British Standard

BRITISH STANDARD

BS 1139-5:
1990
HD 1000:1988

Metal scaffolding —

Part 5: Specification for materials, dimensions, design loads and safety requirements for service and working scaffolds made of prefabricated elements

This Harmonization Document HD 1000:1988 has the status of a British Standard

UDC 69.057.62:614.8

Cooperating organizations

The European Committee for Standardization, under whose supervision this European Standard was prepared, comprises the national standards organizations of the following Western European countries.

Austria	Oesterreichisches Normungsinstitut
Belgium	Institut belge de normalisation
Denmark	Dansk Standardiseringsraad
Finland	Suomen Standardisoimisliito, r.y.
France	Association française de normalisation
Germany	Deutsches Institut für Normung e.V.
Greece	Hellenic Organization for Standardization
Iceland	Technological Institute of Iceland
Ireland	National Standards Authority of Ireland
Italy	Ente Nazionale Italiano di Unificazione
Luxemburg	Inspection du Travail et des Mines
Netherlands	Nederlands Normalisatie-instituut
Norway	Norges Standardiseringsforbund
Portugal	Instituto Português da Qualidade
Spain	Asociación Española de Normalización y Certificación
Sweden	Standardiseringskommissionen i Sverige
Switzerland	Association suisse de normalisation
United Kingdom	British Standards Institution

This British Standard was published under the authority of the Board of BSI and comes into effect on
31 December 1990

The following BSI references relate to the work on this standard:
Committee reference CSB/57
Draft for comment 85/10457 DC

ISBN 0 580 19107 9

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

National foreword

This part of BS 1139 has been prepared under the direction of the Civil Engineering and Building Structures Standards Policy Committee.

This Part of BS 1139 is one of a series specifying requirements for the design, construction and testing of equipment for use in scaffolding and other temporary structures. BS 1139-5 is identical with HD 1000:1988 "Service and working scaffolds made of prefabricated elements. Materials, dimensions, design loads and safety requirements" published by the European Committee for Standardization (CEN). HD 1000 was produced as a result of agreement in CEN Technical Committee TC 53, Scaffolds, falsework and mobile access towers, in which the UK took an active part.

National annexes, referred to in Clause **4** exist for Austria, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden and Switzerland but these are not reproduced here.

Attention is drawn to the following.

a) This is the first time that prefabricated scaffold equipment has been covered by a specific British Standard which includes recommendations concerning the design criteria and basic minimum configuration for prefabricated scaffolds. The manufacturer is therefore given a broad framework to work within, and this is further encouraged by the inclusion of references to a number of national and international standards applicable to this type of scaffolding.

b) As the document reflects practices current in many European countries, there is mention of items that are new to the UK scaffolding industry, such as the reference to provision for intermediate guard rails. These references are not intended to force the use of this additional equipment, but to leave the scaffolder the option of using it should this be required. However it is hoped the emphasis given in the standard to the various forms of side protection will encourage the use of such equipment, giving enhanced levels of protection above the minimum required by the UK's safety legislation.

c) The reference to class 1, 2 or 3 scaffolds with a minimum width of 0.6 m should not be interpreted as implying such a width is legally acceptable in the UK in all circumstances. Compliance with the Construction Working Places Regulations is necessary.

d) This is a standard for the manufacture of prefabricated scaffolds, which includes a requirement for the manufacturer to supply information for the use of the particular scaffold. BS 5973 "Code of practice for access and working scaffolds and special scaffold structures in steel" gives general guidance on scaffolds, but the information on the particular scaffold should be followed.

e) Work is in progress in CEN/TC 53 to produce documents covering testing and assessment of prefabricated scaffolds.

f) The current titles of the publications referred to in the national annex of the United Kingdom are given in national appendix NB.

BS 1139 is now published in separate Parts and Sections as follows:

— *Part 1: Tubes;*

— *Section 1.1: Specification for steel tubes;*

— *Section 1.2: Specification for aluminium tube;*

— *Part 2: Couplers;*

— *Section 2.1: Specification for steel couplers, loose spigots and base-plates for use in working scaffolds and falsework made of steel tubes;*

(Identical with EN 74)

— *Section 2.2: Specification for steel and aluminium couplers, fittings and accessories for use in tubular scaffolding;*

— *Part 3: Specification for prefabricated access and working towers;*

— *Part 4: Specification for prefabricated steel splitheads and trestles;*

— *Part 5: Specification for materials, dimensions, design loads and safety requirements for service and working scaffolds made of prefabricated elements.*

(Identical with HD 1000)

Attention is also drawn to Figure 6, drawing 2d in HD 1000 where the series of axial loads reads V_{12}, V_{13}, V_{14}, V_{16}, V_{17} with V_{15} omitted. This is an editorial error and will be notified to the CEN/TC 53 secretariat.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, the HD title page, pages 2 to 20 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

blank

HARMONIZATION DOCUMENT
DOCUMENT D'HARMONISATION
HARMONISIERUNGSDOKUMENT

HD 1000

June 1988

UDC 69.057.62:614.8

Keywords: Site equipment, Scaffolding, Prefabricated elements, Mechanical strength, Loads: Forces, Dimensions, Specifications, Safety, Designation, Definitions.

English version

Service and working scaffolds made of prefabricated elements Materials, dimensions, design loads and safety requirements

Echafaudages de service en éléments préfabriqués; Matériaux, dimensions, charges de calcul et exigences de sécurité

Arbeitsgerüste aus vorgefertigten Bauteilen (Systemgerüste); Werk-stoffe, Gerüstbauteile, Abmessungen, Lastannahmen und sicherheitstechnische Anforderungen

This Harmonization Document was accepted by CEN on 1988-02-09. CEN members are bound to comply with the requirements of the CEN/CENELEC Rules which stipulate the conditions for giving this Harmonization Document the status of a national document without any alteration.

Up-to-date lists and bibliographical references concerning such national Harmonization Documents may be obtained on application to the CEN Central Secretariat or to any CEN member.

This Harmonization Document exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to CEN Central Secretariat has the same status as the official versions.

CEN members are the national standards organizations of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue Bréderode 2, B-1000 Brussels

Ref. No. HD 1000:1988 E

Brief history

At the request of Denmark CEN/TC 53 began work in 1974 on the standardization of the item "Service and Working Scaffolds made of Prefabricated Elements — Materials, Dimensions, Design Loads and Safety Requirements". Since then twelve draft proposals have been studied. At its 19th plenary meeting in March 1984 CEN/TC 53 decided to publish a revised draft proposal as a European Harmonization Document. After discussion of technical changes proposed on the occasion of the preliminary vote CEN/TC 53 decided in November 1986 to propose a revised Harmonization Document and sent it to the Central Secretariat for final vote. As soon as International Reference Standards for materials and factors of safety are available this Harmonization Document can be considered for adoption as an EN.

During discussion of the draft it was noted that the average height of people is increasing and that consideration will have to be given in later editions to altering vertical dimensions.

Work is proceeding in CEN/TC 53 on the preparation of European Standards for:

— Methods of test for elements and assembled scaffolds and

— methods of assessment and calculation.

According to the Common CEN/CENELEC rules, the following countries are bound to implement this Harmonization Document:

Finland, France, Germany, Greece, Ireland, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

Contents

1 Object and field of application

This Harmonization Document applies to unsheeted anchored prefabricated service and working scaffolds for facades. The requirements described are intended to ensure that scaffolds complying with this Harmonization Document are capable of being erected to a height of 30 m (measured from ground level to the highest platform) under specified loading conditions. The Harmonization Document:

— gives guidelines for the choice of the main dimensions of prefabricated scaffolds

— classifies prefabricated scaffolds according to their loading

— specifies properties for materials to be used

— gives safety engineering requirements and dimensions

— specifies a basic version of an assembled structure.

This Harmonization Document does not specify requirements for ladder components or other means of access between platforms or for sheeted scaffolds.

