

SCHEDULE C: CLSAB POLICY FOR GRADING AGENCY VERIFICATION OF HEAT CHAMBERS

GENERAL

This policy establishes minimum criteria to be used by agencies to verify that equipment and heat treating schedules meet the minimum time and temperature requirements defined in the NLGA Standard Grading Rules for Canadian Lumber - Paragraph 715 HEAT TREATMENT.

Responsibility for this policy is vested in the Board of Directors of the CLSAB. Revisions may be recommended by the Canadian Lumber Standards Accreditation Board Operations Committee (CLSAB OC) or any other appointed committee of the CLSAB.

Responsibility for evaluation, application and interpretation of this policy is vested in the CLSAB OC or any other committee duly appointed by the Board of Directors.

1.0 REQUIREMENTS FOR THE QUALIFICATION OF A FACILITY:

1.1 All equipment must be in proper working condition.

1.2 The agency shall verify that:

1.2.1 the heat treating schedules and heat treatment chambers meet the General Conditions of Section 3.0 and the Specific Heat Treatment Chamber Operating Conditions for Generic Schedules of Section 3.1 or Section 3.2 of this policy; or,

1.2.2 the specific schedule used by the facility achieves a minimum core temperature of 56°C for a minimum of 30 minutes.

1.2.3 temperature sensors be properly located to accurately measure the temperature achieved in the heat chamber. Appendix A provides diagrams illustrating how to determine kiln length to assist in placement of temperature sensors.

1.2.4 the process for verifying the wood core temperature must be specified in the facility's quality manual and approved by CLSAB.

1.3 The agency shall require each facility with or without heat treatment chambers to develop a quality manual of the facility's quality system procedures and it shall review and approve each manual. The quality manual shall include:

1.3.1 a procedure that confirms proper operation of the treatment chamber during heat treatment.

1.3.2 procedures for dealing with failure or deficiencies in equipment operation including heat sensors, fans, etc.

1.3.3 procedures for segregation of non KD-HT and/or HT products for facilities without heat treatment chambers.

1.3.4 an approved method that verifies a sufficient volume of KD-HT or HT material was purchased from a registered facility for the volume of reworked material that is labelled as KD-HT or HT.

1.3.5 the Ramp-up Zone (RUZ), Ramp-up Zone length (RUZL), the Heat Treatment Zone (HTZ) and the Heat Treatment Zone Length (HTZL) for each track. For facilities operating bi-directional continuous kilns. Appendix B provides diagrams illustrating the foregoing definitions for Option A, B and D.

2.0 MONITORING

2.1 Agencies shall require facilities to monitor temperatures throughout the heat treatment cycle by any of the following options:

2.1.1 wet bulb for bi-directional continuous kilns

2.1.2 wet and dry bulb temperature

2.1.3 dry bulb only

2.1.4 direct measurement of wood core temperatures developed by a Heat Treatment Evaluator recognized by the Canadian Food Inspection Agency

2.2 If a facility is not in operation for a period of 6 months or longer, the facility must specify steps used in ensuring that the equipment is in normal operating condition before beginning treatments.

3.0 HEAT TREATMENT CHAMBER OPERATING CONDITIONS AND SCHEDULES

3.1 General Conditions - The following heat treatment chamber operating conditions apply to all generic schedules, Options A, B, C, D, E, F & G.

GENERAL HEAT TREATMENT CHAMBER OPERATING CONDITIONS

- A minimum air velocity of 0.5 meters/second (100 feet/ minute), (measured on the air exit side of the chamber of the load) is required. A zone is an area of 5m (16 feet) long by 2.5m (8 feet) high.
- Lumber must be stacked on stickers no less than 9.5mm (3/8 inches) in thickness and in a manner to provide adequate air flow. Wood packaging or other wood products may be piled in a manner to provide good air circulation through and over all wide surfaces of individual boards.
- For options A, B, C, D, E, F, G and H-1 the dry and wet bulb measuring system must accurately measure the temperature within 2.5°C (4.5°F). The verification of the measuring system will be required on an annual basis. This requirement may be removed where the temperature run time exceeds the requirement for option A-B-D-E-F-G by at least 5°C and by at least 10°C for option C, G and H-1.
- For option H-2 the dry bulb measuring system must accurately measure the temperature within 1.0°C (1.8°F). The verification of the measuring system will be required twice a year by an independent party.
- When wet bulb temperature is monitored, at least 1 wet bulb temperature sensor that directly measures wet bulb temperature or provides information from which wet bulb temperatures can be recorded must be present and in its appropriate location. The system should record temperatures at a minimum of every 30 minutes.

3.2 Specific Heat Treatment Chamber Operating Conditions for Generic Softwood Schedules, Options A, B, C & D

These schedules apply to all coniferous (softwood) species grown in Canada and the following deciduous (hardwood) genus/species grown in Canada:

- *aspen (Populus tremuloides),*
- *poplar (Populus spp.),*
- *Manitoba maple (Acer negundo),*
- *basswood (Tilia americana) and*
- *red alder (Alnus rubra).*

3.3 Specific Heat Treatment Chamber Operating Conditions for Generic Hardwood Schedules, Options E, F, G & H

These schedules apply to all deciduous (hardwood) genera grown in Canada including but not limited to:

- *maple (Acer spp.),*
- *alder (Alnus spp.),*
- *oak (Quercus spp.),*
- *birch (Betula spp.),*
- *ash (Fraxinus spp.) and*
- *beech (Fagus spp.).*

4.0 VERIFICATION OF COMPLIANCE

4.1 LABELING

All softwood lumber which has been treated to meet the General Conditions of Section 3.0 and the specific conditions of one of the options in Section 3.1 or 3.2 may be identified as follows:

- 4.1.1 All pieces of lumber which have achieved both the required moisture content and undergone the appropriate heat treatment schedule may be affixed with a Grading Agency stamp approved by CLSAB bearing the letters KD-HT or HT. The KD-HT or HT stamp shall be positioned on each piece of lumber in accordance with the current CLSAB Regulations.
- 4.1.2 Lumber which has been heat treated without moisture content reduction but has undergone the required heat treatment schedule may be labeled as HT. The HT stamp shall designate the Agency and the Mill Number and shall be positioned on each piece of lumber in accordance with current CLSAB Regulations.
- 4.1.3 KILN WETS (Pieces of lumber that do not achieve the desired moisture content in the drying process). Randomly occurring pieces of lumber which have been processed in the same kiln drying charge, but do not achieve the desired moisture content of 19% or less may be marked with an HT stamp, which will designate that the lumber has undergone "Heat Treatment" in accordance with the NLGA Grading Rules Definition. The HT stamp shall designate the Agency and the Mill Number and shall be positioned on each piece of lumber in accordance with current CLSAB Regulations.

4.2 CERTIFICATE ISSUANCE

All softwood lumber which has been treated to meet the General Conditions of Section 3.0 and the specific conditions of one of the options in Section 3.1 or 3.2 may be identified by:

- 4.2.1 an industry issued certificate stating that material has met the requirements of the HT designation or,
- 4.2.2 a phytosanitary certificate issued by CFIA

In either case, the facility producing or certifying the material shall be under the jurisdiction of the CLSAB and its Accredited Agencies.

5.0 RECORDS & REPORTING

- 5.1 All records shall be in compliance with the general CLSAB "Regulations".
- 5.2 An audit checklist, as shown in Schedule "D" shall be completed by the agency.
- 5.3 Agencies shall make their records available to CLSAB in compliance with CLSAB "Regulations" and as required by the Board.

Option A: Heat Treatment with or without Moisture Reduction

HEAT TREATMENT CHAMBER OPERATING CONDITIONS FOR OPTION A

Temperatures must be recorded at a minimum of every 30 minutes.

