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Textiles and textile products — Smart textiles — Definitions, categorisation, applications and standardization needs

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National foreword

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Textiles et produits textiles - Textiles intelligents - Définitions, catégorisation, applications et besoins de normalisation

Textilien und textile Produkte - Intelligente Textilien - Definitionen, Klassifizierung, Anwendungen und Normungsbedarf

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Foreword

This document (CEN/TR 16298:2011) has been prepared by Technical Committee CEN/TC 248 “Textiles and textile products”, the secretariat of which is held by BSI.

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Introduction

Terms like “smart textile” and “intelligent textile” mean different things to different people. However, there is some common agreement that these are textiles or textile products that possess additional intrinsic and functional properties not normally associated with traditional textiles.

Although adjectives such as "smart" or "intelligent" are mainly intended for marketing purposes, more technically correct definitions will not prevent the use of this terminology by textile manufacturers or by the general public. Nor will the unintended inclusion of “non-smart” products make products any less safe or fit for purpose.

The standardization of smart textiles or smart textile products or systems is not straightforward because it involves an overlap between the standardization of the "traditional" textile product, e.g. a fire fighter's jacket, and the standardization of the additional intrinsic functional properties of the "smart product", whatever they may be. This overlap can manifest itself in a number of areas that may include:

— Legislation: all textile products should comply with the requirements of the general product safety directive, which stipulates that only safe products should be put on the European market. Certain textile product groups, e.g. protective clothing, geotextiles or textile floor coverings, are in addition subject to specific national and European legislation and it may even be necessary to simultaneously address the requirements of more than one EU Directive. A "classic" fire fighter's suit should comply with the requirements of the PPE Directive, usually supported by EN 469, whereas a "smart" fire fighter's suit with built-in electronic features should e.g. also comply with the applicable provisions of ICT and ATEX regulations. Conformity assessment will also need to follow the conformity assessment schemes for both regulations.

— Expertise: the knowledge and experience of standardization for the textile properties and for the additional properties (temperature sensing, variable thermal insulation properties) may come from different unrelated standardization groups. To take the above example, there will need to be input from standardization groups working in the areas of textiles, medical devices and electric or electronic devices.

— Testing: there will be a need to test the additional functional properties to specific textile test standards and vice versa. Again, with the same example, the electronic elements might have to be assessed for their resistance to cleaning and the textile elements may need to be tested for electrical safety.

— Unexpected and/or unintended synergies: these might result from the combination of technologies in smart textiles and should be recognised and addressed by standardization, wherever possible. For example, the presence of conductive fibres to incorporate a personal stereo into a smart raincoat might increase the risk of the wearer suffering a lightning-strike in a thunderstorm. This is despite the fact that neither rainwear nor personal stereos, when separate, need to be assessed against this risk.

The purpose of this technical report is to give advice and information on the considerations that need to be addressed when writing standards for smart textiles, or applying existing standards to them. This information may be of use to:

— end-users, in determining whether a product has indeed been fully assessed;

— conformity assessment bodies, as a guide towards assessing products according to the appropriate standards;

— specification writers, as a guide to writing new specific standards for smart textiles;

— manufacturers of smart textiles, to advise them on appropriate product testing and on suitable ways to substantiate product claims;

— market surveillance authorities, to help in the assessment of product claims, product safety and fitness for purpose.

The factual information in this report is available elsewhere in a more comprehensive form and each individual item will inevitably be common knowledge to at least one group of readers. The aim of this technical report is to guide readers through those areas, with which they are not familiar, and to direct them towards further, more specialised reading. In accordance with CEN rules, this Technical Report will be reviewed regularly to keep it in line with technical and market evolutions.

1 Scope

This Technical Report provides definitions in the field of "smart" textiles and textile products as well as a categorisation of different types of smart textiles. It describes briefly the current stage of development of these products and their application potential and gives indications on preferential standardization needs.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

In literature, both the terms ‘smart’ and ‘intelligent’ are used. In this text the two terms are considered equivalent and hence exchangeable.

NOTE European Directive 2008/121-EC provides definitions of "textile products" and "textile fibres", but these definitions are not suitable for the purpose of this Technical Report, since they do not distinguish between "textile products" and "textile materials".

According to the Directive "textile products" are "raw, semi-worked, worked, semi-manufactured, manufactured, semi-made-up or made-up products which are exclusively composed of textile fibres, regardless of the mixing or assembly process employed" or

— (a) products containing at least 80 % by weight of textile fibres;

— (b) furniture, umbrella and sunshade coverings containing at least 80 % by weight of textile components; similarly, the textile components of multi-layer floor coverings, of mattresses and of camping goods, and warm linings of footwear, gloves, mittens and mitts, provided such parts or linings constitute at least 80 % by weight of the complete article;

— (c) textiles incorporated in other products and forming an integral part thereof, where their composition is specified.

2.1
textile material
material made of textile fibres and intended to be used, as such or in conjunction with other textile or non-textile items, for the production of textile products

2.2
functional textile material
textile material to which a specific function is added by means of material, composition, construction and/or finishing (applying additives, etc.)

2.3
smart textile material (intelligent textile material)
functional textile material, which interacts actively with its environment, i.e. it responds or adapts to changes in the environment

NOTE The term "smart textile" may refer to either a "smart textile material" or a "smart textile system". Only the context, in which the term is used, will determine which one of the two is intended.

2.4
environment (surroundings)
the circumstances, objects, or conditions, which surround a textile material or textile product or the user of that material or product