2 References to other standards

Since other European Standards are not at present available, reference should be made to the relevant standards listed in the national annexes of this Harmonization Document.

NOTE From the date of completion of these European Standards the national standards are to be considered as B-deviation. For the sake of simplicity the concerning applications are already now indicated as B-deviations. At that moment a time limit for the application of national standards as B-deviations should be published.

3 Definitions

For the purpose of this Harmonization Document the following definitions apply (see also Figure 1):

3.1
prefabricated scaffold

scaffold in which some or all the dimensions are predetermined by connections or connecting devices that are permanently fixed to the components

3.2 Bracing member

3.2.1
bracing member in the horizontal plane

frames, framed panels, diagonal braces and rigid connections between transoms and ledgers, etc. used for horizontal bracing

3.2.2
bracing member in the vertical plane

closed frames with or without corner bracing, open frames, ladder frames with access openings, rigid connections of the transoms to the vertical tubes, diagonal bracing, etc. used for vertical bracing

3.2.3
tie member

component connecting the scaffold to the anchorages in the facade of the building

3.3
basic version

see clause **11**

3.4
horizontal frame

component which provides a continuous horizontal stiff plane (see typical example given in Figure 2)

3.5
vertical frame

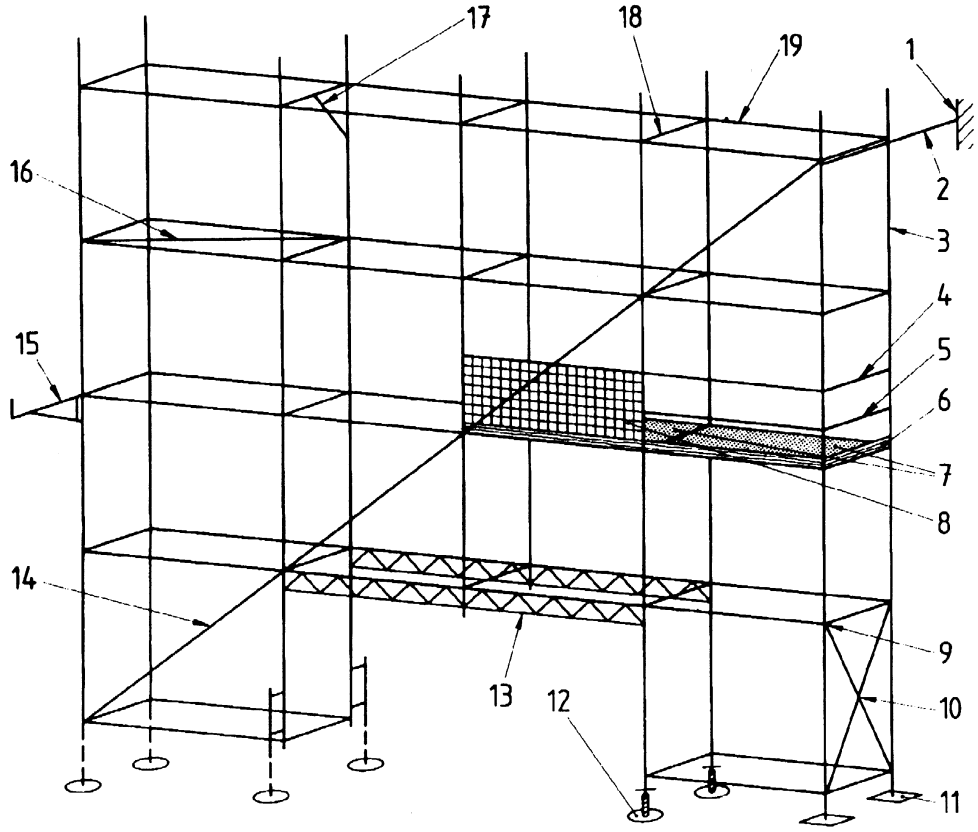
component which provides a continuous vertical stiff plane (see typical example given in Figure 3)

3.6
horizontal/vertical framing system

systems that are continuously braced in vertical and horizontal planes, thus using both types of units defined in **3.4** and **3.5**

3.7
modular system

a prefabricated scaffold where the connections to standards are made by prefabricated joints which are at regular (modular) intervals



1 Anchorage
2 Tie member
3 Standard
4 Guardrail
5 Intermediate guardrail
6 Toeboard
7 Platform
8 Fencing structure
9 Mode
10 Lateral brace (example shown is a cross brace)
11 Non-adjustable base plate
12 Adjustable base plate
13 Bridging ledger
14 Longitudinal brace
15 Hop-up bracket
16 Plan brace
17 Knee brace
18 Transom
19 Ledger

Figure 1 — Identification of typical components of a prefabricated scaffold system
(The Figure 1 is given as an example; examples of stiff planes are given in Figure 2 and Figure 3.)

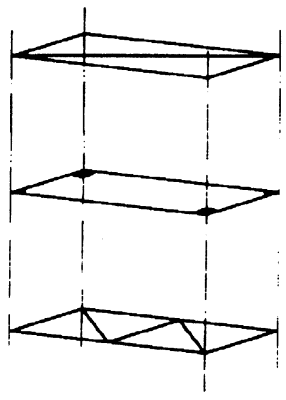
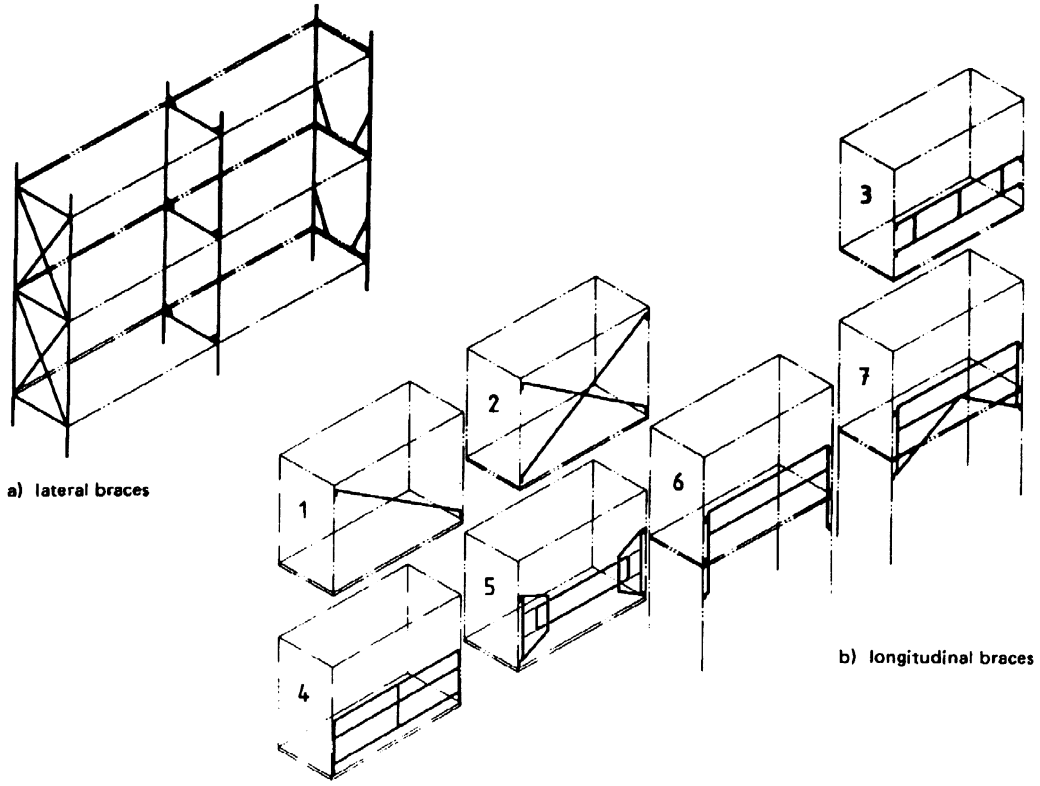


Figure 2 — Example of stiff horizontal planes



1 with diagonal
2 with diagonals as St. Andrew's cross
3 with guardrail and intermediate guardrail as ledger
4 frame with guardrail, intermediate guardrail and standard
5 frame consisting of three parts as braces
6 bridging frame as side protection on the construction level
7 bridging frame with braces as side protection on the construction level

Figure 3 — Examples of stiff vertical planes

3.8
decking component

a unit of decking that supports a load on its own

3.9
platform

one or more decking components forming a working area

NOTE Prefabricated decking components can form part of the structure of the scaffold. When traditional timber planks are used, they are usually supplied separately.