Air flow should occur in each two opposite directions within the treatment chamber for half of the time specified at a temperature equal to or exceeding the wet bulb temperature run time (see tables for each option). This requirement may be modified where it can be technically proven by a recognized heat treatment evaluator and when other measures can compensate for deviation. Any modifications must be included in the quality manual and account for all the processes used to ensure that the phytosanitary standard is being met.

Batch Kilns

Both wet-bulb and dry bulb temperatures are measured.

Dry bulb temperature sensors must be located on at least one side of the heat treatment chamber and spaced not more than 7.3 metres (24 feet) apart, perpendicular to the airflow and with one located no more than 2.5 m (8.5 feet) from each end of the treatment chamber. The number of dry bulb sensors required will depend on the length of the individual kiln and the above sensor placement scale.

At least one wet bulb temperature sensor, either measuring wet bulb temperature or providing data to determine the wet bulb temperature must be located near the mid third of the treatment chamber, on any one side. The dry bulb temperature must exceed the wet bulb temperature during the heat treatment to ensure the uniformity of the heat treatment chamber conditions.

The pre-schedule wood core temperature must be equal to or greater than 15°C (59°F) in order to use the generic schedule for Option A. The pre-schedule wood core temperature can be determined by direct measurement of the wood core temperature or by using the previous night's low temperature as the wood core temperature.

At wood core temperatures below 15°C (59°F) the facility must have specifications in the quality manual to pre-heat the wood until the core temperature of at least one piece of lumber of the thickest nominal size reaches 15°C (59°F), before starting the generic schedule. Alternatively, the following temperature adjustments may be made:

For wood core temperatures below 15°C, add the temperature adjustment to the "Minimum Heat Treatment Run Time".

- *Over 57 mm (2 1/4") to 83 mm (3 1/4")..... add 10.0 minutes per 1 °C (5.6 minutes per 1 °F)*
- *Over 83 mm (3 1/4") to 110 mm (4 1/4")..... add 15.3 minutes per 1 °C (8.5 minutes per 1 °F)*
- *Greater than 108 mm (4 1/4 inches)..... Adjustment not available. Direct core measurement is required.*

Pre-schedule wood core temperature verification and the pre-heating process is not required for pieces of wood less than or equal to 57 mm (2-1/4 inches)

Bi-Directional Continuous Kilns

The following temperature bulb placements are available to a registered facility operating a bi-directional continuous kiln.

a. One wet bulb

- One (1) wet-bulb temperature sensor, either measuring wet bulb temperature or providing data to determine the wet bulb temperature must be placed within the mid-third of the main heating section.
- The length of the mid-third of the main heating section is referred to as the Heat Treatment Zone Length (HTZL) and is used to determine that the wet bulb temperature continuous run time for the option has been satisfied.

b. Three wet bulbs

- One (1) wet-bulb temperature sensor, either measuring wet bulb temperature or providing data to determine the wet bulb temperature must be placed within the mid-third of the main heating section.
- To extend the Heat Treatment Zone Length, one (1) wet-bulb temperature sensor, either measuring wet bulb temperature or providing data to determine the wet bulb temperature must be placed within the exiting (recommended) or entering third of the main heating section on each track.
- The Heat Treatment Zone Length (HTZL) is determined by adding the length of the mid-third heating section plus the distance to the location of the wet-bulb temperature sensor within the exiting (recommended) or entering third of the main heating section on each track and is used to determine that the wet bulb temperature continuous run time for the option has been satisfied.

c. Four wet bulbs

- Two (2) wet-bulb temperature sensors, either measuring wet bulb temperature or providing data to determine the wet bulb temperature must be placed within the main heating section of each track.
- For each track the distance perpendicular to airflow between these sensors is referred to as the Heat Treatment Zone Length (HTZL) and is used to determine that the wet bulb temperature continuous run time for the option has been satisfied.

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION A | | | |
|---|--|---|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 60°C (140°F) | Minimum Final Wet-Bulb Temperature |
| Up to 57 mm (2 1/4 inches) | 6 hrs, 26 minutes | 2 hrs, 3 minutes | 63°C (145°F) |
| Up to 83 mm (3 1/4 inches) | 7 hrs, 20 minutes | 3 hrs, 20 minutes | 66°C (151°F) |
| Up to 108 mm (4 1/4 inches) | 10 hrs, 57 minutes | 6 hrs, 34 minutes | 67°C (153°F) |

Generic Phytosanitary Heat Treatment Schedules for Softwood Timbers Thicker Than 110mm (5 inch nominal)

(Options A-1 to A-6)

