BS EN 16508:2015

BSI Standards Publication

Temporary works equipment — Encapsulation constructions — Performance requirements and general design

National foreword

This British Standard is the UK implementation of EN 16508:2015.

The UK participation in its preparation was entrusted to Technical Committee B/514, Access and support equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2015

ISBN 978 0 580 80767 1

ICS 91.120.01; 91.200

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2015.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16508

December 2015

ICS 91.120.01; 91.200

English Version

Temporary works equipment - Encapsulation constructions - Performance requirements and general design

Équipements temporaires de chantiers - Systèmes de protection d'ouvrage - Exigences de performance et conception générale

Temporäre Konstruktionen für Bauwerke - Einhausungskonstruktionen - Leistungsanforderungen, Entwurf, Konstruktion und Bemessung

This European Standard was approved by CEN on 26 September 2015.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 16508:2015 E

Contents

Page

European foreword

This document (EN 16508:2015) has been prepared by Technical Committee CEN/TC 53 "Temporary works equipment", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by June 2016, and conflicting national standards shall be withdrawn at the latest by June 2016.

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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The purpose of a temporary roof and encapsulation construction according to this standard is to protect the area inside from climatic influences and dust. It is also used to protect the public from effects from inside.

This European Standard includes rules for structural design, which are of particular relevance to encapsulations.

Individual countries may have national laws or regulations which are not in line with this European standard. Information on that can be found in the attached A-deviations.

1 Scope

This European Standard specifies performance requirements and design methods for temporary roofs and encapsulations.

It is possible to form the constructions in several ways:

— temporary roof which is supported by an existing permanent construction (Figure 1);

— temporary roof which is supported by a scaffold (Figure 2 and 3);

— temporary roof which is supported by another temporary construction (e.g. steel frame);

— temporary wall which is supported by a separate construction (Figure 4);

— encapsulation which is a complete temporary construction including roof, walls and corresponding temporary supports (Figure 5).

This European Standard sets out general requirements. These are substantially independent of the materials of which the construction is made. This standard is intended to be used as the basis for enquiry and design.

2 Normative references

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

EN 1990 (all parts), *Eurocode: Basis of structural design*

EN 1991 (all parts), *Eurocode 1: Actions on structures*

EN 1993 (all parts), *Eurocode 3: Design of steel structures*

EN 1995 (all parts), *Eurocode 5: Design of timber structures*

EN 1999 (all parts), *Eurocode 9: Design of aluminium structures*

EN 12811-1:2003, *Temporary works equipment — Part 1: Scaffolds — Performance requirements and general design*

EN 12811-2, *Temporary works equipment — Part 2: Information on materials*

EN 12812:2008, *Falsework — Performance requirements and general design*

3 Terms and definitions

For the purposes of this document the terms of EN 12811-1 and EN 12812 and the following apply.

3.1
temporary roof
construction intended to cover work activities

3.2
temporary encapsulation
construction intended to encapsulate work activity areas, consisting of a combination of following elements: roof, walls and supports

Note 1 to entry: For different types, see Figures 1 to 5.

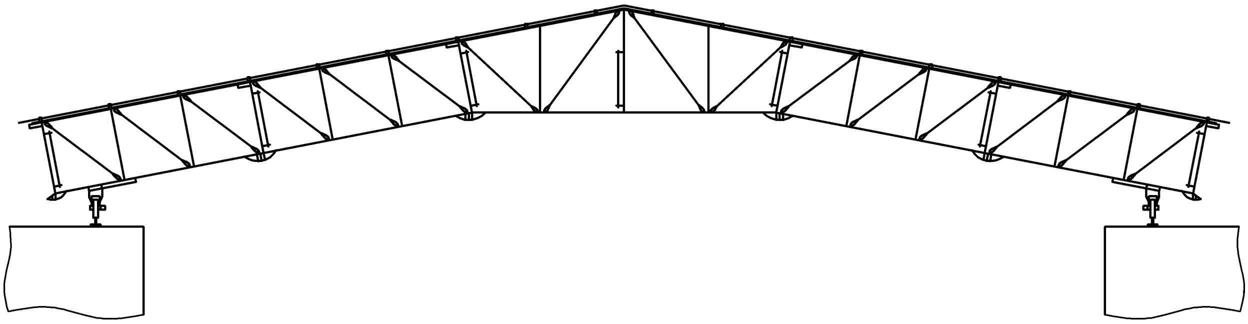


Figure 1 — Example of a temporary roof which is supported by an existing permanent construction

