

FOR THE FIRST TIME

# LASTING LIGHTWEIGHT IS COMBINED WITH EXTREME ROBUSTNESS AND QUICK RE-DRY

EXTRAGUARD upper technology sets new standards  
for GORE-TEX combat boots.

**GORE-TEX**  
PRODUCTS

**GORE**



# ABSTRACT

Soldiers need robust, waterproof and breathable footwear that also offers reliable protection in all weathers and in all various demanding terrains. In the past, robust protection has often automatically been associated with heavier footwear and less comfort for the feet. Now, the new three-layer EXTRAGUARD upper technology is paving the way for the manufacture of a totally new class of GORE-TEX combat footwear. This footwear

is lighter than a conventional combat footwear and remains lightweight even in wet or muddy terrain or in situation where it is difficult for soldiers to dry their boots quickly. The boots are robust, quick to dry and can be worn again in comfort a couple of hours later. Like all other GORE-TEX combat footwear, it is durably waterproof and breathable.

## THE CHALLENGE

Robust, waterproof safety footwear for military helps to provide protection against injuries to feet. However, heavier footwear is often associated with less comfort. This dilemma intensifies when boots are worn for hours in wet conditions. Over time, the water repellent finish wears off and the boot uppers absorb more and more water, the longer wearers spend standing, walking or running in rain. Although the boots remain waterproof, they become heavier as the outer surface gets saturated with water, restricting the wearers' mobility. Wetness also robs the feet of warmth and can cause conductive heat loss. Furthermore, once the boots are wet, they cannot be worn again for quite some time because they need so long to dry.

## THE GOAL

Soldiers have to operate in a wide range of situations and weather conditions. Their footwear has to meet the demands of the job. They need boots that provide durable protection against mechanical impacts, common chemicals, flames, cold and wet. They also want footwear that is lastingly lightweight, highly breathable, and extremely comfortable to wear – ideally it should be barely noticeable.



