

WOODHEAD PUBLISHING SERIES IN TEXTILES



Handbook of fire resistant textiles

Edited by F. Selcen Kilinc



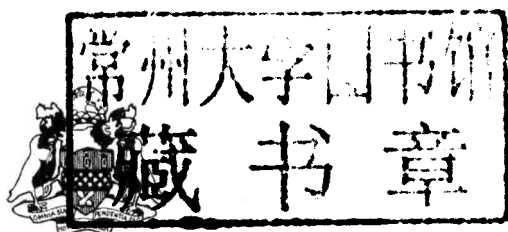
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Handbook of fire resistant textiles

The Textile Institute and Woodhead Publishing

The Textile Institute is a unique organisation in textiles, clothing and footwear. Incorporated in England by a Royal Charter granted in 1925, the Institute has individual and corporate members in over 90 countries. The aim of the Institute is to facilitate learning, recognise achievement, reward excellence and disseminate information within the global textiles, clothing and footwear industries.

Historically, The Textile Institute has published books of interest to its members and the textile industry. To maintain this policy, the Institute has entered into partnership with Woodhead Publishing Limited to ensure that Institute members and the textile industry continue to have access to high calibre titles on textile science and technology.

Most Woodhead titles on textiles are now published in collaboration with The Textile Institute. Through this arrangement, the Institute provides an Editorial Board which advises Woodhead on appropriate titles for future publication and suggests possible editors and authors for these books. Each book published under this arrangement carries the Institute's logo.

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A list of Woodhead books on textile science and technology, most of which have been published in collaboration with The Textile Institute, can be found towards the end of the contents pages.

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To my dear parents.

Fire resistant textiles are one of the fastest growing sectors in industrial textiles. Military personnel, police officers, firefighters, healthcare workers, and those who work in various industrial settings rely on clothing and other equipment for protection against bullets, flames, hazardous chemical splashes, punctures, etc. The purpose of this book is to provide an update on the considerable advances that have occurred in the field of fire resistant textiles in recent years. It is based on the work of numerous researchers and scientists who have devoted the majority of their time and effort towards the advancement of knowledge in the field of fire resistant textiles. The book is intended both for readers in industry, from fiber and fabric manufacturers to garment designers, manufacturers and safety professionals, as well as academic readers, from researchers to students in universities and colleges.

This book is organized into four parts. Part I provides an overview of fire resistant textiles. In this overview, burning and combustion mechanisms of textile fibers, chemical modification of natural and synthetic fibers to improve flame retardancy, multi-component flame resistant coating techniques for textiles, and care and maintenance of fire resistant textiles are discussed along with the safety, health, and environmental aspects of flame retardants. Part II covers different types of fire resistant fibers and fabrics, including flame retardant cotton, manmade cellulose, wool, ceramic fibers and blends, composites and nonwovens. Part III reviews aspects of testing and regulation. It starts with the selection criteria for fire resistant protective clothing and then focuses on the testing, standards, and regulation of fire resistant clothing and soft furnishings. Part IV deals with case studies that detail six major applications of fire resistant textiles. Throughout this book, the terms 'fire resistant' and 'flame resistant' are used interchangeably.

Materials such as textiles used in everyday life consist of mainly organic polymers, which are flammable. Flame retardants have been developed to reduce the risk of fire either by inhibiting the possibility of the material igniting or reducing the rate of flame spread in the event that it does. In Chapter 1 of this book, D. Price and A. R. Horrocks of the University of Bolton review the current knowledge of the processes involved in the combustion behaviour of textiles and approaches to their flame retardant