

Flame Retardants for Textiles

Description of test methods and their application

EN – Standards

■ EN 470 - 1; 1995

■ EN 531; 1995

■ EN 532; 1995

■ EN 533; 1997

■ EN 597 - 1; 1995

■ EN 597 - 2; 1995

■ EN 1021 - 1; 1994

■ EN 1021 - 2; 1994

■ EN 1101; 1996

■ EN 1102; 1996

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EN 470 – 1; 1995

Protective clothing for use in welding and allied processes:

Part 1: General requirements

1. Scope:

This standard specifies the testing process and performance requirements for protective clothing for use in welding and allied processes

2. Preparation of specimens:

The dimensional change, the flame spread and the resistance to small molten iron splashes shall be tested after the following pretreatments:

- * after 5 washings acc. to process ISO 6330 2A (60°C) with 1 g/l IEC detergent
- * materials, which are labelled as dry cleanable only, shall be dry cleaned five times in accordance with ISO 3175
- * If there are no care instructions, both above mentioned pretreatments shall be carried out

3. Test procedure:

see the following test specifications:

- * EN 340 Protective clothing – general requirements
- * ISO 5081 Tensile strength of textiles
- * ISO 4674 (A1) Determination of tear resistance
- * ISO 5077 Textiles – Determination of dimensional change in washing and drying
- * EN 532 Protective clothing for use against heat and flame
- * EN 348 Protective clothing – determination of behaviour of materials on impact of small splashes of molten metal

4. Apparatur:

refer to the relevant test specifications

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Protective clothing for use in welding and allied processes: Part 1: General requirements

5. Assessment:

- * Tensile strength of surface materials must be at least 300 N
- * Tear strength of the surface material must be at least 15 N
- * If the dimensional change of textile surface materials is more than 3 %, it must be noted down.
- * Flame spread: sample may burn to the top or the side edges no hole formation no flaming or molten debris average of the afterflame time max. 2 sec average of the afterglow time max. 2 sec
- * At least 15 metal splashes are necessary to raise the temperature on the surface back to 40 K

6. Notes

EN 470 – 1; 1995 is available in Langweid, but only a part of the tests can be carried out here.

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EN 531; 1995

Protective clothing for industrial workers exposed to heat
(excluding firefighters' and welders' clothing)

1. Scope:

This standard specifies the performance requirements and methods of test for the protective clothing materials and gives design recommendation for the clothing where necessary.

2. Preparation of specimens:

The testing acc. to EN 531 is started after one of the following pretreatments:

- * after five washings with soft water acc. to process ISO 6330 2A (60°C) and drying acc. to process E (tumble drying)
- * materials, which are labelled as dry cleanable only, shall be dry cleaned five times in accordance with ISO 3175
- * Or according to the details described in the care labelling

3. Test procedure:

The testing is carried out acc. to EN 532

4. Assessment:

- * Average of the afterflame time max 2 sec
- * Average of the afterglow time max 2 sec
- * No specimen must burn to the top or to the side edges
- * No hole formation
- * No flaming or molten debris

5. Notes:

- * Testing of convective heat (code-letter B), radiation heat (code-letter C), molten aluminium splash (code-letter D) and molten iron splash (codeletter E) are not possible.
- * The change in dimension acc. to EN 340 must not exceed 3 % in length and width direction (after a pretreatment of 5 cycles).

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EN 532; 1995

Protective clothing –Protection against heat and flame:
Test method of test for limited flame spread

1. Scope:

To determine the limited flame spread of materials intended for protection against heat and flame

2. Preparation of specimens:

3 specimens of 210 mm x 160 mm vertically and diagonally oriented

3. Test procedure:

- adjust the flame height to approx. 40 mm in vertical position and pre-heat it for 2 min
- adjust horizontal reach of 25 ± 2 mm
- vertical arrangement of specimen
- 10 sec area ignition (horizontal distance 17 ± 1 mm to surface of specimen)

4. Apparatus:

-Burning apparatus acc. to ISO 6941 with small holder for specimen –Testing apparatus acc. to BS 5438 can be used alternatively

5. Assessment:

- Afterflame time in sec
- Afterglow time in sec
- Flaming debris
- Molten debris
- Hole formation

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Description of test methods and their application

EN 533; 1997

Protective clothing – Protection against heat and flame:
Limited flame spread materials and material assemblies

