NASA TECH BRIEF
Manned Spacecraft Center

Nonflammable and Abrasion Resistant Coating Process for Glass Fibers

The problem:

Glass fibers are used in the manufacture of fabrics which offer high strength, high resistance to wrinkling, good washability, excellent appearance, and resistance to heat and flammability. To date, one of the barriers to their widespread use has been their relatively low resistance to abrasion.

The solution:

A surface treatment has been developed for glass fibers which significantly improves their resistance to abrasion and flammability.

How it's done:

Glass fibers that have been twisted and/or plied into a yarn are coated with dispersed polytetrafluoroethylene (2 to 15 percent by weight of fabric on each surface). The dispersion contains thickeners so that its consistency or viscosity is suitable for conventional means of coating. The amount of thickener used ranges from 10 to 60 percent by weight of a 3- to 5-percent aqueous solution of solids. The yarns are subsequently dried in the 150 to 175°C (300 to 350°F) range in the time interval ranging from 30 seconds to 5 minutes. The dried yarn is then woven into fabric and heat cleaned to expel any of the remaining volatile organic materials. Heat cleaning is performed at temperatures ranging from 150 to 400°C (300 to 750°F) over a period ranging from 12 to 60 hours. This temperature range has been determined to distill volatiles off the fabric without causing exothermic decomposition. At this range, sintering of the polytetrafluoroethylene and weave setting and heat cleaning of the fabric occur simultaneously. The resulting fabric is smooth, flexible, strong, white in color, and resistant to abrasion and flammability.

Further improvements in fabric flexibility may be obtained by padding it with a lubricant. The lubricant such as an organosilicon compound selected from a group containing silane is applied to the treated fabric in very dilute solution. An alternative is to use the same compound dispersed in an aqueous medium or in organic solvents containing less than 2 percent by weight of organosilicon sufficient to form at least a monomolecular layer.

Patent status:

Title to this invention, covered by U. S. Patent No. 3,653,949, has been waived under the provisions of the National Aeronautics and Space Act [42 U.S.C. 2457 (f)], to the Owens-Corning Fiberglas Corp., Toledo, Ohio 43601

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