3.10
anchorage

the means inserted in, or attached to, the facade of a building for fastening a tie member

3.11
ledger

a horizontal member normally parallel to the facade of a building in the direction of the larger dimension of the scaffold

3.12
standard

a vertical (or nearly vertical) member

3.13
transom

a horizontal member normally fixed at right angles to the face of the building

4 Materials

Materials shall have a good resistance to, or be protected against, atmospheric corrosion and shall be free of any impurities and defects which might affect their satisfactory use.

Where appropriate, materials shall comply with the national standards which are given in the national annexes.

Welded components shall be made of materials other than rimming steel.

5 Design loads

5.1 General

The design loads specify the strength requirements for platforms and for the scaffold structure according to the classification of the scaffold (see Table 1). The factor of safety given in **5.5** shall be applied when using the loads specified in Table 1.

NOTE All loads are taken to be static loads. For normal use no impact factors need be added. Additional information for typical uses of clauses is given in annex A.

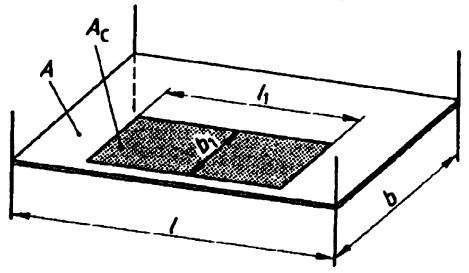


Figure 4 — Measurement of total and partial platform areas

5.2 Platform

5.2.1 *General*

For the purpose of design, the platform area (other than cantilevered platforms see **5.2.6**) to be considered is that bounded by the actual width of the platform measured perpendicular to the facade and by the centre lines of the pairs of standards. The platform shall satisfy the three or four, as appropriate, loading requirements separately.

The platform and its immediate supports shall be capable of supporting the service loads specified in Table 1, except that no platform shall have a load bearing capacity lower than that specified for a class 2 scaffold.

5.2.2 *Uniformly distributed load*

Each platform shall support a load uniformly distributed over the whole area of the platform as specified in Table 1 column 2.

5.2.3 *Concentrated load on an area of 500 mm × 500 mm*

Each platform shall support the load given in Table 1, column 3, uniformly distributed over an area of 500 mm × 500 mm. The position of this load shall be chosen to give the most unfavourable conditions. When the platform contains any independent decking component less than 500 mm wide, the concentrated load shall be reduced for this component in proportion to the width, except that in no case the loading shall be reduced to less than 1,5 kN.

5.2.4 *Concentrated load on an area of 200 mm × 200 mm*

Each platform shall support a load of 1,0 kN uniformly distributed over an area of 200 mm × 200 mm. The position of this load shall be chosen to give the most unfavourable loading of the platform.

5.2.5 *Partial area load*

In addition to the requirements of **5.2.2** and **5.2.3**, each platform in classes 4, 5 and 6 shall support the load specified in Table 1, column 4, uniformly distributed over a single rectangular portion (partial area) of the platform having an area equal to the proportion of the total platform area specified in Table 1, column 5 (see Figure 4). The dimensions and position of this partial area shall be chosen to give the most unfavourable loading of the platform.

5.2.6 *Cantilevered platforms*

All cantilevered portions of a platform shall be able to support the same service loads as specified for the main platform (see **5.2.2**, **5.2.3** and **5.2.4**).

For platforms in classes 4, 5 and 6 incorporating cantilevered areas, where the cantilevered areas do not exceed the width of the adjacent main platform they shall be designed for the same partial area load as that derived for the main platform in the most unfavourable position. Where the width of the cantilevered platform exceeds that of the main platform it shall be designed for a partial area load derived from its own boundary dimensions. A cantilevered platform may have a lower class loading than the adjacent main platform provided that they are at different levels, at least 250 mm apart.

5.2.7 *Deflection of decking*

When subjected to the concentrated load specified in **5.2.3** the maximum deflection of any decking component shall not exceed 1/100 of the span of that decking component.

Table 1 — Service loads for working platforms[a]

1	2	3	4	5	6
Class	**Uniformly distributed load** kN/m^2	**Concentrated load on area**[b] **500 mm × 500 mm** kN	**Concentrated load on area**[c] **200 mm × 200 mm** kN	**Partial area load** kN/m^2	**Partial area**[d] A_c m^2
1[e]	0,75	1,50	1,00	Not applicable	
2	1,50	1,50	1,00	Not applicable	
3	2,00	1,50	1,00	Not applicable	
4	3,00	3,00	1,00	5,00	0,4 · A
5	4,50	3,00	1,00	7,50	0,4 · A
6	6,00	3,00	1,00	10,00	0,5 · A

[a] See Figure 4
[b] See **5.2.3**
[c] See **5.2.4**
[d] *A* is the platform area
[e] See **5.2.1**

In addition, in the case of decking components with spans of 2 m or greater, when the appropriate concentrated load is applied the maximum difference in levels between adjacent loaded and unloaded decking components shall not exceed 20 mm.

5.3 Scaffold structure

5.3.1 *General*

The scaffold structure when erected to a height of 30 m shall be capable of supporting the worse of the two following conditions:

a) Maximum wind conditions:

i) Uniformly distributed load appropriate to the class of the scaffold on the platform at the most unfavourable level (see **5.2** and Table 1), plus

ii) self weight of the scaffold, including the mass of 5 platforms, plus

iii) appropriate maximum wind load [see **5.3.2.1** a)], plus

iv) load due to inaccuracies in construction (see **5.3.4**).

b) Working wind conditions:

i) Uniformly distributed load appropriate to the class of the scaffold on the platform at the most unfavourable level (see **5.2** and Table 1), plus

ii) uniformly distributed load of 50 % of that in i) on the next platform level down the scaffold, plus

iii) self weight of the scaffold, including the mass of 5 platforms, plus

iv) working wind load [see **5.3.2.1** b)], plus

v) load due to inaccuracies in construction (see **5.3.4**).

5.3.2 *Loads due to wind*

5.3.2.1 Wind loads shall be calculated as described in **5.3.2.2** and **5.3.2.3** for winds acting:

i) parallel to the facade served by the scaffold

ii) perpendicular to the facade served by the scaffold.

NOTE In these calculations the load due to the wind is considered as applying a pressure on the effective area of the scaffold. The effective area is calculated as the projected area in the direction i) or ii), as appropriate, multiplied by an appropriate overall pressure coefficient (see annex B).

The design wind pressure adopted for these calculations shall be as follows:

a) *Maximum wind conditions*

A design wind pressure of 600 N/m^2 at the base of the scaffold increasing uniformly to 770 N/m^2 at the height of 24 m and then constant at 770 N/m^2 to the height of 30 m (see Figure 5) and acting over the projected area of the scaffold.

NOTE Figure 5 represents wind conditions in most parts of Europe. Attention is drawn to the actual wind conditions.

b) *Working wind conditions*

A design wind pressure of 200 N/m^2 uniformly distributed over the projected area of the scaffold. For the purpose of this calculation only, a nominal area shall be added to the area $A\perp_r$ and $A\|_r$ (see **5.3.2.2** and **5.3.2.3** respectively). This area results from an obstruction to the wind 400 mm high minus height of toeboard. This nominal area is to be considered acting at the surface of the platform.

