
**Rubber- or plastics-coated fabrics —
Physical and mechanical tests —
Determination of flex resistance by the
flexometer method**

*Supports textiles revêtus de caoutchouc ou de plastique — Essais
physiques et mécaniques — Détermination de la résistance à la flexion
à l'aide d'un flexomètre*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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

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

ISO 32100 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products (other than hoses)*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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Rubber- or plastics-coated fabrics — Physical and mechanical tests — Determination of flex resistance by the flexometer method

1 Scope

This International Standard specifies a test method for determining the flex resistance of rubber- or plastics-coated fabrics in the folded condition. The test method is applicable only to products which can be clamped in the test apparatus used and to products with which the fold made in the test specimen can be caused to move back and forth along the specimen during the test.

The appearance of the test specimen, after completion of either the flex number (see 3.1) or a specified number of flex cycles, is taken as a measure of the flex resistance in the folded condition.

2 Normative references

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

ISO 3, *Preferred numbers — Series of preferred numbers*

ISO 2231:1989, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing*

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

3 Terms and definitions

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

3.1

flex number

number (agreed between the interested parties) of flex cycles to which the test specimen is subjected, the specimen being subsequently examined using a magnifying lens with $\times 6$ magnification to determine whether any damage or other visible change is observable

3.2

flex cycle

cycle comprising one forward and one backward (i.e. a complete to-and-fro) movement of the moveable clamp of the test apparatus

4 Principle

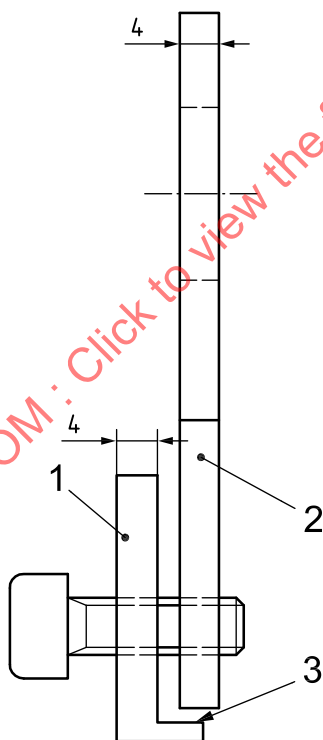
One end of a test piece is folded with the surface to be tested facing inwards and clamped in an upper (moveable) clamp and the other end of the test piece is folded with the surface to be tested facing outwards and clamped in a lower (fixed) clamp. The upper clamp is then moved in such a way that the fold is caused to run along the test piece. The test piece is examined periodically for damage or any other visible change.

5 Apparatus

The test rig consists of a moveable upper clamp as shown in Figure 1 to Figure 3 and a fixed lower clamp as shown in Figure 4.

Both clamps shall lie in the same plane. The moveable clamp shall be pivoted so that it can be driven to swivel through $22,5^\circ$ about pivot point A. During the test, the moveable clamp shall be swivelled at a frequency of (100 ± 5) swivels per minute using a motor drive. It shall also be possible to swivel the clamp by hand. With the two clamps aligned in the same plane, the distance between the upper edge of the lower clamp and the flange (3) on the front plate of the upper clamp shall be 25 mm (see Figure 1 and Figure 8).

