



System Assessment and Validation for Emergency Responders (SAVER)

Structural Firefighting Gloves Market Survey Report

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**Homeland
Security**

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System Assessment and Validation for Emergency Responders

Prepared by the National Urban Security Technology Laboratory

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FOREWORD

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercially available equipment and systems, and develops knowledge products that provide relevant equipment information to the emergency responder community. The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency response equipment; and
- Providing information, in the form of knowledge products, that enables decision-makers and responders to better select, procure, use, and maintain emergency responder equipment.

SAVER Program knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the responder community: “What equipment is available?” and “How does it perform?” These knowledge products are shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. As a SAVER Program Technical Agent, the National Urban Security Technology Laboratory (NUSTL) has been tasked to provide expertise and analysis on key subject areas, including chemical, biological, radiological, nuclear, and explosive weapons detection; emergency response and recovery; and related equipment, instrumentation, and technologies. In support of this tasking, NUSTL conducted a market survey of commercially available structural firefighting gloves. Structural firefighting gloves fall under AEL reference number 01SF-01-GLOV titled Gloves, Protective, Structural Fire Fighting, NFPA 1971.

Visit the SAVER website at <http://www.firstresponder.gov/SAVER> for more information on the SAVER Program or to view additional reports on structural firefighting gloves or other technologies.

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1. INTRODUCTION

Structural firefighting gloves are used in fire suppression and fire rescue operations at residential and commercial structures. They must be resistant to flame, conductive heat, liquid penetration, cuts, and punctures. The National Fire Protection Association (NFPA) standard NFPA 1971 contains performance requirements for structural firefighting gloves. To provide emergency responders with information on commercially available structural firefighting gloves, the System Assessment and Validation for Emergency Responders (SAVER) Program conducted a market survey.

This market survey report is based on information gathered between April and June 2014 from vendors, manufacturers, Internet research, industry publications, and a government-issued Request for Information (RFI) that was posted on the Federal Business Opportunities website (www.fbo.gov). For inclusion in this report, the gloves had to meet the following criteria:

- Designed for use in structural firefighting;
- Commercially available; and
- Certified as compliant with NFPA 1971.

Due diligence was performed to develop a report that is representative of products in the marketplace.

2. STRUCTURAL FIREFIGHTING GLOVES OVERVIEW

Structural firefighting gloves must provide protection from numerous hazards including high heat, flame, some hazardous liquids, cuts, punctures, and abrasions, while allowing for manual dexterity, comfortable fit, and durability. Manufacturers use various materials and design approaches to balance the trade-offs in dexterity, grip, and ease of use with adequate hand protection.

2.1 Current Technologies

As defined in NFPA 1971, the main part of a structural firefighting glove is called the glove body; it encases the fingers and palm and extends at least 2 inches beyond the wrist crease. Some gloves may extend more than 2 inches from the wrist crease. Material from 2 to 5 inches beyond the wrist crease is called the glove interface component. It may be wristlet style, in which a knit material fits snugly around the wrist, or a more loose-fitting gauntlet style. Any material beyond 5 inches from the wrist crease is called the glove extension. Figure 1 illustrates the parts of the glove as they are used to specify NFPA standard performance tests and requirements.

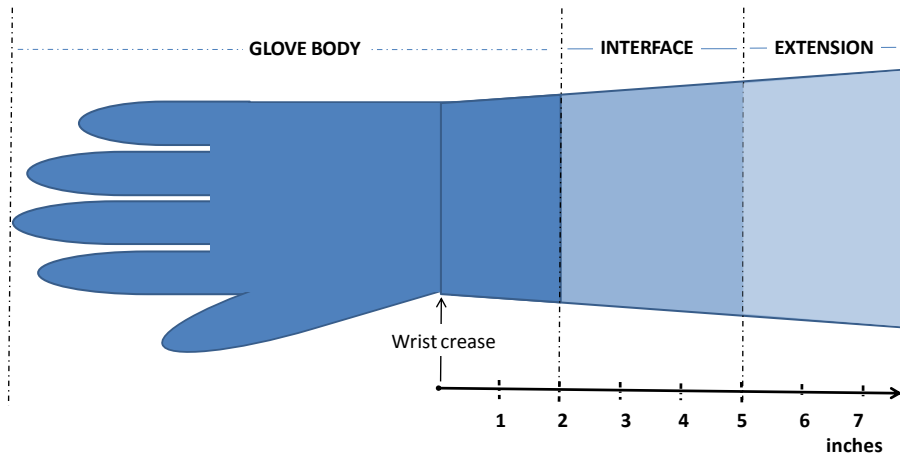


Figure 1. Illustration of Glove Sections

The parts of the glove comprise layers of different materials that serve specific purposes. Gloves consist of an outer shell, a moisture barrier, and a thermal barrier. In many products, the outer shell is made of leather. Leathers provide friction grip and puncture resistance and can be specially processed during tanning for flame resistance. For the outer shell, full-grain cowhide, pig, elk, and goat skin are commonly used; kangaroo skin, which can be made thinner, may also be used. Some leathers may be impregnated with silicone to improve water repellence and durability. Other products use synthetic fiber materials, such as Kevlar[®] or Nomex[®], for their high strength-to-weight properties. Some gloves combine several materials and may use additional reinforcements in the palm to improve grip or in the back of the hand and knuckle area for additional protection.

The moisture barrier prevents penetration of liquids such as water, blood, and some chemicals. In some products, the moisture and thermal barriers are combined into one material. In others, the thermal barrier is an inner lining that insulates the hand from heat and provides a layer of comfort. A synthetic polymer knit material known as a modacrylic is often used for the glove thermal lining because it is flame resistant and a good insulator. Kevlar or Nomex may also be used for the thermal barrier. All threads used in the glove construction must be inherently flame-resistant fibers, and any metal hardware must be resistant to corrosion.

The geometric design of the glove body, such as the number of components and the way the fingers and thumb protrude, also varies from one product to another. For example, a Gunn cut glove has a seamless back, and the two middle fingers are made from separate material than the palm. A two-dimensional (2D) glove design consists of two sheets of material joined by a continuous seam along the outline of the hand between each finger. In contrast, a three-dimensional (3D) design uses an additional inset of glove material, called the gusset or fourchette, to form a sidewall on the side of each finger between the two sheets. Some products enhance the 3D design with a curved shape in the fingers to conform to the natural hand shape.

