

TREATMENT OF SAWDUST INSULATION FOR PROTECTION AGAINST

MOLD, DECAY, INSECTS, RODENTS, AND FIRE

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Dry sawdust or planer shavings properly packed in the walls and attics of buildings afford excellent heat insulation. They have long been used for the purpose, although apparently not very extensively. The Forest Products Laboratory is frequently asked by prospective users of such insulation to suggest methods of treatment to prevent its being used as a nesting place for rats, mice, and insects, or to increase its resistance to decay, mold, or fire. As far as known, no test results have been published to supply the answers to the questions about rodents and insects, but a few experiments on the effectiveness of fire-retarding chemicals in sawdust have been reported.<sup>2</sup>

From a consideration of the character of the insulation and of the habits of mice, rats, and insects, it seems improbable that a wall packed with either sawdust or planer shavings would prove more attractive than hollow walls to any of these pests, but it is known that they will nest in insulated walls if other conditions are favorable. Although termites could build their runways through insulated walls and use the sawdust and shavings for food if they so desired, they probably prefer solid wood. The presence of the insulation in the walls should be of no advantage to them. Similarly, it does not seem probable that sawdust or shavings in a wall would offer any attraction to bedbugs, cockroaches, silver fish, ants, or other household insects or provide any more favorable conditions for them than are provided by hollow walls. For these reasons it is believed that sawdust or planer shavings need no treatment for protection against insects and vermin. If the walls of a building remain damp for any considerable period of time, they may decay; and if they remain dry, they will not decay, whether or not they are filled with sawdust.

Condensation may develop in walls during cold weather; and the more efficient the insulation, the more likely condensation is to occur. Most building materials, such as plaster, wood, brick, and concrete, are permeable to vapor. Condensation takes place when outside temperatures are below the dew point of the inside atmosphere and the moisture, passing as vapor through the plaster and insulation, reaches some surface that is below the dew point. The same principles of vapor movement apply to attics and roof spaces.

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<sup>1</sup>Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

<sup>2</sup>"Decreasing the Combustibility of Sawdust," by Joseph L. McCarthy. Indus. & Eng. Chem., Vol. 32, p. 1494-96, Nov. 1940.

Conditions favorable for condensation are likely to be present when humidities are 30 percent or higher inside of the houses during periods when outdoor temperatures are 15° F. or lower.

Attics and roof spaces can usually be protected against condensation by ample ventilation. Protection against condensation in side walls is obtained by increasing the resistance of inner wall surfaces to vapor transmission.

For new houses, the use of asphalt-coated sheathing paper applied over the inside face of the studs before plastering is recommended. For buildings already constructed, suitable paint coatings on the plaster or interior finish should give ample protection for most cases. Aluminum paint followed by other finishing paints gives excellent protection over plaster. Primer and sealer paints also make good base coats. Glue size, calcimine, and cold-water paints offer practically no protection. For further details on the subject, see the publication, "Condensation Problems in Modern Buildings," which may be obtained from the Forest Products Laboratory upon request.

If a wall containing sawdust or shaving insulation became thoroughly damp, it would take such a long time for it to dry out that considerable trouble might result. The insulation should, of course, be thoroughly dry when placed in the walls; the walls should be dry, and the construction should be such that they will remain dry. If this can be accomplished, no disadvantage from the standpoint of decay should result from the use of untreated sawdust or planer-shaving insulation.

A wall properly filled with sawdust or planer shavings is more resistant to flame spread up through the wall space than a similar hollow wall, for the insulation prevents drafts and thus retards the spread of flames. A smouldering fire in a sawdust-filled wall might be difficult to get at and to put out, but the very slow rate of burning should more than offset this disadvantage by allowing plenty of time for extinguishing it. If one side is burned away from a sawdust-filled wall, loose sawdust will, of course, run out.

For the foregoing reasons, treatment of the insulating material does not seem very important. Nevertheless, it is possible by suitable treatment to increase the resistance of planer shavings and sawdust to fire, decay, and insects. The following treatments are suggested for the benefit of those who may be willing to bear the expense and inconvenience of treatment for the additional insurance of satisfactory performance that treatment will provide. It is not known that these treatments will have any effect on rats, and mice, but they include chemicals known to be highly effective against decay, insects, and fire.

#### Treatment A

##### For Protection Against Mold, Decay, and Insects

Mix thoroughly with each 100 pounds of air-dry sawdust or planer shavings, by sprinkling and stirring, a hot-water solution (approximately 15 gallons)

containing 3 pounds of sodium fluoride and 5 pounds of borax. A clean concrete mixer could be used if available. Sodium fluoride is a fine white powder that is poisonous to human and animal life. Care should be taken to avoid breathing or swallowing the dust. Since sodium fluoride may resemble sugar, table salt, or baking soda so closely that it may be mistaken for them, it is best not to have any left over after the treating job is done.

After the chemical is mixed with the wood particles, the mixture should be dried very thoroughly before being put into the walls of a building.

#### Treatment B

##### For Protection Against Flame Spread

Mix with each 100 pounds of air-dry sawdust or planer shavings, in the same manner as for treatment A, a solution containing 5 pounds of monoammonium phosphate and 5 pounds of borax in about 15 gallons of water. If, from the standpoint of cost or availability of materials, it is desired to substitute another chemical for monoammonium phosphate, diammonium phosphate, ammonium sulphate, or boric acid may be used. Monoammonium phosphate is preferred to the others, however, because it is less hygroscopic than either diammonium phosphate or ammonium sulphate and, therefore, is less likely to lead to moisture-condensation problems, and because it is a better fire-retardant than ammonium sulphate or boric acid. Fire-retarding chemicals of high hygroscopicity, such as zinc chloride and calcium chloride, are not recommended because they may cause undue dampness in the wall cavities.

After the insulation has been treated, it should be dried thoroughly before being used.

#### Treatment C

##### For Protection Against Flame Spread Mold, Decay, and Insects

Mix with each 100 pounds of air-dry sawdust or planer shavings, in the same manner as for treatment A, a solution containing 5 pounds of monoammonium phosphate, 5 pounds of borax, and 3 pounds of sodium fluoride.

After the insulation has been treated it should be dried thoroughly before being used.

### Wet Treatment Preferable

For treating insulation with the formulas given under treatments A, B, and C, the chemicals can be mixed in the dry form if circumstances are such that the solution method cannot be used. The treatment by solution is preferable, however, because it insures a permanent, even distribution of the chemical, whereas with the dry treatment, there is a tendency for the fine chemical to sift through the coarser sawdust or shavings.

No specific information as to cost can be given, for labor and chemical costs vary widely with time and place. Both transportation charges and quantity purchased have an important bearing on the cost of the chemicals.

Attention is called to USDA Farmers Bulletin No. 1638, "Rat Proofing Buildings and Premises," and to Conservation Bulletin No. 8, "Rat Control," which can be obtained for 5¢ each from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. (stamps or personal checks not accepted).