Draft

Changes to the administrative provision model for

Technical Building Regulations (Muster-Verwaltungsvorschrift Technische Baubestimmungen [MVV TB])

- Issue 2023/1 (known as MVV TB 2022/1)[[1]](#footnote-1)

Content:

Amendments to Sections A 1 to A 3 and A 6

Amendments to the Annexes to Sections A 1 and A 6

Amendment to Section B 2

Amendments to the Annexes to Section B 2

Amendments to Sections C 1 to C 3

Amendments to the Appendices to Sections C 2 and C 3

Amendments to Section D 2

Amendments to Annexes 2, 4, 6, 8, 10, 12, 13, 14 and 18

Change of source of supply certification

**A 1 Mechanical strength and stability**

**A 1.1 General information**

Under § 3 and § 12(1) of the MBO1 each building structure must be stable as a whole, in its individual parts and on its own. The stability of other structural works and the bearing capacity of the building site of neighbouring plots may not be jeopardised. Furthermore, any effects arising during erection and use must not cause damage to any parts of the structure or facilities and equipment due to excessive deformations of the load-bearing construction.

To meet these requirements for building works, the Technical Rules under Section A 1.2 must be observed.

**A 1.2 Technical requirements in respect of the planning, designing and execution of structural works and parts thereof pursuant to § 85a(2) MBO1**

|  |  |  |  |
| --- | --- | --- | --- |
| **A 1.2.2 Structural works in earthworks and foundations** | | | |
| A 1.2.2.1 Geotechnical planning, calculation and design | | | |
|  | General rules | DIN EN 1997-1:2009-09  DIN EN 1997-1/NA:2010-12 | Annex A 1.2.2/1 |
| Subsoil - Verification of the safety of earthworks and foundations | DIN 1054:2021-04 | Annex A 1.2.2/1 |
| A 1.2.2.5 | Execution of ground anchors | DIN EN 1537:2014-07  DIN/TS 18537:2021-05 | Annex A 1.2.2/3 |
| **A 1.2.3 Structural works in concrete, reinforced concrete and prestressed concrete construction** | | | |
| A 1.2.3.1 Design and construction of reinforced concrete and prestressed concrete supporting structures | | | |
|  | General rules - Rules for buildings, bridges and civil engineering structures | DIN EN 1992-1-1:2011-01  DIN EN 1992-1-1/A1:2015-03  DIN EN 1992-1-1/NA:2013-04  DIN EN 1992-1-1/NA/A1:2015-12 | Annexes A 1.2.3/1 and A 1.2.3/2 |
| Concrete, reinforced and prestressed concrete structures | DIN 1045-2:2008-08  DIN EN 206-1:2001-07  DIN EN 206-1/A1:2004-10  DIN EN 206-1/A2:2005-09  DIN EN 206-9:2010-09 | Annex A 1.2.3/4 |
| Execution of concrete structures | DIN 1045-3:2012-03  DIN 1045-3 Cor. 1:2013-07  DIN EN 13670:2011-03 | Annex A 1.2.3/4 |
| A 1.2.3.8 | Anchors in concrete with embedded or subsequently fitted fasteners | DIN EN 1992-4:2019-04  DIN EN 1992-4/NA:2019-04  and  planning, designing and executing requirements anchors in concrete with cemented or subsequently fitted fasteners:2021-10  (See Annex 2) |  |
| **A 1.2.4 Structural works in metal and composite construction** | | | |
| A 1.2.4.1 Design of steel structures | | | |
|  | Structural fire design | DIN EN 1993-1-2:2010-12  DIN EN 1993-1-2/NA:2010-12 | Annexes A 1.2.3/3 and A 1.2.4/9 |
| Supplementary rules for stainless steels | DIN EN 1993-1-4:2015-10  DIN EN 1993-1-4/A2:2021-02  DIN EN 1993-1-4/NA:2020-11 |  |
| Plated structural elements | DIN EN 1993-1-5:2019-10  DIN EN 1993-1-5 Corrigendum 1:2020-07  DIN EN 1993-1-5/NA:2018-11 | Annex A 1.2.4/10 |
| Design of joints | DIN EN 1993-1-8:2010-12  DIN EN 1993-1-8/NA:2020-11 | Annex A 1.2.4/11 |
| Crane supporting structures | DIN EN 1993-6:2010-12  DIN EN 1993-6/NA:2017-11 |  |
| A 1.2.4.2 Design of composite steel and concrete structures | | | |
|  | Structural fire design | DIN EN 1994-1-2:2010-12  DIN EN 1994-1-2/A1:2014-06  DIN EN 1994-1-2/NA:2010-12 | Annexes A 1.2.3/3 and A 1.2.4/9 |
| A 1.2.4.3 Design of aluminium structures | | | |
|  | General structural rules | DIN EN 1999-1-1:2014-03  DIN EN 1999-1-1/NA:2021-03 | Annex A 1.2.4/1 |
| **A 1.2.5 Structural works in timber construction** | | | |
| A 1.2.5.1 Design of timber structures | | | |
|  | Design of timber structures | DIN EN 1995-1-1:2010-12  DIN EN 1995-1-1/A2:2014-07  DIN EN 1995-1-1/NA:2013-08 | Annex A 1.2.5/1 |
| Bridges | DIN EN 1995-2:2010-12  DIN EN 1995-2/NA:2011-08 | Annex A 1.2.5/1 |
| **A 1.2.6 Structural works in masonry structures** | | | |
| A 1.2.6.1 Design of masonry structures | | | |
|  | Design considerations, selection of materials and execution of masonry | DIN EN 1996-2:2010-12  DIN EN 1996-2/NA:2012-01  DIN EN 1996-2/NA/A1:2021-06 |  |
| **A 1.2.9 Structural works in seismic zones** | | | |
| A 1.2.9.1 | Buildings in German earthquake areas | DIN 4149:2005-04 | Annex A 1.2.9/1 |

Annex A 1.2.3/1

1 Section C 2.1 of this MVV TB regulates the requirements for construction products used in concrete, reinforced concrete, and prestressed concrete construction.

2 Prefabricated parts

2.1 For support structures made of prefabricated parts according to harmonised standards, DIN V 20000‑ 120:2006‑04 — Application of construction products in structures - Part 120: Application rules for DIN EN 13369:2004-09 – must be observed.

2.2 When using non-harmonised source materials, the Technical Rules under Section C 2.1 apply. The used concrete, reinforced steel and/or prestressed steel, and their technical specifications must be indicated.

2.3 Where load-bearing features of building structural elements or kits are specified in the form of calculated load-bearing values, mechanical strength or complete static calculations in the declaration of performance, these count as structural engineering verifications.

2.4 The design and structural construction of prefabricated concrete structural elements in structural works must be carried out in accordance with A 1.2.3.1.

2.5 For individual garages pursuant to EN 13978-1:20051, the standard DIN V 20000-125:2006-12 may also be used for the planning, design and execution. In this case, the rules of A 1.2.3.1 apply instead of DIN 1045-1:2001-07.

2.6 When using bricks according to EN 15037-3:2009+A1:20112 in ceiling systems, DIN 20000‑129:2014‑10 — Application of construction products in structures – Part 129: Rules for the application of ceramic intermediate structural elements according to DIN EN 15037-3:2011-07 – must be observed.

3 In the absence of a technical best practice for the planning, the designing and execution of structural works using prestressing methods, with the exception of the prestressing bed method for prestressing with immediate bonding according to DIN EN 1992 ‑1‑1:2011‑ 01, Section 5.10, proof according to § 16a MBO3 is required.

4 Re. DIN EN 1992-1-1:2011-01, Section 2.5:

The design of load-bearing structures on the basis of tests shall not apply.

5 The following design and construction rules must be observed for flat slabs, individual foundations and ground slabs made of reinforced concrete with double-headed anchors or lattice girders as punching shear reinforcement:

* Technical Rule (DIBt [Deutsches Institut für Bautechnik]) Design of flat slabs, individual foundations and ground slabs made of reinforced concrete with double-headed anchors as punching shear reinforcement (application document for EOTA TR 060); Version: August 2019
* Technical Rule (DIBt) Design of flat slabs, individual foundations and ground slabs made of reinforced concrete with lattice girders as punching shear reinforcement (application document for EOTA TR 058); Version: August 2019.

6 In the planning and design of structural elements made of reinforced concrete, the 'DAfStb Guideline for Steel Fibre Reinforced Concrete' (DAfStb [Deutscher Ausschuss für Stahlbeton] Richtlinie Stahlfaserbeton) (2021-06), Part 1, must also be observed.

\_\_\_\_\_\_\_\_\_\_\_

1 Implemented in Germany by DIN EN 13978-1:2005-07.

2 Implemented in Germany by DIN EN 15037-3:2011-07.

3 According to national law

**Annex A 1.2.3/4**

1 The specifications of C 2.1.4.3 apply.

2 For determining the compressive strength of concrete in existing buildings, DIN EN 13791:2008 ‑05 (including national annex as amended A20:2017-02) can be used.

3 For the use of self-compacting concrete, the ‘DAfStb guideline on self-compacting concrete (DAfStb-Richtlinie Selbstverdichtender Beton, SVB-Richtlinie)’ (09-2012) shall apply.

4 The ‘DAfStb guideline on bulky concrete structural elements’ (DAfStb-Richtlinie Massige Bauteile aus Beton) (2010-04) shall apply to bulky concrete structural elements.

5 In principle, the compressive strength for classification into the required strength class according to DIN EN 206‑1:2001-07, Section 4.3.1 for determining the characteristic strength according to DIN EN 206‑1:2001-07, Section 5.5.1.2 must be determined on samples aged 28 days. Conformity must be verified on samples aged 28 days within the scope of the conformity control for compressive strength in accordance with DIN EN 206-1:2001-07, Section 8.2.1. Deviation from this principle is only permitted if either   
I) the DAfStb Guideline 'Solid concrete structural elements' (2010-04) can be applied and is applied or

II) the following conditions are met:

1. There is a technical requirement to demonstrate compressive strength at a higher testing age. This is the case for example with some high-strength concretes, for low-joint/joint-free constructions and for structural elements with high requirements for crack width limitation.
2. The use of concrete is at least subject to the rules for monitoring class 2 in accordance with DIN 1045-3:2012-03, unless higher requirements apply to the compressive strength class. If a higher test age is required, this must be confirmed by the monitoring body within the framework of monitoring the installation of concrete in accordance with DIN 1045-3:2012-03, Annex C.
3. The construction company draws up a quality assurance plan which sets out, in relation to the project, how the changed test age is taken into account in terms of stripping periods, curing duration and construction process. This quality assurance plan must be submitted to the monitoring body for approval within the framework of monitoring in accordance with DIN 1045-3:2012-03, Annex C, prior to construction.
4. The compressive strength of the concrete after more than 28 days must also be separately indicated on the delivery list and on the delivery note. Regardless of this rule, the manufacturer remains responsible for the agreement with the buyer as required by the standard. The effects on the construction process, in particular with regard to the curing period, durability and stripping periods, should be noted on a case-by-case basis.

6 When using reinforced concrete, the 'DAfStb Guideline for Steel Fibre Reinforced Concrete' (DAfStb-Richtlinie Stahlfaserbeton) (2021-06), Part 2 and Part 3 shall be observed.

Annex A 1.2.4/1

For the execution of steel structural elements or kits according to DIN EN 1993-1-1:2010-12 and DIN EN 1993‑ 1‑ 1/A1:2014-07 in connection with DIN EN 1993-1-1/NA:2018-12, made of aluminium  
 according to DIN EN 1999-1-1:2014-03 in connection with DIN EN 1999-1-1/NA:2021-03 or of composite structures or structural elements according to DIN EN 1994-1-1:2010-12 in connection with DIN EN 1994‑ 1‑ 1/NA:2010-12, the following applies:

1 Where load-bearing features of building structural elements or kits are specified in the form of calculated load-bearing values, mechanical strength or complete static calculations in the declaration of performance, these count as structural engineering verifications.

2 The design of load-bearing structures on the basis of tests shall not apply. Exceptions to this are trapezoidal profiles and corrugated profiles made of steel and aluminium, whose load-bearing capacity is also determined on the basis of tests in accordance with Annex A to DIN EN 1993‑1‑3:2010‑12 or Annex A to DIN EN 1999‑1‑4:2010‑05 The test reports and their evaluation in accordance with Annex A to DIN EN 1993‑1‑3:2010-12 or Annex A to DIN EN 1999‑1‑4:2010‑05 are part of the structural verifications.

**Annex A 1.2.4/9**

In addition to DIN EN 1993-1-2 and DIN EN 1994-1-2, the emissivity of hot-dip galvanised structural elements may be determined in compliance with the DASt Directive 027:2020-11. In this case, it is necessary to ensure that no additional coatings are applied during its entire period of use and no surface-influencing changes are made. Section 6(2) of DASt Directive 027:2020-11 shall not apply.

**Annex A 1.2.4/10**

To DIN EN 1993-1-5/NA:2018-11

In DIN EN 1993-1-5/NA:2018-11, ‘DIN EN 1993-1-5:2017-07’ shall be replaced by ‘DIN EN 1993-1-5:2019-10 and DIN EN 1993-1-5 Corrigendum 1:2020-07’.

**Annex A 1.2.4/11**

To DIN EN 1993-1-8:2010-12

In the absence of a technical best practice for the planning, designing and execution of connections using injection screws, proof according to § 16a MBO 1 is required.

To DIN EN 1993-1-8/NA:2020-11, Annex NA.A

The definition of tightening procedures and/or tightening parameters through procedure tests (see Sections 5 and 9 of the DASt Directive 024:2018) is not applicable.

Annex A 1.2.5/1

1 In addition to DIN EN 1995-1-1:2010-12, DIN EN 1995-1-1/A2:2014-07 and DIN EN 1995-1-1/NA:2013-08, the following application standards must also be observed in the planning, designing and execution:

DIN 20000-1:2017-06 Application of construction products in structures – Part 1: Wood based panels

DIN 20000-3:2015-02 Application of construction products in structures – Part 3: Glued laminated timber and glued solid timber according to DIN EN 14080

DIN 20000-4:2013-08 Application of construction products in structures – Part 4: Prefabricated structural members assembled with punched metal plate fasteners according to DIN EN 14250:2010-05

DIN 20000-5:2016-06

and

DIN 20000-5/A1:2021-06 Application of construction products in structures – Part 5: Strength graded structural timber with rectangular cross section

DIN 20000-6:2015-02 Application of construction products in structures – Part 6: Dowel-type fasteners and connectors according to DIN EN 14592 and DIN EN 14545

DIN 20000-7:2015-08 Application of construction products in structures – Part 7: Structural finger jointed solid timber according to DIN EN 15497

1a In the absence of a technical best practice for the planning, designing and execution, proof according to § 16a MBO1 is required when using structural elements with laminated veneer lumber according to DIN EN 1995 ‑1‑1:2010-12 and DIN EN 1995-1-1/A2:2014-07 with DIN EN 1995-1-1/NA:2013-08, especially for connections.

2 Re. DIN EN 1995-1-1/NA:2013-08, Section 3.6 ‘Adhesives’:

Wood structural elements with glued load-bearing joints may only be used if these joints have been manufactured with adhesives that are classified as type I according to DIN EN 301:2013-12 or DIN EN 15425:2008-06 in conjunction with EN 14080:20132, Annex B.2 or classified according to DIN EN 16254:2014‑02. This does not apply to joints of elements in wood-based materials.

Sentence 1 applies correspondingly to the manufacture of glued, load-bearing joints of timber materials on site.

In the absence of a technical best practice for the planning, designing and execution, proof according to § 16a MBO1 is required when using timber construction products and bonded joints on timber structural elements that have been manufactured using adhesives for general usage in structural adhesive bonds according to EN 15274:20153 or repaired with these adhesives.

3 Regarding ETAs for ‘Beams made of one to four finger-jointed timbers that are tested for tensile strength’:

When designing beams, the test load coefficient must be set to a value of kpl = 1.0.

4 In the absence of a technical best practice for the planning, designing and execution when using kits for wood-concrete composite systems according to ETA, proof pursuant to § 16a MBO1 is required.

5 Re. EAD 130022-00-03.04:

Solid wood and glued laminated timber with finger joints may be used in service class 1 and 2. Only ‘beam log’ type beams may be used.

6 Where load-bearing features of building structural elements or kits are specified in the form of calculated load-bearing values, mechanical strength or complete static calculations in the declaration of performance, these count as structural engineering verifications.

\_\_\_\_\_\_\_\_\_\_

1 According to national law

2 Implemented in Germany by DIN EN 14080:2013-09.

3 Implemented in Germany by DIN EN 15274:2015-06.

Annex A 1.2.9/1

Re DIN 4149

The following must be observed when applying the Technical Rule:

1 In earthquake zone 3, roofing on roofs with more than 35° inclination, and in earthquake zones 2 and 3 the free-standing parts of the chimneys over the roofs, must be secured against the effects of earthquakes using appropriate measures to ensure that no parts can fall on adjacent public thoroughfares or on entrances to the structural works.

2 In terms of the allocation of earthquake zones and geological underground classes, refer to the map of earthquake zones and geological underground classes for xxx1), published by xxx1) or DigitalService CD-PRINT, Isener Str. 7, 84405 Dorfen. The table ‘Classification of earthquake zones according to administrative limits’ is available at https://www.dibt.de/de/wir-bieten/technische-baubestimmungen.

2a The references to DIN 1045-1:2001-07 and DIN 1052:2004-08 are replaced as follows throughout the standard text:

DIN 1045-1:2001-07 replaced by reference to DIN EN 1992-1-1:2011-01 and DIN EN 1992-1-1/A1:2015-03 in conjunction with DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992-1-1/NA/A1:2015-12,

DIN 1052:2004-08 replaced by reference to DIN EN 1995-1-1:2010-12 and DIN EN 1995-1-1/A2:2014-07 in conjunction with DIN EN 1995-1-1/NA:2013-08.

3 Re. Section 5.5:

When determining the effective masses to calculate earthquake load, snow loads shall be multiplied in Equation (12) with the combination coefficient Ψ2 = 0.5. These reduced snow loads must also be taken into account in the proof of stability.

4 Re. Section 6:

* In 6.2.2.4.2 (8), the reference to ‘Section (7)’ shall be replaced by the reference to ‘Section (6)’.
* The condition ‘or’ is replaced by ‘and’ in the first sentence of 6.2.4.1(5).

5 Re. Section 8:

In earthquake checks of steel and prestressed concrete constructions under this standard, DIN EN 1992-1-1:2011-01 shall apply in conjunction with DIN EN 1992-1-1/NA:2013-04.

* Paragraph 8.2(3) shall be worded as follows:

‘The design and structural design provisions specified in DIN EN 1992-1-1:2011-01 shall apply. Accordingly, the procedures specified for determining force variables in 5.5 and 5.6 of DIN EN 1992‑1‑1:2011‑01 shall not apply unless dual utilisation of plastic reserves (due to q > 1 and non-linear calculation assumptions) is excluded in the process.’

* Paragraph 8.2(5)(a) and Paragraph 8.3.2(2) shall be worded as follows:

‘In building structural elements used to mitigate the effects of earthquakes, type B500B steel with increased ductility shall be used. This may be foregone if it is ensured that the affected areas do not plasticise in the event of an earthquake, without taking into account a behaviour coefficient that reduces the calculated earthquake action (i.e. q = 1.0).’

* Paragraph 8.3.5.3(4), sentence 1 shall be worded as follows:

‘The transverse reinforcement to be provided for in case of seizure breaches shall be measured in accordance with DIN EN 1992-1-1:2011-01, Section 8.7.4.’

* Paragraph 8.4(2), sentence 2 shall be worded as follows:

'The regulations in accordance with DIN EN 1992-1-1:2011-01, Section 9.4.1 (3) shall be taken into account here.'

* Paragraph 8.4(3), sentence 2 shall be worded as follows:

‘The minimum reinforcement grade for shear reinforcement shall be determined pursuant to DIN EN 1992-1-1:2011-01, Section 9.2.2(5) including DIN EN 1992‑1‑1/NA:2013-04, NDP re 9.2.2(5).’

6 Re. Section 9:

* For earthquake checks of steel structures, the references to DIN 18800-1 to 18800-4 and DIN V ENV 1993-1-1 with DASt (Deutscher Ausschuss für Stahlbau [German commission on steel construction]) Guideline 103 shall be replaced by DIN EN 1993-1-1:2010-12 and DIN EN 1993‑1‑1/A1:2014‑07 in conjunction with DIN EN 1993‑1‑1/NA:2018-12 and DIN EN 1993-1-8:2010-12 in conjunction with DIN EN 1993-1-8/NA:2020-11.
* In Paragraph 9.3.4(1), the reference to DIN 18800-7 is replaced by the reference to DIN EN 1090-2:2018-09.
* Ductility classes 2 and 3 may only be used if the maximum value of the tensile yield point fy, max (see DIN 4149:2005-04, Section 9.3.1.1) and the minimum notch impact strength for the steel to be used stated in Paragraph 9.3.1.1(2) are documented in the building documents.
* Section 9.3.5.1(2)(c) shall be worded as follows:

'c) the condition of DIN EN 1993‑1‑1:2010‑12, 6.2.3 (3) shall be met in the case of traction-loaded structural elements at points of hole weakening (Nu,R,d > Npl,R,d)”.

* In Paragraph 9.3.5.4 (7), the reference to Paragraph ‘9.3.3.3 (10’ is replaced by ‘9.3.5.3 (10)’;
* In Paragraph 9.3.5.5 (5), formula (87) is replaced by the following:



* In Paragraph 9.3.5.8 (1), the reference to Sections ‘8 and 11’ is replaced by ‘8 and 9’.

7 Re. Section 10:

* For the seismic qualification of timber structures under this standard, DIN EN 1995-1-1:2010-12 shall apply in conjunction with DIN EN 1995‑1‑1/NA:2013-08.
* Paragraph 10.1 (5) shall be worded as follows:

‘(5) In seismic zones 2 and 3, a combination of structural models of ductility classes 1 and 3 for the two main directions of the structure must not be used in the calculation.’

* Paragraph 10.3 (1) shall be worded as follows:   
  ‘(1) The conditions of DIN EN 1995-1-1:2010-12, Section 3 in conjunction with DIN EN 1995‑1‑1/NA:2013-08 must be adhered to.’
* In Paragraph 10.3 (2), the paragraph marked with the 4th indent is replaced by the following:   
  '– the usability of multi-layer solid wood panels and their connectors must be demonstrated;’
* In Paragraph 10.3 (3), the paragraph marked with the 2nd indent is replaced by the following:  
  ‘- increasing the nail distance with the same load capacity in accordance with DIN EN 1995‑1‑1:2010‑12, Section 9.2.3.2 (4) is not taken into consideration in seismic zones 2 and 3;'
* In Paragraph 10.3 (3), the paragraph marked with the 3rd indent is replaced by the following:

'– the application of glued panels leads to classification in ductility class 1, including in the case of simultaneous use of mechanical connectors.'

* Paragraph 10.3 (6) shall be worded as follows:   
  ‘(6) When using the equations to determine load-bearing capacity of dowel-type connectors and for shearing pursuant to DIN EN 1995-1-1/NA:2013-08, Section NCI on 8.2 to NCI at 8.7, the minimum thickness in timber materials, as permitted in DIN EN 1995‑1‑1/NA:2013‑08 NCI NA.8.2.4 (NA.2) and NCI NA.8.2.5 (NA.4), must be adhered to in seismic zones 2 and 3.’
* Paragraph 10.3 (7) shall be added as follows:   
  ‘(7) The load-bearing capacity of the connectors pursuant to DIN EN 1995-1-1:2010-12, Section 9.2.4.2(5) may not be increased.'

8 Re. Section 11:

Paragraphs 11.7.3 (1), 11.7.3 (2) and 11.7.3 (3) are replaced by the following (Tab. 16 is to be deleted):

‘(1) The rated value Ed of the decisive force variables in the earthquake measurement situation shall be determined using Equation (37). Depending on the existing boundary conditions, either the simplified or the more precise calculation methods under DIN 1053-1:1996-11 may be applied.'

‘(2) When applying the simplified calculation procedure according to DIN 1053-1:1996-11, the rated load capacity Rd may be determined from the permissible stresses increased by 50 %. Explicit mathematical proof of sufficient spatial stiffness may not be dispensed with.’

‘(3) When applying the more precise calculation method, the rated value Ed of the decisive force variables must be determined using γtimes the effects pursuant to DIN 1053-1:1996-11. The decisive safety factor γ may be reduced to 2/3 of the values set out in Section 7 of DIN 1053-1:1996-11.

The calculated strength values specified in DIN 1053-1:1996-11 are to be used as the design load-bearing capacity Rd.’

9 Re. Section 12:

* For the seismic qualification of foundations and support structures according to this standard, DIN 1054:2005‑01 including DIN 1054 Correction 1:2005‑04, DIN 1054 Correction 2:2007‑04, DIN 1054 Correction 3:2008-01 and DIN 1054 Correction 4:2008-10 and DIN 1054/A1:2009‑07.
* Paragraphs 12.1.1(1) and 12.1.1 (2) are worded as follows:

‘(1) Where the proof is conducted based on capacity measurement, Section 7.2.5 must be observed.’

‘(2) The detection under combinations of action referred to in Section 7.2.2 shall include:

(a) proof of sufficient load-bearing capacity for the foundation elements under the building material rules of this standard and the relevant technical standards;

(b) The relevant proof regarding the foundations under DIN 1054:2010-12, DIN 1054/A1:2012-08 and DIN 1054/A2:2015-11. Restrictions concerning the general applicability of verification procedures for the earthquake load case in DIN 1054 or in its accompanying calculation standards need not be observed if there are no unfavourable sold conditions (debris, loose sediment, artificial recharge, etc.).’

* Paragraph 12.1.1 (4) shall be worded as follows:

‘(4) When demonstrating slide stability, the characteristic value of earth resistance (passive earth pressure) may only be used with 30 % maximum of its nominal value.’

* Paragraph 12.2.1 (2) shall be worded as follows:

‘Earth pressure effects during earthquakes can be determined in simplified fashion by replacing the earth pressure value  with.’

\_\_\_\_\_\_\_\_\_\_\_

1 According to national law

# A 2 Fire protection

A 2.1 General health protection requirements for structural works for reasons of fire protection

Under § 3 MBO1 in conjunction with § 14 MBO1, buildings must be positioned, erected, converted and maintained in such manner that

* fire emergence is prevented,
* the spread of fire and smoke (fire expansion) is prevented,
* during a fire it is possible to rescue people and animals and
* effective firefighting is possible.

The provisions of § 5, 26 to 36, 39 to 42, 46 and 47 MBO1 and the requirements in the following Sections elaborate the fire protection requirements in terms of the relevant protection objectives for structural works.

For construction products under current harmonised European specifications whose use has an impact on structural works in terms of compliance with fire protection requirements (A 2.1.1 et seq.), classifications of performance data and related usability and execution conditions are included in the Technical Rule included in ser. No A 2.2.1.2.

A 2.1.1 Requirements on the accessibility of buildings

In order to carry out extinguishing and rescue operations, provision must be made for foot and vehicle access for the fire brigade, as well as installation and movement areas on the land, in accordance with § 5 MBO1; the specificities of the Technical Rule referred to in number A 2.2.1.1 shall be observed.

In open carriageways and passageways through which the only escape route to public thoroughfares leads or the accessibility for the fire service is ensured, only non-combustible insulating layers are permitted on supports, walls and ceilings.

A 2.1.2 Requirements for the fire behaviour of building materials and building components

A 2.1.2.1 General information

In order to meet the basic requirements, general requirements for fire behaviour are formulated in § 26(1) MBO 1.

The Technical Rule included in ser. No A 2.2.1.2 must be observed to meet the following requirements. This also applies to the assembly of building materials.

A 2.1.2.2 Non-combustible

When used in structural works, it must be ensured that the parts of structural works do not contribute to the fire, specifically a developing or fully developed fire. Depending on the use, there shall be no or limited ignition, the least possible smoke development, no progressive glowing and/or smouldering and no burning particles or debris; the type of structural elements, dimensional stability and melting point/melting temperature and raw density shall be taken into account.

Building materials are not combustible if they permanently comply with the criteria specified in DIN 4102-1:1998-05, Section 5.1 or 5.2 during a fire, if required, with the melting point information of at least 1 000°C pursuant to DIN 4102-17: 2017-12.

A 2.1.2.3 Flame-resistant

When used in structural works, it must be ensured that the parts of the structural works make only a limited contribution to the fire and that there is only a limited propagation during and when the fire effect is eliminated.

Depending on the use of the component, ignition shall occur only after flames have been present for a specific time, only when smoke reaches a specific temperature, only where there is a limited release of energy, a defined amount of smoke development, no self-sustained continuation of the fire, no progressive glowing and/or smouldering, and – where applicable – no burning particles or debris.

With the exception of external wall cladding and floor coverings, the fire effect referred to in Section 6.1.1 a of DIN 4102-1:1998-05 shall be assumed to be the fire of an object in a room; in the case of external wall cladding, the fire effect referred to in Section 6.1.1(b) of DIN 4102-1:1998-05 from a wall opening (see also A 2.1.5), in the case of floor coverings, the fire effect referred to in Section 6.1.1(c) of DIN 4102-1:1998-05 is to be assumed from a fire situation in which flames reach a neighbouring room from the door opening and where horizontal flame propagation and smoke development are safe.

Building materials are deemed flame-resistant if they permanently meet the criteria specified according to DIN 4102‑1:1998-05, Section 6.1 under the effects of a fire.

Parts of buildings that should not produce any falling burning particles or debris must also fulfil the criteria pursuant to DIN 4102‑16:2021-01, Section 10.3.

A 2.1.2.4 Normal flammability

For use in buildings in case of exposure to an incipient fire it must be ensured that parts of buildings can onlycontribute to the fire to a limited extent; where applicable, no falling burning debris or particles should be produced. The fire effect shall be assumed as a fire effect in accordance with Section 6.2.1 of DIN 4102-01:1998-05.

Building materials are deemed normal flammability if they permanently meet the criteria specified according to DIN 4102‑1:1998-05, Section 6.2 under the effects of a fire.

Parts of buildings that should not produce any falling burning debris or particles must also fulfil the criteria pursuant to DIN 4102-1:1998-05, Section 6.2.6

If a component is to be used for the structural installation that does not meet at least the requirement ‘normal flammability’ (lightly flammable), § 26(1) sentence 2 MBO1 must be complied with.

A 2.1.3 Requirements on the fire resistance of parts of buildings

A 2.1.3.1 General information

For the fulfilment of the basic requirements in accordance with § 3 in conjunction with § 14 MBO1, general requirements for the fire resistance of parts of buildings are set out in § 26(2) MBO1 and a distinction is made between:

The fire resistance of structural elements is essentially based on the applicable system of building inspection requirements (building classes, height of storeys, type of building). The classifications in fire resistance classes are determined on the basis of fire tests according to the standard temperature-time curve (Einheitstemperaturzeitkurve [ETK]). Fire-resistance classes follow from the Technical Rule described under Paragraph A 2.2.1.2.

In the case of load-bearing and reinforcing structural elements of structural systems, the fire resistance refers to their stability in the event of fire. In the case of room-closing structural elements, such as walls and ceilings, the fire resistance also refers to their resistance to fire propagation (room-enclosing fire resistance — hereinafter: closing off the room).

In terms of their fire characteristics, fire-resistant structural elements must not contribute more to the fire than specified in § 26(2) MBO1.

Where specific fire protection requirements and fire protection values of the building material class apply, coatings applied subsequently to structural elements up to a thickness of 0.5 mm remain disregarded, where the coatings are fully applied without hollow spaces on a non-combustible substrate.

Fire-resistant structural elements are divided into:

1. fire-resistant structural elements:

Load-bearing and reinforced parts must consist of non-combustible building materials. Space-enclosing structural elements must additionally have a layer of non-combustible building materials that is continuous in the component plane.

1. Highly fire-retardant structural elements:

Where structural and reinforced parts consist of combustible building materials, they must have fire-protective cladding made from non-combustible building materials (fire protective cladding) and, where available, non-combustible insulation materials. The fire-protective cladding must prevent

* burning of the supporting and reinforced parts,
* the introduction of fire and smoke into wall and ceiling structural elements through joints, installations or fittings and the spread of fire within these structural elements,
* the transmission of fire via connecting joints of space-enclosing structural elements into adjacent units or rooms and
* any significant spread of smoke through connecting joints (see A 2.1.3.3.3)

.

Where space-enclosing high fire-retardant structural elements in their load-bearing and reinforced parts are made of non-combustible building materials and a continuous layer of non-combustible building materials is arranged at the component level, no covering designed to protect against fire is required; they can also consist of non-combustible building materials as a whole.

1. fire-retardant structural elements:

Load-bearing and reinforcing structural elements can be made of combustible building materials. This also applies to space-enclosing structural elements.

1. Structural elements according to § 26(2) sentence 4 MBO1, which may consist of combustible building materials and do not have cavities or filled cavities or insulating materials inside. Load-bearing and reinforcing structural elements can be made of combustible building materials. This also applies to space-enclosing structural elements.
2. Fire-resistant structural elements for 120 minutes of stability in the event of fire and room closure;  
   load-bearing and reinforcing structural elements must be made of non-combustible building materials. This also applies to space-enclosing structural elements.

A 2.1.3.2 Requirements for stability in the event of fire

A 2.1.3.2.1 General information

To meet the requirements of § 12 MBO1, load-bearing parts of buildings must remain stable even if a fire develops over a specific period of time.

Cross-Section modifications and penetrations – including those performed subsequently – and deformations due to fire exposure must be taken into account insofar as they could have an impact on stability.

A 2.1.3.2.2 Fire-resistant

The stability must be ensured for at least 90 minutes in case of fire exposure according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4.

A 2.1.3.2.3 Highly fire-retardant

The stability must be ensured for at least 60 minutes in case of fire exposure according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4.

A 2.1.3.2.4 Fire-retardant

The stability must be ensured for at least 30 minutes in case of fire exposure according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4.

A 2.1.3.2.5 Fire resistance of 120 minutes after A 2.1.3.1 letter (e)

The stability must be ensured for at least 120 minutes in case of fire exposure according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4.

A 2.1.3.2.6 Fire resistance of 90 minutes for structural elements according to A 2.1.3.1 letter (d)

The stability must be ensured for at least 90 minutes in case of fire exposure according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4.

A 2.1.3.2.7 Fire resistance of 60 minutes for structural elements according to A 2.1.3.1 letter (d)

The stability must be ensured for at least 60 minutes in case of fire exposure according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4.

A 2.1.3.3 Space barrier requirements in the event of fire

A 2.1.3.3.1 General information

Parts of structural works are space-enclosing fire-resistant if they permanently prevent fire propagation for at least a specified period of time, if the space enclosure is not impaired even in the area of connections to adjacent parts of structural works and if there is no significant smoke development and if the side not exposed to fire does not show any significant smoke development or droplets of particles from structural elements. Substantial falling or dripping of structural elements on the side away from the fire is not deemed to be present if the size of such structural elements does not exceed 10 cm in length or width. Explosive spalling of these structural elements must not occur.

The same applies to closures and other closures of openings.

Unless otherwise specified, fire resistance refers to any possible direction of fire exposure (e.g. inward, outward, downward or upward).

Space-enclosing parts of the structure must each be adjacent to other parts of the structure that ensure room enclosure for at least the same amount of time.

If structural element boundaries that must be space-enclosing structural elements without fire resistance (e.g. exterior wall or roof), these space-enclosing structural elements must remain stable over the time required in the event of fire exposure. Cross-sectional changes and penetrations — including retrospective nature — as well as deformations during fire exposure shall be taken into account, insofar as they may have an influence on the closure of the room.

Openings in space-enclosing parts are not permitted, unless otherwise specified in § 28 to § 32, § 35, § 36, § 39 and § 45 MBO1.

Where light-permeable surfaces may be used as fire protection glazing in space-enclosing walls that do not prevent thermal radiation from passing through, they must prevent the spread of fire and smoke in accordance with the fire resistance period of space-enclosing walls for the minimum required period of time according to DIN 4102‑13:1990-05, Section 6.1, and comply with the criteria in accordance with DIN 4102‑13:1990‑05. They may be created only in places where there are no concerns in terms of rescuing persons or effective firefighting. To prevent the spread of fire, openings in these fire protection glazings are not permitted. The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements. For the planning, designing and execution of fire protection glazing, there are no technical best practices with regard to the building inspection requirements, and proof pursuant to § 16a MBO1 is required.

If overflow openings are made in space-enclosing walls, the closures of such openings must be fitted with a smoke-triggered device and prevent the passage of fire and smoke according to the fire resistance of the space-enclosing walls, at least based on a standard fire as defined in DIN 4102‑2:1977-09. The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements. In the absence of a technical best practice for the planning, designing and execution using these closures, proof in accordance with § 16a MBO1 is required.

Joints of the structural elements must remain closed to ensure closure of the room during the fire. This requirement can be met with non-combustible mineral building materials (such as mortar, concrete) or mineral insulating materials with a melting point of at least 1 000°C according to DIN 4102-17:2017-12 as well as with products that securely seal the residual cross-section in case of fire exposure.

A 2.1.3.3.2 Fire-resistant

The room closure must be ensured for at least 90 minutes in case of fire according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4. The stability of non-load-bearing structural elements under their own weight in case of fire must be demonstrated. In the observations on smoke development according to DIN 4102‑2:1977‑09, Section 8.6, it must be established that at most low smoke development has been observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

There is deemed to be a continuous layer in the component plane if it is placed perpendicular to the direction of fire impact over the entirety of the space-enclosing part and does not itself contribute to the fire (i.e. is non-combustible).

Structural elements of space-enclosing structural elements which are not load-bearing and reinforced parts and not to the continuous layer of the component shall be at least normal flammability.

A 2.1.3.3.3 Highly fire-retardant

The room closure must be ensured for at least 60 minutes in case of fire according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4. The stability of non-load-bearing structural elements under their own weight in case of fire must be demonstrated.

In the observations on smoke development according to DIN 4102‑2:1977‑09, Section 8.6, it must be established that at most low smoke development has been observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

For highly fire-retardant space-enclosing structural elements with combustible load-bearing and reinforced parts made of wood, the detailed specifications of the Technical Rule included in ser. No A 2.2.1.4 must be observed.

A 2.1.3.3.4 Fire-retardant

The room closure must be ensured in case of fire according to the ETK in accordance with DIN 4102‑ 2:1977‑ 09, Section 6.2.4., for at least 30 minutes. The stability of non-load-bearing structural elements under their own weight in case of fire must be demonstrated. In the observations on smoke development according to DIN 4102‑2:1977‑09, Section 8.6, it must be established that at most low smoke development has been observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

A 2.1.3.3.5 Fire resistance of 120 minutes after A 2.1.3.1 letter (e)

The room closure must be ensured in case of fire according to the ETK in accordance with DIN 4102‑ 2:1977‑ 09, Section 6.2.4, for at least 120 minutes. The stability of non-load-bearing structural elements under their own weight in case of fire must be demonstrated. In the observations on smoke development according to DIN 4102‑2:1977‑09, Section 8.6, it must be established that at most low smoke development has been observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

A 2.1.3.3.6 Fire resistance of 90 minutes for structural elements according to A 2.1.3.1 letter (d)

The room closure must be ensured for at least 90 minutes in case of fire according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4. The stability of non-load-bearing structural elements under their own weight in case of fire must be demonstrated. In the observations on smoke development according to DIN 4102‑2:1977‑09, Section 8.6, it must be established that at most low smoke development has been observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

A 2.1.3.3.7 Fire resistance of 60 minutes for structural elements according to A 2.1.3.1 letter (d)

The room closure must be ensured for at least 60 minutes in case of fire according to the ETK in accordance with DIN 4102‑2:1977-09, Section 6.2.4. The stability of non-load-bearing structural elements under their own weight in case of fire must be demonstrated. In the observations on smoke development according to DIN 4102‑2:1977‑09, Section 8.6, it must be established that at most low smoke development has been observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

A 2.1.4 Load-bearing and reinforcing structural elements

Depending on the building class, the relevant requirements arise from § 27 MBO 1.

Parts of buildings that bear (support) loads or stiffen parts of buildings must remain stable under this load over a specific period in case of fire as per Section 2.1.3.2.

If supporting parts of the structural installation are made of concrete, steel, aluminium, wood or masonry, the Technical Rules for the design of the structure for the event of fire in A 1.2.3, A 1.2.4, A 1.2.5 and A 1.2.6 shall be observed. If stability in case of fire is demonstrated mathematically, the following applies to:

* load-bearing structural elements that must be fire-resistant, load-bearing capacity must be mathematically demonstrated for at least 90 minutes under fire exposure using the standard temperature-time curve,
* load-bearing structural elements that must be highly fire-retardant, load-bearing capacity must be mathematically demonstrated for at least 60 minutes under fire exposure using the standard temperature-time curve,
* load-bearing structural elements that must be fire-retardant, load-bearing capacity must be mathematically demonstrated for at least 30 minutes under fire exposure using the standard temperature-time curve, and
* load-bearing structural elements that must have fire resistance of 120 minutes, load-bearing capacity must be mathematically demonstrated for at least 120 minutes under fire exposure using the standard temperature-time curve
* load-bearing structural elements referred to in A 2.1.3.1 letter (d) which must have a fire resistance of 90 minutes, the load-bearing capacity shall be calculated for at least 90 minutes under fire exposure using the standard temperature-time curve and
* load-bearing structural elements referred to in A 2.1.3.1 letter (d) which must have a fire resistance of 60 minutes, the load-bearing capacity shall be calculated for at least 60 minutes under fire exposure using the standard temperature-time curve.

If load-bearing and reinforced parts of structural works are designed using natural fire models, Appendix A 1.2.1/3 must be observed. Natural fire models shall not be used for load-bearing structural elements which have a fire resistance of 90 minutes or 60 minutes in accordance with Section 5 of the Technical Rule referred to in ser. No A.2.2.1.4.

For highly fire-retardant load-bearing and reinforcing structural elements with combustible wood parts and fire-resistant structural elements made of combustible building materials according to A 2.1.3.1 letter (d), the specifications of the Technical Rule referred under ser. No A 2.2.1.4 shall be observed.

A component that is only used for reinforcing may also display other fire characteristics than the fire-resistant component it is reinforcing if the entire system has sufficient fire resistance.

A 2.1.5 Outer walls

Depending on the building class, the relevant requirements arise from § 28 MBO 1.

Non-supporting outer walls are structural elements that do not remove vertical loads, other than their own weight, and are only designed for the absorption of the net weight and wind loads.

Openings in external walls of usage units to open corridors according to § 36(5) MBO1 must have sealing doors. Openings of necessary stairwells or necessary landings adjacent to the open corridor must have smoke-tight and self-closing closures. Openings of exterior emergency stairwells on high-rise buildings towards open corridors must have smoke-tight and self-closing closures, openings in exterior walls of open corridors in high-rise buildings to utility units must have fire-retardant, smoke-tight and self-closing closures. In addition to the requirements of A 2.1.6, the requirements for the outdoor climate apply. The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements.

By way of deviation from the specifications of Section A 2.1.3.3.4 (re. § 26 MBO1), for fire impact from the outside to the inside, failure may not occur earlier than 30 minutes in accordance with DIN 4102‑ 3:1977‑09, Section 5.3.2 (decreased standard time-temperature curve).

If surfaces of exterior walls and exterior wall cladding, except for substructures in accordance with § 28(3) sentence 1 Clause 2, MBO1, must be flame-resistant overall, then the same applies to the individual structural elements thereof.

For flame-resistant external wall cladding, the criteria for fire exposure according to DIN 4102‑20:2017‑10, Section 4.2 must be met.

Exterior wall cladding in the form of an external thermal insulation composite system (ETICS) with EPS insulation materials meets the flame-retardant requirements if stable and dimensionally stable, non-combustible constructions are arranged at existing openings in the exterior wall in the area of​the lintels above the opening, even in the event of a fire. This can be dispensed with if horizontally arranged, stable and dimensionally stable, non-combustible constructions are arranged even in the event of fire exposure.

For exterior wall cladding designed as a thermal insulation composite system with EPS insulating materials, fire exposure from outdoors directly affecting the lower area of the façade must also be taken into account. For this purpose, suitable non-combustible constructive measures must be put in place so that the protection objective according to § 26(1) sentence 1 MBO1 is fulfilled; otherwise, the Technical Rule included in ser. No A 2.2.1.5 must be observed.

If cladding with normal flammability building materials is permitted for exterior building walls, light-flammable building materials may only be used if they are permanently connected in conjunction with other building materials pursuant to § 26(1) MBO1. § 26 Para. 1 sentence 2 Clause 2, MBO1 is not applicable to exterior wall cladding if accessibility is ensured or there is risk of damage.

In the case of exterior walls with rear-ventilated cladding which have cross-storey cavities or which are carried over fire walls, other than those referred to in Section 6 of the Technical Rule referred to in ser. No A 2.2.1.4, supplementary precautions shall be taken to limit the spread of fire even if they consist of non-combustible building materials and the Technical Rule referred to in ser. No A 2.2.1.6 shall be complied with.

For external wall cladding of wood or wood-based materials for buildings of building classes 4 or 5, Section 6 of the Technical Rule referred to in ser. No A 2.2.1.4 shall be observed.

A 2.1.6 Partition walls

Depending on the building class, the relevant requirements arise from § 29 and 45 MBO 1.

Depending on how they are used in the building structure, in case of fire, partition walls must ensure a space barrier as per Section A 2.1.3.3 for a sufficient period of time and be stable as loadbearing partitions as per Section A 2.1.3.2. pursuant to § 29 MBO1.

Connections including those of joints, pipe penetrations and cross-section reductions for the installation of sockets, switch boxes, line splitters etc. must not adversely affect the space barrier and, for loadbearing partitions, stability.

Doors for openings in partition walls pursuant to § 29 Section 5 Clause 2 and 45 No. 2 MBO1 must be fire resistant (continuous fire-retardant, sealing and self-closing closures). The barriers are self-closing if they have suitable closing devices that automatically close the barrier by means of mechanically stored energy. These barriers are considered doors if they are not wider and not higher than 2.50 m (see DIN 4102-18:1991-03, Section 2.3), including existing side panels and skylights. Larger closures are gates. Regarding usage in rescue routes, reference is made to the Technical Rule referred to in ser. No A 2.2.1.2, Section 5.1.6, No. 2.

The barriers must ensure the room closure and the tightness against fire from each side according to DIN 4102‑2:1977‑09, Section 6.2.4, for at least 30 minutes, they must meet the criteria according to DIN 4102-5:1977-09, Sections 5.2.2 to 5.2.8, and they must comply with the criteria of the continuous function according to DIN 4102-18:1991-03. In the case of doors, the self-closing property of at least 200 000 closing operations (test cycles) is assumed; this also applies to doors in gates (sliding doors). In the case of barriers other than doors, self-closing property is assumed to be at least 10,000 closing operations. The observation of smoke development according to DIN 4102-5:1977-09 must have led to the finding that at most a small amount of smoke was observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

These doors and gates as fire-retardant closures may consist of at least normal flammability building materials; they also include all accessories and necessary fasteners. Fire protection barriers must have adequate locks with an adequate latch bolt in case of fire to prevent opening and spread of fire if pressure changes due to fire.

The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements.

In order for people to save themselves by means of rescue routes and for firefighters to reach the site or to rescue people, a fire protection barrier must be able to be opened manually in the form of a door in the course of these rescue routes until it is impinged by fire. These requirements also apply to fire protection locks in the form of a sliding, lifting or rolling door for example, which have relatively long opening and closing times, using auxiliary power where necessary, meaning that an additional door must be provided for these fire protection closures for rescue purposes.

These fire protection closures should be kept closed as intended. A fire-protection closure may be kept open if it is provided with a device that ensures the immediate and safe closing of the fire protection closure already in the event of smoke exposure and where necessary in the event of heat exposure, in order to ensure the closure of the partition wall.

A locking mechanism is a system consisting of devices and/or combinations thereof that can be used to disable the operation of closing devices. When the activation mechanism is triggered in case of fire, due to a malfunction or through manual operation, any locks that were kept open shall be immediately cleared for closing. A locking mechanism shall consist of at least:

* a fire alarm, in the form of a smoke and, where necessary, heat alarm,
* a signal-processing activation device,
* an energy supply connected to a power grid,
* a locking device connected to the power supply and
* a manual activation button.

In the case of locking systems on swing-wing doors, the detection of which can be removed by pulling with low force may be waived, provided that the proof of applicability permits this.

In the absence of a technical best practice for the planning, designing and execution when using locking mechanisms, a proof pursuant to § 16a MBO1 is required.

Self-closing barriers may be opened and closed by an electric motor only if the drive systems meet the following requirements.

The drive system required for the electromotive opening and closing of locks shall be a system consisting of at least:

* a drive with signal-processing drive control,
* an energy supply in addition to the general power supply,
* a fire detector as a smoke detector or, where necessary, as a heat detector; and
* a manual activation button.

The propulsion system shall also be capable of opening the closure if necessary and to close it immediately without delay and safely in the event of a fire, fault or manual release. After closing, only manual opening shall be permitted. For the planning, design and execution of drive systems for the electromotive (powered) opening and closing of barriers, except for construction products pursuant to C 2.6.10 and C 2.6.13, there is no technical best practice with respect to building inspection requirements, so proof pursuant to § 16a MBO1 is required.

Partition walls made of fire-resistant glazings must satisfy the requirements for room-enclosing structural elements in case of exposure as defined in DIN 4102-13:1990-05, Section 6.1 with respect to the minimum time and further criteria pursuant to DIN 4102-13:1990-05, Sections 6.2 and 6.3.1. In the observations on smoke development according to DIN 4102‑13:1990‑05, Section 8.1, it must be established that at most low smoke development has been observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements. To ensure that the partition wall is sealed off, the closures of necessary openings in a partition wall designed as fire protection glazing must correspond to the fire resistance period of the fire protection glazing; in addition, the aforementioned requirements for fire protection closures apply.

The requirements placed on doors and gates as fire-protection closures shall also apply, unless otherwise specified, to closures required by model regulations based on the MBO1 or other technical construction regulations of the MVV TB. With regard to the fire resistance duration and the smoke tightness, the above-mentioned model regulations are also decisive due to the MBO1 and the technical construction regulations of the MVV TB.

A 2.1.7 Firewalls and walls permissible in place of firewalls

Depending on the building class, the relevant requirements arise from § 30 MBO 1.

Firewalls of structural works may not contribute to the fire in accordance with § 30(3) sentence 1 MBO1 to ensure the protection objectives. They must be made of non-combustible building materials. By way of deviation from § 28(3) MBO1, exterior wall cladding including insulation materials and substructures according to § 30(7) sentence 3 MBO1 must be non-combustible on building walls.

Firewalls must also be stable and room-enclosing in the event that additional mechanical loads from parts of the building structure failing in the event of fire have an effect on these walls (impact). This also applies to walls used instead of firewalls, unless otherwise specified.

Firewalls are only deemed stable and space-enclosing in case of fire if they meet the requirements of Sections A 2.1.3.2 and A 2.1.3.3 without additional measures as well as the criteria of DIN 4102‑3:1977-09, Sections 4.2.1 to 4.2.4. The observation of smoke development according to DIN 4102-3:1977‑09, Section 5.4, must have led to the finding that at most a small amount of smoke was observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

Walls instead of firewalls according to § 30(3) sentence 2 No. 1 MBO1

* + Highly fire-retardant walls as defined in Section A 2.1.3.3.3; or
  + Walls with a fire resistance of 60 minutes according to Section A2.1.3.3.7,

in the event of fire, they are only stable and room-enclosing if they meet the requirements of Sections A 2.1.3.2 and A 2.1.3.3 without additional measures and comply with the criteria of DIN 4102‑3:1977-09, Sections 4.2.2 to 4.2.4, but only for a period of 60 minutes. For highly fire-retardant walls, the requirements of Section A 2.1.3.1. sentence 6 letter (b) apply in addition. For walls referred to in Section A 2.1.3.3.7, the requirements of Section 5.2 of the Technical Rule published under Ser. number A 2.2.1.4 apply in addition. The observation of smoke development according to DIN 4102-3:1977-09, Section 5.4, must have led to the finding that at most a small amount of smoke was observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

For other walls instead of firewalls according to § 30(3) sentence 2 Numbers 2 and 3 MBO1, the requirements according to Section A 2.1.6 shall be observed.

Connections in other structural elements in firewalls and walls used instead of firewalls, including joints, pipe penetrations and cross-section reductions for the installation of sockets, switch boxes, line splitters, etc. must not adversely affect the space barrier or stability.

In internal firewalls and internal walls used instead of firewalls, openings are only allowed for doors, gates and closures for pipe passages and conveyor systems pursuant to § 30(8) MBO1; they shall be permanently sealed and self-closing in the fire resistance period corresponding to the wall and shall be limited to the number and size required for use, in order to ensure the room closure of these walls. The requirements under Section A 2.1.6 also apply.

For glazing pursuant to § 30(9) MBO1, these requirements are fulfilled with fire-resistant glazing if during a fire pursuant to DIN 4102-13:1990-05, Section 6.1, the spread of fire and smoke and the passage of heat radiation is prevented for the minimum required time and the criteria pursuant to DIN 4102‑13:1990-05 are satisfied. In the observations on smoke development according to DIN 4102‑13:1990‑05, Section 8.1, it must be established that at most low smoke development has been observed (no surface smoke emission from the component surface, only single wisps of smoke, including from joints).

The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements.

A 2.1.8 Ceilings

Depending on the building class, the relevant requirements arise from § 31 MBO 1.

Ceilings between storeys must remain stable and space-enclosing for a sufficient amount of time in buildings pursuant to § 31 MBO1 and must meet the requirements of Sections A 2.1.3.2 and A 2.1.3.3.

Connections, including joints, to other structural elements, including external walls, shall be designed in such a way as to ensure stability and room enclosure in order to prevent the spread of fire.

If openings in ceilings according to § 31 Section 4 Number 3 MBO1 must have permanently sealing and self-closing closures (flaps, sliding panes, etc.) to ensure the fire resistance of the ceiling, then the enclosing function of the ceiling must be ensured. The requirements under Section A 2.1.6 also apply, including those concerning keeping this fire protection closure open; concerning the continuous function, 10 000 closing operations are sufficient. The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements.

A 2.1.9 Roofs

Depending on the building class, the relevant requirements arise from § 32 MBO1.

The roof covering as part of the building structure consists of the rainwater-draining layer (roof membrane), including parts used for thermal insulation and to protect against the penetration of moisture, parts needed to transfer load to the parts bearing the roof covering load (insulating materials, moisture barriers, underlays, battens). The roofing also includes translucent surfaces and closures of openings and their connections to the roof.

Unless otherwise permitted in § 32(3) MBO1, roofing must withstand fire exposure for a sufficient length of time in the event of fire from the outside into the physical structure through heat radiation or burning parts from other physical structures and the spread of fire to the physical structure (hard roofing pursuant to § 32(1) MBO1). The roofing may be damaged only to a limited extent both vertically and horizontally and may contribute only to a limited extent to the fire process itself. The roof inclinations must be taken into account because the fire characteristics of roofs can vary according to roof inclination.

This requirement is met when non-green roofs are used that at a minimum meet the criteria set forth in DIN 4102-7:2018-11, Section 4 letters (a) to (e) during a fire as set out in DIN 4102-7:2018-11, Section 6.1 to 6.5 in consideration of Section 7.

Green roofs are considered to be hard roofs if they meet the requirements of the Technical Rule under ser. No A 2.2.1.3.

For specific combustible translucent surfaces or barriers of openings for which there is no proof of hard roofing, use as roofing is permitted without this leading to the expectation that the prevention of fire formation or spread of fire in or on the roof is impaired if:

* the sum of the subsurfaces does not exceed 30% of the roof area,
* the subsurfaces are at a distance of at least 5 m from firewalls or directly adjacent higher buildings or parts of buildings

and the subsurfaces,

* the lighting strips are maximum 2 m wide and 20 m long, are at least 2 m from each other and from the roof edges or
* the dome lights have an area of not more than 6 m² each, are at least 1 m from each other and from the roof edges and are at least 2 m from lighting strips made of combustible building materials.

To prevent fire spreading to parts of the building structure via roof installations or superstructures such as heat extraction surfaces or smoke and heat extraction devices, these roof installations or super structures must be at a sufficient distance from combustible parts, or these parts must be non-combustible pursuant to § 32(5) MBO1. Heat extraction surfaces or smoke and heat extraction devices are considered roof superstructures in accordance with § 32(5) sentence 1 MBO1.

A 2.1.10 Stairs

Depending on the building class, the relevant requirements arise from § 34 MBO 1.

The load-bearing parts of necessary stairs in buildings in accordance with § 34(4) sentence 1 MBO1 must be able to withstand the effects as referred to in A 2.1.3.2 to enable effective firefighting operations.

A 2.1.11 Necessary stairwells

Depending on the building class, the relevant requirements arise from § 35 MBO 1.

