



System Assessment and Validation for Emergency Responders (SAVER)

Life Safety Ropes Market Survey Report

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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 commercial equipment and systems, and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL). The SAVER Program mission includes:

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

Information provided by the SAVER Program will be 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. Further, SAVER focuses primarily on two main questions for the emergency responder community: “What equipment is available?” and “How does it perform?”

As a SAVER Program Technical Agent, the U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC) has been tasked to provide expertise and analysis on key subject areas, such as personal protective equipment, rapid deployment shelters, and shelf stable food. In support of this tasking, NSRDEC conducted a market survey of life safety ropes that fall under AEL category reference number 03OE-05-ROPE. The following report presents the survey’s findings.

Visit the SAVER website at www.dhs.gov/science-and-technology/SAVER for more information on the SAVER Program or to view additional reports on life safety ropes and other technologies.

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1. MARKET SURVEY OBJECTIVES

The purpose of this market survey report is to provide information on currently available life safety ropes (Authorized Equipment List [AEL] reference number 03OE-05-ROPE). The information provided herein is meant to be useful in determining the types of life safety ropes available for use by responders.

Life safety ropes are one of the primary components that enable human rescue from areas of limited or perilous access. The ropes used in these scenarios are built to support and manipulate the weight of one or more people through a range of rescue scenarios. Several classifications of rope are identified within the heading of life safety rope, each for use in mission specific applications. The overarching benefit of using the appropriate life safety rope is enhanced safety and control of the rescuer, as well as the person being rescued. Thorough understanding of operational applications, maintenance, and supporting equipment of life safety ropes (e.g., harness, carabiners) can enhance responder safety on the job, potentially preventing injury to the responder and the person being rescued.

This market survey represents an effort to exercise due diligence in the collection of valuable support information for emergency responders. It is not intended to be a complete catalog of all available life safety ropes.

2. RESEARCH METHODOLOGY

The market research methods used in this survey comply with the System Assessment and Validation for Emergency Responders (SAVER) Program guidelines for market surveys. In addition, these market research procedures comply with the Federal Acquisition Regulation (FAR); specifically, Section 10, Market Research.

Four methodologies were used in the life safety ropes market research: (1) Internet research, including product catalogs; (2) request for information; (3) subject matter expertise; and (4) a focus group.

2.1 Internet Research

The Internet was employed as a resource in this survey. Specific product information, including manufacturers, features, and specifications, was identified by utilizing this resource.

2.2 Request for Information (RFI)

An RFI was posted on the Federal Business Opportunities (FedBizOpps) website (<http://www.fbo.gov>) in January 2011, inviting manufacturers to provide information on their currently available life safety ropes. The notice clarified several important aspects of the request: (1) it is not a request for proposals; (2) it is for information gathering and planning purposes only; (3) the Government does not intend to award a contract based on the RFI or otherwise pay for the information solicited; and (4) there will not be an endorsement for any product or manufacturer. Manufacturers were asked to identify and describe their particular

brand or product, to provide pertinent information regarding their rope products, and to provide their company address and contact information.

2.3 Subject Matter Expert (SME)

SMEs from the U.S. Army Natick Soldier Research, Development and Engineering Center, as well as other government agencies, provided relevant technical expertise in the review of information and development of this report.

2.4 Focus Group

Emergency response personnel participated in a SAVER focus group. Participants possessed backgrounds in fire, law enforcement, and emergency medical services, and they represented a broad range of geographic regions and environments. The group's primary purpose was to help identify criteria that users might consider important and useful when procuring this type of equipment. For more information on the focus group deliberations, refer to the *Life Safety Ropes Focus Group Report* located in the SAVER website at www.dhs.gov/science-and-technology/SAVER.

3. INTRODUCTION TO LIFE SAFETY ROPE TECHNOLOGIES

Emergency responders may be required to access steep, vertical, and near vertical terrain; ascend or descend from multi-story buildings; and conduct search, rescue, and recovery in maritime environments. Life safety ropes are one of the primary components that enable successful completion of these missions. National Fire Protection Association (NFPA) 1983 defines life safety rope as, "rope dedicated solely to supporting people during rescue, fire-fighting, other emergency operations, or during training evolutions." When combined with auxiliary equipment such as harnesses and carabiners, "an extremely adaptable system is created to support operational activities across the emergency responder spectrum (NFPA 1983)."