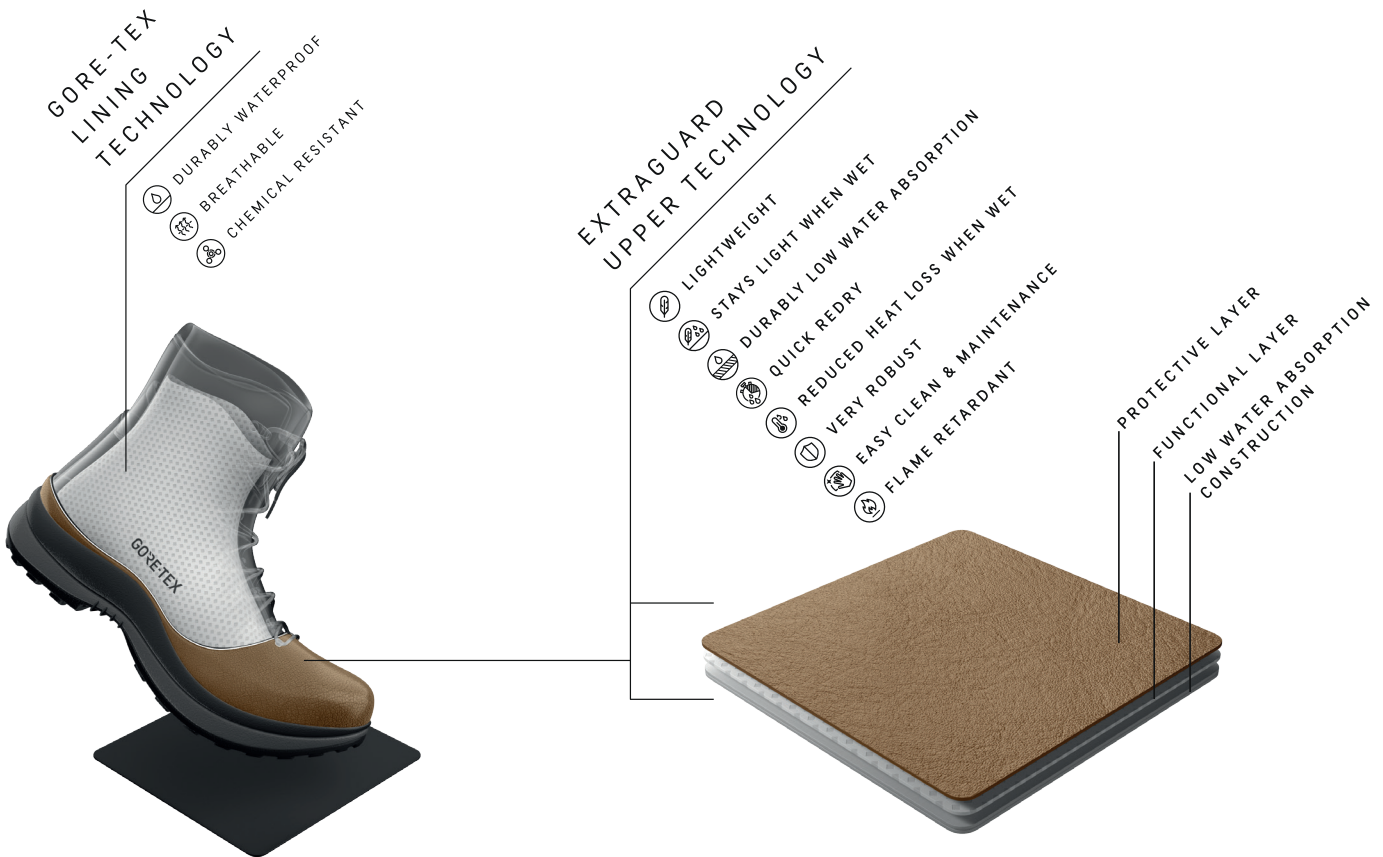
# INNOVATIVE UPPER

EXTRAGUARD is a new, sustainable, upper technology from Gore that combines the benefits of a robust upper material with the advantage of lightweight, flexible and breathable textiles. This paves the way for the manufacture of a whole new class of GORE-TEX combat boots.

The new EXTRAGUARD upper is made of 3 layers:

1. A highly abrasion-resistant and flame-retardant protective layer
2. A functional layer, providing physical protection
3. An innovation low water absorption construction.

This 3-layer upper is sealed with GORE SEAM® Tape and, together with the GORE-TEX lining (inner bootie construction), integrated into the boot. Seam sealing prevents moisture from making its way into the boot through the seams. The EXTRAGUARD upper technology ensures that the boot only absorbs a minimal amount of water, even after months of extensive use and loss of the water repellent finish. The GORE-TEX bootie ensures the durable waterproofness of the boots even after the water repellent finish has worn off, or the upper material has been damaged. The GORE-TEX EXTRAGUARD boot combines the following features and benefits:



## GORE-TEX EXTRAGUARD COMBAT BOOTS

3-layer technically engineered upper construction – seam-sealed with GORE SEAM® Tape – and GORE-TEX lining (bootie construction).

# GORE-TEX COMBAT BOOTS WITH EXTRAGUARD UPPER

GORE-TEX EXTRAGUARD combat boots are **durably waterproof and breathable**. They exceed the requirements of EN ISO 20345/347.

GORE-TEX boots engineered with EXTRAGUARD upper technology are **very robust** and yet comfortable right from the start. They need no breaking in and don't change their shape. These boots provide protection against sharp objects,

common chemicals, abrasion, and wetness. They also provide flame protection. All these functional features translate into a long product life.



DURABLY WATERPROOF



BREATHABLE



VERY ROBUST



CHEMICAL RESISTANT



Even after months of use under extreme weather conditions the GORE-TEX combat boot with EXTRAGUARD upper (right) doesn't change its shape or function.