Sufficiently long use in case of fire according to § 35(1) sentence 2 MBO1 means that persons present in the building continue to be able to escape until smoke has entered the necessary stairwell. If necessary, stairwells are required, they must have walls and ceilings which are sufficiently long, room-enclosing and stable, because they are also access paths for the fire brigade according to § 35 Section 4 MBO1. This also applies to required vestibules of emergency stairwells. Necessary stairwells shall, depending on building class, ensure stability and enclosing function in accordance with the requirements of Sections A 2.1.3.2 and A 2.1.3.3. The walls must – where necessary – satisfy the requirements of Section A 2.1.7 for interior firewalls.

Conclusion according to § 35(6) sentence 1 No. 1 MBO 1 of door openings in the walls of necessary stair rooms must be permanently fire-retardant, smoke-proof and self-closing, so that the prevention of fire propagation is not endangered and the passage of smoke in accordance with DIN 18095‑ 2:1991‑ 03 in the stair room is prevented during the period of exposure specified there; the room enclosure must be secured and the criteria of continuous function in accordance with DIN 4102‑18:1991-03 must be fulfilled. These fire protection closures should be kept closed as intended. The requirements under Section A 2.1.6 also apply. The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements.

Openings in the walls of necessary stairways to necessary corridors shall have permanently smoke-tight and self-closing closures (smoke protection closures) in order to prevent the passage of smoke in accordance with DIN 18095‑ 2:1991‑ 03 into the stair room during the period of exposure specified therein; the room must be securely closed. The smoke barriers must meet the criteria of DIN 18095‑1:1988‑12 and the criteria of the permanent function according to DIN 4102‑18:1991-03. These smoke barriers should be kept closed as intended. They may be kept open if they are fitted with devices which, in the event of exposure to smoke, permanently ensure immediate and safe closing (locking mechanism); in addition, the requirements of A 2.1.6. apply. In order to fulfil the requirements for the barriers, the Technical Rule included in ser. No A 2.2.1.2 must be observed.

Door openings according to § 35(6) sentence 1 No. 3 MBO 1 must have permanently sealed and self-closing accounts. This requirement is met with structural elements (doors) that ensure sealing when smoke is present in the stairwell, provided there are no pressure differences between the stairwell and the area to be closed off beyond those due to normal climate thermal lift and the smoke has not dropped to the bottom of the door. A door is sealed if it meets the requirements of the Technical Rule referred to in Section 5.4 of ser. No A 2.2.1.2. The doors are permanently self-closing if the permanent function criteria of DIN 4102‑18:1991‑03 is met.

The space barriers of walls of necessary stairwells or walls of rooms between a necessary stairwell and the exit to the outside is ensured for openings to necessary corridors only if they have smoke-tight and self-closing barriers.

A 2.1.12 Required corridors and open corridors

Depending on the building class, the relevant requirements arise from § 36 MBO 1.

Taking into account the protection objective according to § 36(1) MBO1, the walls of required corridors should have only such door openings as are necessary for their use. The doors must close tightly as per § 36(4) sentence 4 MBO1 through constructive measures on the doors to hinder the entry of smoke over a specific period of time in case of fire in a unit or an adjoining unit. This requirement is considered sufficient, because it is assumed that such non-self-closing doors will be kept closed. Doors are deemed to close tightly if the requirements for the construction of the door leaf and the seal according to Section 2.1.11 are met.

For open doors or doors closed after burn-through, the spread of fire must be inhibited on the ceiling and wall surfaces of the necessary corridor so as not to hamper rescue and firefighting measures. In the event that the ceilings and walls are made of combustible building materials, cladding made of non-combustible building materials of sufficient thickness is required, e.g. in the form of a 12.5 mm thick plasterboard.

If walls of necessary corridors are to be designed as fire-resistant glazing, the requirements for fire-resistant glazing are met if a during a fire pursuant to DIN 4102‑13:1990‑05, Section 6.1, the spread of fire and smoke and the passage of heat radiation is prevented over the minimum period of time and the criteria pursuant to DIN 4102-13:1990-05 are satisfied. Notwithstanding § 36(4) sentence 4 MBO1, in order to ensure the space barrier of fire-resistant glazing, the doors of the fire-resistant glazing must be smoke-tight and self-closing and correspond to the fire resistance of the fire-resistant glazing.

Smoke protection closures within necessary hallways according to § 36(3) MBO 1 may be executed high and in corridor width and have fixed side panels and skylights.

In addition, the requirements of Section A 2.1.6 and A 2.1.11 apply in the case of fire and smoke protection seals, also with regard to the keeping of these smoke protection seals.

The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements.

A 2.1.13 Shaft walls and landing doors for lifts

Depending on the building class, the relevant requirements arise from § 39 MBO 1.

To achieve the protection objectives, in the event of fire the lift shaft walls must ensure the space barrier for a sufficient period of time, remain stable where necessary and meet the requirements of Sections A 2.1.3.2 and A 2.1.3.3. Shaft walls made of combustible building materials shall have cladding made of non-combustible building materials of sufficient thickness (e.g. in the form of a 12.5 mm thick plasterboard) on the shaft side so that fire does not propagate in case of open landing doors or after closed doors on the surfaces of the shaft walls have been burned through.

Lift doors must essentially consist of non-combustible building materials to fulfil the protection objective according to § 39(1) MBO1 and the requirements of § 39(2) sentence 2 MBO1.

The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements.

A 2.1.14 Service shafts and ducts, system floors and electrical service areas

In buildings, service shafts and ducts as per § 40 MBO1 may only pass through space-enclosing structural elements with a specified fire resistance requirement if there is no risk of the spread of fire for a sufficient period of time or if appropriate precautions have been taken to counteract it, and there are no more or larger openings than necessary. The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements.

Where installations pass through cavities of system floors in buildings, the Technical Rule under ser. No A 2.2.1.9 must be observed; regardless of actual traffic loads, a traffic load of at least 1.5 kN/m 2 shall be taken into account in the design of the fire resistance period in the case of raised floors. For fire tests, a traffic load of 1.5 kN/m² must also be taken into account. The Technical Rule included in ser. No A 2.2.1.2 must be observed in order to meet these requirements.

To protect other areas from fire from electrical service areas for transformers or switchgears, the Technical Rule under ser. No A 2.2.1.10 must be observed.

A 2.1.15 Installations and construction products of technical building equipment

A 2.1.15.1 General information

The building approval requirements of the MBO1, the M-GarVO and special construction regulations 1 due to the MBO 1 to the installations and construction products of the technical building equipment are specified by the technical rules referred to in serial numbers A 2.2.1.8, A 2.2.1.9, A 2.2.1.10, A 2.2.1.11, A 2.2.1.12 and A 2.2.1.16. In order to fulfil the requirements, the Technical Rule under ser. No A 2.2.1.2 must also be observed.

Otherwise, the requirements of the following numbers A 2.1.15.2 to 2.1.15.6 must also be observed.

A 2.1.15.2 Lightning protection systems

Lightning protection systems pursuant to § 46 MBO1 should prevent the emergence of fire in and on the building structure and prevent the endangerment of people through lightning strikes (exterior lightning protection).

Where technical safety devices and systems are present, they must protect against the effects of lightning currents and voltages on installations and on electrical and electronic parts of the other devices and systems in the building structure in case of a direct or indirect lightning strike (additional interior lightning protection).

To this end, measures must be taken against overvoltage and dangerous spark formation.

A 2.1.15.3 Fire control system for lifts

The fire control system must ensure that lifts immediately go to a storey with exits to the outside, or the next higher or lower storey that is not affected by the fire and shut down there with the doors open.

Fire control systems shall consist at least of automatic fire detectors for fire detection on each storey, the automatic alarm transmission devices of the fire alarm and the evaluation and control system for the lift. The fire control system may also be automatically activated by an automatic fire alarm system.

A 2.1.15.4 Heat extraction devices

Where heat extraction devices are required, fire propagation should be counteracted in view of a full fire in certain areas of a structural installation in order to prevent the ignition of combustible parts of the structural installation outside the actual fire area by means of combustion gases. For existing structural elements in the fire area, thermal effects must be reduced so that stability or the space barrier remains intact in case of fire. This can also support effective extinguishing work.

Requisite heat extraction devices must be chosen and used depending on their location in the building structure, the prescribed geometric dimensions, the requisite geometric opening area and the location of the building structure in respect of functionality and the effects, inter alia, wind, snow and of ambient temperatures. Electrically operated heat extraction devices require a safety power supply.

This must be shown in the fire protection certificate. Their use is subject to the Technical Rule included in ser. No A 2.2.1.2 with the performance requirements specified therein. All necessary data on the position of the heat extraction devices must be stated in the fire protection certificate.

A 2.1.15.5 Firefighter lifts

Firefighter lifts are used in particular in exceedingly high buildings to support effective firefighting operations. Firefighter lifts must remain usable by the fire brigade in case of fire.

Therefore, no other lifts may be arranged in the driving shafts of firefighter lifts. Firefighter lift shafts together with landing doors must remain safely operable for a sufficient length of time in case of fire, in accordance with A 2.1.13. Only the necessary technical equipment and systems required to operate the firefighter lift may be located in lift shafts. Firefighter lifts may only be accessible via a vestibule. The walls and ceilings of the vestibule must remain enclosed and non-combustible for a sufficient length of time in case of fire. The barriers to necessary openings in vestibules must remain enclosed and smoke-proof for a sufficient length of time. The vestibules may only be accessible via necessary corridors. To avoid the lift shafts being affected by smoke, the vestibules and lift shafts must be kept free of smoke in case of fire using pressure ventilation systems. Firefighter lifts must have automatic fire detection devices which can be used to shut down lifts outside the fire area in case of fire (fire-mode control system) and can only be started up again by the fire service (fire service circuit). The triggering of the fire-mode control system is also permitted by an automatic fire alarm system.

Lifts may only be used to transport people and goods if there is no fire.

Firefighter lifts must have a power supply and remain operationally reliable for a sufficient length of time if the general power supply fails (emergency power supply).

Electrical circuit systems needed to operate firefighter lifts must be designed or separated by structural elements so that the safety systems remain operational for a sufficient length of time in the event of fire.

All necessary data must be stated in the fire protection certificate.

A 2.1.15.6 Indoor radio systems for the fire brigade

Indoor radio systems for the fire brigade are used to support effective firefighting operations. The systems support radio communications between fire service crews in the building structure and with fire service crews present immediately outside the building structure during operations, if this is not sufficiently possible due to the spatial configuration, dimensions or because the properties of the building structure inhibit radio communication using fire service radio communication devices. They shall consist at least of transmission, reception and transmission devices.

Indoor radio systems must have a power supply and remain operationally reliable for a sufficient length of time if the general power supply fails (emergency power supply).

Electrical circuit systems necessary for the operation of indoor radio systems for power supply must be provided or separated by structural elements in such a way that the systems remain operational in the event of fire for a sufficient period of time. The Technical Rule under ser. No A 2.2.1.8 must be observed.

All necessary data must be stated in the fire protection certificate.

A 2.1.16 Buildings used to store plastic secondary materials

Where structural works are used to store plastic secondary materials, the spread of fire must be prevented and effective firefighting enabled. The Technical Rule under ser. No A 2.2.1.14 must be observed.

A 2.1.17 Garages

To meet the basic requirements for structural works used as garages, specific requirements are defined. The Technical Rule under ser. No A 2.2.2.1 must be observed.

A 2.1.18 Requirements for special buildings

For certain special constructions according to § 2(4) MBO1, the design and execution is subject to the detailed requirements of the Technical Rulesunder serial numbers A 2.2.2.2 to A 2.2.2.8.

Note:

Special fire protection requirements can also be made within the framework of a construction regulations derogating decision pursuant to § 67 MBO 1 or in the building permit pursuant to § 64 MBO1 for a special construction. Where the protection objectives pursuant to § 14 MBO1 cannot be met by following the Technical Rule under ser. No A 2.2.1.2, the necessary technical information shall be included in the building documents.

|  |  |  |  |
| --- | --- | --- | --- |
| A 2.2.1 Planning, designing and execution | | | |
| A 2.2.1.1 | Fire service areas[[2]](#footnote-2)1 | Model Guideline on fire service areas: 2009-10[[3]](#footnote-3)2 | Annex A 2.2.1.1/1 |
| A 2.2.1.2 | Construction products and designs | Building approval requirements, classification, use of construction products, use of designs:  2022-112 (See Annex 4) |  |
| A 2.2.1.3 | Classified building materials and components, execution rules | DIN 4102-4:2016-05 | Annex A 2.2.1.3/1 |
| A 2.2.1.4 | Highly fire-retardant structural elements in wooden construction and fire-resistant structural elements in solid wood construction, external wall cladding made of wood and wooden materials | Model Guideline on fire protection requirements for structural elements and external wall cladding in wooden construction – M‑HolzBauRL:2020-102 |  |
| A 2.2.1.5 | Thermal insulation composite systems | WDVS with EPS, socket fire test method:  2016-062 (See Annex 5) |  |
| A 2.2.1.6 | Rear-ventilated, external-wall cladding | Rear-ventilated external wall cladding: 2021-10 (See Annex 6) |  |
| A 2.2.1.7 | ‘Locking mechanisms’ deleted from MVV TB 2019/1 | | |
| A 2.2.1.8 | Conduits | Model Guideline on fire protection requirements for conduits (Model Conduit Guideline – MLAR): Version of 10 February 2015, last amended by decision of the Commission for Construction Supervision of 3.9.20204 |  |
| A 2.2.1.9 | System floors | Model Guideline on fire protection requirements pertaining to system floors (Muster-Richtlinie über brandschutztechnische Anforderungen an Systemböden [MSysBöR]): 2005‑09 |  |
| A 2.2.1.10 | Electrical operation rooms | Model of a regulation on the construction of operating rooms for electrical installations (EltBauVO): 2009‑012 last amended by decision of the Commission for Construction Supervision of 22 February 2022 |  |
| A 2.2.1.11 | Ventilation systems | Model guideline on fire protection requirements pertaining to ventilation systems (Model Ventilation System Guideline, Muster-Lüftungsanlagen-Richtlinie [M‑LüAR]): Version of 29 September 2005, last amended by decision of the Commission for Construction Supervision of 3.9.2020[[4]](#footnote-4)4 |  |

|  |  |  |  |
| --- | --- | --- | --- |
| A 2.2.1.12 | Furnaces[[5]](#footnote-5)1, other heat generation and fuel supply systems | Model Combustion Ordinance (Muster-Feuerungsverordnung [MFeuV]): September‑2007, last amended by decision of the Commission for Construction Supervision of 27.9.2017[[6]](#footnote-6)2 |  |
| A 2.2.1.13 | ‘Containment systems for extinguishing water’ deleted from MVV TB 2019/1 | | |
| A 2.2.1.14 | Storage of plastic secondary materials | Model guideline on fire protection during the storage of plastic secondary materials (Muster-Kunststofflagerrichtlinie [MKLR]): 1996‑062 |  |
| A 2.2.1.15 | Industrial construction1 | Model guideline on structural fire protection in industrial buildings (Muster-Industriebaurichtlinie [MIndBauRL]): 2019-052 |  |
| A 2.2.1.16 | Technical fittings for buildings | Technical Rule on Technical Building Equipment (Technische Regel Technische Gebäudeausrüstung [TR TGA]): 2022-04[[7]](#footnote-7)4. (See Annex 14) |  |
| A 2.2.1.17 | Normal flammability glazing | Use of normal flammability glazing in external walls, excluding exterior wall structures with inter-storey cavities or airspaces and façades: 2022-072 (See Annex 18) |  |
| A 2.2.2 Garages and special buildings  § 85a(1) sentence 3 MBO1 does not apply to Technical Building Regulations according to Section A 2.2.2 | | | |
| A 2.2.2.1 | Garages1, 4 | Model of a regulation on construction and operation of garages: 2008-052 |  |
| A 2.2.2.2 | Accommodation facilities1, 4 | Model regulation on the building and operation of accommodation facilities: 2014-052 |  |
| A 2.2.2.3 | Retail outlets1, 4 | Model regulation on the construction and operation of retail outlets: 2014‑072 |  |
| A 2.2.2.4 | Meeting places1, 4 | Model regulation on the construction and operation of meeting places: 2014‑072 |  |
| A 2.2.2.5 | Schools1, 4 | Model guideline on Building approval requirements pertaining to schools: 2009‑042 |  |
| A 2.2.2.6 | Residential accommodation for people in need of care or with disabilities1, 4 | Model guideline on Building approval requirements for residential accommodation for people in need of care or with disabilities: 2012‑052 |  |
| A 2.2.2.7 | High-rise buildings1, 4 | Model guideline on the building and operation of high-rise buildings: 2008-04, last modified on 2012‑022 |  |
| A 2.2.2.8 | Industrial buildings1, 4 | Model guideline on structural fire protection in industrial buildings (Muster-Industriebaurichtlinie [MIndBauRL]): 2019‑052 |  |

Annex A 2.2.1.1/1

On the guideline on fire service areas

The following must be observed when applying the Technical Rule:

1 Re. Section 1

Access routes, installation areas and movement areas must be fortified at least in line with road building class VI (Richtlinie für Standardisierung des Oberbaues von Verkehrsflächen [Guideline on the standardisation of superstructures for road surfaces (RStO 01)]).

Instead of DIN 1055-3:2006-03, DIN EN 1991-1-1:2010-12 in conjunction with DIN EN 1991-1-1/NA:2010‑12 shall apply.

2 Signs

2.1 Signs for access routes and thoroughfares are marked ‘Fire Brigade Access’, signs for installation areas or movement areas are marked ‘Fire Service Area’.

The signs for fire service areas must comply with DIN 4066:1997-07; the ‘Fire Brigade Access’ sign must have a size of at least W/H = 594/210 mm and be recognisable from the public traffic area. Fire service areas must have a clearly visible boundary at all times.

2.2 Under § 12 Section 1 Number 5 of the Highway Code (Strassenverkehrs-Ordnung [StVO]), stopping in front of or in fire service access routes is not permitted if these access routes are officially marked.

If stopping must be prohibited under StVO in the public thoroughfare in the fire service access area, the sign must be marked ‘Fire Brigade Access’ by the competent authority (official sign).

Instead of the official ‘Fire Brigade Access’ sign, the competent authority may order the installation of traffic sign 283 (stopping prohibited) under the StVO with an additional ‘Fire Brigade Access’ sign (protection area as defined in § 45(1) sentence 2 No. 5 StVO).

2.3 For the positioning of exterior wall cladding made of wood or wood-based materials for buildings of building classes 4 and 5, the requirements set out in Section 6.3 of the Technical Rule published under ser. No A 2.2.1.4 shall be observed.

Annex A 2.2.1.3/1

The subject of the Technical Building Regulations are only the classified building materials and types of structural elements that are required to meet the requirements according to Technical Building Regulation A 2.2.1.2.

The following must be observed when applying the Technical Rule:

Re. Section 4.2

In the case of fire protection requirements and fire protection evaluations of the building material class, subsequently applied coatings up to a thickness of 0.5 mm on structural elements are not taken into account if the coatings are applied completely to a non-combustible substrate without cavities.

Re. Section 10.5.6

Paragraph 3 shall not apply to buildings in class 4 and 5.

# A 3 Hygiene, health and preservation of the environment

A 3.1 General information

Under § 3 and § 13 MBO1 structural works must be positioned, erected, modified and maintained so that public health and safety – particularly life, health and natural resources – are not endangered and so that no dangers or unreasonable nuisances arise due to plant and animal pests and other chemical, physical or biological effects.

To demonstrate compliance with these requirements, structural works must be designed and executed as a whole and in their separate parts so that the requirements pertaining to health protection and the protection of soil and water under Section A 3.2 are met.

A 3.2 Technical requirements in respect of the planning, designing and execution of structural works and parts thereof pursuant to § 85a(2) MBO1

The building requirements on reducing harmful emissions in accommodation areas pursuant to ser. No A 3.2.1 and A 3.2.2 and on ensuring external building structural elements are environmentally friendly pursuant to ser. No A 3.2.3 are set out in the regulations. They must be observed. If constructive measures (e.g. surface layers, casings) are planned for the affected areas instead, their protective effect must be demonstrated.

|  |  |  |  |
| --- | --- | --- | --- |
| Ser. No | Planning, designing and execution pursuant to § 85a(2) MBO1 | Technical rules/version | Further measures pursuant to § 85a(2) MBO1 |
| 1 | 2 | 3 | 4 |
| A 3.2.1 | Health protection requirements for structural works | ABG - Health protection requirements for structural works 2022-04 (See Annex 8) |  |
| A 3.2.3 | Requirement for structural works regarding effects on soil and water | ABuG - Requirements for structural works with regard to the impact on soil and water: 2022-04  (See Annex 10) | Annex A 3.2/4 |

# A 6 Thermal insulation

A 6.1 General information

Under § 3 and § 15(1) MBO1 structural works must be positioned, erected, modified and maintained to have thermal insulation in accordance with their use and with climatic conditions.

To meet this requirement for structural works as a whole and in their separate parts, the Technical Rules on thermal insulation under Section A 6.2 must be observed.

A 6.2 Technical requirements in respect of the planning, designing and execution of structural works and parts thereof pursuant to § 85a(2) MBO1

|  |  |  |  |
| --- | --- | --- | --- |
| Ser. No | Planning, designing and execution requirements pursuant to § 85a(2) MBO1 | Technical rules/version | Further measures pursuant to § 85a(2) MBO1 |
| 1 | 2 | 3 | 4 |

|  |  |  |  |
| --- | --- | --- | --- |
| A 6.2.1 Thermal insulation in buildings | | | |
|  | Hygrothermal design values | DIN 4108-4:2020-11 | Annex A 6.2/3 |
| Application-related requirements for thermal insulation materials | DIN 4108-10:2021-11 | Annex A 6.2/5 |

Annex A 6.2/3

Re DIN 4108-4

For insulating materials and insulating plaster with ETA1, the rated thermal conductivity value must be determined as follows:

On the basis of the nominal value given in the ETA, which represents 90% of production with a confidence factor of 90%, the nominal thermal conductivity value results from conversion to a moisture content at 23°C and 80% relative humidity and multiplication by the safety factor γ = 1.03. The conversion factors specified in the ETA are to be used to convert the humidity.

\_\_\_\_\_\_\_\_\_\_\_\_

1 Under EAD/ETAG/CUAP

Annex A 6.2/4

- deleted from MVV TB 2022/1 -

Annex A 6.2/5

1 In the absence of a technical best practice for technology for the planning, designing and execution of structural works using thermal insulation materials not listed in DIN 4108-10:2021-11, proof according to § 16a MBO 1 is required. This excludes the design of structural elements with insulation products in accordance with points 1.1 to 1.4 in case of compliance with the corresponding requirements:

1.1 Thermal insulation panels made of mineral material with an ETA based on EAD 040012-00-1201 and EEAS 040012-01-1201:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Application area according to DIN 4108-10, Table 1 (short sign) | Boundary dimensions for length, width and thickness | Right-angled | Flatness | Tensile strength perpendicular | Compressive strength | Dimensional stability | | Water absorption with partial immersion | |
| at a defined temperature | at a defined temperature and humidity conditions | brief | long term |
| mm | mm/m | mm | kPa | kPa | % | % | [kg/m²] | [kg/m²] |
| DAD | ± 2 | ≤ 5 | ≤ 2 | - | ≥ 200 | ≤ 1.0 | ≤ 1.0 | ≤ 2.0 | ≤ 3.0 |
| DAA | ± 2 | ≤ 5 | ≤ 2 | ≥ 80 | ≥ 200 | ≤ 1.0 | ≤ 1.0 | ≤ 2.0 | ≤ 3.0 |
| DZ | ± 2 | ≤ 5 | ≤ 2 | - | - | ≤ 1.0 | ≤ 1.0 | - | - |
| DI | ± 2 | ≤ 5 | ≤ 2 | - | ≥ 150 | ≤ 1.0 | ≤ 1.0 | - | - |
| DEO | ± 2 | ≤ 5 | ≤ 2 | - | ≥ 150 | ≤ 1.0 | ≤ 1.0 | - | - |
| WI | ± 2 | ≤ 5 | ≤ 2 | - | ≥ 150 | ≤ 1.0 | ≤ 1.0 | - | - |
| WZ | ± 2 | ≤ 5 | ≤ 2 | - | - | ≤ 1.0 | ≤ 1.0 | ≤ 2.0 | ≤ 3.0 |
| WAB | ± 2 | ≤ 5 | ≤ 2 | ≥ 80 | ≥ 200 | ≤ 1.0 | ≤ 1.0 | ≤ 2.0 | ≤ 3.0 |
| WAP | ± 2 | ≤ 5 | ≤ 2 | ≥ 80 | ≥ 200 |  |  | ≤ 2.0 | ≤ 3.0 |
| WH | ± 2 | ≤ 5 | ≤ 2 | - | - |  |  | - | - |
| WTR | ± 2 | ≤ 5 | ≤ 2 | - | - |  | | - | - |

1.2 Expanded perlite insulation products (EPB) with an ETA based on EAD 040010-00-1201:

DIN 4108-10:2021-11, Table 11, applies to use, with the exception of the requirement relating to bending strength.

1.3 Granulated polystyrene and binder mixtures with an ETA based on EAD 040635-00-1201:

The product may be used as thermal insulation in line with areas of application DEO, DAD and DAA (dm) under DIN 4108‑10:2021-11 if the declared compression stress value at 10 % compression is at least 100 kPa and the maximum relative compression difference is 5 % at deformation under pressure and temperature load.

1.4 Products with reflective layers for thermal insulation of the building envelope with an ETA based on EAD 04007-00-1201:

1.4.1 Application

The products may be used as non-pressurised, additional thermal insulation on the inside of heat-transferring construction structural elements corresponding to the area of application DI and WI in accordance with the DIN 4108‑10:2021-11 standard.

They may only be incorporated in constructions in which they are protected against rainfall, weathering and moisture penetration.

1.4.2 Rated value of the thermal resistance

The calculation of the thermal insulation shall be carried out with the rated value of the thermal resistance. The rated value of the thermal resistance shall be determined as follows:

The rated value of the thermal resistance is derived on the basis of the nominal value given in the ETA (‘Core thermal resistance’ without neighbouring airspaces) divided by the safety factor γ = 1.03. For products based on natural fibre insulation, an additional conversion to a moisture content at 23 °C and 80 % relative humidity shall be carried out using the conversion factors indicated in the ETA.

In areas where the products will be pressed together (e.g. fastening areas on the supporting structure), the thermal resistance of the products should not be given for the certificate.

1.4.3 Thermal resistance of adjacent unventilated airspaces

For the calculation of the thermal resistance of unventilated airspaces limited by the products with a length and width of more than 10‑times the thickness according to DIN EN ISO 6946:2018-03, Annex D, the following values shall be taken into account:

* Emissions grade ε for the surface of the products in accordance with ETA
* *h*a in accordance with DIN EN ISO 6946:2018-03, Table D.2, where ΔT = 10 K
* *h*ro = 5.7 W/(m²·K)

Only airtight construction structures may be taken into account in which the products are installed on the inside of the structure protected from contamination and weather.

1.4.4 Climatic moisture protection

The values given in the ETA for the products must be used for the calculation report of the climatic moisture protection in accordance with DIN 4108-3:2018-10.

2 For the execution of structural elements with insulating products made of vegetable or animal fibres in accordance with DIN 4108-10:2021-11, Tables 15 and 20:

The insulation products must be classified in class 0 in respect of resistance to mould. Alternatively, it should be demonstrated by hygrothermal simulation that there is no risk of mould infestation.

If the insulating products are processed dry, they may also be used for exterior structural elements GK 0 (use class 0 according to DIN 68800‑2:2012‑02) with the exception of Figure A.8, layer No. 7 in cases where according to DIN 68800‑ 2:2012‑02 insulation materials with proof of fitness for purpose for certain applications are required if the following performance is indicated:

* thickness when installed 25 kg/m³ to 155 kg/m³
* water vapour diffusion resistance value µ ≤ 3
* mass moisture content according to DIN EN ISO 12571:2013-12 at 23°C/80% relative humidity ≤ 0.19 kg/kg.

\_\_\_\_\_\_\_\_\_\_\_\_

1 According to national law

# B 1 General information

This section contains the Technical Building Regulations to be observed for structural elements and special constructions. To facilitate application, the Technical Building Regulations are presented for each special construction / component, as they serve to clarify several basic requirements.

Buildings must be stable on their own over their entire period of use as a whole and in their separate parts. They must be arranged, procured and fit for use in such a way that there is no danger or unreasonable harassment.

# B 2 Technical regulations for special constructions and structural elements according to § 85a(2) MBO1

|  |  |  |
| --- | --- | --- |
|  | | |
| Ser. No | Planning, designing and execution requirements pursuant to § 85a(2) MBO1 | Measures/specifications pursuant to § 85a(2) MBO1 |
| 1 | 2 | 3 |
| B 2.2 Structural elements | | |
| B 2.2.1 Structural elements for walls, roofs, ceilings and façade constructions | | |
| B 2.2.1.1 | Cladding for external walls, ventilated at rear | DIN 18516-1:2010-06  Annex B 2.2.1/1  DIN 18516-3:2021-05  DIN 18516-5:2021-05  Annex B 2.2.1/2  Also applicable:  A 2.2.1.6 |
| B 2.2.1.2 | Load-bearing external walls made from construction kits | Annex B 2.2.1/3 |
| B 2.2.1.6 | In-situ concrete walls made of formwork components | Application rules for non-load-bearing permanent formwork kits/‑systems and formwork components for the construction of in-situ concrete walls: 2021-10  (See Annex 12) |
| B 2.2.1.8 | Construction kits for timber, metal and reinforced concrete buildings3 | Annex B 2.2.1/3 |
| B 2.2.1.9 | Prefabricated room units for buildings3 | Annex B 2.2.1/3 |
| B 2.2.5 Structural elements for sealing structural works  Under § 13 MBO1, physical structures must be positioned, designed and fit for purpose so that no dangers or unreasonable inconveniences arise due to water or moisture. | | |
| B 2.2.5.3 | Building waterproofing made of plastic and elastomer damp-proof courses | DIN/TS 20000-202:2020-11  Section 5.3 |
| B 2.2.5.4 | Building waterproofing made of bitumen and damp-proof courses | DIN/TS 20000-202:2020-11  Section 5.2 |
| B 2.2.5.5 | Building waterproofing against ground moisture and water made of plastic and elastomer sheets | DIN/TS 20000-202:2020-11  Section 5.3 |
| B 2.2.5.6 | Building waterproofing against ground moisture and water made of bitumen sheets | DIN/TS 20000-202:2020-11  Section 5.2 |
| B 2.2.5.7 | Reinforced bitumen sheets for waterproofing of concrete bridges and other traffic areas | DIN/TS 20000-203:2021-03  Section 5 |

Annex B 2.2.1/3

1 Stability

For load-bearing features of building structural elements or kits in the form of calculated load-bearing values as per ETA1, mechanical strength or complete static calculations are stated in the declaration of performance, these count as building documents.

2 Thermal insulation

The design values as per DIN 4108-4:2020-11 are to be used for the thermal insulation certificate. The insulating materials used in the construction kit must meet the requirements under DIN 4108-10:2021-11 in line with the relevant area of application.

\_\_\_\_\_\_\_\_

1 Under EAD/ETAG/CUAP

Prerequisites for issuing a declaration of conformity for construction products and details on designs and construction products that require only a general building inspection test certificate

# C 1 General information

Construction products may only be used if during use the building structure meets building inspection requirements.

To clarify the building inspection requirements with Technical Building Regulations, compulsory technical rules have been agreed with the highest federal state building inspection authorities (see § 85a MBO1). These technical rules for construction products that do not bear the CE mark under the Construction Products Regulation (Regulation [EU] No. 305/2011) are set out in Chapter C 2, column 3. The manufacturer shall confirm compliance with these Technical Rules by submitting a declaration of conformity by marking the construction products with the conformity mark (‘ÜZ’‑ in German). Pursuant to § 85a(2) Number 5 MBO1, Chapter C 2, column 4 sets out the requirements for issuing a manufacturer’s declaration of conformity (§ 22 MBO1):

* Manufacturer’s declaration of conformity (Übereinstimmungserklärung des Herstellers [ÜH]),
* Declaration of conformity of the manufacturer after prior examination of the construction product by a recognised testing body (Übereinstimmungserklärung des Herstellers nach vorheriger Prüfung des Bauprodukts durch eine anerkannte Prüfstelle [ÜHP (MDT)]), or
* Conformity Mark Certificate by a recognised certification body (ÜZ).

The regulations previously laid down in the Building Rules List A Part 1 are continued in Chapter C 2.

Where construction products that do not bear the CE mark under the Construction Products Regulation do not have technical approval and there are no generally accepted technical standards, or where the construction product deviates significantly from a Technical Building Regulation, general building inspection approval (§ 18 MBO1) or approval in individual cases (§ 20 MBO1) is required.

This does not include construction products listed in Chapter C 3 for which there are recognised test procedures in column 2 and those which require only a general building inspection test certificate instead of general building inspection approval (§ 19 MBO1). Pursuant to § 85a(2) No. 5 MBO1, column 4 sets out the requirements for issuing a manufacturer’s declaration of conformity in respect of the general building inspection test certificate.

The regulations previously laid down in the Building Rules List A Part 2 are continued in Chapter C 3.

The required type of conformity for construction products is specified in Chapters C 2 and C 3.

The type of proof required under public law is decisive, even if the Technical Rule may stipulate otherwise. External monitoring provided for in a Technical Rule therefore need not be observed under public law if column 4 does not stipulate a certificate of conformity.

If tests on construction products, in particular suitability tests, initial tests or tests for obtaining test certificates or factory certificates, are provided for in the Technical Rules in accordance with Chapters C 2 and C 3, these tests must be carried out within the framework of the stipulated proof of conformity.

In-house quality control is the manufacturer’s continuous monitoring of production to ensure that the construction products it manufactures satisfy the provisions of the relevant Technical Rules. The quality control is carried out under DIN 18200:2021-04, Section 4.2. Moreover, the provisions contained in the technical rules governing the in-house quality control are decisive. Self-monitoring provisions apply as provisions for in-house quality control.

If construction products are not manufactured in series by companies whose operators are listed in the Register of Craftsmen, the requirements for in-house quality control under DIN 18200:2021‑04, Section 4.2, are considered to be met if the handicraft regulations are observed.

External monitoring is carried out in accordance with DIN 18200:2021-04, Sections 4.3 and 4.4 for system A. Otherwise, the provisions of the Technical Rules are decisive for external monitoring.

Designs that deviate significantly from the Technical Building Regulations or for which there are no generally accepted technical standards in respect of planning, design and execution may only be used if there is general design approval or project-related design approval.

This excludes the designs listed in Chapter C 4 for which approved test procedures (column 2) are available and which require only a general certificate of inspection instead of a general design approval. Users must confirm compliance of the design with the general building inspection test certificate in a declaration of conformity.

The regulations previously laid down in the Building Rules List A Part 3 are continued in Chapter C 4.

Under the principle of mutual recognition, a construction product that is not the subject matter of EU-wide harmonisation and has lawfully been placed on the market in another member state of the European Union, of the European Economic Area, in Turkey or Switzerland under their national technical provisions qualifies as equivalent to a construction product under and on the basis of the requirements set out in Building Code1, provided it is used as intended according to the other national technical provisions and meets the requirements applicable in Germany under and on the basis of the Building Code1. This includes requirements pertaining to the conformity assessment procedure and the conformity assessment bodies.

# C 2 Requirements for submitting a declaration of conformity for construction products pursuant to § 22 MBO1

The following is stipulated in accordance with § 85a(2) No. 5 MBO1:

|  |  |  |  |
| --- | --- | --- | --- |
| Ser. No | Construction product | Technical rules/version | Declaration of conformity |
| 1 | 2 | 3 | 4 |
| C 2.1 Construction products for concrete, reinforced concrete and prestressed concrete construction | | | |
| C 2.1.1 Binders | | | |
| C 2.1.1.3 | Portland-composite cement CEM II/C-M and Composite cement CEM VI | DIN EN 197-5:2021-07  Also applicable:  Annex C 2.1.8 | Mark of conformity [ÜZ] |
| C 2.1.4 Concrete | | | |
| C 2.1.4.3 | Concrete by properties, concrete by composition | DIN EN 206-1:2001-07,  DIN EN 206-1/A1:2004-10,  DIN EN 206-1/A2:2005-09,  DIN EN 206-9:2010-09 and  DIN 1045-2:2008-08  Also applicable:  DIN 1045-3:2012-03,  DIN EN 1008:2002-10 and  DAfStb Guideline – Requirements for source materials for the production of concrete as per DIN EN 206-1 in conjunction with DIN 1045-2 (08-2019)  Annexes C 2.1.2 and C 2.1.3  Also applicable, depending on construction product:  DAfStb Guideline for concrete with extended processing time (slow-setting concrete) (2006‑11),  DafStb Guideline on precautions against harmful alkali reactions in concrete (Alkali-Richtlinie [Alkali Guideline]) – AlkR- (2013-10),  DAfStb Guideline on concrete in accordance with DIN EN 206-1 and DIN 1045-2 with recycled aggregates in accordance with DIN EN 12620; Part 1 – RBrezG/1 – (2010‑09) incl. correction 1 (2019‑09),  DAfStb Guideline on the manufacture and use of dry concrete and dry mortar (Dry Concrete Guideline) – TrBMR – (2005‑06),  DAfStb Guideline on self-compacting concrete – SVBR – (2012‑09),  DAfStb Guideline on solid concrete structural elements (2010‑04) and  DAfStb Guideline for Steel Fibre Reinforced Concrete (DAfStb-Richtlinie Stahlfaserbeton) (2021-06), Part 2 | Mark of conformity [ÜZ] |
| C 2.1.5 Prefabricated structural elements made of concrete and reinforced concrete, structural glass and bricks | | | |
| C 2.1.5.6 | Steel-fibre reinforced concrete load-bearing prefabricated construction units | DAfStb Guideline for Steel Fibre Reinforced Concrete (DAfStb-Richtlinie Stahlfaserbeton) (2021-06),  DIN 1045-4:2012-02  Also applicable:  Annex C 2.1.7 | Mark of conformity [ÜZ]  also applies to non-series  production |
| C 2.2 Construction products for masonry construction | | | |
| C 2.2.3 | Ceramic bricks | DIN 105-4:2019-01 DIN 105-4/A1:2021-04  in conjunction with DIN 105-41:2019-01 | Mark of conformity [ÜZ] |
| C 2.6 Doors and gates | | | |
| C 2.6.12 | Interior doors are made to meet the requirements in terms of sound insulation, with the exception of fire and smoke protection barriers | Annex C 2.6.3 | MDT |
| C 2.8 Special constructions | | | |
| C 2.8.1 | Roller shutter boxes with thermal and sound insulation requirements | Guidelines on roller shutter boxes  (RokR):(2021-09) (See annex 13) | MDT |
| C 2.10 Construction products for building waterproofing and roof sealing | | | |
| C 2.10.3 | Normal flammability joint tape made of thermoplastic materials for sealing joints in in-situ concrete | DIN 18541-1, -2:2021-01 and DIN 18541-3:2021-07  Also applicable:  DIN 4102-1:1998-05  DIN EN ISO 11925-2:2011-02  in conjunction with Annex C 3.7 | MDC |
| C 2.14 Furnaces | | | |
| C 2.14.1 Furnaces and combustion appliances | | | |
| C 2.14.1.5 | Fireplaces fired by solid fuel - Independent supply through the room air | DIN EN 16510-1:2018-11 Appendix C 14.5 | Mark of conformity [ÜZ] |
| C 2.15 Construction products for stationary installations that are used for the containment, drawing off and handling of water-polluting materials: | | | |
| C 2.15.16 | Concrete used as sealant for collecting chambers and surfaces | DIN 1045-2:2008-08  in conjunction with  DIN EN 206-1:2001-07,  DIN EN 206-1/A1:2004-10,  DIN EN 206-1/A2:2005-09  Also applicable:  DIN 1045-3:2012-03 in conjunction with  DIN EN 13670:2011-03,  DAfStb Guideline for Concrete construction when handling water-endangering substances (BUmwS), Part 2 (2011-03),  DAfStb Guideline for Steel Fibre Reinforced Concrete (DAfStb-Richtlinie Stahlfaserbeton) (2021-06) and Appendix C 2.15.11 | Mark of conformity [ÜZ] |
| C 2.16 Scaffolding structural elements10 | | | |
| C 2.16.1 | Adjustable steel telescopic piles with mathematically determined load-bearing capacity[[8]](#footnote-8)10 | DIN EN 1065:1998-12  Also applicable:  Annex C 2.16.1 | Mark of conformity [ÜZ] |

Annex C 2.1.3

1 Re. DIN 1045-2:2008-08

1.1 Section 5.1.2:

To be amended: ‘Cements in accordance with EN 197-1:20111, DIN 1164-10:2013-03, DIN 1164‑11:2003‑11, DIN 1164-12:2005-06 and EN 14216:20152 are deemed suitable.’

1.2 Section 5.1.6:

To be added: ‘For ground granulated blast furnace slag as per EN 15167‑1:20063, its suitability as a type II additive is regarded as having been proven.’

1.3 Section 5.2.3.4:

To be added: ‘The alkali reactivity class of aggregates under EN 12620:2002+A1:20084 under the DAfStb  Alkali Guideline can be taken from the declaration of performance.’

1.4 Section 5.2.3.5:

The paragraph is replaced by: ‘Regarding the use of recycled aggregates as per DIN EN 12620:2008-07, the DAfStb guideline “Concrete in accordance with DIN EN 206-1 and DIN 1045-2 with recycled aggregates in accordance with DIN EN 12620:2010-09 must be observed.”’

1.5 Section 5.2.5.1:

To be added: ‘Suitability of the k-value approach is regarded as having been demonstrated for ground granulated blast furnace slag.’

The following shall be added after Paragraph 8: ‘Only silica fumes containing Class 1 silicon dioxide may be used.’

1.6 Section 5.2.5.2.1:

To be added: ‘Regarding the application of the k-value approach to ground granulated blast furnace slag, the stipulations under DIN 1045‑2:2008-08, 5.2.5.2.2 apply to fly ash accordingly. The lowering of the minimum cement content and making allowances for the water/cement ratio are not permitted for the exposure classes XF2 and XF4.

The simultaneous use of ground granulated blast furnace slag and fly ash and/or silica fume is not permitted.’

1.7 Section 5.2.5.2.2:

The following is to be added to the list of cements in Paragraph 1:

'Portland composite cements CEM II/B-M (S-LL), CEM II/B-M (V-LL) and CEM II/B-M (T-LL) with up to 20 % (mass portion) limestone'

To be added: Regarding the maximum quantity of ground granulated blast furnace slag h which may be included in the water/cement ratio, the condition h/z (ratio of ground granulated blast furnace slag to cement) ≤ 0.33 by mass portions can be applied in the case of all cements pursuant to point 5.2.5.2.2.

In the case of cements with the main constituent D, a quantity of ground granulated blast furnace slag in excess of h/z = 0.15 may be used.

After the 7th paragraph for the production of high sulphate resistance concrete is listed in the first indent to be added: 'Portland composite cements CEM II/B-M (S-LL), CEM II/B-M (V-LL) and CEM II/B-M (T-LL) with up to 20 % (mass portion) limestone'

The flight ash content in terms of cement and fly ash content (z+) must be at least 20 % (by mass) of these types of cement.

The provisions under 5.2.5.2.2 concerning fly ash used in the production of concrete with a high sulphate resistance may not be applied to ground granulated blast furnace slag.’

To be amended: ‘NOTE: The requirements for HS cement are met for CEM I-SR 0, CEM I-SR 3, CEM III/B-SR and CEM III/C-SR under EN 197-1:20111.’

To be added: ‘The provisions in 5.3.4 for the use of fly ash in underwater concrete do not apply for ground granulated blast furnace slag.’

1.8 Section 5.2.5.2.3:

The following is to be added to the list of cements in Paragraph 2:

'Portland composite cements CEM II/B-M (S-LL), CEM II/B-M (V-LL) and CEM II/B-M (T-LL) with up to 20 % (mass portion) limestone'

1.9 Section 5.2.5.2.4:

In the 4th paragraph, cements shall be added that may be used:

'Portland composite cements CEM II/B-M (S-LL) and CEM II/B-M (T-LL) with up to 20 % (mass portion) limestone'

1:10 Table F.3.1

Table heading:

To be amended: ‘Areas of application for cements according to EN 197-1:20111, DIN 1164-11:2003-11, DIN 1164‑12:2005-06 and for FE cements as well as CEM I-SE and CEM II-SE according to DIN 1164-11:2003-11 for the production of concrete according to DIN 1045-2:2008-08’

Footnote d:

To be amended: ‘NOTE: The requirements for HS cement are met for CEM I-SR 0, CEM I-SR 3, CEM III/B-SR and CEM III/C-SR under EN 197-1:20111.’

1:11 to Table F.3.2

A new line and a footnote j shall be inserted before the last line: (See extract from Table F.3.2)

Extract from Table F.3.2 of DIN 1045-2:2008

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Prestressing steel compatibility** | | | | X | a, d, f, i, j see footnote in Table F.3.3 |
| **Concrete attack** | Wear | | **XM3** | X |
| **XM2** | X |
| **XM1** | X |
| Aggressive chemical environment | | **XA3a** | X |
| **XA2d** | X |
| **XA1** | X |
| Frost Attack | | **XF4** | O |
| **XF3** | O |
| **XF2** | O |
| **XF1** | X |
| **Reinforcement corrosion** | Corrosion caused by chlorides | Chlorides from sea water | **XS3** | X |
| **XS2** | X |
| **XS1** | X |
| chlorides other than seawater | **XD3** | X |
| **XD2** | X |
| **XD1** | X |
| Corrosion caused by carbonatisation | | **XC4** | X |
| **XC3** | X |
| **XC2** | X |
| **XC1** | X |
| **No corrosion/attack risk** | | | **X0** | X |
| Exposure classes X = valid scope of application  O = not applicable for manufacturing according to this standard | | | | S-LLj;Vi-LLj;  T-LLj |
| **T** |
| **B** |
| **CEM II** |

1:12 to Table F.3.3

Add footnote j:

j The permissible limestone content of the cements (S-LL), (V-LL) and (T-LL) is limited to 20 M.-%. Compliance with the maximum permissible limestone content shall be explained by the cement manufacturer.

2 About the Alkali Guideline – AlkR – (2013-10)

Section 7.1.1:

To be added: ‘The manufacturer must declare compliance with DIN 1164-10:2013-03 for cement with low effective alkali content.’

\_\_\_\_\_\_\_\_\_\_\_

1 Implemented in Germany by DIN EN 197-1:2011-11.

2 Implemented in Germany by DIN EN 14216:2015-09.

3 Implemented in Germany by DIN EN 15167-1:2006-12.

4 Implemented in Germany by DIN EN 12620:2008-07.

Annex C 2.1.8

Portland composite cement CEM II/C-M (S-LL) according to DIN EN 197-5 may be used for the production of concrete according to DIN EN 206-1:2001-07 +A1:2004-10+A2:2005-09 in conjunction with DIN 1045-2:2008-08 in all exposure classes except XF2 to XF4. The prestressing steel compatibility is considered to be proven.

Other Portland composite cements CEM II/C-M and compound CEM VI (CEM VI (S P), CEM VI (S-V), CEM VI (S-L) and CEM VI (S-LL)) according to DIN EN 197-5 may only be used in the production of concrete according to DIN EN 206-1:2001-07 +A1:2004-10+A2:2005-09 in conjunction with DIN 1045-2:2008-08 in the exposure classes X0 and XC2. The prestressing steel compatibility shall be considered to be demonstrated if the cement does not contain a pozzolan (P) as its main component.

Annex C 2.4.15

Re. DIN EN 1090-3

The Technical Rule shall be applied as follows:

1 Confirmation of conformity of aluminium structural elements not covered by EN 1090‑1:2009+A1:20111 but which have to remove payloads shall be carried out with a manufacturer’s declaration of conformity on the basis of an initial test in accordance with Section 6.2 of EN 1090‑1:2009+A1:20111 and in-house quality control according to Section 6.3 of EN 1090‑1:2009+A1:20111.

2 The manufacturer shall provide the declaration of conformity by marking the construction products with the ‘ÜZ’ conformity mark, with reference to the designated use.

3 The manufacture of welded aluminium structural elements not covered by EN 1090‑1:2009+A1:20111 but which need to bear payloads, may be carried out only by companies which possess a proof of suitability for the execution of welding work in the relevant execution class (EXC). Alternatively, the following shall be considered as proof of suitability:

* a welding certificate in line with EN 1090‑1:2009+A1:20111 issued or certified by a notified body, if the firm’s in-house production control is certified by this body in line with EN 1090‑1:2009+A1:20111;
* a welding certificate based on DIN EN 1090-3:2019-07 in conjunction with EN 1090‑1:2009+A1:20111, Table B.1 issued by an officially recognised body.

For the assignment of structural elements into the execution classes (EXC), DIN EN 1999-1‑1/NA:2021-03 applies.

\_\_\_\_\_\_\_\_

1 Implemented in Germany by DIN EN 1090-1:2012-02.

Annex C 2.6.3

1. General information

The following provisions shall apply to interior doors, on which there are requirements on sound insulation. Interior doors consist of at least the structural elements door wings and frames as well as the building fittings.

Interior doors must be made of at least normally flame-resistant materials.

2 Rated sound insulation value

If sound-insulating properties are to be identified depending on the intended use, the rated sound insulation measure Rw shall be determined according to Section 5.6 of DIN EN 14351-2:2019-01.

3 Main features of the ‘ÜZ’ conformity mark

On the ‑mark of conformity of an interior door that meets the requirements of Section 2, the rated sound insulation value Rw must be specified as well as the combinations of door leaves with door frames to which this applies.

Appendix C 2.14.5

The air-independent fireplaces shall conform to the type CA in accordance with Table 1 of DIN EN 16510‑ 1:2018-11. The leakage determined must not exceed 2 m³/h. As part of the external monitoring, which takes place once a year, the leakage test bench of the fireworks manufacturer must also be assessed with regard to its suitability.

Annex C 2.16.1

The regulations of Annex E to the standard for monitoring level M apply to the in-house quality control and external monitoring. Contrary to Table E.1, the properties of the materials and structural elements used are specified in test certificate 2.2, and the properties of the pipes with an increased yield strength are specified in the acceptance test certificate 3.1 in accordance with EN 10204:2005-01.

Mathematical proof of the load-bearing capacity of adjustable steel telescopic piles must be tested under the certification procedure. Testing may be carried out directly by the certification body itself or by a third body appointed by it.

If according to Section 9.4.2 of DIN EN 1065:1998-12 it can be shown that the characteristic load capacity for the adjustment device is at least 44.0 kN (class A) or 59.5 kN (classes B to E), a greater characteristic load capacity may be used compared to the nominal characteristic load capacity according to Section 8 of the standard, provided that this has been mathematically demonstrated for the overall support in accordance with Section 9.2 of the standard.

The approach of larger characteristic load capacities of the structural supports according to DIN EN 1065:1998-12 is not permissible than 44.0 kN (class A) or 59.5 kN (classes B to E).

# C 3 Construction products that require only a general building supervisory inspection certificate pursuant to § 19(1) sentence 2 MBO1

The following is stipulated in accordance with § 85a(2) No. 4 MBO1:

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| Ser. No | Construction product | approved test procedure according to: | Declaration of conformity |
| 1 | 2 | 3 | 4 |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| C 3.13 | Adjustable telescopic steel props - Product specifications, design and assessment by calculation and tests | DIN EN 1065:1998-12 Additionally applies: Annex C 3.9 | Mark of conformity [ÜZ] |
| C 3.27 | Products for seals in conjunction with tiles and slab surfaces  - for internal and exterior walls and floors that are connected with buildings, against water without hydrostatic pressure in high-load situations such as in wet rooms in the public and commercial sector  - for containers and basins located inside or outside, where these are connected to buildings against fill water such as with swimming pools | Test principles for the issuing of general building inspection certificates for seals in conjunction with tiles and slab surfaces  - Part 1: Liquid-applied seals (PG AIV-F) (2018-03),  - Part 2: Sheet-type seals (PG AIV-B) (2018-03),  - Part 3: Slab-type seals (PG AIV-P) (2018-03)  - Part 4: Additional tests on sealing systems in connection with wear layers (PG‑AIV‑N) (2021-07) | MDT |
| C 3.30 | Waterproofing for joints and transitions in or on water-tight structural elements including those made of concrete, with high resistance to water penetration in soil contact areas, which cannot be classified as C 2.10.2 or C 2.10.3 products as referred to in Chapter C 2 | Testing principles regarding the issuing of general building supervisory inspection certificates for joint sealants in concrete structural elements with a high resistance to water penetration (PG-FBB Part 1: Sealings for working joints and target crack cross Sections, transitions and connections (May 2020) Part 2: Seals for motion joints (July 2021) | MDT |

Annex C 3.9

The regulations of Annex E to the standard for monitoring level M apply to the in-house quality control and external monitoring. Contrary to Table E.1, the properties of the materials and structural elements used are specified in test certificate 2.2, and the properties of the pipes with an increased yield strength are specified in the acceptance test certificate 3.1 in accordance with EN 10204:2005-01.

If according to Section 9.4.2 of DIN EN 1065:1998-12 it can be shown that the characteristic load capacity for the adjustment device is at least 44.0 kN (class A) or 59.5 kN (classes B to E), a greater characteristic load capacity may be used compared to the nominal characteristic load capacity according to Section 8 of the standard, provided that this has been demonstrated by test for the overall support in accordance with Section 9.3 of the standard.

The approach of larger characteristic load capacities of the structural supports according to DIN EN 1065:1998-12 is not permissible than 44.0 kN (class A) or 59.5 kN (classes B to E).

D 2.2 Products for which there are no generally accepted technical rules

This list only applies to construction products and applications that are only subject to a normal flammability requirement under building inspection requirements, and not to any further fire protection requirements or requirements for sound or thermal insulation.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | D 2.2.2 Construction products relating to interior work | | | D 2.2.2.11 | Sealants   * on floor plates with water effects of class W1-E according to DIN 18533-1 * on splashed wall sockets * on wall and floor surfaces with water effects of class W0-I and W1-I according to DIN 18534‑1 * for balconies, loggias and arcades. | | D 2.2.2.25 | Accessories for plastering or tile work, such as mounting and finishing rails, beams and reinforcements | | D 2.2.3 Construction products for home automation | | | D 2.2.3.14 | Waterless urinals | | D 2.2.6 Other construction products | | | D 2.2.6.9 | Floating roofs and ring gap sealing systems of floating roofs in flat floor tank structures | |

## Annex 2

Planning, designing and execution requirements of anchors in concrete with cemented or subsequently fitted fasteners

Last updated: October 2021

**Contents**

1 Scope

2 Planning

3 Design

4 Execution

1 Scope

These technical rules apply to anchors set in concrete with fasteners that have a European Technical Assessment/Approval (ETA) according to the following technical specifications:

* EAD 330008 ‘Anchor channels’
* EAD 330012 ‘Cast-in anchor with internal threaded socket’
* EAD 330084 ‘Steel plate with head bolts’
* EAD 330232 ‘Mechanical fasteners for use in concrete’
* EAD 330284 ‘Plastic anchors for redundant non-supporting systems in concrete and masonry’
* EAD 330499 ‘Bonded fasteners for use in concrete’
* EAD 330747 ‘Fasteners for use in concrete for redundant non-structural systems’
* EAD 330924 ‘Cast-in anchor bolt of ribbed reinforcing steel’
* ETAG 020 ‘Plastic anchors’.

This Technical Rule does not apply to anchors in nuclear installations.

2 Planning

2.1 General information

The anchorages (except for with plastic dowels) must be planned in line with engineering practice under DIN EN 1992‑4 and DIN EN 1992‑4/NA. W plastic dowels is to be planned in accordance with the design procedure for plastic anchorages for use in concrete and masonry, August 2019 (German application document for EOTA TR 064 from May 2018) ([www.dibt.de](https://www.dibt.de))

Verifiable design drawings must be prepared taking into account the loads to be anchored.

The provisions of the relevant ETA must be observed. In particular these are:

* difference in cracked or uncracked concrete
* concrete strength class of anchor base
* minimum component thickness
* minimum centre and edge distances
* limit values for ambient and component temperatures.

Plastic dowel anchors with ETA: the characteristic load-bearing capacities in the ETA apply to the strength class, the drilling procedure and the anchoring depth as specified in the ETA. For greater anchoring depths, different drilling methods or if no information on the concrete strength class is available, the characteristic load-bearing capacity may be determined by construction site tests under the Technical Rule ‘Execution and evaluation of on-site tests for plastic anchors in concrete and masonry with ETA according to ETAG 020 or EAD 330284‑00‑0604, Last updated: September 2019’.

2.2 Anchors for redundant, non-structural systems

Application limits for redundant, non-structural systems:

Mechanical dowels and composite dowels: N1 ≥ 4; n2 ≥ 1 and n3 ≤ 3.0 kN or

n1 ≥ 3; n2 ≥ 1 and n3 ≤ 2.0 kN.

