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## Textile floor coverings — Installation practices — General

*Revêtements de sol textiles — Pratiques d'installation — Généralités*



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## 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 procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement..

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary Information](#)

The committee responsible for this document is ISO/TC 219, *Floor coverings*.

# Textile floor coverings — Installation practices — General

## 1 Scope

This International Standard sets out the requirements for installing textile floor coverings (carpets). It gives details of the work necessary in preparing subfloor surfaces together with the procedures that are to be adopted where textile floor coverings are laid over various types of subfloors and underlays and where subfloor heating units are installed.

NOTE This International Standard addresses needle insertion tufted, woven, fusion bonded, fibre bonded, knitted, non-woven, felted, and flocked textile floor coverings.

The objective of this International Standard is to provide the contractors, manufacturers, suppliers, and purchasers of textile floor coverings and others, for example, technical educators, with procedures to enable the provision of correctly installed textile floor coverings.

## 2 Normative references

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

ISO 1957, *Machine-made textile floor coverings — Selection and cutting of specimens for physical tests*

ISO 2424, *Textile floor coverings — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2424 and the following apply.

### 3.1

#### **adhesive**

substance that dries to a film capable of holding materials together by surface attachment. Applying adhesive to the floor is normally accomplished with a trowel, airless spray, or roller

### 3.2

#### **adhesive transfer**

degree of coverage and/or penetration of the applied *adhesive* (3.1) into the back of the carpet (when installing the carpet) while maintaining full coverage of the floor

Note 1 to entry: The degree of coverage can be influenced by adhesive type, method of installation, open assembly time, and other factors.

### 3.3

#### **alkali**

soluble substance with base properties and having a *pH* (3.11) greater than 7

### 3.4

#### **bow**

distortion visible as wavy or crooked lines when viewed across the carpet's width or length

### 3.5

#### **contractor**

firm or person authorized by the purchaser to carry out the laying of the textile floor covering

**3.6**

**crotch**

junction of the lower edge of the riser with the rearmost edge of the stair tread

**3.7**

**fill-out**

installed length of textile floor covering of a width dimension less than its usable manufactured width

**3.8**

**laitance**

layer of material formed from the constituents of concrete which can collect on the surface soon after pouring

**3.9**

**pattern bow**

distortion visible as wavy or crooked pattern lines when viewed across the carpet width

**3.10**

**pattern skew**

distortion visible when the pattern on one side is slightly ahead of the pattern on the other side

Note 1 to entry: Skew or bias describes pattern squareness.

**3.11**

**pH**

value representing the concentration of hydrogen ions in gram-equivalents per litre used to indicate the acidity or alkalinity (base) of a substance on a scale from 0 to 14 with 7 representing neutrality, numbers less than 7 increasing acidity, and numbers greater than 7 increasing alkalinity

Note 1 to entry: For laboratory and field testing of pH, distilled water should be used.

**3.12**

**plane (surface)**

condition such that when a straightedge 3,0 m long is placed on the surface at any position, no part is more than 5 mm above or below the straightedge

**3.13**

**power stretcher (i.e. mechanical stretching device)**

carpet installation tool used to stretch carpet for installation on the tack strip and consists of a pinned plate that grips the carpet, tubular extensions, a padded end used to brace against an opposing wall or other structure, and a lever system that multiplies the installer's applied stretching force

**3.14**

**purchaser**

principal to the contract or person authorized by the principal to superintend the work on his behalf

**3.15**

**seam**

joints or interface of two pieces of carpet by the use of various securing techniques in a carpet installation

**3.16**

**seam adhesive**

specifically formulated *adhesive* (3.1) for securing and protecting cut edges of carpet to be seamed

**3.17**

**seam peaking**

slight elevation of taped seams which usually renders the *seam* (3.15) more visible resulting from stretching of the carpet sometimes referred to as seam stress realignment

Note 1 to entry: Peaking is a natural and sometimes unavoidable condition and not the result of a manufacturing or installation defect.

Note 2 to entry: For additional information, refer to CRI Technical Bulletin – Peaking Seams in Stretch-In Carpet Installations.

### 3.18

#### **seam sealing (edge sealing)**

application of *seam adhesive* (3.16) to secure and protect cut edges of carpet to be seamed from edge ravelling and delamination

### 3.19

#### **seaming tape**

tape used for joining two sections of the carpet

Note 1 to entry: Hot-melt tape is pre-coated with a thermoplastic adhesive and *adhesives* (3.1) can be applied separately to other types of seaming tapes.

### 3.20

#### **secondary backing**

woven or non-woven fabric reinforcement laminated to the back of tufted carpet, usually with an *adhesive* (3.1), to enhance dimensional stability, strength, stretch resistance, and ease of handling

### 3.21

#### **smooth (surface)**

condition such that, when a straightedge 150 mm long is placed on the surface at any position, no part of it is more than 1 mm below the straightedge

### 3.22

#### **stair nose**

leading edge of a stair thread

Note 1 to entry: For carpet installation, it is required that this edge be rounded.

### 3.23

#### **subfloor**

surface on which the textile floor covering or the underlay is to be laid (see [Figure 1](#))

### 3.24

#### **subfloor heating (underfloor heating)**

any panel heating appliance or system whereby the subfloor structure is warmed intentionally for space heating purposes

### 3.25

#### **trowel**

hand implement used for metering and spreading *adhesive* (3.1) to the floor or other substrate

## 4 Materials

### 4.1 Textile floor coverings

Textile floor coverings shall comply with the requirements of the relevant International Standards. Where applicable, the textile floor covering referred to in this International Standard shall be suitable for use above subfloor heating where the temperature of the upper surface of the subfloor does not exceed 29 °C.

### 4.2 Underlays

#### 4.2.1 Underlays

Unless the subfloor is substantially free from grooves, ridges, gaps, holes, and similar imperfections, the use of a hard underlay is recommended.

Where a hard underlay is used, the following requirements apply:

- a) the underlay shall have an estimated service life not shorter than that of the textile floor covering;
- b) the underlay shall be compatible with the textile floor covering and the adhesive(s) to be used;
- c) the underlay shall be non-staining, non-exuding, and sufficiently dense to withstand normal traffic load on the floor without becoming indented or deformed;
- d) the underlay shall be capable of being bonded to the subfloor in such a manner that the bonding is not affected by normal traffic loading;
- e) the underlay shall be non-shrinking to the extent that when the textile floor covering is laid, no evidence of gaps shall be visible;
- f) the maximum variation in length between the diagonals of underlay sheet shall not exceed 1,0 mm;
- g) for timber subfloors, the underlay shall be either reduced density hardboard flooring underlay or medium density fibreboard or medium density fibre cement sheet known to manufacturers as hard underlay.

NOTE Other products can be used if agreed between the contractor and the purchaser.

### 4.2.2 Soft underlays

The soft underlay shall have a service life no shorter than that of the textile floor covering in accordance with the recommendations of the underlay manufacturer and the carpet manufacturer. The requirements for soft underlays are detailed in [Annex E](#) of this International Standard.

In commercial applications, soft underlays shall have a total thickness not greater than 10 mm. For installation of soft underlays, see [6.7](#) and [6.8](#).

Carpet should never be laid over existing carpet and/or existing underlay as this can cause permanent damage to the new floor covering installation.

### 4.3 Adhesives

The choice of adhesives shall be made by consultation between the contractor and the manufacturer/supplier of the selected underlay, manufacturer/supplier of the textile floor covering, and the manufacturer/supplier of the adhesive and the purchaser shall be advised if requested.

Adhesives used shall be such that they ensure minimal hazardous risk to both personnel and property involved with the installation and site. Adhesives used shall be labelled in accordance with the regulations concerning occupational health and safety, poisons, dangerous goods, and transportation of dangerous goods.

Material Safety Data Sheets which should be easily obtainable from manufacturers of all chemical products should be provided on-site whenever adhesives are being used.

Where the relative humidity of the atmosphere in the building is 75 % or more, only adhesives suitable for such conditions shall be used. Any such adhesive shall be used in accordance with the instructions of the manufacturers of the textile floor covering and of the adhesive.

NOTE 1 In high humidity, condensation can form on the surface of the substrate and/or adhesive and prevent adhesion of the flooring.

Where subfloor heating units are installed, the adhesive shall be such that it is not affected adversely by the temperature at which the heating units are to be operated.



Where additives such as curing agents, parting agents, and surface treatments which can have a deleterious effect on an adhesive are present on the subfloor, the adhesive shall be isolated from the deleterious material/s with the use of appropriate trowelled-on compounds.

NOTE 2 Some curing agents might need to be removed by grinding or sanding. Some parting agents can be removed by washing with sugar soap, water blasting, and/or grinding.

#### 4.4 Carpet gripper

The carpet gripper shall be constructed of five even thickness plywood layers.

The carpet gripper shall be constructed of sufficient pins and nails so as to withstand a minimum stretching force of 6 580 N over a 1 220 mm length.

### 5 Pre-Installation requirements

#### 5.1 Site inspection and report — Commercial installations

##### 5.1.1 Inspection by contractor

For textile floor coverings to be installed, a state of cleanliness for concrete/timber floors is required. Cleanliness of floors can require, as a minimum, sanding, grinding, power washing, wet/dry vacuuming, or similar.

If dry clean processes are used, remove all residual waste materials by vacuuming. If wet clean processes are used, ensure that the floors are dry enough to vacuum waste surface materials before installing the textile floor coverings.

The contractor shall obtain the site information on the subfloor outlined in [Annex A](#) and inspect the following:

- a) each of the relevant particulars required in [Annex A](#);
- b) whether any repairs to the subfloor are required and whether the surface of timber subfloors needs to be sanded;
- c) whether the surface of the subfloor requires cleaning to remove existing floor covering, any deleterious materials such as grease, oil, paint curing or parting agents, or any surface treatment which could adversely affect adhesion.

##### 5.1.2 Report by contractor

If the contractor considers the subfloor under inspection to be unsuitable, the contractor shall submit a report in writing to the purchaser, and where appropriate, the builder.

The report shall state the following:

- a) whether the subfloor over which the floor covering is to be laid is in suitable condition;
- b) any and all conditions that, in the contractor's opinion, will affect the satisfactory execution of the installation work or impair the durability and serviceability of the textile floor covering or installation systems.

Where the contractor indicates that the subfloor is not in a suitable condition for laying of the floor coverings, the contractor shall specify reasons for the unsuitability of the subfloor.

Where the contractor indicates that removal or rectification work on the subfloor, doors, quads, or scotia moulding is needed, the contractor shall advise the purchaser that this work is the responsibility of others or as otherwise agreed.

## 5.2 Installation site — Residential installations

The contractor shall advise the purchaser, prior to installation, of the factors which can make the subfloor unsuitable to receive the new floor covering(s). Where the condition of the subfloor can be practically determined, the contractor shall advise the purchaser of necessary remedial work.

## 5.3 Exchange of information

### 5.3.1 General

The information to be exchanged between the contractor and the purchaser shall include advice as to whether the installation should be in accordance with the commercial or residential laying requirements of this International Standard.

Where, because of economics or aesthetics, compliance with parts of this International Standard are not practical, the contractor shall discuss the effects of non-compliance with the purchaser and reach an understanding on the effects of non-compliance.