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m

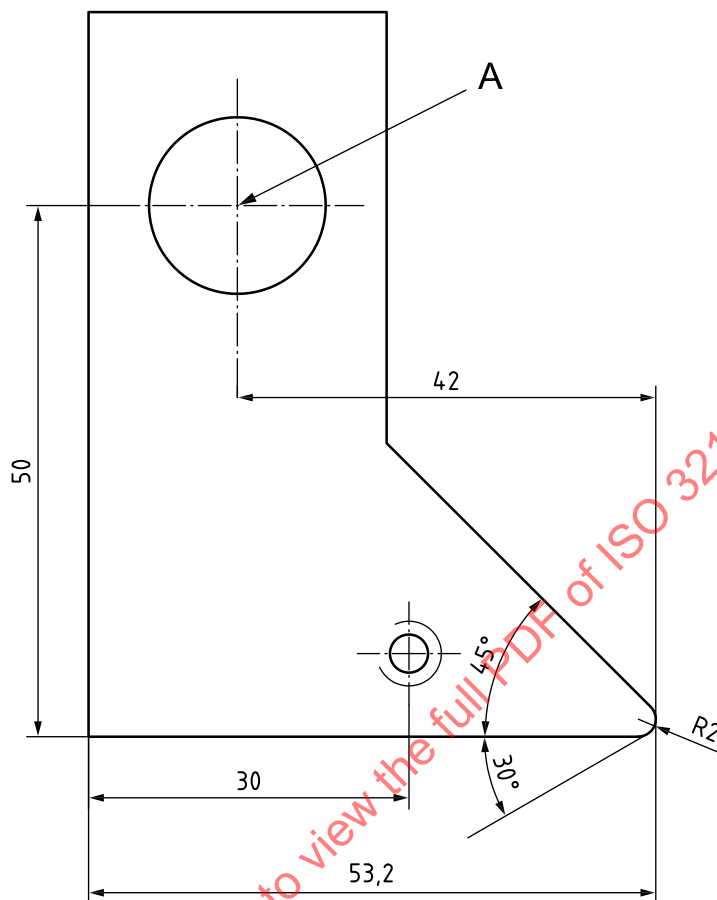


Key

- 1 front plate
- 2 back plate
- 3 flange on front plate

Figure 1 — Upper (moveable) clamp

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m



Key

A pivot point

Figure 2 — Back plate (Ref. No. 2 in Figure 1) of upper clamp

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m

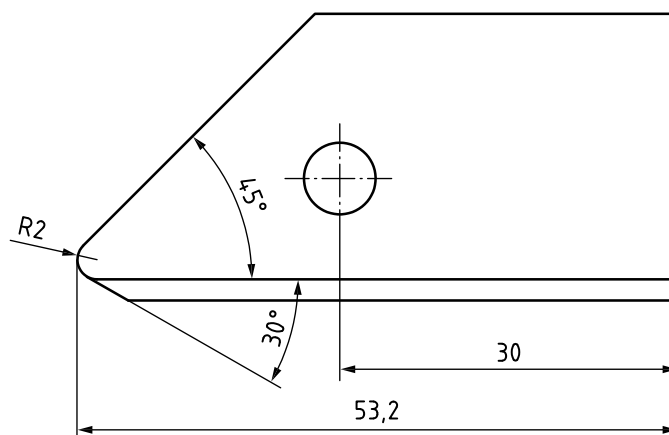


Figure 3 — Front plate (Ref. No. 1 in Figure 1) of upper clamp

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m

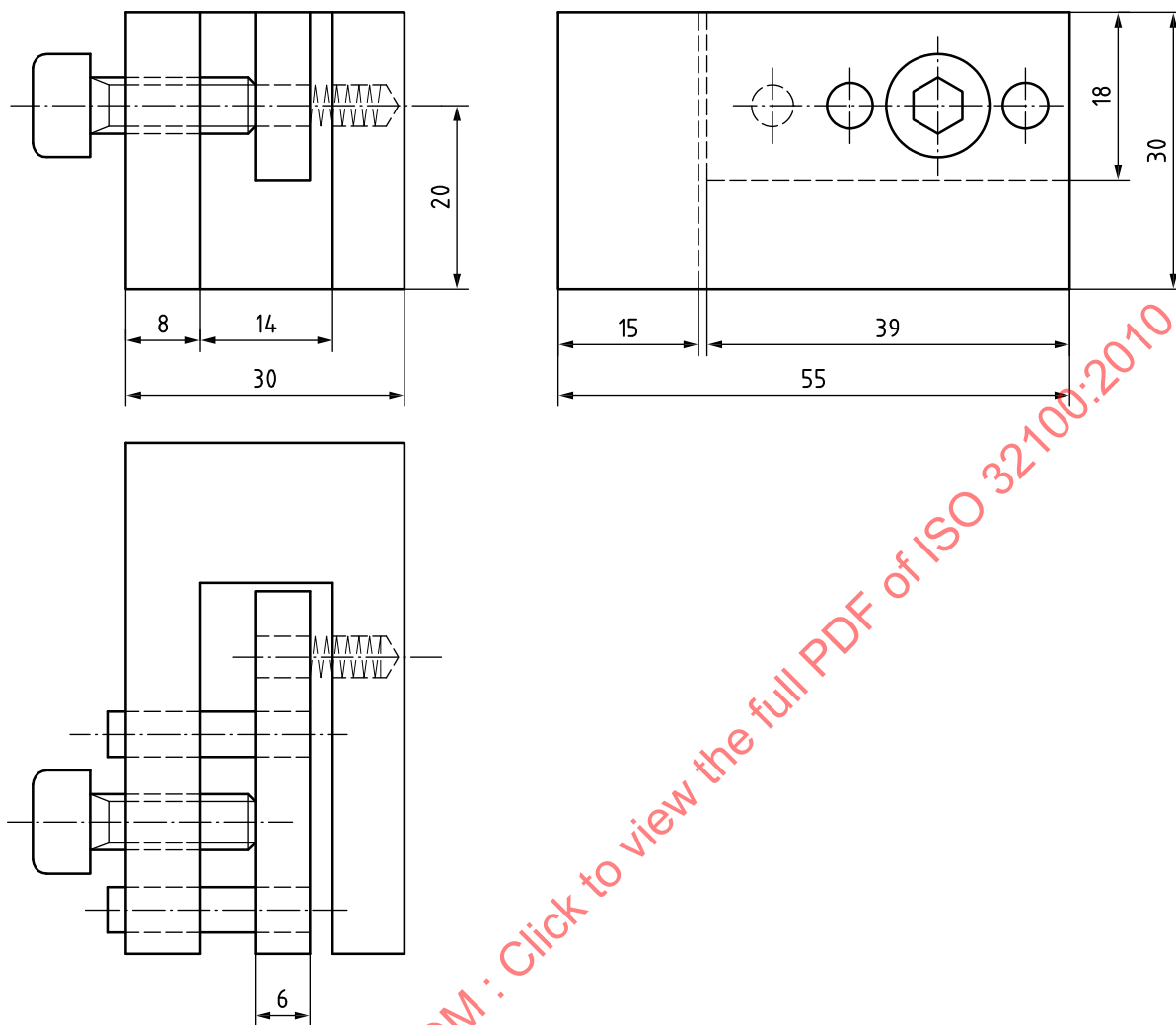


Figure 4 — Lower (fixed) clamp

6 Test specimens

6.1 Sampling

