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(54) Glove

(57) Disclosed is a glove having a rubber or resin coated on the surface of a fiber-made glove, wherein a stretchable yarn is knitted at least into the wrist area of the fiber-made glove, the stretchable yarn having a rubber or resin coated thereon, and wherein a difference in level occurring at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted is 210 μm or less. The glove of the present invention is a chemical-resistant, support-type glove in which no cracks or pin holes are formed at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted, and which is superior in chemical permeation-resistance property and has a high degree of safety.

EP 2 727 483 A2

Description

[0001] The present invention relates to a chemical-resistant glove, and more specifically, relates to a chemical-resistant, support-type glove in which no cracks or pin holes are formed at the boundary portion between the areas where a stretchable yarn is used and where it is not used, and which is superior in chemical permeation-resistance property and has a high degree of safety.

[0002] There have been conventionally used, as working gloves, so-called support-type gloves in which polyvinyl chloride, polyurethane, a natural rubber, a synthetic rubber (NBR-, SBR-, chloroprene-, or silicone-based rubber), or the like have been coated on a fiber-made glove (for example, JP-A-2012-77416).

[0003] In manufacturing these working gloves, a fiber-made glove cannot sufficiently fit to a dipping hand-mold in a step in which the fiber-made glove is put on the dipping hand-mold, and wrinkles may consequently be formed on the fiber-made glove. These wrinkles cause the formation of cracks, pin holes, and the like on a coating formed when a rubber or resin is coated onto the fiber-made glove. Accordingly, in order to allow a fiber-made glove to sufficiently fit to a dipping hand-mold, and to improve the fitting property to the hand of a user of the finished glove and the anti-slip property of the finished glove, it has been conventionally known that a stretchable yarn (rubber thread) is knitted into a fiber-made glove (for example, Japanese Patent Nos. 3760441 and 2925543, and JP-A-2007-9346).

[0004] In addition, there is known a method for producing a glove in which after a rubber is coated on a fiber-made glove using a dipping hand-mold, the glove is transferred from the dipping hand-mold onto a forming hand-mold, followed by heat curing, in order to form the glove into a glove having a sharper three-dimensional shape (for example, JP-A-2005-320652). If a support glove is produced by the method using a fiber-made glove not including a stretchable yarn, then the fiber-made glove does not fit to a forming hand-mold, and as a result, the support glove does not fit to the hand of its user. Also in such a case, therefore, a fiber-made glove into which a stretchable yarn is knitted is used.

[0005] In the case where a rubber or resin is coated on a conventional fiber-made glove into which a stretchable yarn is knitted, however, cracks or pin holes are easily formed on the coating at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted. When such cracks, pin holes, and the like are formed, water or chemicals penetrate into the inside of the glove through the cracks or the like during operation, thereby causing safety impairment and thus inviting a danger.

[0006] To solve the problems described above, the present inventors have made extensive studies, and as a result, have found out that the difference in level occurs at the boundary portion between the areas where a stretchable yarn is knitted and where it is not knitted, thereby causing cracks and others at the boundary portion. Based on this finding, the present inventors have completed the present invention.

[0007] That is, the present invention aims to solve problems associated with conventional chemical-resistant gloves, thereby to provide a chemical-resistant, support-type glove in which cracks or pin holes are difficult to be formed at the boundary portion between the areas where a stretchable yarn is knitted and where it is not knitted and which is superior in chemical permeation-resistance property and has a high degree of safety.

[0008] An aspect of the present invention relates to a glove having a rubber or resin coated on the surface of a fiber-made glove, wherein a stretchable yarn is knitted at least into the wrist area of the fiber-made glove, the stretchable yarn having a rubber or resin coated thereon, and wherein a difference in level occurring at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted is 210 μm or less.

[0009] Another aspect of the present invention relates to the glove, wherein a difference in level occurring at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted is 50 μm or less.

[0010] Another aspect of the present invention relates to the glove, wherein the glove has a sulfuric acid permeation time of 20 minutes or more in a test for sulfuric acid permeation in accordance with the method specified in European Standard EN 374-3.

