



# WEIGHT-MINIMIZED CERAMIC BODY ARMOR

Optimum personal protection together with maximum mobility thanks to minimum weight are the key prerequisites for safe and successful deployment. ESK's innovative ballistic protection materials surpass conventional armor systems.



ESK boron carbide system (German SK 4 - protection)

## Lightweight

While aluminum oxide (alumina) designs for SK 4 protection usually weigh around 42 kg/m<sup>2</sup>, and silicon carbide designs around 36 kg/m<sup>2</sup>, boron carbide based technical solutions can be designed in the **28 to 32 kg/m<sup>2</sup>** range.

A size M front or back plate designed with a 28 kg/m<sup>2</sup> boron carbide system can weigh as little as 2 kg. This is by far the lightest SK 4 body armor plate available on the market.

## Reliable

ESK's ceramic solutions provide maximum SK 4 protection, together with weight saving that is superior to any other commercially available system.

ESK offers a wide variety of material solutions for different applications and threat levels. The extensive ESK portfolio includes both boron carbide and silicon carbide grades with application-oriented microstructures.

The hot pressed boron carbide plates are integrated with optimized composite structures to provide rugged multi-hit armors.

The projectile shatters when it strikes the ceramic impact surface of the weight-optimized armor system. The protective effect of the ceramic is further increased by a supporting composite backing layer that provides additional stability and absorbs the kinetic energy.

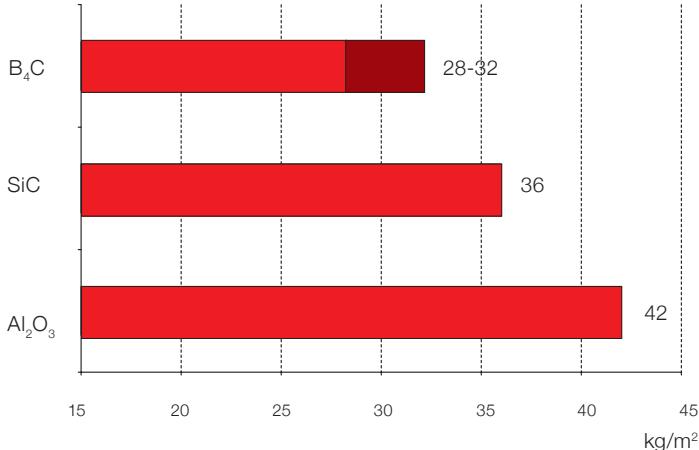


Fig. 1: Areal density of SK 4 ceramic composite systems

Boron carbide's hardness and strength, combined with its low density make it ideal as the principal component of modern ballistic inserts. Boron carbide allows the realization of ideal lightweight technical solutions.

Boron carbide is 20% lighter than silicon carbide and even 37% lighter than aluminum oxide (alumina) - the other materials commonly used in body armor.

The boron carbide ceramic plates are combined with a high-end composite backing structure.

Polyethylene-based fibers, such as Dyneema® or Spectra Shield®, are used in combination with a variety of resins, chosen specifically to meet the application requirements.

### Flexible

Front and back plates are available as **size S, M, L and XL** double-curved plates. Side plates are available to increase protection as needed.

ESK personnel protection systems can be easily integrated into a wide range of currently available vests.

## ESK

ESK Ceramics GmbH & Co. KG, founded 1922 in Kempten, Germany, has been a leading supplier of ceramic raw materials for body armor plates for over 40 years. Since 2004, ESK has been a wholly owned subsidiary of Ceradyne, Inc., an established leader in the manufacture of ceramic composite body armor upgrade plates, and key supplier to the U.S. Military.

Together, ESK and Ceradyne are a fully vertically integrated manufacturer of ceramic body armor, with manufacturing capacity in the U.S. and Europe.

The data presented in this leaflet are in accordance with the present state of our knowledge, but do not absolve the user from carefully checking all supplies immediately on receipt. We reserve the right to alter product constants within the scope of technical progress or new developments. The recommendations made in this leaflet should be checked by preliminary trials because of conditions during processing over which we have no control, especially where other companies' raw materials are also being used. The recommendations do not absolve the user from the obligation of investigating the possibility of infringement of third parties' rights and, if necessary, clarifying the position. Recommendations for use do not constitute a warranty, either express or implied, of the fitness or suitability of the products for a particular purpose.

The management system has been certified according to DIN EN ISO 9001, DIN EN ISO 14001.

ESK Ceramics GmbH & Co. KG  
Max-Schaidhauf-Straße 25  
87437 Kempten, Germany  
www.esk.com, info@esk.com

a ceradyne company