TECHNICAL REPORT

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Textiles — Methods of simulating colour change during actual wear by means of laboratory colour-fastness tests

Textiles — Méthodes de laboratoire pour simuler la dégradation des couleurs, lors du porter réel, au moyen d'essais de solidité des teintures

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 12116 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 1, *Tests for coloured textiles and colorants*.

Introduction

Actual wear of textile garments can be represented by four models. Four test methods corresponding to each of these models are provided in this Technical Report. The user of this Technical Report can select the appropriate method depending on the situation.

Colour-fastness is an important property of coloured textiles. This Technical Report includes the effect of washing, light, weathering, perspiration and rubbing, which are the factors experienced in actual wear. Other chemical and physical tests may be performed in order to evaluate a textile for end-use performance.

It is known that differences exist, in terms of fading and cross-staining, between the results of individual colour-fastness tests and in-use performance. Many factors influence the change in colour of textiles during use.

Research carried out in China, starting in 1964, has attempted to overcome this problem. Summer military uniform was chosen for wear tests to be conducted by army personnel stationed on Hainan Island (Southern China), situated between about 18° and 20° latitude north. Due to the activities of the personnel at this location, the uniforms required frequent washing. All personnel activities in which the uniform was worn were monitored closely. The same kinds of fabrics involved in the wear trial were also subjected to a range of colour-fastness tests ranging from outdoor exposure to manual washing and wet scrubbing. A comprehensive laboratory colour-fastness test involving weathering, manual washing and wet scrubbing was then formulated to simulate the actual wear. It was found that one cycle of this laboratory test was equivalent to about one month of actual wear. The test method used was confirmed as a military standard in China in 1969. Since then, the comprehensive colour-fastness test for military uniforms has been used satisfactorily. Later, the test method was extended to several cities at different latitudes in China and to all coloured fabrics. The same results were obtained when mechanical rather than manual washing was used in the laboratory tests. This extended test method was published as Chinese national standard GB/T 14575-1993 (method 4).

The following points needed to be considered, however:

— external influences and their magnitude depend on the actual wearing situation, which means there are more factors to be taken into consideration in simulating in-use performance;

— ISO 105 only has a xenon arc fading lamp test, used in ISO 105-B02 and ISO 105-B04, for instance;

— home washing machines are now widely used in the world.

Another three kinds of wearing model and associated laboratory test methods (methods 1, 2 and 3) were formulated after a new comparative study in the Beijing area. These three methods simulate three different wearing situations. The external influences and their magnitude were taken sufficiently into consideration in these three methods. Some approximate relationships between colour fading in actual wear and that in laboratory testing were also obtained for some fabrics (see Annex A).

Textiles — Methods of simulating colour change during actual wear by means of laboratory colour-fastness tests

1 Scope

This Technical Report describes four methods designed to simulate, by means of laboratory colour-fastness tests, the colour changes which take place in clothing during actual wear. The four methods are applicable to the following types of clothing:

— sports clothing (method 1);

— smocks and other shirt-like outer garments worn outdoors (method 2);

— indoor clothing and underwear (method 3);

— military uniforms (method 4).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 105-B02, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*

ISO 105-B04, *Textiles — Tests for colour fastness — Part B04: Colour fastness to artificial weathering: Xenon arc fading lamp test*

ISO 105-C07, *Textiles — Tests for colour fastness — Part C07: Colour fastness to wet scrubbing of pigment printed textiles*

ISO 105-C10:2006, *Textiles — Tests for colour fastness — Part C10: Colour fastness to washing with soap or soap and soda*

ISO 105-E04:2008, *Textiles — Tests for colour fastness — Part E04: Colour fastness to perspiration*

ISO 105-X12, *Textiles — Tests for colour fastness — Part X12: Colour fastness to rubbing*

3 Principle

Textile specimens are subjected to one or more test cycles. In the respective methods, one cycle is composed of the following:

— in method 1, a rubbing/perspiration test, a light/perspiration test and a washing test;

— in method 2, a light/perspiration test and a washing test;