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION A-1 | | | |
|---|--|---|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 70°C (158°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 9 hrs, 38 minutes | 5 hrs, 8 minutes | 70°C (158°F) |
| Up to 152 mm (6 inches) | 11 hrs, 16 minutes | 6 hrs, 46 minutes | 70°C (158°F) |
| Up to 178 mm (7 inches) | 13 hrs, 14 minutes | 8 hrs, 44 minutes | 70°C (158°F) |
| Up to 203 mm (8 inches) | 15 hrs, 37 minutes | 11 hrs, 7 minutes | 70°C (158°F) |
| Up to 228 mm (9 inches) | 18 hrs, 25 minutes | 13 hrs, 55 minutes | 70°C (158°F) |
| Up to 254 mm (10 inches) | 21 hrs, 44 minutes | 17 hrs, 14 minutes | 70°C (158°F) |
| Up to 279 mm (11 inches) | 25 hrs, 36 minutes | 21 hrs, 6 minutes | 70°C (158°F) |
| Up to 305 mm (12 inches) | 30 hrs, 4 minutes | 25 hrs, 34 minutes | 70°C (158°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION A-2 | | | |
|---|--|---|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Continuous Temperature Run Time ≥ 69° C (156°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 11 hrs, 10 minutes | 6 hrs, 40 minutes | 69°C (156°F) |
| Up to 152 mm (6 inches) | 12 hrs, 16 minutes | 8 hrs, 46 minutes | 69°C (156°F) |
| Up to 178 mm (7 inches) | 15 hrs, 49 minutes | 11 hrs, 19 minutes | 69°C (156°F) |
| Up to 203 mm (8 inches) | 18 hrs, 52 minutes | 14 hrs, 22 minutes | 69°C (156°F) |
| Up to 228 mm (9 inches) | 22 hrs, 29 minutes | 17 hrs, 59 minutes | 69°C (156°F) |
| Up to 254 mm (10 inches) | 26 hrs, 44 minutes | 22 hrs, 14 minutes | 69°C (156°F) |
| Up to 279 mm (11 inches) | 31 hrs, 41 minutes | 27 hrs, 11 minutes | 69°C (156°F) |
| Up to 305 mm (12 inches) | 37 hrs, 24 minutes | 32 hrs, 54 minutes | 69°C (156°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION A-3 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time $\geq 68^{\circ}\text{C}$ (154°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 12 hrs, 18 minutes | 7 hrs, 48 minutes | 68°C (154°F) |
| Up to 152 mm (6 inches) | 14 hrs, 45 minutes | 10 hrs, 15 minutes | 68°C (154°F) |
| Up to 178 mm (7 inches) | 17 hrs, 44 minutes | 13 hrs, 14 minutes | 68°C (154°F) |
| Up to 203 mm (8 inches) | 21 hrs, 17 minutes | 16 hrs, 47 minutes | 68°C (154°F) |
| Up to 228 mm (9 inches) | 25 hrs, 30 minutes | 21 hrs | 68°C (154°F) |
| Up to 254 mm (10 inches) | 30 hrs, 26 minutes | 25 hrs, 56 minutes | 68°C (154°F) |
| Up to 279 mm (11 inches) | 36 hrs, 11 minutes | 31 hrs, 41 minutes | 68°C (154°F) |
| Up to 305 mm (12 inches) | 42 hrs, 49 minutes | 38 hrs, 19 minutes | 68°C (154°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION A-4 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time $\geq 67^{\circ}\text{C}$ (152°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 13 hrs, 14 minutes | 8 hrs, 44 minutes | 67°C (152°F) |
| Up to 152 mm (6 inches) | 15 hrs, 59 minutes | 11 hrs, 29 minutes | 67°C (152°F) |
| Up to 178 mm (7 inches) | 19 hrs, 18 minutes | 14 hrs, 48 minutes | 67°C (152°F) |
| Up to 203 mm (8 inches) | 23 hrs, 16 minutes | 18 hrs, 46 minutes | 67°C (152°F) |
| Up to 228 mm (9 inches) | 27 hrs, 58 minutes | 23 hrs, 28 minutes | 67°C (152°F) |
| Up to 254 mm (10 inches) | 33 hrs, 29 minutes | 28 hrs, 59 minutes | 67°C (152°F) |
| Up to 279 mm (11 inches) | 39 hrs, 53 minutes | 35 hrs, 23 minutes | 67°C (152°F) |
| Up to 305 mm (12 inches) | 47 hrs, 17 minutes | 42 hrs, 47 minutes | 67°C (152°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION A-5 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time $\geq 66^{\circ}\text{C}$ (150°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 14 hrs, 3 minutes | 9 hrs, 33 minutes | 66°C (150°F) |
| Up to 152 mm (6 inches) | 17 hrs, 2 minutes | 12 hrs, 32 minutes | 66°C (150°F) |
| Up to 178 mm (7 inches) | 20 hrs, 39 minutes | 16 hrs, 9 minutes | 66°C (150°F) |
| Up to 203 mm (8 inches) | 24 hrs, 59 minutes | 20 hrs, 29 minutes | 66°C (150°F) |
| Up to 228 mm (9 inches) | 30 hrs, 7 minutes | 25 hrs, 37 minutes | 66°C (150°F) |
| Up to 254 mm (10 inches) | 36 hrs, 7 minutes | 31 hrs, 37 minutes | 66°C (150°F) |
| Up to 279 mm (11 inches) | 43 hrs, 5 minutes | 38 hrs, 35 minutes | 66°C (150°F) |
| Up to 305 mm (12 inches) | 51 hrs, 9 minutes | 46 hrs, 39 minutes | 66°C (150°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION A-6 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time $\geq 64^{\circ}\text{C}$ (148°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 14 hrs, 46 minutes | 10 hrs, 16 minutes | 64°C (148°F) |
| Up to 152 mm (6 inches) | 17 hrs, 59 minutes | 13 hrs, 29 minutes | 64°C (148°F) |
| Up to 178 mm (7 inches) | 21 hrs, 52 minutes | 17 hrs, 22 minutes | 64°C (148°F) |
| Up to 203 mm (8 inches) | 26 hrs, 31 minutes | 22 hrs, 1 minute | 64°C (148°F) |
| Up to 228 mm (9 inches) | 32 hrs, 1 minute | 27 hrs, 31 minutes | 64°C (148°F) |
| Up to 254 mm (10 inches) | 38 hrs, 28 minutes | 33 hrs, 58 minutes | 64°C (148°F) |
| Up to 279 mm (11 inches) | 45 hrs, 57 minutes | 41 hrs, 27 minutes | 64°C (148°F) |
| Up to 305 mm (12 inches) | 54 hrs, 36 minutes | 50 hrs, 6 minutes | 64°C (148°F) |

Option B: Heat Treatment with Moisture Reduction**HEAT TREATMENT CHAMBER OPERATING CONDITIONS FOR OPTION B**

This option can be used by a facility to heat treat the wood during the kiln drying process in order to reduce the moisture content below the fiber saturation point of the wood (approximately 30% MC).

Temperatures must be recorded at a minimum of every 30 minutes.

Air flow should occur in each two opposite directions within the treatment chamber for half of the time specified at a temperature equal to or exceeding the wet bulb temperature run time (see tables for each option). This requirement may be modified where it can be technically proven by a recognized heat treatment evaluator and when other measures can compensate for deviation. Any modifications must be included in the quality manual and account for all the processes used to ensure that the phytosanitary standard is being met.

Batch Kilns

Both wet-bulb and dry bulb temperatures are measured.

At least one dry bulb temperature sensor must be located near the mid third of the heat treatment chamber, on any one side.

At least one wet bulb temperature sensor, either measuring wet bulb temperature or providing data to determine the wet bulb temperature must be located near the mid third of the treatment chamber, on any one side.

The heat treatment chamber must be equipped with at least one dry-bulb temperature sensor. If the air entering/ air exiting plenum is divided into three equal length segments, the temperature sensor(s) must be located as follows: At least one dry-bulb temperature sensor will be located within the mid-third segment of the kiln (on either side). If this condition is met, location of other sensors is not restricted. In lieu of a dry-bulb temperature sensor within the mid-third of the kiln, the kiln can be operated with two (or more) dry-bulb temperature sensors with at least one sensor located in each of the segments located at opposite ends of the kiln (on either side). The dry bulb(s) temperature must exceed the wet bulb temperature during the heat treatment to ensure the uniformity of the heat treatment chamber conditions.

The pre-schedule wood core temperature must be determined by the facility (e.g. wood core measurements or the previous night's low temperature could be used as methods for determining core temperatures). At temperatures below 15°C (59°F) the facility must have specifications in the quality manual to pre-heat the wood until a wood core temperature of at least one piece of lumber of the thickest nominal size (i.e. 57 mm (2-1/4 inches), 83 mm (3-1/4 inches), or 108 mm (4-1/4 inches) reaches 15°C (59°F), before starting the official heat treatment process. Alternatively, the following temperature adjustment may be made

For wood core temperatures below 15°C, add the temperature adjustment to the "Minimum Heat Treatment Run Time".

- *Over 57 mm (2 1/4") to 83 mm (3 1/4") add 10.0 minutes per 1°C (5.6 minutes per 1°F)*
- *Over 83 mm (31/4") to 110 mm (4 1/4") add 15.3 minutes per 1°C (8.5 minutes per 1°F)*

Pre-schedule wood core temperature verification and the pre-heating process is not required for pieces of wood less than or equal to 57 mm (2-1/4 inches).

Bi-Directional Continuous Kilns – refer to Option A

Option B1: Heat Treatment With or Without Moisture Reduction**HEAT TREATMENT CHAMBER OPERATING CONDITIONS FOR OPTION B-1**

Moisture reduction is not required to use this option.

Temperatures must be recorded at a minimum of every 30 minutes.

Air flow should occur in each two opposite directions within the treatment chamber for half of the time specified at a temperature equal to or exceeding the wet bulb temperature run time (see tables for each option). This requirement may be modified where it can be technically proven by a recognized heat treatment evaluator and when other measures can compensate for deviation. Any modifications must be included in the quality manual and account for all the processes used to ensure that the phytosanitary standard is being met.

Batch Kilns

Both wet-bulb and dry bulb temperatures are measured.

At least three (3) dry bulb temperature sensors must be located on either side of the heat treatment chamber. Sensors must be spaced approximately at equal distance apart perpendicular to the air flow. One sensor must be located at each end of the treatment chamber. These sensors should be placed closest to the end of the treatment chamber (approximately 5 m (16.5 feet). The number of dry bulb sensors required will depend on the length of the individual kiln and the above sensor placement scale. The dry bulb(s) temperature must exceed the wet bulb temperature during the heat treatment to ensure the uniformity of the heat treatment chamber conditions.

At least one wet bulb temperature sensor, either measuring wet bulb temperature or providing data to determine the wet bulb temperature must be located near the mid-point of the treatment chamber, on any one side.

