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Changes to the administrative provision model for Technical Building Regulations (Muster-Verwaltungsvorschrift Technische Baubestimmungen [MVV TB]) - Version 2024/1*

Contents:

* 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).

A - Technical Building Regulations to be observed to meet the basic requirements for buildings

A 1 Mechanical strength and stability

A 1.1 General information

Under § 3 and § 12(1) of the MBO[1] 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) MBO[1]

1 According to national law

Ser. No	Planning, designing and execution requirements pursuant to Section 85a(2) MBO[1]	Technical rules/version	Further measures pursuant to § 85a(2) MBO[1]
1	2	3	4
A 1.2.2	**Structural works in earthworks and foundations**		
A 1.2.2.7	Execution of special geotechnical work (special civil engineering) - Injections, jet grouting, design of consolidated soil bodies - Produced using jet grouting, deep mixing or injection methods	DIN EN 12715:2000-10: DIN SPEC 18187:2015-08 DIN EN 12716:2019-03: DIN 4093:2015-11	Annex A 1.2.2/4
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 DIN 1045-1:2023-08 DIN 1045-1000:2023-08	Annex A 1.2.3/1 Annex A 1.2.3/2
	Structural fire design	DIN EN 1992-1-2:2010-12 DIN EN 1992-1-2/NA:2010-12 DIN EN 1992-1-2/NA/A1:2015-09 DIN EN 1992-1-2/A1:2019-11 DIN EN 1992-1-2/NA/A2:2021-04	Annex A 1.2.3/1 Annex A 1.2.3/3
	Concrete, reinforced concrete and prestressed concrete structures	DIN 1045-2:2023-08	Annex A 1.2.3/1 Annex A 1.2.3/4
	Execution of concrete structures	DIN 1045-3:2023-08	Annex A 1.2.3/1 Annex A 1.2.3/4
	Prefabricated parts	DIN 1045-4:2023-08	Annex A 1.2.3/1
A 1.2.3.2	Protection and repair of concrete structural components	Technical Rule on the maintenance of concrete structures:2020-05 [Technische Regel (DIBt) Instandhaltung von Betonbauwerken – TR Instandhaltung] Part 1 – Field of application and maintenance planning Part 2 – Characteristics of repair products or systems and regulations for their use in conjunction with the Directive of the German Committee for Reinforced Concrete (DAfStb) – Protection and Repair of Concrete Components:2001-10 Cor. 1:2002-01 Cor. 3:2014-09	Annex A 1.2.3/5
A 1.2.3.6	Application in structures of prefabricated components of lightweight aggregate concrete with open structure with structural or non-structural reinforcement	DIN 4213:2015-10 DIN 4213/A1:2022-08	Annex A 1.2.3/1 Sections 1, 2.2, 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 for anchors in concrete with cemented or post-installed fasteners:2023-03 (See Annex 2)	

1 According to national law

Ser. No	Planning, designing and execution requirements pursuant to Section 85a(2) of the Model Building Code (MBO)[1]	Technical rules/version	Further measures pursuant to Section 85a(2) MBO[1]
1	2	3	4
A 1.2.4	**Structural works in metal and composite construction**		
A 1.2.4.1	Design of steel structures		
	Crane supporting structures	DIN EN 1993-6:2010-12 DIN EN 1993-6/NA:2022-06	
	Above ground cylindrical flat bottom tank structures	DIN EN 1993-4-2:2017-09 DIN EN 1993-4-2/NA:2018-12	Annex A 1.2.4/8
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:2021-06	Annex A 1.2.5/1
	Structural fire design	DIN EN 1995-1-2:2010-12 DIN EN 1995-1-2/NA:2010-12	Annex A 1.2.3/3
A 1.2.5.2	Wood preservation	DIN 68800-1:2019-06 DIN 68800-2:2022-02	Annex A 1.2.5/2
A 1.2.6	**Structural works in masonry structures**		
A 1.2.6.1	Design of masonry structures		
	Structural fire design	DIN EN 1996-1-2:2011-04 DIN EN 1996-1-2/NA:2022-09	Annex A 1.2.6/2

1 According to federal state law

Annex A 1.2.2/4

Re DIN EN 12716 Additional requirements for the material composition of the suspension:
Cements according to DIN EN 197-1:2011-11, as well as additives and admixtures according to DIN 1045-2:2023-08.

Annex A 1.2.3/1

1 Section C 2.1 of this Model Administration Regulation Technical Building Regulations (MVV TB) regulates the requirements for construction products used in concrete, reinforced concrete, and prestressed concrete construction.

2 Prefabricated parts
2.1 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.

2.2 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.

2.3 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.

2.4 For individual garages pursuant to EN 13978-1:2005[1], 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.

2.5 When using bricks according to EN 15037-3:2009+A1:2011[2] 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.

2.6 Parts 1 and 2 of the ‘DAfStb Guideline on concrete ceilings and roofs made of prefabricated slabs’ (01-2023) must be taken into account for the planning, design and execution of concrete ceilings/roofs made of prefabricated slabs. In the absence of a generally accepted rule of the technique for demonstrating the integrity of a component (see MVV TB, A 2.1.3.3), evidence pursuant to Section 16a of the MBO[3] shall be required.

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 Section 16a MBO[3] shall be 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); As of 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); As of August 2019.

6 In the planning and design of structural elements made of steel fibre 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.

7 Re DIN 1045-1000: 2023-08

The requirements for communication and its documentation in parts of Sections 4 and 5 and in Annex A shall not be considered as Technical Building Regulations.

8 Re DIN 1045-4: 2023-08

In Annex C, Section C.5 paragraph 2, the factor 0.90 shall be replaced by 0.95.

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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 When determining the compressive strength of concrete in existing buildings, DIN EN 13791:2020-02 in conjunction with DIN EN 13791/A20:2022-04 must be taken into account.

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

4 When using steel fibre 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 1.2.3/5

The building supervisory authority requires the application of the technical rules only for the maintenance of concrete components where stability is jeopardised. Stability shall be considered to be jeopardised if it is sufficiently probable that damage will occur in the future.

Annex A 1.2.4/8

1. Basic principles

The technical rule shall also be applied to tank structures with a volume ≤ 100 m³.

DIN EN 1993-4-2:2017-09, Section 2.8 does not apply.

The rigid classification of the damage class of the tank structure to a calculation method according to DIN EN 1993-4-2:2017-09, Section 4.2.2 does not apply. The design method for cylindrical walls is based on the rules in DIN EN 1993-1-6:2010-12, Section 2.2 depending on the tank geometry, the boundary conditions and the shape/load pattern of the action.

The numerical values of the actions specified in the informative Annex B to DIN EN 1991-4:2010-12 apply. Annex B, Section B.3, paragraph 2 of DIN EN 1991-4:2010-12 does not apply. In addition, the operator shall provide nominal values for operating states and failures as well as requirements exceeding the requirements of EN 1990, EN 1993-1-1 and EN 1993-1-6.

If the wind pressure q_W, which is unevenly distributed on the shell, is replaced by the equivalent constant external pressure for the circumferential buckling safety verification under wind load, the equivalent constant external pressure is determined in accordance with DIN EN 1993-1-6:2010-12, Section D.1.3.2.

Table NA.1 from DIN EN 1993-4-2/NA:2018-12 does not apply. If the maximum filling height and the largest weights to be assumed for the liquids intended for storage cannot be exceeded, the safety coefficient γ_F of

variable fluid action may be reduced from 1.50 to 1.35. Design rules which conflict with the Eurocodes shall not apply. If requirements of DIN EN 14015 and DIN EN 14620 conflict with requirements of the Eurocodes, the requirements of the Eurocode series apply. Any temperature-dependent change in the characteristic material parameters must always be checked for containers for the storage of liquefied gases with boiling temperatures below 0 °C and taken into account if necessary. For containers for the storage of liquids at ambient temperature and higher temperatures, the characteristic material parameters must be reduced from an operating temperature of > 50 °C.

For the manufacture of containers for the storage of cryogenic liquefied gases, suitable materials that can withstand low temperatures must be used.

2. Evidence of earthquakes

When determining the design acceleration for the exceptional impact of an earthquake,

1. the following procedure must be followed for tanks up to damage consequence class 2 in accordance with Section A 1.2.9 of the MVV TB. Unless more accurate evidence is provided, the design spectrum $S_d(T)$ shall be determined for horizontal and vertical action according to DIN 4149:2005-04, Section 5.4.3, formula (6) to (9),

2. for tanks of the damage consequence class 3 in the ultimate limit state of the load capacity, the impact of an earthquake must be determined by means of a seismological site assessment.

The behaviour coefficient of a tank structure shall not be higher than q = 1.0. In the case of elevated tanks, a higher behaviour coefficient may be applied to the substructure in the seismic load case, depending on its dissipative properties.

To determine the hydrodynamic pressures, the load model according to DIN EN 1998-4:2007-01, Annex A, must be used.

The design of the cylindrical walls in the ultimate limit state of the load capacity shall be carried out in accordance with DIN EN 1993-4-2:2017-09, taking into account the provision in Clause 1 of this Annex.

3. Tests

In addition to DIN EN 1090-2:2018-09, at least the following tests shall be carried out on welded flat floor tank structures.

1. For tanks for the storage of liquids at ambient temperature and higher temperatures: Tests according to DIN EN 14015:2005, Section 19,
2. For tanks for the storage of cryogenic liquefied gases:
   a) Water sample and gas pressure tests in accordance with DIN EN 14620-5:2006-12, with the water sample to be carried out at a reduced height,
   b) Weld seam tests according to DIN EN 14620-2:2006-12, Table 14; the scope of radiation/ultrasonic tests of weld seams on the shell of the liquid-bearing inner and outer tank shall be as set out in Table 15.

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 20000-3:2022-02	Application of construction products in structures – Part 3: Glued laminated timber and glued solid timber according to DIN EN 14080:2013-09 Sections 4.2 and 4.11:

	the protective agent is specified exclusively in accordance with Regulation (EU) No. 528/2012 (Biocide Products Regulation) in conjunction with the national implementing provisions.
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 20000-7:2022-02	Application of construction products in structures – Part 7: Structural finger jointed solid timber according to DIN EN 15497:2014-07 Sections 4.2 and 4.5: the protective agent is specified exclusively in accordance with Regulation (EU) No. 528/2012 (Biocide Products Regulation) in conjunction with the national implementing provisions.

1a In the absence of a technical best practice for the planning, designing and execution using structural elements with laminated veneer lumber in accordance with 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, proof according to Section 16a MBO[1] is required, especially for joints.

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 14080:2013[2], 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 MBO[1] 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 15274:2015[3] 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 $k_{pl} = 1.0$.

4 In the absence of a technical best practice for the planning, designing and execution using kits for wood-concrete composite systems according to ETA, proof pursuant to Section 16a MBO[1] 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.

7 Re DIN EN 1995-2/NA:2021-06:
NCI NA.4.4.2, paragraph (NA.1) first indent, first sub-indent is replaced by the following: ‘- if suitable stainless steels in accordance with DIN EN 1993-1-4, Annex A in conjunction with DIN EN 1993-1-4/NA are used’
NCI NA.C.1, paragraph (NA.1) is replaced by the following: ‘Components which cannot be replaced or can only be replaced with considerable effort, such as main beams, must be designed as protected components. This does not apply to timbers of durability class 1 in accordance with DIN EN 350.’
NCI NA.C.1, paragraph (NA.3) is replaced by the following: ‘The upper surfaces of unprotected load-bearing components and end grain surfaces should be covered. This does not apply to plank coverings and timbers of durability of class 1 according to DIN EN 350.’

1 According to federal state law
2 Implemented in Germany by DIN EN 14080:2013-09.
3 Implemented in Germany by DIN EN 15274:2015-06.

Annex A 1.2.5/2

1 DIN 68800-1:2019-06 and DIN 68800-2:2022-02 apply exclusively to the application and classification in use classes.

2 Section 3.2 of DIN 68800-1:2019-06 is not applicable. As far as DIN 68800 1:2019-6 and DIN 68800-2:2022-02 declare that certificates of usability are required by building supervisory authorities, these provisions are not applicable. The requirement for certificates of usability and applicability issued by building supervisory authorities arises exclusively from the Model Building Code (in accordance with federal state law) and the regulations issued on the basis of this Act.

1 Implemented in Germany by DIN EN 13859-2:2010-11.

Annex A 1.2.6/2

Re DIN EN 1996-1-2 in conjunction with DIN EN 1996-1-2/NA

For special designs (e.g. connections, joints, etc.), the rules of application under DIN 4102-4:2016-05 must be observed, where the Eurocode does not provide any information.

Re DIN EN 1996-1-2/NA, Table NA.B.1.3, line 1.3
The utilisation factor αfi ≤ 0.70 shall be used for the design.

Re DIN EN 1996-1-2/NA, Table NA.B.1.3, line 5.1
The utilisation factor $\alpha_{fi} \leq 0.55$ shall be used for the design.

Annex A 1.2.6/3

Re DIN 1053-4

When applying the technical rule, DIN EN 1996-1-1/NA/A1:2014-03, DIN EN 1996-1-1/NA/A2:2015-01, DIN EN 1996-3/NA/A1:2014-03 and DIN EN 1996-3/NA/A2:2015-01 as well as Annex A 1.2.6/1 must also be taken into account.

For the fire protection design of the masonry, the provisions of DIN EN 1996-1-2:2011-04 in conjunction with DIN EN 1996-1-2/NA:2013-06 apply to the corresponding non-prefabricated masonry, and for the classification of firewalls (criterion REI-M and EI-M) the following shall apply:

Unless the masonry is constructed from masonry panels of room width or cast panels of room width, vertical butt joints in the wall shall be constructed as follows:

In single panels a factory-fitted ⊘ 6 mm concrete steel looped reinforcement must be positioned at one third and two thirds of the length and at half the wall height – as shown in the figure – in the horizontal joints so that the loops interlock in the butt joint when the masonry panels are installed. An ⊘ 8 mm reinforcing bar must be inserted from above through the reinforcement rings formed in this way. The requirements of Section 8.2.1 of the standard must be observed. The joint must then be filled with mortar without cavities as per Section 5.3.3 of the standard.

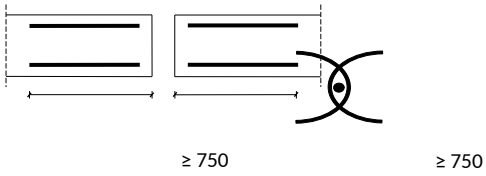


Figure: Wall-level vertical butt joints for fire walls

A - Technical Building Regulations to be observed to meet the basic requirements for buildings

A 2 Fire protection

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

Under § 3 MBO[1] in conjunction with § 14 MBO[1], 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 MBO[1] 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 MBO[1]; 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.

1 According to federal state law

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 only contribute to the fire to a limited extent; where applicable, no falling burning debris or particles should be produced. The fire effect shall be assumed to be the 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 building that does not meet at least the requirement of ‘normal flammability’ (easily flammable), Section 26(1) sentence 2 of the MBO[1] must be complied with.

1 According to federal state law

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 MBO[1], general requirements for the fire resistance of parts of buildings are set out in § 26(2) MBO[1] 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 behaviour, fire-resistant structural elements must not contribute more to the fire than specified in Section 26(2) MBO[1].

For fire protection requirements and fire protection assessments of the building material class, subsequently applied coatings of up to a thickness of 0.5 mm on structural elements are not taken into account, where the coatings are fully applied without cavities on a non-combustible substrate.

Fire-resistant structural elements are divided into:

a) 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.

b) Highly fire-retardant structural elements:

   Where load-bearing 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.

c) 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 According to federal state law

d) Structural elements according to Section 26(2) sentence 4 MBO[1], which consist of combustible building materials, must 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.

e) 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 Section 12 MBO[1], load-bearing parts of buildings must remain stable over a specific period of time, even when exposed to fire.

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. There is no significant dropping or dripping from structural elements on the side facing away from the fire 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.

1 According to federal state law

The same applies to closures and other closures of openings.

1 According to federal state law

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 elements that must be room-closing structural elements are adjacent to structural elements without fire resistance (e.g. exterior wall or roof), these room-closing structural elements must remain stable for the required period of time when exposed to fire. 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 MBO[1].

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 referred to 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 code requirements, and proof pursuant to Section 16a MBO[1] 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 Section 16a MBO[1] is required.

Joints of the structural elements must remain closed to ensure that the room is sealed during exposure to 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 exposure to 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).

1 According to federal state law

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).
For room-closing structural elements, the specifications of the Technical Rule referred to in ser. No. A 2.2.1.4 must be observed.

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 exposure to 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 room-closing structural elements, the specifications of the Technical Rule referred to in ser. No. A 2.2.1.4 must be observed.

A 2.1.4 Load-bearing and reinforcing structural elements

Depending on the building class, the relevant requirements result from Section 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

1 According to federal state law

- 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 buildings are designed using natural fire models, Annex 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(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 result from Section 28 MBO[1].

Non-load-bearing exterior walls are structural elements that do not transfer any vertical loads, other than their own weight, and are only designed to absorb dead weight and wind loads.

Openings in exterior walls of building units to open corridors according to Section 36(5) MBO[1] 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 concerning the outdoor climate apply. The Technical Rule referred to 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 Section 26 MBO[1]), for fire effect 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 temperature-time curve).

If surfaces of exterior walls and exterior wall claddings, except for substructures in accordance with Section 28(3) sentence 1 clause 2 MBO[1], must be flame-resistant overall, then the same applies to the individual components 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 ofthe 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 constructions must be provided so that the protection objective according to Section 26(1) sentence 1 MBO[1] is fulfilled; otherwise, the Technical Rule referred to in ser. No. A 2.2.1.5 must be observed.

1 According to federal state law

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) MBO[1]. § 26 Para. 1 sentence 2 Clause 2, MBO[1] 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 pass over firewalls, 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 result from Sections 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 MBO[1].

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 Section 29(5) clause 2 and Section 45 No. 2 MBO[1] must be fire resistant (permanently 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 in case of fire exposure 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 for permanent 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. As for the observations concerning smoke development according to DIN 4102-5:1977-09, it must be established that at most a small amount of smoke was observed (no surface smoke emission from the surface of the structural element, 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 closures in the form of a sliding, lifting or rolling gates 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 on rescue routes.

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.

1 According to federal state law

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 MBO[1] 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 the building code requirements, so proof pursuant to Section 16a MBO[1] is required.

Partition walls made of fire-resistant glazing must satisfy the requirements for room-closing structural elements in case of exposure to fire as defined in DIN 4102-13:1990-05, Section 6.1 with respect to the minimum time and the 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 MBO[1] 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 MBO[1] and the technical construction regulations of the MVV TB.

1 According to federal state law

A 2.1.7 Firewalls and walls permissible in place of firewalls

Depending on the building class, the relevant requirements result from Section 30 MBO[1].

Firewalls of structural works may not contribute to the fire in accordance with § 30(3) sentence 1 MBO[1] to ensure the protection objectives. They must be made of non-combustible building materials. By way of deviation from § 28(3) MBO[1], exterior wall cladding including insulation materials and substructures according to § 30(7) sentence 3 MBO[1] 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 room-closing 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 according to DIN 4102-3:1977-09, Sections 4.2.1 to 4.2.4. By way of derogation from DIN 4102-3:1977-09, Section 4.2.3, firewalls may also be tested without a central and eccentric load.

Walls instead of firewalls according to Section 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 A 2.1.3.3.7,

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. By way of derogation from DIN 4102-3:1977-09, Section 4.2.3, walls may be tested in lieu of firewalls without a central and eccentric load. For highly fire-retardant walls, the requirements of Section A 2.1.3.1. sentence 6(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. No. A 2.2.1.4 apply in addition.

For other walls instead of firewalls according to Section 30(3) sentence 2 No. 2 and 3 MBO[1], the requirements according to Section A 2.1.6 shall be observed.

For firewalls and walls instead of firewalls, the test according to DIN 4102-3:1977-09 shall determine the load to be applied in accordance with DIN 4102-3:1977-09, 4.2.3, 4.2.4 and 4.3.2 by application. A minimum value does not have to be complied with. In the case of walls tested without load, the impact load shall be applied so that the requirements for the wall can also be demonstrated in the area of anchorages and fixings in accordance with DIN 4102-3:1977-09, Section 4.3.3.

Claddings of firewalls within the meaning of DIN 4102-3:1977-09, paragraph 4.2.2, are generally layers applied to the wall or at a distance from the wall after the construction of the wall, which are not to be added to the fire resistance of the wall, such as external wall claddings, installation levels, sound insulation measures, wall coverings, etc. firewalls and walls in place of firewalls must comply with the requirements of DIN 4102-3:1977-09 without such cladding.

Claddings that are essential components of the wall construction and without which the wall is not room-closing, such as walls with a steel substructure and a flat cladding of non-combustible plasterboard, are not to be understood as claddings within the meaning of Section 4.2.2 of DIN 4102-3:1977-09. This may also apply to plasters on walls that are regularly finished with plaster.

For all the walls covered by this section applies that, as for the observations concerning smoke development according to DIN 4102:-3:1977-09, Section 5.4, it must be established that at most a small amount of smoke was observed (no surface smoke emission from the surface of the structural element, only single wisps of smoke, including from joints).

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) MBO[1]; 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

1 According to federal state law

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) MBO[1], 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 MBO[1] 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 MBO[1] 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 MBO[1].

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) MBO[1], 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) MBO[1]). 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,

1 According to federal state law

- 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) MBO[1]. Heat extraction surfaces or smoke and heat extraction devices are considered roof superstructures in accordance with § 32(5) sentence 1 MBO[1].

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 MBO[1] 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 Section 35(1) sentence 2 MBO[1] 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 MBO[1]. 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.

Closures according to Section 35(6) sentence 1 No. 1 MBO[1] of door openings in the walls of necessary stairwells must be permanently fire-retardant, smoke-proof and self-closing, so that the prevention of the spread of fire is not jeopardised and the passage of smoke in accordance with DIN 18095- 2:1991-03 in the stairwell is prevented during the exposure time specified therein; 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 referred to in ser. No. A 2.2.1.2 must be observed.

Door openings according to Section 35(6) sentence 1 No. 3 MBO[1] must have permanently sealed and self-closing closures. 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 result from Section 36 MBO[1].