In order to qualify for Federal grant funding to support the purchase of life safety rope systems, the emergency responder community can use the U.S. Department of Homeland Security (DHS) AEL in their selection of equipment for procurement. DHS directs state and local responders to refer to specific program guidelines for the list of authorized equipment eligible for purchase through that particular grant program. The AEL refers to life safety ropes as "certified as compliant with *NFPA 1983, Standard on Life Safety Rope and Equipment for Emergency Services*."

3.1 Standards

The following standards address life safety ropes and their application to the emergency responder community. These standards do not encompass all known standards in relation to life safety ropes, but rather cover the relevant standards to support the most common emergency responder applications.

NFPA 1983, Standard on Life Safety Rope and Equipment for Emergency Services, 2012 Edition (NFPA 1983:2012). This standard, outlined in Table 3-1, identifies the requirements for the design, performance, testing, and certification for life safety ropes and the system components.

Table 3-1 NFPA 1983:2012 Requirements for Life Safety Ropes

Designation	Life Safety Rope Requirements
Summary	NFPA 1983:2012 specifies the minimum design, performance, certification requirements, and the test methods for life safety ropes, which include escape ropes, throw lines, life safety harnesses, belts, and auxiliary equipment used by emergency responders.
Requirements	<ol style="list-style-type: none"> (1) When tested in accordance with the Cordage Institute Standard CI 1801, the ropes shall meet the following minimum breaking strength (MBS) requirements: <ul style="list-style-type: none"> - 40 kilonewton (kN) (8,992 pound force [lbf]) for general-use and moderate elongation laid life safety ropes; - 20 kN (4,496 lbf) for technical-use life safety ropes; - 13.5 kN (3,034 lbf) for escape ropes and fire escape ropes; and - 13 kN (2,923 lbf) for throw lines. (2) When tested in accordance with the Cordage Institute Standard CI 1801, general-use, technical-use, escape rope, and fire escape rope shall meet the following elongation requirements: <ul style="list-style-type: none"> - Minimum elongation of 1 percent and maximum elongation of 10 percent at 10 percent of breaking strength. (3) When tested in accordance with the Cordage Institute Standard CI 1801, moderate elongation laid life safety rope shall meet the following elongation requirements: <ul style="list-style-type: none"> - Minimum elongation of 1 percent and maximum elongation of 25 percent at 10 percent of breaking strength. (4) When tested in accordance with ASTM E 794, the general-use, technical-use, escape rope, fire escape rope, and moderate elongation laid life safety ropes shall not have a melting point of less than 204°C (400°F).

NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, 2007 Edition (NFPA 1500:2007). This standard, outlined in Table 3-2, identifies the principles for usage, inspection, and maintenance of life safety ropes identified in NFPA 1983 for use in rescue, fire suppression, emergency medical services, hazardous materials operations, special operations, and related activities.

Table 3-2 NFPA 1500:2007 Requirements for Life Safety Ropes

Designation	Fire Department Occupational Safety and Health Program Requirements
Summary	NFPA 1500:2007 specifies safety requirements for those members involved in rescue, fire suppression, emergency medical services, hazardous materials operations, special operations, and related activities.
Requirements	<ol style="list-style-type: none"> (1) All safety ropes, harnesses, and hardware used by fire departments shall meet NFPA 1983, <i>Standard on Life Safety Rope and Equipment for Emergency Services</i>. (2) Ropes used to support the weight of members or other persons during rescue, firefighting, other emergency services, or training evolutions shall be life safety rope and shall meet the requirements of NFPA 1983. (3) Life safety rope used for fire rescue at fires or other emergency incidents or for training shall be permitted to be reused if inspected before and after each use in accordance with the manufacturers' instructions. (4) Records shall be maintained to document the use of each life safety rope used at fires and other emergency incidents or for training.

CI 1801, Low Stretch and Static Kernmantle Life Safety Ropes, 2007 Edition (CI 1801:2007). This standard, outlined in Table 3-3, identifies test methods and standards for measuring diameter, minimum breaking strength, elongation, and knotability of static and low stretch life safety ropes.

