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European Assessment Document for

Chimney kits with clay or ceramic flue
liner with increased adjacent thermal
insulation or outer walls jointed by
polyurethane-based adhesive, or
combination of both



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This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) No 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

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1 SCOPE OF THE EAD

1.1 Description of the construction product

The chimney kits with clay or ceramic flue liner with increased adjacent thermal insulation or outer walls jointed by polyurethane-based adhesive or combination of both (from now on “chimney kit”) is a kit for multiwall chimneys designated according to EN 1443:2003, clause 4.11, with a temperature class according to EN 1443:2003, Clause 4.2 (tested with minimum temperature class T200 if increased thermal insulation is used), corrosion resistance class according to EN 1443:2003, Clause 4.5, working under dry (“D”) or wet (“W”) conditions according to EN 1443:2003, Clause 4.4, and sootfire resistance class “O” (not sootfire resistant) or “G” (sootfire resistant) according to EN 1443:2003, Clause 4.6.

In addition to the classifications according to EN 13063-1¹, EN 13063-2 and EN 13063-3, the following classifications are covered by this EAD, if the outer walls are jointed by polyurethane-based adhesive:

- Txxx P1 D3 Gxx
- T400 N1/P1 W3 Gxx

Note: For the assessment of these classifications the footnotes in table 2.1.1 apply.

The chimney kit may be manufactured as storey height units, whereas storey height units mean with defined length of the units. Their maximum length shall be stated in the ETA.

If outer walls are jointed by polyurethane-based adhesive, the following applies: The maximum temperature class according to EN1443:2003, clause 4.2, is limited to T400 and the grout (used for outer walls in combination with reinforcement, if part of the chimney kit) does not go in contact with the polyurethane-based adhesive (used for jointing the outer wall elements in order to build storey height units). The jointing of the outer wall units is exclusively done by polyurethane-based adhesive. The jointing surface of the outer wall elements shall be plane-parallel and flat (e.g., without any tongue and groove; see also EN 12446, figure 1, right picture).

The chimney kit consists of the following components:

- clay/ceramic flue liner and chimney fittings according to EN 13063-1, -2 or -3
- outer wall made of concrete or clay/ceramic according to EN 12446 or EN 13069 respectively
- thermal insulation according to EN 13063-1, Clauses 4.2 and 5.1.5, or EN 13063-2, Clauses 4.2 and 5.1.4
- mortar for jointing flue liners according to EN 13063-1, Clause 5.1.4, or EN 13063-2, Clause 5.1.3
- jointing material for outer walls, either
 - o mortar (according to EN 13063-1, Clause 5.1.7 or EN 13063-2, Clause 5.1.6) or
 - o polyurethane-based adhesive with reaction to fire of at least class E according to EN 13501-1 and bond strength of adhesive at least 1,25 N/mm² according to Clause 2.2.9

Optional components for the chimney kit are:

- outer wall made of concrete including specific surface treatment (foam concrete, durable according to clause 2.2.4)
- thermal separating outer wall element
- grout for outer walls with defined degree of shrinkage and expansion
- reinforcement and related ancillaries, consisting of metallic elements
- chimney base with the following components:
 - o outer wall elements made of concrete or clay/ceramic
 - o flue liner made of clay/ceramic
 - o plate made of concrete or metal
 - o siphon made of metal or plastic
 - o concrete as filling material
 - o cleaning and inspection door
 - o condensate drain
 - o ancillaries

¹ All undated references to standards or to EADs in this EAD are to be understood as references to the dated versions listed in chapter 4.

- covering made of stainless steel, concrete or fibre cement category A according to EN 12467
- elastomeric sealing in case of classification according to EN 13063-2
- closing devices in case of more than one heating appliance
- upper cleaning and inspection door made of metal or clay/ceramic with optional insulation made of mineral wool

The product is not fully covered by the harmonised technical specifications EN 13063-1:2007, EN 13063-2:2007 and EN 13063-3:2007 due to the following reasons:

The application of polyurethane-based adhesive for jointing the outer wall elements and the assessment of resistance to fire related to the use of polyurethane-based adhesive is not covered by these harmonised technical specifications.

Besides classifications according to EN 13063-1 and EN 13063-2 the chimney kit with clay/ceramic flue liner according to this EAD can be classified as Txxx/P1/D3 Gxx and T400 N1/P1 W3 Gxx, too.

The concerned harmonised specifications EN 13063-1, EN 13063-2 and EN 13063-3 do refer for the assessment of system chimneys to assessment methods given in EN 13216-1:2004. Therefore, assessment methods given in EN 13216-1:2004 are used throughout in this EAD in order to comply with related assessment methods in hENs, referred to in this EAD, and related classes indicated in EN 1443:2003 and implemented in the concerned hENs cited in the OJEU.