1. Scope:

To determine the limited flame spread on materials and material assemblies, intended for protection against heat and flame

2. Preparation of specimens:

The test acc. to EN 532 is carried out after one of the following pretreatments:

- * After 12 wash cycles with the industrial wash procedure acc. EN ISO 10528 at 75°C (mark with “X”)
- * Materials which are negatively influenced by washing have to be tested acc. to the soaking process with 5 cycles of dry cleaning acc. to ISO 3175 (mark with “R”)
- * Aluminized materials (mark with “A”) and leather (mark with “L”) must be examined only in their original state
- * Washing procedure as indicated by the producer

3. Assessment:

Index 1: – The flame or the hole must not reach the top or the side edges
– No flaming debris
– No afterglowing of the burned area into the undamaged part of the specimen

Index 2: – The flame must not reach the top or the side edges
– No flaming debris
– No afterglowing of the burned area into the undamaged part of the specimen
– No hole formation

Index 3: – The flame must not reach the top or the side edges
– No flaming debris
– No afterglowing of the burned area into the undamaged part of the specimen
– No hole formation
– Average afterflame time max. 2 sec

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Description of test methods and their application

EN 597 – 1; 1994

Furniture – Assessment of the ignitability of mattresses and upholstered bed bases Part 1: Smouldering cigarette

1. Scope:

This standard lays down a test method to assess the ignitability of mattresses, upholstered bed bases and mattress pads when subjected to a smouldering ignition cigarette (air mattresses and water beds are excluded from this standard).

2. Preparation of specimens:

small scale test: 1 sample 450 mm x 350 mm x nominal thickness of the finished mattress

3. Test procedure:

- * Setting of the test equipment For a small scale test, place the test specimen on the test rig. For a full size test, bed bases are tested on a horizontal surface (mattresses and mattress pads are tested on a specific test rig)
- * Setting of the ignition source Light up the cigarette and draw on it till the peak is glowing, 5 – 8 mm must burn down. Then the cigarette is placed on the mattress (at least 50 mm distance from the edge or other burnings). Where the test specimen has a piped or tape – edged finish, or is quilted or tufted, position additional cigarettes on the tape edge, in the groove of the quilt – line and on the tufts.

4. Apparatus:

- * Testing equipment for the mattress test

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Description of test methods and their application

EN 597 – 1; 1994

Furniture – Assessment of the ignitability of mattresses and upholstered bed bases
–Part 1: Smouldering cigarette

* Cigarette with the following measurements:

length: 70 ± 4 mm
diameter: 8 ± 0.5 mm
weight: 1 ± 0.1 g
burning time: 12 ± 3 min/50 mm

5. Assessment:

If an ignition by increased smouldering and burning of the filling material or cover can be viewed one hour after placing the cigarette, the material does not correspond to the norm. In this case, the test is carried out at an other part of the upholstery. If there is no ignition after two cigarettes, the material meets the norm requirements.

6. Notes:

The test specimen shall be representative of the components and make – up of the finished mattress, mattress pad or upholstered bed base. If we do not receive any information from the customer concerning the filling material, we use here in Langweid combustible PUR – foam.

Flame Retardants for Textiles

Description of test methods and their application

EN 597 – 2; 1994

Furniture – Assessment of the ignitability of mattresses and upholstered bed bases
–Part 2: match flame equivalent

1. Scope:

This standard lays down a test method to assess the ignitability of mattresses, upholstered bed bases and mattress pads when subjected to a gas flame equivalent to a match flame (air mattresses and water beds are excluded from this standard).

2. Preparation of specimens:

small scale test: 1 sample 450 mm x 350 mm x nominal thickness of the finished mattresses

3. Test procedure:

- * Setting of the test equipment For a small scale test, place the test specimen on the test rig. For a full size test, bed bases are tested on a horizontal surface (mattresses and mattress pads are tested on a specific test rig)
- * Setting of the ignition source Light up the match burner, fix it to a flame height of approx. 35 mm and let it stabilize for 2 min. Place the burning tube horizontally onto the mattress or mattress pads (at least 100mm distance from the edge or other burnings). Where the test specimen has a piped or tape – edged finish, or is quilted or tufted, position the burner on the tape edge, in the groove of the quilt – line and on the tufts. The combination has to be ignited for 15 ± 1 sec; after that, the flaming has to be stopped by carefully removing the burning tube from the combination.