1 According to federal state law

Taking into account the protection objective according to Section 36(1) MBO[1], the walls of required corridors should have only such door openings as are necessary for their use. The doors must close tightly as per Section 36(4) sentence 4 MBO[1] tso that smoke ingress in one or an adjoining building unit is made more difficult over a certain period of time by constructive measures on the doors. 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. Tightly closing doors may contain transparent side parts, provided that the overall width of the door component with side part is not more than 1.50 m.

If doors are open or closed after a fire has burnt through them, fire must not be allowed to spread 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 plasterboard with a thickness of 12.5 mm.

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. In deviation from Section 36(4) sentence 4 MBO[1], in order to ensure the room closure by fire-resistant glazing, the doors of the fire-resistant glazing must be tight and self-closing and correspond to the fire resistance of the fire-resistant glazing.

Smoke protection closures in required corridors according to Section 36(3) MBO[1] may be executed room-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 result from Section 39 MBO [1].

In order to guarantee the protection objectives in the event of fire, the lift shaft walls must ensure the room closure 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 plasterboard with a thickness of 12.5 mm) on the shaft side to prevent the spread of fire on the surfaces of the lift shaft walls in case of open landing doors or of closed doors after the fire has burned through them.

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

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

1 According to federal state law

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

In buildings, service shafts and ducts as per § 40 MBO[1] 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 supervision requirements of the MBO[1], the model garage and parking space regulation (M-GarVO) and special building regulations[1] based on the MBO[1] for the installations and construction products of technical building equipment are specified in the Technical Rules referred to in ser. No. A 2.2.1.8 to A 2.2.1.12, A 2.2.1.16 and A 2.2.2.1 to A 2.2.2.8. 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 MBO[1] 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.

1 According to federal state law

This must be shown in the fire protection certificate. Their use is subject to the Technical Rule referred to 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 referred to under ser. No. A 2.2.1.8 must be observed.

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

1 According to federal state law

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 referred to 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 Section 2(4) MBO[1], the design and execution is subject to the detailed requirements of the Technical Rules under ser. No. A 2.2.2.2 to A 2.2.2.8.

Note:
Special fire protection requirements can also be stipulated as part of a deviation decision under building regulations pursuant to Section 67 MBO [1] or in the building permit pursuant to Section 64 MBO [1] for a special construction. Where the protection objectives pursuant to Section 14 MBO[1] 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.

1 According to federal state law

A 2.2 Technical requirements concerning the planning, designing and executing and technical requirements of structural elements pursuant to § 85a(2) MBO[1]

Ser. No	Planning, designing and execution requirements pursuant to Section 85a(2) of the Model Building Code (MBO)[1]	Technical rules/version	Further measures pursuant to Section 85a(2) MBO[1]
1	2	3	4
A 2.2.2 Garages and special buildings § 85a(1) sentence 3 MBO[1] does not apply to Technical Building Regulations according to Section A 2.2.2			
A 2.2.2.1	Garages[1, 4]	Model of a Regulation on the construction and operation of garages and parking spaces (Model Garage and parking space regulation M-GarVO):2022-07[2]	Annex A 2.2.2.1/1

1 According to federal state law
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.
4 Regulations for the fulfilment of other basic requirements for structural works must be observed.

1 According to federal state law

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)]). Access routes, installation areas and movement areas of use category N Fw in accordance with the guidelines for green pavements of the Research Association Landscape Development and Landscaping (Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau, FLL) must also meet the building supervision requirements.

Remark: The requirements for load class Bk0.3 in accordance with RStO 12 (Guidelines for the standardisation of the superstructure of traffic areas) go beyond the required minimum level.
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 Section 12(1) No. 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 2.2.2.1/1 (robust load-bearing structure)

When applying Section 7(3), sentence 1, No. 2, of the Model Garage and parking space regulation (M-GarVO) referred to under ser. No. A 2.2.2.1, the following shall be taken into account:

- Garage storey ceilings shall also be designed in such a way that the spread of fire caused by liquid fires is effectively prevented. The requirement shall be deemed to be fulfilled if:

  - Ceiling edges, ceiling and connection joints, and remaining cavities of penetrations are sealed in a non-combustible and liquid-tight manner, e.g. with cement mortar or concrete, or with circumferential and opening-free flashings made of non-combustible materials with a height of at least 30 mm;

  - Gutters and floor drains in ceilings, with the exception of seals and sealants, are made of non-combustible building materials, and

  - Pipes that pass through the ceilings of the garage storeys are made of non-combustible building materials; Sealing and connecting materials as well as pipe coatings up to 2 mm thick may be made of combustible building materials.

1 According to federal state law

When applying Section 7(3), sentence 1, No. 2, of the M-GarVO referred to in ser. No. A 2.2.2.1, the following shall be taken into account:

- For parking spaces less than 2.50 m wide, at least 0.20 m wide separating strips shall be installed to prevent the spread of the fire.

- By way of derogation from Section 9(2) of the M-GarVO, spatial partitions are not permitted in order to reduce fire loads and to support effective firefighting operations. This does not apply to parking spaces for bicycles, trailers and small electric vehicles under the M-GarVO and areas for parking necessary equipment (e.g. sweeping machines); Partitions may consist only of non-combustible gridwalls.

- By way of derogation from Section 21(2) sentence 2 of the M-GarVO, no combustible substances may be placed outside motor vehicles.

- The requirements for a robust load-bearing structure shall be deemed to be satisfied for composite structures of non-combustible construction materials which are statically constructed in such a way that, in the event of the failure of structural elements in the event of local fires, there is no need to assume a sudden collapse of the main structure outside the affected fire zone. This shall normally be deemed to be fulfilled, provided that:

    - Supports are at least fire-retardant and, in addition, continuous over at least three storeys given the corresponding number of storeys; supports on open external walls and external ramps (external support) are excluded from the fire-retardant requirement,

    - mechanical connections between beams and supports have the fire resistance duration of the supports, and

    - ceilings and beams are connected to each other by a mechanical connection (e.g. continuous ceilings, additive ceilings or composite ceilings).

1 According to federal state law

A - Technical Building Regulations to be observed to meet the basic requirements for buildings

A 3 Hygiene, health and preservation of the environment

A 3.1 General information

In accordance with Section 3 and Section 13 MBO[1] buildings must be positioned, erected, modified and maintained so that public safety and order – particularly life, health and natural resources – are not jeopardised and that no dangers or unreasonable nuisances arise due to plant and animal pests or 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 for the planning, designing and execution of buildings and parts thereof pursuant to Section 85a(2) MBO[1]

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 requirements pursuant to Section 85a(2) MBO[1]	Technical rules/version	Further measures pursuant to Section 85a(2) MBO[1]
1	2	3	4
A 3.2.1	Health protection requirements for structural works	ABG - Health protection requirements for structural works 2022-10 (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: 2023-08 (See Annex 10)	Annex A 3.2/4

1 According to federal state law

Annex A 3.2/4

According to Chapter D 3 further information on products according to harmonised technical specifications can be provided voluntarily and their correctness can be demonstrated in a technical documentation.

The applications of

- DAfStb Directive “Use of silicon-rich fly ash and boiler sand in concrete structural elements in contact with soil, groundwater or precipitation” (version of June 2023) and
- DIN 4226-101:2017-08 "Recycled rock grains for concrete according to DIN EN 12620 – Part 101: Types and controlled hazardous substances“ and DIN 4226-102:2017-08”Recycled rock grains for concrete according to DIN EN 12620 – Part 102: Type testing and factory production control”

provide an opportunity to meet the requirements for structural installations with regard to the effects on soil and water (ABuG) and to prepare appropriate technical documentation for this purpose. The impact on soil and water when using track ballast cannot be assessed on the basis of DIN 4226-101:2017-08.

A - Technical Building Regulations to be observed to meet the basic requirements for buildings

A 4 Safety and accessibility in use

A 4.1 General information

In accordance with Section 3 MBO[1] buildings must be positioned, erected, modified and maintained so that public safety and order, in particular life, health and natural resources, are not jeopardised.

The requirements for safety in use and accessibility are implemented in particular pursuant to Sections 16 and 50 MBO[1] if buildings as a whole and in their separate parts are designed and executed in line with the technical rules on safety and accessibility pursuant to Section A 4.2.

A 4.2 Technical requirements for the planning, designing and execution of buildings and parts thereof pursuant to Section 85a(2) MBO[1]

Ser. No.	Planning, designing and execution requirements pursuant to Section 85a(2) of the Model Building Code (MBO)[1]	Technical rules/version	Further measures pursuant to Section 85a(2) MBO[1]
1	2	3	4
A 4.2.2	**Obstacle-free building**		
A 4.2.2.1	Publicly accessible buildings	DIN 18040-1:2010-10	Annex A 4.2/2

Annex A 4.2/2

Re DIN 18040-1

The insertion relates to buildings or parts thereof that must be accessible under Section 50(2) MBO[1].
The following must be observed when applying the Technical Building Regulation:

1 Section 4.3.7 is not covered by the insertion.
2 Section 4.3.6 must only be applied to necessary stairs.

3 At least one toilet room for users shall comply with Section 5.3.3; Section 5.3.3, sentence 1, shall not apply if it is ensured that a sufficient number of accessible toilet rooms are available within a short distance.

4 At least 1 % and at least one of the necessary parking spaces for users must correspond to Section 4.2.2 sentences 1 and 2.

5 At least 1 % and at least one of the visitor seats in meeting rooms with fixed rows of chairs shall comply with Section 5.2.1; they can be included in the places required by Section 10(7) of the model regulation on places of assembly (MVStättV)[1] for wheelchair users.

6 Sections 4.2.1, 4.3.6 and 4.3.8 also apply to non-building-related main routes.

1 According to federal state law

A - Technical Building Regulations to be observed to meet the basic requirements for buildings

A 5 Sound insulation

A 5.1 General information

In accordance with Section 3 and Section 15(2) MBO[1] buildings must be positioned, erected, modified and maintained so that they have sound insulation in accordance with their use.

To meet this requirement, the technical rules for sound insulation under Section A 5.2 must be observed.

A 5.2 Technical requirements in respect of the design, dimensioning and execution of building works and parts thereof pursuant to Article 85a(2) MBO[1]

Item numbers:	Planning, designing and execution requirements pursuant to Section 85a(2) of the Model Building Code (MBO)[1]	Technical rules/version	Further measures pursuant to Section 85a(2) MBO[1]
1	2	3	4
A 5.2.1	Sound insulation in buildings	DIN 4109-1:2018-01	Annexes A 5.2/1 to A 5.2/3

1 According to federal state law

Annex A 5.2/1

Re DIN 4109-1

1 Re Section 7.1:
Where the total rated sound insulation value $R'_{w,ges}$ must be > 50 dB, or with a reference external noise level L_a > 80 dB, the requirements shall be determined for each individual case by the building supervisory authority.

2 Re Section 8, Table 8:
The requirements in Table 8, lines 3.3, 3.4, 5.1 and 5.2 need to be satisfied only if the rooms requiring protection are living rooms or bedrooms in accordance with DIN 4109-1:2018-01, Section 3.16.

3 Re Sections 7, 8 and 9:
For buildings classified as per Table 9, lines 3 and 4, compliance with the required sound pressure level must be demonstrated by submitting measurement results. The same applies to compliance with the required sound insulation value for structural elements pursuant to Table 8 and for exterior structural elements that are subject to the requirements of Table 7.1, provided that the total evaluated sound insulation value $R'_{w,ges}$ must be ≥ 50 dB, or alternatively with a reference external noise level L_a > 80 dB. These measurements are to be carried out in accordance with DIN 4109-4:2016-07 by building acoustics testing centres, which are listed in a register of 'recognised sound insulation testing centres' at the Association of Material Testing institutes (VMPA)[1].

4 The informative Annexes A and B do not apply.

5 Re Section 7:
Proof of airborne sound insulation of external components is required if
a) the development plan stipulates that precautions must be taken to protect the building from outside noise (Section 9(1)(24) of the Building Code, BauGB) or
b) even after the intended noise reduction measures have been taken, the 'relevant external noise level' (Section 4.4.5 of DIN 4109-2:2018-01) is equal to or greater than

- 61 dB(A) in living spaces in apartments, bedrooms, classrooms and the like, and in bedrooms in hospitals and sanatoriums
- 66 dB(A) in offices

1 Association of Material Testing Insitutes (VMPA) e.V., Littenstraße 10, 10179 Berlin (www.vmpa.de)

Annex A 5.2/2

The soundproofing must be verified according to DIN 4109-2:2018-01 in conjunction with DIN 4109-31:2016-07, DIN 4109-32:2016-07, DIN 4109-33:2016-07, DIN 4109-34:2016-07, DIN 4109-34/A1:2019-12, DIN 4109-35:2016-07 DIN 4109-35/A1:2019-12 and DIN 4109-36:2016-07.
For structural elements in solid construction, Supplement 1 to DIN 4109:1989-11 may be used. If masonry made of perforated stones is used, this applies only to masonry, which meets the conditions in DIN 4109-32:2016-07, Section 4.1.4.2.1. Supplement 1 to DIN 4109:1989-11, however, may not be used as proof for solid stairs.

Re DIN 4109-2

The informative Annexes B, C and D do not apply.

Re DIN 4109-36

The informative Annex A does not apply.

Annex A 5.2/3

1 In the absence of a technical best practice for the planning, designing and execution of structural elements for which the input data for the computational proof of sound protection in accordance with DIN 4109-2:2018-01, Section 5.1, are to be determined by building acoustics tests, as there are no characteristic values under DIN 4109-32:2016-07 to DIN 4109-35:2016-07, proof in accordance with Section 16a MBO[3] is required.
This excludes types of construction using construction products with an ETA as defined in numbers 2 and 3.

2 In the case of structural elements with granulated polystyrene insulating materials and binder mixture with an ETA based on EAD 040635-00-1201 or EAD 040635-01-1201 the following applies:
The construction product may be used for impact sound insulation under unheated floating screeds either if a maximum difference in relative compression of 5 % is observed for pressure and temperature deformation or the declared value of the compressive stress at 10 % compression is at least 30 kPa. In the latter case, dimensional stability at defined temperature and moisture conditions must be shown.
The sound protection shall be demonstrated in accordance with DIN 4109-2:2018-01 with the nominal value of the impact sound reduction ΔL_w specified for the design structure.
With regard to design and execution, DIN 4109-34:2016-07, Section 4.5.3 is to be observed.

3 For the execution of structural elements with rubber fibre mats and/or polyurethane (PU) foam mats for impact sound insulation with an ETA based on EAD 040048-00-0502 or EAD 040048-01-0502 or an ETA based on EAD 040049-00-0502 or EAD 040049-01-0502, respectively:

The construction products may be used for impact sound insulation on solid ceilings under floating screeds if the maximum difference in relative compression for pressure and temperature deformation is 5 %. The sound protection shall be demonstrated in accordance with DIN 4109-2:2018-01 with the nominal value of the impact noise reduction ΔL_w specified for the design structure.
With regard to design and execution, DIN 4109-34:2016-07, Section 4.5.3 is to be observed.

Annex A 5.2/4

- deleted from MVV TB 2024/1 -

B - Technical Building Regulations for components and special constructions to be observed in addition to the Technical Building Regulations listed in Part A

B 2 Technical regulations for special structures and components according to § 85a para. 2 MBO[1]

Item numbers:	Requirements for the planning, design and execution according to § 85a para. 2 MBO[1]	Measures/specifications pursuant to § 85a(2) MBO[1]
1	2	3
B 2.2	**Structural elements**	
B 2.2.1	**Structural elements for walls, roofs, ceilings and façade constructions**	
B 2.2.1.6	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: 2023-08 (see Annex 12)

Annex B 2.1/2

Re DIN EN 13814

The following must be observed when applying the Technical Rule:

1.1 Section 1 shall be worded as follows:
“This standard shall apply to temporary structures according to Section 76 MBO[1] e.g. carousels, swings, boats, ferris wheels, roller coasters, slides, stands, textile and membrane constructions, stalls, stages, show shops and superstructures for artistic performances in the air. It shall also apply to the design of corresponding buildings which are installed in amusement parks for an extended period, with the exception of the wind load evaluations and the foundation design. This standard does not apply to tents. Temporary structures do not include permanent platforms, building site equipment, scaffolding and movable agricultural structures.”

1.2 For the application of the standard, the interpretations as of March 2010, which were published by the Working Committee on Temporary Structures NA 005-11-15 AA (https://www.din.de/de/mitwirken/normenausschuesse/nabau/auslegungen-zu-din-normen-des-nabau-68630) must be observed.

2.1 The corresponding Technical Rules referred to in Part A shall apply for undated references to standards of the series ENV 1991 to ENV 1997.

2.2 In the case of references to ‘relevant European standards’ or ‘EN standards’, appropriate Technical Rules of the administrative provision on Technical Building Regulations shall apply.

3 Sections 3.1 to 3.7 are not covered by the insertion.

4.1 Re Section 5.2:
When selecting the materials, the conditions of use specified in the Model Building Regulation and in the provisions based on this regulation (each time in accordance with federal state law) must be observed.

4.2 Re Section 5.3.3.1.2.2:
Vertical live loads of q_k = 7.5 kN/m² shall be assumed for platforms which do not have fixed seats, and for their accesses and landings.

4.3 Re Section 5.3.3.4:
If Table 1 is applied, the temporary structure, which has been strengthened by the necessary protection and reinforcement measures, shall be designed for the highest envisaged wind zone with the velocity pressures specified in Table NA.B.3 or Section NA.B.3.3 of the DIN EN 1991-1-4/NA:2010-12 when not in service. These may be reduced by a factor of 0.7. Other reductions in velocity pressures shall not be taken into account.

Alternatively, proof of stability must be provided for temporary structures that are not in service, including for installation locations with $v_{b,0} > 28$ m/s with the peak velocity pressures specified in Table NA.B.3 or Section NA.B.3.3 of the DIN EN 1991-1-4/NA:2010-12. These may be reduced by a factor of 0.7. Other reductions in gust velocity pressures may not be taken into account.

Fig. 1 is not included in the insertion.

4.4 Re Section 5.3.6.2:
The partial load factor $\gamma_G = 1.0$ shall be used for permanent favourable actions.

4.5 Re Section 5.6.5.3:
Foot strap buckles in rollover swings, including their fasteners and connections, must have a breaking load of at least 2 kN.

5 Re Section 6:
Instead of the sections in the standard listed below which are not covered by the insertion, the requirements laid down in the Guideline on the construction and operation of temporary structures[1] shall apply.

5.1 Sections 6.1.3.2, 6.1.3.3, 6.1.4.1, 6.1.4.5 and 6.1.5.2 are not covered by the insertion.

5.2 Re Section 6.1.6.4:
In the case of chair swing rides, the failure of a carrying chain, in particular, must not result in a failure of the passenger safety device (closing chain, bar, etc.).

5.3 Re Section 6.2.1.2:
Rotors must have a closed cylinder wall. The floor and inside of the cylinder wall shall be executed without prominent or recessed parts. It should not be possible for either the user or spectators to reach the rim of the cylinder wall. The height-adjustable floor is to be fitted into the cylinder with a small joint and to be guided in the same direction as the cylinder rotation. The doors shall be incorporated into the cylinder wall with small joint gaps. The rotors shall be designed such that they cannot start when the doors are open.

5.4 Re Section 6.2.2.2:
The height of the fencing around open gondolas on ferris wheels in which passengers can stand up during operation must be at least 0.55 m, measured from the upper edge of the seat. It must be possible to close entry and exit points at the height of the protector by means of fixed devices. They must be capable of being secured with locks which cannot be disengaged automatically.

5.5 Re Section 6.2.3.1:
Roller coasters shall be fitted with a specification class J3 area barrier all around.

Ghost train tracks shall be fenced off to spectators as far as the entry and exit points using at least specification class J2 area barriers.

5.6 Re Section 6.2.3.5.1:
As regards ghost trains where the vehicles travel slowly (at speeds ≤ 3 m/s) and which have appropriate impact absorbers, a block system can be dispensed with.

5.7 Re Section 6.2.3.5.2:
Ghost trains with different floors must have backstops on the inclined sections. On inclined sections, provision must be made, if necessary, for brakes to control the speed and tilt protection devices.

5.8 Re Section 6.2.5.1.1:
There must be a fixed, horizontal and smooth sliding surface at least 2 m wide between the turntable and the bumper.

5.9 In Section 6.2.5.2, paragraph 1 is not covered by the insertion.

5.10 Section 6.2.6 is not covered by the insertion.

5.11 Re Section 6.2.7.5:
Shooting tables are to be fixed in such a way that they cannot be moved. The distance to individual targets no more than 0.40 m deep which are limited in terms of area (e.g. shooting gallery booths) may be reduced to up to 2.40 m.

5.12 Sections 6.4, 6.5 and 6.6 are not covered by the insertion.

6 Section 7 is not covered by the insertion.

7 Annexes A, C, E, F, H and I are not covered by the insertion.

1 According to federal state law

B - Technical Building Regulations for components and special constructions to be observed in addition to the Technical Building Regulations listed in Part A

B 3 Technical building equipment and parts of systems for the storage, filling and handling of water-polluting substances that do not have the CE mark under the Construction Products Regulation

B 3.1 General information

Technical Building Equipment and parts of systems for the storage, filling and handling of water-polluting substances that do not meet specific fundamental requirements under Article 3(1) of the Construction Products Regulation for building structures and parts thereof in respect of their intended use (and are subject to further harmonised legal areas).

For these products, proof of fitness for purpose is required to demonstrate the main features missing under the conditions of Section 17(1) MBO[1]. This does not apply if there is a different specification in column 4(d). In this case, a declaration of conformity on the missing fundamental characteristics according to Section 22 MBO[1] issued by the manufacturer based on a prior examination of the construction products by a test centre recognised by building supervisory authority shall be sufficient.

