



**Homeland
Security**

Science and Technology

Summary

U.S. Department of Homeland Security



System Assessment and Validation for Emergency Responders

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 operational tests 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, and operationally oriented assessments and validations of emergency responder equipment;
- 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-saving 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?"

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Law Enforcement Tactical Protective Padding

In order to provide emergency responders with information on currently available law enforcement tactical protective padding (LE Padding) capabilities, limitations, and usability, the Center for Domestic Preparedness (CDP) conducted a comparative assessment of four LE Padding ensembles for the SAVER Program in November 2007. Detailed findings are provided in the Assessment Report on Law Enforcement Tactical Protective Padding, which is available by request at <https://www.rkb.us/saver>.

Background

LE Padding is described by the U.S. Department of Homeland Security's Authorized Equipment List (AEL) as general protective pads that provide protection for elbows, knees, shins, and neck while conducting tactical law enforcement operations, such as restoring order during civil disturbances.

Assessment

Prior to the assessment, CDP conducted a market survey to compile information on commercially available equipment. Then, a focus group consisting of nine law enforcement practitioners from various regions in the country met in August 2007, to identify equipment selection criteria, determine evaluation criteria, and recommend assessment scenarios.

Although the AEL specifically identifies elbow, knee, shin, and neck protection in the tactical protective padding category, the focus group recommended that the assessment focus on elbow, knee, shin, and forearm protection when used as part of a complete ensemble. The focus group then recommended six manufacturers who offer the entire ensemble as they specified, or who offer the necessary components. Based on focus group recommendations and market survey research, the CDP selected those six ensembles for the assessment. However, two manufacturers were unable to meet the required delivery date. The following four padding ensembles were assessed:

- Damascus Flex Force™ (Damascus)
- Hatch® ExoTech® (Hatch)
- Galls® System (Galls)
- RedMan DRS 360 (RedMan).

Eight emergency response practitioners with strong law enforcement backgrounds served as evaluators for this assessment. The activities performed in this assessment were consistent with activities that could be performed by law enforcement personnel in riot control situations.

Each LE Padding ensemble was evaluated in the same manner, and operational conditions were controlled to make the evaluation of each system as similar as possible. Detailed comments were captured by the data recorders

during the assessment activities and these comments have been included in the full assessment report.

Assessment Results

Evaluators rated the LE Padding components based on the evaluation criteria established by the LE Padding focus group. Each recommended criterion was assigned to one of the five SAVER categories and was then assigned a weighting factor based on a 100-point scale. The SAVER category and composite scores are shown in table 1. Higher scores indicate better LE Padding performance.

The following paragraphs provide a brief summary of the evaluator comments and feedback on the LE Padding employed during the assessment. The paragraphs present the LE Padding from the highest to lowest composite score. The full report includes a more thorough review of evaluator comments on the LE Padding by SAVER category and individual criterion.

Damascus

The Damascus ensemble received the highest composite score, as well as the highest category scores in the usability and deployability categories. This ensemble performed well in usability because of its mobility, compatibility with other equipment, comfort, adjustability, and stability/durability. Mobility was especially important to the evaluators, and they believed Damascus provided a good balance of mobility, flexibility, and protection during the simulated riot scenario. This ensemble could be donned without assistance and could be easily reconfigured for separate component use. It seemed easy to transport and store while not in use.

SAVER Program Category Definitions

Affordability: This category groups criteria related to life-cycle costs of a piece of equipment or system.

Capability: This category groups criteria related to the power, capacity, or features available for a piece of equipment or system to perform or assist the responder in performing one or more responder-relevant tasks.

Deployability: This category groups criteria related to the movement, installation, or implementation of a piece of equipment or system by responders at the site of its intended use.

Maintainability: This category groups criteria related to the maintenance and restoration of a piece of equipment or system to operational conditions by responders.

Usability: This category groups criteria related to the quality of the responders' experience with the operational employment of a piece of equipment or system. This includes the relative ease of use, efficiency, and overall satisfaction of the responders with the equipment or system.

Other advantages included the availability of size options, the protection coverage, the affordability, the construction (i.e., hard chest plate and textured knee components), and compatibility with the riot shields used in the assessment.