For the assessment of increased thermal insulation and related assessment of distance to combustible materials for products according to this EAD the Clause 5.7.2.2 in EN 13216-1:2004 is not applicable. The increased thermal insulation to be applied to walls and floors is not dealt with in the assessment methods in EN 13216-1:2004, referred to in EN 13063-1 and EN 13063-2, as in EN 13216-1:2004 in Clause 5.7.2.2 for walls and roofs explicit testing conditions are stated which are leading to thermal performances in conjunction with defined minimum distance to combustible materials.

With regard to EN 13216-1:2019 concerning increased thermal insulation and related assessment of distance to combustible materials, EN 13216-1:2019 is only listing limited variations for configurations of testing chimneys for increased thermal insulation (see Table F.1 in EN 13216-1:2019). This EAD is covering additional configurations of the applied thermal insulation in Clause 2.2.1 and 2.2.2. Consequently, the test setup given in EN 13216-1:2019 does not fully apply, Clause 2.2.1 is considering the deviations to the test setup given in EN 13216-1:2019.

Furthermore, for the essential characteristic “Resistance to fire from external to external” the European assessment method has been introduced in table 2.1.1.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer’s instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer’s stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

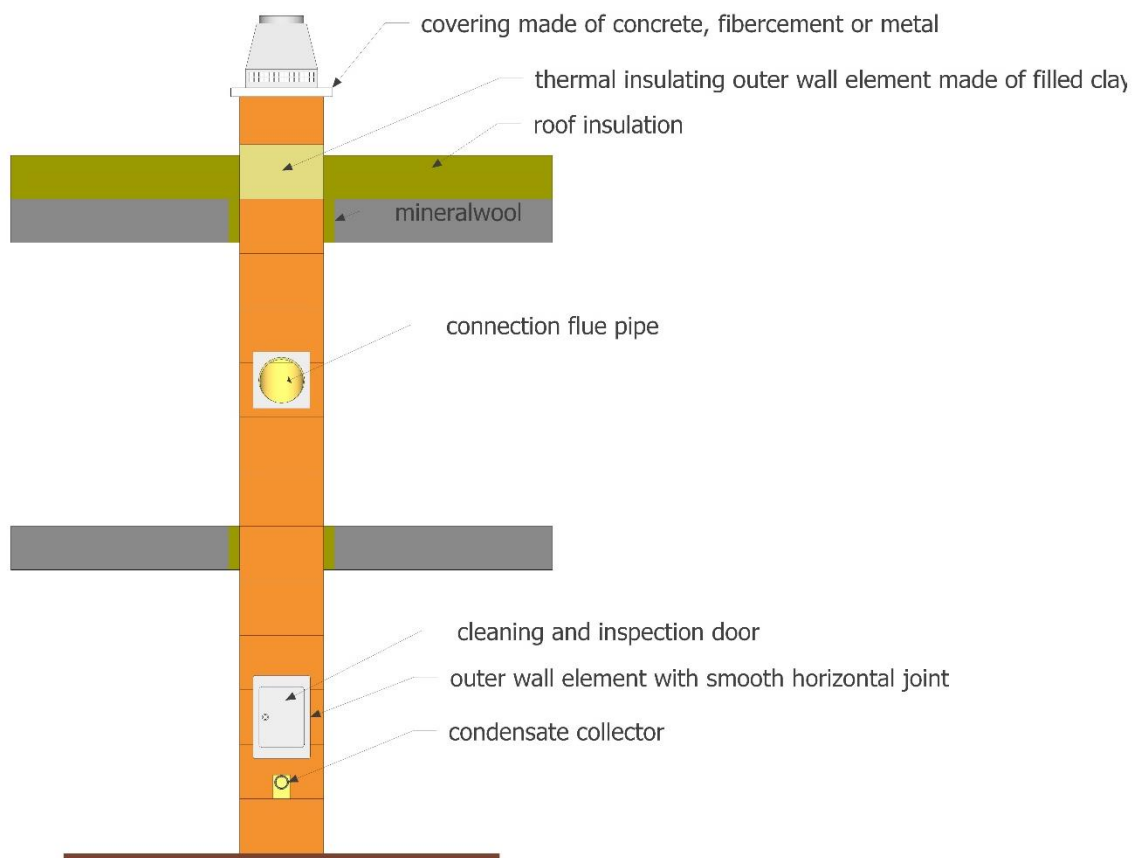


Figure 1.1.1: Example of assembled chimney kit

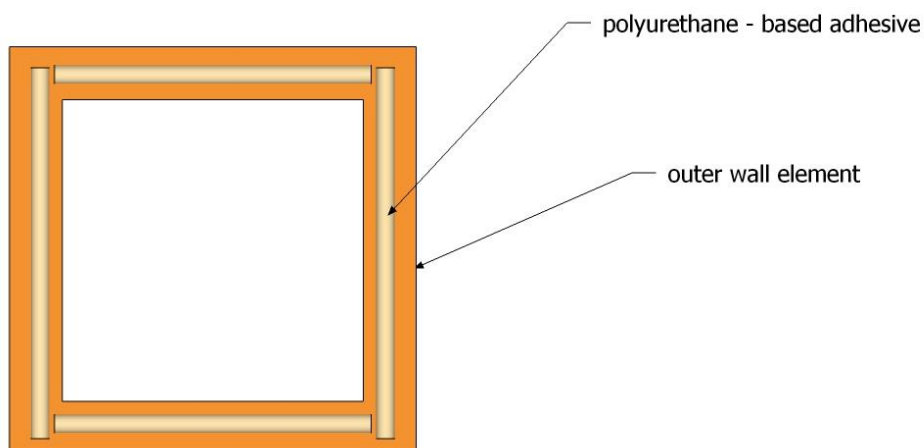


Figure 1.1.2: Jointing outer wall elements by means of polyurethane-based adhesive (example)

