TECHNICAL REPORT

ISO TR 4918

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Textile floor coverings — Determination of wear — Castor chair test

Revêtements de sol textiles — Détermination de l'usure — Essai à l'appareil à roulettes

Reference number
ISO/TR 4918:1990(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, 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).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 4918, which is a Technical Report of type 3, was prepared by Technical Committee ISO/TC 38, *Textiles*.

From 1977, when it was formed by ISO/TC 38/SC 12, Working Group WG 7 worked towards the development of a castor chair test within its terms of reference "to develop a method or methods of test for determining the behaviour of textile floor coverings under castor chairs alone, with particular reference to applicability to all types of textile floor coverings." The basis for the work was the castor chair test method which was then a standard in Austria, the Federal Republic of Germany and Switzerland.

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(This method was also used in Belgium, Denmark, France and the Netherlands.)

In the first interlaboratory trials to investigate the test variables, a poor correlation of the test with practical experience was found. In spite of the extended and more detailed investigations and trials described in this report, no satisfactory correlation of the test with practical experience of floor trials was found for various reasons. As a result of the various studies, the group was able to establish the important properties required of carpets installed in castor chair wear areas, which are as follows:

adequate durability;

good appearance retention;

sufficient tuft retention and

backings which do not delaminate or break down with use.

The group found that, for the assessment of results, it was better to take the overall assessment procedure similar to that described in TR 9405 instead of assessing the change in individual parameters.

For the foregoing reasons, it was agreed by ISO/TC 38/SC 12 that the test could not be advanced to an International Standard and that the work should be reported in a type 3 (state-of-the-art) Technical Report. Accordingly, this Technical Report is such a type 3 document.

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Textile floor coverings — Determination of wear — Castor chair test

1 Scope

This Technical Report is a description of the castor chair test machine and the operating procedures employed in the investigations carried out by ISO/TC 38/SC 12/WG 7.

2 References

ISO 139:1973, *Textiles — Standard atmospheres for conditioning and testing.*

ISO 1957:1986, *Machine-made textile floor coverings — Sampling and cutting specimens for physical tests.*

ISO/TR 9405:—[1], *Textile floor coverings — Assessment of changes in appearance.*

3 Apparatus

The apparatus used comprised a rotating, circular test platform P (see figure 1) 800 mm ± 5 mm in diameter, and a mounting R bearing the castors, which rotated 198 mm ± 1 mm from the centre of the test platform. The three castors were each arranged concentrically at 120° around the pivot of the mounting at a distance of 130 mm ± 1 mm from the centre of the mounting and were free to rotate, so that they followed the rotation of the mounting. The stressed area was 0,3 m^2 approximately, this being determined by the distance between the two axes of revolution and the distance of the castors from the pivot of the mounting. The apparatus was provided with a lifting rod to raise the mounting above the test platform when the apparatus was stopped.

The test platform and the castor mounting were interlocked and fitted with a reversing mechanism. The number of revolutions was set by means of a pre-set counter. In addition to curved pathways, the castors made a sharp reverse movement of about 160° at a point close to the outer edge of the stressed surface (see figure 2). This was brought about by maintaining a certain ratio between the number of revolutions of the test platform and the number of revolutions of the castor mounting. Over the entire width of the stressed circular part of the specimen there was a suction device A, the height of its nozzles being adjustable. The suction capacity was between 25 and 30 litres of air per second.

The castors used are illustrated in figure 3, where the essential dimensions are shown. They were made of polyamide having a Shore hardness between 90 and 100.

Experience has shown that the castors and the pivot of the castor should be replaced after about 500 000 revolutions of the test platform on condition that the pivots have been lubricated regularly with an acid-free non-resinifying lubricant.

Before starting a new test a check was made to see whether the castors rotated freely, and any remnants of fibres which may have settled in the bearings were removed, for example with compressed air.

4 Preparation of test specimens

Samples were taken in accordance with ISO 1957 and, preferably after conditioning in accordance with ISO 139, test specimens were cut from the samples as quadrants of preferably two differently coloured designs from the same material (radius of the quadrants about 350 mm). The edges of the quadrants were cut parallel with and perpendicularly to the direction of manufacture. Test specimens from carpet tiles were cut and tested in the form of quadrants.

The specimens were pre-cleaned with a vacuum cleaner and then supported on the testing machine by a flat, undeformable acrylic disk 8 mm thick. The

1) To be published.

specimen, or the four quadrant specimens, were stuck to this support over their whole area by double-sided adhesive tape, care being taken that the quadrants lay next to each other without any gaps. Self-adhesive tiles were tested in the non-adhered state and retained in position by a metal ring 10 mm high and 700 mm diameter. Test specimens were taken from some forty textile floor coverings of different fibre composition and construction.

5 Operating procedure used

5.1 Principal procedure

5.1.1 Machine settings

A total loading on three castors of 90 kg was used with a test table speed of 19 r/min. Rotation was reversed every 3 min and the suction nozzle was operated continuously.

5.1.2 Machine operation

The supporting disc with specimens attached was locked on to the test platform and the castors lowered slowly into contact with the specimens. The platform was then rotated for 5 000 revolutions at which point the machine was stopped and two quadrants removed for evaluation and replaced by unworn specimens of the same carpet. The test was continued for a further 20 000 revolutions so that specimens after 5 000 and 25 000 revolutions were available for comparison and assessment of change of appearance and mechanical damage. The overall running time was approximately 23 h.

5.2 Variations of the procedure used

Having unified the details of the test equipment used by participating laboratories (eight) and having carried out an extended interlaboratory trial comparing the test machine results with practical behaviour in use, the three main test variables were explored. These were loading (90 and 60 kg), number of castors (three or five) and test duration (5 000 to 50 000 revolutions). A detailed investigation of the forces imposed by the test machine was also carried out.

6 Assessment procedure

All specimens were assessed for change in appearance of four individual parameters, i.e. structure, roughening, design and colour, and an index of change, I, calculated on a factorial basis. An overall assessment on a 1 to 5 scale was also carried out at each stage.

The results after 5 000 and 25 000 revolutions were combined as:

$$I_R = 0{,}75\ I_{5\,000} + 0{,}25\ I_{25\,000}$$

to take into account that rapid changes in appearance retention or wear are more important than those which occur later on in the lifetime of a carpet. The overall assessment was found to be easier to use and more meaningful.