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Treating Processes

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Treating Processes

- **Consists of three basic processes:**
  - Pre-treatment conditioning
  - Treatment processes
  - Post-treatment conditioning

Treating Processes

- **Pre-treatment Conditioning**
  - Controlled air drying
  - Kiln drying
  - Boultonizing
  - Steam conditioning
  - Vapour drying

Treating Processes

- **Boultonizing**
  - Accomplished by heating wood in creosote or oil-type preservative under vacuum.
  - Water is evaporated at a rate of 1/3-3/4 lbs/cu ft. depending on temperature and vacuum conditions.
  - Used primarily for D-fir piles and timbers and to a lesser extent Oak piles and timbers
  - Conditioning time varies from 10 - 40 hours for D-fir and 6 to 12 hours for oak.
  - Total water removed ranges from 2-12 lbs/cu ft.

Treating Processes

- **Vapour Drying**
  - This method of drying is used primarily with hardwood cross and bridge ties
  - Drying is accomplished by condensing vapours of high boiling organic solvents on the surface of the wood.
  - Drying time is normally 8 to 16 hours
  - Used with oilborne treatments primarily.

Treating Processes

- **Steam Conditioning**
  - Wood is subjected to live steam at temperatures of 220-245 ° F for up to 20 hours
  - A minimum vacuum of 22 inches Hg is applied immediately following for 1-3 hours
  - During vacuum, from 4-5 lbs/cu. ft. of water can be removed.

Treating Processes

- **There are basically two different treating processes:**
  - Pressure processes
  - Non-pressure processes

Treating Processes

- **Non-Pressure Processes**
  - Dipping
    - Used primarily for treatment of millwork with light solvents
  - Thermal Process
    - Used for treatment of poles
    - Hot bath-cold bath creates partial vacuum
  - Diffusion
    - Used primarily for unseasoned lumber relying on diffusion.

Treating Processes

- **Pressure Processes**
  - There are basically two different pressure treating processes:
    - Empty Cell
    - Full Cell

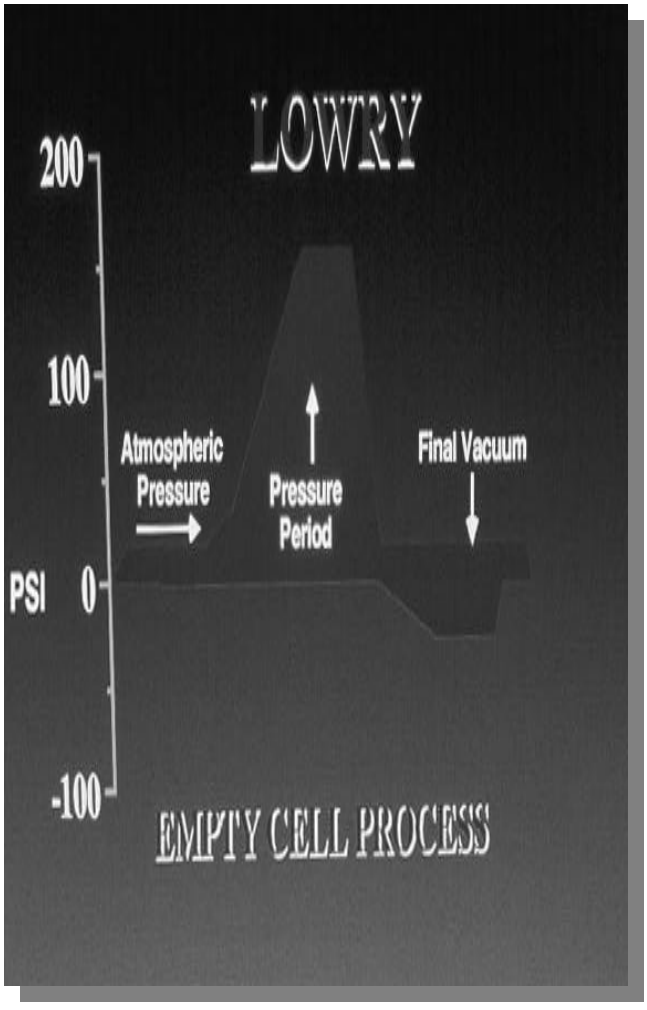
Treating Processes

- **There are two types of Empty Cell processes:**
  - The Lowry process
  - The Reuping process

Treating Processes

- **The Lowry Empty Cell Process:**
  - The Lowry process was named after Cuthbert Lowry, who patented this process in the U.S. in 1906.