Additional features may be used to enhance tactility and dexterity on the glove fingers and thumb. A rollover or wraparound design extends the fabric from the palm side over the top of

the finger to the fingernail area to create a seamless fingertip. In some gloves, the thumb is shaped from the same fabric as the palm so there are no seams on the palm, and it may be set out at an angle, called a wing thumb, or parallel to the index finger, called a straight thumb. In contrast, the keystone thumb design is made from a separate piece of material that is attached to the palm with seams at the base of the thumb, so that it protrudes in opposition to the fingers, from the palm rather than the edge of the hand. Sometimes, an additional piece of material called a welt is sewn into a seam to strengthen it.

Gloves typically come in sizes ranging from extra-extra-small (XXS) to extra-extra-large (XXL). Some products are also offered in cadet sizes which have shorter finger length (typically about ½ inch shorter).

2.2 Applications

Firefighters use different types of hand protection for different missions: work gloves for maintenance tasks, extrication gloves during vehicle rescues, and proximity gloves in the extreme heat environments of aircraft or chemical fires. Structural firefighting gloves are used in fire suppression and rescue operations during fires at residential and commercial structures. Structural firefighting gloves must be resistant to flame, conductive heat, liquid penetration, cuts, punctures, and abrasions.

Firefighters require hand protection while fighting structural fires but also need to be able to perform manual tasks that require dexterity, tactility, and grip. Manual tasks in structural firefighting operations include setting up and climbing ladders, connecting and disconnecting fire hose couplings, handling ropes and tying knots in ropes, operating small buttons on flashlights and communication radios, using fire extinguishers, setting up and operating power tools such as a chain saw or hydraulic extrication device, using hand tools such as a sledge hammer, pike pole, or hydrant wrench, and using Self-Contained Breathing Apparatus (SCBA).

2.3 Standards/Regulations

The NFPA, an international nonprofit organization that provides standards for fire safety, published NFPA 1971: *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting* (2013).¹ This definitive standard contains performance requirements for structural firefighting gloves, including flame and conductive heat resistance, liquid penetration, cut/puncture resistance, hand function, and grip. For a product to be labeled as certified compliant with NFPA 1971, it must be tested by an independent third party certification organization as specified in NFPA 1971. Products which pass the performance tests are marked with labels identifying the certification organization and listing the generic names of materials used in the glove. Labeling also includes the following compliance statement:

“THIS STRUCTURAL FIRE FIGHTING PROTECTIVE GLOVE MEETS THE GLOVE
REQUIREMENTS OF NFPA 1971, 2013 EDITION.
DO NOT REMOVE THIS LABEL.”

¹ NFPA 1971 is available for purchase, or for viewing in a free, read-only format at the NFPA website at <http://www.nfpa.org/codes-and-standards/free-access>

Thermal Protective Performance (TPP) is an estimate of the thermal insulation of the glove's composite material. To comply with NFPA 1971, the structural firefighting glove body must have a TPP of at least 35.0, a second-degree burn time of not less than 10.0 seconds, and a pain time of not less than 6.0 seconds. The glove interface component has lower requirements; for example, a minimum TPP of 20.0.

NFPA 1971 provides standard sizing dimensions for the circumference and length of the hand and each finger. It describes tests for dry hand donning and wet hand donning, which must be achievable within 10 seconds and 30 seconds, respectively, with no detachment of the inner layer or moisture barrier.

3. PRODUCT INFORMATION

This section provides information on 43 structural firefighting glove models that range in price from \$56 to \$135. Table 3-1 summarizes general product specifications, and subsequent sections provide additional product-specific information. Product information was obtained directly from manufacturers' responses to the RFI, and by Internet research using manufacturer and vendor websites. The information has not been independently verified by the SAVER Program. Additional explanation of the specifications in Table 3-1 is provided below, listed in column order.

Vendor is the manufacturer or distributor of the product. Note that some manufacturers market their gloves under additional brand names (as noted in footnotes).

Outer Shell is the material used in the outermost layer of the glove, such as an animal skin (cow, pig, elk, goat, and kangaroo) or the synthetic fabric Kevlar (see Other Materials).

Glove Body Features includes the design of the glove, such as 2D or 3D, and finger and thumb features, such as seamless fingertips, curved fingers, grip enhancements, or knuckle guards.

Other Materials lists the components used within the glove body to form the moisture and thermal barriers. These include several synthetic fabrics known by their trademarked or proprietary names, as well as other generic terms, as follows:

- Crosstech[®] is a liquid-resistant material (water, blood, body fluids, and common chemicals) that is also flame and abrasion resistant.²
- Kevlar and Nomex are the trademarked names for fabric made from synthetic fibers consisting of strings of repeating carbon based molecules (called polymers) that are five times as strong as steel (on an equal weight basis) and inherently fire resistant.³ Inherently fire-resistant fiber is not flammable.⁴ In Nomex, the fiber swells and becomes thicker when exposed to flame. A blend of the two fabrics is listed as Kevlar/Nomex.
- Kovenex is also a fabric woven of a proprietary blend of inherently fire-resistant fibers.⁵

² Made by W. L. Gore & Associates, Inc.

³ Made by DuPont

⁴ See <http://www.dupont.com/products-and-services/personal-protective-equipment/thermal-protective/articles/flame-resistant-technology.html> (accessed June 24, 2014)

⁵ Made by Waubridge Specialty Fabrics, LLC

- Porelle® is a liquid-resistant and breathable polyurethane material having many small interconnecting micropores.⁶
- ProTect is a low-breathability polyurethane moisture barrier.⁷
- Pyroprotect is a high-breathability polyurethane moisture barrier.⁷
- RT7100 is a liquid-resistant, breathable barrier.⁸
- Aramid knit is made from synthetic fibers that are strong and inherently flame resistant; this is the general term that describes the fibers in Kevlar and Nomex.
- Modacrylic is a synthetic polymer knit that is flame resistant and insulative.
- Polyurethane and urethane are types of polymers that do not soften or melt when heated.
- SEF stands for Self-Extinguishing Fabric or Self-Extinguishing Fleece, and is another name for modacrylic.