Plastic dowels: N 1 ≥ 4; n2 ≥ 1 and n3 ≤ 4.5 kN or

n1 ≥ 3; n2 ≥ 1 and n3 ≤ 3.0 kN.

n1 = Number of fastening points

n2 = Number of anchors per fastening point

n3 = Rated value of the effects NEd (kN) of a fastening point

3 Design

The anchorages (except for with plastic dowel anchors) must be designed in line with engineering practice under DIN EN 1992‑4 and DIN EN 1992‑4/NA. For anchor rails, the design method for anchor rails, August 2020 (German application document for EOTA TR 047 of March 2018) ([www.dibt.de](http://www.dibt.de)) and the design method for anchor rails under fatigue-relevant load, August 2020 (German application document for EOTA TR 050 of October 2018) (www.dibt.de) may be used.

Anchorages with plastic dowels are to be designed in line with engineering practice in accordance with ETAG 020, Annex C or EOTA TR 064. Anchorages with plastic dowels are to be designed in accordance with the design procedure for plastic dowels in anchorages for use in concrete and masonry, August 2019 (German application document for EOTA TR 064 from May 2018) ([www.dibt.de](https://www.dibt.de)).

Verifiable calculations must be made taking into account the loads to be anchored.

The product performance required for the design (characteristic load-bearing capacity values, centre and edge distances, installation parameters) must be taken from the relevant ETA.

If applied transverse loads change their sign several times, they may have to be regarded as fatigue-related stress. Varying transverse loads with changing signs resulting from wind loads or temperature changes are usually regarded as quasi-static loads, not fatigue stresses. Further information can be found in DAfStb vol. 615, Commentary on DIN EN 1992-4, Section 8.1(2).

If the specifications of the relevant ETA are observed, proof of direct local force application in the concrete is deemed provided.

Transfer within the component of the loads to be anchored must be demonstrated.

4 Execution

Notes on the execution are contained in the DIBt paper ‘Notes on the installation of anchors, October 2010’ ([www.dibt.de](https://www.dibt.de)).

## Annex 4

**Building approval requirements, classification, use of construction products, use of designs**

Last updated: 2022-11

Annex 4 takes into account the hEN, EEAS and ETAGs, which were available in December 2021 and are relevant to building regulations.

**CONTENTS**

1 Parts of buildings that are subject to the requirements for fire characteristics and smouldering

2 Electrical wiring and electrical lines

3 Roofing

4 Structural elements

5 Barriers

6 Safety precautions for cable and/or

pipe passages in fire-resistant structural elements

7 Heat extraction devices in accordance with EN 12101-2:2003 for use in roofs in shopping streets pursuant to the Model Retail Outlet Regulation [Muster-Verkaufsstättenverordnung] and provisions on application and execution

8 Service ducts and shafts, including their opening barriers

9 Fire-resistant glazing

10 Special fire protection products

1 Parts of buildings that are subject to the requirements for fire characteristics and smouldering

For the fulfilment of the building requirements in A 2.1.2 when using structural works according to Technical Building Regulations or proof of usability according to § 17 MBO[[9]](#footnote-9), the minimum required building material classes are to be determined in Section 1.1. Unless otherwise specified in the following Sections, the minimum requirement ‘normal flammability’ applies to the fire characteristics of the building materials.

For the fulfilment of the building requirements in A 2.1.2 when using parts of structural works that use construction products in accordance with harmonised technical specifications, the minimum required building material performance is listed in Section 1.2.

1.1 Building approval requirements and assignment of building material classes according to DIN 4102‑ 1:1998‑ 05 and other features

Table 1.1: Building approval requirements and classification of building material classes according to DIN 4102‑ 1:1998‑ 05 including floor coverings and linear pipe insulation materials and other features

|  | Building approval requirementsb | Minimum required building material classes pursuant to DIN 4102‑1:1998-05 | Other characteristics for use: |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| **1** | non-combustible1,2 | A 2 | -- |
| **2** | flame-resistant2 | B 1 | Building materials with the exception of floor coverings:  Limited smoke development  Passed (I ≤ 400 % x min. when tested pursuant to DIN 4102‑15:1990‑05) |
| **3** | flame-resistant2 and no burning particles or droplets | B 1 | No burning droplets or particles falling  Limited smoke development Passed (Ia ≤ 400 % x min. when tested pursuant to DIN 4102‑15:1990‑05) |
| **4** | flame-resistant2 and low smoke development | B1 | Low smoke development Passed (Ia ≤ 100 % x min. when tested pursuant to DIN 4102‑15:1990‑05) |
| **5** | flame-resistant2 and no burning droplets or particles and low smoke development | B1 | No burning droplets or particles falling  Low smoke development Passed (Ia ≤ 100 % x min. when tested pursuant to DIN 4102‑15:1990‑05) |
| **6** | normal flammability, no burning droplets or particles | B 2 | No burning droplets or particles falling |
| **7** | normal flammability | B 2 | -- |
|  | 1 if necessary, additionally melting point> 1000 °C | -- | Specification: Melting point at least 1,000°C pursuant to DIN 4102-17:2017-12 |
|  | 2 if required, additional raw density | -- | Specification: Bulk density |
|  | a The integral value I of smoke development shall be determined over time by determining the surface content by means of rectangular method under the light attenuation curve during the test according to DIN 4102-15: 1990-05 during the flame exposure period by means of the light measuring distance according to DIN 50055:1989-03 with a sampling rate of at least one measured value per 3 seconds.  b If a component is to be used for the construction installation that does not meet at least the requirement “normal flammability” (lightly flammable), § 26(1) sentence 2 MBO2 shall be complied with. | | |

For construction products – except flooring – the tests shall include results on burning droplets or falling burning particles of the sample pursuant to DIN 4102-1:1998-05, Sections 6.1 and 6.2, and/or values for smoke development pursuant to DIN 4102-1:1998-05, Sections 6.1. These results and the values must be provided by the manufacturer with the exception of floor coverings.

1.2 Minimum required fire performance according to harmonised technical specifications

Construction products for use in buildings, including their structural elements, may be used in accordance with the harmonised technical specifications. The minimum required performance shall be taken from Table 1.2. For the use of these construction products for horizontal installation, additional 1.4 must be considered.

Table 1.2: Building approval requirements and at least required fire behaviour and other features

|  | Building approval requirement | Minimum required performances | | | other features (excluding floor coverings) |
| --- | --- | --- | --- | --- | --- |
| Construction products excluding linear pipe insulation materials and floor coverings | Linear pipe insulation materials | Floor coverings |
|  | 1 | 2 | 3 | 4 | 5 |
| **1** | non-combustible | A2 – s1,d0 | A2L – s1,d0\* | A2fl – s1 | Specification: Glowing behaviour according to 1.3 and if necessary raw density |
| **2** | non-combustible and additionally melting point > 1 000 °C | A2 – s1,d0\* | A2L – s1,d0\* | A2fl – s1 | Specification: Melting point of at least 1 000 °C and glow behaviour according to 1.3 and if necessary raw density |
| **3** | flame-resistant and no burning droplets or particles and low smoke development | C – s1,d0\* | CL – s1,d0 | - | Specification: Glowing behaviour according to 1.3 and if necessary raw density |
| **4** | flame-resistant and no burning droplets or particles | C – s2,d0\* | CL – s2,d0 | - |
| **5** | flame-resistant and low smoke development | C – s1,d2\*\* | CL – s1,d2 | Cfl – s1 |
| **6** | flame-resistant | C – s2,d2\* | CL – s2,d2 | Cfl – s1 |
| **7** | normal flammability and no burning droplets or particles | E | EL | - | - |
| **8** | normal flammability | E – d2 | EL – d2 | Efl | - |
| **\*** When tested according to EN 13823:2020 TSP 600 s ≤ 35 m²; this information is not required for construction products whose fire behaviour according to CWFT Decisions 2003/43/EC of 17.1.2003 (Fig. L13/35), 2003/593/EC of 7.8. 2003 (OJ L201/35), 2006/673/EC of 5.10.2006 (OJ L276/77) and 2010/83/EU of 9.2.2010 (OJ L38/13) and Delegated Regulation (EU) 2017/1228 of 20 March 2017 (OJ L177/4) is classified in Class A2 — s1,d0 without testing.  **\*\*** When tested according to EN 13823:2020 TSP 600 s ≤ 35 m²; this information is not required for construction products whose fire behaviour is classified in Class B-s1,d0 without testing according to CWFT Decisions 2003/43/EC of 17.1.2003 (Fig. L13/35) and 2007/348/EC of 15.5.2007 (OJ L131/21). | | | | | |

Explanatory notes to Table 1.2:

|  |  |  |
| --- | --- | --- |
| Derivation of the abbreviation | Criterion | Scope |
| s (Smoke) | Smoke development | Requirements for smoke development   * s1; low smoke development * s2: limited smoke development |
| d (droplets) | burning droplets/particles | Requirements for burning droplets/particles   * d0: no burning dripping/particles * d1, d2; burning droplets/particles |
| ....fl (floorings) |  | Fire performance class for floorings |
| …L (linear pipe thermal insulation products) |  | Fire performance class for linear products for thermal insulation of pipes |

1.3 Minimum required smouldering performances

For the fulfilment of the building requirements in A 2.1.2 for flame-resistant or non-combustible parts of structural works where construction products are used in accordance with the following harmonised standards (EN 438‑7:2005[[10]](#footnote-10), EN 13162:2012+A1:2015[[11]](#footnote-11), EN 13168:2012+A1:2015[[12]](#footnote-12), EN 13170:2012+A1:2015[[13]](#footnote-13), EN 13171:2012+A1:2015[[14]](#footnote-14), EN 13950:2014[[15]](#footnote-15), EN 13964:2014[[16]](#footnote-16), EN 13986:2004+A1:2015[[17]](#footnote-17), EN 14064‑1:2010[[18]](#footnote-18), EN 14190:2014[[19]](#footnote-19), EN 14303:2009+A1:2013[[20]](#footnote-20), EN 15037-4:2010+A1:2013[[21]](#footnote-21), EN 15498:2008[[22]](#footnote-22)), specifications on smouldering performance according to according to Table 1.2 must be met. A European test method DIN EN 16733:2016-07 is available to determine the smouldering behaviour; the required indication is: ‘The test was passed: the product shows no tendency of continuous smouldering.’.

1.4 Use of building materials for horizontal installation

By way of deviation from the information set out in Table 1.2, construction products made of rigid polystyrene foam (EPS, XPS) shall not be installed horizontally in accordance with harmonised product specifications and composite construction products with polystyrene hard foam insulation layers in accordance with harmonised product specifications, provided that such construction products are subject to the construction supervision requirement ‘seriously flammable’ for the intended use.

Excluded from this is the use of these construction products under screeds on floors made of concrete.

2 Electrical wiring and electrical lines

2.1 Electrical wiring

2.1.1 Building approval requirements and assignment of building material classes according to DIN 4102-1:1998-05 and other features

To demonstrate the fire characteristics of electrical cables under the Technical Building Regulations or under the proof of fitness for purpose pursuant to § 17 MBO**Error! Bookmark not defined.**, assignment of building material classes pursuant to DIN 4102‑1:1988-05 for the requirements of A 2.1.2 may be based on Table 2.1.1 as well as further characteristics.

Table 2.1.1: Building approval requirements and assignment of building material classes according to DIN 4102‑ 1:1998‑ 05 and other features

|  | Building approval requirement | Minimum required building material classes pursuant to DIN 4102‑1:1998-05 | Other characteristics for use: |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| **1** | non-combustible | A2 | - |
| **2** | flame-resistant | B1 | limited smoke development (Ia ≤ 400 % x min. when tested pursuant to DIN 4102‑15:1990-05)  Pass |
| **3** | flame-resistant and with low smoke development | B1 | low smoke development (Ia ≤ 100 % x min. when tested pursuant to DIN 4102‑15:1990-05)  Pass |
| **4** | normal flammability | B2 | -- |
|  | a The integral value I of smoke development shall be determined over time by determining the surface content by means of rectangular method under the light attenuation curve during the test according to DIN 4102-15: 1990-05 during the flame exposure period by means of the light measuring distance according to DIN 50055:1989-03 with a sampling rate of at least one measured value per 3 seconds. | | |

For construction products, values on smoke development are determined during the tests according to DIN 4102-15:1990-05 Section 4.4. These values shall be specified by the manufacturer.

2.1.2 Minimum required fire performance

The minimum required performance is given in Table 2.1.2 for cables and wiring for use in structural works as defined in Section 4.1 of EN 50575:2014+A1:2016[[23]](#footnote-23).

Table 2.1.2: Building approval requirements and minimum required fire performance

|  |  |  |
| --- | --- | --- |
|  | Building approval requirement | Minimum required performances |
|  | 1 | 2 |
| **1** | non-combustible | Aca |
| **2** | flame-resistant | B1ca –s2 |
| **3** | flame-resistant and with low smoke development | B1ca –s1 |
| **4** | normal flammability | Eca |

Explanatory notes for Table 2.1.2: ...ca(cable) fire performance class of cables

2.2 Electrical cable systems

In order to fulfil the structural requirements of A 2.1.15 and A 2.2.1.8, functional integrity of electrical cable systems under fire impact for types according to § 16a MBO**Error! Bookmark not defined.** shall be demonstrated based on the minimum required functional integrity classes pursuant to DIN 4102‑12:1998‑11 as given in Table 2.2.1.

Table 2.2.1: Building approval requirements and assignment of functional maintenance classes according to DIN 4102‑ 12:1998‑ 11

|  |  |  |
| --- | --- | --- |
|  | Requirements for function retention in minutes | Minimum required functional integrity classes according to DIN 4102‑ 12:1998-11 |
|  | 1 | 2 |
| **1** | ≥ 30 | E 30 |
| **2** | ≥ 60 | E 60 |
| **3** | ≥ 90 | E 90 |

3 Roofing

3.1 Roofing with external fire stress due to flying fire and radiant heat and classification of classes according to DIN 4102-7:2018-11

In order to fulfil the building requirements in A 2.1.9, the property of a roofing as part of the building structure under fire impact from outside against flying sparks and radiating heat (hard roofing) shall be demonstrated based on the minimum required class for a roofing deemed resistant to flying sparks and radiating heat pursuant to DIN 4102‑7:2018-11 in conjunction with DIN SPEC 4102‑23:2018-07, as given in Table 3.1.

Table 3.1: Building supervision requirement and classification of classes according to DIN 4102‑ 7:2018-11

|  |  |
| --- | --- |
| Building approval requirement | Classes according to DIN 4102‑ 7:2018-11 |
| 1 | 2 |
| External fire exposure due to sparks and radiant heat (hard roofing) | Resistant to sparks and radiant heat |

3.2 Roofing with external fire exposure due to sparks and radiant heat when using construction products according to European harmonised specifications and minimum required performance

In order to fulfil the structural requirements in A 2.1.9, proof for hard roofing using construction products (EN 492:2012+A1:2018[[24]](#footnote-24), EN 494:2012+A1:2015[[25]](#footnote-25), EN 534:2006+A1:2010[[26]](#footnote-26),   
EN 1873:2005[[27]](#footnote-27), EN 13707:2004+A2:2009[[28]](#footnote-28), EN 13956:2012[[29]](#footnote-29), EN 14351‑ 1:2006+A2:2016[[30]](#footnote-30), EN 14783:2013[[31]](#footnote-31) and EN 14963:2006[[32]](#footnote-32)) with CE‑ marking pursuant to Regulation (EU) No 305/2011 shall be based on the minimum required performance as given in Table 3.2.

If the CE marking specifies class BROOF(t1), stress by fire from the outside according to DIN EN 13501-5:2016-12, this applies to roofing according to A 2.1.9 only if the execution of the roof corresponds to the versions in the associated classification document.

Table 3.2: Building approval requirement and minimum required performance

|  |  |
| --- | --- |
| Building approval requirement | Minimum required performance |
| 1 | 2 |
| External fire exposure due to sparks and radiant heat (hard roofing) | BROOF(t1) |

4 Structural elements

4.1 Load-bearing structural elements

In order to meet the structural requirements in A 2.1.3 for the planning, designing and execution of load-bearing structural elements of structural works, Tables 4.1.1 and 4.1.2 shall be complied with when determining the stability in the event of fire in accordance with Eurocode.

The requirements in the tables are deemed fulfilled only if the structural elements have been designed in accordance with the Technical Building Regulations of Part A, Chapter A 1, ser. No A 1.2.

For structural elements in accordance with national Technical Rules, the following tables list only the minimum building regulations requirements.

Table 4.1.1A: Building approval requirements for load-bearing structural elements, design according to Eurocode and additional application rules

|  | Building approval requirement | Determined duration of stability in the event of fire in min. Eurocode1,\*\* under action ETK in accordance with DIN EN 19911,\*\* | In addition to the Eurocode application rule for construction types using certain building materials\*\*\* |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| **1** | Of non-combustible\* building materials | Not required | DIN 4102-4:2016-05 |
| **2** | Made of normal-flammability building materials | Not required | DIN 4102-4:2016-05 |
| **3** | Fire-retardant | ≥ 30 | DIN 4102‑4:2016‑05 |
| **4** | Fire-retardant and made of non-combustible\* materials | ≥ 302 | DIN 4102‑4:2016‑05 |
| **5** | Highly fire-retardant (load-bearing combustible parts, non-combustible\* with insulation materials and fire-protective cladding of 60 min. made of non-combustible building materials) according to Section 4 of the Technical Rule under ser. No A 2.2.1.4.4 | ≥ 603 | A 2.2.1.4 |
| **6** | Highly fire-retardant and essential parts made of non-combustible materials | ≥ 602 | DIN 4102‑4:2016‑05 |
| **7** | Highly fire-retardant and made of non-combustible materials | ≥ 602 | DIN 4102‑4:2016‑05 |
| **8** | Fire-resistant (non-combustible\* load-bearing and reinforced parts) | ≥ 902 | DIN 4102‑4:2016‑05 |
| **9** | Fire-resistant and made of non-combustible\* building materials | ≥ 902 | DIN 4102‑4:2016‑05 |
| **10** | Fire resistance of 120 minutes and made of non-combustible\* building materials | ≥ 1202 | - |
| **11** | Structural elements referred to in A 2.1.3.1 letter (d) with fire resistance of 60 minutes and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.44 | ≥ 603,\*\* | A 2.2.1.4 |
| **12** | Structural elements referred to in A 2.1.3.1 letter (d) with fire resistance of 90 minutes and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.44 | ≥ 903,5,\*\* | A 2.2.1.4 |
|  | A. Table contains only building supervisory requirements for structural elements, which are also represented by the Eurocodes.  1 DIN EN 1992-1-2:2010-12, DIN EN 1993-1-2:2010-12, DIN EN 1994-1-2:2010-12, DIN EN 1995-1-2:2010-12, DIN EN 1999-1-2:2010-12, DIN EN 1996-1-2:2011-04,  DIN EN 1991-1-2:2010-12, Section 3.2.1  2 Not applicable to DIN EN 1995, as requirements for the fire characteristics of load-bearing parts are not fulfilled.  3 Not applicable to DIN EN 1992-1-2:2010-12, DIN EN 1993-1-2:2010-12, DIN EN 1994-1-2:2010-12, DIN EN 1999-1-2:2010-12, DIN EN 1996-1-2:2011-04  4 As far as the design according to DIN EN 1995-1-2:2010-12 and DIN EN 1995-1-2/NA:2010-12 should take into account the fire-protective cladding according to Sections 4.2 and 5.2 of the Technical Rule in accordance with ser. No A 2.2.1.4, a type-approval according to § 16a MBO 1 is required. Excluded from this are designs for beams and columns according to DIN EN 1995-1-2:2010-12 Section 3.4.3.  5 In connection with DIN EN 1995-1-2:2010-12 Section 6, reference is made to the possibility of DIN EN 1995-1-1/NA:2010-12, NCI NA.12 (‘carpenter-style connections’).  \* Regarding the requirements, Table 1.1. applies.  \*\* Design according to Eurocode does not account for the fire characteristics of building materials.  \*\*\* Regarding the requirements, Table 1.1 or Table 1.2 applies. | | |

The requirement of Table 4.1.1, column 1, is met only if reinforcing structural elements with their connections have at least the same determined duration of stability in the event of fire.

Table 4.1.2A: Building approval requirements for load-bearing structural elements and classification of classes (table values) according to Eurocode DIN EN 1992‑ 1‑ 2:2010-12, DIN EN 1994‑1‑2:2010-12, DIN EN 1996‑ 1‑ 2/NA:2013-06 and additional application rules

|  | Building approval requirement | Classes according to Eurocode\*\*  DIN EN 1992‑1‑2:2010-12, Section 5 DIN EN 1994‑1‑2:2010-12, Section 4.2 DIN EN 1996‑1‑2/NA:2013-06, to Annex B | Application rule to be observed in addition to Eurocode for designs using certain building materials\*\*\* |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| **1** | Of non-combustible\* building materials | Not required | DIN 4102-4:2016-05 |
| **2** | Fire-retardant | R 30 | DIN 4102‑4:2016‑05 |
| **3** | Fire-retardant and made of non-combustible\* materials | R 30 | DIN 4102‑4:2016‑05 |
| **4** | Highly fire-retardant and essential parts made of non-combustible materials | R 60 | DIN 4102-4:2016-05 |
| **5** | Highly fire-retardant and made of non-combustible materials | R 60 | DIN 4102-4:2016-05 |
| **6** | Fire-resistant (non-combustible\* load-bearing and reinforced parts) | R 90 | DIN 4102-4:2016-05 |
| **7** | Fire-resistant and made of non-combustible\* building materials | R 90 | DIN 4102-4:2016-05 |
| **8** | Fire resistance of 120 minutes and made of non-combustible\* materials | R 120 | DIN 4102-4:2016-05 |
|  | A Table contains only building supervisory requirements for structural elements, which are also represented by the Eurocodes.  \* Regarding the requirements, Table 1.1. applies.  \*\* The Eurocode class does not account for the fire characteristics of building materials. Table 1.1 or 1.2 applies.  \*\*\* Regarding the requirements, Table 1.1 or Table 1.2 applies. | | |

The requirements of Tables 4.1.1, column 1 and 4.1.2, column 1 are met only if the parts bearing or reinforcing the structural elements these parts have at least the same fire resistance.

4.2 Space-enclosing structural elements

In order to fulfil the building requirements in A 2.1.3 for the planning, design and execution of space-enclosing and, where applicable, load-bearing parts of structural works, Tables 4.2.1 to 4.2.3 shall be observed when designing the fire resistance according to Eurocode.

The requirements in Tables 4.2.1 to 4.2.3 are met only if the design of the structural elements has been carried out in accordance with the Technical Building Regulations of Part A, Chapter A 1, ser. No A 1.2.

For structural elements in accordance with national Technical Rules, the following tables list only the minimum building regulations requirements.

4.2.1 Non-supporting space-enclosing walls

Table 4.2.1A: Building approval requirements for non-bearing space-closing walls and assignment of classes (table value) according to Eurocode DIN EN 1992-1-2:2010-12 and DIN EN 1996-1/NA:2013-06 and additional application rules

|  | Building approval requirement | Classes according to Eurocode\*\*  DIN EN 1992‑1‑2:2010-12, Section 5 DIN EN 1996‑1‑2/NA:2013‑06 to Annex B | Application rule to be observed in addition to Eurocode for designs using certain building materials\*\*\* |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| **1** | Fire-retardant | EI 30 | DIN 4102‑4:2016‑05 |
| **2** | Fire-retardant and made of non-combustible\* materials | EI 30 | DIN 4102-4:2016-05 |
| **3** | Highly fire-retardant and essential parts made of non-combustible materials | EI 60 | DIN 4102‑4:2016‑05 |
| **4** | Highly fire-retardant and made of non-combustible materials | EI 60 | DIN 4102‑4:2016‑05 |
| **5** | Fire-resistant (non-combustible\* load-bearing and reinforced parts) | EI 90 | DIN 4102‑4:2016‑05 |
| **6** | Fire-resistant and made of non-combustible\* building materials | EI 90 | DIN 4102‑4:2016‑05 |
| **7** | Fire resistance of 120 minutes and made of non-combustible\* building materials | EI 120 | DIN 4102-4:2016-05 |
|  | A Table contains only building supervisory requirements for structural elements, which are also represented by the Eurocodes.  \* Regarding the requirements, Table 1.1. applies.  \*\* The Eurocode class does not account for the fire characteristics of building materials. Table 1.1 or 1.2 applies.  \*\*\* Regarding the requirements, Table 1.1 or Table 1.2 applies. | | |

The requirement of Table 4.2.1, column 1, is only met if subsequent structural elements have at least the same fire resistance, unless Part A 2.1.3.3.1 allows a different connection for subsequent structural elements. The transitions to such structural elements must not affect the space barrier pursuant to ser. No A 2.1.3.3.

4.2.2 Load-bearing space-enclosing walls

Table 4.2.2A: Building approval requirements for loadbearing partitions and classification of classes (table values) according to Eurocode DIN EN 1992-1-2:2010-12 and DIN EN 1996‑ 1‑ 2/NA:2013‑ 06 and additional application rules

|  | Building approval requirement | Classes according to Eurocode\*\*  DIN EN 1992‑1‑2:2010-12, Section 5 DIN EN 1996‑1‑2/NA:2013-06, to Annex B under unilateral fire stress | Application rule to be observed in addition to Eurocode for designs using certain building materials\*\*\* |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| **1** | Fire-retardant | REI 30 | DIN 4102‑4:2016‑05 |
| **2** | Fire-retardant and made of non-combustible\* materials | REI 30 | DIN 4102‑4:2016‑05 |
| **3** | Highly fire-retardant and essential parts made of non-combustible materials | REI 60 | DIN 4102‑4:2016‑05 |
| **4** | Highly fire-retardant and made of non-combustible materials | REI 60 | DIN 4102‑4:2016‑05 |
| **5** | Fire-resistant (non-combustible\* load-bearing and reinforced parts) | REI 90 | DIN 4102‑4:2016‑05 |
| **6** | Fire-resistant and made of non-combustible\* building materials | REI 90 | DIN 4102‑4:2016‑05 |
| **7** | Firewall (fire-resistant and made of non-combustible materials) | REI 90 and Criterion M | DIN 4102-4:2016-05 |
| REI-M 90 | DIN 4102-4:2016-05 |
| **8** | Wall instead of a firewall (highly fire-retardant and made of non-combustible\* building materials and stable even under additional mechanical stress | REI 60 and Criterion M | DIN 4102-4:2016-05 |
| REI-M 60 | DIN 4102-4:2016-05 |
| **9** | Fire resistance of 120 minutes and made of non-combustible\* materials | REI 120 | DIN 4102-4:2016-05 |
| **10** | Fire resistance of 120 min and made of non-combustible\* building materials, stable even under additional mechanical stress | REI 120 and Criterion M | DIN 4102-4:2016-05 |
| REI-M 120 | DIN 4102-4:2016-05 |
|  | \* A Table contains only building supervisory requirements for structural elements, which are also represented by the Eurocodes.  \* \* Regarding the requirements, Table 1.1. applies.  \*\* \*\* The Eurocode class does not account for the fire characteristics of building materials. Table 1.1 or 1.2 applies.  \*\*\* \*\*\* Regarding the requirements, Table 1.1 or Table 1.2 applies. | | |

The requirement of Table 4.2.2, column 1, is only met if subsequent structural elements have at least the same fire resistance, unless Part A 2.1.3.3.1 allows a different connection for subsequent structural elements. The transitions to such structural elements must not affect the space barrier pursuant to ser. No A 2.1.3.3.

4.2.3 Load-bearing space-enclosing ceilings

Table 4.2.3A: Building approval requirements for load-bearing space-closing ceilings and classification of classes (table values) according to Eurocode and additional application rules

|  | Building approval requirement | Classes according to Eurocode\*\* DIN EN 1992‑ 1‑ 2:2010‑ 12, Section 5 or DIN EN 1994-1-2:2010-12, Section 4.3 | Application rule to be observed in addition to the Eurocode for designs using certain building materials\*\*\* |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| **1** | Fire-retardant | REI 30 | DIN 4102‑4:2016‑05 |
| **2** | Fire-retardant and made of non-combustible\* materials | REI 30 | DIN 4102‑4:2016‑05 |
| **3** | Highly fire-retardant and essential parts made of non-combustible materials | REI 60 | DIN 4102‑4:2016‑05 |
| **4** | Highly fire-retardant and made of non-combustible materials | REI 60 | DIN 4102‑4:2016‑05 |
| **5** | Fire-resistant (non-combustible\* load-bearing and reinforced parts) | REI 90 | DIN 4102‑4:2016‑05 |
| **6** | Fire-resistant and made of non-combustible\* building materials | REI 90 | DIN 4102‑4:2016‑05 |
| **7** | Fire resistance of 120 minutes and made of non-combustible\* building materials | REI 120 | DIN 4102-4:2016-05 |
|  | A Table contains only building supervisory requirements for structural elements, which are also represented by the Eurocodes.  \* Regarding the requirements, Table 1.1. applies.  \*\* The Eurocode class does not account for the fire characteristics of building materials. Table 1.1 or 1.2 applies.  \*\*\* Regarding the requirements, Table 1.1 or Table 1.2 applies. | | |

In the case of ceilings, the proof referred to in Table 4.2.3, column 2 shall also be provided for fire exposure from the top (fire from top to bottom) in accordance with the requirement in A 2.1.8.

The requirement of Table 4.2.3, column 1, is only met if subsequent structural elements have at least the same fire resistance, unless Part A 2.1.3.3.1 allows a different connection for subsequent structural elements. The transitions to such structural elements must not affect the space barrier pursuant to ser. No A 2.1.3.3.

For ceilings made of concrete, reinforced concrete, prestressed concrete or composite ceilings in accordance with the Eurocodes DIN EN 1992‑1‑1:2011-01 or DIN EN 1994-1-1:2010-12, which have been measured in terms of load capacity in the event of fire (criterion R), the following applies in addition to Table 4.1.1:

* For the ceilings, proof of space enclosing barrier (criteria E and I) for the duration as given in Table 4.1.1, column 2, shall be provided based on the provisions of Paragraph A 1.2.
* For ceilings, the aforementioned proof shall also be given for fire impact from above (fire from top to bottom) in accordance with the requirement in A 2.1.8.

4.2.4 Load-bearing structural elements, space-enclosing ceilings, firewalls and walls instead of firewalls, partitions, walls of necessary stairwells and corridors, walls of open corridors, exterior walls, independent subceilings, roofs, stairs, system floors

In order to fulfil the structural requirements in A 2.1.3, space-enclosing and/or load-bearing parts of buildings according to Technical Building Regulations or according to a proof of fitness for purpose in accordance with § 17 MBO**Error! Bookmark not defined.** or proof of the suitability of designs according to § 16a MBO**Error! Bookmark not defined.** shall be subject to the minimum required classes as given in Section 4.2, Table 4.2.4.

Table 4.2.4: Building approval requirements and classification of classes according to DIN 4102-2:1977-09

|  | Building approval requirement | Minimum required classes according to DIN 4102‑2:1977-09 | Abbreviation pursuant to DIN 4102‑2:1977-09 |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| **1** | Of non-combustible\* building materials | No specification of the class required. Table 1.1 applies. | |
| **2** | Of flame-retardant building materials |
| **3** | Of flame-retardant building materials, non-flaming falling or dripping |
| **4** | Made of normal-flammability building materials |
| **5** | Fire-retardant | Fire resistance class F 30 | F 30-B1 |
| **6** | Fire-retardant and made of non-combustible\* materials | Fire resistance class F 30 and made of non-combustible building materials | F 30-A1 |
| **7** | Highly fire-retardant and of incombustible materials in the main parts | Fire resistance class F 60 and essential parts made of non-combustible building materials | F 60-AB2,3 |
| **8** | Highly fire-retardant (load-bearing combustible parts, non-combustible\* with insulation materials and fire-protective cladding of 60 min. made of non-combustible\* building materials) according to Section 4 of the Technical Rule under ser. No A 2.2.1.44 | Highly fire-retardant (load-bearing combustible parts, non-combustible\* with insulation materials and fire-protective cladding of 60 min. made of non-combustible building materials) according to Section 4 of the Technical Rule under ser. No A 2.2.1.4 | - |
| **9** | Highly fire-retardant and made of non-combustible materials | Fire resistance class F 60 and made of non-combustible building materials | F 60-A2,3 |
| **10** | Fire-resistant (non-combustible load-bearing and reinforced parts) | Fire resistance class F 90 and essential parts made of non-combustible building materials | F 90-AB5,6 |
| **11** | Fire-resistant and made of non-combustible\* building materials | Fire resistance class F 90 and made of non-combustible building materials | F 90-A, 5,6 |
| **12** | Firewall (including fire-resistant and non-combustible building materials under additional mechanical stress) | Firewall | - |
| **13** | Wall in the type of firewalls (fire resistant and non-combustible\* building materials) | Wall in the type of firewalls (fire resistant and non-combustible\* building materials) | - |
| **14** | Wall instead of a firewall highly fire-retardant (load-bearing combustible parts, non-combustible\* with insulation materials and fire-protective cladding of 60 min. made of non-combustible building materials) according to Section 4 of the Technical Rule under ser. No A 2.2.1.44 | Wall instead of a firewall highly fire-retardant (load-bearing combustible parts, non-combustible\* with insulation materials and fire-protective cladding of 60 min. made of non-combustible building materials) according to Section 4 of the Technical Rule under ser. No A 2.2.1.4 | - |
| **15** | Wall instead of a firewall  highly fire-retardant and made of non-combustible\* building materials and stable even under additional mechanical stress | Wall instead of a firewall  highly fire-retardant and made of non-combustible building materials and stable even under additional mechanical stress | - |
| **16** | Wall instead of a firewall highly fire-retardant and in the essential parts of non-combustible\*\* building materials also under additional mechanical stress stable | Wall instead of a firewall highly fire-retardant with essential parts made of non-combustible building materials and stable even under additional mechanical stress | - |
| **17** | Building shell walls which, from the inside out, always have the fire resistance of the load-bearing and reinforced parts of the building (however, the building structural elements must be at least fire-retardant), and, from the outside in, have the fire resistivity of the fire-resistant building structural elements | Building shell walls which, from the inside out, always have the fire resistance of the load-bearing and reinforced parts of the building (however, the building structural elements must be at least fire-retardant), and, from the outside in, have the fire resistivity of the fire-resistant building structural elements. | F 30-B (from the inside) and F90-B (from the outside) |
| **18** | Fire resistance of 120 minutes and made of non-combustible building materials | Fire resistance class F 120 and made of non-combustible building materials | F 120-A |
| **19** | Fire resistance of 120 min and made of non-combustible\* building materials, stable even under additional mechanical stress | Firewall with a higher fire resistance duration of 120 min | - |
| **20** | Structural elements referred to in A 2.1.3.1 letter (d) with fire resistance of 90 minutes and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.48 | Structural elements referred to in A 2.1.3.1 letter (d) with fire resistance of 90 minutes and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.47 | - |
| **21** | Structural elements referred to in A 2.1.3.1 letter (d) with fire resistance of 60 minutes and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.44 | Structural elements referred to in A 2.1.3.1 letter (d) with fire resistance of 60 minutes and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.47 | - |
| **22** | Structural elements referred to in A 2.1.3.1 letter (d)  as a wall instead of a firewall  (also under additional mechanical stress with fire resistance of 60 min and made of combustible building materials) in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.4 8 | Wall instead of a firewall  (even under additional mechanical stress, fire resistance of 60 min and made of combustible building materials)in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.4 7 | - |
|  | 1 W 30 is also permitted for non-load-bearing exterior walls.  2 Proof and classification as per Table 4.3.1.  3 W 60 also permitted for non-load-bearing exterior walls.  4 A type-approval according to § 16a MBO is required, unless construction types according to DIN 4102-4:2016-05 or according to DIN EN 1995-1-2:2010-12 and the fire-protective cladding in accordance with Section 4.2 or 5.2 of the Technical Rule according to ser. No A 2.2.1.4 are used and the connections are executed according to the Technical Rule in accordance with ser. No A 2.2.1.4.  5 W 90 is also permitted for non-load-bearing exterior walls.  6 Load-bearing structural elements must be tested under an appropriate load in accordance with DIN 4102-2:1977-09, Section 6.2.2.6.  7 Cladding made from non-combustible building materials is required in accordance with the Technical Rule under ser. No A 2.2.1.4, unless facilitations are made in Section 5.2. of the Technical Rule under ser. No A 2.2.1.4.  8 Design approval according to § 16a MBO is required.  \* Regarding the requirements, Table 1.1. applies.  \*\* Continuous layer of non-combustible building materials in the component plane. | | |

The requirement of Table 4.2.4, column 1, is only met if subsequent structural elements have at least the same fire resistance, unless Part A 2.1.3.3.1 allows a different connection for subsequent structural elements. The transitions to such structural elements must not affect the space barrier, if required, under ser. No A 2.1.3.3.

4.3 Use of construction products according to harmonised technical specifications for load-bearing and/or space-enclosing structural elements

For the fulfilment of the building requirements in A 2.1.3 when using construction products in accordance with harmonised technical specifications for load-bearing and/or space-enclosing parts of structural works, the minimum required performance shall be taken from Section 4.3.

The requirements in the tables are deemed fulfilled only if the required performance has been achieved based on design or, where required, test load calculation in case of fire resistance tests in accordance with the Technical Building Regulations of Part A, Chapter A 1, ser. No A 1.2.

In accordance with A 2.1.3.3.1, the proof of fire resistance shall be demonstrated for each of the possible directions of fire exposure (e.g. from the inside to the outside and from the outside to the inside and both from the top to the bottom and from the bottom to the top) for space barrier requirements.

In the absence of a technical best practice for the planning, designing and execution when using the aforementioned construction products, a proof pursuant to § 16a MBO**Error! Bookmark not defined.** is required.

For structural elements according to harmonised technical specifications, the following tables list only the minimum building regulatory requirements.

4.3.1.1 Fire resistance requirements including fire performance when using construction products in accordance with harmonised technical specifications[[33]](#footnote-33) for load-bearing, load-bearing and space-closing structural elements and at least required performances, excluding construction products in accordance with 4.3.1.2

Table 4.3.1.1: Building approval requirements and minimum required performances

|  | Building approval requirement | Minimum required performances | | |
| --- | --- | --- | --- | --- |
| Fire resistance | | Fire performance |
| without space barrier1 | with space barrier |
|  | **1** | 2 | 3 | 4 |
| **1** | Of non-combustible\* building materials | - | - | A2 – s1,d0\*\* |
| **2** | Made of flame retardant\* building materials | - | - | C – s2,d2\*\* |
| **3** | Made of normal flame retardant\* building materials | - | - | E – d2 |
| **4** | Fire-retardant | R 30 | REI 30 | E – d2 |
| **5** | Fire-retardant with one-sided2 cladding made of non-combustible\* building materials | - | REI 30 | Non-combustible\* cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **6** | Fire-retardant and made of non-combustible\* materials | R 30 | REI 30 | A2 – s1,d0\*\* |
| **7** | Highly fire-retardant (load-bearing combustible parts, non-combustible\* with insulation materials and fire-protective cladding of 60 min. made of non-combustible building materials) according to Section 4 of the Technical Rule under ser. No A 2.2.1.43 | R 60 Fire-protective cladding: K260 | REI 60 Fire-protective cladding: K260 | Insulation materials, fire-protective cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **8** | Highly fire-retardant and made of non-combustible materials | R 60 | REI 60 | A2 – s1,d0\*\* |
| **9** | Highly fire-retardant and of incombustible materials4 in the main parts | R 60 | REI 602 | Essential parts:  A2 – s1,d0\*\*  Otherwise: E – d2 |
| **10** | Wall instead of a firewall highly fire-retardant (from non-combustible\* building materials even under additional mechanical stress) | - | REI 60-M | A2 – s1,d0\*\* |
| **11** | Wall instead of a firewall highly fire-retardant and stable in the essential parts of non-combustible\* building materials even under additional mechanical stress | - | REI 60-M | Essential parts:  A2 – s1,d0\*\*  Otherwise: E – d2 |
| **12** | Wall instead of a fire-retardant wall (carrying parts flammable, insulating materials non-combustible\* with fire-protective cladding of 60 min. made of non-combustible\* building materials also under additional mechanical stress resistant) according to Section 4 of the Technical Rule according to ser. No A 2.2.1.4 3 | - | REI 60-M Fire-protective cladding: K260 | Load-bearing and reinforcing parts: E, incidentally, A2 – s1,d0\*\* |
| **13** | Structural elements according to A 2.1.3.1 letter (d) with a fire resistance of 60 min and of flammable building materials,  according to Section 5 of the technical regulation in accordance with ser. No A 2.2.1.43,with room-side fire-protective cladding of 30 min. made of non-combustible\* building materials according to Section 5.2 of the Technical Rule in accordance with ser. No A 2.2.1.4  3, and with one-sided cladding made of non-combustible\* building materials in accordance with § 35(5) MBO in conjunction with A 2.1.12, also stable under additional mechanical stress (staircase wall) | - | REI 60-M  Fire-protective cladding: K230 | fire-protective cladding, non-combustible\* cladding A2 – s1,d0\*\*; Otherwise: E – d2 |
| **14** | Fire-resistant (non-combustible load-bearing and reinforced parts)4 | R 90 | REI 902 | A2 – s1,d0\*\*; Otherwise E – d2 |
| **15** | Fire-resistant and made of non-combustible\* building materials | R 90 | REI 90 | A2 – s1,d0\*\* |
| **16** | Fire resistance of 120 minutes and made of non-combustible\* building materials | R 120 | REI 120 | A2 – s1,d0\*\* |
| **17** | Fire resistance of 120 minutes and made of non-combustible\* building materials, stable even under additional mechanical stress | - | REI 120-M4 | A2 – s1,d0\*\* |
| **18** | Structural elements in accordance with A 2.1.3.1 letter (d) with fire resistance of 60 min or 90 min and made of combustible building materials, in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.43 | R 60 or R 90 | - | E – d2 |
| **19** | Structural elements referred to in A 2.1.3.1 letter (d) with fire resistance of 60 min or 90 min and made of combustible building materials as defined in Section 5 of the Technical Rule under ser. No A 2.2.1.43, and fire-protective cladding made of non-combustible\* building materials as defined in Section 5.2 of the Technical Rule under ser. No A 2.2.1.43 | R 60 or R 90 | REI 60 or REI 90  Fire-protective cladding: K230 | Fire-protective cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **20** | Structural elements according to A 2.1.3.1 letter (d) with a fire resistance of 30 min. or 90 min. and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.43, and with one-sided cladding made of non-combustible\* building materials according to § 36(6) MBO in conjunction with A 2.1.12 (corridor wall) | - | REI 30 or REI 90 | Non-combustible\* cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **21** | Structural elements according to A 2.1.3.1 letter (d) with a fire resistance of 30 min. or 90 min. and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.43, and fire-protective cladding made of non-combustible\* building materials in accordance with Section 5.2 of the Technical Rule under ser. No A 2.2.1.43, and with one-sided cladding made of non-combustible\* building materials according to § 36(6) MBO in conjunction with A 2.1.12 (corridor wall) | - | REI 30 or REI 90  Fire-protective cladding: K230 | Fire-protective cladding, non-combustible\* cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **22** | Firewall\*\*\* | - | REI 90-M | A2 – s1,d0\*\* |
| **23** | Wall in the construction of firewalls (including under additional mechanical stress, fire-resistant and of non-combustible\* building materials) | - | REI 90-M | A2 – s1,d0\*\* |
| **24** | Structural elements referred to in A 2.1.3.1 letter (d)  as a wall instead of a firewall (stable even under additional mechanical stress with a fire resistance of 60 min. and made of combustible building materials according to Section 5 of the Technical Rule under ser. No A 2.2.1.43) with fire-protective cladding made of non-combustible building materials, according to Section 5.2 of the Technical Rule under ser. No A 2.2.1.43 | - | REI 60-M  Fire-protective cladding: K230 | Fire-protective cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
|  | 1 For the steel structural elements coated with reactive fire protection systems, the IncSlow specification according to DIN EN 13501‑2:02-2010 must be mentioned in the declaration of performance.  2 pursuant to § 35(5); § 36 Para. 6 and § 39 Para. 2 MBO in conjunction with A 2.1.12  3 For structural elements referred to in A 2.1.3.1 letter (d) in standard buildings of building classes 4 and 5, the Technical Rule set out in ser. No A 2.2.1.4 shall apply to the design and use  4 A non-combustible layer continuous in the component plane: A2 — s1,d0\*\* as defined in Table 1.2  \* Regarding the requirements, Table 1.1. applies.  \*\* Section 1.3 shall apply where necessary.  \*\*\* The firewall must be made of non-combustible building materials. | | | |

The requirement of Table 4.3.1.1, column 1, is only met if subsequent structural elements have at least the same fire resistance. With regard to the fire behaviour of the construction products, Table 1.2 applies.

If the requirements of technical regulation according to ser. No A 2.2.1.4 according to Table 4.3.1.1, footnote 3, are not met, proof according to § 16a MBO**Error! Bookmark not defined.** is required in the absence of a generally accepted Technical Rule for the planning, designing and execution of the above-mentioned construction products.

4.3.1.2 Fire resistance requirements including fire performance when using construction products in accordance with DIN EN 13964:2014-08 for space-closing structural elements as non-supporting subceilings with fire stress only from bottom or bottom up and from top to bottom and at least required performance

Table 4.3.1.2: Building approval requirements and minimum required performances

|  | Building approval requirement | Minimum required performances | | |
| --- | --- | --- | --- | --- |
| Fire resistance of the subceiling | | Fire behaviour of the subceiling |
| with a fire stress only from below | with a fire stress from bottom to top and from top to bottom |
|  | **1** | 2 | 3 | 4 |
| **1** | Of non-combustible\* building materials | - | - | A2 – s1,d0\*\* |
| **2** | Of flame-retardant building materials, non-flaming falling or dripping\* | - | - | C – S2,d0\*\* |
| **3** | Fire-retardant | From bottom to top EI 30 (a←b) | From bottom to top and from top to bottom EI 30 (a↔b) | E – d2 |
| **4** | Fire-retardant and made of non-combustible\* materials | From bottom to top EI 30 (a←b) | From bottom to top and from top to bottom EI 30 (a↔b) | A2 – s1,d0\*\* |
| **5** | Highly fire-retardant and made of non-combustible\*building materials | From bottom to top EI 60 (a←b) | From bottom to top and from top to bottom EI 60 (a↔b) | A2 – s1,d0\*\* |
| **6** | Fire-resistant and made of non-combustible\* building materials | From bottom to top EI 90 (a←b) | From bottom to top and from top to bottom EI 90 (a↔b) | A2 – s1,d0\*\* |
|  | \* Regarding the requirements, Table 1.1. applies.  \*\* Regarding the requirements, Table 1.1 or Table 1.2 applies. | | | |

4.3.1.3 Terms of use and execution of construction products in accordance with Table 4.3.1.2

1. Use is only permitted if the structural elements adjacent to the construction product described in the manufacturer’s installation manual are in compliance with the fire resistance requirements for the building structure. These structural elements must be designed so as to withstand the impacts of the use of the construction product as well as the impacts of the construction product in case of fire. The requirements of Table 4.3.1.2 are only met if subsequent, room-closing structural elements have at least the same fire resistance.
2. The requirements of Table 4.3.1.2 for sub-ceilings with fire stress only from below shall be met only if the ceiling to which this subceiling is installed meets the requirements in the case of fire action from the top (top-down fire) in accordance with the requirement in ser. No A 2.1.8.
3. The use of sub-ceilings is only permitted if the type of attachment to vertical and/or horizontal structural elements is apparent from the manufacturer’s installation instructions in accordance with the classification report.
4. The use of ceilings with installations (such as luminaires, loudspeakers, ventilation structural elements, etc.) is only permitted if this is indicated in the classification report and the installation method is apparent from the manufacturer’s installation instructions.
5. The use of undercovers with revision openings is only permitted if this is indicated in the classification report and the installation method for the revision opening is apparent from the manufacturer’s installation instructions.

4.3.2 Requirements on fire resistance including fire performance when using construction products in accordance with harmonised technical specifications for non-supporting walls, non-supporting partitions or walls of necessary corridors, walls of open corridors and minimum required performance

Table 4.3.2: Building approval requirements and minimum required performances

|  | Building approval requirement | Minimum required performances | |
| --- | --- | --- | --- |
| Fire resistance | Fire performance |
|  | 1 | 2 | 3 |
| **1** | Made of normal-flammability building materials | - | E – d2 |
| **2** | Made of normal-flammability building materials with fire-resistant cladding of 30 min. of non-combustible\* building materials, in accordance with Section 5.2 of the technical regulation in accordance with point A 2.2.1.4 | Fire-protective cladding: depending on use, single-sided or double-sided K 2 30 | Fire-protective cladding: A2 – s1,d0\*\*,  Otherwise: E – d2 |
| **3** | Fire-retardant | EI 30 | E – d2 |
| **4** | Fire-retardant with one-sided1 cladding made of non-combustible\* building materials | EI 30 | Non-combustible\* cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **5** | Fire-retardant and made of non-combustible\* materials | EI 30 | A2 – s1,d0\*\* |
| **6** | Highly fire-retardant (carrying parts flammable, insulating materials non-combustible\* with fire-protective cladding of 60 min. made of non-combustible\* building materials)2 according to Section 4 of the Technical Rule according to ser. No A 2.2.1.4 3 | Egg 60-  fire-protective cladding: both sides K 2 60 | Insulation materials and fire-protective cladding: A2 – s1,d0\*\*,  Otherwise: E – d2 |
| **7** | Highly fire-retardant and made of non-combustible materials | EI 60 | A2 – s1,d0\*\* |
| **8** | Highly fire-retardant and made of non-combustible\* materials in the main parts (non-combustible load-bearing and reinforced parts)2,4 | EI 60 | Essential parts:  A2 – s1,d0\*\*,  Otherwise: E – d2 |
| **9** | Hire-resistant (non-combustible load-bearing and reinforced parts)2,4 | EI 90 | A2 – s1,d0\*\*,  Otherwise E – d2 |
| **10** | Fire-resistant and made of non-combustible\* building materials | EI 90 | A2 – s1,d0\*\* |
| **11** | Fire resistance of 120 minutes and made of non-combustible\* building materials | EI 120 | A2 – s1,d0\*\* |
| **12** | Structural elements according to A 2.1.3.1, letter (d) with a fire resistance of 60 min or 90 min and of flammable building materials according to Section 5 of the Technical Rule of ser. No A 2.2.1.4 3, with fire-protective cladding of 30 min. made of non-combustible\* building materials, in accordance with Section 5.2 of the Technical Rule in accordance with ser. No A 2.2.1.4 3 | EI 60 or EI 90  Fire-protective cladding: both sides K2 30 | Fire-protective cladding, non-combustible cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **13** | Structural elements according to A 2.1.3.1 letter (d) with a fire resistance of 30 min. or 90 min. and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.43, and with one-sided cladding made of non-combustible\* building materials according to § 36 Para. 6 MBO in conjunction with A 2.1.12 (corridor wall, open corridor) | EI 30 or EI 90 | Non-combustible\* cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **14** | Structural elements according to A 2.1.3.1 letter (d) with a fire resistance of 30 min. or 90 min. and made of combustible building materials in accordance with Section 5 of the Technical Rule under ser. No A 2.2.1.43, and fire-protective cladding made of non-combustible\* building materials in accordance with Section 5.2 of the Technical Rule under ser. No A 2.2.1.43, and with one-sided cladding made of non-combustible\* building materials according to § 36(6) MBO in conjunction with A 2.1.12 (corridor wall, open corridor) | Egg 30 or EI 90 fire-protective cladding: single-sided K2 30 | Fire-protective cladding, non-combustible\* cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
|  | 1 pursuant to § 35(5); § 36 Para. 6 and § 39(2) MBO in conjunction with A 2.1.12 and A 2.1.13  2 Parts within the component to ensure stability (intrinsic weight) and suitability.  3 For structural elements referred to in A 2.1.3.1 letter (d) in standard buildings of building classes 4 and 5, the Technical Rule set out in ser. No A 2.2.1.4 shall apply to the design and use  4A non-combustible layer continuous in the component plane: A2 — s1,d0\*\* as defined in Table 1.2.  \* Regarding the requirements, Table 1. applies. 1.  \*\* Section 1.3 shall apply where necessary. | | |

The requirement of Table 4.3.2, column 1, is deemed fulfilled only if adjacent structural elements have at least the same fire resistance. The transitions to such structural elements must not affect the space barrier pursuant to ser. No A 2.1.3.3. With regard to the fire behaviour of the construction products, Table 1.2 applies.

4.3.3 Requirements for fire resistance including fire performance when using construction products according to harmonised technical specifications fornon-load-bearing exterior walls (with space barrier) and minimum required performance

Table 4.3.3: Building approval requirements and minimum required performances

|  | Building approval requirement | Minimum required performances | |
| --- | --- | --- | --- |
| Fire resistance | Fire performance |
|  | 1 | 2 | 3 |
| **1** | Of non-combustible\* building materials | - | A2 – s1,d0\*\* |
| **2** | Of flame-retardant building materials | - | C – s2,d2\*\* |
| **3** | Of flame-retardant building materials, non-flaming falling or dripping | - | C – s2,d0\*\* |
| **4** | Made of normal-flammability building materials | - | E – d2 |
| **5** | Fire-retardant | From the inside to the outside: E 30 (i→o) and  from the outside to the inside:  EI 30-ef (i←o) | E – d2 |
| **6** | Fire-retardant with one-sided cladding made of non-combustible\* building materialsaccording to § 36(6)1 MBO in conjunction with A 2.1.12 | EI 30 | Non-combustible cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **7** | Fire-retardant with one-sided cladding made of non-combustible\* building materialsaccording to § 35(5) 1 and § 39(2) MBO in conjunction with A 2.1.12 and A 2.1.13 | From the inside to the outside: E 30 (i→o) and  from the outside to the inside:  EI 30-ef (i←o) | Non-combustible\* cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **8** | Fire-retardant with a fire-protective cladding of 30 min. made of non-combustible\* building materials in accordance with Section 5.2 of the Technical Rule in accordance with point A 2.2.1.4 | From the inside to the outside: E 30 (i→o) and  from the outside to the inside:  EI 30-ef (i←o)  Fire-protective cladding: K230 | Non-combustible\* cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **9** | Fire-retardant with a fire-protective cladding of 30 min. made of non-combustible\* building materials according to Section 5.2 of the Technical Rule in accordance with point A 2.2.1.4, and with one-sided cladding made of non-combustible\* building materials pursuant to § 36(6) MBO in conjunction with A 2.1.12 (open passage) | EI 30  Fire-protective cladding: K230 | Fire-protective cladding, non-combustible\* cladding: A2 – s1,d0\*\*; Otherwise: E – d2 |
| **10** | Fire-retardant and made of non-combustible\* materials | From the inside to the outside:  E 30 (i→o) and  from the outside to the inside:  EI 30-ef (i←o) | A2 – s1,d0\*\* |
| **11** | Fire resistant (non-combustible carrying and reinforced parts not combustible\*)2,3 | From the inside to the outside: EI 90 (i→o) and  from outside to inside: EI 90-ef (i←o) | Essential parts:  A2 – s1,d0\*\*,  Otherwise: E – d2 |
| **12** | Fire-resistant and made of non-combustible\* building materials | From the inside to the outside: EI 90 (i→o) and  from outside to inside: EI 90-ef (i←o) | A2 – s1,d0\*\* |
|  | 1 To be cladded on both sides if stairwell wall is also the wall of the open corridor  2 Parts within the component to ensure stability (intrinsic weight) and suitability.  3 A non-combustible layer continuous in the component plane: A2 — s1,d0\*\* as defined in Table 1.2.  \* Regarding the requirements, Table 1.2. applies.  \*\* Section 1.3 shall apply where necessary. | | |

The requirement of Table 4.3.3, column 1, is deemed fulfilled only if adjacent structural elements have at least the same fire resistance. The transitions to such structural elements must not affect the space barrier as per ser. No A 2.1.3.3. With regard to the fire behaviour of the construction products, Table 1.2 applies.

5 Barriers

5.1 Fire and/or smoke protection barriers as well as tight-sealing and self-closing barriers

In order to fulfil the structural requirements in A 2.1.6, A 2.1.7, A 2.1.8, A 2.1.11, A 2.1.12 and A 2.1.13 when using fire and smoke protection locks based on proofs of fitness for purpose in accordance with § 17 MBO**Error! Bookmark not defined.**, the minimum required classes and designations shall be taken from Sections 5.1.1 and 5.1.2.

For the purpose of complying with the building requirements in A 2.1.6, A 2.1.7, A 2.1.8, A 2.1.11, A 2.1.12 and A 2.1.13 for using fire and smoke protection barriers for which harmonised technical specifications exist, the minimum required performance is set out in Section 5.1.4.

* Gates as fire barriers according to EN 16034:2014[[34]](#footnote-34) in conjunction with EN 13241:2003+A2:2016[[35]](#footnote-35) do not meet the requirements for electromotive opening and closing according to A 2.1.6.