Treating Processes

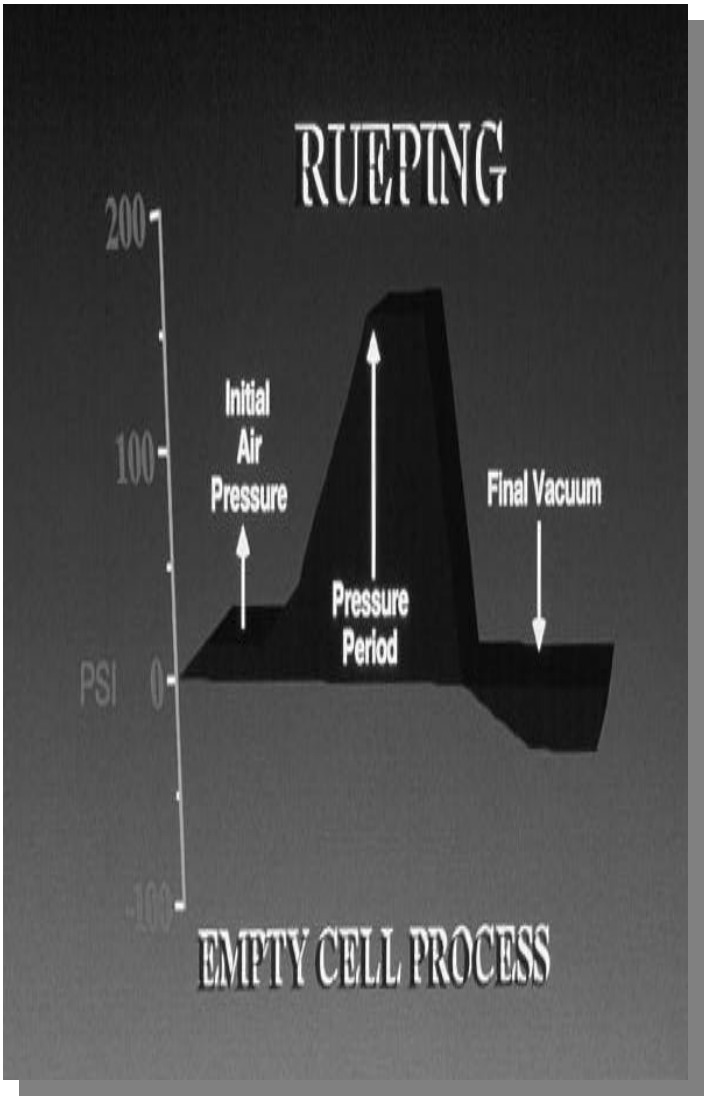


- **The Lowry Empty Cell process:**
  - Cylinder is filled at atmospheric pressure - no initial vacuum.
  - Pressure is applied until absorption is achieved.
  - Cylinder is then emptied of solution.
  - Final vacuum is drawn.

Treating Processes

- **The Reuping Empty Cell process:**
  - The Reuping process was named after Max Reuping, from Germany in 1902.
  - This process is similar to the Lowry process except it uses initial air pressure 4-5 times atmospheric pressure (60 lbs. per sq. in.)
  - The kick back is greater in the Reuping process than the Lowry process.
  - Most widely used process for treatment of poles, piles, and cross ties with oilborne systems.

