

TECHNICAL NOTE NUMBER 226

FOREST PRODUCTS LABORATORY

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GLUES FOR WOOD IN ARCHERY

Uses

Glues are used (1) to splice billets for bowstaves, (2) to splice "footings" to arrow shafts, (3) to attach feathers to shafts, (4) to attach backings to bows, (5) to lay bindings on arrows, and (6) to lay cord bindings, leather, or cloth on bow grips or handles. Glue is sometimes used to attach horn tips to bows, to splice horn nocks in arrows, to attach arrow heads, and to lay bowstrings. Laying bowstrings is not covered in this note.

Properties of glues¹

The following incomplete summary of the characteristics of glues may give some guidance to amateur archers who do not wish to make a special study of gluing literature:

- (a) Woodworking glues vary greatly in water resistance. In addition to the characteristics of the glue, the water resistance of the joint will vary according to the quality of the gluing and the effectiveness of the protective coatings.
- (b) Animal glues are characterized by high strength, low water resistance, and quick jellifying. The high grades jellyfy the quickest and are slightly more re-

¹The characteristics of various glues are described in greater detail in Technical Note 207.

sistant to moisture than the lower grades.

There is a paraformaldehyde animal glue which approaches casein glue in water resistance, but it is not recommended for amateurs.

Animal glue should be used as soon as possible after melting. Boiling, or prolonged heating at temperatures below 212° F. reduces its quality.

- (c) There are many kinds and grades of casein glue. For wood used in archery a water-resistant and a "joint" grade casein glue should be specified. The strength of casein glue in wood joints approaches that of animal glues.

Casein glues are used cold.

- (d) Some synthetic resin glues can be used at room temperatures. They are characterized by very high water resistance and by the necessity of close control of gluing conditions. Their use in archery has been limited, partly because they are not readily available in retail outlets, but must be ordered directly from the manufacturers.

- (e) No glue will produce joints of maximum strength unless the joint fits closely and unless the glue is prepared and used according to proper directions.

Use requirements

(1 and 2) For fishtail splices in staves and for footing joints in arrows high strength is required and water resistance is important. A good fit and a large bearing surface affect strength more than the kind of glue. In staves the bearing surface may be

enlarged by keeping plenty of thickness under the handle. In shafts a sufficient bearing surface is assured if the length of the splice is at least 15 times the diameter.

(3) Any good glue or cement is strong enough for attaching feathers. The choice depends on the degree of water resistance desired, and more especially on the speed of jelling suitable to the mechanical method used for feather attachment. If steamed feathers are to be attached without clamps, a quick-jelling adhesive, such as animal glue, is usually preferred. If dry feathers are to be attached with thread binding a slow-jelling adhesive, such as casein glue, is usually preferred.

Moisture readily enters feather joints by reason of the absorbency of the feather itself. Under long exposure to moisture the feathers will come off unless attached with glues of very high water resistance. Under short exposure any good glue will hold.

(4) Glue for attaching bow backings requires not only strength and water resistance, but also the capacity to bend with the bow without cracking the glue film.

Separate films of animal glue bend farther without breaking than films of casein glue. The extent to which the bending properties of separate glue films indicate their bending properties in actual joints is not known. The interaction between the properties of the glue and the properties of the backing are not known.

To avoid glue bubbles under rawhide backings it is necessary to use thin glue and with a wet finger to wipe off excess glue from both the backing and the bow before laying them together. To lay a backing with animal glue a warm room and warm wood are essential.

(5) Arrow bindings require no particular strength or other special properties except ease of application. Bindings laid in casein glue lie smooth and do not gum the fingers.

(6) Handle cord is best laid in casein glue, or in one of the commercial liquid glues or cements. Animal glue jellifies too quickly and the jelly gathers as unsightly lumps between the wrappings.

Leathers may be laid in either animal or casein glue except on woods, such as osageorange, which are high in colored extractives. In such woods the alkali in the casein glue forms dark stains which may discolor the bow.

In gluing horn tips and nocks it should be remembered that horn, like wood, shrinks in drying. Nonaqueous cements liquified by heating, such as the DeKhotinsky cement are therefore preferable.

Gluing properties of archery woods

All of the native woods commonly used in archery glue readily except osageorange, hickory, and the oily cedars (Port Orford white-cedar and Alaska yellow-cedar). Strong-glued joints of these species are hard to make unless the surfaces to be glued are sponged with a 10 percent solution of caustic soda, wiped, and dried before gluing. The caustic dissolves the extractives on the surface of the wood and thus improves the anchorage for the glue.