The pre-schedule wood core temperature must be determined by the facility (e.g. wood core measurements or the previous night's low temperature could be used as methods for determining core temperatures). At temperatures below 15°C (59°F) the facility must have specifications in the quality manual to pre-heat the wood until a wood core temperature of at least one piece of lumber of the thickest nominal size (i.e. 57 mm (2-1/4 inches), 83 mm (3-1/4 inches), or 108 mm (4-1/4 inches) reaches 15°C (59°F) , before starting the official heat treatment process. Alternatively, the following temperature adjustment may be made:

For wood core temperatures below 15 °C, add the temperature adjustment to the "Minimum Heat Treatment Run Time".

- *Over 57 mm (2 1/4") to 83 mm (3 1/4") add 10.0 minutes per 1°C (5.6 minutes per 1°F)*
- *Over 83 mm (3 1/4") to 110 mm (4 1/4") add 15.3 minutes per 1°C (8.5 minutes per 1°F)*

Pre-schedule wood core temperature verification and the pre-heating process is not required for pieces of wood less than or equal to 57 mm (2-1/4 inches).

Bi-Directional Continuous Kilns – refer to Option A

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION B AND B-1 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 60°C (140 °F) | Minimum Final Wet-Bulb Temperature |
| Up to 57 mm (2 1/4 inches) | 8 hrs, 29 minutes | 4 hrs, 6 minutes | 63°C (145°F) |
| Up to 83 mm (3 1/4 inches) | 10 hrs, 40 minutes | 6 hrs, 40 minutes | 66°C (151°F) |
| Up to 108 mm (4 1/4 inches) | 17 hrs, 31 minutes | 13 hrs, 8 minutes | 67°C (153°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR Option B-1 (Thick stock) | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 70°C (158 °F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 14 hrs, 46 minutes | 10 hrs, 16 minutes | 70°C (158°F) |
| Up to 152 mm (6 inches) | 18 hrs, 02 minutes | 13 hrs, 32 minutes | 70°C (158°F) |
| Up to 178 mm (7 inches) | 21 hrs, 58 minutes | 17 hrs, 28 minutes | 70°C (158°F) |
| Up to 203 mm (8 inches) | 26 hrs, 44 minutes | 22 hrs, 14 minutes | 70°C (158°F) |
| Up to 228 mm (9 inches) | 32 hrs, 20 minutes | 27 hrs, 50 minutes | 70°C (158°F) |
| Up to 254 mm (10 inches) | 38 hrs, 58 minutes | 34 hrs, 28 minutes | 70°C (158°F) |
| Up to 279 mm (11 inches) | 46 hrs, 42 minutes | 42 hrs, 12 minutes | 70°C (158°F) |
| Up to 305 mm (12 inches) | 55 hrs, 38 minutes | 51 hrs, 08 minutes | 70°C (158°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR Option B-2 (Thick stock) | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 69°C (156 °F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 17 hrs, 50 minutes | 13 hrs, 20 minutes | 69°C (156°F) |
| Up to 152 mm (6 inches) | 22 hrs, 02 minutes | 17 hrs, 32 minutes | 69°C (156°F) |
| Up to 178 mm (7 inches) | 27 hrs, 08 minutes | 22 hrs, 38 minutes | 69°C (156°F) |
| Up to 203 mm (8 inches) | 33 hrs, 14 minutes | 28 hrs, 44 minutes | 69°C (156°F) |
| Up to 228 mm (9 inches) | 40 hrs, 28 minutes | 35 hrs, 58 minutes | 69°C (156°F) |
| Up to 254 mm (10 inches) | 48 hrs, 58 minutes | 44 hrs, 28 minutes | 69°C (156°F) |
| Up to 279 mm (11 inches) | 58 hrs, 52 minutes | 54 hrs, 22 minutes | 69°C (156°F) |
| Up to 305 mm (12 inches) | 70 hrs, 18 minutes | 65 hrs, 48 minutes | 69°C (156°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR Option B-3 (Thick stock) | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 68°C (154 °F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 20 hrs, 06 minutes | 15 hrs, 36 minutes | 68°C (154°F) |
| Up to 152 mm (6 inches) | 25 hrs, 00 minutes | 20 hrs, 30 minutes | 68°C (154°F) |
| Up to 178 mm (7 inches) | 30 hrs, 58 minutes | 26 hrs, 28 minutes | 68°C (154°F) |
| Up to 203 mm (8 inches) | 38 hrs, 04 minutes | 33 hrs, 34 minutes | 68°C (154°F) |
| Up to 228 mm (9 inches) | 46 hrs, 30 minutes | 42 hrs, 00 minutes | 68°C (154°F) |
| Up to 254 mm (10 inches) | 56 hrs, 22 minutes | 51 hrs, 52 minutes | 68°C (154°F) |
| Up to 279 mm (11 inches) | 67 hrs, 52 minutes | 63 hrs, 22 minutes | 68°C (154°F) |
| Up to 305 mm (12 inches) | 81 hrs, 08 minutes | 76 hrs, 38 minutes | 68°C (154°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR Option B-4 (Thick stock) | | | |
|---|--|---|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 67°C (152°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 21 hrs, 58 minutes | 17 hrs, 28 minutes | 67°C (152°F) |
| Up to 152 mm (6 inches) | 27 hrs, 28 minutes | 22 hrs, 58 minutes | 67°C (152°F) |
| Up to 178 mm (7 inches) | 34 hrs, 06 minutes | 29 hrs, 36 minutes | 67°C (152°F) |
| Up to 203 mm (8 inches) | 42 hrs, 02 minutes | 37 hrs, 32 minutes | 67°C (152°F) |
| Up to 228 mm (9 inches) | 51 hrs, 26 minutes | 46 hrs, 56 minutes | 67°C (152°F) |
| Up to 254 mm (10 inches) | 62 hrs, 28 minutes | 57 hrs, 58 minutes | 67°C (152°F) |
| Up to 279 mm (11 inches) | 75 hrs, 16 minutes | 70 hrs, 46 minutes | 67°C (152°F) |
| Up to 305 mm (12 inches) | 90 hrs, 04 minutes | 85 hrs, 34 minutes | 67°C (152°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR Option B-5 (Thick stock) | | | |
|---|--|---|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 66°C (150°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 23 hrs, 36 minutes | 19 hrs, 06 minutes | 66°C (150°F) |
| Up to 152 mm (6 inches) | 29 hrs, 34 minutes | 25 hrs, 04 minutes | 66°C (150°F) |
| Up to 178 mm (7 inches) | 36 hrs, 48 minutes | 32 hrs, 18 minutes | 66°C (150°F) |
| Up to 203 mm (8 inches) | 45 hrs, 28 minutes | 40 hrs, 58 minutes | 66°C (150°F) |
| Up to 228 mm (9 inches) | 55 hrs, 44 minutes | 51 hrs, 14 minutes | 66°C (150°F) |
| Up to 254 mm (10 inches) | 67 hrs, 44 minutes | 63 hrs, 14 minutes | 66°C (150°F) |
| Up to 279 mm (11 inches) | 81 hrs, 40 minutes | 77 hrs, 10 minutes | 66°C (150°F) |
| Up to 305 mm (12 inches) | 97 hrs, 48 minutes | 93 hrs, 18 minutes | 66°C (150°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR Option B-6 (Thick stock) | | | |
|---|--|---|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 64°C (148°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 25 hrs, 02 minutes | 20 hrs, 32 minutes | 64°C (148°F) |
| Up to 152 mm (6 inches) | 31 hrs, 28 minutes | 26 hrs, 58 minutes | 64°C (148°F) |
| Up to 178 mm (7 inches) | 39 hrs, 14 minutes | 34 hrs, 44 minutes | 64°C (148°F) |
| Up to 203 mm (8 inches) | 48 hrs, 32 minutes | 44 hrs, 02 minutes | 64°C (148°F) |
| Up to 228 mm (9 inches) | 59 hrs, 32 minutes | 55 hrs, 02 minutes | 64°C (148°F) |
| Up to 254 mm (10 inches) | 72 hrs, 26 minutes | 67 hrs, 56 minutes | 64°C (148°F) |
| Up to 279 mm (11 inches) | 87 hrs, 24 minutes | 82 hrs, 54 minutes | 64°C (148°F) |
| Up to 305 mm (12 inches) | 104 hrs, 42 minutes | 93 hrs, 18 minutes | 64°C (148°F) |

Option C: Heat Treatment with Moisture Reduction (Dry Bulb Only)**HEAT TREATMENT CHAMBER OPERATING CONDITIONS FOR OPTION C**

This option can be used by a facility to heat treat the wood during the kiln drying process in order to reduce the moisture content below the fiber saturation point of the wood (approximately 30% MC).

