MULTIPURPOSE COMPOSITE EXTENDED-SLEEVE PROTECTIVE GLOVE

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ABSTRACT

A composite extended-sleeve protective glove is disclosed for multipurpose use in healthcare, industry, academic institutions, veterinary care, farm, and home for applications in which to protect the user's hand and arm from a variety of liquid exposures during washing, cleaning, material application, and other hand-arm exposure situations that may contain biological, chemical, or radiological agents. A glove of similar or dissimilar material to that of the sleeve is sealed to a fabricated, tapered tubular constructed sleeve with an elastic (or cinched) turn-down cuff on the distal end from glove to protect the wearer from fluid exposure to the hand and from fugitive exposure to the upper arm. The protective glove is sealed fluid-tight to the sleeve by a hot-melt adhesive.
MULTIPURPOSE COMPOSITE EXTENDED-SLEEVE PROTECTIVE GLOVE

[0001] This is a continuation in part of U.S. Pat. Application Ser. No. 61/568,392 filed Dec. 8, 2011 entitled “Multipurpose Extended-Sleeve Protective Glove.”

BACKGROUND OF THE INVENTION

[0002] 1. Field of Invention

[0003] The present invention relates to a protective glove that provides an affixed and sealed extended protective sleeve to protect the wearer’s arm from exposures to liquid splash and run-off during washing, cleaning, material application, and other hand-arm situations in which the liquid may contain biological pathogens, radiological agents, or chemical agents as found within healthcare, industry, academic institutions, veterinary care, farm, and home. More particularly, the present invention provides a glove that offers a high level of protection as required for hazardous liquid emission and user application for tensile strength, tactile sensation, liquid resistance, chemical resistance, and other use requirements, yet provides an attached, sealed sleeve of a material that prevents arm/wrist splash and run-off exposures and provides the flexibility, fit, and comfort required of a protective sleeve.

[0004] 2. Description of Prior Art

[0005] Fluid and chemical resistant protective gloves are used for many purposes in industry and at home to protect the wearer from hand exposure to fluids or chemicals. Protective gloves are made of a variety of compositions, each with particular resistances, barriers, or thicknesses to preclude exposure of a specific liquid(s) or chemical(s) during a particular use. As examples, latex or vinyl medical exam gloves are used in healthcare due to their flexibility and tactile sensitivity while nitrile gloves are used in industrial applications for their resistance to a broad spectrum of chemicals.

[0006] However hand exposure may still occur if the gloved hand is fully immersed in the liquid, allowing the liquid to enter the open end of the glove at the wrist or lower arm. Fugitive liquids traveling down the full length of the glove may also enter via the open end of the glove or splash on the wrist or lower arm causing liquid exposure to hand or arm. The use of protective sleeves may mitigate liquid intrusion by immersion or arm exposure from splash on glove run-off, but these cuffs are not liquid tight and exposures still can occur at the glove-sleeve interface.

[0007] Full-length gloves extending to the biceps or shoulder are commercially available. These gloves are intended for liquid (aqueous or chemical) immersion and are designed to be liquid and chemical resistant for heavy-duty and repeated use. Typically these gloves are composed of nitrile, Neoprene, or polyvinyl chloride (PVC).

[0008] There exists a need for an intermediate alternative for splash protection to the already available wrist length protective glove with an associated detached sleeve for arm exposure protection and the full-length heavy-duty glove designed for full liquid immersion use. It would be desirable to have a protective glove with a permanently sealed sleeve designed to avoid hand and arm exposure from glove run-off and for splash protection. It would be equally desirable to have that sleeve-glove constructed to allow arm movement, flexibility, and comfort that an extended glove cannot provide. It would also be desirable to provide a mechanism by which the sleeve liquid run-off can be captured at the proximal (near the glove cuff) or distal (upper arm) portion of the sleeve. Additionally, it would be desirable to have a small, vented opening at the distal (upper arm) portion of the sleeve to allow for air and accumulated body heat to escape. It would also be desirable if to have that sleeve-glove be constructed to allow it being sterilized for those applications requiring process and material sterility.