Table 3-3 CI 1801:2007 Low Stretch and Static Kernmantle Life Safety Ropes

Designation	Life Safety Rope Requirements
Summary	CI 1801:2007 specifies general characteristics of low stretch and kernmantle ropes used for life safety applications, whatever their constituent material. This standard identifies test methods for determining the specified characteristics as well.
Requirements	<ol style="list-style-type: none"> (1) Diameter testing determines the actual reported diameter of the rope to the nearest 0.5 millimeter (mm) (0.2 inches [in]). This test requires two unused rope samples at least 760 mm (30 in) in length. All measurements shall fall within 5 percent of actual diameter.

CI 1805, 3 Strand Life Safety Ropes Moderate Stretch, 2008 Edition (CI 1805:2008). This standard, outlined in Table 3-4, identifies test methods and standards for measuring diameter, minimum breaking strength, elongation, and knotability of three strand laid ropes.

Table 3-4 CI 1805:2008 - 3 Strand Life Safety Ropes Moderate Stretch

Designation	Life Safety Rope Requirements
Summary	CI 1805:2008 specifies general characteristics of three strand laid ropes used for life safety applications, whatever their constituent material. This standard identifies test methods for determining the specified characteristics as well.
Requirements	(1) Diameter testing determines the actual reported diameter of the rope to the nearest 0.5 mm (0.2 in). This test requires two unused rope samples at least 760 mm (30 in) in length. These samples are held in reference tension determined by the estimate diameter. All measurements shall fall within 5 percent of actual diameter.

3.2 Test Methods

The following test method is applicable or used by industry for life safety ropes. The information includes a short summary and is intended as a brief overview.

ASTM E 794 – *Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis*. This standard test method is generally applicable to thermally stable materials with well-defined melting temperatures. The test method involves heating the constituent materials that compose the rope at a controlled rate in a controlled environment. This process will determine the melting temperature for each rope certified to NFPA 1983 to ensure potential heat loads will not reduce their performance at temperatures below 204°C (400°F). In addition, fire escape rope is also required to pass a test method specific to NFPA 1983 as an “elevated temperature rope test.” This test ensures that ropes will hold a 300 pound load at 600°C for 45 seconds and 400°C for 5 minutes.

3.3 Equipment Terms

The following definitions were collected from Internet sources, industry information websites, and manufacturer product information.

Breaking Strength. For rope, the nominal force (or load) that would be expected to break or rupture a single specimen in a tensile test conducted under a specified procedure.

Carabiner. An oval or D-shaped metal, load bearing connector with a self-closing gate used to join other components of a rope system.

Elongation. The ratio of the extension of a rope, under an applied load, to the length of the rope prior to the application of the load (expressed as a percentage).

Escape Rope. A rope carried for the sole purpose of allowing emergency escape for the carrier. These ropes are designed for one time use to support the rescue of a single person.

Fall Factor. A number between 0 and 2 which measures a fall's severity by dividing the distance fallen by the amount of rope used to arrest the fall. This number will be between 0 and 1 below an anchor point and between 1 and 2 above an anchor point. Higher fall factors relate to higher potential for injury.

Fire Escape Rope. A rope carried for the sole purpose of allowing emergency escape for the carrier in very high heat environments. These ropes are designed for one time use to support the rescue of a single person.

General-Use Life Safety Rope. High strength, high durability rope designed to withstand the wear and tear of normal use. NFPA requires these ropes to be 11 mm to 16 mm in diameter with an MBS of 40 kN. High MBS and thickness requirements often lead to increased weight, durability, versatility, and reduced flexibility.

Impact Force. The sudden application of force felt by the climber or rescuer and equipment at the termination of a fall.

Kernmantle Rope. Rope consisting of a twisted parallel core (kern) and a tightly braided outer sheath (mantle). This construction allows for tailored rope properties (i.e., strength, stretch, etc.) of the inner core while maintaining maximum durability from the properties of the outer sheath.

Life Safety Rope. Rope dedicated solely for the purpose of supporting people during rescue, fire-fighting, other emergency operations, or during training evolutions.