The temperatures must be recorded at a minimum of every 30 minutes.

Air flow should occur in each two opposite directions within the treatment chamber for half of the time specified at a temperature equal to or exceeding the dry bulb temperature run time (see tables for each option). This requirement may be modified where it can be technically proven by a recognized heat treatment evaluator and when other measures can compensate for deviation. Any modifications must be included in the quality manual and account for all the processes used to ensure that the phytosanitary standard is being met.

Batch Kilns

Only dry bulb measurement is required.

The facility must employ the use of at least two dry bulb temperature sensors.

Bi-Directional Continuous Kilns

As per site specific continuous kiln specific HT schedule.

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION C | | |
|---|---|---|
| Lumber Thickness | Dry-Bulb Temperature Continuous Run Time > 52° C (>126° F) | Minimum time at the End of the Treatment with the Dry-Bulb > 60° C (140° F) |
| Up to 29 mm (1 1/8 inches) | 8 hrs. | 4 hrs. |
| Up to 57 mm (2 1/4 inches) | 18 hrs. | 6 hrs. |
| Up to 83 mm (3 1/4 inches) | 45 hrs. | 15 hrs. |
| Up to 108 mm (4 1/4 inches) | 72 hrs. | 24 hrs. |

Option D: Heat Treatment with Moisture Reduction (Dry Bulb Only)**HEAT TREATMENT CHAMBER OPERATING CONDITIONS FOR OPTION D**

This option can be used by a facility to heat treat the wood during the kiln drying process in order to reduce the moisture content below the fiber saturation point of the wood (approximately 30% MC).

The temperatures must be recorded at a minimum of every 30 minutes.

Fan reversal is not required.

Batch Kilns

Only dry bulb measurement is required.

The facility must employ the use of at least two dry bulb temperature sensors.

Bi-Directional Continuous Kilns

The following temperature bulb placements are available to a registered facility operating a bi-directional continuous kiln.

a. Four dry-bulbs –

- To maximize the Heat Treatment Zone Length, two (2) dry-bulb temperature sensors on each track with one dry-bulb sensor located within the first half of the mid-third of the main heating section of the kiln. The second dry-bulb must be located in the second-half of the exiting third of the main heating section.
- For each track the distance from the beginning of the mid-third of the main heating section to the end of the main heating section is referred to as the Heat Treatment Zone Length and is used to determine that the minimum time at the end of the treatment with the dry bulb for the option has been satisfied.
- Where the Heat Treatment Zone Length has not been maximized the Heat Treatment Zone Length is the distance between the dry-bulb temperature sensors. The first dry-bulb temperature sensor shall not be placed in the first-third of the main heating section of the kiln.

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION D | | |
|---|--------------------------------|--|
| Lumber Thickness | Heat Treatment Run Time | Minimum time at the End of the Treatment with the Dry-Bulb > 71° C (160°F) |
| Up to 57 mm (2 1/4 inches) | 12 hrs. | 6 hrs. |
| Up to 133 mm (5 1/4 inches) | 42 hrs | 36 hrs |

Option E: Generic Hardwood Phytosanitary Heat Treatment Schedule without Moisture Reduction

Heat Treatment Chamber Operating Conditions for Option E

Both wet-bulb and dry bulb temperatures are measured.

The temperatures must be recorded at a minimum of every 30 minutes.

Dry bulb temperature sensors must be located on at least one side of the heat treatment chamber and spaced not more than 7.3 meters (24 feet) apart, perpendicular to the airflow and with one located no more than 2.5 m (8 feet) from each end of the treatment chamber. The number of dry bulb sensors required will depend on the length of the individual kiln and the above sensor placement scale.

At least one wet bulb temperature sensor, either measuring wet bulb temperature or providing data to determine the wet bulb temperature must be located near the mid third of the treatment chamber, on any one side. The dry bulb(s) temperature must exceed the wet bulb temperature during the heat treatment to ensure the uniformity of the heat treatment chamber conditions.

Air flow should occur in each two opposite directions within the treatment chamber for half of the time specified at a temperature equal to or exceeding the wet bulb temperature run time (see tables for each option). This requirement may be modified where it can be technically proven by a recognized heat treatment evaluator and when other measures can compensate for deviation. Any modifications must be included in the quality manual and account for all the processes used to ensure that the phytosanitary standard is being met.

The pre-schedule wood core temperature must be determined by the facility (e.g. wood core measurements or the previous night's low temperature could be used as methods for determining core temperatures). At temperatures below 15°C (59°F) the facility must have specifications in the quality manual to pre-heat the wood until a wood core temperature of at least one piece of lumber of the thickest nominal size (i.e. 57 mm (2-1/4 inches), 83 mm (3-1/4 inches), or 108 mm (4-1/4 inches) reaches 15°C (59°F), before starting the official heat treatment process. Alternatively, the following temperature adjustments may be made:

For wood core temperatures below 15° C, add the temperature adjustment to the "Minimum Heat Treatment Run Time".

- 57 mm (2 1/4") to 83 mm (3 1/4") add 12.7 minutes per 1° C (7.1minutes per 1°F)
- 83 mm (3 1/4") to 108 mm (4 1/4") add 19.3 minutes per 1° C (10.7minutes per 1°F)

Pre-schedule wood core temperature verification and the pre-heating process is not required for pieces of wood less than or equal to 60 mm (2-1/4 inches).

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION E | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 60°C (> 140°F) | Minimum Final Wet-Bulb Temperature |
| Up to 57 mm (2 1/4 inches) | 8 hrs, 2 minutes | 2 hrs, 46 minutes | 63°C (145°F) |
| Up to 83 mm (3 1/4 inches) | 9 hrs, 10 minutes | 4 hrs, 30 minutes | 66°C (151°F) |
| Up to 108 mm (4 1/4 inches) | 13 hrs, 40 minutes | 8 hrs, 52 minutes | 67°C (153°F) |

Generic Phytosanitary Heat Treatment Schedules for Hardwood Timbers Thicker Than 5"

(Options E-1 to E-6)