NOTE This nominal area takes into account piles of materials, etc.

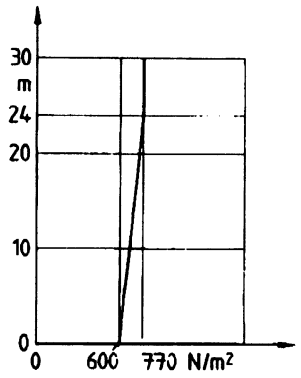


Figure 5 — Design wind pressure applying to the height above ground level

5.3.2.2 The force parallel to the facade $F\|$ in N, shall be calculated from the expression:

$$F\| = W \cdot c\| \cdot \left[A\perp_r + \sum_{1}^{n} \frac{A\perp_s \cdot c_f}{1,2} \right]$$

where:

W is the appropriate pressure as specified in **5.3.2.1** in N/m^2

$c\|$ is the overall pressure coefficient for forces parallel to the supporting structure and has the value 1,1

$A\perp_r$ is the total area of all round parts and toeboards projected onto a plane at right angles to the supporting structure in m^2 [see **5.3.2.1**b)]

$A\perp_s$ is the area of parts of a particular cross section (other than those included in $A\perp_r$) projected onto a plane at right angles to the supporting structure in m^2.

c_f is the aerodynamic force coefficient appropriate to the cross section of the parts in question, as given in annex B.

5.3.2.3 The force perpendicular to the facade in N, shall be calculated from the expression

$$F\perp = W \cdot c\perp \cdot \left[A\|_r + \sum_{1}^{n} \frac{A\|_s \cdot c_f}{1,2} \right]$$

where:

W is the appropriate pressure as specified in **5.3.2.1** in N/m^2

$c\perp$ is the overall pressure coefficient for forces perpendicular to the supporting structure and has the value 0,9 (see annex C)

$A\|_r$ is the total area of all round parts and toeboards projected onto a plane parallel to the supporting structure in m^2 [see **5.3.2.1**b)]

$A\|_s$ is the area of parts of a particular cross section other than those included in $A\|_r$) projected to a plane parallel to the supporting structure in m^2

C_f is the aerodynamic force coefficient appropriate to the cross section of the parts in question, as given in annex B.

5.3.2.4 Where the scaffold crosses in front of large openings in the facade or extends beyond the sides or top, higher forces perpendicular to the facade may occur and the design of the scaffold shall permit these extra loads to be allowed for (see annex C).

NOTE In areas with high winds giving pressures exceeding those in **5.3.2** a check should be made by the user to see if there are any limitations on loads applied to scaffolds.

5.3.3 *Loads due to snow*

No allowance need be made for snow loading.

5.3.4 *Loads due to inaccuracies in construction*

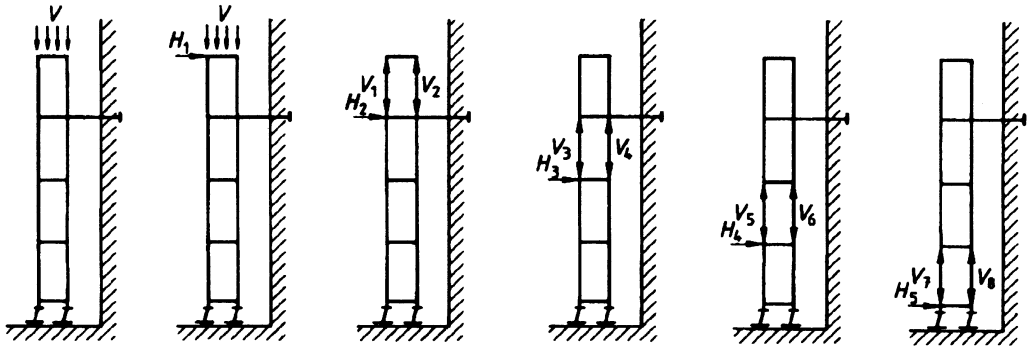
The loads arising in the scaffold as a result of inaccuracies in construction in any one level of the standards linked by transoms, ledgers or horizontal frames shall be considered as using a horizontal load, H, calculated from the expression

$$H = \frac{V_1 + V_2 + V_3 + \ldots + V_n}{100\sqrt{n}}$$

where

V_1 to V_n are the axial loads in each standard

n is the number of linked standards at the level under consideration (see Figure 6).



1. Load system Substitute systems:

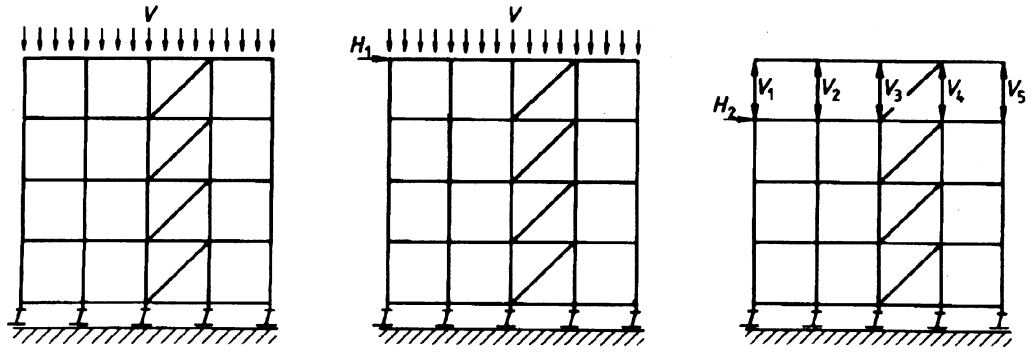
a) $H_1 = \frac{V}{100\sqrt{2}}$

b) $H_2 = \frac{V_1 + V_2}{100\sqrt{2}}$

c) $H_3 = \frac{V_3 + V_4}{100\sqrt{2}}$

d) $H_4 = \frac{V_5 + V_6}{100\sqrt{2}}$

e) $H_5 = \frac{V_7 + V_8}{100\sqrt{2}}$

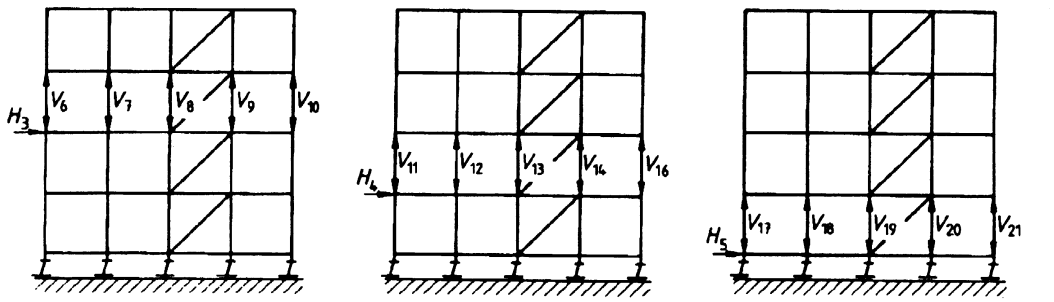


2. Load system

Substitute systems:

a) $H_1 = \frac{\Sigma V}{100\sqrt{5}}$

b) $H_2 = \frac{V_1 + V_2 + V_3 + V_4 + V_5}{100\sqrt{5}}$



Substitute systems:

c) $H_3 = \frac{V_6 + V_7 + V_8 + V_9 + V_{10}}{100\sqrt{5}}$

d) $H_4 = \frac{V_{11} + V_{12} + V_{13} + V_{14} + V_{16}}{100\sqrt{5}}$

e) $H_5 = \frac{V_{17} + V_{18} + V_{19} + V_{20} + V_{21}}{100\sqrt{5}}$

Figure 6 — Examples of checking the effects of inaccuracies in construction

NOTE *H* is a notional load, introduced for design purposes, as a substitute for the effect of the structure being out of plumb. It is not considered as imposing secondary effects due to deflections. It is a function of the total vertical loads applied to vertical members in a linked group of standards and when considering the strength of a scaffold it is calculated and applied separately for each level, i.e. consecutively not concurrently (see Figure 6). The load *H* becomes additional of any other forces generated due to eccentricity of connections or displacements of base plates, etc.

