# SHOULD WE HAVE QUALITY GRADES FOR PRESSURE TREATED LUMBER?

by Paul A. Cooper
Morrison Hershfield Ltd. Toronto Ont.

Anyone who has studied the preservative penetration patterns in lumber of Canadian softwood species will agree that there are tremendous variations in penetration within and between boards. The minimal penetration observed in many cases cannot protect the treated product under the varied end use conditions it may be placed in. One way of overcoming this problem is to recognize the difficulties with our lumber species and to ensure that the most efficient use is made of the resource.

Where wood is used for structural purposes, the effects of species and defects on strength are recognised by defining species groups that have similar strength characteristics and by visually or mechanically grading individual pieces of lumber within a species group on the basis of their defects or measured stiffness. Design engineers and builders then select appropriate species and grade for a particular application.

I suggest that several grades of pressure treated lumber could also be recognized to reflect the different treating characteristics of our wood species and the different durability requirements for different end uses.

The fact that the treatability characteristics vary between species is recognized in the CSA Standards in two ways:
----penetration requirements vary from species to species (table 1); in fact, penetration specifications reflect what is physically and economically feasible, not what is desireable or even required to ensure a certain level of durability.
----it is stated in the FORWARD to the CSA standards that the different species of wood listed may not be equally satisfactory for all service conditions. This effect deserves more consideration than is normally given by specifiers. By a comparison of the relevant treatability and durability factors for the most common softwoods (Table 1), it is clear that treated lumber of certain species will provide better service performance than others.

There is also a wide variation in the durability requirements for different uses of treated lumber. These requirements should reflect the decay hazard potential for a particular application as well as the consequences of failure. For example, for the above-ground portions of fences, trellises, decorative work, etc. the decay potential is very low and the consequences of failure are not serious.

The use of poorly or inconsistently treated wood such as spruce or alpine fir can be justified for such applications. Other uses such as fence posts, deck boards or guardrails are more subject to decay, and the consequences of failure e.g., replacement cost or probability of injuries resulting, from failure are higher. These products justify a higher quality and more expensive treatment. For products such as the preserved wood foundation, playground equipment and other public structures, only the highest quality treatment is acceptable.

I am advocating the definition of three "grades" of treatment for different applications:

"LIGHT" treatment requiring only that the sapwood be treated and recommended only for low hazard/consequence above ground applications.

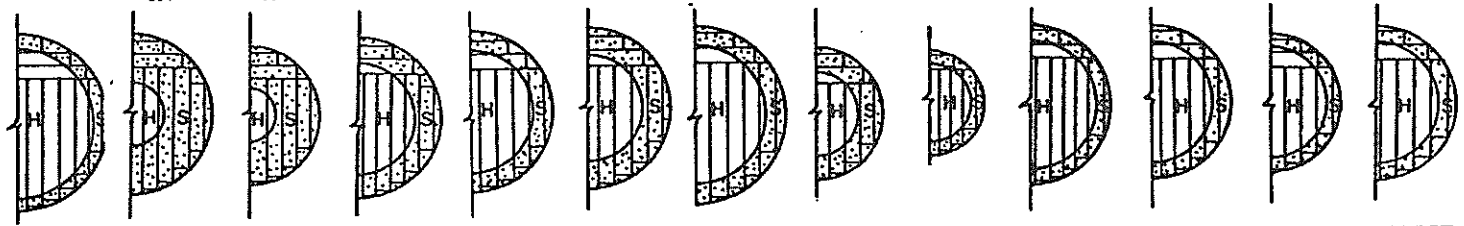
"MEDIUM" treatment requiring a minimum penetration (e.g. 1/4 inch) or percent of cross section treated (e.g. 30%).

"HEAVY" treatment with specifications similar to those required for the Preserved Wood Foundation (CSA O80.15).

Generally the treating characteristics of a given species would define the grade it would fall into. However lumber of a difficult-to-treat species could be upgraded by presorting lumber for high sapwood content, by using a longer pressure treating cycle, or by developing and using an appropriate incising procedure for the species.

The greater effort and trouble expended by the treater in upgrading lumber would be reflected in the higher value and market price of the lumber.

**Table 1 Guide to Specifying Pressure-Treated Softwood Lumber for High Decay Hazard Applications**

| | Western redcedar | Ponderosa Pine | Red Pine | White Pine | Amabilis Fir | Western Hemlock | Coast Douglas-Fir | Lodgepole Pine | Jack Pine | Western Larch | Alpine Fir | Spruce Species | Inland Douglas-Fir |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sapwood[1] Treatability | P | P | P | P | P | P | P | P | P | P | P | R | MR |
| Heartwood[1] Treatability | R | R | R | MR | R | R | R | R | R | ER | ER | ER | ER |
| Heartwood[2] Durability | D | ND | ND | MD | ND | ND | MD | ND | ND | MD | ND | ND | MD |
| Typical CSA Penetration (CCA,ACA) (mm) (2) | - | 25 or 85% of sapwood | 25 or 85% of sapwood | 9.5 and 90% of sapwood | 9.5 and 90% of sapwood | 9.5 and 90% of sapwood | 9.5 and 90% of sapwood | 9.5 and 90% of sapwood | 12.5 and 90% of sapwood | 90% of sapwood | - | 6.4 with average of 12.5 | 90% of sapwood |
| Typical CSA Retention CCA, ACA ($Kg/m^3$) (2) | - | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | - | 3.5[4] | 6.4 |
| Typical[3] Log size, Sapwood depth and sawing Pattern (1:20 scale) |  | | | | | | | | | | | | |
| Relative rating for serviceability of treated lumber | BEST | | | | | | | | | | | | WORST |

1. P-Permeable; MR-Moderately Resistant; R-Resistant; ER-Extremely Resistant
2. Pe-Perishible ( < 5y); ND-Non Durable (5-10y); MD-Moderately Durable (10-15y); D-Durable (15-25y). Ground Contact use.
3. Larger diameter logs have lower relative sapwood volumes and vice versa
4. Not recommended for Ground Contact use.

CWPA WORKING GROUP II DOCUMENT

Forintek Canada Corp.

# BORON DIFFUSION RESULTS

by Dr. R. S. Smith
FORINTEK Canada Corp.
Vancouver, B.C.

Table 1

Average Percentage of Area Penetrated by Boron Diffusion Treatments
(Cross-Sections of 2 x 4 in. (38 x 89 mm) Hem-fir Lumber)

| Percentage Moisture Content | Treatment | | | |
|---|---|---|---|---|
| | TIMBOR | BORACOL | | |
| | 30 percent | 40 percent | 20 percent | 10 percent |
| 43 - 47 | 79 | 72 | 72 | 67 |
| 33 - 37 | 68 | 65 | 65 | 71 |
| 23 - 27 | 43 | 44 | 54 | 55 |
| 13 - 17 | 34 | 36 | 35 | 37 |