From the product to be tested, take test specimens either of dimensions 70 mm × 45 mm or, in certain cases as described in 7.3, in accordance with Figure 5.

Dimensions in millimetres

General tolerances in accordance with ISO 2768-1, tolerance class m

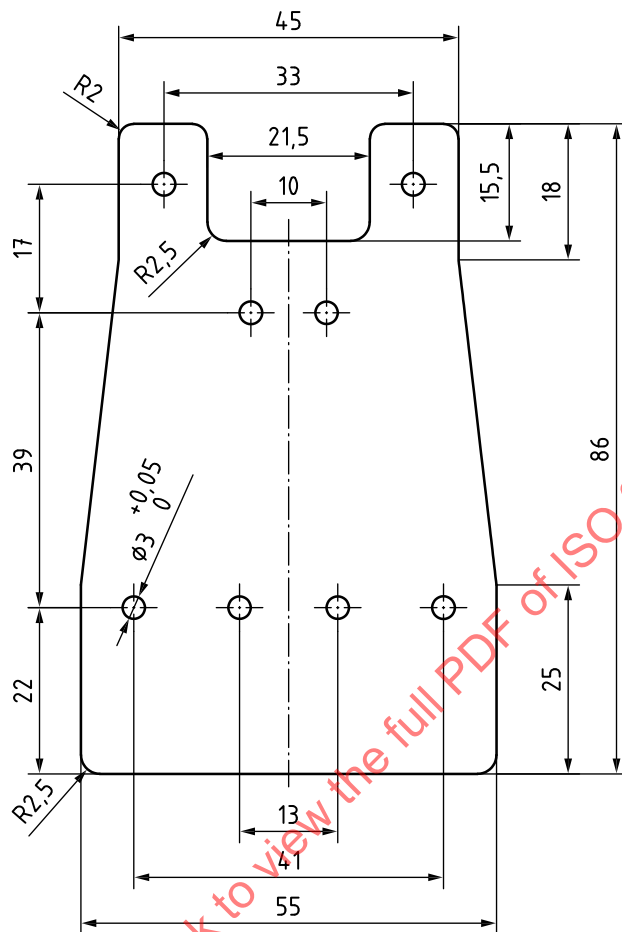


Figure 5 — Test specimen for special cases (see 7.3)

6.2 Number of test specimens

Cut at least three test specimens from the sheet longitudinal to the direction of manufacture and at least another three test specimens perpendicular to the direction of manufacture.

6.3 Conditioning of the test specimens

Prior to testing, condition the test specimens in standard atmosphere B as defined in ISO 2231:1989 (23 °C and 50 % r.h.) for the length of time specified in ISO 2231:1989.

