minute increase in ramp-up time.
- 2 The core of the fruit must reach 110.3 °F (43.5 °C) within 2.25 hours.

T601-b

Apples

Pest: *Cydia pomonella* (Codling moth) and *Grapholita molesta* (Oriental fruit moth)

Treatment: T601-b—CATTS

Units	Ramp-Up Rate (per hour) ¹	Final Temperature	Internal fruit (core) Temperature within 2.5 hours ²	Time at Core Temperature (minutes)	Total Treatment Time (hours)
°F	53.6	114.8	112.3	15	3
°C	12.0	46.0	44.6	15	3

- The temperature ramp-up rate is the rate (in hours) at which the temperature changes in the chamber. Add 10 minutes to the total treatment time for every 10 minute increase in ramp-up time.
- The core of the fruit must reach 112.3 °F (44.6 °C) within 2.5 hours.

T601-c

Sweet Cherries

Two alternative treatments

Pest: *Cydia pomonella* (Codling moth) and *Rhagoletis indifferens* (Western Cherry Fruit Fly)

Treatment: T601-c-1—CATTS

Units	Ramp-Up Rate (per hour)	Final Chamber Temperature	Internal fruit (core) Temperature within (minutes):		Total Treatment Time (minutes)
			9 ¹	22–24 ²	
°F	None	113.0	107.6	112.1	45
°C	None	45.0	42.0	44.5	45

- The internal fruit temperature must reach the 107.6 °F (42.0 °C) within 9 minutes.
- After the internal fruit temperature reaches 107.6 °F (42.0 °C) in 9 minutes, the internal fruit temperature must then continue to increase to 112.1 °F (44.5 °C) within 22-24 more minutes.

Treatment: T601-c-2—CATTS

Units	Ramp-Up Rate (per hour)	Final Chamber Temperature	Internal fruit (core) Temperature within (minutes):		Total Treatment Time (minutes)
			9 ¹	12-14 ²	
°F	None	116.6	107.6	113.9	25
°C	None	47.0	42.0	45.5	25

- 1 The internal fruit temperature must reach the 107.6 °F (42.0 °C) within 9 minutes.
- 2 After the internal fruit temperature reaches 107.6 °F (42.0 °C) in 9 minutes, the internal fruit temperature must continue to increase to 113.9 °F (45.5 °C) within 12-14 more minutes.

TABLE 5-7-1 Summary of CATTS treatments

Treatment Schedule	Commodity	Pest	Ramp-up Rate (per hour)	Final Chamber Temperature	Total Treatment Time	Core Temperature	Time at Core Temperature
T601-a-1	Nectarine and Peach	<i>Cydia pomonella</i> (Codling moth) and <i>Grapholita molesta</i> (Oriental fruit moth)	53.6 °F (12 °C)	114.8 °F (46 °C)	3 hours	109.4 °F (43 °C) within 2.5 hours	30 minutes
T601-a-2	Nectarine and Peach	<i>Cydia pomonella</i> (Codling moth) and <i>Grapholita molesta</i> (Oriental fruit moth)	75.2 °F (24 °C)	114.8 °F (46 °C)	2.5 hours	110.3 °F (43.5 °C) within 2.25 hours	15 minutes
T601-b	Apple	<i>Cydia pomonella</i> (Codling moth) and <i>Grapholita molesta</i> (Oriental fruit moth)	53.6 °F (12 °C)	114.8 °F (46 °C)	3 hours	112.3 °F (44.6 °C) within 2.5 hours	15 minutes
T601-c-1	Cherry	<i>Cydia pomonella</i> (Codling moth) and <i>Rhagoletis indifferens</i> (Western Cherry Fruit Fly)	None	113 °F (45 °C)	45 minutes	107.6 °F (42 °C) within 9 minutes	112.1 °F (44.5 °C) within 22-24 minutes
T601-c-2	Cherry	<i>Cydia pomonella</i> (Codling moth) and <i>Rhagoletis indifferens</i> (Western Cherry Fruit Fly)	None	116.6 °F (47 °C)	25 minutes	107.6 °F (42 °C) within 9 minutes	113.9 °F (45.5 °C) within 12-14 minutes