Minimum Breaking Strength (MBS). For low stretch and static kernmantle ropes, the statistically derived value for breaking strength at or above, which approximately 99.9 percent of all similar ropes would be expected to perform.

Moderate Elongation Laid Life Saving Rope. A rope with significantly more stretch than general-use, technical-use, escape rope, and fire escape rope.

Static Rope. A rope exhibiting minimum elongation under load generally used in rescue situations where lowering and raising is a normal task. These tasks are more efficient with this type of rope due to the lack of stretch in the rope.

Technical-Use Life Safety Rope. High strength, moderate durability rope designed to maximize performance of highly proficient users. NFPA requires these ropes to be less than 12.5 mm in diameter with an MBS of 20 kN. Lower MBS and thickness requirements than general-use rope often lead to reduced weight and increased flexibility at the expense of durability and versatility.

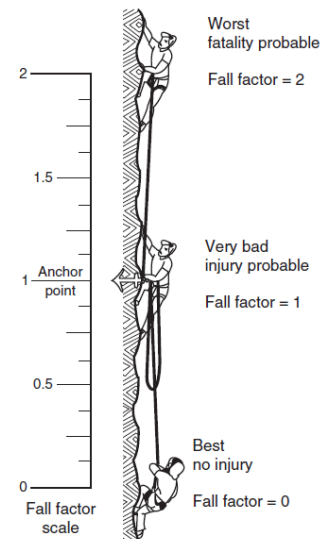


Image Courtesy of NFPA

Figure 3-1 - Fall Factor

Throw Line. A floating, one person rope that is intended to be thrown to a person during water rescues or used as a tether for rescuers entering the water.

Working Load. The maximum load that a rope is designed to carry without causing damage to the components of the rope.

3.4 Equipment Applications

Emergency responders use various life safety ropes in numerous operational scenarios. Listed below are some of the more common scenarios:

- Tactical operations such as rappelling down a building;
- Debris removal;
- Crime scene investigation requiring movement on steep terrain;
- Medical rescue requiring movement on steep terrain;
- Extraction/rescue such as confined space rescue;
- Water rescue; and
- Diving rescue.

4. EQUIPMENT INFORMATION

Life safety ropes are textile based products generally consisting of continuous fibers spun into core or sheath components and combined to create the desired properties for a given application. Fibers are carefully chosen, spun, and oriented to provide the ideal values for breaking/tensile strength, elongation, impact absorption, durability, and handling that will maximize their utility. Life safety ropes represent a special class of rope designed to strict specifications and factors of safety to guard both the rescuer and potential victim against rope failure under even the most extreme rescue conditions. Life safety ropes certified to NFPA 1983 are recommended for applications when the user is working beneath an anchor point and the fall factor is less than 0.25.

Life safety ropes, as defined in the 2012 edition of NFPA 1983, are classified into six categories: general-use, technical-use, throw line, escape rope, fire escape rope, and moderate elongation laid life safety rope. Each rope category has a specific use in emergency application depending on mission scenarios that may have different requirements for loads, durability, and elongation.

5. CURRENTLY AVAILABLE LIFE SAFETY ROPES

Since the initiation of this market survey, NFPA 1983's 2012 edition was released, which updated terminologies and broadened the scope of certifiable rope categories. During the preparation of this report, no ropes had yet been certified to the NFPA 1983:2012 (sixth edition). The 2006 edition of this standard identified only general-use, light-use (updated to technical-use in the 2012 edition), throw lines, and escape rope. The ropes certified to the 2006 edition of the standard will be identified in this market survey to avoid assumptions of future certification.

Buyers should be aware, however, that newly certified products will be available soon to include fire escape rope and moderate elongation laid life safety rope. If organizational or mission requirements demand certified products, consideration should be given to delaying the purchase of fire escape rope or moderate elongation laid life safety rope until certification is complete.

The market for life safety ropes is reasonably large and most vendors make ropes in a variety of sizes, colors, lengths, and styles. Many vendors of certified ropes support custom sizing of their products. These vendors will work with customers to provide specific performance characteristics that may fall outside or above the NFPA specifications. An example of non-standard performance is the requirement for water resistant ropes for water rescue and diving rescue. These applications require that the ropes perform to the standard while submerged in either fresh or salt water. Specific inquiries to the degree of water resistance, rope care, and maintenance should be identified before purchase is made.