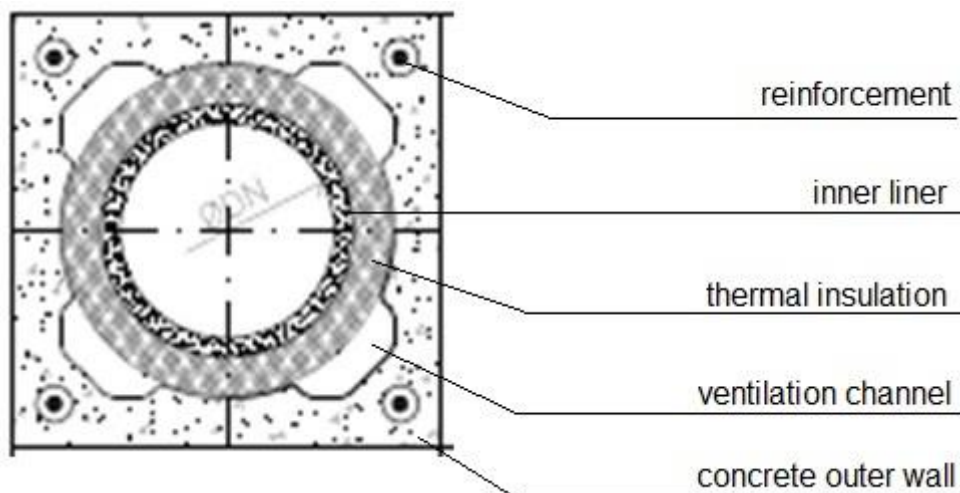


Figure 1.1.3: Example of outer wall as storey height unit with reinforcement

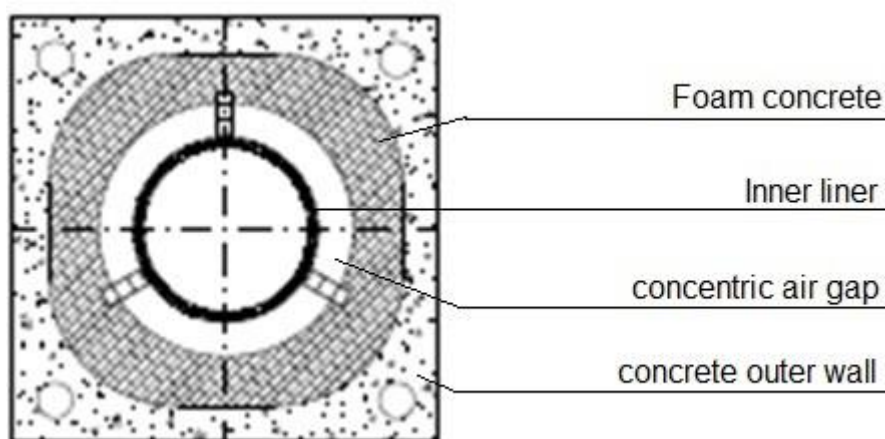


Figure 1.1.4: Example for outer wall element with foam concrete

1.2 Information on the intended use(s) of the construction product

1.2.1 Intended use(s)

This EAD covers the following intended uses and (assembled) systems of the chimney kit:

- Used as system chimney for the conveyance of the products of combustion from appliances to the outside atmosphere.
- Optional: Used as system chimney serving more than one heating appliance, restricted to T400 and to solid fuel, for room-sealed appliances for pressure class N1.
- Optional: Used as system chimney in case of chimneys for room-sealed appliances to be used as suitable component in buildings with specific requirements regarding tightness of the building and air exchange rate (e.g., passive house).

1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the chimney kit for the intended use of 30 years when installed in the works (provided that the chimney kit is subject to appropriate installation (see 1.1)). These provisions are based upon the current state of the art and the available knowledge and experience. Appropriate evaluation is carried out by means of the assessment of the resistance to abrasion of the flue liner in relation to a working life and assessment of durability of the gluing of the outer wall elements by means of the one-component polyurethane-based adhesive as defined by the durability of outer wall compound in Clause 2.2.9, if part of the product.

When assessing the product, the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works².

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

1.3 Specific terms used in this EAD

For the purposes of this EAD, the specific terms and definitions given in EN 1443:2003, EN 13063-1, EN 13063-2 and EN 13063-3 apply.