Interface Style refers to the part of the glove beyond the wrist crease and may be wristlet style, in which a knit material fits snugly around the wrist, or a more loose-fitting gauntlet style.

Standard Sizes lists the available sizes for each product. A number is used to denote the size, for example, 2XS means XXS, and 3XL means XXXL.

Cadet Sizes have shorter fingers, (typically 1/2 inch shorter) than the standard size. In this column, availability is indicated by yes, no, or a listing of the cadet sizes offered.

Cost is the price, or price range, dependent on options. Where two types of cuffs are offered, usually the wristlet model is slightly more expensive than the gauntlet. Note that prices for the same product may vary among vendors and may differ from the manufacturer's suggested retail price.

⁶ Made by PIL Membranes

⁷ Made by Insert Technology, Inc.

⁸ Made by W. L. Gore & Associates, Inc.

Table 3-1. Structural Firefighting Glove Specifications

Vendor	Product	Outer shell	Glove Body Features	Other Materials	Interface Style	Standard Sizes	Cadet Sizes	Cost
Dragon Fire*	Alpha-X [†]	cow, pig	3D, fingertip/thumb grip pads	urethane, Kovenex	gauntlet wristlet	2XS-3XL	2XS-3XL gauntlet only	\$65
Dragon Fire*	Alpha-X Texan [†]	cow, pig	3D, fingertip/thumb grip pads	urethane, Kovenex	gauntlet with extension	XS-3XL	NA	\$135
Fire Craft Safety Products	FC-P100 [‡] FC-P100W [‡]	goat	3D, thumb/index finger aligned	Kevlar, Nomex, Porrelle	gauntlet wristlet extension	2XS-4XL	no	\$70 - \$73
Fire-Dex	Blue Cow Glove [†]	cow	2D, two fit options: – long finger, straight thumb – standard finger, wing thumb, wraparound index finger	Crosstech	gauntlet wristlet	2XS-3XL	NA	\$96 - \$110
Fire-Dex	Courage™ Glove [†]	goat palm, elk back	2D, longer finger, straight thumb	Crosstech	gauntlet wristlet	2XS-3XL	NA	\$108
Fire-Dex	FDX G1 [†]	cow, goat, pig	3D, precurved fingers, seamless fingertips, keystone thumb, palmstrap, knuckleguard	Kovenex, Pyrotec	gauntlet wristlet	XS-2XL	NA	\$80
Fire-Dex	Gold Elk Glove [†]	elk	2D, two fit options: - longer finger, straight thumb - standard finger, wing thumb, wraparound index finger	Crosstech	gauntlet wristlet	2XS-3XL	NA	\$104 - \$118
Fire-Dex	Grey Cow Glove [†]	cow	(same as above)	Crosstech	gauntlet wristlet	2XS-3XL	NA	\$97
Fire-Dex	Honor™ Glove [†]	cow palm, elk back	(same as above)	Crosstech	gauntlet wristlet	2XS-3XL	NA	\$100 - \$117
Glove Crafters Inc.	Fire Armor [‡] FA-G-1020 FA-KW-1025	cow palm, Kevlar back	3D, curved fingers, inset thumb, seamless fingertips, knuckle band	modacrylic, Kevlar/ Nomex, Pyrotec	gauntlet wristlet	2XS-3XL 2XS-4XL	2XS-3XL	\$93
Glove Crafters Inc.	Fire Hog [‡] FH-G-1010 FH-KW-1015	cow	2D, girdle in palm, reinforced thumb, welts in middle and ring finger seams, knuckle band	modacrylic, Pyrotec	gauntlet wristlet	2XS-5XL	2XS-5XL	\$69
Glove Crafters Inc.	Fire Pro II [†]	cow	2D, welts in middle and ring finger seams	modacrylic, Pyrotec	gauntlet wristlet	XS-3XL	NA	\$68

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Vendor	Product	Outer shell	Glove Body Features	Other Materials	Interface Style	Standard Sizes	Cadet Sizes	Cost
Glove Crafters Inc.	Fire Raider [†]	cow	3D, girdle in palm, curved fingers, inset thumb, reinforced thumb, welts in middle and ring finger seams, knuckle band	modacrylic, Pyrotec	gauntlet wristlet	2XS-3XL	NA	\$78
Honeywell First Responder Products[§]	GL-6550 [†]	cow	2D, wing thumb	Crosstech, SEF	gauntlet	2XS-3XL	S-XL	\$66
Honeywell First Responder Products[§]	GL-7550 [†] GL-7500 [†]	cow	2D, wing thumb	polyurethane, SEF	gauntlet wristlet	2XS-3XL	S-XL	\$66
Honeywell First Responder Products[§]	GL-9950 [†] GL-9900 [†]	elk	2D, wing thumb	Crosstech, Kevlar/Nomex	gauntlet wristlet	2XS-3XL	NA	NA
Honeywell First Responder Products[§]	Eclipse™ GL-5400 [†]	cow palm, elk back	2D, opposing thumb	polyurethane, SEF	convertible wristlet-gauntlet	2XS-3XL	NA	\$68
Honeywell First Responder Products[§]	Eclipse™ GL-6400 [†]	cow palm, elk back	2D, opposing thumb	Crosstech, SEF	convertible wristlet-gauntlet	2XS-3XL	NA	NA
Honeywell First Responder Products[§]	Eclipse™ GL-8700 [†]	kangaroo palm, elk back	2D, opposing thumb	Kevlar/Nomex, Pyrotec	convertible wristlet-gauntlet	2XS-3XL	NA	\$91
Honeywell First Responder Products[§]	Fire Mate™ [†] GL-9550 GL-9500	kangaroo palm, elk back	2D, wing thumb	Crosstech, Kevlar/Nomex	gauntlet wristlet	2XS-3XL	NA	\$96
Honeywell First Responder Products[§]	SleeveMate [†] GL-HNO-EGG-SM	elk	2D, wing thumb	Kevlar, Crosstech, SEF	gauntlet cinches over sleeve	2XS-2XL	NA	NA
Honeywell First Responder Products[§]	Super Glove [†] GL-SGKCG GL-SGKCW	kangaroo	3D, wing thumb	Crosstech, Kevlar/Nomex	gauntlet wristlet	2XS-3XL	2XS-3XL	\$119
Innotex	INNO715 [†] INNO710 [†]	cow	2D	ProTect, SEF	gauntlet wristlet	2XS – 2XL	L, XL	\$66 - \$79
Innotex	INNO735 [†] INNO730 [†]	cow palm, elk back	2D, kangaroo leather palm patch, cowhide gusset on back of hand	Pyrotec, SEF	gauntlet wristlet	2XS – 2XL	L, XL	\$76 - \$91