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION E-1 | | | |
|---|--|---|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time ≥ 70° C (158°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 11 hrs, 26 minutes | 6 hrs, 56 minutes | 70°C (158°F) |
| Up to 152 mm (6 inches) | 13 hrs, 38 minutes | 9 hrs, 8 minutes | 70°C (158°F) |
| Up to 178 mm (7 inches) | 16 hrs, 17 minutes | 11 hrs, 47 minutes | 70°C (158°F) |
| Up to 203 mm (8 inches) | 19 hrs, 30 minutes | 15 hrs | 70°C (158°F) |
| Up to 228 mm (9 inches) | 23 hrs, 17 minutes | 18 hrs, 47 minutes | 70°C (158°F) |
| Up to 254 mm (10 inches) | 27 hrs, 46 minutes | 23 hrs, 16 minutes | 70°C (158°F) |
| Up to 279 mm (11 inches) | 32 hrs, 59 minutes | 28 hrs, 29 minutes | 70°C (158°F) |
| Up to 305 mm (12 inches) | 39 hrs, 1 minute | 34 hrs, 31 minutes | 70°C (158°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION E-2 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time $\geq 69^{\circ}\text{C}$ (156°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 13 hrs, 30 minutes | 9 hrs | 69°C (156°F) |
| Up to 152 mm (6 inches) | 16 hrs, 20 minutes | 11 hrs, 50 minutes | 69°C (156°F) |
| Up to 178 mm (7 inches) | 19 hrs, 47 minutes | 15 hrs, 17 minutes | 69°C (156°F) |
| Up to 203 mm (8 inches) | 23 hrs, 54 minutes | 19 hrs, 24 minutes | 69°C (156°F) |
| Up to 228 mm (9 inches) | 28 hrs, 47 minutes | 24 hrs, 17 minutes | 69°C (156°F) |
| Up to 254 mm (10 inches) | 34 hrs, 31 minutes | 30 hrs, 1 minute | 69°C (156°F) |
| Up to 279 mm (11 inches) | 41 hrs, 12 minutes | 36 hrs, 42 minutes | 69°C (156°F) |
| Up to 305 mm (12 inches) | 48 hrs, 55 minutes | 44 hrs, 25 minutes | 69°C (156°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION E-3 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time $\geq 68^{\circ}\text{C}$ (154°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 15 hrs, 2 minutes | 10 hrs, 32 minutes | 68°C (154°F) |
| Up to 152 mm (6 inches) | 18 hrs, 20 minutes | 13 hrs, 50 minutes | 68°C (154°F) |
| Up to 178 mm (7 inches) | 22 hrs, 22 minutes | 17 hrs, 52 minutes | 68°C (154°F) |
| Up to 203 mm (8 inches) | 27 hrs, 9 minutes | 22 hrs, 39 minutes | 68°C (154°F) |
| Up to 228 mm (9 inches) | 32 hrs, 51 minutes | 28 hrs, 21 minutes | 68°C (154°F) |
| Up to 254 mm (10 inches) | 39 hrs, 31 minutes | 35 hrs, 1 minute | 68°C (154°F) |
| Up to 279 mm (11 inches) | 47 hrs, 16 minutes | 42 hrs, 46 minutes | 68°C (154°F) |
| Up to 305 mm (12 inches) | 56 hrs, 14 minutes | 51 hrs, 44 minutes | 68°C (154 °F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION E-4 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time $\geq 67^{\circ}\text{C}$ (152°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 16 hrs, 17 minutes | 11 hrs, 47 minutes | 67°C (152°F) |
| Up to 152 mm (6 inches) | 20 hrs | 15 hrs, 30 minutes | 67°C (152°F) |
| Up to 178 mm (7 inches) | 24 hrs, 29 minutes | 19 hrs, 59 minutes | 67°C (152°F) |
| Up to 203 mm (8 inches) | 29 hrs, 50 minutes | 25 hrs, 20 minutes | 67°C (152°F) |
| Up to 228 mm (9 inches) | 36 hrs, 11 minutes | 31 hrs, 41 minutes | 67°C (152°F) |
| Up to 254 mm (10 inches) | 43 hrs, 38 minutes | 39 hrs, 8 minutes | 67°C (152°F) |
| Up to 279 mm (11 inches) | 52 hrs, 16 minutes | 47 hrs, 46 minutes | 67°C (152°F) |
| Up to 305 mm (12 inches) | 62 hrs, 15 minutes | 57 hrs, 45 minutes | 67°C (152°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION E-5 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time $\geq 66^{\circ}\text{C}$ (150°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 17 hrs, 24 minutes | 12 hrs, 54 minutes | 66°C (150°F) |
| Up to 152 mm (6 inches) | 21 hrs, 25 minutes | 16 hrs, 55 minutes | 66°C (150°F) |
| Up to 178 mm (7 inches) | 26 hrs, 18 minutes | 21 hrs, 48 minutes | 66°C (150°F) |
| Up to 203 mm (8 inches) | 32 hrs, 9 minutes | 27 hrs, 39 minutes | 66°C (150°F) |
| Up to 228 mm (9 inches) | 39 hrs, 5 minutes | 34 hrs, 35 minutes | 66°C (150°F) |
| Up to 254 mm (10 inches) | 47 hrs, 11 minutes | 42 hrs, 41 minutes | 66°C (150°F) |
| Up to 279 mm (11 inches) | 56 hrs, 35 minutes | 52 hrs, 5 minutes | 66°C (150°F) |
| Up to 305 mm (12 inches) | 67 hrs, 29 minutes | 62 hrs, 59 minutes | 66°C (150°F) |

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION E-6 | | | |
|---|--|--|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time $\geq 64^{\circ}\text{C}$ (148°F) | Minimum Final Wet-Bulb Temperature |
| Up to 127 mm (5 inches) | 18 hrs, 22 minutes | 13 hrs, 52 minutes | 64°C (148°F) |
| Up to 152 mm (6 inches) | 22 hrs, 42 minutes | 18 hrs, 12 minutes | 64°C (148°F) |
| Up to 178 mm (7 inches) | 27 hrs, 57 minutes | 23 hrs, 27 minutes | 64°C (148°F) |
| Up to 203 mm (8 inches) | 34 hrs, 13 minutes | 29 hrs, 43 minute | 64°C (148°F) |
| Up to 228 mm (9 inches) | 41 hrs, 39 minutes | 37 hrs, 9 minutes | 64°C (148°F) |
| Up to 254 mm (10 inches) | 50 hrs, 21 minutes | 45 hrs, 51 minutes | 64°C (148°F) |
| Up to 279 mm (11 inches) | 60 hrs, 27 minutes | 55 hrs, 57 minutes | 64°C (148°F) |
| Up to 305 mm (12 inches) | 72 hrs, 8 minutes | 67 hrs, 38 minutes | 64°C (148°F) |

Option F: Generic Hardwood Phytosanitary Heat Treatment Schedule with Moisture Reduction

SPECIFIC HEAT TREATMENT CHAMBER OPERATING CONDITIONS FOR OPTION F

This option can be used by a facility to heat treat the wood during the kiln drying process in order to reduce the moisture content below the fiber saturation point of the wood (approximately 30% MC).

Both wet-bulb and dry bulb temperatures are measured. Temperatures must be recorded at a minimum of every 30 minutes.

The heat treatment chamber must be equipped with at least one dry-bulb temperature sensor. If the air entering/ air exiting plenum is divided into three equal length segments, the temperature sensor(s) must be located as follows: At least one dry-bulb temperature sensor will be located within the mid-third segment of the kiln (on either side). If this condition is met, location of other sensors is not restricted. In lieu of a dry-bulb temperature sensor within the mid-third of the kiln, the kiln can be operated with two (or more) dry-bulb temperature sensors with at least one sensor located in each of the segments located at opposite ends of the kiln (on either side). The dry bulb(s) temperature must exceed the wet bulb temperature during the heat treatment to ensure the uniformity of the heat treatment chamber conditions.

At least one dry bulb temperature sensor must be located near the mid third of the heat treatment chamber, on any one side.

At least one wet bulb temperature sensor, either measuring wet bulb temperature or providing data to determine the wet bulb temperature must be located near the mid third of the treatment chamber, on any one side.

Air flow should occur in each two opposite directions within the treatment chamber for half of the time specified at a temperature equal to or exceeding the wet bulb temperature run time (see tables for each option). This requirement may be modified where it can be technically proven by a recognized heat treatment evaluator and when other measures can compensate for deviation. Any modifications must be included in the quality manual and account for all the processes used to ensure that the phytosanitary standard is being met.