5.1.1 Fire and/or smoke protection barriers inside structural works according to usability certification according to § 17 MBOError! Bookmark not defined., excluding conveyor closures

Table 5.1.1: Building approval requirements and classification of classes

|  | Building approval requirements | Minimum required class according to proof of fitness for purpose |
| --- | --- | --- |
|  | **1** | **2** |
| **1** | Fire-retardant and self-closing tight-sealing | T 30 |
| **2** | Fire-retardant and self-closing  smoke-proof | T 30‑RS |
| **3** | Highly fire-retardant and self-closing, tight-sealing | T 60 |
| **4** | Highly fire-retardant and self-closing smoke-proof | T 60‑RS |
| **5** | Fire resistant and  self-closing, tight-sealing | T 90 |
| **6** | Fire resistant and self-closing  smoke-proof | T 90‑RS |
| **7** | Fire resistance of 120 minutes and self-closing, tight-sealing | T 120 |
| **8** | Fire resistance of 120 minutes and self-closing,  smoke-proof | T 120‑RS |
| **9** | Smoke-proof and self-closing | RS |

5.1.2 Fire and/or smoke protection closures in external walls of structural works, excluding conveyor closures

The requirements set out in Table 5.1.1 shall apply. For outdoor use, the differential climate according to EN 14351-1:2006+A2:201623 and the deformation class according to EN 12219:1999[[36]](#footnote-36) must also be demonstrated. At least classes 2(d) and 2(e) are required to comply with the building approval requirements.

5.1.3 Terms of use and implementation of financial statements in accordance with 5.1.1

The provisions on application and execution are part of the proof of fitness for purpose according to § 17 MBO1**Error! Bookmark not defined.**.

5.1.4 Construction products according to EEAS No 020029-00-1102 and EEAS No 020062-00-1102 and EN 16034:201427 in conjunction with EN 13241:2003+A2:201628 for use in the interior of structural works as fire and/or smoke protection seals

Table 5.1.4: Building approval requirements and at least required services and other features

|  | Building approval requirement | Minimum required performances | Other features |
| --- | --- | --- | --- |
| Fire resistance and smoke-resistance for construction products as barriers1,2 | Fire performance |
|  | 1 | 2 | 3 |
| **1** | Fire-retardant, tight-sealing self-closing | EI230  Sa  CContinuous Function Check2 | E – d2 |
| **2** | Highly fire-retardant, tight-sealing self-closing | EI2 60  Sa  C Continuous function test2 |
| **3** | Fire resistant, tight-sealing self-closing | EI290  Sa  C Continuous function test2 |
| **4** | Fire-retardant, smoke-proof, self-closing | EI230  S200  C Continuous function test2 |
| **5** | Highly fire-retardant, smoke-proof, self-closing | EI2 60  S200  C Continuous function test2 |
| **6** | Fire-resistant, smoke-proof, self-closing | EI290  S200  C Continuous function test2 |
| **7** | Smoke-proof and self-closing | S200  C Continuous function test2 |
|  |  |  |
|  |  |  |  |
|  | 1 The minimum required performance must be verified for both sides of the barrier.  2 Continuous function testing: - Class 5 for fire/smoker doors (rotating wings), slip doors in gates and construction products according to EN 13241:2003 + A2:2016, which are considered as doors in accordance with Section A 2.1.6 - min. class 2 for other fire protection/smoker seals (e.g. flaps, gates)  \* Table 1.1 applies to the requirements  \*\* Regarding fire performance requirements, Table 1.2 applies. Section 1.3 shall apply where necessary. | | |

5.1.5 Construction products according to EN 16034:201427 in conjunction with EN 14351-1:2006+A2:201623 or EN 13241:2003+A2:201628 for use as fire and/or barriers in exterior walls of structural works

The requirements set out in Table 5.1.4 shall apply. For outdoor use, the differential climate according to EN 14351-1:2006+A2:201623 and the deformation class according to EN 12219: 199929 shall be proven. At least classes 2(d) and 2(e) are required to comply with the building approval requirements.

5.1.6 Usage and implementation provisions for barriers according to 5.1.4 and 5.1.5

For the use of construction products as fire and/or smoke protection barriers, DIN 18093:2017-10 and the following conditions of use and execution shall apply:

1. Use is only permitted if the structural elements that need to be described in the manufacturer’s installation instructions pursuant to DIN 18093:2017-10, Section 3.2, are in compliance with the fire resistance requirements for the structural installation. These structural elements must be designed so as to withstand the impacts of the use of the construction product as well as the impacts of the construction product in case of fire.

2. The use in escape and rescue routes shall only be permitted if, in the case of sliding, lifting or rolling barriers, including those considered doors in accordance with A 2.1.6, and fire and smoke protection curtains which do not open in the direction of escape, a door that can be opened in the direction of escape is located in the immediate vicinity.

3. So-called side and/or fall flaps in conjunction with construction products as fire and/or smoke protection barriers are not covered by EN 16034:201427. For the planning, designing and execution there are no technical best practices, and proof pursuant to § 16a MBO**Error! Bookmark not defined.** is required.

4. The use of construction products as fire and/or smoke barriers for non-floor level installation (height > 500 mm above upper edge of the finished floor of the room) is only permitted if this is tested and specified in the installation instructions.

5. The lintel/component above a construction product as a fire and/or smoke protection barrier shall be static and designed in such a way that the construction product does not receive any additional load as a barrier (except its own weight).

6. Visible instructions shall be affixed to both sides of sliding, lifting and rolling barriers, reminding that the closing area must be kept free at all times from any objects that could obstruct the closing of the barrier. Sliding, lifting and rolling barriers shall be equipped with an audio-visual warning system that announces the closing. Once initiated, the closing process may only be interrupted for personal safety purposes. The closing process must continue automatically from each opening position after the closing area has been released.

7. A fire and/or smoke barrier in the interior of structural works may be fitted with a suitable locking mechanism for the fire and/or smoke barrier with applicability demonstrated on this barrier by type approval.

8. The indication ‘released’ for the ‘ability to release’ characteristic in the declaration of performance only means that a locking device is present, not a locking mechanism.

9. The decision to use a fire curtain may be made only on the basis of the following criteria:

* Expected air flows, e.g. through natural thermals or artificial ventilation systems, which would affect safe closing,
* the existing shape stability to collapsing or falling debris, structural elements or objects,
* smoke leakage,
* the behaviour of pressure ratios that differ from those specified in EN 1634-1:2014+A1:2018[[37]](#footnote-37) and,
* the rolling-down of the curtain in case of pressure differences.

Fire curtains may only be used and installed in the dimensions for which a test has been carried out. A series of two or more fire curtains, including those separated by supporting elements, is not permitted.

10. The decision to use a smoke curtain may be made only on the basis of the following criteria:

* Expected air flows, e.g. through natural thermals or artificial ventilation systems, which would affect safe closing,
* existing dimensional stability when faced with falling debris, structural elements or objects,
* Behaviour at pressure ratios that differ from those specified in EN 1634-3:2005-01[[38]](#footnote-38).

Smoke curtains may only be used and installed in the dimensions for which a test has been carried out. A series of two or more smoke curtains, including those separated by supporting elements, is not permitted.

11. Use is only permitted if the installation manual specifies that the barrier fulfils the requirements for fire impact from either side and for smoke development pursuant to A 2.1.6.

Use in escape routes is only permitted if the installation manual states that the requirements with regard to the closing devices and the possibility of manual opening according to A 2.1.6 are met.

5.2 Fire protection barriers in path-bound conveyor systems

In order to fulfil the structural requirements in A 2.1.7 and A 2.1.8 when using fire protection barriers in track-bound conveyor systems based on proofs of fitness for purpose in accordance with § 17 MBO**Error! Bookmark not defined.**, the minimum required classes and designations shall be taken from Section 5.2.1.

In order to comply with the building requirements in A 2.1.7 and A 2.1.8 when using fire protection barriers in path-bound conveyor systems for which harmonised technical specifications are available, the minimum required performance is set out in Section 5.2.2.

5.2.1 Fire protection barriers in path-bound conveyor systems classified according to DIN 4102‑5:1977‑05

Table 5.2.1: Building approval requirements and classification of the class according to DIN 4102‑ 5:1977-05

|  |  |  |
| --- | --- | --- |
|  | Building approval requirement | Fire protection barrier in conveyor systems |
|  | 1 | 2 |
| **1** | Fire-retardant, sealing and self-closing | T 30 |
| **2** | Highly fire-retardant, sealing and self-closing | T 60 |
| **3** | fire-resistant and self-closing | T 90 |

5.2.2 Construction products as fire protection barrier in path-bound conveyor systems according to EAD 350022-01-1107

Table 5.2.2: Building approval requirements and minimum required performances

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Building approval requirement | Minimum required performance1 | | |
| Fire resistance | Fire performance | Electromotive open and/or closing |
|  | 1 | 2 | 3 | 4 |
| **1** | Fire-retardant, sealing and self-closing | EI230 C Continuous function test2 | E – d2 | Specification: Annex B2 and B3 of the EAD fulfilled |
| **2** | Highly fire-retardant, sealing and self-closing | EI2 60 C Continuous function test2 | E – d2 | Specification: Annex B2 and B3 of the EAD fulfilled |
| **3** | fire resistant, sealing and self-closing | EI2 90 C Continuous function test2 | E – d2 | Specification: Annex B2 and B3 of the EAD fulfilled |
|  | 1 The minimum required performance must be declared **for both sides** of the barrier.  2 Continuous function testing:  Class 5 (200,000 cycles)  for fire protection barriers in track-bound conveyor systems as planned closed barriers]  Class 2 (10,000 cycles) for fire-protection closures in the course of railway-bound conveyor systems as scheduled | | | |

5.2.3 Conditions of use and implementation of construction products according to 5.2.2

1. General information

Use is only permitted if the structural elements adjacent to the construction product described in the manufacturer’s installation manual are in compliance with the fire resistance requirements for the building structure. These structural elements must be designed so as to withstand the impacts of the use of the construction product as well as the impacts of the construction product in case of fire.

The fire protection barrier in path-bound conveyor systems (hereinafter referred to conveyor system barriers) must be installed at the place of use.

Installation shall be carried out only by undertakings which have sufficient experience in this field and which have been trained and informed by the manufacturer and which can provide a confirmation from the manufacturer as proof of their expertise.

The conveyor system barrier may be provided with a suitable locking mechanism whose suitability for the relevant barrier is documented by a type approval.

If the finalisation of the conveyor system barrier is already equipped with a locking device on the manufacturer’s side, it shall comply with the provisions of the type approval of the locking mechanism used.

2. Installation manual

The manufacturer shall provide a written German-language installation manual that is based on the classification document. It shall contain at least the following information:

* Information on the installation of the fire barrier (e.g. adjacent structural elements, permitted fasteners, number and spacing of fixing points, joints),
* Instructions for any required welding work on the structure of the fire barrier,
* Information on permissible accessories for the fire protection barrier (e.g. damping devices),
* Information on the functional interaction of all parts,
* Information on the order of working steps during installation,
* Information on setting the closing speed of the fire barrier*,*
* Instructions regarding the application of locking mechanisms,
* Information on interfaces for closing the conveyor system barrier,
* Information on service and maintenance.

The user shall install the conveyor system barrier in accordance with this installation manual and give the installation manual to the client together with a statement confirming correct installation.

3. Inspection of conveyor system barriers and conveyor systems in the closing area of the wall opening

Through suitable measures agreed with the conveyor system manufacturer, care must be taken to ensure that when the fire alarm is triggered, the conveying process is interrupted, and the goods located within the opening area of the conveyor system barrier leave this area.

4. Maintenance and testing

The operator shall undertake and document the necessary maintenance and tests in accordance with the installation instructions.

Monthly check

The conveyor system barrier must be kept permanently operational. It must be tested for operational readiness at least once a month by the operator under its own responsibility. This monthly test must be performed by a qualified technician or a specially trained person. The results must be recorded in an inspection log. The manufacturer of the conveyor system barrier must notify this requirement to the conveyor’s operator in writing.

Annual testing and servicing

The operator is also obliged to carry out an annual inspection for smooth operation of the conveyor system barrier in conjunction with the conveyor system and the locking mechanism as well as an appropriate maintenance regardless of the time limits of the installation instructions. The annual inspection and maintenance shall be carried out by a specialist or trained person. The results must be recorded in an inspection log.

5.3 Landing doors for lifts

Lift shaft doors according to Part C, Chapter C 2, ser. No C 2.6.2 to C 2.6.4, for lifts in shaft walls pursuant to A 2.1.13 of fire resistance class F 90 are deemed to fulfil the requirements of § 39 Para. 2 sentence 2 MBO**Error! Bookmark not defined.** only if the following application rules have been observed:

1. They are installed in solid enclosed masonry or concrete walls,
2. The lift cage is predominantly made of non-combustible building materials (this is the case if the load-bearing and reinforced parts of the lift cage are made of non-combustible building materials and the other parts of the lift cage (such as wall and ceiling cladding, flooring, ventilation and lighting covers) do not have more than 2.5 kg of combustible building materials, at least normal flammability building materials per m2 of the interior lift cage area),
3. The doors shall be controlled in such a way that they remain open only for as long as it is necessary to enter or leave the lift cage; When closed, two doors on top of each other prevent fire from spreading from the fire storey to the storey above,
4. Where several doors are positioned side by side, the doors shall be separated by fire-resistant structural elements and attached to these structural elements, and
5. The lift shaft shall have an opening to remove smoke as per § 39(3)(1) MBO**Error! Bookmark not defined.**.

Lift shaft doors with the classification “E 30/60/90” in accordance with DIN EN 81‑58:2018[[39]](#footnote-39) for installation in fire-retardant, highly fire-retardant or fire-resistant casing walls in accordance with A 2.1.13 meet the requirements of § 39 Para. 2 sentence 2 MBO**Error! Bookmark not defined.** only if the requirements of letters (b), (c) and (e) are met and the carriage shaft doors are arranged next to each other. The fire performance of the structural elements of the lift shaft door shall be demonstrated; they must be at least normal flammability.

5.4 Sealing doors

Doors are sealed or tight-closing if they have stable door leaves and are equipped with three-sided continuous elastic seals, which, due to their shape (lip/hose seal) and the sealing path when closed, are attached to both the door frame and the door leaf after installation. Door leaves are dimensionally stable if they are closed and show deformations ≤ 4 mm relative to the door-leaf plane in the longitudinal direction (in the sense of RAL-GZ 426/1).

For outdoor use, the differential climate according to EN 14351-1:2006+A2:201623 and the deformation class according to EN 12219:1999[[40]](#footnote-40) must also be demonstrated. At least classes 2(d) and 2(e) are required to comply with the building approval requirements.

For outdoor use DIN 18055:2020-09 must be observed.

5.5 Other closures as doors

5.5.1 Sealing and self-closing degrees

Doors which must be sealed and self-closing as closures shall comply with the requirements of Section 5.4. The barriers are self-closing if they have suitable closing devices that automatically close the barrier by means of mechanically stored energy.

5.5.2 Construction products according to EN 16034:201427 in conjunction with EN 14531-1:201623 or EN 13241:2003+A2:201628 and EEAS No 020029-00-1102 and EEAS No 020062-00-1102 for use as seal and self-closing financial statements

Table 5.5.2: Building approval requirements and at least required services and other features

|  | Building approval requirement | Minimum required performances | Other feature |
| --- | --- | --- | --- |
| Fire performance |
|  | 1 | 2 | 3 |
| **1** | Tightly closing and self-closing | Sa  CContinuous Function Check1 | E – d2\*\* |
| **2** | Tight-sealing and self-closing, made of non-combustible\* building materials | Sa  CContinuous Function Check1 | A 2-s1,d0\*\* |
|  | 2 Continuous function testing: - Class 5 for doors (rotated wings), sliding doors in gates and construction products according to EN 13241:2003 + A2:2016, which are considered as doors in accordance with Section A 2.1.6  - min. class 2 for other sealing and self-closing closures (gates)  \* Table 1.1 applies to the requirements  \*\* Regarding fire performance requirements, Table 1.2 applies. Section 1.3 shall apply where necessary. | | |

5.5.3 Terms of use and execution for financial statements in accordance with 5.5.2

1. DIN 18093:2017-10 applies mutatis mutandis to the use of construction products as seal and self-closing financial statements.
2. The use in escape and rescue routes shall only be permitted if, in the case of sliding, lifting or rolling barriers, including those considered doors in accordance with A 2.1.6, and fire and smoke protection curtains which do not open in the direction of escape, a door that can be opened in the direction of escape is located in the immediate vicinity.
3. So-called side and/or fall flaps in connection with construction products as sealing and self-closing closures are not covered by EN 16034:201427. For the planning, designing and execution there are no technical best practices, and proof pursuant to § 16a MBO**Error! Bookmark not defined.** is required.
4. The use of construction products as sealing and self-closing closures for non-floor-equivalent installation (height > 500 mm above OKF of the room) is only permitted if this is tested and specified in the installation instructions.
5. The fall/component over a construction product as a sealing and self-closing finish must be statically and dimensioned in such a way that the construction product does not receive any additional load (except for its own weight).
6. Visible instructions shall be affixed to both sides of sliding, lifting and rolling barriers, reminding that the closing area must be kept free at all times from any objects that could obstruct the closing of the barrier. Sliding, lifting and rolling barriers shall be equipped with an audio-visual warning system that announces the closing. Once initiated, the closing process may only be interrupted for personal safety purposes. The closing process must continue automatically from each opening position after the closing area has been released.
7. A construction product for use as a sealing and self-closing closure may be carried out with a locking system suitable for sealing and self-closing closure inside construction installations, the applicability of which is demonstrated at this conclusion by a type-approval.
8. The indication ‘released’ for the ‘ability to release’ characteristic in the declaration of performance only means that a locking device is present, not a locking mechanism.
9. The decision to use a sealing and self-closing curtain can only be made taking into account the following criteria:
   * + - Expected air flows, e.g. through natural thermals or artificial ventilation systems, which would affect safe closing,
       - Existing dimensional stability when faced with falling debris, structural elements or objects.

Sealing and self-closing curtains may only be used and installed in the dimensions for which a test has also been carried out. A sequence of two or more sealing and self-closing curtains, including one with separation by supporting elements, is not permitted.

1. Use shall be permitted only if the installation instructions indicate that the requirements for fire from both sides are complied with in the essential smoke protection feature for the closure.

Use in escape routes is only permitted if the installation manual states that the requirements with regard to the closing devices and the possibility of manual opening according to A 2.1.6 are met.

6 Preventive measures for cable and/or pipe passages in fire-resistant structural elements

If, in order to fulfil the structural requirements in A 2.1.15 and A 2.2.1.8 for preventive measures for cable and pipe passages, proof of the suitability of designs pursuant to § 16a MBO**Error! Bookmark not defined.**, is required, the minimum required classes shall be as given in Table 6.

Table 6: Building approval requirements and classification of classes according to DIN 4102‑ 9:1990-05 or DIN 4102‑ 11:1985‑ 12

|  |  |  |  |
| --- | --- | --- | --- |
|  | Building approval requirement | Minimum required classes pursuant to | |
| DIN 4102-9:1990-05 for cable sealing | DIN 4102-11:1985-12 for pipe sealing1 |
|  | 1 | 2 | 3 |
| **1** | Fire-retardant | S 30 | R 30 |
| **2** | Highly fire-retardant | S 60 | R 60 |
| **3** | Fire-resistant | S 90 | R 90 |
| **4** | Fire resistance of 120 minutes | S 120 | R 120 |
|  | 1 Classification is permitted only if the fire test of the following is performed:  a) Preventative measures for flammable pipe passages and pipes with a melting point < 1000 °C where the pipe ends are open inside and outside of the test furnace. If the preventive measures are intended only for drinking water, heating and cooling pipes with diameters ≤ 110 mm, the pipe may optionally be closed outside the test furnace.  b) Preventive measures for passages of non-combustible pipes with a melting point ≥ 1000 °C (piping designed without connections of combustible pipes), the pipe ends used in the fire test are closed inside the test furnace and open outside (or optionally open on both sides). | | |

Note:

In the absence of a technical best practice for the planning, designing and execution of preventive measures for cable and/or pipe passages using construction products based on harmonised technical specifications, proof pursuant to § 16a MBO**Error! Bookmark not defined.** is required.

Simplifications under the Technical Rule included in ser. No A 2.2.1.8 are not affected.

7 Heat extraction devices in accordance with EN 12101-2:2003[[41]](#footnote-41) for use in roofs in shopping streets pursuant to the Model Retail Outlet Regulation [Muster-Verkaufsstättenverordnung] and provisions on application and execution

Provisions on application and execution

A 2.1.9 must be observed in respect of position and arrangement for the use of heat extraction devices as transparent areas in roof covering if the performance requirement under Section 7.5.2 of EN 12101‑2:200334 is not declared as being at least A2 – s1,d0; otherwise, proof must be provided pursuant to A. 2.1.9 for roof covering resistant to flying sparks and radiating heat (see Section 3, Table 3.2), or the building structure must observe the distances set out in § 32(2) MBO**Error! Bookmark not defined.**. Use in transparent roof coverings that are permitted to be flame-resistant and that do not shed burning droplets is permitted if the performance requirement of Section 7.5.2 of EN 12101‑2:200334 is declared as being at least C – s2,d0.

Table 7: Minimum required performances

|  |  |  |
| --- | --- | --- |
|  | EN 12101-2:200334 | Minimum required performances |
| 1 | 2 |
| **1** | 4.1 | Thermocouple pursuant to 4.1.1 a) and manual release pursuant to 4.1.1 d) |
| **2** | 4.2 | Fulfilled |
| **3** | 4.4 | Specifications (m²), width ≥1.0 m |
| **4** | 7.1.1 | Re 50 |
| **5** | 7.1.3 | Yes, if additional ventilation function |
| **6** | 7.2.1.1 | SL 500 |
| **7** | 7.3.1 | T (0) |
| **8** | 7.4.1 | WL 1 500 |
| **9** | 7.5.1 | B 300 |
| **10** | 7.5.2 | E – d2 |

8 Service ducts and shafts, including their opening barriers

In order to fulfil the structural requirements in A 2.1.14 when using construction products for installation shafts and ducts, including their openings, proof of the suitability of designs pursuant to § 16a MBO**Error! Bookmark not defined.**, the minimum required classes shall be as given in Section 8.1.

In order to comply with the building requirements in A 2.1.14, where construction products are used as service ducts for which harmonised technical specifications are available, the minimum required performance is set out in Section 8.2.

8.1 Service ducts and ‑shafts, including their opening barriers

Table 8.1: Building approval requirements and classification of classes according to DIN 4102-11:1985-12

|  |  |  |
| --- | --- | --- |
|  | Building approval requirement | Minimum required classes according to DIN 4102-11:1985-12 |
|  | 1 | 2 |
| **1** | Fire-retardant and made of non-combustible building materials | I 30 |
| **2** | Highly fire-retardant and made of non-combustible building materials | I 60 |
| **3** | Fire-resistant and made of non-combustible building materials | I 90 |
| **4** | Fire resistance of 120 minutes and made of non-combustible building materials | I 120 |

8.2 Construction products for service shafts made of prefabricated fittings and accessories according to EAD 350003-00‑1109

Table 8.2: Building approval requirements and minimum required performances

|  | Building approval requirement | Minimum required performances | |
| --- | --- | --- | --- |
| Fire resistance | Fire performance |
|  | 1 | 2 | 3 |
| **1** | Fire-retardant and made of non-combustible\* materials | EI 30(veho i↔o) | A2 – s1,d0\*\* |
| **2** | Highly fire-retardant and made of non-combustible materials | EI60(veho i↔o) |
| **3** | Fire-resistant and made of non-combustible building materials | EI90(veho i↔o) |
| **4** | Fire resistance of 120 minutes | EI 120(veho i↔o) |
|  | \* Table 1.1 applies to the requirements  \*\* Regarding fire performance requirements, Table 1.2 applies. Section 1.3 shall apply where necessary. | | |

8.3 Conditions of use and execution for construction products according to 8.2

If the construction product used for the service shaft is described conclusively in the ETA based on the EAD, the manufacturer shall provide a written German-language installation manual based on the classification document, which must contain at least the following information:

* description of the combination of the permitted structural elements,
* description of the installation in adjacent structural elements (including permitted fasteners and their distances),
* description of permissible execution variants.

Use is permitted only if the structural elements adjacent to the construction product that are described in the manufacturer’s installation manual are in compliance with the fire resistance requirements for the building structure and the space barrier pursuant to A 2.1.3.3. is not affected.

The user shall install the construction product in accordance with this installation manual and give the installation manual to the client together with a statement confirming correct installation.

9 Fire-resistant glazing

In order to fulfil the structural requirements in A 2.1.6, A 2.1.7, A 2.1.8, A 2.1.9 and A 2.1.12 when using construction products for fire-resistant glazings with proof of fitness for purpose in accordance with § 17 MBO**Error! Bookmark not defined.** or proof of the suitability of designs according to § 16a MBO**Error! Bookmark not defined.**,the minimum required classes shall be as given in Section 9.1.

In order to fulfil the building requirements in A 2.1.6, A 2.1.7, A 2.1.8, A 2.1.9 and A 2.1.12 when using construction products as fire-resistant glazings if there are harmonised technical specifications for them, the minimum required performance shall be as given in Section 9.2.

9.1 Fire-resistant glazing

Table 9: Building approval requirements and classification of classes according to DIN 4102‑ 13:1990‑ 05

|  |  |  |
| --- | --- | --- |
|  | Building approval requirement | Minimum required classes according to DIN 4102‑13:1990-05 |
|  | 1 | 2 |
| **1** | Fire-retardant | F 30 |
| **2** | Highly fire-retardant | F 60 |
| **3** | Fire-resistant | F 90 |
| **4** | Fire resistance of 120 minutes | F 120 |

Fire-resistant glazings that do not meet these requirements (such as G-glazing according to DIN 4102‑13:1990‑05) are specified under A 2.1.3.3.1.

9.2 Construction products for fire protection glazing according to ETAG 003 or EAD 210005-00-0505

To meet the building requirements in A 2.1.6, A 2.1.7, A 2.1.8, A 2.1.9 and A 2.1.12 when using construction products for fire-resistant glazings that are used as construction products for non-loadbearing interior partitions, the minimum required performances in Section 4.3 and Table 4.3.2 apply. According to A 2.1.6 or A 2.1.12, barriers to necessary openings in such dividing walls must have the same fire resistance as the non-load-bearing interior dividing wall. The minimum required performance of the barriers is set out in Section 5.1.4.

9.3 Provisions on application and execution of construction products pursuant to 9.2

If the construction product used for the dividing wall is described conclusively in the ETA, the manufacturer shall provide a written German-language installation manual based on the classification document, which must contain at least the following information:

* description of the combination of the permitted structural elements,
* description of the installation in adjacent structural elements (including permitted fasteners and their distances),
* description of permissible execution variants.

Use is permitted only if the structural elements adjacent to the construction product that are described in the manufacturer’s installation manual are in compliance with the fire resistance requirements for the building structure and the space barrier pursuant to A 2.1.3.3. is not affected.

The user shall install the construction product in accordance with this installation manual and present the installation manual to the client together with a statement confirming correct installation.

10 Special fire protection products

10.1 fire-retardant agent

10.1.1 General information

In order to fulfil the structural requirements in A 2.1.2 when using fire protective devices in based on proofs of fitness for purpose in accordance with § 17 MBO**Error! Bookmark not defined.**, the minimum required classes and designations shall be as given in Section 1.1.

For the fulfilment of the building requirements in A 2.1.2 when using fire-retardant agents for which there are harmonised technical specifications, the minimum required performance shall be as given in Section 1.2.

10.1.2 Rules for use and implementation of construction products with fire-retardant agents according to harmonised technical specifications

If the construction product is described in the ETA according to ETAG 028 or EAD 350865-00-1106, the manufacturer shall provide a written installation instruction in German based on the classification document, which shall contain at least the following information:

* description of the processing of the construction product,
* description of the minimum applied quantity,
* description of the installation of building materials finished with the construction product.

fire-retardant agents are not verified for use on floorings and/or substrates subject to continuous moisture and/or UV‑radiation.

10.2 Reactive fire protection coating on steel structural elements

In order to fulfil the structural requirements in A 2.1.4 when using reactive fire protective coatings on steel structural elements based on proofs of fitness for purpose in accordance with § 17 MBO**Error! Bookmark not defined.**, the minimum required classes and designations shall be as given in Section 4.3.

In order to fulfil the building requirements in A 2.1.4 when using reactive fire protection coatings on steel structural elements for ETA according to ETAG 018-1 and -2/EAD 350402-00-1101, the minimum required performance shall be as given in Section 4.3 and the designations as given in Table 4.3.1, footnote 1.

Provisions on application and execution

In the absence of a technical best practice for the planning, designing and execution, the use of reactive fire protective coatings on steel structural elements pursuant to ETAG 018-1 and -2 or EAD 350402-00-1101 requires proof pursuant to § 16a MBO**Error! Bookmark not defined.**.

10.3 Linear joint seals

Joint seals pursuant to EAD 350141-00-1106 are suitable for closing structurally defined horizontal and vertical linear joints (connection, structural and expansion joints) in or between fire-resistant space-enclosing structural elements.

Joints are not independently considered under the building regulations.

Declaration of the ‘fire resistance’ performance characteristic for joint seals as per EAD 350141-00-1106 is not a substitute for the required proof of fire resistance of the overall component including joint(s).

Appendix to Annex 4: Explanations of the classification criteria and additional information on classification in Annex 4

|  | Derivation of the abbreviation | Criterion | Scope |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| **1** | R (Résistance [resistance]) | Load-bearing capacity | for the description of fire resistance |
| **2** | E (Étanchéité [leak sealant]) | Space barrier |
| **3** | I (Isolation) | Thermal insulation (under fire exposure) |
| **4** | W (Radiation) | Limiting radiation passage |
| **5** | M (Mechanical) | Mechanical effect on walls (impact stress) |
| **6** | Sa (Smoke) | Limit of smoke permeability (sealing, leakage rate), meets the requirements at ambient temperature | tightly sealing barriers |
| **7** | S200 (Smokemax. leakage rate) | Limit of smoke permeability (sealing, leakage rate), meets the requirements at ambient temperature and at 200 °C | Smoke protection barriers (including for fire protection barriers as an additional requirement) |
| **8** | C... (Closing) | Self-closing property (where applicable with number of loading cycles) including permanent functionality | Smoke protection doors, fire protection barriers (including conveyor system barriers) |
| **9** | P | Maintenance of energy supply and/or signal transmission | Electrical cable systems in general |
| **10** | K1, K2 | Fire protection assets | Wall and ceiling cladding (fire protection cladding) |
| **11** | I1, I2 | different thermal insulation criteria | Fire protection barriers (including conveyor system barriers) |
| **12** | i→o  i←o  i↔o (in - out) | Direction of classified fire resistance time | Non-load-bearing external walls, service shafts/ducts, see Table 8.2 |
| **13** | a↔b (above - below) | Direction of classified fire resistance time | Subceilings |
| **14** | ca (cable) | Fire performance class | Cables |
| **15** | ROOF | Fire performance | Roofing |

## Annex 6

Rear-ventilated, external-wall cladding

Last updated: October 2021

**Contents**

1 Scope

2 Terms

3 Insulating materials, substructures, rear-ventilation gap

4 Horizontal fire barriers

5 Vertical fire barriers

1 Scope

In the case of rear-ventilated external wall cladding that

* has hollow or air spaces across storeys

or

* extends above firewalls,

special precautions must be taken against the spread of fire in accordance with § 28(4), in conjunction with (5), as well as in accordance with § 30 Para. 7 MBO[[42]](#footnote-42). This is considered to be fulfilled if the design of the ventilated outer wall covering is carried out in accordance with this Technical Rule.

2 Terms

2.1 Rear-ventilated external wall cladding consisting of:

* cladding elements with open or closed joints, covering elements or impacts
* substructures (e.g. load-bearing profiles and, where appropriate, wall profiles made of metal, wooden battens (load-bearing battens), counter-battens (basic battens))
* holding supports (anchoring, connecting and fastening elements)
* accessories (e.g. connecting profiles, sealing strips, thermal separating elements)
* rear-ventilation gap
* if necessary, thermal insulation with insulating material supports.

**2.2** The rear-ventilation gap is the air space between the cladding and the thermal insulation or between the cladding and the wall, if provision is not made for any external thermal insulation.

**2.3** Fire barriers assist in limiting the spread of fire in the rear-ventilation gap for a sufficiently long period of time by interrupting or partially reducing the clear cross-section of the rear-ventilation gap.

3 Insulating materials, substructures, rear-ventilation gap

**3.1** In deviation from § 28 Para. 3 sentence 1 MBO1, the thermal insulation must be non-combustible. The insulating materials shall be attached to the substrate either mechanically or with an adhesive mortar that is flame-resistant or does not contain more than 7.5% organic structural elements. Rod-shaped timber substructures are permitted (§ 28 Para. 3 sentence 1 Clause 2 MBO1).

**3.2** The depth of the rear ventilation gap shall not be greater than

* 50mm with a timber substructure and
* 300 mm when using a linear or selective metal substructure.

4 Horizontal fire barriers

**4.1** On every second floor, horizontal fire barriers shall be positioned in the rear-ventilation gap. The fire barriers shall be installed between the wall and the cladding. In the case of external thermal insulation, installation between the insulating material of the external thermal insulation and the cladding is sufficient with a ventilation gap depth of up to a maximum of 150 mm if the insulating material is dimensionally stable in the event of fire and has a melting point of > 1 000 °C. The fire barrier shall be integrated into the insulation material up to a depth of at least 40 mm.

For external wall coverings with a depth of the back ventilation gap > 150 mm to a maximum of 300 mm, the fire barrier must always be installed between the wall and the cladding.

**4.2** Substructures made of combustible building materials must be completely interrupted in the area of horizontal fire barriers.

**4.3** The total size of the openings in the horizontal fire barriers shall be limited to 100 cm² per linear metre of wall. The openings may be positioned as evenly distributed individual openings or as a continuous gap.

**4.4** The horizontal fire barriers shall be sufficiently stable for at least 30 minutes. This is considered to be fulfilled when the fire barriers are made of sheet steel with a thickness of d ≥ 1 mm. They shall be anchored in the outer wall at intervals of ≤ 0.6 m. The steel sheets shall overlap the joints by at least 30 mm.

In the case of ventilated outer wall coverings with a depth of the back ventilation gap not exceeding 100 mm, horizontal fire barriers may consist of a non-combustible insulation material with a melting point > 1 000 °C which is dimensionally stable in the event of fire, if the following boundary conditions are met:

* The fire barrier shall be at least 150 mm high.
* The fixing of the fire barrier shall be carried out as follows:
* mechanically anchored with non-combustible fasteners in the outer wall at intervals of ≤ 0.6 m

or

* fully glued to the outer wall with non-combustible adhesive mortar

or

* clamped into an external thermal insulation of an insulating material that is stable in the event of fire with a melting point > 1 000 °C, wherein the thickness of the thermal insulation shall be at least twice as large as the depth of the back ventilation gap and the clamping depth of the fire barrier shall correspond to the thickness of the thermal insulation.

In the case of ventilated outer wall cladding with a depth of the back ventilation gap > 150 mm to a maximum of 300 mm, horizontal fire barriers shall be made of sheet steel (thickness d ≥ 1 mm) and shall be attached to the supporting profiles of the metal substructure above the fire barriers with steel angles. The need for any necessary measures to prevent contact corrosion when fixing fire barriers to the supporting profiles of the metal substructure is indicated.

**4.5** Reveals of exterior wall openings (doors, windows) may be an integral part of fire barriers, provided that the rear ventilation gap is closed by cladding the reveals and lintels of the outer wall openings; the cladding shall comply with the requirements of point 4.4, substructures and any existing thermal insulation shall be made of non-combustible building materials.

**4.6** Horizontal fire barriers are not required.

1. in the case of external walls with no openings,

2. if the spread of fire in the rear-ventilation gap is prevented as a result of the type of window placement (e.g. continuous hinge plates, window elements which extend over several storeys) and

3. in the case of external walls with a depth of the back ventilation gap not exceeding 150 mm and with ventilated garments, including their substructures, thermal insulation and brackets, made of non-combustible building materials, if the rear ventilation gap is dimensionally stable in the area of the adjacent friction (sided and in the fall of) of apertures in the event of a fire for at least 30 minutes (e.g. by sheet steel with a thickness of d ≥ 1 mm).

5 Vertical fire barriers

5.1 The rear ventilation gap must not be passed over fire walls. The rear ventilation gap shall be filled in at least in firewall thickness with a vertical fire barrier from an insulating material that is stable in the event of fire with a melting point of > 1.000 °C. The vertical fire barrier shall be anchored with non-combustible mechanical fasteners in the outer wall at intervals of ≤ 0.6 m or shall be fully fixed to the outer wall with a non-combustible adhesive mortar.

§ 30 Para. 7 sentence 1 MBO1 remains unaffected.

5.2 Vertical fire locks are also required

* on building corners with a transition to outside walls without openings in accordance with Section 4.6 No. 1; and
* on transitions to other exterior wall coverings.

The vertical fire locks shall be executed as described in Section 5.1.

## Annex 8

Health protection requirements for structural works (Anlagen bezüglich des Gesundheitsschutzes [ABG])

Last updated: April 2022

**Contents**

1 Subject matter and scope

2 Requirements

Appendix 1 References

Appendix 2 LCI values (target compounds)

Appendix 3 16 PAH in accordance with EPA

1 Subject matter and scope

The ABG elaborate the general requirements for structural works with regard to health protection.

Indoor air quality plays an important role in human health and well-being. Numerous scientific studies have shown that the development of respiratory and inflammatory diseases and respiratory and eye irritation, systemic damage, sensitisation/allergies as well as a number of nonspecific symptoms (unwellness, headaches, nausea, central nervous system disorders, dizziness etc.) are directly related to indoor air quality and air pollution. Among the adverse health effects, carcinogenic, mutagenic and reproductively toxic effects require special attention.

The health and hygiene requirements for structural works are derived from the health-relevant properties of the structural elements, kits and building materials used. These can contribute to indoor air pollution through emissions and cause significant health effects. These include potential emissions of volatile inorganic and organic compounds as well as particles.

Structural works, structural elements and building materials with direct or indirect contact to the interior are to be taken into account, i.e. products that are covered or covered with other products but which are not sealed off diffusion-proof. Also, the proportion of substances of zero or low volatility is important for assessments of their health impact since they may be released e.g. from the processing of the products in particulate or dust form, made available to the human body, or absorbed through direct skin contact.

2 Requirements

Other legislative instruments (e.g. the REACH Regulation (EC) No 1907/2006, the Biocides Regulation (EU) No 528/2012, the POP Regulation (EC) No 850/2004, the Chemicals Prohibition Ordinance [Chemikalien-Verbotsverordnung]) and the Closed Substance Cycle Act (Kreislaufwirtschaftsgesetz [KrWG]) are not affected.

2.1 General requirements for construction products

Otherwise, any construction product shall not be used as a part of buildings if the individual concentration of an active substance[[43]](#footnote-43) classified as Carc. (H350; H350i) of category 1A or 1B and/or muta. (H340) of category 1A or 1B in accordance with Regulation (EC) No 1272/2008 reaches or exceeds the following values:

* the specific concentration limits set out in Part 3 of Annex VI to Regulation (EC) No 1272/2008; or
* the respective general concentration limits set out in Part 3 of Annex I to Regulation (EC) No 1272/2008.

The stated requirements for structural elements of construction products or kits relating to carcinogenic and mutagenic substances do not apply if it is demonstrated that they pose no potential hazard to human health when installed[[44]](#footnote-44).

2.2 Special requirements for building products in lounges and not separate rooms

In addition to the general requirements for construction products as referred to in 2.1, the active1 use of substances classified under the CLP Regulation (EC) No 1272/2008, in the relevant current version, as acute tox. 1, 2 or 3 (H300, H301, H310, H311, H330 or H331), repr 1A or 1B (H360, H360F, H360D, H360FD) and STOT SE 1 (H370) or STOT RE 1 (H372), in construction products that are used in human occupancy areas and in areas not structurally separate from them, shall be avoided. If this is not possible, it must be ensured that exposure of building users to health hazards is excluded.

2.2.1 Emissions

For the construction products listed below, there are requirements with respect to emissions of volatile organic compounds if they are used in human occupancy areas and in areas not structurally separate from those:

* Floor coverings[[45]](#footnote-45), floor covering constructions and their structural elements,
* Adhesives[[46]](#footnote-46),
* reactive fire protection coating systems on steel structural elements,
* Insulating materials (phenolic foams and UF in-situ foams),
* Decorative wall coverings and thick-layered plastic-based wall coatings,
* Ceiling coverings and ceiling constructions based on plastics,
* Wood materials in the form of slender aligned chips (OSB) and resin-bound chipboard,
* High-pressure decorative laminated sheets (HPL),
* organic fire-protection agents applied subsequently

2.2.1.1 VOC emissions

The terms used are defined as follows:

* VVOC (retention area < C6): Volatile organic compound eluted before n-hexane from a gas-chromatographic separation column defined as a 5% phenyl/95% methyl polysiloxane capillary column.
* VOC (retention range C6 to C16): volatile organic compound eluting from a gas chromatographic separation column established as 5 % phenyl/95 % methyl polysiloxane capillary column between n-hexane and including n-hexadecan.
* SVOC (retention area > C16 to C22): semi-volatile organic compound eluted between n‑hexadecane and n-docosane and from a gas-chromatographic separation column defined as a 5% phenyl/95% methyl polysiloxane capillary column.
* TVOCspec (total volatile organic compounds): Total of the volatile organic compounds. Sum of concentrations of identified and unidentified volatile organic compounds calculated by summing up the concentrations of all substances (target compounds and non-target compounds, identified and unidentified compounds) in the air of the reference space; these are substances that elute between n-hexane and including n-hexadecan using a defined separation column, each with a concentration of 5 µg/m³. Target compounds shall be quantified substance-specifically, whereas non-target compounds, identified and unidentified compounds shall be quantified as a toluene equivalent.
* TSVOC (total concentrations of semi-volatile organic compounds): Sum of volatile organic compounds. Sum of concentrations of identified and unidentified heavy volatile organic compounds calculated by summing up the concentrations of all substances (target compounds and non-target compounds, identified and unidentified compounds) in the air of the reference space; these are substances that elute according to n-hexadecan up to and including n-docosan using a defined separation column calculated by the TIC response factor for toluene, each with a concentration of 5 µg/m³.
* R value  
  total of all Rivalues determined[[47]](#footnote-47) in a particular test.

The following requirements regarding emissions of volatile organic compounds – for the construction products listed in Section 2.2.1 – in accordance with DIN EN 16516:2020-10[[48]](#footnote-48), apply to the specified parameters:

All compounds whose concentration is at least 1 µg/m³ are identified, listed with their CAS numbers and quantified by category.

* **Carcinogenic substances (categories 1A and 1B)**

No carcinogen of category 1A and 1B under CLP Regulation (EC) No 1272/2008 shall exceed the emission values set out in Table 1. Excluded from this Regulation are defined substances classified as carcinogen 1A or 1B, for which a threshold can be derived from the most sensitive endpoint, since it is no longer possible to assume carcinogenic potential. Substances for which an LCI (Lowest Concentration of Interest) value has been derived on this basis and listed in Annex 2 shall be treated in the same manner as other VOCs with LCI values (see R value).

* **TVOCspec**

The TVOCspec values shall not exceed the values specified in Table 1.

* **TSVOC total semi-volatile organic compounds**

The total SVOCs in the chamber air after 28 days must not exceed the concentration given in Table 1. In individual cases, LCI values are derived for SVOCs.

The SVOCs for which NIC values have been set shall be included in the R-values (see below) and in the TVOC values and are no longer subject to the sum value SVOC of 0.1 mg/m³ after 28 days.

* **R value (evaluation of the individual substance)**

The sum of all Ri values must not exceed the value given in Table 1.

R = sum of all Ri = sum of all quotients (Ci / NIKi) ≤ 1

The evaluation shall be based on calculating i the ratio Ri for each compound, as defined in the following equation.

Ri = Ci /LCIi .

Here Ci is the substance concentration in the chamber air.

For a variety of internally relevant volatile organic compounds (VVOC, VOC and SVOC) NIC values are listed in Appendix 2. They are quantified in a substance-specific manner. All individual substances with a concentration of 5 μg/m³ or more shall be taken into account in the evaluation of the individual substance.

* **VOCs without assessment criteria according to LCI**

The total of the VOC that cannot be evaluated, with a concentration of ≥ 5 μg/m³, must not exceed the value given in Table 1.

* **Volatile organic compounds (VVOC)**

The VVOCs for which the LCI values were determined shall be mathematically included in the R value formation but are not taken into account when forming the TVOC value.

Table 1: Requirements for VOC emissions

|  |  |  |  |
| --- | --- | --- | --- |
| Type of issue | Value after 3 days | Value after 28 days | Section of ABG |
| Carcinogen (category 1A/1B) | ≤ 0.01 mg/m3 | ≤ 0.001 mg/m3 | 2.2.1.1 |
| TVOCspec | ≤ 10 mg/m3 | ≤ 1.0 mg/m3 |
| TSVOC |  | ≤ 0.1 mg/m3 |
| TVOC without NIK |  | ≤ 0.1 mg/m3 |
| R value |  | ≤ 1\* |
| \* The requirement does not apply to wood-based materials in the form of slim aligned chips (OSB) and resin-bound clamping boards. | | | |

2.2.1.2 Ammonia emissions

In the case of parquets and wooden floors made of smoked wood, the ammonia value shall not exceed the value set out in Table 2 after 28 days.

Ammonia emissions shall be determined under the same conditions as for VOC emissions (test chamber and chamber conditions as per DIN EN 16516:2020-10).

2.2.1.3 Requirements for nitrosamine emissions

For products referred to in Section 2.2.1, containing amounts of rubber/gum containing vulcanising agents with nitrosamine splitters and/or recycled structural elements of rubber, the nitrosamine value shall not exceed the value set out in Table 2 after 28 days.

The nitrosamine emissions shall be determined based on the analytic method for the determination of N‑nitrosamines, DGUV Information 213-523 (formerly BGI/GUV-I 505-23 or ZH1/120.23).

Table 2: Requirements for other emissions

|  |  |  |
| --- | --- | --- |
| Type of issue | Value after 28 days [mg/m3] | Section of ABG |
| Ammonia[[49]](#footnote-49) | ≤ 0.1 | 2.2.1.2 |
| Nitrosamines[[50]](#footnote-50) | ≤ 0.0002 | 2.2.1.3 |

2.2.2 Content

2.2.2.1 PAH

For products that are delivered to the general public (consumer-related uses), the requirements in accordance with the REACH Regulation must be complied with; this also includes floor coverings and impact wall constructions for sports halls and lounges, even if these are only supplied to professional users and installed by them.

For products referred to in Section 2.2.1, even without direct contact with the building user, which contain secondary raw materials made of rubber or raw materials with the use of plasticiser oils containing PAH or soot containing PAH, the content of benzo(a)pyrene (BaP) as a guide substance and the content of 16 PAH (see Appendix 3) according to EPA (US-Environmental Protection Agency) shall not exceed the values set out in Table 3.

Analytical demonstration of PAHs shall be done for 16 PAHs based on the method of AfPS GS 2019:01[[51]](#footnote-51).

Excluded from this are products which are used according to their installation situation and use, related to a possible release of particulate-bound PAH into the lounge. The long-term protective effect of such constructive measures shall be ensured by:

* Use of diffusion seals as well as
* Use under an effective cover layer made of other materials, e.g. seals such as screed coverings, in combination with foils and covers with edge seals in edge areas or floor coverings used over the entire surface

This regulation does not affect existing levels for pollutants, in particular according to the Closed Substance Cycle Act (Kreislaufwirtschaftsgesetz [KrWG]) and Landfill Ordinance (Deponieverordnung [DepV]).

2.2.2.2 Nitrosamines

For products pursuant to Section 2.2.1 that contain vulcanised or unvulcanised rubber with nitrosamine release agents and/or recycled rubber, the content of nitrosamines as given in Table 3 shall not be exceeded.

Analytical determination of nitrosamine (pursuant to TRGS 552) is done in line with the DIK method (Deutsches Institut für Kautschuktechnologie e.V. [German Institute of Rubber Technology]), published in ‘Kautschuk Gummi Kunststoffe’, No 6/91, pp. 514-521).

Table 3: Salary requirements

|  |  |  |
| --- | --- | --- |
| Material/material group | Content [mg/kg] | Section of ABG |
| B(a)P[[52]](#footnote-52) | ≤ 5 | 2.2.2.1 |
| 16 PAH10 | ≤ 50 | 2.2.2.1 |
| Nitrosamines8 | ≤ 0.011 | 2.2.2.2 |

**Annex 1 – References**

DIN EN 16516: 2020-10 Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air; German version EN 16516:2017

DIN ISO 18287:2006-05 Soil quality - Determination of polycyclic aromatic hydrocarbons (PAH) - Gas chromatographic method with mass spectrometric detection (GC-MS)

TRGS 552 Technical Rule for hazardous substance 'N-nitrosamines'; GMBI 2018   
PP 913-934

DIK process specification DIK (Deutsches Institut für Kautschuktechnologie e.V. [German Institute of Rubber Technology]), ‘Methods to determine N‑nitrosamines in air, vulcanisates and vulcanisation vapours’, Liekefeld et. al., published in Kautschuk Gummi Kunststoffe, point 6/91, pp. 514-521).

AFPs GS 2019:01 PAH GS specification 'Testing and evaluation of polycyclic aromatic hydrocarbons (PAHs) when awarding the GS‑ mark of the Committee on Product Safety (AfPS); Annex Test instruction Harmonised method for the determination of polycyclic aromatic hydrocarbons (PAHs) in polymers

DGUV information 213-523 Analytical methods for the determination of N-nitrosamines

**Annex 2 – LCI‑values (target compounds)**

The LCI values in force pursuant to building legislation are listed in Table 4.