1.3.1 Chimney fitting

The term chimney fitting corresponds to similar terms (chimney junctions (EN 1457-1 and EN 1457-2), opening sections (EN 13063-1)).

1.3.2 Grout

Grout (in the sense of this EAD): Cement-bonded mortar.

1.3.3 Polyurethane-based adhesive

Moisture hardening one-component polyurethane adhesive.

² The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 2.1.1 shows how the performance of the chimney kit is assessed in relation to the essential characteristics.

The testing of the chimney kit shall be carried out according to the following test sequence:

- In case of classification according to EN 13063-1 and EN 13063-2, according to the test sequences stated in Annex A.1 of EN 13063-1 and EN 13063-2 respectively, depending on the classification of resistance to fire from internal to external (O or G).
- In case of classification P1 D3 Gxx, the test sequences shall be followed as defined in EN 13063-1, Annex A.1.
- In case of designation W3 Gxx testing of the chimney kit shall be carried out according to the test sequence stated in Annex A.

Table 2.1.1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 2: Safety in case of fire			
1	Resistance to fire from external to external	EAD 060009-00-0802, Clause 2.2.2	Level, Class
2	Resistance to fire from internal to external (sootfire resistance and thermal shock resistance) ¹⁾	2.2.1	Class
3	Thermal shock resistance ²⁾	2.2.2	Class
Basic Works Requirement 3: Hygiene, health and the environment			
4	Gas tightness/leakage	2.2.3	Class
5	Flow resistance	EN 13063-1, Clause 5.3.3 EN 13063-2, Clause 5.3.3 EN 13063-3, Clause 5.7.1	Level
6	Thermal resistance	2.2.4	Level
7	Durability/Condensate resistance ³⁾	2.2.5	Class
8	Durability: gas tightness/ leakage against chemicals/ corrosion Durability: compressive strength against chemicals ¹⁾	2.2.6	Class
9	Durability: acid resistance ²⁾	EN 13063-2, Clauses 5.3.2.1 & 5.3.2.2	Description
10	Thermal and fluid dynamic characteristics of chimneys serving more than one heating appliance	EAD 060011-00-0802, Clause 2.2.8	Description

No	Essential characteristic	Assessment method	Type of expression of product performance
11	Air tightness of the outer wall ⁴⁾	2.2.7	Level
12	Minimum outer surface temperature at defined ambient temperature ⁴⁾	EAD 060011-00-0802, Clause 2.2.10	Level
Basic Works Requirement 4: Safety and accessibility in use			
13	Maximum height of the assembled system	2.2.8	Level
14	Durability of outer wall compound ⁵⁾	2.2.9	Description
15	Resistance to freeze/thaw	2.2.10	Description
16	Wind load ⁵⁾	2.2.11	Level
¹⁾ Relevant in case of classification according to EN 13063-1 and classification P1 D3 Gxx and N1/P1 W3 Gxx. ²⁾ Relevant in case of classification according to EN 13063-2. ³⁾ Relevant in case of classification according to EN 13063-2 and classification N1/P1 W3 Gxx. ⁴⁾ For specific intended use in buildings with specific requirements regarding tightness of the building and air exchange rate. ⁵⁾ Relevant in case of outer walls jointed by polyurethane-based adhesive.			

2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

This chapter is intended to provide instructions for TABs. Therefore, the use of wordings such as “shall be stated in the ETA” or “it has to be given in the ETA” shall be understood only as such instructions for TABs on how results of assessments shall be presented in the ETA. Such wordings do not impose any obligations for the manufacturer and the TAB shall not carry out the assessment of the performance in relation to a given essential characteristic when the manufacturer does not wish to declare this performance in the Declaration of Performance.

If for any components covered by harmonised standards or European Technical Assessments the manufacturer of the component has included the performance regarding the relevant characteristic in the Declaration of Performance, retesting of that component for issuing the ETA under the current EAD is not required.

2.2.1 Resistance to fire from internal to external (sootfire resistance and thermal shock resistance)

Purpose of the assessment

For the assembled chimney kit in case of classification “G”, the concerned class and related minimum distance to combustible materials shall be assessed.

Assessment method

The sootfire resistance and the distance between the outer surface of the chimney and the adjacent combustible material shall be assessed as G (xx), where G is the sootfire resistance class for chimneys with sootfire resistance and xx is the minimum distance in [mm].

Regarding the maximum temperature of adjacent combustible materials, EN 1443:2003, Clause 6.3.3.2 and Clause 6.3.3.3 apply.

In case of applying hot gas velocity according to EN 13216-1:2019, table 1 or EN 1859, table 1, instead of EN 13216-1:2004, table 1 (reference method), this shall be stated in the ETA. It is exclusively related to the assessment of minimum distance to combustible materials in case of increased thermal insulation.