## MATERIAL PROPERTIES OF EXTRAGUARD UPPER:

- ◆ Consistent quality: even thickness
- ◆ Form stability: no need for additional reinforcements in the boot construction
- ◆ Material can be seam-sealed with GORE SEAM® Tape
- ◆ Multiple design options: stick-on reflective elements, protective or colour patches, printing, PU castings (plastic) and other applications.

When dry, the robust and abrasion resistant EXTRAGUARD upper material construction is **40 percent lighter\*** than leather. Due to the low water absorption construction on the outside, it remains **lightweight when integrated into GORE-TEX combat boots engineered with EXTRAGUARD upper**. GORE-TEX EXTRAGUARD combat boots retain their functional features even after months of use and constant wear in wet environments. They also retain them once the water repellent finish has worn off, which is not always the case with conventional boots.



LIGHTWEIGHT



STAYS LIGHT WHEN WET

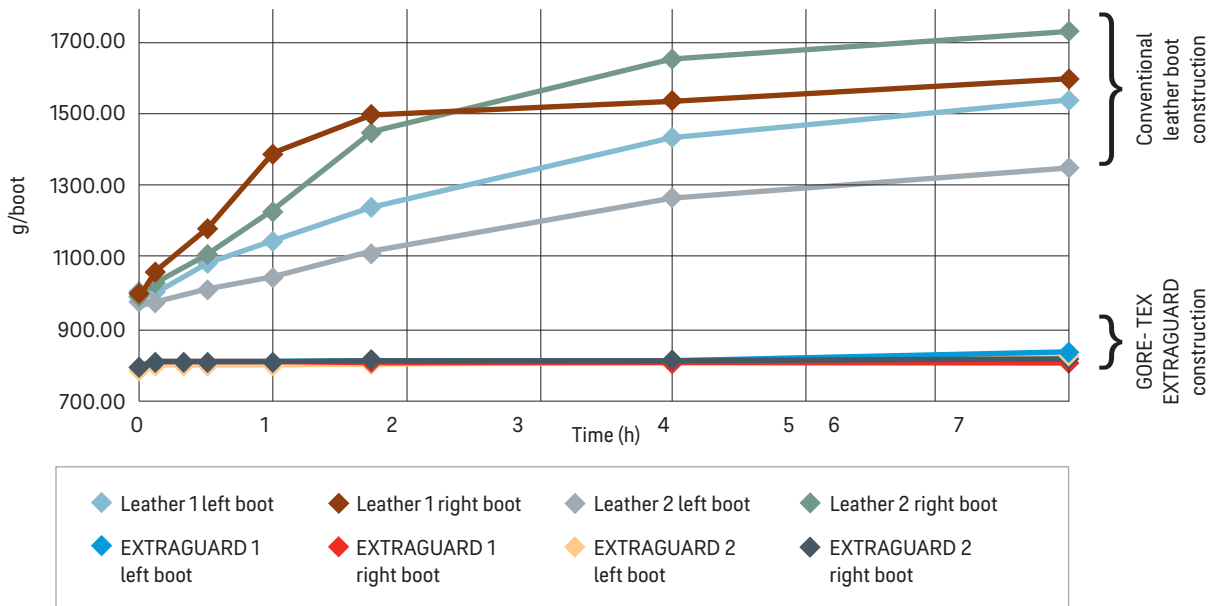


DURABLY LOW WATER ABSORPTION



\*Compared with full grain leather. Thickness measurement calculated in accordance with DIN 53326.

