

- B.** Water must circulate constantly, and be kept at 120.2 °F (or above) for 20 minutes. Treatment time begins when the water temperature reaches at least 120.2 °F in all locations throughout the tank.³

Temperatures exceeding 121.1 °F can cause phytotoxic damage.

- 3.** Hydrocooling for 20 minutes at 75.2 °F is recommended, though not required, to prevent injury to the fruit from the hot water treatment.

T102-a

Mango

Pest: *Ceratitidis capitata* (Mediterranean fruit fly), *Anastrepha spp.*, *Anastrepha ludens* (Mexican fruit fly)

Treatment: **T102-a** Hot water dip

Fruit must be treated in country of origin at a certified facility and under the monitoring of APHIS personnel.

- 1.** Mangoes must be pre-sorted by weight class. Treatment of mixed loads is not allowed.
- 2.** Pulp temperature must be the average pulp temperature determined during certification (or above) before start of treatment.
- 3.** Fruit must be submerged at least 4 inches below the water's surface.
- 4.** Water must circulate constantly and be kept at least at the "Adjusted Tank Sensor Temperature" determined during certification throughout the treatment with the following tolerances:
 - ◆ **During the first 5 minutes of a treatment**—Adjusted Tank Temperatures from Figure 6-1-1 in Chapter 6-5, Certifying Facilities, below 113.7°F are allowed during the first 5 minutes of a treatment only if the temperature is at least 115 °F at the end of the 5 minute period.
 - ◆ **For treatments lasting 65 to 75 minutes**—Adjusted Tank Temperatures from Figure 6-1-1 in Chapter 6-5, Certifying Facilities, may fall as low as 113.7 °F for no more than 10 minutes under emergency conditions. (Emergency conditions are defined ONLY as electrical power failures).

³ Treatment does not begin until after the fruit is immersed and the water temperature recovers to 120.2 °F (or above). Therefore, before the start of the treatment, fruit pulp temperatures of 70 °F (or above) are recommended to minimize water temperature recovery time and the overall time fruit are immersed in heated water. Fruit quality of treated lychees with initial pulp temperatures below 68 °F has not been studied.

◆ **For treatments lasting 90 to 110 minutes**—Adjusted Tank Temperatures from Figure 6-1-1 in Chapter 6-5, Certifying Facilities, may fall as low as 113.7 °F for no more than 15 minutes under emergency conditions.

5. Determine the dip time from Tables [Table 5-2-1](#), [Table 5-2-2](#), or [Table 5-2-3](#).



Important

Dip times for T102-a are valid if the fruit is not hydrocooled within 30 minutes of removal from the hot water immersion tank.

However, if hydrocooling starts immediately after the hot water immersion treatment, then the original dip time must be extended for an additional 10 minutes.

(Hydrocooling is optional and may be done only at temperatures of 70°F or above, for any length of time, or not at all.)

TABLE 5-2-1: Determine Dip Time Based on Origin of Fruit¹

If the origin of the fruit is:	And the shape of the fruit is:	And the weight is (grams):	Then dip:
Puerto Rico, U.S. Virgin Islands, or West Indies (excluding Aruba, Bonaire, Curacao, Margarita, Tortuga or Trinidad and Tobago)	Flat, elongated varieties ²	Up to 400 grams	65 minutes
		401 to 570 grams	75 minutes
	Rounded varieties ³	Up to 500 grams	75 minutes
		501 to 700 grams	90 minutes
		701 to 900 grams	110 minutes

- Valid if the fruit is not hydrocooled within 30 minutes of removal from the hot water immersion tank.
- Such as 'Frances,' 'Carrot,' 'Zill,' 'Ataulfo,' 'Carabao,' 'Irwin', and Manila
- Such as 'Tommy Atkins,' 'Kent,' 'Hayden,' and 'Keitt.'

TABLE 5-2-2: Determine Dip Time Based on Origin of Fruit¹

If the origin of the fruit is:	And the shape of the fruit is:	And the weight is (grams):	Then dip:
Mexico or Central America (north of and including Costa Rica)	Flat, elongated varieties ²	Up to 375 grams	65 minutes
		376 to 570 grams	75 minutes
	Rounded varieties ³	Up to 500 grams	75 minutes
		501 to 700 grams	90 minutes
		701 to 900 grams	110 minutes

- Valid if the fruit is not hydrocooled within 30 minutes of removal from the hot water immersion tank
- Such as 'Frances,' 'Carrot,' 'Zill,' 'Ataulfo,' 'Carabao,' 'Irwin.', and Manila
- Such as 'Tommy Atkins,' 'Kent,' 'Hayden,' and 'Keitt.'