Homeland Security
Science and Technology

Summary

U.S. Department of Homeland Security
SAVER
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 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 Helmets (LE Helmets)

In order to provide emergency responders with information on currently available tactical protective helmet technologies, capabilities, and limitations, the Center for Domestic Preparedness (CDP) conducted a comparative assessment of tactical protective helmets for the SAVER Program in April 2008. Detailed findings are provided in the Assessment Report on Law Enforcement Tactical Protective Helmets, *which is available by request at https://www.rkb.us/saver.*

Background

In order to prevent head injury, LE Helmets are used by special operations teams (e.g., Special Weapons and Tactics [SWAT] teams) during tactical operations, as well as by personnel performing crowd control operations (e.g., protestor demonstrations and riots). While special operations teams may require the protection level of a ballistic helmet, the other identified teams and general patrol officers may be issued a non-ballistic riot helmet for use in crowd control operations, in support of tactical operations, and in general law enforcement activities. LE Helmets are usually equipped with a face shield to protect the face and eyes.

Assessment

Prior to the assessment, the CDP conducted a market survey to provide an overview of currently available LE Helmets as well as their capabilities and limitations. The survey process was guided by factors such as equipment capabilities, availability, and cost. A focus group consisting of students attending CDP training courses from the central, western, and eastern regions of the United States met to develop LE Helmets evaluation criteria and to recommend possible tasks and scenario activities to be used in the assessment plan development.

After much discussion, the focus group recommended that an equal number of ballistic and non-ballistic helmet models be assessed in crowd control and general law enforcement scenarios. The focus group recommended a number of desired features found in both ballistic and non-ballistic LE Helmets including:

- Non-ballistic faceshields
- Multi-purpose use
- Customizable padding/sizing systems
- Chin strap options.

Group members agreed this approach would better address the needs of responders than simply focusing on one helmet type. The six assessed LE Helmets were:

- United Shield International Commando SC 650 Ballistic

- Mine Safety Appliances ForceField™ Advanced Combat Helmet (ACH) Ballistic
- Protech™ Tactical TR2200 Non-ballistic
- HighCom Security, Inc. Rebel HCG Non-ballistic
- HighCom Security, Inc. Striker PLT Ballistic
- Premier Crown® 906C Non-ballistic.

The assessment was conducted using law enforcement-related activities recommended by the LE Helmets focus group. Twelve emergency responders with strong law enforcement backgrounds served as evaluators for this assessment. Each helmet was evaluated in the same manner, and operational conditions were controlled to make the evaluation of each helmet 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 Helmets based on the evaluation criteria established by the LE Helmets focus group. Each criterion was prioritized within the five SAVER categories and 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 performance. To view how each light scored against each of the evaluation criteria assigned to the SAVER Program categories, see table 2.

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.

The following sections provide a brief summary of evaluator comments and feedback on each LE Helmet used during the assessment. The LE Helmets are listed by highest to lowest composite scores. The full report includes a breakdown of evaluator comments by individual criterion.

Table 1. LE Helmets Assessment Results[1]

LE Helmet	Composite Score	Affordability (10% Weighting)	Capability (30% Weighting)	Deployability (15% Weighting)	Maintainability (10% Weighting)	Usability (35% Weighting)
Commando SC 650	**74**	60	76	78	65	78
ForceField ACH	**70**	60	75	67	68	71
Tactical TR2200	**69**	52	72	74	54	73
Rebel HCG	**68**	52	74	69	57	70
Striker PLT	**68**	46	74	73	51	71
906C	**63**	61	67	66	72	55

Note:

[1] Scores contained in the assessment report may be displayed differently. For the purposes of the SAVER Summary, all SAVER category scores are normalized using a 100-point scale and rounded to the nearest whole number.

Commando SC 650 (Ballistic)

The Commando SC 650 received the highest composite score, as well as the highest scores in the capability, usability, and deployability categories.

Commando SC 650 with APR
Photo courtesy of CDP

Evaluators rated this helmet high in the capability category largely due to its faceshield's compatibility with air-purifying respirators (APR), personal protective equipment (PPE), and communications systems. The Commando SC 650 also received high capability scores because of its chemical resistance, size availability, coverage area, and field of vision.

The helmet received a high usability score because of its comfort, weight, and adjustability. It was compatible with weapons systems and eyewear used during the assessment. The Commando SC 650's faceshield was easy to remove and/or replace and shielded the evaluators from liquid projectiles during assessment activities. The Commando SC 650 rated high in the deployability category due to its ability to be quickly donned and its protective transport case.

Evaluators noted some disadvantages with this helmet. For example, the chin strap load release latch would release with only moderate pressure. Also, there was limited neck protection and the suspension system interfered with the APR.