Table 4: LCI values list 2020

|  | Substance | | CAS Number | LCI [µg/m³] | Comments |
| --- | --- | --- | --- | --- | --- |
| 1 | Aromatic hydrocarbons | | | | |
| 1-1 | Toluene | | 108-88-3 | **2 900** | Adoption of EU LCI value |
| 1-2 | Ethylbenzene | | 100-41-4 | **850** | Adoption of EU LCI value |
| 1-3 | Xylol, mixture of isomers o-, m- and p-xylol | | 1330-20-7 | **500** | Adoption of EU LCI value |
| 1-4 | p-xylene | | 106-42-3 | **500** | Adoption of EU LCI value |
| 1-5 | m-xylene | | 108-38-3 | **500** | Adoption of EU LCI value |
| 1-6 | o-xylene | | 95-47-6 | **500** | Adoption of EU LCI value |
| 1-7 | Isopropylbenzene | | 98-82-8 | **1 700** | Adoption of EU LCI value |
| 1-8 | N-propylbenzene | | 103-65-1 | **950** | Adoption of EU LCI value  Read across of ethylbenzene |
| 1-9 | 1-propenylbenzene  (ß-methylstyrene) | | 637-50-3 | **1 200** | Adoption of EU LCI value  Read across of 2-phenylpropene |
| 1-10 | 1,3,5-trimethylbenzene | | 108-67-8 | **450** | Adoption of EU LCI value |
| 1-11 | 1,2,4-trimethylbenzene | | 95-63-6 | **450** | Adoption of EU LCI value |
| 1-12 | 1,2,3-trimethylbenzene | | 526-73-8 | **450** | Adoption of EU LCI value |
| 1-13 | 2-ethyltoluene | | 611-14-3 | **550** | Adoption of EU LCI value  Read across of xylene |
| 1-14 | 1-isopropyl-2-methylbenzene  (o-cymene) | | 527-84-4 | **1 000** | Adoption of EU LCI value |
| 1-15 | 1-isopropyl-3-methylbenzene  (m-cymene) | | 535-77-3 | **1 000** | Adoption of EU LCI value |
| 1-16 | 1-isopropyl-4-methylbenzene  (p-cymol) | | 99-87-6 | **1 000** | Adoption of EU LCI value |
| 1-17 | 1,2,4,5-tetramethylbenzene | | 95-93-2 | **250** | Adoption of EU LCI value  Read across of trimethylbenzene |
| 1-18 | N-butylbenzene | | 104-51-8 | **1 100** | Adoption of EU LCI value  Read across of ethylbenzene |
| 1-19 | 1,3-diisopropylbenzene | | 99-62-7 | **750** | Adoption of EU LCI value  Read across of xylene |
| 1-20 | 1,4-diisopropylbenzene | | 100-18-5 | **750** | Adoption of EU LCI value  Read across of xylene |
| 1-21 | Phenyloctane and isomers | | 2189-60-8 | **1 100** | Adoption of EU LCI value  Read across of ethylbenzene |
| 1-22 | 1-phenyldecane and isomers | | 104-72-3 | **1 100** | Read across of ethylbenzene |
| 1-23 | 1-phenylundecane and isomers | | 6742-54-7 | **1 100** | Read across of ethylbenzene |
| 1-24 | 4-phenylcyclohexene (4-PCH) | | 4994-16-5 | **300** | Read across of styrene |
| 1-25 | Styrene | | 100-42-5 | **250** | Adoption of EU LCI value |
| 1-26 | Phenylacetylene | | 536-74-3 | **200** | Read across of styrene |
| 1-27 | 2-phenylpropene  (α-methylstyrene) | | 98-83-9 | **1 200** | Adoption of EU LCI value |
| 1-28 | Vinyl toluene (all isomers:  o-, m-, p-methylstyrenes) | | 25013-15-4 | **1 200** | Adoption of EU LCI value |
| 1-29 | Other alkylbenenes, unless individual isomers shall be assessed differently | |  | **450** | Read across of trimethylbenzene |
| 1-30 | Naphthalene | | 91-20-3 | **10** | Adoption of EU LCI value |
| 1-31 | Indene | | 95-13-6 | **450** | Adoption of EU LCI value |
| 2 | Aliphatic hydrocarbons (n-, iso- and cyclo-) | | | | |
| 2-1 | 3-methylpentane | | 96-14-0 |  | VVOC |
| 2-2 | Hexane | | 110-54-3 | **4 300** | Adoption of EU LCI value |
| 2-3 | Cyclohexane | | 110-82-7 | **6 000** | Adoption of EU LCI value |
| 2-4 | Methylcyclohexane | | 108-87-2 | **8 100** | Adoption of EU LCI value |
| 2-5 | - | |  |  | 1) |
| 2-6 | - | |  |  | 1) |
| 2-7 | - | |  |  | 1) |
| 2-8 | n-heptane | | 142-82-5 | **15 000** | Adoption of EU LCI value |
| 2-9 | Other saturated aliphatic hydrocarbons C6 to C8 | |  | **14 000** | Adoption of EU LCI value  Read across of 2-methylpentane |
| 2-10 | Other saturated aliphatic hydrocarbons C9 to C16 | |  | **6 000** | Adoption of EU LCI value |
| 2-11 | Other saturated aliphatic hydrocarbons C17 to C22 | |  | **1 000** | SVOC  Individual substances |
| 2-12 | 1-dodecene | | 112-41-4 | **750** | Individual substances |
| 3 | Terpene | | | | |
| 3-1 | 3-carene | | 498-15-7 | **1 500** | Adoption of EU LCI value |
| 3-2 | α-pines | | 80-56-8 | **2 500** | Adoption of EU LCI value |
| 3-3 | ß-pinene | | 127-91-3 | **1 400** | Adoption of EU LCI value |
| 3-4 | Limonene | | 138-86-3 | **5 000** | Adoption of EU LCI value |
| 3-5 | Terpenes, other | |  | **1 400** | Adoption of EU LCI value (all monoterpenes and sesquiterpenes and their oxygen derivatives belong to the group) |
| 4 | Aliphatic mono alcohols (n-, iso- and cyclo-) and dialcohols | | | | |
| 4-1 | Ethanol | | 64-17-5 |  | VVOC |
| 4-2 | 1-Propanol | | 71-23-8 |  | VVOC |
| 4-3 | 2-Propanol | | 67-63-0 |  | VVOC |
| 4-4 | tert-butanol, 2-methyl-2-propanol | | 75-65-0 | **620** | Adoption of EU LCI value |
| 4-5 | 2-methyl-1-propanol | | 78-83-1 | **11 000** | Adoption of EU LCI value |
| 4-6 | 1-butanol | | 71-36-3 | **3 000** | Adoption of EU LCI value |
| 4-7 | Pentanol (all isomers) | | 71-41-0 30899-19-5 94624-12-1 6032-29-7 584-02-1 137-32-6 123-51-3 598-75-4  75-85-4  75-84-3 | **730** | Adoption of EU LCI value |
| 4-8 | 1-hexanol | | 111-27-3 | **2 100** | Adoption of EU LCI value |
| 4-9 | Cyclohexanol | | 108-93-0 | **2 000** | Adoption of EU LCI value |
| 4-10 | 2-ethyl-1-hexanol | | 104-76-7 | **300** | Adoption of EU LCI value |
| 4-11 | 1-octanol | | 111-87-5 | **1 700** | Adoption of EU LCI value |
| 4-12 | 4-hydroxy-4-methylpentan-2-one (diacetone alcohol) | | 123-42-2 | **960** | Adoption of EU LCI value |
| 4-13 | other C4-C10 saturated n- and iso alcohols | |  |  | Reassessment, see 4-16 and 4-17 |
| 4-14 | Other C11-C13 saturated n- and iso-alcohols | |  |  | Reassessment, see 4-16 and 4-17 |
| 4-15 | 1,4-cyclohexandimethanol | | 105-08-8 | **1 600** | Individual substances |
| 4-16 | Other C7-C13 saturated  N-alcohols | |  | **1 700** | Read across of 1-octanol, except for cyclical compounds |
| 4-17 | Other C6-C13 saturated iso-alcohols | |  | **300** | Read across of 2-ethyl-1-hexanol, except for cyclical compounds |
| 5 | Aromatic alcohols (phenols) | | | | |
| 5-1 | Phenol | | 108-95-2 | **70** | Adoption of EU LCI value |
| 5-2 | 2,6-di-tert-butyl-4-methylphenol (BHT) | | 128-37-0 | **100** | Adoption of EU LCI value |
| 5-3 | Benzyl alcohol | | 100-51-6 | **440** | Adoption of EU LCI value |
| 6 | Glycols, Glycol ethers, glycol esters | | | | |
| 6-1 | Propylene glycol  1,2-dihydroxypropane | | 57-55-6 | **2 100** | Adoption of EU LCI value |
| 6-2 | Ethylene glycol (ethanediol) | | 107-21-1 | **3 400** | Adoption of EU LCI value |
| 6-3 | Ethylene glycol monobutyl ether | | 111-76-2 | **1 600** | Adoption of EU LCI value |
| 6-4 | Diethyleneglycol | | 111-46-6 | **5 700** | Adoption of EU LCI value  Read across of ethylene glycol |
| 6-5\* | Diethylene glycol monobutyl ether | | 112-34-5 | **350** | Adoption of EU LCI value |
| 6-6 | 2-phenoxyethanol | | 122-99-6 | **60** | Adoption of EU LCI value |
| 6-7 | Ethylene carbonate | | 96-49-1 | **4 800** | Read across of ethylene glycol |
| 6-8 | 1-methoxy-2-propanol | | 107-98-2 | **7 900** | Adoption of EU LCI value |
| 6-9\* | 2,2,4-Trimethyl-1,3 pentandiol monobutyrate | | 25265-77-4 | **850** | Adoption of EU LCI value |
| 6-10\* | Glycolic acid butyl ester (hydroxyacetic acid butyl ester) | | 7397-62-8 | **900** | Adoption of EU LCI value |
| 6-11 | Butyldiglycol acetate (ethanol, 2-(2-butoxyethoxy)acetate, BDGA) | | 124-17-4 | **850** | Adoption of EU LCI value |
| 6-12 | Dipropylene glycol monomethyl ether | | 34590-94-8 | **3 100** | Adoption of EU LCI value |
| 6-13\* | 2-methoxyethanol | | 109-86-4 | **100** | Adoption of EU LCI value |
| 6-14 | 2-ethoxyethanol | | 110-80-5 | **8** | EU-OEL: 8 000 µg/m³ Adoption of the EU LCI value is still under discussion |
| 6-15 | 2-propoxyethanol | | 2807-30-9 | **860** | Adoption of EU LCI value |
| 6-16 | 2-methylethoxyethanol | | 109-59-1 | **220** | Adoption of EU LCI value |
| 6-17\* | 2-hexoxyethanol | | 112-25-4 | **900** | Adoption of EU LCI value |
| 6-18\* | 1,2-dimethoxyethane | | 110-71-4 | **100** | Read across from 2-methoxyethanol |
| 6-19 | 1,2-diethoxyethane | | 629-14-1 | **10** | Read across of 2-ethoxyethanol |
| 6-20\* | 2-methoxyethyl acetate | | 110-49-6 | **150** | Adoption of EU LCI value  Read across from 2-methoxyethanol |
| 6-21 | 2-ethoxyethyl acetate | | 111-15-9 | **11** | EU-OEL: 11 000 µg/m³ Adoption of the EU LCI value is still under discussion |
| 6-22 | 2-butoxyethylacetate | | 112-07-2 | **2 200** | Adoption of EU LCI value  Read across of ethylene glycol butyl ether |
| 6-23\* | 2-(2-hexoxyethoxy)-ethanol | | 112-59-4 | **400** | Adoption of EU LCI value  Read across of diethylene glycol monobutyl ether |
| 6-24 | 1-methoxy-2-(2-methoxyethoxy)-ethane | | 111-96-6 | **28** | Adoption of EU LCI value |
| 6-25 | 2-methoxy-1-propanol | | 1589-47-5 | **19** | Adoption of EU LCI value |
| 6-26 | 2-methoxy-1-propyl acetate | | 70657-70-4 | **28** | Adoption of EU LCI value |
| 6-27 | Propylene glycol diacetate | | 623-84-7 | **1 600** | Adoption of EU LCI value  Read across of acetic acid |
| 6-28 | Dipropylene glycol | | 110-98-5 25265-71-8 | **670** | Adoption of EU LCI value |
| 6-29\* | Dipropylene glycol monomethyl ether acetate | | 88917-22-0 | **950** | Adoption of EU LCI value  Read across 2-methoxy-1-methylethyl acetate |
| 6-30\* | Dipropylene glycol mono-n-propyl ether | | 29911-27-1 | **200** | Adoption of EU LCI value  Read across of dipropylene glycolmono-n-butyl ether |
| 6-31\* | Dipropylene glycol mono-n-butyl ether | | 29911-28-2 35884-42-5 | **250** | Adoption of EU LCI value |
| 6-32\* | Dipropylene glycolmono-t-butyl ether | | 132739-31-2 (mixture) | **250** | Adoption of EU LCI value |
| 6-33 | 1,4-butanediol | | 110-63-4 | **2 000** | Adoption of EU LCI value |
| 6-34 | Tri(propylene glycol) methyl ether | | 20324-33-8 25498-49-1 | **1 200** | Adoption of EU LCI value |
| 6-35\* | Triethylene glycol dimethyl ether | | 112-49-2 | **150** | Adoption of EU LCI value |
| 6-36 | 1.2-propylene glycol dimethyl ether | | 7778-85-0 | **25** | Read across 2-methoxy-1-propanol |
| 6-37\* | 2,2,4-Trimethyl-1,3-pentanediol diisobutyrate | | 6846-50-0 | **1 300** | Adoption of EU LCI value |
| 6-38 | Ethyldiglycol | | 111-90-0 | **350** | Adoption of EU LCI value |
| 6-39 | Di(propylene glycol) methyl ether | | 63019-84-1 89399-28-0 111109-77-4 | **1 300** | Adoption of EU LCI value |
| 6-40 | Propylene carbonate\* | | 108-32-7 | **1 000** | Individual substances |
| 6-41 | Hexylene glycol  (2-methyl-2,4-pentanediol) | | 107-41-5 | **3 500** | Adoption of EU LCI value |
| 6-42 | 3-methoxy-1-butanol | | 2517-43-3 | **500** | Individual substances |
| 6-43 | 1,2-propylene glycol n-propyl ether | | 1569-01-3 30136-13-1 | **1 400** | Individual substances |
| 6-44\* | 1,2-propylene glycol n-butyl ether | | 5131-66-8 29387-86-8 15821-83-7 63716-40-5 | **650** | Adoption of EU LCI value |
| 6-45 | Diethylene glycol-phenyl ether | | 104-68-7 | **80** | Adoption of EU LCI value  Read across from 2-phenoxyethanol |
| 6-46 | Neopentylglykol (2.2-dimethyl-1.3-propanediol) | | 126-30-7 | **1 000** | Individual substances |
| 7 | Aldehyde | | | | |
| 7-1 | Butanal | | 123-72-8 | **650** | VVOC  Adoption of EU LCI value |
| 7-2 | Pentanal | | 110-62-3 | **800** | Adoption of EU LCI value  Read across by Butanal |
| 7-3 | Hexanal | | 66-25-1 | **900** | Adoption of EU LCI value  Read across by Butanal |
| 7-4 | Heptanal | | 111-71-7 | **900** | Adoption of EU LCI value  Read across by Butanal |
| 7-5 | 2-Ethylhexanal | | 123-05-7 | **900** | Adoption of EU LCI value  Read across by Butanal |
| 7-6 | Octanal | | 124-13-0 | **900** | Adoption of EU LCI value  Read across by Butanal |
| 7-7 | Nonanal | | 124-19-6 | **900** | Adoption of EU LCI value  Read across by Butanal |
| 7-8 | Decanal | | 112-31-2 | **900** | Adoption of EU LCI value  Read across by Butanal |
| 7-9 | 2-butenal (crotonaldehyde, mixture of cis and trans) | | 4170-30-3 123-73-9 15798-64-8 | **1#** | Individual considerations; Adoption of the EU LCI value is still under discussion |
| 7-10 | 2-pentenal | | 1576-87-0 764-39-6 31424-04-1 | **12** | Read across from 2-Butenal, but no EU mutagenicity classification Adoption of the EU LCI value is still under discussion |
| 7-11 | 2-Hexenal | | 16635-54-4 6728-26-3 505-57-7 1335-39-3  73543-95-0 | **14** | Read across from 2-pentenal; Adoption of the EU LCI value is still under discussion |
| 7-12 | 2-heptenal | | 2463-63-0 18829-55-5 29381-66-6  57266-86-1 | **16** | Read across from 2-pentenal; Adoption of the EU LCI value is still under discussion |
| 7-13 | 2-octenal | | 2363-89-5 25447-69-2 20664-46-4 2548-87-0 | **18** | Read across from 2-pentenal; Adoption of the EU LCI value is still under discussion |
| 7-14 | 2-nonenal | | 2463-53-8 30551-15-6 18829-56-6 60784-31-8 | **20** | Read across from 2-pentenal; Adoption of the EU LCI value is still under discussion |
| 7-15 | 2-Decenal | | 3913-71-1 2497-25-8 3913-81-3 | **22** | Read across from 2-pentenal; Adoption of the EU LCI value is still under discussion |
| 7-16 | 2-undecenal | | 2463-77-6 53448-07-0 | **24** | Read across from 2-pentenal; Adoption of the EU LCI value is still under discussion |
| 7-17 | Furfural | | 98-01-1 | **10** | Adoption of EU LCI value |
| 7-18 | Glutaraldehyde | | 111-30-8 | **1#** | Adoption of EU LCI value |
| 7-19 | | Benzaldehyde | 100-52-7 | **90** | WEEL (AIHA): 8 800 µg/m³ |
| 7-20\* | | Acetaldehyde | 75-07-0 | **300** | VVOC  Individual substances |
| 7-21\* | | Propane | 123-38-6 | **650** | VVOC  Adoption of EU LCI value |
| 7-22 | | Formaldehyde | 50-00-0 | **100** | VVOC  Adoption of EU LCI value |
| 7-23 | | Propenal | 107-02-8 | **14** | VVOC  Individual substances |
| 8 | | Ketone | | | |
| 8-1 | | Ethyl methyl ketone | 78-93-3 | **20 000** | Adoption of EU LCI value |
| 8-2 | | 3-methyl-2-butanone | 563-80-4 | **7 000** | Adoption of EU LCI value |
| 8-3 | | Methyl isobutyl ketone | 108-10-1 | **1 000** | Adoption of EU LCI value |
| 8-4 | | Cyclopentanone | 120-92-3 | **900** | Adoption of EU LCI value |
| 8-5 | | Cyclohexanone | 108-94-1 | **410** | Adoption of EU LCI value |
| 8-6 | | 2-methylcyclopentanone | 1120-72-5 | **1 000** | Read across of Cyclopentanone |
| 8-7 | | 2-methylcyclohexanon | 583-60-8 | **2 300** | Adoption of EU LCI value |
| 8-8 | | Acetophenone | 98-86-2 | **490** | Adoption of EU LCI value |
| 8-9 | | 1-hydroxyacetone  (1-hydroxy-2-propanone) | 116-09-6 | **2 100** | Adoption of EU LCI value  Read across of propylene glycol |
| 8-10\* | | Acetone | 67-64-1 | **120 000** | VVOC  Adoption of EU LCI value |
| 9 | | Acids | | | |
| 9-1 | | Acetic acid | 64-19-7 | **1 200** | Adoption of EU LCI value |
| 9-2 | | Propionic acid | 79-09-4 | **1 500** | Adoption of EU LCI value |
| 9-3 | | Isobutyric acid | 79-31-2 | **1 800** | Adoption of EU LCI value  Read across of propionic acid |
| 9-4 | | Butyric acid | 107-92-6 | **1 800** | Adoption of EU LCI value  Read across of propionic acid |
| 9-5 | | Pivalic acid | 75-98-9 | **2 100** | Adoption of EU LCI value  Read across of propionic acid |
| 9-6 | | n-Valeric acid | 109-52-4 | **2 100** | Adoption of EU LCI value  Read across of propionic acid |
| 9-7 | | n-Capronic acid | 142-62-1 | **2 100** | Adoption of EU LCI value  Read across of propionic acid |
| 9-8 | | n-Heptanoic acid | 111-14-8 | **2 100** | Adoption of EU LCI value  Read across of propionic acid |
| 9-9 | | n-Octanic acid | 124-07-2 | **2 100** | Adoption of EU LCI value  Read across of propionic acid |
| 9-10 | | 2-ethylhexanic acid | 149-57-5 | **150** | Adoption of EU LCI value |
| 9-11\* | | Neodecanoic acid | 26896-20-8 | 750 | Individual substances |
| 10 | | Ester and lactone | | | |
| 10-1 | | Methyl acetate | 79-20-9 |  | VVOC |
| 10-2 | | Ethyl acetate | 141-78-6 |  | VVOC |
| 10-3 | | Vinyl acetate | 108-05-4 |  | VVOC |
| 10-4 | | Isopropyl acetate | 108-21-4 | **4 200** | Adoption of EU LCI value |
| 10-5 | | Propyl acetate | 109-60-4 | **4 200** | Adoption of EU LCI value |
| 10-6\* | | 2-methoxy-1-methylethyl acetate | 108-65-6 | **650** | Adoption of EU LCI value |
| 10-7 | | n-Butyl formate | 592-84-7 | **2 000** | Read across of methyl formate (AGW: 120 000 µg/m³) |
| 10-8 | | Methyl methacrylate | 80-62-6 | **750** | Adoption of EU LCI value |
| 10-9 | | Other methacrylates |  | **750** | Read across of methyl methacrylate |
| 10-10 | | Isobutyl acetate | 110-19-0 | **4 800** | Adoption of EU LCI value |
| 10-11 | | 1-butyl acetate | 123-86-4 | **4 800** | Adoption of EU LCI value |
| 10-12 | | 2-ethylhexyl acetate | 103-09-3 | **350** | Adoption of EU LCI value  Read across of 2-ethyl-1-hexanol |
| 10-13 | | Methylacrylate | 96-33-3 | **180** | Adoption of EU LCI value |
| 10-14 | | Ethyl acrylate | 140-88-5 | **200** | Adoption of EU LCI value |
| 10-15 | | n-butyl acrylate | 141-32-2 | **110** | Adoption of EU LCI value |
| 10-16 | | 2-ethylhexyl acrylate | 103-11-7 | **380** | Adoption of EU LCI value |
| 10-17 | | Other acrylates  (acrylic acid esters) |  | **110** | Adoption of EU LCI value |
| 10-18 | | Adipic acid diethyl ester | 627-93-0 | **50** | Adoption of EU LCI value |
| 10-19 | | Fumaric acid dibutyl ester | 105-75-9 | **50** | Adoption of EU LCI value |
| 10-20 | | Succinic dimethyl ester | 106-65-0 | **50** | Adoption of EU LCI value |
| 10-21 | | Glutaric acid dimethyl ester | 1119-40-0 | **50** | Adoption of EU LCI value |
| 10-22 | | Hexanediol diacrylate | 13048-33-4 | **10** | Adoption of EU LCI value |
| 10-23 | | Maleic dibutyl ester | 105-76-0 | **50** | Adoption of EU LCI value |
| 10-24 | | Butyrolactone | 96-48-0 | **2 800** | Adoption of EU LCI value |
| 10-25 | | Glutaric acid diisobutyl ester | 71195-64-7 | **100** | Individual substances |
| 10-26 | | Succinic acid diisobutyl ester | 925-06-4 | **100** | Individual substances |
| 11 | Chlorinated hydrocarbons | | | | |
|  | Not used at present | | | | |
| 12 | Other | | | | |
| 12-1 | 1,4-dioxane | | 123-91-1 | **400** | Adoption of EU LCI value |
| 12-2 | Caprolactam | | 105-60-2 | **300** | Adoption of EU LCI value |
| 12-3 | N-methyl-2-pyrrolidone | | 872-50-4 | **1 800** | Adoption of EU LCI value |
| 12-4 | Octamethylcyclotetrasiloxane (D4) | | 556-67-2 | **1 200** | Adoption of EU LCI value |
| 12-5 | Methenamine, Hexamethylentetramine (formaldehyde releaser) | | 100-97-0 | **30** | Adoption of EU LCI value |
| 12-6 | 2-butanonoxime | | 96-29-7 | **15** | Adoption of EU LCI value |
| 12-7 | Tributyl phosphate | | 126-73-8 | **300** | SVOC  Adoption of EU LCI value |
| 12-8 | Triethyl phosphate | | 78-40-0 | **80** | Individual substances |
| 12-9 | 5-chloro-2-methyl-4isothiazolin-3-on (CIT) | | 26172-55-4 | **1**# | Adoption of EU LCI value |
| 12-10 | 2-methyl-4-isothiazolin-3-one (MIT) | | 2682-20-4 | **100** | Adoption of EU LCI value |
| 12-11 | Triethylamine | | 121-44-8 | **60** | Adoption of EU LCI value |
| 12-12 | Decamethylcyclopenta-siloxane (D5) | | 541-02-6 | **1 500** | Read across of octamethylcyclotetrasiloxane |
| 12-13 | Dodecamethylcyclopentasiloxane (D6) | | 540-97-6 | **1 200** | Read across of octamethylcyclotetrasiloxane |
| 12-14\* | Tetrahydrofuran | | 109-99-9 | **500** | Adoption of EU LCI value |
| 12-15 | Dimethylformamide | | 68-12-2 | **15** | AGW: 15 000 µg/m³ |
| 12-16 | Tetradecamethylcycloheptasiloxane (D7) | | 107-50-6 | **1 200** | Read across of octamethylcyclotetrasiloxane |
| 12-17 | N-ethyl-2-pyrrolidone | | 2687-91-4 | **400** | Adoption of EU LCI value |
| 12-18 | N-butyl-2-pyrrolidone | | 3470-98-2 | **500** | Individual substance assessment |

|  |
| --- |
| \* New inclusions/amendments 2020  # LCI ‑value‑ assessment only takes place from measured emissions of 5 µg/m³.  VVOC very volatile organic compounds)  SVOC semi-volatile organic compounds  1) To ensure compatibility with the ADAM evaluation template, sequential numbers in the LCI list formerly used may not be re-used if substances or substance groups are discontinued or re-sorted. |

**Notes:**

**I) Note on current lists of carcinogenic substances (EU category 1):**

I) The following links point to lists of substances classified as Category 1A or 1B carcinogens under EU Regulation 1272/2008, and for which testing and control under the scheme are required (version should be up to date):

* IFA, Institute for Occupational Safety and Health of the German Social Accident Insurance (Deutsche Gesetzliche Unfallversicherung [DGUV])

<http://www.dguv.de/ifa/fachinfos/kmr-liste/index.jsp>

* ECHA, European Chemicals Agency

<http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

**Analysis of carbonyl compounds:**

For the following carbonyl compounds, in accordance with DIN EN 16516, the procedure described in DIN ISO 16000-3 shall be used: Formaldehyde, acetaldehyde, propane, butanal, acetone. Propenal shall be determined in accordance with ISO 16000-3.

**III) Analysis of VVOC:**

For the determination of the VVOC formaldehyde, acetaldehyde, propane and acetone, the procedure described in DIN ISO 16000-3 shall be used. Propenal shall be determined in accordance with ISO 16000-3. For the other VVOCs listed in the NIK list, an appropriate test procedure must be used and demonstrated according to the current state of standardisation (see also DIN EN 16516, Annex C).

**IV) Analysis of groups of substances saturated aliphatic hydrocarbons (NIK 2-9/2-10):**

The subdivision of the group of substances required by the different NIK values takes place when an 'alkane hump' occurs in the gas chromatogram at the retention time of n-Nonan, i.e. for aliphatic KW with a smaller retention time such as n-Nonan, the NIK value of 14 000 µg/m³ applies and for aliphatic KW with the same or greater retention time as n-Nonan, the NIK value of 6 000 µg/m³ applies.

The retention time of n-nonane should also be used to classify individual peaks of saturated aliphatic hydrocarbons which cannot be identified more accurately.

**V) Published explanatory documents for the adopted EU LCI values**

The justification documents for the adopted EU-LCI values are published under<https://ec.europa.eu/growth/sectors/construction/eu-lci/documents-glossary_en>.

Appendix 3

List of 16 PAHs designated by the US Federal Environmental Protection Agency as lead substances for PAH analytics:

* Benzo(a)pyrene
* Benzo(a)anthracene
* Benzo(b)fluoranthene
* Benzo(k)fluoranthene
* Benzo(g,h,i)perylene
* Chrysene
* Dibenzo(a,h)anthracene
* Indeno-(1,2,3-cd)-pyrene
* Pyrene
* Fluoranthene
* Anthracene
* Phenanthrene
* Fluorides
* Acenaphtylene
* Acenaphtene
* Naphthalene.

## Annex 10

**Requirements for structural works regarding effects on soil and water (Anforderungen an bauliche Anlagen bezüglich der Auswirkungen auf Boden und Gewässer [ABuG])**

Last updated: April 2022

**CONTENTS**

1 Subject matter and scope

2 Requirements for ingredients

3 Requirements on the release of hazardous substances

4 Requirements for roof structural elements

5 Requirements for exterior walls (including beams and columns)

6 Requirements for surface coverings outdoors

7 Requirements for foundations including piles

8 Requirements for steel seals for the production of construction pits

9 Requirements for backfill

10 Requirements for underground containers and pipes

Annex A Maximums

1 Subject matter and scope

In § 3, the MBO1 specifies that installations must be placed, erected, modified and maintained so as to not endanger public safety and order, in particular life, health and natural resources.

To meet the requirements set out in the MBO[[53]](#footnote-53), for structural works or structural elements thereof installed in the soil or groundwater or subject to precipitation, it must be ensured that the structural elements used do not cause any harmful soil changes or groundwater pollution.

This document sets out the general requirements for structural works in respect of their effects on soil and water.

buildings whose structural elements and construction products used therein that are installed in soil and groundwater or are subject to precipitation are of particular significance because of their effects on soil and water. On contact with water, substances can be washed out of them and enter the groundwater, seawater, surface water and/or the soil that could adversely affect the quality thereof and thereby contribute to endangering natural resources.

Structural works, their structural elements and the construction products used in them must therefore meet environmental protection requirements with respect to their constituents and the release of hazardous substances[[54]](#footnote-54). In particular, an assessment of the release of inorganic and organic substances is relevant. The installation situation must also be taken into account (direct or indirect contact with the soil and groundwater). Where constructive measures exclude the release of hazardous substances, no proof need be provided regarding the release of hazardous substances.

According to § 1 Federal ‑Soil Protection Act (BBodSchG), impacts on the soil, in this case due to structural works or parts of structural works, are to be avoided as far as possible by adverse effects on its natural functions as well as its function as an archive of natural and cultural history.

The provisions of the ABuG do not affect the competent water authorities’ right to reserve the granting of permission, particularly in water protection areas.

Table 1 lists the structural elements in contact with the soil, groundwater or precipitation for which environmental protection requirements under the MBO1 must currently be fulfilled (environmentally relevant structural elements).

Table 1: Environmentally relevant structural elements (structural elements in contact with the soil, groundwater or precipitation)

| Structural elements | | For requirement, see Section |
| --- | --- | --- |
| Roof | Concrete roof structural elements | 4.1 |
| Timber roof structural elements | 4.2 |
| Waterproofing | 4.3 |
| Outer wall including beams and supports | Concrete exterior wall structural elements | 5.1 |
| structural elements for external walls made of wood | 5.2 |
| Waterproofing | 5.3 |
| Fire protection products for improving the fire resistance of structural elements | 5.4 |
| Surface coverings | Concrete surface coverings | 6.1 |
| Timber surface coverings | 6.2 |
| Surface coverings handling wastewater | 6.3 |
| Foundations including piles | Injection and grouting materials | 7.2 |
| structural elements of concrete | 7.3 |
| Waterproofing | 7.4 |
| Excavation seals | Injection and pressing materials made of binder suspensions or grout | 8.2 |
| Silicon-based injection and pressing materials | 8.3 |
| Granular fillings | Foam glass gravel used to backfill foundation slabs | 9.1 |
| Filter materials for the treatment of precipitation wastewater to be leaked | 9.2 |
| Underground pipes and containers | Underground concrete containers and pipes | 10.1 |
| Sewer rehabilitation products | 10.2 |

2 Requirements for ingredients

The legal regulations for substances such as REACH Regulation (EC) No. 1907/2006, the Biocidal Regulation (EU) No 528/2012, the POP Regulation (EC) No. 850/2004, the Chemicals Prohibition Ordinance and the Closed Substance Cycle Act (Kreislaufwirtschaftsgesetz [KrWG]) apply.

In addition, any component of a construction product or kit may not be used as part of a building installation if the individual concentration of an active substance[[55]](#footnote-55) which is carcinogenic (H350; Of category 1A or 1B, mutagen (H340) of category 1A or 1B and/or toxic to reproduction (H360, H360F, H360D, H360FD) of category 1A or 1B in accordance with Regulation (EC) No 1272/2008, has reached or exceeds:

* the specific concentration limits set out in Part 3 of Annex VI to Regulation (EC) No 1272/2008; or
* the respective concentrations set out in Part 3 of Annex I to Regulation (EC) No 1272/2008, unless a specific concentration limit is specified in Part 3 of Annex VI to Regulation (EC) No 1272/2008.

The above requirements for structural elements of construction products or kits with regard to carcinogenic, mutagenic and reprotoxic substances do not apply if it can be shown that they pose no potential hazard to soil or water when installed[[56]](#footnote-56).

Note:

The active3 use of substances that must be marked H400, H410, H411, H300, H301, H310, H311, H341, H351, H361, H370 and H372 pursuant to the CLP‑ Regulation (EU) No 1272/2008, as amended, shall be avoided. If the use of a component cannot be avoided, it must not pose a risk when installed.

3 Requirements on the release of hazardous substances

The concentration of hazardous substances released from construction installations may:

* Change the chemical composition of bodies of water to only a negligible extent,
* Have no relevant eco-toxicological effects on bodies of water and
* Not adversely affect or overload the natural soil function, in particular the function of the soil as a decomposition, neutralisation and regeneration medium for material impacts by virtue of its filtering, buffering and substance conversion properties (filter and buffer function), and in particular for groundwater protection purposes.

This is deemed to have been satisfied if for example the de-minimis thresholds[[57]](#footnote-57) and the requirements listed below in this section are met.

Note:

Eluate concentrations determined in laboratory tests are generally not directly comparable with the specification values at the place of assessment under real conditions. The installation situation and any transport pathways must be taken into account, for example with transfer functions[[58]](#footnote-58).

The release of hazardous substances from structural works may not cause any lasting changes to electric conductivity or the pH‑ or any other changes in water such as discolouration, turbidity, foaming or smell.

If the requirement values (Annex A) for the release of hazardous substances from a specific component/construction product are complied with – insofar as these are explicitly specified – these requirements are deemed to have been met.

Where organic substances are released from buildings for which no test values exist, the requirements as per Table 2 must also be met.

Table 2: Requirements for environmentally relevant structural elements of organic materials in respect of the biological effects in groundwater

| **Parameter** | **Test during the reaction of the materials\*** | **Testing of fully cured materials\*** |
| --- | --- | --- |
| TOC | Indication in mg/l | Indication in mg/l |
| Algae test with *Desmodesmus subspicatus* or *Pseudokirchneriella subcapitata* according to DIN EN ISO 8692:2012-06 | GA\*\* ≤ 8 | GA ≤ 4 |
| *Daphnia test* with *Daphnia magna Straus* according to DIN EN ISO 6341:2013-01 | GD ≤ 8 (after 24 h) | GD ≤ 4 (after 24 h) |
| Luminescent bacteria luminescence inhibition test with V*ibrio fischeri* according to DIN EN ISO 11348‑1 to DIN EN ISO 11348‑3:2009-05 | GL ≤ 8 | GL ≤ 8 |
| Luminescent cell proliferation inhibition test with *Photobacterium phosphoreum* according to DIN 38412‑37:1999-04, if GL > 8 | GLW ≤ 2 | GLW ≤ 2 |
| Fish egg test with *Danio rerio* according to DIN EN ISO 15088:2009-06 | GEI ≤ 6 | GEI ≤ 6 |
| Umu‑ test on mutagenic potential according to ISO 13829:2000-03 | GEU ≤ 1.5 | GEU ≤ 1.5 |
| Biodegradability where TOC > 10 mg/l | ‘Readily biodegradable’  as per OECD 301:1992-07 | ‘Readily biodegradable’ as per OECD 301:1992-07 |
| \* The requirements relate to elution testing on the component/construction product.  \*\* Under the test specifications, inhibition of cell reproduction of green algae of 5 % or more is classified as a toxic effect. The thinning level necessary for less than 5 % inhibition of the original eluate (thinning level GA) is determined. The other G‑ values are defined analogously. | | |

4 Requirements for roof structural elements

No proof is required in respect of the release of hazardous substances for small-scale structural elements such as fastenings, lightning conductors.

4.1 Concrete roof structural elements

Concrete source materials used in roof structural elements must meet the requirements set out in the following Sections.

In the case of the exclusive use of natural rock granules, no evidence of the substance content and the release of dangerous substances shall be provided.

Construction products manufactured using display glass may not be used.

4.1.1 Recycled granules of rock

Concrete roof structural elements manufactured using recycled aggregates may only be installed if the recycled roof structural elements meet the following requirements:

* Only waste generated during construction activities (e.g. dismantling, demolition, conversion, expansion, new construction and maintenance of buildings and civil engineering, roads, paths, aerodromes and other traffic areas) may be used for the production of recycled rock granulation and were previously used as natural or artificial mineral building materials in bound or unbound form in civil engineering. The waste must correspond to the waste types mentioned in Table A‑1 (Annex A). Before rebuilding, dismantling or demolishing a building, it shall first be determined by viewing and analysing existing documents whether a pollutant load of the resulting material is to be expected. If a pollutant load could exist beyond the scope of parameters listed in Table A‑ 2 (Annex A), the material shall be assessed separately under waste legislation. Contaminated building materials and structural elements must be separated during the dismantling of a building and sent to an orderly disposal. This applies in particular to fire debris, structural elements with insulation and paints based on pitch, interior walls of industrial chimneys, substances containing asbestos and PCBs‑, parts of buildings contaminated with pollutants from gas works, filling stations, electroplating plants and chemical industry production facilities.
* Eluate concentrations under DIN EN 12457‑4:2003-01 in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* Concentrations of solid matter in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* For concrete as per DIN 1045‑2:2008-08, the material composition of the recycled aggregates must correspond to the delivery types under DAfStb‑ Guideline ‘Concrete pursuant to DIN EN 206‑1 and DIN 1045‑2 with recycled aggregates pursuant to DIN EN 12620:2010-09’.

If reject batches from prefabricated concrete structural elements (including concrete residue in ready-mixed concrete construction) are used directly as recycled aggregates in the production plant, no proof is required regarding the substance content and the release of hazardous substances.

4.1.2 Industrially manufactured aggregates

Concrete roof structural elements manufactured using industrially manufactured aggregates may only be installed if the industrially manufactured aggregates meet the following requirements:

* Eluate concentrations under DIN EN 12457‑4:2003-01 in industrially manufactured aggregates must comply with the upper limits according to Table A‑3 (Annex A).
* The material content in the solid of the industrially produced grain shall comply with the upper limits set out in Table A‑3 (Annex A).

In the use of crystalline blast furnace slag, metallurgical sand, melt chamber granules, expanded mica (vermiculite), expanded perlite, wind shale, expanded clay and brick sprit from unused bricks as rock grain (or rock flour) in concrete, no evidence of the substance contents and the release of dangerous substances shall be provided. For the use of sintered coal fly ash and boiler ash (boiler sand) in concrete, no evidence of substance content and release of hazardous substances shall be provided if the rock grain (or rock meal) comes from thermal power plants in which only coal and no secondary fuels, except biomass in a proportion of up to 14 M.-% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) with a proportion of up to 5 M.-% (dry mass) based on dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

Industrially manufactured aggregates that are not listed in the above paragraph or in Table A‑3 may not be used in concrete.

4.1.3 Fly ashes

Concrete roof structural elements manufactured using silicon-rich fly ash (generally hard coal fly ash) may only be installed if the silicon-rich fly ash meets the following requirements:

* Concentrations of solid matter in silicon-rich fly ash must comply with the upper limits of Table A‑4 (Annex A).

When using silicon-rich fly ash in concrete, no evidence of substance content and release of hazardous substances shall be provided if the ash comes from such thermal power plants where only coal and no secondary fuels, with the exception of biomass in a proportion of up to 14 M.-% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV[[59]](#footnote-59)) in a proportion of up to 5 M.‑% (dry mass), on the basis of dry coal, be co-burned. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

For calcium-rich fly ash (generally lignite fly ash) for roof components, there are no Technical Building Regulations or generally recognised rules of technical construction according to which their effects on soil and water can be assessed. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

4.2 Timber roof structural elements

Note:

Timber structural elements treated with wood preservative may only be used for roof structural elements (including windows) if the wood preservative (biocide products) meet the requirements of the Biocide Regulation (EU) No 528/2012. When using biocide products, the constraints listed in the approval under the Biocide Ordinance pursuant to Article 22(1) of the Biocide Ordinance and/or nationally applicable transitional provisions pursuant to the Ordinance on the reporting of biocidal products pursuant to the Chemicals Act (Biocide‑Reporting Ordinance [ChemBiozidMeldeV]) must be met. Timber structural elements treated with preservatives to guard against biological infestation must be marked as per DIN EN 15228:2009-08, Section 6.

When using scrap timber roof structural elements, the requirements of the Scrap Timber Ordinance [Altholzverordnung] must be met.

4.3 Seals for roof structural elements

Sealings for roof structural elements containing substances intended to inhibit or prevent rooting (root protectors) shall be installed only if the requirements set out in Section 2 and the concentration of the root preservative in the eluate are met with the requirements set out in Section 3. For Mecoprop, the cumulated discharge determined according to DIN CEN/TS 16637-2:2014-11 must not exceed a value of 47 mg/m2. For MCPA, the cumulative discharge determined in accordance with DIN CEN/TS 16637-2:2014-11 shall not exceed 206 mg/m².

5 Requirements for exterior walls (including beams and columns)

No proof is required in respect of the release of hazardous substances for small-scale structural elements such as fastenings.

Furthermore, for structural elements for external walls made of natural stone, glass or ceramics, no proof of the material content and release of dangerous substances is to be provided.

5.1 Concrete exterior wall structural elements

Concrete starting materials used in external wall structural elements must meet the requirements set out in the following Sections.

In the case of the exclusive use of natural rock granules, no evidence of the substance content and the release of dangerous substances shall be provided.

Construction products manufactured using display glass may not be used.

5.1.1 Recycled granules of rock

structural elements for external walls of concrete produced using recycled rock grains may only be installed if the recycled grain of rock meets the following requirements:

* Only waste generated during construction activities (e.g. dismantling, demolition, conversion, expansion, new construction and maintenance of buildings and civil engineering, roads, paths, aerodromes and other traffic areas) may be used for the production of recycled rock granulation and were previously used as natural or artificial mineral building materials in bound or unbound form in civil engineering. The waste must correspond to the waste types mentioned in Table A‑1 (Annex A). Before rebuilding, dismantling or demolishing a building, it shall first be determined by viewing and analysing existing documents whether a pollutant load of the resulting material is to be expected. If a pollutant load could exist beyond the scope of parameters listed in Table A‑ 2 (Annex A), the material shall be assessed separately under waste legislation. Contaminated building materials and structural elements must be separated during the dismantling of a building and sent to an orderly disposal. This applies in particular to fire debris, structural elements with insulation and paints based on pitch, interior walls of industrial chimneys, substances containing asbestos and PCBs, parts of buildings contaminated with pollutants from gas works, filling stations, electroplating plants and chemical industry production facilities.
* Eluate concentrations under DIN EN 12457‑4:2003-01 in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* Concentrations of solid matter in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* For concrete as per DIN 1045‑2:2008-08, the material composition of the recycled aggregates must correspond to the delivery types under DAfStb‑ Guideline ‘Concrete pursuant to DIN EN 206‑1 and DIN 1045‑2 with recycled aggregates pursuant to DIN EN 12620:2010-09’.

If reject batches from prefabricated concrete structural elements (including concrete residue in ready-mixed concrete construction) are used directly as recycled aggregates in the production plant, no proof is required regarding the substance content and the release of hazardous substances.

5.1.2 Industrially manufactured aggregates

Concrete exterior wall structural elements manufactured using industrially manufactured aggregates may only be installed if the industrially manufactured aggregates meet the following requirements:

* Eluate concentrations under DIN EN 12457‑4:2003-01 in industrially manufactured aggregates must comply with the upper limits according to Table A‑3 (Annex A).
* The material content in the solid of the industrially produced grain shall comply with the upper limits set out in Table A‑3 (Annex A).

For exterior walls of concrete produced using industrially produced rock granules, where used in contact with soil or groundwater, the concentrations of substances in eluate in accordance with DIN CEN/TS 16637‑ 2:2014-11 (for hardened concrete test specimens of a model concrete) must comply with the limits set out in Table A‑ 6 (Annex A) or, in the case of boiler ash, the ceilings set out in Table A‑ 5 (Annex A).

Proof that the concentrations of substances in the eluate in accordance with DIN CEN/TS 16637‑ 2:2014-11 comply with the limits set out in Table A‑ 5 or Table A‑ 6(Annex A) shall be omitted if structural measures prevent direct contact of the component with soil or groundwater.

In the use of crystalline blast furnace slag, metallurgical sand, melt chamber granules, expanded mica (vermiculite), expanded perlite, wind shale, expanded clay and brick sprit from unused bricks as rock grain (or rock flour) in concrete, no evidence of the substance contents and the release of dangerous substances shall be provided. For the use of sintered coal fly ash and boiler ash (boiler sand) in concrete, no evidence of substance content and release of hazardous substances shall be provided if the rock grain (or rock meal) comes from thermal power plants in which only coal and no secondary fuels, except biomass in a proportion of up to 14 M.-% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) with a proportion of up to 5 M.-% (dry mass) based on dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

Industrially manufactured aggregates that are not listed in the above paragraph or in Table A‑3 may not be used in concrete.

5.1.3 Fly ashes

structural elements for external walls of concrete produced using silicon-rich fly ash (typically hard coal ash) shall not be installed unless the silicon-rich fly ash meets the following requirement:

Concentrations of solid matter in silicon-rich fly ash must comply with the upper limits of Table A‑4 (Annex A).

For exterior walls made of concrete produced using silicon-rich fly ash and used in contact with soil and groundwater, the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 (for hardened concrete test specimens of a model concrete) must comply with the upper limits given in Table A‑5 (Annex A).

Proof that the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 comply with the upper limits given in Table A‑5 (Annex A) is not required if direct contact between the component and soil or groundwater is excluded through constructive measures.

In the case of the use of silicon-rich fly ash in concrete, no evidence of substance content and release of hazardous substances shall be provided if the ash originates from thermal power plants in which only coal and no secondary fuels, except biomass in a proportion of up to 14 M.‑% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) are used in a proportion of up to 5 M.-% (dry mass) based on dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

For calcium-rich fly ash (generally lignite fly ash) for concrete exterior wall structural elements, there are no Technical Building Regulations or generally recognised rules of technical construction according to which their effects on soil and water can be assessed. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

5.1.4 Sulphate hut cement and calcium aluminate sulfate cement

Structural elements for concrete exterior walls manufactured using supersulphated cement or calcium aluminate sulphate cement may only be installed in contact with soil and groundwater if the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 (for hardened concrete test specimens of a model concrete) comply with the upper limits according to Table A‑6 (Annex A).

Proof of compliance with these requirements is not required if direct contact of the component with soil or groundwater is prevented through constructive measures.

5.1.5 Concrete admixtures for external concrete walls

Concrete admixtures used in concrete for exterior walls in contact with soil or groundwater and for which there are no Technical Building Regulations or technical best practice are of significance for complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

5.2 structural elements for external walls made of wood

Note:

Timber structural elements treated with wood preservative may only be used on exterior walls (including windows and doors) if the wood preservative (biocide products) meet the requirements of the Biocide Regulation (EU) No 528/2012. When using biocide products, the constraints listed in the approval under the Biocide Ordinance pursuant to Article 22(1) of the Biocide‑ Ordinance and/or nationally applicable transitional provisions pursuant to the Ordinance on the reporting of biocide products pursuant to the Chemicals Act (Biocide‑ Reporting Ordinance [ChemBiozidMeldeV]) must be met. Timber structural elements treated with preservatives to guard against biological infestation must be marked as per DIN EN 15228:2009-08, Section 6.

When using scrap timber for exterior wall structural elements, the requirements of the Waste Wood Ordinance must be met.

5.3 Seals for external walls

There are no Technical Building Regulations or technical best practice for assessing the impact on soil and water of curtain injections as subsequent waterproofing for buildings. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

5.4 Fire protection products for improving the fire resistance of structural elements

Reactive fire protection coatings, fire-protection plaster cladding and line-shaped joint sealing shall comply with the requirements of Section 2 concerning the content of hazardous substances. Hazardous substances contained in the product must be declared.

6 Requirements for surface coverings outdoors

No proof is required in respect of the release of hazardous substances for small-scale structural elements such as fastenings.

6.1 structural elements for outdoor surface coverings made of concrete

Concrete source materials used in floorings or staircase coverings must meet the requirements set out in the following Sections.

In the case of the exclusive use of natural rock granules, no evidence of the substance content and the release of dangerous substances shall be provided.

Construction products manufactured using display glass may not be used.

6.1.1 Recycled granules of rock

Concrete surfaces manufactured using recycled aggregates may only be installed if the recycled aggregates meet the following requirements:

* Only waste generated during construction activities (e.g. dismantling, demolition, conversion, expansion, new construction and maintenance of buildings and civil engineering, roads, paths, aerodromes and other traffic areas) may be used for the production of recycled rock granulation and were previously used as natural or artificial mineral building materials in bound or unbound form in civil engineering. The waste must correspond to the waste types mentioned in Table A‑1 (Annex A). Before rebuilding, dismantling or demolishing a building, it shall first be determined by viewing and analysing existing documents whether a pollutant load of the resulting material is to be expected. If a pollutant load could exist beyond the scope of parameters listed in Table A‑ 2 (Annex A), the material shall be assessed separately under waste legislation. Contaminated building materials and structural elements must be separated during the dismantling of a building and sent to an orderly disposal. This applies in particular to fire debris, structural elements with insulation and paints based on pitch, interior walls of industrial chimneys, substances containing asbestos and PCBs, parts of buildings contaminated with pollutants from gas works, filling stations, electroplating plants and chemical industry production facilities.
* Eluate concentrations under DIN EN 12457‑4:2003-01 in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* Concentrations of solid matter in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* For concrete as per DIN 1045‑2:2008-08, the material composition of the recycled aggregates must correspond to the delivery types under DAfStb‑ Guideline ‘Concrete pursuant to DIN EN 206‑1 and DIN 1045‑2 with recycled aggregates pursuant to DIN EN 12620:2010-09’.

If reject batches from prefabricated concrete structural elements (including concrete residue in ready-mixed concrete construction) are used directly as recycled aggregates in the production plant, no proof is required regarding the substance content and the release of hazardous substances.

6.1.2 Industrially manufactured aggregates

Concrete surface coverings manufactured using industrially manufactured aggregates may only be installed if the industrially manufactured aggregates meet the following requirements:

* Eluate concentrations under DIN EN 12457‑4:2003-01 in industrially manufactured aggregates must comply with the upper limits according to Table A‑3 (Annex A).
* The material content in the solid of the industrially produced grain shall comply with the upper limits set out in Table A‑3 (Annex A).

In the use of crystalline blast furnace slag, metallurgical sand, melt chamber granules, expanded mica (vermiculite), expanded perlite, wind shale, expanded clay and brick sprit from unused bricks as rock grain (or rock flour) in concrete, no evidence of the substance contents and the release of dangerous substances shall be provided. For the use of sintered coal fly ash and boiler ash (boiler sand) as a rock grain (or rock meal) in concrete, no evidence of the substance content and release of hazardous substances shall be provided if the sintered coal fly ash and the boiler ash originate from such thermal power plants where only coal and no secondary fuels, excluding biomass in a proportion of up to 14 M.-% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) with a proportion of up to 5 M.-% (dry mass) based on dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

Industrially manufactured aggregates that are not listed in the above paragraph or in Table A‑3 may not be used in concrete.

6.1.3 Fly ashes

Concrete surface coverings manufactured using silicon-rich fly ash (generally hard coal fly ash) may only be installed if the silicon-rich fly ash meets the following requirements:

* Concentrations of solid matter in silicon-rich fly ash must comply with the upper limits of Table A‑4 (Annex A).

In the case of the use of silicon-rich fly ash in concrete, no evidence of substance content and release of hazardous substances shall be provided if the ash comes from such thermal power plants where only coal and no secondary fuels, with the exception of biomass in a proportion of up to 14 M.‑% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) are used in a proportion of up to 5 M.‑% (dry mass) in relation to dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

For calcium-rich fly ash (generally lignite fly ash) for concrete surfaces, there are no Technical Building Regulations or generally recognised rules of technical construction according to which their effects on soil and water can be assessed. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

6.2 Floor coverings of wooden structural elements

Note:

Timber structural elements treated with wood preservative may only be used as surface coverings (including windows) if the wood preservative (biocide products) meet the requirements of the Biocide‑Regulation (EU) No 528/2012. When using biocide products, the constraints listed in the approval under the Biocide Ordinance pursuant to Article 22(1) of the Biocide‑ Ordinance and/or nationally applicable transitional provisions pursuant to the Ordinance on the reporting of biocidal‑ products pursuant to the Chemicals Act (Biocide‑ Reporting Ordinance [ChemBiozidMeldeV]) must be met. Timber structural elements treated with protective agents to guard against biological infestation must be marked as per DIN EN 15228:2009‑08, Section 6.

When using waste wood for surface coverings, the requirements of the Waste Timber Regulation must be complied with.

6.3 Surface coverings handling wastewater

There are no Technical Building Regulations or technical best practices for assessing the impact on soil and water of water-permeable coverings for motor vehicle‑ traffic areas used for treating wastewater for subsequent percolation. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

7 Requirements for foundations including piles

7.1 General information

No recycled or industrially produced grains of rock shall be used in injections and pressing materials used for foundations and piles directly in groundwater.

7.2 Injection and pressing materials for foundations including piles

7.2.1 Fly ash

Foundations including piles made of binder suspension, grout (cement mortar) or concrete manufactured using silicon-rich fly ash (generally hard coal fly ash) may only be installed if the silicon-rich fly ash meets the following requirements:

* Concentrations of solid matter in silicon-rich fly ash must comply with the upper limits given in Table A‑4 (Annex A).
* The concentrations in eluate in accordance with DIN CEN/TS 16637‑ 2:2014-11 (for mortar or hardened concrete specimens of a model concrete) shall comply with the limits set out in Table A‑ 5 (Annex A).

Proof that the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 of mortar or concrete (based on a model formulation) manufactured using silicon-rich fly ash comply with the upper limits according to Table A‑5 (Annex A) is not required if construction measures are used to prevent direct contact with soil and/or groundwater.

In the case of the use of silicon-rich fly ash in concrete or mortar, no evidence of the substance content and release of hazardous substances shall be provided if the ash originates from thermal power plants in which only coal and no secondary fuels, excluding biomass in a proportion of up to 14 M.‑% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) are used in a proportion of up to 5 M.-% (dry mass) in relation to dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

For calcium-rich fly ash (generally lignite fly ash) for foundations including piles made of binder suspensions, grout (cement mortar) or concrete, there are no Technical Building Regulations or generally recognised rules of technical construction according to which their effects on soil and water can be assessed. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

**7.3 Foundations of concrete**

Concrete feedstocks used in foundations having contact with groundwater or soil shall comply with the requirements set out in the following Sections.

In the case of the exclusive use of natural rock granules, no evidence of the substance content and the release of dangerous substances shall be provided.

7.3.1 Recycled granules of rock

Concrete foundations manufactured using recycled aggregates may only be installed if the recycled aggregates meet the following requirements:

* Only waste generated during construction activities (e.g. dismantling, demolition, conversion, expansion, new construction and maintenance of buildings and civil engineering, roads, paths, aerodromes and other traffic areas) may be used for the production of recycled rock granulation and were previously used as natural or artificial mineral building materials in bound or unbound form in civil engineering. The waste must correspond to the waste types mentioned in Table A‑1 (Annex A). Before rebuilding, dismantling or demolishing a building, it shall first be determined by viewing and analysing existing documents whether a pollutant load of the resulting material is to be expected. If a pollutant load could exist beyond the scope of parameters listed in Table A‑ 2 (Annex A), the material shall be assessed separately under waste legislation. Contaminated building materials and structural elements must be separated during the dismantling of a building and sent to an orderly disposal. This applies in particular to fire debris, structural elements with insulation and paints based on pitch, interior walls of industrial chimneys, substances containing asbestos and PCBs‑, parts of buildings contaminated with pollutants from gas works, filling stations, electroplating plants and chemical industry production facilities.
* Eluate concentrations under DIN EN 12457‑4:2003-01 in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* Concentrations of solid matter in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* For concrete as per DIN 1045‑2:2008-08, the material composition of the recycled aggregates must correspond to the delivery types under DAfStb‑ Guideline ‘Concrete pursuant to DIN EN 206‑1 and DIN 1045‑2 with recycled aggregates pursuant to DIN EN 12620:2010-09’.

If reject batches from prefabricated concrete structural elements (including concrete residue in ready-mixed concrete construction) are used directly as recycled aggregates in the production plant, no proof is required regarding the substance content and the release of hazardous substances.

7.3.2 Industrially manufactured aggregates

Concrete foundations manufactured using industrially manufactured aggregates may only be installed if the industrially manufactured aggregates meet the following requirements:

* Eluate concentrations under DIN EN 12457‑4:2003-01 in industrially manufactured aggregates must comply with the upper limits according to Table A‑3 (Annex A).
* The material content in the solid of the industrially produced grain shall comply with the upper limits set out in Table A‑3 (Annex A).
* The concentrations of substances in the eluate in accordance with DIN CEN/TS 16637‑ 2:2014-11 (for hardened concrete test specimens of a model concrete) shall comply with the limits set out in Table A‑ 6(Annex A) or, for boiler sand, the upper limits of Table A‑ 5 (Annex A).

Proof that the concentrations of substances in the eluate in accordance with DIN CEN/TS 16637‑ 2:2014-11 comply with the limits set out in Table A‑ 5 or Table A‑ 6 (Annex A) shall be omitted if direct contact with soil or groundwater is excluded by constructive measures.

In the use of crystalline blast furnace slag, metallurgical sand, melt chamber granules, expanded mica (vermiculite), expanded perlite, wind shale, expanded clay and brick sprit from unused bricks as rock grain (or rock flour) in concrete, no evidence of the substance contents and the release of dangerous substances shall be provided. For the use of sintered coal fly ash and boiler ash (boiler sand) as a rock grain (or rock meal) in concrete, no evidence of the substance content and release of hazardous substances shall be provided if the sintered coal fly ash and the boiler ash originate from thermal power plants in which only coal and no secondary fuels (except biomass in a proportion of up to 14 M.-% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) with a proportion of up to 5 M.-% (dry mass), based on dry coal, are co-burned, biomass is understood as vegetable material. Waste wood or secondary material are not allowed.

Industrially manufactured aggregates that are not listed in the above paragraph or in Table A‑3 may not be used in concrete.

7.3.3 Fly ashes

Concrete foundations manufactured using silicon-rich fly ash (generally hard coal fly ash) may only be installed if the fly ash meets the following requirements:

* Concentrations of solid matter in silicon-rich fly ash must comply with the upper limits given in Table A‑4 (Annex A).
* The eluate concentrations pursuant to DIN CEN/TS 16637‑2:2014-11 (for hardened concrete test specimens of a model concrete) must comply with the upper limits according to Table A‑5 (Annex A).

Proof that the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 comply with the upper limits given in Table A‑5 (Annex A) is not required if construction measures are used to prevent direct contact with soil or groundwater.

In the case of the use of silicon-rich fly ash in concrete, no evidence of the substance content and release of hazardous substances shall be provided if the ash originates from thermal power plants in which only coal and no secondary fuels, except biomass in a fraction of 14 M.‑% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) are used in a proportion of up to 5 M.‑% (dry mass) based on dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

For calcium-rich fly ash (generally lignite fly ash) for concrete foundations, there are no Technical Building Regulations or generally recognised rules of technical construction according to which their effects on soil and water can be assessed. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

7.3.4 Sulphate hut cement and calcium aluminate sulfate cement

Concrete foundations manufactured using supersulphated cement or calcium aluminate sulphate cement may only be installed if the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 (for hardened concrete test specimens of a model concrete) comply with the upper limits according to Table A‑6 (Annex A).

Proof that the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 comply with the upper limits given in Table A‑6 (Annex A) is not required if construction measures are used to prevent direct contact with soil or groundwater.

7.3.5 Concrete admixtures

Concrete admixtures used for concrete foundations and for which there are no Technical Building Regulations or technical best practice are of significance for complying with the requirements of § 3 MBO1, as well as in terms of their impact on soil and water.

**7.4 Seals for foundations**

There are no Technical Building Regulations or technical best practice for assessing the impact on soil and water of curtain injections as subsequent waterproofing for buildings. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

8 Requirements for steel seals for the production of construction pits

8.1 General information

No recycled or industrially manufactured aggregates may be used in injection materials made of binder suspension or grout (cement mortar) installed directly in groundwater.

8.2 Injection and pressing materials for seals made of binder suspensions or press-in mortars

8.2.1 Fly ash for cement-bound sole seals

Injection materials made of binder suspension or grout (cement mortar) manufactured using silicon-rich fly ash (generally hard coal fly ash) may only be installed if the silicon-rich fly ash meets the following requirements:

* Concentrations of solid matter in silicon-rich fly ash must comply with the upper limits of Table A‑4 (Annex A).
* The eluate concentrations pursuant to DIN CEN/TS 16637‑2:2014-11 (on mortar or concrete test samples from a sample mortar or concrete) must comply with the upper limits according to Table A‑5 (Annex A).

In the case of the use of silicon-rich fly ash in concrete or mortar, no evidence of the substance content and release of hazardous substances shall be provided if the ash originates from thermal power plants in which only coal and no secondary fuels, excluding biomass in a proportion of up to 14 M.‑% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) are used in a proportion of up to 5 M.-% (dry mass) in relation to dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

For calcium-rich fly ash (generally lignite fly ash) for injection materials made of binder suspensions or press-in mortars (cement mortar), there are no Technical Building Regulations or generally recognised rules of technical construction according to which their effects on soil and water can be assessed. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

8.3 Injection and pressing materials for silicate-based sole sealing

There are no Technical Building Regulations or technical best practice for assessing the impact on soil and water of injection and pressing materials for silicon-based sealing bases. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

9 Requirements for backfill

9.1 Foam glass chippers as fillings under foundation plates

Backfill made of foam glass gravel may be installed under foundation slabs if the foam glass gravel meets the following requirements, and the backfill is installed above the saturated soil zone and above the groundwater capillary fringe (generally 30 cm above the highest measured groundwater level):

* Eluate concentrations as per DIN EN 12457‑4:2003-01 in the glass powder manufactured from foam glass gravel must comply with the upper limits according to Table A‑7 (Annex A).
* The content of the material in the solid of glass flour from which foam glass chips are produced shall comply with the upper limits set out in Table A‑7 (Annex A).

Construction products manufactured using display glass may not be used.

9.2 Filter materials for the treatment of precipitation wastewater to be leaked

For filter materials flowing through by precipitation water, there are no Technical Building Regulations or generally accepted technical rules according to which their effects on soil and water can be assessed. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

10 Requirements for underground containers and pipes

10.1 Underground concrete containers and pipes

Concrete exit materials used in underground containers and pipes having contact with groundwater or soil shall comply with the requirements set out in the following Sections.

