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Fire Retardant Treated Lumber

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Wood is Good.
Pressure treatment improves it.
Fire retardance places Wood on a par with competitive materials.

Fire

Retardant

Treated

Lumber

by CARL F. HARTMAN, President
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THE STORY of fire retardant lumber is as old as man. Since the day that he learned to make a fire, man has endeavored to learn how to control it. Wood is one of man's oldest building materials. History has recorded the uses that he has made of wood, as well as the conflagrations that have caused him to investigate the possibilities of reducing the combustibility of wood.

The advent of the 20th Century actually dates the first commercial application of a fire retardant treatment accomplished by means of a vacuum pressure method of impregnation. Today, wood is, perhaps, the most maligned construction material in use. It rots and decays, it is subject to wood-destroying insects, and it burns. Of these three inherent weaknesses, this paper will endeavor to dwell upon the fact that wood, while combustible, can be rendered fire retardant. Make no mistake that the combustible characteristics of wood cannot be overcome. They definitely have been overcome, and the proof lies in the acceptance of fire retardant treated lumber in building codes, as well as listings by fire underwriters. Formulations, combining fire retardant chemicals with standard wood preservatives, have been available since the early Thirties. In one comprehensive treatment, the three prime wood destroying agencies can be overcome.

A deterring factor, in the acceptance and growth of fire retardant lumber markets, was the unavailability of the product. In the late Twenties through the early Forties only one commercial treating plant offered this type of treatment. The World War II emergency plant offered this type of treatment. The World War II emergency created an interest on the part of other pressure treating concerns to enter this highly specialized field. As a result, the post war era proved this interest to be so sincere that today distribution on a nationwide basis is virtually assured.

The acceptance of fire retardant processed lumber and plywood has also been obstructed over the years due to the lack of agreement as to methods of test. There is still a great divergence of opinion as to methods of test. Perhaps the oldest prescribed tests, together with conditions of acceptance, are contained in the Administrative Building Code of the City of New York. These date back to the early 1900's, and are still observed today.

In the middle Thirties, the Underwriters' Laboratories undertook to develop a new method of test whereby the combustibility of wood could be studied. The result of this program brought into existence what is now commonly referred to as the Tunnel Test. This test was designed to develop flame spread characteristics, fuel contribution, and fume toxicity data. This method of test was eventually adopted to classify other materials.

About the same time the Forest Products Laboratories was experimenting with their Fire Tube Test. The Engineering College of Columbia University also was experimenting with a Crib Test. These tests were designed only for field and plant checks. They are not as elaborate as the Tunnel Test. The apparatus is quite simple, and the results are quickly calculated.

The Engineering Laboratories of the Factory Mutual Insurance Companies have been investigating the combustible characteristics of materials in their Calorimeter Furnace. While this method of test varies from the Tunnel Test, the data obtained is essentially the same. Again, there is a divergence of opinion, but at least new ideas and test methods are constantly being explored. The Forest Products Laboratory is developing information on a small scale Tunnel Test.

The Inclined Panel Test, still in use today for acoustical materials, was not favorably considered, since it failed to develop the critical information
able, one can use any of the other kinds of glue such as animal or resin. A special non-coloring casein, which is made for use on oak, redwood, etc., can be purchased.

**Nail and Screw Holding**

Redwood has nail- and screw-holding values which are equal to or superior to cypress, West Coast hemlock, the cedars, ponderosa pine, yellow poplar, etc.

Speaking from practical experience we know that to get good results, screws cannot be hammered into redwood but instead should be screwed in. Also, we know that when heavy loads are to be carried, as in the case of hinged doors, it is desirable to pre-bore with the correct size of bit.

The hole for the threaded portion should be \( \frac{3}{4} \) the diameter of the screw at the root of the thread. When there are extremely heavy loads and large screws are to be used, a hole should be bored also for the shank, about \( \frac{7}{8} \) the diameter of the shank.

**For Doors and Paneling**

In discussing doors with a customer a while back, he made the statement that he thought redwood was a little too soft for doors. I agreed with him that redwood is soft and that if the door is to be abused by rough utilization, such as being kicked open, that I would not recommend redwood for that kind of exposure. I told him that if scuffing or marking is the main consideration, one would not want a redwood door.

On the other hand, if one wanted a door that did not stick or warp, that would not decay if used outside, that glued together best, and that took and held finish best, he should consider redwood. To get the lifetime of good service that redwood doors will give, he might even be willing to go to the trouble of hanging the door properly by using three hinges, by pre-boring for the hinge screws, etc.