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Vendor	Product	Outer shell	Glove Body Features	Other Materials	Interface Style	Standard Sizes	Cadet Sizes	Cost
Innotex	INNO755 [†] INNO750 [†]	kangaroo palm, elk back	2D, cowhide knuckle guard	Crosstech, Nomex/Kevlar	gauntlet wristlet	2XS – 2XL	L, XL	\$110
Innotex	INNO775 [†] INNO770 [†]	cow palm, elk back	3D, kangaroo fourchette, knuckleguard	Nomex/Kevlar	gauntlet wristlet	2XS – 2XL	L, XL	\$81
Innotex	INNO785 [†] INNO780 [†]	kangaroo	3D, knuckleguard	Crosstech, Nomex/Kevlar	gauntlet wristlet	2XS – 2XL	L, XL	\$109
Innotex	INNO795 [†] INNO790 [†]	kangaroo	3D, knuckleguard	Nomex/Kevlar	gauntlet wristlet	2XS – 2XL	L, XL	\$96
Lion	Commander [‡] LPG926 LPG927	cow	2D, knuckleguard	Crosstech	gauntlet wristlet	2XS – 4XL	yes	\$88 - \$91
Lion	Defender [‡] LPG827 LPG826	cow	2D	Crosstech, modacrylic cotton	gauntlet wristlet	2XS – 4XL	no	\$70 - \$75
Lion	Patriot [‡] LPG827G LPG826G	cow	2D	Crosstech, modacrylic cotton	gauntlet wristlet	2XS – 4XL	no	\$70 - \$75
Lion	Rebel [‡] LPG925 LPG924	goat, cow, aramid knit	3D, 14-piece shell	Crosstech, Kovenex	gauntlet wristlet	2XS – 5XL	no	\$125
Paul Conway Shields	Generation 2 [†] PCS2 PCS2W	cow	3D, seamless fingertip, kangaroo fourchettes, knuckleguard	Nomex/Kevlar	gauntlet wristlet	2XS – 2XL	NA	\$75 - \$80
Shelby Specialty Gloves	5226 [†] 5225 [†]	pig, cow	Gunn cut, wing thumb, wraparound index finger	SEF, RT7100	gauntlet wristlet	2XS – XL, 3XL	no	\$66 - \$70
Shelby Specialty Gloves	5228 [‡] 5227 [‡]	cow	Gunn cut, wing thumb, wraparound index finger	SEF, RT7100	gauntlet wristlet	2XS – XL, 3XL	no	\$68
Shelby Specialty Gloves	5280G [†] 5280 [†]	pig palm, elk back	Gunn cut, wing thumb, wraparound index finger	SEF, RT7100	gauntlet wristlet	2XS – XL, 3XL	no	\$78
Shelby Specialty Gloves	5282G [‡] 5282 [‡]	elk	Gunn cut, wing thumb, wraparound index finger	SEF, RT7100	gauntlet wristlet	2XS – XL, 3XL	no	\$89 - \$90

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Vendor	Product	Outer shell	Glove Body Features	Other Materials	Interface Style	Standard Sizes	Cadet Sizes	Cost
Shelby Specialty Gloves	5283 [†] 5281 [†]	cow	(same as above) + thermal protection at back of hand, finger compression areas	Crosstech, Kevlar, SEF	gauntlet wristlet	2XS – XL, 3XL	no	\$68
Shelby Specialty Gloves	5285 [‡] 5284 [‡]	cow palm, Kevlar back	(same as above) + reflective material on fingertips	Kevlar/Nomex, Crosstech	gauntlet wristlet	2XS –XL, 3XL	no	\$110 - \$111
Shelby Specialty Gloves	Flex-Tuff 5292 [‡] Flex-Tuff 5291 [‡]	cow	mutlidimensional, precurved tapered index finger, finger flex-points, additional thermal layers	Crosstech, Kevlar, SEF	gauntlet wristlet	2XS –XL, 3XL	no	\$120
Techtrade LLC	Pro-Tech 8 Fusion [†] PT8-SC PT8 – LC	goat	Kevlar/Nomex fourchettes, knuckleguard with silicon carbide fused to Kevlar	Kevlar/Nomex, modacrylic, polyurethane	gauntlet wristlet	XS-3XL 2XS – 4XL	yes	\$56 - \$63
Techtrade LLC	Pro-Tech 8 Titan [†] PT8-TN SC PT8-TN LC	goat	Kevlar/Nomex fourchettes, knuckleguard contains Kevlar, Nomex, and silicon carbide	Kevlar/Nomex, Nomex, Kevlar, polyurethane	gauntlet wristlet	XS – 4XL 2XS – 4XL	2XS-4XL	\$76 - \$79
Techtrade LLC	Pro-Tech 8 Titan K [†] PT8-TNK SC PT8-TNK LC	kangaroo	Kevlar/Nomex fourchettes, knuckleguard contains Kevlar, Nomex, and silicon carbide	Kevlar/Nomex, Nomex, Kevlar, polyurethane	gauntlet wristlet	XS – 4XL	yes	\$93 - \$103

NA means information was not available

* Also known as Fireman’s Shield LLC

† Information from manufacturer or vendor website

‡ Information from manufacturer’s response to RFI

§ Also marketed under American Firewear brand

3.1 Dragon Fire Alpha-X

The Alpha-X structural firefighting glove has a leather outer shell of cow and pig hide. It has a thermal urethane vapor barrier with welded (not glued) seams and 350 percent elongation prior to burst. The thermal liner is made of Kovenex. The glove liner is guaranteed to remain intact and not pull out of the glove. Each glove has wear pads and grip pads on the fingertips and thumbs. The Alpha-X is available in both gauntlet and wristlet versions, and each pair is packaged with a reusable utility bag and Velcro® glove strap.