### 5.3.2 Commercial installations

In addition to the information required to be provided by the contractor, elsewhere specified in this International Standard, there shall be consultation, preferably early in the design stage and generally throughout the whole course of the contract between all parties concerned with the work. Information to be exchanged shall include the following as applicable:

- a) site factors such as location, access, other contractors on site, unloading, hoisting and storage facilities, air conditioning, heating, lighting and power supply, floor loading, and security arrangements;
- b) building factors such as the nature of the building, assessment of type and density of traffic, particulars of corrosive conditions, or other potentially damaging conditions;
- c) specifications for or details of
  - 1) the floor structure,
  - 2) the damp-proof membrane and its location within the floor construction,
  - 3) screed curing and drying times,
  - 4) floor warming installations,
  - 5) underlays,
  - 6) adhesives and accessories including floor preservation treatments,
  - 7) textile floor coverings, including type, batch or rotation number, classification, supplier, dimensions, and repeat pattern size if applicable,
  - 8) subsequent maintenance of the textile floor covering, and
  - 9) finished floor level and permissible deviations;
- d) associated work including services embedded in or passing through the floor, skirtings and abutments, ducts, and junctions with other adjacent floorings;
- e) planning and procedures for the installation, i.e.
  - 1) adequate details of total area including landings and stairs,
  - 2) number of stair treads and landings where direction of seams or lay of the pile is outside normal practice, and

- 3) method of installation and seaming;
- f) details on the intended means of protection including the method of, and responsibility for, the protection of the stored textile floor covering and the completed work and fabric of the building;
- g) storage instructions: the textile floor covering shall be stored on a flat, clean, dry surface preferably suspended from the sub-floor, protected from soil, dust, and moisture. Heavy objects shall not be stacked on top of the carpet rolls and carpet rolls shall not be stacked more than three rolls high;
- h) contract information shall include particulars of the form and type of contract, whether the work is to be completed in any specific order or in sections, safeguarding against damage and theft, safety and health provisions, welfare facilities, air conditioning, heating, lighting and power supply, and insurance;
- i) a time schedule for the progress of the work in relation to other trades and services (see [Annex A](#));
- j) time lapse before use: where pressure sensitive adhesive, direct-stick or double-bond systems have been used, advice shall be given that concentrated foot and wheeled traffic should be avoided for 24 h after installation so that arrangements can be made for protection if avoidance is not possible;
- k) details of problems which might be expected to arise and where special consultation might be necessary, e.g. pattern matching;
- l) prior to the installation of the textile floor covering, the purchaser shall be informed of the floor covering plan setting out the details required by this clause. The floor covering plan shall include the following:
  - 1) a scaled drawing or proportional sketch of the areas in which the installation shall take place;
  - 2) all dimensions necessary to the installation in accordance with this International Standard;
  - 3) all dimensions recorded in centimetres;
  - 4) all dimensions recorded in a manner that enables them to be read from the bottom-right hand corner;
  - 5) where possible, all dimensions recorded inside the scaled drawing or proportional sketch;
  - 6) the approximate position of all seams and cross joins;
  - 7) the manufacturer's description of the textile floor covering for the installation;
  - 8) the manufacturer's description of the underlay for the installation;
  - 9) the manufacturer's description of the accessories for the installation;
  - 10) so far as possible, a description of the condition of the subfloor;
  - 11) so far as possible, details of the subfloor preparation required to obtain a subfloor that complies with [5.4.2.3](#);
  - 12) the method of seaming to be used for the installation;
  - 13) the direction of pile lay, clearly identified.

### 5.3.3 Residential installations

The contractor shall provide the following:

- a) the manufacturer's description of the textile floor covering material to be installed;
- b) the manufacturer's description of the type of underlay to be used for the installation;

- c) where appropriate, a description of accessories and fittings;
- d) where the condition of the subfloor can be practicably determined by the contractor or where the contractor has previously advised the purchaser of necessary subfloor preparation, the nature of any work required to the subfloor.

The contractor shall provide the purchaser with the total quantity meterage and an assurance that the textile floor covering will be installed in accordance with this installation document.

## **5.4 Conditioning of floor coverings and subfloor**

### **5.4.1 General**

The following shall apply:

- a) before conditioning, textile floor covering and underlay materials shall be kept in a clean, dry, well-ventilated place and stored as specified in [5.3.2, g\)](#);
- b) before installation, the textile floor covering shall be allowed to come to the same temperature and relative humidity as the area where it is to be laid;
- c) the preferred ambient installation temperature in the area where the textile floor covering is to be laid shall be between 10 °C and 35 °C, but reference shall be made to the manufacturer's recommendation;
- d) the textile floor covering shall be installed only where relative humidity of the area does not exceed 75 % or fall below 30 %.

**NOTE** The optimum installation temperature is between 15 °C and 25 °C. Floor coverings installed outside this temperature range can experience variations in carpet tension.

Adequate ventilation and airflow should be maintained at all times before and after conditioning materials and adhesives and sub-floor preparation. For double-bond and pre-applied installations, see [6.7, c\)](#) for conditioning of soft underlay.

### **5.4.2 Commercial installations**

#### **5.4.2.1 Air-conditioned areas**

Wherever possible, no underlay or textile floor covering shall be laid on the subfloor until the air-conditioning units have been in operation at normal operating temperature for at least seven days. During this period, the temperature should not be allowed to fall outside the textile floor coverings manufacturer's recommended limits. These conditions should be maintained during laying and for the next 72 h.

Where air-conditioning is to be installed, but is not yet operational, it is recommended that the room be maintained within the temperature range of 10 °C to 35 °C for seven days prior to and during installation and for the next 72 h.

Without such temperature control at this stage, subsequent movement of the subfloor, underlay, and textile floor coverings can occur.

#### **5.4.2.2 Heating units**

Where underfloor heating units are installed on or in the subfloor, the following shall apply:

- a) the heating units shall be turned on prior to laying the floor covering for a period sufficient to ensure that the moisture condition of the heated subfloor is such as will permit successful laying of the covering;

- b) the heating unit shall then be turned off to allow the subfloor to return to the temperature range recommended by the textile floor coverings manufacturer and soft underlay manufacturer before the laying is commenced;
- c) the heating units shall remain turned off during the laying and shall not be turned on until 48 h after the laying is completed in order to allow the adhesive to cure;
- d) heating units shall not be used to dry the concrete subfloor before the concrete is fully cured, e.g. one month after placing. The concrete shall be allowed to dry out slowly to minimize cracking.

Cyclic heating should be avoided during this period. Following curing, it is recommended that the lowest temperature setting be used and heating be maintained over a period of at least seven days to assist in lowering the moisture content.

#### 5.4.2.3 Subfloor preparation

Before a floor coverings installation is commenced over a concrete subfloor or screed topping all subfloor, surfaces shall be dry, smooth, plane, sound, and clean (see [Annex A](#)). Dryness shall be considered satisfactory when relative humidity by the hygrometer test does not exceed 70 %.

NOTE For the determination of subfloor dryness, methods detailed in [Annex B](#) are recognized procedures.

When double-bond or direct-stick systems are used, porous subfloors shall be primed as recommended by the adhesive manufacturer.

#### 5.4.3 Residential installations

Before the installation of the floor coverings is commenced, all subfloor surfaces shall be dry, smooth, plane, sound, and clean (see [Annex A](#)).

When double-bond or direct-stick systems are used, porous subfloors shall be primed as recommended by the adhesive manufacturer.

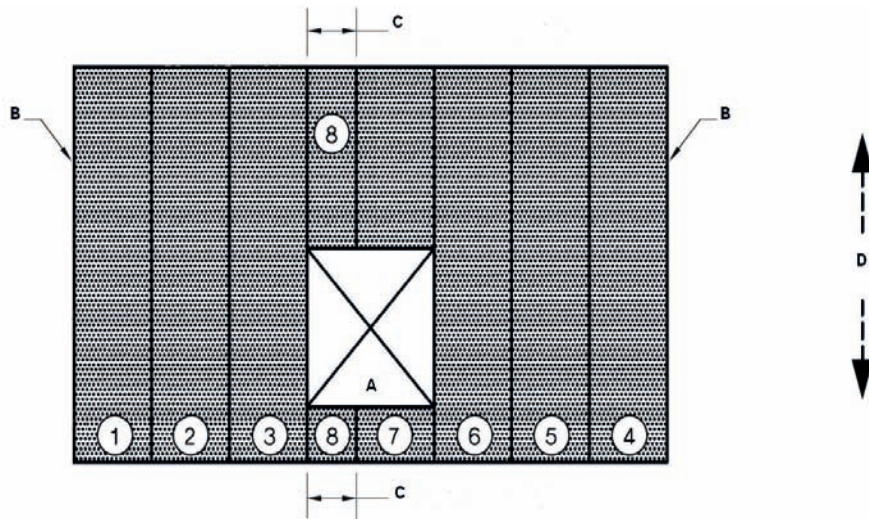
## 6 Installation methods

### 6.1 Planning, general layout, and dye batch continuity

The contractor shall give consideration to the general layout so that, where possible:

- a) seams run the length of the area;
- b) traffic runs along rather than across the seams;
- c) light from windows does not strike across seams;
- d) all pile faces away from the main source of incident light;
- e) all pile faces towards the main entry to the area of installation;
- f) on stairs, the pile lay runs towards the leading stair edge;
- g) selvedge seams are accurately aligned throughout the entire installation;
- h) textile floor coverings start within a full width on the door side;
- i) part width fill-outs are placed on the opposite side of the room from the door;
- j) textile floor coverings are accurately and closely fitted to all skirtings, architraves, and other perimeters;

- k) where a textile floor covering joins occur in a doorway, it is recommended that the joins fall within the thickness of the closed door;
- l) where a textile floor covering abuts a different floor covering in a doorway, it is recommended that the join falls within the thickness of the closed door;
- m) where a textile floor covering edge finishes at a bare subfloor in a doorway, it is recommended that the edge of the textile floor covering falls within the thickness of the closed door;
- n) full widths of textile floor coverings should be used wherever practical;
- o) textile floor coverings shall all run in the same direction in any one area,
- p) where textile floor coverings run contiguously in adjoining areas on the same level, the textile floor coverings shall all run in the same direction and be from the same dye batch;
- q) fill-outs are not used in doorways where the same textile floor coverings are on both sides;
- r) in circumstances where two fill-outs are used in one room, they do not abut;
- s) fill-outs are not positioned between full widths except in unusual circumstances where laying has to commence on opposite walls and proceed to the middle of floor area. The final width installed can be reduced to no less than 50 % of a full width (see [Figure 1](#)).



- Key**
- A out direction
  - B wall
  - C reduced width
  - D direction of lay
  - 1 to 8 strips of textile floor covering

**Figure 1 — Possible reduced width where laying has commenced at opposite walls**

## 6.2 Pile lay, pattern matching, dye batch continuity, and finishing

The following shall apply:

- a) where two or more pieces of the textile floor coverings abut, the pile direction shall be the same;
- b) where possible or where the manufacturer’s tolerance allows, the pattern repeat shall be aligned;

- c) where textile floor covering runs continuously in adjoining areas on the same level, it shall all be from the same dye batch;
- d) where two or more pieces of textile floor coverings are adjacent (i.e. lie in the same field of vision), the pile direction shall be the same, unless otherwise specified.

Edging and dividing strips available in wood, metal, or other suitable materials can be used between dissimilar types of floor coverings at door openings or to act as a finish to a floor. Textile floor coverings can then be used as skirtings, but in such cases, adequate provision should be made for the protection of the exposed raw edge of the materials.

## 6.3 Seaming and joining

### 6.3.1 General

Except for fibre-bonded textile floor coverings, the following requirements and recommendations apply:

- a) the seams and cross-joins shall be strong enough to permit the textile floor coverings to be stretched without gapping and to not break down under traffic using machine or hand-stitched installation processes or a seaming tape recommended by the manufacturer for the intended purpose;

NOTE Refer to direct stick system and the double-bond system for method of seaming and joining.