This same thinking should apply to interior paneling. Redwood makes a beautiful interior wall but scuffs if used where children kick it or throw toys against it. For that kind of wall, the wood paneling should have a wainscoting of hardwood like oak or walnut, capped with a suitable chair rail, with redwood above, running to the ceiling. The boards of the wainscoting could run horizontally with the redwood boards placed vertically or vice-versa.

**Cabinets and Closets**

Electronically edge-glued redwood panels are used extensively for cabinets of all kinds and for closets including full-size closets which act as non-load bearing partitions. Half the length of the wall serves as a closet for one room and the other half is for the adjacent room. The fact that redwood stays flat and true makes it ideal for this purpose—and especially for the sliding doors which must not warp if to work satisfactorily.

**Recommended Practices for Buying House Lumber**

Here are some important safeguards and recommendations that should be followed when buying redwood or other species for certain of the building items:

1. Bevel siding of any species should be bought in vertical grain only. This is a "must" if slivering, grain loosening, shelling back, etc., are to be avoided and if good painting results are to be had.
2. If desired, the rough or sawn face of bevel siding can be turned to the outside for a natural finish, giving a fine rustic appearance.
3. On orders for flat-grain rustic or drop siding, V-joint, combed-grain paneling, flat-grain flooring, or any pattern item, in any species, you should write on your order, "The pattern or paint side must be run on the "bark" side of each piece." This will save you many complaints from your customers.
4. Random-width siding, both bevel and drop siding, as well as vertical boards, can be used in a prescribed rotation to give a different and attractive appearance.
5. Insist that your framing lumber and sheathing boards have a moisture content between 9 and 14%.
6. Insist that your siding and interior paneling and finish have a moisture content between 8 and 11%.
7. When buying S4S finish, specify that the edges be eased. This helps prevent splintering to a tremendous extent.
8. Sell aluminum or galvanized nails for exterior work.

You will notice I am doing two things while talking to my prospect. I am telling him how good redwood is and I am giving him valuable information about related subjects; information which he can use to enable him to make more money in the doing of it. Space will not permit me to include in this article the 101 bits of worthwhile facts which I pass on to customers during my visits with them; facts about vapor barriers, slab floors, kiln dried and air dried lumber, mill priming of siding, treated siding, back priming of siding, straight grain lumber, nails and nailing, paints and painting, etc.

Believe it or not, customers look forward to visits from a salesman who tells the customers some money-making fact on each call—usually only one fact per call.

One way for you to check this is to place yourself in the position of a retail lumber dealer with a limited knowledge of lumber and its utilization and ask yourself if you would be interested in what you just read and glad to learn the facts given. Also are you more favorably inclined toward redwood than you were a half-hour ago? Would you like to spend 15 to 30 minutes occasionally with this salesman?

In closing I will admit that much lumber is sold on the basis of friendship, much on low prices and much on high-pressure salesmanship. However, my experience indicates that the firmest basis for continuing lumber sales is the establishment of yourself as the man to whom to turn when help is needed on any lumber problem.

I repeat what I said in the beginning: "In this article I talk about redwood but similar articles could be written about the other commercial species."
deemed necessary to qualify fire retardant lumber. The military services, however, base their Qualified Products List on this procedure.

After many years of study by pertinent committees of the A.S.T.M., the Tunnel Test, Fire Tube Test, and Crib Test, are now Standards of the A.S.T.M.

Building codes are leaning towards the Fire Hazard Classification of Materials as investigated and listed by the Tunnel Test procedure. Here-to-fore building officials have not had a so-called yardstick by which they could rate materials, such as lumber and plywood.

Pressure treated retardant lumber has gained recognition, in the past, on its merit alone. Today, the criteria and method of test are fairly well established. As a result, the only requirement of fire retardant lumber is to meet performance specifications. This definitely eliminates the greatest barrier towards the acceptance of fire retardant lumber.

A recent action by one of the country's largest fire rating organizations is indicative of the acceptance of fire retardant lumber on a performance basis. Insurance rate reductions have been granted where fire retardant lumber is employed.

The story of the advancement of fire retardant lumber would not be complete without mentioning its use in Protective Opening Assemblies, especially Fire Doors. The early development of such a door was doomed by the failures of adhesives which could not withstand the rigors of the required fire test. During World War II, the development of resorcinol and phenolic glues, as well as melamines, provided the necessary components essential to the production of a labelled wood fire door.