5.3.5 *Erection and dismantling loads*

The scaffold and all parts of it when being erected or dismantled in accordance with the manufacturer's instructions shall be capable of withstanding all the resultant loads.

5.4 Requirements for guardrails

A guardrail, regardless of its span, shall withstand separately:

a) a point load of 0,3 kN without an elastic deflection of more than 35 mm; and

b) a point load of 1,25 kN without breaking or disconnecting and without being displaced from its original line by more than 200 mm at any point.

Both the above loads shall be applied in the most unfavourable positions and at any horizontal or downward angle. These loads are not additional to those in **5.3.1** or **5.3.2**.

5.5 Factors of safety

The various parts of the scaffold shall have a safety factor in accordance with the relevant standards listed in the national annexes.

6 Dimensions

The dimensions of working levels shall comply with the requirements of **10.2**.

NOTE 1 With the exception of working levels this Harmonization Document does not limit the dimensions of prefabricated scaffolds. However, the following dimensions are preferred:

Width[a]:	Classes 1, 2 and 3 scaffolds:
	Scaffold width of 0,7 m with minimum platform width of 0,6 m
	Classes 4, 5 and 6 scaffolds:
	Scaffold width of 1 m with minimum platform width of 0,9 m
Length[a]:	Classes 1, 2 and 3 scaffolds:
	1,5 m up to 3 m with 0,3 m or 0,5 m steps
	Classes 4, 5 and 6 scaffolds:
	1,5 m up to 2,5 m and with 0,3 m or 0,5 m steps
Height[b]:	minimum 2 m

[a] Measured centre to centre between adjacent standards

[b] Measured between the upper surfaces of adjacent platforms

NOTE 2 Because the dimensions of the scaffold depend on the type of work and the method of execution the corresponding national rules should be taken into account.

7 Tying

7.1 General

The scaffold shall be designed in such a manner that it can be tied to the facade by means of anchorages at suitable points, preferably close to the intersections of vertical members and ledgers. The design of ties shall be suitable for resisting horizontal forces perpendicular to the facade and parallel to the facade.

7.2 Dissipation of horizontal loads

Horizontal loads normal and parallel to the facade are to be allocated to the anchorages if their distribution to the anchorages and over the vertical stiffeners to the bases cannot be made more accurately because of considerations of looseness and rigidity.

NOTE At the bottom of the scaffold between the bases and first anchoring level, the horizontal loads may be allocated equally between these anchorages and the bases. Consideration should be paid to the fact that horizontal loads may induce quite high vertical loads in a scaffold.

7.3 Other requirements

The connection to the structure shall provide restraint to inner and outer vertical planes.

Where the tying pattern intended by the design does not include a tie at each pair of standards sufficient strength shall be provided in the horizontal plane to provide restraint from adjacent tied standards.

The scaffold shall have sufficient strength to allow it to be erected with, at any level on the facade, a zone at least 3,8 m high in which there are no ties to the facade.

NOTE 1 The restraint should preferably be direct to both standards at each tie point, but may be attached to one plane only, provided the resulting force distribution within the scaffold framework is satisfactory.

NOTE 2 It is preferable for this tie-free zone to be twice the normal clear height between working levels (see **10.2**).

NOTE 3 The requirements for a tie-free zone are to ensure that the scaffold has sufficient strength integral in the design. It is not a limit on the arrangement of ties that may be used in practice.

8 Connections

8.1 General

Connections between separate parts shall be effective and easy to monitor. They shall be easy to assemble and secure against accidental disconnection.

8.2 Vertical spigot and socket connection

When assembled, the horizontal movement (play) between upper and lower components shall not exceed 4 mm.

NOTE 1 This is the same as a movement away from the centre line of 2 mm.

The maximum angle of play shall not exceed 5 % from the true line. In all cases it shall not be possible to disconnect an upper component laterally until the upper component has been lifted more than 100 mm. if this lateral disconnection can occur before the upper component has been lifted 150 mm, a positive connection shall be provided between upper and lower components. In other cases, where a positive connection is not provided, the spigot and socket arrangement shall be such that the upper unit will return to its correctly assembled position when displaced vertically by 150 mm and then released.

NOTE 2 A cross pin is an example of such a positive connection.

8.3 Other connections

There shall be equivalent provisions to limit the risk of accidental disconnection.

NOTE Other strength requirements of this Harmonization Document may impose further limitations on the arrangement of connections.

9 Base plates

9.1 General

The strength and rigidity of the base plates shall be adequate to effectively transmit the maximum design load from the-scaffold to the foundations. The bearing surface of a flat steel base plate shall have a minimum thickness of 5 mm, and the area of contact with the foundation shall have a minimum area of 150 cm^2. The minimum width shall be 120 mm.

9.2 Non-adjustable base plates

Non-adjustable base plates shall be provided with a permanently attached and centrally positioned centering device, having a minimum length of 50 mm. This device shall be so designed that the base plate cannot move laterally by more than 11 mm (see Figure 7).

NOTE Base plates complying with EN 74 satisfy the requirements of this Harmonization Document.

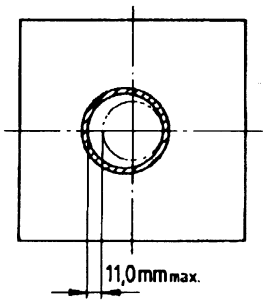


Figure 7 — Maximum clearance between centering device and tube in non-adjustable base plate

9.3 Adjustable base plates

Adjustable base plates shall be provided with a centrally positioned adjusting spindle of such a size that, in the unloaded condition, the greatest inclination of the axis of the spindle from the axis of the standard does not exceed 2,5 %. The minimum length of that part of the spindle remaining in the standard at any position of adjustment shall be 25 % of the total length of the spindle, or 150 mm whichever is the greater.

10 Working levels

10.1 Particular safety requirements

10.1.1 *Decking components*

Platform decking components shall be durable and shall have a slip-resistant surface. It shall be possible to secure these components so that lifting by wind and overturning is not possible.

Apertures in platforms shall not exceed 25 mm in width.

Where openings for access are provided within the platform area such openings shall be guarded, or shall be capable of being closed.

10.1.2 *Side protection*

10.1.2.1 *General*

Side protection components shall be incapable of removal except by direct intentional action.

It shall be possible to erect protection at platform edges comprising:

a) two guardrails;

b) a toeboard at the bottom to prevent objects rolling or being pushed off the platform;

c) sufficient obstruction of the space between the guardrail and the toeboard to reduce the risk of people and large objects falling through.

NOTE 1 Structural requirements are given in **5.4**.
NOTE 2 A fencing structure may be provided capable of preventing objects as small as bricks from falling, and can either be combined with the guardrail and toeboard, or be an additional and separate component.

10.1.2.2 *Principal guardrail*

It shall be possible to fix a guardrail in such a position that its top surface is 1 000 ± 50 mm above the level of the platform it is guarding (see Figure 8).

10.1.2.3 *Toeboard*

It shall be possible to fix a solid toeboard such that its top edge is at least 150 mm above the adjacent platform level.

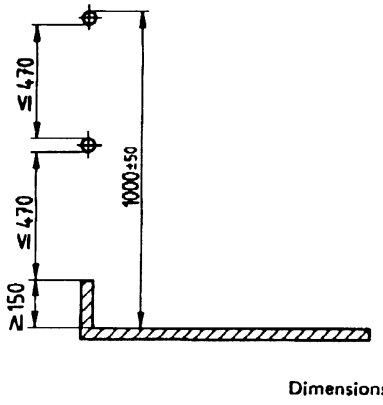


Figure 8 — Side protection dimensions

10.1.2.4 *Intermediate guardrail*

It shall be possible to fix a second guardrail, such that neither the space above and between it and the underside of the principal guardrail nor the space below and between it and the top of the toeboard exceeds 470 mm.

