
Hidroizolacijski trakovi - Določanje odpornosti mehansko pritrjenih hidroizolacijskih trakov za tesnjenje streh proti obremenitvi z vetrom

Flexible sheets for waterproofing - Determination of the resistance to wind load of mechanically fastened flexible sheets for roof waterproofing

Abdichtungsbahnen - Bestimmung des Widerstandes gegen Windlast von mechanisch befestigten Dachabdichtungsbahnen

Feuilles souples d'étanchéité - Feuilles bitumineuses, en plastique et en caoutchouc destinées à assurer l'étanchéité des toitures - Détermination de la résistance à l'arrachement au vent

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EUROPEAN STANDARD
NORME EUROPÉENNE
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English Version

**Flexible sheets for waterproofing - Determination of the
resistance to wind load of mechanically fastened flexible sheets
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l'arrachement au vent

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gegen Windlast von mechanisch befestigten
Dachabdichtungsbahnen

This European Standard was approved by CEN on 23 April 2010.

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Foreword

This document (EN 16002:2010) has been prepared by Technical Committee CEN/TC 254 “Flexible sheets for waterproofing”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2010, and conflicting national standards shall be withdrawn at the latest by November 2010.

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

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Introduction

The test is performed on a standard test configuration, i.e. a load-bearing structure, a layer of insulation material and the mechanically fastened membrane(s).

For the determination of the performance of the mechanical fastening system (fastener and washer), with or without possible substrates, ETAG 006:2000, Annex D may be used. The suppliers of these mechanical fastening systems should provide the required information.

For the calculation of the performance of wind load resistance of the whole roof, see the relevant national and/or international standards.

The result of this standard is the resistance to wind load of the flexible sheet expressed as the characteristic load per fastener. Safety factors may be defined by national regulation and/or within European or national application documents.

In principle, the test apparatus may also be used to assess (partially) bonded flexible sheets, but some modifications and additional guidance are needed. This is the reason to limit the scope of this standard to mechanically fastened sheets only.

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1 Scope

This European Standard specifies a test method to determine the resistance to wind load of mechanically fastened flexible sheets for roof waterproofing.

The assessment is limited to the performance of the mechanically fastened flexible sheets only. The test method does not include the determination of the performance of the mechanical fastener and/or the combination of the mechanical fastener and the substrate.

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.

EN 10346:2009, *Continuously hot-dip coated steel flat products — Technical delivery conditions*

EN 13162, *Thermal insulation products for buildings — Factory made mineral wool (MW) products — Specification*

EN 13416, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Rules for sampling*

EN 13707:2004+A2:2009, *Flexible sheets for waterproofing — Reinforced bitumen sheets for roof waterproofing — Definitions and characteristics*

EN 13956:2005, *Flexible sheet for waterproofing — Plastic and rubber sheets for roof waterproofing — Definitions and characteristics*

ETAG 006:2000, *Guideline for European Technical Approval systems of systems mechanically fastened flexible roof waterproofing membranes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13707:2004+A2:2009 and EN 13956:2005 and the following apply.

3.1

fastener

object to fasten the flexible sheet to a structural deck

NOTE A fastener may be made of a washer, a metal sleeve and a screw or of a plastic washer with an integrated sleeve and a metal shank.

3.2

fastening system

assembly of components intended to secure a waterproofing system to the structural deck by means of point fasteners or linear fasteners

NOTE Whilst primarily intended to secure the covering against wind uplift forces, the system may contribute to securing intermediate layers such as thermal insulation, vapour control layers, etc.

3.3

jointing technique

sealing of at least two layers of flexible sheets for roof waterproofing

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NOTE This may be done by e.g. bond (torch, adhesive) or welding (hot air, chemicals).

3.4**linear fastener**

continuous strip or lath perforated by point fasteners intended to secure the flexible sheets for roof waterproofing in the general area of the roof and/or at its perimeter

NOTE The strip or lath is commonly made of metal.

3.5**point fastener**

shaft, in form of a screw, nail or expanding anchor, together with a disc-shaped washer or collar

NOTE Forces may be transmitted to the fastener by the clamping action of the washer or by bond between a plastic surface on the washer and a plastic roof covering, or by other means.

3.6**test specimen**

representative part of the roof, consisting of one or more layers of flexible sheet for roof waterproofing, an insulation layer and a structural deck

3.7**structural deck**

roofing panel which has to transfer both permanent and variable loads to the other construction parts of the roof or building

3.8**vapour control layer**

sheet used to limit the transportation of water vapour into any part of the roof

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4 Symbols and abbreviations

For the purposes of this document, the following symbols apply.

		Unit
A_i	area of influence of the fastener	mm ²
a	maximum spacing between rows of fasteners	mm
b	maximum spacing between individual fasteners in a row	mm
C_a	geometric correction factor	-
C_d	statistical correction factor	-
g	number of gusts, specified for each "proportional" peak load in a cycle	-
i	proportional part of $P_{100\%;n}$	%
l	length of the test area inside the pressure chamber	mm
m	width of the test area inside the pressure chamber	mm
n_f	number of cycles before failure	-
P_a	applied pressure during the gust	kPa
P_i	peak pressure during the gust	kPa
P_{test}	peak pressure of the cycle preceding the cycle of failure	kPa
$P_{100\%;n}$	peak pressure in the pressure chamber during cycle (n)	kPa

t	time	s
ΔW_a	applied load per fastener	N
ΔW_{char}	characteristic load for the resistance to wind uplift per mechanical fastener	N
ΔW_i	peak load per fastener	N
$\Delta W_{100\%;n}$	peak load per fastener of cycle (n) with $n = 1, 2, 3, \dots, n_f$	N
α	number of spaces between rows of fasteners	-
β	number of spaces between fasteners	-

5 Sampling

The flexible sheets for roof waterproofing shall be sampled according to EN 13416.

All additional materials to construct the test specimen such as fasteners, insulation, substrate, vapour control layers, shall be according to the sampling requirements of the relevant European harmonised technical specifications. If these specifications are not available, then sampling shall be done according to the instructions of the applicant.

6 Test conditions

The test specimen and the apparatus shall be conditioned for at least 16 h in an environment of $(23 \pm 5) ^\circ\text{C}$ prior to the test and used under the same conditions.

7 Apparatus and additional devices

7.1 Pressure (vacuum) chamber

The internal length and width of the pressure chamber shall be according to 8.2. The height of the pressure chamber shall be such that the applied pressure is equally distributed and not affected by deformations of the test specimen. The pressure chamber shall be provided with one or more windows in such a way that the test specimen can be observed during testing.

The pressure chamber shall be capable of resisting a suction pressure of 10 kPa. It shall be possible to create an airtight seal between the test specimen and the pressure chamber.

7.2 Fan including control and recording system

7.2.1 Fan and controlling equipment

The combination of the fan and the controlling equipment (e.g. valve) shall be capable of producing the dynamic load cycles, as defined in 9.4.

7.2.2 Pressure measurement device

The pressure measurement device shall have a measurement tolerance less than or equal to $\pm 1 \%$ in combination with the registration apparatus used.

NOTE The best attainable accuracy of measurement is 0,02 kPa, being the accuracy of measurement of the pressure gauge.