	**Pros**	• Size availability • Comfortable to wear and weight • Chemical resistance • Comfortable chin strap • Low-profile faceshield • Good adjustability • Stable when struck • Faceshield compatibility with APR and PPE
	Cons	• Chin strap load release latch released under moderate pressure • Faceshield locking mechanism • Limited neck protection • Suspension system interfered with APR
Commando SC 650	**Composite Assessment Score: 74**	

ForceField ACH (Ballistic)

ForceField with APR
Photo courtesy of CDP

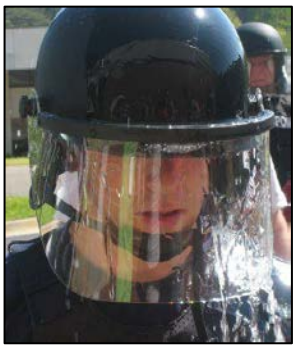
The ForceField ACH received the second highest composite score with advantages including comfort, fit, APR compatibility, and low-profile faceshield design. The helmet features a comfortable harness and buckle system, and a wide neck strap. Evaluators also noted that the ForceField ACH shell was designed to accommodate communication devices.

Evaluators noted several disadvantages as well. The padding was only available in two sizes, and it was easily torn by the hook and loop system that held it in place. Other concerns listed as disadvantages include the way in which the faceshield locking mechanism slid off the faceshield, allowing the faceshield to move freely, and difficulty sighting weapons while wearing the helmet in conjunction with an APR.

	**Pros**	• Good fit • Comfortable to wear • Low-profile faceshield • Shell cut for communication devices • Wide, comfortable neck strap • APR compatibility
	Cons	• Limited sizes of padding available • Helmet hook and loop system tears padding • Faceshield was difficult to adjust • Difficulty sighting weapons with APR
ForceField ACH	**Composite Assessment Score: 70**	

Tactical TR2200 (Non-ballistic)

The Tactical TR2200 received the third highest overall score and was the highest scoring non-ballistic helmet. Evaluators identified advantages of this helmet including overall comfort, the inner liner, and neck protection.



Tactical TR2200 Splash
Photo courtesy of CDP

	Pros	• Comfortable to wear • Padded liner • Coverage of the neck protection
	Cons	• Hard sections in liner • Not enough padding provided for proper sizing • Liner sticks to head • Chin strap latch was easy to latch incorrectly
Tactical TR2200	**Composite Assessment Score: 69**	

Evaluators noted several disadvantages of this helmet. They noted that the liner shifted, exposing hard sections beneath that stuck to their head when they perspired, and the padding sizes were not adequate to obtain a secure fit. The chin strap was difficult to release because the latch was easily locked in place incorrectly.

Rebel HCG (Non-ballistic)

The Rebel HCG received the fourth highest composite score. This helmet had several advantages, including good initial fit and a permanently affixed faceshield.

Evaluators noted several disadvantages including the lack of padding required to properly size the helmet. Additionally, the Rebel HCG's padding absorbed perspiration causing the helmet to slide on the evaluator's heads, and there was no air flow through the helmet. The neck protection on this helmet was not compatible with raised-collar ballistic vests and evaluators also listed the faceshield seal, chin strap latch, and compatibility with APR as disadvantages.

	Pros	• Initial fit • Permanently affixed faceshield
	Cons	• Padding absorbed perspiration • Faceshield did not seal completely against the helmet • Neck protection interferes with collared vests • Poor air flow • APR compatibility
Rebel HCG	**Composite Assessment Score: 68**	

Striker PLT (Ballistic)

The Striker PLT received the fifth highest composite score. The tight padding fit and high comfort level were cited as advantages for this helmet.

	Pros	• Tight padding fit • Comfortable to wear
	Cons	• Poor fit • Pressure and pinch points • Chin strap difficult to fasten • Chin piece movement • Water leakage during splash test • Faceshield length
Striker PLT	**Composite Assessment Score: 68**	

Disadvantages included pressure and pinch points from buckles, chin piece movement, and multiple necessary adjustments. Poor fit, a difficult-to-fasten chin strap latch, liquid leakage, and faceshield length were also listed as disadvantages.

906C (Non-ballistic)

The 906C received the lowest composite score. However, this helmet received the highest scores in affordability and maintainability. It was rated high in affordability because of its life-cycle costs, options availability, and cost of replacement parts. The helmet received a high maintainability rating because of the availability of replacement parts, ease of cleaning, and storage requirements.

Evaluators also noted some disadvantages of this helmet. Wearing this helmet caused pressure points on the front and back of the head. The helmet's chin strap latch could easily be latched incorrectly and was difficult to remove after this was done. Also, evaluators noted that the wire guard faceshield made it difficult to see, and the faceshield did not fully close when evaluators were wearing APR.