Treating Processes



- **The Reuping Empty Cell Process:**
  - Cylinder is pressurized to 60 Lbs. per sq. in. before being filled with liquid.
  - Pressure is applied until absorption is achieved.
  - Cylinder is then emptied of solution.
  - Final vacuum is drawn.

Treating Processes

- **Empty Cell**
  - The term Empty Cell means exactly that, after treatment the wood cells are empty.
  - The compressed air expands when the pressure is released, thereby forcing out some of the preservative.
  - The wood cells are lined rather than filled with preservative.
  - The final vacuum is used to extract more preservative.

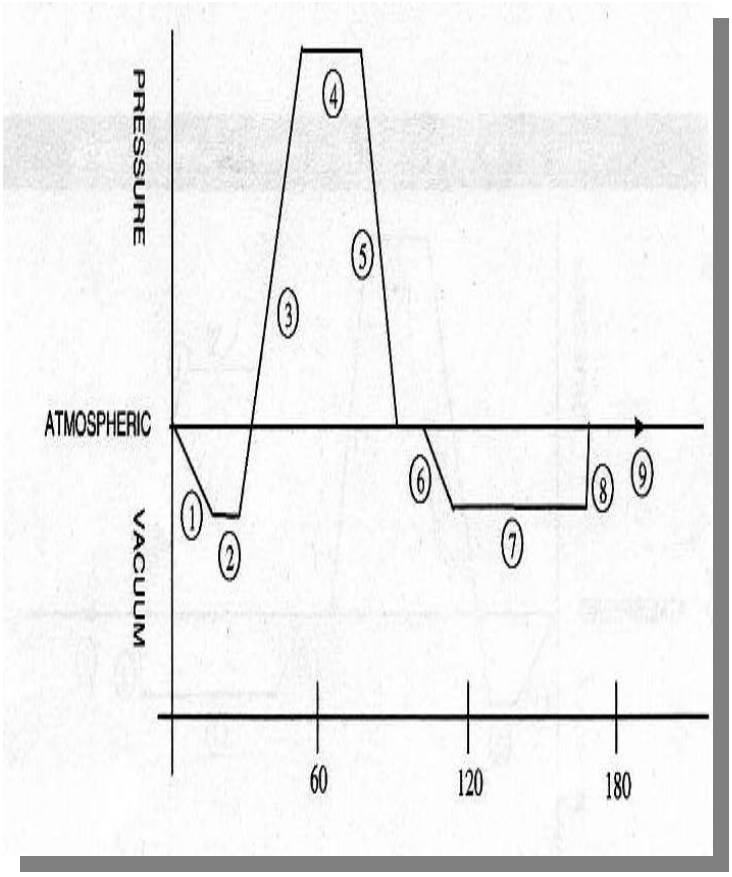
Treating Processes

- **The Lowry Process and the Reuping Process are used mainly for oil based preservatives:**
  - Creosote Preservatives
  - PCP Preservatives
- **The Benefits of the Empty Processes are:**
  - The final weight of the treated wood is reduced compared to Full Cell.
  - A cost saving is realized from the use of less preservative chemical and carrier liquid.

Treating Processes

- **The Full Cell process**
  - This process was developed by John Bethell in 1838.
  - It is the only process used for treatment with CCA & ACZA, as well creosote where high retention is required such as in marine structures.
  - It gives the highest penetration and retention.

Treating Processes



The Full Cell Process (Bethell Process) steps:

1) Initial Vacuum
2) Fill with Preservative
3) Pressure Increase
4) Preservative Absorption
5) Pressure Release
6) Preservative Pump-out
7) Final Vacuum
8) Vacuum Release
9) Treated Wood Removal

Treating Processes

- **The Full Cell Process**
  - The object of this process is to fill the wood cells with as much of preservative as possible.
  - This is done by drawing a vacuum of 22 to 24 in. of mercury for at least 30 minutes.
  - The cylinder is then filled with waterborne preservative while still under vacuum thus allowing the preservative to fill the void in the cell created by the vacuum.
  - Pressure is then applied up to 150 lbs. per sq. in. forcing more solution into the wood cell.

