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Molotov cocktail protection – protective clothing for emergency services

Objective

Special task forces are exposed to physically demanding tasks in operations lasting up to more than 10 hours. Wearing heavy, multi-layered body armour is an additional burden. Currently, the demands on the body armour of special task forces in the police, special task forces and fire brigades are increasing due to the growing willingness of right-wing and left-wing extremist perpetrators to use violence, e.g. attacks with firebombs. For this reason, the emergency services are calling for the weight of the KSA to be reduced by utilising current technical possibilities and modern materials, and for wearing comfort to be increased while providing sufficient protection.

Approach and results

The aim of the research project was the development of a heat-resistant fabric for the operational clothing of special forces. In line with the name of the project, the main objective was to protect against Molotov cocktail attacks. These can cause serious injuries that need to be prevented. The potential for injury is due in particular to the extremely high combustion temperature of 800 °C - 1,700 °C, but also to the strong adhesive effect of the incendiary devices.

Protective clothing (overalls) made from developed fabric

The protective clothing developed is characterised by an optimised fibre composition and a special yarn and fabric construction. In addition, the functionalisation of the fabric has been adapted. It has been possible to limit the heat shrinkage in the yarns themselves and in the fabric even more. As the development also focused on a yarn construction suitable for mass production, the innovative approaches of the development lie in particular in the material composition of the fibre mixture used. At the same time, wearing comfort was increased with sufficient protection by means of an innovative fabric weave. One of the criteria for wearing comfort is breathability, measured by the air permeability of the suit. A durable finishing formula was developed in order to optimise the run-off behaviour of fire accelerants from the clothing. In the course of the project, a test methodology based on the "TNO – W 9999 - Molotov cocktail test" was also successfully developed for small test specimens. The test methodology developed is used to test the burning behaviour of the protective textiles, including adhering substances and heat-intensifying fire accelerants. In addition, the performance of the developed fabrics can be assessed.

Acknowledgement

We would like to thank the Federal Ministry for Economic Affairs and Climate Action for funding the research project Molotov cocktail protection (Reg. No. 20599 BG) of the Forschungsvereinigung Forschungskuratorium Textil e.V. via the AiF within the funding programme "Industrielle Gemeinschaftsforschung (IGF)".

Supported by:

Federal Ministry for Economic Affairs and Climate Action

on the basis of a decision by the German Bundestag

The final report on this project is available on request.

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27/04/2023