	Pros	• Optional soft chin strap • Life-cycle costs • Availability of replacement parts
	Cons	• Pressure on front and back of head • Front heavy • Wire guard faceshield hindered vision • Chin strap latch was easy to latch incorrectly • APR compatibility
906C	**Composite Assessment Score: 63**	

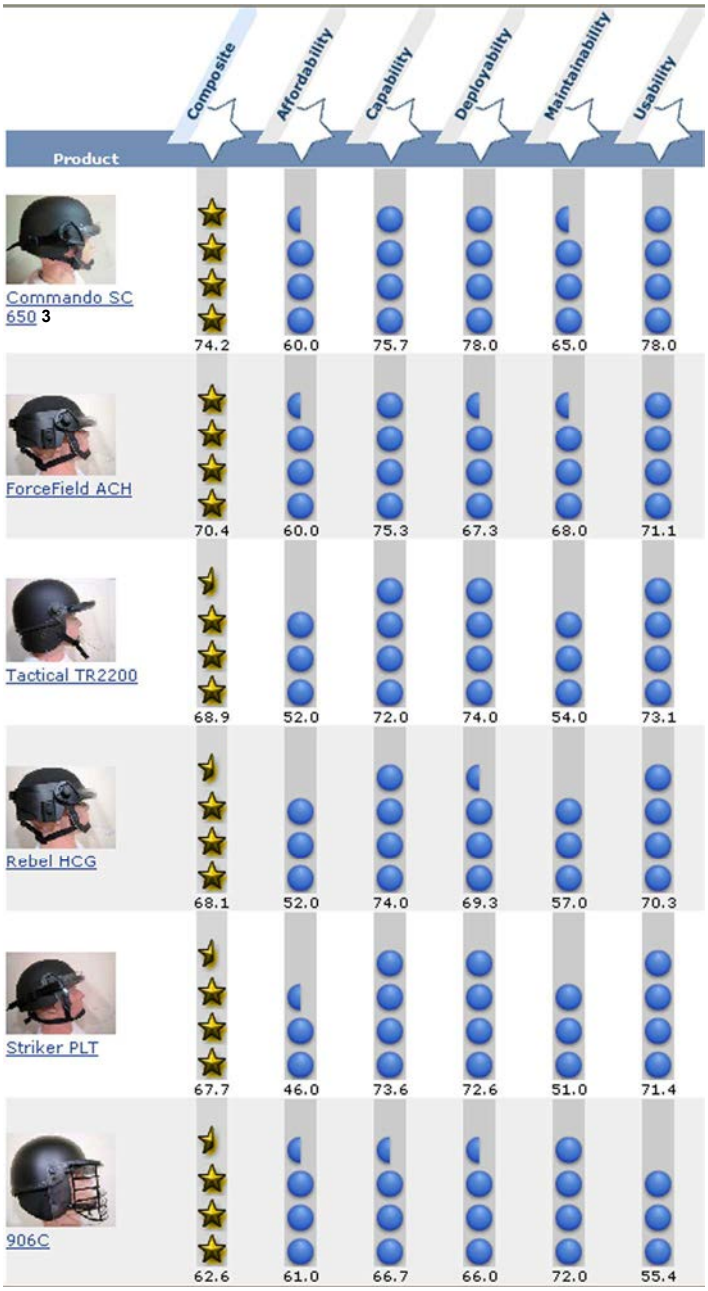
Conclusion

Although the evaluator comments and scoring indicated that all six assessed LE Helmets would enable responders to respond to non-routine tactical situations, it was agreed that some of the helmets would be more effective than others.

The assessment goal was achieved by utilizing and evaluating the LE Helmets in scenario driven exercises. Analysis of the evaluators' scoring and comments revealed these common observations concerning the assessed LE Helmets:

- Helmet comfort was highly valued. Helmets with ample padding, comfortable chin and neck harnesses, and good airflow were preferred. Also, these helmets seemed lightweight because the suspension and padding systems distributed the weight well.
- A secure fit was essential to helmet usability. Evaluators expressed a strong preference for helmets that did not shift during physical activity or when struck.
- Helmets and faceshields should allow for a good, clear field of vision with as few hindrances as possible. Visibility is essential for law enforcement personnel to be able to recognize and respond to potential threats, allowing them to protect themselves in hostile situations. Evaluators reacted positively to helmets that provided good visibility during the assessment.
- Helmets should provide adequate coverage without limiting head mobility. Helmets that provided both good coverage and good mobility were favored.
- APR compatibility should be considered during the helmet selection process. Evaluators frequently commented that they would want to try the helmet with the APR model they currently use before selecting a helmet model.

QuickLook Snapshot[2]



Notes:

[2] 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.

[3] Scores contained in the assessment report may be displayed differently. For purposes of the QuickLook, all SAVER category scores are normalized using a 100-point scale.

All reports in this series as well as reports on other technologies are available by request at https://www.rkb.us/saver.

Table 2. SAVER Category and Criteria Scores

KEY Least Favorable → Most Favorable	 Commando SC 650	 ForceField ACH	 Tactical TR2200	 Rebel HCG	 Striker PLT	 906C
Assessment Criteria						
Affordability						
Life-cycle costs						
Options availability						
Cost of replacement parts						
Capability						
Compatibility with air-purifying respirators						
Field of vision						
Coverage area						
Compatibility with communication systems						
Compatibility with personal protective equipment						
Resistant to chemicals						
Size availability						
Deployability						
Quick donning						
Protective transport case						
Maintainability						
Availability of replacement and spare parts						
Easy to clean						
Storage requirements						
Usability						
Adjustability						
Comfort						
Weight						
Compatibility with weapons systems						
Sound clarity						
Compatibility with eyewear						
Easy to remove and/or replace faceshields						
Faceshield stability						
Shields from liquids						