

# SILQUEST\*

## Silanes For Fiber Glass Reinforcements



### Product Description

Glass fiber is widely used to reinforce thermoplastic and thermoset resins used to fabricate high performance composites that are used in various applications. Nevertheless, the naturally low compatibility of glass fiber with most resins generally leads to poor interfacial bonding and thus low composites performance. Silquest silanes, when used as coupling agents can significantly enhance interfacial bonding and composites performance.

A typical Silquest silane has two different functional groups, an alkoxy-silyl group and a reactive functional group. The alkoxy-silyl group, after reaction with water, forms chemical bonds with the glass fiber surface. The reactive functional group reacts with thermosetting resins during curing or with thermoplastic resins during processing and fabrication to form chemical bonds. The silane coupling agents facilitate the transfer of stress from the low modulus organic matrix to the high modulus glass fiber reinforcements. The interfacial bonds formed by the silane coupling agents can also enhance composites' resistance to hygrothermal degradation and environmental aging.

The Silquest silane products are chosen to match the curing chemistry or functional groups on the resins. Our extensive product line allows for use with many different thermosetting and thermoplastic resins. The performance benefits offered by Silquest silanes can enable glass fiber reinforcement resins to be used in a number of high-performance applications, including transportation, energy (windmills), marine and industrial goods.

### Key Features & Typical Benefits

Throughout the process of glass fiber drawing, processing, composites fabrication and subsequent applications, Silquest silanes may provide a variety of benefits, including:

- Increased glass fiber tensile strength
- Reduced fuzz during glass fiber processing
- Enhanced glass fiber strand integrity
- Reduced hygrothermal degradation in corrosive environments
- Enhanced composites strength
- Long-term durability of the composition

## Product Selections

Silquest silanes are selected based upon the resin used in fabricating the composite. A typical guide to selecting the silane for the resin is:

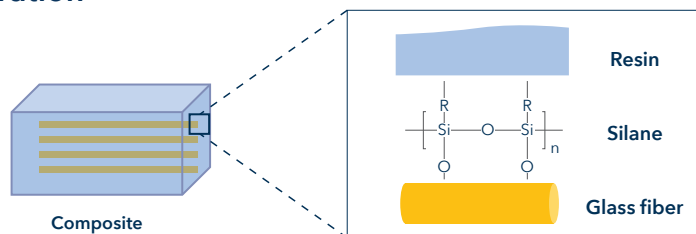
### Standard Silanes

NAME	FUNCTIONALITY	MW	COMPATIBLE RESINS
Silquest A-1100* silane	Amino	221.4	Epoxies, Phenolics, Polyamides, PET, PBT, Polycarbonate, Polypropylene
Silquest A-187* silane	Epoxy	236.1	Epoxies, Polyamides
Silquest* A-174NT silane	Methacrylate	248.4	Unsaturated polyesters, Vinyl esters
Silquest A-171* silane	Vinyl	148.2	Polyethylene

### Specialty Silanes

NAME	FUNCTIONALITY	MW	COMPATIBLE RESINS	FEATURES
E-Free* 1100 silane	Amino	Oligomeric	Epoxies, Phenolics, Polyamides, PET, PBT, Polycarbonates	<ul style="list-style-type: none"> <li>• Lower VOC</li> </ul>
Silquest A-1524 silane	Ureido	222.4	Polyamides, Epoxies, Phenolics	<ul style="list-style-type: none"> <li>• Low yellowing</li> </ul>
Silquest Y-9669 silane	Amino	255.4	Epoxies, Polyamides, Phenolics, PET, PBT, Polycarbonates	<ul style="list-style-type: none"> <li>• High temp. resistance</li> </ul>
Silquest Y-19139 silane	Amino	Polymeric	Epoxies, Polyamides	<ul style="list-style-type: none"> <li>• High strand integrity</li> <li>• Fiber protection</li> <li>• Choppability</li> <li>• Formulated without HAPS</li> </ul>
Silquest A-1387 silane	Amino	Polymeric	Epoxies, Polyamides	<ul style="list-style-type: none"> <li>• High stand integrity</li> <li>• Fiber protection</li> <li>• Choppability</li> </ul>

## Mechanism Illustration



#### General Considerations For Use

Fillers are typically treated by dissolving 2-5 wt% silane in an alcohol/water (90/10 by volume) mixture. Acidify non-amino silanes to pH =4 with acetic acid. The silane solution is applied to the filler using conventional equipment such as blender or mixers. If low VOC application is desired, silanes can be dissolved in a water only solution or applied as received to the filler with adequate mixing.

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