MULTI-LAYER TEXTILES:
BURNING BEHAVIOUR – TABLET TEST

0. INTRODUCTION

0.1 The test specified in this method deals only with a simple presentation of a particular aspect of the potential fire situation typified by a match equivalent flame exposure to the product. The test cannot alone provide any direct guidance on behaviour or safety in other types of accidents, like exposure to glowing cigarettes or larger sources of flames. A test of this type may, however, be used to make comparisons or to ensure the existence of a certain characteristic considered to have bearing on fire performance in general; in the present case ignitability and flame spread rate at an early stage of fire. No other significance should be attached to performance in this test.

0.2 The attention of all users of the test is drawn to the following warning:

SAFETY WARNING. IN ORDER THAT SUITABLE PRECAUTIONS MAY BE TAKEN TO SAFEGUARD HEALTH, THE ATTENTION OF ALL ENGAGED WITH FIRE TESTING IS DRAWN TO THE FACT THAT TOXIC OR HARMFUL GASES MAY BE RELEASED DURING COMBUSTION OF TEST SPECIMENS.
1. SCOPE

This method is suitable for the determination of the burning behaviour of sleeping bags, quilts, and other similar multilayer textile products. A burning methenamine tablet is used as ignition source.

2. FIELD OF APPLICATION

This method can be used to determine the early burning properties of multilayer textile products like sleeping bags and quilts. The method is not applicable to multilayer textile products used in a vertical position, such as clothing.

3. REFERENCES

ISO 3261 Fire tests - Vocabulary
ISO 6925 Textile floor coverings - Burning behaviour - Tablet test at ambient temperature.

4. DEFINITIONS

For the purposes of this NORDTEST method, the definitions given in ISO 3261 apply, together with the following:

**Flame spread rate along the surface:** The time in seconds counted from the moment the burning methenamine tablet is placed on the ignition point until the flame passes the circumference of a circle of 100 mm radius drawn with the ignition point as centre.

**Burning-through time:** The time in seconds counted from the moment the burning methenamine tablet is placed on the ignition point until a hole or char formed by burning or melting can be seen on the underside of the specimen.

5. SAMPLING

Five specimens, each 230 mm ± 3 mm square, are cut from each sample. The specimens must be representative of the whole product to be tested. If possible, the specimens should be taken in such a way that ignition can also be started along the seams and their intersections.
For sleeping bags, the outer cover is exposed in the test. For quilts and similar products the top side is exposed. Where there is doubt as to which side is the top side and the sides are different, the test should be carried out on both sides. Five additional specimens are then needed.

Five additional specimens may be needed if the product is sold as flame retarded, see 6.3. Five additional specimens may also be needed if there are great variations in the test results of the first series, see 6.6. Consequently, there should be a sufficient amount of each sample to allow at least 10 specimens to be taken.

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If the product contains loose filling material, the edges must be sewn. It is advisable to sew the seams before cutting the specimens in order to avoid loss of the filling material.

6. METHOD OF TEST

6.1 Principle

Exposure of a specimen in the horizontal plane to the action of a small ignition source (methenamine tablet) under specified conditions, and measurement of the flame spread rate along the surface and the burning-through time.

6.2 Apparatus and material

The following equipment and material are necessary for the test:

a. Flame resistant glass plate 5 mm ± 1 mm thick and about 400 mm square.

b. Support frame about 350 mm square with 250 mm legs (to be placed under the glass plate).

c. Mirror about 300 mm x 400 mm.

d. Square metal plate, 230 mm x 230 mm, 6.5 mm ± 0.5 mm thick, with a 205 mm diameter hole cut in the centre of the plate.
e. Desiccators for storing the methenamine tablets and the dry specimens. It is recommended that self-indicating silica gel is used as desiccant.

f. Circulating air oven, ventilated, forced draught and thermostatically controlled at 105 °C ± 2 °C throughout the enclosure.

g. Methenamine (hexamethylene tetramine) tablets, flat, with a mass of 150 mg ± 5 mg and diameter of 6 mm.

h. Draught-free chamber for the testing (e.g. laboratory fume cupboard, volume about 2 m³).

i. Means to draw the circular measuring lines on the specimen.

j. Timing device(s).

6.3 Preparation of test specimens

The centre of each specimen is marked, and two circles (radius 50 mm and 100 mm) are drawn from it. The smaller circle can be used to classify the burning behaviour of a product which extinguishes itself. The specimens are dried for two hours at 105 °C ± 2 °C and cooled in a desiccator.

If the product is sold as flame retarded it must also be tested after three cleaning treatments carried out according to the instructions given by the manufacturer.

