Chemco, Inc.

4191 Grandview Road
Ferndale, WA 98248
(360) 366-3500

Quality Control Manual

For

FRX, SAFERWOOD-FX, THERMEX-FR, METAVERDE, FLAME REPEL

Fire Retardant Pressure Treated Lumber and Plywood

Document No. QC2 REV 6
Approved: June, 2019
Revision: January 20, 2026

Controlled Copy Number:	
Issued to:	

CONFIDENTIAL

Table of Contents

REVISION	DATE	APPROVAL	DESCRIPTION
1	June 2019	D. Dalry	Publish of Updated Quality Control Manual for Chemco.
2	March 2021	D. Dalry ML QAI	Update to manual to reflect change in inspection agency from FireTech to QAI Laboratories, Ltd. Corrected labeling information.
3	March 2021	D. Dalry ML QAI	Update to include ~~private label of~~ Metaverde product for Hem-Fir treated lumber. Update to include all QC forms in Appendix.
4	November 5, 2021	D.Dalry ML: QAI	Update to include ~~multiple listee of~~ Flame Repel information, key personnel and descriptions.
5	January 26, 2022	D.Dalry ML: QAI	Update to remove and correct Private Label and Multiple Listee information to ensure accuracy, as products are labeled as manufactured by Chemco, as such, are not private label or multiple listee. Update to marking sections for clarity of labels and products
6	January 20, 2026	D. Dalry ML: QAI	Removal of Flame Repel Update to include Thermally modified Ayous, Thermally modified Nordic Pine as exterior non-structural decking and siding.

Table of Contents

I. ADMINISTRATIVE SECTION

1-1	Scope	4
1-2	Quality Control Polices	4
1-3	Organization Chart	4
1-4	Key Personnel	4
1-5	Identification	5
1-6	Notification of Cancellation	6
1-7	Notification of Major Deviations	6
1-8	Notification of Work Stoppage	7
1-9	Agreement to Investigate Problems	7
1-10	Service Agreement Allowance for Inspection	7
1-11	Notification of Improper Follow-up	7
1-12	Review of Quality Control Manual	8
1-13	Product Change	8
1-14	Statement of Use	8

II. TECHNICAL SECTION

2-1	Acceptance Standard LM 1000, Lumber	9
2-2	Acceptance Standard DM 1200, Solution	10
2-3	Quality Control Procedures, Incoming Materials	11
2-4	Quality Control Procedures, Nonconforming Materials	12
2-5	Quality Control Procedures, In Process	13
2-6	Quality Control Test MC 2000, Oven Dry	14
2-7	Quality Control Test MC 2006, Meter	15
2-8	Quality Control Test NV 2300, Percent Solids, Oven Dry, Solution	16
2-9	Quality Control Test NV 2301, Dilutability	17
2-10	Quality Control Test NV 2305, Percent Solids, Refractometer	18
2-11	Actual Chemical Solids Graph NV2305	19
2-12	Quality Control Test FT 2500, Fire Tube Test	20
2-13	Production and Quality Control Equipment	22
2-14	Equipment Calibration	23
2-15	Established Minimums	23
2-16	Data Systems	23
2-17	Facility Layout	24
2-18	Production Process	25
2-19	Attesting Signatures	26

III. APPENDIX

3-1	QAI Laboratories, Ltd; Inspector's Checklist	27
3-2	QAI Laboratories, Ltd.; Inspection Worksheet	28
3-3	QAI Laboratories, Ltd.; Typical Inspection Report	29
3-4	Typical Certificate of Analysis, Chemco Thermex-FR Solution	30
3-5	Quality Control Worksheet, Incoming Mat'l, Fire Retardant Solution	31

I. ADMINISTRATIVE SECTION

1-1 Scope

This Quality Control Manual contains standards, guidelines and procedures necessary for the production of all treated lumber and plywood by Chemco, Inc. using Thermex FR fire-retardant solution manufactured by Chemco, Inc. The quality program documented in this manual has been designed to consistently produce products capable of meeting ICC Evaluation Service, Inc. requirements.

1-2 Quality Control Policies

The management of Chemco, Inc. has established the goal of producing the finest materials available. The Quality Control programs and procedures necessary to accomplish this goal have been given the highest priority. The Quality Control Department has the authority to return shipments of raw materials or stop production at any stage if the QC guide criteria are not met.

1-3 Organization

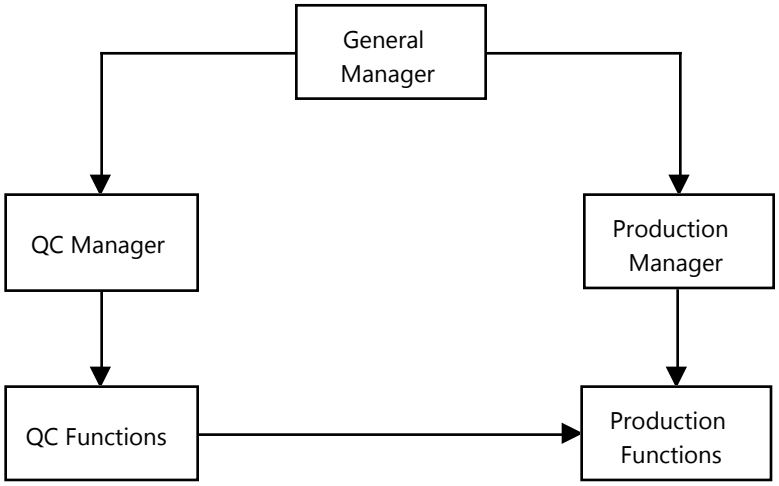

Figure 1 – Organizational Chart

1-4 Key Personnel

Darin Dalry. General Manager, Responsible for overall plant management and production. Assures all QC requirements become company policy.

Brad Miller, Production Manager, Responsible for all Production Activities and Productions adherence to Quality Control Standards.

Cristi Zamarripa, Quality Control Manager, Oversight of Quality Control Department. Enforces and Reviews all QC related documentation.

II. TECHNICAL SECTION (Continued)

1-5 Identification

1-5.1 Marking

FRX, SaferWood-FX, Thermex-FR, Metaverde and Flame Repel products are all treated wood products based on treatment with Thermex FR Fire Retardant solution. The products noted are different only in tradename.

All fire-retardant-treated lumber and plywood is to be legibly marked by either an ink stamp or by label at least once. Identification to include treatment company information and ICC Evaluation Service issued report number, inspection agency information (QAI Laboratories) and International Accreditation Service accreditation number (AA-635), type of wood including species and appropriate test results (See 1-5.2). All stamps and/ or labels are issued by QAI Laboratories Ltd and must be returned to them immediately upon their request. All stamps and/or unused labels must be securely stored when not in process of applying including any labels that inadvertently land on the floor.