The surface temperature shall be assessed according to EN 13063-1, Clause 5.4, for cleaning and inspection doors, if part of the product composition, when assessed according to Clauses 2.2.1. Referring to EN 13063-1, Clause 5.4, the temperature at the outer surface of the cleaning and inspection doors shall not increase more than 140 K.

Possible restriction of relative movement of flue liner shall be assessed for the chimney kit with clay/ceramic flue liner, including cleaning and inspection doors if part of the product composition, after assessment according to Clauses 2.2.1 by means of visual inspection. Referring to EN 13063-1, Clause 5.4, the cleaning and inspection doors shall not hinder the relative movement of the flue liner.

2.2.1.1 Assessment without increased thermal insulation:

For the assessment EN 13063-1, Clauses 5.2.1.2 and 5.2.1.3, apply.

2.2.1.2 Assessment with increased thermal insulation:

For the assessment with increased thermal insulation, EN 13063-1, Clauses 5.2.1.2 and 5.2.1.3 apply, whereas for the testing setup, EN 13216-1:2019 applies with the following deviations:

- In opposition to EN 13216-1:2019, Clause 5.7.2.2.1, the configurations of the applied thermal insulation by steps of 100 mm can be supplemented by other non-fixed values (e.g., 150 mm).
- Due to the possible increased thermal insulation between zone A and B, the length of zone B (2400 mm +/- 25 mm), as shown in Figure b) in Clause 4.1 of EN 13216-1:2019, may be reduced.
- Ceiling penetration shall be done either by applying thermal insulation material (closed) or without thermal insulation material (open). The conditions applied (open or closed) shall be stated in the ETA.
- The upper cleaning- and inspection opening can also be situated in zone B.

Expression of results

In the ETA the following shall be stated: Class G(xx) (related to temperature class Txxx), including information and position of the increased thermal insulation [mm] of concerned wall/floor and type of ceiling penetration.

2.2.2 Thermal shock resistance

Purpose of the assessment

For the assembled chimney kit in case of classification “O”, the thermal shock resistance and related minimum distance to combustible materials shall be assessed.

Assessment method

The thermal shock resistance and the distance between the outer surface of the chimney and the adjacent combustible material shall be assessed as O (xx), where “O” means a chimney without sootfire resistance and xx is the minimum distance in mm.

Regarding the maximum temperature of adjacent combustible materials, EN 1443:2003, Clause 6.3.3.2 applies.

In case of applying hot gas velocity according to EN 13216-1:2019, table 1 instead of EN 13216-1:2004, table 1 (reference method), this shall be stated in the ETA. It is exclusively related to the assessment of minimum distance to combustible materials in case of increased thermal insulation.

2.2.2.1 Assessment without increased thermal insulation:

For the assessment EN 13063-2, Clauses 5.2.2.2 applies.

2.2.2.2 Assessment with increased thermal insulation:

For the assessment with increased thermal insulation, EN 13063-2, Clauses 5.2.2.2 applies, whereas for the applicability of 13216-1:2019, Clause 2.2.1.2 of this EAD applies.

Expression of results

In the ETA the following shall be stated: Class Oxx (related to temperature class Txxx) and including information and position of the increased thermal insulation [mm] of concerned wall/floor and type of ceiling penetration.

2.2.3 Gas tightness/leakage

Purpose of the assessment

For the chimney kit with clay/ceramic flue liner, gas tightness/leakage shall be assessed.

Assessment method

Depending on the envisaged designation according to EN 13063-1 or EN 13063-2, for the assessment EN 13063-1, Clause 5.3.1, or EN 13063-2, Clause 5.3.1, apply respectively. In case of use of upper cleaning/inspection doors and closing devices in case of more than one heating appliance as part of the chimney kit with clay/ceramic flue liner to be assessed, they shall be included in the assessment.

In case of classification P1 D3 Gxx and N1/P1 W3 Gxx, EN 13063-1, Clause 5.3.1 applies with the following deviation: For the leakage rates, EN 13063-2, table 3 applies instead of table 2 of EN 13063-1. In case of upper cleaning and inspection doors and closing devices in case of more than one heating appliance as part of the chimney kit with clay/ceramic flue liner to be assessed, they shall be included in the assessment.

Expression of results

The pressure class (N1/P1) shall be stated in the ETA.

2.2.4 Thermal resistance

The thermal resistance shall be assessed according to EAD 060011-00-0802, Clause 2.2.5, with the following deviation:

The thermal resistance of the assembled system shall be assessed according to EN 13063-1, Clause 5.2.3 and EN 13063-2, Clause 5.2.4 respectively, depending on the classification of resistance to fire from internal to external (classification “G” in case of applying EN 13063-1, classification “O” in case of applying EN 13063-2).

2.2.5 Durability/Condensate resistance

Purpose of the assessment

For the chimney kit, the condensate resistance, dealt with in harmonised standards as durability aspect, shall be assessed.

Assessment method

For the assessment EN 13063-2, Clause 5.3.2.1, applies.