10.1.2.5 *Fencing structures*

When a fencing structure (see Figure 1, item 8) is provided any holes or slots in it shall have an area smaller than 100 cm^2 except where one dimension of such a slot is less than 50 mm.

10.2 Dimensions

The minimum clear height for access measured between platforms and transoms supporting the adjacent upper platform shall not be less than 1,75 m. The minimum clear height between platforms shall be 1,90 m.

NOTE 1 These measurements correspond to a module height of 2 m (see clause **6**).

The minimum width for access measured in any position shall not be less than 500 mm.

NOTE 2 These dimensions permit access along the platforms and a standing position for working.

10.3 Protection against falling materials

The scaffold shall incorporate features permitting the construction of protection screens (e.g. boards or netting).

NOTE The specification of such protection is outside the scope of this Harmonization Document.

11 Basic version

For the purpose of this Harmonization Document a basic version of the scaffold shall comprise at least the following:

— an arrangement of components, including ties, to allow the construction of a 30 m high scaffold and providing the facilities appropriate to its class (but see clause **12**, note 2)

— the data specified in clause **12**,

— adjustable base plates or equivalent components,

— means of vertical access (see clause **12**, note 2).

NOTE The manufacturer may additionally include hop-up brackets or similar components in the basic version.

12 Data required from the manufacturer

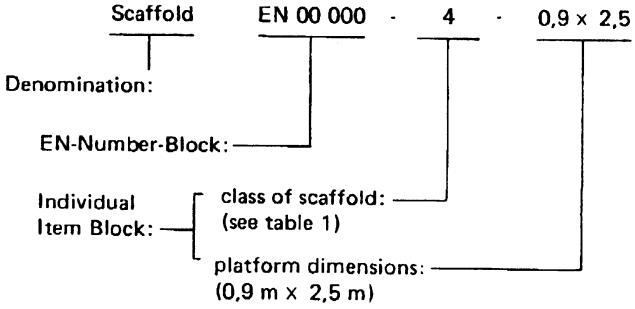
The manufacturer shall supply the user with technical data listing all those components used in the system together with their technical specification. The manufacturer shall also provide erection instructions appropriate to the scaffold's class taking into consideration any requirements for tying and bracing. For example, the instructions shall describe any additional anchoring and/or bracing which is needed in cases where the scaffold crosses in front of large openings and/or extends beyond the sides or top of the facade. Where such calculations are made, they shall be in accordance with annex C. The manufacturer shall also provide instructions relating to any special measures which are to be taken in cases where the normal design is deviated from, e.g. when the permeability of the facade deviates from that laid down in the Harmonization Document. Layouts for erection of the scaffold at corners shall also be included.

NOTE 1 If the scaffold has greater capacity than that required for its loading classification, the manufacturer may provide additional information which will facilitate its use in other loading conditions (see note in **5.3.2.4**).

NOTE 2 When alternative methods of providing platforms are acceptable, such as by means of separately provided timber planks (see **3.9**) or ladders and where such components do not directly contribute to the strength of the scaffold structure the supplier of the scaffold should provide such information about the required strength and weight of the components as is needed to ensure that components obtained from a separate source are suitable.

13 EN Designation

The EN designation shall comprise the following items according to the denomination scheme: e.g. for a prefabricated scaffold system of class 4 with platform dimensions 0,9 m × 2,5 m:



Annex A (informative)
Typical uses of classes of scaffolds

This annex gives additional information and does not form an integral part of the Harmonization Document. The classes 2 – 3 and 4 – 5 deal with the variation of national practices and the differences of loading intensities in such operations as brickwork and blockwork, etc. The service loads are classified so that the user can relate them to the purpose for which the scaffolds are required.

Where materials are placed on the platform or transported over the platform in trolleys or in barrows, the classification only covers the temporary storage of materials immediately required.

COMMENTARY ON SERVICE LOADS FOR WORKING PLATFORMS:

Class 1 *has class 2 decking components, but allows reductions in total loads transferred to supporting members. This class is intended for inspection purposes and operations with only light tools but without material storage.*

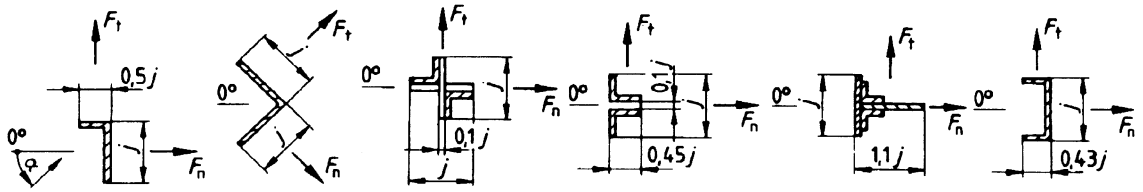
Classes 2 and 3 *are intended for access for inspection work and operations not involving stacking of materials except those immediately required e.g. painting, stone cleaning, pointing and plastering.*

Classes 4 and 5 *are intended for operations such as brickwork, fixing of concrete units, plastering, etc.*

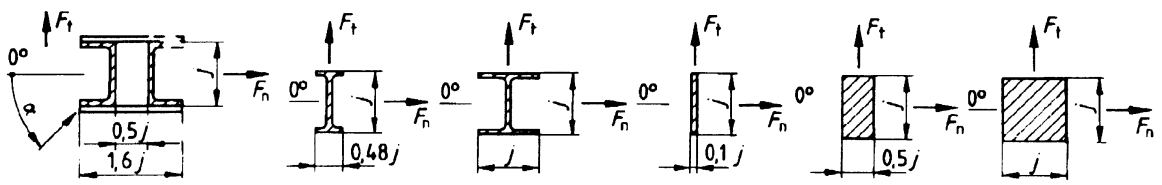
Class 6 *is intended for heavy masonry work or increased storage of materials.*

Annex B (obligatory)
Values of force coefficient c_f for various cross sections

Table 2 — Force coefficients c_{fn} and c_{ft} for individual cross sections[a]



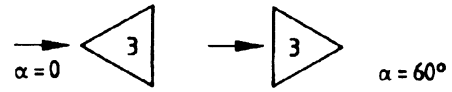
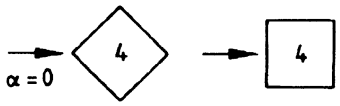
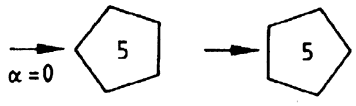
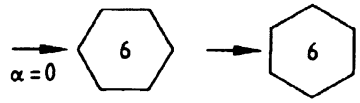
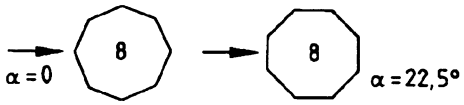
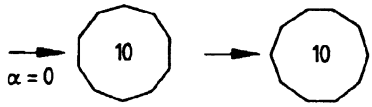
α	c_{fn}	c_{ft}	c_{fn}	c_{ft}	c_{fn}	c_{ft}	c_{fn}	c_{ft}	c_{fn}	c_{ft}	c_{fn}	c_{ft}
degree												
0	+ 1,9	+ 0,95	+ 1,8	+ 1,8	+ 1,75	+ 0,1	+ 1,6	0	+ 2,0	0	+ 2,05	0
45	+ 1,8	+ 0,8	+ 2,1	+ 1,8	+ 0,85	+ 0,85	+ 1,5	– 0,1	+ 1,2	+ 0,9	+ 1,85	+ 0,6
90	+ 2,0	+ 1,7	– 1,9	– 1,0	+ 0,1	+ 1,75	– 0,95	+ 0,7	– 1,6	+ 2,15	0	+ 0,6
135	– 1,8	– 0,1	– 2,0	+ 0,3	– 0,75	+ 0,75	– 0,5	+ 1,05	– 1,1	+ 2,4	– 1,6	+ 0,4
180	– 2,0	+ 0,1	– 1,4	– 1,4	– 1,75	– 0,1	– 1,5	0	– 1,7	– 2,1	– 1,8	0