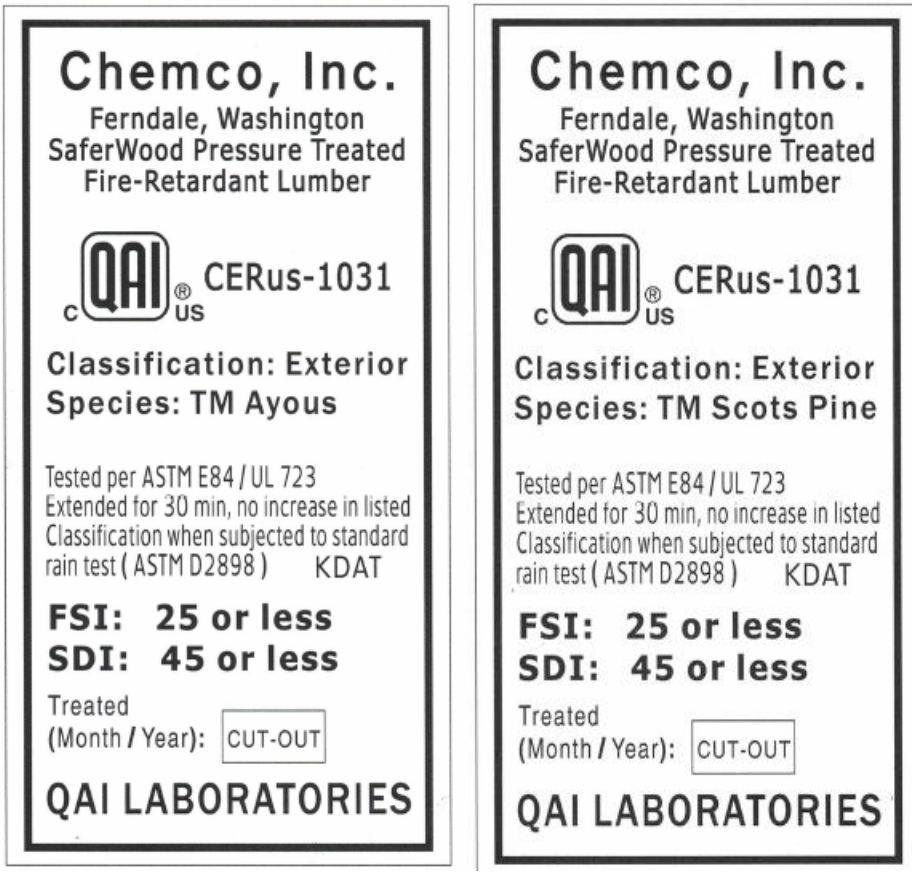

Figure 2.a. Example Chemco Inc. QAI CERus-1031 finished product labels.

Chemco, Inc.
Ferndale, Washington
SaferWood Pressure Treated
Fire-Retardant Lumber
ICC ES Report ESR-1159
ESL 1021
MIL-L-19140E Specification
FR-12-X Type II Category 2
Classification: Exterior
Species: Douglas Fir
Tested per ASTM E84 / UL 723
Extended for 30 min, no increase in listed Classification when subjected to standard rain test (ASTM D2898) KDAT
FSI: 25 or less
SDI: 45 or less
Treated
(Month / Year): CUT-OUT
QAI Laboratories, LTD.
IAS Report No.AA-635

Chemco, Inc.
Ferndale, Washington
SaferWood Pressure Treated
Fire-Retardant Lumber
ICC ES Report ESR-1159
ESL 1021
Classification: Exterior
Species: WRC
Tested per ASTM E84 / UL 723
Extended for 30 min, no increase in listed Classification when subjected to standard rain test (ASTM D2898) KDAT
FSI: 25 or less
SDI: 45 or less
Treated
(Month / Year): CUT-OUT
QAI Laboratories, LTD.
IAS Report No.AA-635

Chemco, Inc.
Ferndale, Washington
SaferWood Pressure Treated
Fire-Retardant Lumber
ICC ES Report ESR-1159
ESL 1021
Classification: Exterior
Species: SPF
Tested per ASTM E84 / UL 723
Extended for 30 min, no increase in listed Classification when subjected to standard rain test (ASTM D2898) KDAT
FSI: 25 or less
SDI: 45 or less
Treated
(Month / Year): CUT-OUT
QAI Laboratories, LTD.
IAS Report No.AA-635

Figure 2.b – Example Chemco Inc. ICC-ES Stamp Examples
Chemco SaferWood Treated Lumber Products.

As FRX, SaferWood-FX and Thermex-FR are the same treatment process by Chemco Inc, these labels match the above with the appropriate product tradename included in label.

Mataverde
Pressure Treated Fire- Retardant
Lumber and Siding
ICC ES Report ESR-1159
Classification: Exterior
Species: Hem Fir
Tested Per ASTM E 84/UL 723
Extended for 30 Min, no increase in listing Classification when subjected to standard rain test (ASTM D2898) KDAT
FSI: 25 or Less
SDI: 45 or Less
Treated
CUT-OUT (Month/Year)
QAI LABORATORIES
IAS Report No. AA-635
Treated by: Chemco, Inc.
Ferndale Washington

Figure 3 – Stamp Examples Chemco Metaverde Treated Lumber Products.

II. TECHNICAL SECTION (Continued)

As Metaverde are the same treatment process by Chemco Inc, these labels match the above with the appropriate product tradename included in label.

1-5 Identification (Continued)

1-5.2 Test Results Information for Markings

Lumber Species	**Interior**		**Exterior**	
	Flame Spread	Smoke Density	Flame Spread	Smoke Density
Douglas Fir	10	5	15	0
Southern Pine	0	30	15	20
Spruce	0	5	20	0
Red Cedar	15	80	20	45
Redwood	0	160	20	35
Hem-fir	15	100	20	25
Plywood Species	**Interior**		**Exterior**	
	Flame Spread	Smoke Density	Flame Spread	Smoke Density
Douglas Fir	25	25	15	0
Southern Pine	15	15	20	0
Spruce	10	0	20	10
Siding and Decking (Non Structural)	**Interior**	**Exterior**	**Interior**	**Exterior**
	Flame Spread	Smoke Density	Flame Spread	Smoke Density
Thermally Modified Ayous	5	50	5	50
Thermally Modified Radiata Pine	5	55	5	55

Table 1 - Flame Spread and Smoke Density Values

1-6 Notification of Cancellation

ICC Evaluation Service, Inc. shall be notified in writing prior to the cancellation of the inspection agreement between QAI Laboratories, and Chemco Inc.

