E-Glass vs Warp Glass vs S-Glass: A Brief Overview

**Editors note: the terms "cloth" and "glass" are often used interchangeably in reference to fiberglass styles. i.e.; "E-Glass" is the same as "E-Cloth". In other uses, cloth refers to any general fabric, while glass refers exclusively to fiberglass.*

Surfboard builders have long tried to find the ideal balance between performance and durability. We have materials to build indestructible boards that could paddle and track well but would be difficult to turn. We also have materials to build light weight, maneuverable boards but those might not last more than a couple sessions, subject to heel dents and structurally failure.

Modern surfboard blanks (we use US Blanks foam), whether polyurethane or EPS, are now first-quality, consistent and reliable which means lamination is the key construction factor for a board's performance and durability quotients.

Lamination is the result of impregnating cloth (commonly fiberglass) with resin (polyester, vinyl ester or epoxy). Through proper selection of these materials one can build any style of board that will net both high performance and high durability. The focus of this piece concentrates on the first choice a builder needs to make; what type of fiberglass cloth will best suit my end result goal? It is important to start with an acknowledgment that simply listing these three glass types in order of strength does not accurately represent their applications, virtues, nor duties.

E-Glass	Warp Glass	S-Glass
(PLAIN WEAVE)		**(PLAIN WEAVE)**
Lightest, Most Pliable	Moderate Weight, Moderate Pliability	Strongest, Stiffest

SAME IS NOT ALWAYS EQUAL

Each of these cloth styles are available in 4oz and 6oz weights (per square yard, with E-Glass also available in 7.5oz and 10oz weights). Layering cloth coupled with resin saturation can net different strength-to-weight ratios thus, resulting in altered performance and durability.

For example, despite S-Glass being 30% stronger than E-Glass, some laminators have found that they net higher strengths by laminating three layers of 4 oz cloth (netting 12 ounces) than by laminating two layers of 6oz cloth (also netting 12 ounces). Yet, while this method might net "stronger" lamination, there are still more factors to consider. One must consider the desired "workability" of the layers of cloth around the contours and curves of the board and very importantly one must always ensure thorough resin saturation through each layer of cloth.

Three layers of cloth will require more resin and work to "wet out". It is important to account for the added weight with each layer of lamination because it will ultimately affect the board's performance and flex pattern.

No cloth style is “better” than another. While some board builders have preferences, others use each of the three types for different styles of boards. Our goal below is to offer you enough detail and context to select right cloth style for your specific build.

E-GLASS

E-Glass (the “E” stands for “electric grade” as it was originally developed for electrical wire insulation) fiberglass cloth is extremely popular due to its light weight, ease of use and pliability around rails, in channels, and contours.

Universally referred to as style 1522 (4 oz./ sq. yd.), 4 oz is a balanced plain weave fabric, meaning there are nearly an equal number of glass yarns in both the warp and fill directions, providing uniform mechanical properties. Consider alternating plies at 45-degrees for optimal strength. It is ideal for use in marine, composites construction, sealing, general composites repair and when water-clear laminates are required such as on surfboards and canoes. It works well with polyester, vinyl ester and epoxy resins. Balanced plain weave fabrics are available in 4oz, 6oz, 7.5oz, and 10oz.

WARP GLASS

Warp glass was developed in the early 1990’s, engineered for the surf and sailboard industry. The count per square inch in each direction of the cloth was redistributed by adding more "picks" to the "warp" (longitudinal 0° direction) and removing picks from the "fill" (traverse direction 90°). These modified "warp" fabrics do not increase or decrease the weight of the material laminated to the board however, they do add longitudinal (nose-to-tail) strength. Warp Glass Cloth can be used in fiberglass surfboard construction and repair. Warp Glass Cloth can be used in fiberglass surfboard construction and repair. Warp cloth can laminated with polyester or epoxy resins applied with a brush, roller, or squeegee. It is available in 30” width either cut yardage or full rolls at 125+ yards.

S-GLASS

S-Glass was originally developed for military applications with a much higher tensile strength and modulus. It’s approximately 30% stronger than E-Glass and 10% stiffer but still pliable enough to work around rails and contours. S-Glass tends to be the preferred fiberglass style because of its strength however, its higher cost has inspired laminators to find layering solutions with E-Glass and Warp Glass (as outlined above) as a substitute. S-Glass can be laminated with polyester or epoxy resins applied with a brush, roller or squeegee. It is available in 4oz and 6oz weights at 30” width.

SIZING & FIBERGLASS FINISHES

Sizing is a proprietary coating that is applied to the fibers as they are made into yarn during manufacturing. These *Finishes* are the final treatment to the woven and non-woven fiberglass fabrics that enhance wet out, feel and color for epoxy and polyester resins.

There are three common finishes that surfboard manufacturers use.

Silane
Silane finish is the standard surfboard cloth transparent finish. Regularly used so that manufacturer's laminates (logos) and artwork displays clearly under glass. This is what all of our regular 4oz, 6oz, E and S cloths are stocked in. When ordering cloth, if not otherwise specified, it will be a Silane finish. Silane finish offers the laminate clarity resulting in the bright, white, glossy appearance that surfboard manufacturers have come to expect.

Volan
Volan fabric has a green tinge to it that when laminated brings out a vintage, old school look on a finished board. Volan is very often used on wood and classic surfboards. Volan is most easily identified when looking at a full roll of fabric, the ends of the roll will have a significant green coloration to it displaying vastly different from the bright, white Silane finishes when viewing side-by-side.

Most all of our fiberglass fabrics are available packaged in cut lengths as well as full rolls, in a variety of weight options. Check FiberglassHawaii.com for full availability and spec details.

Our staff is always available to further explain our products and help you find the precise solution for your build.