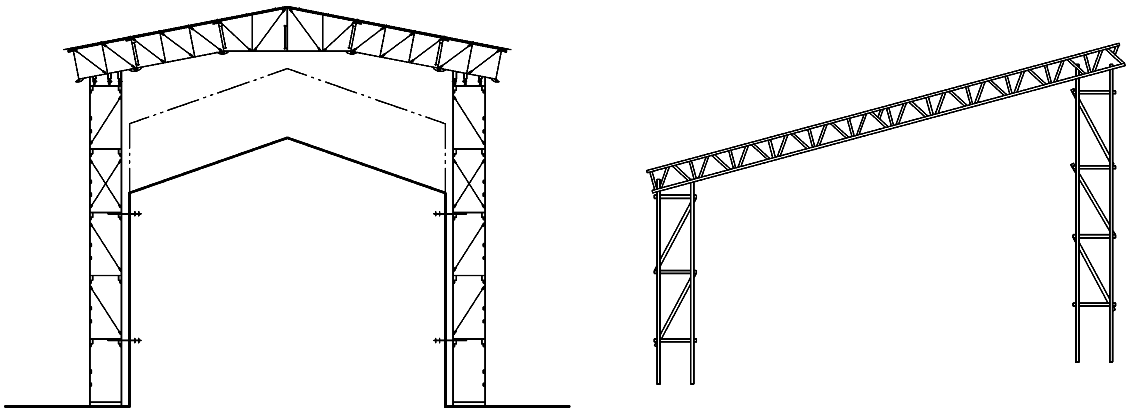


Figure 2 — Examples of temporary roofs supported by scaffolding elements

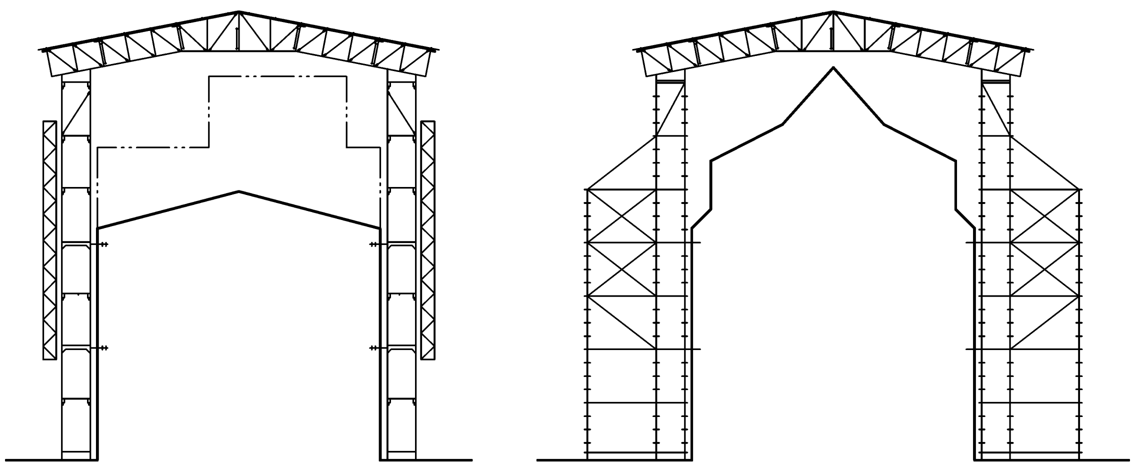
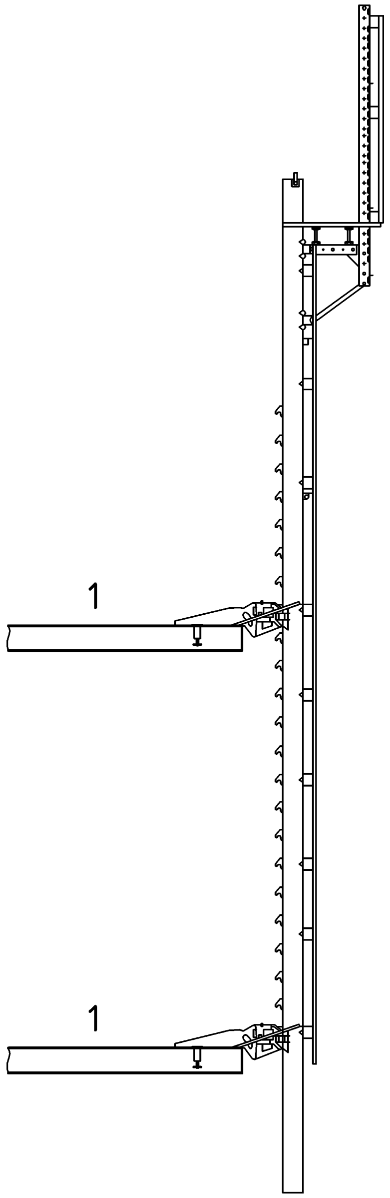


