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FINISH FOR GLASS CLOTH

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This invention relates to a polyethylene-silicone finish for glass cloth.

When glass cloth is used for decorative purposes, such as drapes, it is necessary to apply a finish to the cloth in order to increase the abrasion resistance of the fibers. Otherwise excessive abrasion occurs during laundering and handling. In the case of fiber glass drapes, excessive abrasion can result from the movement of the drapes in a breeze. Although various finishes have been used to reduce the abrasion resistance, these finishes have other undesirable properties. Some of the present finishes do not impart sufficient water repellency to the fabric. Some of the present finishes also impart an objectional color to the fabric. Many of the present finishes do not appreciably increase the abrasion resistance of the glass fibers.

It is a primary object of this invention to develop a clear finish for glass cloth which increases the abrasion resistance of the fibers. It is a further object that the finish have a high degree of wash-fastness in order to prevent loss of the finish and pigment during laundering.

These objects are obtained by an article of manufacture comprising a woven glass cloth, the fibers in said cloth being coated with from 0.1 to 2.4 percent by weight based upon the weight of the glass cloth of a composition consisting essentially of

(1) 100 parts by weight of polyethylene and

(2) from 25 to 400 parts by weight of

(A) from 3 to 100 mol per cent of a siloxane of the unit formula $R_aH_bSiO_{4-a-b/2}$, wherein R is an alkyl radical of from 1 to 5 inclusive carbon atoms, *a* has a value of from 1.0 to 1.5 inclusive, *b* has a value of from 0.75 to 1.25 inclusive and the sum of *a* and *b* is from 2.0 to 2.25 inclusive,

(B) from 0 to 97 mol percent of a siloxane of the unit formula $R'_nSiO_{4-n/2}$, wherein R' is selected from the group consisting of monovalent hydrocarbon radicals of from 1 to 18 inclusive carbon atoms, dichlorophenyl and perfluoroalkylethyl radicals of the general formula

$$C_yF_{2y+1}CH_2CH_2—$$

wherein *y* has a value of from 1 to 10 inclusive, and *n* has a value of from 1.75 to 2.2 inclusive.

This coating composition contains 100 parts by weight of polyethylene. This composition also contains from 25 to 400 parts by weight of a silicone material. From 3 to 100 mol percent of this silicone material is a siloxane of the unit formula $R_aH_bSiO_{4-a-b/2}$, where *a* has a value of from 1.0 to 1.5 inclusive, *b* has a value of from 0.75 to 1.25 inclusive and the sum of *a* and *b* is from 2.0 to 2.25 inclusive. R is an alkyl radical of from 1 to 5 inclusive carbon atoms. Illustrative of suitable siloxanes are methylhydrogensiloxane, ethylhydrogensiloxane and amylhydrogensiloxane. Although the silicone material can consist entirely of an organohydrogensiloxane, it is

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preferable that the organohydrogensiloxane be present in an amonnt from 10 to 90 mol percent. The preferred organohydrogensiloxane is methylhydrogensiloxane. This organohydrogensiloxane can be a homopolymer, a mixture of homopolymers or a copolymer.

The silicone material also contains (B) from 0 to 97 mol percent of a siloxane of the unit formula $R'_nSiO_{4-n/2}$. R' can be a monovalent hydrocarbon radical of from 1 to 18 inclusive carbon atoms. Specific examples of suitable hydrocarbon radicals are alkyl radicals, such as methyl, ethyl, tert-butyl and octadecyl; alkenyl radicals such as vinyl, allyl and butadienyl; cycloalkyl radicals such as cyclobutyl, cyclopentyl and cyclohexyl; cycloalkenyl radicals such as cyclopentenyl and cyclohexenyl; aryl radicals such as phenyl and xenyl; aralkyl radicals such as benzyl and xylyl and alkaryl radicals such as tolyl. R' can also be a dichlorophenyl radical. R' can also be a perfluoroalkylethyl radical of the general formula

$$C_yF_{2y+1}CH_2CH_2—$$

with *y* having a value of from 1 to 10 inclusive. Illustrative of the perfluoroalkylethyl radicals which are operative in this invention are 3,3,3-trifluoropropyl,

$$C_3F_7CH_2CH_2—$$

and $C_8F_{17}CH_2CH_2—$. The organosiloxane (B) can be a homopolymer (i.e. containing only one specie of siloxane unit) or a copolymer containing two or more species of siloxane units. The siloxane can also be a mixture of any combination of homopolymers and/or copolymers. In the siloxane, either one or different types of organic radicals can be attached to each silicon atom. This siloxane (B) can have from 1.75 to 2.2 inclusive of the above organic radicals per silicon atom. It is preferred, however, that this siloxane have from 1.9 to 2.1 organic radicals per silicon atom. It is preferred that R' be an alkyl radical of from 1 to 6 inclusive carbon atoms. The preferred alkyl radical is methyl. Although good results are obtained when the silicone material (2) contains from 0 to 97 mol percent of the siloxane (B), it is preferred that this siloxane be present in an amount from 10 to 90 mol percent. The best results are obtained when the organohydrogensiloxane is present in an amount from 30 to 70 mol percent and the organosiloxane (B) is present in an amount from 30 to 70 mol percent.

These organosiloxanes (B) can range in viscosity from thin fluids of low molecular weight to high molecular weight non-flowing gums. Preferably the viscosity of this siloxane should range from 50 to 20,000 cs. at 25° C.

The silicone-polyethylene coating is best applied to the fibers by first preparing a cationic emulsion of the silicone and polyethylene and then applying the emulsion to the fibers. This cationic emulsion contains from 0.6 to 2.4 percent by weight of an emulsifiable polyethylene and from 0.6 to 2.4 percent of the silicone material (2) and from 95.2 to 98.8 percent water. In order to obtain good results, it is necessary that this emulsion be cationic. The preferred technique for preparing this cationic emulsion comprises preparing a non-ionic silicone (2) emulsion and preparing a cationic emulsion of polyethylene and then adding these emulsions to sufficient water to obtain the desired solids concentration. Alternatively, all of the ingredients can be emulsified together. For the most efficient use of manufacturing facilities, it is preferred that