7 Procedure

7.1 Unless otherwise specified, carry out the test in standard atmosphere B as defined in ISO 2231:1989. Fold a conditioned test specimen (see 6.3) along its longitudinal axis with the surface to be evaluated facing inwards and the longer edges flush with each other. Then, clamp the folded test specimen horizontally in the upper (moveable) clamp, which shall be in the same plane as the lower (fixed) clamp, so that the specimen is adjacent to the clamp bolt and supported on the flange on the front plate (see Figure 6). Fold the free end of the test specimen outwards over the inclined edges of the moveable clamp so that the specimen surface to be evaluated is now facing outwards (see Figure 7). Hold the corners together and clamp them in the lower (fixed) clamp with the fold vertical and without producing any tensile strain in the specimen (see Figure 8).

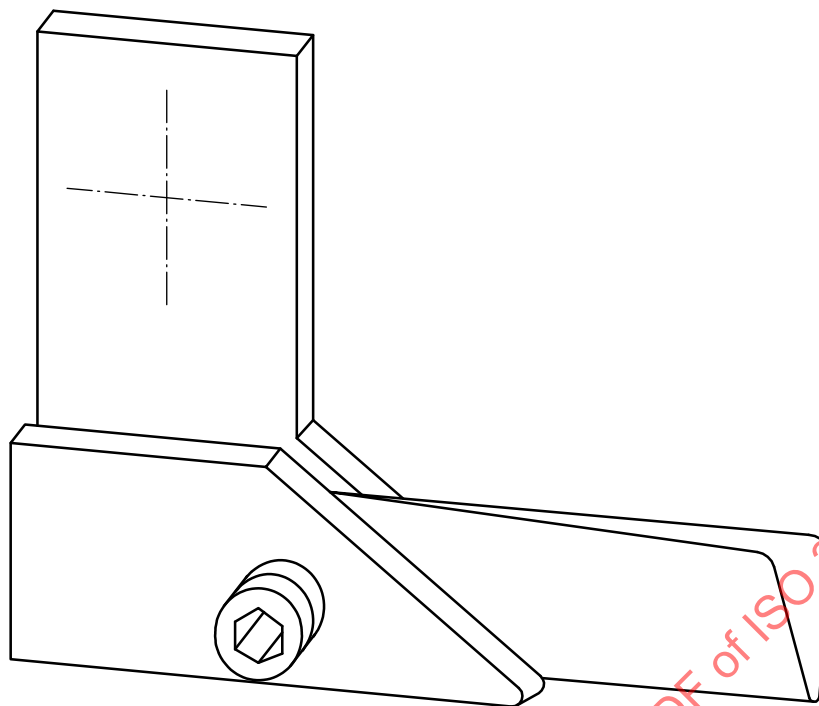


Figure 6 — Test specimen clamped in upper clamp

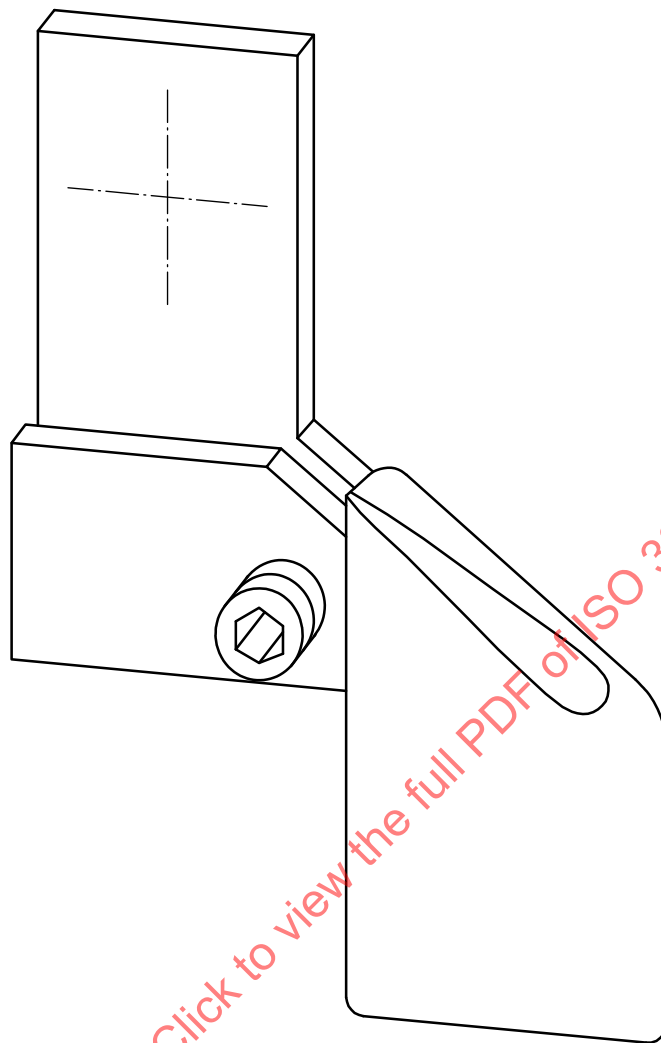


Figure 7 — Test specimen clamped in upper clamp with the free end folded outwards over the sloping edges of the clamp