Figure 3 — Examples of temporary roofs supported by working scaffold



Key

1 existing support

Figure 4 — Example of a temporary wall supported by a separate construction

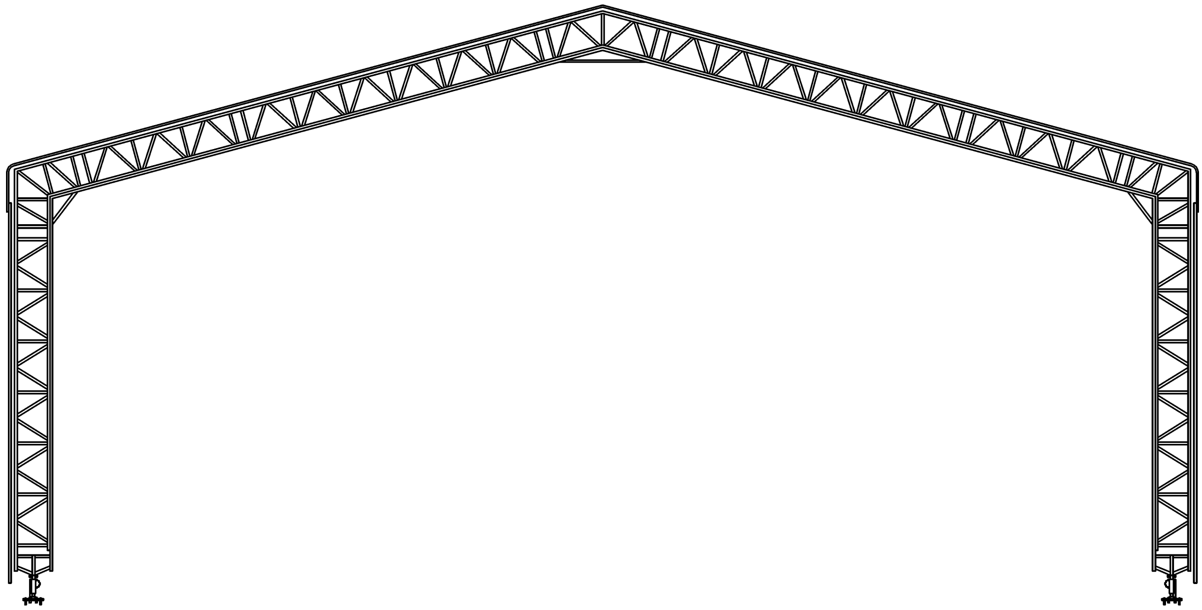


Figure 5 — Example of an encapsulation consisting of a complete temporary construction including roof, walls and supports

3.3
kentledge
material attached to or placed on a structure to provide stability by the action of its dead weight

3.4
support
structure which is to withstand the imposed effects from the construction

3.5
sheeting/cladding
flexible or stiff component, normally intended to provide protection from climatic influences and/or dust protection

4 Materials

Materials shall fulfil the requirements given in European Standards, where design data are provided. If European Standards do not exist, ISO Standards may be applied.

This European standard is not intended to prevent the use of existing components made of materials in accordance with standards that were valid at the time of their introduction.

Materials shall be sufficiently robust and durable to withstand normal working conditions.

Materials shall be free from any impurities and defects, which may affect their satisfactory use.

Additional requirements for some materials are given in EN 12811-2.

This European standard does not intend to prevent the use of non-standardized materials. When materials are used, whose properties in relation to the intended application (e.g. temperature, ageing, UV-degradation) are not given in any available standard, an adequate assessment according to relevant national regulations is required.

If walking on the sheeting is permitted by the supplier of the encapsulation, then it shall be able to withstand the appropriate actions.

NOTE Material requirements for some sheeting are given in EN 13782.

5 General requirements

5.1 General

The components shall be designed so they can be safely erected, used, maintained and dismantled. Attention shall be paid to ergonomic considerations.

5.2 Access

Safe and ergonomic means of access to all areas within the encapsulation and to the temporary roof shall be provided when appropriate. The access should preferably be by means of stairways. Access shall be according to the requirements of EN 12811-1.

NOTE Access to the temporary roof could be required for repair, opening or snow clearance.

5.3 Openings

If necessary, for the purpose of lifting in equipment or materials, it should be possible to remove parts of the structure temporarily. These parts shall be secured when removed.

5.4 Moveable structures

Moveable structures shall be secured against uplift at all times. If such securing is not possible, a maximum wind speed for loosening and moving shall be stated.

6 Classification of snow/minimum load classes

Encapsulations are classified in snow load classes according to Table 1. Exceptions to the snow load classes may be decided by national regulations.