- b) the pile lay shall be in the same direction on either side of a seam or cross join;
- c) the pile shall not be caught down into a seam or cross-join, nor shall there be gaps in the pile;
- d) the seams and cross-joins shall be straight and aligned;
- e) the seams and cross-joins shall be as flat as possible;
- f) the diagonals and designs shall be, where possible, correctly aligned;
- g) the backing edges shall butt and they shall not overlap or gape;
- h) care shall be taken to minimize cross-joins in an installation;
- i) cross-joins shall be unobtrusive;
- j) wherever possible, cross-joins shall not be placed in main traffic ways;
- k) cross-joins in a fill-out shall be not less than 100 cm apart;
- l) wherever possible, the number of cross-joins in a fill out shall be not greater than
  - 1) in a half-width, one cross-join,
  - 2) in a third-width fill, two cross-joins, or
  - 3) in a quarter-width fill, three cross-joins;
- m) where the pattern of a textile floor covering requires cross-joins less than 100 cm apart, they shall be the closest multiple of the pattern to 100 cm;
- n) any variance from these requirements for cross-joins shall be determined through negotiations with the purchaser (see [5.3.1](#)).

### 6.3.2 Methods of seaming and cross joining

#### 6.3.2.1 Machine or hand sewing

Make the stitching of even tension. Protect cut edges of woven carpets to prevent loss of pile along the seam. Use approximately 20 stitches per 10 cm depending on the type of carpet being sewn.

When seaming woven carpets in commercial installations, it is recommended that the contractor consult the textile floor coverings manufacturer on preferred seaming techniques. Particular seaming methods can be preferable for particular woven carpet constructions or where there are site specific factors such as end-use environment or traffic conditions which favour the use of the particular seaming method.

#### 6.3.2.2 Hot-melt adhesive tapes (heat bond iron or electrically activated)

When a heat bond iron is used, protect the textile floor coverings with a heat shield with the iron set and moved along the seam at a rate in accordance with the instructions given by the hot-melt adhesive tape manufacturer. Use electrically heated tapes in accordance with the instructions given by the electrically activated tape and control unit manufacturer. Butt all edges. When seaming carpets with hot-melt adhesive tape in contact with a polyethylene surfaced underlay, joining tape with silicon release backing shall be used if required to prevent the carpet bonding to the underlay.

NOTE A slip-sheet or powder equivalent can also be used in this application.

#### 6.3.2.3 Seam sealing

Apply appropriate seam sealer to each cut edge to ensure that the tufts are adequately anchored within the textile floor covering.

Before using methods described in [6.3.2.2](#) and [6.3.2.3](#), all edges which are to be seamed or joined should be cut straight and square (cuts should follow the tuft line wherever possible). To avoid warranty exclusion, where recommended by the machine made textile floor coverings manufacturer, cut edges should be treated with an edge sealing adhesive.

### 6.4 Stretching

The following shall apply:

- a) the textile floor coverings shall, when laid over soft underlay, be installed flat, taut, and evenly tensioned.
- b) care shall be taken to ensure that the textile floor covering is stretched in accordance with the manufacturer's recommendations (where available);
- c) a two-way stretch shall be used;

NOTE The principles of stretching textile floor coverings are given in [Annex C](#).

- d) textile floor coverings shall be laid using a suitable power stretcher aided by a knee-kicker or a tubeless power stretcher (restretcher), but should not be stretched using a knee-kicker as the principal tool for stretching;
- e) foam-backed or fibre-bonded textile floor coverings shall be tensioned, but not stretched;
- f) care shall be taken when using a knee-kicker or a power stretcher to ensure by correct adjustment of the pins that its force is applied on the total textile carpet backing substrate and not just on the pile or wear surface and does not cause movement of or damage to the soft underlay.

NOTE Poor penetration of the knee-kicker or power stretcher will cause pile to be partly or totally removed.



## 6.5 Method of installation using the carpet gripper system

### 6.5.1 General

The carpet gripper system can be used with most types of textile floor coverings with the exception of foam back types, fibre bonded types without pile, and carpet tiles.

### 6.5.2 Carpet gripper

Inspect any existing gripper strips and determine whether they are damaged, loose, or in any way unsuitable for correct tensioning of carpet. Leave in place any gripper strips that are sound, secure, and in good condition. Replace any others with new gripper strips.

For all textile floor coverings where any dimension in the area to be covered is more than 7 m in any direction, one row of a commercial grade carpet gripper or two rows of a domestic grade carpet gripper shall be used.

### 6.5.3 Procedure

Textile floor coverings shall be installed using the carpet gripper system as follows:

- a) make sure the floor and walls form a right angle to each other to allow correct fitting of carpet gripper;
- b) fit and fix carpet gripper strips around the entire perimeter of the area(s) to be fitted (with the exception of doorway openings) leaving a gully between the carpet gripper and the wall of not more than 60 % of the thickness of the textile floor covering being installed, unless otherwise specified by the textile floor coverings manufacturer;
- c) on timber subfloors, fix the carpet gripper strips with annular ringed nails or on monolithic subfloors, fix the carpet gripper strips with hardened steel core nails,
  - 1) by drilling and plugging,
  - 2) by an appropriate adhesive, or
  - 3) with a combination of these methods;
- d) fix carpet gripper strips at maximum intervals of 15 cm and at a maximum of 3,5 cm from each end. Fix carpet gripper strips less than 7 cm in length in a minimum of two places;
- e) carpet gripper strips shall not be fitted across door openings except where textile floor coverings abut a floor covering of a different type and a suitable door bar is fitted;
- f) spot-fix fibrous (impregnated fibrous and needle felt) underlay by stapling or by adhesive;
- g) staple or adhere seams to provide a flat butt joint;
- h) lay non-fibrous [cellular plastics (polymeric), cellular rubber/rubber crumb combinations] underlay loose with tight butt joints secured by applying pressure-sensitive tape with a minimum width of 50 mm. Run the tape continuously down the butted underlay seams and joints and on timber floors, use stapling or some other method of fixing to prevent movement.

## 6.6 Method of installation using the direct-stick system

### 6.6.1 General

The direct stick method is not recommended for all types of textile floor coverings and shall be carried out in accordance with advice from the textile floor coverings manufacturer or adhesive manufacturer.

### 6.6.2 Ambient temperature

The following shall apply:

- a) the minimum ambient room temperature before commencing surface preparation and adhesive application shall be 10 °C;
- b) where there are underfloor heating units, switch the heating off for 48 h prior to installation and do not switch it on again until the adhesive is set. Avoid peak temperatures until seven days after completion of the laying operations [see [5.4.2.2](#)];
- c) an ambient room temperature of 10 °C to 35 °C and the relative humidity between 30 % and 75 % shall be maintained in the laying area well before and after laying. During the laying period, a temperature of 10 °C to 35 °C shall be maintained in the laying area.

It is recommended that these conditions are maintained at least 48 h before and after laying.

### 6.6.3 Laying procedure

The textile floor covering shall be installed as follows:

- a) prepare the subfloor in accordance with [5.4.2.3](#);
- b) spread the primer and adhesive by trowel, roller, brush, squeegee, or spray in accordance with the manufacturer's recommendations. See [Annex D](#) for recommended trowel specifications;
- c) once spread, take care to ensure that the area is kept free from all traffic until dry;
- d) once the floor is primed and dry and door bars have been installed, unroll the carpet with pile running in one direction;
- e) trim all selvages using either a parallel cutter or similar tool to ensure a good butt joint;
- f) treat cross-joints in the same manner as in step e);
- g) apply the adhesive in accordance with the adhesive and the textile floor covering manufacturer's directions;
- h) take care to ensure that all seams and cross-joints are sealed with the recommended adhesive and a minimum 3 mm bead of adhesive is to be applied to one side of the seam where both cut edges have been applied with seam sealing adhesive. For foam backed textile floor coverings, apply adhesive to one cut edge of the primary backing and press both edges together. Where recommended by the textile floor coverings manufacturer, appropriate double bond heat bond tape shall be used for the direct-stick method of installation;
- i) leave all work brushed clean and remove excess materials and trimmings immediately;
- j) roll the textile floor covering in both lengthwise and widthways directions with a roller weighing 25 kg to 35 kg in accordance with the adhesive manufacturer's instructions;
- k) following installation, it is important that concentrated foot and wheeled traffic be avoided while the adhesive is curing. For commercial installations, if concentrated traffic cannot be avoided, the textile floor covering shall be covered with suitable material to avoid movement and impact damage. (see [5.3.2, f](#)) on protection and [5.3.2, j](#)) on time lapse before use).

### 6.7 Method of installation using the double-bond system

The textile floor covering shall be installed as follows:

- a) prepare the subfloor in accordance with [5.4.2.3](#);

- b) spread the primer and adhesive by trowel, roller, brush, squeegee, or spray in accordance with the manufacturer's recommendations;
- c) unless otherwise specified, soft underlay shall be removed from its packaging and fully unrolled for a period of not less than 3 h for conditioning purposes;
- d) the underlay shall be laid at 90° to the intended run of the textile floor covering. If this is not possible, ensure that parallel underlay and carpet seams do not fall within 300 mm of each other;
- e) bond the underlay firmly to the subfloor in accordance with the manufacturer's instructions with an adhesive approved by the underlay manufacturer;
- f) all joins shall be close fitting when positioned;
- g) apply appropriate sealer to each cut edge to ensure that the tufts are adequately anchored within the textile floor covering;

Before using methods described in b) and c) all edges which are to be seamed or joined should be cut straight and square (cuts should follow the tuft line wherever possible). To avoid warranty exclusion, where recommended by the textile floor coverings manufacturer, cut edges must be treated with an edge sealing adhesive.

- h) take care to ensure that all seams and cross-joins are sealed with the recommended adhesive and a minimum 3 mm bead of adhesive is to be applied to one side of the seam where both cut edges have been applied with 60 % natural latex. For foam backed textile floor coverings, apply adhesive to one cut edge of the primary backing and press both edges together. Appropriate double bond heat bond tape shall be used for the double-bond method of installation;
- i) after the underlay has been satisfactorily installed, proceed to lay the textile floor covering in accordance with [6.6.3](#).

Excessive rolling should be avoided.

## 6.8 Method of installation using the pre-applied underlay adhesive system

The textile floor covering shall be installed as follows:

- a) prepare the subfloor in accordance with [5.4.2.3](#);
- b) spread primer and adhesive by trowel, roller, brush, squeegee, or spray in accordance with the manufacturer's recommendations;
- c) unless otherwise specified, the underlay shall be removed from its packaging and fully unrolled for a period of not less than 3 h for conditioning purposes;
- d) the underlay shall be laid at 90° to the intended run of the textile floor covering. If this is not possible, ensure that parallel underlay and carpet do not fall within 300 mm of each other;
- e) lay out the underlay as specified;
- f) with release film facing downwards, place first run into position. Fold back to the halfway point of the cut length. Proceed to remove release film from this section. Install this section back onto primed subfloor consolidating into position and expelling air by using foot pressure or a soft wide broom;
- g) with the first half consolidated to the subfloor, repeat the process to the remaining length of underlay;
- h) all joins shall be close fitting when positioned;
- i) after the underlay has been satisfactorily installed, proceed to lay the textile floor covering in accordance with [6.6.3](#) for direct-stick system.

