

# TECHNICAL NOTES

FOREST PRODUCTS LABORATORY

U. S. FOREST SERVICE

MADISON, WISCONSIN

No. F-4

## WATER RESISTANT GLUES

Water resistant glues are of two general types, those made from blood albumen and those made from casein. All blood albumen glues are made directly from the raw ingredients at the time the glue is to be used. The manufacturers using these glues make them by their own secret formulas, and there are no published formulas available. Casein glues are made from casein, which is obtained from milk. They can be obtained in the prepared state ready for mixing with water, or they can be made directly from the ingredients at the time the glue is to be used.

The following prepared casein glues are now on the market:

Certus glue ..... Certus Cold Glue Co.,  
88 Isabelle St.,  
Detroit, Mich.

Napco glue ..... The Napco Corporation,  
Indianapolis, Ind.

Casco glue ..... Casein Mfg. Co.,  
15 Park Row,  
New York City, N.Y.

Perkins waterproof  
glue ..... Perkins Glue Co.,  
Lansdale, Pa.

Directions for mixing the prepared glues can be obtained from the respective manufacturers or from the Forest Products Laboratory, Madison, Wis.

The water resistant qualities of casein and blood glues are well demonstrated by the acceptance test imposed on plywood manufactured with these glues for use in airplanes. Samples of the plywood are boiled in water for 8 hours or soaked in cold water for 10 days. An acceptable product will show no separation of the plies under such treatment.

The shearing strength of casein and blood glues in plywood for airplane use is required to be at least 150 lbs. per sq. in. Most of the plywood tested at the Forest Products Laboratory showed values considerably higher than this minimum requirement. In general, veneer panels glued with blood glue show higher average strength under the varying conditions than those glued with casein glues. It seems possible, however, that casein glues will in time be developed which will be the equal of blood albumen glues in this respect.

Both casein and blood glues are materially weaker wet than dry. Casein glues tested wet commonly have 20 to 40 per cent of their dry plywood shear strength, and blood glues 50 to 75 per cent. When plywood using these glues is redried after being soaked, however, the original strength of the glue is very largely recovered.

Blood glues are not at present commonly used for gluing anything thicker than veneer. Casein glues are used for gluing all thicknesses. Casein glue test joints, using blocks of maple with the grain running in the same direction, commonly have a shearing strength of 2000 to 2500 lbs. per sq. in.

Blood albumen glue joints must be made with a "hot press" (having hollow plates heated with steam); a few minutes pressure is sufficient. Casein glue requires only an ordinary press, such as is used, with or without retaining clamps, for animal and vegetable glues.

The spreading equipment used for vegetable glues is suitable for both casein and blood albumen glues.

A mixer similar to the cake dough mixer used by bakers, consisting of a can in which a paddle revolves at high speed, is suitable for mixing casein glues. Blood albumen glues are mixed in different ways according to the requirements of their secret formulas.