



Laser Protective Eyewear

Market Survey Report

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Science and
Technology



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FOREWORD

The National Urban Security Technology Laboratory (NUSTL) is a federal laboratory within the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T). Located in New York City, NUSTL is the only national laboratory focused exclusively on supporting the capabilities of federal, state, local, tribal, and territorial responders to address the homeland security mission. The laboratory assists responders with the use of technology to prevent, protect against, mitigate, respond to, and recover from homeland security threats and incidents. NUSTL provides expertise on a wide range of subject areas, including chemical, biological, radiological, nuclear, and explosive detection, personal protective equipment, and tools for emergency response and recovery.

NUSTL manages the System Assessment and Validation for Emergency Responders (SAVER) program, which provides information on commercially available equipment to assist response organizations in equipment selection and procurement. SAVER 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?” The SAVER program works with responders to conduct objective, practitioner-relevant, operationally-oriented assessments and validations of commercially available emergency response equipment. Having the right tools provides a safer work environment for responders and a safer community for those they serve.

NUSTL is responsible for all SAVER activities, including selecting and prioritizing program topics, developing SAVER knowledge products, and coordinating with other organizations to leverage appropriate subject matter expertise. Under the SAVER program, NUSTL conducted a market survey of commercially available laser protective eyewear. This equipment falls under the AEL reference number O1ZA-03-LASR titled Protection, Laser Eye, Personal.

SAVER reports are available at www.dhs.gov/science-and-technology/SAVER.

Visit the NUSTL website at www.dhs.gov/science-and-technology/national-urban-security-technology-laboratory or contact the lab at NUSTL@hq.dhs.gov.



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EXECUTIVE SUMMARY

In recent years, law enforcement officers have increasingly been subjected to threats from handheld lasers. These devices can be used to distract or disorient a responder and can potentially cause injuries if aimed directly at a person's eyes. In response to this threat, responders can use laser eye protection to shield their eyes from potentially harmful or disruptive lasers. This eye protection is designed to block certain wavelengths of light while allowing other wavelengths in the visible spectrum to pass through.

Between July and December 2023, the Systems Assessment and Validation for Emergency Responders (SAVER) program conducted a market survey of commercially available laser protective eyewear. This market survey report is based on information gathered from manufacturer and vendor websites, internet research, industry publications and a government-issued request for information that was posted on the System for Award Management website. The survey identified 39 relevant products ranging in price from \$25 to \$434.

The purpose of this market survey is to provide emergency responders with information that will guide first response agencies in making operational and procurement decisions. Emergency responder agencies should consider overall capabilities, technical specifications and limitations of performance in relation to their agency's operational needs when making equipment selections. The performance of these products and the information included in this report have not been independently verified by the SAVER program.

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1.0 INTRODUCTION

In recent years, higher power handheld lasers, with power levels in the 5 mW to 5-Watt range, have become commercially available. They are commonly used for long-range applications, such as pointing out distant objects in the sky for astronomy or as signaling devices for hikers and campers in low-light conditions. High-power, handheld lasers are inexpensive, easy to obtain, easy to conceal and carry, and simple to use, but they can also be potentially dangerous: if aimed directly at a person's eyes, they can cause temporary or permanent eyesight damage with only momentary exposure.

Low-power laser pointers, often used to enhance a visual presentation in business or educational settings, have been commonplace for many years. These lasers are typically considered safe because the power level is limited to less than 5 milliwatts (mW), and a person exposed to this type of laser can blink or look away without experiencing eye injury. [1] High-power lasers, however, are more dangerous to the human eye because the body's aversion response does not work fast enough when a laser's power level is above 5 mW. [1] This means that even a momentary exposure can potentially cause eye damage.

High-power handheld lasers are also increasingly used for nefarious purposes, such as to distract aircraft pilots during low-altitude flights. These lasers have also been used to distract, disorient or injure first responders. Many accounts have been reported of lasers being used against law enforcement officers during public gatherings and violent civil unrest. In response to this emerging threat, law enforcement agencies are starting to acquire various types of laser protective eyewear to protect against high-power handheld lasers.

Between July and December 2023, the System Assessment and Validation for Emergency Responders (SAVER) program conducted a market survey of laser protective eyewear. This market survey report is based on information gathered from manufacturer and vendor websites, internet research, industry publications, and a government-issued [request for information \(RFI\)](#) that was posted on the System for Award Management website. The U.S. Department of Homeland Security (DHS) Science and Technology Directorate's (S&T's) Technology Scouting Group also contributed to the market research used in the development of this report. Due diligence was performed to develop a report that is representative of current products available in the marketplace.

This report covers four types of laser protective eyewear products:

1. Glasses and goggles
2. Face shields
3. Air-purifying respirator (APR) and self-contained breathing apparatus (SCBA) outserts
4. Films that can be applied to face shields, glasses or goggles

Products included in this report meet the following criteria:

- Are commercially available and can be purchased and used by a responder
- As a single unit, can protect against both green and blue lasers (minimum), with a minimum optical density of two for each spectrum
- Have minimum visible light transmission (VLT) ratings of at least 40% for glasses and goggles and at least 20% for face shields, films and outserts

2.0 LASER PROTECTIVE EYEWEAR OVERVIEW

Laser eye protection shields the eyes from harmful radiation by blocking certain wavelengths of light while allowing other wavelengths in the visible spectrum to pass through. To understand this more fully, relevant terms used to specify laser eye protection are described below:

- **Optical Density (OD)** is a logarithmic measure of the amount of energy that passes through an optical filter at a specified wavelength. A higher OD value corresponds to greater attenuation. For instance, an OD of one signifies a tenfold reduction in light intensity (10x), an OD of two indicates a hundredfold reduction (100x), and so on. The OD ratings of laser protective eyewear specify how much energy is blocked at specific laser wavelengths.
- **Visible light** refers to radiant energy in the electromagnetic spectrum that is visible to the human eye, in the range of approximately 400 to 700 nanometers (nm).
- **Visible light transmission (VLT)** is the amount of visible light allowed to pass through a lens and is expressed as a percentage. A higher VLT percentage means more visible light passes through the lens. Laser protective eyewear is designed to optimize the balance of light transmitted for the user to see while reducing potential exposure to specific laser wavelengths.