## 6.9 Method of installation using the hook and loop system

The textile floor covering shall be installed as follows:

- a) prepare subfloor as specified in [5.4.2.3](#) to receive hook tape to manufacturer's grid layout;
- b) remove all dust including loose concrete laitance, builders, and plasterers dust;
- c) for refurbishment works, remove any residual (previously) installed carpet, underlay, vinyl, and other resilient materials from the subfloor where hook tape layout is to be applied. The subfloor should be free of all surface materials. The primer must be applied direct to concrete substrate. If necessary, diamond grind or shot blast subfloor;
- d) assess if cementitious self levellants are required;
- e) accurately mark subfloor where hook tape layout (linear and cross width) applies;
- f) prime subfloor to specified tape layout using an acrylic primer;
- g) test using a sample of a 30 cm length of hook tape on a prepared floor to check if adhesion is acceptable;
- h) the tape position shall be 100 mm wide to perimeters of walls, pillars, ceramic thresholds etc., and built-in fixtures;
- i) the tape shall be 100 mm wide to all underlay seams and cross joints;

NOTE Ensure hook tape is fixed to allow 50 mm centre to lock onto underside of underlay, i.e. each underlay seam is hooked 50 mm either side.

- j) apply selected hook tape width at 2 m intervals along the linear direction of underlay;
- k) after the underlay has been satisfactorily installed, proceed to lay the textile floor covering in accordance with [6.6.3](#).

## 6.10 Installation on stairs

### 6.10.1 General

To enable textile floor coverings to be installed on stairs, the stair nosing should have a radius of 18 mm to 25 mm to prevent sharp stair edges from cutting the textile floor covering and underlay.

### 6.10.2 Method of installation using the carpet gripper system

The textile floor covering shall be installed on stairs as follows:

- a) install a carpet gripper strip on each tread and riser;
- b) lay the carpet gripper strips such that the dimensions of the gully between the carpet gripper strip on the riser and the gully between the carpet gripper strip on the tread are both not more than 60 % of the thickness of each thickness of the textile floor covering being installed. Orient the pins of the gripper strip towards the crotch of the step;
- c) where necessary, to maintain proper tension, use carpet gripper strips on the sides of stairs;
- d) butt one end of the carpet gripper strip against the carpet gripper strip fitted across the tread and finish the other end 20 mm to 25 mm back from the nose of the step;
- e) stretch the textile floor covering tightly over each step, secure the textile floor covering to each carpet gripper strip, and drive it into the gully at the crotch of the stair;
- f) on open tread stairs, cover the underside of the tread;

- g) finish open string stairs on the treads with a minimum of a 25 mm turn under on the open ends;
- h) there shall not be a cross join on the tread or riser;
- i) other than for bullnose, cap return, spiral, kite winder, or open tread stairs, a minimum of two steps using one unjoined length of textile floor covering shall be covered;
- j) there shall be no selvedge seams on stairs unless the manufactured width or pattern dictates otherwise;
- k) soft underlay shall be fitted to cover both the tread and the riser and to butt the carpet gripper strips on all perimeters.

NOTE Carpets will require different methods when laying on stairs with different profiles and substrates.

### 6.10.3 Method of installation using the direct-stick system

The textile floor covering shall be installed on stairs as follows:

- a) unless recommended by the adhesive manufacturer, the surface of stair treads and risers shall not be primed. This applies to concrete, wood, or chipboard type finishes;
- b) trowel grade contact adhesive which is compatible with the textile floor covering shall be applied to the entire installation area;
- c) a separate piece of textile floor covering shall be used on each step with riser except on concrete steps without nosing;
- d) there shall not be a cross join on the tread or riser;
- e) there shall be no selvedge seam on stairs unless the manufactured width or pattern dictates otherwise.

### 6.10.4 Method of installation using the double-bond system

The textile floor covering shall be installed on stairs as follows:

- a) in all installations, the surface of stair treads and risers shall not be primed. This applies to concrete, wood, or chip-board type finishes;
- b) cut and fit underlay to cover each tread surface in one piece;
- c) underlay shall be installed in one piece covering the tread of the step and trimmed at the nose of each step. Underlay is not required on the riser of the step;
- d) where the installation requirement calls for stair nosing fitment, fit the underlay to surface tread trimming back from stair leading edge or nose to a width that will allow the nosing to be secured directly to the surface of the stair tread;
- e) where practicable, use a separate piece of textile floor covering on each tread and riser;
- f) joins shall be at the crotch of the stair;
- g) the carpet pile direction shall run towards the leading stair edge or away from the riser. Do not insert cross-joints on treads or risers;
- h) trowel grade non-toxic contact adhesive shall be applied to the entire top surface area.

### 6.10.5 Method of installation using the hook and loop system

The textile floor covering shall be installed on stairs as follows:

- a) in all installations, the surface of stair treads and risers shall be primed. This applies to concrete, wood, or chip-board type finishes;
- b) apply 100 mm wide hook tape to the total area of the treads and risers;
- c) cut and fit underlay to cover each tread surface in one piece;
- d) trim at the nose of each step. Underlay is not required on the riser of the step. Where the installation requirement calls for stair nosing fitment, fit the underlay to surface of tread trimming back from stair leading edge or nose to a width that will allow the nosing to be secured directly to the surface of the stair tread. The riser shall have underlay neatly trimmed just below level of the stair nosing;
- e) where practicable, use a separate piece of textile floor covering on each tread and riser. Joins shall be at the crotch of the stair;
- f) the carpet pile direction shall run towards the leading stair edge or away from the riser. Do not insert cross-joins on treads or risers;
- g) trowel grade contact adhesive shall be applied to the entire top surface area of underlay.

### 6.11 Completion of installation

The whole work area shall be cleared of tools and waste and the job shall be examined for lumps and tightness or for air pockets if either direct-stick system or double-bond system have been used. All stay tacks shall be removed. Where required for commercial installations, the installed textile floor covering shall be protected by a suitable material.

Caution should be taken if impervious protective covering materials are used. Condensation can collect under the cover and cause serious damage to the textile floor covering.

## Annex A (normative)

### Site information to requested by the contractor from the purchaser

#### A.1 General

The contractor shall request the purchaser to supply the following information where appropriate:

- a) the position and depth of electric power cables and cold and hot water pipes;
- b) the nature of any additives, curing agents, parting compounds, surface treatments, or similar used in the construction of the subfloor as these can have a deleterious effect on any floor adhesive used;
- c) particulars and location of damp course to ensure that the subfloor is free from rising moisture. Where the subfloor is constructed on fill, hardcore, or the ground, the contractor shall be advised as to whether the subfloor has been protected from entry of moisture by the recommended means of a continuous impermeable membrane of minimum thickness of 0,2 mm. If the subfloor is concrete, the contractor shall be advised as to whether the concrete is sufficiently dry when assessed, in accordance with [5.4.2.3](#), 1<sup>st</sup> para.;

NOTE 1 Concrete waterproofing additives and curing compounds are not considered a substitute for a membrane that is impermeable to water vapour.

NOTE 2 Certain concrete waterproofing additives and curing compounds may adversely affect adhesives used during the installation process.

- d) the location and type of air conditioning or other type of space heating not mentioned above;
- e) the position and depth of any other structural elements which can affect the work or the quality of the work being undertaken by the contractor;
- f) assurance that the subfloor on which the textile floor covering is to be installed shall be provided clear of the tools and goods of other trades;
- g) assurance that the site meets occupational health and safety requirements.

#### A.2 Concrete subfloors

In addition, for concrete subfloors, the contractor shall request the purchaser to supply the following information where appropriate:

- a) the position and depth of heating elements whether electric or heated water pipes and whether these have been insulated;

NOTE Unless the heated elements are insulated sufficiently, hot spots can occur which could result, in time, in the failure of the adhesive or the floor covering.

- b) particulars of the ventilation under the subfloor;
- c) whether the surface is plane, smooth, and true to grade.

Where a subfloor is so rough or uneven that it is unsuitable for the direct application of the floor covering, corrective action should be taken (e.g. steel-trowelled concrete layer) to level the subfloor.

### A.3 Timber subfloors

The contractor shall request the purchaser to supply the following details on timber subfloors:

- a) whether the timber subfloor has been kiln-dried or air-dried in order to achieve a moisture content which is at equilibrium with the environment.

NOTE Failure of textile floor coverings can occur when they are laid over timber subfloors subjected to conditions which might cause the timber subfloor to buckle, rot, or otherwise, deteriorate.

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## Annex B (informative)

### Determining the dryness and alkalinity of subfloors

#### B.1 General

This Annex sets out some general information and methods for determining the dryness and alkalinity of concrete subfloors.

#### B.2 Determination of dryness

##### B.2.1 General

The correct assessment of the suitability of the subfloor prior to the installation of textile floor coverings is a critical factor in the success of the installation. In all cases, the potential egress of excess moisture through or from a substrate has the potential to negatively affect the structure and/or performance of the floor covering products and installation systems.

In the use of all methods, there are variables in the conditions under which the test is conducted in procedures used in testing and in the maintenance of instrument calibration which can cause the tests to have a low level of repeatability.

The only test method that provides the critical reading of the internal moisture content is the Invasive RH test method. All other methods mentioned in this Annex provide a reading of the surface moisture level only.

All test methods provide a reading of either internal or surface moisture levels that are relative to the day and time of the reading being taken. While each test method will provide varying levels of risk mitigation against future moisture related issues arising, no method can provide full guarantee against future moisture related issues.

Testing should be conducted at multiple points as a survey of the total subfloor area and include testing points in both central and perimeter areas.

Tests results should be recorded, both notated and photographic, and witnessed by an independent third party.

Tests should be carried out in accordance with the instrument manufacturer's instructions.

Instruments should be calibrated by an approved authority.

NOTE Other tests are also available, but insufficient experience has been gained with them to assess their usefulness.

##### B.2.2 Hygrometer test

###### B.2.2.1 Principle

A hygrometer sealed to the subfloor measures the relative humidity of a small quantity of air confined between the slab and the instrument.

### B.2.2.2 Apparatus

The apparatus shall consist of a dial hygrometer in a vapour-tight mounting housed in a well-insulated box. The shape and dimensions of the housing are not critical, but the principles of thermal insulation and vapour barrier should be followed. Provision shall be made for sealing the edges of the instrument against the surface to be tested. Plasticine is a convenient material for this purpose and for reading the hygrometer scale while the instrument is in position on the subfloor. The hygrometer should be calibrated regularly according to the manufacturer's instructions.

### B.2.2.3 Procedure

After the instrument has been sealed firmly to the subfloor surface, a period of not less than 16 h shall be allowed to elapse for the entrapped air to reach moisture equilibrium with the concrete base before the reading is taken. This can be obtained conveniently by placing the instrument in position overnight and taking the reading in the morning. If readings are to be taken at several points with only one instrument available, subsequent positions can be covered by impervious mats (bitumen felt, polyethylene sheeting, etc.) about 1 m square laid down when the instrument is placed in its first position to speed up the later readings.

The instrument should be placed so that direct sunlight does not fall on it as this could produce a false low reading.

The concrete slab shall be considered to provide sufficiently dry conditions for satisfactory laying of the machine made textile floor covering if the relative humidity does not exceed 70 %.

## B.2.3 Electrical Resistance Test

### B.2.3.1 Apparatus

The following apparatus is required:

- a) a resistance meter of suitable range to enable it to be calibrated in terms of the moisture content of the concrete subfloor in the range of 4 % to 9 %, and having sufficient sensitivity to clearly distinguish changes of 0,5 %;
- b) suitable electrodes to be inserted into holes drilled in the concrete subfloor as specified for that particular instrument;
- c) a suitable contact medium of conductive jelly which is placed into the electrode holes.