The pre-schedule wood core temperature must be determined by the facility (e.g. wood core measurements or the previous night's low temperature could be used as methods for determining core temperatures). At temperatures below 15°C (59°F) the facility must have specifications in the quality manual to pre-heat the wood until a wood core temperature of at least one piece of lumber of the thickest nominal size (i.e. 57 mm (2-1/4 inches), 83 mm (3-1/4 inches), or 108 mm (4-1/4 inches) reaches 15°C (59°F) , before starting the official heat treatment process. Alternatively, the following temperature adjustment may be made:

For wood core temperatures below 15 °C, add the temperature adjustment to the "Minimum Heat Treatment Run Time".

- *Over 57 mm (2 1/4") to 83 mm (3 1/4") add 12.7 minutes per 1 °C (7.1 minutes per 1 °F)*
- *Over 83 mm (31/4") to 108 mm (4 1/4") add 19.3 minutes per 1 °C (10.7 minutes per 1 °F)*

Pre-schedule wood core temperature verification and the pre-heating process is not required for pieces of wood less than or equal to 60 mm (2-1/4 inches).

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION F | | | |
|---|--|---|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 60°C (140°F) | Minimum Final Wet-Bulb Temperature |
| Up to 57 mm (2 1/4 inches) | 10 hrs, 36 minutes | 5 hrs, 32 minutes | 63°C (145°F) |
| Up to 83 mm (3 1/4 inches) | 13 hrs, 20 minutes | 9 hrs | 66°C (151°F) |
| Up to 108 mm (4 1/4 inches) | 21 hrs, 54 minutes | 17 hrs, 44 minutes | 67°C (153°F) |

Option F-1: Specific Heat Treatment Chamber Operating Conditions without Moisture Reduction

At least 3 dry bulbs temperature sensor must be located on either side of the heat treatment chamber. Sensors must be spaced approximately at equal distance apart, perpendicular to the air flow. One sensor must be located at each end of the treatment chamber. These sensors should be placed closest to the end of the treatment chamber (approx. > 5 m (16.5 feet)). For chamber equal to or less than 17 metres (56 feet) in length (in the direction perpendicular to air flow) the number of dry bulb sensors can be reduced to 2 dry bulb sensors with the above placement criteria.

The dry bulb temperature must exceed the wet bulb temperature during the heat treatment to ensure the uniformity of the heat treatment chamber conditions.

The temperatures must be recorded at a minimum of every 30 minutes.

| GENERIC PHYTOSANITARY HEAT TREATMENT SCHEDULE FOR OPTION F | | | |
|---|--|---|---|
| Lumber Thickness | Minimum Heat Treatment Run Time | Wet Bulb Temperature Continuous Run Time > 60°C (140°F) | Minimum Final Wet-Bulb Temperature |
| Up to 57 mm (2 1/4 inches) | 10 hrs, 36 minutes | 5 hrs, 32 minutes | 63°C (145°F) |
| Up to 83 mm (3 1/4 inches) | 13 hrs, 20 minutes | 9 hrs, 00 minutes | 66°C (151°F) |
| Up to 108 mm (4 1/4 inches) | 21 hrs, 54 minutes | 17 hrs, 44 minutes | 67°C (153°F) |

Option G: Generic Hardwood Phytosanitary Heat Treatment Schedule, Heat Treatment with Moisture Reduction (Dry Bulb Only)

SPECIFIC HEAT TREATMENT CHAMBER OPERATING CONDITIONS FOR OPTION G

The following sets out the minimum conditions under which a facility may heat treat the wood during the kiln drying process in order to reduce the moisture content below the fiber saturation point of the wood (approximately 30 % MC).

Air flow should alternate in each of two opposite directions within the treatment chamber for approximately half of the time specified at the dry bulb temperature equal to or exceeding 60°C.

This requirement may be modified where it can be technically proven, by recognized heat treatment evaluator and when others measures can compensate for deviation. Any modifications must be included in the manual and account for all the processes used to ensure that the phytosanitary standard is being met.

The facility must employ the use of at least two dry bulb temperature sensors.

The temperatures must be recorded at a minimum of every 30 minutes.

| Generic hardwood Phytosanitary Heat Treatment Schedule for Option G | | |
|--|---|--|
| Lumber Thickness | Dry- Bulb Temperature Continuous Run Time ≥ 52°C (126°F) | Minimum Time at the End of the Treatment with the Dry-Bulb ≥ 60°C (140°F) |
| Up to 28 mm (1 1/8 inches) | 12 hrs, 00 minutes | 6 hrs, 00 minutes |
| Up to 57 mm (2 1/4 inches) | 27 hrs, 00 minutes | 9 hrs, 00 minutes |
| Up to 83 mm (3 1/4 inches) | 67 hrs, 30 minutes | 22 hrs, 30 minutes |
| Up to 108 mm (4 1/4 inches) | 108 hrs, 00 minutes | 36 hrs, 00 minutes |

Options H-1 and H-2: Hardwood Heat Treatment Schedule to 71°C throughout the profile for 1200 minutes with Moisture Reduction

Specific Heat Treatment Chamber Operating Conditions for Option H

Only dry bulb measurement is required. The facility must employ the use of at least two dry bulb temperature sensors.

The temperatures must be recorded at a minimum of every 30 minutes.

Air flow should occur in each two opposite directions within the treatment chamber for half of the time specified at a temperature equal to or exceeding the minimum time at the end of the treatment with the dry bulb temperature (see tables for each option).

This requirement may be modified where it can be technically proven, by recognized heat treatment evaluator and when others measures can compensate for deviation. Any modifications must be included in the manual and account for all the processes used to ensure that the phytosanitary standard is being met.

| Generic Hardwood Phytosanitary Heat Treatment Schedule for Option H-1 | | |
|--|---|---|
| Lumber Thickness | Dry-Bulb Temperature Continuous Run Time ≥ 67°C / ≥ 153 °F | Minimum Time at the End of the Treatment with the Dry-Bulb ≥ 75°C / ≥ 167 °F |
| Up to 28 mm (1 ¹ / ₈ inches) | 31 hrs, 30 minutes | 25 hrs, 30 minutes |
| Up to 57 mm (2 ¹ / ₄ inches) | 46 hrs, 30 minutes | 28 hrs, 30 minutes |
| Up to 83 mm (3 ¹ / ₄ inches) | 87 hrs, 00 minutes | 42 hrs, 00 minutes |
| Up to 108 mm (4 ¹ / ₄ inches) | 127 hrs, 30 minutes | 55 hrs, 30 minutes |

| Generic Hardwood Phytosanitary Heat Treatment Schedule for Option H-2 (with independent calibration check) | | |
|--|---|---|
| Lumber Thickness | Dry-Bulb Temperature Continuous Run Time ≥ 65°C / ≥ 149 °F | Minimum Time at the End of the Treatment with the Dry-Bulb ≥ 73°C / ≥ 163 °F |
| Up to 28 mm (1 ¹ / ₈ inches) | 31 hrs, 30 minutes | 25 hrs, 30 minutes |
| Up to 57 mm (2 ¹ / ₄ inches) | 46, hrs, 30 minutes | 28 hrs, 30 minutes |
| Up to 83 mm (3 ¹ / ₄ inches) | 87 hrs, 00 minutes | 42 hrs, 00 minutes |
| Up to 108 mm (4 ¹ / ₄ inches) | 127 hrs, 30 minutes | 55 hrs, 30 minutes |

Appendix A

The following diagrams are provided to assist in understanding the definition of kiln length for a batch kiln