# WEIGHT GAIN OF BOOTS\* WHEN WET

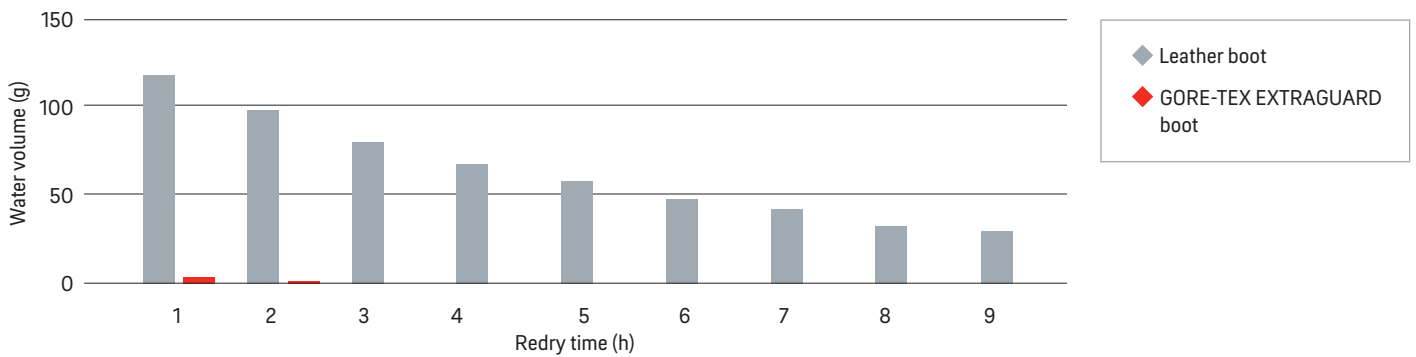


Compared with conventional boots, GORE-TEX EXTRAGUARD boots have very low water absorption, confirmed by the water bucket test.

# COMPARISON OF REDRY TIMES\*

When compared with traditional leather combat boots, the low water absorption construction of GORE-TEX EXTRAGUARD footwear ensures quick redry. In wet environments, the upper materials used in conventional footwear absorb considerable amounts of water as soon as the water repellent finish wears off.

This increases the weight and often makes them feel damp and cold. By comparison, GORE-TEX EXTRAGUARD boots hardly absorb any moisture on the outside. This translates into significantly faster drying times when compared with standard boots.



As GORE-TEX EXTRAGUARD boots only absorb minimal moisture from the outside, they dry considerably faster than standard boots.

GORE-TEX EXTRAGUARD boots are **easy to clean**. They can be rinsed under the tap or hosed down. Specific care products needed for leather are not necessary.



\*Artificially aged to replicate 2-3 months of wear.

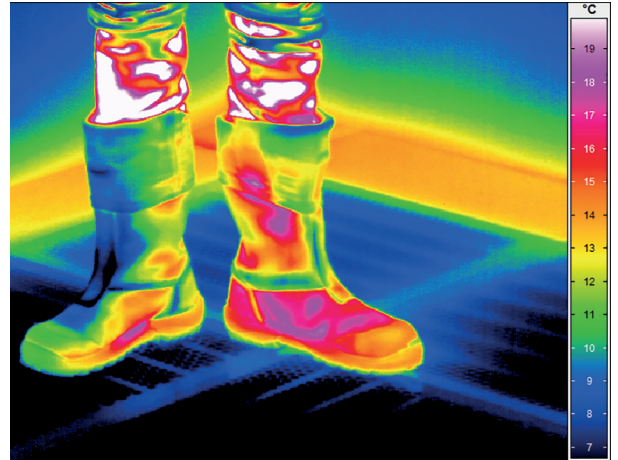
# COMPARISON OF RESISTANCE TO CONDUCTIVE HEAT LOSS (RCT)

Water from the outside only ever gets as far as the innovative low water absorption construction where it is prevented from penetrating further.