1-7 Notification of Major Deviations

QAI Laboratories shall notify ICC Evaluation Service, Inc. in writing within ten days of any major deviations from this Quality Control Manual. The notification shall include the disposition of the deviation.

If a major discrepancy or variance as outlined in this Quality Control Manual is detected during regular inspections, QAI Laboratories shall initiate double frequency inspections until two consecutive inspections show full compliance. If three consecutive inspections or four inspections in a six-month period show non-conformance, Chemco, Inc. marking privileges shall be suspended and all stamps removed from the facility until all requirements are met to the satisfaction of QAI Laboratories and ICC Evaluation Service, Inc.

Additionally, if a failure occurs in any of the periodic quality assurance fire tests, QAI Laboratories shall conduct an immediate follow-up inspection of the treatment facility. Treatment records pertaining to the failed specimens shall be examined to determine the cause of failure and the failed product type shall be re-sampled from current production and retested in accordance with ASTM E84 extended methods appropriate for the failed product at the appropriate treatment level.

Failure of the re-sampled product will be cause for immediate revocation of Chemco's marking privileges and QAI Laboratories shall remove the identifying stamps. ICC Evaluation Service, Inc. shall be notified within ten days of the date of the first test failure. Reinstatement of marking privileges will require requalification in accordance with IBC Section 2303.2.

1-7 Notification of Work Stoppage

Chemco, Inc. shall notify QAI Laboratories of any production shutdown, the reason for the stoppage and the planned date of resumption. For any production shutdown extending more than thirty days Chemco shall agree not to start production without an inspection and the approval of QAI Laboratories.

1-8 Agreement to Investigate

Chemco, Inc. and QAI Laboratories agree to promptly investigate and respond to ICC Evaluation Service or any Building Official when notified of problems concerning the performance of the Thermex-FR treated wood. Complaints when submitted shall be thoroughly documented and followed-up by an investigation to determine validity of complaint, identify the problem, determine potential cause and execute a course of action to solve the problem by QAI Laboratories.

The investigation will be documented and all records retained for minimum of two years.

II. TECHNICAL SECTION (Continued)

1-9 Inspection Agreement

The Service Agreement between Chemco, Inc. and QAI Laboratories shall allow QAI Laboratories and ICC Evaluation Service, Inc., or their properly designated representatives, to examine any product stamped in conjunction with Evaluation Report ESR-1159. Such inspection may be made at treatment sites or at any distribution point.

1-10 Notification of Improper Follow-up

Chemco, Inc. shall notify, in writing, ICC Evaluation Service, Inc. if the follow-up inspections performed by QAI Laboratories are not in accordance with the inspection guidelines of this manual.

1-11 Review of Quality Control Manual

Personnel of Chemco, Inc. and QAI Laboratories shall review this Quality Control Manual annually. Any revisions and/or additions deemed necessary to maintain the level of production quality established by the Manual or to comply with current Code shall be updated at the maximum annual interval where required.

1-12 Quality Control Records Retention

Chemco, Inc. shall retain all forms, checklists and reports pertaining to quality control for a minimum of two years. In addition all Chemco QC inspection reports generated by QAI Laboratories shall be retained for at least two years.

1-13 Product Change

QAI Laboratories, and ICC-ES shall be notified in writing if the FR treated material changes from that which was originally recognized.

The following procedure will be followed when making significant changes to the product or production method:

- Chemco Inc. will contact QAI and ICC-ES to review the proposed significant changes to the product or production method.

- QAI and ICC-ES will evaluate the proposed changes, and perform any testing, engineering analysis, inspection, and quality documentation revisions required. If the changes comply with the listed standard(s), QAI will revise this manual and certification documents accordingly.

- Chemco Inc. will contact QAI and ICC-ES in writing explaining the significant changes to be made to the product or production method. Also included will be a revised copy of the quality manual including the changes along with any supporting test data (as required).

II. TECHNICAL SECTION (Continued)

- QAI and ICC-ES will review and decide if further testing is required.

1-14 Statement of Use

The QAI and ICC-ES name, mark, or evaluation report number will only be used on product(s) that are in compliance with the published ESR-1159 Evaluation Report and the quality control documentation approved by ICC-ES / or QAI.

I. TECHNICAL SECTION

2-1 Acceptance Standard - Wood LM 1000

2-1.1 Scope

This specification defines the necessary criteria for receiving the lumber and/or plywood and/or siding/decking for FR treatment by Chemco, Inc.

2-1.2 Properties

All properties of the lumber/plywood/siding or decking are to be compared with the Purchase Order. Properties to include wood species, grade and any certification. Wood products to be treated are to bear the mark of an approved grading agency (lumber) or certification body (plywood), confirmed by Chemco Inc. staff prior to unloading into inventory.

2-1.3 Minimum Acceptance

2-1.3.1 Description
The following products are approved for treatment by Chemco:

LUMBER	
Grade Types	Douglas-fir, Southern Yellow Pine, Western Red Cedar, Hem-Fir, Spruce-Pine-Fir, Redwood
PLYWOOD	
Species	Douglas-fir, Southern Yellow Pine, Spruce
SIDING AND DECKING (NON-STRUCTURAL)	
Species	Thermally modified Ayous, Thermally modified Nordic Pine.

2-1.3.2 Lumber Grade
All lumber must be graded and imprinted with a grade stamp from an approved lumber grading agency.

2-1.3.3 Plywood Grade
All plywood must be graded and imprinted with a grade stamp from an approved certification agency for the approval of engineered wood sheathings.

2-1.3.3 Siding and Decking (Non-Structural)

All siding and decking (non-structural products, are to be in agreement with approved product / species as outlined. Grade stamps are not required as the products are not for structural applications.

2-2 Acceptance Standard - FR Solution DM 1200

2-2.1 Scope

This specification defines the necessary criteria for receiving Thermex FR fire retardant solution.

2-2.2 Description

The material is an aqueous resin solution identified as Thermex FR.

2-2.3 Required Incoming Fire-Retardant Treatment Properties

PROPERTY	**METHOD OF TEST**	**REQUIREMENT**
Percent Nonvolatile (solids)	Certificate of Analysis Each Lot Received and Incoming Lab Test	64 ± 3%
Viscosity	Certificate of Analysis Each Lot Received and Incoming Lab Test	Maximum 150 cps Brookfield
pH	Certificate of Analysis Each Lot Received and Incoming Lab Test	1.1 – 1.5
Dilutability	Certificate of Analysis Each Lot Received and Incoming Lab Test	Minimum 50:1
Specific Gravity	Certificate of Analysis Each Lot Received and Incoming Lab Test	1.40 – 1.45

2-3 Quality Control Procedures, Incoming Materials

2-3.1 Fire Retardant Solution:

Examine all test documents supplied by the manufacturer for the incoming material.