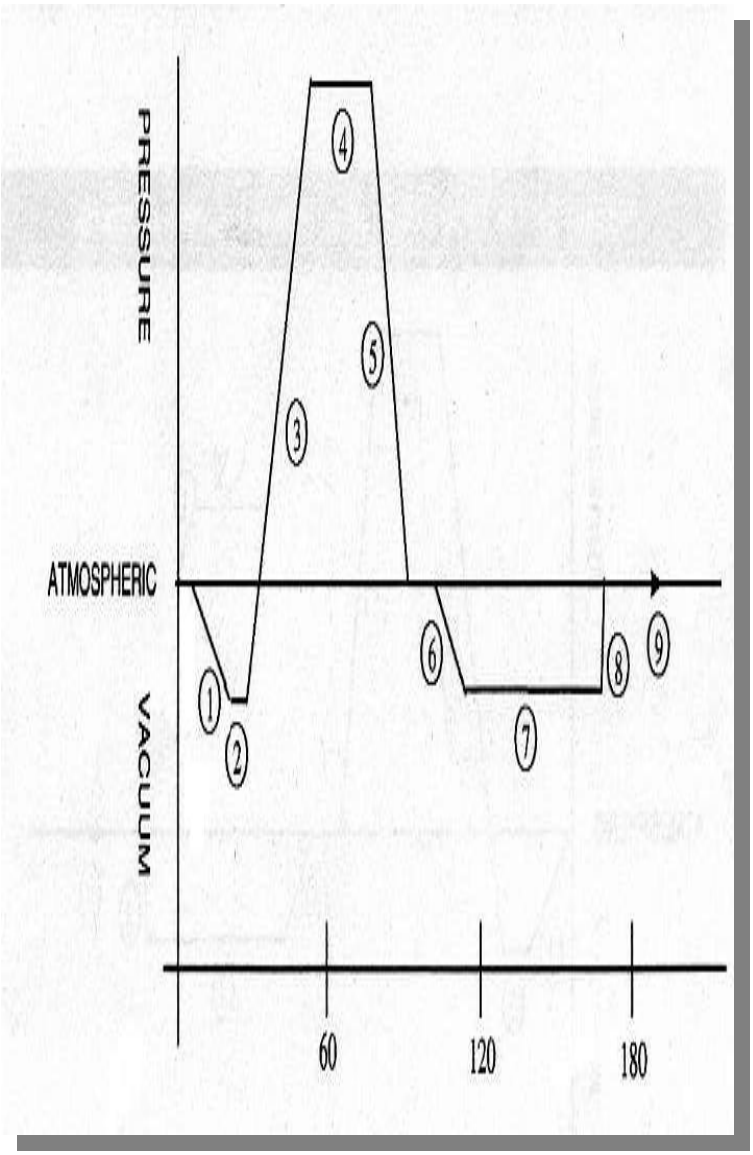
Treating Processes

- **The Full Cell Process.**
  - The pressure is maintained for a specified time, from one to several hours until injection is reached or until refusal.
  - The penetration and retention of preservative depends on the permeability of the wood.
  - Some wood may need special preparation like incising, steaming etc.
  - This process provides the maximum uptake and penetration of preservative
  - A final vacuum is used mainly to dry the wood surface and reduce drippage, but is not part of the original Full Cell Process.

Treating Processes

- **The Modified Full Cell Process.**
  - The Modified Full Cell Process is an adaptation of the Full Cell Process.
  - This process is used for waterborne preservatives like CCA.
  - This process uses a lower initial vacuum then the Full Cell Process.

