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Materials Used in Protection from Firearms

Modern body armor uses many different materials to protect people from firearms. This can range from a fabric to a metal. The most common and affordable body armor is Kevlar®. Kevlar® is a para-aramid synthetic fiber made from Poly-paraphenylene terephthalamide (Kwolek) allowing it to be a robust cloth that weighs very little and is chemical, cut, and flame resistant. ("Body Armor Materials | Materials Used For Body Armor") Kevlar® is rated up to level IIIA, meaning it can stop up to a 44-magnum round. (Armored Republic, LLC) Kevlar® is used in many other products besides body armor, it is also used in canoes and bicycle frames. (Kwolek) The second type of body armor used is steel alloys. The most common steel alloy used is AR500. This is made out of 93.765% Iron, 0.30% Carbon, 0.70% Silicon, 1.60% Manganese, 0.02% Phosphorus, 0.01% Sulfur, 1.50% Chromium, 1.50% Nickel, 0.60% Molybdenum, and 0.005% Boron. ("AR 500 Steel Plates In Toronto, Mississauga, ON") These types of plates are rated to stop up to green tip (armor piercing) 5.56 and .308 Win Mag. (Armored Republic, LLC) The third type of body armor is ceramic. They can be made of many types of ceramics such as alumina, boron carbide, silicon carbide, and titanium diboride. (Elsevier B.V.) silicon carbide is commonly used and is very tough, but very brittle. Ceramic body armor is rated to stop up to black tip (armor piercing) .30-06. (Armored Republic, LLC) The ammunition commonly fired at body armor is made up of lead with an outer coating of copper. In armor-piercing ammunition, a tungsten carbide core is inserted into the round to give it better penetration.

Works Cited

"AR 500 Steel Plates In Toronto, Mississauga, ON." *Titus Steel*, https://titussteel.com/our-products/wear-and-impact-steel/ar-500/. Accessed 21 August 2024.

Armored Republic, LLC. "Levels of Body Armor Protection from Armored Republic." *Levels of Body Armor Protection | Armored Republic*, 2012, https://www.ar500armor.com/levels-of-body-armor?srsltid=AfmBOoqLoIikCJb1JkIsAB_fY0i5doJ9RpHnNRzmNMOPl0wLy4nMT2Vc. Accessed 21 August 2024.

"Body Armor Materials | Materials Used For Body Armor." *Body Armor News*, https://www.bodyarmornews.com/body-armor-materials/. Accessed 21 August 2024.

Elsevier B.V. "High energy absorbing materials for blast resistant design." *Ceramic Armor - an overview | ScienceDirect Topics*, 2024, https://www.sciencedirect.com/topics/materials-science/ceramic-armor#:~:text=The%20most%20common%20ceramic%20materials,4.3). Accessed 21 August 2024.

Kwolek, Stephanie. "What is Kevlar?" *Metallurgy for Dummies*, https://www.metallurgyfordummies.com/what-is-kevlar.html. Accessed 21 August 2024.