No photo has been provided by the vendor for this product

3.2 Dragon Fire Alpha-X Texan

The Alpha-X Texan has the same features as the Alpha-X but it has a gauntlet cuff with a longer extension.

3.3 Fire Craft Safety Products FC-P100/100W

The FC-P100 and FC-P100W are 3D gloves with an all-leather goat skin outer shell with two Porelle moisture barriers. A dexterity feature called Tip-Fit Thumb™ is intended to eliminate excess fabric in fingertips for close contact between the thumb and index finger. The FC-P100 is a gauntlet style glove and the FC-P100W is a knit wristlet style. An additional extended cuff is available.



FC-P100

Image courtesy of Fire Craft Safety Products

3.4 Fire-Dex Blue Cow Glove

The Blue Cow Glove is available with two Crosstech moisture barrier options: a breathable, fluid-repellant liner or a combined moisture and thermal barrier layer. The glove is sewn with lock-stitched Kevlar thread, and is available in a gauntlet cuff and Nomex knit wrist style. Sizes are available in two styles: the Standard Fit has longer fingers and a straight thumb, and TrueFit™ has standard finger length with wing thumb and wraparound index finger.

No photo has been provided by the vendor for this product

3.5 Fire-Dex Courage Glove

The Courage™ Glove features a goat hide palm and elkhide back. It uses a Crosstech glove insert in which the moisture barrier is fully bonded to the thermal liner. The gloves are sewn with lock-stitched Kevlar thread and are available in a gauntlet cuff and Nomex knit wrist style. Sizes are Standard Fit with longer fingers and a straight thumb.

3.6 Fire-Dex FDX G1

The FDX G1 glove is designed with pre-curved fingers, seamless fingertips, and a keystone thumb. The back is composed of five layers: two layers of Kovenex thermal protection, one layer of moisture barrier, one layer of reverse grain pig skin, and one layer of full-grain cowhide. Goat skin is used on the palm side and around the finger tips. Cowhide is used across the palm strap and knuckle guard. Kevlar stitching is used on the leathers and Nomex stitching on the liner. The glove is available in gauntlet and aramid knit wrist styles.

3.7 Fire-Dex Gold Elk Glove

The Gold Elk Glove is available with two Crosstech moisture barrier options: a breathable, fluid-repellant liner or a combined moisture and thermal barrier layer. The gloves are sewn with lock-stitched Kevlar thread. Sizes are available in two styles: the Standard Fit has longer fingers and a straight thumb, and TrueFit™ has standard finger length, with wing thumb and wraparound index finger. The glove is available in a gauntlet cuff and Nomex knit wristlet style.

3.8 Fire-Dex Grey Cow Glove

The Grey Cow Glove is available with two Crosstech moisture barrier options: a breathable, fluid-repellant liner or a combined moisture and thermal barrier layer. The gloves are sewn with lock-stitched Kevlar thread. Sizes are available in two styles: the Standard Fit has longer fingers and a straight thumb, and TrueFit™ has standard finger length, with wing thumb and wraparound index finger. The glove is available in a gauntlet cuff and Nomex knit wrist style.

3.9 Fire-Dex Honor Glove

The Honor™ Glove features a cowhide palm and elkhide back. It is available with two Crosstech moisture barrier options: one offers maximum protection with a thermal barrier, and the other optimizes dexterity and comfort while providing proven protection. The gloves are sewn with lock-stitched Kevlar thread. Sizes are available in two styles, the Standard Fit has longer fingers and a straight thumb, and TrueFit™ has standard finger length with wing thumb and wraparound index finger. The Honor glove is available in a gauntlet cuff and Nomex knit wrist style.

3.10 Glove Crafters Inc. Fire Armor

The Fire Armor glove is a 3D glove with curved finger design and inset thumb. It has five separate finger fourchettes made of tanned cowhide. The back shell is made from one piece of flame-retardant, water-repellent Kevlar knit fleece fabric. The back is also lined with a layer of modacrylic. A leather knuckle band is sewn across the knuckle area, and the palm is tanned cow leather. The moisture barrier is breathable and waterproof Pyroprotect. This glove is sewn with Kevlar thread. The Fire Armor is available in a gauntlet model and wristlet model. The wristlet model has a 4-inch Nomex cuff with leather pull patch and hang up loop. This glove is made in the United States.



Fire Armor

*Image courtesy of
Glove Crafters Inc.*

3.11 Glove Crafters Inc. Fire Hog

The Fire Hog glove has a cow leather back and cowhide palm. It has a girdle sewn into the palm for positive grip and a reinforced thumb. Welts are sewn into the middle and ring fingers for extra seam strength. The moisture barrier is breathable and waterproof Pyroprotect. The back is also lined with a layer of modacrylic. The Fire Hog is available in gauntlet and wristlet models. The gauntlet style has a 1-inch leather cuff hemmed over the top of the glove. The wristlet model has a 4-inch Nomex cuff with leather pull patch. This glove is made in the United States.



Fire Hog

*Image courtesy of
Glove Crafters Inc.*

3.12 Glove Crafters Inc. Fire Pro II

The Fire Pro II glove is made of cowhide leather. It has welts sewn into the middle, ring fingers, and thumb for extra seam strength. The moisture barrier is breathable and waterproof Pyroprotect. The back is also lined with a layer of modacrylic. The Fire Pro II is available in gauntlet and wristlet models. The gauntlet style has a 1-inch leather hemmed cuff and a leather hang up loop. The wristlet model has a 4-inch Nomex cuff. This glove is made in the United States.



Fire Pro II
Image courtesy of Glove Crafters Inc.

3.13 Glove Crafters Inc. Fire Raider

The Fire Raider is a 3D glove with curved finger design and inset thumb. It has five separate finger fourchettes made of tanned cowhide. The back and palm are made of cow leather. It has a girdle sewn into the palm for positive grip and a reinforced thumb. A band is sewn across the knuckles for extra protection. Welts are sewn into the middle and ring fingers for extra seam strength. The moisture barrier is breathable and waterproof Pyroprotect. The back is also lined with a layer of modacrylic. The glove comes with a 1-inch leather cuff hemmed over the top of glove in gauntlet style, and with a 4-inch Nomex wristlet cuff with leather pull patch in wristlet style. This glove is made in the United States.



Fire Raider
Image courtesy of Glove Crafters Inc.