2.1 Current Technologies

Laser protective eyewear is available in a variety of form factors. Protective lenses can be incorporated into glasses and goggles or provided as inserts for tactical eyewear. Face shields can also be constructed with special materials to provide laser protection. Some manufacturers offer laser protective films that can be applied to safety glasses or face shields.

Laser protective lenses are fabricated from either glass or polycarbonate and are designed to filter laser light of specific wavelengths. Polycarbonate lenses are manufactured by mixing clear polycarbonate with dyes or other light absorbing materials that provide laser filtering. The material is then formed into eyewear lenses through a thermal injection-molding process. Several different dyes can be combined to provide protection from multiple laser wavelengths. Polycarbonate lenses are lighter weight and less costly than glass lenses but tend to have slightly lower VLT values.

Glass lenses are created by infusing the glass with metal ions or other similar materials as it is formulated. This process provides differing levels of OD at varying wavelengths depending on the density and type of additives used. The glass sheets are cut into smaller squares and heated in kilns where they are molded to the desired curvature. The lenses are then polished to a specified thickness and cut to the required shape for use in various frame styles. Glass lenses can be more easily fabricated as prescription eyewear when compared to polycarbonate lenses.



Figure 2-1 Laser Protective Glasses and Goggles

Image credit: Cascade Laser

Additionally, some manufacturers offer laser protective laminate films that can be applied to tactical glasses and face shields. Laser protective films are lightweight and generally have similar OD values as compared to protective lenses, but their VLT ratings tend to be lower. They are often applied as a strip at the top of a face shield so that if a laser threat is encountered, the wearer can lower their head and look through the protective strip. This is not as an effective solution as a fully protected face shield, since higher-power lasers can cause eye injuries nearly instantly before a responder can react to the threat. Care should be taken when applying the film, as optical distortion could occur if the laminate is not smooth and flush to the surface.

2.2 Selection Considerations

Commercially available handheld lasers are available in a variety of colors, such as violet, blue, green and red. No single laser protective lens can efficiently block all of these laser wavelengths, as to do so would result in a very low VLT rating, effectively making the eyewear unusable. In 2016, the Federal Aviation Administration started tracking the number of laser incidents at U.S. airports and summarizing the results in a yearly report. Based on the 2022 report [2] the most common laser colors encountered were green (84%) and blue (12%), so all products covered in this report are designed to filter both green and blue lasers at a minimum.

The selected minimum OD requirement for all the protective lenses in this report is two. Note that an OD 2 filter does not guarantee complete protection against all handheld laser threats, and that higher power handheld lasers could still cause deleterious effects from momentary exposure even with an OD 2 filter.

Another important consideration is the visible light transmission, or VLT. The higher the VLT rating, the more visible light will pass through the lens, allowing the wearer to see their surroundings more clearly. Laser protective lenses with VLTs less than 25% may not be suitable for use at night or in low-light conditions.

Comfort is another consideration when choosing laser protective eyewear. Glass lenses tend to have better VLT ratings as compared to polycarbonate lenses, but they are also heavier and may not be as comfortable to wear over long periods. Glass lenses can also be more easily fabricated as prescription eyewear, although some manufacturers offer prescription inserts for their polycarbonate lens eyewear.

For glasses and goggles, there are a variety of frame styles to choose from, including aviator style, wrap-around, flip-up, and a few that are designed to fit over prescription eyewear. For detailed sizing information and images of the available styles, it is recommended to visit the specific product websites of products noted in Section 3.0.

Laser protective face shields can be particularly useful during instances of civil unrest where laser threats may be present. The APR and SCBA outserts are another valuable tool, designed to fit over the visors of the respirator devices. This provides laser protection in situations where an APR or SCBA is necessary. Additionally, laminate films offer a cost-effective solution for enhancing existing face shields and/or glasses with laser protection, eliminating the need to purchase new tactical equipment.

2.3 Standards for Laser Protective Eyewear

Three standards that specifically address eye protection against lasers, as well as two U.S. standards that address protection against other eye hazards, are described in the subsections below.

2.3.1 Standards for Eye Protection Against Lasers

To have confidence that eye protection will protect against lasers, at least one of the standards listed here must be used by manufacturers to assess and demonstrate performance.

ANSI Z136.1-2022, *American National Standard for the Safe Use of Lasers*. This standard sets recommended guidelines for the safe use of lasers that operate at wavelengths between 180 nm and 1000 micrometers (μm). It also defines laser classifications and establishes specific controls to minimize hazards for those who work with them. [3]

EN 207:2017, *Personal eye-protection equipment. Filters and eye-protectors against laser radiation (laser eye-protectors)*. This European standard applies to eye-protectors used for protection against accidental exposure to laser radiation. It defines the requirements, test methods and markings. [4]

ISO 19818-1:2021, *Eye and face protection, Protection against laser radiation, Part 1: Requirements and test methods*. This standard is applicable to laser eye protection intended to protect against accidental exposure to lasers. [5]

2.3.2 Other Protective Eyewear Standards

There are several standards that apply to eye protection against hazards other than lasers, and the following are relevant for responders operating at public order events.


ANSI Z87.1-2020, *American National Standard for Occupational and Educational Personal Eye and Face Protection Devices*. This standard prescribes the design, performance specifications, and marking of safety eye and face products worn by workers in occupational settings. Products can be certified to Z87.1 or Z87+, which is a higher impact standard. [6]

MIL-PRF-32432A (2018), *Performance Specification: Military Combat Eye Protection (MCEP) System*. This standard establishes the performance specifications for military combat eye protection products to safeguard against dust, flying debris, and ballistic hazards. [7]

2.4 Emerging Technologies

In 2020, the Irregular Warfare Technical Support Directorate funded the development of laser protective eyewear that filters multiple portions of the electromagnetic spectrum while minimally reducing visible light transmission. The eyewear, intended for U.S. public safety and military operators, had the following requirements:

- Eye protection against:
 - red (620–750 nm) (minimum requirement)
 - green (495–570 nm) (minimum requirement)
 - blue (450–495 nm) (desired)
 - violet (380–450 nm) (desired)
- VLT of 40% (minimum requirement), 80% (desired)



The technology developer, Advanced Material Development (AMD), completed the project in 2023. The protection is based on bio-inspired photonic crystal technology made into super-thin layers and assembled into a multiwavelength coating. The coating achieves OD > 1.5 at the red, green, blue, and violet wavelengths with a VLT of 70%. Based on the success with visible wavelengths, the Irregular Warfare Technical Support Directorate is funding a project to extend protection into the near-infrared spectrum.