α	c_{fn}	c_{ft}	c_{fn}	c_{ft}	c_{fn}	c_{ft}	c_{fn}	c_{ft}	c_{fn}	c_{ft}	c_{fn}	c_{ft}
degree												
0	+ 1,4	0	+ 2,05	0	+ 1,6	0	+ 2,0	0	+ 2,1	0	+ 2,0	0
45	+ 1,2	+ 1,6	+ 1,95	+ 0,6	+ 1,5	+ 1,5	+ 1,8	+ 0,1	+ 1,4	+ 0,7	+ 1,55	+ 1,55
90	0	+ 2,2	+ 0,5	+ 0,9	0	+ 1,9	0	+ 0,1	0	+ 0,75	0	+ 2,0

[a] These coefficients relate to an area of length unity l and, as shown in Table 2, width j. Where the width of the projected area in the direction under consideration is not j or the directions of the forces F_t or F_n are not appropriate, the coefficient shall be modified in inverse proportion to the actual projected width before it is used in **5.3.2.2** and **5.3.2.3**.

Table 3 — Force coefficients c_f for prismatic or tapering cross sections

Form of cross-section	l/D_m	α	c_f	α	c_f
	∞	0°	+ 1,3	60°	+ 2,0
	5 to 10 > 20	0°	+ 1,1 + 1,5	45°	+ 1,5 + 2,0
	> 7,5	0°	+ 1,1	36°	+ 2,0
	10 ∞	0°	+ 1,0 + 1,3	30°	+ 1,2 + 1,5
	∞	0°	+ 1,15	22,5°	+ 1,3
	∞	0°	+ 1,1	18°	+ 1,2
where: l is the length D_m is the thick; for tapered shapes, it is the mean thickness					

Annex C (obligatory)
Calculation of the overall pressure coefficient perpendicular to the building facade $c\perp$ for facades of varying permeability

The coefficient $c\perp$ for a structure comprising circular members and toeboards is calculated from the expression:

$c\perp = c\perp_{\text{closed}} + D$

Where:

$c\perp_{\text{closed}}$ is the overall pressure coefficient of the scaffold beside a closed building facade, and has the value 0,3

D is the permeability of the building facade, calculated as

$$\frac{A_{\text{open}}}{A_{\text{total}}}$$

and where

A_{open} is the total area of openings in the building facade taking into account the most open face of the building perpendicular to the wind face.

A_{total} is the total area of the building face.

NOTE For the purpose of the requirement of **5.3.2.3**, the value of $c\perp$ is taken as 0,9 and represents a facade which is 60 % open.

National annex of the United Kingdom

National annex to 10.1.1 (Deviation A)

In addition to the limitation of width, the maximum area of any hole in a platform shall be 4 000 mm^2.

National annex to clauses 2 and clause 4 (Deviation B)[1)]

For the United Kingdom the standards detailed below are listed in BS 1139 (Metal scaffolding). The main text of these standards may also impose additional limits on the grade of material to be used.

BS 1139-1, *Specification for tubes for use in scaffolding.*

Publications referred to:

BS 1474, *Wrought aluminium and aluminium alloys for general engineering purposes — bars, extruded round tubes and sections.*

BS 3436, *Ingot zinc.*

BS 5973, *Code of practice for access and working scaffolds and special scaffold structures in steel.*

BS 5974, *Code of practice for temporarily installed suspended scaffolds and access equipment.*

CP 118, *The structural use of aluminium.*

BS 1139-2, *Specification for couplers and fittings for use in tubular scaffolding.*[2)]

Publications referred to:

BS 18, *Methods for tensile testing of metals.*

BS 916, *Black bolts, screws and nuts.*

BS 970, *Wrought steels in the form of blooms, billets, bars and forgings.*

BS 1139, *Metal scaffolding.*

BS 1139-1, *Specification for tubes for use in scaffolding.*

BS 1449, *Steel plate, sheet and strip.*

BS 1472, *Wrought aluminium and aluminium alloys for general engineering purposes — forging stock and forgings.*

BS 4360, *Specification for weldable structural steels.*

BS 5973, *Code of practice for access and working scaffolds and special scaffold structures in steel.*

CP 118, *The structural use of aluminium.*

BS 1139-3, *Metal scaffolding — Specification for prefabricated access and working towers.*

Publications referred to:

BS 4, *Structural steel sections.*

BS 309, *Whiteheart malleable iron castings.*

BS 310, *Blackheart malleable iron castings.*

BS 449, *The use of structural steel in building.*

BS 693, *General requirements for oxy-acetylene welding of mild steel.*

(This standard has subsequently been withdrawn)

BS 970, *Wrought steels in the form of blooms, billets, bars and forgings.*

BS 1129, *Timber ladders, steps trestles and lightweight staging for industrial use.*

BS 1139, *Metal scaffolding.*

BS 1139-1, Specification for tubes for use in scaffolding.

BS 1139-2, Specification for couplers and fittings for use in tubular scaffolding.

BS 1139-4, Specification for prefabricated steel spitheads and trestles.

BS 1140, *Specification for resistance spot welding of uncoated and coated low carbon steel.*

BS 1449, *Carbon steel plate, sheet and strip.*

BS 1452, *Specification for grey iron castings.*

[1)] Parts 1 to 4 of BS 1139 were published in 1982/3. For current titles of the publications referred to see national appendix NB.

[2)] Reference to BS 1473 and BS 1490 were added by amendment No. 1 dated August 1987 to BS 1139-2:1983

BS 1470, *Wrought aluminium and aluminium alloys for general engineering purposes — plate, steel and strip.*

BS 1471, *Wrought aluminium and aluminium alloys for general engineering purposes — drawn tube.*

BS 1472, *Wrought aluminium and aluminium alloys for general engineering purposes — forging stock and forgings.*

BS 1474, *Wrought aluminium and aluminium alloys for general engineering purposes — bars, extruded round tub and sections.*

BS 1490, *Aluminium and aluminium alloys — ingots and castings.*

BS 1775, *Steel tubes for mechanical, structural and general engineering purposes.*

(This document has been superseded by BS 6323: Specification for seamless and welded steel tubes for automobile, mechanical and general engineering purposes: Parts 1 – 8)

BS 2037, *Aluminium ladders, steps and trestles for the building and civil engineering industries.*

BS 2789, *Iron castings with spheroidal or nodular graphite.*

BS 2901, *Filler rods and wires for gas-shielded arc welding.*

BS 2994, *Specification for cold rolled steel sections.*

BS 3019, *General recommendations for manual inert-gas tungsten-arc welding.*

BS 3019-1, *Wrought aluminium, aluminium alloys and magnesium alloys.*

BS 3100, *Specification for steel castings for general engineering purposes.*

BS 3468, *Austenitic cast iron.*

BS 3571, *General recommendations for manual inert-gas metal-arc welding.*

BS 3571-1, *Aluminium and aluminium alloys.*

BS 4114, *Dimensional and quantity tolerances for steel drop and press forgings and for upset forgings made horizontal forging machines.*

BS 4300, *Specification for wrought aluminium and aluminium alloys for general engineering purposes, supplementary series.*

BS 4300-1, *Aluminium alloy longitudinally welded tube.*

BS 4360, *Specification for weldable structural steels.*

BS 4848, *Hot-rolled structural steel sections.*

BS 4848-2, *Hollow sections.*

BS 4848-4, *Equal and unequal angles.*

BS 4848-5, *Bulb flats.*

BS 5135, *Metal-arc welding of carbon and carbon manganese steels.*

BS 5493, *Code of practice for protective coating of iron and steel structures against corrosion.*

CP 3, *Code of basic data for the design of buildings.*

CP 3:Chapter V, *Loading.*

CP 3-2, *Wind loads.*

CP 112, *The structural use of timber.*

CP 3-2, *Metric units.*

(This document has been partly superseded by BS 5268: Code of practice for structural use of timber)

CP 118, *The structural use of aluminium.*

PD 6484, *Commentary on corrosion at bimetallic contacts and its alleviation.*

DD 24, *Recommendations for methods of protection against corrosion on light section steel used in building.*

DIN 1725, *Aluminiumlegierungen; Knetlegierungen*[3)] (Aluminium alloys; wrought alloys).