In case of use of upper cleaning/inspection doors as part of the chimney kit to be assessed they shall be included in the assessment, whereas according to EN 13063-2, Clause 5.4, no water shall occur at the outside of the cleaning and inspection door.

In case of designation W3 G the following applies:

The condensate resistance of the assembled system shall be assessed according to EN 13216-1:2004, Clause 5.5, except assessment of changing in weight of test sample or components according to Clauses 5.5.3 and 5.5.5. The vapour saturation resistance (condensate resistance in the meaning of EN 13063-2) shall be assessed according to EN 13216-1:2004, Clause 5.6, as stated in EN 13063-2, Clause 5.3.2.1.

In case of use of upper cleaning/inspection doors as part of the chimney kit to be assessed they shall be included in the assessment, whereas according to EN 13063-2, Clause 5.4, no water shall occur at the outside of the cleaning and inspection door.

No vapour saturation in any part of the chimney kit and no appearance of water on the outside of the test specimen of fittings or chimney sections shall occur.

In case of elastomeric sealings used in the inspection doors for classification for P1:

It shall be assessed whether at the elastomeric sealing, if any, condensate occurs. According to EN 13063-2, Clause 5.4, no water shall occur.

Elastomeric sealings are not part of the chimney kit with clay/ceramic flue liner in case of classification W3 Gxx.

Expression of results

The condensate resistance class shall be stated in the ETA

2.2.6 Durability of gas tightness/leakage against chemicals/ corrosion, Durability of compressive strength against chemicals

Purpose of the assessment

The assessment shall be done for the classification of the chimney kit and is resulting in an overall assessment of the concerned corrosion resistance class.

Assessment method

In case of classification according to EN 13063-1 and P1 D3 Gxx, EN 13063-1, Clause 5.3.2 applies.

In case of designation N1/P1 W3Gxx the following applies:

After the product has been assessed according to the test sequence stated in Annex A, the following requirements for mortar for jointing the flue liners apply:

- Compressive strength according to EN 13063-2, Clause 5.1.3.1.2,
- Water resistance according to EN 13063-2, Clause 5.1.3.1.3, and
- Acid resistance according to EN 13063-2, Clause 5.1.3.1.4.

Expression of results

If the requirements stated above are fulfilled, the chimney shall be classified as corrosion resistance class “3”, otherwise the designation “W3 Gxx” is not applicable.

The corrosion resistance class shall be stated in the ETA.

2.2.7 Air tightness of the outer wall

The air tightness of the outer wall shall be assessed according to EAD 060011-00-0802, Clause 2.2.9, with the following deviation:

Assessment of the tightness shall be carried out before and after thermal load of the chimney kit as defined in Clause 2.2.1 or 2.2.2 of this EAD (depending on the classification G or O), whereas the assessment shall be done on separate specimen.

2.2.8 Maximum height of the assembled system

Purpose of the assessment

The maximum height of the chimney kit shall be assessed by means of the assessment of its components outer wall, types of flue liners and their jointing materials. This is in order to assess the minimum resulting maximum height on basis of the individual assessments.

Assessment method

For assessment of the maximum height of the inner liner by means of maximum load for opening sections, EN 13063-1, Clause 5.1.3 in case of designation “D” and EN 13063-2, Clause 5.1.2 in case of designation “W” apply. For pressure equalizing openings, if part of the product composition, EN 13063-3, Clause 5.3 applies. For all test specimens the applied load shall be increased until failure and the maximum load “F_{OP}” in [kN] shall be recorded. The maximum height “H_{IL}” in [m] of the inner liner shall be calculated as follows:

$$H_{IL} = (100 * F_{OP.min}) / (\chi_I * G_I)$$

where

F_{OP.min} Minimum of the recorded loads of the opening sections in [kN]

χ_I Safety factor = 5

G_I Weight per meter [kg/m] of the inner liner

For the mortar for jointing the flue liner, the following applies:

- In case of classification “D”, Clause 5.1.4.2 of EN 13063-1 applies.

- In case of classification “W”, Clause 5.1.3.1.2 of EN 13063-2 applies.

2.2.8.1 Assessment of outer wall in case of use of mortar as jointing material

For assessment of the maximum height of the outer wall made of concrete, EN 12446, Clause 8.4 applies. For the test load Annex A.11 of EN 1857 applies. The compressive strength “ σ ” in [N/mm²] shall be measured before and after thermal load. In case of need of test specimens with smaller dimensions (see Annex A.8.2.1 of EN 1857), they shall be taken from the corner situated on the same side as the flue duct, if a side-by-side air flue chimney is part of the product composition.