Prior to off-loading the FR solution, perform Percent of Solids, Viscosity, pH, Dilutability and Specific Gravity tests to determine compliance with Acceptance Specifications.

If the incoming FR solution does not meet the specification tolerances it shall be rejected and returned to the supplier without off-loading.

2-3.2 Nonconforming Material

Any incoming materials not meeting minimum specification tolerances shall be rejected. Materials should not be off-loaded from shipping source or, if so, placed in a “Nonconforming” holding area and returned to the supplier with proper notification.

2-3.3 Product Traceability

Identification tags showing current production numbers are to be securely fastened to each lot of lumber and/or plywood to be treated. ID numbers, species, date received and any pertinent client information shall be entered in the production logbook or recorded on the proper forms. The ID tags are to remain with the lumber and/or plywood lot through the treatment process and are included in the treatment records. The ID numbers are to be entered in the Shipping logbook along with date of shipment and destination.

II. TECHNICAL SECTION (Continued)

2-4 Quality Control Procedures, Treated Materials

2-4.1 Solids retention of FRX, SaferWood-FX, Thermex-FR, Metaverde*, and Flame Repel treated lumber:**

2-4.1.1 Exterior Applications,

Douglas Fir	1.0 lbs./cu. ft. ±0.3
Southern Pine	3.0 lbs./cu. ft. ±0.3
Spruce	1.5 lbs./cu. ft. ±0.3
Hem-fir	2.5 lbs./cu. ft. ±0.3
Western Red Cedar	3.0 lbs./cu. ft. ±0.3
Redwood	3.0 lbs./cu. ft. ±0.3

2-4.1.2 Interior Applications

Douglas Fir	0.5 lbs./cu. ft. ±0.3
Southern Pine	2.0 lbs./cu. ft. ±0.3
Spruce	1.0 lbs./cu. ft. ±0.3
Hem-fir	1.5 lbs./cu. ft. ±0.3
Western Red Cedar	2.0 lbs./cu. ft. ±0.3
Redwood	2.3 lbs./cu. ft. ±0.3

2-4.2 Solids retention of Thermex FR treated plywood:*

2-4.2.1 Exterior Applications

Douglas Fir	2.0 lbs./cu. ft. ±0.3
Southern Pine	4.0 lbs./cu. ft. ±0.3
Spruce	3.0 lbs./cu. ft. ±0.3

2-4.2.2 Interior Applications

Douglas Fir	1.0 lbs./cu. ft. ±0.3
Southern Pine	3.0 lbs./cu. ft. ±0.3
Spruce	1.5 lbs./cu. ft. ±0.3

2-4.3 Solids retention of Thermex FR treated siding and decking (non-structural) –

2.4.3.1 Exterior Applications

Thermally Modified Ayous	3.0 lbs./cu. ft. ±0.3
Thermally Modified Nordic Pine	3.0 lbs./cu. ft. ±0.3

2-4.2.2 Interior Applications

Thermally Modified Ayous	3.0 lbs./cu. ft. ±0.3
Thermally Modified Nordic Pine	3.0 lbs./cu. ft. ±0.3

*Metaverde products are only Hem-fir grade treated lumber products.
**Note: To comply with the ±0.3 tolerance an accurate measurement of the treated material weight before and after treatment is critical.

2-4.3 Nonconforming Treated Material

Any treated material found to be in non-conformance with this manual shall be segregated by placing in a pre-designated “Nonconforming” area and marked for retreating. The treating records shall be examined for any deviation from established tolerances and corrective measures taken. The material shall then be retreated or rejected if it is outside treatable tolerances.

2-5 Quality Control Procedures, In Process

Note: Prior to and during each production batch cycle, follow this procedure:

2-5.1 Initiate test MC 2006 on lumber and/or plywood lot prior to treatment.

2-5.2 Initiate test NV 2305 on the aqueous solution prior to treating.

2-5.3 Weigh each unit/bundle of lumber and/or plywood, record results. Place material to be treated into autoclave.

2-5.3.1 Place wood QA test samples into autoclave with batch being treated.

2-5.4 Observe vacuum and pressure recording instruments and record the following:

2-5.4.1 Date and charge numbers

2-5.4.2 Charge cycle starting and ending times

2-5.4.3 Vacuum measurement and time period

2-5.4.4 Pressure measurement and time period

2-5.5 Remove treated material from autoclave and weigh each unit/bundle and calculate solids uptake. Observe oven kiln temperature recording instrument with regard to cycle time and temperature.

2-5.6 The specifications for the above are as follows:

2-5.6.1	MC 2006	25% maximum before treatment.
2-5.6.2	NV 2305	10% minimum - No maximum
2-5.6.3	Vacuum/ Pressure	8 to 26 inches Hg - 0-30 minutes 0 to 150 psi - for the time required to obtain the percent of solids uptake required.

Note: Ranges only, actual values depend on the wood species.

2-5.6.4 Temperature	Drying Cycle: As required Curing Cycle: 110°F to 180°F

Note: Solution temperatures are not critical. The solution may be used at any temperature between boiling and freezing.

2-5.7 Measure Moisture Content per MC 2000 - Maximum of 19% for lumber and 15% for plywood after treatment.

2-5.8 Initiate Fire Tube Test FT 2500 on treated test samples

2-6 Quality Control Test, Oven Dry Method MC 2000

2-6.1 Scope

This test is an oven dry method to determine the percent moisture content present in wood. Used as a calibration check for the moisture meter.

2-6.2 Apparatus

Convection Laboratory oven

Gram Balance scale

2-6.3 Procedure

Weigh the wood sample on the gram scale and record the weight to the nearest 0.1 gram. Place the sample(s) in the laboratory oven with the temperature setting at 105 (± 5) Celsius until weight stabilizes. Reweigh the sample(s) and record the dry weight.

2-6.4 Calculations

The percent moisture content can be determined from the following formula:

$$\text{Percent Moisture Content} = \frac{\text{Wet weight - Oven dry weight}}{\text{Oven dry weight}} \times 100$$

2-7 Quality Control Test, Meter Method MC 2006

2-7.1 Scope

This test is a method to determine the moisture content of lumber and plywood.

2-7.2 Apparatus

Moisture Meter

2-7.3 Procedure

Take one board from each lot to be treated. Test with moisture meter at three different locations on each board

2-7.4 Calculation

[Location 1 reading] plus [Location 2 reading] plus [Location 3 reading] divided by 3 equals the average moisture content per board. Record the average moisture content.

2-8 Quality Control Test, Oven Dry, Solution NV 2300

2-8.1 Scope

This test is the oven dry method of determining the percent nonvolatile (solids) content of a resinous solution.