[0011] Another aspect of the present invention relates to the glove, wherein the glove has a sulfuric acid permeation time of 30 minutes or more in a test for sulfuric acid permeation in accordance with the method specified in European Standard EN 374-3.

[0012] Another aspect of the present invention relates to the glove, wherein a coating layer of a synthetic rubber or resin is formed on the surface of the fiber-made glove by a coagulation method by use of a coagulant, using a rubber or resin latex compound comprising 1.0 part by weight or more of a crack inhibitor per 100 parts by weight of a rubber or resin solid content.

[0013] Another aspect of the present invention relates to the glove, wherein the crack inhibitor is at least one selected from the group consisting of titanium dioxide, silicon dioxide and zirconium dioxide.

[0014] Another aspect of the present invention relates to the glove, wherein the coagulant is an organic acid-based coagulant.

[0015] Another aspect of the present invention relates to the glove, wherein the organic acid-based coagulant comprises at least one coagulant selected from the group consisting of acetic acid, formic acid, propionic acid, citric acid and oxalic acid, and at least one solvent selected from the group consisting of water, methanol and ethanol.

[0016] According to the present invention, a difference in level occurring at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted is 210 μm or less, preferably 50 μm or less, so that a chemical-resistant, support-type glove can be provided in which cracks or pin holes are not formed at the boundary portion and which is superior in chemical permeation-resistance property and has a high degree of safety.

[0017] The glove of the present invention is a glove having a rubber or resin coated on the surface of a fiber-made glove, wherein a stretchable yarn is knitted at least into the wrist area of the fiber-made glove, the stretchable yarn having a rubber or resin coated thereon, and wherein a difference in level occurring at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted is 210 μm or less.

[0018] For the fiber-made glove in the present invention, gloves made of various fibers can be applied, and gloves made by knitting, in a seamless manner, known filament yarns or spun yarns alone or in combination, for example, yarns of cotton, polyamide (nylon), polyester, polyurethane, high-strength stretched polyethylene such as Dyneema (registered trademark), and aramid such as Kevlar (registered trademark); gloves made by sewing knitted fabrics, woven fabrics, and nonwoven fabrics; and the like can be used.

[0019] In the fiber-made glove for use in the present invention, a stretchable yarn is knitted at least into the wrist area.

[0020] In the present invention, the stretchable yarn refers to a yarn having rubber elasticity, called a rubber thread, that is, a yarn in which a yarn of a non-elastic fiber is wound around an elastic fiber such as spandex, such that it has rubber elasticity and can be used in common knitting machines. In the present invention, any stretchable yarn can be used which has rubber elasticity and can be knitted into the fiber-made glove.

[0021] In a preferred embodiment the stretchable yarn has a stretchability of 1.5 to 6 times.

[0022] A preferred stretchable yarn has an elastic fiber as a core fiber which has a stretchability of about 5-7 times. A non-elastic fiber such as nylon and wooly nylon is wound around this elastic fiber.

[0023] Such a stretchable yarn which is commercial available includes, for example, LYCRA (registered trademark) (Toray Opelontex Co., Ltd.).

[0024] In the present invention, a method for weaving a stretchable yarn into the fiber-made glove is not limited in particular, and examples thereof can include a method in which in a knitting procedure concurrently using two yarns as in knitting with some yarns together or plating knitting, one of the two yarns is changed to a stretchable yarn in a predetermined part; and a method in which in a usual knitting procedure as in plain stitching in which knitting is performed using one yarn, a stretchable yarn is added in and knitted into a predetermined part.

[0025] In the present invention, a rubber or resin is coated on the surface of the fiber-made glove. The rubber or resin is usually coated on the whole of the glove; however, any glove in which at least the boundary portion between the areas where a stretchable yarn is knitted and where it is not knitted is coated with the rubber or resin is included in the present invention.

[0026] Examples of the rubber for use in the present invention can include a natural rubber (NR); a diene-based rubber such as a nitrile-butadiene rubber (NBR), a styrene-butadiene rubber (SBR), and a butadiene rubber; an isoprene rubber; and a butyl rubber. Among them, a nitrile-butadiene rubber is particularly preferred from the viewpoints of economic efficiency, versatility, no proteins which are likely to cause allergy, and the like. These rubbers are generally used in an aqueous dispersion latex, though they can also be used in a solvent solution or a solvent dispersion.