The maximum possible height “ $H_{OW.Concrete}$ ”, in [m], of the concrete outer wall element is calculated as follows:

$$H_{OW.Concrete} = \text{MIN} \{ H_{OWb.th}; H_{OWa.th} \}$$

where

$$H_{OWb.th} = (\sigma_{b.th} * A) / (10 * \chi_{b.th} * G_{OW.Concrete}) = \text{Maximum possible height before (b.th) thermal load in [m]}$$

$$H_{OWa.th} = (\sigma_{a.th} * A) / (10 * \chi_{a.th} * G_{OW.Concrete}) = \text{Maximum possible height after (a.th) thermal load in [m]}$$

$\sigma_{b.th/a.th}$ compressive strength before (b.th) and after (a.th) thermal load in [N/mm²]

A Cross sectional area of outer wall element in [mm²]

$\chi_{b.th/a.th}$ Safety factor = 4 before (b.th) and = 3 after (a.th) thermal load

$G_{OW.Concrete}$ Weight per meter [kg/m] of the outer wall

For assessment of the outer wall made of clay/ceramic, EN 13069, Clause 6 applies, with the following deviation: The applied load shall be increased until failure and the maximum load “ $F_{OW.c}$ ” in [kN] shall be recorded. The maximum height “ $H_{OW.c}$ ” in [m] of the outer wall shall be calculated as follows:

$$H_{OW.c} = (100 * F_{OW.c}) / (\chi_c * G_{OW.c})$$

where

$F_{OW.c}$ Maximum load of the clay/ceramic outer wall in [kN]

χ_c Safety factor = 5

$G_{OW.c}$ Weight per meter [kg/m] of the clay/ceramic outer wall

$H_{OW.c}$ Maximum height of the clay/ceramic outer wall [m]

For the maximum height of outer wall, the thermal insulating outer wall element, if any, shall be taken into account. Its properties shall be assessed equal to the assessment stated above for the outer wall made of concrete or clay/ceramic, depending on the material of the thermal insulating outer wall element.

For the jointing material for the outer wall according to EN 13063-1, -2 and -3, the following applies:

- In case of classification “D”, Clause 5.1.7 of EN 13063-1 applies.
- In case of classification “W”, Clause 5.1.6 of EN 13063-2 applies.

2.2.8.2 Assessment of outer wall in case of jointing by polyurethane-based adhesive

Assessment shall be done according to Clause 2.2.8.1 for the relevant outer wall (clay/ceramic or concrete) with the following deviation: the test specimen consists of two outer wall elements glued with PU adhesive.

Expression of results

The maximum height of the assembled chimney kit shall be expressed in the ETA by [m], whereas it is outcome of overall assessment of maximum heights of flue liners and outer walls. As far as compressive strength is concerned, the outcome of the assessment according to the relevant standard, mentioned above, shall be stated in the ETA.

Note: In the assessment the type of chimney base, including plate of concrete or suspension devices made of metal, if any, shall be taken into account

2.2.9 Durability of outer wall compound

Purpose of the assessment

The purpose is the assessment of the performance of the outer wall compound in terms of durability by means of:

- assessment of bond strength,
- resistance to thermal load,
- resistance against changing climate and
- resistance against hydrolysis and resistance against alkaline substances.

Assessment method

The durability assessment shall be carried out on specimen representing the outer wall elements.

2.2.9.1 Assessment of bond strength

2.2.9.1.1 Testing equipment

- Laboratory with constant climate of 23°C (+-2 °C)/50% (+- 15%) relative humidity.
- Mechanical testing equipment for testing of bending strength.
- Testing machine according to EN ISO 7500-1, class 0,5 from 1 N to 500 N.
- Dimensions of the platens (equal or larger than the dimensions of the specimen).
- Platens shall be rigid, face-grinded and plane parallelism.
- Measurements: During the test, the load is recorded continuously until failure of the sample.

2.2.9.1.2 Test specimen preparation, including pre-conditioning

Test specimen: Five specimens, made of the same material as the outer wall elements, with a size according to Figure 2.2.9.1.2.1, (a), without any cracks and dust free shall be jointed together by means of the polyurethane-based (PU) adhesive. The adhesive shall be applied on the full surface (Figure 2.2.9.1.2.1, (b)).

After gluing, the test specimens shall be free of gaps and clean, whereas plane parallel bearing surfaces are to be ensured.