Table 1 — Snow load classes

Snow load class	**Guidance**	**Load** kN/m²
SL 1	No snow load (Minimum load)	0,1
SL 2a	Based upon snow clearance management [a]	0,25
SL 2b	Based upon snow clearance management [a]	0,6
SL 3	Site specific snow load	in accordance with EN 1991–1-3
NOTE See also national annexes.		
[a] Snow clearance management may be achieved by physical removal, heating, etc.		

7 Structural design

7.1 General

Each encapsulation, including all its parts, shall be designed, constructed and maintained to ensure that it does not collapse or move unintentionally and so that it can be used safely. This applies at all stages, including erection, modification and until fully dismantled.

The designer shall have access to all relevant design data from the supplier of prefabricated equipment.

The forces determined for the loading capacity and stability proof for temporary roofs and encapsulations shall be taken into consideration in regard to the external supporting structure.

7.2 Support

An encapsulation shall have support capable of resisting the design loads and limiting movement.

7.3 Method of design

The structure shall be designed in accordance with recognized engineering principles. The design shall take into account the variability of materials, workmanship, site conditions and construction tolerances.

The structure shall be designed with regard to ease and safety of erection and dismantling. The designers shall provide guidance on the implementation of their design.

If not specified otherwise, the design should be carried out following the ultimate limit state (ULS), including load bearing capacity, stability against sliding laterally, overturning and uplift.

Design shall be carried out in accordance with the European Standards for structural engineering, including their respective national Annexes. The current standards include:

For design:	EN 1990
For actions:	EN 1991
For steel:	EN 1993
For timber:	EN 1995
For aluminium:	EN 1999

If there are conflicts between provisions in this standard and other standards, e.g. ENs, then the provisions in this standard shall have precedence.

The encapsulation shall be designed by taking the effects of the complete structure into account.

The design of a scaffold as support of a temporary roof shall be carried out in accordance with EN 12811-1 considering the safety factors defined in 7.6 with taking into account the additional effects from the temporary roof, see Figure 3.

7.4 Actions

7.4.1 General

Typical actions on encapsulations are described in the following sub-clauses. The values Q_1 to Q_8 are characteristic values of actions.

Where appropriate for a specific project, account shall be taken of other loading conditions with load combination according to EN 1990.

NOTE Loads from specific projects may come from lifting equipment, lighting etc.

7.4.2 Permanent actions, Q_1

The permanent action "self-weight" shall be taken into account.

Self-weight includes:

— the encapsulation structure;

— kentledge;

— other dead loads (e.g. suspended working platforms, lifting beams, lighting etc.).

7.4.3 Variable imposed actions, $Q_2 - Q_4$

7.4.3.1 General

The designer shall consider which combinations of the variable loads are favourable or unfavourable for the structure.

7.4.3.2 Access and service load, Q_2

All access and service loadings on scaffolding elements shall be taken from EN 12811-1.

7.4.3.3 Other imposed loads, Q_3

Other imposed loads include effects of lifting operations etc.

7.4.3.4 Service load on the roof, Q_4

Two concentrated loads of 1,0 kN, each at a distance of 2,0 m from each other, in the most unfavourable position, shall be taken into account for each individual component. Each load area shall be 200 mm × 200 mm.

Q_4 shall not be applied in combination with other loads, however self-load of the component shall be taken into consideration. This load may be neglected if it is forbidden for any persons to be on the temporary roof in the method statement.

7.4.4 Climatic loads

7.4.4.1 General

Snow load shape coefficient for Q_5 shall be taken from EN 1991-1-3.

Wind pressure coefficients c_{pe} and c_{pi} shall be taken from EN 1991-1-4.

NOTE An alternative method to calculate c_{pe} is given in Annex A.

7.4.4.2 Vertical climatic loads

7.4.4.2.1 General

If there is no risk of snow for the period that the temporary construction is to be provided, then snow loads may be ignored. In this case the minimum load Q_7 shall be taken into account.

7.4.4.2.2 Site specific snow load, Q_5

The site specific snow load (SL 3) is the load according to EN 1991-1-3.

7.4.4.2.3 Reduced snow load, Q_6

The snow loading may only be reduced to class SL 2 if a practical snow management method has been agreed by contractor and client.

7.4.4.2.4 Minimum load, Q_7

A minimum vertical loading of 0,1 kN/m^2 shall be applied (Class SL 1). If the construction is indoors, this may be ignored.

NOTE The minimum load is to consider climatic effects other than snow (rain and hail).

