

ICS 91.100.50

English Version

Design guideline for mechanically fastened roof waterproofing systems

Règles de conception des systèmes d'étanchéité de
toiture fixés mécaniquement

Richtlinie für die Konstruktion von mechanisch
befestigten Dachabdichtungssystemen

This Technical Specification (CEN/TS) was approved by CEN on 16 August 2021 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword.....	3
1 Scope.....	4
2 Normative references.....	4
3 Terms and definitions	4
4 Symbols and abbreviations	6
5 Introduction to design concept.....	7
5.1 Introduction.....	7
5.2 Actions on structures - Eurocode 1.....	7
5.3 Wind load resistance of the roof.....	7
5.4 Safety factors.....	7
6 Wind load - Design value of the wind pressure.....	8
6.1 Wind pressure (w_{tot})	8
6.2 Wind load, $Q_{wind;d}$	8
7 Admissible (design) load resistance of the waterproofing system.....	9
7.1 General.....	9
7.2 Method 1 - Full scale dynamic wind load system test.....	9
7.3 Method 2 - Using data from fastener manufacturer's ETA - Weakest link in the system concept.....	10
7.4 Method 3 - On site field pull-out testing of the fastener - weakest link in the system concept.....	11
8 Fastener density and positioning of the fasteners.....	12
8.1 Fastener density	12
8.2 Positioning of the fasteners.....	12
9 Material partial (safety) factors, γ_M	14
9.1 Material partial factor - dynamic full-scale testing.....	14
9.2 Material partial factor - pull-out value and field pull-out test.....	14
9.3 Material partial factor - Pull-over value.....	15
10 Interpolation and application rules	15
10.1 General.....	15
10.2 Flexible sheets.....	16
11 Field pull-out test.....	16
11.1 General.....	16
11.2 Test equipment.....	16
11.3 Test method	17
11.4 Test procedure	18
11.5 Calculation of the characteristic load per fastener.....	18
Bibliography.....	20

European foreword

This document (CEN/TS 17659:2021) has been prepared by Technical Committee CEN/TC 254 “Flexible sheets for waterproofing”, the secretariat of which is held by NEN.

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

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document gives guidance for the design of a roof waterproofing system mechanically fastened to the structural deck in relation to wind load resistance.

This document is intended to be used together with EN 16002 and the relevant clauses of EAD-030351-00-0402-2019.

This guideline does not include the separate fastening requirements of the insulation boards, the securement to upstands, perimeter fastening, flashings or other roof details.

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 1990:2002,¹ *Eurocode — Basis of structural design*

EN 1991-1-4, *Eurocode 1: Actions on structures — Part 1-4: General actions — Wind actions*

EN 16002:2018, *Flexible sheets for waterproofing — Determination of the resistance to wind load of mechanically fastened flexible sheets for roof waterproofing*

EAD-030351-00-0402-2019, *Systems of mechanically fastened flexible roof waterproofing sheets*

EN 13707, *Flexible sheets for waterproofing — Reinforced bitumen sheets for roof waterproofing — Definitions and characteristics*

EN 13956:2012, *Flexible sheets for waterproofing — Plastic and rubber sheets for roof waterproofing — Definitions and characteristics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13707 and EN 13956 and the following apply.

3.1

fastener

object to fasten the fixing element to a structural deck

Note 1 to entry: Fastener can be e.g. a screw, nail, expanding anchor or rivet.

3.2

fastening system

assembly of the fastener and the fixing element intended to secure the waterproofing system to the structural deck

Note 1 to entry: Fastening system can be e.g. a fastener with a:

- metal washer with or without a plastic sleeve,
- plastic washer with or without an integrated sleeve, or
- metal bar/continuous strips with or without a plastic sleeve.

¹ As impacted by EN 1990:2002/A1:2005 and EN 1990:2002/A1:2005/AC:2010.