### B.2.3.2 Procedure

After holes are drilled 25 mm deep in the concrete subfloor at intervals specified by the manufacturer, the electrodes shall be set in the holes using the conductive jelly and connected to the electrical resistance meter. The moisture content of the subfloor shall then be read off to the nearest 0,5 % after allowance is made for the temperature of the subfloor. Readings shall be taken from several widely distributed locations on the concrete subfloor.

### B.2.3.3 Results

The concrete subfloor shall not be considered sufficiently dry if the moisture content of the subfloor exceeds 5,5 % or as determined by the apparatus.

Electrical test apparatus of this type might not necessarily determine the exact moisture content of the subfloor and discretion should be used in the interpretation of the results. If any doubt exists with

regard to moisture content of the subfloor, the machine made textile floor covering manufacturer should be contacted.

NOTE 1 The electrical resistance method described above cannot be used with concrete subfloors incorporating subfloor heating or other electrical conductors near the surface because of the danger of cutting the hot water pipes or electrical heating wires when drilling holes. Alternatively, if much of the distance between the contact holes is occupied by metal, false readings can be obtained.

NOTE 2 Chlorides, where present as a deliberate addition or otherwise, and other screed additions can give rise to erroneous readings. The error will depend on the quantity present, but in general, the water content indicated by the test will be the maximum water content present.

#### **B.2.4 Capacitance test concrete and timber**

The capacitance test is designed to estimate the moisture content of concrete and timber through the emission and reception of low-frequency energy waves. Devices of this type typically involve the placement of an energy transmitter/receiver on the substrate. Often based on one or more internal predetermined correlations for different materials, the instrument calculates the approximate saturation of the substrate to a nominal depth of up to 10 mm. Moisture readings with a capacitance type meter can either be shown on an analogue scale or as a digital readout. While capacitance tests provide a very fast and non-destructive measurement of a substrate, the testing regime is less reliable than other approaches due to variations of the substrate, range of materials used in substrate, presence of coatings or existing flooring products, unknown capacitive properties of newer product, and operator error. Accordingly, the capacitance test is best used as an initial testing regime to indicate the possibility of excess moisture. If excess moisture is suspected, then additional hygrometer testing could be conducted.

#### **B.2.5 Electrical resistance test — Timber only**

The electrical resistance test is designed to estimate the moisture content of timber through the emission and reception of low-voltage electrical charge between two electrodes. This testing regime is not suitable for concrete. Electrical resistance testing uses the insertion of electrodes into the timber substrate between which an electrical current is passed. Based on a predetermined correlation, the instrument calculates the approximate saturation of the timber substrate by the electrical resistance encountered. Moisture readings are displayed either on an analogue scale or as a digital readout. Variations in moisture values of up to 5 % can occur depending on the species type and the temperature of timber.

The value of moisture content measured by electrical resistance is expressed as a percentage of the total saturation of the timber cells. Depending on timber species, total saturation can range from 32 % to 36 %. While it is problematic to specify exact percentage thresholds, a percentage reading above 15 % would indicate a higher than acceptable level of moisture. This said, it is important to consider the moisture content of a timber substrate in comparison to other timber fittings in the building.

#### **B.2.6 Invasive Hygrometer Test**

##### **B.2.6.1 Procedure**

The invasive Relative Humidity (RH) test method requires drilling a hole into the concrete substrate and leaving a probe sealed in the floor for a time period recommended by the meter manufacturer.

Within the sealed hole, a level of moisture vapour is captured during the required test time frame and this is measured in terms of Relative Humidity.

The invasive RH test method is recognized as the most accurate method for determining the moisture content of a substrate as it measures the moisture content at depth.

The concrete slab shall be considered to provide sufficiently dry conditions for satisfactory installation of adhesives and the floor covering if the relative humidity does not exceed 75 %.

### B.2.7 Other testing regimes

Other testing regimes such as anhydrous copper sulfate or anhydrous calcium chloride are not recommended as insufficient experience has been gained of their use.

While calcium carbide testing systems have been widely used in the United States of America for numerous years, these are now considered problematic due to the destructive nature of the test and the necessity for a testing regime to measure the emission rate from the surface of the concrete. Calcium carbide testing has not been widely adopted in Australia and New Zealand for these reasons.

## B.3 Test report

### B.3.1 General

The value of adequate moisture testing often is not realized until a problem arises with an installation sometime after completion. Accordingly, written records of moisture testing results should capture the following:

- a) physical address of substrate tested;
- b) type of substrate tested;
- c) testing regime;
- d) date and time of measurements taken;
- e) location of testing equipment;
- f) results of readings taken;
- g) ambient temperature and relative humidity at time of test results.

## B.4 Determination of alkalinity

### B.4.1 General

For testing purposes, use a pH test kit. Refer results to manufacturer's instructions relating to subfloor primers, adhesive and soft textile floor coverings, and carpet tiles as to whether installation should proceed.

### B.4.2 pH test

A suitable method of determining pH is as follows:

- a) sweep/clean concrete to a minimum of 100 mm diameter;
- b) apply 10 mL to 15 mL distilled water to prepare concrete area. Allow water to bead;
- c) while water is still beaded, immerse pH paper in water for a minimum of 10 s and
  - 1) read coloured pH test paper for pH number for verification;
  - 2) verify if pH level is acceptable for materials to be installed as per the manufacturer's recommendations.

## Annex C (informative)

### Principles of stretching textile floor coverings

#### C.1 General

This Annex illustrates the principles of stretching different types of textile floor coverings. Additional procedures are required for large commercial installations or for more complex room shapes.

The aim of stretching is to produce a uniform tension of the installed textile floor covering in all directions. The amount of stretch required to achieve the desired tension varies according to the carpet construction, but the resultant tension should be uniform

#### C.2 Tufted carpet

Tufted carpet should always be two-way stretched at a 15° angle. A typical method is shown in [Figure C.1](#).

#### C.3 Wilton carpet

Wilton carpet should be stretched more in the width than in the length. The width should always be stretched first. A typical method is shown in [Figure C.2](#).

#### C.4 Axminster carpet

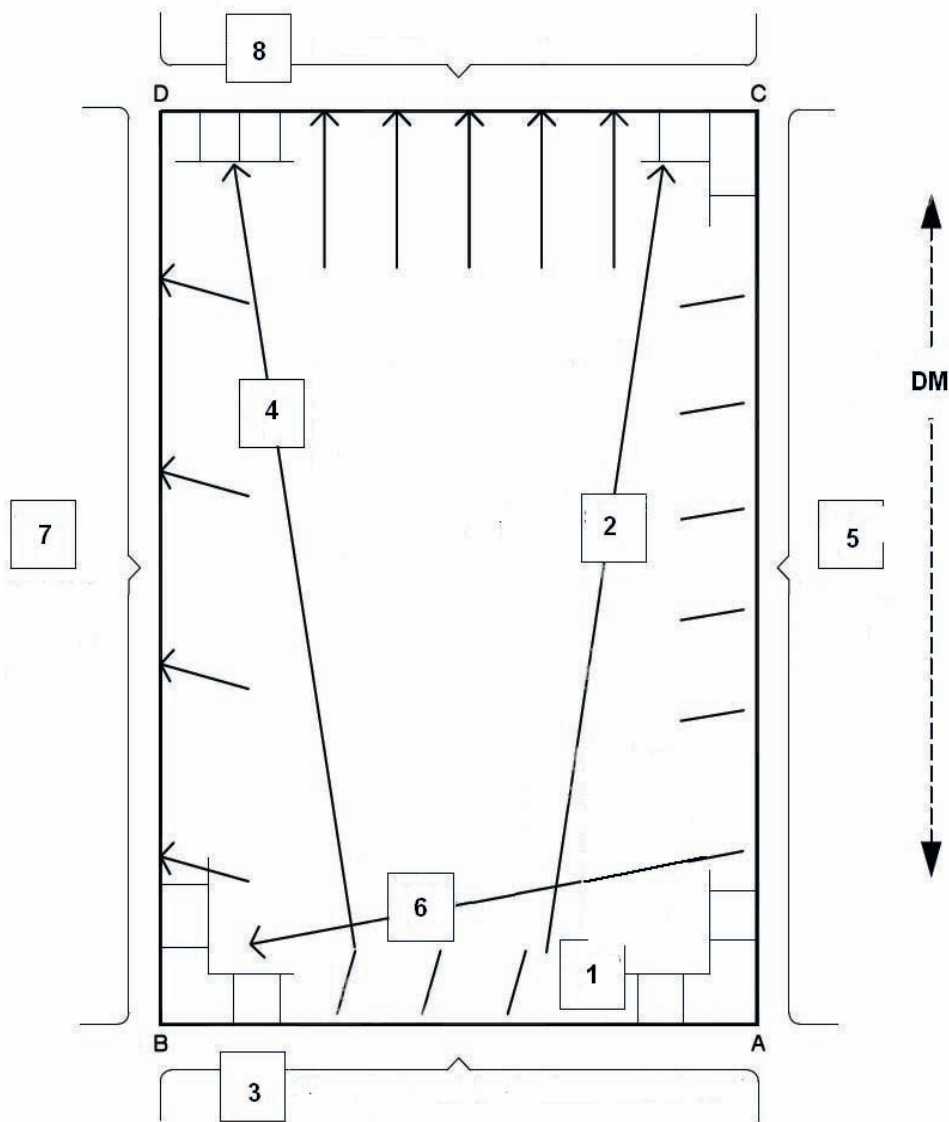
Axminster carpet should be stretched more in the length than in the width. The length should always be stretched first. A typical method is shown in [Figure C.3](#).

#### C.5 Knitted carpet

Knitted carpet should be stretched more in the width than in the length. The width should always be stretched first. A typical method is shown in [Figure C.4](#).