4. Apparatus:

- * Testing equipment or mattress test
- * Match burner acc. to EN 597–2 (BS 5852)

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Description of test methods and their application

EN 597 – 2; 1994

Furniture - Assessment of the ignitability of mattresses and upholstered bed bases - Part 2: match flame equivalent

5. Assessment:

The burning process must be examined and every sign of increased smouldering or burning of the upholstery and/or cover must be noted. Flames, afterglow, smoke or smouldering, stopping 120 s after removing the burning tube, can be ignored. If the burning lasts longer than 120 s, the material does not correspond to the norm. In this case, the test must be repeated. If then there is none of the above mentioned appearances, the material meets the norm requirements.

6. Notes:

The test specimen shall be representative of the components and make – up of the finished mattress, mattress pad or upholstered bed base. If we do not receive any information from the customer concerning the filling material, we use here in Langweid combustible PUR – foam.

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Description of test methods and their application

EN 1021 – 1; 1994

Furniture – Assessment of the ignitability of upholstered furniture:
Part 1: Ignition source: smouldering cigarette

1. Scope:

Testing process to determine the ease of ignition of combinations of industrial textiles such as covers and filling material for upholstered furniture exposed to a glowing cigarette

2. Preparation of specimens:

- * 1 Specimen of 800 ± 10 mm x 650 ± 10 mm (in warp direction)
- * The specimen must be soaked before testing: The fabric to be tested is layed down into water with a liquor ratio of 20:1 in a sufficiently large and flat container (starting temperature $40^{\circ}\text{C} \pm 1^{\circ}\text{C}$), to which 0.5 g/l of a non-ionic wetting agent is added. The specimen must be completely under water. After 30 min, the specimen is taken out and rinsed with water in a liquor ratio of 20:1 for 2 min and afterwards dried with a method suitable for the fabric. If the specimen has been folded before immersion, it must be unfolded before rinsing.

3. Test procedure:

- * Setting of the testing equipment Pull the specimen behind the hinge pole and arrange the filling material under the covering and make up a sofa (seat + back) out of these pieces
- * Setting of the ignition source Light up the cigarette and draw on it till the peak is glowing, 5 – 8 mm must burn down. Then the cigarette is placed along the joint between seat and back (at least 50 mm distance from the edge or other burnings)

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Description of test methods and their application

EN 1021 – 1; 1994

Furniture – Assessment of the ignitability of upholstered furniture:
Part 1: Ignition source: smouldering cigarette

4. Apparatus:

- * Testing apparatus according to DIN EN 1021 (BS 5852)
- * Cigarette with the following measurements: length: 70 ± 4 mm diameter: 8 ± 0.5 mm weight: 1 ± 0.1 g burning time: 12 ± 3 min/50 mm

5. Assessment:

If an ignition by increased smouldering and burning of the filling material or cover can be viewed one hour after placing the cigarette, the material does not correspond to the norm. In this case, the test is carried out at another part of the upholstery. If there is no ignition after two cigarettes, the material meets the norm requirements.

6. Notes:

The test specimen shall be representative of the components and make – up of the finished mattress, mattress pad or upholstered bed base. If we do not receive any information from the customer concerning the filling material, we use here in Langweid combustible PUR – foam.

Flame Retardants for Textiles

Description of test methods and their application

EN 1021 – 2; 1994

Furniture – Assessment of the ignitability of upholstered furniture:
Part 2: Ignition source: match flame equivalent

1. Scope:

Testing process to determine the ease of ignition of combinations of industrial textiles such as covers and filling material for upholstered furniture exposed to a little flame.

2. Preparation of specimens:

- * 1 specimen of $800 \pm 10\text{mm} \times 650 \pm 10\text{ mm}$ (in warp direction)
- * The specimen must be soaked before testing: The fabric to be tested is layed down into water with a liquor ratio of 20:1 in a sufficiently large and flat container (starting temperature $40^{\circ}\text{C} \pm 1^{\circ}\text{C}$), to which 0.5 g/l of a non-ionic wetting agent is added. The specimen must be completely under water. After 30 min, the specimen is taken out and rinsed with water in a liquor ratio of 20:1 for 2 min and afterwards dried with a method suitable for the fabric. If the specimen has been folded before immersion, it must be unfolded before rinsing.