In the case of the exclusive use of natural rock granules, no evidence of the substance content and the release of dangerous substances shall be provided.

Construction products manufactured using display glass may not be used.

10.1.1 Recycled granules of rock

Underground containers and pipes manufactured using recycled aggregates may only be installed if the recycled aggregates meet the following requirements:

* Only waste generated during construction activities (e.g. dismantling, demolition, conversion, expansion, new construction and maintenance of buildings and civil engineering, roads, paths, aerodromes and other traffic areas) may be used for the production of recycled rock granulation and were previously used as natural or artificial mineral building materials in bound or unbound form in civil engineering. The waste must correspond to the waste types mentioned in Table A‑1 (Annex A). Before rebuilding, dismantling or demolishing a building, it shall first be determined by viewing and analysing existing documents whether a pollutant load of the resulting material is to be expected. If a pollutant load could exist beyond the scope of parameters listed in Table A‑ 2 (Annex A), the material shall be assessed separately under waste legislation. Contaminated building materials and structural elements must be separated during the dismantling of a building and sent to an orderly disposal. This applies in particular to fire debris, structural elements with insulation and paints based on pitch, interior walls of industrial chimneys, substances containing asbestos and PCBs, parts of buildings contaminated with pollutants from gas works, filling stations, electroplating plants and chemical industry production facilities.
* Eluate concentrations under DIN EN 12457‑4:2003-01 in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* Concentrations of solid matter in recycled aggregates must comply with the upper limits according to Table A‑2 (Annex A).
* For concrete as per DIN 1045‑2:2008-08, the material composition of the recycled aggregates must correspond to the delivery types under DAfStb‑ Guideline ‘Concrete pursuant to DIN EN 206‑1 and DIN 1045‑2 with recycled aggregates pursuant to DIN EN 12620:2010-09’.

If reject batches from prefabricated concrete structural elements (including concrete residue in ready-mixed concrete construction) are used directly as recycled aggregates in the production plant, no proof is required regarding the substance content and the release of hazardous substances.

10.1.2 Industrially manufactured aggregates

Underground containers and pipes manufactured using industrially manufactured aggregates may only be installed if the industrially manufactured aggregates meet the following requirements:

* Eluate concentrations under DIN EN 12457‑4:2003-01 in industrially manufactured aggregates must comply with the upper limits according to Table A‑3 (Annex A).
* Concentrations of solid matter in industrially manufactured aggregates must comply with the upper limits given in Table A‑3 (Annex A).

The following applies to structural elements for underground concrete containers and pipes in contact with groundwater:

* The substance concentrations in the eluate in accordance with DIN CEN/TS 16637‑ 2:2014-11 (for hardened concrete test specimens of a model concrete) shall comply with the upper limits set out in Table A‑ 6 (Annex A) or, for boiler ash, the upper limit set out in Table A‑ 5 (Annex A).

Proof that the concentrations of substances in the eluate in accordance with DIN CEN/TS 16637‑ 2:2014-11 comply with the limits set out in Table A‑ 5 or Table A‑ 6 (Annex A) shall be omitted if direct contact with groundwater is excluded by constructive measures.

In the use of crystalline blast furnace slag, metallurgical sand, melt chamber granules, expanded mica (vermiculite), expanded perlite, wind shale, expanded clay and brick sprit from unused bricks as rock grain (or rock flour) in concrete, no evidence of the substance contents and the release of dangerous substances shall be provided. For the use of sintered coal fly ash and boiler ash (boiler sand) as a rock grain (or rock meal) in concrete, no evidence of the substance content and release of hazardous substances shall be provided if the sintered coal fly ash and the boiler ash originate from such thermal power plants where only coal and no secondary fuels, excluding biomass in a proportion of up to 14 M.-% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) with a proportion of up to 5 M.-% (dry mass) based on dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

Industrially manufactured aggregates that are not listed in the above paragraph or in Table A‑3 may not be used in concrete.

10.1.3 Fly ashes

Underground containers and concrete pipes produced using silicon-rich fly ash (typically hard coal ash) shall not be installed unless the silicon-rich fly ash complies with the following requirements:

* Concentrations of solid matter in silicon-rich fly ash must comply with the upper limits of Table A‑4 (Annex A).

The following applies to structural elements for underground concrete containers and pipes in contact with groundwater:

* The concentrations in the eluate in accordance with DIN CEN/TS 16637‑ 2:2014-11 of solid concrete (for hardened concrete test specimens of a model concrete) produced using silicon-rich fly ash shall comply with the limits set out in Table A‑ 5 (Annex A).

Proof that the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 comply with the upper limits given in Table A‑5 (Annex A) is not required if construction measures are used to prevent direct contact with groundwater.

In the case of the use of silicon-rich fly ash in concrete, no evidence of substance content and release of hazardous substances shall be provided if the ash originates from thermal power plants in which only coal and no secondary fuels, except biomass in a proportion of up to 14 M.‑% (dry mass), of virtually ash-free natural gas and municipal sewage sludge (waste key 19 08 05 according to AVV7) are used in a proportion of up to 5 M.-% (dry mass) based on dry coal. Biomass is understood as plant material. Waste wood or secondary material are not allowed.

For calcium-rich fly ash (generally lignite fly ash) for underground tanks and pipes, there are no Technical Building Regulations or generally recognised rules of technical construction according to which their effects on soil and water can be assessed. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

10.1.4 Sulphate hut cement and calcium aluminate sulfate cement

Underground containers and pipes made of concrete produced using supersulphated cement and calcium aluminate sulphate cement may only be installed in contact with soil or groundwater if the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 for hardened concrete (based on model concrete specimens) manufactured using supersulphated cement or calcium aluminate sulphate cement comply with the upper limits according to Table A‑6 (Annex A).

Proof that the eluate concentrations as per DIN CEN/TS 16637‑2:2014-11 comply with the upper limits given in Table A‑6 (Annex A) is not required if construction measures are used to prevent direct contact with soil or groundwater.

10.1.5 Concrete admixtures

Concrete admixtures used in concrete underground containers and pipes in contact with soil or groundwater and for which there are no Technical Building Regulations or technical best practice are of significance for complying with the requirements of § 3 MBO1, as well as in terms of their impact on soil and water.

10.2 Sewer rehabilitation products

For sewer rehabilitation there are no Technical Building Regulations or generally accepted rules of technology according to which their effects on soil and water can be assessed. However, they are of significance when it comes to complying with the requirements of § 3 MBO1, as well as in terms of their effects on soil and water.

Annex A – Maximums

Table A-1: Permitted source materials in a rubble waste treatment facility for manufacturing recycled aggregates

|  |  |
| --- | --- |
| 1 | Concrete (waste code 17 01 01 as per the EWC Ordinance\*) |
| 2 | Bricks (waste code 17 01 02 as per the EWC Ordinance\*) |
| 3 | Tiles, bricks, ceramic (waste code 17 01 03 as per the EWC Ordinance\*) |
| 4 | Mixtures of concrete, tiles, bricks and ceramic that do not contain any hazardous substances (waste code 17 01 07 as per the EWC Ordinance\*) |
| 5 | Bitumen mixes except for those under 17 03 01 (waste code 17 03 02 as per the EWC Ordinance\*) (here: Asphalt, tar-free) |
| 6 | Concrete waste but without concrete sludge (waste code 10 13 14 as per the EWC Ordinance\*) |
| 7 | Soil and stones that do not contain dangerous substances (Waste code 17 05 04 according to AVV\*) |
| 8 | Track cotter which does not contain dangerous substances (waste key 17 05 08 according to AVV\*) |
| \* Ordinance on the European Waste Catalogue (EWC Ordinance) of 10 December 2001, as amended. | |

Table A-2: Upper limits for eluate concentrations and solids content in recycled aggregates

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Parameter** | **Dimension** | **Upper limit** |
| **Eluate concentration** | Arsenic (As) | µg/l | 50 |
| Lead (Pb) | µg/l | 100 |
| Cadmium (Cd) | µg/l | 5 |
| Chromium, total (Cr) | µg/l | 100 |
| Copper (Cu) | µg/l | 200 |
| Nickel (Ni) | µg/l | 100 |
| Mercury (Hg) | µg/l | 2 |
| Zinc (Zn) | µg/l | 400 |
| Chloride (Cl-) | mg/l | 150 |
| Sulphate (SO42-) | mg/l | 600 |
| Phenol index | µg/l | 100 |
| Atrazine\* | µg/l | 0.1 |
| Bromacil\* | µg/l | 0.1 |
| Diuron\* | µg/l | 0.1 |
| Glyphosate\* | µg/l | 0.1 |
| AMPA\* | µg/l | 0.1 |
| Simazine\* | µg/l | 0.1 |
| Dimefurone\* | µg/l | 0.1 |
| Flazasulfuron\* | µg/l | 0.1 |
| Flumioxazine\* | µg/l | 0.1 |
| Ethidimuron\* | µg/l | 0.1 |
| Thiazafluron\* | µg/l | 0.1 |
| newly authorised active substances\* | µg/l | 0.1 |
| pH value pH value\* | - | 7.0-12\*\* 6.5-10\*\* |
| Conductivity Conductivity\* | µS/cm | 3 000\*\* 500\*\* |
| **Solids content** | Hydrocarbons | [mg/kg] | 1 000\*\*\* |
| PAH16 | [mg/kg] | 25 |
| PCB6 | [mg/kg] | 1 |
| \* is only required for track gates. The investigation can be waived if the manufacturer has evidence from Deutsche Bahn AG that no herbicides are used on the respective section of the line.  \*\* Exceedances are not a criterion for exclusion if the concrete proportion in the material being investigated is at least 60% by mass‑.  \*\*\* Exceedances that are attributable to asphalt proportions are not a criterion for exclusion. | | | |

Table A-3: Upper limits for eluate concentrations and solids content in industrially manufactured aggregates

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Parameter** | **Dimension** | **Steelworks slag (SWS)** | **Bottom ash from coal-fired power plants with co-combustion\*** | **Slag from copper production (CUS/CUG)** | **Foundry sand (foundry sand residuals, GRS)** | **Aggregate from broken glass scrap** |
| **Eluate concentration** | Arsenic (As) | µg/l |  |  |  | 60 | 60 |
| Lead (Pb) | µg/l |  |  | 100 | 200 | 200 |
| Cadmium (Cd) | µg/l |  |  |  | 10 | 6 |
| Chromium, total (Cr) | µg/l | 100 |  |  | 150 | 60 |
| Copper (Cu) | µg/l |  |  | 100 | 300 | 100 |
| Nickel (Ni) | µg/l |  |  |  | 150 | 70 |
| Mercury (Hg) | µg/l |  |  |  |  | 2 |
| Vanadium | µg/l | 250 |  |  |  |  |
| Zinc (Zn) | µg/l |  |  | 200 | 600 | 600 |
| Chloride (Cl-) | mg/l |  |  |  |  |  |
| Sulphate (SO42-) | mg/l |  |  |  |  |  |
| Fluoride | mg/l | 5 |  |  | 1 |  |
| Phenol index | µg/l |  |  |  | 100 |  |
| DOC | µg/l |  |  |  | 20 000 |  |
| pH value\*\* | - | 10-13 |  | 6.0-10 | 5.5-12 | 5.5-12 |
| Conductivity\*\* | µS/cm | 1 500 |  | 700 | 1 000 | 2 000 |
| **Solid content** | Arsenic | [mg/kg] | 150 | 150 | 150 | 150 | 150 |
| Lead | [mg/kg] | 700 | 700 | 700 | 700 | 700 |
| Cadmium\* | [mg/kg] | 10 | 10 | 10 | 10 | 10 |
| Chromium, total | [mg/kg] | 600 | 600 | 600 | 600 | 600 |
| Copper | [mg/kg] | 400 | 400 | 400 | 400 | 400 |
| Nickel | [mg/kg] | 500 | 500 | 500 | 500 | 500 |
| Thallium | [mg/kg] | 7 | 7 | 7 | 7 | 7 |
| Vanadium | [mg/kg] |  | 1 500 |  |  |  |
| Mercury | [mg/kg] | 5 | 5 | 5 | 5 | 5 |
| Zinc | [mg/kg] | 1 500 | 1 500 | 1 500 | 1 500 | 1 500 |
| EOX | [mg/kg] |  |  |  | 10\*\*\* |  |
| BTX | [mg/kg] |  |  |  | 1 |  |
| LHKW | [mg/kg] |  |  |  | 1 |  |
| Benzo(a)pyrene | [mg/kg] |  |  |  | 3 |  |
| Hydrocarbons | [mg/kg] |  |  |  | 1 000 |  |
| PAH16 | [mg/kg] |  | 30 |  | 20 |  |
| PCB6 | [mg/kg] |  | 0.5 |  |  |  |
| PCDD/PCDF | ng TEQ/kg\*\*\*\* |  | 100 |  |  |  |
|
| \* Only petroleum co-fuels or municipal sewage sludge (with waste key 19 08 05 in accordance with the Regulation on the European Waste List) may be used.  \*\* The pH value and conductivity data are orientation values. In case of deviations from the material-specific reference value, the cause shall be checked.  \*\*\* Subjected to the existence of a European test standard.  \*\*\*\* TEQ = WHO-TEF toxicity equivalent. | | | | | | | | |

Table A-4: Upper limits for the solids content of silicon-rich fly ash for use in concrete

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Parameter** | **Dimension** | **Upper limit** |
| **Solid content** | Arsenic (As) | [mg/kg] | 150 |
| Lead (Pb) | [mg/kg] | 700 |
| Cadmium (Cd) | [mg/kg] | 10 |
| Chromium, total (Cr) | [mg/kg] | 600 |
| Copper (Cu) | [mg/kg] | 400 |
| Nickel (Ni) | [mg/kg] | 500 |
| Mercury | [mg/kg] | 5 |
| Thallium (Tl) | [mg/kg] | 7 |
| Vanadium (V) | [mg/kg] | 1 500 |
| Zinc (Zn) | [mg/kg] | 1 500 |
| PAH16 | [mg/kg] | 30 |
| PCB6 | [mg/kg] | 0.5 |
| PCDD/PCDF | ng TEQ/kg\* | 100 |
| \* TEQ = WHO-TEF toxicity equivalent. | | | |

Table A-5: Upper limits for the release of substances in the eluate of hardened concrete (model concrete) using silicon-rich fly ash or boiler sand

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Dimension** | **Upper limit** |
| Barium (Ba) | mg/m² | 375 |
| Lead (Pb) | mg/m² | 7.7 |
| Chromium VI (Cr) | mg/m² | 6.6 |
| Chromium, total (Cr) | mg/m² | 7.7 |
| Cyanide | mg/m² | 5.5 |
| Mercury (Hg) | mg/m² | 0.22 |
| Selenium | mg/m² | 7.7 |
| Thallium (Tl) | mg/m² | 0.88 |
| Vanadium (V) | mg/m² | 4.4\* |
| Zinc (Zn) | mg/m² | 63.9 |
| \* Currently suspended | | |

Table A-6: Upper limits for the release of substances in the eluate of hardened concrete (model concrete) using sulphate metallurgy cement, calcium aluminate sulphate cement or other industrially produced rock grains (excluding boiler sand)

| **Parameter** | **Dimension** | **Upper limit** |
| --- | --- | --- |
| Antimony (Sb) | mg/m² | 5.5 |
| Arsenic (As) | mg/m² | 11 |
| Barium (Ba) | mg/m² | 375 |
| Lead (Pb) | mg/m² | 7.7 |
| Cadmium (Cd) | mg/m² | 0.56 |
| Chromium VI (Cr) | mg/m² | 6.6 |
| Chromium, total (Cr) | mg/m² | 7.7 |
| Cyanide | mg/m² | 5.5 |
| Cobalt (Co) | mg/m² | 8.8 |
| Copper (Cu) | mg/m² | 15.4 |
| Molybdenum (Mo) | mg/m² | 38.6 |
| Nickel (Ni) | mg/m² | 15.4 |
| Mercury (Hg) | mg/m² | 0.22 |
| Selenium | mg/m² | 7.7 |
| Thallium (Tl) | mg/m² | 0.88 |
| Vanadium (V) | mg/m² | 4.4\* |
| Zinc (Zn) | mg/m² | 63.9 |
| Chloride (Cl-) | mg/m² | 27 5000 |
| Fluoride (F-) | mg/m² | 826 |
| Sulphate (SO42-) | mg/m² | 264 500 |
| \* Currently suspended | | |

Table A-7: Upper limits for eluate concentrations and solids of glass powder, for the manufacture of foam glass chips for filling

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Parameter** | **Dimension** | **Upper limit** |
| **Eluate concentration** | Arsenic (As) | µg/l | 20 |
| Lead (Pb) | µg/l | 80 |
| Cadmium (Cd) | µg/l | 3 |
| Chromium, total (Cr) | µg/l | 25 |
| Copper (Cu) | µg/l | 60 |
| Nickel (Ni) | µg/l | 20 |
| Mercury (Hg) | µg/l | 1 |
| Zinc (Zn) | µg/l | 200 |
| **Solid content** | Arsenic (As) | [mg/kg] | 45 |
| Lead (Pb) | [mg/kg] | 210 |
| Cadmium (Cd) | [mg/kg] | 3 |
| Chromium, total (Cr) | [mg/kg] | 180 |
| Copper (Cu) | [mg/kg] | 120 |
| Nickel (Ni) | [mg/kg] | 150 |
| Mercury (Hg) | [mg/kg] | 1.5 |
| Zinc (Zn) | [mg/kg] | 450 |

## Annex 12

**Application rules for non-load-bearing permanent formwork kits/systems and formwork components for the construction of in-situ concrete walls**

Last updated: October 2021

**CONTENTS**

Foreword

A Special definitions

B Stability and fitness for purpose

C Fire protection

D Sound insulation

E Thermal insulation

References

Appendix 1 Demonstrating resistance to horizontal effects (*HEd*) at wall plane for lattice-type and column-type walls, excluding the effects of earthquakes.

Foreword

This Technical Rule applies to the use or application of construction products or construction kits regulated in the following technical specifications:

1. Non-load-bearing permanent formwork components as per ETA built on the basis of ETAG 009 [1],
2. Non-load-bearing permanent formwork components made of normal concrete and lightweight concrete as per EN 15435:2008[[60]](#footnote-60) [2],
3. Non-load-bearing permanent formwork components of made of wood-chip concrete as per EN 15498:2008[[61]](#footnote-61) [3].

The above-mentioned construction products or construction kits must be formed jointly so that they form a non-load-bearing permanent formwork system to enable the construction of in-situ concrete walls. The formwork components or formwork kits/systems as per I), II), and III) – hereinafter referred to as formwork components – remain part of the wall after the concrete core is concreted.

A Special definitions

**Geometrical formation of load-bearing concrete core:**

The geometric formation of the load-bearing concrete core is defined by the (non-load-bearing) formwork components and their arrangement. The concrete structure may be reinforced.

The concrete core thickness is defined as the smallest thickness above wall height of the geometric formation of the load-bearing concrete core.

Types depending on the geometrical formation of the concrete core:

**1. Disc-like type**

The load-bearing core concrete of the disc-like type is a concrete wall that is only interrupted in individual places by spacers. The spacers are generally regularly arranged. Total spacer cross-sectional areas must be no more than 1 % of the wall area.

**2. Lattice type**

The load-bearing core concrete of the lattice type consists of concrete supports, which are connected by horizontal concrete bars. The supports and bars occur due to the concreting in of the cavities in the formwork components. Vertical supports run over the entire height of the wall, withoutinterruptions or reduction in the cross-sectional area.

**3. Column type**

The load-bearing core concrete of the column type consists of regularly arranged concrete supports without horizontal concrete bars or with concrete bars that have no mathematically load-bearing connection to the concrete supports. The supports occur due to the concreting in of the cavities in the formwork components. Vertical supports run over the entire height of the wall, without interruptions or reduction in the cross-sectional area.

**4. Other types**

All types that are not defined above.

B Stability and fitness for purpose

B1 Design, construction, and execution

The design, construction, and execution of in-situ concrete walls with permanent formwork systems as per the above-mentioned technical specifications in line with A 1.2.3.1 of MVV TB.

Formwork components must be laid dry.

Exterior walls built with formwork components must be protected against environmental impact by plaster or cladding.

To ensure that the reinforcing steel bars are connected, the formwork components may not be taken into account with the concrete surfacing.

For formwork kits/systems according to ETA based on ETAG 009 [1], the statements regarding the resistance to formwork pressure and/or the statements regarding the maximum permissible filling height shall be taken from the ETA. For formwork components as per EN 15435:200811 [2] and/or EN 15498:20082 [3], the resistance to formwork pressure (characteristic tensile strength of studs, characteristic bending tensile strength of walls) must be taken from the declaration of performance or the accompanying documents.

Where no maximum permitted fill level is specified, suitable static systems must be chosen to realistically determine the formwork load with the estimated loads due to fresh concrete pressure from DIN 18218:2010-01 [4]; Chapter B 2 of this Technical Rule must be observed. To prove resistance to formwork pressure, the rated values for the resistances (e.g. breaking stress of studs, bending tensile strength of walls, tearing strength of the stud from the wall, where appropriate) should be compared to the rated values for the stresses. The partial safety coefficients shall be determined in accordance with DIN EN 1990:2010-12 [5] and DIN EN 1990/NA:2010-12 [6].

B1.1 With regard to the design and construction according to DIN EN 1992-1-1:2011-01 and DIN EN 1992‑1‑1/A1:2015-03 [7] in conjunction with DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992‑1‑1/NA/A1:2015-12 [8] the following shall also apply for an in-situ concrete wall made of formwork components of the grid type, column type or ‘other type’:

1. Only predominantly stationary effects are permitted. The design and construction of supporting structures in earthquake circumstances are not covered by this Technical Rule.

2. The thinness of the wall or the concrete core support may not exceed the value λ = 85.

3. Higher in-situ concrete strength classes than C30/37 or LC30/33 may not be taken into account in calculations.

B1.2 For proof of resistance to horizontal influences () in the wall plane for walls of the grid type and column type, the following also applies:

* The walls may be dimensioned in accordance with Annex 1 if the cross-section of the horizontal concrete bars between the vertical supports is at least 100 cm², the smallest thickness of which is at least three times the largest grain diameter and at least four such bars are placed per m wall height. If this condition is not met, the design models as per Annex 1 may not be used. In this case, static proof of resistance to horizontal effects at the wall plane must be provided as if they were adjacent supports. The definition of stud recesses can be found in ETA or EN 15435:20081, Section 3.1.10 [2] and EN 15498:20082, Figure 3.b [3].
* For loadbearing partitions of grid and column types, the length of the cross-section, in any direction, of the uninterrupted pillars shall be at least 120 mm over the entire wall height. This prohibits formwork components which do not fulfil this condition in their final state from being used for loadbearing partitions.
* The stability of non-loadbearing partitions with dimensions smaller than 120 mm in the direction of a cross-section must be demonstrated as per DIN 4103-1:2015-06 [9].
* Annex 1 of this Technical Rule applies to the design of grid-type walls at wall plane under shear loading.
* In case of stresses perpendicular to the plane of the wall, a wall of the grid or column type must always be two-sided, i.e. such walls may normally be used only in structures where the ceilings have a disk-like effect.
* The following reinforcements may be placed:
  + no more than two bars in each concrete bar for grid type systems
  + in each support of the grid type or column type systems, one vertical bar or a set of vertical bars combined into a mesh for each side of the concrete cross-section, or a reinforcement basket for the entire concrete cross-Section.
* For planning and execution, the following applies:
  + The horizontal dimension of the vertical reinforcement meshes and cages, including spacers, shall be less than the corresponding minimum dimensions of the concrete core.
* For concrete coverings, DIN EN 1992-1-1:2011-01 and DIN EN 1992-1-1/A1:2015-03 [7] in conjunction with DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992-1-1/NA/A1:2015-12 [8] apply.
* The provisions of DIN EN 1992-1-1:2011-01 and DIN EN 1992-1-1/A1:2015-03 [7] in conjunction with DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992‑1‑1/NA/A1:2015-12 [8] apply to the distance between the rebars.
* If more than one concrete bar is placed on one side of the concrete cross-section of the supports, they shall be joined to a mesh (e.g. by welded or bonded crossbars).
* Vertical reinforcement may only be calculated statically if it complies with the corresponding reinforcement and design rules for normal force and/or bend-stressed beams or supports according to DIN EN 1992 1 1:2011-01 and DIN EN 1992-1-1/A1:2015-03 [7] in conjunction with DIN EN 1992‑1‑1/NA:2013‑04 and DIN EN 1992-1-1/NA/A1:2015-12 [8].

B2 In addition to DIN EN 1992-1-1:2011-01 and DIN EN 1992-1-1/A1:2015-03 [7] in conjunction with DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992-1-1/NA/A1:2015-12 [8], the following applies:

1. The minimum flow class to be maintained and the maximum aggregate grain size for the fresh concrete used must correspond to the information in the following Table 1 for all systems (including ‘disc-type’ systems.

Table 1:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Minimum size of the filling range** | **Largest grain of the aggregate** | **Flow class** |
| **1** | **2** | **3** |
| 1 | < 120 mm | ≤ 16 mm | F5 |
| 2 | 120 to 140 mm | ≤ 16 mm | ≥ F3 |
| 3 | ≥ 140 mm | ≤ 32 mm | ≥ F2 |

The maximum flow class must not exceed F5.

Fresh concrete at the lower end of flow class F3 and below must be compacted by means of vibration.

Fresh concrete at the upper end of flow class F3 and above must be compacted by means of raking.

The strength development of fresh concrete must be ‘Medium’ to ‘Fast’ in accordance with DIN EN 206-1:2001-07, DIN EN 206‑1/A1:2004-10 and DIN EN 206-1/A2:2005-09 [10] in conjunction with DIN 1045‑2:2008-08 [11], Table 12.

2. Horizontal work joints shall preferably be arranged at the level of the storey ceilings. Where work stoppages cannot be avoided, vertical reinforcing steel bars (iron plugs) must be placed as follows in the construction joints:

* The iron plugs must be offset against each other and the distance between them must not be greater than 500 mm.
* The total cross-section must be at least 1/2000 of the cross-section area of the concrete core to be connected, but at least two reinforcing steel bars B500 Ø 8 mm (or equivalent) must be positioned per metre of wall length.
* The iron plugs must each reach at least 200 mm into the concrete layers to be connected.

3. The concrete may be allowed to fall freely up to a height of 2 m; beyond this the concrete must be held together by pouring pipes or concreting hoses with a maximum diameter of 100 mm and conducted to shortly before the installation site. Material cones should be avoided due to the short filling point intervals.

There must be enough space in the reinforcement for pouring pipes or concreting hoses. The DBV explanatory leaflet ‘Betonierbarkeit von Bauteilen aus Beton und Stahlbeton’ [Concreting capability of concrete and reinforced concrete structural elements] [12] – 01/2014 must be observed.

4. The walls may not deviate from the perpendicular by more than 5 mm per running metre of wall height – by more than 15 mm from wall heights of 3 m and up – and must comply with the evenness tolerance for wall surfaces under DIN 18202:2013-04, Table 3, row 6 [13].

C Fire protection

C1 Fire resistance

In the case of load-bearing wall constructions that are constructed using previously mentioned formwork components or formwork kits/systems, the fire resistance with regard to stability (load bearing criterion R) for the internal supporting concrete construction according to DIN EN 1992‑1‑2:2010‑12 [14] may be carried out taking into account DIN EN 1992-1-2/NA:2010-12 [15] if it is possible to demonstrate stability at normal temperatures on the basis of DIN EN 1992-1-1:2011-01 and DIN EN 1992‑1‑1/A1:2015‑03 [7] taking into account DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992‑1‑1/NA/A1:2015-12 [8]. The scope in which an assessment of the fire resistance is possible with regard to the space barrier and insulation (EI) or load capacity, space barrier and insulation (REI) depends on the corresponding boundary conditions of the verification procedure according to DIN EN 1992‑1‑2:2010‑12 [14] taking into account DIN EN 1992‑1‑2/NA:2010‑12 [15].

There is no universally applicable Technical Rule for test-specific proof.

C2 Fire performance

For non-load-bearing permanent formwork components made of expanded polystyrene (EPS) insulating material as per EN 13163:2012+A2:2016[[62]](#footnote-62) [16], the TR ‘WDVS with ETA as per ETAG 004’ [thermal insulation composite systems with ETA as per ETAG 004] (June 2016) Section 3.2[[63]](#footnote-63), shall apply analogously in respect of classification in terms of building inspection requirements according to DIN EN 13501‑1:2010-01 [17].

D Sound insulation

If formwork components are used in cases where sound insulation requirements apply, proof of sound insulation as per DIN 4109-1:2018-01 [18] and DIN 4109‑32:2016-07 [19] must be provided.

E Thermal insulation

The nominal value of the thermal resistance of the formwork block, as indicated in the above technical specifications in [1], [2] and [3], shall be converted into a rated value for proof of thermal insulation. The rated value is the nominal value divided by the safety factor = 1.2.

For formwork components, proof of thermal insulation may alternatively be provided using the thermal conductivity rated values for individual structural elements as per DIN 4108-4:2020-11 [20].

As integrated thermal insulation, these are thermal insulation inserts inside the formwork block, which are directly exposed to fresh concrete pressure, only insulating materials whose compressive stress at 10% compression is at least equal to the level ≥ 100 kPa [16] shall be used.

**References**

|  |  |  |  |
| --- | --- | --- | --- |
| [1] |  | ETAG 009:2002-06 | Non load-bearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and sometimes concrete. |
| [2] |  | DIN EN 15435:2008-10 | Precast concrete products - Normal weight and lightweight concrete shuttering blocks - Product properties and performance; German version EN 15435:2008. |
| [3] |  | DIN EN 15498:2008-08 | Precast concrete products - Wood-chip concrete shuttering blocks - Product properties and performance; German version EN 15498:2008. |
| [4] |  | DIN 18218:2010-01 | Pressure of fresh concrete on vertical formwork. |
| [5] |  | DIN EN 1990:2010-12 | Eurocode: Basis of structural design;  German version EN 1990:2002+A1:2005+A1:2005/AC:2010. |
| [6] |  | DIN EN 1990/NA:2010-12 | National Annex – Nationally determined parameters – Eurocode: Basis of structural design. |
| [7] |  | DIN EN 1992-1-1:2011-01  DIN EN 1992-1-1/A1:2015-03 | Eurocode 2: Design and construction of reinforced concrete and prestressed concrete supporting structures – Part 1-1: General rules - Rules for buildings, bridges and civil engineering structures;  German version EN 1992 1 1:2004 + AC:2010. |
| [8] |  | DIN EN 1992-1-1/NA  DIN EN 1992-1-1/NA/A1:2015-12 | National annex: 2013-04 - National Annex – Nationally Determined parameters – Eurocode 2: Design and construction of reinforced concrete and prestressed concrete supporting structures – Part 1-1: General rules and rules for buildings. |
| [9] |  | DIN 4103-1:2015-06 | Internal non-loadbearing partitions – Part 1: Requirements and verification. |
| [10] |  | DIN EN 206-1:2001-07  DIN EN 206-1/A1:2004-10  DIN EN 206-1/A2:2005-09 | Concrete – Part 1: Specification, performance, production and conformity; German version EN 206-1:2000  Amendment A1  Amendment A2. |
| [11] |  | DIN 1045-2:2008-08 | Concrete, reinforced and prestressed concrete structures – Part 2: Concrete – Specification, performance, production, and conformity – Application rules for DIN EN 206 1. |
| [12] |  | DBV Reference document | The concreting ability of concrete and reinforced concrete structural elements — Planning and execution recommendations for concrete installation — 01/2014. |
| [13] |  | DIN 18202:2013-04 | Tolerances in building construction — Buildings. |
| [14] |  | DIN EN 1992-1-2:2010-12 | Design and construction of reinforced concrete and prestressed concrete supporting structures – Part 1-2: General rules – Structural fire design; German version EN 1992 1-2:2004 + AC:2008. |
| [15] |  | DIN EN 1992-1-2/NA:2010-12 | National Annex – Nationally determined parameters – Eurocode 2: Design and construction of reinforced concrete and prestressed concrete supporting structures – Part 1-2: General rules – Structural fire design. |
| [16] |  | DIN EN 13163:2017-02 | Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products - Specification; German version EN 13163:2012+A2:2016. |
| [17] |  | DIN EN 13501-1:2010-01 | Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests; German version EN 13501-1:2007+A1:2009. |
| [18] |  | DIN 4109-1:2018-01 | Sound insulation in buildings – Part 1: Minimum requirements. |
| [19] |  | DIN 4109-32:2016-07 | Sound insulation in buildings – Part 32: Data for verification of sound insulation (component catalogue) – Solid construction. |
| [20] |  | DIN 4108-4:2020-11 | Thermal insulation and energy economy in buildings – Part 4: Hygrothermal design values. |

**Appendix 1**

**Detection of resistance to horizontal influences (****), in wall planes for walls of grid type and column type, excluding earthquakes**

Design resistance is determined by choosing a relevant model (see (a), (b) or (c) below and the concrete used (normal or porous concrete). When determining the relevant influences, DIN EN 1992-1-1:2011-01 and DIN EN 1992-1-1/A1:2015-03 [7] in conjunction with DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992-1-1/NA/A1:2015-12 [8] shall be taken into account.

Partial safety coefficients for ‘extraordinary design situations’ must be chosen in line with those for ‘constant and temporary design situations’.

Three static models as per Fig. 1 may be applied:

* 1. Frame model (unreinforced concrete)
  2. Model with continuous struts (unreinforced concrete)
  3. Beam model (reinforced concrete)



a) Frame model b) Model with continuous struts c) Beam model

**Figure 1:** Static models for horizontal shear forces

Proof of horizontal forces along the wall (shear forces) must be provided as follows:

 where i = 1 to 3 (design resistance of the following individual models)

Under the combined effect of horizontal and vertical loads the concrete supports must remain as isΙ, i.e. no tensile stress should occur, otherwise the planners must place vertical reinforcement in the supports to cover the tensile strength.

Proof  of the static models suggested may be provided using the following approaches:

A Frame model

The design resistance  of the frame model depends on the tensile strength of the concrete bars. Assuming parabolic shear flow distribution along the length of the wall *L* under the beam theory and zero-point moment in the middle of the concrete bar, the load-bearing capacity of a concrete bar is reached if the tensile strength exceeds the tensile strength of the concrete due to maximum bending moment at the bar/support intersection. The maximum value of the shear stress is obtained from equation (1):

(1)



and thus leads to a maximum shear force ** in a concrete bar of

(2)



The maximum related bending moment  in a concrete bar is (3)



With a specified section modulus** of the concrete bar and a characteristic concrete tensile strength,** the design resistance for a wall is as follows:

(4)



In equation (4), the following descriptions (see Figure 2) apply:

**rated shear strength according to the frame model;

 wall length;

*h*s distance between concrete bar centres;

*l*r clear length of concrete bar;

*Z*r modulus of resistance of concrete bar;

** characteristic tensile strength of concrete;

** [MN/m²];

** characteristic compressive strength of concrete (cylinder);

**where ** partial safety coefficient for tensile strength of in-situ concrete;

** with ** for in-situ concrete;

for on-site concrete made of lightweight concrete with a computational value of the dry raw density of η in [kg/m³].



|  |  |
| --- | --- |
| Beton-Riegel | Concrete bars |
| Stütze | Support |

**Figure 2:** Designations

B Model with continuous diagonal struts

The design resistance  of the model with continuous struts depends on the strength *n* of struts running continuously through the wall from one storey to the next (see Fig. 1 and 3).



|  |  |
| --- | --- |
| Durchbrüche im Kernbeton  durch Stege der Schalungssteine | Recesses in core concrete  using formwork block studs |

**Figure 3:** Height *d*c of a continuous strut

The design resistance of a strut is determined using equation (5). The angle of inclination *θ* for the struts is derived from Fig. 3.

The rated resistance *H*Rd,2 is a result of equation (5):

(5)

  
with

 = Design resistance in the model with continuous struts

 = Number of continuous struts in a wall

 = Design value of the compressive strength of the concrete

= 0.6 ∙ (1 - fck/250) [fck in MN/m²]*;(equivalent to 6.6N in [8] and [9])*

 = Thickness of the struts

 = Height of the struts (minimum 70 mm)

 = Inclination angle of the struts 30°≤ *θ* ≤ 60°

*=*Rated value of the acting normal force.

C Beam model

Design resistance  under the beam model can be determined using same design rules as for reinforced concrete beams. The concrete diagonal strut does not run over the entire storey but within the concrete support. The diagonal concrete strut is hung back with the help of the reinforcement. This ‘re-suspended reinforcement’ is formed using horizontal reinforcing steel bars running within the concrete bar of the support/bar system. Sufficient final anchoring of the horizontal rods – e.g. by looping the reinforcement – must be ensured in accordance with DIN EN 1992-1-1:2011-01 and DIN EN 1992‑1‑1/A1:2015‑03 [7] in conjunction with DIN EN 1992-1-1/NA:2013-04 and DIN EN 1992‑1‑1/NA/A1:2015-12 [8], Section 8.

The design resistance  of re-suspended reinforcement is derived from equation (6):

(6)



where

 = = Design resistance of re-suspended reinforcement as per beam model

= Cross-section of horizontal re-suspended reinforcement

= Cross-section of vertical concrete bar reinforcement

 = Width of the considered concrete support

 = Rated value of steel strength of re-suspended reinforcement.

The design resistance *H*Rd,3b of the diagonal strutis based on analogy to (5) from equation (7):

(7)



where

 = 1;  
  *=* Inclination angle of the strut 30°≤ *θ* ≤ 60°

The design resistance  of the bar model as shown in Figure 1c) results from equation (8):

(8)



## Annex 13

**Directive on roller shutters**

Last updated: September 2021

**CONTENTS**

1 Scope

2 Thermal insulation

3 Sound insulation

4 Main features of the ‘ÜZ’ conformity mark

1 Scope

This directive applies to factory-made roller shutter boxes (including roller shutter covers), which comply with the thermal and sound insulation requirements.

The structural elements of the roller shutter boxes must consist of at least normal flammability building materials.

For factory-made roller shutter boxes with a static support function in the structure, the Technical Rule laid down in Chapter C 2 must also be observed for the relevant construction product.

2 Thermal insulation

2.1 Minimum thermal protection requirements

Requirements have been laid down for the heat transmission limit and for the surface temperature.

The roller shutter box must meet the minimum thermal insulation requirement according to DIN 4108‑2:2013‑02, Section 5.1.3.

This requirement shall be deemed to be met if the thermal transmission coefficient Usb of the roller shutter box Usb calculated in accordance with Section 2.2 or measured in accordance with Section 2.3 is ≤ 0.85 W/(m² ⋅ K) and the temperature factor fRsi calculated in accordance with Section 2.2 is ≥ 0.70.

2.2 Calculation of thermal transmission coefficient Usb and temperature factor fRsi

The thermal transmission coefficient Usb of the roller shutter box shall be calculated two-dimensionally in accordance with DIN EN ISO 10077‑2:2018‑01 and rounded to two digits. The calculation is to be carried out with a blind frame with a 60 mm constructional depth, which for the purposes of this Directive is to be regarded as adiabatic. The blind frame shall be set flush with the outer side of the actual or planned window frame, irrespective of its width.

During the two-dimensional calculation, the heat flow density shall be obtained from the relevant height bsb in accordance with DIN EN ISO 10077‑2:2018‑01.

The temperature factor fRsi of the roller shutter box shall be calculated two-dimensionally in accordance with DIN EN ISO 10211:2018‑03 in conjunction with DIN EN ISO 10077‑2:2018‑01 and rounded to two decimal places. The calculation shall be made with a blind frame with a construction depth of 70 mm made of wood of thermal conductivity λ = 0.13 W/(m ⋅ K) under the boundary conditions set out in DIN 4108‑2:2013‑02. For the contact resistances, the boundary conditions in accordance with Addendum 2:2019‑06 to DIN 4108 shall be applied. The upper structural shell connections shall be considered as adiabatic for the purposes of this Directive.

For the structural elements of the roller shutter box, the respective rated thermal conductivity values are in accordance with DIN EN ISO 10456:2010‑05, DIN EN ISO 10077‑2:2018-01, or DIN 4108‑4:2020-11. The roller space is to be treated according to the conditions stated in Section 6.3.5 or DIN EN ISO 10077‑2:2018‑01.

2.3 Measurement of heat transfer coefficient Usb

The thermal transmission coefficient Usb of the roller shutter box shall be determined in accordance with DIN EN 12412‑4:2003‑11.

3 Sound insulation

If soundproofing properties are to be demonstrated for the roller shutter box, the associated sound insulation value is to be determined as follows:

* Based on design characteristics according to DIN 4109‑35:2016‑07, Table 6, or
* By measuring according to DIN EN ISO 10140‑1:2016‑12, DIN EN ISO 10140‑2 and -4:2010‑12 and DIN EN ISO 10140-5:2014‑09 and assessment according to DIN EN ISO 717‑1:2013-06. If only a weighted standard sound level difference Dn,e,w has been demonstrated during the measurement, this should be converted into a weighted sound insulation value using the following formula:

Rw = Dn,e,w + 10 log(SR/10m²)  
with SR area of the roller shutter box in m².

Test reports in accordance with DIN EN ISO 10140‑1:2010‑12, 2012‑05 and 2014‑09 and DIN EN ISO 10140‑05:2010‑12 in conjunction DIN EN ISO 717‑1:2006‑11 and/or DIN EN ISO 717‑1:2013‑06 that were created before the entry into force of this version of the Administrative Rules laying down Technical Building Regulations may continue to be used.

When calculating airborne sound insulation, the declared rated sound insulation Rw can be directly placed in Equation 37 of DIN 4109‑2:2018‑01, Section 4.4.2.

4 Main features of the ‘ÜZ’ conformity mark

In the m‑ark of conformity of a roller shutter box which complies with the requirements of Sections 1 and 2, the heat transfer coefficient Usb is to be indicated as an essential feature in roller shutter boxes with sound insulation properties in accordance with Section 3, in addition to the rated sound insulation‑value ‘RW= ...’

The key features of the ‑mark of conformity also include the information for combining roller shutter boxes with roller shutter box covers.

For roller shutter boxes with a static support function in the structure, the regulations for marking in accordance with the relevant Technical Rule must also be observed.

## Annex 14

**Technical Rule on Technical Building Equipment (Technische Regel Technische Gebäudeausrüstung [TR TGA])**

Last updated: April 2022

**CONTENTS**

1 COMBUSTION PLANTS

2 FIRE ALARM SYSTEMS

3 ALARM SYSTEMS

4 EMERGENCY LIGHTING SYSTEMS

5 EMERGENCY POWER SUPPLY SYSTEMS

6 VENTILATION SYSTEMS

7 SMOKE EXTRACTION SYSTEMS AND SMOKE EXTRACTORS

8 PRESSURE VENTILATION SYSTEMS

9 CO-WARNING SYSTEMS

10 FIRE EXTINGUISHING SYSTEMS

1 Furnaces

1.1 Purpose of the installation

Combustion plants consist of fixed furnaces and exhaust systems. Combustion plants generate heat by burning liquid, gaseous, or solid fuels. Installations and facilities connected to fixed fuel supply lines via flexible lines are also considered to be fixed. Other heat-producing systems are fixed combustion engines, combined heat and power plants, fuel cells, and compressors.

1.2 Operational and fire safety

For operational and fire safety, combustion plants must be constructed in accordance with generally accepted technical best practices and the use of suitable construction products. In doing so, the requirements of the Technical Rule included in the MVV TB under ser. No A 2.2.1.12 must be observed, including in terms of combustion air supply, placement of combustion plants, distances to combustible building materials, exhaust gas discharge, and fire resistance between storeys.

Electrically powered parts, such as motors, sensors and switches, shall be designed, insulated and protected accordingly; this also applies to influences due to moisture and cold or heat loads.

Sub-installations used for the conveyance of fuels shall be designed in such a way that fuels cannot ignite themselves in these sub-installations or in the fuel accumulators in front of them.

1.3 Setting up combustion plants

Detailed requirements for the design and permitted uses of installation areas for combustion plants are specified in the Technical Rule included in the MVV TB under ser. No A 2.2.1.12.

Boiler rooms are required according to the Technical Rule included in the MVV TB in under ser. No A 2.2.1.12 if solid fuels are used and performance limits are exceeded.

1.4 Spread of fire and safe exhaust discharge

To prevent the spread of fire and to ensure that exhaust gases are properly discharged, the provisions of the Technical Rule included in the MVV TB in ser. No A 2.2.1.12 must be observed.

1.5 Fuel supply and storage

The requirements of the Technical Rule referred to in the MVV TB under ser. No A 2.2.1.12 shall be complied with for all fuels. In particular, the requirements on the storage of fuels, including with regard to the provisions of the Product Safety Act [Produktsicherheitsgesetz], must be observed.

The building inspection requirements for the supply and connection of combustion plants for gas and liquid gas as fuels shall be considered fulfilled if the technical regulations of the German Gas and Water Specialist Association (DVGW) or the German Liquid Gas Specialist Association (DVFG) have been followed in the construction of the fuel supply system.

1.6 Essential requirements

1.6.1 Essential requirements for combustion plants

Proof that the exhaust gases from fireplaces in all intended operating conditions are discharged flawlessly into the open and that there is no dangerous overpressure compared to rooms is to be carried out on the basis of DIN EN 13384‑ 1:2019-09 or DIN EN 13384-2:2019-09.

Adequate combustion air supply for the operation of open-flue furnaces shall be ensured, taking account of building impermeability and in compliance with the Technical Rule included in the MVV TB under ser. No A 2.2.1.12. Operational safety of open-flue combustion plants must not be affected by the operation of ambient air extraction systems such as ventilation or warm air heating systems, extractor hoods and tumble dryer exhausts.

In room-sealed combustion plants, the required combustion air shall be supplied via air-tight ducts directly from the outside or via an air shaft, e.g. an air-exhaust system and a connecting line: it must not be taken from the installation areas of the combustion plants. Proof of sufficient combustion air supply for the operation of room-sealed combustion plants shall be carried out in accordance with DIN EN 13384‑1:2019-09 or DIN EN 13384-2:2019-09 respectively.

Room-sealed solid-fuel combustion plants may only be installed in rooms, apartments, or similar unit with systems that extract air from the room if the air supply-side design is such that no negative pressure greater than 8 Pa with respect to ambient air can be produced by the operation of the room-air extraction systems in the installation area, apartment or similar unit.

Room-sealed solid-fuel furnaces must have automatic, tight-closing doors, or other measures must be in place during operation to ensure that combustion gases cannot escape in hazardous amounts.

Due to their mode of operation, room-sealed furnaces may also be installed in service units which are permanently sealed in accordance with the state of the art and in service units equipped with mechanical ventilation systems.

For the establishment and operation of fireplaces, additional requirements may arise from other areas, such as the immission protection law, the building energy law and the sweeping and inspection regulations.

1.6.2 Essential requirements for stand-alone safety devices

In order to ensure safe overall operation of ventilation systems, including indoor air-extracting installations, such as extractor hoods or tumble dryer exhausts and open-flue furnaces, separate safety devices may be used to prevent the creation of a dangerous vacuum in the room where the furnace is installed in all operating conditions of the furnace.

Safety devices for differential pressure measurement shall be designed in such a way that the negative pressure in the storage room is 4 Pa or less compared to the external atmosphere; in the case of fireplaces for solid fuels, the design may also be carried out in such a way that the negative pressure in the connector is 4 Pa or more compared to the installation space.

Safety devices using an exhaust gas temperature sensor must be designed in such a manner that the sensor triggers differential pressure measurement, position monitoring, or other monitoring methods at a maximum exhaust gas temperature of 50°C (solid fuel furnace).

Self-contained safety devices may be used only in units wherein they can monitor the room in which the open-flue furnace is installed and connected spaces. It should be kept in mind that the open-flue furnace should not be connected to an exhaust system with multiple connections.

Secure data transmission shall be ensured. Unauthorised access to security-related functions shall be prevented.

The use of a safety device is not a substitute for professional design and execution of the air conditioning and firing systems in terms of the required combustion air supply and exhaust gas discharge with respect to the surrounding space. Self-contained safety devices may be installed only by persons with sufficient expertise. If a safety device is installed, the competent authorised chimney sweep shall be informed by the operator.

1.7 Requirements for the use of furnaces

1.7.1 Essential requirements

The building inspection requirements shall be deemed to have been met if furnaces are used in accordance with this Technical Rule.

1. With CE marking pursuant to:

* + Regulation (EU) No 305/2011 (Construction Products Regulation) (on furnaces for solid and liquid fuels), in particular in accordance with Section 1.9 of this Technical Rule,
  + Regulation (EU) 2016/426 (Gas Appliances Regulation) (on furnaces for gaseous fuels),
  + Directive 2006/42/EC (Machinery Directive) (on e.g. furnaces for liquid and solid fuels with motorised drive),
  + Directive 2014/35/EC (Low-Voltage Directive) (on e.g. furnaces for liquid and solid fuels with combustion air controls or convection air blowers) or
  + Directive 2014/68/EU (Pressure Equipment Directive) (on hot water production assemblies),

2. Without CE marking, e.g. if constructed in accordance with ‘Specialist Regulation [Fachregel] on furnace and air heating construction’, TR OL 2006, 2010 version’, or if they are solid fuel furnaces without motorised drive, with the exception of residential furnaces or

3. With building inspectorate proof of fitness for purpose.

1.7.2 Furnaces for solid and liquid fuels bearing the CE marking according to harmonised technical specifications based on the Construction Products Regulation

In order to fulfil the building inspection requirements, the performance of the construction products used in terms of fundamental characteristics must at least satisfy Table 1

Explanation for Table 1

| Column  no | Product according to harmonised standard |
| --- | --- |
| 2 | EN 13240:2001, EN 13240:2001/A2:2004 and EN 13240:2001/AC:2006 and EN 13240:2001/A2:2004/AC:2007 Room heaters fired by solid fuel – Requirements and test methods[[64]](#footnote-64) |
| 3 | EN 13229:2001, EN 13229:2001/A1:2003, EN 13229:2001/AC:2006 and EN 13229:2001/A2:2004/AC:2007 Inset appliances including open fires fired by solid fuels – Requirements and test methods[[65]](#footnote-65) |
| 4 | EN 12815:2001, EN 12815:2001/A1:2004 und EN12815:2001/AC:2006 und EN 12815:2001/A1:2004/AC:2007 – Residential cookers fired by solid fuel – Requirements and test methods[[66]](#footnote-66) |
| 5 | EN 12809:2001, EN 12809:2001/A1:2004, EN 12809:2001/AC:2006/AC:2007 + EN 12809:2001/A1:2004/AC:2007 Residential independent boilers fired by solid fuel – Nominal heat output up to 50 kW– Requirements and test methods[[67]](#footnote-67) |
| 6 | EN 15250:2007 Slow heat release appliances fired by solid fuel – Requirements and test methods[[68]](#footnote-68) |
| 7 | EN 14785:2006 Residential space heating appliances fired by wood pellets – Requirements and test methods[[69]](#footnote-69) |
| 8 | EN 15821:2010 Multi-firing sauna stoves fired by natural wood logs – Requirements and test methods[[70]](#footnote-70) |
| 9 | EN 1:1998 and EN1:1998/A1:2007 Flued oil stoves with vaporising burners and chimney connection[[71]](#footnote-71) |

**Table 1:**

| Essential feature | Product according to harmonised standard | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| **Fire safety** |  | | | | | | | |
| Distances to combustible materials | L | L | L | L | L | L | L | L |
| Fire hazard due burning materials falling out | X | X | X | X | X | X | X | - |
| **Emissions from combustion products (at rated thermal output and if declared at partial load and light load)** |  | | | | | | | |
| CO | L | L | L | L | L | L | L | K\* |
| **Release**  **of dangerous substances** | X | X | X | X | X | X | X | X |
| **Surface temperature** | X | X | X | X | X | X | X | X |
| **Electrical safety** | X | X | X | X | X | X | X | X |
| **Cleanability** | - | - | - | - | - | - | - | - |
| **Maximum operating pressure (only applicable if the furnace is equipped with water-bearing structural elements)** | L | L | L | L | L | L | L | - |
| **Mechanical strength (capacity to support a chimney)** | - | - | - | - | - | - | - | - |
| **Heat output/efficiency** |  | | | | | | | |
| Nominal space heat output | L | L | L | L | L | L | L | L |
| Nominal water heat output (if applicable)1 | L | L | L | L | L | L | L | - |
| Partial-load room heat output (if specified by the manufacturer)2 | L | L | L | L | L | L | L | L |
| Partial load water heat output (if applicable1 and if specified2) | L | L | L | L | L | L | L | - |
| Low load room heat output (if specified by the manufacturer2) | L | L | L | L | L | L | L | - |
| Light-load water heat output (if applicable1 and if specified by the manufacturer2) | L | L | L | L | L | L | L | - |
| Efficiency at nominal heat output | L | L | L | L | L | L | L | K |
| Efficiency  at partial-load heat output  (if specified by the manufacturer2) | L | L | L | L | L | L | L | - |
| **Exhaust gas temperature at nominal thermal output and partial-load thermal output (if specified)** | L | L | L | L | L | L | L | L |
| **Durability** | - | - | - | - | - | - | - | - |
| 1. Water thermal output – Output must be specified if the furnace has a water heat exchanger; 2. If the manufacturer provides for partial or light load operation for the furnace, the performance of this thermal output is required   This applies equally to cases with/without water heat exchangers;  X must be fulfilled  K Classification required  K\* The class may contain other parameters in addition to the CO value and the specification of the efficiency.  L Value for the output required  - Essential feature not included in Annex ZA for the construction product, or included in Annex ZA but not required under building inspection regulations | | | | | | | | |

When using furnaces according to the Construction Products Regulation, except for sauna stoves according to EN 15821:20107, it should be kept in mind that

* The distance to structural elements made of combustible building materials, as specified by the CE marking, is observed, where adjacent structural elements shall have a thermal resistance, in accordance with the harmonised standard, of R ≤ 1.2 m²K/W for solid fuel furnaces and R ≤ 0.127 m²K/W for liquid fuel furnaces, unless otherwise specified in the declarations of performance with respect to the thermal resistance of the adjacent structural elements. In case of higher thermal resistances, additional measures may be required, e.g. according to DIN 18896:2014‑02, Section 4.4.1,
* For inset appliances in furnaces, the provisions of the ‘Specialist Regulation [Fachregel] on furnace and air heating construction, TG OL 2006, 2010 version’ or the manufacturer’s specifications, e.g. pursuant to EN 13229:20012, shall be observed,
* When using slow heat release furnace appliances

1. The nominal heat output (kW) of the furnace is specified on the basis of the total heat output [kJ] and the time until the average surface temperature is 25% of the maximum value, and

2 Mineral structures of the furnace that come into contact with fire or exhaust gas, have the following characteristics as described in Table 2.

**Table 2:**

|  |  |
| --- | --- |
| **Materials** | **Raw density [kg/dm³]** |
| Standard chamotte | 1.75 to 2.2 |
| Dense chamotte | 2.3 to 4.0 |
| Vermiculite | 0.6 to 1.5 |
| Soapstone1 | 2.8 to 3.2 |
| Fire-proof concrete | 1.9 to 2.8 |
| 1 not for the combustion chamber | |

or the durability requirements of relevant standards have been demonstrated as follows:

1. Fire resistance (pyrometric cone equivalent as a fire resistance index) > 15,
2. Thermal shock resistance ≥ 25 cycles,
3. Thermal length expansion ≤ 1.5 %,
4. permanent length expansion after exposure to temperature < 1.5 %.

1.7.3 Furnaces bearing the CE marking under harmonising rules other than the Construction Products Regulation

When using furnaces which do not bear the CE marking in accordance with the Construction Products Regulation, the following shall apply:

For the construction and operation of furnaces for gaseous fuels with CE marking pursuant to the Gas Appliances Regulation or the Machinery Directive, the requirements of the ‘technical rules for Gas Installations’ (DVGW Guideline G 600, technical rules for Gas Installations, DVGW-TRGI, 2018 version) or the Technical Rules summarised in the ‘technical rules for Liquefied Petroleum Gas’ (TRF 2021), shall be observed, taking account of the Technical Rule included in the MVV TB under ser. No A 2.2.1.12. This includes the exhaust system.

For the establishment and operation of CE-marked liquid fuel fireplaces under the Machinery Directive, the Technical Rule referred to in MVV TB under ser. No A 2.2.1.12 shall be observed. In addition, the technical rules summarised in the ‘Technical Rules of Oil Plants’ (TRöl 2.1, Issue 12/2019) must be taken into account.

1.7.4 Furnaces without CE marking

For the construction and operation of on-site solid-fuel furnaces with handcrafted furnaces, the Technical Rules summarised in the ‘Specialist Rules for Furnaces and Air Heating Systems’ TR OL 2006, 2010 version, shall be observed together with the Technical Rule included in the MVV TB under ser. No A 2.2.1.12.