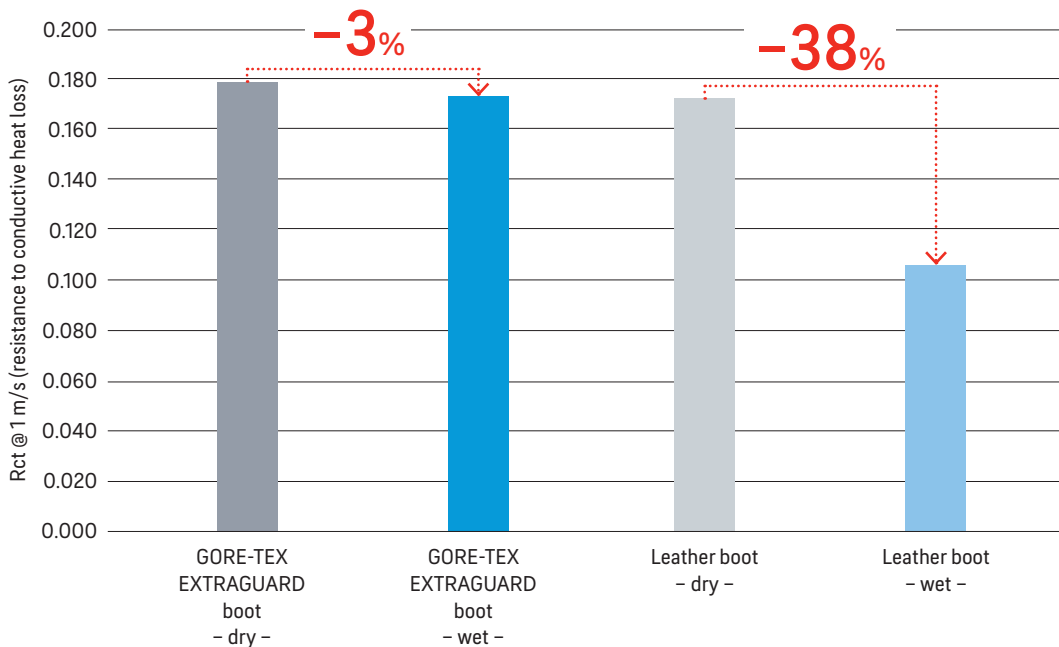
No moisture accumulates between the upper material and the waterproof inner bootie. This reduces **conductive heat loss\***, which can occur in footwear using conventional upper materials in wet and cold environments. Feet stay dry and comfortable, even in cold and wet conditions.



REDUCED HEAT LOSS  
WHEN WET



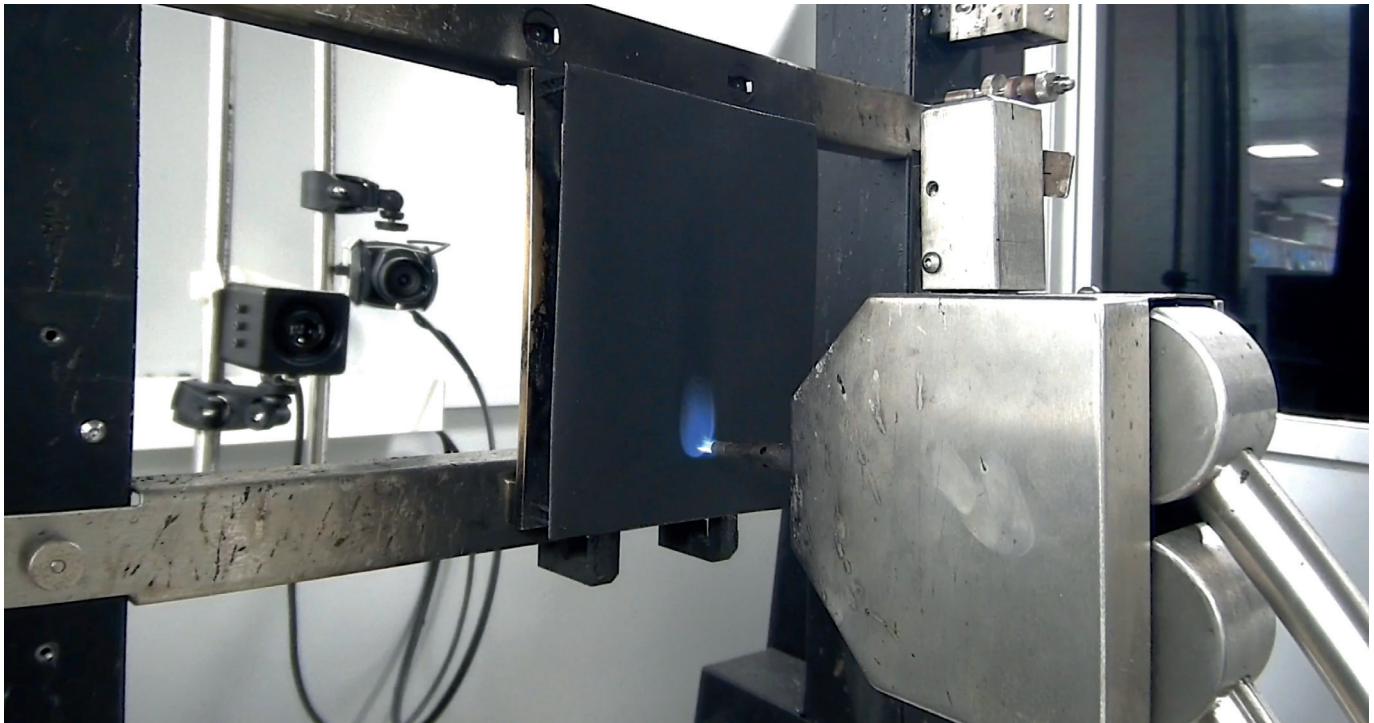
Conductive heat loss of a GORE-TEX EXTRAGUARD boot is considerably less than that of an identical leather version.