[0027] Examples of the resin for use in the present invention can include polyvinyl chloride, polyurethane, an ethylene-vinyl alcohol copolymer, polyvinyl acetate, and modifications thereof. These are used alone or in combination of two or more as necessary.

[0028] A rubber or resin latex can have one or more of a metal oxide, a vulcanization accelerator, sulfur, a surfactant, an antioxidant, a pH adjusting agent, a plasticizer, a filler, and the like compounded therein.

[0029] A specific method for coating the rubber or resin on the fiber-made glove is not limited in particular, and examples thereof can include a method in which the fiber-made glove is put on a hand-mold, then dipped into a solution of a coagulant, pulled out of the solution, dried, thereafter, dipped into a rubber or resin latex, pulled out of the latex after a given period of time, and dried. The hand-mold for use in this method is not limited in particular, and any hand-mold made of metal, ceramic, wood, plastic, or the like can be used.

[0030] The coagulant for use in the present invention may be one usually used. Specifically, an acid such as formic acid, acetic acid, propionic acid, citric acid, oxalic acid or sulfuric acid; or a salt such as sodium chloride, aluminum sulfate, or calcium nitrate can be used. Among them, an inorganic salt of a divalent alkaline earth metal, which is represented by calcium nitrate, is preferable in terms of its high capability of coagulation. A solvent in which these coagulants can be dissolved is not limited in particular. While water, methanol, ethanol, or the like is usually used, methanol is preferable in that it is volatile and is easy to be dried out.

[0031] In the present invention, it is preferable that a crack inhibitor is added, in order to enhance the chemical resistance.

[0032] The crack inhibitor for use in the present invention is a metallic oxide containing a tetra-valent element, and preferable examples thereof include titanium dioxide (TiO_2), silicon dioxide (SiO_2) and zirconium dioxide (ZrO_2), which can be used alone or in combination.

[0033] Titanium dioxide and silicon dioxide are known as fillers. For example, JP-A-2011-32590 and JP-A-2011-231448 also describe that these can be compounded in a latex. However, titanium dioxide is used for the purposes of masking and of preventing coagulation by crushing it into smaller pieces than other fillers, and silicon dioxide is used for the purposes of preventing sagging, surface modification and of improving the anti-slip property. These purposes are quite different from the purpose of improving the chemical resistance in the present invention.

[0034] The crack inhibitor is used in an amount of 1.0 part by weight or more per 100 parts by weight of the synthetic rubber or resin solid content. When the crack inhibitor is used in an amount of less than 1.0 part by weight, it does not exhibit a satisfactory crack-inhibiting effect. The upper limit for the crack inhibitor is not defined in particular; however, it is preferably approximately 10 parts by weight or less from the viewpoint that a satisfactory crack-inhibiting effect is achieved, more preferably 5 parts by weight or less from the viewpoint of the stability of a compound, and preferably 2 parts by weight or less from the viewpoint of cost.

[0035] The particle size of the crack inhibitor is not limited in particular, and is preferably 20 μm or less and more preferably 10 μm or less from the viewpoint that no aggregates are formed in a rubber compounding system and the like. Regarding the type and shape of the crack inhibitor, when the crack inhibitor is titanium dioxide, it is preferably one having a rutile-type crystal structure, and when the crack inhibitor is silicon dioxide, it is preferably one produced by a wet method, among those which are amorphous silica not having a particular crystal structure.

[0036] When the crack inhibitor is added in the present invention, the coagulant is preferably an organic acid, so that a superior crack-inhibiting effect is achieved by a synergetic effect of the crack inhibitor and the coagulant. Examples of such an organic acid can include acetic acid, formic acid, propionic acid, citric acid and oxalic acid. As a solvent in which these organic acids can be dissolved, water, methanol, ethanol or the like is usually used, and methanol is preferable in that it is volatile and is easy to be dried out.

[0037] The ratio of the organic acid to the solvent is preferably 2 to 6 parts by weight of the organic acid per 100 parts by weight of the solvent. When the organic acid is used in an amount of less than 2 parts by weight, there is a tendency that groove-like cracks are formed. When the organic acid is used in an amount of more than 6 parts by weight, on the other hand, there is a tendency that the coating easily peels from the fiber-made glove.