2-8.2 Apparatus

Convection Laboratory oven

Gram Balance Scale

Laboratory Plastic Weighing Boats

2-8.3 Procedure

Using the balance scale, weigh 1 gram of resin into an aluminum dish. Place this sample into the laboratory oven set at 85° C for 2 hours. Reweigh the sample and record this oven dry weight.

2-8.4 Calculations

The percent nonvolatile (solids) is calculated using the following formula:

$$\text{Percent Nonvolatile} = \frac{\text{Net Resin Weight - Oven Dry Weight Loss}}{\text{Net Resin Weight}} \times 100$$

Note: When a refractive index resin solids chart has been established, the use of a refractometer may be substituted for the oven dry method.

2-9 Quality Control Test, Dilutability NV 2301

2-9.1 Scope

This test is a standard water tolerance test to determine the dilutability ratio of maximum amount of water to resin.

2-9.2 Apparatus

Graduated cylinder: 250 ml

Graduated cylinder: 10 ml

2-9.3 Reagents

Tap water

2-9.4 Procedure

Adjust resin sample and tap water to 25°C. Exactly measure 10 ml sample of resin in 10 ml graduate. Transfer 10 ml sample to 250 ml graduated cylinder. Rinse 10 ml graduate with small aliquots of 25°C distilled water and transfer to 250 ml graduate. Add small increments of distilled water to the 250 ml graduate, swirling after each addition.

As end point is approached there may be a light haze found upon addition of water, which dissipates upon swirling or agitation. Stop addition when haze becomes permanent.

Record total volume of water added.

2-9.5 Calculation

Water dilutability

$$\text{Dilutability} = \frac{\text{mls of water added}}{10}$$

Report as Dilutability =_____: 1 @ 25°C

2-10 Quality Control Test, Refractometer NV 2305

2-10.1 Scope

This test is a method to determine the percent solids of a resin solution using a refractometer.

2-10.2 Apparatus

Refractometer

Automatic 2-10.3 Procedure

Obtain a sample of working chemical solution from the retort and apply this with a disposable plastic pipette to the dry prism surface of the refractometer.

Record the reading from the refractometer scale. The percent solids (nonvolatile) of the chemical solution is obtained from the refractometer index graph NV 2305.

2-10.4 Frequency

The working solution shall be tested at least once per day during normal operation of plant. In addition, samples shall be tested when chemical alterations are performed.

2-10.5 Calibration

Sample work solution perform quality control test NV 2300 of solution. Retain solution sample in sealed container. Obtain results of NV 2300 test. Perform NV 2305 QC test of retained sample. Compare NV 2300 results to NV 2305 results. If different calibrate refractometer to NV 2300 results using retained sample.

2-11 Actual Chemical Solids Graph NV 2305 Graph

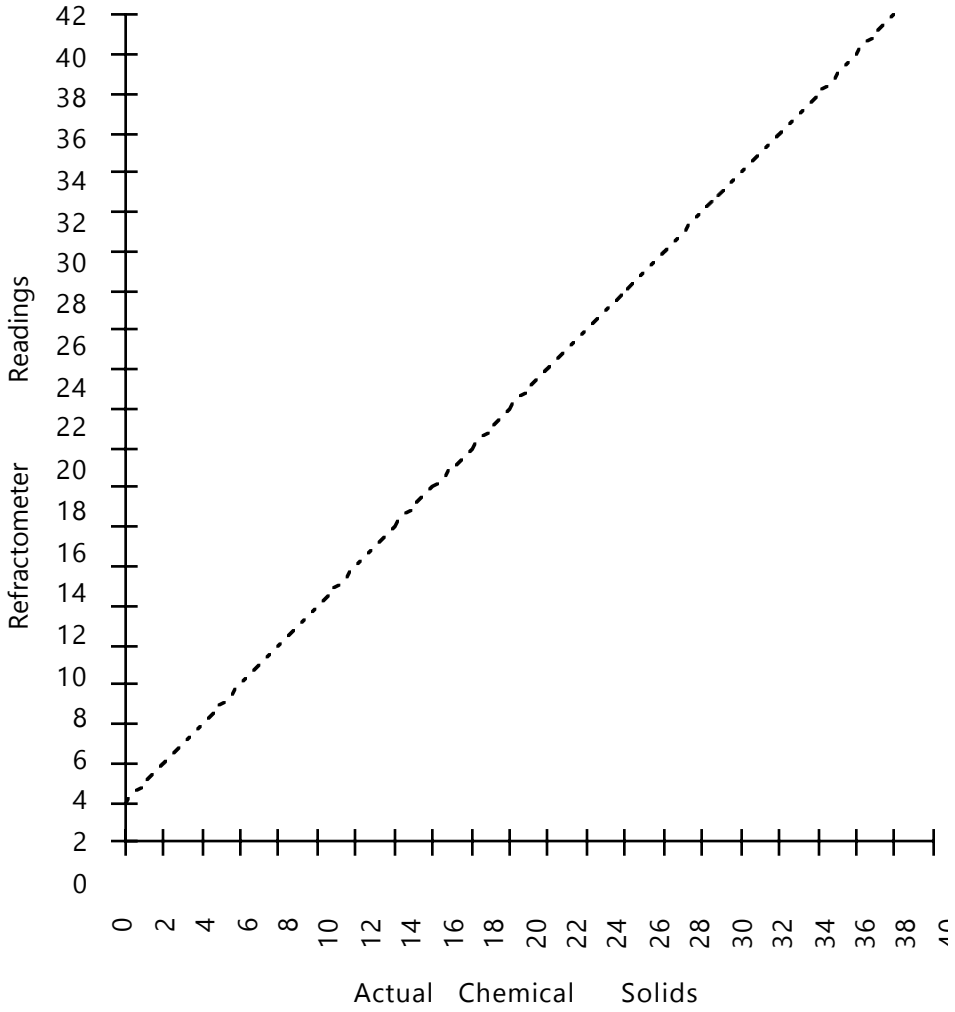

Figure 3 - Refractometer Readings to Actual Chemical Solids Graph

2-12 Fire Tube Test FT 2500

2-12.1 Scope

Test based on ASTM E69 Standard Test Method for Combustible Properties of Treated Wood by the Fire Tube Apparatus.

2-12.2 Sampling

One sample piece selected and identified shall be included for each 5000 board feet in a charge. These sample pieces shall be of a standard species, such as Douglas Fir. Place the sample pieces with the lumber lot so that they receive an average exposure to the treating solution and are accessible for ready removal. Sample pieces shall be 3/8 by 3/4 inches in cross section and 48 inches in length, smooth sawed to dimensions within ±1/32 inch or at least eight feet in length and may be full size rough or dressed standard. They shall be of the same cross-sectional dimensions as the material in the lot for thickness up to and including three inches in thickness.
Where material in the charge is over three inches in thickness, irrespective of width, sample pieces shall be four by four inches in nominal size.