Tables 5-1 to 5-4 below identify general-use, light-use (technical-use), escape rope, and throw lines that are currently certified to NFPA 1983:2006. Each table identifies the manufacturer, model, diameter, MBS, percent elongation, price per foot, and rope weight.

Product data presented in this report was obtained from manufacturers and distributors and their websites, as well as the Underwriter Laboratories' (UL) central database of certified products. UL acts as a certification body for many NFPA standards. As such, their database acts as a reliable source for currently certified products. Products shown in this report are a small representative sample from manufacturers that responded to an RFI and do not reflect the entire range of certified products. The information in this report has not been validated by the SAVER Program.

The ropes listed in Tables 5-1 to 5-4 are in alphabetical order by the manufacturer, then by diameter and rope weight (lowest to highest).

Table 5-1 NFPA 1983:2006 Certified General-Use Life Safety Ropes

Manufacturer	Model	Diameter	MBS	Percent Elongation	Price per Foot	Rope Weight per 100 ft
Bluewater Ropes	SafeLine	12.5 mm	44.0 kN	3.2 at 1.35 kN (300 lbf) 5.4 at 2.7 kN (600 lbf) 7.9 at 4.4 kN (1,000 lbf)	\$1.26	8.21 lbs
	Protac	13.0 mm	43.0 kN	2.9 at 1.35 kN (300 lbf) 4.8 at 2.7 kN (600 lbf) 7.1 at 4.4 kN (1,000 lbf)	\$1.20	8.41 lbs
	Armor-Tech	13.0 mm	42.0 kN	3.4 at 1.35 kN (300 lbf) 5.6 at 2.7 kN (600 lbf) 7.9 at 4.4 kN (1,000 lbf)	\$2.79	8.53 lbs
	Spec-Static	13.0 mm	42.0 kN	1.8 at 1.35 kN (300 lbf) 2.6 at 2.7 kN (600 lbf) 3.4 at 4.4 kN (1,000 lbf)	\$1.20	10.10 lbs
	SafeLine	15.5 mm	57.0 kN	1.8 at 1.35 kN (300 lbf) 3.3 at 2.7 kN (600 lbf) 5.0 at 4.4 kN (1,000 lbf)	\$1.74	12.02 lbs
Samson Rope Technologies	Vector Life Line	12.5 mm	41.0 kN	3.3 at 1.35 kN (300 lbf) 6.3 at 2.7 kN (600 lbf) 8.9 at 4.4 kN (1,000 lbf)	\$0.39	7.70 lbs
	Static Rope	13.0 mm	47.0 kN	3.2 at 1.35 kN (300 lbf) 5.8 at 2.7 kN (600 lbf) 8.6 at 4.4 kN (1,000 lbf)	\$0.67	8.00 lbs
	Static Rope	15.5 mm	50.0 kN	1.6 at 1.35 kN (300 lbf) 3.3 at 2.7 kN (600 lbf) 5.3 at 4.4 kN (1,000 lbf)	\$0.88	11.20 lbs
	HTP Static	16.0 mm	53.0 kN	0.9 at 1.35 kN (300 lbf) 1.2 at 2.7 kN (600 lbf) 1.8 at 4.4 kN (1,000 lbf)	\$1.49	12.50 lbs
Sterling Ropes	Super Static	13.0 mm	41.0 kN	3.0 at 1.35 kN (300 lbf) 4.5 at 2.7 kN (600 lbf) 7.1 at 4.4 kN (1,000 lbf)	\$1.27	7.90 lbs
	Super Static Safety Glo	13.0 mm	41.0 kN	3.0 at 1.35 kN (300 lbf) 4.5 at 2.7 kN (600 lbf) 7.1 at 4.4 kN (1,000 lbf)	\$1.35	7.90 lbs
	HTP Static	13.0 mm	40.0 kN	0.8 at 1.35 kN (300 lbf) 1.4 at 2.7 kN (600 lbf) 1.8 at 4.4 kN (1,000 lbf)	\$1.19	8.00 lbs
	Super Static	15.5 mm	48.0 kN	0.8 at 1.35 kN (300 lbf) 1.8 at 2.7 kN (600 lbf) 3.3 at 4.4 kN (1,000 lbf)	\$1.49	10.30 lbs

ft = feet, HTP = High Tenacity Polyester, kN = kilonewton, lbf = pound force, lbs = pounds, MBS = minimum breaking strength, mm = millimeter