3.14 Honeywell First Responder Products GL-6550

The GL-6550 glove is a 2D pattern glove with wing thumb. The outer shell is made of cowhide leather and uses a Crosstech moisture barrier and SEF liner. This glove is available in gauntlet style in regular and cadet sizes.



GL-6550
Image courtesy of Honeywell

3.15 Honeywell First Responder Products GL-7550/7500

The GL-7500/7550 is a 2D pattern glove with wing thumb. The outer shell is made of cowhide leather. It uses a polyurethane moisture barrier and SEF liner. This glove is available in gauntlet (GL-7550) and wristlet (GL-7500) styles. The wristlet style uses a double layer of Nomex for the wristlet and has a leather pull-tab cuff.



GL-7550
Image courtesy of Honeywell

3.16 Honeywell First Responder Products GL-9950/9900

The GL-9900/9950 is a 2D pattern glove with wing thumb. The outer shell is made of elk leather with an elk palm strap reinforcement. It uses a Crosstech moisture barrier and Kevlar/Nomex liner. This glove is available in gauntlet (GL-9950) and wristlet (GL-9900) styles. The wristlet style uses a double layer of Nomex Spandex for the wristlet and has a leather pull-tab cuff.



GL-9900
Image courtesy of Honeywell

3.17 Honeywell First Responder Products Eclipse GL-5400

The Eclipse GL-5400 is a 2D pattern glove with the thumb set opposing the fingertips. The outer shell has a cowhide palm and elk skin back. This glove uses a polyurethane moisture barrier and SEF liner. It features a convertible cuff that can be worn as a gauntlet or wristlet. The extra-wide cuff is made with two layers of Nomex.



GL-5400

Image courtesy of Honeywell

3.18 Honeywell First Responder Products Eclipse GL-6400

The Eclipse GL-6400 is a 2D glove with the thumb set opposing the fingertips. The outer shell has a cowhide palm and elk skin back. This glove uses a Crosstech moisture barrier and SEF liner and features a convertible cuff that can be worn as a gauntlet or wristlet. The extra-wide cuff is made with two layers of Nomex.



GL-6400

Image courtesy of Honeywell

3.19 Honeywell First Responder Products Eclipse™ GL-8700

The Eclipse GL-8700 is a 2D pattern glove with the thumb set opposing the fingertips. The outer shell has a kangaroo leather palm and elk skin back. This glove uses a Pyrotect moisture barrier and Kevlar/Nomex liner. It features a convertible cuff that can be worn as a gauntlet or wristlet. The extra-wide cuff is made with two layers of Nomex.



GL-8700

Image courtesy of Honeywell

3.20 Honeywell First Responder Products Fire Mate™ GL-9550/9500

The Fire Mate GL-9500/9550 is a 2D pattern glove with wing thumb. The outer shell has a kangaroo leather palm and elk skin back. This glove uses a Crosstech moisture barrier and a Kevlar/Nomex liner. It is available in gauntlet (GL-9550) and wristlet (GL-9500) styles. The wristlet is two-ply Nomex Spandex with leather pull-tab.



GL-9500

Image courtesy of Honeywell

3.21 Honeywell First Responder Products Sleevemate GL-HNO-EGG-SM

The Sleevemate GL-HNO-EGG-SM features a unique glove-to-coat cuff interface: a 6.5-inch gauntlet is designed to fit over the end of a sleeve and be cinched to prevent thermal gaps in the wrist area. The gauntlet is made from Kevlar with a Crosstech moisture barrier and has a 2-inch reflective trim. The glove is a 2D pattern with wing thumb, and has an elk skin outer shell, Crosstech moisture barrier, and SEF lining.



GL-HNO-EGG-SM

Image courtesy of Honeywell

3.22 Honeywell First Responder Products Super Glove GL-SGKCG/SGKCW

The Super Glove is a 3D glove with wing thumb. It has a kangaroo leather outer shell, Crosstech moisture barrier, and a Kevlar/Nomex thermal liner. Air spacers are constructed within the glove to give thermal protection without added bulk. This glove is available in gauntlet (GL-SGKCG) and wristlet (GL-SGKCW) styles.



GL-SGKCG

Image courtesy of Honeywell

3.23 Innotex INNO715/710

The INNO715/710 is a 2D glove with a cowhide palm and back. It has a ProTect glove insert, SEF lining, and Kevlar thread. The INNO715 gauntlet style has half-inch elastic sewn around the entire wrist and the INNO710 is the wristlet style which uses two layers of Nomex knit. This glove is made in the United States.

No photo has been provided by the vendor for this product

3.24 Innotex INNO735/730

The INNO735/730 is 2D glove with a cowhide palm and elk skin back. This glove has a Pyroprotect glove insert, SEF lining, a cowhide gusset on the back of the hand, and a kangaroo palm patch. The INNO735 gauntlet style glove has half-inch elastic sewn around the entire wrist, and the INNO730 wristlet uses two layers of Nomex knit. This glove is made in the United States.

3.25 Innotex INNO755/750

The INNO755/750 is a 2D glove with a kangaroo skin palm and elk skin back, and a cowhide knuckle guard. It uses a Crosstech insert, a Nomex/Kevlar thermal lining, and Kevlar thread. The INNO755 gauntlet style glove has half-inch elastic sewn around the entire wrist, and the INNO750 wristlet uses two layers of Nomex knit. This glove is made in the United States.

3.26 Innotex INNO775/770

The INNO775/770 is a 3D glove with fourchettes on the sides of each finger and thumb. It is constructed with a cowhide palm and elk skin back. The fourchettes and knuckle guard are kangaroo leather. It uses a glove insert, a Nomex/Kevlar thermal lining, and Kevlar thread. The INNO775 gauntlet style glove has half-inch elastic sewn around the entire wrist. The wristlet style INNO770 has a double-layer Nomex knit cuff. This glove is made in the United States.

3.27 Innotex INNO785/780

The INNO785/780 is a 3D glove with fourchettes on the sides of each finger and thumb. The glove shell is made of kangaroo leather. It uses a Crosstech glove insert, a Nomex/Kevlar thermal lining, and Kevlar thread. The INNO785 gauntlet style glove has half-inch elastic sewn around the entire wrist, and the INNO780 wristlet has a double-layer Nomex knit cuff. This glove is made in the United States.