Figure 1

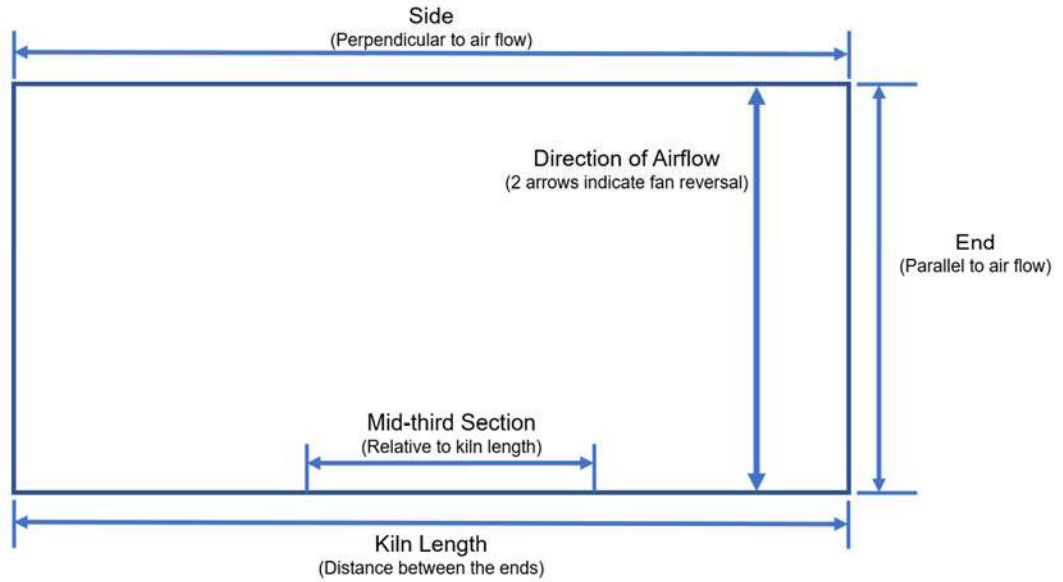
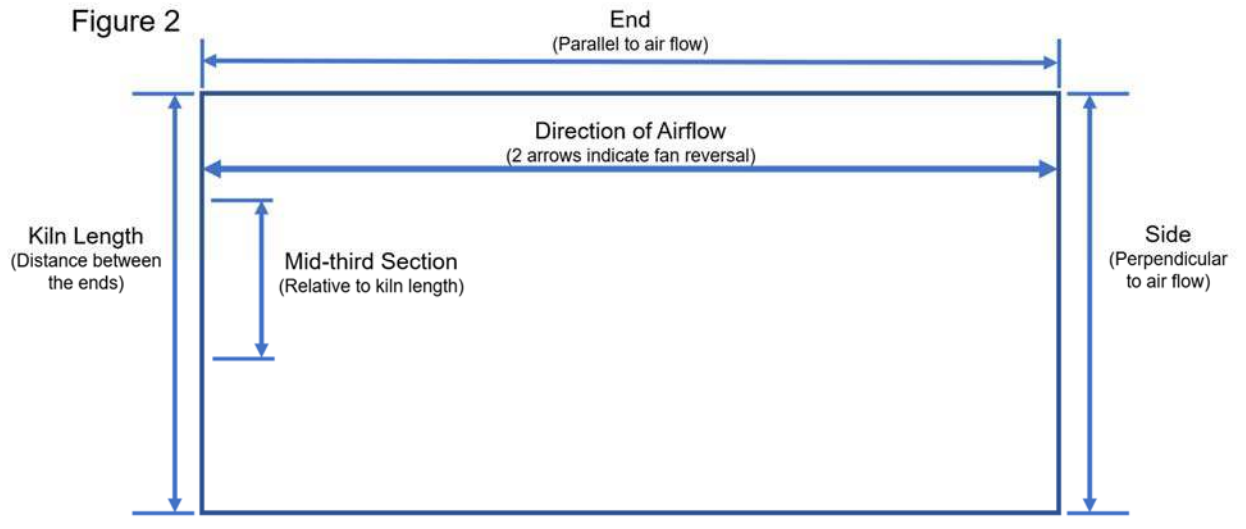


Figure 2



Appendix B

The following diagrams of the layout of Bi-Directional Continuous Kilns (BDCK) are provided to assist in understanding the definitions for a BDCK as provided in Section 3.0

Figure 1 - Option A and B – one wet bulb

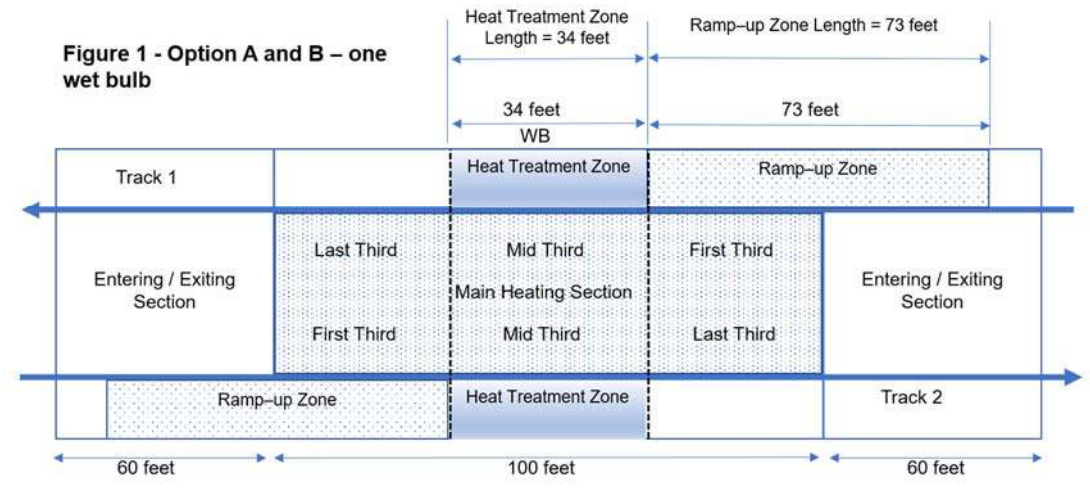


Figure 2 - Option A and B – three wet bulbs

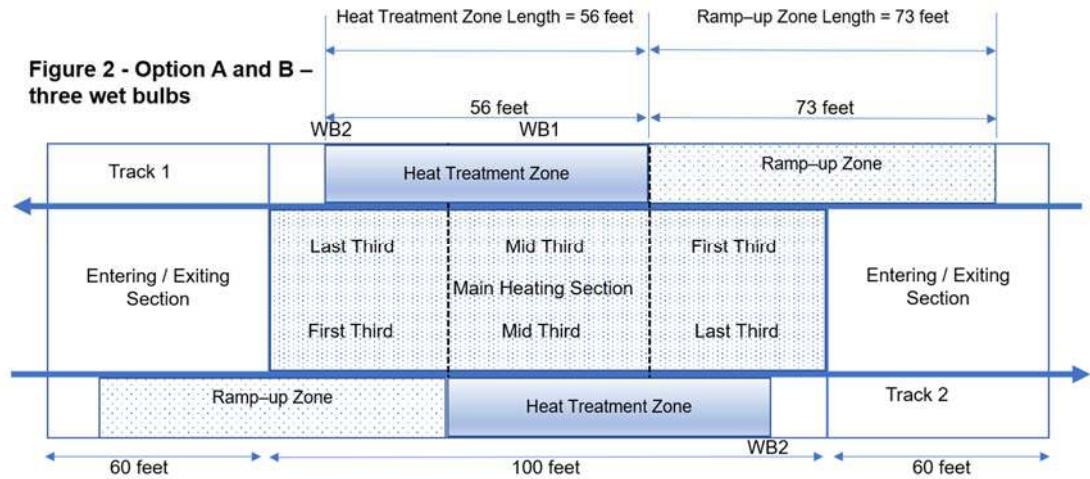


Figure 3 - Option D – 2 dry bulbs/track