7.4.4.3 Wind load

7.4.4.3.1 Maximum wind load, Q_8

Data shall be obtained from EN 1991-1-4, which gives the basic wind velocity for a 50-year return period. The basic wind velocity may be modified according to EN 1991-1-4, taking into consideration for example the working life of the encapsulation and season factors.

7.4.4.3.2 Working wind load, Q_9

For the working wind, a velocity pressure of 0,20 kN/m^2 shall be used.

NOTE The working wind is to account for situations in normal service, e.g. partially open structure to transfer equipment or materials.

7.5 Load combinations

The following load combinations shall be taken into account (see Table 2).

NOTE If different conditions occur at site, it may be necessary to modify these combinations or take account of others.

Table 2 — Load combinations to be verified depending on the snow load class

Snow load class	LC 1	LC 2	LC 3	LC 4	LC 5	LC 6	LC 7	LC 8
SL 1	X	X	X					
SL 2	X			X	X			
SL 3	X					X	X	X

Table 3 — Load combination factors, ψ_i

	LC 1	LC 2	LC 3[a]	LC 4	LC 5[a]	LC 6	LC 7[a]	LC 8
	Max. upward load	**Max. downward load and working wind combined**	**Wind and min. load combined**	**Max. downward load and working wind combined**	**Wind and snow combined**	**Max. downward load & Working wind combined**	**Wind and snow combined**	**Wind and snow combined**
Q_1 Permanent actions	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Q_2 Access and service loads	–	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Q_3 Other imposed loads	–	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Q_5 Site specific snow load	–	–	–	–	–	1,0	0,5	1,0
Q_6 Reduced snow load	–	–	–	1,0	1,0	–	–	–
Q_7 Min. load	–	1,0	1,0	–	–	–	–	–
Q_8 Max. wind load	1,0	–	1,0	–	1,0	–	1,0	0,5
Q_9 Working wind load	–	1,0	–	1,0	–	1,0	–	–

[a] For these load combination cases, access and service loads Q_2 shall be reduced according to EN 12811–1:2003, 6.2.9.2

7.6 Extent of static calculation

7.6.1 Ultimate limit state

It shall be verified that:

$$E_d \leq R_d \quad (1)$$

where

E_d is the design value of an internal force or moment;

R_d is the corresponding design value of resistance.

The value of E_d shall be established from the design values of the actions Q_d, taking the second order effects into account where appropriate.

Based on the characteristic value of the action $Q_{k,i}$, the design value of the action Q_d shall be calculated using Formula (2):

$$Q_{d,i} = \gamma_{F,i} \times \psi_i \times Q_{k,i} \quad (2)$$

where

$Q_{d,i}$ is the design value of the action *i*;

$\gamma_{F,i}$ is the partial load factor, to be taken according to Table 4;

ψ_i load combination factor for action *i* (See Table 3);

$Q_{k,i}$ is the characteristic value of the action *i*.

Table 4 — Partial load factors $\gamma_{F,i}$ for static calculation

Action	Unfavourable	Favourable
Q_1	1,35	1,0
All other actions	1,5	0

The design value of the resistance $R_{d,i}$ shall be calculated using Formula (3) as appropriate:

$$R_{d,i} = \frac{R_{k,i}}{\gamma_{M,i}} \qquad (3)$$

where

$R_{k,i}$ is the characteristic value of the resistance for material *i*;

$\gamma_{M,i}$ are the partial factors for material *i*:

γ_M = 1,1 for ductile metallic materials;

γ_M = 1,25 for brittle metallic materials;

γ_M = 1,3 for timber.

7.6.2 Static equilibrium

7.6.2.1 General

The structure shall be stable under the load combinations specified in 7.5 in respect of global sliding, overturning and uplift. For the purposes of determining whether a structure is stable, it may be considered as a rigid body. Each action shall be considered individually to determine whether it is stabilizing or destabilizing. Values for the partial factor, $\gamma_{F,i}$, are given in Table 5.

Table 5 — Partial load factors $\gamma_{F,i}$ for static equilibrium

Action	Stabilizing	Destabilizing
Q_1	1,0	1,0
All other actions	0	1,5

7.6.2.2 Global sliding

Global sliding shall be resisted either by means of friction resulting from self-weight or by a mechanical device or by a combination of both. Only where it can be shown that a mechanical device acts cumulatively with frictional resistance the resistances of both means of restraint may be taken into account simultaneously.

It shall be verified that the design force resisting sliding, $F_{stb,d}$, is greater than or equal to the design forces leading to sliding, $F_{dst,d}$:

$$F_{dst,d} \leq F_{stb,d} \quad (4)$$

where

$F_{dst,d}$ is the design value of the force parallel to the plane of bearing leading to sliding;

$F_{stb,d}$ is the design value of the resistance against sliding parallel to the plane of bearing and is calculated using Formula (5):

$$F_{stb,d} = \mu \times N_d + R_{m,d,i} \quad (5)$$

where

μ is the minimum friction coefficient (see EN 12812:2008, Annex B);

N_d is the design force normal to the plane of sliding;

$R_{m,d,i}$ is the design value of the resistance of the mechanical device.

