



SPEC-1S-P-XX
March 25, 2009

SPECIFICATION FOR ONESuit® Pro
NFPA 1991, 2005 ED. CERTIFIED VAPOR PROTECTIVE ENSEMBLE
NFPA 1994 CLASS 2, 2007 ED. CERTIFIED FIRST RESPONDER ENSEMBLE

1. SCOPE

1.1 Scope. This specification covers requirements for ONESuit® Pro, a totally encapsulating vapor chemical protective suit that will provide protection against highly toxic chemicals.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in Section 3 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information as examples. While every effort has been made to ensure that completeness of this list, document users are cautioned that they must meet all specified requirement documents cited in Section 3 of this specification, whether or not they are listed.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D747	Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
D751	Standard Test Methods for Coated Fabrics
D2136	Standard Test Method for Coated Fabrics - Low Temperature Bend Test
D2582	Standard Test Method for Puncture - Propagation Tear Resistance of Plastic Film and Thin Sheeting
D4157	Standard Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)
F739	Standard Test Method for Resistance of Protective Clothing Materials to Permeation by Liquids or Gases under Conditions of Continuous Contact

- F392 Standard Test Method for Flex Durability of Flexible Barrier Materials
- F1001 Standard Guide for Chemicals to Evaluate Protective Clothing Materials
- F1052 Standard Test Method for Pressure Testing of Vapor Protective Ensembles

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1991 Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies, 2005 Edition.

NFPA 1994 Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents, 2007 Edition.

(Application for copies should be addressed to the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101)

3. REQUIREMENTS

3.1 Qualification. When specified and applicable, ONESuit® Pro suit shall be subjected to qualification inspection.

3.2 First article. When specified and applicable, a sample shall be subjected to first article inspection.

3.3 Certification. The suit shall be certified as an ensemble to:

NFPA 1991, 2005 ed. – Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies. Certification shall include the optional liquefied gas protection.

NFPA 1994 Class 2, 2007 ed. – Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents.

3.4 Design requirements.

3.4.1 Description. The ONESuit® Pro vapor protective suit shall be a one piece (no separate overcover), totally encapsulating suit with integral booties, integral back pod, airtight slide fastener closure, glove cuff assembly and visor.

3.4.2 Suit material. Suit body material shall be CoreTech™ Pro. This material shall be a laminate structure using fluoropolymer film technology. Separable garments shall not be used to meet performance requirements.

3.4.2.1 Color. Color shall be high-visibility orange.

3.4.2.2 Weight. Weight shall be 15 oz/sq yd.

3.4.2.3 Thickness. Thickness shall be 23 mil.

3.4.2.4 Chemical resistance. Chemical permeation resistance of the suit material to NFPA 1991 specified chemicals shall have no detectable breakthrough greater than 4 hours when tested in accordance with ASTM F739 after flex and abrasion. Cumulative chemical permeation of the suit material to NFPA 1994 specified chemicals shall be less than 1 $\mu\text{g}/\text{cm}^2$ when tested in accordance with ASTM F739 after flex and abrasion.

3.4.2.5 Flame resistance. Flame resistance shall exceed requirements of NFPA 1991. There shall be 0 seconds of after flame.

3.4.2.6 Burst Strength. Burst strength in accordance with ASTM D751 shall be greater than 174 lbf.

3.4.2.7 Tear Resistance. Tear resistance in accordance with ASTM D2582 shall be greater than 23 lbf.

3.4.3 Seams. Suit seams shall be constructed using heat welding technology. No stitching is permitted for use in garment seam construction.

3.4.3.1 Seam Tape. The outside of all suit seams shall be covered with high-visibility orange colored weldable tape.

3.4.4 Visor. The material used for the chemical protective visor shall be 10 mil FEP film. This shall be integrally welded into the protective suit in between 2 layers of 20 mil clear vinyl.

3.4.4.1 Field of vision. The suit shall have an integral visor not less than 17 inches high by 18 inches wide.

3.4.5 Gloves. The ONEGlove® Hazmat NFPA 1991 / NFPA 1994 certified protective glove shall be used.

3.4.5.1 Glove attachment. The glove attachment interface shall consist of a 4" dia. PVC ring with hose clamp. The glove attachment shall not compromise the overall protection of the suit.

3.4.6 Suit Closure. The suit closure shall consist of a slide fastener with 48" open length located in the front left of the suit.

3.4.6.1 Slide fastener. The slide fastener shall consist of a black PVC YKK vapor tight design.

3.4.6.2 Slide fastener attachment. The slide fastener shall be attached to the suit using stitching that is covered both sides by CoreTech™ Pro weldable seam tape both sides.

3.4.6.3 Closure flaps. The closure shall be covered by flaps made of CoreTech™ Pro. These shall be designed to close using black colored polyester hook and loop fastener.

3.4.7 Weight. The suit with all of its components shall weigh less than 12 pounds (largest available size).

3.4.8 Sizing. The suit shall be available in 6 sizes (Small – 3XL).

3.4.10 Waist belt. The suit shall be equipped with a waist belt. The belt shall be constructed of 1.5" wide black nylon webbing, and fastened by adjustable plastic squeeze release buckles.

3.4.11 Exhaust valves. The suit shall have 2 exhaust valves manufactured to a unique design by Saint-Gobain Performance Plastics. Valves operate by way of a spring activated diaphragm. Diaphragm is made of silicone providing extended shelf life beyond 10 years. These shall be located in the back of the hood area of the suit.

3.5 Interface and interoperability requirements.

3.5.1 Breathing apparatus. The suit back pod shall accommodate/cover NFPA 1981 breathing apparatus as well as a rebreather system.

3.5.2.1 Passthrough device. If required, the suit shall be compatible with a passthrough for supplied air operations with the following SCBA systems: Interspiro, MSA, Draeger, Scott, ISI, and Survivair.

3.5.3 Boots. The ONESuit® Pro protective suit shall be compatible and certified for use with the Onguard Hazmax® and Tingley HazProof® chemical protective boots.

3.6 Support requirements.

3.6.1 Suit storage bag. The ONESuit® Pro shall be shipped in a storage bag produced of black colored heavy weight fabric. The bag shall contain carrying straps made of black webbing.

3.6.2 Test equipment. The suit manufacturer shall separately offer a leak test adapter kit designed to interface with commonly available leak test equipment.