B 3.2 Regulations pursuant to Section 85a(2) No. 3 MBO

Ser. No.	Construction product	Relevant harmonisation provisions	a: Specific purpose b: Basic requirements in accordance with the Model Building Code (MBO)[1], if necessary with specification c: Missing essential feature d: Procedure for documentation of the missing essential feature
1	2	3	4
B 3.2.1	**Technical Building Equipment subject to requirements under other legislation**		
B 3.2.1.10	Ventilation units with a volumetric flow ≤ 1 000 m^3/h	2014/35/EU 2014/30/EU 2006/42/EG 2009/125/EG Regulation (EU) No. 1253/2014 Regulation (EU) No. 2017/1369 Delegated Regulation (EU) No. 1254/2014	a: Aeration and ventilation of residential and non-residential buildings b.1: Fire protection b.2: Hygiene, health, environmental protection b.3: Energy saving and thermal insulation c.1: Fire behaviour c.2: Characteristic curve, minimum volume flow, tightness, air quality (filter), safety devices c.3: Energy characteristics
B 3.2.1.22	Solar collectors with mechanically held glass cover with a maximum single pane surface of up to 3.0 m2 for the application: - on roofs with an inclination ≤ 75°1 According to federal state law - in building-independent solar systems in areas not open to the public[1]	2014/68/EU	a: Energy generation for warming heating water b: Fire protection c: Fire behaviour of structural elements when required to be flame-retardant or non-combustible

1 According to federal state law

5 Note: When used in thoroughfares that could be endangered by falling glass parts (overhead glazing), the provisions of Section A 1.2.7 must be observed.

Ser. No.	Construction product	Relevant harmonisation provisions	a: Specific purpose b: Basic requirements in accordance with the Model Building Code (MBO)[1], if necessary with specification c: Missing essential feature d: Procedure for documentation of the missing essential feature
1	2	3	4
B 3.2.1.23	Solar collectors and their use by way of derogation from B 3.2.1.22 or B 3.2.1.33	2014/68/EU	a: Energy generation for warming heating water b.1: Mechanical strength and stability b.2: Fire protection c.1: Depending on the installation situation, the provisions of A 1.2.7 must be met. c.2: Fire behaviour of structural elements when required to be flame-retardant or non-combustible
B 3.2.1.25	Photovoltaic modules with mechanically held glass cover with a maximum single pane surface of up to 3.0 m^2 for the application: - on roofs with an inclination of < 75°5 - in building-independent solar energy systems in areas not open to the public[1]	2014/35/EU	a: Power generation for buildings b: Fire protection c: Fire behaviour of structural elements when required to be flame-retardant or non-combustible
B 3.2.1.26	Photovoltaic modules without glass surfaces for the application: - on roofs - in building-independent solar energy systems in areas not open to the public	2014/35/EU	a: Power generation for buildings b: Fire protection c: Fire behaviour of structural elements when required to be flame-retardant or non-combustible
B 3.2.1.27	Photovoltaic modules and their use by way of derogation from B 3.2.1.25 or B 3.2.1.26	2014/35/EU	a: Power generation for buildings b.1: Mechanical strength and stability b.2: Fire protection c.1: Depending on the installation situation, the provisions of A 1.2.7 must be met. c.2: Fire behaviour of structural elements when required to be flame-retardant or non-combustible

Ser. No.	Construction product	Relevant harmonisation provisions	a: Specific purpose b: Basic requirements in accordance with the Model Building Code (MBO)[1], if necessary with specification c: Missing essential feature d: Procedure for documentation of the missing essential feature
1	2	3	4
B 3.2.1.33	Solar collectors without glass surfaces for the application: - on roofs - in building-independent solar energy systems in areas not open to the public	2014/68/EU	a: Energy generation for warming heating water b: Fire protection c: Fire behaviour of structural elements when required to be flame-retardant or non-combustible

C - Technical Building Regulations for construction products that do not bear the CE marking and for designs

C 2 Requirements for submitting a declaration of conformity for construction products pursuant to § 22 MBO[1]

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 2.1.1.1	Fast-setting cement (FE cement) and quick-setting Portland and Portland composite cement (SE cement)	DIN 1164-2, -11:2023-02 Also applicable: Annexes C 2.1.1, C 2.1.9 and C 2.1.10	Mark of conformity [ÜZ]
C 2.1.1.3	Portland-composite cement CEM II/C-M and Composite cement CEM VI	DIN EN 197-5:2021-07	Mark of conformity [ÜZ]
C 2.1.2	**Concrete additives**		
C 2.1.2.1	Trass	DIN 51043-1, -2:2023-02	Mark of conformity [ÜZ]
C 2.1.4	**Concrete**		
C 2.1.4.2	standard concrete	DIN 1045-2:2023-08 Also applicable: DIN 1045-3:2023-08	MDC
C 2.1.4.3	Concrete by properties, concrete by composition	DIN 1045-2:2023-08 Also applicable: DIN 1045-3:2023-08 Annexes C 2.1.2 and C 2.1.3 Also applicable, depending on construction product: DafStb Guideline on precautions against harmful alkali reactions in concrete (Alkali-Richtlinie [Alkali Guideline]) AlkR – (2013-10), DAfStb Guideline on the manufacture and use of dry concrete and dry mortar (Dry Concrete Guideline) TrBMR – (2005-06), 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 2.1.4.4	Grout for pre-stressing tendons	DIN EN 447:1996-07: Also applicable: DIN EN 445:1996-07, DIN EN 446:1996-07 and Annexes C 2.1.4 and C 2.1.5	Mark of conformity [ÜZ][8]
C 2.1.4.5	Grouting mortar, liquid concrete	DAfStb Guideline on the manufacture	Mark of

8 8 Only applies in the federal states of Bremen, Lower Saxony and Saarland (as of 30.8.2010). In the federal states where the regulations on the requirements for manufacturers of construction products and users of designs, and those concerning the supervision of activities involving construction products and designs, have been issued, the certificate of conformity [Übereinstimmungsnachweis (ÜZ)] is replaced by the inspection or monitoring performed by accredited centres in accordance with the said Regulations and the relevant standard.

Ser. No	Construction product	Technical rules/version	Declaration of conformity
1	2	3	4
		and use of cement-bonded liquid concrete and grouting mortar - VeBMR – (2019-07) Also applicable: DIN 1045-2:2023-08, Annex O	conformity [ÜZ]
C 2.1.5	**Prefabricated structural elements made of concrete and reinforced concrete, structural glass and bricks**		
C 2.1.5.4	Precast concrete, reinforced concrete or prestressed concrete components that do not comply with harmonised product standards	DIN 1045-40:2023-08	Mark of conformity [ÜZ] also applies to non-serial production
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 1045-40:2023-08	Mark of conformity [ÜZ] also applies to non-serial production
C 2.3	**Construction products for timber construction**		
C 2.3.1	**Precast structural elements**		
C 2.3.1.1	Glued load-bearing timber construction products according to DIN 1052-10:2012-05, Sections 6.2 to 6.5 and 6.7, excluding construction products under ser. No. C 2.3.1.5	DIN 1052-10:2012-05 Also applicable: Annex C 2.3.1	MDC
C 2.3.1.2	Load-bearing structures of laminated beams, glued laminated timber or laminated veneer softwood timber with punched metal plate fasteners	DIN 1052:2008-12 and DIN 1052/Corrigendum 1:2010-05	Mark of conformity [ÜZ] also applies to non-serial production
C 2.3.1.3	Glued composite structural elements made of laminated timber that do not fall within the scope of DIN EN 14080, and cross-laminated timber	DIN 1052-10:2012-05	Mark of conformity [ÜZ]
C 2.3.1.4	Wood panel elements closed on both sides, not glued, DIN 1052-11, type M2	DIN 1052-11:2022-12	Mark of conformity [ÜZ] also applies to non-serial production
C 2.3.1.5	Glued wall, ceiling and roof elements with cladding or panelling on both sides, e.g. panel elements for wooden houses using the panel construction method	DIN 1052-10:2012-05 Also applicable, mutatis mutandis: 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 (1992-06)	Mark of conformity [ÜZ] also applies to non-serial production

Ser. No	Construction product	Technical rules/version	Declaration of conformity
1	2	3	4
C 2.3.1.6	Wood panel elements closed on one side, not glued, DIN 1052-11, type M1A and M1B	DIN 1052-11:2022-12	MDC
C 2.3.1.7	Wood panel elements closed on one side, not glued, DIN 1052-11, type M1C	DIN 1052-11:2022-12	ÜZ, also applies to non-serial production
C 2.6	**Doors and gates**		
C 2.6.7	Door closers with controlled closing sequence – swing leaf drives with self-closing function	DIN EN 17372:2021-09:	Mark of conformity [ÜZ]
C 2.8	**Special constructions**		
C 2.8.1	Roller shutter boxes with thermal and sound insulation requirements	Guidelines on roller shutter boxes (RokR):(2022-09) (see annex 13)	MDT
C 2.9	**Construction products for roofs and roof coverings, walls and wall coverings, as well as ceilings and ceiling linings and internal non-loadbearing dividing walls**		
C 2.9.3	Unreinforced lightweight concrete wall panels	DIN 18162:2000-10 with the exception of the provisions concerning independent quality control inspection Also applicable: Annexes C 2.1.5, C 2.1.6 and C 2.9.2	MDC
C 2.12	**Construction products for site drainage**		
C 2.12.1	**Pipes, pipe fittings and jointing materials for lines and ducts**		
C 2.12.1.3	Pipes, fittings and piping of plasticiser-free polyvinyl chloride (PVC-U) for non-pressurised underground sewers and pipelines	DIN EN 1401-1:2019-09 in conjunction with DIN CEN/TS 1401-2:2020-09 Also applicable: Annex C 2.12.2	Mark of conformity [ÜZ]
C 2.12.1.4	High-density polyethylene (HDPE) pipes and fittings for hot-water resistant waste water pipes (HT) inside buildings	DIN EN 1519-1:2019-07 in conjunction with DIN CEN/TS 1519-2:2012-05 Also applicable: DIN 4102-1:1998-05 DIN EN ISO 11925-2:2011-02 in conjunction with Annex C 3.7	Mark of conformity [ÜZ]
C 2.12.1.6	Shafts and accessories of plasticiser-free polyvinylchloride (PVC-U), polypropylene (PP) and polyethylene (PE) for non-pressurised underground sewers and pipelines	DIN EN 13598-1:2020-12 in conjunction with DIN CEN/TS 13598-3:2012-07	Mark of conformity [ÜZ]
C 2.12.1.7	Manholes and inspection shafts made of plasticiser-free polyvinyl chloride (PVC-U), polypropylene (PP) and polyethylene (PE) for non-pressurised underground sewers and -pipelines	DIN EN 13598-2:2020-12 in conjunction with DIN CEN/TS 13598-3:2012-07	Mark of conformity [ÜZ]
C 2.12.1.14	Plastic piping systems made of polypropylene (PP) for draining waste water inside buildings	DIN EN 1451-1:2018-10 in conjunction with DIN CEN/TS 1451-2:2020-08 Also applicable: DIN 4102-1:1998-05 DIN EN ISO 11925-2:2011-02 in conjunction with Annex C 3.7	Mark of conformity [ÜZ]
C 2.12.1.18	Polypropylene waste water pipes and fittings for underground sewers and pipelines	DIN EN 1852-1:2018-03 in conjunction with DIN CEN TS 1852-2:2020-08	Mark of conformity [ÜZ]
C 2.12.1.20	Plastic piping systems for non-pressurised underground sewers and	DIN EN 13476-2:2020-12 in conjunction with	Mark of conformity

Ser. No	Construction product	Technical rules/version	Declaration of conformity
1	2	3	4
	pipelines with profiled walls made of polyvinylchloride (PVC-U), polypropylene (PP) and polyethylene (PE) – Pipes and fittings with smooth inner and outer surfaces, pipe type A –	DIN CEN/TS 13476-4:2020-08	[ÜZ]
C 2.12.1.21	Plastic piping systems for non-pressurised underground sewers and pipelines with profiled walls made of polyvinylchloride (PVC-U), polypropylene (PP) and polyethylene (PE) – Pipes and fittings with smooth inner and profiled outer surfaces, pipe type B –	DIN EN 13476-3:2020-12 in conjunction with DIN CEN/TS 13476-4:2020-08	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 2.15.15	Concrete formwork bricks for fermentation silos and liquid manure tanks in biogas storage and filling systems and systems for the storage of slurry, liquid manure and silage effluents containing mixtures, up to a maximum of 10% by volume of silage effluents	DIN 11622-22:2015-09	Mark of conformity [ÜZ]
C 2.15.16	Concrete used as sealant for collecting chambers and surfaces	DIN 1045-2:2023-08 Also applicable: DIN 1045-3:2023-08, 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 2.15.22	Components for supply systems for liquid fuel consumption points	DIN EN 12514:2022-01: Also applicable: Annex C 2.15.19	MDT
C 2.15.24	Leak detectors for under- and overpressure systems for storing water-polluting liquids9 Excluded from this are leak detectors for equipment for storing fuels used to supply heating systems in buildings.	Annex C 2.15.15	MDT
C 2.15.25	Leak detectors for liquid systems for storing water-polluting liquids[9]	Annex C 2.15.16	MDT
C 2.16	**Scaffolding components[10]**		
C 2.16.4	Couplings	DIN EN 74-1:2022-09 Also applicable: Annexes C 2.16.2 and C 2.16.4	Mark of conformity [ÜZ]
C 2.16.7	Pre-assembled steel, aluminium and wooden scaffolding parts	DIN EN 12812:2008-12: Also applicable: Annexes C 2.16.2 and C 2.16.6	MDC
C 2.16.12	Special couplings	DIN EN 74-2:2022-09 Also applicable: Annexes C 2.16.2 and C 2.16.10	Mark of conformity [ÜZ]
C 2.16.15	Prefabricated scaffolding components of steel, aluminium and wood, with the exception of basic components, access panels and coverings of consoles and	DIN EN 12811-1:2004-03 Also applicable: Appendix C 2.16.11	Monitoring certificate

9 9 Excluded from this are leak detectors for equipment for storing fuels used to supply heating systems in buildings.

Part C

Ser. No	Construction product	Technical rules/version	Declaration of conformity
1	2	3	4
	passage frames		

Annex C 2.1.1

The manufacturer shall indicate to the certification body the type and percentage of (cement) additives according to DIN 1164-11:2023-02, Section 5.

Annex C 2.1.2

In derogation from DIN 1045-2:2023-08 Annex F, Table F.1, concrete for bridge caps exposed to de-icing salt may be manufactured as exposure class XD3 with a maximum water/cement ratio of 0.50. In derogation from DIN 1045-2:2023-08, Annex F, Table F.1 and Table F.2, in exposure classes XD3 and XF4, the minimum compressive strength class of air-entrained concrete shall be C25/30 after 28 days.

In derogation from DIN 1045-2:2023-08, Annex F, Table F.1 and Table F.2, for structural elements of road bridges, tunnels and trenches in exposure classes XD2, XS2, XF2, XF3 or XA2, the minimum compressive strength class of concrete shall be C30/37 after 28 days.

Annex C 2.1.3

1 Re DIN 1045-2: 2023-08

1.1 Section 5.1.2:
Paragraph (4) is replaced by the following paragraph:
"(4) Requirements for cements are specified in Annex O (normative)."

1.2 Section 5.1.5:
Paragraph (3) is replaced by the following paragraph:
"(3) Requirements for admixtures are specified in Annex O (normative)."

1.3 Section 5.1.6:
Paragraph (9) is replaced by the following paragraph:
"(9) Requirements for additives are specified in Annex O (normative)."

1.4 Section 5.1.7:
Paragraph (2) is replaced by the following paragraph:
"(2) Requirements for fibres are specified in Annex O (normative)."

1.5 Section 5.2.3.4
Paragraph (4) is supplemented by the following sentence:
„.... The use of recycled rock granules in exposure classes XA2, XA3 and XM, as well as for prestressed concrete and light concrete shall not be permitted."

1.6 Section 5.2.5.1
Paragraph (8) is replaced by the following paragraph:
"(8) Requirements for additives are specified in Annex O (normative)."

1.7 Section 5.5.4:
Paragraph (1) is replaced by the following paragraph:
"(1) Concrete with a composition of rock granules in accordance with 5.1.3, cement in accordance with 5.1.2, admixtures in accordance with 5.1.5, additives in accordance with 5.1.6, fibres in accordance with 5.1.7 or other inorganic materials in accordance with 5.1.1 with a maximum of 1 % by mass or by volume of organic constituents (whichever is the greater) may be classified as class A1 for fire behaviour in accordance with Decision 96/603/EC (as amended by Decisions 2000/605/EC and 2003/424/EC)[6] without the need for a test."
For class A1, the following footnote 6 is to be taken into account:
“6 "no contribution to fire" in accordance with Delegated Regulation (EU) 2016/364."

1.8 Annex O, Table O.1
In Table O.1, the reference to "Cement with low effective alkali content in accordance with DIN 1164-10:2013-03" is replaced by the following:
"Cement with low effective alkali content in accordance with DIN 1164-10:2023-02"

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

Section 7.1.1:
To be added: "The manufacturer must declare compliance with DIN 1164-10:2023-02 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 2.1.4

The following must be observed when applying the Technical Rules:

1 The prestressing tendons may be grouted with a grout consisting of Portland cement CEM I in accordance with EN 197-1:2011[1] or DIN 1164-10:2023-02, water and a grouting aid in accordance with EN 934-4:2009[2]. The use of grouting aids must comply with DIN V 20000-101: 2002-11. The corrosion behaviour may, as an alternative to DIN V 20000-101:2002-11, Section 7, also be demonstrated based on DIN EN 934-1:2008-04. The use of other grout types requires a certificate of usability from the building supervisory authority.

2 Re DIN EN 445:1996-07

2.1 Section 2:
The most recent date of issue "DIN EN 196-1:2016-11" must be cited.

2.2 Section 3.2.2.3:
The final sentence "Two... must be performed." shall be replaced by the following sentences: "Three tests must be carried out; the first test shall be carried out immediately after mixing the grout and the remaining two tests shall be performed 30 minutes after mixing the grout. While the tests are being carried out, the grout must be kept in motion."

2.3 Section 3.4.2.3:
"(see 3.4)" shall be replaced by "(see 3.3.3)".

2.4 Section 3.4.3:
The word ‘vessel method’ shall be replaced by ‘container method’. Accordingly, use of the word ‘vessels’ in the subsections is always taken to mean ‘containers’. In the subsections, "calliper gauge" shall always be replaced with "depth gauge".

2.5 Section 3.4.3.2:
Under a), the first two sentences in the first paragraph must carry the following wording: ‘The initial measurement must be performed immediately after the containers have been filled with grout, while the gap between the surface of the grout and the upper edge of the container with the cover plate on the container must be read off at at least 6 points using the depth indicator or other measuring devices. The marking on the cover plate must correspond to the marking on the edge of the container (reference point).’).’

Under a), the second paragraph shall be replaced by the following: ‘In the case of the second measurement, the gap between the firm surface of the grout and the upper edge of the vessel must be measured at the same 6 points used for the initial measurement while using the same measuring method.’.’

Under a), ‘(see 3.6)’ at the end shall be deleted.

2.6 Section 3.5.1.2:
"b)..." shall be replaced with the following: "b) Storage facilities pursuant to Section 4.1 of DIN EN 196-1:2016-11".

2.7 Section 3.5.1.3.1:
The third paragraph must be supplemented as follows at the end: "Then the samples must be covered with a glass plate."

3 Re DIN EN 446: 1996-07

3.1 Section 0:
"Requirements for grout" shall be replaced by "Requirements for grouting with grout" and "Eurocode 2" shall be replaced by "DIN EN 1992-1-1:2011-01 and DIN EN 1992-1-1/A1:2015-03".

3.2 Section 3:
The definitions of the grouting procedures given in subsections 3.2 and 3.3 shall be replaced with the following:

"3.2 Re-grouting: Additional grouting for removing air or water bubbles by grout in the prestressing cuts before the original grout has hardened.

3.3 Re-backfilling: Additional grouting for removing air or water bubbles by grout in the prestressing cuts after the original grout has hardened.“

3.3 Section 4:
With regard to Section 4, it is necessary to clarify: "The preliminary test pursuant to DIN EN 446:1996-07, Section 4, shall be regarded as having been complied with from the point of view of the building supervisory authority in relation to the materials pursuant to DIN EN 447:1996-07, Section 4, provided the latter comply with the Technical Rules specified in Chapter C 2 or, in case of significant deviations, the required certificate of usability is available and the certificate of conformity was furnished in relation to it."

3.4 Section 7.3:
The words "Grouting and re-grouting procedures" are to be replaced with the words "procedures for grouting and re-grouting".

3.5 Section 7.6:
The following shall be deleted: ‘ without curing retardant ’.

3.6 Section 7.8:
The words "re-injection" and "re-pressing" in the heading and text body are to be replaced with "re-grouting".

3.7 Section 7.9:
In the heading and the text body, the word "re-grouting" is to be replaced by the word "re-backfilling" and, in the first sentence of the text, the word "form" is to be replaced by the words "have formed".

3.8 Section 8.1:
After the first indent, the word "consumer" shall be replaced by "client", while the second sentence after the second indent shall be replaced with the following: "The competent centre may require additional checks."

3.9 Section 8.4:
After ‘bleeding:’ the following shall be added: ‘...grout fluidity... the requirements"...’.

"Grouting" shall be replaced by "order for grouting".

4 Re DIN EN 447:1996-07

4.1 Section 0:
In the second paragraph, the words “above all” before the indents shall be deleted.

4.2 Table 1:
Table 1 shall be replaced by the following:

In accordance with DIN EN 445:2008-01	**Immediately after mixing time (in s)**	**30 Minutes after mixing[1)] or after grouting time (in s)**	**at the outlet of the cladding tube, time (in s)**
Immersion test	≥ 30	≤ 80 (200)2)	≥ 30
Funnel method	≤ 25 (50)2)	≤ 25 (50)2)	≥ 10

1) The mixing time shall be measured from the point when all the necessary material quantities are in the mixer.
2) As regards grouts which are prepared in certain mixers which have a high agitator speed, the limit values indicated in Table 1 above may be increased by up to 200 s in the case of the immersion test and by up to 50 s in the case of the funnel method. The mixer and these limit values must be agreed on with the competent authority.