NOTE See also 7.6.3.

7.6.2.3 Global overturning

Overturning shall be resisted by self-weight, kentledge, a mechanical fixing or a combination of these.

It shall be verified that the design moment resisting overturning, $M_{stb,d}$, is greater than or equal to the design moment causing overturning, $M_{dst,d}$:

$$M_{dst,d} \leq M_{stb,d} \quad (6)$$

7.6.2.4 Global uplift

Uplift shall be resisted by self-weight, kentledge, a mechanical fixing or a combination of these.

It shall be verified that the design resistance against uplift, $N_{stb,d}$, is greater than or equal to the design forces causing uplift, $N_{dst,d}$:

$$N_{dst,d} \leq N_{stb,d} \quad (7)$$

7.6.3 Local sliding

Local sliding shall be resisted either by means of friction or by a mechanical device or by a combination of both. Only where it can be shown that a mechanical device acts cumulatively with frictional resistance the resistances of both means of restraint may be taken into account simultaneously.

The stiffness of the mechanical device and any clearance or looseness that it needs to take up before generating resistance shall be taken into account.

It shall be verified that:

$$F_d \leq R_{f,d} \quad (8)$$

where

F_d is the design value of the force parallel to the plane of bearing leading to sliding calculated with the partial load factors according to Table 5;

$R_{f,d}$ is the design value of the resistance against sliding parallel to the plane of bearing and is calculated using Formula (9):

$$R_{f,d} = \frac{\mu}{\gamma_{\mu}} \times N_d + R_{m,d,i} \tag{9}$$

where

μ is the minimum friction coefficient (see EN 12812:2008, Annex B);

γ_{μ} is the partial factor for friction and is taken as 1,3;

N_d is the design force normal to the plane of sliding;

$R_{m,d,i}$ is the design value of the resistance of the mechanical device.

7.6.4 Loads on flexible sheeting

The effect of actions rectangular to the flexible space-enclosing elements results in loads which act on the membrane and structure. These effects need not be considered for spans covered by flexible sheeting with a width up to 3,5 m and if constructive bracing of the end spans of the roof or wall covered by flexible sheeting is provided.

8 Documentation

For each encapsulation the following documentation shall be available.

a) Method statement, which shall include:

- information about the permissible loading(s) for the construction;
- information relating access to the temporary roof or other parts of the construction, if appropriate;
- information relating to snow clearance, if appropriate;
- information about walking on the sheeting or individual structural elements, if appropriate;
- information relating to openings in temporary roof, if appropriate.

b) Instruction manual including the procedures for erection, maintenance, use and dismantling the encapsulation, describing the correct sequence of working steps. These instructions shall include illustrations and text. If personal protective equipment (PPE) is used in the above, attachment points shall be clearly described in the manual.

c) Design drawings including design load assumptions and load effects imposed by the encapsulation on its external supporting structure to which it will transfer loads.

d) Any other relevant information.

Annex A
(informative)

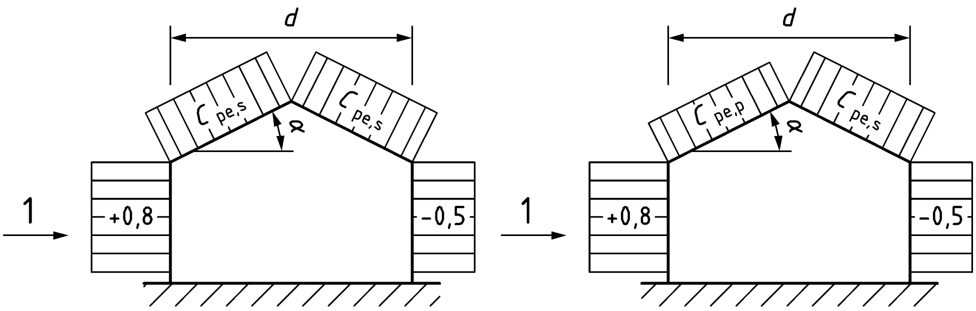
Pressure coefficients for the external pressure, c_{pe}

On base of the existing experiences with encapsulations of conventional type the pressure coefficients for the external pressure according to the following figures may be used.

$c_{pe,s}$ is the external pressure coefficient for suction forces.

$c_{pe,p}$ is the external pressure coefficient for pressure forces.