Treating Processes



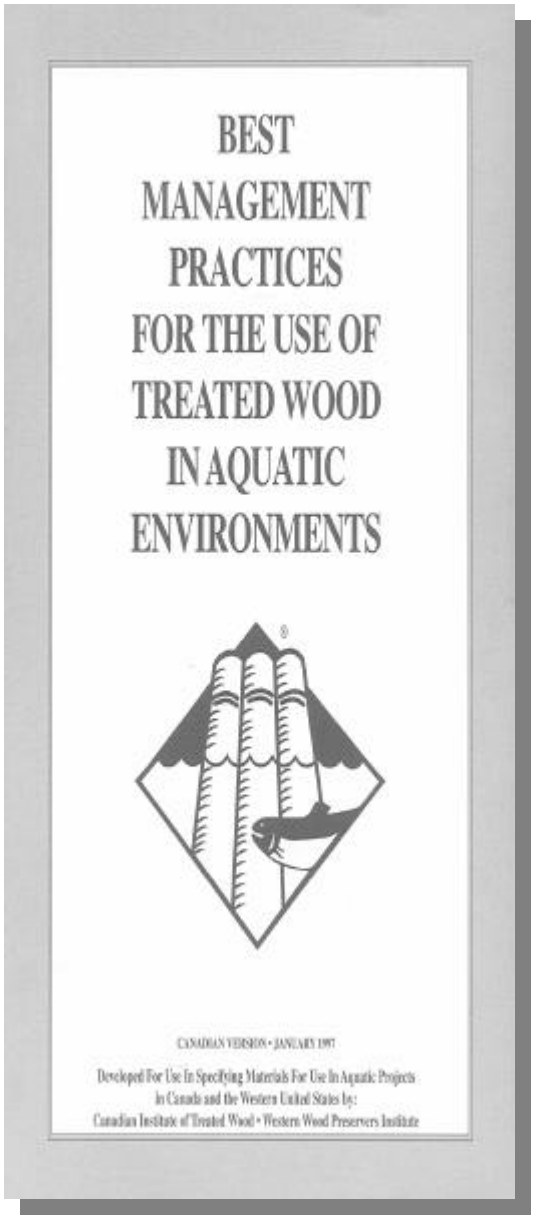
The Modified Full Cell Process steps:

1) Lower Initial Vacuum
2) Fill with Preservative
3) Pressure Increase
4) Preservative Absorption
5) Pressure Release
6) Preservative Pump-out
7) Final Vacuum
8) Vacuum Release
9) Treated Wood Removal

Treating Processes

- **The Modified Full Cell Process.**
  - The Modified Full Cell Process uses a higher concentration of CCA than the Full Cell Process.
  - It is used primarily for treatment of Southern pine
  - In this process the wood cells will retain more CCA chemical relative to the amount of water.
  - The treatment results in lower weight in the treated wood products and lower transportation cost
  - The process must be followed with a fixation period.

Treating Processes



- **Post Treatment Processes**
  - Oilborne
    - Expansion Bath
    - Steaming
    - Visual inspection
  - Waterborne
    - Fixation
    - Minimum Plant Holding Time
    - Post Treatment Kiln Drying
    - Visual inspection

Treating Processes

- **Oilborne**
  - Expansion Bath
    - Used primarily for treatment with creosote
    - Following the pressure period the creosote is heated 5 to 10°C above press temperature for up to 1 hour.
    - The creosote is then pumped back to storage and a final vacuum applied for a minimum of 2 hours
  - Steaming
    - Following final vacuum, the wood is steamed for up to 2 hours.
    - A second vacuum is applied for a minimum of 4 hours.

Treating Processes

- **Oilborne**
  - Visual Inspection
    - Inspect the treated wood for excessive residual materials or preservative deposits
    - Material which develops “bleeding” should be rejected
    - Material should appear to be clean and dry.

Treating Processes

- **Waterborne**
  - Fixation
    - Apply appropriate post treatment processes to achieve fixation of waterborne preservatives
      - Accelerated fixation
      - Kiln drying
      - Minimum plant holding time
    - Use Chromotropic Acid Test to check fixation of CCA
  - Visually inspect material for presence of surface residues or preservative deposits.