4.3 Section 4.2:
In note 2 the words "blast furnace slag" shall be replaced by "granulated slag".

4.4 Section 4.4:
By way of deviation from Section 4.4, only admixtures authorised for grout (grouting aids) may be used.

4.5 Section 5.2:
In the second sentence, the words ‘Sections 3.2 and 3.3’ shall be replaced by ‘Section 3.2’3.2’.

In deviation from Section 5.2, fluidity testing may only be performed in relation to grouts containing grouting aids using the immersion test as per Section 3.2.1 of DIN EN 445 since the limit values as per Table 1 relating to the discharge hopper do not apply to this grout. If, during the suitability testing of a grout containing grouting aids, the limit values relating to the discharge hopper are calibrated using the immersion test, measurements may also be conducted in accordance with Section 3.2.2 of DIN EN 445:2008-01 using the funnel method. The limit values determined must be observed instead of the values specified in Table 1 in relation to the funnel method.

4.6 Section 5.3:
Reference shall be made to "Section 3.3" instead of to "Section 3.4".

4.7 Section 5.4:
Reference shall be made to "Section 3.4" instead of "Section 3.5 or 3.6". The final sentence must be supplemented as follows: ‘Grout containing foaming agents may not exhibit any reduction in volume during the suitability test.’.’

4.8 Section 5.5:
In deviation from Section 5.5, the compressive strength of grouts containing grouting aids may only be tested using the cylinders indicated in Table 2.

4.9 Table 2:
In Table 2, the references must be altered as follows:

To ‘Section 3.5.1’ instead of to ‘Section 3.7’,
to ‘Section 3.5.2’ instead of to ‘Section 3.8’ and
In footnote 1), "Section 3.5.2" instead of "Section 3.6".

4.10 Section 6:
By way of deviation from Section 6, the mixing time is limited to 4 minutes.

1 Implemented in Germany by DIN EN 197-1:2011-11.
2 Implemented in Germany by DIN EN 934-4:2009-09.

Annex C 2.1.5

Table 1: Use of cement according to EN 197-1:2011[1]

The standard DIN 1164-1:1994-10 was replaced by the European standard EN 197-1:2011[1] and the standard DIN 1164-10:2023-02. Insofar as there is a reference to DIN 1164 (earlier versions) in the Technical Rules of the administrative provision in the Technical Building Regulations, the cements in accordance with EN 197-1:2011[1] can be used according to the following table. Restrictions on use in the Technical Rules remain unaffected.

Ser. No.	Technical rule		Usable cements (cement type) according to EN 197-1:2011[1]
1	2	3	4
1	DIN EN 447	1996-07	CEM I
2	DIN EN 588-1	1996-11	In accordance with the application rules for exposure class XF 1 in DIN 1045-2:2023-08
3	DIN 4166	1997-10	All
4	DIN 18148	2000-10	All
5	DIN 18162	2000-10	
6	DIN EN 12763	2000-10	As for ser. No. 2

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

Annex C 2.1.8

- deleted from MVV TB 2024/1 -

Annex C 2.1.9

If DIN 1164-2:2023-02 is applied:

Section 4.2, paragraph 3: The last part of the sentence: "... and strength in accordance with DIN EN 196-1 to be tested with a test specimen age of 6h ± 15 min" deviating from DIN EN 196-1" shall not be applied. The strength shall be checked on samples manufactured in accordance with DIN 1164-11:2023-02, Annex A.3, in accordance with DIN EN 196-1.

Section 5.2, paragraph 2: The last part of the sentence: "... and strength in accordance with DIN EN 196-1 to be tested with a test specimen age of 6h ± 15 min" deviating from DIN EN 196-1" shall not be applied. The strength shall be checked on samples manufactured in accordance with DIN 1164-11:2023-02, Annex A.3, in accordance with DIN EN 196-1.

Annex C 2.1.10

If DIN 1164-11 is applied the following applies:

Foreword
Indent (d) shall not apply.

Table 1:
Column “Requirement” SE cements: Strength after 6 h: ≥ 4.0 MPa shall not be applied.
Column ‘Test procedure’, Annex A: Reference to footnote (a) is not applicable.
Footnote (a) is not applicable.

Table 2:
1. Column 6 Line: “Compressive strength after 6 h” shall not be applied.
3. Column 2 Line: Footnote (a) for test methods shall not apply.
3. Column 4 Line: DIN EN 196-3 with reference to footnote (a) shall apply.
3. Column 6 Line: Footnote (e) does not apply to Annex A.

Table 3:
5. Line is not applicable.

Annex C 2.13.6

The energy parameters determined in accordance with the National Annex (NA) to DIN EN 13142 can be used as input for the calculation of the annual primary energy demand in accordance with DIN V 18599-1:2018-09.

Annex C 2.15.13

- deleted from MVV TB 2024/1 -

Annex C 2.15.14

- deleted from MVV TB 2024/1 -

Annex C 2.15.15

1 Requirements for the construction product

Leak detectors must be designed in accordance with DIN EN 13160-2:2016-12 in conjunction with EN 13160-1:2016-12.

The parts of a leak detector intended for outdoor installation must be operational within a temperature range of -20 °C to + 60 °C.

2 Specifications for in-house production control and initial testing

For the in-house production control and initial testing, EN 13160-2, Annex ZA, Table ZA.1 and Table ZA.3 shall apply. During the initial testing, the instructions according to EN 13160-2, clause 7, shall also be checked. The other sections of Annex ZA do not apply.

2 Marking specifications

For conformity marking, the administrative provision in the Technical Building Regulations, Section C 2, Annex C 2.15.15 shall be indicated as the decisive Technical Rule.

4 Installation specifications

The leakage detectors for negative pressure and over-pressure systems as part of Class I leakage detection systems may be used for the following applications:

- double-walled containers,
- double-walled pipes,
- single-walled containers with leak detection lining,
- single-walled pipes with leak detection lining,
- single-walled containers with leak detection jacketing,
- single-walled pipes with leak detection jacketing.

Annex C 2.15.16

1 Requirements for the construction product

Leak detectors must be designed in accordance with DIN EN 13160-3:2016-12 in conjunction with EN 13160-1:2016-12.

The parts of a leak detector intended for outdoor installation must be operational within a temperature range of -20 °C to + 60 °C.

2 Specifications for in-house production control and initial testing

For the in-house production control and initial testing, EN 13160-3, Annex ZA, Table ZA.1 and Table ZA.3 shall apply. During the initial testing, the instructions according to EN 13160-3, clause 7, shall also be checked. The other sections of Annex ZA do not apply.

3 Marking specifications

For conformity marking, the administrative provision in the Technical Building Regulations, Section C 2, Annex C 2.15.16 shall be indicated as the decisive Technical Rule.

4 Installation specifications

1 The leakage detectors for liquid systems as part of Class II leakage detection systems may be used for the following applications:

- double-walled, unpressurised, above-ground tanks,
- single-walled, unpressurised, above-ground tanks with leak protection lining,
- single-wall, unpressurised, above-ground tanks with leak protection coating.

2 The volume of the interstitial space of the system must not exceed 1 m^3.

Annex C 2.15.19

By way of derogation from Section 4.12.2 of DIN EN 12514:2022-01, the leakage rate for the internal tightness of safety devices against lifters shall not exceed the leakage rate A in accordance with EN 12266-2:2012.

Annex C 2.16.6

DIN EN 17293:2020-07 and Annexes A 1.2.4/5 and A 1.2.4/6 apply to the welding of steel and aluminium structural elements.

Annex C 2.16.9

- deleted from MVV TB 2024/1 -

Annex C 2.16.11

DIN EN 17293:2020-07 and Annexes A 1.2.4/5 and A 1.2.4/6 apply to the welding of steel and aluminium structural elements.
Structural elements in accordance with Annex A, paragraph A.1 of DIN EN 12810-1:2004-03 qualify as basic structural elements.
Scaffolding components must be marked in accordance with federal state conformity regulations. Scaffolding parts must also be easily recognisable and durably marked with:

- the capital letter ‘Ü’,
- the manufacturer’s logo,
- the marking ‘EN 12811’;

- the last two numbers representing the year of manufacture (encoded if necessary) and
- a marking for the assignment of the scaffolding component to the assembly and use instructions[1].

.

Scaffolding parts may only be manufactured by manufacturers whose in-house quality control is regularly checked at least every five years by external monitoring. The manufacturer may itself carry out initial testing on scaffolding components that can be assigned to a product group for which initial testing has been carried out by an accredited body for the manufacturer on at least one scaffolding component.

Welded steel or aluminium scaffolding components may only be manufactured by firms that have a welding certificate for at least execution class EXC 2 according to EN 1090-1:2009+A1:2011[2] for the area of application.

1 The assembly and usage instructions must comply with the requirements set out in the ‘Application guideline for scaffolding according to DIN EN 12811-1’; see DIBt-Mitteilung, vol. 2/2006.

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

C - Technical Building Regulations for construction products that do not bear the CE marking and for designs

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

Ser. No	Construction product	approved test procedure according to:	Declaration of conformity
1	2	3	4
C 3.1	Prefabricated ventilation ducts to which requirements on fire resistance and/or sound insulation apply1 According to federal state law	Also applicable, depending on construction product: *As regards the fire resistance time:* DIN 4102-6:1977-09 and – where applicable – in conjunction with DIN V 4102-21:2002-08), or DIN EN 1363-1:2020-05, DIN EN 1366-1:2020-11 and – where applicable - in conjunction with DIN V 4102-21:2002-08 and Annex C 3.1 *for sound insulation:* DIN EN ISO 10140-1, -2, 4, 5:2021-09 DIN EN ISO 717-1:2021-05	MDC
C 3.6	Chimney cleaning caps and soot shut-off valves	Construction and testing principles for chimney cleaning caps and soot shut-off valves (2012-11)	MDT
C 3.7	Mountings and appliances of the water installation which are subject to noise requirements	DIN EN ISO 3822-1:2009-07 DIN EN ISO 3822-2:1995-05 DIN EN ISO 3822-3:2018-04 in conjunction with Annex C 3.10 DIN EN ISO 3822-4:1997-03	MDT
C 3.17	Automatically closing nozzles	DIN EN 13012:2021-11:	MDT

1 According to federal state law

Annex C 3.1

Ventilation ducts

A round or rectangular ventilation duct with maximum dimensions according to DIN EN 1366-1:2020-11, Table 6, may be classified as L... in accordance with DIN 4102-6:1977-09 if the ventilation duct of standard dimensions according to DIN EN 1366-1:2020-11, Section 6.1 fulfils the requirements of DIN EN 1363-1:2020-05 in conjunction with DIN EN 1366-1:2020-11, Section 11, for a test duration of... minutes.

A ventilation duct with the nominal internal dimensions of the air-carrying cross-section of 1 250 mm x 1 000 mm < B x H ≤ 2 500 mm x 1 250 mm or a nominal inner diameter of 1 000 mm < D ≤ 1 250 mm can be classified as L... according to DIN 4102-6:1977-09 if

- it has been tested in accordance with DIN V 4102-21:2002-08 and, for a test duration of... minutes observed the requirements of DIN V 4102-21:2002-08, Section 5.2 and 5.3

and where in either case:

- a ventilation duct with the same design (material, material thickness, connection technology, fastening) according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1366-1:2020-11 was previously tested for the dimension specified in DIN EN 1366-1:2020-11, Table 2.

Annex C 3.10

For angle valves installed upstream of outlet taps for washbasins, sinks and bidets, the flow shall be set to 0.25 l/s (flow class A) or 0.42 l/s (flow class B).
For combination angle valves with appliance connection, the flow rate for the appliance connection shall be set to 0.2 l/s.

C - Technical Building Regulations for construction products that do not bear the CE marking and for designs

C 4 Designs that require only a general building authority test certificate pursuant to Section 16a(3) MBO[1]

Item numbers:	Construction type:	approved test procedure according to:
1	2	3
C 4.1	Designs other than those referred to in Section A 2, No. A 2.2.1.4, for the construction of ceilings, roofs, suspended ceilings, raised floors, hollow floors, columns, beams, joists, stairs, and load-bearing walls, which are subject to fire resistance and/or sound insulation requirements. This does not apply to parts of buildings which are subject to further requirements if the relevant designs significantly differ from the Technical Building Regulations or if there are no generally accepted technical best practices for the relevant designs.1 According to federal state law	Also applicable, depending on design: *As regards the fire resistance time:* DIN 4102-2:1977-09 with the exception of Sections 6.2.7, 6.2.9 and 6.2.10 or DIN EN 1363-1:2020-05, DIN EN 1363-2:1999-10, DIN EN 1364-2:2018-03, DIN EN 1365-1:2013-08, DIN EN 1365-2:2015-02 DIN EN 1365-3:2000-02, DIN EN 1365-4:1999-10, DIN EN 1366-6:2005-02 in conjunction with Annex C 4.6 *for sound insulation:* DIN EN ISO 10140-1, -2, -3, -4, -5:2021-09, DIN EN ISO 717-1, -2:2021-05, and DIN EN ISO 10848-1, -2, -3:2018-02
C 4.1.1	Designs, other than those referred to in Chapter A 2, serial No. A 2.2.1.4, for the installation of firewalls or walls instead of firewalls with additional mechanical stress, are subject to fire resistance requirements. The second sentence of paragraph C 4.1 applies accordingly.	Also applicable, depending on design: DIN 4102-3:1977-09 or DIN EN 1363-1:2020-05, DIN EN 1363-2:1999-10 and for load-bearing walls: DIN EN 1365-1:2013-08 or for non-load-bearing walls: DIN EN 1364-1:2015-09, in conjunction with Annex C 4.6
C 4.2	Designs other than those referred to in Section A 2, No. A 2.2.1.4, for the construction of non-load-bearing internal partition walls, including installations (sanitary equipment), the fall protection of which is to be proven experimentally and/or which are subject to fire resistance and/or sound insulation requirements, with the exception of those made of glass. The second sentence of paragraph C 4.1 applies accordingly.	Also applicable, depending on design: *As regards protection against falling:* DIN 4103-1:2015-06 The following characteristics are each to be met together with the requirements of DIN 4103-1:2015-06: *As regards the fire resistance time:* DIN 4102-2:1977-09 apart from Sections 6.2.7 and 6.2.9 or DIN EN 1363-1:2020-05, DIN EN 1363-2:1999-10, DIN EN 1364-1:2015-09 in conjunction with Annex C 4.6 *for sound insulation:* DIN EN ISO 10140-1, 2, 4, 5:2021-09 DIN EN ISO 717-1:2021-05, and DIN EN ISO 10848-1, -2, -3:2018-02

1 According to federal state law

Item numbers:	Construction type:	approved test procedure according to:
1	2	3
C 4.3	Designs for the construction of non-load-bearing exterior walls subject to fire resistance and sound insulation requirements. The second sentence of paragraph C 4.1 applies accordingly.	Also applicable, depending on design: *As regards the fire resistance time:* DIN 4102-3:1977-09 or DIN EN 1363-1:2020-05, DIN EN 1363-2:1999-10, DIN EN 1364-1:2015-09 in conjunction with Annex C 4.6 *for sound insulation:* DIN EN ISO 10140-1, -2, -4, -5:2021-09 DIN EN ISO 717-1:2021-05, and DIN EN ISO 10848-1, -2, -3:2018-02 *As regards protection against falling:* ETB Guideline ‘Components that protect against falls’ (1985-06)
C 4.4	Designs for the construction of ventilation ducts subject to fire resistance time and/or sound insulation requirements. The second sentence of paragraph C 4.1 applies accordingly.	Also applicable, depending on design: *As regards the fire resistance time:* DIN EN 4102-6:1977-09 and – where applicable – in conjunction with DIN V 4102-21:2002-08), or DIN EN 1363-1:2020-05, DIN EN 1366-1:2020-11 and – where applicable – in conjunction with DIN V 4102-21:2002-08 and Annex C 3.1 of Section C 3 *for sound insulation:* DIN EN ISO 10140-1, -2, -4, -5:2021-09 DIN EN ISO 717-1:2021-05
C 4.6	Designs for pipe bulkheads on thermoplastic pipes (heat-insulated where applicable), - whose function is based on the arrangement of a pipe encasement/section insulation layout, - in which no insulating building materials are used, and - in relation to which requirements are only laid down in terms of fire resistance time. Ser. No. C 4.1 sentence 2 applies accordingly.	DIN 4102-11:1985-12 in conjunction with Annex C 4.5 and Annex C 4.1
C 4.7	Designs for the manufacture of service shafts and ducts, including the closures of their inspection openings, which are subject to fire resistance and sound insulation requirements. The second sentence of paragraph C 4.1 applies accordingly.	Also applicable, depending on design: As regards the fire resistance time: DIN 4102-11:1985-12 or as test procedures for service shaft walls of service shafts also DIN 4102-2:1977-09, except Sections 6.2.7 and 6.2.9 or DIN EN 1363-1:2020-05, DIN EN 1363-2:1999-10, DIN EN 1364-1:2015-05 in conjunction with Annex C 4.6 for sound insulation: DIN EN ISO 10140-1, -2, -4, -5:2021-09 DIN EN ISO 717-1:2021-05
C 4.8	Designs for the manufacture of roofing subject to requirements regarding resistance to spreading of fires and radiating heat. Ser. No. C 4.1 sentence 2 applies accordingly.	DIN 4102-7:2018-11 in conjunction with DIN SPEC 4102-23:2018-07 Sections 1, 2, 3, 4 and 7, or DIN CEN/TS 1187:2012-03 Test method 1 in conjunction with DIN SPEC 4102-23:2018-07 Sections 1, 2, 3, 4 and 7, or

Item numbers:	Construction type:	approved test procedure according to:
1	2	3
		DIN CEN/TS 1187:2012-03 Test method 1 in conjunction with DIN CEN/TS 16459:2020-04 Sections 1, 2, 3, 4 and 7, and Annex A
C 4.10	Designs for the construction of smoke extraction ducts to which requirements on fire resistance and/or sound insulation apply. The second sentence of paragraph C 4.1 applies accordingly.	Also applicable, depending on design: As regards the fire resistance time: DIN 4102-6:1977-09 DIN V 18232-6:1997-10 in conjunction with Annex C 4.2 DIN EN 1363-1:2020-05, DIN EN 1366-1:2020-11 in conjunction with DIN EN 1366-8:2004-10 in conjunction with Annex C 4.3 for sound insulation: DIN 52210-6:2013-07

Annex C 4.3

A smoke extractor duct can be classified as category 3 according to DIN V 18232-6:1997-10 if it has passed the tests according to DIN EN 1366-1:2020-11 (duct A at a pressure of -500 Pa) and for a test duration of ≥ 30 minutes under a temperature load as per DIN EN 1363-1:2020-05 meets the requirements of DIN EN 1366-8:2004-10, Section 11.3.2, tightness; Section 11.3.3, Room closure; Section 11.3.4, Thermal insulation and Section 11.3.5, Cross-section reduction.

Annex C 4.5

A pipe encasement/pipe seal can be classified as R ... under DIN 4102-11:1985-12 if it complies with the conditions under DIN 4102-11:1985-12 with testing

- in accordance with DIN 4102-11:1985-12 (including Annex 4.1) has been conducted

or

- in accordance with DIN 4102-11:1985-12 but with modified test conditions in accordance with DIN EN 1366-3:2009-07, Section 5: The furnace temperature was controlled in accordance with DIN EN 1363-1:2020-05, Section 5.1 with furnace thermocouples in accordance with Section 4.5.1.1 and testing was started in accordance with DIN EN 1363-1:2020-05, Section 10.3. The pressure conditions in the fire room corresponded to DIN EN 1366-3:2009-07, Section 5.2.

Annex C 4.6

1 Non-load-bearing room-closing dividing walls

A non-load-bearing room-closing dividing wall may be classified as F... under DIN 4102-2:1977-09 if it either

- complies with the conditions under DIN 4102-2:1977-09,

or

- has been tested in accordance with DIN EN 1363-1:2020-05 in conjunction with DIN EN 1364-1:2015-09 and, for a duration of... minutes, has met the requirements of DIN EN 1363-1:2020-05, Section 11.2, Room closure, and Section 11.3, Thermal insulation.

For testing according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1364-1:2015-09, a fire test is required for symmetrical structural elements.

2 Load-bearing room-closing walls

A load-bearing room-closing wall may be classified as F... pursuant to DIN 4102-2:1977-09 if it

- complies with the conditions under DIN 4102-2:1977-09,

or

- was tested in accordance with DIN EN 1363-1:2020-05 in conjunction with DIN EN 1365-1:2013-08, and, over a test duration of... minutes, met the requirements of DIN EN 1363-1:2020-05, Section 11.1, Load-bearing capacity, clause II and Section 11.2, Room closure, and Section 11.3, Thermal insulation.

For testing according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1365-1:2013-08, a test is required for symmetrical structural elements.

3 Suspended ceiling (as an independent structural element)

A suspended ceiling as an independent structural element may be classified as F... under DIN 4102-2:1977-09 if it either

- complies with the conditions under DIN 4102-2:1977-09,

or

- was tested in accordance with DIN EN 1363-1:2020-05 in conjunction with DIN EN 1364-2:2018-03, and, over a test duration of... minutes, has met the requirements of DIN EN 1364-2:2018-03, Section 11.2, Room closure, and Section 11.3, Thermal insulation.

For testing according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1364-2:2018-03, a stress test is required on the underside and on the topside. If classification is only to be done on one side, a stress test on this side is required.

4 Supports

A support may be classified as F... under DIN 4102-2:1977-09 if it either

- complies with the conditions under DIN 4102-2:1977-09,

or

- was tested in accordance with DIN EN 1363-1:2020-05 in conjunction with DIN EN 1365-4:1999-10 and, for the test duration of... minutes, has met the requirements of DIN EN 1363-1:2020-05, Section 11.1, Load-bearing capacity, clause II.

For testing according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1365-4:1999-10, a test is required.

5 Beams/joists

A beam/joist may be classified as F... under DIN 4102-2:1977-09 if it either

- complies with the conditions under DIN 4102-2:1977-09,

or

- was tested in accordance with DIN EN 1363-1:2020-05 in conjunction with DIN EN 1365-3:2000-02, and, over a test duration of... minutes, met the requirements of DIN EN 1363-1:2020-05, Section 11.1, Load-bearing capacity, clause I.

For testing according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1365-3:2000-02, a test is required.