#### C.6 Fusion-bonded carpet

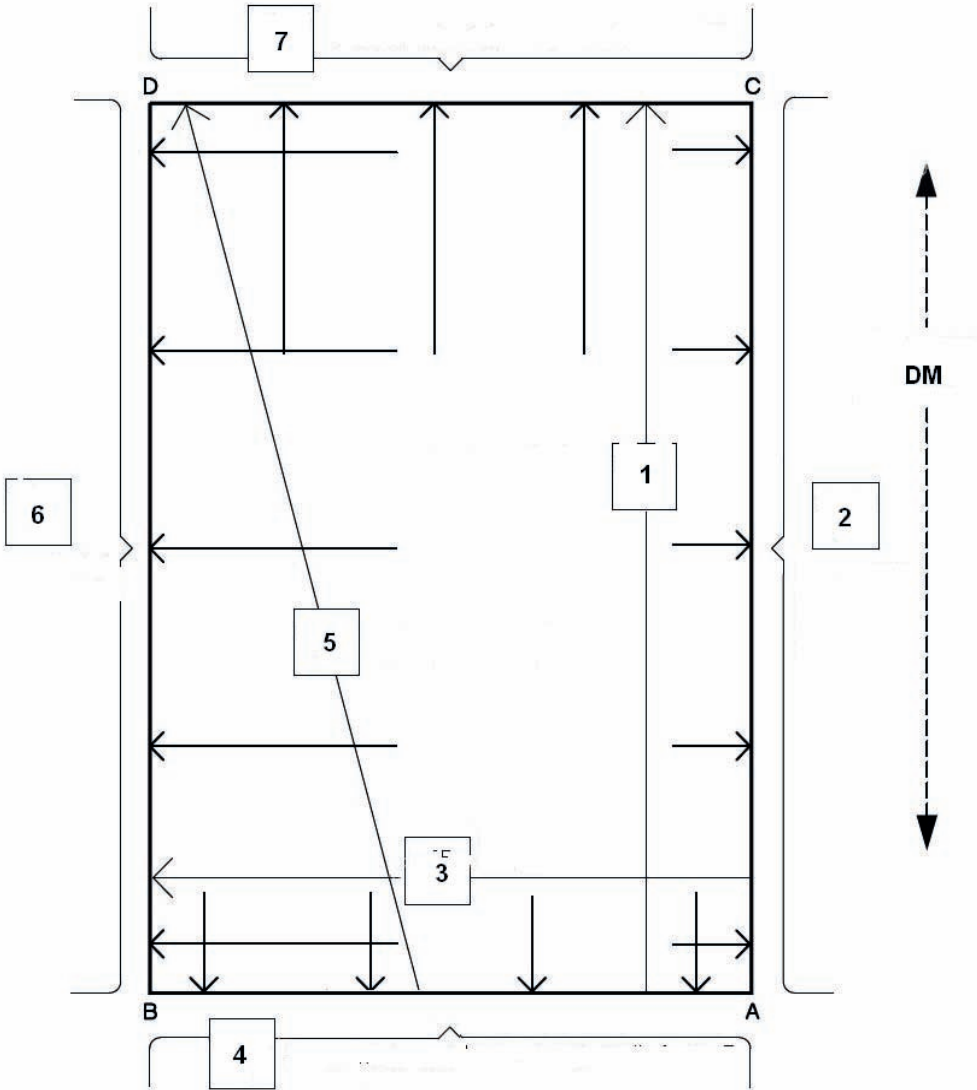
Fusion-bonded carpet should be stretched more in the width than in the length. A typical method is shown in [Figure C.5](#).



**Key**

- DM direction of manufacture
- 1 Step 1: hook onto carpet gripper 1 m in both directions along corner A
- 2 Step 2: power-stretch from A-B to corner C at 15° angle
- 3 Step 3: knee kick and hook along wall A to B
- 4 Step 4: power-stretch from A-B at 15° angle and hook along at wall C-D (starting at corner C)
- 5 Step 5: knee kick and hook along wall A to C
- 6 Step 6: power-stretch from A-C at 15° angle and hook along wall B-D (starting at corner B)
- 7 Step 7: power-stretch along wall B to D at 15° angle
- 8 Step 8: power-stretch along wall C to D

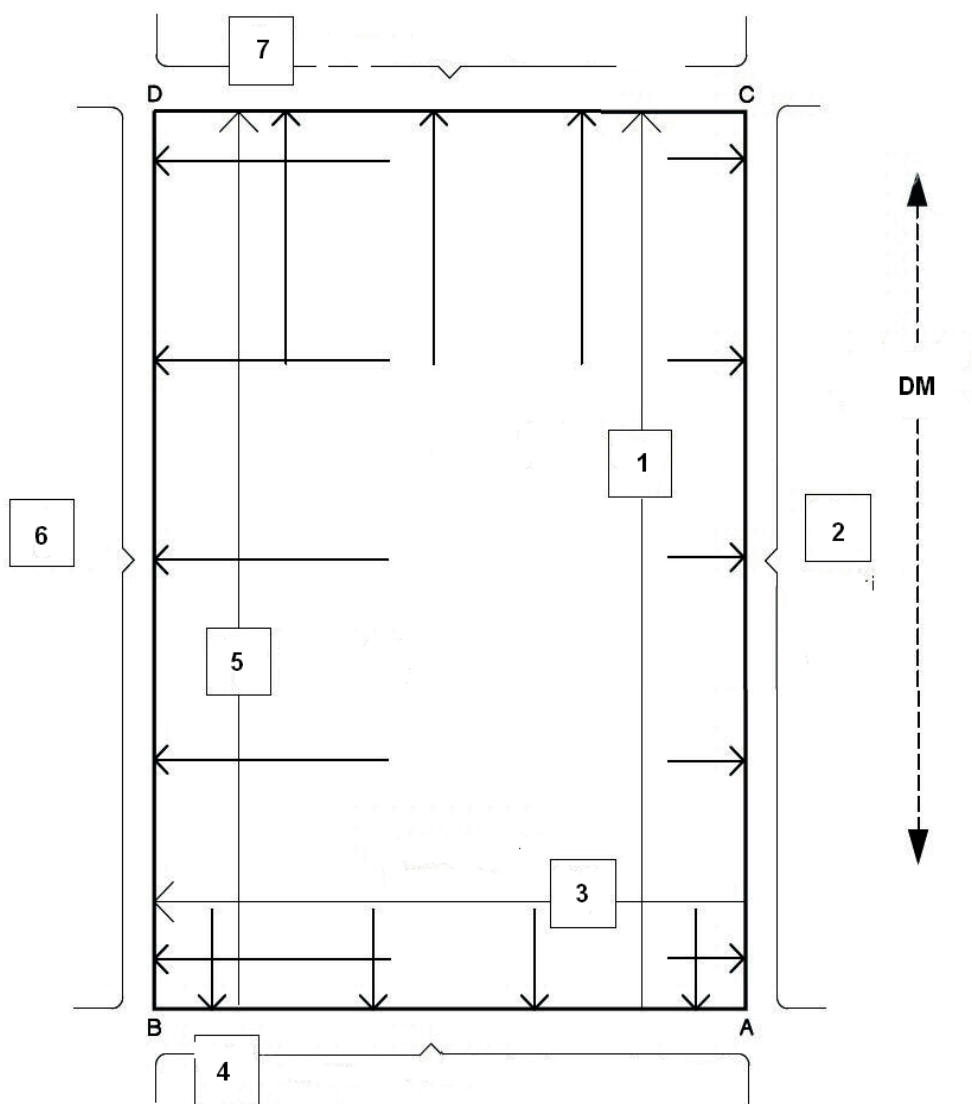
**Figure C.1 — Stretching tufted carpet**



**Key**

- DM direction of manufacture
- 1 Step 1: power-stretch from A to C
- 2 Step 2: knee kick and hook along wall A to C
- 3 Step 3: power-stretch from A to B
- 4 Step 4: knee kick and hook along wall A to B
- 5 Step 5: power-stretch from B to D at 15° angle
- 6 Step 6: power-stretch along wall B to D
- 7 Step 7: power-stretch along wall D to C

**Figure C.2 — Stretching Wilton carpet**

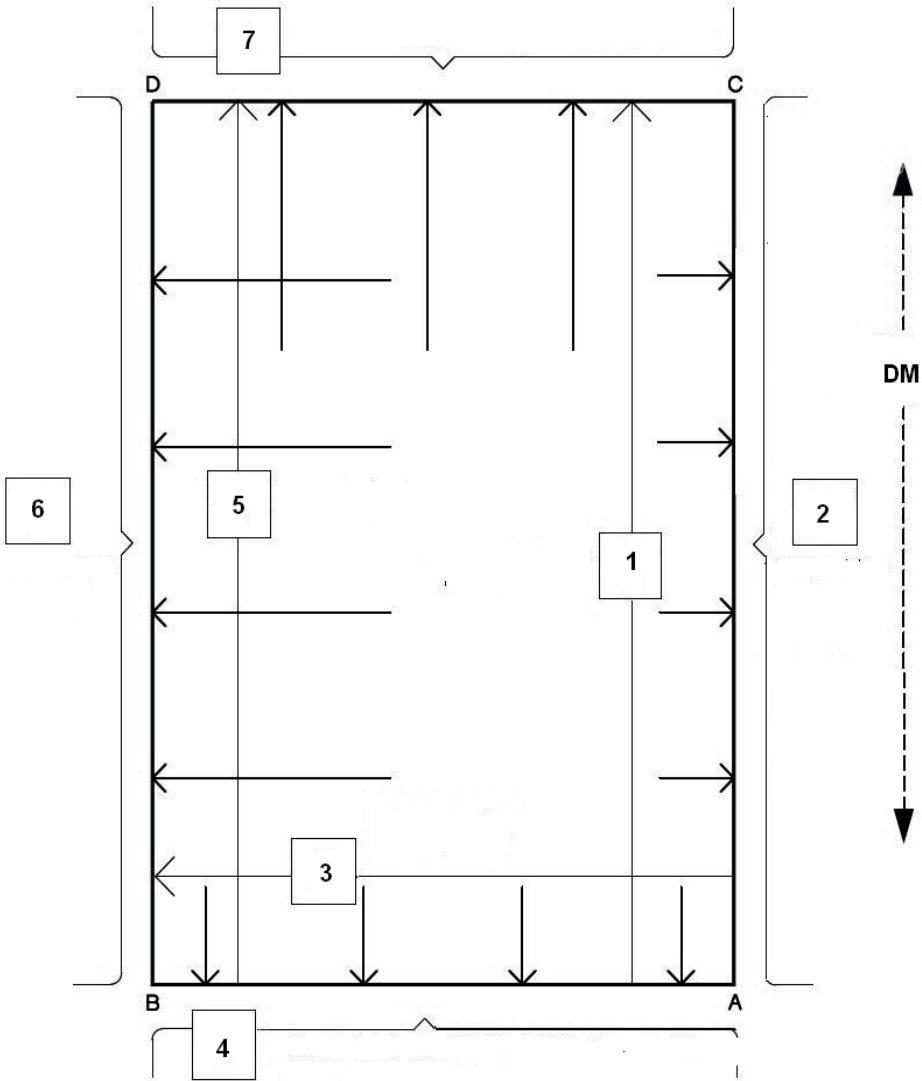


**Key**

- DM direction of manufacture
- 1 Step 1: power-stretch from A to C
- 2 Step 2: knee kick and hook along wall A to C
- 3 Step 3: power-stretch from A to B
- 4 Step 4: knee kick and hook along wall A to B
- 5 Step 5: power-stretch from B to D
- 6 Step 6: power-stretch along wall B to D
- 7 Step 7: power-stretch along wall D to C