For full size samples two fire tube test specimens shall be cut from each selected sample and shall be 3/8 by 3/4 inches in cross section and 48 inches in length, smooth sawed to dimensions within ±1/32 inch. An eight-inch length thereof shall be cut off for moisture test specimens. The fire tube test specimens shall not be cut closer than 2 feet from ends of sample pieces nor closer than 1/2 inch from their edges. The specimens shall be cut so that one side 3/4 inches in width will be from a treated face of the sample piece.

2-12.3 Conditioning

The moisture content of the specimen when tested shall be 7 ± 3 weight percent of the dry material. Make the moisture determination for each specimen on a piece 3/8 by 3/4 inch in cross-section and not less than 2 inches in length, cut adjacent to one end of the specimen. Weigh the moisture test specimen to the nearest 0.1 gram or less and dry for 24 hours at 212 ± 3°F. Record the weight of the fire tube specimen at the time of weighing of the moisture test specimen. If the moisture content exceeds 10%, condition the sample of prepared specimen by drying at temperatures not exceeding 150°F (65°C) until the moisture content is within the prescribed limits. Low moisture content can be increased by storage in air on a screen over a pan of water. Test immediately when desired results are obtained.

2-12 Fire Tube Test (Continued) FT 2500

Calculate the weight to which the specimen must be conditioned to contain 7% moisture as follows:

Wt = Desired weight of the specimen containing 7% moisture at time of test
Wo = Original weight of the specimen before conditioning
X = Moisture content of the specimen, percentage

2-12.4 Test Procedure

Adjust the burner to give a blue flame approximately 11 inches in height, with a tall indistinct inner cone. Place the burner within the empty fire tube, so that top of the burner is even with the top of the opening in the screen section. Regulate the flame further to produce a temperature of 356 ± 9°F at the top of the fire tube. Withdraw the burner when adjustment is satisfactory.

Weigh the test specimen and record weight.

Place the test specimen in the fire tube so that it is suspended from the support rod at the top of the tube.

Insert the lighted burner within the fire tube so that the top of the burner is one inch below the lower end of the specimen with the standardized flame centered on the specimen. Apply the flame for four minutes then withdraw it from the fire tube.

After flaming and glowing have ceased, remove and weigh specimen.

Calculate percentage of weight loss using initial and final weights.

The average final percentage weight loss of the treated specimens shall be equal to or less than that obtained on the qualification test specimens (**67.9% Loss**). The final per- centage weight loss of any individual specimen shall not exceed the qualification value by more than five percentage points.

II. TECHNICAL SECTION (Continued)

2-13 Production and Quality Control Equipment

Vacuum/Pressure	
Autoclave	
Pressure Pump	-Gould MT 3196
Vacuum Pump	-Nash CL 1000 Series
Recorder	-Osmose Treating Control (PC based)
Pressure Transducer	-Johnson Yokogawa YA43F Transmitter
Liquid Tank Level Indicators	-Yokogawa YA 21F Pressure Transmitters
	-Flowline Echosonic II
Drying/Curing	
Kiln	-Salton Fabrication & Custom Dry Kiln
Burner	-Cleaver-Brooks
Controller	-Alan Bradley PLC (PC based)
Production Control	
Refractometers	-Atago Automatic 0~50%, ATC-1e 0~32%
Water Bath	-Precision Sciences Model RC
pH Meters	-Thermo Scientific Instruments Model Orion 2
Scale	-Mettler AG285
Moisture Meter	-Wagner Orion 940
Quality Control	
Refractometers	-Atago automatic 0~50%,
	-Atago ATC-1e 0~32%
pH Meters	-Thermo Scientific Instruments Model Orion 2
Scales	-Mettler Toledo AG 285
	-Mettler Toledo PB 1501-S
	-Mettler AE 100
Viscometer	-Brookfield DV-E
Moisture Meter	-Wagner Orion 940
Ovens	-Lab Line 3510
	-VWR 1350
Thermometers	-Alcohol Type
Thermocouples	-J and K Type with digital readout
	-Calibration Thermometer
pH Meter Calibration	-Oakton/Orion Standard Solutions
Flammability-Vertical Tube	-ASTM E 69 Apparatus

II. TECHNICAL SECTION (Continued)

2-14 Equipment Calibration

All production electronic measuring equipment including flow meter, chart recorders and digital controllers, are serviced and calibrated on an annual basis.

The Ph meters are calibrated daily using Standard Solutions purchased from Oakton/ Orion.

2-15 Established Minimums

The minimum tolerances shown in the production specifications have been selected after a long period of experimentation. The resulting figures include a large allowance for material variance and production conditions.

2-16 Data Systems

The Quality Control Department uses individual logbooks for each quality control function. All test data and calculations are entered in the logbooks and signed by individual performing function. The Quality Control Supervisor reviews the logbooks daily.

Copies of the QAI Laboratories Inspector's checklist and inspection worksheet are included herein.