While the flush type wood fire doors, generally produced today, are described as "composite core" construction, these assemblies rely heavily upon pressure treated fire retardant processed hardwoods as stiles and rails. Such doors bear the "B" and "C" labels of the Underwriters' Laboratories, and are approved by building authorities for openings, requiring a one hour label. These doors have only been on the market for the past eight or nine years. The warmth, beauty, and acoustical properties of such doors presage greater use in the future. They are ideal for hospitals, schools, and other institutional uses, as well as apartment and office buildings. Partitions of composite core construction, using fire retardant lumber, are popular today in subdividing office areas in our large office buildings throughout the country.

About
The Author

Perhaps the largest volume market the future holds for fire retardant lumber and plywood is in the modern sprawling supermarket type of building, especially for roof ducking. Suspended ceilings in this type of design create fire hazards which are readily combatted through the use of fire retardant lumber.

It would be well to mention the fact that most building codes permit sizable increased areas of one story buildings of wood construction, if an approved fire retardant treatment is employed. Building codes prescribe the types of construction and materials admitted within fire limits. Little, if any, control is imposed on the modern shopping center, or sprawling industrial type buildings being erected in rural areas, except where state codes may be in effect. Insurance agencies have been satisfied to rely on sprinkler protection which, all too many times, either fails or is inadequate.

Witness the General Motors' fire at Livonia, Michigan. Much has been written about this $55,000,000.00 loss. Pictures showing the total collapse of walls, and roof, are mute testimony of the weaknesses of unprotected lightweight steel construction. The N.F.P.A. Report, covering the General Motors' fire, published in the Quarterly of October, 1953, lists seven factors responsible for the loss. Factor No. 4 states, "Unprotected steel construction, in particular the thin steel deck that did not offer sufficient insulation between banking heat and the built-up roof covering to prevent asphalt from melting and dripping through joints of heat-warped deck. Steel trusses collapsed in a matter of minutes."

Witness instead, a fire in an all wood structure employing approximately 2,500,000 F.B.M. of lumber, pressure treated with fire retardant chemicals, in its construction. One such fire occurred at Tillamook, Oregon, in a blimp hangar built during the World War II emergency. The fire ignited the roof covering of this building 1,000 feet long, and 170 feet high at the crown of the roof. It is a matter of record that static water pressure in the mains was not high enough to provide water to the roofs without pumper. Fire fighting equipment supplied the necessary pressure, but personnel fighting the blaze were unable to control the hoses. Space does not permit a full report, but anyone interested can refer to the Wood Preserving News dated May, 1956. The amazing fact is that this fire, involving fire retardant treated lumber, was brought under control in about an hour. The affected area, some 3,000 square feet, was subsequently replaced. At no time, nor in any instance was there any structural collapse. The total area involved in the fire was 500,000 square feet—more than eleven acres. The General Motors' plant in Livonia, thirty-four and a half acres, lay in complete ruin after its fire. The story is in the record, and fire retardant lumber stands vindicated. There are other records of fires in these huge wooden structures. The subsequent reports state that the fire retardant treated lumber did not contribute to the fires or support combustion.

The threat of World War III demands a need for an early aircraft warning protection system. The D.E.W. (Distant Early Warning) line project, extending eastward from Alaska across the northern perimeter of Canada, is now being enforced with a new line of defense, the B.M.E.W.S. (Ballistic Missile Early Warning System). Living quarters, radar instrument housing, and survival buildings are being constructed of prefabricated panels all of which employ fire retardant pressure treated number specified by the Corps of Engineers, Department of Defense. Hundreds of thousands of F.B.M. are being used for this new protection screen. Little does the average person know of this use of fire retardant lumber.

Actually, it has been said that an untreated piece of dimension lumber can, after having acclimated itself to the rigors and low humidity of the climate prevalent in the arctic region, be ignited with a book match and will burn freely until it is consumed. Fire retardant treatment is a boon in this instance.

The future of fire retardant lumber and plywood is bright. It is incumbent upon all allied interests to unite in a common effort. Engineering schools should be encouraged to offer timber design courses. The lumber and allied industries have been remiss in failing to stress the need of trained timber engineers. There is an undercurrent of awakening on the part of the wood preserving industry. The aggressive approach of The Woodworking Industry is encouraging. Too long have we stood by idly and permitted markets to slip out from under our very noses.

It has been a long road, but for those who have persisted in the face of seemingly insurmountable objections, fire retardant lumber has arrived, to stay. In other words, the dogmas of the past have been overcome. Gone are the days when the proponents of fire retardant treatments for lumber and plywood are ridiculed. It has taken a lot of faith, together with a tremendous amount of effort, plus the expenditures of moneys which could be ill afforded.

Wood is good—pressure treatment improves it—fire retardance places wood on a par with competitive materials.