

# Heat Sterilization of Wood

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## Contents

Heat Treatment Standards	20-1
Factors Affecting Heating Times	20-2
Energy Source	20-2
Heating Medium	20-2
Air Circulation	20-2
Size and Configuration of Wood	20-3
Species	20-3
Stacking Methods	20-5
Heating Times for Wood in Various Forms	20-5
Methods for Estimating Heating Times	20-6
MacLean Equations	20-6
Multiple Regressions	20-8
American Lumber Standards Committee (ALSC) Enforcement Regulations	20-10
Quality Mark	20-12
Other Considerations	20-14
Literature Cited	20-14

Insects and other pests can travel between countries in pallets and other wood packaging materials through international trade. Because these pests can cause significant ecological damage, their invasion into non-native countries is undesirable. Heat sterilization is currently the most practical and environmentally friendly treatment to kill pests in solid wood materials and prevent their transfer between continents and regions. Consequently, regulations requiring heat sterilization are becoming more common.

Two important questions should be considered in heat sterilizing solid wood materials: First, what temperature-time regime is required to kill a particular pest? Second, how much time is required to heat the center of any wood configuration to the kill temperature? The entomology research on the first question has facilitated the development of international standards for heat sterilization of various solid wood materials. This chapter primarily addresses the second question. It focuses on various factors that should be considered when planning and implementing a heat treatment process using a conventional steam or dry kiln heat chamber, discusses experimentally derived heating times for commonly used wood products, and presents analytical and empirical methods for estimating heating times that can be used as starting points in the development of heat treatment schedules. Current wood packaging material enforcement regulations and several additional practical considerations for heat treatment operations are also presented.

## Heat Treatment Standards

The current international standard for heat sterilization of solid wood packaging materials is the International Standard for Phytosanitary Measures (ISPM) 15, "Guidelines for Regulating Wood Packaging Material in International Trade," which requires heating wood to a minimum core temperature of 56 °C (133 °F) for a minimum of 30 min when using conventional heat chamber technology (IPPC 2002, 2017; APHIS 2004). (Note: In 2013, the Eighth Session of the Commission on Phytosanitary Measures (CPM-8) adopted revised Annex 1 to ISPM 15 to include heat treatment using dielectric heating. Where dielectric heating (microwave or radio waves) is used, wood packaging material must be heated to achieve a minimum temperature of 60 °C (140 °F) for 1 min continuously throughout the entire profile of the wood, including its surfaces.) These guidelines are for all forms of wood packaging material that may serve as a pathway

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1. Understanding the eBook Wood Handbook Chapter 20 Heat Sterilization Of Wood
  - The Rise of Digital Reading Wood Handbook Chapter 20 Heat Sterilization Of Wood
  - Advantages of eBooks Over Traditional Books
2. Identifying Wood Handbook Chapter 20 Heat Sterilization Of Wood
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Wood Handbook Chapter 20 Heat Sterilization Of Wood
  - User-Friendly Interface
4. Exploring eBook Recommendations from Wood Handbook Chapter 20 Heat Sterilization Of Wood
  - Personalized Recommendations
  - Wood Handbook Chapter 20 Heat Sterilization Of Wood User Reviews and Ratings
  - Wood Handbook Chapter 20 Heat Sterilization Of Wood and Bestseller Lists
5. Accessing Wood Handbook Chapter 20 Heat Sterilization Of Wood Free and Paid eBooks
  - Wood Handbook Chapter 20 Heat Sterilization Of Wood Public Domain eBooks
  - Wood Handbook Chapter 20 Heat Sterilization Of Wood eBook Subscription Services
  - Wood Handbook Chapter 20 Heat Sterilization Of Wood Budget-Friendly Options
6. Navigating Wood Handbook Chapter 20 Heat Sterilization Of Wood eBook Formats
  - ePub, PDF, MOBI, and More
  - Wood Handbook Chapter 20 Heat Sterilization Of Wood Compatibility with Devices
  - Wood Handbook Chapter 20 Heat Sterilization Of Wood Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Wood Handbook Chapter 20 Heat Sterilization Of Wood
  - Highlighting and Note-Taking Wood Handbook Chapter 20 Heat Sterilization Of Wood
  - Interactive Elements Wood Handbook Chapter 20 Heat Sterilization Of Wood
8. Staying Engaged with Wood Handbook Chapter 20 Heat Sterilization Of Wood

- Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Wood Handbook Chapter 20 Heat Sterilization Of Wood
9. Balancing eBooks and Physical Books Wood Handbook Chapter 20 Heat Sterilization Of Wood
- Benefits of a Digital Library
  - Creating a Diverse Reading Collection Wood Handbook Chapter 20 Heat Sterilization Of Wood
10. Overcoming Reading Challenges
- Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Wood Handbook Chapter 20 Heat Sterilization Of Wood
- Setting Reading Goals Wood Handbook Chapter 20 Heat Sterilization Of Wood
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Wood Handbook Chapter 20 Heat Sterilization Of Wood
- Fact-Checking eBook Content of Wood Handbook Chapter 20 Heat Sterilization Of Wood
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
- Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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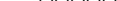
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web callan method levels the callan method has 12 levels from beginner to advanced in this table you will see what you will learn in each level of the method as well as the comparison of each level with the levels of the cefr common european framework of reference for languages

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