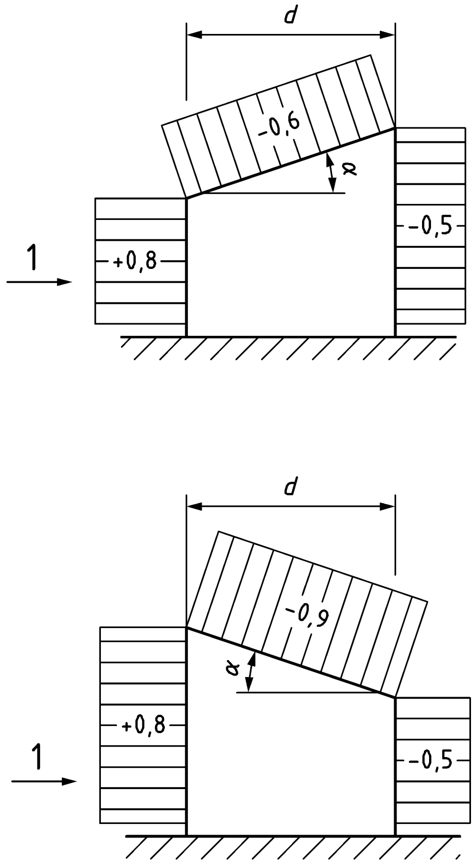
Positive c_{pe} means that values act towards the surface. Negative c_{pe} means that values act away from the surface. Parts of wind loads which appear favourable in combination with other imposed loads shall be neglected.



Key

1 direction of wind

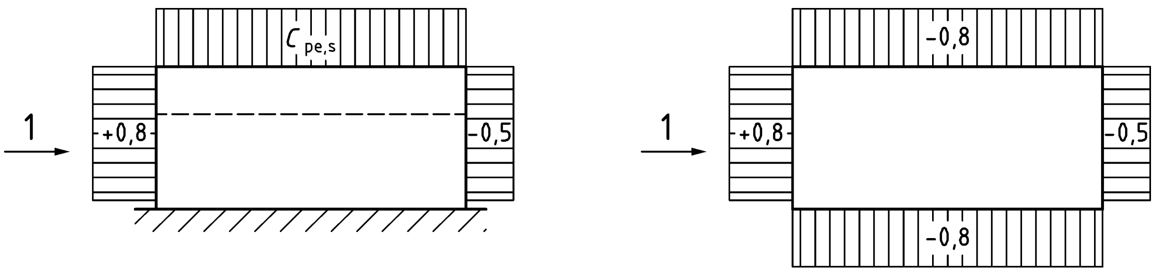
Figure A.1 — Double pitch roof (α < 30°)



Key

1 direction of wind

Figure A.2 — Mono pitch roof (α < 30°)

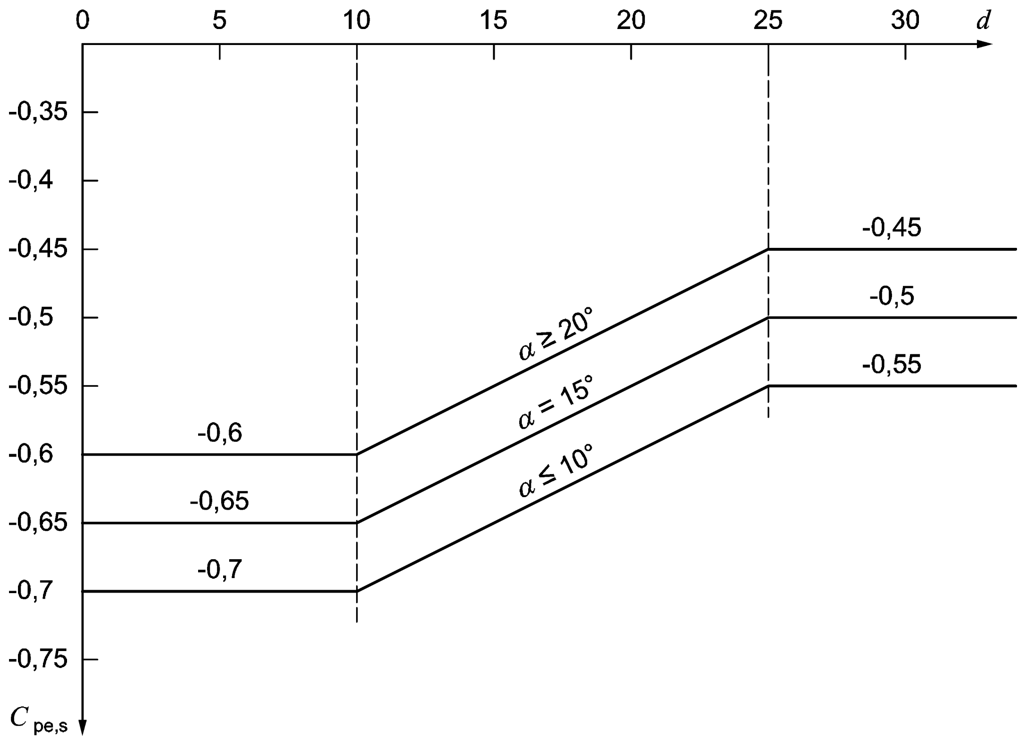


Key

1 direction of wind

c_{pe} values in view and plan view apply for both mono-pitch and double-pitch roofs