[0038] In the case where the solvent is water, the pH of the aqueous coagulant solution is preferably from 2 to 2.7, and more preferably from 2.2 to 2.6. At a pH of less than 2, there is a tendency that peeling is caused between the fiber-made glove and the coating layer. At a pH of more than 2.6, on the other hand, there is a tendency that sufficient coagulation is not achieved.

[0039] In the case where the solvent is not water, it is preferable that when the solvent is replaced with the same weight of water, the pH is within the above-described range.

[0040] After the rubber or resin is coated on the fiber-made glove, the glove is subjected to heat curing. Conditions for the heat curing are those usually used in the art. Specifically, heat curing is carried out at 100 to 150°C for 0.15 to 1 hour, preferably at 120 to 140°C for 0.25 to 0.5 hours. However, when the coated glove is subjected to heating immediately under the above conditions, water contained in the glove rapidly vaporizes within the coating, which adversely affects the quality of the glove and may give rise to a so-called blistering phenomenon. Therefore, it is preferable that before the heat curing at high temperatures, heating is performed at 60 to 90°C for 0.5 to 1 hour, preferably at 60 to 80°C for 0.5 to 0.75 hours, so as to reduce the water content in the coating.

[0041] After the heat curing, the glove is removed from the hand-mold and then optionally subjected to washing with water and drying, to obtain a glove of the present invention.

[0042] The glove of the present invention is characterized in that the difference in level occurring at the boundary portion between the areas where a stretchable yarn is knitted and where it is not knitted is 210 μm or less, and preferably 50 μm or less. The smaller the difference in level occurring at the boundary portion, the more desirable it is. For example, the area of the fiber-made glove, where a stretchable yarn is to be knitted, is allowed to have a thickness reduced in advance by a degree corresponding to the thickness of the stretchable yarn to be knitted, so that the difference in level can be 0 μm.

[0043] A method for reducing to a given value or less, the difference in level occurring at the boundary portion is not limited in particular, and examples thereof include a method in which the stretchable yarn is selected so as to reduce the difference in level between the areas where the stretchable yarn is knitted and where it is not knitted.

[0044] Specifically, in the case of a method in which in a knitting procedure concurrently using two yarns as in knitting with some yarns together or plating knitting, one of the two yarns is changed to a stretchable yarn in a predetermined part, it is preferable that the weights per unit length (hereinafter referred to as "denier number") of the knitting yarn before changed and of the stretchable yarn are as close as possible. For example, the denier number of the stretchable yarn is preferably 30 to 300%, and more preferably 50 to 250%, of that of the knitting yarn before changed.

[0045] In the case of a method in which in a usual knitting procedure in which knitting is performed using one yarn, a stretchable yarn is added and only a predetermined part is knitted using two yarns, on the other hand, the finer the stretchable yarn to be used, the more desirable it is. For example, the stretchable yarn preferably has a denier number of 140 deniers or less, more preferably 90 deniers or less.

[0046] A method for determining, in the glove of the present invention, the difference in level occurring at the boundary portion between the areas where a stretchable yarn is knitted and where it is not knitted is carried out as described below.

[0047] The boundary portion is cut in the direction perpendicular to that of knitting of the stretchable yarn, and its cross-section is subjected to observation by a microscope (Model VHX-900, manufactured by KEYENCE CORPORATION) with the rubber or resin coating in an upward direction and the portion of the fiber-made glove in a downward direction. After the observation, a straight line A is drawn horizontally passing the outermost of the coating of the rubber or resin with which the area comprising no stretchable yarn is coated, and a straight line B is drawn in parallel to the line A, passing the outermost of the coating of the rubber or resin with which the area comprising a stretchable yarn is coated. The distance between these lines A and B is determined and defined as the difference in level. When the measurement is carried out for a plurality of boundary portions, the maximum value of all measurements is defined as the difference in level.

[0048] The present invention will be described in more detail below with reference to Examples, which are not intended to limit the present invention thereto in any way.