DIN 1745 Teil 1, *Bänder und Bleche aus Aluminium und Aluminium-Knetlegierungen mit Dicken über 0,35 mm;.*

[3)] Reference to these publications was deleted by amendment No.1:1986 to BS 1139-3:1983.

DIN 1745 Teil 1, *Eigenschaften*[4].
(Strips and sheets of wrought aluminium and aluminium alloys with thicknesses over 0,35 mm; properties)
Operator's code of practice
Published by the Prefabricated Aluminium Scaffolding Manufacturers Association Limited
BS 1139-4, *Specification for prefabricated steel splitheads and trestles.*
Standards publications referred to:
BS 4, *Structural steel sections.*
BS 970, *Wrought steels in the form of blooms, billets, bars and forgings.*
BS 1139, *Metal scaffolding.*
BS 1139-1, *Specification for tubes for use in scaffolding.*
BS 1449, *Steel plate, sheet and strip.*
BS 1775, *Steel tubes for mechanical, structural and general engineering purposes.*
(This document has been superseded by BS 6323: Specification for seamless and welded steel tubes for automobile, mechanical and general engineering purposes
BS 4360, *Specification for weldable structural steel.*
BS 4848, *Hot-rolled structural steel sections.*
BS 5135, *Metal-arc welding of carbon and carbon manganese steels.*
BS 5493, *Code of practice for protective coating of iron and steel structures against corrosion.*
DD 24, *Recommendations for methods of protection against corrosion on light section steel used in building.*

National annex to 5.5 (Deviation B)

For the United Kingdom the following standards specify or imply factors of safety that are relevant to scaffolding:
BS 449, *The use of structural steel in building.*
BS 5973, *Code of practice for access and working scaffolds and special scaffold structures in steel.*
BS 5975, *Code of practice for falsework.*
CP 112, *The structural use of timber.*
(This document has been partly superseded by BS 5268: Code of practice for the structural use of timber)
CP 118, *The structural use of aluminium.*
DD 72, *Draft for development. Design requirements for access and working scaffolds.*

[4] Reference to these publications was deleted by amendment No.1:1986 to BS 1139-3:1983.

National appendix NA

The United Kingdom participation in the preparation of this Harmonization Document was entrusted by the Civil Engineering and Building Structures Standards Policy Committee CSB/- to technical committee CSB/57 upon which the following bodies were represented.

Association of Consulting Engineers
Association of Consulting Scientists
British Constructional Steelwork Association Ltd.
British Steel Industry
Building Employers' Confederation
Concrete Society
Construction Health and Safety Group
Construction Industry Training Board
Department of the Environment (Property Services Agency)
Electricity Supply Industry in England and Wales
Engineering Equipment and Materials Users' Association
English Net Manufacturers' Association
Federation of Civil Engineering Contractors
Health and Safety Executive
Institute of Building Control
Institution of Civil Engineers
Institution of Structural Engineers
National Association of Scaffolding Contractors
National Federation of Master Steeplejacks and Lightning Conductor Engineers
Prefabricated Aluminium Scaffolding Manufacturers' Association
Suspended Access Equipment Manufacturers' Association

National appendix NB

Publications referred to

Current titles of the publications referred to in the National annex of the United Kingdom

BS 4, *Structural steel sections.*

BS 18, *Method for tensile testing of metals (including aerospace materials).*

BS 449, *Specification for the use of structural steel in building.*

BS 916, *Specification for black bolts, screws and nuts, hexagon and square, with B.S.W. threads, and partly machined bolts, screws and nuts, hexagon and square, with B.S.W. or B.S.F. threads.*

BS 970, *Specification for wrought steels for mechanical and allied engineering purposes.*

BS 1129, *Specification for portable timber ladders, steps, trestles and lightweight staging.*

BS 1139, *Metal scaffolding.*

BS 1140, *Specification for resistance spot welding of uncoated and coated low carbon steel.*

BS 1449, *Steel plate, sheet and strip.*

BS 1452, *Specification for grey iron castings.*

BS 1470, *Specification for wrought aluminium and aluminium alloys for general engineering purposes: plate, sheet and strip.*

BS 1471, *Specification for wrought aluminium and aluminium alloys for general engineering purposes — drawn tube.*

BS 1472, *Specification for wrought aluminium and aluminium alloys for general engineering purposes — forging stock and forgings.*

BS 1473, *Specification for wrought aluminium and aluminium alloys for general engineering purposes — rivet, bolt and screw stock.*

BS 1474, *Specification for wrought aluminium and aluminium alloys for general engineering purposes: bars, extruded round tubes and sections.*

BS 1490, *Specification for aluminium and aluminium alloy ingots and castings for general engineering purposes.*

BS 2037, *Specification for portable aluminium ladders, steps, trestles and lightweight stagings.*

BS 2789, *Specification for spheroidal graphite or nodular graphite cast iron.*

BS 2901, *Specification for filler rods and wires for gas-shielded arc welding.*

BS 2994, *Specification for cold rolled steel sections.*

BS 3109, *TIG welding.*

BS 3109-1, *Specification for TIG welding of magnesium and their alloys.*

BS 3100, *Specification for steel castings for general engineering purposes.*

BS 3436, *Specification for ingot zinc.*

BS 3468, *Specification for austenitic cast iron.*

BS 3571, *MIG welding.*

BS 3571-1, *Specification for MIG welding of aluminium and aluminium alloys.*

BS 4114, *Specification for dimensional and quantity tolerances for steel drop and press forgings and for upset forgings made on horizontal forging machines.*

BS 4300, *Wrought aluminium and aluminium alloys for general engineering purposes (supplementary series) 4300/1 Aluminium alloy longitudinally welded tube.*

BS 4360, *Specification for weldable structural steels.*

BS 4848, *Specification for hot-rolled structural steel sections.*

BS 4848-2, *Hollow sections.*

BS 4848-4, *Equal and unequal angles.*

BS 4848-5, *Bulb flats.*

BS 5135, *Specification for arc welding of carbon and carbon manganese steels.*

BS 5268, *Structural use of timber.*

BS 5493, *Code of practice for protective coating of iron and steel structures against corrosion.*

BS 5973, *Code of practice for access and working scaffolds and special scaffold structures in steel.*

BS 5974, *Code of practice for temporarily installed suspended scaffolds and access equipment.*

BS 5975, *Code of practice for falsework.*

BS 6323, *Specification for seamless and welded steel tubes for automobile, mechanical and general engineering purposes.*

BS 6681, *Specification for malleable cast iron.*

CP 3, *Code of basic data for the design of buildings.*

CP 3:Chapter V, *Loading.*

CP 3-2, *Wind loads.*

CP 118, *The structural use of aluminium.*

DD 24, *Recommendations for methods of protection against corrosion on light section steel used in building.*

DD 72, *Design requirements for access and working scaffolds.*

PD 6484, *Commentary on corrosion at bimetallic contacts and its alleviation.*

Operators code of practice. Prefabricated Aluminium Scaffolding Manufacturers Association Limited.

blank

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL