AIGIS PPE100 MINE BOOTS

AIGIS Blast Protection Ltd. | United Kingdom

GENERAL DESCRIPTION

The AIGIS blast-protected PPE100 mine boots are specifically designed to prevent traumatic amputation and to help reduce limb damage to a recoverable minimum, using the company’s blast-attenuating technology “TABREshield”. Certified by an orthopaedic surgeon, the PPE100 Mine Boots currently hold the best Mine Trauma Score in the industry.

The boots have been designed with the wearer in mind to maintain maximum mobility, durability and comfort in all climates.

The key components are

> Soft inner boot;
> TABREshield-protected outer boot; and
> Ballistic gaiter.

Boot features are

> Based on military standard mountain climbing boot;
> ‘Toe-curl’ shape and good ankle articulation make walking and kneeling/standing transitions easy;
> Low weight and sturdy build enable stable walking over all ground conditions;
> Blast protection in the sole to help keep the upper boot intact and inner sole un-penetrated; and
> Waterproof and suitable for all climates

The soft inner provides comfort, ventilation in hot climates and insulation in cold climates. The soft tissue helps mitigate trauma mitigation. The boots are easily put on and removed, and can be worn for light duties.

The ballistic gaiter helps prevent flash burns and limits fragment ingress into both legs. It is water repellent and easily cleaned.

PROTECTIVE PERFORMANCE | MASS

<table>
<thead>
<tr>
<th>PPE TYPE</th>
<th>WEIGHT</th>
<th>COMMENTS</th>
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<tr>
<td>PPE100 mine boots</td>
<td>Weight per boot is 3 kg including fragmentation protection gaiter.</td>
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**COLOUR OPTIONS AND SIZE**

- All boots and gaiters are supplied in black.
- Available in EU sizes 7-11. Other sizes can also be made.

**EQUIPMENT IN USE TO DATE**

The PPE100 Mine Boots are currently used in UN and NATO countries for military and humanitarian demining operations.

**TEST AND EVALUATION**

The PPE100 Mine Boot system has been tested at the Cranfield University Ordnance Test and Evaluation Centre, run under the auspices of the British Army’s Royal Military College of Science at Shrivenham. The test report can be provided on request. The Aigis Blast Protection quality system has been approved by ISO 9001.

The PPE100 mine boot has been tested against simulant AP mines using amputated human limbs. The resultant conditions of the limbs were evaluated by an orthopaedic surgeon for injury classification and likely recovery outcome: the boot provided protection leading to no traumatic amputation and full recovery outcomes. This was achieved by the blast-protected sole absorbing blast energy, the boot and gaiters limiting fragment ingress and the boot supporting and containing the foot and ankle until surgical intervention.

**COST**

Prices available on request.
GENERAL DESCRIPTION

The Allen Vanguard Spider Boot, or foot protection system, is designed to protect a deminer’s feet and legs against blast-type anti-personnel mines. It can be worn in difficult terrains during reconnaissance, detection and victim assistance operations.

The boot offers a high level of protection by maximising the stand-off distance between the foot and a blast-type anti-personnel mine. In the event of a blast, the boot is engineered to deflect and absorb the residual energy transmitted to the foot. The design represents four years of research and development in cooperation with Canadian and international military research establishments.

Residual blast energy and fragments are absorbed by the hull. The equipment secures the user’s combat boot to a platform with four pods: two forward and two rear, and all four extended slightly to the sides.

PROTECTIVE PERFORMANCE | MASS

Provides significant protection for the full range (M14 to PMN) of blast-type anti-personnel mines.

Proven through extensive live blast testing to provide four to five times the protection of conventional mine boots when the source of blast is in almost direct contact with the foot.

For greatest safety the spider boot should be worn in combination with well-proven PPE and combat boots.
COLOUR OPTIONS AND SIZE

- Adjustable to all common sizes of combat boots.
- Secure binding system with quick adjustment/release mechanism
- Detachable Sand Pods are available for operations in soft terrain.
- Live hinge system allows natural walking motion.

EQUIPMENT IN USE TO DATE

Several thousand pairs have been sold for use in demining theatres worldwide.

TEST AND EVALUATION

Three test reports are available on the ITEP website. [www.itep.ws](http://www.itep.ws)


COST

Price from the manufacturer on request.
BFR COMBAT BOOTS

BfR Holdings Ltd. | Hong Kong | China

GENERAL DESCRIPTION

The blast and fragment resistant (BfR) Combat Boot V-50 was developed as a military combat boot that provides soldiers with a measure of protection against anti-personnel landmines. With its advanced technology, it is designed to mitigate soft tissue and skeletal damage to the feet by deflecting blast from anti-personnel landmines. Since 1991 it has been manufactured in Singapore.

The key to the BfR boot’s deflection capability is its protective sole system. Developed with patented technologies, the sole system is based on specially woven fabric bonded together with a specially constructed sole and heel plates and heel plug. It is very flexible and manoeuvrable.

Specifications

- Outer shell: 1.4 to 1.6 mm full grain, waterproof leather (with polypropylene woven fabric for some models).
- Intermediate protection system, woven Aramid: specific density – 1.44g/m³, tenacity – 250 mN/dtex¹, modulas of elasticity – 90 Giga Pascal elongation at break – 3.3%, water resistant laminate and seams – polyurethane materials, waterproof membrane lining
- Protective sole system.
- Lightweight dual density rubber sole.
- Chevron or Panama outsole tread pattern.
- Eyelets, loop-hole hooks and rivets for quick release.

¹ for mN see: http://en.wikipedia.org/wiki/Newton: “...a force of 1 N exerted over a distance of 1 m is 1 N·m = 1 joule...” for dtex see: http://en.wikipedia.org/wiki/Dtex#: “...Tex is a unit of measure for the linear mass density of fibers and is defined as the mass in grams per 1000 meters. ... The unit code is “tex”. The most commonly used unit is actually the decitex, abbreviated dtex, which is the mass in grams per 10,000 meters.”
COLOUR OPTIONS AND SIZE

The BfR Combat Boot is available in several options:

- V50128 (10-inch polypropylene and leather);
- V50138 (10-inch polypropylene and sand suede leather);
- V50168 (10-inch leather); and
- V50188 (10-inch sand suede leather).

EQUIPMENT IN USE TO DATE

Customers include China’s Ministry of Public Security, demining organisations in India (Horizon), UNDP in the Middle East, the armies of Korea, Pakistan, U.A.E., U.K. and the U.S., and the Malaysian Navy.

TEST AND EVALUATION

The BfR V50 combat boots were independently tested by the Royal Military College of Science in the United Kingdom against certain common types of anti-personnel landmine of different explosive charge sizes. The report can be seen at the manufacturer’s website: www.bfrboots.com/english/html/blast_tests.html.

COST

The BfR boots retail online for US$ 288 per pair.
GENERAL DESCRIPTION

Wellco has manufactured anti-personnel mine blast protective footwear since 1969. It produces both mine protective boots and over boots, either with solid rubber soles or – as in its latest development, the Anti Mine (Amine) Bogglers A – with a combination of polyurethane (towards the foot) and rubber (towards the ground). These products are designed to reduce injury from activation of anti-personnel mines which, all too frequently, results in amputation.

All Wellco’s protective boots are designed to be functional in mud, sand and rocks. The protective over boot can be worn over a standard combat boot or over a Wellco protective boot, which can be worn all day in all terrains while protecting against anti-personnel mine detonation.

The AMine Bogglers and boots are comfortable to wear all day. Their weight is equal to or less than most standard combat boots.

Wearing both the blast protective boot and the blast protective over boot doubles the protection, and is used mostly when mapping or clearing mine fields.

PROTECTIVE PERFORMANCE | MASS

Inside the polyurethane sole is a wedge-shaped attenuator constructed from stainless steel and aluminum honeycomb. The upward force of a detonation makes the stainless steel compress the honeycomb and thereby absorb energy that otherwise would continue into the foot. The thick polyurethane sole between the upper and the rubber cleats is of a special blend which can also absorb large amounts of force before being ripped apart. This contributes to the hard force resistance in Wellco’s protective boots and over boots. The use of polyurethane allows the sole to be thicker without adding weight. Because there is more distance between the blast and the foot, the blast’s force has more area to dissipate before reaching the foot and leg.

The boot upper can be of any type that is desirable, such as all leather, insulated, hot weather, desert type, etc. All boots have protective insoles made from several layers of Kevlar 7. The over boot also has Kevlar 7 in the upper side panels. Kevlar 7 in the side panels of the boot has been tested extensively, but was never liked by operators as it substantially reduces comfort in the boot, which is designed for all-day wear.

Even with protective footwear, injury to an operator’s foot and leg when stepping on a mine is in many cases unavoidable. Wellco products are designed to protect against the severity of the injury, which in the worst cases results in amputation. The original
The mine protective boot, produced in 1969, was designed to prevent amputation if exposed to detonation of anti-personnel mines with up to 28 g of C-4 explosive. Improvements over the years have increased the level of protection and usability.

There are many variables that affect the level of injury from anti-personnel mine activation and Wellco cannot guarantee a level of protection. Perhaps the best indicator of the protection provided by these products is the significant number of re-orders received by Wellco.

The picture below is from testing at Aberdeen Proving Grounds. The charge for each blast was 25 g of C-4.

### PROTECTIVE PERFORMANCE | MASS

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<tr>
<td>Mine Boggler boots</td>
<td>5 lbs per pair</td>
<td>Shipping weight</td>
</tr>
<tr>
<td>Over boot</td>
<td>4 lbs per pair</td>
<td>Shipping weight</td>
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### COLOUR OPTIONS AND SIZE

Wellco blast mitigation products are available in black or desert tan.

### EQUIPMENT IN USE TO DATE

Products are currently in use in Colombia, Egypt, India, Jordan, Nicaragua, South Korea and Turkey. They are also procured by the Organization of American States for use in humanitarian demining.

The US Army has purchased the rubber-bottomed over boot since 1970. Some 20 other countries have bought the boots and over boots, either with all-rubber bottoms or the new polyurethan/rubber combination.

Wellco protective footwear is being used by NATO Human Factors and Medicine Task Group for its ATest Methodologies for Personal Protective Equipment Against Anti-Personnel Mine Blast programme. This programme intends to publish a description of available protective measures against anti-personnel mines.

### TEST AND EVALUATION

Wellco has performed blast tests at Fort Benning and the Aberdeen Proving Grounds. These tests compare new materials and constructions with earlier models. Changes are only made when results equal or better those of earlier models. The incorporation of Kevlar 7 and polyurethane was a result of such testing.

Comfort has always been a factor. Latest products are light weight and comfortable with more protection than ever and can be worn all day, especially in mine-affected areas.

### COST

- Boots: US$ 299.95 per pair (Dec.2008);