Example 1

[0049] Plating knitting is carried out using two polyester twin-folded yarns of 75 deniers (82.5 dtex) as ground knitting yarns and one polyester twin-folded yarn of 75 deniers (82.5 dtex) as an appending yarn. In the wrist area, the appending yarn was changed to a stretchable yarn having one wooly nylon single yarn of 70 deniers (77 dtex) wound around a spandex of 20 deniers (22 dtex), which in turn was subjected to knitting, to produce a fiber-made glove comprising an area where the stretchable yarn was knitted and a flat-knit area where it was not knitted. The plating knitting was carried out such that the ground knitting yarns were on the face side and the appending yarn was on the wrong side.

[0050] The fiber-made glove was put on a dipping hand-mold. Then, the dipping hand-mold was dipped in a bath containing a coagulant including 5 parts by weight of acetic acid and 100 parts by weight of methanol, and pulled out of the bath after 5 seconds.

[0051] The glove dipped into the coagulant was dried at 30°C for 45 seconds. Then, the entire of the fiber-made glove was dipped in a bath containing an NBR latex compound shown in Table 1, pulled out of the bath, and dried at 70°C for 30 minutes. After that, the glove dried was removed from the dipping hand-mold and subjected to leaching in warm water at 30°C for 1 hour.

[0052] After the leaching, water was removed from the glove. Then, the glove was put on a setting hand-mold (hand-mold with a natural shape of the human's hand) and subjected to heat curing. The heat curing was carried out first by heat drying at 70°C for 60 minutes and then by heating at 120°C for 20 minutes.

[0053] After the heat curing, the glove was removed from the setting hand-mold, to obtain a glove of the present invention.

[0054] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the areas where the stretchable yarn was knitted and where it was not knitted was 32.4 μm.

Table 1

Trade name	Name of Material	Maker	Added parts (by wt.)
Nipol (Registered trademark) LX550	NBR latex	ZEON CORPORATION	100
KOH	pH adjusting agent	KANTO CHEMICAL CO., INC.	0.5
S	Vulcanizing agent	KANTO CHEMICAL CO., INC.	1.5
ZnO	Crosslinking agent	KANTO CHEMICAL CO., INC.	2
BZ	Vulcanization accelerator	OUCHI SHINKO CHEMICAL INDUSTRIAL CO., LTD	0.5
BKF	Antioxidant	Lanxess	0.5
Ti02	Metallic oxide	Ishihara Sangyo Kaisha, Ltd.	2
A-7075	Thickening agent	Toagosei Co., Ltd.	0.2
Water			35

Example 2

[0055] A glove of the present invention was produced in the same way as in Example 1, except that as the fiber-made glove, a glove was used which was knitted by flat knitting using two polyester twin-folded yarns of 75 deniers (82.5 dtex) and in which only the wrist area was knitted using three yarns including a stretchable yarn of a covering yarn having one wooly nylon single yarn of 70 deniers (77 dtex) wound around a spandex of 20 deniers (22 dtex).

[0056] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the areas where the stretchable yarn was knitted and where it was not knitted was 40.7 μm.

Example 3

[0057] A glove of the present invention was produced in the same way as in Example 2, except that as the stretchable yarn, a stretchable yarn of a covering yarn having one wooly nylon single yarn of 70 deniers (77 dtex) wound around a spandex of 70 deniers (77 dtex) was used.

[0058] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the areas where the stretchable yarn was knitted and where it was not knitted was 200.5 μm.

Example 4

[0059] The procedure was carried out in the same way as in Example 1, before the glove was pulled out of the bath containing the NBR latex formulation solution. After that, the glove was dried at 25°C for 7 minutes and then at 75°C for 5 minutes. Subsequently, the glove dried was subjected to leaching in warm water at 50°C for 2 minutes, and then pulled out of warm water and dried until water droplets on the surface disappeared, thereby forming a first layer of coating.

[0060] The glove having the first coating layer formed thereon was subjected to dipping for 5 seconds into the same latex formulation solution as shown in Table 1, except that the NBR latex was changed to Lx-551 and the amount of the thickening agent A-7075 was changed to 0.3 parts by weight. Then, the glove was dried, subjected to leaching, and dried again in the same way as for the first layer, thereby forming a second layer of coating.