Although the coating can be applied to spectacle lenses, face shields, wind shields, and other protective products, incorporation of the technology into such products has not yet been achieved.

3.0 PRODUCT INFORMATION

This section provides information on 39 laser protective eyewear products, ranging in price from \$25 to \$434. Product data was obtained directly from the manufacturer or distributor, or their respective websites. All products are distributed by their manufacturers with only two exceptions; a note on distribution is included in the detailed product information for those two options. Table 3-1 provides a product comparison of laser protective glasses and goggles, while Table 3-2 provides a product comparison of face shields, films and outserts. Information in the tables is listed alphabetically, first by product type and then by manufacturer. The information in Section 3.0 has not been independently verified by the SAVER program.

Below are definitions of the product information in Tables 3-1 and 3-2, listed in column order.

Manufacturer refers to the maker of the product.

Product refers to the name and/or part number of the product. For glasses and goggles, the part number refers to the lens filter, which can be incorporated into many different frame styles.

Type refers to the form factor of the product (glasses, goggles, face shields, films or outserts).

Filter Material refers to the substance used to make the filter.

OD @ Wavelength refers to the optical density of the filter at various wavelengths. Nominal wavelengths for the various laser colors are: violet @ 405 nm, blue @ 445 nm, green @ 532 nm.

VLT, which stands for visible light transmission, refers to the amount of visible light that passes through the filter.

Compliance with laser safety standards lists the standards to which the product is certified.

MSRP indicates the manufacturer's suggested retail price in U.S. dollars.

Table 3-1 Product Comparison Matrix for Glasses and Goggles

Manufacturer	Product	Type	Filter Material*	OD @ Wavelength	VLT	Compliance with laser safety standards	MSRP
Cascade Laser	LSEG-AKP	Glasses, goggles	PC	>6 @ 190–532 nm (violet, blue, green) >6 @ 5000–11,000 nm	46%	ANSI Z136.1	\$90–\$135
Cascade Laser	LSEP-ARG	Glasses, goggles	PC	>7 @ 180–532 nm (violet, blue, green)	48%	ANSI Z136.1, EN 207	\$105
DiOptika	LG-005	Glasses	PC	>7 @ 190–532 nm (violet, blue, green)	48%	ANSI Z136.1, EN 207	\$92
Edmund Optics	LS02	Glasses, goggles	PC	>7 @ 180–532 nm (violet, blue, green)	48%	ANSI Z136.1, EN 207	\$122
Kentek	4501	Glasses, goggles	PC	>7 @ 190–380 nm >4 @ 401–520 nm (violet, blue) 3-4 @ 532 nm (green) >7 @ 5000–11,000 nm	60%	ANSI Z136.1	\$209–\$244
Kentek	5301	Glasses, goggles	PC	>7 @ 190–532 nm (violet, blue, green) >7 @ 5500–11,000 nm	42%	ANSI Z136.1	\$209
Kentek	5303	Glasses, goggles	PC	>7 @ 190–532 nm (violet, blue, green)	48%	ANSI Z136.1, EN 207	\$110
Kentek	5305	Glasses, goggles	PC	>6 @ 190–532 nm (violet, blue, green) >7 @ 5000–11,000 nm	55%	ANSI Z136.1, EN 207	\$165–\$200
Laser Safety Industries	110	Glasses, goggles	PC	>6 @ 190–532 nm (violet, blue, green) >6 @ 10,000–11,000 nm	50%	ANSI Z136.1	\$94
Laser Safety Industries	230	Glasses, goggles	Glass	>6 @ 190–540 nm (violet, blue, green) >5 @ 10,600 nm	42%	ANSI Z136.1	\$359
Laservision	P5E01	Glasses, goggles	PC	>7 @ 190–315 nm >6 @ 315–532 nm (violet, blue, green)	40%	ANSI Z136.1	\$119
Laservision	P5L10	Glasses	PC	>8 @ 180–315 nm >6 @ 315–500 nm (violet, blue) >4 @ 500–532 nm (green) >2 @ 800–975 nm >4 @ 975–1070 nm	40%	ANSI Z136.1	\$169

Manufacturer	Product	Type	Filter Material*	OD @ Wavelength	VLT	Compliance with laser safety standards	MSRP
Laservision	T5E02	Glasses, goggles	Glass	>9 @ 180–315 nm >8 @ 315–532 nm (violet, blue, green)	40%	ANSI Z136.1	\$339
NoIR InSight	60	Glasses, goggles	PC	>5 @ 190–400 nm >2 @ 400–535 nm (violet, blue, green)	45%	ANSI Z136.1, EN 207	\$66–\$94
NoIR InSight	6032	Glasses, goggles	PC	>3 @ 190–535 nm (violet, blue, green) >2 @ 535–540 nm	48%	ANSI Z136.1, EN 207	\$70–\$105
NoIR InSight	ARG	Glasses, goggles	PC	>7 @ 180–532 nm (violet, blue, green)	48%	ANSI Z136.1, EN 207	\$105
NoIR InSight	CC1	Glasses, goggles	PC	>5 @ 190–400 nm >3 @ 405–445 nm (violet, blue) >2 @ 520 nm >3 @ 532 nm (green)	49%	ANSI Z136.1, EN 207	\$155
NoIR InSight	RT1	Glasses, goggles	PC	>5 @ 190–430 nm (violet) >3 @ 430–445 nm (blue) >3 @ 532 nm (green) >2 @ 805–1064 nm	40%	ANSI Z136.1, EN 207	\$205
Phillips Safety	AKP	Glasses	PC	>6 @ 190–532 nm (violet, blue, green) >6 @ 5000–11,000 nm	46%	ANSI Z136.1	\$90–\$100
Phillips Safety	Blue Green Beam	Glasses, goggles	PC	>5 @ 190–400 nm >2 @ 445–450 nm (blue) >2.5 @ 532 nm (green)	43%	ANSI Z136.1	\$150
Phillips Safety	W570	Glasses, goggles	Glass	>6 @ 190–535 nm (violet, blue, green) >6 @ 5000–10,600 nm	75%	ANSI Z136.1	\$249
Revision Military	StingerHawk FT-2	Glasses	PC	>4 @ 405 nm (violet) >4 @ 445 nm (blue) >4 @ 532 nm (green)	42%	ANSI Z136.1	\$157
Rockwell Laser Industries	103	Glasses	PC	>7 @ 190–532 nm (violet, blue, green) >5 @ 10,600 nm	50%	ANSI Z136.1	\$194–\$217
Rockwell Laser Industries	ARG	Glasses	PC	>7 @ 180–532 nm (violet, blue, green)	48%	ANSI Z136.1, EN 207	\$105