6 Firewalls

6.1 Firewalls as load-bearing walls

A firewall may be classified as such under DIN 4102-2:1977-09 if it either

- complies with the conditions under DIN 4102-3:1977-09,

or

- was tested in accordance with DIN EN 1363-1:2020-05 in conjunction with DIN EN 1365-1:2013-08 and DIN EN 1363-2:1999-10, Section 7, and during a test period of 90 minutes, met the requirements of DIN EN 1363-1:2020-05, Section 11.1(b), Load-bearing capacity, and Section 11.2, Room closure and Section 11.3, Thermal insulation.

The walls must meet these requirements without cladding. They must also be made exclusively of non-combustible materials.

For testing according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1365-1:2013-08 and DIN EN 1363-2:1999-10, Section 7, a test is required for symmetrical structural elements.

In the case of walls with mechanical stress, the relevant requirements apply as for firewalls, but with the proviso that the fire resistance period must be at least 60 minutes in accordance with the relevant requirements under building regulations.

6.2 Firewalls as non-load-bearing walls

A firewall may be classified as such under DIN 4102-2:1977-09 if it either

- complied with the conditions under DIN 4102-3:1977-09 (concerning the load, see paragraph A 2.1.7);

or

- was tested according to DIN EN 1364-1: 2015-02 and DIN EN 1363-2:1999-10, Section 7, and, during a test period of 90 minutes, met the requirements of DIN EN 1363-1:2020-05, Section 11.2, Room closure and Section 11.3, Thermal insulation.

The walls must meet these requirements without cladding. They must also be made exclusively of non-combustible materials.

For testing according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1364-1:2015-09 and DIN EN 1363-2:1999-10, Section 7, a test is required for symmetrical structural elements.

However, in the case of walls with mechanical stress, the relevant requirements apply to walls, as for firewalls, provided that the duration of fire resistance must be at least 60 minutes in accordance with the relevant requirements under building regulations.

The impact load in accordance with DIN EN 1363-2:1999-10, taking into account the requirements of DIN 4102-3:1977-09, Section 4.3.3, must also be carried out in anchorage and fixing areas.

7 Non-load-bearing exterior walls

A non-load-bearing room-closing exterior wall may be classified as W... according to DIN 4102-3:1977-09 if it either

- complies with the conditions under DIN 4102-3:1977-09,

or

- was tested from inside in accordance with DIN EN 1363-1:2020-05 (for unit temperature-time curve testing) and from outside in accordance with DIN EN 1363-2:1999-10 (for external fire curve testing) in conjunction with DIN EN 1364-1:2015-09, and for... minutes, has met the requirements of DIN EN 1363-1:2020-05, Section 11.2, Room closure, and Section 11.3, Thermal insulation.

8 Ceilings/roofs

A ceiling/roof may be classified as F... under DIN 4102-2:1977-09 if it either

- complies with the conditions under DIN 4102-2:1977-09,

or

- was tested in accordance with DIN EN 1363-1:2020-05 in conjunction with DIN EN 1365-2:2015-02, and, over a test duration of... minutes, met the requirements of DIN EN 1363-1:2020-05, Section 11.1, Load-bearing capacity, clause I and Section 11.2, Room closure, and Section 11.3, Thermal insulation.

For testing according to DIN EN 1363-1:2020-5 in conjunction with DIN EN 1365-2:2015-02, a test is required.

9 Service shafts and ducts

A service shaft/duct may be classified as I... under DIN 4102-11:1985-12 if it either

- complies with the conditions under DIN

or

- being a service shaft, consists of walls that have been tested pursuant to DIN

or

- being a service shaft, consists of walls that have been tested pursuant to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1364-1:2015-09 and, for a duration of... minutes, has met the requirements of DIN EN 1363-1:2020-05, Section 11.2, Room closure, and Section 11.3, Thermal insulation.

For testing according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1364-1:2015-09, a fire test is required for symmetrical structural elements.

10 Raised floors/hollow floors

A raised floor/hollow floor may be classified as F... under DIN 4102-2:1977-09 if it either

- meets the conditions for a horizontal room-closing component according to DIN 4102-2:1977-09 (with a minimum load of 1.5 kN/m² in the event of a fire),

or

- was tested according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1366-6:2005-02 for fire loads according to the standard temperature-time curve and, over a test period of... minutes, met the requirements under DIN EN 1363-1:2020-05, Section 11.1, Load-bearing capacity, and Section 11.2, Room closure, and Section 11.3, Thermal insulation.

For testing according to DIN EN 1363-1:2020-05 in conjunction with DIN EN 1366-6:2005-02, at least one test is required. The fire test must be carried out with a minimum load of 1.5 kN/m².

For a raised floor according to Section 4.1 of the model System Floor Guideline, the assessment during the structural element testing under DIN 4102-2:1977-09 or DIN EN 1363-1:2020-05 in conjunction with DIN EN 1366-6:2005-02 concerns only the supporting structure (supporting plates and studs), in each case with a minimum load of 1.5 kN/m² in the event of a fire. If the load-bearing capacity is ensured for at least 30 minutes, the evaluation "Raised floor with fire-retardant supporting structure in case of fire exposure from below" can be granted; this must be stated on both the cover sheet and in the scope of application in the general building authority test certificate. No classification is carried out.

D - Construction products that do not require usability certification

D 2 List according to § 85a para 4 MBO[1]

D 2.1 Examples of products for which there are technical best practices

- Barrier mountings in water supply and disposal plants
- Barrier installations in gas supply plants
- Flow monitors
- Gas installation safety equipment
- Gas hose safety lines for connection to domestic gas appliances
- Multi-layer composite pipes for internal gas installations
- Liquid gas pressure regulators
- Drinking water heaters and storage devices
- Hot water surface heating and radiator connections
- Plastic piping systems for hot water underfloor heating
- Heat transfer systems
- Sanitary equipment
- Shafts for wells and percolation systems
- Percolation pipes for landfills
- Lightning protection installations
- Electrical installations such as cables, switches, sockets, etc. for general power supply under standard conditions in buildings
  - Telecommunications, TV and radio installations

Annex 1

Requirements for planning, designing and executing post-installed rebar connections with bonded-in rebars

As of: April 2024

CONTENTS

1 Scope of application

This Technical Rule applies to steel rebars constructed in accordance with DIN 488 or which have a general building authority approval and which are mortared in using injection systems with European Technical Assessment (ETA) based on EAD 330087 "Systems for post-installed rebar connections with mortar".

The possible fields of application are shown in Annex 1, Fig. 1 to Fig. 5.

2 Planning

Rebar connections must be designed in line with engineering practice. In compliance with the following points, verifiable design drawings must be drawn up.

- Rebar connections may only be used to transfer tension forces in the direction of the bar axis.
- The position of reinforcement set in concrete must be determined based on the planning documents and, where applicable, determined by a reinforcement detector and marked on the concrete surface.
- The concrete strength class of the anchor base must be determined based on the planning documents and, where applicable, core sampling.
- The transmission of transverse forces between existing and new concrete must be proven in accordance with DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA:2013-04, and DIN EN 1992-1-1/NA/A1:2015-12. The joints for concreting must be roughened at least to the point that aggregates protrude. Remark: The design drawings shall include information such as how roughening must be carried out (e.g. in accordance with DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA:2013-04, and DIN EN 1992-1-1/NA/A1:2015-12).
- Where the surface of the existing concrete is carbonated, the carbonated layer must be removed before connecting the new bar near the rebar connection with a diameter of ϕ + 6 cm. The depth of the concrete to be removed must at least meet the minimum concrete covering for the corresponding environmental conditions under DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA: 2013-04, and DIN EN 1992-1-1/NA/A1:2015-12. This does not apply in the case of new, non-carbonated components in dry surroundings.
- General construction rules according to Annex 2
- Minimum concrete covering c_{min} according to Table 1 and minimum clearance a according to Table 2
- Drilling procedure

Table 1: Minimum concrete covering c_{min} [mm] depending on drilling procedure, bar diameter and the use of a drilling aid

Drilling procedure	Bar diameter	Without drilling aid	With a drilling aid
Hammer drilling Hollow drilling Diamond drilling	ϕ < 25 mm	c_{min} = 30 mm + 0.06 $\square_v \geq 2\ \phi$	c_{min} = 30 mm + 0.02 $\square_v \geq 2\ \phi$
	$\phi \geq$ 25 mm	c_{min} = 40 mm + 0.06 $\square_v \geq 2\ \phi$	c_{min} = 40 mm + 0.02 $\square_v \geq 2\ \phi$
Compressed air drilling	ϕ < 25 mm	c_{min} = 50 mm + 0.08 $\square_v$	c_{min} = 50 mm + 0.02 $\square_v$
	$\phi \geq$ 25 mm	c_{min} = 60 mm + 0.08 $\square_v \geq 2\ \phi$	c_{min} = 60 mm + 0.02 $\square_v \geq 2\ \phi$

Table 2: Minimum clearance a [mm] depending on the use of a drilling aid and the bar diameter

Without drilling aid	With a drilling aid
a = 40 mm $\geq 4\ \phi$	a $\geq 2\ \phi$

3 Design

Rebar connections must be designed in line with engineering practice. Verifiable calculations must be made taking into account the loads to be anchored.

Rebar connections must be dimensioned in accordance with DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA:2013-04, and DIN EN 1992-1-1/NA/A1:2015-12. The bond stress calculation values f_{bd} or the reduction factor for the bond stress calculation values k_b are specified in the European Technical Assessment/Approval (ETA), and must be multiplied by the bond stress calculation value in accordance with DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA:2013-04, and DIN EN 1992-1-1/NA/A1:2015-12.

For rebar connections with fire resistance requirements, the bond stress rated value under fire exposure $f_{bd,fi}$ must be determined in accordance with the relevant ETA specifications.
The minimum anchorage length $l_{b,min}$ and the minimum overlap length $l_{0,min}$ in accordance with DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA:2013-04, and DIN EN 1992-1-1/NA/A1:2015-12 must be multiplied by the factor α_{lb} specified in the ETA.
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

4.1 General information

The rebar connections may only be executed by firms that meet the requirements of Section 5.

The rebar connections must be executed in line with the construction drawings and the installation instructions (drilling, cleaning, preparing the rebar, injecting adhesive mortar and setting rebar) of the relevant injection system manufacturer. Only the appliances provided for this purpose may be used for drilling, cleaning the drill hole and injecting the mortar.

4.2 Execution documentation

An installation log must be drawn up for each rebar connection. The execution documentation is based on Table 3. Installation logs must be readily available on the building site during the construction period. As for the delivery notes, they must be kept for at least 5 years by the companies after work is completed.

4.3 Execution monitoring

The proper preparation and execution of work must be monitored. To this end, the installation log must be checked and countersigned. In case of deviations from the planning guidelines, the responsible planning engineer must be contacted.

Table 3: Installation log – Tests, Requirements and Frequency

Line	Test object	Type of test	Requirements	Frequency, time
	Preparation			
1	Mortar container	Packaging instructions	Expiry date not yet passed	each delivery
		Visual inspection	No conspicuous changes	On-going
		Storage conditions	Manufacturer's instructions	for storage/outsourcing
2	Processing equipment	Functional check	proper working order	on commissioning and daily
3	Work plan (created from the planning documents)	Manufacturing and processing instructions	Compliance with provisions	prior to work starting
	Processing			
4	Weathering	Temperature (in anchor base)	Compliance with work plan and installation instructions	before filling the drill hole
		Drill hole protected from water ingress	No water in drill hole	Before filling the drill hole
5	Drilling	Overlap, edge distances centre distances	Compliance with work plan and installation instructions No reinforcement strikes during drilling when hitting rebar, consult planners	each drill hole
6	Drill hole cleaning	Visual inspection and blow-out check	dust-free; clean drill hole surface	each drill hole before filling
7	Rebar	condition, marking, mobility in drill hole	only rust film, embedment depth marked, mobile	each bar before filling the drill hole
8	Occupational safety	Personal safety equipment	wear suitable protective clothing, protective gloves and goggles/face protection	when working with the injection mortar
9	Backfilling	Mortar fill mark on mixer extension tube	in line with work plan and installation instructions	each bar during setting
		without cavities	no springing back of the bar, no mortar spraying	
10	Bonded-in rebar connections	Embedment depth	Embedment mark at drill hole mouth	each bar after setting
		Backfilling	Visibly leaking mortar at drill hole mouth	

5 Operating requirements

5.1 General information

Those persons manufacturing the rebar connection must

1 have valid proof of suitability as per Section 6,
2 have a qualified manager named in the proof of suitability,
3 have a responsible site manager,
4 have specialist site personnel specially trained to carry out the reinforcement connection and who can provide proof of successful participation in training for this purpose, and
5 have the necessary instrumentation.

The company must ensure that the site personnel have been trained in carrying out post-installed rebar connections with bonded-in rebar.

5.2 Qualified manager

The qualified managers must have sufficient knowledge in reinforced concrete construction and experience in the manufacture of subsequent rebar connections with bonded-in rebar. They must have at least the qualifications necessary for carrying out reinforced concrete work independently and to manage operations in this field.
The qualified managers are competent and responsible for manufacturing rebar connections on the building site.

The tasks of qualified management include:

- Assessing construction drawings in respect of the completeness of the information for subsequently bonded-in rebar,
- Drawing up and, where applicable, testing service descriptions and assessing the operability of the rebar connections,
- Drawing up work plans (work instructions),
- Assessing the expert qualifications of site personnel,
- Evaluating the results of the installation log.

5.3 Responsible site manager

When carrying out rebar connections with post-installed rebars, a responsible site manager named in the proof of suitability must supervise on-site that the rebar connections with post-installed rebars are carried out in line with the provisions of this guideline.

The site manager must ensure that the work is properly prepared and executed and supervise the execution of the work. To this end, the installation log drawn up by the site personnel must be checked and countersigned.

The site manager must have technical knowledge of and skills and practical experience with concrete and other materials. The site manager must either have equivalent qualifications to the qualified managers or be trained to the same degree as the site personnel.

5.4 Skilled site personnel

The work shall be carried out by a member of construction site personnel designated in the certificate of suitability and trained in accordance with Section 7, in particular with skilled craftsmanship and with appropriate skills and practical experience.

The tasks of skilled personnel include:

- The practical execution of drilling, cleaning, filling and fixing work according to the work plan. Any deviations must be documented in the installation log and the responsible site manager must be immediately informed.
- Keeping the installation log.

5.5 Instrumentation

For the manufacture of rebar connections with subsequent bonded-in rebars, the equipment and devices mentioned in the installation instructions of the injection system to be used must be present on the building site to enable expert execution of these works. All devices and equipment must be kept in good working order.

Devices and equipment include:

- Devices for accurate drilling (drilling aids) drillings stands for diamond core drilling devices,
- Devices for cleaning the drill holes,
- Equipment for storing the injection mortar cleanly and at the right temperature,
- functional dispensers and mixer extensions,
- Compressor for oil-free compressed air of at least 6 bars.

6 Proof of suitability

The proof of suitability is issued by a recognised testing centre (see Register of the testing, monitoring and certification centres (PÜZ) Part 6).

If the testing centre has determined that the operating requirements under Section 5.1 clauses 2 to 4 are met, and if the company can demonstrate possession of a complete system case provided with functional equipment, it shall issue proof of suitability.

Proof of suitability is issued for a period of 3 years and is revocable. Upon request, the validity period of the proof of suitability may be extended by the inspection body for 3 years.

Before any extension, the inspection body must be provided with proof that the above-mentioned operating requirements have been met. Any change to the personnel named in the proof of suitability must be notified to the testing centre.

7 Training and examination of construction site personnel

7.1 General information

Site personnel must be trained as set out below. After a training, a recognised testing centre must verify that the personnel have sufficient knowledge (see PÜZ--Register Part 6, ser. No. 7).

If this testing centre has determined that the training has been carried out successfully, it shall issue a certificate of successful training participation to the construction site personnel.

7.2 Contents of the training

- Safety measures (goggles, gloves, etc.)
- Ensuring that devices function (when is a device no longer working properly)
- Drilling methods (what methods are valid for the system and how they work, what characteristics, etc.)
- Using drilling aids (when and why they may be necessary, how to use)
- Cleaning methods (what methods are valid for the system and how they work, what characteristics, etc.)
- Special installation conditions (e.g. overhead, extreme temperatures)
- Work process (hierarchy and tasks of persons involved in planning and execution; Minimum work plan requirements; inspections to be carried out during and after the setting process; what to do when hitting rebar in case of drilling errors or missing information or incomplete work plan; requirements and inspections of additional equipment required; storage and protection of equipment and injection mortar; keeping the installation log, what to do if work is interrupted)

7.3 Contents of theoretical testing

The theoretical examination involves site personnel demonstrating in writing that they possess sufficient knowledge of the training content for the system.

7.4 Contents of practical testing

The practical examination involves site personnel carrying out the following tasks:

- Execution of a complete overlapping joint near the edge ϕ = 12 mm, $\square_v$ = 1.0 m in reinforced concrete according to the design drawings with installation log according to the relevant manufacturer's installation instructions (MPII)
  - with subsequent final check and self-assessment

- Bonding in of a rebar ϕ = 12 mm in covered, transparent sight tube where $\square_v$ = 60 cm.
  - The time required to inject the mortar and insert the bar must be measured.

The practical examination involves site personnel demonstrating that there is inter alia sufficient knowledge regarding the following issues:

- Was the work plan checked for completeness in terms of all necessary information?
- Before work begins, is there sufficient understanding of the work to be carried out?
- Do the devices used meet the approval requirements and are these devices safely controlled?
- Is the drill hole being drilled in the right place?
- For drilling near edges is the guidance device safely handled?
- Does the angular deviation during drilling meet the permitted tolerances?
- Is the drill hole cleaning performed in line with installation instructions?
- Are the rebar anchor lengths correctly marked and mobility in the drill hole controlled?
- Are mortar containers checked for temperature and expiry date?
- Are mortar containers correctly opened and prepared for changing the container?
- Are injection devices handled according to installation instructions?
  Is the fill mark correctly attached to the mixer extension?
- Is the marked bar to hand before injection begins?
- Is the necessary volume of mortar discarded when a new container is opened?
- Does the mortar injection procedure meet the installation instructions for complete and cavity-free filling?
- Is the bar properly placed up to the the anchor depth marking?
- Is the mortar leaking from the drill hole mouth?
- Is the permitted processing time complied with from the start of injection until the rebar is set?
- Were defects during or after rebar connection manufacture detected and properly corrected?
- Was the installation log completely and accurately kept?

Annex 1 – Fields of application

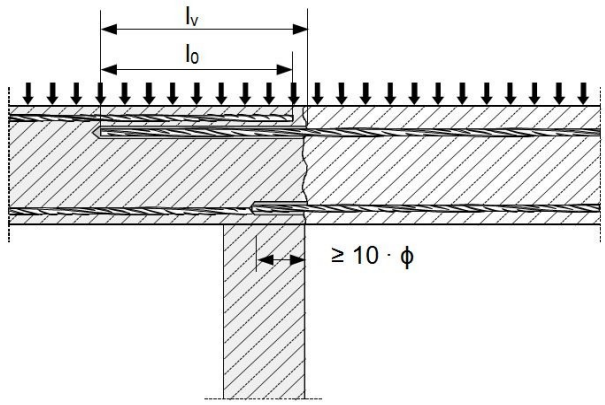


Figure 1: Overlapping joint with existing reinforcement of rebar connections of slabs and beams

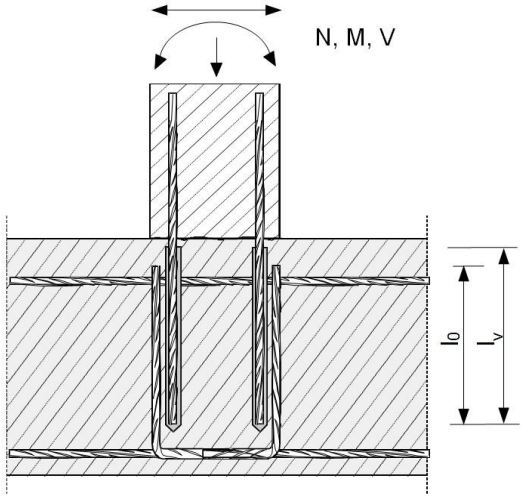


Figure 2: Overlapping joint with existing reinforcement of supports or walls subject to bending stress to a base. The reinforcement bars are subject to tensile stress.