3.28 Innotex INNO795/790

The INNO795/790 is a 3D glove with fourchettes on the sides of each finger and thumb. The glove shell is made of kangaroo leather. This glove uses a glove insert, a Nomex/Kevlar thermal lining, and Kevlar thread. The INNO795 gauntlet style glove has half-inch elastic sewn around the entire wrist. The wristlet style INNO790 has a double-layer Nomex knit cuff. This glove is made in the United States.

3.29 Lion Commander LPG927/LPG926

The Commander glove is made of cowhide. The back is made of three separate pieces for knuckle protection and improved stretch. The glove uses a Crosstech glove insert that is fully bonded to the thermal liner.



LPG927BG

Image courtesy of Lion

The Commander is available in gauntlet (LPG927) and wristlet (LPG926) styles, and is offered in two color choices, black/gold (designated by “BG” after the model number) or blue (BL).

3.30 Lion Defender LPG827/LPG826

The Defender is made of cowhide. It uses a Crosstech glove insert and modacrylic cotton-blend lining. The Defender is available in gauntlet and wristlet styles in two color schemes. Model LPG827 is blue with a leather gauntlet, and the LPG826 is blue with a Kevlar wristlet. The LPG827BG is black and gold with a leather gauntlet and the LPG826BG is black and gold with a Kevlar wristlet.



LPG826 and LPG827BG
Image courtesy of Lion

3.31 Lion Patriot LPG827G/LPG826G

The Patriot glove is made of cowhide. It uses a Crosstech glove insert and a modacrylic/cotton-blend lining. The Patriot is available in leather gauntlet (LPG827G) and Kevlar wristlet styles (LPG826G).



LPG827G
Image courtesy of Lion

3.32 Lion Rebel LPG925/LPG924

The Rebel is a 3D glove with a 14-piece shell. The shell is constructed with aramid knit, goat hide, and cowhide. It uses a Crosstech glove insert with a Kovenex thermal lining. The Rebel is available in gauntlet (LPG925) or Kevlar wristlet (LPG924) styles.



LPG925
Image courtesy of Lion

3.33 Paul Conway Shields, Generation 2 PCS2/PCS2W

The Generation 2 glove is a 3D glove with seamless fingertips and kangaroo leather fourchettes. The outer shell is made of black cowhide, and the back-of-the-hand is made of three separate pieces with a kangaroo leather knuckle piece. This glove uses a glove insert and a Nomex/Kevlar inner liner. It is available in a gauntlet (PCS2) and wristlet (PCS2W) style.

No photo has been provided by the vendor for this product

3.34 Shelby Specialty Gloves 5226/5225

The 5225/5226 is a Gunn cut pattern glove with wing thumb and wraparound index finger. It is made of brushed pig skin, gold colored tanned cowhide, and an SEF layer laminated to an RT7100 moisture barrier. It is sewn with Kevlar thread. This glove is available in gauntlet (5226) and wristlet (5225) styles. The 4-inch wristlet is double-layer Nomex. These gloves are made in the United States.



5226
Image courtesy of Shelby Specialty Gloves

3.35 Shelby Specialty Gloves 5228/5227

The 5227/5228 is a Gunn cut pattern glove with wing thumb and wraparound index finger. It is made of blue-colored tanned cowhide with a RT7100 moisture barrier laminated to a SEF thermal liner. It is sewn with Kevlar thread throughout. This glove is available in gauntlet (5228) and wristlet (5227) styles. The 4-inch wristlet is double-layer Nomex. These gloves are made in the United States.



5227
Image courtesy of Shelby Specialty Gloves

3.36 Shelby Specialty Gloves 5280G/5280

The 5280/5280G is a Gunn cut pattern glove with wing thumb and wraparound index finger. It is made with brushed pig skin on the palm and elkhide on the back. The RT7100 moisture barrier is laminated to the SEF thermal liner. It is sewn with Kevlar thread throughout. This glove is available in gauntlet (5280G) and wristlet (5280) styles. The 4-inch wristlet is double-layer Nomex. These gloves are made in the United States.



5280G
Image courtesy of
Shelby Specialty Gloves

3.37 Shelby Specialty Gloves 5282G/5282

The 5282/5282G is a Gunn cut pattern glove with wing thumb and wraparound index finger. It has an elkhide outer shell and RT7100 moisture barrier laminated to the SEF thermal liner. It is sewn with Kevlar thread. This glove is available in gauntlet (5282G) and wristlet (5282) styles. The 4-inch wristlet is double-layer Nomex. These gloves are made in the United States.



5282
Image courtesy of
Shelby Specialty Gloves

3.38 Shelby Specialty Gloves 5283/5281

The 5281/5283 is a Gunn cut pattern glove with wing thumb and wraparound index finger. It has a cowhide leather outer shell, Crosstech moisture barrier, and a Kevlar and SEF thermal liner. It also has secondary thermal protection zones at the back of the hand and fingers at compression areas. The glove is sewn with Kevlar thread. It is available in gauntlet (5283) and wristlet (5281) styles. The 3-inch wristlet is double-layer Nomex. These gloves are made in the United States.



5283
Image courtesy of
Shelby Specialty Gloves

3.39 Shelby Specialty Gloves 5285/5284

The 5284/5285 is a Gunn cut pattern glove with wing thumb and wraparound index finger. It has a cowhide palm and the back of the hand is made of stretch Kevlar. The back of the hand has an air-locking thermal spacer of insular Kevlar/Nomex. The moisture barrier is a Crosstech insert laminated to the thermal lining. The fingertip backs are silver reflective material. The glove is sewn with Kevlar thread. It is available in gauntlet (5285) and wristlet (5284) styles. The 4-inch wristlet is double-layer Nomex. These gloves are made in the United States.



5285
Image courtesy of
Shelby Specialty Gloves

3.40 Shelby Specialty Gloves Flex-Tuff 5292/5291

The Flex-Tuff 5291/5292 is a pre-curved, multi-dimensional glove with tapered index finger and Kevlar flex-points sewn on thumb, middle, ring, and little fingers. It has a cowhide outer shell, a Crosstech moisture barrier laminated to fleece, and a Kevlar and nonwoven fleece thermal lining. A thermal spacer on the back of the hand and additional thermal layers on the finger and thumb backs provide additional thermal protection. The glove has a wrist-blocking system to help prevent glove shifting during use. The glove is sewn with Kevlar thread. It is available in gauntlet (5292) and wristlet (5291) styles. The 3-inch wristlet is double-layer Nomex. These gloves are made in the United States.