3. Test procedure:

- * Setting of the testing equipment Pull the specimen behind the hinge pole and arrange the filling material under the covering and make up a sofa (seat + back) out of these pieces
- * Setting of the ignition source Light up the match burner, fix it to a flame height of approx. 35 mm and let it stabilize for 2 min. Place the burning tube along the joint between seat and back (at least 50 mm distance from the edge or other burnings). The combination has to be ignited for $15 \pm 1\text{ sec}$; after that, the flaming has to be stopped by carefully removing the burning tube from the combination

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Description of test methods and their application

EN 1021 – 2; 1994

Furniture – Assessment of the ignitability of upholstered furniture:
Part 2: Ignition source: match flame equivalent

4. Apparatus:

- * Testing apparatus according to DIN EN 1021 (BS 5852)
- * Match burner according to DIN EN 1021 (BS 5852)

5. Assessment:

The burning process must be examined and every sign of increased smouldering or burning of the upholstery and/or cover must be noted. Flames, afterglow, smoke or smouldering, stopping after 120 s after removing the burning tube, can be ignored. If the burning lasts longer than 120 s, the material does not correspond to the norm. In this case, the test must be repeated. If then there is none of the above mentioned appearances, the material meets the norm requirements.

6. Notes:

The test specimen shall be representative of the components and make – up of the finished mattress, mattress pad or upholstered bed base. If we do not receive any information from the customer concerning the filling material, we use here in Langweid combustible PUR – foam.

Flame Retardants for Textiles

Description of test methods and their application

EN 1101; 1996

Burning behaviour of curtains and drapes: Detailed procedure to determine the ignitability of vertically oriented specimens

1. Scope:

Determination of the ignitability of textiles for curtains and drapes by testing acc. to DIN EN ISO 6940

2. Preparation of specimens:

- * A sufficient amount of samples have to be prepared, so that at least 5 times “ignition” and 5 times “no ignition” can be observed. If both surfaces of a sample act differently in a preliminary examination, it is necessary for the surface ignition that the front and back side of the fabric are examined
- * specimens must be cleaned acc. to care label. If there are no other instructions, the specimens must be cleaned in one of the following ways:
 - Wash procedure acc. to EN 26330, process 6A (40°C ± 3°C)
 - Dry cleaning procedure acc. to EN ISO 3175
 - If the material is not suitable for cleaning, the test must be carried out with the original fabric.

3. Test procedure:

The testing is carried out acc. to ISO 6940

4. Apparatus:

- Testing equipment acc. to ISO 6940

5. Assessment:

- *Each case of ignition and no ignition with corresponding ignition time
- *Average ignition time for each direction and side of the specimen
- *Note, if the specimen could not be ignited after 20 sec.

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Description of test methods and their application

EN 1102; 1996

Burning behaviour of curtains and drapes: Detailed procedure to determine the flame spread of vertically oriented specimens

1. Scope:

Determination of flame spread properties of textiles for curtains and drapes by testing acc. to DIN EN ISO 6941

2. Preparation of specimens:

- * 3 specimens of 560 mm x 170 mm each, vertically and diagonally oriented (if necessary also 3 specimen, each vertically and diagonally oriented, for edge ignition)
- * specimens must be cleaned acc. to care label. If there are no other instructions, the specimens must be cleaned in one of the following ways:

- Wash procedure acc. to EN 26330, process 6A (40°C ± 3°C)
- Dry cleaning procedure acc. to EN ISO 3175
- If the material is not suitable for cleaning, the test must be carried out with the original fabric.

3. Test procedure:

Determination of the flame spread properties acc. to DIN EN ISO 6941

- * ignition time 10 sec (if there was no ignition by using the surface ignition, the edge ignition has to be carried out)
- * only the first and third marking thread may be used
- * the times between beginning of ignition and burning through of the marking thread must be noted
- * burning side effects must be noted

4. Apparatus:

Testing apparatus acc. to ISO 6941

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Description of test methods and their application

EN 1102; 1996

Burning behaviour of curtains and drapes: Detailed procedure to determine the flame spread of vertically oriented specimens

5. Assessment:

The flame spread rate of each sample must be calculated and indicated in [mm/s]

$$V = \frac{300 \text{ mm (distance between 1st and 3rd marking thread)}}{\text{time from 1st to 3rd marking thread}}$$