The following insulation materials may be used for on-site furnaces in accordance with the implementing provisions of the TR OL 2006, 2010 version:

* Thermal insulation products for building equipment and industrial installations - Factory made mineral wool (MW) products – pursuant to DIN EN 14303:2016-08;
* Thermal insulation products for building equipment and industrial installations – Factory made calcium silicate (CS) products – pursuant to DIN EN 14306:2016-03;
* Thermal insulation products for building equipment and industrial installations – Factory made expanded perlite (EP) and expanded vermiculite (EV) products – pursuant to DIN EN 15501:2016‑03.

1.8 Requirements for the installation and safe use of exhaust systems

Exhaust systems shall safely discharge the exhaust gases from furnaces to the outside. Exhaust systems such as exhaust pipes, chimneys, air-exhaust systems, air-exhaust chimneys, and connectors may be constructed either from individual structural elements (assembly exhaust system) or from kits (system exhaust system) in accordance with this section.

The building inspection requirements for the design and execution of exhaust systems for the discharge of exhaust gases from furnaces fired with solid, liquid or gaseous fuels, as well as for the discharge of exhaust gases from heat pumps, combined heat and power plants, and stationary interior combustion engines shall be deemed fulfilled if the rules of DIN V 18160-1:2006-01, excluding Sections 5.2.1, 6.2, 6.5, 6.9, 6.10.1 and 6.10.2, in conjunction with DIN V 18160-1 Addendum 1:2015-11 und Addendum 2:2016-04 as well as the following provisions are complied with.

structural elements of exhaust gas systems shall be at least normal flammability in terms of their fire characteristics.

The distance to combustible building materials specified in the marking of construction products for exhaust systems applies only to adjacent walls with a thermal resistance of R ≤ 2.7 m2K/W and for ceilings and roofs to be penetrated with a thermal resistance of R ≤ 5.4 m2K/W. The use of exhaust systems in buildings with wall, ceiling and roof structures made of or with combustible building materials with higher thermal resistances is permitted only if covered by harmonised specifications or if an appropriate type approval has been granted.

Where exhaust systems extend across floors, they must be designed in such manner that in case of an indoor fire with an external fire impact on the surfaces of the exhaust system, propagation of the fire is prevented for a specified time. Such exhaust systems must therefore have sufficiently long fire resistance. This may be achieved by an appropriate choice of materials and construction for the exhaust system or by combining them with a shaft.

For applications where requirements for the fire resistance duration of the exhaust system to avoid the fire transmission from floor to floor are to be demonstrated, the fire resistance including a thermal pretreatment, according to a thermal load due to heating operation taking into account DIN 18160-60:2014-02 or DIN EN 1366-13:2019-09. To demonstrate the fire resistance according to DIN EN 1366-13:2019-09, the vertical test structure with a test specimen “B” shall be used. By way of deviation from DIN EN 1366-13:2019-09, test results with stainless steel inner tubes can only be transferred to internal pipes made of non-combustible materials.

Exhaust systems shall be marked permanently and visibly, depending on the scope of application, with at least the following information:

* Standard number: DIN V 18160-1:2006-01,
* The temperature class ‘Txxx’ indicates the nominal operating temperature xxx in °C up to which the executed exhaust system can be operated.
* The gas tightness/pressure class indicates the mode of operation for which the exhaust system is suitable:

‘N1’ and ‘N2’ for vacuum, ‘P1’ also for overpressure ≤ 200 Pa

‘P2’ also for overpressure ≤ 200 Pa outdoor

‘H1’ also for overpressure ≤ 5 000 Pa

‘H2’ also for overpressure ≤ 5 000 Pa outdoors.

* The condensate resistance class specifies the operating conditions for which the exhaust system is suitable:

‘D’ for scheduled dry operation (without lowering the dew point temperature);

‘W’ also for wet operation as planned.

* The corrosion resistance class specifies the fuel type for which the exhaust system is suitable:

‘1’ for gaseous fuels with a sulphur content ≤ 50 mg/m³, such as LPG, NG L and H, and for liquid fuels with a sulphur content ≤ 50 mg/kg, ‘2’ for gaseous fuels, for liquid fuels with a sulphur content ≤ 2 000 mg/kg and for wood in open furnaces, ‘3’ for gaseous and liquid fuels, as well as for wood, coal, and peat.

* The soot fire resistance class with specifications for distance from combustible building materials:   
  ‘Oxx’ indicates that the exhaust system is not resistant to soot fires, and is accordingly suitable only as an exhaust gas duct for gaseous and liquid fuel furnaces;

‘Gxx’ indicates that the exhaust system is resistant to soot fires and is therefore also suitable as a chimney for furnaces for solid fuels.

‘xx’ indicates the necessary minimum distance from the outer surface area of the flue to combustible structural elements, where xx is the numerical value of the minimum distance in rounded millimetres.

* The fire resistance class ‘LA’ indicates the time during which an exhaust system is able to withstand external exposure to fire, and during which there will be no transfer of the fire via its surfaces to other fire compartments. The possible classes are set out in Table 3.

**Table 3:**

|  |  |  |
| --- | --- | --- |
| Building approval requirement and classification according to DIN 18160-60 for exhaust systems | | |
| Building approval requirement | Fire resistance classes | |
| Fire-retardant | LA30\* | Fire resistance time ≥ 30 minutes |
| Fire-resistant | LA90\* | Fire resistance time ≥ 90 minutes |
| \* The declared fire resistance must have been tested with thermal pretreatment according to the selected temperature class (e.g. T400). | | |

Each performance indicator shall correspond at least to the required class or to a higher class in the following order:

T600 >T450 >T400 >T300 >T250 >T200 >T160 >T140 >T120 >T100 >T080.

H > P > N; Wx > Dx; D3 > D2 > D1; W3 > W2 > W1; G > O.

Example marking of an exhaust system:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Exhaust system DIN V 18160-1 | | | | | | | | | | T400 | | P1 | | | W | | 1 | | O50 | | LA90 | |
|  | | | | |  | |  | | |  |  | |  |  |  |  |  |  |  |  |  |  |
| Standard number |  | | | |  | |  | | |  |  | |  |  |  |  |  |  |  |  |  |  |
|  | | | |  | |  | | |  |  | |  |  |  |  |  |  |  |  |  |  |
| Temperature class |  | | | |  | |  | | |  |  | |  |  |  |  |  |  |  |  |  |  |
|  | | | |  | |  | | |  |  | |  |  |  |  |  |  |  |  |  |  |
| Gas seal class/pressure class | | |  | |  | |  | | |  |  | |  |  |  |  |  |  |  |  |  |  |
|  | |  | |  | | |  |  | |  |  |  |  |  |  |  |  |  |  |
| Condensate resistance class | | | | |  | |  | | |  |  | |  |  |  |  |  |  |  |  |  |  |
|  | |  | | |  |  | |  |  |  |  |  |  |  |  |  |  |
| Corrosion resistance class | | | |  | |  | |  | |  |  | |  |  |  |  |  |  |  |  |  |  |
|  | |  | |  | |  |  | |  |  |  |  |  |  |  |  |  |  |
| Soot fire resistance class with  specification of distance from combustible building materials | | | | | | | | | |  |  | |  |  |  |  |  |  |  |  |  |  |
|  |  | |  |  |  |  |  |  |  |  |  |  |
| Fire resistance class | |  | | |  | | | |  |  |  | |  |  |  |  |  |  |  |  |  |  |
|  | | |  | | | |  |  |  | |  |  |  |  |  |  |  |  |  |  |

Exterior shells of exhaust systems pursuant to DIN V 18160-1:2006-01 that are designed as assembly chimneys must have performance characteristics satisfying the same or a higher performance class than that required for the proposed design. For this purpose, construction products according to EN 1858: 2008+A1:2001[[72]](#footnote-72), EN 12446: 2011[[73]](#footnote-73), EN 13069: 2005[[74]](#footnote-74) and EN 1806:2006[[75]](#footnote-75) may be used, and must be marked at least with T400 and G. If there are requirements for fire resistance during use, this must be verified in accordance with DIN 18160-60: 2014-02 by means of a proof of fitness for purpose by the building authorities. The proof may be provided for the outer shell alone or together for structures with multiple shells.

The following may also be used to manufacture outer shells from masonry:

* Bricks according to DIN EN 771-1:2015-11 in conjunction with DIN 20000-401:2017-01 or alternatively DIN 105‑100:01‑2012 with a wall thickness of ≥11.5 cm;
* Solid bricks (Mz) and perforated bricks type A (HLzA) in accordance with EN 771-1:2015-11 in conjunction with DIN 20000‑401:2017‑01 or alternatively DIN 105-100:2012-01 with wall thickness ≥ 11.5 cm and raw density of ≥ 1.2 kg/dm³;
* Perforated bricks type B (HLzB) in accordance with EN 771-1:2015-11 in conjunction with DIN 20000-401:2017-01 or alternatively DIN 105-100:2012-01 with wall thickness ≥ 24 cm and raw density ≥ 1.2 kg/dm³;
* Sand-lime bricks according to DIN EN  771-2:2015-11 in conjunction with DIN 20000-402:2017-01 with a wall thickness of≥ 11.5 cm;
* Autoclave aerated concrete components pursuant to DIN EN 771-4:2011-07 in conjunction with DIN 20000‑404:2015-12 with wall thickness ≥ 10 cm;
* Hollow bricks made of lightweight concrete as per DIN 18151 with wall thickness ≥ 17.5 cm;
* Solid lightweight concrete bricks pursuant to DIN EN 771-3:2005-05 in conjunction with DIN V 20000-403:2005-06 or DIN V 18152-100:2005-10 with wall thickness ≥ 11.5 cm are deemed equivalent.

Outer shells made from the above-mentioned masonry correspond to classification T400 G50 LA90.

For assembly exhaust gas systems, insulating materials pursuant to DIN EN 14303:2016-08 may be used in accordance with the relevant requirements for the proposed exhaust system together with the following provisions:

1. Insulation materials for assembly chimneys

The insulation materials for chimneys must be able to withstand the effects of temperature caused by soot fire. Soot fire resistance cannot be demonstrated pursuant to DIN EN 14303:2016-08.

Insulation shells made of insulating materials as per DIN EN 14303:2016-08 must be at least 3 cm thick and have thermal resistance of at least 0.4 m²K/W at 300°C.

In the case of internal shells according to EN 1856-1:2009[[76]](#footnote-76), an insulation shell can be dispensed with a thermal insulation of at least 3 cm in conjunction with the outer shells specified in DIN V 18160-1:2006-01, Section 7.2.3.

2. Insulating materials for assembly exhaust pipes

Insulating materials according to DIN EN 14303:2016-08 may be used for assembly exhaust pipes. The upper application limit temperature of the insulating material must be higher than or equal to the required temperature class for the exhaust system.

3. Insulating materials for connectors and single-layer metallic exhaust systems

Insulating materials that are placed directly on the surfaces of metallic exhaust systems or connectors must be non-combustible. The upper application limit temperature of the insulating material must be higher than or equal to the required temperature class for the exhaust system.

Any subsequent designs will require a type approval:

* Air-exhaust chimneys,
* Multiple-use exhaust systems for room-sealed solid-fuel furnaces,
* Chimneys operated under overpressure,
* Connectors for solid-fuel furnaces operated under overpressure, and
* Assembly exhaust systems with a higher temperature class than T400.

For free-standing exhaust systems with a height > 3 m above the highest effective support, the provisions of Section A 1.2.8.1 of MVV TB shall be observed.

In order to meet the requirements for the quality of exhaust systems, the construction products used pursuant to harmonised technical specifications must satisfy at least the performance levels given in Tables 4 and 5 for the key features.

Explanation for Table 4

| Column no. | Product according to harmonised standard |
| --- | --- |
| 2 | EN 1457-1:2012 Clay/ceramic flue liners for operating under dry conditions[[77]](#footnote-77) |
| 3 | EN 1457-2:2012 Clay/ceramic flue liners for operating under wet conditions[[78]](#footnote-78) |
| 4 | EN 1806:2006 Ceramic mould components for exhaust systems12 |
| 5 | EN 1856-1:2009 Requirements for metal chimneys - System chimney products13 |
| 6 | EN 1856-2:2009 Metal flue liners and connecting flue pipes for chimneys[[79]](#footnote-79) |
| 7 | EN 1857:2010 Concrete flue liners for chimneys[[80]](#footnote-80) |
| 8 | EN 1858:2008+A1:2001 Concrete flue components9 |
| 9 | EN 12446:2011 Chimneys - Concrete exterior wall elements10 |
| 10 | EN 13063-1:2005+A1:2007 Soot fire-resistant system chimneys with ceramic flue liners[[81]](#footnote-81) |
| 11 | EN 13063-2:2005+A1:2007 System chimneys with clay/ceramic flue liners[[82]](#footnote-82) |
| 12 | EN 13063-3:2007 Air flue system chimneys with clay/ceramic flue liners[[83]](#footnote-83) |
| 13 | EN 13069:2005 Ceramic outer shells for system exhaust installations11 |
| 14 | EN 14471:2013+A1:2015 System exhaust systems with plastic flue liners[[84]](#footnote-84) |
| 15 | EN 14989-1:2007 Appliances for room-sealed exhaust systems of gas appliances of type C6[[85]](#footnote-85) |
| 16 | EN 14989-2:2007 Exhaust and air supply ducts for room-sealed furnaces[[86]](#footnote-86) |

**Table 4:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Essential feature | Product according to harmonised standard | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Temperature class | K | K | K | K | K | K | K | K | K | K | K | K | K | K | K |
| Pressure class | K | K | K | K | K | K | K | - | K | K | K | - | K | K | K |
| Condensate resistance class | K | K | K | K | K | K | K | - | K | K | K | - | K | K | K |
| Corrosion resistance class | K | K | K | K | K | K | K | - | K | K | K | - | K | K | K |
| Soot fire resistance class | K | K | K | K | K | K | K | K | K | K | K | K | K | K | K |
| Specifications for distance from combustible building materials | - | - | L | L | L | - | L | L | L | L | L | - | L | L | L |
| Pressure class if  not indicated above (for LAS) | - | - | - | - | - | - | - | K | - | - | - | K | - | - | - |
| Fire performance | - | - | - | - | - | K | K | K | - | - | - | - | K | - | - |
| Thermal resistance | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L |
| Flow resistance | L | L | L | L | L | L | L | - | L | L | L | - | L | L | L |
| Freeze-thaw cycle resistance | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Mechanical strength and stability | L | L | L | L | L | L | L | L | L | L | L | L | L | X | L |
| X must be fulfilled  K Classification required  L Value for the output required  - Essential feature not included in Annex ZA for the construction product, or included in Annex ZA but not required under building inspection regulations | | | | | | | | | | | | | | | |

Explanation for Table 5

|  |  |
| --- | --- |
| Column no. | European Assessment Document (EAD) |
| 2 | CHIMNEY KIT WITH CERAMIC FLUE LINER  EAD 060001-00-0802 |
| 3 | Chimney kit with ceramic flue liner and with specific outer wall  EAD 060003-00-0802 |
| 4 | Chimney kit with ceramic flue liner, with different outer walls and possible change of outer wall  EAD 060008-00-0802 |

**Table 5:**

|  |  |  |  |
| --- | --- | --- | --- |
| Essential feature | Construction product  according to European Assessment Document (EAD) | | |
| 1 | 2 | 3 | 4 |
| Temperature class | K | K | K |
| Pressure class | K | K | K |
| Condensate resistance class | K | K | K |
| Corrosion resistance class | K | K | K |
| Soot fire resistance class | K | K | K |
| Specifications for distance from combustible building materials | L | L | L |
| Pressure class  unless included above (for LAS) | X | X | X |
| Thermal resistance | L | L | L |
| Flow resistance | L | L | L |
| Freeze-thaw cycle resistance | X | X | X |
| Mechanical strength and stability | L | L | L |
| X must be fulfilled  K Classification required  L Value for the output required | | | |

1.9 Installation and operation of products

Detailed installation and operating instructions from the manufacturer or its representative must be available in German and must be observed.

The operating instructions must contain in detail the information required for commissioning, inspection, maintenance, repair and functional verification.

2 Fire alarm systems

2.1 Purpose of the installation

Fire alarm systems are hazard alarm systems. They must be used by people to call for help directly (manual release) in the event of fire hazards. Automatic fire alarm systems must detect and report fires at an early stage. The fire alarm shall be forwarded immediately by the transmission device to alert the control centre of the locally responsible fire department.

Fire detection systems are technically suitable to warn the persons threatened by the fire and to inform about the fire event.

Smoke alarms or networked smoke alarms do not constitute fire alarm systems.

Fire alarm systems cannot be taken over by fire alarm systems.

Unlike fire warning systems, fire alarm systems are technically suitable to control other systems, in particular to activate fire control systems.

2.2 Construction products of fire alarm systems

To fulfil the building inspection requirements, fire alarm systems must be permanently reliable in operation and constructed using construction products of the DIN EN 54 series of standards.

To that end, they must be sufficiently powerful and permanently reliable, have sufficient response delay, moisture, corrosion and temperature resistance as well as shock and vibration resistance.

In order to fulfil the building inspection requirements, the performance of the construction products used in terms of key features must at least satisfy Table 1.

Explanation for Table 1

| **Column no.** | **Product according to harmonised standard** |
| --- | --- |
| 2 | EN 54-2:1997/A1:2006 Fire Detection Panels[[87]](#footnote-87) |
| 3 | EN 54-3:2001 + A1:2002 + A2:2006 Acoustic Signal Transmitter [[88]](#footnote-88) |
| 4 | EN 54-4:1997 + EN 54-4:1997/AC:1999 + EN 54-4:1997/A1:2002 + EN 54-4:1997/A2:2006 Power Supplies[[89]](#footnote-89) |
| 5 | EN 54-5:2017 +A1:2018 Heat detectors – Point detectors[[90]](#footnote-90) |
| 6 | EN 54-7:2018 Smoke detectors — Point-shaped detectors according to the scattered light, transmitted light or ionisation principle[[91]](#footnote-91) |
| 7 | EN 54-10:2002 + EN 54-10/A1:2005 Flame detector — Point-shaped detectors[[92]](#footnote-92) |
| 8 | EN 54-11:2001 + EN-54-11/A1:2005 Manual call points[[93]](#footnote-93) |
| 9 | EN 54-12:2015 Smoke detectors – Line detectors using an optical beam[[94]](#footnote-94) |
| 10 | EN 54-16:2008 Voice alarm control and indicating equipment[[95]](#footnote-95) |
| 11 | EN 54-17:2005 + EN 54-17:2005/AC:2007 Short-circuit insulators[[96]](#footnote-96) |
| 12 | EN 54-18:2005 + EN 54-18:2005/AC:2007 Input/Output Devices[[97]](#footnote-97) |
| 13 | EN 54-20:2006 + EN 54-20:2006/AC:2008 Aspirating smoke detectors[[98]](#footnote-98) |
| 14 | EN 54-21:2006 Alarm transmission and fault warning routing equipment[[99]](#footnote-99) |
| 15 | EN 54-23:2010 Visual alarm devices[[100]](#footnote-100) |
| 16 | EN 54-24:2008 structural elements of voice alarm systems – Loudspeakers[[101]](#footnote-101) |
| 17 | EN 54-25:2008 + EN 54-25:2008/AC:2012 structural elements using high-frequency connections[[102]](#footnote-102) |

**Table 1:**

| Essential feature | | Product according to harmonised standard | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| **Performance in case of fire** | |  | | | | | | | | | | | | | | | |
| General requirements | | X |  | X |  |  |  |  |  | X |  |  |  | X |  |  |  |
| General requirements for displays | | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Fire alarm status | | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Functions | |  |  | X |  |  |  |  |  |  |  |  |  | X |  |  |  |
| Materials, manufacture and execution | |  |  | X |  |  |  |  |  |  |  |  |  | X |  |  |  |
| Sound level | |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Frequency and sound form | |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spread between samples | |  | X |  | X | X | X |  | X |  | X |  | X |  |  | X |  |
| Function testing | |  | X |  |  |  |  |  |  |  |  | X |  |  |  |  |  |
| Location of heat-sensitive elements | |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |
| Directional dependence | |  |  |  | X | X | X |  |  |  |  |  |  |  |  |  |  |
| Static response temperature | |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |
| Response times at typical application temperature | |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |
| Response times at 25 C | |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |
| Response times at high ambient temperature | |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |
| Additional check for detectors with category S 1 | |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |
| Additional check for detectors with category index R 1 | |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |
| Response to slowly developing fires | |  |  |  |  | X |  |  |  |  |  |  | X |  |  |  |  |
| Repeatability/repeat precision | |  |  |  |  | X | X |  | X |  |  |  | X |  |  |  |  |
| Air movement | |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |
| Glare | |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |
| Fire sensitivity | |  |  |  |  | X | X |  | X |  |  |  | X |  |  |  |  |
| Classification | |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |
| Glare test (in operation) | |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |
| Alarm status | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Alarm status displays | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Safety aspects | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Protection from unintentional triggering | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Suitability for use test | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Verification of function | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Response to slowly developing fires | |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |
| Dependence on length of the optical measuring Section | |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |
| Scattered light | |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |
| Voice alarm status | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Manual triggering of voice alarm | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Emergency microphone | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Signal-to-noise ratio | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Frequency response of the voice alarm system without microphone | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Frequency response of the voice alarm system with microphone | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Signalling range | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Change in light emission | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Smallest & largest effective light intensity | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Light colour | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Light pattern over time and flash frequency | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Tolerance for misalignment of the beam | |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |
| Synchronisation | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Frequency response limits | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |
| Nominal impedance | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |
| Horizontal and vertical beam angle | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |
| Maximum sound level | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |
| **Response delay** | |  | | | | | | | | | | | | | | | |
| Reception and processing of fire alarms | | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Output for forwarding the fire alarm state | | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Dependence of the fire alarm state on more than one alarm signal | | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Rapid changes in light attenuation | |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |
| Delay in the transition to the voice alarm state | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Output to alarm systems | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Emergency microphone | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| **Operational reliability** | |  | | | | | | | | | | | | | | | |
| General requirements | | X |  | X |  |  |  |  |  | X | X |  |  | X |  |  | X |
| General requirements for displays | | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Operational readiness state | | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Fire alarm status | | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fault alarm status | | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Shutdown status | | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Requirements for execution | | X |  |  |  |  |  |  |  | X |  |  |  | X |  |  |  |
| Additional requirements for the execution of software-controlled fire alarm systems | | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Labelling | | X |  | X |  |  |  |  |  |  |  |  |  | X | X |  |  |
| Functions | |  |  | X |  |  |  |  |  |  |  |  |  | X |  |  |  |
| Materials, manufacture and execution | |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Documentation. | |  |  | X |  |  | X | X |  |  |  |  | X |  |  |  | X |
| Service life | |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Structure | |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Labelling and data | |  | X |  |  |  |  |  |  |  |  |  |  | X |  | X | X |
| Life span test | |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Individual alarm display | |  |  |  | X | X | X |  | X |  |  |  | X |  |  |  |  |
| Connection of auxiliary devices | |  |  |  | X | X | X |  | X |  |  |  | X |  |  |  |  |
| Monitoring detachable detectors 2 | |  |  |  | X | X | X |  | X |  |  |  |  |  |  |  |  |
| Manufacturer comparisons | |  |  |  | X |  | X |  | X |  |  |  | X |  | X |  |  |
| Setting the response behaviour on site | |  |  |  | X2 |  | X |  | X |  |  |  | X |  | X |  |  |
| Additional requirements for software-controlled detectors 2 | |  |  |  | X | X | X |  | X |  |  |  | X |  |  |  |  |
| Protection from the penetration of foreign bodies | |  |  |  |  | X |  |  | X |  |  |  |  |  |  |  |  |
| Reset device | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Testing device | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Shape, dimensions, and colours | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Symbols and labelling | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Environmental category | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Additional requirements for software-controlled handheld fire detectors 2 | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Inspection of the testing device  (In operation) | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Reliability test (durability test) | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Voice alarm status | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Manual triggering of voice alarm | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Interface to external controls | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Additional requirements for the execution of software-controlled voice alarm systems | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| Mechanical strength of the pipeline | |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |
| Hardware structural elements and additional sensor units in the suction system | |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |
| Air flow monitoring | |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |
| Power supply | |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |
| Duration of operation | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Preventive measures for outdoor cables | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Flammability of materials | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Access | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Requirements for software-controlled devices | |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |
| Durability | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |
| Construction | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |
| Nominal noise power (durability) | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |
| Housing protection | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |
| Distance loss immunity | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Identification of the RF-connected component | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Performance characteristics of the receiver | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Immunity from interference | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Loss of communication | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Antenna | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Power supply device | |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  | X |
| Requirements for environmental assessment | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Distance loss immunity testing | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Testing to identifying the HF-connected structural elements | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Testing the performance characteristics of the receiver | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Verification of compatibility with other users of the frequency band | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Testing detection of loss of communication on a connection | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Testing the aerial | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X2) |
| Test plan for component testing | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Review of the service life of the autonomous energy source | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Testing fault alarm for the weak energy supply status | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X2) |
| Testing polarity reversal | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X2) |
| Repeatability test | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| **Permanence of operational reliability, moisture resistance, corrosion resistance, shock and vibration resistance, temperature resistance** | |  | | | | | | | | | | | | | | | |
| Cold in operation | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Vibration, sinusoidal  (in operation) | | X |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Vibration, sinusoidal (durability test) | | X |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |
| EMC immunity  (in operation) | | X | X2) | X | X | X | X | X2) | X | X | X | X | X | X |  |  | X |
| Supply voltage fluctuations  (in operation) | | X |  |  |  |  |  |  |  | X |  |  |  | X |  |  |  |
| Moist heat, constant (in operation) | | X |  | X |  | X |  |  | X | X |  |  | X | X |  |  | X2) |
| Moist heat, constant (durability test) | | X | X | X | X | X | X | X | X | X | X |  | X | X | X | X | X |
| Shock (in operation) | |  |  | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Dry heat  (in operation) | |  | X |  |  | X | X | X | X |  | X | X | X |  | X | X | X2) |
| Dry heat (durability test) | |  | X1) |  |  |  |  | X1) |  |  |  |  |  |  | X1) | X1) | X2) |
| Moist heat, cyclic (in operation) | |  | X |  | X |  | X | X |  |  | X | X |  |  | X | X | X2) |
| Moist heat, cyclic (durability test) | |  | X1) |  |  |  |  | X1) |  |  |  | X |  |  | X1) | X1) |  |
| Sulphur dioxide corrosion (durability test) | |  | X |  | X | X | X | X | X |  | X | X | X |  | X | X | X2) |
| Impact (in operation) | |  | X |  | X | X | X |  |  |  | X | X | X |  | X | X | X2) |
| Oscillation, sinusoidal (in operation) | |  | X |  | X | X | X | X |  | X | X | X | X | X | X | X | X |
| Oscillation, sinusoid (durability test) | |  | X |  | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Production by housing | |  | X |  |  |  |  | X1) |  |  |  |  |  |  | X |  |  |
| Fluctuations in supply parameters | |  |  |  | X | X | X | X | X |  | X | X | X |  |  |  |  |
| Shocks (in operation) | |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| Output power | |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| **Transmission power** | |  | | | | | | | | | | | | | | | |
| General requirements | |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |
| Requirements for functions | |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |
|  | X must be fulfilled  1 if the feature is required due to the application  2 if the feature is applicable to the construction product | | | | | | | | | | | | | | | | |

If harmonised standards are not available for structural elements of a fire alarm system, construction products described in DIN 14675-1:2020-01 or DIN VDE 0833-2:2017-10 may also be used.

The cables and lines necessary for the connection of individual construction products may be used if they are suitable for use, sufficiently dimensioned and suitable for the intended purpose according to technical best practices. In addition, the requirements for fire performance and functional integrity under fire impact must be observed in accordance with the Technical Rule included in MVV TB under ser. No A 2.2.1.8, taking into account Section 2 of the Technical Rule included in MVV TB, ser. No A 2.2.1.2.

2.3 Planning, design, and execution of fire alarm systems

Fire alarm systems whose technical planning, design and execution is carried out in accordance with DIN 14675‑1:2020-01 in conjunction with DIN VDE 0833-1:2014-10 and -2:2017-10, are deemed to fulfil the building inspection requirements unless more stringent requirements are imposed in the building supervisory procedure.

Fire alarm systems must be supplied with electricity for a sufficiently long time even in the event of a failure of the general power supply and remain functional.

The rules of planning, design and execution standards on maintenance are not part of this Technical Rule.

All necessary data must be stated in the fire protection certificate.

3 Alarm systems

3.1 Purpose of the installation

Alarm systems are hazard alerting systems. In the event of danger, they must alert and cause persons to leave the danger area by disseminating an emergency signal and/or a voice instruction. An alarm system shall consist of at least one control panel, an energy supply, trigger or control devices, signalling devices, and the connecting transmission path.

Voice alarms must be given at least in German language and be sufficiently comprehensible.

Alarm systems include electro-acoustic alarm systems in particular for issuing instructions, such as voice alarm systems or emergency warning systems. Alarm systems can also be executed as fire alarm systems with alarm function.

Tasks of alarm systems cannot be taken over by fire warning systems.

3.2 Alarm system construction products

In order to fulfil the building inspection requirements, alarm systems must be permanently reliable in operation and be constructed using construction products that are sufficiently powerful and permanently reliable in case of an alarm and have sufficient response delay; resistance to moisture, corrosion, and temperature; and shock and vibration resistance.

If construction products according to DIN EN 54 Parts 3, 4, 16, 17, 23, and 24 are used for fire alarm systems for the construction of alarm systems, the performance of key features shall be determined and declared at least in accordance with Table 1 of Section 2.2 Fire alarm systems of this Technical Rule.

The cables and lines necessary for the connection of individual construction products may be used if they are fit for use, sufficiently dimensioned, and suitable for the intended purpose. In addition, the requirements for fire characteristics and functional integrity under fire impact in accordance with the Technical Rule included in the MVV TB under ser. No A 2.2.1.8 must be observed, taking into account Section 2 of the Technical Rule included in the MVV TB under ser. No A 2.2.1.2.

3.3 Design, design, and execution of alarm systems

Alarm systems whose technical planning, designing, and execution observe the standards

* DIN 14675-1:2020-01 in conjunction with DIN VDE 0833-1:2014-10 and DIN VDE 0833‑2:2017-10,
* DIN 14675-1:2020-01 in conjunction with DIN VDE 0833-1:2014-10, DIN VDE 0833‑2:2017-10 and DIN VDE 0833‑4:2014-10 or
* DIN EN 50849 (DIN VDE 0828-1):2017-11

if the building regulations requirements are met, if there are no further requirements in the building supervision procedure or if further requirements arise for reasons of accessibility according to the Technical Rule referred to in the MVV TB under ser. No A 4.2.2.1. The rules of planning, design and execution standards on maintenance are not part of this Technical Rule.

In the case of alarm systems with acoustic signal transmitters, the switch off of the signals must also be possible in the immediate vicinity of the first contact point for the fire brigade or the assisting point.

An alarm system with voice alarm requires a voice alarm control system. The voice alarm system may be a separate unit or physically integrated with the fire alarm system. Fire alarm and voice alarm control may be located at the same location, including the structural elements required for their operation.

Alarm systems must be supplied with power for a sufficiently long time even in the event of a failure of the general power supply and remain operational.

All necessary data must be stated in the fire protection certificate.

4 Emergency lighting systems

4.1 Purpose of the installation

Emergency lighting systems are electrical systems, including associated wiring, with a power supply and more than one light, that illuminate rooms, escape routes or emergency signs even in case of power failure of the general lighting for as long as is needed to enable persons to safely leave the rooms or the building and – if required under building inspection rules – to reach public traffic areas, as well as to safely complete work operations where appropriate.

4.2 Construction products of emergency lighting systems

In order to comply with the building inspection requirements, emergency lighting systems must be permanently operationally reliable.

Construction products for emergency lighting systems must comply with the product requirements of European standards or, if only national technical rules such as DIN or DIN VDE standards are in place, with those Technical Rules.

Emergency luminaires complying with the standard DIN EN 60598-2-22 (VDE 0711-2-22):2020-12 meet the building approval requirements.

The cables and lines necessary for the connection of individual construction products may be used if they are fit for use, sufficiently dimensioned, and suitable for the intended purpose. In addition, the requirements for fire characteristics and functional integrity under fire impact in accordance with the Technical Rule included in the MVV TB under ser. No A 2.2.1.8 must be observed, taking into account Section 2 of the Technical Rule included in the MVV TB under ser. No A 2.2.1.2.

4.3 Planning, design, and execution of emergency lighting systems

Emergency lighting systems whose technical planning, designing and execution observes the DIN VDE 0100 series of standards (with the exception of Parts 801 et seq. of each standard), DIN V VDE V 0108-100-1:2018-12 and DIN EN 1838:2019-11 as well as Section 5 ‘Emergency power supply systems’ of this Technical Rule, are deemed to comply with the building inspection requirements unless more stringent requirements are imposed in the building supervisory procedure.

All necessary data must be stated in the fire protection certificate.

5 Emergency power supply systems

5.1 Purpose of the installation

Emergency power supply systems are electrical installations which, in the event of a failure of the general power supply, maintain the operation of the safety installations for a certain period of time. Emergency power supply systems include the power source (voltage source or energy storage), the required switching and auxiliary equipment, and the associated wiring up to the terminals of the safety equipment to be supplied with power.

Backup systems that are needed for operational reasons, are not considered to be emergency power supply systems in the building supervisory sense.

5.2 Construction products of emergency power supply systems

In order to fulfil the building inspection requirements, emergency power supply systems must be permanently reliable in operation.

Construction products for emergency power supply systems must comply with the product requirements of European standards or, if only national technical rules such as DIN or DIN VDE‑standards are in place, with those technical rules.

Power generators with reciprocating internal combustion engines that meet the requirements of the DIN 6280 series of standards as well as central power supply systems that meet the requirements of DIN EN 50171:2001-11 (DIN VDE 0558-508) are deemed to be compliant with the building inspection requirements.

The cables and lines necessary for the connection of individual construction products may be used if they are fit for use, sufficiently dimensioned, and suitable for the intended purpose. In addition, the requirements for fire characteristics and functional integrity under fire impact in accordance with the Technical Rule included in the MVV TB under ser. No A 2.2.1.8 must be observed, taking into account Section 2 of the Technical Rule included in the MVV TB under ser. No A 2.2.1.2.

5.3 Planning, design and execution of the emergency power supply systems

Emergency power supply systems whose technical planning, design and execution observes the DIN VDE 0100 series of standards (with the exception of Parts 801 ff of each standard), or the DIN VDE 0101 series of standards in the case of systems with a nominal voltage over 1000 V, are deemed to be compliant with the building inspection requirements unless more stringent requirements are imposed in the building supervisory procedure.

Emergency power supply systems shall be designed in such a way that, in the event of overload or short circuit, only the affected section is switched off, while the rest of the system remains in operation (selectiveness). Proof of selective fault switch-off may be provided with suitable engineering (calculation) methods.

The power source shall be designed such that it can maintain the power supply to the safety equipment for the required period of time. When designing the power source, its performance and start-up behaviour as well as the non-linearity of the consumers must be taken into account.

A dual system pursuant to DIN VDE 0100-560:2013-10, Section 6.1 ‘Power sources for emergency purposes’, final indent, is not deemed to fulfil the building inspection requirements for emergency power supply systems.

All necessary data must be stated in the fire protection certificate.

6 Ventilation systems

6.1 Purpose of the installation

Ventilation systems are used for the ventilation of rooms. The systems may be natural or mechanical ventilation systems. Mechanical systems include air-conditioning systems, climate control systems, and air heating systems.

Ventilation systems serve to meet the building inspection requirements for the adequate and effective ventilation of rooms.

6.2 Planning, designing and execution

Ventilation systems shall be planned, designed and executed in such a way that the building inspection requirements are met. The Technical Rules included in the MVV TB under serial numbers A 2.2.1.11 and A 3.2.6 must be observed.

Building inspection requirements may also be elaborated as technical best practices that have not been enacted in building supervisory rules.

Ventilation systems are to be designed in such a way that there is no risk of hygienic pollution of the room air.

Adequate ventilation of human occupancy areas requires a mechanical ventilation system if it cannot be ensured with natural ventilation.

If overflow openings are provided in room-closing walls for ventilation reasons, the regulations on overflow openings according to MVV TB, Section A 2.1.3.3.1 shall be observed.

In the case of fire dampers, proper closing must be checked after first installation in order to prevent damage during installation.

All necessary data must be stated in the fire protection certificate.

6.3 Construction products and designs

6.3.1 General provisions

Construction products and designs of ventilation systems shall be selected and used in accordance with technical and hygienic requirements. In particular, the place of installation, required temperature resistance, fire resistance time, the tightness requirements, required volume flow, pressure difference, location and ambient temperatures must all be taken into account.

Fire dampers according to EN 15650:2010[[103]](#footnote-103) with mechanical shut-off element may only be used in ventilation systems with the axle position of the mechanical shut-off element, which has been demonstrated by the fire resistance test specified in the above harmonised standard. The nominal trigger temperature of the thermal triggering device of the fire dampers must not exceed 72°C, or 95°C in the supply air for warm air ventilation systems.

Fire dampers used in atmospheres that may have a damaging or corrosive effect on them due to planned or unplanned chemical reactions are not in the scope of EN 15650:201040. These include atmospheres in exhaust air ducts or ventilation ducts in commercial kitchens.

6.3.2 Performance required to meet the building requirements

When using construction products with proof of fitness for purpose in accordance with § 17 MBO[[104]](#footnote-104) or when using designs pursuant to § 16a MBO41, the minimum classes shall be as given in Tables 1 to 3 and 6.

When using construction products for ventilation systems for which there are harmonised technical specifications pursuant to Regulation (EU) No 305/2011, the performance of key features shall be at least as given in Table 4 in conjunction with Table 5 and Table 7.

**Table 1:**

|  |  |  |  |
| --- | --- | --- | --- |
| Fire dampers in suspended ceilings (not in the scope of EN 15650:201040) | | | |
|  | **Minimum necessary** | | |
| Building inspection  Requirement | Fire resistance class according to DIN 4102-6:1977-09 and additional designation according to proof of fitness for purpose | Building material class pursuant to DIN 4102-1:1998-05 | |
|  |  | Housing, switch-off valve | Other structural elements |
| Fire-retardant | K 30 U | A2 | B2 |
| Highly fire-retardant | K 60 U |
| Fire-resistant | K 90 U |

**Table 2:**

|  |  |  |  |
| --- | --- | --- | --- |
| - Fire dampers in ventilation systems in waste or exhaust air ducts of commercial kitchens do not fall into the scope of EN 15650:201040 | | | |
| - Fire damper poppet valves that are not in the scope of EN 15650:201040 | | | |
|  | Minimum necessary | | |
| Building inspection  Requirement | Fire resistance class according to DIN 4102‑6:1977-09 | Building material class pursuant to DIN 4102-1:1998-05 | |
|  |  | Housing, switch-off valve | Other structural elements |
| Fire-retardant | K 30 | A2 | B2 |
| Highly fire-retardant | K 60 |
| Fire-resistant | K 90 |

**Table 3:**

|  |  |
| --- | --- |
| Shut-off devices and fire protection systems in ventilation systems in accordance with the Technical Rule referred to in MVV TB under Ser. No 2.2.1.11, Section 7.2 | |
|  | **Minimum necessary** |
| Building approval requirement | Fire resistance class according to DIN 4102-6:1977-09 and additional designation according to proof of fitness for use |
| Fire-retardant | K30-18017, K30-18017 S |
| Highly fire-retardant | K60-18017, K60-18017 S |
| Fire-resistant | K90-18017, K90-18017 S |

**Table 4:**

|  |  |
| --- | --- |
| Essential feature | Fire damper in accordance with EN 15650:201040 |
| Reference conditions for activation/response sensitivity | X |
| Response delay/response time | X |
| Operational safety (cycles) | 50 |
| Fire resistance⧫ |  |
| - Space barrier | K |
| - Thermal insulation | K |
| - Smoke leakage | K |
| - Mechanical strength (with respect to E) | X |
| - Retention of cross-section (with regard to E) | X |
| Durability |  |
| - of the response delay | X |
| - of operational safety | L |
| X must be fulfilled  K Classification required  L Performance required as a value (In the case of fire dampers with only temperature sensitive probes (without motor) the durability is demonstrated with the 50 cycles of operational safety).  ⧫ see Table 5 | |

**Table 5:**

|  |  |  |  |
| --- | --- | --- | --- |
| Fire dampers in accordance with EN 15650:201040 | | | |
|  | Minimum required performances | | |
| Building inspection  Requirement | Fire resistance | Fire performance | |
|  |  | Housing, switch-off valve | Other structural elements |
| Fire-retardant | EI 30 (veho i↔o)‑S | A 2-s1,d0 | E-d2 |
| Highly fire-retardant | EI 60 (veho i↔o)‑S |
| Fire-resistant | EI 90 (veho i↔o)‑S |
| Fire resistance of 120 minutes | EI 120 (veho i↔o)‑S |

**Table 6:**

|  |  |  |
| --- | --- | --- |
| Fire resistant ventilation ducts | | |
|  | Minimum necessary | |
| Building approval requirement | Fire-resistance class pursuant to DIN 4102-6:1977-09 and possibly DIN V 4102-21:2002-08 | Building material class pursuant to DIN 4102-1:1998-05 |
| Fire-retardant | L 30 | A2  by way of deviation from A 2.2.1.11, Section 3.2:  B1 |
| Highly fire-retardant | L 60 | A2 |
| Fire-resistant | L 90 |
| Fire resistance of 120 minutes | L 120 |
| For fire-resistant ventilation ducts that require a general building supervisory inspection certificate, see also Sections C 3.1 and C 4.4 of the MVV TB. | | |

**Table 7:**

|  |  |  |
| --- | --- | --- |
| Kits for fire-resistant ventilation ducts according to EAD 350142-00-1106[[105]](#footnote-105) | | |
|  | Minimum required performances | |
| Building approval requirement | Fire resistance | Fire performance1 |
| Fire-retardant | EI 30 (veho i↔o)S | A2 – s1,d0  by way of deviation from A 2.2.1.11, Section 3.2  C-s2, d2, otherwise |
| Highly fire-retardant | EI 60 (veho i↔o)S | A2 – s1,d0 |
| Fire-resistant | EI 90 (veho i↔o)S | A2 – s1,d0 |
| Fire resistance of 120 minutes | EI 120 (veho i↔o)S | A2 – s1,d0 |
| 1 Inside and outside | | |

6.3.3 Special provisions for use and execution

Kits for fire-resistant ventilation ducts pursuant to: EAD 350142-00-110642

Under Regulation (EU) No 305/2011, the manufacturer is required to provide an installation manual based on the classification document for kits for the construction of fire-resistant ventilation ducts under the ETA and in accordance with EAD 350142‑00‑110642 consisting of fire protection plates, sealants, connectors and fasteners. It shall contain at least the following information:

* Description of permitted four-sided duct constructions made of pipe fittings (materials, dimensions, reinforcing if any, pipe routing (vertical/horizontal/inclined), associated fittings, maximum storey height and load transfer for vertical ducts, suspensions, fasteners),
* Permitted operating pressure range,
* Type and minimum thickness of structural elements (wall/ceiling) that may be passed through by the ducts,
* Principles for the production of duct fittings from the fire protection plates and the connectors and sealants (e.g. glue, clamps, screws, reinforcing if any, including fasteners) with information about the joining method,
* Principles for the assembly of fittings into ducts and their installation, with information about the construction products to be used (e.g. suspensions, trusses, cladding of suspensions/trusses if any, compensators, permitted fasteners), joining method, necessary spacing, and any permitted later coatings,
* Execution and sealing of component passages as well as inspection opening closures,
* Notes on design and execution of the attachment,
* Processing instructions (e.g. with regard to permitted tools, sequence of operations in the production of the fitting, and joining them to make a duct),
* If applicable, instructions for transport and storage of fire protection plates,
* Instructions for maintenance.

Use is only permitted if the structural elements adjacent to the construction product described in the manufacturer’s installation manual are in compliance with the fire resistance requirements for the building structure.

In accordance with this installation manual, the user must install the ventilation ducts into the ventilation system, hand over the installation instructions to the client and produce an installation confirmation for proper installation, which is also to be handed over.

If the conditions of sentence 1 in conjunction with sentence 2 of this section are not fulfilled, there is no technical best practice under ETA based on EAD 350142-00-1106[[106]](#footnote-106) for fire-resistant ventilation duct kits.

7 Smoke extraction systems and smoke extractors

7.1 Purpose of smoke extraction systems and smoke extractors

Smoke extraction systems and smoke extractors are used to extract smoke in order to simultaneously support the fire brigade’s effective firefighting operations.

Smoke extraction systems and smoke extractors are required in accordance with special building regulations and special building guidelines. Smoke extraction systems and smoke extractors are also required if they are mandated in a building supervisory procedure.

If several smoke extraction devices have to work together in order to comply with the building regulation requirements, these devices form a system.

Closures of openings for the dissipation of smoke, e.g. in stairwells, are not considered smoke extraction systems in the sense intended here.

7.2 Planning, designing and execution

Smoke extraction systems and smoke extractors shall be planned, designed and constructed in such a way that the building approval requirements are met on the basis of the special building regulations, special building guidelines, and fire protection certificates.

Smoke extraction systems that are constructed in accordance with the relevant provisions of the DIN 18232 series of standards as well as according to this Technical Rule are also deemed to fulfil the building inspection requirements except where deviating individual requirements apply. The design of smoke extraction systems and smoke extraction devices may be done in accordance with fire protection engineering methods. The input parameters shall be documented in the building documents.

In the case of smoke extraction systems and smoke extractors, the supply air required for smoke extraction must be traceable. When a mechanical smoke extraction system starts up or opens the required supply air openings, the supply air systems must start up automatically. Where manual supply air openings are permitted, they shall be easily accessible and can be easily opened and remain open.

At no time must the door opening forces for doors in escape routes be greater than 100 N due to the operation of the smoke extraction system.

For the use of smoke extractors in roofing, A 2.1.9 shall be complied with in terms of location and arrangement as translucent surfaces if the performance according to Section 7.5.2 of DIN EN 12101‑2:2003-09 is not declared to be at least A2 – s1,d0; otherwise, the proof shall be provided in accordance with MVV TB, A 2.1.9 for roofing resistant to flying sparks and radiant heat (see Section 3, Table 3.2) or the structural installation shall respect the distances referred to in Section 32(2) of the MBO41.

All necessary data must be stated in the fire protection certificate.

7.3 Triggering – manual/automatic

Fire detectors shall be used to automatically trigger mechanical smoke extraction systems, which detect the expected fire characteristics. Fire detectors according to the DIN EN  54 series of standards can be used for this purpose.

Naturally acting smoke extraction systems and smoke extractors must be able to be automatically triggered by hand.

Switches or manual devices for triggering smoke extraction systems shall be placed in a position accessible at any time at a height of between 1.2 m and 1.6 m above the ground. The switches or manual triggering devices must be marked with a clearly legible ‘Smoke exhaust’ sign. The sign may be placed on the switch or housing or in the immediate vicinity thereof and must be durably attached. The colour of the switches or manual triggers shall not be red.

7.4 Ventilation openings

Openings that serve to supply the additional air necessary for smoke extraction must be marked with a clearly legible sign that reads ‘Supply air opening for smoke extraction system’.

7.5 Construction products and designs

7.5.1 General provisions

Smoke extraction systems shall consist of at least the operating and triggering devices as well as the respective smoke extraction devices. Mechanical smoke extraction systems may additionally comprise the smoke extraction ducts including necessary smoke control dampers.

Construction products for smoke extraction systems and smoke extractors shall be selected and used in accordance with the place of installation, required temperature resistance, required volume flow, pressure difference, required aerodynamically effective or geometric opening area, and location in terms of functional integrity and the effects of factors including wind, snow, and ambient temperatures.

The manufacturer’s detailed installation instructions and instructions for use must be provided in writing by the manufacturer in German for each installation location. The manufacturer shall provide detailed descriptions in the operating manual of the installation, inspection, repair, maintenance, and verification of functionality of the construction product. For construction products according to harmonised technical specifications, the installation manual must comply with the provisions of the classification reports.

The manufacturer’s installation and use instructions for the construction products to be used shall be taken into account and handed over to the customer.

In mechanical smoke extraction systems, mechanical smoke extraction devices according to EN 12101-3: 2015[[107]](#footnote-107) must be used. There is no defined technical best practice for the use of mechanical smoke extraction devices43.

Construction products such as windows and doors may be used to ensure the after-flow of supply air if it is ensured that the required free cross-section of smoke extraction systems and smoke extraction devices is maintained throughout the entire period of operation.

If smoke extraction dampers are also to be controlled manually in mechanical smoke extraction systems, these must be suitable for manual activation. Smoke dampers with mechanical shut-off elements according to EN 12101-8[[108]](#footnote-108) may only be used in mechanical smoke extraction systems with the axle position of the mechanical shut-off element, which has been demonstrated in accordance with the fire resistance test on both sides specified in the above-mentioned harmonised standard.

Smoke extraction ducts must not themselves contribute to the spread of fire and smoke in the structure. They must be non-combustible, temperature-resistant, and smoke-proof. Their dimensional stability (cross-section stability) and mechanical strength must be such that the envisaged amount of smoke can be dissipated. Smoke extraction ducts must be placed and designed in such manner that they do not contribute to the spread of fire by increasing the temperature at the outside of the ducts.

7.5.2 Performance required to meet the building requirements

If construction products are used with proof of usability in accordance with § 17 MBO41or application of construction types according to § 16a MBO41. The minimum required classes shall be shown in Table 1.

**Table 1:**

|  |  |  |  |
| --- | --- | --- | --- |
| Smoke extraction ducts pursuant to DIN V 18232-6:1997-10 in conjunction with DIN 4102-6:1977-09 | | | |
|  | Minimum necessary | | |
| Building approval requirement | Fire resistance class, category and compression level | Building material class according to DIN 4102-1:1998-05 |
| Fire-retardant | L 30, category 3, and pressure level 1/2/3\* | A2 |
| Highly fire-retardant | L 60, category 3, and pressure level 1/2/3\* |
| Fire-resistant | L 90, category 3, and pressure level 1/2/3\* |
| \* Depending on intended use, but at least pressure rating 1 | | | |

When using construction products for mechanical smoke extraction systems for which there are harmonised technical specifications pursuant to Regulation (EU) No 305/2011, the performance of key features shall be at least as given in Table 2 in conjunction with Table 3 and Table 4.

Explanation for Table 2

|  |  |
| --- | --- |
| **Column no.** | **Product according to harmonised standard** |
| 2 | EN 12101-2:2003 Smoke and heat control systems  Part 2: Specifications for natural smoke and heat extraction devices[[109]](#footnote-109) |
| 3 | EN 12101-3: 2015 Smoke and heat control  Part 3: Provisions for mechanical smoke and heat extractors44 |
| 4 | EN 12101-7:2011 Smoke and heat control systems – Part 7: Smoke duct Sections[[110]](#footnote-110) |
| 5 | EN 12101-8:2011 Smoke and heat control systems – Part 8: Smoke extraction dampers45 |
| 6 | EN 12101-10:2005/AC:2007 Smoke and heat control systems  Part 10: Energy supply[[111]](#footnote-111) |

**Table 2:**

| Essential feature | Product according to harmonised standard | | | | |
| --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 |
| **Nominal trigger conditions/sensitivity** | X |  |  |  |  |
|  |  | | | | |
| **Functional safety (Re)** | K |  |  |  |  |
| **Wind load (WL)** | K |  |  |  |  |
| **Aerodynamically effective opening surface# (Aa)** | L |  |  |  |  |
| **Performance under fire conditions** | K |  |  |  |  |
| **Fire performance of building materials** | K |  |  |  |  |
| **Operational reliability** |  | | | | |
| Application categories |  | K\* |  |  |  |
| Motor power |  | K |  |  |  |
| **Effectiveness of smoke/hot gas discharge: (similar to effectiveness of smoke and heat dissipation**) | X |  |  |  |  |
| Maintaining gas volume and pressure during the smoke and hot gas discharge test |  | L |  |  |  |
| **Fire-resistance** |  | K |  |  |  |
| **Ability to open under ambient conditions** |  | | | | |
| Opening under wind load within a specified time period |  | K\*\* |  |  |  |
| Open under snow load within a predetermined time (SL) | K | K\*\* |  |  |  |
| Opening at low ambient temperature within a predetermined time (T) | K |  |  |  |  |
| **Reference conditions for activation/response sensitivity** |  |  |  | X |  |
| **Operational safety** |  |  |  | K | X |
| **Fire resistance⧫, ⧫⧫** |  | | | | |
| Space barrier |  |  | K | K |  |
| Thermal insulation |  |  | K\*\*\* | K\*\*\* |  |
| Smoke-proof |  |  | K | K |  |
| Mechanical dimensional stability (under E) |  |  | X | X |  |
| Retention of cross-section (under E) |  |  | X | X |  |
| **Response delay/response time** | X | X\* |  | X, K | X |
| **Performance parameters under fire conditions** |  |  |  |  | X |
| **Durability of operational reliability** |  | K |  |  |  |
| **Durability** |  | | | | |
| Of response delay |  |  |  | X |  |
| Of operational safety |  |  |  | X |  |
| X must be fulfilled  X\* Must be fulfilled if K\*\* is required  L Value for the output required  K Classification required  K\* Specification of application categories required  K\*\* Classification required depending on use  K\*\*\* Specification only for smoke extraction ducts or smoke dampers for multiple Sections  # Not required if used in pressure ventilation systems according to Section 8  ⧫ - For smoke extraction ducts made of smoke extraction fittings according to EN 12101-7:2011, see Table 3  ⧫⧫ - For smoke dampers according to EN 12101-8:2011, see Table 4 | | | | | |

**Table 3:**

|  |  |  |
| --- | --- | --- |
| **- Fire-resistant smoke extraction ducts according to EN 12101-7:2011**[[112]](#footnote-112) | | |
| **- Fire-resistant smoke extraction ducts according to EAD 350142-00-1106**42 | | |
|  | **Minimum required performances** | |
| **Building approval requirement** | **Fire resistance** | **Fire performance** |
| Fire-retardant | EI 30 (ve –ho)Sxx1 multi | A 2‑s1, d0 |
| Highly fire-retardant | EI 60 (ve – ho)S xx1 multi |
| Fire-resistant | EI 90 (ve – ho)S xx1 multi |
| Fire resistance of 120 minutes | EI 120 (ve – ho)S xx1 multi |
| 1 Depending on the intended use, but not less than 500 Pa | | |

**Table 4:**

|  |  |  |  |
| --- | --- | --- | --- |
| Fire-resistant smoke extraction ducts according to EN 12101-8:201145 | | | |
|  | Minimum required performances | | |
| Building approval requirement | Fire resistance | Fire performance | |
|  | Damper blade, housing | Other structural elements |
| Fire-retardant | EI 30 (ve1-ho2 - i↔o) S xx3 Cxx4 MA/AA5 multi | A 2-s1, d0, | E-d2 |
| Highly fire-retardant | EI 60 (ve1-ho2- i↔o) S xx3 Cxx4 MA/AA5 multi |
| Fire-resistant | EI 90 (ve1-ho2- i↔o) S xx3 Cxx4 MA/AA5 multi |
| Fire resistance of 120 minutes | EI 120 (ve1-ho2- i↔o) S xx3 Cxx4 MA/AA5 multi |
| 1 Depending on the intended use: Vew, vedw, ved (ved only in conjunction with vew)  2 Depending on the intended use: how, hodw, hod(hod only in conjunction with how)  3 Depending on the intended use, but not less than 500 Pa  4 Depending on the intended use: C300 or C10000  5 depending on the use (see Section 7.5.1 and/or Section 8.2) | | | |

If construction products are to be used in structural works according to Table 2, column 2, in accordance with the Technical Rules referred to in MVV TB under points A 2.2.2.3, A 2.2.2.4 and A 2.2.1.15, the performance of key features according to the intended use and taking into account Section 7.2 shall be determined in order to meet the building requirements. At a minimum, performance is required on key features as listed in Table 5.