2-17 Facility Layout

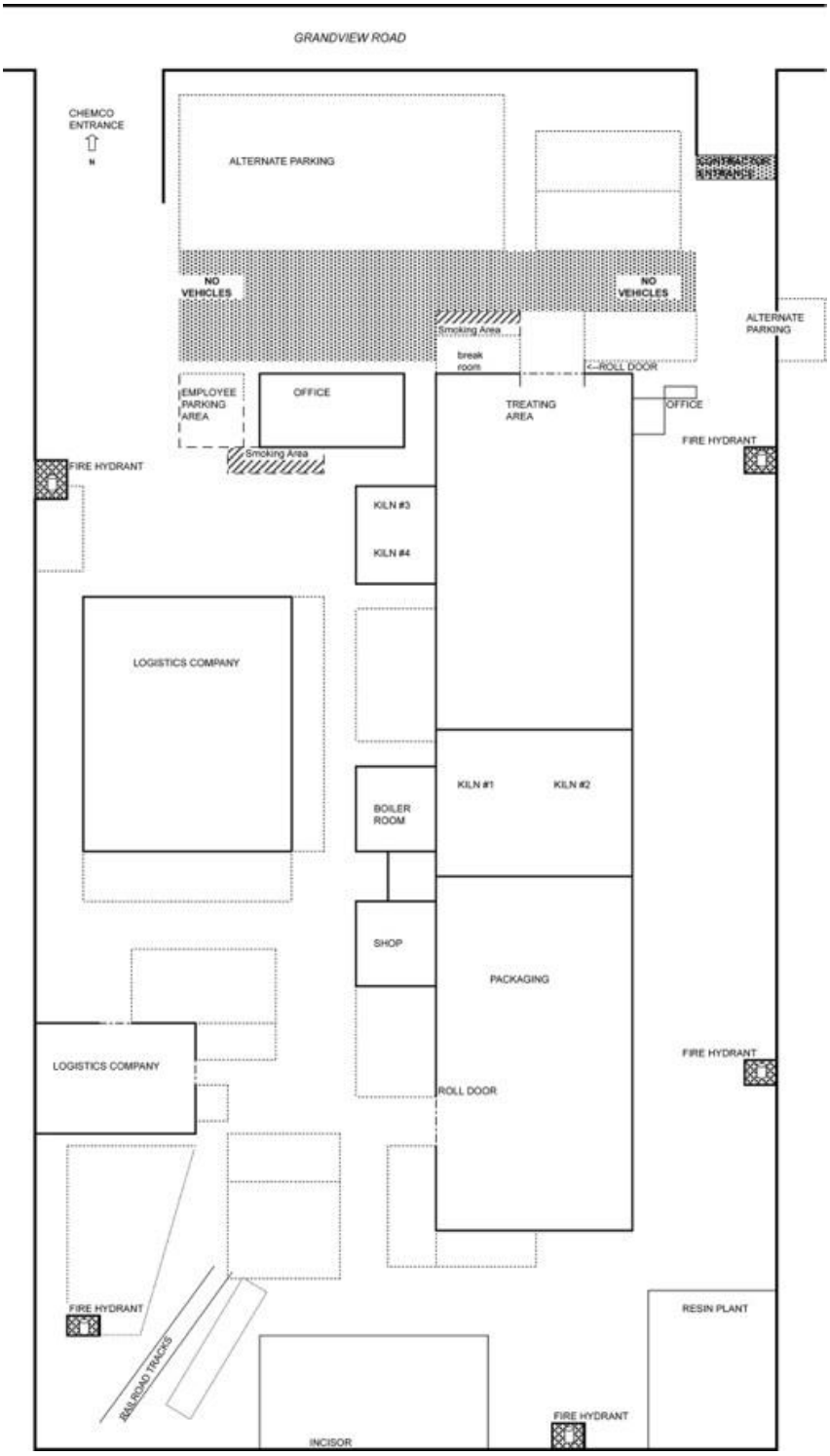

Figure 4 - Chemco Ferndale Facility

2-18 Production Process

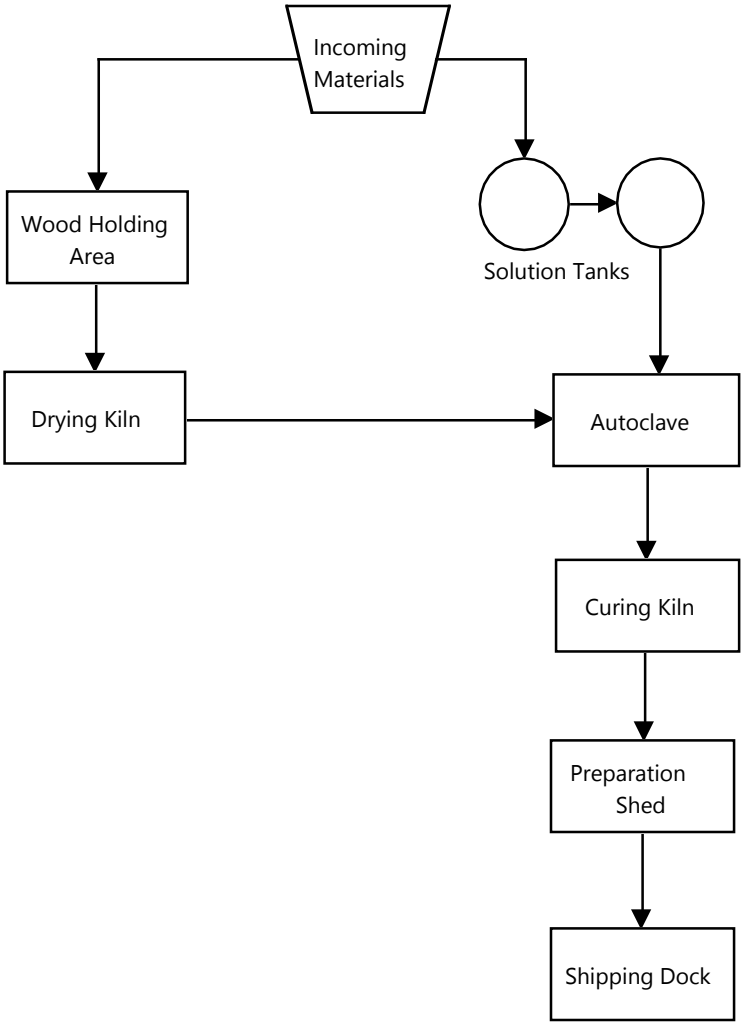

Figure 5 - Production Flow Chart

2-18.1 Description

Incoming materials are checked for compliance with the purchase acceptance standards. Solution concentrate is placed in holding tanks until working solution is prepared. Wood materials are kept in a holding area and moisture content tests are conducted. If the moisture content checks are too high, the material is placed in a drying kiln until the required moisture content is reached. When the moisture content checks are within proper range, the wood material is placed on rail cars for loading into the autoclave. After pressure treatment period, material is removed from autoclave and allowed to drip for 8 hours. The material is then placed in the curing kiln. When curing is completed, the material is sent to the preparation shed for labeling and prepped for shipping.

2-19 Attesting Signatures

Signatures of authorized owner representatives, attesting to the statements made herein.

CHEMCO, INC.	QAI Laboratories, Ltd.
_____	_____
Darin Dalry, General Manager	Matt Lansdowne
Date:_____	Date: _____

III. APPENDIX

Inspector's Checklist FRT Lumber & Plywood

Client: _____ Date of inspection: _____
Time: Arrival: _____
Departure: _____

I. Records:

a. Raw Materials:

1. Receiving documents: _____
2. Manufacturer's solution test results: _____
3. Test results by QC personnel: _____

b. Production:

1. Moisture content readings: _____
2. Autoclave chart readings: _____
3. Kiln chart readings: _____
4. Calibration records: _____

c. Quality Control:

1. Small scale lab tests: _____
2. Solution solids content: _____
3. Moisture content readings: _____
4. Calibration records: _____

d. Shipping:

1. Shipping documents: _____
2. Label use log: _____

II. Operational Procedures:

a. Autoclave:

1. Vacuum: _____
2. Pressure: _____

b. Kiln:

1. Drying cycle: _____
2. Curing cycle: _____
3. Moisture content readings: _____

Sample Selection

A sample of the fire-retardant solution will need to be taken at least once per quarter for HPLC or FTIR identification by QAI Rancho, Cucamonga, CA location of 150 mL.