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m

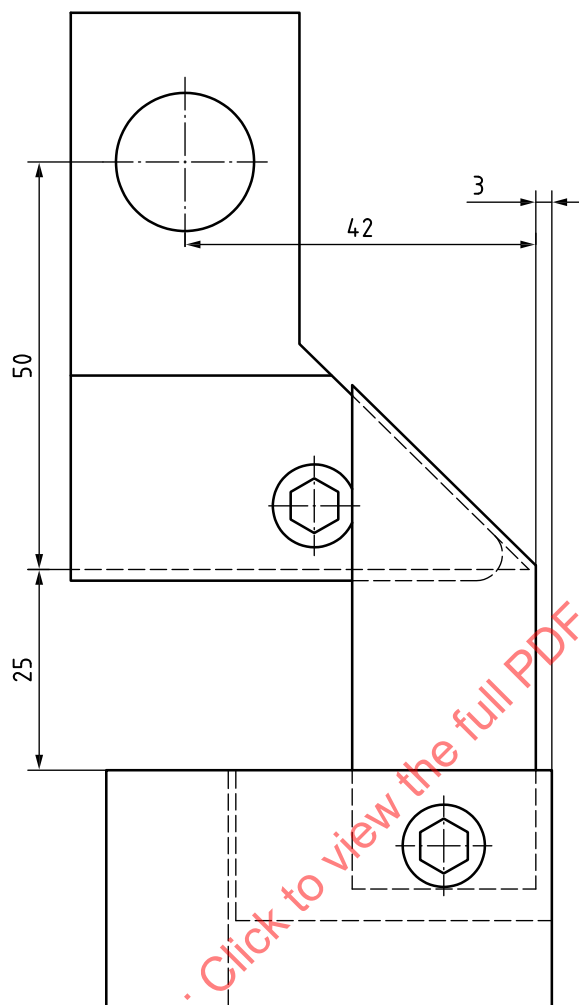


Figure 8 — Test apparatus in starting position with the test specimen clamped in place

7.2 Programme the test rig to carry out either an agreed number of flex cycles (the flex number — see 3.1) or to carry out the test at the intervals recommended in Table 1. Set the upper clamp in motion. During the swivelling motion, the fold shall run up and down along the test specimen (see Figure 9). After completion of the relevant number of flex cycles, check the test specimen for damage or other visible change by examining it under a magnifying lens with $\times 6$ magnification.

NOTE The numbers of flex cycles given in Table 1 are stepped in accordance with the R 10 series specified in ISO 3 (see Annex A).

Table 1 — Preferred intervals, i.e. number of flex cycles completed, at which test specimens should be examined

—	200	315	500	800
1 250	2 000	3 150	5 000	8 000
12 500	20 000	31 500	50 000	80 000
125 000	200 000	315 000	500 000	—