Table 5-2 NFPA 1983:2006 Certified Light-Use Life Safety Ropes

Manufacturer	Model	Diameter	MBS	Percent Elongation	Price per Foot	Rope Weight per 100 ft
Bluewater Ropes	E-Safe	9.5 mm	32.5 kN	2.2 at 1.35 kN (300 lbf) 3.4 at 2.7 kN (600 lbf) 4.4 at 4.4 kN (1,000 lbf)	\$1.65	4.30 lbs
	Assaultline	11.0 mm	27.4 kN	2.4 at 1.35 kN (300 lbf) 4.9 at 2.7 kN (600 lbf) 7.1 at 4.4 kN (1,000 lbf)	\$1.10	6.64 lbs
	NFPA BWII	11.5 mm	32.0 kN	3.4 at 1.35 kN (300 lbf) 5.4 at 2.7 kN (600 lbf) 8.4 at 4.4 kN (1,000 lbf)	\$0.98	6.64 lbs
Samson Rope Technologies	Static Rope	9.5 mm	26.0 kN	5.2 at 1.35 kN (300 lbf) 9.8 at 2.7 kN (600 lbf) 14.3 at 4.4 kN (1,000 lbf)	\$0.41	4.20 lbs
	Vector Life Line	11.0 mm	32.0 kN	4.6 at 1.35 kN (300 lbf) 8.0 at 2.7 kN (600 lbf) 11.8 at 4.4 kN (1,000 lbf)	\$0.03	6.00 lbs
	Static Rope	11.0 mm	34.0 kN	3.8 at 1.35 kN (300 lbf) 7.4 at 2.7 kN (600 lbf) 11.0 at 4.4 kN (1,000 lbf)	\$0.52	6.00 lbs
Sterling Rope	HTP Static	11.0 mm	34.0 kN	1.7 at 1.35 kN (300 lbf) 2.2 at 2.7 kN (600 lbf) 2.8 at 4.4 kN (1,000 lbf)	\$1.04	6.50 lbs
	Tactical Response	9.5 mm	27.1 kN	3.8 at 1.35 kN (300 lbf) 6.5 at 2.7 kN (600 lbf) 8.6 at 4.4 kN (1,000 lbf)	\$1.28	4.20 lbs
	Super Static Safety Glo	10.0 mm	25.9 kN	4.2 at 1.35 kN (300 lbf) 7.4 at 2.7 kN (600 lbf) 10.3 at 4.4 kN (1,000 lbf)	n/a	4.20 lbs
	Super Static	10.0 mm	25.9 kN	4.2 at 1.35 kN (300 lbf) 7.4 at 2.7 kN (600 lbf) 10.3 at 4.4 kN (1,000 lbf)	\$0.96	4.20 lbs
	HTP Static	10.0 mm	27.0 kN	1.0 at 1.35 kN (300 lbf) 1.7 at 2.7 kN (600 lbf) 2.6 at 4.4 kN (1,000 lbf)	\$0.97	5.30 lbs
	Safety Pro	11.0 mm	32.5 kN	2.6 at 1.35 kN (300 lbf) 4.9 at 2.7 kN (600 lbf) 8.3 at 4.4 kN (1,000 lbf)	\$1.06	4.20 lbs
	Super Static	11.5 mm	30.0 kN	3.1 at 1.35 kN (300 lbf) 5.3 at 2.7 kN (600 lbf) 8.0 at 4.4 kN (1,000 lbf)	\$1.04	6.00 lbs

ft = feet, HTP = High Tenacity Polyester, kN = kilonewton, lbf = pound force, lbs = pounds, MBS = minimum breaking strength, mm = millimeter, NFPA = National Fire Protection Association, n/a = information not available