SUMMARY OF THE INVENTION

[0009] The present invention provides a light-weight protective glove to which is permanently affixed or sealed an extended sleeve to prevent liquid exposure from run-off and splash to the wearer’s wrist and arm during use. It is the object of the invention to provide a glove that can more fully protect the wearer for those tasks that do not require a heavy and less flexible glove, which may potentially inhibit the process performed. More specifically, the invention provides: (1) an extended-sleeve protective glove that offers splash and run-off protection to the hand, wrist, and arm by permanently affixing or sealing to the glove a liquid and chemical resistant sleeve that precludes liquid intrusion into the glove from inadvertent wrist and arm immersion into a liquid or from liquid run-off during use; (2) an extended-sleeve protective glove that offers increased arm flexibility and comfort during use that is not obtainable with extended gloves manufactured for industrial or heavy use; (3) an extended-sleeve protective glove and extended sleeve that can be constructed of a variety of materials to allow greater chemical resistance, greater strength, or greater flexibility necessary under certain applications; (4) an extended-sleeve protective glove that offers an extended sleeve that can retain liquid run-off at the lower arm and prevent upper arm and shoulder exposure; (5) an extended-sleeve protective glove that offers a more secure fit to prevent the glove from slipping or being pulled down on the hand; (6) an extended-sleeve protective glove that offers an outer adhesive tape seal to prevent peel-back separation of the glove’s cuff from the sleeve; and (7) an extended-sleeve protective glove that can be sterilized for those applications requiring sterility.

[0010] Thus, the invention relates to a protective glove having been permanently affixed or sealed to a protective sleeve that protects the wrist and lower and upper arm from liquid exposure by intrusion or splashing for use in applications involving liquids, both aqueous and chemical for those tasks that do not require a heavy and less flexible glove.

[0011] Preferably, the protective molded glove is comprised of a material that is liquid and vapor/fume impermeable, both for aqueous-based and chemical liquid or solid agents. Preferably, these materials are nitrile, neoprene, PVC, vinyl, latex or other chemical resistant material. Preferably, the materials are of a tensile strength and thickness required of the application.

[0012] Preferably, the protective sleeve is constructed of a material that is liquid and vapor/fume impermeable, both for aqueous-based and chemical liquid or solid agents. Preferably, these materials are nitrile, neoprene, PVC, vinyl, polyolefin, latex, spunbond nonwoven or other chemical resistant material. Preferably, the materials are of a tensile strength and thickness required of the application.

[0013] Preferably, the protective glove is affixed to the sleeve by a pressure-sensitive adhesive or heat seal that provides the required fluid and chemical resistance and bonding strength necessary to prevent fluid or chemical intrusion through the seal or bond during the manufacturer’s specified lifespan of the sleeve-glove.
Preferably, the protective sleeve is constructed and sized to allow flexibility and comfort by the wearer to the wrist, lower arm, elbow, and upper arm without the use of cinches or other devices to reduce slack in the sleeve or to provide good fit to the wearer.

Preferably, the protective sleeve is constructed to provide a mechanism to retain run-off of liquids at the proximal (near glove cuff) or distal end of the sleeve by a fold-over of sleeve material or other such mechanism or device.

Preferably, the protective sleeve is constructed to provide a means to provide a secure fit on the upper arm, if required.

Preferably, the protective sleeve is constructed to provide a means by a vent opening to allow for air and accumulated body heat to escape.

Preferably, the protective sleeve is constructed to provide a means by loop or other conveyance, to offer a mechanism to hang the sleeve-glove for drying after washing.

Preferably, the extended-sleeve glove is constructed to provide a means by an elastic band on the proximal (near glove cuff) end of the sleeve to prevent the glove from slipping or being pulled down on the hand.

Preferably, the extended-sleeve glove is constructed to provide a means by an outer adhesive tape seal covering the sleeve and glove portions at their joined area to provide an initial fluid barrier and to prevent peel-back separation of the glove’s cuff from the sleeve.