Manufacturer	Product	Type	Filter Material*	OD @ Wavelength	VLT	Compliance with laser safety standards	MSRP
Rockwell Laser Industries	CC1	Glasses	PC	>5 @ 190–400 nm >3 @ 405–445 nm (violet, blue) >2 @ 520 nm >3 @ 532 nm (green)	49%	ANSI Z136.1, EN 207	\$155
Thorlabs	LG3	Glasses, goggles	PC	>7 @ 180–532 nm (violet, blue, green)	48%	ANSI Z136.1, EN 207	\$178
*PC = polycarbonate							

Table 3-2 Product Comparison Matrix for Face Shields, Films and Outserts

Manufacturer	Product	Type	Filter Material*	OD @ Wavelength	VLT	Compliance with laser safety standards	MSRP
Kentek	FSD-5300U	Face shield	PC	>5 @ 190–532 nm (violet, blue, green) >5 @ 10,600 nm	55%	ANSI Z136.1	\$209
Kentek	FSD-5400U	Face shield	PC	>6 @ 200–532 nm (violet, blue, green) >4 @ 850–879 nm >5 @ 900–1070 nm >5 @ 10,600 nm	27%	ANSI Z136.1	\$252
Laser Safety Industries	410 UV KTP Argon	Face shield	PC	>5 @ 190–532 nm (violet, blue, green) >5 @ 10,000–11,000 nm	43%	ANSI Z136.1	\$199
Laservision	P5N01	Face shield	PC	>5 @ 190–375 nm >4 @ 375–532 nm (violet, blue, green) >6 @ 532 nm >5 @ 10,600 nm	38%	ANSI Z136.1	\$209
Phillips Safety	Blue Green Beam	Face shield	PC	>5 @ 190–400 nm >2 @ 445–450 nm (blue) >2.5 @ 532 nm (green)	43%	ANSI Z136.1	\$290
Phillips Safety	LSFS-ARGONKTP	Face shield	PC	>5 @ 190–532 nm (violet, blue, green) >5 @ 10,600 nm	55%	ANSI Z136.1	\$199
Phillips Safety	LSFS-YAGD	Face shield	PC	>6 @ 200–532 nm (violet, blue, green) >4 @ 850–879 nm >5 @ 900–1070 nm >5 @ 10,600 nm	27%	ANSI Z136.1	\$242
Kentek	RPG-F531TG	Film	PVC	>4 @ 200–540 nm (violet, blue, green)	30%	ANSI Z136.1	\$25–\$155
Laser Optical Engineering	Laser Strips for Visors	Film	Not specified	>3 @ 445 nm (blue) >3.5 @ 532 nm (green)	>20%	ANSI Z136.1, EN 207, ISO 19818-1	\$60
OptoSigma	YLC-2A	Film	PVC	>4 @ 190–380 nm >4 @ 441–532 nm (blue, green)	40%	ANSI Z136.1	\$434
Phillips Safety	YLC-2	Film	PVC	>3 @ 441 and 488 nm (blue) >3 @ 514.5 and 532 nm (green)	30%	ANSI Z136.1, EN 207	\$250

Manufacturer	Product	Type	Filter Material*	OD @ Wavelength	VLT	Compliance with laser safety standards	MSRP
Avon Protection	Orange Laser Outsert	Outsert	PC	4 @ 405 nm (violet) 4 @ 445 nm (blue) 3 @ 532 nm (green)	42%	ANSI Z136.1	\$158
Phillips Safety	Blue Green Beam	Outsert	PC	>5 @ 190-400 nm >2 @ 445-450 nm (blue) >2.5 @ 532 nm (green)	43%	ANSI Z136.1	\$150
*PC = polycarbonate PVC = polyvinyl chloride							

3.1 Glasses and Goggles

3.1.1 Cascade Laser LSEG-AKP

Cascade Laser LSEG-AKP



Figure 3-1 Cascade Laser LSEG-AKP


Image credit: Cascade Laser

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	9
OD @ Wavelength	>6 @ 190–532 nm (violet, blue, green) >6 @ 5000–11,000 nm
VLT	46%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$90–\$135
Warranty	90 days

Other info:

- Detailed information about this product may be found here: [Cascade Laser LSEG-AKP](#)
- Noteworthy features: The manufacturer claims that the lenses are scratch-resistant. Prescription lenses are available for some frame styles.

3.1.2 Cascade Laser LSEP-ARG

<h1>Cascade Laser LSEP-ARG</h1>  <p>Figure 3-2 Cascade Laser LSEP-ARG Image credit: Cascade Laser</p>	Product Type	Glasses, goggles
	Filter Material	Polycarbonate
Frame Styles	8	
OD @ Wavelength	>7 @ 180–532 nm (violet, blue, green)	
VLT	48%	
Compliance with laser safety standards	ANSI Z136.1, EN 207	
Compliance with other standards	N/A	
Resistant to impact	Not specified	
MSRP	\$105	
Warranty	90 days	

Other info:

- Detailed information about this product may be found here: [Cascade Laser LSEP-ARG](#)
- Noteworthy feature: The manufacturer claims that the lenses are scratch-resistant.

3.1.3 DiOptika LG-005

DiOptika LG-005



Figure 3-3 DiOptika LG-005

Image credit: DiOptika

Product Type	Glasses
Filter Material	Polycarbonate
Frame Styles	2
OD @ Wavelength	>7 @ 190–532 nm (violet, blue, green)
VLT	48%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$92
Warranty	2 years

Other info:

- Detailed information about this product may be found here: [DiOptika LG-005](#)

3.1.4 Edmund Optics LS02

Edmund Optics LS02



Figure 3-4 Edmund Optics LS02
Image credit: Edmund Optics

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	4
OD @ Wavelength	>7 @ 180–532 nm (violet, blue, green)
VLT	48%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$122
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Edmund Optics LS02](#)

3.1.5 Kentek 4501

Kentek 4501



Figure 3-5 Kentek 4501

Image credit: Kentek

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	13
OD @ Wavelength	>7 @ 190–380 nm >4 @ 401–520 nm (violet, blue) 3-4 @ 532 nm (green) >7 @ 5000–11,000 nm
VLT	60%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87+
Resistant to impact	Yes
MSRP	\$209–\$244
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [Kentek 4501](#)
- Noteworthy feature: Prescription lenses are available for some frame styles.

