

## A LED Warning Vest as Safety Smart Textile and Active Cooperation in a Working Group for Building a Normative Standard

**Authors :** Werner Grommes

**Abstract :** The institute of occupational safety and health works in a working group for building a normative standard for illuminated warning vests and did a lot of experiments and measurements as basic work (cooperation). Intelligent car headlamps are able to suppress conventional warning vests with retro-reflective stripes as a disturbing light. Illuminated warning vests are therefore required for occupational safety. However, they must not pose any danger to the wearer or other persons. Here, the risks of the batteries (lithium types), the maximum brightness (glare) and possible interference radiation from the electronics on the implant carrier must be taken into account. The all-around visibility, as well as the required range, play an important role here. For the study, many luminance measurements of already commercially available LEDs and electroluminescent warning vests, as well as their electromagnetic interference fields and aspects of electrical safety, were measured. The results of this study showed that LED lighting is all far too bright and causes strong glare. The integrated controls with pulse modulation and switching regulators cause electromagnetic interference fields. Rechargeable lithium batteries can explode depending on the temperature range. Electroluminescence brings even more hazards. A test method was developed for the evaluation of visibility at distances of 50, 100, and 150 m, including the interview of test persons. A measuring method was developed for the detection of glare effects at close range with the assignment of the maximum permissible luminance. The electromagnetic interference fields were tested in the time and frequency ranges. A risk and hazard analysis were prepared for the use of lithium batteries. The range of values for luminance and risk analysis for lithium batteries were discussed in the standards working group. These will be integrated into the standard. This paper gives a brief overview of the topics of illuminated warning vests, which takes into account the risks and hazards for the vest wearer or others

**Keywords :** illuminated warning vest, optical tests and measurements, risks, hazards, optical glare effects, LED, E-light, electric luminescent

**Conference Title :** ICSTWT 2019 : International Conference on Smart Textiles for Wearable Technology

**Conference Location :** Rome, Italy

**Conference Dates :** July 22-23, 2019