

## California Walnut Board

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### **Standard Operating Procedure for Pasteurization of Walnuts**

**This recommended SOP for walnut kernel pasteurization was approved by the FDA on 6/7/12 to provide a 5-log reduction. Please read, understand, and follow all PPO label instructions. To establish a PPO operating procedure for your company follow the Critical Factors listed below and/or, consult with equipment and chemical company representatives.**

1. Pre-warm product to at least 86°F (30°C) at the coldest point in the container. The product temperature should not exceed 105°F (40°C) during this step due to product quality concerns. The pre-warm temperature area can be in the range of 100°F - 110°F to achieve the 86°F (30°C) minimum product temperature.
2. Pre-heat the PPO chamber to 106-114°F (41-45.6°C).
3. Load the conditioned product into the pre-heated PPO chamber and start the pump down vacuum cycle.
4. Maintain a chamber temperature of 106°F to a maximum of 114°F (41-45.6°C).
5. Apply a vacuum until the chamber reaches a minimum of 25.5" Hg.
6. Turn on PPO vaporizer to achieve a temperature of at least 140°F (60°C), but not in excess of 160°F (71°C).
7. Inject a sufficient amount of PPO through the vaporizer to assure that PPO vapor in the chamber reaches at least 0.83 oz PPO/ ft<sup>3</sup>. (The absolute amount of PPO will depend upon the chamber size.) The vacuum in the chamber will decrease slightly upon addition of the PPO.
8. Inject an inert gas to clear the input line of PPO and decrease chamber vacuum to 5-6" Hg. Typically, the chamber vacuum will begin to decrease after achieving the target level. This is acceptable.
9. Treat product according to approved regulatory PPO label requirements (min. 4 hours). The pasteurization time begins after completion of inert gas injection to between 5 and 6" Hg. .

10. After 4 hours of exposure, increase the vacuum to 25.5” Hg and begin air wash cycles.
11. Repeat air wash cycles a minimum of 4 times but not more than 14 times as required by the label.
12. After completion of air wash cycles, transfer the product to a room for post-treatment ventilation. The temperature recommended for post-ventilation is ambient temperature at or above 59°F (18°C) for a minimum of 5 days or until the residue meets label requirements.
13. Record all measurements and document all recordings for each PPO pasteurization treatment on the PPO Batch Process Log (or equivalent).
14. Good manufacturing practices must be followed to assure that recontamination of the treated walnuts does not occur.

**CRITICAL FACTORS FOR WALNUT PASTEURIZATION**

<b>Parameters</b>	<b>Operational Levels</b>	<b>Record Data</b>
Initial product temperature	Not less than 86°F (30°C)	PPO Batch Process Log
Temperature inside chamber at start and during pasteurization	106-114°F (41-45.6°C)	PPO Batch Process Log
Chamber vacuum before PPO injection	At least 25.5”Hg Vacuum	PPO Batch Process Log
PPO vaporizer temperature at point of PPO injection	140-160°F (60-71°C)	PPO Batch Process Log
Initial PPO concentration in chamber	Not less than 0.83oz PPO/ft3	PPO Batch Process Log
Initial chamber vacuum at completion of inert gas injection	5-6” Hg vacuum	PPO Batch Process Log
Duration of pasteurization	4 hours	PPO Batch Process Log
Aeration cycles	Not less than 4 and not more than 14	PPO Batch Process Log
Post ventilation time/temperatures	At or above 59°F (18°C) for 5 days.	PPO Batch Process Log