Figure A.3 — Views of double pitch and mono pitch roof



$$c_{\text{pe,s}} = \begin{cases} -0,7 + K_a & \text{for } d \le 10 \text{ m} \\ +0,01 \cdot d - 0,8 + K_a & \text{for } 10 \text{ m} < d < 25 \text{ m} \\ -0,55 + K_a & \text{for } d \ge 25 \text{ m} \end{cases}$$

$$K_a = \frac{\alpha - 10}{100} \quad \text{and} \quad 0 \le K_a \le 0,1$$

Figure A.4 — Diagram showing $C_{\text{pe, s}}$-values

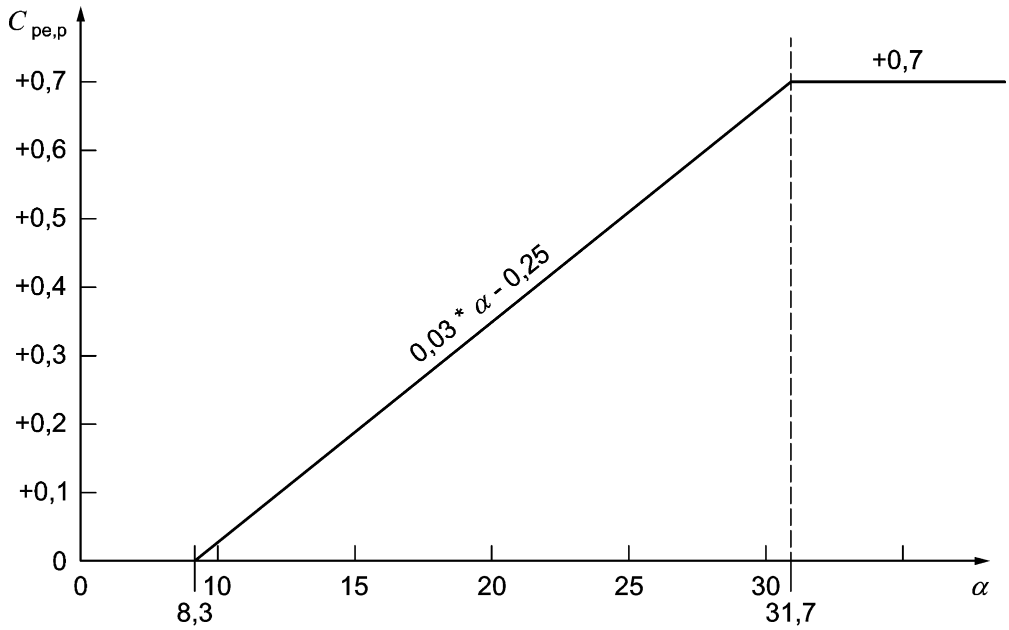


Figure A.5 — Diagram showing $C_{\text{pe, p}}$ -values

Annex B
(informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN-CENELEC national member.

This European Standard does not fall under any Directive of the EU.

In the relevant CEN-CENELEC countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

Sweden

Clause	Deviation
Clause 6, Table 1 – Snow load classes	The size of the snow load class 2a is in conflict with article 42 of the Provisions and General Recommendations of the Swedish Work Environment Authority on Scaffolding, AFS 2013:4. In Sweden, the reduced snow load based upon snow clearance management shall be according to SL 2b, unless an investigation for the place in question has been carried out.
7.4.3.4, Service load on the roof, Q_4	In Sweden, according to AFS 2013:4, the loads Q_4 shall be at least 1,2 kN each for the two concentrated loads, and shall, in the design of the construction, be placed in the most unfavourable position(s). It shall also be combined with other loads, e.g. self-weight, wind and snow loads, where relevant.
7.5, Table 3 – Load combination factors ψ_i	In Sweden, according to AFS 2013:4, the load cases LC2 and LC4 shall also consist of the load Q_4, with the combination factor Ψ = 1,0.

Bibliography

[1] EN 13782, *Temporary structure — Tents — Safety*

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

bsi.

...making excellence a habit.™