6.4 Procedure

The test is carried out in an atmosphere with a temperature between 10 °C and 30 °C and a relative humidity between 20% and 65%. The glass plate is mounted on the support frame and the mirror is placed 250 mm underneath the glass plate and parallel to it or in a small angle to the horizontal plane to ensure viewing of the undermost layer of the specimen. The specimen is removed from the desiccator and placed flat on the horizontal underlay in the draught-free chamber. The metal plate is placed concentrically on the specimen.

The methenamine tablet is ignited (by gas flame or match) and immediately placed in the centre of the specimen. (To ensure that the centre points are representative of the whole product see instructions in Clause 5).
If more than 2 minutes elapse between the removal of the specimen from the desiccator and the placing of the burning methenamine tablet on the ignition point, repeat the procedure with another specimen.

Start the timing devices immediately after placing the burning methenamine tablet on the specimen. It is advisable to use two timing devices one for the surface burn and one for the burning through.

The burning-through time and the time for flames to pass the circle of 100 mm radius are recorded. If the burning ceases within the circle of 50 mm radius or between the 50 mm and 100 mm circles or before the burning through, the time to the termination of the burning is recorded and reported. If the product extinguished itself inside the 50 mm circle or between the 50 mm and 100 mm circles, this should also be noted.

Burning through is evaluated visually by viewing the underside of the specimen by means of the glass plate and the mirror. The first moment at which a hole or char formed by burning or melting can be seen is taken as the burning-through time. Exceptions must be reported.

It must be stressed that the flame spread rate along the surface does not per se tell the whole story of the fire safety of multi-layer textile products such as sleeping bags. It must be combined with some information about the burning-through time.

The fire shall be extinguished (e.g. with a wet paper) as soon as possible after recording these parameters to avoid unnecessary smoke and gases. At least five parallel tests must be carried out, see 6.6.

6.5 Expression of test results

The test results include the following measurements and observations for each specimen.

- The flame spread rate along the surface expressed as the time in seconds counted from the moment the burning methenamine tablet is placed on the specimen until the flame passes the circumference of the circle of 100 mm radius.
- The burning-through time expressed as the time in seconds counted from the moment the burning methenamine tablet is placed on the specimen until a hole or char formed by burning or melting can be seen on the underside of the specimen.

- If the flame does not spread beyond the circles or the specimen does not burn through, the time to the termination of the burning is also reported. If the product extinguishes itself (inside the 50 mm circle or between the 50 mm and 100 mm circles) this is also reported.

### 6.6 Accuracy

The structure of multi-layer textile products can be irregular, especially when loose filling material is used. This can cause great variations in the test results.

The limits to acceptable variations depend partly on the purpose of the results. If they are used for classification purposes (e.g. to classify products having a high fire risk), the limits should be defined in the classification requirements. In some cases it may be necessary to carry out a new test series on five specimens of the same sample.

### 6.7 Test report

The test report shall include the following information, where relevant:

a) Name and address of the testing laboratory
b) Identification number of the test report
c) Name and address of the client
d) Purpose of the test
e) Method of sampling and other circumstances (date and person responsible for the sampling)
f) Name and address of manufacturer or supplier of the product
g) Name or other identification marks of the product
h) Description of the product
i) Date of supply of the product
j) Date of the test
k) Test method
l) Conditioning of the specimens and the conditions during the test (temperature and relative humidity)
m) When not identified in the test method, equipment and instruments used
n) Any deviations from the test method
o) Test results (use SI units)
p) Classification of the product according to criteria expressed in official regulations
q) Date and signature.
APPENDIX A

Recommended

CLASSIFICATION REQUIREMENTS FOR MULTI-LAYER TEXTILE PRODUCTS
TESTED ACCORDING TO THE NT FIRE 019 METHOD

Class 1 (the best class)
The product extinguishes itself inside the smaller circle of 50 mm radius. No burning-through. Both clauses shall be fulfilled.

If only one of the five parallel specimens burns through, or outside the smaller circle of 50 mm, one complete retest of a similar batch is permitted. In the retest series all the specimens shall extinguish by themselves inside the smaller circle and no burning-through may occur.

Failure of the second batch to meet the criteria provides the basis for the product to be classified in class 2 Type A or Type B.

Class 2 Type A
Flame spread along the surface: Time for the flame to pass the circumference of the circle of 100 mm radius >60 s. Burning-through time >60 s.

Class 2 Type B
Flame spread rate along the surface: Time for the flame to pass the circumference of the circle of 100 mm radius >60 s. Burning-through time ≤60 s.

If the mean value of the burning-through times of five specimens is less than 30 s, and in one single specimen the flame spread rate along the surface is shorter than 60 s, then a complete retest of a similar batch is permitted. Failure of any one specimen of the second batch to meet the requirement of flame spread rate >60 s provides the basis for the product to be classified in class 3.
Class 3 (highly flammable) Flame spread along the surface: Time for the flame to pass the circumference of the circle of 100 mm radius ≤60 s. Burning-through time ≤30 s.