3.1.6 Kentek 5301

Kentek 5301



Figure 3-6 Kentek 5301
Image credit: Kentek

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	19
OD @ Wavelength	>7 @ 190–532 nm (violet, blue, green) >7 @ 5500–11,000 nm
VLT	42%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87+
Resistant to impact	Yes
MSRP	\$209
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [Kentek 5301](#)
- Noteworthy feature: Prescription lenses are available for some frame styles.

3.1.7 Kentek 5303

Kentek 5303



Figure 3-7 Kentek 5303

Image credit: Kentek

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	5
OD @ Wavelength	>7 @ 190–532 nm (violet, blue, green)
VLT	48%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	ANSI Z87.1
Resistant to impact	Yes
MSRP	\$110
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [Kentek 5303](#)

3.1.8 Kentek 5305

Kentek 5305



Figure 3-8 Kentek 5305

Image credit: Kentek

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	14
OD @ Wavelength	>6 @ 190–532 nm (violet, blue, green) >7 @ 5000–11,000 nm
VLT	55%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	ANSI Z87+
Resistant to impact	Yes
MSRP	\$165–\$200
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [Kentek 5305](#)
- Noteworthy features: Prescription lenses are available for some frame styles.

3.1.9 Laser Safety Industries 110

Laser Safety Industries 110



Figure 3-9 Laser Safety Industries 110
Image credit: Laser Safety Industries

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	4
OD @ Wavelength	>6 @ 190–532 nm (violet, blue, green) >6 @ 10,000–11,000 nm
VLT	50%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$94
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Laser Safety Industries 110](#)

3.1.10 Laser Safety Industries 230

Laser Safety Industries 230



Figure 3-10 Laser Safety Industries 230

Image credit: Laser Safety Industries

Product Type	Glasses, goggles
Filter Material	Glass
Frame Styles	2
OD @ Wavelength	>6 @ 190–540 nm (violet, blue, green) >5 @ 10,600 nm
VLT	42%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$359
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Laser Safety Industries 230](#)

3.1.11 Laservision P5E01

Laservision P5E01



Figure 3-11 Laservision P5E01

Image credit: Laservision

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	19
OD @ Wavelength	>7 @ 190–315 nm >6 @ 315–532 nm (violet, blue, green)
VLT	40%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$119
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Laservision P5E01](#)

3.1.12 Laservision P5L10

Laservision P5L10



Figure 3-12 Laservision P5L10

Image credit: Laservision

Product Type	Glasses
Filter Material	Polycarbonate
Frame Styles	4
OD @ Wavelength	>8 @ 180–315 nm >6 @ 315–500 nm (violet, blue) >4 @ 500–532 nm (green) >2 @ 800–975 nm >4 @ 975–1070 nm
VLT	40%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$169
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Laservision P5L10](#)

3.1.13 Laservision T5E02

Laservision T5E02



Figure 3-13 Laservision T5E02

Image credit: Laservision

Product Type	Glasses, goggles
Filter Material	Glass
Frame Styles	3
OD @ Wavelength	>9 @ 180–315 nm >8 @ 315–532 nm (violet, blue, green)
VLT	40%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$339
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Laservision T5E02](#)
- Noteworthy feature: Prescription lenses are available for some frame styles.

3.1.14 NoIR InSight 60

NoIR InSight 60



Figure 3-14 NoIR InSight 60

Image credit: NoIR InSight

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	15
OD @ Wavelength	>5 @ 190–400 nm >2 @ 400–535 nm (violet, blue, green)
VLT	45%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$66–\$94
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [NoIR 60](#)

3.1.15 NoIR InSight 6032

NoIR InSight 6032



Figure 3-15 NoIR InSight 6032

Image credit: NoIR InSight

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	15
OD @ Wavelength	>3 @ 190–535 nm (violet, blue, green) >2 @ 535–540 nm
VLT	48%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$70–\$105
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [NoIR 6032](#)

3.1.16 NoIR InSight ARG

NoIR InSight ARG



Figure 3-16 NoIR InSight ARG

Image credit: NoIR InSight

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	16
OD @ Wavelength	>7 @ 180–532 nm (violet, blue, green)
VLT	48%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$105
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [NoIR ARG](#)

3.1.17 NoIR InSight CC1

NoIR InSight CC1



Figure 3-17 NoIR InSight CC1
Image credit: NoIR InSight

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	16
OD @ Wavelength	>7 @ 190–400 nm >3 @ 405–445 nm (violet, blue) >2 @ 520 nm >3 @ 532 nm (green)
VLT	49%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$155
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [NoIR CC1](#)

3.1.18 NoIR InSight RT1

NoIR InSight RT1



Figure 3-18 NoIR InSight RT1

Image credit: NoIR InSight

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	16
OD @ Wavelength	>5 @ 190–430 nm (violet) >3 @ 430–445 nm (blue) >3 @ 532 nm (green) >2 @ 805–1064 nm
VLT	40%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$205
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [NoIR RT1](#)

3.1.19 Phillips Safety AKP

Phillips Safety AKP



Figure 3-19 Phillips Safety AKP
Image credit: Phillips Safety

Product Type	Glasses
Filter Material	Polycarbonate
Frame Styles	10
OD @ Wavelength	>6 @ 190–532 nm (violet, blue, green) >6 @ 5000–11,000 nm
VLT	46%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87.1
Resistant to impact	Yes
MSRP	\$90–\$100
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Phillips Safety AKP](#)

3.1.20 Phillips Safety Blue Green Beam

Phillips Safety Blue Green Beam



Figure 3-20 Phillips Safety Blue Green Beam

Image credit: Phillips Safety

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	7
OD @ Wavelength	>5 @ 190–400 nm >2 @ 445–450 nm (blue) >2.5 @ 532 nm (green)
VLT	43%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87.1
Resistant to impact	Yes
MSRP	\$150
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Phillips Safety Blue Green Beam](#)

3.1.21 Phillips Safety W570

Phillips Safety W570



Figure 3-21 Phillips Safety W570

Image credit: Phillips Safety

Product Type	Glasses, goggles
Filter Material	Glass
Frame Styles	11
OD @ Wavelength	>6 @ 190–535 nm (violet, blue, green) >6 @ 5000–10,600 nm
VLT	75%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87.1
Resistant to impact	Yes
MSRP	\$249
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Phillips Safety W570](#)

3.1.22 Revision Military StingerHawk FT-2

Revision Military StingerHawk FT-2



Figure 3-22 Revision Military StingerHawk FT-2

Image credit: Revision Military

Product Type	Glasses
Filter Material	Polycarbonate
Frame Styles	2
OD @ Wavelength	>4 @ 405 nm (violet) >4 @ 445 nm (blue) >4 @ 532 nm (green)
VLT	42%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87+, MIL-PRF-32432A
Resistant to impact	Yes
MSRP	\$157 (see below)
Warranty	3 years

Other info:

- Detailed information about this product may be found here: [Revision Military FT-2](#)
- Noteworthy features: Prescription lens inserts are available for this product.
- It is also available through General Services Administration (GSA) Advantage for \$98.

3.1.23 Rockwell Laser Industries 103

Rockwell Laser Industries 103



Figure 3-23 Rockwell Laser Industries 103

Image credit: Rockwell Laser Industries

Product Type	Glasses
Filter Material	Polycarbonate
Frame Styles	2
OD @ Wavelength	>7 @ 190–532 nm (violet, blue, green) >5 @ 10,600 nm
VLT	50%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$194–\$217
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [Rockwell Laser Industries 103](#)

3.1.24 Rockwell Laser Industries ARG

Rockwell Laser Industries ARG



Figure 3-24 Rockwell Laser Industries ARG
Image credit: Rockwell Laser Industries

Product Type	Glasses
Filter Material	Polycarbonate
Frame Styles	7
OD @ Wavelength	>7 @ 180–532 nm (violet, blue, green)
VLT	48%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$105
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [Rockwell Laser Industries ARG](#)
- Noteworthy feature: Prescription inserts are available for some frame styles.

3.1.25 Rockwell Laser Industries CC1

Rockwell Laser Industries CC1



Figure 3-25 Rockwell Laser Industries CC1

Image credit: Rockwell Laser Industries

Product Type	Glasses
Filter Material	Polycarbonate
Frame Styles	4
OD @ Wavelength	>5 @ 190–400 nm >3 @ 405–445 nm (violet, blue) >2 @ 520 nm >3 @ 532 nm (green)
VLT	49%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$155
Warranty	1 year lenses, 5 years frames

Other info:

- Detailed information about this product may be found here: [Rockwell Laser Industries CC1](#)
- Noteworthy features: Prescription inserts are available for some frame styles.

3.1.26 Thorlabs LG3

Thorlabs LG3



Figure 3-26 Thorlabs LG3

Image credit: Thorlabs

Product Type	Glasses, goggles
Filter Material	Polycarbonate
Frame Styles	4
OD @ Wavelength	>7 @ 180–532 nm (violet, blue, green)
VLT	48%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$178
Warranty	Limited lifetime

Other info:

- Detailed information about this product may be found here: [Thorlabs LG3](#)

3.2 Laser Protective Face Shields, Films and Outserts
 3.2.1 Kentek Laser Safety Face Shield FSD-5300U

**Kentek Laser Safety
 Face Shield
 FSD-5300U**



Figure 3-27 Kentek Face Shield FSD-5300U
 Image credit: Kentek

Product Type	Face shield
Filter Material	Polycarbonate
OD @ Wavelength	>5 @ 190–532 nm (violet, blue, green) >5 @ 10,600 nm
VLT	55%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87+
Resistant to impact	Yes
MSRP	\$209
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Kentek FSD-5300U](#)
- Noteworthy feature: The manufacturer claims that the face shield is scratch-resistant.

3.2.2 Kentek Laser Safety Face Shield FSD-5400U

Kentek Laser Safety Face Shield FSD-5400U



Figure 3-28 Kentek Face Shield FSD-5400U

Image credit: Kentek

Product Type	Face shield
Filter Material	Polycarbonate
OD @ Wavelength	>6 @ 200–532 nm (violet, blue, green) >4 @ 850–879 nm >5 @ 900–1070 nm
VLT	27%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87+
Resistant to impact	Yes
MSRP	\$252
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Kentek FSD-5400U](#)
- Noteworthy feature: The manufacturer claims that the face shield is scratch-resistant.

3.2.3 Laser Safety Industries Face Shield 410 UV KTP Argon

Laser Safety Industries Face Shield 410 UV KTP Argon



Figure 3-29 Laser Safety Industries Face Shield 410 UV KTP Argon

Image credit: Laser Safety Industries

Product Type	Face shield
Filter Material	Polycarbonate
OD @ Wavelength	>5 @ 190–532 nm (violet, blue, green) >5 @ 10,000–11,000 nm
VLT	43%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$199
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Laser Safety Industries 410 UV](#)

3.2.4 Laservision Laser Safety Face Shield P5N01

Laservision Laser Safety Face Shield P5N01



Figure 3-30 Laservision Face Shield P5N01

Image credit: Laservision

Product Type	Face shield
Filter Material	Polycarbonate
OD @ Wavelength	>5 @ 190–375 nm >4 @ 375–532 nm (violet, blue, green) >6 @ 532 nm >5 @ 10,600 nm
VLT	38%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$209
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Laservision P5N01](#)

3.2.5 Phillips Safety Blue Green Beam Laser Face Shield

Phillips Safety Blue Green Beam Laser Face Shield



Figure 3-31 Phillips Safety Blue Green Beam Laser Face Shield

Image credit: Phillips Safety

Product Type	Face shield
Filter Material	Polycarbonate
OD @ Wavelength	>5 @ 190–400 nm >2 @ 445–450 nm (blue) >2.5 @ 532 nm (green)
VLT	43%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87.1
Resistant to impact	Yes
MSRP	\$290
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Phillips Safety BGB Face Shield](#)

3.2.6 Phillips Safety Laser Safety Face Shield LSFS-ARGONKTP

Phillips Safety Laser Safety Face Shield LSFS-ARGONKTP



Figure 3-32 Phillips Safety Face Shield LSFS-ARGONKTP

Image credit: Phillips Safety

Product Type	Face shield
Filter Material	Polycarbonate
OD @ Wavelength	>5 @ 190–532 nm (violet, blue, green) >5 @ 10,600 nm
VLT	55%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$199
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Phillips Safety LSFS-ARGONKTP](#)

3.2.7 Phillips Safety Laser Safety Face Shield LSFS-YAGD

Phillips Safety Laser Safety Face Shield LSFS-YAGD



Figure 3-33 Phillips Safety Face Shield LSFS-YAGD

Image credit: Phillips Safety

Product Type	Face shield
Filter Material	Polycarbonate
OD @ Wavelength	>6 @ 200–532 nm (violet, blue, green) >4 @ 850–879 nm >5 @ 900–1070 nm
VLT	27%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$242
Warranty	1 year

Other info:

- Detailed information about this product may be found here: [Phillips Safety LSFS-YAGD](#)

3.2.8 Kentek Laser Protective Film RPG-F531TG

Kentek Laser Protective Film RPG-F531TG



Figure 3-34 Kentek Protective Film RPG-F531TG

Image credit: Kentek

Product Type	Film
Filter Material	PVC
OD @ Wavelength	>4 @ 200–540 nm (violet, blue, green)
VLT	30%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	N/A
MSRP	\$25–\$155 (see below)
Warranty	See below

Uses:

This film is marketed for industrial use on windows as well as for use on responder face shields. The smaller film strips can be applied to a gas mask or face shield above the wearer’s normal line of sight. The wearer must tilt their head down to view through the film.

Other info:

- Detailed information about this product may be found here: [Kentek RPG-F531TG](#)
- Noteworthy features: The manufacturer claims that the film is scratch-resistant.

This film is available from Kentek in three sizes, which determines their MSRP:

- RPG-F531TG = \$25 (1 x 9 inch)
- RPG-F531TG-112 = \$32 (1 x 12 inch)
- RPG-F531TG-13 = \$155 (13 x 13 inch)

This product is also distributed by Safariland as “Laser Protective Film Kit,” SKU1350178.

- Safariland offers a 1 x 12 inch strip for \$30 to \$37.50 and a 1.5 x 12 inch strip for \$26 to \$45.
- Safariland offers a 5-year warranty.

3.2.9 Laser Optical Engineering Laser Strips for Visors

Laser Optical Engineering Laser Strips for Visors



Figure 3-35 Laser Optical Engineering Laser Strips

Image credit: Laser Optical Engineering

Product Type	Film
Filter Material	Not specified
OD @ Wavelength	>3 @ 445 nm (blue) >3.5 @ 532 nm (green)
VLT	>20%
Compliance with laser safety standards	ANSI Z136.1, EN 207, ISO 19818-1
Compliance with other standards	N/A
Resistant to impact	N/A
MSRP	\$60 per strip
Warranty	None

Uses:

This product is intended to be applied to a face shield above the wearer's normal line of sight. The wearer must tilt their head down to view through the film.

Other info:

- Detailed information about this product may be found here: [Laser Optical Engineering](#)
- Noteworthy features: The laser strip is disposable and therefore has no warranty.

This product is distributed in the United States by Civil Defense Supply, Inc.; details may be found at this website: [Civil Defense Supply](#)

The distributor cuts the laser strip to fit a specific product. The approximate dimensions of the strip for a face shield are 1-2 inches in height by 9-12 inches in width.

3.2.10 OptoSigma Laser Shield Window Film YLC-2A

OptoSigma Laser Shield Window Film YLC-2A



Figure 3-36 OptoSigma Laser Shield Film YLC-2A

Image credit: OptoSigma

Product Type	Film
Filter Material	PVC
OD @ Wavelength	>4 @ 190–380 nm >4 @ 441–532 nm (blue, green)
VLT	40%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	N/A
MSRP	\$434 per roll
Warranty	Not specified

Uses:

This film is marketed for industrial use on windows. It may be cut to an appropriate size and applied to a face shield above the wearer’s normal line of sight. The wearer must tilt their head down to view through the film.

There is an additional notice that the product should be replaced periodically because the optical density may deteriorate depending on the usage or storage environment, or due to scratches.

Other info:

- Detailed information about this product may be found here: [OptoSigma Window Film](#)
- Noteworthy feature: This product is available as a roll of approximately 40 x 40 inches.

3.2.11 Phillips Safety Laser Protection Film YLC-2

Phillips Safety Laser Protection Film YLC-2



Figure 3-37 Phillips Safety Protection Film YLC-2

Image credit: Phillips Safety

Product Type	Film
Filter Material	PVC
OD @ Wavelength	>3 @ 441 and 488 nm (blue) >3 @ 514.5 and 532 nm (green)
VLT	30%
Compliance with laser safety standards	ANSI Z136.1, EN 207
Compliance with other standards	N/A
Resistant to impact	N/A
MSRP	\$250 per roll
Warranty	1 year

Uses:

This film marketed for industrial use on windows. It may be cut to an appropriate size and applied to a face shield above the wearer’s normal line of sight. The wearer must tilt their head down to view through the film.

Other info:

- Detailed information about this product may be found here: [Phillips Safety YLC-2](#)
- Noteworthy feature: This product is available as a roll of approximately 20 x 40 inches.

3.2.12 Avon Protection Orange Laser Outsert

Avon Protection Orange Laser Outsert



Figure 3-38 Avon Protection Orange Laser Outsert

Image credit: Avon Protection

Product Type	Outsert
Filter Material	Polycarbonate
OD @ Wavelength	4 @ 405 nm (violet) 4 @ 445 nm (blue) 3 @ 532 nm (green)
VLT	42%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	N/A
Resistant to impact	Not specified
MSRP	\$158 (see below)
Warranty	1 year

Uses:

This product is a laser protective outsert that is designed to fit over the visor portion of Avon Protection 50, 53, and 54 series air-purifying respirators.

Other info:

- Detailed information about this product may be found here: [Avon Protection Laser Outsert](#)
- Noteworthy feature: This product is available through GSA Advantage for \$102.