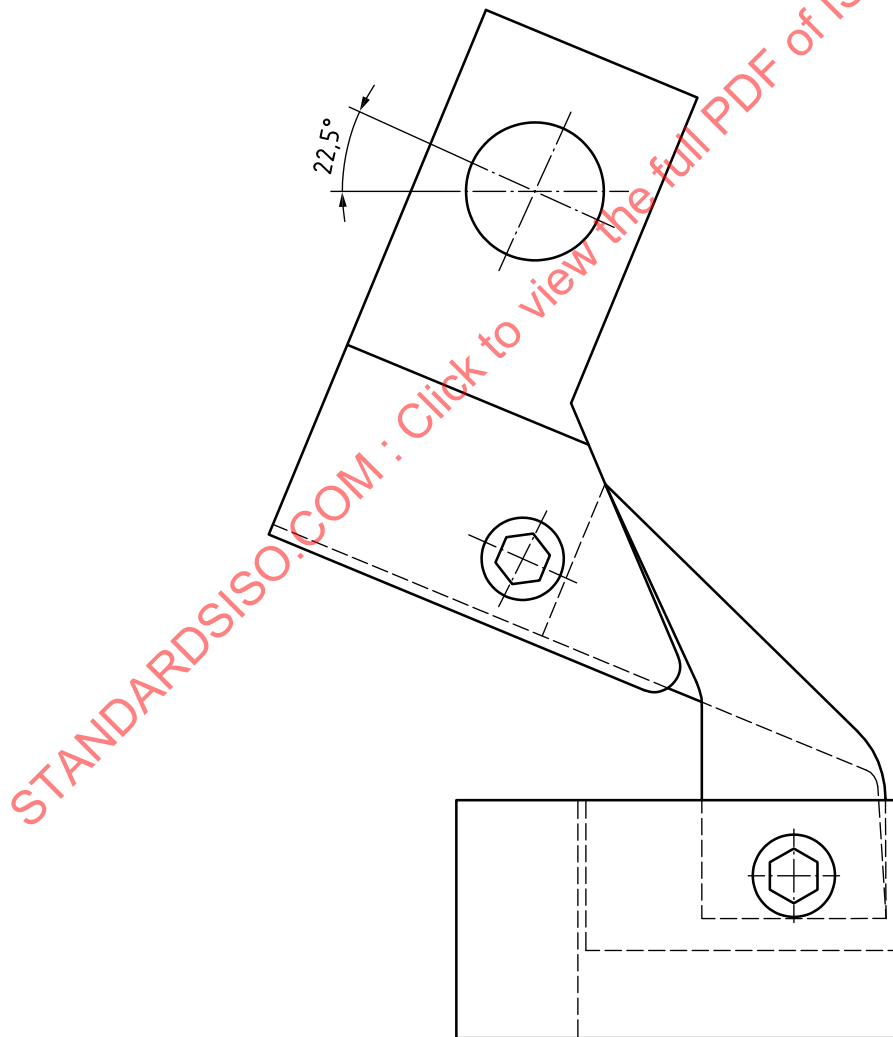


Figure 9 — Test apparatus and test specimen in the fully swivelled position

If testing was carried out at the intervals recommended in Table 1, grade the damage or other visible change observed in accordance with Table 2. If necessary, the moveable clamp may be slowly swivelled manually for the purposes of the examination or the test specimen may be taken out of the test apparatus. In the latter case, the test specimen shall be repositioned in the test apparatus exactly as before (see 7.3).

Table 2 — Grading of the damage/other change

Grade	Degree of change in coated fabric
0	No change.
1	Crazing of the finish detectable only under the magnifying lens. Minor changes in the surface due to greying (stress whitening) and/or creasing.
2	Top layer of coated fabric shows crazing and/or very small tears detectable only under the magnifying lens. With poromerics, no cracks in the poromeric layer detectable even under the magnifying lens. Cracks in the finish and/or minor stress whitening; with poromerics, crazing in the protective coating.
3	Cracks in the base layer or in the poromeric layer, detectable only under the magnifying lens. Cracks in the top or protective layer. Major stress whitening; formation of blisters; separation of layers. Base layer not identical in hue with the other layers.
4	Major cracks in the top or surface layer, and/or cracks in the base or poromeric layer.
5	Coating completely broken; stratum clearly recognizable and/or hole formation.

Continue testing until all the test specimens have been tested.

7.3 During testing, pressure marks might be produced on certain test specimens by the clamps. Some test specimens also increase in length during the test and, if so, must not be stretched tight during reinstallation. In order to ensure exact repositioning, the use of test specimens in accordance with Figure 5 is recommended, in which case the upper and lower clamps will need to be equipped with suitable pins.

7.4 If the test apparatus is shut down for an extended period of time, e.g. overnight, with the test specimen(s) still clamped in the apparatus, the clamps shall be positioned so that the test specimens are not stretched tight.

7.5 When examining wet test specimens, the test apparatus shall be stopped for the absolute minimum time necessary for checking the test specimens.

8 Expression of results

For each test specimen, express the result either as the flex number (i.e. the agreed number of flex cycles to which the specimen was subjected — see 3.1), together with the result of the examination, or as the grade corresponding to the visible appearance of the test specimen after completion of each of the specified numbers of flex cycles which were carried out (see Table 1).

9 Test report

The test report shall include the following information:

- a) a reference to this International Standard;
- b) the type of product tested and its designation;