Identical boots were compared when dry and when wet. The potential heat loss of wet leather boots is significantly higher than that of wet GORE-TEX EXTRAGUARD boots.

\*Conductive heat loss: conductive heat loss occurs when the outer surface of a boot becomes saturated with water. This wet surface draws heat away from the foot (passive heat loss) far faster than when the surface is dry. The only way that wearers can compensate for this is if they keep moving. Otherwise they get cold feet. Very often, it will feel like feet are uncomfortably damp and clammy. Some people even assume that the boots are leaking, and that water is penetrating, even though that's not the case.

# FLAME RETARDANT



EXTRAGUARD upper material does not inflame when exposed to a Bunsen burner for 5 seconds.

GORE-TEX EXTRAGUARD combat boots provide flame protection.



FLAME RETARDANT

## EXTRAGUARD UPPER MATERIAL AND SUSTAINABILITY

W. L. Gore & Associates is committed to continuously improving the environmental impact of its products without compromising on durable performance. All new product technology developments need to support the Sustainability Strategy, for example by selecting sustainable materials, reducing manufacturing waste or using simpler transport solutions.

The EXTRAGUARD upper is a great example due to its robust and durable performance. This is confirmed by a variety of tests carried out under laboratory and real-life conditions. The material also sets new standards in terms of the reduced environmental impact of its manufacture:

- ◆ **Low water consumption**
- ◆ **Reduced CO<sub>2</sub> emissions**
- ◆ **Few chemicals used**
- ◆ **Consistent quality**
- ◆ **Supplied as a rolled good which no longer requires extra inspection on receipt.**

This significantly reduces work, material waste and the overall environmental impact.



“ Backed by decades of experience working with defense forces across the world, we know exactly what level of comfort and protection combat boots need to offer and share the desire of soldiers to continuously improve their performance while not compromising protection and comfort in challenging environments. Gore is proud that the years of research that have gone into the development of its EXTRAGUARD upper technology have made a significant contribution to raising comfort levels in terms of key features such as weight, redry and breathability while not trading off robustness and protective features of the boots. Initial reactions from military field tests across the globe and multiple challenging terrains confirm this and promise a step change in the field of combat boots.

**Martin Pfister,**  
GORE-TEX Professional Defense Footwear Product Specialist

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#### PRODUCT BENEFITS:

- ◆ Extremely lightweight
- ◆ Stays light when wet
- ◆ Durably low water absorption
- ◆ Quicker redry
- ◆ Reduced heat loss when wet
- ◆ Very robust
- ◆ Easy clean and maintenance
- ◆ Flame retardant