Table 5-3 NFPA 1983:2006 Certified Escape Ropes

Manufacturer	Model	Diameter	MBS	Percent Elongation	Price per Foot	Rope Weight per 100 ft.
Bluewater Ropes	Hybrid PER	7.5 mm	15.0 kN	6.4 at 1.35 kN (300 lbf) 9.4 at 2.7 kN (600 lbf) 11.9 at 4.4 kN (1,000 lbf)	\$0.94	2.75 lbs
	Escape-Tech	7.5 mm	26.0 kN	1.8 at 1.35 kN (300 lbf) 2.0 at 2.7 kN (600 lbf) 2.4 at 4.4 kN (1,000 lbf)	\$2.10	3.05 lbs
	PER	8.0 mm	19.0 kN	5.3 at 1.35 kN (300 lbf) 8.2 at 2.7 kN (600 lbf) 10.6 at 4.4 kN (1,000 lbf)	\$0.65	2.87 lbs
	Technora PER	8.0 mm	18.0 kN	5.1 at 1.35 kN (300 lbf) 7.2 at 2.7 kN (600 lbf) 8.7 at 4.4 kN (1,000 lbf)	\$1.56	3.36 lbs
	SearchLine	9.0 mm	23.0 kN	4.8 at 1.35 kN (300 lbf) 7.6 at 2.7 kN (600 lbf) 9.7 at 4.4 kN (1,000 lbf)	\$1.62	3.90 lbs
Sterling Ropes	Escape Tech	7.5 mm	17.0 kN	6.1 at 1.35 kN (300 lbf) 7.9 at 2.7 kN (600 lbf) 9.7 at 4.4 kN (1,000 lbf)	\$1.39	2.80 lbs
	TSAFE	7.5 mm	18.0 kN	4.7 at 1.35 kN (300 lbf) 8.4 at 2.7 kN (600 lbf) 10.4 at 4.4 kN (1,000 lbf)	\$1.21	2.80 lbs
	Fire Tech 32	7.5 mm	26.0 kN	1.2 at 1.35 kN (300 lbf) 1.6 at 2.7 kN (600 lbf) 2.0 at 4.4 kN (1,000 lbf)	\$1.97	3.00 lbs
	RIT 500	8.0 mm	24.0 kN	3.4 at 1.35 kN (300 lbf) 6.0 at 2.7 kN (600 lbf) 8.2 at 4.4 kN (1,000 lbf)	\$1.23	2.80 lbs
	PER	8.0 mm	17.0 kN	3.7 at 1.35 kN (300 lbf) 6.7 at 2.7 kN (600 lbf) 8.7 at 4.4 kN (1,000 lbf)	\$0.70	3.00 lbs
	PER Safety Glo	8.0 mm	17.0 kN	3.7 at 1.35 kN (300 lbf) 6.7 at 2.7 kN (600 lbf) 8.7 at 4.4 kN (1,000 lbf)	\$0.84	3.00 lbs
	RIT Response	9.0 mm	31.0 kN	1.9 at 1.35 kN (300 lbf) 2.9 at 2.7 kN (600 lbf) 3.9 at 4.4 kN (1,000 lbf)	\$1.66	4.20 lbs
	HTP	9.0 mm	23.1 kN	1.6 at 1.35 kN (300 lbf) 2.2 at 2.7 kN (600 lbf) 3.1 at 4.4 kN (1,000 lbf)	\$0.88	4.20 lbs

ft = feet, HTP = High Tenacity Polyester, kN = kilonewton, lbf = pound force, lbs = pounds, MBS = minimum breaking strength, mm = millimeter, PER = Personal Escape Rope, RIT = Rapid Intervention Team

Table 5-4 NFPA 1983:2006 Certified Throwlines

Manufacturer	Model	Diameter	MBS	Percent Elongation	Price per Foot	Rope Weight per 100 ft
Bluewater Ropes	Sure Grip	9.5 mm	19.7 kN	Not Applicable	\$1.34	3.08 lbs
Sterling Ropes	Grabline	9.5 mm	15.0 kN	Not Applicable	\$0.54	3.10 lbs
	Grabline Safety Glo	9.5 mm	15.0 kN	Not Applicable	\$0.62	3.10 lbs
	Waterline	9.5 mm	15.0 kN	Not Applicable	\$0.49	3.30 lbs
	Ultraline	9.5 mm	23.0 kN	Not Applicable	\$1.21	3.80 lbs

ft = feet, kN = kilonewton, lbf = pound force, lbs = pounds, MBS = minimum breaking strength, mm = millimeter

6. MANUFACTURER CONTACT INFORMATION

Table 6-1 includes contact information for the manufacturers listed in Tables 5-1 to 5-4. Table 6-1 also includes contact information for other manufacturers that produce NFPA 1983 certified life safety ropes according to the UL database, but may not have responded to the RFI. This list is representative of the marketplace and is not intended to be all inclusive.