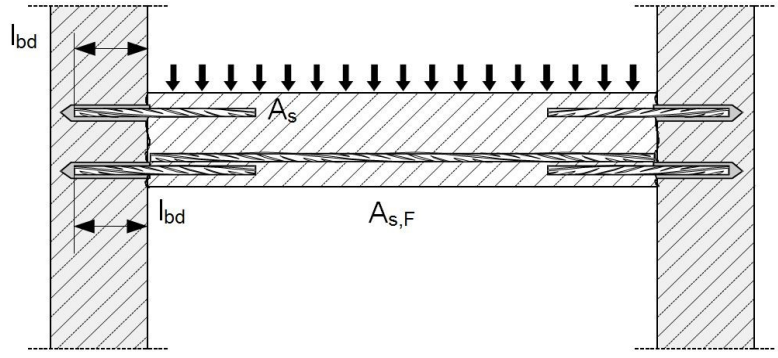


Figure 3: End anchorage of slabs or beams

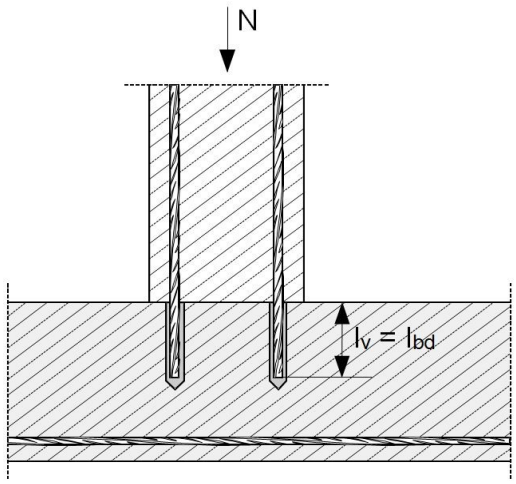
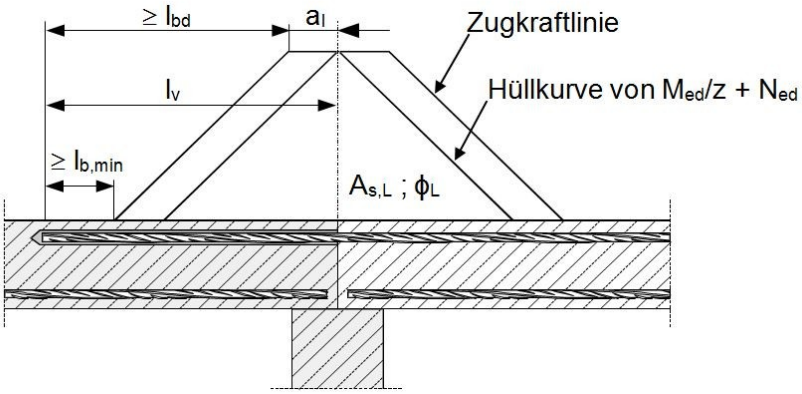


Figure 4: Rebar connections for structural elements predominantly subject to compressive loading



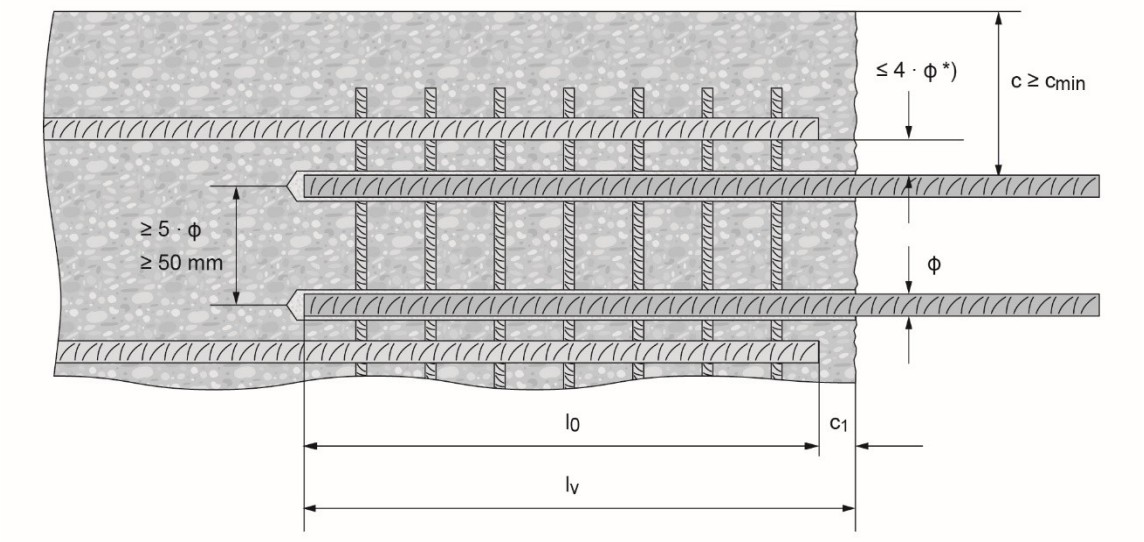
Zugkraftlinie	Resistance to tension curve
Hüllkurve von $M_{ed}/z + N_{ed}$	Envelope of $M_{ed}/Z + N_{ed}$

Figure 5: Anchoring of reinforcement to cover the line of tensile force in structural elements subject to bending stress

Comments:

- No transverse reinforcement is shown in Figure 1 to Figure 5. The transverse reinforcement required according to DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA:2013-04, and DIN EN 1992-1-1/NA/A1:2015-12 must be fitted.
- Transverse force transmission between existing and new concrete must be determined in accordance with DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA:2013-04, and DIN EN 1992-1-1/NA/A1:2015-12.

Annex 2 – General construction rules



8 mm ≤ ϕ ≤ 40 mm

Figure 6: Distances between existing and post-installed rebars and distance to the (parallel) edge.

*) If the clear width of joined bars is more than 4 • ϕ, the overlap length must be increased by the difference between the existing clear bar spacing and 4 • ϕ.

c Concrete surfacing for the bonded-in rebar
c_1 Concrete surfacing on the front of the bonded-in rebar
c_{min} Minimum concrete cover according to Table 1 and DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA:2013-04, und DIN EN 1992-1-1/NA/A1:2015-12
ϕ Diameter of the rebar
l_0 Length of the overlap joint according to DIN EN 1992-1-1:2011-01, DIN EN 1992-1-1/A1:2015-03, DIN EN 1992-1-1/NA:2013-04, and DIN EN 1992-1-1/NA/A1:2015-12
l_v Setting depth ≥ l_0 + c_1

Annex 2

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

As of: April 2024

CONTENTS

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’

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

2 Planning

2.1 General information

The anchorages (except for anchorages with plastic dowels) must be planned by engineers in accordance with DIN EN 1992-4 and DIN EN 1992-4/NA. The use of plastic anchors is to be planned in accordance with the design method for plastic anchors for use in concrete and masonry, August 2019 (German application document for EOTA TR 064 from May 2018) (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: $n_1 \geq 4$; $n_2 \geq 1$ and $n_3 \leq 3.0$ kN or
$n_1 \geq 3$; $n_2 \geq 1$ and $n_3 \leq 2.0$ kN.

Plastic anchors: $n_1 \geq 4$; $n_2 \geq 1$ and $n_3 \leq 4.5$ kN or
$n_1 \geq 3$; $n_2 \geq 1$ and $n_3 \leq 3.0$ kN.

n_1 = Number of fastening points
n_2 = Number of anchors per fastening point
n_3 = Rated value of the effects N_{Ed} (kN) of a fastening point

3 Design

The anchorages (except for anchorages with plastic dowel anchors) must be designed by engineers in accordance with DIN EN 1992-4 and DIN EN 1992-4/NA. For anchor channels, the design method for anchor channels, August 2020 (German application document for EOTA TR 047 dated March 2018) (www.dibt.de) and the design method for anchor channels under fatigue-relevant loading, August 2020 (German application document for EOTA TR 050 dated October 2018) (www.dibt.de) may also be used.

The use of plastic anchors is to be designed in accordance with the design method for plastic anchors for use in concrete and masonry, August 2019 (German application document for EOTA TR 064 from May 2018) (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).

Annex 3

Requirements for planning, designing and executing anchors in masonry with subsequently fitted fasteners

As of: April 2024

CONTENTS

1 Scope of application

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

- EAD 330076 "Metal injection anchors for use in masonry"
- EAD 330284 "Plastic anchors for redundant non-load-bearing systems in concrete and masonry"

2 Planning

2.1 General information

Anchors must be designed in line with engineering practice. 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:

- Differentiation between anchoring methods
- Strength class of anchor base
- Type of butt joints and horizontal joints
- minimum component thickness
- minimum centre and edge distances
- Limit values for ambient and structural element temperatures.
- Drill procedure.

The characteristic load-bearing capacities in the ETA apply only to the bricks as specified in the ETA. For masonry made of other, similar bricks, the characteristic load-bearing capacity may be determined by on-site testing according to the following rules:

- Injection anchor systems: "Execution and evaluation of on-site tests for injection anchor systems in masonry with ETA according to ETAG 029 or EAD 330076-00-0604, As of: September 2019"
- Plastic anchors: "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-load-bearing (non-structural) systems

The following application limits apply to redundant, non-load-bearing (non-structural) systems:

Plastic anchors: $n_1 \geq 4$; $n_2 \geq 1$ and $n_3 \leq 4.5$ kN or
$n_1 \geq 3$; $n_2 \geq 1$ and $n_3 \leq 3.0$ kN.

n_1 = Number of fastening points
n_2 = Number of anchors per fastening point
n_3 = Rated value of the effects N_{Ed} (kN) of a fastening point

3 Design

Anchors must be designed in line with engineering practice. Verifiable calculations must be made taking into account the loads to be anchored.

Depending on the type of fastening, the following design methods should be used for designing anchors:

- Design method for metal injection anchors for use in masonry, August 2019 (German application document for EOTA TR 054 from April 2016) (www.dibt.de) or
- Design method for plastic anchors for use in concrete and masonry, August 2019 (German application document for EOTA TR 064 from May 2018) (www.dibt.de).

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 the specifications of the relevant ETA are observed, proof of direct local force application in the masonry 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).

Annex 4

Building authority requirements, classification, use of construction products, use of designs

Last updated: January 2024

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

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[1], 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 requirements[b]	**Minimum required building material classes pursuant to DIN 4102-1:1998-05**	**Other characteristics for use:**
	1	**2**	**3**
1	non-combustible[1,2]	A 2	--
2	flame-resistant[2]	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-resistant[2] and no burning particles or droplets	B 1	No burning droplets or particles falling Limited smoke development Passed (I^a ≤ 400 % x min. when tested pursuant to DIN 4102-15:1990-05)
4	flame-resistant[2] and low smoke development	B1	Low smoke development Passed (I^a ≤ 100 % x min. when tested pursuant to DIN 4102-15:1990-05)
5	flame-resistant[2] and no burning droplets or particles and low smoke development	B1	No burning droplets or particles falling Low smoke development Passed (I^a ≤ 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 > 1 000 °C	--	Specification: Melting point at least 1 000 °C pursuant to DIN 4102-17:2017-12
	[2] if required, additionally 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 building that does not meet at least the requirement "normal		

1 According to national law

	flammability" (easily flammable), Section 26(1) sentence 2 MBO1 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 authority requirements and required minimum performance regarding fire behaviour and other features

		Minimum required performance[1]			
	Building approval requirement	**Construction products excluding linear pipe insulation materials and floor coverings**	**Linear pipe insulation materials**	**Floor coverings**	**other features (excluding floor coverings)**
	1	**2**	**3**	**4**	**5**
1	non-combustible	A2 – s1,d0*	$A2_L$ – s1,d0*	$A2_{fl}$ – s1	Specification: Smouldering behaviour according to 1.3 and if necessary raw density
2	non-combustible and additionally melting point > 1 000 °C	A2 – s1,d0*	$A2_L$ – s1,d0	$A2_{fl}$ – s1	Specification: Melting point of at least 1 000 °C and smouldering 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**	C_L – s1,d0	-	Specification: Smouldering behaviour according to 1.3 and if necessary raw density
4	flame-resistant and no burning droplets or particles	C – s2,d0*	C_L – s2,d0	-	
5	flame-resistant and low smoke development	C – s1,d2**	C_L – s1,d2	C_{fl} – s1	
6	flame-resistant	C – s2,d2*	C_L – s2,d2	C_{fl} – s1	
7	normal flammability and no burning droplets or particles	E	E_L	-	
8	normal flammability	E – d2	E_L – d2	E_{fl}	

[1] Classes according to Delegated Regulation 2016/364 (EU) – implemented by classification according to DIN EN 13501-1 or Commission decisions for classifications without further testing.

* When tested according to EN 13823:2023 $TSP_{600\,s} \leq 35\ m^2$; 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 13823:2023 $TSP_{600\,s} \leq 35\ m^2$; 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[2], EN 13162:2012+A1:2015[3], EN 13168:2012+A1:2015[4], EN 13170:2012+A1:2015[5], EN 13171:2012+A1:2015[6], EN 13950:2014[7], EN 13964:2014[8], EN 13986:2004+A1:2015[9], EN 14064-1:2010[10], EN 14190:2014[11], EN 14303:2009+A1:2013[12], EN 15037-4:2010+A1:2013[13], EN 15498:2008[14]), 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 in case of horizontal installation below ceilings

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 "low flammability" for the intended use.

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[1], 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.

2 Implemented in Germany by DIN EN 438-7:2005-04.
3 Implemented in Germany by DIN EN 13162:2015-04.
4 Implemented in Germany by DIN EN 13168:2015-04.
5 Implemented in Germany by DIN EN 13170:2015-04.
6 Implemented in Germany by DIN EN 13171:2015-04.
7 Implemented in Germany by DIN EN 13950:2014-09.
8 Implemented in Germany by DIN EN 13964:2014-08.
9 Implemented in Germany by DIN EN 13986:2015-06.
10 Implemented in Germany by DIN EN 14064-1:2010-06.
11 Implemented in Germany by DIN EN 14190:2014-09.
12 Implemented in Germany by DIN EN 14303:2013-04.
13 Implemented in Germany by DIN EN 15037-4:2013-08.
14 Implemented in Germany by DIN EN 15498:2008-08.

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 ($I^a \leq 400$ % x min. when tested pursuant to DIN 4102-15:1990-05)
3	flame-resistant and with low smoke development	B1	low smoke development ($I^a \leq 100$ % x min. when tested pursuant to DIN 4102-15:1990-05)
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[15].

15 Implemented in Germany by DIN EN 50575:2017-02.

Table 2.1.2: Building approval requirements and minimum required fire performance

	Building approval requirement	Minimum required performances
	1	**2**
1	non-combustible	A_{ca}
2	flame-resistant	$B1_{ca}$ –s2
3	flame-resistant and with low smoke development	$B1_{ca}$ –s1
4	normal flammability	E_{ca}

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[1] 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[16], EN 494:2012+A1:2015[17], EN 534:2006+A1:2010[18], EN 1873:2005[19], EN 13707:2004+A2:2009[20], EN 13956:2012[21], EN 14351- 1:2006+A2:2016[22], EN

16 Implemented in Germany by DIN EN 492:2018-07
17 Implemented in Germany by DIN EN 494:2015-12.
18 Implemented in Germany by DIN EN 534:2010-07.
19 Implemented in Germany by DIN EN 1873:2006-03.
20 Implemented in Germany by DIN EN 13707:2009-10.
21 Implemented in Germany by DIN EN 13956:2013-03.
22 Implemented in Germany by DIN EN 14351-1:2016-12.

14783:2013[23] and EN 14963:2006[24]) 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 B_{ROOF}(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)	B_{ROOF}(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 buildings, 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 4.1.1[A]: 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. Eurocode[1,**] under action ETK in accordance with DIN EN 1991[1,**]	Application rule to be observed in addition to the Eurocode for types of construction 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	≥ 30[2]	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]	≥ 60[3]	A 2.2.1.4
6	highly fire retardant and of incombustible materials in the main parts	≥ 60[2]	DIN 4102-4:2016-05
7	highly fire retardant and made of non-combustible materials	≥ 60[2]	DIN 4102-4:2016-05
8	fire-resistant (non-combustible load-bearing and stiffening parts)	≥ 90[2]	DIN 4102-4:2016-05

23 Implemented in Germany by DIN EN 14783:2013-07.

24 Implemented in Germany by DIN EN 14963:2006-12.

	Building approval requirement	Determined duration of stability in the event of fire in min. Eurocode[1,**] under action ETK in accordance with DIN EN 1991[1,**]	Application rule to be observed in addition to the Eurocode for types of construction using certain building materials***
	1	2	3
9	fire-resistant and made of non-combustible materials	≥ 90[2]	DIN 4102-4:2016-05
10	Fire resistance of 120 minutes and made of non-combustible* building materials	≥ 120[2]	-
11	Structural elements in accordance with A 2.1.3.1(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 2.2.1.4[4]	≥ 60[3,**]	A 2.2.1.4
12	Structural elements in accordance with A 2.1.3.1(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 2.2.1.4[4]	≥ 90[3.5,**]	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 behaviour 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 behaviour 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 4.1.2[A]: 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

	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
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 4.2.1[A]: Building authority requirements for non-load-bearing room-closing walls and classification (table value) 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	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	Firewall (fire-resistant and made of non-combustible* construction materials, stable also under additional mechanical stress)	EI 90-M	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)	EI 60-M	DIN 4102-4:2016-05
9	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 4.2.2[A]: 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 The 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 4.2.3[A]: 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 MBO1 or proof of the suitability of designs according to § 16a MBO1 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	made of flame-retardant building materials		
3	made of flame-retardant building materials not falling off burning or dripping off		
4	made of normal-flammability building materials		
5	Fire-retardant	Fire resistance class F 30	F 30-B[1]
6	Fire-retardant and made of non-combustible* materials	Fire resistance class F 30 and made of non-combustible building materials	F 30-A[1]
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-AB[2,3]
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 2.2.1.4[4]	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-A[2,3]
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-AB[5,6]
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 2.2.1.4[4]	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 made of non-combustible** building materials and stable even under additional mechanical stress	Wall instead of a firewall highly fire-retardant with essential parts made of non-combustible building materials and stable even under additional mechanical stress	-

	Building approval requirement	Minimum required classes according to DIN 4102-2:1977-09	Abbreviation pursuant to DIN 4102-2:1977-09
	1	2	3
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 2.2.1.4[8]	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 2.2.1.4[7]	-
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 2.2.1.4[4]	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 2.2.1.4[7]	-
22	Structural elements in accordance with A 2.1.3.1(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 is also permitted for non-load-bearing exterior walls. 4 A type-approval according to Section 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 of non-combustible building materials is required in accordance with the Technical Rule under ser. No. A 2.2.1.4, unless facilitations are provided for in Section 5.2. of the Technical Rule under ser. No. A 2.2.1.4. 8 Design approval according to Section 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 MBO1 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 behaviour when using construction products in accordance with harmonised technical specifications for load-bearing, load-bearing and room-closing structural elements, and required minimum 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 barrier[1]	**with space barrier**	
	1	**2**	**3**	**4**
1	made of non-combustible* building materials	-	-	A2 – s1,d0**
2	made of flame-retardant* building materials	-	-	C – s2,d2**
3	made of normal-flammability* building materials	-	-	E – d2
4	Fire-retardant	R 30	REI 30	E – d2
5	Fire-retardant with one-sided[2] 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 2.2.1.4[3]	R 60 Fire-protective cladding: $K_2$60	REI 60 Fire-protective cladding: $K_2$60	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**

	Building approval requirement	Minimum required performances		
		Fire resistance		Fire performance
		without space barrier[1]	with space barrier	
	1	2	3	4
9	Highly fire-retardant and of incombustible materials[4] in the main parts	R 60	REI 60[2]	Essential parts: A2 – s1,d0** Otherwise: E – d2
10	Wall instead of a firewall, highly fire-retardant (made of non-combustible* building materials and stable even under additional mechanical stress)	-	REI 60-M	A2 – s1,d0**
11	Wall instead of a firewall, highly fire-retardant and in the essential parts of non-combustible* building materials and stable even under additional mechanical stress	-	REI 60-M	Essential parts: A2 – s1,d0** Otherwise: E – d2
12	Wall instead of a firewall, highly fire-retardant (carrying parts combustible, insulating materials non-combustible* with fire-protective cladding of 60 min. made of non-combustible* building materials and stable even under additional mechanical stress) according to Section 4 of the Technical Rule according to ser. No. A 2.2.1.4[3]	-	REI 60-M Fire-protective cladding: $K_2$60	Load-bearing and reinforcing parts: E, incidentally, A2 – s1,d0**
13	Structural elements according to A 2.1.3.1(d) with a fire resistance of 60 min and of combustible building materials, according to Section 5 of the Technical Rule in accordance with ser. No. A 2.2.1.4[3], 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 Section 35(5) MBO in conjunction with A 2.1.12, and stable even under additional mechanical stress (staircase wall)	-	REI 60-M Fire-protective cladding: $K_2$30	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 90[2]	A2 – s1,d0**; Otherwise E – d2
15	Fire-resistant and made of non-combustible* building materials	R 90	REI 90	A2 – s1,d0**

	Building approval requirement	Minimum required performances		
		Fire resistance		Fire performance
		without space barrier[1]	with space barrier	
	1	2	3	4
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-M[4]	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 2.2.1.4[3]	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 2.2.1.4[3], and fire-protective cladding made of non-combustible* building materials as defined in Section 5.2 of the Technical Rule under ser. No A 2.2.1.4[3]	R 60 or R 90	REI 60 or REI 90 Fire-protective cladding: $K_2$30	Fire-protective cladding: A2 – s1,d0**; Otherwise: E – d2
20	Structural elements according to A 2.1.3.1(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 2.2.1.4[3], and with one-sided cladding made of non-combustible* building materials according to Section 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

	Building approval requirement	Minimum required performances		
		Fire resistance		Fire performance
		without space barrier[1]	with space barrier	
	1	2	3	4
21	Structural elements according to A 2.1.3.1(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 2.2.1.4[3], and fire-protective cladding made of non-combustible* building materials in accordance with Section 5.2 of the Technical Rule under ser. No. A 2.2.1.4[3], and with one-sided cladding made of non-combustible* building materials according to Section 36(6) MBO in conjunction with A 2.1.12 (corridor wall)	-	REI 30 or REI 90 Fire-protective cladding: $K_2$30	Fire-protective cladding, non-combustible* cladding: A2 – s1,d0**; Otherwise: E – d2
22	Firewall***	-	REI 90-M	A2 – s1,d0**
23	Wall with the design of a firewall (fire-resistant also under additional mechanical stress and made of non-combustible* building materials)	-	REI 90-M	A2 – s1,d0**
24	Structural elements in accordance with A 2.1.3.1(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 2.2.1.4[3]) with fire-protective cladding made of non-combustible building materials, according to Section 5.2 of the Technical Rule under ser. No. A 2.2.1.4[3]	-	REI 60-M Fire-protective cladding: $K_2$30	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 additionally 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 in accordance with A 2.1.3.1(d) in 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. ** Regarding fire performance requirements, Table 1.2 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 MBO1 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 fire exposure only from below	**with fire exposure from bottom to top and from top to bottom**	
	1	**2**	**3**	**4**
1	made of non-combustible* building materials	-	-	A2 – s1,d0**
2	made of flame-retardant building materials not falling off burning or dripping off*	-	-	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 1.2. 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 suspended ceilings is only permitted if the method of attachment to vertical and/or horizontal structural elements is specified in the classification report, and this is apparent from the manufacturer's installation instructions.
4. The use of suspended ceilings with installations (such as luminaries, 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 suspended ceilings 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 authority 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-sided[1] 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	highly fire-retardant and made of non-combustible* building materials, stable even under additional mechanical stress	EI 60-M	A2 – s1,d0**
10	Structural elements in accordance with A 2.1.3.1(b), highly fire-retardant, stable also under additional mechanical stress (load-bearing parts combustible, insulating materials non-combustible* with 60 min fire-protective cladding made of non-combustible* building materials) in accordance with Section 4 of the Technical Rule pursuant to Section A 2.2.1.4.[3] (Wall instead of a firewall)	EI 60-M Fire-protective cladding: $K_2$60	Load-bearing and reinforcing parts: E, otherwise A2 – s1,d0**
11	Hire-resistant (non-combustible load-bearing and reinforced parts)[2,4]	EI 90	A2 – s1,d0**, Otherwise E – d2

	Building authority requirement	Minimum required performances	
		Fire resistance	**Fire performance**
	1	**2**	**3**
12	Fire-resistant and made of non-combustible* building materials	EI 90	A2 – s1,d0**
13	Firewall fire-resistant and made of non-combustible* building materials, stable also under additional mechanical stress	EI 90-M	A2 – s1,d0**
14	Fire resistance of 120 minutes and made of non-combustible* building materials	EI 120	A2 – s1,d0**
15	Structural elements in accordance with A 2.1.3.1(d) with a fire resistance of 60 min or 90 min and made of combustible building materials according to Section 5 of the Technical Rule of ser. No. A 2.2.1.4 [3], with 30 min. fire-protective cladding 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: on both sides $K_2$30	Fire-protective cladding, non-combustible cladding: A2 – s1,d0**; Otherwise: E – d2
16	Structural elements in accordance with A 2.1.3.1(d) with a fire resistance of 60 minutes, stable also under additional mechanical stress, and made of combustible building materials, with a cladding with a fire resistance of 30 minutes made of non-combustible* construction materials, in accordance with Section 5.2, of the Technical Rule referred to in Section A 2.2.1.4.[3] (Wall instead of a firewall)	EI 60-M Fire-protective cladding: $K_2$30	Load-bearing and reinforcing parts: E, otherwise A2 – s1,d0**
17	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 2.2.1.4[3], 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

	Building authority requirement	Minimum required performances	
		Fire resistance	Fire performance
	1	2	3
18	Structural elements according to A 2.1.3.1(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 2.2.1.4[3], and fire-protective cladding made of non-combustible* building materials in accordance with Section 5.2 of the Technical Rule under ser. No. A 2.2.1.4[3], and with one-sided cladding made of non-combustible* building materials according to Section 36(6) MBO in conjunction with A 2.1.12 (corridor wall, open corridor)	EI 30 or EI 90 fire-protective cladding: one-sided $K_2$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 structural element to ensure stability (dead weight) and suitability for use. 3 For structural elements in accordance with A 2.1.3.1(d) in 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. ** Regarding fire behaviour requirements, Table 1.2 applies. 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 for non-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	made of non-combustible* building materials	-	A2 – s1,d0**
2	made of flame-retardant building materials	-	C – s2,d2**
3	made of flame-retardant building materials not falling off burning or dripping off	-	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 materials according to § 36(6)[1] MBO in conjunction with A 2.1.12	EI 30	Non-combustible cladding: A2 – s1,d0**; Otherwise: E – d2

	Building approval requirement	Minimum required performances	
		Fire resistance	Fire performance
	1	2	3
7	Fire-retardant with one-sided cladding made of non-combustible* building materials according 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: $K_2$30	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: $K_2$30	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 structural element to ensure stability (dead weight) and suitability for use. 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. ** Regarding fire behaviour 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 Closures

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[1], 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[25] in conjunction with EN 13241:2003+A2:2016[26] 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 MBO[1], 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 external use, the differential climate in accordance with EN 14351-1:2006+A2:2016[22] and the deformation classes in accordance with EN 12219:1999[27] must also be verified. 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 MBO[1].