Inspection Worksheet FRT Lumber & Plywood

Client: _____ Date:_____

Time: Arrival _____

Departure _____

Sample Identification:

LUMBER

Charge No. _____

Solids Uptake: _____

Solution Solids Content_____%

PLYWOOD

Charge No. _____

Solids Uptake: _____

Solution Solids Content_____%

Vacuum:_____in. Pressure:_____psi Kiln Temperature: _____

Fire Tube Test Results: _____

Plant Records: Raw Materials:_____ Production: _____

Quality Control:_____Calibration:_____Shipping:_____Marking: _____

Comments:

Plant Official:_____Inspector: _____

Office Use Only:

INSPECTION REPORT

Client:
Address:

Contact Name:

Report Number:
Inspection Date:
Arrival Time:
Departure Time:

Incoming Materials:
Production:
QC Tests:

Marking Control:
Calibration:
Shipping:

Lumber
Species: Size:
Treatment Date:
Batch No.
Percent Solution Solids:
Percent Solids Retention:
Moisture Content:
Vacuum:
Pressure:
Kiln Temp (°F):

Plywood
Species: Size:
Treatment Date:
Batch No.
Percent Solution Solids:
Percent Solids Retention:
Moisture Content:
Vacuum:
Pressure:
Kiln Temp (°F):

(a) Resolution of any discrepancies noted during previous inspection.
(b) Any changes to supervisory personnel, vendors, production or process equipment
(c) If not in production, details of last production
(d) General comments (Including Pass/Fail, samples selected, etc.)

Inspected by:

Signed:

Inspection Date:

Report Date:

Chemco ,Inc

Certificate of Analysis

REFERENCE #	490760
CUST P.O #	490760
PRODUCT	FR
LOT NUMBER	1932, 1933, 1934
ANALYSIS DATE	2021-03-10
DELIVERY DATE	2021-03-10

	RESULT	SPECIFICATIONS
SOLIDS	61.84%	64% ± 3%
SPECIFIC GRAVITY	1.39	1.3 - 1.4 g/ml
pH	1.2	1.1 - 1.5
VISCOSITY	(25c): 150cps Maximum	
Lbs. OF CHEMICAL	48,380	
APPEARANCE	AMBER VISCOUS LIQUID	

Quality Control Lab

4191 Grandview Rd. P.O. Box 875 Ferndale, WA 98248
Office: (360) 366-3500 Fax: (360)366-3831

III. APPENDIX (Continued)

Thermex-FR Incoming Resin Analysis

Test Date:	Batch #:	Dilution:	Concentrate:	Mfr Date:	Test Performed By:
pH: (Dillution)		pH: (Concentrate)	Viscosity (25° C): (spindle: #2, speed: 100rpm)	Refractive Index - Solids: (Dilution)	
Solution Weight:		Solids Weight:		Specific Gravity (25° C):	
Container Weight:		Container Weight:		Dilutability:	
Result:		Result:		Percent Solids: x 4 =	

Test Date:	Batch #:	Dilution:	Concentrate:	Mfr Date:	Test Performed By:
pH: (Dillution)		pH: (Concentrate)	Viscosity (25° C):	Refractive Index - Solids: (Dilution)	
Solution Weight:		Solids Weight:		Specific Gravity (25° C):	
Container Weight:		Container Weight:		Dilutability:	
Result:		Result:		Percent Solids: x 4 =	

Test Date:	Batch #:	Dilution:	Concentrate:	Mfr Date:	Test Performed By:
pH: (Dillution)		pH: (Concentrate)	Viscosity (25° C):	Refractive Index - Solids: (Dilution)	
Solution Weight:		Solids Weight:		Specific Gravity (25° C):	
Container Weight:		Container Weight:		Dilutability:	
Result:		Result:		Percent Solids: x 4 =	

Test Date:	Batch #:	Dilution:	Concentrate:	Mfr Date:	Test Performed By:
pH: (Dillution)		pH: (Concentrate)	Viscosity (25° C):	Refractive Index - Solids: (Dilution)	
Solution Weight:		Solids Weight:		Specific Gravity (25° C):	
Container Weight:		Container Weight:		Dilutability:	
Result:		Result:		Percent Solids: x 4 =	

Test Date:	Batch #:	Dilution:	Concentrate:	Mfr Date:	Test Performed By:
pH: (Dillution)		pH: (Concentrate)	Viscosity (25° C):	Refractive Index - Solids: (Dilution)	
Solution Weight:		Solids Weight:		Specific Gravity (25° C):	
Container Weight:		Container Weight:		Dilutability:	

III. APPENDIX (Continued)

Thermex-FR Daily Work Solution Analysis

Date:	Shift	Test Performed by:
pH:		Refractive Index:
Solution Weight:	Solids Weight:	Specific Gravity:
Container:	Container:	
Result:	Result:	Percent Solids:

Date:	Shift	Test Performed by:
pH:		Refractive Index:
Solution Weight:	Solids Weight:	Specific Gravity:
Container:	Container:	
Result:	Result:	Percent Solids:

Date:	Shift	Test Performed by:
pH:		Refractive Index:
Solution Weight:	Solids Weight:	Specific Gravity:
Container:	Container:	
Result:	Result:	Percent Solids:

Date:	Shift	Test Performed by:
pH:		Refractive Index:
Solution Weight:	Solids Weight:	Specific Gravity:
Container:	Container:	
Result:	Result:	Percent Solids:

III. APPENDIX (Continued)

Moisture Content		
Wt In	Wt Out	MC Percent

CHEMCO AUTOCLAVE LOAD SHEET

CHARGE #

DATE:

BURN STICKS:

M/C

REQUIRED UP TAKE:

UNIT NO.	SPECIES	MIL	ITEM	LENGTH	ORDER NUMBER	No. of PCS	WEIGHT IN	WEIGHT OUT	UP-TAKE	LB/FT3
Actual Dimension										
Actual Dimension										
Actual Dimension										
Actual Dimension										
Actual Dimension										
Actual Dimension										
Actual Dimension										
Actual Dimension										
TOTAL FT3										
GAL REQUIRED										
					TOTALS					

Chemical Added

Gallons	RI

SHIFT

WEIGHED BY

OPERATOR

REMARKS

TAGGED BY

Tank Level (Inches)

BEFORE	AFTER	USED

VAC TIME

PRESS TIME

TREATMENT TYPE **INTERIOR** **EXTERIOR**

C:\Users\Matt\Desktop\Work\Quality Control forms

III. APPENDIX (Continued)

E-69 Tube Test for FR Lumber

Burn Loss						
Smpl No.	Date Treated	Wt. Before	Wt. After	Mass Loss	% Loss	Smpl No.