**Table 5:**

|  |  |
| --- | --- |
| At least necessary services for smoke extraction equipment for use in necessary stairwells of sales and assembly sites and in smoke extraction systems | |
| EN 12101‑2:200346 | |
| 4.1 — Nominal trigger conditions/sensitivity | Possibility of manual controllability (Section 4.1.1 b) |
| 6 — Aerodynamically effective opening area | Indication (m²) |
| 7.1.1 — Functional safety | Re 50 |
| 7.1.2 — Response delay (response time) | ≤ 60 s |
| 7.1.3 — Functional safety | Yes, if additional ventilation function |
| 7.2.1.1 — Opening under environmental conditions snow load, excluding installation inclination ≥ 60° | SL 500 |
| 7.3.1 — Opening under environmental conditions — low ambient temperature | T (-05) |
| 7.4.1 — Functional safety -wind load | WL 1500 |
| 7.5.1 — Thermal resistance classification | B 300 |
| 7.5.2 — Performance characteristics for thermal resistance | E – d2 |

7.5.3 Special provisions for use and execution

Kits for fire-resistant ventilation ducts pursuant to EAD 350142-00-110642

For kits for the construction of fire-resistant ventilation ducts pursuant to ETA and in accordance with EAD 350142-00-110642, consisting of fire protection plates, connectors, sealants and fasteners, the manufacturer is required under Regulation (EU) No 305/2011 to provide an installation manual based on the classification document. It shall contain at least the following information:

* Description of permitted four-sided duct constructions made of pipe fittings (materials, dimensions, reinforcing if any, duct routing (vertical/horizontal/inclined), associated fittings, maximum storey height and details of load transfer for vertical pipes, inspection openings, suspensions, fasteners),
* Permitted operating pressure range,
* Type and minimum thickness of structural elements (wall/ceiling) that may be passed through by the ducts,
* Principles for the production of pipe fittings from the fire protection plates and the connectors and sealants (e.g. glue, clamps, screws, reinforcing if any, including fasteners) with information about the joining method,
* Principles for the assembly of fittings into ducts and their installation, with information about the construction products to be used (e.g. suspensions, trusses, cladding of suspensions/trusses if any, compensators, permitted fasteners), joining method, necessary spacing, and any permitted later coatings,
* Execution and sealing of component passages as well as inspection opening closures,
* Notes on design and execution of the attachment,
* Processing instructions (e.g. with regard to permitted tools, sequence of operations in the production of the fitting, and joining them to make a duct),
* If applicable, instructions for transport and storage of fire protection plates,
* Instructions for maintenance.

If the conditions of sentence 1 in conjunction with sentence 2 of this section are not fulfilled, there is no technical best practice for ETA fire-resistant smoke extraction duct kits based on EAD 350142-00-110643.

8 Pressure ventilation systems

8.1 Purpose of the installations

Pressure ventilation systems are used to keep escape routes that require special protection under building supervisory rules as well as elevator shafts of firefighting lifts smoke-free so that persons can reach safety and effective firefighting is also supported.

The entry of smoke into internal safety staircases and firefighting lift shafts and their respective vestibules must be prevented by means of pressure ventilation systems. In addition, pressure ventilation systems may be required in certain individual escape routes according to a fire safety certificate or fire protection concept.

8.2 Planning, designing and execution

Pressure ventilation systems must ensure a continuous flow of air via the air path for external air intake, as well as overflow and outflow openings if relevant.

Pressure ventilation systems for safety staircases shall be dimensioned and constructed in such a way that the air volume flow

* in the case of open doors from the stairway to the ground floor affected by the fire at an average speed of at least 2.0 m/s in relation to the free door cross-section flowing opposite the direction of flight,
* flows in the same direction throughout the cross-section of the doors; and
* is discharged in a suitable manner on the floor where the fire occurs.

By way of deviation, the air volume flow through the open door of the front compartment of a firefighting elevator shall flow at an average speed of at least 0.75 m/s.

The operation of the pressure ventilation system must not result in doors in escape routes no longer being able to be opened due to high pressure differences. The maximum door opening force is 100 N. It must not be exceeded at the doors of the landing, even if one of the two doors is open. After opening and closing doors to the emergency stairwell or landing, the setpoint must be restored within 3 seconds.

The requirements for throughput speeds through the open entrance doors and the door opening forces on closed anteroom doors also apply to foreseeable adverse weather conditions.

Switching off the pressure ventilation systems by smoke extraction devices is not permitted.

If there is only one internal emergency stairwell, operational replacement devices must take over their function if the devices required to maintain the overpressure fail.

Switchgear assemblies, control units, regulating units and ventilators of the pressure ventilation system must be installed in such manner that the pressure ventilation system is effective for a sufficiently long time.

External air intake

The external air intake required for a pressure ventilation system shall be so arranged that no smoke can be sucked in, and it is at least 2.5 m away from windows, other external wall openings and external walls with combustible building materials and exterior wall cladding.

Outdoor and supply air ducts

These pipes must be trained in terms of fire resistance and fire behaviour in accordance with the fire protection requirements for ventilation systems. Fire and smoke dampers shall not be used in these ducts.

When using flaps in the outdoor air or supply air duct, the drives must be connected or equipped with a secure energy supply.

Exhaust air and smoke extraction lines

These pipes must be trained in terms of fire resistance and fire behaviour in accordance with the fire protection requirements for smoke extraction systems. Smoke dampers and fans may be used in these pipes.

Overflow openings

It must be possible to flush air through the landings of emergency stairwells even when the doors are closed. This may be achieved with overflow openings**.**

The closure of the overflow opening between the landing and stairwell is not subject to any requirements in terms of fire resistance: it is sufficient to have one flap that closes in case of air flow in the direction of the stairwell.

The closure of the overflow opening between the landing and the firefighting lift shaft is not subject to any requirements with regard to fire resistance; a motorised or other device-driven flap is sufficient.

In the wall between the landing and necessary corridor or unit, the closure of the overflow opening must have the same fire resistance time as the wall.

Closures must not be controlled via a smoke-triggered device. Flaps that are kept open or driven by motor or other devices must be connected to a secure energy supply.

Outflow openings

Outlets and outflow openings shall be placed such that the effectiveness of the pressure ventilation system is ensured even in adverse weather conditions.

Windows in the façade of the fire-affected storey may be used as outflow openings. These shall be arranged per outflow area on opposite façades.

If outflow takes place via a shaft, smoke dampers must be integrated in the shaft wall.

Exhaust air openings (outlets) of ducts from which combustion gases may escape into the ambient air must be situated or designed in accordance with the fire protection requirements for ventilation systems. MVV TB Section A 2.2, ser. No A 2.2.1.11, Section 5.1.2 No. 1). Fire dampers shall not be used.

Necessary information in the fire protection concept

All necessary data must be stated in the fire protection certificate.

8.3 Triggering

The pressure ventilation systems must be triggered automatically in case of fire.

Where automatic fire alarm systems are required or available, they must trigger the pressure ventilation systems.

In the absence of a fire alarm system, the triggering shall be carried out at least by means of appropriate triggering devices controlled by smoke detectors positioned in the area of access to the safety staircase (excluding vestibules) and to the firefighting front compartment and in the area of the necessary discharge openings. Smoke detectors pursuant to the DIN EN 54 series of standards are suitable for detection.

If pressure ventilation systems are also to be triggered by hand, switches shall be used, which shall be positioned between 1.2 m and 1.6 m above the ground. The switches shall be marked with a clearly legible sign that reads ‘Pressure ventilation system’. The sign may be placed on the switch or housing or in the immediate vicinity thereof and must be durably attached. The colour of switches shall not be red.

Necessary outflow outlets should only be controlled automatically.

The pressure ventilation system must reach its full functionality and effectiveness within 120 seconds after triggering.

When controlling or triggering via a programmable system, its programming status must also be documented. The change in the programming state or changes to the operating and system software is a significant change in the pressure ventilation system. If the control or activation is to take place via a programmable system, a safety-technical control concept shall be created.

Energy supply

Pressure ventilation systems required by the building authority must be supplied with sufficient power and remain functional, even in the event of a failure of the general power supply; this is considered to be fulfilled when connected to a security power supply system.

8.4 Construction products and types of pressure ventilation systems

Pressure ventilation systems consist of construction products and structural elements (e.g. fan, outflow elements) necessary for the function of the pressure ventilation system. Doors and windows may be used for outflow.

Construction products for pressure ventilation systems shall be selected and used in accordance with the place of installation, required temperature resistance, required volume flow, pressure difference, and location in terms of functional integrity and the effects of factors including wind, snow and ambient temperatures.

In order to meet the building authority requirements, the building products to be used in accordance with harmonised technical specifications require services for key features at least in accordance with Section 6, Tables 4, 5 and 7 and Section 7, Tables 2 to 5. Otherwise, Section 6, Table 6 applies.

Supply air fans may be operated with frequency converters. Repair switches on fans must be monitored or secured against unauthorised actuation. The sound pressure level in the stairwell as produced by the pressure ventilation system must not exceed 85 dB(A) at a distance of 5 m from the air outlet. For fire lifts, a maximum sound pressure level of 80 dB(A) generated by the pressure ventilation system is allowed at 0.5 m distance from the microphone in the car, in the fire department access level and at the tableau for emergencies and tests.

A fire damper without duct connection according to EN 1565040 may be used as a closure for the overflow opening between a landing and necessary corridor or unit; a classification of EI 90 (ve i↔o)-S pursuant to DIN EN 13501-3:2010-02 is sufficient. Fire dampers with a mechanical switch-off element may be used in pressure ventilation systems only with the axis position of the mechanical switch-off element that has passed the fire resistance test according to DIN EN 1366‑2:1999-10. The nominal triggering temperature of the thermal actuator of the fire dampers must not exceed 72 °C.

9 CO-warning systems

9.1 Purpose of the installation

CO-warning systems are hazard detection systems. They serve to warn persons as soon as dangerous amounts of carbon monoxide (CO) are reached in garages.

9.2 Construction products of CO-warning systems

The construction products used must be suitable for measurement, evaluation, and warning.

The CO-warning system includes all construction products (such as intake points, measuring points, ducts, transmission equipment, backup power supply, control unit, visual and audible signalling devices, etc.) that are needed to maintain the operation of the CO-warning system.

9.3 Planning, designing and execution of CO-warning systems

CO-warning systems shall be planned, designed and executed in such a way that the CO content is reliably recorded in all garage areas and an alarm is sounded when the CO content in the air exceeds 250 ppm. Technical best practices shall be followed unless stated otherwise below. In systems that fulfil additional functions, the CO‑warning system component must allow independent operation and testing.

The CO measuring points shall be positioned at a height of approximately 1.50 m above the floor and shall be arranged in such a way as to reliably detect areas for which increased CO concentrations are to be expected.

Co-warning systems must be supplied with electricity for a sufficiently long time even in the event of a failure of the general power supply and remain functional. The signalling must remain activated for as long as the CO concentration exceeds the limit.

All necessary data must be stated in the fire protection certificate.

10 Fire extinguishing systems

10.1 Purpose of the installation

Automatic fire extinguishing systems detect a fire event at an early stage and generally serve to contain/limit the fire source or directly extinguish the fire event. Manual, non-automatic systems such as hydrant systems with wet or dry risers support effective firefighting work. Both types of systems serve primarily to rescue humans and animals but can also be efficient in reducing fire, material and environmental damage.

Fire extinguishers include all types of fixed, non-automatic fire extinguishing systems (ns-FLA) and fixed automatic fire extinguishing systems (s-FLA). The extinguishing agent may be water or any other substance capable of controlling the spread of fire or of extinguishing it.

Non-automatic fire extinguishing systems consist of a network of ducts (including dry and wet risers) as well as withdrawal points, wall hydrants for the fire department (F type), or outdoor hydrants. Automatic fire extinguishing systems are fixed firefighting systems. The extinguishing agent is water, e.g. in sprinkler‑, spraying, or mist extinguishing systems. Systems using other types of extinguishing agents may also be used. This can be e.g. installations with foam, CO2, nitrogen, inert gases, halogenated hydrocarbons or powder extinguishing agents, as well as water extinguishing plants containing foaming agents.

10.2 Construction products of fire extinguishers

In fire extinguishing systems, only those construction products (products, building materials, structural elements and systems, as well as kits pursuant to § 2 No. 2 of Regulation [EU] No 305/2011) may be installed and operated that are necessary and suitable for the operation of the systems. Other construction products, e.g. safety devices for drinking water, must not affect the effectiveness of the fire extinguishing system. They must also not affect the operation of the fire extinguishing systems.

Construction products that may come into contact with drinking water or that are connected to the drinking water mains must be suitable for such use.

As construction products for sprinkler and spray water extinguishing systems, the construction products of the standard series DIN EN 12259 may be used, for extinguishing systems with gaseous extinguishing agents, the construction products of the standard series DIN EN 12094 may be used.

For other extinguishing systems, including with other extinguishing agents, e.g. foam-based extinguishing agents, the construction products as specified in the standards for the design and design of such systems shall be used.

Wall hydrants according to EN 671-1[[113]](#footnote-113) and EN 671-2[[114]](#footnote-114), above-ground hydrants according to EN 14384[[115]](#footnote-115), and underground hydrants according to EN 14339[[116]](#footnote-116) may be used for non-automatic fire extinguishing systems.

10.3 Required performance of construction products for fire extinguishers

Construction products must be sufficiently powerful and permanently reliable; have sufficient response delay and resistance to moisture, corrosion and temperature; and shock and vibration resistance. The construction products must be hydraulically suitable for the particular application and have sufficient pressure resistance as well as permanent ease of operation.

The choice of products, taking into account the intended use, must be based on the information on the key features and properties.

In order to fulfil the building inspection requirements, the performance of the construction products used in terms of key features must at least satisfy the following Tables 1 to 3.

Explanation for Table 1

|  |  |
| --- | --- |
| Column no. | Product according to harmonised standard |
| 2 | EN 12259-1:1999 + A1:2001 + A2:2004 + A3:2006 Part 1: Sprinklers[[117]](#footnote-117) |
| 3 | EN 12259-2:1999 + A1:2001 + AC:2002 + A2:2005 Part 2: Wet alarm valve assemblies[[118]](#footnote-118) |
| 4 | EN 12259-3:2000 + A1:2001 + A2:2005: Dry alarm valve assemblies[[119]](#footnote-119) |
| 5 | EN 12259-4: 2000 + A1:2001 Part 4: Water motor alarms[[120]](#footnote-120) |
| 6 | EN 12259-5:2002 Part 5: Water flow detectors[[121]](#footnote-121) |

**Table 1:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Essential feature | Construction products for fixed firefighting systems – structural elements for sprinkler and spray water systems according to harmonised standard | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 |
| Nominal trigger conditions | X |  |  |  |  |
| Extinguishing agent distribution | X |  |  |  |  |
| Response delay (response time) | X | X | X | X | X |
| Reliability | X |  |  |  |  |
| Durability  - Heat resistance,  - Temperature shock resistance | X |  |  |  |  |
| Corrosion resistance | X |  |  |  |  |
| Operational reliability |  | X | X | X | X |
| Performance in case of fire |  | X | X | X |  |
| Response delay – Durability |  | X | X | X |  |
| Operational reliability – Durability  - Ageing of non-metallic structural elements; and  - Fire stress |  | X | X | X |  |
| Nominal response conditions |  |  |  |  | X |
| Operational reliability stability  - Corrosion resistance  - Strength of non-metallic structural elements |  |  |  |  | X |
| X must be fulfilled | | | | | |

Explanation for Table 2

|  |  |
| --- | --- |
| Column no. | Product according to harmonised standard |
| 2 | EN 671-1:2012 Fixed fire extinguishing systems — Wall hydraulics — Part 1: Hose reels with dimensionally stable hose50 |
| 3 | EN 671-2:2012 Fixed fire extinguishing systems — Wall hydrants — Part 2: Hose systems with lay-flat hose51 |

**Table 2:**

| Essential feature | Construction products for fixed firefighting systems – Hose systems – pursuant to harmonised standard | |
| --- | --- | --- |
| 1 | 2 | 3 |
| **Distribution of extinguishing agent with:** |  | |
| Hose inner diameter | X | X |
| Minimum flow rate | X | X |
| Effective throwing range | X | X |
| Spraying jet operation | X | X |
| **Functional safety/operational reliability** |  | |
| Reel – Construction | X |  |
| Reel – Turning | X |  |
| Reel – Swivelling | X |  |
| Reel – Resistance to shock | X |  |
| Reel – Resistance to loads | X |  |
| Hose – General | X | X |
| Lockable jet pipe – General | X | X |
| Lockable jet pipe – Resistance to impact | X | X |
| Lockable jet pipe – Torque for operation | X | X |
| Shut-off valve on the water connection |  | X |
| Shut-off valve on the water connection – General | X |  |
| Shut-off valve on the water connection – Manually operated shut-off valve | X |  |
| Shut-off valve on the water connection – Automatic shut-off valve | X |  |
| Hydraulic properties – Strength under internal pressure load | X |  |
| Hydraulic properties – Compressive strength | X |  |
| Hydraulic properties – Resistance to internal pressure |  | X |
| Hydraulic properties, safety of couplings |  | X |
| **Ease of unrolling the hose** |  | |
| Reel – Unwinding force | X |  |
| Reel – Dynamic braking | X |  |
| Hose – Maximum length | X |  |
| Hose retention device, type 1 |  | X |
| Hose retention device, type 1 and type 3 |  | X |
| **Durability of functional safety/operational reliability** |  | |
| Resistance to corrosion of coated parts | X | X |
| Corrosion resistance of water-impacted parts | X | X |
| Ageing test for plastic parts | X | X |
| X must be fulfilled | | |

Explanation for Table 3

|  |  |
| --- | --- |
| Column no. | Product according to harmonised standard |
| 2 | EN 12094-1:2003 Part 1: Requirements and test methods for automatic electric control and delay devices[[122]](#footnote-122) |
| 3 | EN 12094-2:2003 Part 2: Requirements and test methods for automatic non-electric control and delay devices[[123]](#footnote-123) |
| 4 | EN 12094-3:2003 Part 3: Requirements and test methods for manual triggering and stop switches[[124]](#footnote-124) |
| 5 | EN 12094-4:2004 Part 4: Requirements and test methods for container valve assemblies and their actuators[[125]](#footnote-125) |
| 6 | EN 12094-5:2006 Part 5: Requirements and test methods for high- and low-pressure selector valves and their actuators[[126]](#footnote-126) |
| 7 | EN 12094-6:2006 Part 6: Requirements and test methods for non-electric  disabling devices[[127]](#footnote-127) |
| 8 | EN 12094-7:2000 + A1:2005 Part 7: Requirements and test methods for nozzles  for CO2 systems[[128]](#footnote-128) |
| 9 | EN 12094-8:2006 Part 8: Requirements and test methods for connectors[[129]](#footnote-129) |
| 11 | EN 12094-9:2003 Part 9: Requirements and test methods for special fire detectors[[130]](#footnote-130) |
| 12 | EN 12094-10:2003 Part 10: Requirements and test methods for pressure gauges and pressure switches[[131]](#footnote-131) |
| 13 | EN 12094-11:2003 Part 11: Requirements and test methods for mechanical  weighing devices[[132]](#footnote-132) |
| 14 | EN 12094-12:2003 Part 12: Requirements and test methods for pneumatic alarm devices[[133]](#footnote-133) |
| 15 | EN 12094-13:2001/AC:2002 Part 13: Requirements and test methods for check valves and non-return valves[[134]](#footnote-134) |

**Table 3:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Essential  feature | Construction product for gas extinguishing systems according to harmonised standard | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Response delay (response time) | X | X |  | X |  | X |  |  | X |  |  |  |  |
| Operational safety |  |  |  |  |  |  |  |  |  |  |  |  | X |
| Operational reliability | X | X | X | X | X |  |  | X | X |  | X | X |  |
| Stability of operational reliability against corrosion |  | X |  |  |  |  |  |  | X |  |  |  | X |
| Stability of operational reliability; Swinging |  |  |  |  |  |  |  |  | X |  |  |  | X |
| Durability of operational reliability against corrosion |  |  | X |  |  |  |  |  |  |  | X |  |  |
| Durability of operational reliability |  |  |  |  | X | X |  | X |  |  |  | X |  |
| Performance in case of fire | X | X | X | X |  |  |  | X |  |  |  |  |  |
| Durability | X |  |  | X |  |  |  |  |  |  |  |  |  |
| Extinguishing agent distribution |  |  |  |  | X |  | X |  |  |  |  |  | X |
| Nominal triggering conditions/sensitivity |  |  |  |  |  |  |  |  | X |  |  |  |  |
| Nominal response conditions – Response sensitivity – Pressure switch |  |  |  |  |  |  |  |  |  | X |  |  |  |
| Nominal response conditions – Response sensitivity – Pressure gauges |  |  |  |  |  |  |  |  |  | X |  |  |  |
| Operational reliability – Pressure switch |  |  |  |  |  |  |  |  |  | X |  |  |  |
| Operational reliability – Pressure gauges |  |  |  |  |  |  |  |  |  | X |  |  |  |
| Stability of operational reliability of pressure measurement devices against corrosion |  |  |  |  |  |  |  |  |  | X |  |  |  |
| Stability of operational reliability of pressure switches against corrosion |  |  |  |  |  |  |  |  |  | X |  |  |  |
| X must be fulfilled | | | | | | | | | | | | | |

10.4 Planning and design of automatic and non-automatic firefighting systems

10.4.1 General requirements

Firefighting systems shall be designed and constructed in accordance with the space-defining structure of the building structure and existing building materials and combustible materials, their distribution and position within the room and their combustion characteristics and – with respect to the fire detection and triggering devices, suitable extinguishing agents, quantities of extinguishing agents, and required operational ranges for the extinguishing agents – in accordance with the rules applicable in each individual case. Where necessary, pump systems shall be constructed to increase the pressure.

Automatic firefighting systems, systems with wall hydrants for the fire service (type F), and systems with dry extinguishing water ducts must be situated on each floor in each part of the structure where they are required under building supervisory rules.

Compliance with the requirements for qualifications (competence, training and certification) as a planner and installer in standards are not binding for the achievement of the building authority protection objectives.

The rules of the design and design standards with regard to maintenance are not part of this building authority Technical Rule. The requirements with regard to maintenance in accordance with § 3 MBO41 are not affected.

All necessary data must be stated in the fire protection certificate.

10.4.2 Automatic firefighting systems

The design, installation, and design of sprinkler systems as automatic firefighting systems shall be undertaken in accordance with the provisions of DIN EN 12845:2020-11 (Fixed firefighting systems – Automatic sprinkler systems – Designing, installation and maintenance).

Where sprinkler systems are to be designed based on a different body of technical rules (e.g. CEA 4001, FM Global Data Sheets, VdS CEA 4001), this must be stated in the fire protection certificate.

If a sprinkler system cannot or should not be used, the fire protection certificate shall specify the technology to be used and the regulation to be applied to it. With regard to the selected extinguishing agents, the necessary protective measures, e.g. in the case of gas extinguishing systems according to the standard series DIN EN 15004, should be noted.

Combining or cross-referencing different or competing regulations or individual provisions thereof is not permitted.

When a required automatic fire extinguishing system is triggered, a fire alarm must automatically sound via a suitable fire alarm device at the local fire service control centre, unless otherwise stipulated by the building inspectorate.

10.4.3 Non-automatic firefighting systems

Non-automatic firefighting systems shall be dimensioned and constructed in accordance with the technical body of technical rules. The building inspection requirements are deemed fulfilled if DIN 14462:2012-09 is observed.

10.5 Water supply

If the extinguishing water supply is to be provided through a direct connection of the extinguishing systems to the general drinking water supply, the relevant requirements of water legislation must be observed. If extinguishing water cannot be supplied from the drinking water mains, the necessary extinguishing water must be stored in suitable containers (tanks, ponds, etc). The entire installation of the extinguishing system through which the extinguishing water flows must be suitable for the water used; this must be checked before the extinguishing system is implemented.

If fixed automatic firefighting systems are to be supplied together with fixed non-automatic systems from a shared water storage, then sufficient water volumes must be stored as required to fulfil both protection objectives. A failure of the water source for one extinguishing system must not impair the effectiveness and operational safety of the second extinguishing system. This is considered to be fulfilled if independent sources of extinguishing water supply the extinguishing systems.

In case of a non-direct connection to the general drinking water supply, at least one storage tank and a technical device for transporting the extinguishing water are required, taking into account and observing the appropriate design criteria.

10.6 Protection of persons

Automatic extinguishing systems that use technical gases for firefighting purposes or light foam as an extinguishing agent may only trigger their extinguishing process after detection of a fire when users have been alerted and have had sufficient time to leave the affected area (room/protected area). This does not affect the forwarding of the fire alarm.

10.7 Storage room

The main structural elements of the fire extinguishing system, such as the pump system and its switching cabinet, pressure maintenance systems/devices with fittings, alarm valves, auxiliary generators and main gate valves, controls and alerting devices, must be installed in a separate room (fire extinguishing room). In case of non-centrally located alarm valves/sprinkler sub-centres, structural separation is not required if unauthorised access is prevented through suitable measures, e.g. wire mesh, and the area concerned is a sprinkler-protected area.

Access to the firefighting room must be quick and safe at all times, including in the event of fire.

10.8 Installation and operation

Simultaneous decommissioning of non-automatic and automatic fire extinguishing systems is not permitted.

## Annex 18

**Use of normal flammability glazing in external walls, excluding exterior wall structures with inter-storey cavities or airspaces and façades**

Last updated: July 2022

Instead of non-combustible glazing in external walls, normal flammability glazing may be used if the glazing with multi-pane insulating glass with laminated safety glass consists of single non-flammable glass (e.g. float glass, single pane safety glass) and intermediate films and the multi-pane insulating glass with laminated safety glass is at least normal flame resistant and the glazing does not contribute to a permanent flame propagation in the event of fire.

This is considered to be met by laminated safety glass with a maximum of two 0.38 mm thick polyvinyl butyral (PVB) films per liner. These composite safety glasses may also be arranged in several disk planes (e.g. as outer, middle and inner panes). The disc edges must be protected from flame by a glass holder made of non-combustible materials. If this is to be deviated from this, a proof of applicability according to § 16a MBO[[135]](#footnote-135) is required.

# Source of supply certification

Standards (DIN, DIN V, DIN V ENV, DIN EN, DIN EN ISO, DIN CEN/TS, DIN SPEC, Eurocode), AD datasheets, DIN technical reports

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

EADs (European Assessment Documents)

[www.eota.eu](https://www.eota.eu)

ETAGs (European Technical Approvals Guidelines)

[www.eota.eu](https://www.eota.eu)

Application guideline for working scaffolds as per DIN EN 12811-1

November 2005 version

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Application guideline for falsework in accordance with DIN EN 12812

August 2009 version

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Building inspection guideline on the ventilation of windowless kitchens, bathrooms and toilets in apartments,

April 2009 version, as last amended on 1 July 2010

[www.is-argebau.de](file:///C:\Users\redmann.petra\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\7DEPHNBU\www.is-argebau.de)

Construction and test principles for coatings for concrete, plaster and screed surfaces in catching tubs and collecting chambers

August 2017 version

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Design method for anchor rails (German application document for EOTA TR 047 dated March 2018)

Last updated: August 2020

German Institute for Building Technology (DIBt)

[www.dibt.de](file:///C:\Users\redmann.petra\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\7DEPHNBU\www.dibt.de)

Design method for anchor rails under fatigue-relevant load (German application document for EOTA TR 050 dated October 2018)

Last updated: August 2020

German Institute for Building Technology (DIBt)

[www.dibt.de](file:///C:\Users\redmann.petra\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\7DEPHNBU\www.dibt.de)

Design procedure for plastic anchors for anchoring in concrete and masonry   
(German application document for EOTA TR 064 of May 2018)

Last updated: August 2019

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Design procedure for metal injection anchors   
for anchoring in masonry, (German application document for EOTA TR 054 of April 2016)

Last updated: August 2019

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Design of flat slabs, individual foundations and ground slabs made of reinforced concrete with double-headed anchors as punching shear reinforcement (German application document for EOTA TR 060 of November 2017)

Last updated: August 2019

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Design of flat ceilings, individual foundations and floor slabs made of reinforced concrete with grid beams as punching shear reinforcement (German application document for EOTA TR 058 of June 2017)

Last updated: August 2019

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

DAfStb Guideline on concrete in accordance with DIN EN 206-1 and DIN 1045-2 with recycled aggregates in accordance with DIN EN 12620

September 2010 version

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DAfStb Guideline on concrete construction when handling water-endangering substances – BUmwS

March 2011 version

German Committee for Reinforced Concrete - Deutscher Ausschuss für Stahlbeton e. V. (DAfStb)

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DAfStb Guideline for concrete with extended processing time (slow setting concrete)

November 2006 version

German Committee for Reinforced Concrete - Deutscher Ausschuss für Stahlbeton e. V. (DAfStb)

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DAfStb Guideline on the manufacture and use of dry concrete and dry mortar (Dry Concrete Guideline) – TrBMR –

June 2005 version

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DAfStb Guideline for the production and use of cement bonded concrete and mortar – VeBMR —

November 2011 version

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DAfStb Guideline for solid concrete structural elements

April 2010 version

German Committee for Reinforced Concrete - Deutscher Ausschuss für Stahlbeton e. V. (DAfStb)

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DAfStb Guideline on the protection and repair of concrete structural elements (Repair Guideline)

October 2001 version

Part 1: General rules and planning principles

Part 2: Construction products and application

Part 3: Requirements pertaining to enterprises and the monitoring of execution

Part 4: Test procedure

Corrigendum 1 (2002-01)

Corrigendum 2 (2005-12)

Corrigendum 3 (2014-09)

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DAfStb Guideline on self-compacting concrete – SVBR

September 2012 version

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DAfStb Guideline on steel fibre concrete

Additions and amendments to DIN EN 1992-1-1 in conjunction with DIN EN 1992‑1‑ 1/NA, DIN EN 206-1 in conjunction with DIN 1045-2 and DIN EN 13670 in conjunction with DIN 1045-3, Parts 1 to 3

June 2021 version

German Committee for Reinforced Concrete - Deutscher Ausschuss für Stahlbeton e. V. (DAfStb)

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DAfStb Guideline on the use of silicon-rich fly ash and boiler sand in concrete structural elements in contact with soil, groundwater or precipitation

June 2020 version

German Committee for Reinforced Concrete - Deutscher Ausschuss für Stahlbeton e. V. (DAfStb)

Beuth Verlag GmbH

[www.beuth.de](http://www.beuth.de)

DAfStb guideline Preventive measures against harmful alkali reaction in concrete (alkali‑direct line)

October 2013 version

German Committee for Reinforced Concrete - Deutscher Ausschuss für Stahlbeton e. V. (DAfStb)

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

DASt Guideline 021

Bolt assemblies with hot-dip galvanised HV-sets M39 to M72 as per DIN EN 14399-4, DIN EN 14399-6

September 2013 version

Stahlbau Verlags- und Service GmbH

[shop.deutscherstahlbau.de](https://shop.deutscherstahlbau.de)

DASt Guideline 022

Hot-dip galvanising of structural steel structural elements

June 2016 version

Stahlbau Verlags- und Service GmbH

[shop.deutscherstahlbau.de](https://shop.deutscherstahlbau.de)

DASt Guideline 024

Tightening of screwed connections of dimensions M12 to M36

June 2018 version

Stahlbau Verlags- und Service GmbH

[shop.deutscherstahlbau.de](file:///\\ddibt.local\users\abr\Documentum\Checkout\shop.deutscherstahlbau.de)

DASt Guideline 027

Determination of component temperature of hot-dip galvanised steel structural elements in case of fire

November 2020 version

Stahlbau Verlags- und Service GmbH

[shop.deutscherstahlbau.de](file:///\\ddibt.local\users\abr\Documentum\Checkout\shop.deutscherstahlbau.de)

‘Execution and evaluation of on-site tests for injection anchor systems in masonry with ETA according to ETAG 029 or EAD 330076-00-0604

Last updated: September 2019

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Execution and evaluation of tests during construction for plastic anchors in concrete and masonry with ETA according to EAD 330284-00-0604 or ETAG 020

Last updated: September 2019

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

DVS Guideline DVS 1708:2009-09

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

Recommendations for the design and calculation of embankments with geosynthetic – EBGEO

Deutsche Gesellschaft für Geotechnik

2010 version

Ernst & Sohn Verlag für Architektur und technische Wissenschaften GmbH & Co. KG

[www.ernst-und-sohn.de](https://www.ernst-und-sohn.de)

ETB Guideline ‘structural elements that protect against falls’

June 1985 version

Mitteilungen IfBt (News IfBt [Institute for Structural Engineering]) Volume 2/1987

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

Technical Rule Furnace and air heating — TR OL 2006

2010 version

Zentralverband Sanitär Heizung Klima [Central Association of Sanitary Heating Air Conditioning]

[www.zvshk.de](https://www.zvshk.de)

Notes on the installation of anchors

October 2010 version

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Maintenance of concrete structures (TR maintenance):

Part 1 – Scope and planning of maintenance

Part 2 – Characteristics of products or systems for repair and regulations for their use

May 2020 version

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Loam construction rules

February 2008 version

Dachverband Lehm e. V.  
[www.dachverband-lehm.de](https://www.dachverband-lehm.de)

Model Regulation on the Construction and Operation of Garages – MGarVO

May 2008 version

[www.is-argebau.de](https://www.is-argebau.de)

Model Regulation on the construction of operating spaces for electrical installations – EltBauVO

Version of January 2009, as last amended by decision of the Commission for Construction Supervision of 22.2.2022

[www.is-argebau.de](https://www.is-argebau.de)

Model combustion ordinance – MFeuV

Version of September 2007, as last amended by decision of the Commission for Construction Supervision of 27.9.2017

[www.is-argebau.de](https://www.is-argebau.de)

Model Manufacturer and User Ordinance – MHAVO

March 2018 version

[www.is-argebau.de](https://www.is-argebau.de)

Model Guideline on building authority requirements for schools – MSchulbauR

April 2009 version

[www.is-argebau.de](https://www.is-argebau.de)

Model Directive on building authority requirements for forms of housing for people in need of care or with disabilities – MWR

May 2012 version

[www.is-argebau.de](https://www.is-argebau.de)

Model Directive on fire protection requirements for structural elements and exterior wall coverings in wood construction – MHolzBauRL

Version: October 2020

[www.dibt.de](https://www.is-argebau.de)

Model Directive on fire protection requirements pertaining to conduits – MLAR

Version of 10.2.2015, last amended by decision of the Commission for Construction Supervision of 03.9.2020

[www.is-argebau.de](https://www.is-argebau.de)

Model Guideline on fire protection requirements for ventilation systems – M-LüAR

Version: 29.9.2005, last amended by decision of the Commission for Construction Supervision of 03.9.2020

[www.is-argebau.de](https://www.is-argebau.de)

Model Directive on fire protection requirements pertaining to system floors – MSysBöR

September 2005 version

[www.is-argebau.de](http://www.is-argebau.de)

Model Directive on the construction and operation of high-rise buildings – MHHR

April 2008 version, modified February 2012

[www.is-argebau.de](https://www.is-argebau.de)

Model guideline on structural fire protection in industrial buildings (MIndBauRL):

May 2019 version

Model directive on fire protection during the storage of plastic secondary materials (MKLR)

June 1996 version

[www.is-argebau.de](https://www.is-argebau.de)

Model directive on fire service areas

October 2009 version

[www.is-argebau.de](https://www.is-argebau.de)

Model Regulation on the construction and operation of accommodation facilities – MBeVO

May 2014 version

[www.is-argebau.de](https://www.is-argebau.de)

Model of a Regulation on the construction of operating rooms for electrical installations (EltBauVO):

Version of January 2009, as last amended by decision of the Commission for Construction Supervision of 22.2.2022

[www.is-argebau.de](file:///C:\Users\redmann.petra\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\7DEPHNBU\www.is-argebau.de)

Model Regulation on the construction and operation of retail outlets – MVKVO

July 2014 version

[www.is-argebau.de](https://www.is-argebau.de)

Model Regulation on the construction and operation of meeting places – MVStättVO

July 2014 version

[www.is-argebau.de](https://www.is-argebau.de)

Test principles for chimney cleaning hatches and soot barriers

November 2012 version

German Institute for Building Technology (DIBt)

[www.dibt.de](http://www.dibt.de)

Test principles for the issuing of general building inspection certificates for seals in conjunction with tiles and slab surfaces

Part 1: Liquid-applied seals – PG AIV-F

Last updated: March 2018

Part 2: Sheet-type seals – PG AIV-B

Last updated: March 2018

Part 3: Slab-shaped seals – PG AIV-P

Last updated: March 2018

Part 4: Additional tests on sealing systems in connection with useful layers (PG AIV N)

Last updated: July 2021

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Test principles for issuing general building authority test certificates for building waterproofing with liquid plastics – PG‑FLK

July 2019 version

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Test principles for the conferral of general building authority test certificates for rigid and flexible mineral slurry seals as well as flexible polymer-modified thick coatings for the waterproofing of structures – PG-MDS/FPD

November 2016 version

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Test principles for the issuing of general building authority test certificates for joint seals in structural elements made of concrete, among others, with high water penetration resistance in the area in contact with the ground – PG-FBB

Part 1: Waterproofing for construction joints and crack cross-sections, transitions, and connections

Last updated: May 2020

Part 2: Seals for expansion joints

Last updated: July 2021

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Test plan for refurbishment of timber structural elements contaminated with pentachlorophenol (PCP)‑

Last updated: January 2006

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Guideline for the demonstration of stability of metal-plastic composite profiles

August 1986 version

Mitteilungen IfBt (News IfBt [Institute for Structural Engineering]) Volume 6/1986

Ernst & Sohn Verlag für Architektur und technische Wissenschaften GmbH & Co. KG

[www.ernst-und-sohn.de](https://www.ernst-und-sohn.de)

Guideline concerned with the appraisal and restoration of building materials and structural elements in structures which are contaminated with PCB

September 1994 version

Mitteilungen IfBt (IfBt News) Volume 2/1995

Ernst & Sohn Verlag für Architektur und technische Wissenschaften GmbH & Co. KG

[www.ernst-und-sohn.de](https://www.ernst-und-sohn.de)

Guideline concerned with the appraisal and restoration of building materials and structural elements in structures which are contaminated with PCP

October 1996 version

Mitteilungen IfBt (IfBt News) Volume 1/1997

Ernst & Sohn Verlag für Architektur und technische Wissenschaften GmbH & Co. KG

[www.ernst-und-sohn.de](https://www.ernst-und-sohn.de)

Guideline on the manufacture and use of dry concrete and dry mortar – TrBMR

June 2005 version

German Committee for Reinforced Concrete - Deutscher Ausschuss für Stahlbeton e. V. (DAfStb)

Beuth Verlag GmbH

[www.beuth.de](https://www.beuth.de/)

Guideline on the monitoring of wall, ceiling and roof elements for wooden frame houses built using the panel construction method as per DIN 1052 Parts 1 to 3

June 1992 version

Mitteilungen IfBt (News IfBt [Institute for Structural Engineering]) Volume 1/1993

Ernst & Sohn Verlag für Architektur und technische Wissenschaften GmbH & Co. KG

[www.ernst-und-sohn.de](https://www.ernst-und-sohn.de)

Guideline for standardising traffic area surfaces RStO 01

FGSV Verlag GmbH

[www.fgsv-verlag.de](https://www.fgsv-verlag.de)

Guideline for wind turbines

Influences and proofs of stability for tower and foundation

October 2012 version, corrected version March 2015

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

Guideline on automatic sliding doors in escape routes – AutSchR

December 1997 version

[www.is-argebau.de](https://www.is-argebau.de)

Guideline on electrical locking systems for doors in escape routes – EltVTR

December 1997 version

[www.is-argebau.de](https://www.is-argebau.de)

Technical specifications/technical test regulations for construction materials for producing bridge decks on concrete with a waterproofing layer made of fluid synthetic materials

(TL/TP BEL – B, Part 3)

Version 1995

Federal Ministry of Transport, Department of Road Construction

Verkehrsblatt-Verlag Borgmann GmbH & Co KG

[www.verkehrsblatt.de](https://www.verkehrsblatt.de)

Technical specifications and test methods for surface protection systems (TL/TP OS)

Version 1996

Verkehrsblatt-Verlag Borgmann GmbH & Co KG

[www.verkehrsblatt.de](https://www.verkehrsblatt.de)

Technical Rules for liquid gas (TRF 2012)

wvgw Wirtschafts- und Verlagsgesellschaft Gas und Wasser mbH

[shop.wvgw.de](https://shop.wvgw.de)

Technical Rules for Flammable Liquids (TRbF)

UWS Environmental Management GmbH

[www.umwelt-online.de](https://www.umwelt-online.de)

Technical Rules for Gas Installations (DVGW G 600)

September 2018 version

Beuth Verlag GmbH, Wirtschafts- und Verlagsgesellschaft Gas und Wasser mbH

[www.beuth.de](https://www.beuth.de/)

Technical Rules for Oil Installations (TRÖl 2.1)

Version 12/2019

Institut für Wärme und Öltechnik e.V. [Institute of Heat and Oil Technology]

[www.zukunftsheizen.de](https://www.zukunftsheizen.de)

Regulation on the European List of Wastes (Waste List Regulation — AVV)

Date of issue: 10/12/2001

[www.gesetze-im-internet.de](file:///C:\Users\redmann.petra\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\7DEPHNBU\www.gesetze-im-internet.de)

List of testing laboratories, inspection bodies and certification bodies according to state building regulations (PÜZ list)

German Institute for Building Technology (DIBt)

[www.dibt.de](https://www.dibt.de)

1. Notified in accordance with Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services (OJ L 241, 17.9.2015, p. 1). [↑](#footnote-ref-1)
2. 1 According to national law [↑](#footnote-ref-2)
3. 2 For building regulations requirements in this Technical Building Regulation, a deviation pursuant to § 85a Section 1 sentence 3 MBO is excluded; a deviation from requirements under building regulations can only be considered under § 67 MBO. § 16a Para. 2 and § 17(1) MBO are not affected. [↑](#footnote-ref-3)
4. 4 Regulations for the fulfilment of other basic requirements for structural works must be observed. [↑](#footnote-ref-4)
5. 1 According to national law [↑](#footnote-ref-5)
6. 2 For building inspection requirements in this Technical Building Regulation, a deviation pursuant to § 85a Section 1 sentence 3 MBO is excluded; a deviation from building inspection requirements is permitted only in accordance with § 67 MBO. § 16a Para. 2 and § 17(1) MBO are not affected. [↑](#footnote-ref-6)
7. 4 Regulations for the fulfilment of other basic requirements for structural works must be observed. [↑](#footnote-ref-7)
8. 10 This chapter does not apply in the Free State of Bavaria [↑](#footnote-ref-8)
9. According to national law [↑](#footnote-ref-9)
10. Implemented in Germany by DIN EN 438-7:2005-04. [↑](#footnote-ref-10)
11. Implemented in Germany by DIN EN 13162:2015-04. [↑](#footnote-ref-11)
12. Implemented in Germany by DIN EN 13168:2015-04. [↑](#footnote-ref-12)
13. Implemented in Germany by DIN EN 13170:2015-04. [↑](#footnote-ref-13)
14. Implemented in Germany by DIN EN 13171:2015-04. [↑](#footnote-ref-14)
15. Implemented in Germany by DIN EN 13950:2014-09. [↑](#footnote-ref-15)
16. Implemented in Germany by DIN EN 13964:2014-08. [↑](#footnote-ref-16)
17. Implemented in Germany by DIN EN 13986:2015-06. [↑](#footnote-ref-17)
18. Implemented in Germany by DIN EN 14064-1:2010-06. [↑](#footnote-ref-18)
19. Implemented in Germany by DIN EN 14190:2014-09. [↑](#footnote-ref-19)
20. Implemented in Germany by DIN EN 14303:2013-04. [↑](#footnote-ref-20)
21. Implemented in Germany by DIN EN 15037-4:2013-08. [↑](#footnote-ref-21)
22. Implemented in Germany by DIN EN 15498:2008-08. [↑](#footnote-ref-22)
23. Implemented in Germany by DIN EN 50575:2017-02. [↑](#footnote-ref-23)
24. Implemented in Germany by DIN EN 492:2018-07 [↑](#footnote-ref-24)
25. Implemented in Germany by DIN EN 494:2015-12. [↑](#footnote-ref-25)
26. Implemented in Germany by DIN EN 534:2010-07. [↑](#footnote-ref-26)
27. Implemented in Germany by DIN EN 1873:2006-03. [↑](#footnote-ref-27)
28. Implemented in Germany by DIN EN 13707:2009-10. [↑](#footnote-ref-28)
29. Implemented in Germany by DIN EN 13956:2013-03. [↑](#footnote-ref-29)
30. Implemented in Germany by DIN EN 14351:2016-12. [↑](#footnote-ref-30)
31. Implemented in Germany by DIN EN 14783:2013-07. [↑](#footnote-ref-31)
32. Implemented in Germany by DIN EN 14963:2006-12. [↑](#footnote-ref-32)
33. Excluding structural elements according to B 2.2.1.6 made of construction products according to harmonised technical specifications. [↑](#footnote-ref-33)
34. Implemented in Germany by DIN EN 16034:2014-12. [↑](#footnote-ref-34)
35. Implemented in Germany by DIN EN 13241:2016-12. [↑](#footnote-ref-35)
36. Implemented in Germany by DIN EN 12219:2000-06 [↑](#footnote-ref-36)
37. Implemented in Germany by DIN EN 1634-1:2018-04 [↑](#footnote-ref-37)
38. Implemented in Germany by DIN EN 1634-3:2005-01 [↑](#footnote-ref-38)
39. Implemented in Germany by DIN EN 81-58:2018-05 [↑](#footnote-ref-39)
40. Implemented in Germany by DIN EN 12219:2000-06 [↑](#footnote-ref-40)
41. Implemented in Germany by DIN EN 12101-2:2003-09. [↑](#footnote-ref-41)
42. According to national law [↑](#footnote-ref-42)
43. Active use is the targeted use of substances to achieve particular product properties. Not 'actively used' substances are those which are present in the product as contaminations and/or minor constituents. [↑](#footnote-ref-43)
44. For example, the substance reacts completely to form another compound, is completely encapsulated or bound, or a threshold value for the most sensitive end point could be derived for the substance. [↑](#footnote-ref-44)
45. for example, elastic floor coverings, textile floor coverings, laminate floor coverings, surface coated/glued parquet and wooden floors, synthetic resin screeds, artificial resin-based stone, composite floor coverings, cork floor coverings, sports floors, floor coverings, surface coatings for wood floors, elastic floor coverings and cork floors. [↑](#footnote-ref-45)
46. floor covering adhesives and structural adhesive bonds. [↑](#footnote-ref-46)
47. Ratio C*i*/LCI*i*, in which C*i* is the mass concentration in the air in the reference area and LCI*i* is the LCI value of the compound *i*. [↑](#footnote-ref-47)
48. Target compounds are the substances listed in the LCI list in Annex 2 hereto. [↑](#footnote-ref-48)
49. Requirements for parquets and wooden floors with proportions of smoked wood. [↑](#footnote-ref-49)
50. Requirement for products according to Section 2.2.1, with proportions of vulcanised or unvulcanised rubber, containing vulcanisation agents with nitrosamine releasers and/or recycled rubber structural elements. [↑](#footnote-ref-50)
51. A European harmonised test procedure for PAHs is currently being developed. The GC method according to DIN ISO 18287:2006-05 is optionally permitted until this test procedure is published. [↑](#footnote-ref-51)
52. Requirements for products pursuant to Section 2.2.1, without direct contact with the building user, which contain raw materials with recycling proportions of rubber or raw materials with use of PAH-containing extender oils or PAH-containing soot. [↑](#footnote-ref-52)
53. According to national law [↑](#footnote-ref-53)
54. The term ‘hazardous substances’ is used in the Construction Products Regulation and refers to substances that are relevant to construction products and are restricted or prohibited by EU and/or Member State provisions due to the risk of harmful effects. [↑](#footnote-ref-54)
55. Active use is the targeted use of substances to achieve particular product properties. Not ‘actively used’ substances are those which are present in the product as contaminations and/or minor constituents. [↑](#footnote-ref-55)
56. For example, the substance reacts completely to form another compound, is completely encapsulated or bound, or a threshold value for the most sensitive end point could be derived for the substance and is adhered to. [↑](#footnote-ref-56)
57. The test values for the release of hazardous substances listed in ABuG are based on the LAWA de-minimis thresholds: LAWA: ‘Drainage of de-minimis thresholds for groundwater’, December 2004. Available from Kulturbuch‑Verlag GmbH, Postfach 47 04 49, 12313 Berlin or downloadable from the LAWA website: www.lawa.de. [↑](#footnote-ref-57)
58. For the release of hazardous substances from hardened concrete, see derived transfer functions in Annex II-B to the ‘Principles for assessing the impact of construction products on soil and groundwater – version 2011’. [↑](#footnote-ref-58)
59. Ordinance on the European Waste Catalogue (EWC Ordinance) of 10 December 2001, as amended. [↑](#footnote-ref-59)
60. Implemented in Germany by DIN EN 15435:2008-10. [↑](#footnote-ref-60)
61. Implemented in Germany by DIN EN 15498:2008-08. [↑](#footnote-ref-61)
62. Implemented in Germany by DIN EN 13163:2017-02. [↑](#footnote-ref-62)
63. When applying TR ‘Thermal insulation composite system with ETA pursuant to ETAG 004’ in respect of the fire characteristics of permanent polystyrene formwork kits, it should be borne in mind that under state building regulations, ‘flame-resistant’ is only required for the surfaces of exterior walls of buildings in building classes 4 and 5. ‘normal flammability’ is sufficient for building classes 1 to 3. [↑](#footnote-ref-63)
64. Implemented in Germany by DIN EN 13240:2005-10 + DIN EN 13240 Corrigendum 1 2008-06 [↑](#footnote-ref-64)
65. Implemented in Germany by DIN EN 13229:2005-10 + DIN EN 13229 Corrigendum 1:2008-06 [↑](#footnote-ref-65)
66. Implemented in Germany by DIN EN 12815:2005-09 + DIN EN 12815 Corrigendum 1:2008-06 [↑](#footnote-ref-66)
67. Implemented in Germany by DIN EN 12809:2005-08 + DIN EN 12809 Corrigendum 1:2008-06 [↑](#footnote-ref-67)
68. Implemented in Germany by DIN EN 15250:2007-06 + DIN EN 15250 Corrigendum 1:2015-05 [↑](#footnote-ref-68)
69. Implemented in Germany by DIN EN 14785:2006-09 + DIN EN 14785 Corrigendum 1:2007-10 [↑](#footnote-ref-69)
70. Implemented in Germany by DIN EN 15821:2011-01 [↑](#footnote-ref-70)
71. Implemented in Germany by DIN EN 1:2007-12 [↑](#footnote-ref-71)
72. Implemented in Germany by DIN EN 1858:2011-09 [↑](#footnote-ref-72)
73. Implemented in Germany by DIN EN 12446:2011-09 [↑](#footnote-ref-73)
74. Implemented in Germany by DIN EN 13069:2005-12 [↑](#footnote-ref-74)
75. Implemented in Germany by DIN EN 1806:2006-10 [↑](#footnote-ref-75)
76. Implemented in Germany by DIN EN 1856-1:2009-09 [↑](#footnote-ref-76)
77. Implemented in Germany by DIN EN 1457-1:2012-04 [↑](#footnote-ref-77)
78. Implemented in Germany by DIN EN 1457-2:2012-04 [↑](#footnote-ref-78)
79. Implemented in Germany by DIN EN 1856-2:2009-09 [↑](#footnote-ref-79)
80. Implemented in Germany by DIN EN 1857:2010-08 [↑](#footnote-ref-80)
81. Implemented in Germany by DIN EN 13063-1:2007-10 [↑](#footnote-ref-81)
82. Implemented in Germany by DIN EN 13063-2:2005-12 [↑](#footnote-ref-82)
83. Implemented in Germany by DIN EN 13063-3:2007-10 [↑](#footnote-ref-83)
84. Implemented in Germany by DIN EN 14471:2015-03 [↑](#footnote-ref-84)
85. Implemented in Germany by DIN EN 14989-1:2007-05 [↑](#footnote-ref-85)
86. Implemented in Germany by DIN EN 14989-2:2008-03 [↑](#footnote-ref-86)
87. In Germany implemented by DIN EN 54-2:1997-12 in conjunction with DIN EN 54-2/A1:2007-01 [↑](#footnote-ref-87)
88. Implemented in Germany by DIN EN 54-3:2006-08 [↑](#footnote-ref-88)
89. In Germany implemented by DIN EN 54-4:1997-12 in conjunction with DIN EN 54-4/A1:2003-03 + DIN EN 54-4/A2:2007-01 [↑](#footnote-ref-89)
90. Implemented in Germany by DIN EN 54-5:2018-10 [↑](#footnote-ref-90)
91. Implemented in Germany by DIN EN 54-7:2018-10 [↑](#footnote-ref-91)
92. Implemented in Germany by DIN EN 54-10:2002-05 + DIN EN 54-10/A1:2006-03 [↑](#footnote-ref-92)
93. Implemented in Germany by DIN EN 54-11:2001-10 + DIN EN -54-11/A1:2006-03 [↑](#footnote-ref-93)
94. In Germany implemented by DIN EN 54-12:2015-10 in conjunction with DIN EN 54-12 Corrigendum 1:2018-08 [↑](#footnote-ref-94)
95. Implemented in Germany by DIN EN 54-16:2008-06 [↑](#footnote-ref-95)
96. Implemented in Germany by DIN EN 54-17:2006-03 [↑](#footnote-ref-96)
97. Implemented in Germany by DIN EN 54-1: 2006-03 and DIN EN 54-18 Corrigendum 1: 2007-05 [↑](#footnote-ref-97)
98. Implemented in Germany by DIN EN 54-20:2009-02 [↑](#footnote-ref-98)
99. Implemented in Germany by DIN EN 54-21:2006-08 [↑](#footnote-ref-99)
100. Implemented in Germany by DIN EN 54-23:2010-06 [↑](#footnote-ref-100)
101. Implemented in Germany by DIN EN 54-24:2008-06 [↑](#footnote-ref-101)
102. Implemented in Germany by DIN EN 54-25:2009-02 and DIN EN 54-25 Corrigendum 1:2012-09 [↑](#footnote-ref-102)
103. Implemented in Germany by DIN EN 15650:2010-09 [↑](#footnote-ref-103)
104. According to national law [↑](#footnote-ref-104)
105. Issue date EAD September 2017 [↑](#footnote-ref-105)
106. Application of § 16a MBO [↑](#footnote-ref-106)
107. Implemented in Germany by DIN EN 12101-3:2015-12 [↑](#footnote-ref-107)
108. Implemented in Germany by DIN EN 12101-8:2011-08 [↑](#footnote-ref-108)
109. Implemented in Germany by DIN EN 12101-2:2003-09 [↑](#footnote-ref-109)
110. Implemented in Germany by DIN EN 12101-7:2011-07 [↑](#footnote-ref-110)
111. Implemented in Germany by DIN EN 12101-10:2006-01 and DIN EN 12101-10/ Corrigendum 1: 2009-07 [↑](#footnote-ref-111)
112. Implemented in Germany by DIN EN 12101-7:2011-08 [↑](#footnote-ref-112)
113. Implemented in Germany by DIN EN 671-1:2012-07 [↑](#footnote-ref-113)
114. Implemented in Germany by DIN EN 671-2:2012-07 [↑](#footnote-ref-114)
115. Implemented in Germany by DIN EN 14384:2005-10 + DIN EN 14384 Corrigendum 1:2007-07 [↑](#footnote-ref-115)
116. Implemented in Germany by DIN EN 14339:2005-10 + DIN EN 14339 Corrigendum 1:2007-07 [↑](#footnote-ref-116)
117. Implemented in Germany by DIN EN 12259-1: 2006-03 and DIN EN 12259-1 Corrigendum 1: 2007-01 [↑](#footnote-ref-117)
118. Implemented in Germany by DIN EN 2259-2:2001-08 + DIN EN 12259-2/A2:2006-02 [↑](#footnote-ref-118)
119. Implemented in Germany by DIN EN 12259-1: 2001-08 and DIN EN 12259-3 Corrigendum 1: 2008-06 [↑](#footnote-ref-119)
120. Implemented in Germany by DIN EN 12259-4:2001-08 [↑](#footnote-ref-120)
121. Implemented in Germany by DIN EN 12259-5:2002-12 [↑](#footnote-ref-121)
122. Implemented in Germany by DIN EN 12094-1: 2003-07 and DIN EN 12094-1 / Corrigendum 1: 2006-09 [↑](#footnote-ref-122)
123. Implemented in Germany by DIN EN 12094-2:2003-09 [↑](#footnote-ref-123)
124. Implemented in Germany by DIN EN 12094-3:2003-07 [↑](#footnote-ref-124)
125. Implemented in Germany by DIN EN 12094-4:2004-10 [↑](#footnote-ref-125)
126. Implemented in Germany by DIN EN 12094-5:2006-07 [↑](#footnote-ref-126)
127. Implemented in Germany by DIN EN 12094-6:2006-07 [↑](#footnote-ref-127)
128. Implemented in Germany by DIN EN 12094-7:2005-04 [↑](#footnote-ref-128)
129. Implemented in Germany by DIN EN 12094-8:2006-07 [↑](#footnote-ref-129)
130. Implemented in Germany by DIN EN 12094-9:2003-07 [↑](#footnote-ref-130)
131. Implemented in Germany by DIN EN 12094-10:2003-09 [↑](#footnote-ref-131)
132. Implemented in Germany by DIN EN 12094-11:2003-07 [↑](#footnote-ref-132)
133. Implemented in Germany by DIN EN 12094-12:2003-07 [↑](#footnote-ref-133)
134. Implemented in Germany by DIN EN 12094-13:2001-06 + Corrigendum 1 to DIN EN 12094-13:2002-06 [↑](#footnote-ref-134)
135. According to national law [↑](#footnote-ref-135)