Disadvantages of the Damascus included that the components did not interact well during activities. For example, gapping between some components left other areas exposed (e.g., thigh/groin protection).

Table 1. LE Padding Assessment Results

LE Padding	Composite Score	Affordability (10% weighting)	Capability (30% weighting)	Deployability (15% weighting)	Maintainability (15% weighting)	Usability (30% weighting)
Damascus	71.5	49	73	78	64	78
Hatch®	70.0	48	77	75	64	71
Galls®	63.7	56	59	76	57	68
RedMan	51.5	40	67	39	62	40

Note:

Scores contained in the complete assessment report may be listed in a different numerical scale. For the purposes of the SAVER Summary, SAVER category scores are normalized and rounded to the nearest whole number.




	 Pros <ul style="list-style-type: none"> • Good protection coverage • Compatible with duty belt • Durable protective components • Textured non-skid knee pads • Good mobility and flexibility • Cost • Self-donnable
	 Cons <ul style="list-style-type: none"> • Foot protection has no method for attaching to boots • Components not individually sized • No literature provided with order • Knee padding textured cover easily damaged • Gaps between knee and thigh padding
Damascus	Composite Assessment Score: 71.5

Hatch

The Hatch ensemble received the second highest composite score plus the highest SAVER category scores in capability and maintainability. This ensemble offered good protection and coverage, a variety of size options, modularity, the ability to be used offensively, and durable construction, and therefore was rated high in the capability category. The Hatch ensemble has a hard outer shell on the forearm/elbow and knee/shin padding. Because of the coverage the ensemble offered, it received positive protection level criterion comments. The Hatch ensemble performed well in the maintainability category, due to its durability, storage integrity, ease of cleaning, the materials' chemical resistance, and the availability of customer service. Evaluators were particularly impressed with the ensemble's durability, specifically noting the hard outer shell. It was also believed that the padding would not be compromised while in storage. However, the Hatch came with little information regarding cleaning instructions, the materials' chemical resistance, or customer service information, all of which might be necessary to support the maintainability of the equipment.

Other noted advantages to the ensemble included strap adjustability (e.g., hook and loop fasteners), transportability, mobility, the ability to self-don, and compatibility with other equipment worn during the assessment.

Some disadvantages discussed by evaluators included the lack of stability (i.e., unwanted movement of ensemble components), the soft padding of shoulder components, and gapping in joint areas when flexing.




	 Pros <ul style="list-style-type: none"> • Good component protection level • Allows full range of motion • Self-donnable • Lightweight and easy to transport • Durable, protective plastic outer shell • Allows easy access to other equipment
	 Cons <ul style="list-style-type: none"> • Elastic straps were not adjustable enough for smaller-sized evaluators • Gaps created in joint areas when flexing (e.g., toe/shin) • Sides and back of knees exposed • No hard plastic shell on shoulders
Hatch	Composite Assessment Score: 70.0

Galls

The Galls ensemble received the third highest composite score and the highest category score in affordability. The initial cost seemed reasonable for small and medium-sized jurisdictions, and evaluators found that the components could be ordered separately if needed.

Other advantages included ease of movement, the ability to self-don, construction (e.g., hard plastic on elbow components), and compatibility with other equipment (e.g., chest pouch for equipment storage).

Disadvantages of the Galls ensemble included the low protection level (e.g., no forearm protection), gaps between protective components, and poor protection in particular for offensive maneuvers, (e.g., take-downs or subduing a demonstrator).




	 Pros <ul style="list-style-type: none"> • Quick and easy to don • Lightweight • Good overall range of motion • Hard plastic shell on elbow padding • Good shin coverage • Cost
	 Cons <ul style="list-style-type: none"> • No forearm protection • Limited shoulder rotation • Gap between knee and shin components • Uncomfortable narrow elbow straps
Galls	Composite Assessment Score: 63.7

RedMan

The ensemble received the lowest composite score but scored higher than Galls in the capability and maintainability categories. Capability criteria included protection level, size options, modularity, ability to be used offensively, and construction. While receiving some negative comments in certain criteria (e.g., size options), the RedMan ensemble also received several positive comments, including its ability to provide sufficient protection and the minimal gapping between protection components.

Maintainability criteria included durability, storage integrity, ease of cleaning, chemical resistance, and customer service. Of the four assessed LE Padding ensembles, only the RedMan ensemble manufacturer claimed that the padding was resistant to water- and blood-borne pathogens.

Some disadvantages that evaluators experienced were minimal mobility during assessment activities and inability to don most components without assistance because of the padding thickness. While the padding was thick, it was constructed of cloth-like material that caused it to appear to be less durable than those ensembles with hard outer coverings. All evaluators agreed that they would not use this particular protective ensemble model in a riot situation because of the inability to move easily or freely. Finally, of the four assessed ensembles, the RedMan ensemble was the only one that was difficult for each evaluator to transport and/or place in a car trunk because of its bulkiness.

	 Pros	<ul style="list-style-type: none"> • Sufficient protection • Good coverage • Nomex® material • Components attached to each other
	 Cons	<ul style="list-style-type: none"> • Limited mobility • Heavy, bulky, hot, and tiring to wear • Expensive • Components slid out of place during activities • Duty belt equipment is difficult to see, access, and use • No hard protective shell to protect from sharp objects or limit exposure to water or blood
RedMan	Composite Assessment Score: 51.5	

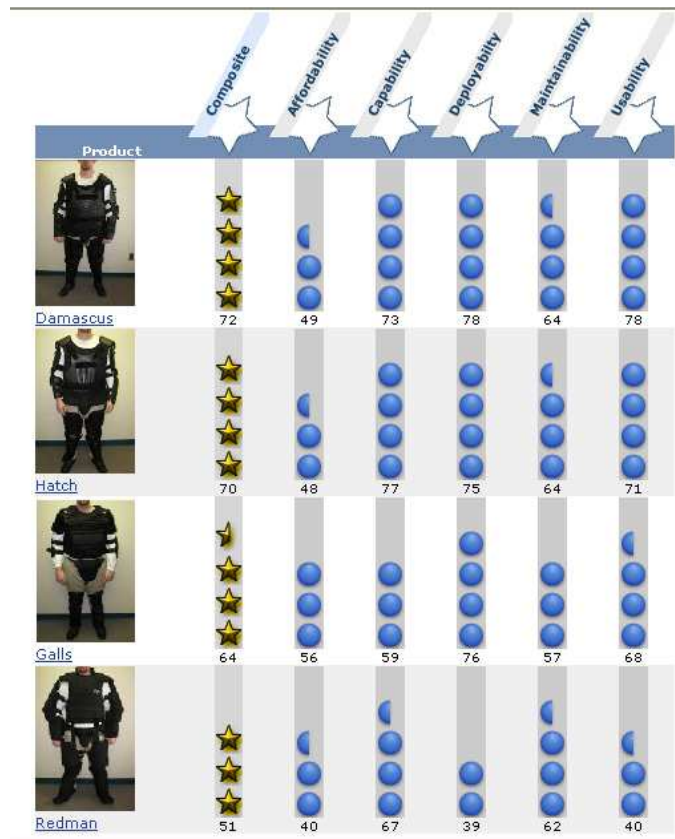
Conclusion

The evaluator comments and the equipment scores indicated that three of the four assessed LE Padding ensembles would enable responders to control a riot situation. It was agreed that some of the ensembles were more effective than others.

The assessment goal of utilizing and comparatively assessing the LE Padding ensembles in scenario-driven exercises was achieved. Analysis of the evaluators' scoring and comments revealed that:

- Comfort of the equipment was an important issue for the responders.
- The equipment provided sufficient protection during the course of the assessment, but evaluators worried about its resilience after repeated use.
- LE Padding ensembles that offered good mobility without sacrificing protection were favored by the evaluators.

QuickLook Snapshot



Note:

The SAVER QuickLook, available on the SAVER Web site, allows users to select the SAVER categories that are most important to their department and view results according to their specific needs.

All reports in this series, including the SAVER QuickLook tool, are available by request at <https://www.rkb.us/saver>.