3.2.13 Phillips Safety Blue Green Beam Laser Respirator Outsert

Phillips Safety Blue Green Beam Laser Respirator Outsert



Figure 3-39 Phillips Safety Blue Green Beam Laser Respirator Outsert

Image credit: Phillips Safety

Product Type	Face shield
Filter Material	Polycarbonate
OD @ Wavelength	>5 @ 190–400 nm >2 @ 445–450 nm (blue) >2.5 @ 532 nm (green)
VLT	43%
Compliance with laser safety standards	ANSI Z136.1
Compliance with other standards	ANSI Z87.1
Resistant to impact	Yes
MSRP	\$150
Warranty	1 year

Uses:

This product is designed to be worn in conjunction with self-contained breathing apparatus (SCBA) full-face air masks. Five versions of this outsert are available to fit various SCBA models.

Other info:

- Detailed information about this product may be found here: [Phillips Safety BGB Outsert](#)

4.0 MANUFACTURER AND VENDOR CONTACT INFORMATION

Additional information on the products included in this market survey report can be obtained from the manufacturers and vendors listed in Table 4-1.

Table 4-1 Manufacturer and Vendor Contact Information

Manufacturer/Vendor	Website	Address	Phone Number	Email Address
Avon Protection	shop.avon-protection.com	503 8 th Street Cadillac, MI 49601	888-286-6440	customerservice@avon-protection.com
Cascade Laser	www.cascadelaser.com	101 N. Elliot Road Newberg, OR 97132	800-443-5561	info@cascadelaser.com
Civil Defense Supply	cde-laser.com	6655 Dubbin Road, Suite 3 Columbia, MD 21045	410-988-2274	uri@cdeusa.org
DiOptika	www.dioptika.com	32 Winding Brook Drive Sinking Spring, PA 19608	877-712-2181	info@dioptika.com
Edmund Optics	www.edmundoptics.com	101 E. Gloucester Pike Barrington, NJ 08007	800-363-1992	sales@edmundoptics.com
Kentek	www.kenteklaserstore.com	5 Jarado Way Boscawen, NH 03303	800-432-2323	info@kenteklaserstore.com
Laser Optical Engineering	laseroptical.co.uk	Building 72a, The Air Cargo Centre, Argosy Road, East Midlands Airport, Derbyshire DE74 2SA, United Kingdom	+44 (0)1332 814 612	enquiries@laseroptical.co.uk

Manufacturer/Vendor	Website	Address	Phone Number	Email Address
Laser Safety Industries	lasersafetyindustries.com	6751 Oxford Street Minneapolis, MN 55426	888-752-7370	info@lasersafetyindustries.com
Laservision	lasersafety.com	595 Phalen Blvd St. Paul, MN 55130	800-393-5565	info@lasersafety.com
NoIR InSight	www.noirinsight.com	4975 Technical Drive Milford, MI 48381	800-521-9746	sales@noirinsight.com
OptoSigma	www.optosigma.com	3210 S. Croddy Way Santa Ana, CA 92704	949-851-5881	sales@optosigma.com
Phillips Safety	phillips-safety.com	271 Lincoln Blvd Middlesex, NJ 08846	866-575-1307	service@phillips-safety.com
Revision Military	www.revisionmilitary.com	7 Corporate Drive Essex, VT 05452	802-879-7002	info@revisionmilitary.com
Rockwell Laser Industries	rli.com	7754 Camargo Road Cincinnati, OH 45243	800-945-2737	products@rli.com
Safariland	safariland.com	4700 E. Airport Drive Ontario, CA 91761	800-347-1200	customercare@safariland.com
Thorlabs	www.thorlabs.com	43 Sparta Avenue Newton, NJ 07860	973-300-3000	sales@thorlabs.com

5.0 CONCLUSIONS

Law enforcement personnel face increasing threats from easily obtainable high-power handheld lasers. Laser protective eyewear is designed to protect the wearer from the harmful effects of these lasers. Laser protective eyewear comes in various form factors, including glasses, goggles, face shields and films. There are also multiple frame styles to choose from. Prescription lenses and/or inserts are available from some manufacturers, as well as frame styles that are made to fit over prescription glasses.

When selecting from among laser protective eyewear options, responders must consider the optical density of the lens at relevant wavelengths, as well as the visible light transmission rating to ensure usability in operational scenarios. Responders should look for eyewear that can protect against both green and blue lasers as a minimum, with a minimum OD of two for each spectrum. Additionally, laser protective eyewear should have a minimum VLT rating of 25% to allow use in low-light conditions.

This market survey report provides information on several types of laser protective eyewear products:

1. Glasses and goggles: 26 products that range in price from \$66 to \$359
2. Face shields and APR/SCBA outserts: Nine products that range in price from \$150 to \$290
3. Films: Four products that range in price from \$25 to \$434

Law enforcement agencies should carefully research the overall capabilities and limitations of laser eye protection in relation to their agency's operational needs when making equipment selections.

6.0 References

- [1] A. Soglin, "American Academy of Ophthalmology," 22 June 2018. [Online]. Available: <https://www.aao.org/eye-health/news/laser-pointer-eye-injury>. [Accessed 27 October 2023].
- [2] FAA, "Laser Incidents," 16 February 2023. [Online]. Available: <https://www.faa.gov/about/initiatives/lasers/laws>. [Accessed 12 December 2023].
- [3] Laser Institute of America, "ANSI Z136.1," 2022. [Online]. Available: <https://www.lia.org/resources/laser-safety-information/laser-safety-standards/ansi-z136-standards/z136-1>. [Accessed 15 November 2023].
- [4] ITeh Standards, "EN 207:2017 - Personal eye-protection equipment," 2020. [Online]. Available: <https://standards.iteh.ai/catalog/standards/cen/c48289cc-46d4-4308-8e4d-def592d13f01/en-207-2017>. [Accessed 15 November 2023].
- [5] International Organization for Standardization, "ISO 19818-1:2021 Eye and face protection Protection against laser radiation Part 1: Requirements and test methods," 2021. [Online]. Available: <https://www.iso.org/standard/74268.html>. [Accessed 15 November 2023].
- [6] O. C. Author, "ANSI/ISEA Z87.1-2020: Current Standard for Safety Glasses," 2020. [Online]. Available: <https://blog.ansi.org/ansi-isea-z87-1-2020-safety-glasses-eye-protection/#gref>. [Accessed 15 November 2023].
- [7] Source, "MIL-PRF-32432A," 2020. [Online]. Available: http://everyspec.com/MIL-PRF/MIL-PRF-030000-79999/MIL-PRF-32432A_55832/. [Accessed 15 November 2023].