Preferably, the extended-sleeve glove is constructed to provide a means of being sterilized by wet heat, dry heat, irradiation, or chemical agent for use in those applications requiring sterility.

FIGS. 1 and 2 are perspective views of the sleeved glove. The protective glove 1 is a molded glove 1 that can be provided in a wide variety of sizes, thicknesses, materials, and colors. The materials may be from either natural or synthetic ingredients. The particular material of glove 1 construction is predicated on the use or application of the glove 1 as it relates to creation of a barrier against the applied fluids (aqueous and chemical), chemicals (solid and liquids), emulsions, biological products and pharmaceuticals, pesticides, and infectious biological agents. Most commonly, the use of nitrile protective gloves offers a broad spectrum of fluid, chemical, and vapor/fume resistance. Gloves may be eight to sixteen inches in length. The protective sleeve 2 is a cylindrically-shaped tapered tube formed by using sheet goods that are woven, knitted, spunbond nonwoven, calendared, or extruded from natural or synthetic sources. The cylindrical tube can be extruded without any side seals, formed from a single sheet with one seam, or from two sheets with two seals. The material selected in the construction of the sleeve 2 will be predicated on the used and application of the sleeved glove and the chemical and/or liquid resistance(s) required. Sleeve lengths can vary from eight to twenty-four inches long with a width four to sixteen inches (flat width). The shape of the sleeve 2 can be tapered or straight. The sleeve 2 is affixed to the glove 1 by way of an adhesive 3 to provide a fluid proof and chemical resistant seal or bond. The composition of the adhesive 3 is dependent on the nature of the application and the chemical resistance required of the bond and may be made from natural or synthetic ingredients. An elastic band 4 provides a secure fit around the forearm, elbow or bicep, depending on the length of the protective sleeve 2, to prevent the protective sleeve 2 from sliding down the arm. The elastic band 4 may be made of any elastomeric material either natural or synthetic.

FIG. 3 is a perspective view of the sleeved glove as referred to in FIG. 1, demonstrating the process of affixing the glove 1 and the protective sleeve 2 with the adhesive 3. The adhesive 3 is applied around the circumference (360 degrees) of the protective sleeve 2. The adhesive 3 may be in the form of a tape, coating, or glue (including hot melt) and is applied to the edge of the protective sleeve 2 or applied allowing a margin to the edge of the protective sleeve 2, creating a lip around the circumference of the protective sleeve 2. The width of the adhesive 3 can be from one-quarter inch to three inches wide and could be applied in one or more rows to provide an extra margin of safety for fluid and chemical resistance. Once the adhesive 3 has been applied the cuff of the molded glove 1 is expanded and pulled over the sleeve. Pressure and any required heat is applied to form the bond.

FIG. 4 is a perspective view of the sleeved glove as referred to in FIG. 1 with applied elastic banding 4. The elastic banding 4 is applied around the circumference of the distal protective sleeve 2 cuff a full 360 degrees. The elastic 4 material may be sewn, surged, heat sealed, or bonded into place. The elastic 4 can be encapsulated in the protective sleeve 2 material.

FIG. 5 is a perspective view of the sleeved glove as referred to in FIG. 1 with applied elastic band 4, liquid retention cuff 7, vent opening 8, and hanging loop 6. The liquid retention cuff 7 is a fold-over layer of the protective sleeve 2 material that may be located above or below the elastic band 4 to provide a retentive barrier to any fugitive liquids running down the glove or protective sleeve 2 during the sleeved glove’s use. At the distal end 5 of the sleeve 2 but below and
in close proximity to the elastic band a small diameter circular vent opening is made by punching, sewing, die-cutting, or made by incorporating through various means of application a plastic or metal grommet. At the open end of the sleeved glove a hanging loop is attached by sewing, surging, heat sealing or bonding to provide a mechanism for hanging the sleeved glove for drying after use and washing.