25 Implemented in Germany by DIN EN 16034:2014-12.
26 Implemented in Germany by DIN EN 13241:2016-12.
27 Implemented in Germany by DIN EN 12219:2000-06

5.1.4 Construction products according to EEAS No 020029-00-1102 and EEAS No 020062-00-1102 and EN 16034:2014[25] in conjunction with EN 13241:2003+A2:2016[26] 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 barriers[1,2]	Fire performance
	1	**2**	**3**
1	Fire-retardant, tight-sealing self-closing	$EI_2$30 S_a C Permanent Function Check[2]	E – d2
2	Highly fire-retardant, tight-sealing self-closing	EI_2 60 S_a C Permanent Function Check[2]	
3	Fire resistant, tight-sealing self-closing	$EI_2$90 S_a C Permanent Function Check[2]	
4	Fire-retardant, smoke-proof, self-closing	$EI_2$30 S_{200} C Permanent Function Check[2]	
5	Highly fire-retardant, smoke-proof, self-closing	EI_2 60 S_{200} C Permanent Function Check[2]	
6	Fire-resistant, smoke-proof, self-closing	$EI_2$90 S_{200} C Permanent Function Check[2]	
7	Smoke-proof and self-closing	S_{200} C Continuous function test[2]	
	1 The minimum required performance must be verified for both sides of the closure. 2 Permanent function testing: Class 5 for fire/smoke protection doors (swing leaf closures), wicket doors in gates as well as 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/smoke protection closures (e.g. flaps, gates)		

5.1.5 Construction products according to EN 16034:2014[25] in conjunction with EN 14351-1:2006+A2:2016[22] or EN 13241:2003+A2:2016[26] 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 construction products according to EN 16034:2014[25] in conjunction with EN 14351-1:2006+A2:2016[22] the differential climate according to EN 14351-1:2006+A2:2016[22] and the deformation class according to EN 12219:1999[27] must be proven in addition. At least classes 2(d) and 2(e) are required to comply with the building authority 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 closures, 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 16034:2014[25]. For the planning, designing and execution there are no technical best practices, and proof pursuant to § 16a MBO[1] is required.

4. The use of construction products as fire and/or smoke protection closures 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/structural element above a construction product as a fire and/or smoke protection closure shall be static and designed in such a way that the construction product does not receive any additional load as a closure (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 protection closure inside a building may be fitted with a suitable locking mechanism for the fire and/or smoke protection closure with applicability demonstrated on this closure 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[28] 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.

28 Implemented in Germany by DIN EN 1634-1:2018-04.

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[29].

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[1], 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, tight-* and self-closing	T 30
2	highly fire-retardant, tight- and self-closing	T 60
3	fire-resistant, tight-*- and self-closing	T 90

* In accordance with the current state of the art, the requirement of ‘tight-closing’ shall be deemed to have been met in the event of fire-resistant closures in connection with track-bound conveyors, even without peripheral permanent elastic sealing.

29 Implemented in Germany by DIN EN 1634-3:2005-01.

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 performance[1]		
		Fire resistance	Fire performance	Electromotive open and/or closing
	1	2	3	4
1	fire-retardant, tight-* and self-closing	EI_2 30 C Continuous function test[2]	E – d2	Specification: Annex B2 and B3 of the EAD fulfilled
2	highly fire-retardant, tight- and self-closing	EI_2 60 C Continuous function test[2]	E – d2	Specification: Annex B2 and B3 of the EAD fulfilled
3	fire-resistant, tight*- and self-closing	EI_2 90 C Continuous function test[2]	E – d2	Specification: Annex B2 and B3 of the EAD fulfilled
	1 The minimum required performance must be declared **for both sides** of the closure. 2 Continuous function testing: Class 5 (200,000 cycles) for fire protection closures in track-bound conveyor systems as planned closed closures] Class 2 (10 000 cycles) for fire protection closures in track-bound conveyor systems as planned open closures] * In accordance with the current state of the art, the requirement of 'tight-closing' shall be deemed to have been met in the event of fire-resistant closures in connection with track-bound conveyors, even without peripheral permanent elastic sealing.			

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[1] only if the following application rules have been observed:

a. They are installed in solid enclosed masonry or concrete walls,
b. 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 m^2 of the interior lift cage area),
c. 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,
d. 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
e. The lift shaft shall have an opening to remove smoke as per § 39(3)(1) MBO[1].

Lift shaft doors with the classification "E 30/60/90" in accordance with DIN EN 81-58:2018[30] 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[1] 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.

30 Implemented in Germany by DIN EN 81-58:2018-05

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 external use, the differential climate in accordance with EN 14351-1:2006+A2:2016[21] and the deformation class in accordance with EN 12219:1999[27] must also be verified. At least classes 2(d) and 2(e) are required to comply with the building authority requirements.

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

5.5 Other closures than 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 in accordance with EN 16034:2014[25] in conjunction with EN 14351-1:2016[22] or EN 13241:2003+A2:2016[26] and EAD No. 020029-00-1102 and EAD No. 020062-00-1102 for use as tight- and self-closing closures

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	S_a C Continuous Function Check[1]	E – d2
2	Tight-sealing and self-closing, made of non-combustible* building materials	S_a C Continuous Function Check[1]	A 2-s1,d0**
	1 Permanent function testing: - Class 5 for doors (swing leaf closures), wicket 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 tight- and self-closing closures (gates) * Regarding the requirements, Table 1.1. applies. ** 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. Use in escape and rescue routes is only permitted if a door is in the immediate vicinity of sliding, lifting or roller closures. This also applies to such closures, which are regarded as doors according to A 2.1.6 and to tight- and self-closing curtains.
3. So-called side and/or fall flaps for construction products according to EN 13241:2003 + A2:2016 in conjunction with EN 16034:2014[25] as tight- and self-closing closures are not covered by EN 16034:2014[25]. For the planning, designing and execution there are no technical best practices, and proof pursuant to § 16a MBO[1] 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.
10. 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 MBO1, 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 sealing[1]**
	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 MBO1 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[31] 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 12101-2:2003[31] 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) MBO1. 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 12101-2:2003[31] is declared as being at least C – s2,d0.

Table 7: Minimum required performances

	EN 12101-2:2003[31]	**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	Specification (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 MBO1, 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.

31 Implemented in Germany by DIN EN 12101-2:2003-09.

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 350003-01-1109

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($v_e h_o$ i↔o)	A2 – s1, d0**; for materials foaming in the event of fire applies: E-d2
2	Highly fire-retardant and made of non-combustible materials	EI 60($v_e h_o$ i↔o)	
3	Fire-resistant and made of non-combustible building materials	EI 90($v_e h_o$ i↔o)	
4	Fire resistance of 120 minutes	EI 120($v_e h_o$ i↔o)	
	* Regarding the requirements, Table 1.1. applies. ** 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_1 or proof of the suitability of designs according to § 16a MBO_1, 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_1, 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 MBO1, 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 MBO1.

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	S_a (Smoke)	Limit of smoke permeability (sealing, leakage rate), meets the requirements at ambient temperature	tightly sealing barriers

	Derivation of the abbreviation	**Criterion**	**Scope**
	1	**2**	**3**
7	S_{200} ($Smoke_{max.\ leakage\ rate}$)	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	K_1, K_2	Fire protection assets	Wall and ceiling cladding (fire protection cladding)
11	I_1, I_2	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: January 2024

CONTENTS

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[32]. 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 A rear-ventilation gab is the airspace between the cladding elements and the thermal insulation, or between the cladding elements and the wall, when no external thermal insulation is provided.

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 MBO[1], 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 MBO[1]).

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.

32 According to national law

4 Horizontal fire barriers

4.1 On every second floor, horizontal fire barriers shall be positioned in the rear-ventilation gap. Fire barriers shall be installed between the wall and the cladding elements. 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 must be embedded at least 40 mm deep into the insulation material.

For external wall claddings with a depth of the rear-ventilation gap of > 150 mm up 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 construction materials must be completely interrupted in the area of horizontal fire barriers.

4.3 The size of the openings in the horizontal fire barriers must be limited to a total of 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 must be sufficiently dimensionally 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 must be anchored in the exterior wall at intervals of ≤ 0.6 m. The steel sheets shall overlap at the joints by at least 30 mm.

In the case of ventilated exterior wall claddings with a depth of the rear-ventilation gap not exceeding 100 mm, horizontal fire barriers may consist of a non-combustible insulation material with a melting point of > 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:

  a mechanically anchored with non-combustible fasteners in the exterior wall at intervals of ≤ 0.6 m
  or
  b all-over glued to the exterior wall with non-combustible adhesive mortar
  or
  c clamped into an external thermal insulation of an insulating material that is dimensionally stable in the event of fire with a melting point > 1 000 °C, where the thickness of the thermal insulation shall be at least twice as large as the depth of the rear-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 exterior wall openings; the cladding shall comply with the requirements of clause 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 exterior walls with no openings,
2. if the window arrangement prevents the spreading of fire in the rear-ventilation gap (e.g. horizontally continuous window strips, window elements spanning several storeys), and
3. in the case of exterior walls with a depth of the rear-ventilation gap not exceeding 150 mm and with rear-ventilated external wall cladding made of non-combustible materials, including sub-structures, thermal insulation and brackets, if the rear-ventilating gap is closed in the vicinity of the adjacent reveals of openings on 3 sides (side and below the lintel) in the event of fire for at least 30 minutes (e.g. 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 MBO_1 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. Alternatively, vertical fire barriers may also be made of sheet steel, in compliance with the requirements of Section 4.4.

Annex 8

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

Last updated: October 2022

CONTENTS

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 legal regulations (e.g. the REACH Regulation (EC) No. 1907/2006, the Biocidal Products Regulation (EU) No. 528/2012, the POP Regulation (EC) No. 850/2004, the Chemicals Prohibition Ordinance [Chemikalien-Verbotsverordnung]) and the Circular Economy 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[33] 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[34].

33 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.

34 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.

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 active[1] 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[35], floor covering constructions and their structural elements,
- Adhesives[36],
- 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.
- $TVOC_{spec}$ (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 $R_i$values determined[37] in a particular test.

35 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.

36 floor covering adhesives and structural adhesive bonds.

37 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 $_i$.

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[38], 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).

- **$TVOC_{spec}$**
  The $TVOC_{spec}$ 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 R_i values must not exceed the value given in Table 1.

  R = sum of all R_i = sum of all quotients $(C_i / NIK_i) \leq 1$

  The evaluation shall be based on calculating $_i$ the ratio R_i for each compound, as defined in the following equation.

  $$R_i = C_i / LCI_i .$$

  Here C_i 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.

38 Target compounds are the substances listed in the LCI list in Annex 2 hereto.

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
$TVOC_{spec}$	≤ 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 oriented stand boards (OSB) and resin-bound particle 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 are determined by analogy with the VOC emission test conditions.
(Test chamber and chamber conditions in accordance with 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[39]	≤ 0.1	2.2.1.2
Nitrosamines[40]	≤ 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 Annex 3) according to the EPA (US-Environmental Protection Agency) shall not exceed the values specified in Table 3.

Analytical demonstration of PAHs shall be done for 16 PAHs based on the method of AfPS GS 2019:01[41].

39 Requirements for parquets and wooden floors with proportions of smoked wood.

40 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.

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.

The analytical detection of nitrosamines (pursuant to TRGS 552) is carried out in accordance with the method of the DIK (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[42]	≤ 5	2.2.2.1
16 PAH[10]	≤ 50	2.2.2.1
Nitrosamines[8]	≤ 0.011	2.2.2.2

41 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.

42 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.

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 2022

	Substance	CAS Number	LCI [µg/m³]	Comments
1	**Aromatic hydrocarbons**			
1-1	Toluene	108-88-3	**2900**	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	**1700**	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	**1200**	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	**1000**	Adoption of EU LCI value
1-15	1-isopropyl-3-methylbenzene (m-cymene)	535-77-3	**1000**	Adoption of EU LCI value
1-16	1-isopropyl-4-methylbenzene (p-cymol)	99-87-6	**1000**	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	**1100**	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	**1100**	Adoption of EU LCI value Read across of ethylbenzene
1-22	1-phenyldecane and isomers	104-72-3	**1100**	Read across of ethylbenzene
1-23	1-phenylundecane and isomers	6742-54-7	**1100**	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	**1200**	Adoption of EU LCI value
1-28	Vinyl toluene (all isomers: o-, m-, p-methylstyrenes)	25013-15-4	**1200**	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	**4300**	Adoption of EU LCI value
2-3	Cyclohexane	110-82-7	**6000**	Adoption of EU LCI value
2-4	Methylcyclohexane	108-87-2	**8100**	Adoption of EU LCI value
2-5	-			[1)]
2-6	-			[1)]
2-7	-			[1)]

	Substance	CAS Number	LCI [µg/m³]	Comments
2-8	n-heptane	142-82-5	**15000**	Adoption of EU LCI value
2-9	Other saturated aliphatic hydrocarbons C6 to C8		**14000**	Adoption of EU LCI value Read across of 2-methylpentane
2-10	Other saturated aliphatic hydrocarbons C9 to C16		**6000**	Adoption of EU LCI value
2-11*	-			[1)]
2-12	1-dodecene	112-41-4	**750**	Individual substance analysis
3	**Terpene**			
3-1	3-carene	498-15-7	**1500**	Adoption of EU LCI value
3-2	α-pines	80-56-8	**2500**	Adoption of EU LCI value
3-3	ß-pinene	127-91-3	**1400**	Adoption of EU LCI value
3-4	Limonene	138-86-3	**5000**	Adoption of EU LCI value
3-5	Terpenes, other		**1400**	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	**11000**	Adoption of EU LCI value
4-6	1-butanol	71-36-3	**3000**	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	**2100**	Adoption of EU LCI value
4-9	Cyclohexanol	108-93-0	**2000**	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	**1700**	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	**8300**	Adoption of EU LCI value
4-16	Other C7-C13 saturated n-alcohols		**1700**	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	57-55-6	**2100**	Adoption of EU LCI value

	Substance	CAS Number	LCI [µg/m³]	Comments
	1,2-dihydroxypropane			
6-2	Ethylene glycol (ethanediol)	107-21-1	**3400**	Adoption of EU LCI value
6-3	Ethylene glycol monobutyl ether	111-76-2	**1600**	Adoption of EU LCI value
6-4	Diethyleneglycol	111-46-6	**5700**	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	**4800**	Read across of ethylene glycol
6-8	1-methoxy-2-propanol	107-98-2	**7900**	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	**3100**	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**	Adoption of EU LCI value
6-19*	1,2-diethoxyethane	629-14-1	**150**	Adoption of EU LCI value
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	**2200**	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	**1600**	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	**2000**	Adoption of EU LCI value
6-34	Tri(propylene glycol) methyl ether	20324-33-8 25498-49-1	**1200**	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	6846-50-0	**1300**	Adoption of EU LCI value

	Substance	CAS Number	LCI [µg/m³]	Comments
	diisobutyrate			
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	**1300**	Adoption of EU LCI value
6-40*	Propylene carbonate*	108-32-7	**1800**	Adoption of EU LCI value
6-41	Hexylene glycol (2-methyl-2,4-pentanediol)	107-41-5	**3500**	Adoption of EU LCI value
6-42*	3-methoxy-1-butanol	2517-43-3	**1700**	Adoption of EU LCI value
6-43*	1,2-propylene glycol n-propyl ether	1569-01-3 30136-13-1	**5200**	Adoption of EU LCI value
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	**8700**	Adoption of EU LCI value
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

□# Only from a measured emission of 5 µg/m³ will an assessment be carried out as part of the LCI-value concept.

	Substance	CAS Number	LCI [µg/m³]	Comments
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 Adoption of EU LCI value
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	**20000**	Adoption of EU LCI value
8-2	3-methyl-2-butanone	563-80-4	**7000**	Adoption of EU LCI value
8-3	Methyl isobutyl ketone	108-10-1	**1000**	Adoption of EU LCI value
8-4*	Cyclopentanone	120-92-3	**1200**	Adoption of EU LCI value
8-5*	Cyclohexanone	108-94-1	**1400**	Adoption of EU LCI value
8-6*	2-methylcyclopentanone	1120-72-5	**1400**	Adoption of EU LCI value Read across of Cyclopentanone
8-7	2-methylcyclohexanon	583-60-8	**2300**	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	**2100**	Adoption of EU LCI value Read across of propylene glycol
8-10	Acetone	67-64-1	**120000**	VVOC Adoption of EU LCI value
9	**Acids**			
9-1	Acetic acid	64-19-7	**1200**	Adoption of EU LCI value
9-2	Propionic acid	79-09-4	**1500**	Adoption of EU LCI value
9-3	Isobutyric acid	79-31-2	**1800**	Adoption of EU LCI value Read across of propionic acid
9-4	Butyric acid	107-92-6	**1800**	Adoption of EU LCI value Read across of propionic acid
9-5	Pivalic acid	75-98-9	**2100**	Adoption of EU LCI value Read across of propionic acid
9-6	n-Valeric acid	109-52-4	**2100**	Adoption of EU LCI value Read across of propionic acid
9-7	n-Capronic acid	142-62-1	**2100**	Adoption of EU LCI value Read across of propionic acid
9-8	n-Heptanoic acid	111-14-8	**2100**	Adoption of EU LCI value Read across of propionic acid
9-9	n-Octanic acid	124-07-2	**2100**	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 substance analysis
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	**4200**	Adoption of EU LCI value
10-5	Propyl acetate	109-60-4	**4200**	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	**4900**	Adoption of EU LCI value Read across from methyl formate
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	**4800**	Adoption of EU LCI value
10-11	1-butyl acetate	123-86-4	**4800**	Adoption of EU LCI value

	Substance	CAS Number	LCI [µg/m³]	Comments
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	**25**	Individual substance analysis
10-19	Fumaric acid dibutyl ester	105-75-9	**50**	Adoption of EU LCI value
10-20*	Succinic dimethyl ester	106-65-0	**20**	Adoption of EU LCI value
10-21*	Glutaric acid dimethyl ester	1119-40-0	**25**	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	**2800**	Adoption of EU LCI value
10-25*	Glutaric acid diisobutyl ester	71195-64-7	**35**	Adoption of EU LCI value Read across from glutaric acid dimethylester
10-26*	Succinic acid diisobutyl ester	925-06-4	**35**	Adoption of EU LCI value Read across from succinic acid dimethylester
10-27*	(5-ethyl-1,3-dioxan-5-yl)methylacrylate	66492-51-1	**80**	Individual substance analysis
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	**1800**	Adoption of EU LCI value
12-4	Octamethylcyclotetrasiloxane (D4)	556-67-2	**1200**	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	Decamethylcyclopentasiloxane (D5)	541-02-6	**1500**	Read across of octamethylcyclotetrasiloxane
12-13	Dodecamethylcyclohexasiloxane (D6)	540-97-6	**1200**	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	**1200**	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
12-19*	5-ethyl-1,3-dioxane-5-methanol	5187-23-5	**850**	Individual substance assessment

* New inclusions/amendments 2022

[#] Only from a measured emission of 5 µg/m³ will an assessment be carried out as part of the LCI-value concept.