[0061] Subsequently, the glove having the second coating layer formed thereon was subjected to dipping for about 5 seconds in a bath containing the same latex formulation solution as for the second layer, pulled out of the bath, and then dried until water droplets on the surface disappeared, thereby forming a third layer of coating.

[0062] Then, the glove was dried at 70°C for 40 minutes. The glove was removed from the hand-mold and dipped into water at 25°C for leaching for 1 hour.

[0063] After the leaching, water was removed from the glove. Then, the glove was put on a setting hand-mold and subjected to heat curing. The heat curing was carried out first by heating at 70°C for 60 minutes and then by heating at 130°C for 20 minutes. After the heat curing, the glove was removed from the setting hand-mold, to obtain a glove of the present invention.

[0064] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the areas where the stretchable yarn was knitted and where it was not knitted was 15.1 μm.

Example 5

[0065] A glove of the present invention was produced in the same way as in Example 1, except that the crack inhibitor TiO_2 was changed to SiO_2 was used.

[0066] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the areas where the stretchable yarn was knitted and where it was not knitted was 31.9 μm.

Example 6

[0067] A glove of the present invention was produced in the same way as in Example 1, except that the crack inhibitor TiO_2 was not used.

[0068] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the areas where the stretchable yarn was knitted and where it was not knitted was 32.1 μm.

Example 7

[0069] A glove of the present invention was produced in the same way as in Example 1, except that 5 parts by weight of acetic acid was changed to 5 parts by weight of citric acid.

[0070] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the

areas where the stretchable yarn was knitted and where it was not knitted was 33.5 μm.

Example 8

[0071] A glove of the present invention was produced in the same way as in Example 1, except that 5 parts by weight of acetic acid was changed to 5 parts by weight of calcium nitrate.

[0072] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the areas where the stretchable yarn was knitted and where it was not knitted was 31.5 μm.

Comparative Example 1

[0073] A glove was produced in the same way as in Example 2, except that as the stretchable yarn, used was a stretchable yarn of a covering yarn having one wooly nylon twin-folded yarn of 70 deniers (77 dtex) wound around a spandex of 70 deniers (77 dtex).

[0074] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the areas where the stretchable yarn was knitted and where it was not knitted was 222.4 μm.

Comparative Example 2

[0075] A glove was produced in the same way as in Example 2, except that as the stretchable yarn, used was a stretchable yarn of a covering yarn having two wooly nylon twin-folded yarns of 70 deniers (82.5 dtex) wound around a spandex of 280 deniers (308 dtex).

[0076] It was found that for the resulting glove, the difference in level occurring at the boundary portion between the areas where the stretchable yarn was knitted and where it was not knitted was 643 μm.

[0077] The gloves obtained in Examples 1 to 8 and Comparative Examples 1 to 2 were subjected to visual observation for the presence or absence of the occurrence of cracks or pin holes at the boundary portion, and in addition, to an air leakage test (in accordance with EN 374-2).

[0078] Further, in order to evaluate the chemical resistance of the coatings, a test for sulfuric acid permeation was carried out based on the specification of European Standard EN 374-3 "gloves for chemical protection." The testing was carried out by holding the outer surface side of the coating in contact with sulfuric acid (having a concentration of 96%) and passing, on the other side, 0.1 M KCl as a carrier to measure the pH of the carrier.

[0079] Specifically, the pH value measured was used to calculate the concentration of hydrogen ion, which in turn was used to calculate the concentration of sulfuric acid. The concentration of sulfuric acid thus obtained was used to calculate the amount of permeation of sulfuric acid per minute, based on the amount, calculating the time (in minutes) to take until the amount of permeation of sulfuric acid per minute exceeded 1 $\mu g/cm^2$, which was defined as the measurement value. The results are shown in Table 2.

[0080] As apparent from Table 2, the gloves of Examples 1 to 8 having a difference in level at the boundary portion of 210 μm or less were ascertained to have no detectable cracks or pin holes, whereas the gloves of Comparative Examples 1 and 2 having a difference in level at the boundary portion of more than 210 μm were ascertained to have cracks or pin holes. Additionally, when the gloves of Examples 1 and 2 were compared with that of Example 3, the gloves of Examples 1 and 2 were found to be superior to that of Example 3 in uniform adhesion of the rubber latex.