[0035] FIG. 6 is a perspective view of the sleeved glove as referred to in FIG. 1 with an applied elastic cuff band. The elastic cuff band 9 provides a more secure fit to prevent the glove portion from slipping or being pulled down on the hand. The elastic cuff band 9 is applied at the wrist just above the glove cuff. The elastic cuff band 9 can be added on the inside of the sleeve or encapsulated between the inside and outside of the sleeve material. The attachment of the elasticized material can be sown, glued, or sealed into position.

[0036] FIG. 7 is a perspective view of the sleeved glove as referred to in FIG. 1 with an adhesive tape outer seal 10. The adhesive tape outer seal 10 is applied around the circumference sleeve and glove interface covering both the sleeve and glove at the joined area, an area one-half inch to four inches wide. The adhesive tape outer seal 10 provides an initial fluid barrier when coated with a fluid-resistant adhesive. The adhesive tape outer seal 10 by covering the edge of the glove cuff can prevent or minimize peel-back separation from the sleeve.

[0037] It will be understood that the foregoing embodiments are merely illustrative of the extended-sleeve protective glove and the methods or making the present invention and that various modifications can be made by those skilled in the art without departing from the scope and spirit of the invention.

What is claimed is:

1. An article for protecting the hand, wrist, and lower and upper arm from inadvertent liquid immersion and run-off from fluids containing water, chemicals, biological agents, and radiological agents, the article comprising:
   a) a glove portion, the glove made of a fluid impermeable and/or chemical impermeable material that provides a barrier for preventing the fluid on the outside surface of the glove from contacting the skin of the wearer's hand inside the glove;
   b) an extended sleeve portion, the extended sleeve portion is a cylindrically-shaped tapered tube formed by using sheet goods that are woven, knitted, spunbond nonwoven, carded, or extruded from natural or synthetic sources and is affixed to the glove portion by an adhesive; and
   c) an adhesive portion, the adhesive portion made of an adhesive that is fluid proof and chemical resistant to the intended application.

2. An article as defined in claim 1 wherein the glove material comprises a material selected from a group consisting of nitrile, neoprene, vinyl compounds, polyolefin, rubber, and latex.

3. An article as defined in claim 1 wherein the extended sleeve portion is comprised of a fluid impermeable and/or chemical impermeable material that provides a barrier for preventing the fluid on the outside surface of the extended sleeve from contacting the skin of the wearer's wrist and lower and upper arm.

4. An article as defined in claim 1 wherein the extended sleeve portion is comprised of a non-porous laminated or co-extruded polyolefin.

5. An article as defined in claim 1 wherein the extended sleeve portion is of a size and shape to maintain continuity with the glove size and to provide arm and elbow comfort and flexibility without the use of cinches, straps or other fastening devices required to minimize or eliminate slack.

6. An article as defined in claim 1 wherein the extended sleeve portion contains an elastic band at the distal open end of the sleeve to prevent sleeve slippage down the arm.

7. An article as defined in claim 1 wherein the extended sleeve portion contains a liquid retention cuff located above or below the distal elastic band to provide a retentive barrier to any fugitive liquids running down the protective glove and sleeve during use.

8. An article as defined in claim 1 wherein the extended sleeve portion contains a hanging loop located at the open end of the glove to provide a mechanism for hanging the sleeved glove for drying after use and washing.

9. An article as defined in claim 1 wherein the extended sleeve portion contains a small diameter circular opening at the distal end of the sleeve glove close to the elastic band so as to vent air and allow accumulated body heat to escape.

10. An article as defined in claim 1 wherein the extended sleeve portion contains an elasticized cuff band at or near the glove cuff-sleeve interface to prevent the glove portion from slipping or being pulled down on the hand.

11. An article as defined in claim 1 wherein the glove-sleeve adhesive interface is protected by an applied adhesive tape seal to provide an initial fluid barrier to the interface and to prevent or minimize peel-back separation of the glove cuff edge from the sleeve at the interface.

12. An article as defined in claim 1 wherein the article has the ability to be sterilized by thermal, chemical, or irradiation means.

13. A process as defined in claim 1 wherein the glove portion is affixed to the sleeve portion by an adhesive using a pressure sensitive hot melt application.

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