VVOC very volatile organic compounds

SVOC semi-volatile organic compounds

1) In order to maintain compatibility in the evaluation, previously documented sequential numbers of the LCI list can no longer be resubmitted in the event of removal or re-sorting of substances or groups of substances.

Notes:

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

The following links contain lists of substances classified as carcinogenic category 1A and 1B in accordance with EU Regulation 1272/2008 and whose testing and limitation is required in the scheme of the Committee for Health Evaluation of Construction Products (AgBB) (to be kept up-to-date – availability of the following links last tested on 23.9.2022):

- 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 “alkanbuckel” 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 14000 µg/m³ applies to aliphatic KW with the same or greater retention time as n-nonan.
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 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
- Chrysen
- 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])

As of: August 2023

CONTENTS

1 Subject matter and scope

In § 3, the MBO[1] 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[0], 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[0]. 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 MBO[1] 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
	Waterproofing	4.2
Outer wall including beams and supports	Concrete exterior wall structural elements	5.1
	Waterproofing	5.2
	Fire protection products for improving the fire resistance of structural elements	5.3
Surface coverings	Concrete surface coverings	6.1
	Surface coverings handling wastewater	6.2
Foundations including piles	Injection and grouting materials	7.2
	Structural elements of concrete	7.3

0 According to national law

0 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.

Structural elements		For requirement, see Section
	Waterproofing	7.4
Excavation seals	Injection and pressing materials made of binder suspensions or grout	8.2
	Silicon-based injection and grouting 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 infiltrated	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[0] 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[0].

Note:
The active[3] 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[0] and the requirements listed below in this section are met.

Note:

0 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.

0 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.

0 The test values for the release of hazardous substances listed in ABuG (Effects on soil and water) are based on the de-minimis thresholds of the LAWA (Working Group of the Federal States on Water Issues): 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.

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, where appropriate, transport paths, e.g. with transmission functions[0] to be taken into account.

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	$G_A^{**} \leq 8$	$G_A \leq 4$
Daphnia test with *Daphnia magna Straus* according to DIN EN ISO 6341:2013-01	$G_D \leq 8$ (after 48 h)	$G_D \leq 4$ (after 48 h)
Light bacteria luminescence inhibition test with V*ibrio fischeri* in accordance with DIN EN ISO 11348-1 to DIN EN ISO 11348-3:2009-05	$G_L \leq 8$	$G_L \leq 8$
Luminescent cell proliferation inhibition test with *Photobacterium phosphoreum* according to DIN 38412-37:1999-04, if $G_L > 8$	$G_{LW} \leq 2$	$G_{LW} \leq 2$
Fish egg test with *Danio rerio* according to DIN EN ISO 15088:2009-06	$G_{EI} \leq 6$	$G_{EI} \leq 6$
umu-test on mutagenic potential according to ISO 13829:2000-03	$G_{EU} \leq 1.5$	$G_{EU} \leq 1.5$
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 of the relevant structural element/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 G_A) 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.

0 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’.

4.1.1 Recycled granules of rock

Concrete roof structural elements manufactured using recycled aggregates[0] may only be installed if the recycled aggregate 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).

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 AVV[8]) 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

[0] This also applies when the recycled aggregate is used as RC sand in cement.

and municipal sewage sludge (waste key 19 08 05 according to AVV0) 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 Sealings 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 for 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 supports)

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 exterior walls of concrete produced using recycled aggregate7 may only be installed if the recycled aggregate 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 aggregate 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).

0 Ordinance on the European Waste Catalogue (EWC Ordinance) of 10 December 2001, as amended.

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 AVV[8]) 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 AVV[8]) 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 MBO[1], 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 MBO[1], as well as in terms of their effects on soil and water.

5.2 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 MBO[1], as well as in terms of their effects on soil and water.

5.3 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 aggregate[7] may only be installed if the recycled aggregate 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).

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 AVV8) 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 AVV8) are co-incinerated 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 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 grouting 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 AVV[8]) 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 MBO[1], 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 aggregate[7] may only be installed if the recycled aggregate 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).

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[7] 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 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 AVV[8]) 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.

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 AVV[8]) 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 MBO[1], 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 MBO[1], 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 MBO[1], as well as in terms of their effects on soil and water.

8. Requirements for base seals for 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 grouting materials for base seals made of binder suspensions or grouting 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).

When using silicon-rich fly ash in concrete or mortar, no proof of substance content and release of hazardous substances is required if the fly ash is co-incinerated from thermal power plants in which only coal and no secondary fuels, with the exception of biomass in a proportion of up to 14 M-% (dry mass), practically ash-free natural gas and municipal sewage sludge (waste code 19 08 05 according to AVV[8]) 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 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 MBO[1], 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 MBO[1], 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 infiltrated

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 MBO[1], 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[7] 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).

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 AVV[8]) 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 AVV[8]) 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 list of wastes regulation (AVV*)
2	Bricks (waste code 17 01 02 as per the list of wastes regulation (AVV*)
3	Tiles, bricks, ceramic (waste code 17 01 03 as per the list of wastes regulation (AVV*)
4	Mixtures of concrete, tiles, bricks and ceramic that do not contain any hazardous substances (waste code 17 01 07 as per the list of wastes regulation (AVV*)
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 list of wastes regulation (AVV*)
7	Soil and stones that do not contain dangerous substances (waste code 17 05 04 as per the list of wastes regulation (AVV*)
8	Track ballast 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 (SO_4^{2-})	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	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***
	PAH_{16}	[mg/kg]	20
	PCB_6	[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	Brown coal fly ash (BFA)
Eluate concentration	Arsenic (As)	µg/l				60	60	100
	Lead (Pb)	µg/l			100	200	200	200
	Cadmium (Cd)	µg/l				10	6	10
	Chromium, total (Cr)	µg/l	100			150	60	300
	Copper (Cu)	µg/l			100	300	100	100
	Molybdenum*	µg/l						300
	Nickel (Ni)	µg/l				150	70	70
	Mercury (Hg)	µg/l					2	2
	Vanadium	µg/l	250					
	Zinc (Zn)	µg/l			200	600	600	600
	Chloride (Cl^-)	mg/l						50
	Sulphate (SO_4^{2-})	mg/l						1000
	Fluoride	mg/l	5			1		
	Phenol index	µg/l				100		
	DOC	µg/l				20000		
	pH value**	-	10-13		6.0-10	5.5-12	5.5-12	10-13
	Conductivity**	µS/cm	1500		700	1000	2000	5000
Solid content	Arsenic	[mg/kg]	150	150	150	150	150	150
	Lead	[mg/kg]	700	700	700	700	700	700
	Cadmium*	[mg/kg]	10	10	10	10	10	10
	Chromium, total	[mg/kg]	600	600	600	600	600	600
	Copper	[mg/kg]	400	400	400	400	400	400
	Nickel	[mg/kg]	500	500	500	500	500	500
	Thallium	[mg/kg]	7	7	7	7	7	7
	Vanadium	[mg/kg]		1500				1500
	Mercury	[mg/kg]	5	5	5	5	5	5
	Zinc	[mg/kg]	1500	1500	1500	1500	1500	1500
	EOX	[mg/kg]				10***		
	BTX	[mg/kg]				1		
	LHKW	[mg/kg]				1		
	Benzo(a)pyrene	[mg/kg]				3		
	Hydrocarbons	[mg/kg]				1000		
	PAH_{16}	[mg/kg]				20		20
	PCB_6	[mg/kg]		0.5				0.5
	PCDD/PCDF	ng TEQ/kg****		100				100

* Only petroleum coke, municipal sewage sludge (with waste code 19 08 05 under the European List of Waste Regulation), biomass or virtually ash-free natural gas may be used as co-incineration materials.

** The pH value and conductivity data are orientation values. In case of deviations from the material-specific reference value, the cause shall be checked.

*** Suspended until a European test standard is available.

**** 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]	1500
	Zinc (Zn)	[mg/kg]	1500
	PCB_6	[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

Parameter	Dimension	Upper limit
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	275000
Fluoride (F-)	mg/m²	826
Sulphate (SO_4^{2-})	mg/m²	264500
* 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: April 2024

CONTENTS

Foreword

This Technical Rule applies to the use or application of construction products or construction kits regulated in the following technical specifications:

I) Non-load-bearing permanent formwork components as per ETA built on the basis of ETAG 009 [1],

II) Non-load-bearing permanent formwork components made of normal concrete and lightweight concrete as per EN 15435:2008[0] [2],

III) Non-load-bearing permanent formwork components of made of wood-chip concrete as per EN 15498:2008[0] [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, without interruptions or reduction in the cross-sectional area.

3. Column type
Column type
Load-bearing concrete core 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.

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[0] Implemented in Germany by DIN EN 15435:2008-10.
[0] Implemented in Germany by DIN EN 15498:2008-08.

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 15435:2008[11] [2] and/or EN 15498:2008[2] [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 $\lambda = 85$.
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 (H_{Ed}) 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 15435:2008[1], Section 3.1.10 [2] and EN 15498:2008[2], 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 changes in the strength of the fresh concrete must be 'medium' to 'fast' in accordance with DIN 1045-2:2023-08 [10], Table 19.

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 explanatory leaflet 'Betonierbarkeit von Bauteilen aus Beton und Stahlbeton' [Concreting capability of concrete and reinforced concrete structural elements] – 01/2014 [11] of the German Concrete and Construction Technology Association (DBV) must be observed.

4. After concreting, the walls must not deviate from the vertical by more than 5 mm per linear metre of wall height, but from a wall height of 3 m a maximum of 15 mm in total, and must comply with the evenness tolerances for wall surfaces in accordance with DIN 18202:2013-04, Table 3, line 6 [12].

C Fire protection

C1 Fire resistance

For load-bearing wall constructions built with the aforementioned shuttering blocks or shuttering kits/systems, the fire resistance with regard to stability (load-bearing capacity criterion R) for the generally internal, load-bearing concrete construction can be determined in accordance with ser. No. A 1.2.3.1, provided that the proof of stability at normal temperatures is based on 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] is fully possible. The extent to which it is possible to assess the resistance to fire with regard to room closure and insulation (EI) or load capacity, room closure and insulation (REI) depends on the relevant boundary conditions of demonstration in accordance with ser. No. A 1.2.3.1.

There is no universally applicable Technical Rule for test-specific proof.

C2 Fire performance

For non-load-bearing permanent shuttering blocks made of expanded polystyrene (EPS) insulation in accordance with EN 13163:2012+A2:2016[0] [13], the TR “ETICS with ETA in accordance with ETAG 004” (June 2016) Section 3.2[0] shall be applied mutatis mutandis with regard to the assignment of the classification in accordance with DIN EN 13501-1:2010-01 [14] to the building authority requirements.

D Sound insulation

If shuttering blocks are used in cases subject to sound protection requirements, the Technical Rules on sound protection set out in Section A 5.2 of the MVV TB shall be used to demonstrate compliance with the requirement.

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 shuttering blocks, 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 [15].

As integrated thermal insulation, these are thermal insulation inserts inside the shuttering 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 of ≥ 100 kPa [13] shall be used.

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[0] Implemented in Germany by DIN EN 13163:2017-02.

[0] 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.

References

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[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 1045-2:2023-08	Concrete, reinforced and prestressed concrete structures – Part 2: Concrete
[11]	DBV Reference document	The concreting ability of concrete and reinforced concrete structural elements — Planning and execution recommendations for concrete installation — 01/2014.
[12]	DIN 18202:2013-04	Tolerances in building construction — Buildings.
[13]	DIN EN 13163:2017-02	Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products - Specification; German version EN 13163:2012+A2:2016.
[14]	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.
[15]	DIN 4108-4:2020-11	Thermal insulation and energy economy in buildings – Part 4: Hygrothermal design values.

Appendix 1

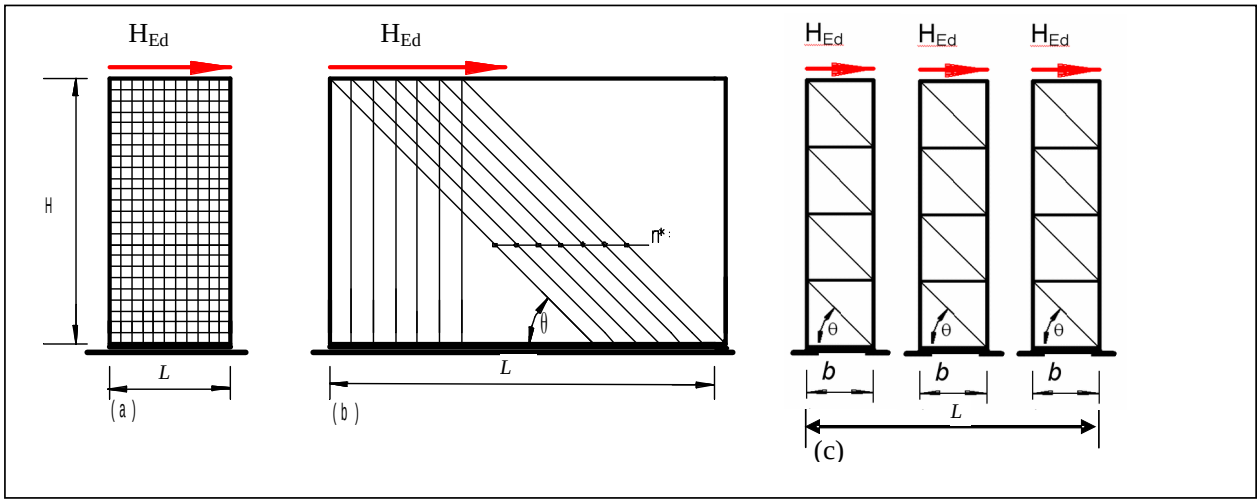
Detection of resistance to horizontal influences (H_{Ed}), in wall planes for walls of grid type and column type, excluding earthquakes

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:

a) Frame model (unreinforced concrete)
b) Model with continuous struts (unreinforced concrete)
c) Beam model (reinforced concrete)



a) Frame model b) Model with continuous struts c) Beam model

Figure 1: Static models for horizontal shear forces H_{Ed}

Proof of horizontal forces along the wall (shear forces) H_{Ed} must be provided as follows:

$H_{Ed} \leq H_{Rd,i}$ 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 is I, i.e. no tensile stress should occur, otherwise the planners must place vertical reinforcement in the supports to cover the tensile strength.

Proof $H_{Ed} \leq H_{Rd,i}$ of the static models suggested may be provided using the following approaches:

A Frame model

The design resistance $H_{Rd,1}$ 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 H'_{Ed} is obtained from equation (1):

$$\max H'_{Ed} = \frac{3}{2}\frac{H_{Ed}}{L} \quad (1)$$

and thus leads to a maximum shear force $\max V_{Ed,r}$ in a concrete bar of

$$\max V_{Ed,r} = \max H'_{Ed}\, h_s = \frac{3}{2}\frac{H_{Ed}}{L} h_s \quad (2)$$

The maximum related bending moment $\max M_{Ed,r}$ in a concrete bar is (3)

$$\max M_{Ed,r} = \max V_{Ed,r}\,\frac{l_r}{2} = \frac{3}{4}\frac{H_{Ed}}{L} h_s\, l_r$$

With a specified section modulus Z_r of the concrete bar and a characteristic concrete tensile strength, $f_{ctk;0,05}$ the design resistance for a wall is as follows:

$$H_{Rd,1} = \frac{4}{3}\frac{L}{h_s}\frac{Z_r}{l_r}\frac{f_{ctk;0,05}}{\gamma_{ct}} \quad (4)$$

In equation (4), the following descriptions (see Figure 2) apply:

$H_{Rd,1}$ rated shear strength according to the frame model;

L wall length;

h_s distance between concrete bar centres;

l_r clear length of concrete bar;

Z_r modulus of resistance of concrete bar;

$f_{ctk;0,05}$ characteristic tensile strength of concrete;

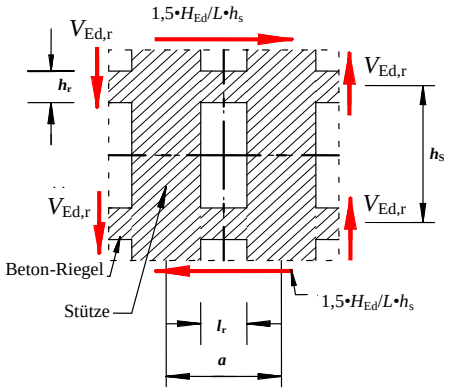
$$f_{ctk;0,05} = \eta_1 \cdot 0{,}7 \cdot 0{,}3 \cdot f_{ck}^{2/3} = \eta_1 \cdot 0{,}21 \cdot f_{ck}^{2/3} \quad [MN/m^2];$$

f_{ck} characteristic compressive strength of concrete (cylinder);

γ_{ct} where 1,5 partial safety coefficient for tensile strength of in-situ concrete;

η_1 with 1,0 for in-situ concrete;

$0{,}40 + 0{,}60 \cdot \rho/2200$ for on-site concrete made of lightweight concrete with a computational value of the dry raw density of ρ in [kg/m³].

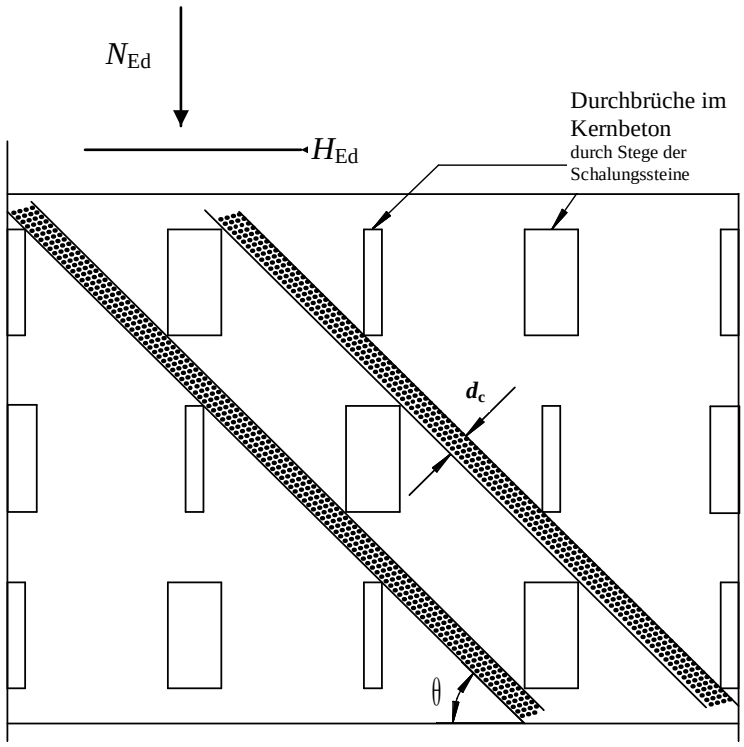


Beton-Riegel	Concrete bars
Stütze	Support

Figure 2: Designations

B Model with continuous diagonal struts

The design resistance $H_{Rd,2}$ 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	Penetrations in core concrete through webs of the shuttering blocks

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):

$$H_{Rd,2} = n * \nu \cdot f_{cd} \cdot b_c \cdot d_c \cdot \cos\theta \leq N_{Ed} \cdot \cot\theta \qquad (5)$$

with

$H_{Rd,2}$ = design resistance in the model with continuous struts;

n = number of continuous struts in a wall;

f_{cd} = Design value of the compressive strength of the concrete

ν = $0.6 \cdot (1 - f_{ck}/250)$ [f_{ck} in MN/m²];*(equivalent to 6.6N in [8] and [9])*

b_c = thickness of the strut;

d_c = height of the strut (minimum 70 mm)

θ = inclination angle of the struts $30° \leq \theta \leq 60°$;

N_{Ed} = Rated value of the acting normal force.

C Beam model

Design resistance $H_{Rd,3}$ 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 “supplementary 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 $H_{Rd,3a}$ of re-suspended reinforcement is derived from equation (6):

$$H_{Rd,3a} = \min\left(A_{sh,r} \cdot f_{yd}; A_{sv,r} \cdot f_{yd} \cdot \frac{H}{b}\right) \quad (6)$$

where

$H_{Rd,3a}$ = design resistance of the supplementary reinforcement as per beam model

$A_{sh,r}$ = cross-section of the horizontal supplementary reinforcement;

$A_{sv,r}$ = cross-section of the vertical concrete bar reinforcement;

b = width of the considered concrete support;

f_{yd} = Rated value of steel strength of re-suspended reinforcement.

The design resistance $H_{Rd,3b}$ of the diagonal strut is based on analogy to (5) from equation (7):

$$H_{Rd,3b} = n * \nu \cdot f_{cd} \cdot b_c \cdot d_c \cdot \cos\theta \quad (7)$$

where

$n * \nu$ = 1;

θ = Inclination angle of the strut $30° \leq \theta \leq 60°$

The design resistance $H_{Rd,3}$ of the bar model as shown in Figure 1c) results from equation (8):

$$H_{Rd,3} = \min\left(H_{Rd,3a}; H_{Rd,3b}\right) \quad (8)$$

Annex 13

Directive on roller shutters

As of: September 2022

CONTENTS

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 U_{sb} of the roller shutter box U_{sb} calculated in accordance with Section 2.2 or measured in accordance with Section 2.3 is $\leq$ 0.85 W/(m² · K) and the temperature factor f_{Rsi} calculated in accordance with Section 2.2 is $\geq$ 0.70.

2.2 Calculation of thermal transmission coefficient U_{sb} and temperature factor f_{Rsi}

The thermal transmission coefficient U_{sb} 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 b_{sb} in accordance with DIN EN ISO 10077-2:2018-01.

The temperature factor f_{Rsi} 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 U_{sb}

The thermal transmission coefficient U_{sb} 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 measurement in accordance with DIN EN ISO 10140-1, -2, -4 and -5:2021-09 and assessment according to DIN EN ISO 717-1:2021-05. If only a weighted standard sound level difference $D_{n,e,w}$ has been demonstrated during the measurement, this should be converted into a weighted sound insulation value using the following formula:
  $R_w = D_{n,e,w} + 10 \log(S_R/10m^2)$
  with S_R area of the roller shutter box in m².

When calculating airborne sound insulation, the declared rated sound insulation R_w 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 U_{sb} 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 ‘R_W = ...’

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.

Source of supply certification

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www.beuth.de

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