[0081] Further, from the comparison of the gloves of Examples 1, 5 and the glove of Example 6, the gloves of Examples 1, 5 using the crack inhibitor are superior in chemical resistance to that of Example 6 not using the crack inhibitor.

[0082] Furthermore, from the comparison of the gloves of Examples 1, 7 and the glove of Example 8, when the crack inhibitor is used, the gloves of Example 1, 7 using the organic acid as the coagulant are superior in chemical resistance to that of Example 8 using calcium nitrate as the coagulant.

Table 2

	Difference in level (μ m)	Crack inhibitor	Coagulant	Crack or pin hole	Chemical resistance (min.)
Example 1	32.4	TiO_2	acetic acid	absence	22
Example 2	40.7	TiO_2	acetic acid	absence	22
Example 3	200.5	TiO_2	acetic acid	absence	20
Example 4	15.1	TiO_2	acetic acid	absence	45
Example 5	31.9	SiO_2	acetic acid	absence	22

(continued)

	Difference in level (μ m)	Crack inhibitor	Coagulant	Crack or pin hole	Chemical resistance (min.)
Example 6	32.1	-	acetic acid	absence	20
Example 7	33.5	TiO_2	citric acid	absence	24
Example 8	31.5	TiO_2	calcium nitrate	absence	20
Comp. Example 1	222.4	TiO_2	acetic acid	presence	1
Comp. Example 2	643	TiO_2	acetic acid	presence	1

[0083] As mentioned above, according to the present invention, the difference in level occurring at the boundary portion between the areas where a stretchable yarn is knitted and where it is not knitted is reduced to 210 μm or less, thereby making it possible to provide a chemical-resistant, support-type glove in which no cracks or pin holes are formed at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted, and which is superior in chemical permeation-resistance property and has a high degree of safety.

[0084] Further, from the comparison of the glove of Example 1 and the glove of Example 6, the glove of Example 1 using the crack inhibitor is superior in chemical resistance to that of Example 6.

[0085] Furthermore, from the comparison of the glove of Example 1 and the glove of Example 8, when the crack inhibitor is used, the glove of Example 1 using the organic acid (acetic acid) as the coagulant is superior in chemical resistance to that of Example 8 using calcium nitrate as the coagulant.

Claims

1. A glove having a rubber or resin coated on the surface of a fiber-made glove, wherein a stretchable yarn is knitted at least into a wrist area of the fiber-made glove, the stretchable yarn having a rubber or resin coated thereon, and wherein a difference in level occurring at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted is 210 μm or less.

2. The glove according to claim 1, wherein the difference in level occurring at the boundary portion between the areas where the stretchable yarn is knitted and where it is not knitted is 50 μm or less.

3. The glove according to claim 1, wherein the glove has a sulfuric acid permeation time of 20 minutes or more in a test for sulfuric acid permeation in accordance with the method specified in European Standard EN 374-3.

4. The glove according to claim 1, wherein the glove has a sulfuric acid permeation time of 30 minutes or more in a test for sulfuric acid permeation in accordance with the method specified in European Standard EN 374-3.

5. The glove according to any one of claims 1 to 4, wherein a coating layer of a synthetic rubber or resin is formed on the surface of the fiber-made glove by a coagulation method by use of a coagulant, using a rubber or resin latex compound comprising 1.0 part by weight or more of a crack inhibitor per 100 parts by weight of a rubber or resin solid content.

6. The glove according to claim 5, wherein the crack inhibitor is at lease one selected from the group consisting of titanium dioxide, silicon dioxide and zirconium dioxide.

7. The glove according to claim 5 or 6, wherein the coagulant is an organic acid-based coagulant.

8. The glove according to claim 7, wherein the organic acid-based coagulant comprises at least one coagulant selected from the group consisting of acetic acid, formic acid, propionic acid, citric acid, and oxalic acid and at least one solvent selected from the group consisting of water, methanol and ethanol.

REFERENCES CITED IN THE DESCRIPTION

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