Table 6-1 Product and Vendor List

Manufacturer	Address/Phone Number	Website/E-Mail
Blue Water Ropes	209 Lovvorn Road Carrollton, GA 30117 800-533-7673	http://www.bluewaterropes.com E-mail: info@bluewaterropes.com
New England Ropes Corp.	848 Airport Road Fall River, MA 02720 800-333-6679	http://www.neropes.com E-mail: neropes@neropes.com
Pelican Rope Works	4001 Carriage Drive Santa Ana, CA 92704 888-860-7673	http://www.pelicanrope.com E-mail inquiries can be submitted to above website.
RIT Rescue & Escape Systems Inc.	1900 Enterprise Parkway Suite H Twinsburg, OH 44087 800-254-2990	http://www.ritrescuesystems.com E-mail inquiries can be submitted to above website.
Pigeon Mountain Industries Inc.	4466 Highway 27 N Lafayette, GA 30728 800-282-7673	http://www.pmirope.com E-mail: custserv@pmirope.com
Samson Rope Technologies	2090 Thornton Street Ferndale, WA 98248 800-229-7673	http://www.samsonrope.com E-mail: custserv@samsonrope.com
Sterling Ropes	26 Morin Street Biddeford, ME 800-788-7673	http://www.sterlingrope.com E-mail inquiries can be submitted to above website.

7. CONCLUSION

Life safety ropes can help emergency responders maximize safety for all mission types requiring access to steep, vertical, and near vertical terrain; ascension or descension from multi-story buildings; and to conduct search, rescue, and recovery in maritime environments. Each scenario may require a specific rope design to maximize the probability of mission success. When combined with auxiliary equipment such as harnesses and carabiners, an extremely adaptable system is created to support operational activities across the emergency responder spectrum.

The list of available ropes in this report represents a small sample of those certified to NFPA1983:2006 for general-use, light-use, escape rope, and throw line applications. Future certification categories will include fire escape rope and moderate elongation laid life safety rope. Certification of products in these new categories should provide emergency responders with increased capability at an increased level of safety. Great care should be taken in the selection of life safety ropes to ensure that the ropes are appropriate for the emergency response application.

8. ADDITIONAL RESOURCES

ASTM Standard E 794, 2003, “*Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis*,” ASTM International, West Conshohocken, PA, 2003, DOI: 17APR2006, astm.org, (accessed March 2012).

CI Standard 1801, 2007, “*Low Stretch and Static Kernmantle Life Safety Rope*,” The Cordage Institute, Wayne, PA 19087, 2007, DOI: OCT 2007, ropecord.com, (accessed March 2012).

The Cordage Institute, *Terminology for Fiber Rope*, <http://www.ropecord.com/new/index.php>, (accessed March 2012).

NFPA Standard 1983, 2012, “*Fire Service Life Safety Rope and System Components*,” NFPA, Quincy, MA 02169, 2012, DOI:2JAN2012, [NFPA.org](http://nfpa.org), (accessed March 2012).

NFPA Standard 1500, 2007, “*Standard on Fire Department Occupational Safety and Health Program*,” NFPA, Quincy, MA 02169, 2007, DOI:17AUG2006, [NFPA.org](http://nfpa.org), (accessed March 2012).

Sterling Rope Company, *Guide to Rope Engineering, Design, and Use: Volume 1*, <http://www.sterlingrope.com/media/document/techmanual.pdf>, (accessed March 2012).

Underwriter Laboratories, *Online Certifications Directory*, <http://database.ul.com/cgi-bin/XYV/cgifind.new/LISEXT/1FRAME/index.html>, (accessed March 2012).