5291
Image courtesy of
Shelby Specialty Gloves

3.41 Techtrade LLC, Pro-Tech 8 Fusion PT8-SC/PT8- LC

The Pro-Tech 8 Fusion is a multilayer glove. The palm consists of a goat skin exterior, a Kevlar/Nomex layer, and an inner liner of modacrylic. The knuckle guard has a Kevlar outer layer, two layers of silicon carbide fused to Kevlar, an additional layer of Kevlar, and a modacrylic knit inner liner. The rest of the back consists of suede leather and Kevlar, and finger fourchettes are made from Kevlar/Nomex. The glove is lined with a double layer of breathable, polyurethane membrane as a moisture barrier. The Fusion is available with a short cuff (gauntlet style, model number PT8-SC) and long cuff (wristlet style, model number PT8-LC) with a Kevlar inner elastic cuff band.



PT8-SC

Image courtesy of Techtrade LLC

3.42 Techtrade LLC, Pro-Tech 8 Titan PT8-TN SC/PT8-TN LC

The Pro-Tech 8 Titan is a multilayer glove with a goat skin leather palm, a Kevlar/Nomex layer, and a full palm-side Nomex inner liner. The back side of the glove consists of goat skin leather, a Kevlar layer, a Nomex layer, and a Nomex inner liner. The knuckle guard contains layers of Kevlar, Nomex, and silicon carbide. Finger fourchettes are comprised of a Kevlar/Nomex outer layer and two Nomex inner layers. The glove is lined with a double layer of breathable, polyurethane membrane as a moisture barrier. The Titan is available with a short cuff (gauntlet style, PT8-SC) and long cuff (wristlet style, PT8-TN LC) with a Kevlar inner elastic cuff band.



PT8-TN SC

Image courtesy of Techtrade LLC

3.43 Techtrade LLC, Pro-Tech 8 Titan K PT8-TNK SC/PT8-TNK LC

The Pro-Tech 8 Titan K is the kangaroo leather version of the Titan glove model. It has a kangaroo leather palm over layers of Kevlar/Nomex and Nomex. The back side of the glove consists of kangaroo leather, a Kevlar layer, a Nomex layer, and a Nomex inner liner. The knuckle guard contains layers of Kevlar, Nomex, and silicon carbide. Finger fourchettes are comprised of a Kevlar/Nomex outer layer and two Nomex inner layers. The glove is lined with a double layer of breathable, polyurethane membrane as a moisture barrier. The Titan K is available with a short cuff (gauntlet style, PT8-TNK SC) and long cuff (wristlet style, PT8-TNK LC) with a Kevlar inner elastic cuff band.



PT8-TNK SC

Image courtesy of Techtrade LLC

4. VENDOR CONTACT INFORMATION

Additional information on the structural firefighting gloves included in this market survey report can be obtained from the companies listed below. The products listed in this survey may be available from multiple vendors not listed here.

Table 4-1. Vendor Contact Information

Company	Address/Phone Number	Website/E-Mail Address
Dragon Fire	8243 Hampton Bluff Terrace Chesterfield, VA 23832 (800) 975-7059	http://dragonfiregloves.com kristi@dragonfiregloves.com
FireCraft Safety Products	1395 Grandview Avenue, Suite 10 Columbus, OH 43212 (800) 369-1800	http://firecraftsafety.com sales@firecraftsafety.com
Fire-Dex	780 South Progress Drive Medina, OH 44256 (330) 723-0000	http://firedex.com info@firedex.com
Glove Crafters Inc.	6099 Heber Springs Road W. Quitman, AR 72131 (501) 589-5336	http://glovecrafters.com sales@glovecrafters.com
Honeywell First Responder Products	1 Innovation Court Dayton, OH 45414 (800) 688-6148	http://honeywellfirstresponder.com james.walter@honeywell.com
Innotex	P.O. Box 2980 275 Gouin Street Richmond (Quebec) Canada J0B 2H0 (888) 821-3121	http://innotexprotection.com info@innotexprotection.com
Lion	7200 Poe Avenue, Suite 400 Dayton, OH 45414 (937) 898-1949	http://lionprotects.com ordersupport@lionprotects.com
Paul Conway Shields	14100 West Cleveland Avenue New Berlin, WI 53151 (800) 955-8489	http://paulconwayshields.com service@paulconwayshields.com
Shelby Specialty Gloves	3035 Centre Oak Way, Suite 102 Germantown, TN 38138 (901) 360-8928	http://shelbyglove.com Tragan@shelbyglove.com
Techtrade LLC	22 Hudson Place Hoboken, NJ 07030 (866) 491-TECH	http://pro-tech8.com info@pro-tech8.com

5. SUMMARY

This market survey report provides information on 43 models of structural firefighting gloves from 10 different companies. Most of the gloves are available with both gauntlet and wristlet cuffs; three are available with convertible cuffs that can be used as either wristlet or gauntlet, and three are available with longer sleeve extensions. All but one use animal skins of cow, pig, goat, elk, or kangaroo in the outer shell. The inner layers are made of a wide variety of synthetic fabrics for moisture and thermal barriers, and wristlet cuffs are typically of aramid knit. The majority of gloves are 2D designs and many incorporate special seams, finger placement, or knuckle, palm, or fingertip straps for additional dexterity or protection. All of the models are available in at least six sizes, although many come in additional sizes. Sixteen models are also available in cadet sizes with shorter finger lengths.

Prices vary from \$56 to \$135 with an average of about \$87 per pair. All of the gloves in this survey are stated to be certified to NFPA 1971 and meet minimum requirements for flame and conductive heat resistance, liquid penetration, cut/puncture resistance, hand function, and grip. Dexterity and protection are often tradeoffs in design, and a firefighter's experience with any particular glove will depend on how it fits that individual's hand shape and the manual techniques used for various tasks. Emergency responder agencies that are considering purchasing structural firefighting gloves should carefully research each product's overall capabilities and limitations in relation to their agency's operational needs.