**Figure C.3 — Stretching Axminster carpet**

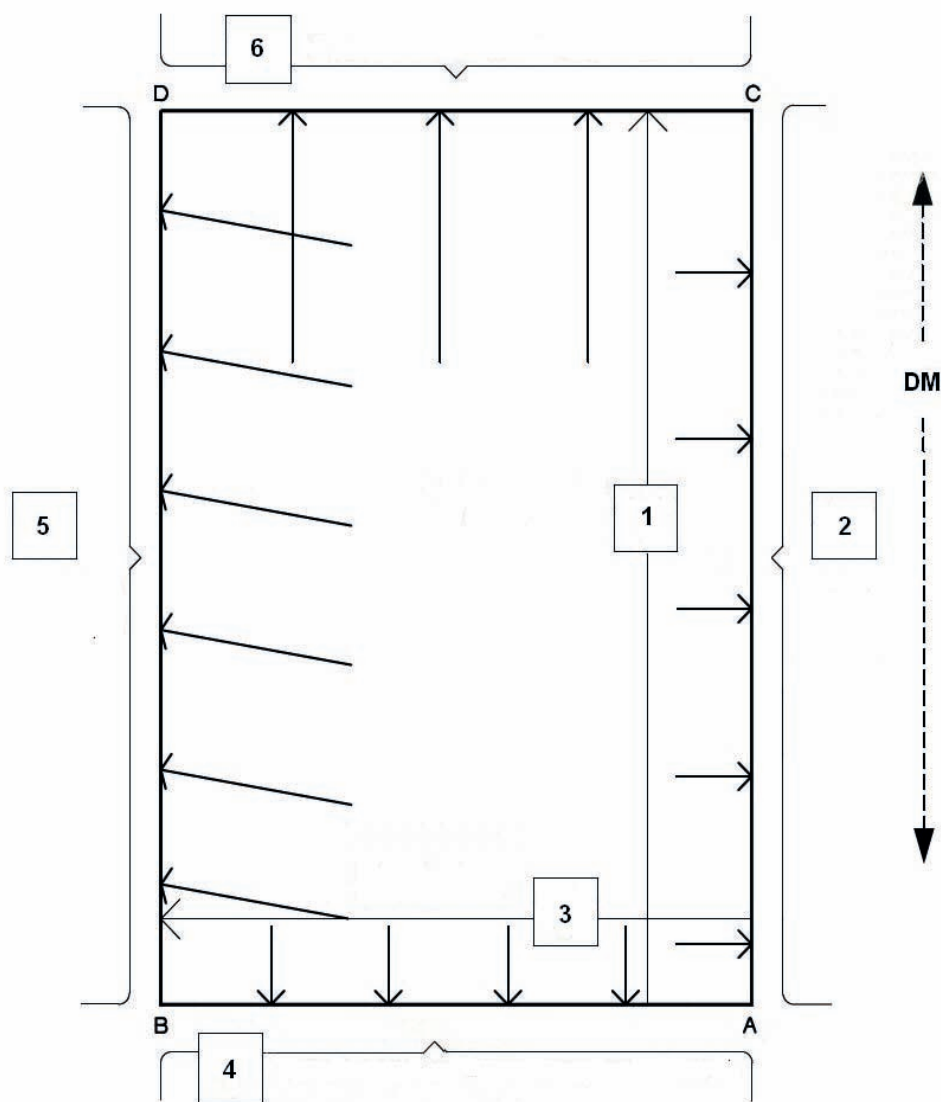




**Key**

- DM direction of manufacture
- 1 Step 1: power-stretch from A to C
- 2 Step 2: knee kick and hook along wall A to C
- 3 Step 3: power-stretch from A to B
- 4 Step 4: knee kick and hook along wall A to B
- 5 Step 5: power-stretch from B to D
- 6 Step 6: power-stretch along wall B to D
- 7 Step 7: power-stretch along wall D to C

**Figure C.4 — Stretching Knitted carpet**



**Key**

- DM direction of manufacture
- 1 Step 1: power-stretch from A to C
- 2 Step 2: knee kick and hook along wall A to C
- 3 Step 3: power-stretch from A to B
- 4 Step 4: knee kick and hook along wall A to B
- 5 Step 5: power-stretch from B to D at 10° angle
- 6 Step 6: power-stretch along wall B to D

**Figure C.5 — Stretching Fusion-bonded carpet**

## Annex D (informative)

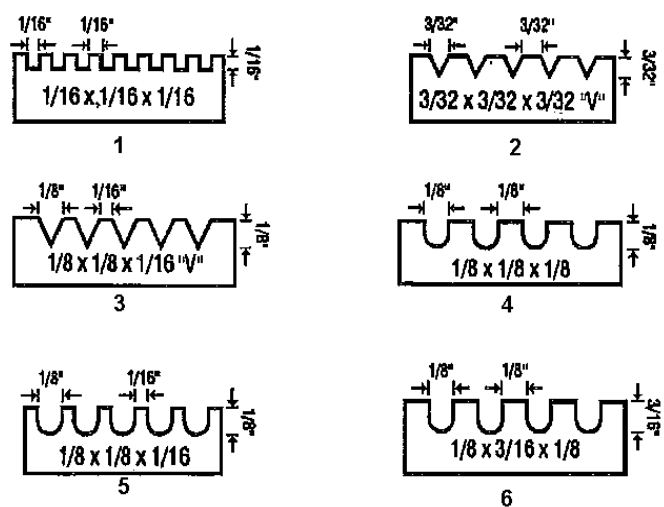
### Guidelines to trowel selection

[Table D.1](#) gives guidelines for the selection of the right trowel per type of carpet back. [Figure D.1](#) gives the relationship between the type of trowel and the expected spread rate range of glue.

**Table D.1 — Guidelines for trowel size**

Trowel Size — Minimum Guidelines				
Direct Glue Down				
Type Carpet Back	Trowel Size (in inches *)			
	Notch Width	Notch Depth	Space Between	Notch Shape
Polypropylene, woven mesh secondary	1/8	1/8	1/16	V
	1/8	1/8	1/8	U
Unitary, no secondary fabric	1/8	1/8	1/16	V
	1/8	1/8	1/8	U
Woven carpet	1/8	1/8	1/16	V
	1/8	1/8	1/8	U
Non-woven	Refer to manufacturer recommendations			
Hot-melt polymer	1/8	1/8	1/16	V
Woven jute secondary	3/32	3/32	3/32	V
Attached cushion	3/32	3/32	3/32	V
Vinyl-backed broadloom	3/32	3/32	3/32	V
Modular carpet tiles	Refer to manufacturer recommendations			
Double Glue Down				
Cushion to floor	1/16	1/16	1/16	U
Carpet to cushion:				
* smooth back carpet	1/8	1/8	1/16	U
* rough back carpet	1/8	3/16	1/8	U

The above guidelines should only be used when specific recommendations are not available from the carpet manufacturer and/or the adhesive supplier. Rough, porous concrete surfaces, and heavily textured carpet backs often require trowels with deeper notches than listed above.



**Key**

- 1  $1/16 \times 1/16 \times 1/16$  square (3,3 m<sup>2</sup>/l to 4,4 m<sup>2</sup>/l)
- 2  $3/32 \times 3/32 \times 3/32$  V (2, m<sup>2</sup>/l to 3,3 m<sup>2</sup>/l)
- 3  $1/8 \times 1/8 \times 1/16$  V (1,75 m<sup>2</sup>/l to 2,2 m<sup>2</sup>/l)
- 4  $1/8 \times 1/8 \times 1/8$  U (1,3 m<sup>2</sup>/l to 2,2 m<sup>2</sup>/l)
- 5  $1/8 \times 1/8 \times 1/16$  U (1,1 m<sup>2</sup>/l to 1,75 m<sup>2</sup>/l)
- 6  $1/8 \times 3/16 \times 1/8$  U (1,1 m<sup>2</sup>/l to 1,75 m<sup>2</sup>/l)

**Figure D.1 — Actual size towel notch and reasonable expected spread rate ranges (in m<sup>2</sup>/l)**

## Annex E (informative)

### Soft underlays for textile floor coverings

#### E.1 Terms and definitions

For the purpose of this International Standard, the definitions given in here with the exception of combination underlay and those below apply.

##### E.1.1

##### **combination underlay**

underlay composed of one or more layers of any fibrous underlay material combined with one or more layers of any non-fibrous underlay material

##### E.1.2

##### **deflection (also known as compression)**

change in thickness of the underlay when the pressure is increased from 2 kPa to 100 kPa

##### E.1.3

##### **fibrous underlay**

underlay made of fibrous material consolidated by impregnation with a binding agent

##### E.1.4

##### **needlefelt underlay**

underlay made wholly of fibres entangled or matted together by needling of a fibre batt

Note 1 to entry A woven, non-woven, or film scrim may be included in a fibrous underlay for support during manufacture.

##### E.1.5

##### **cellular plastics (polymeric) underlay**

an underlay formed essentially of a vulcanized rubber foam, with or without a carrier or backing materials bonded thereto

##### E.1.6

##### **cellular rubber underlay**

a non-fibrous underlay formed essentially of a vulcanized rubber foam with or without a carrier or backing materials bonded thereto

### E.1.7

#### rubber crumb underlay

a non-fibrous underlay formed essentially of new or recycled crumb vulcanized rubber with or without a carrier or backing material bonded thereto

### E.1.8

#### initial thickness

thickness of the underlay measured under a pressure of 2 kPa

### E.1.9

#### load-deflection curve

plot of decreasing thickness against increasing pressure from 2 kPa to 100 kPa

### E.1.10

#### underlays

soft underlay

### E.1.11

#### work of compression

work done on the underlay when the pressure is increased from 2 kPa to 100 kPa, i.e. the area under the load-deflection curve.

Note 1 to entry A value of deflection alone does not indicate the shape of the load-deflection curve. However, work of compression does distinguish between soft underlays, although they can have the same value for deflection, have different energy absorbing characteristics, and hence, differently shaped load-deflection curves.

## E.2 Classification and designation

Underlays specified in [Table E.1](#) shall be classified as suitable for light residential, general residential, luxury, general commercial, or heavy commercial in accordance with their values for deflection and work of compression when measured after dynamic loading in accordance with [Figure 1](#).

Underlays should initially be specified to the appropriate classification for that particular application. When looking at the alternative uses for any of the classes of underlays, advice should be sought from the manufacturer/supplier of the carpet and the underlay.

## E.3 Performance requirements

Underlays shall comply with the performance requirements given in [Table E.2](#) when tested in accordance with the test methods given in [Table E.2](#).

## E.4 Sampling

Sampling shall be carried out in accordance with ISO 1957. A full width sample 1 m in length shall be taken. For non-fibrous underlays, a minimum period of 72 h shall be allowed between manufacturing and sampling.

## E.5 Classification

All underlay shall be classified as suitable for different intended use/application in accordance with the performance levels shown in [Figure 1](#) for work of compression after dynamic loading versus deflection after dynamic loading.

Underlays should initially be specified to the appropriate classification for that particular application. An underlay classified “luxury” that is suitable for luxury use can be used in a commercial application where extra comfort or firmness is required.

**Table E.1 — Designation and description of intended use/application**

Designation	Description of intended use/application
LR	Light residential use, not suitable for stairs.
GR	General residential use.
L	Luxury use, domestic/commercial where high energy absorption is desirable.
GC	General commercial use suitable for normal foot and wheel traffic.
HC	Heavy commercial use suitable for heavy foot and wheel traffic and castor chairs.

**Table E.2 — Performance requirements**

Property	Performance requirement		Test method
Breaking force	40 N min.		ISO 9073-3
Extension	20 % max. extension for applied force of 40 N		ISO 9073-3
Loss of thickness:			
(a) After static loading, recovery period 24 h	Fibrous underlay	40 % max.	ISO 3415
	Non-fibrous underlay	15 % max.	
	Combined underlay	40 % max.	
(b) After 1 000 cycles of dynamic loading	Fibrous underlay	40 % max.	ISO 2094
	Non-fibrous underlay	15 % max.	
	Combined underlay	20 % max.	
Thickness deviation:			
(a) Deviation of the mean initial thickness from the thickness stated by the manufacturer/supplier	Fibrous and combined underlay	±15 % max.	ISO 1765 Measured at 10 equally spaced intervals across the full width of an underlay using a presser foot of area between 700 mm <sup>2</sup> and 1 000 mm <sup>2</sup> at a pressure of 2 kPa.
	Non-fibrous underlay	±12 % max.	
(b) Difference between maximum and minimum initial thicknesses	Fibrous and combined underlay	4 mm max.	
	Non-fibrous underlay	3 mm max.	
Mean deflection at 100 kPa after dynamic loading	Not less than 1,5 mm and not more than 9 mm (see also <a href="#">Figure 1</a> for classification limits).		<a href="#">Annex E</a> , <a href="#">Annex A</a>
Work of compression after dynamic loading	50 J/m <sup>2</sup> min, 200 J/m <sup>2</sup> max.		<a href="#">Annex E</a> , <a href="#">Annex A</a>

Table E.2 (continued)

Property	Performance requirement	Test method
Percentage retention of original work of compression after dynamic loading	40 % min.	<a href="#">Annex E</a> , <a href="#">Annex A</a>
Resistance to breaking or cracking (felts excluded)	No cracks longer than 50 mm No cracks in any backing material	<a href="#">Annex E</a> , <a href="#">Annex B</a>



## Annex F (informative)

### Method for the determination of compression characteristics

#### F.1 General

This Annex provides a method for measuring the thickness and compression characteristics of underlays. The method is only applicable to underlays having uniform thickness and construction.

#### F.2 Principle

The thickness of an underlay specimen is measured as the distance between the reference plate on which the soft underlay rests and a parallel circular presser-foot, exerting a known pressure to an area between 700 mm<sup>2</sup> to 1 000 mm<sup>2</sup> inclusive within a larger area of underlay. By the application of a series of increasing loads to the specimen, the thickness at various pressures and the load-compression characteristics are determined.

#### F.3 Apparatus

##### F.3.1 Measuring instrument

An instrument used for measuring the thickness of the specimen having a circular plane presser-foot of area between 700 mm<sup>2</sup> and 1 000 mm<sup>2</sup>. It shall be capable of exerting pressures normal to the surface of the underlay from 2 kPa to 100 kPa with intermediate values of 5 kPa, 10 kPa, 20 kPa, and 50 kPa, with an accuracy of  $\pm 1\%$  of the total pressure applied to the specimen or  $\pm 0,05$  kPa whichever is greater. The instrument shall have a means of measuring the thickness to an accuracy of 0,1 mm over a range of 25 mm. The movement of the presser-foot shall be normal to the plane of the underlay. The reference plate on which the specimen rests shall be a horizontal plane, at least 125 mm  $\times$  125 mm in size, and parallel to the presser-foot within one part in 500. The reference plate and the presser-foot shall be flat to an accuracy of 0,01 mm.

##### F.3.2 Dynamic loader

A dynamic loader in accordance with ISO 2094.

##### F.3.3 Circular guard ring

A circular guard ring with a mass of 1 000 g, an external diameter not greater than 125 mm, and an internal diameter of  $d + 40$  mm ( $d$  being the diameter of the presser-foot in millimetres), such that a pressure of at least 1 kPa is exerted. A throat of 40 mm width could be cut from the guard ring.

##### F.3.4 Conditioning facility

A conditioning facility capable of providing and maintaining the Publicly Available Specification atmosphere as described in ISO 139.

#### F.4 Sample and test specimen

Select the sample and the test specimens in accordance with ISO 5086. Select the test specimens well away from distorted parts of the sample. Test specimens shall not be taken from areas in the same line in a lengthwise or widthwise direction.

Cut each test specimen not less than 125 mm × 125 mm. Prepare sufficient specimens to allow at least three tests to be made.

## F.5 Procedure

- a) Condition the test specimens by laying them out singly and flat with the use-surface uppermost in the Publicly Available Specification atmosphere as described in ISO 139. Allow the test specimens to condition for at least 24 h or until they reach equilibrium (see Note), whichever is the greater period. Test the specimens in that atmosphere.

NOTE It is not required that specimens should be pre-conditioned as stated in ISO 139. Equilibrium is considered to have been reached when successive weighings at 2 h intervals show no progressive change in mass greater than 0,25 %.

- b) Check that the presser-foot shaft moves freely. With the presser-foot and baseplate in contact, either set the gauge to read zero or obtain the zero reading for the baseplate.
- c) Place the specimen use-surface uppermost on the baseplate so that no part of the presser-foot is within 20 mm of the edge of the specimen and so that the specimen cannot move. If several measurements are to be made on one large specimen, place the specimen on the baseplate so that the centre of the area in contact with the presser-foot is not less than 75 mm from the centre to an area of any previous measurement and so that the whole area of the specimen is supported in the same horizontal plane.
- d) Place the guard ring on the specimen to hold it steady before lowering the presser-foot.
- e) Lower the presser-foot gently on to the specimen and measure the initial thickness under a pressure of 2 kPa after 30 s.
- f) Without raising the presser-foot, add extra mass carefully to increase the pressure to 5 kPa and record the gauge reading after 30 s. Take care to add extra mass gently so that the required pressure is not exceeded.
- g) Immediately add extra mass to increase the pressure to 10 kPa and record the gauge reading after 30 s.
- h) Continue this procedure adding extra mass to raise the pressure in turn to 20 kPa, 50 kPa, and 100 kPa and recording the gauge reading in each case after the mass has been applied for 30 s. Do not, at any time, decrease the pressure during the loading sequence.
- i) Subject the test specimen to 1 000 impacts in accordance with the procedure in ISO 2094.
- j) Repeat steps b to h on the area of the specimen that has been subjected to the 1 000 impacts in step i).
- k) Repeat steps b) to j) for each of the other test specimens.

## F.6 Calculation and expression of results

Results shall be calculated and expressed as follows:

- a) tabulate the thickness for each specimen to the nearest 0,1 mm at each pressure;
- b) calculate the mean thickness for each pressure and plot the mean thickness versus pressure on a graph as in [Figure F.1](#), with lines joining the mean values. Also plot the individual values of thickness at each pressure on the same graph so as to display the variation;
- c) calculate, from the mean results, the following estimates:
  - 1) the mean deflection at 100 kPa,  $(t_2 - t_{100})$ , to the nearest 0,1 mm where  $t_2$  and  $t_{100}$  are the thickness at 2 kPa and 100 kPa, respectively in millimetres;

2) the work of compression ( $W$ ), in joules per square metre, estimated as the area under the load-deflection curve, i.e. area ABD in [Figure F.1](#), using Formula (F.1):

$$W = 1,5t_2 + 4t_5 + 7,5t_{10} + 20t_{20} + 40t_{50} - 73t_{100}^2 \text{ J/m}^2 \tag{F.1}$$

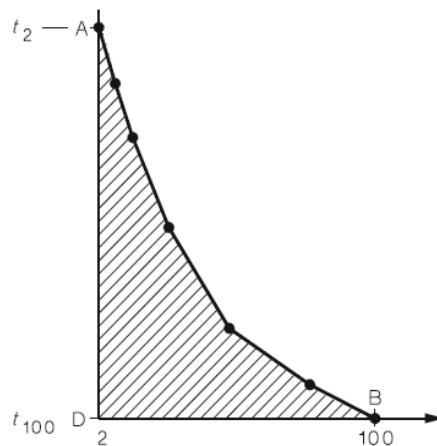
where

- $t_2$  is the thickness (in millimetres) at 2,0 kPa pressure;
- $t_5$  is the thickness (in millimetres) at 5,0 kPa pressure;
- $t_{10}$  is the thickness (in millimetres) at 10,0 kPa pressure;
- $t_{20}$  is the thickness (in millimetres) at 20,0 kPa pressure;
- $t_{50}$  is the thickness (in millimetres) at 50,0 kPa pressure;
- $t_{100}$  is the thickness (in millimetres) at 100,0 kPa pressure.

3) the percentage retention of original work of compression using Formula (F.2):

$$\frac{W_1}{W_0} \times 100 \tag{F.2}$$

where



$W_1$  is the work of compression in joules per square metre after dynamic loading;

$W_0$  is the original work of compression in joules per square metre.

**Key**

- |        |                           |           |                       |
|--------|---------------------------|-----------|-----------------------|
| x-axis | loading pressure (in kPa) | $t_{100}$ | thickness at 100 kPa  |
| y-axis | thickness ( $t$ , in mm)  | AB        | load-deflection curve |
| $t_2$  | thickness at 2 kPa        |           |                       |

**Figure F.1 — Typical thickness/pressure curve for soft underlays**

## Annex G (informative)

### Method for the determination of resistance to breaking and cracking

#### G.1 General

This Annex provides a method for determining the resistance to breaking and cracking of underlay. This Annex does not apply to needlefelt underlays.

#### G.2 Principle

A rectangular piece of underlay is folded at each end. One end is placed under a weight piece, while the other is folded without an added weight. After 1 h, the weight-piece is removed and each fold of the test specimen is visually assessed for signs of cracking.

#### G.3 Apparatus

The following apparatus is required:

- a) rectangular rigid metal plate of minimum dimensions 80 mm × 40 mm;
- b) weight-piece such that the combined mass of the metal plate and the weight-piece is 2,5 kg;
- c) single-sided adhesive carpet tape 50 mm wide;
- d) conditioning facility as described in [Annex A](#).

#### G.4 Test specimen

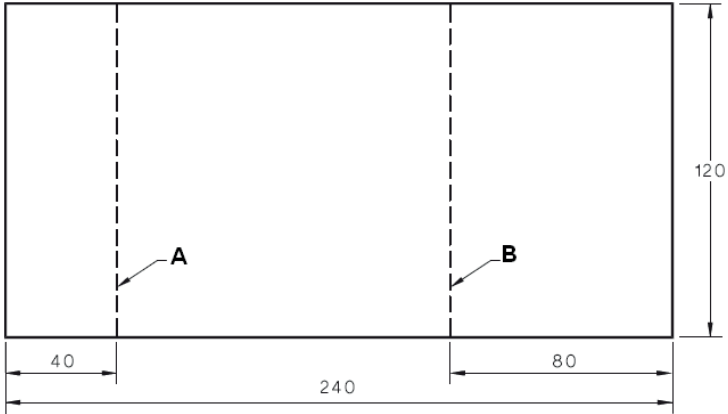
The test specimen shall be of minimum dimensions 240 mm × 120 mm.

#### G.5 Procedure

The procedure shall be as follows:

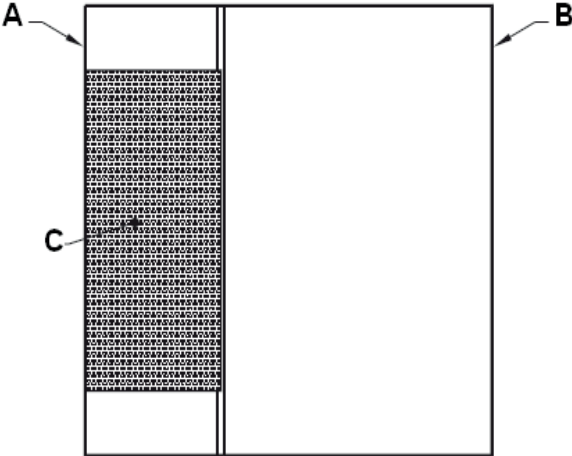
- a) condition the test specimen according to the procedure in [Annex A](#);
- b) fold the test specimen as shown in [Figure G.1a](#) so that when folded, the edges of the test specimen meet and the backing material, if any, is on the inside of the fold;
- c) tape the edges of the test specimen together and then turn the test specimen over so that the edges where the folds meet are on the underside;
- d) place the metal plate on the folded test specimen aligning the plate with the folded edge as shown in [Figure G.1b](#);
- e) place the weight-piece on top of the metal plate and leave for 1 h;
- f) remove the weight-piece and metal plate and immediately examine the folded specimen for signs of cracking and breaking.

All dimensions in millimetres (mm)



- Key**  
A fold A  
B fold B

Figure G.1a — Arrangements of folds in test specimen (unfolded)



- Key**  
A fold A  
B fold B  
C metal plate

Figure G.1b — Arrangements of folds in test specimen (folded)

## Bibliography

- [1] ASTM F710-11, *Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring*
- [2] ASTM F1869-11, *Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride*
- [3] ASTM F2170-11, *Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes*

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