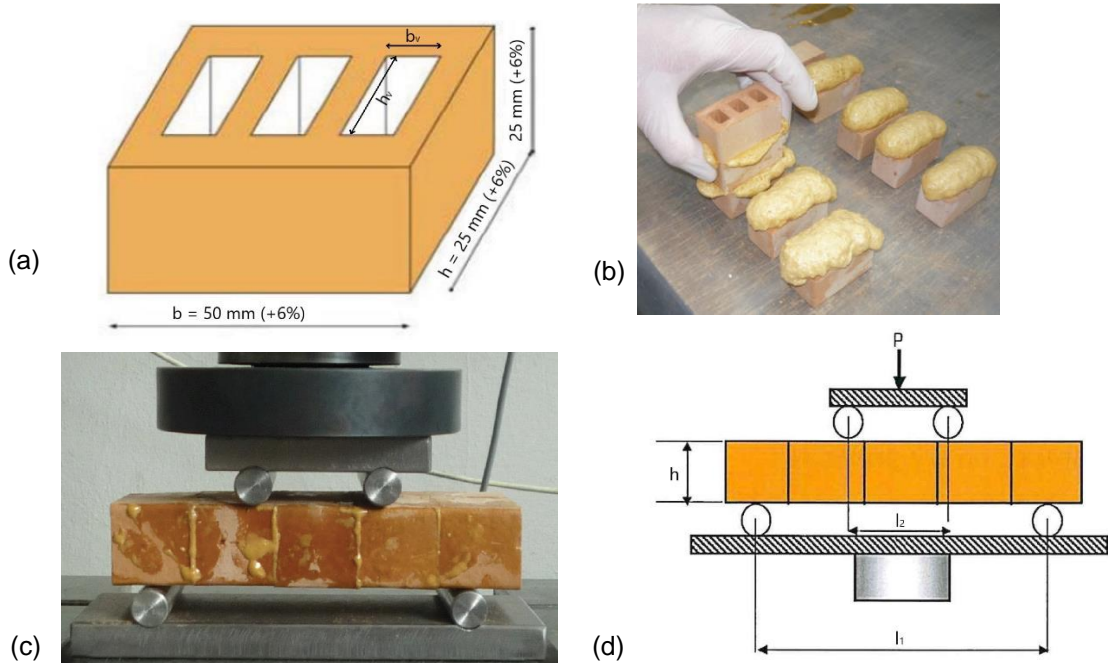


Figure 2.2.9.1.2.1: Sample preparation and test equipment for bending strength test: (a) small scale block, (b) gluing of blocks, (c) specimen in four-point bending test equipment and (d) positioning of test specimen.

The prepared test specimen (Figure 2.2.9.1.2.1, (c)) shall be stored for 7 days under constant climate conditions of 23°C (+2 °C)/50% (+- 15%) relative humidity.

Before carrying out the test the specimen surface shall be cleaned from surplus PU adhesive.

2.2.9.1.3 Test execution

The bending strength shall be measured on 6 specimens by using a four-point bending test setup (see Figure 2.2.9.1.2.1, (c)).

After placing the specimen on the test equipment, the exact position shall be controlled, as defined in Figure 2.2.9.1.2.1 (d).

Loading shall be applied using a constant rate of 220 N/s.

Loading shall be done up to occurring failure. The minimum value of the maximum load at break and the failure mode (e.g., failure in adhesive, failure in block, mixed break) shall be recorded. The maximum bond strength shall be calculated as $\sigma_{max} = \frac{M_{max}}{W_{net}}$

with

$$M_{max} = \frac{P_{max}}{2} \frac{l_1 - l_2}{2}$$

$$W_{net} = \left(\frac{bh^3}{12} - n_v \frac{b_v h_v^3}{12} \right) \frac{h}{2}$$

where

P_{max} is the minimum value of all test specimens of the maximum load at break

M_{max} is the maximum bending moment at break

σ_{max} is the maximum bond strength

h is the height of bending specimen = 25 mm (+6%)

b is the width of specimen = 50 mm (+6%)

h_v is the height of single voids = 15 mm (-10%)

- b_v is the width of single voids = 30 mm (-10%)
 n_v is the number of voids = 3
 l_1 is the distance between bearing of sample = 100 mm \pm 2 mm
 l_2 is the distance between loading points = 40 mm \pm 2 mm
 W_{net} is the section modulus of specimen considering the voids in the cross section

For the assessment the following applies:

The lowest maximum bond strength σ of the test specimens shall be higher than 1,25 N/mm², according to the scope of this EAD.

2.2.9.2 Resistance to thermal load

For the assessment of the resistance to thermal load, the bond strength after thermal load defined for the temperature class T 400 shall be assessed.

Test specimens prepared according to Clause 2.2.9.1 shall be stored (after curing for one week at ambient temperature (23 °C \pm 2 °C)) at constant temperature of 120°C \pm 5°C.

The bending strength shall be assessed on samples conditioned as defined above after 2, 4, 6, and 8 weeks of storage. With the given accelerated ageing test conditions of 120°C and a test duration of 8 weeks the required life time defined in Clause 1.2.2 can be ensured for the intended use defined in Clause 1.2.1. For each series, 5 specimens shall be tested.

For testing equipment and execution of the test Clause 2.2.9.1 applies.

The lowest mean bond strength σ of the individual test series shall be higher than 1,25 N/mm², according to the scope of this EAD.

2.2.9.3 Resistance against changing climate

Test specimens prepared according to Clause 2.2.9.1 shall be cured at ambient temperature (23 °C \pm 2 °C) for 1 week.

After curing, the test specimens shall be placed in a climate chamber for 12 weeks. Compared to the resistance to thermal load test, the test duration shall be extended to 12 weeks because of the lower maximum temperature in the changing climate test. The changing climate shall be defined as follows:

- Duration of one cycle: 12 hours
- Extreme values of temperature/relative humidity: -15°C/5% and +45°C/100%
- Holding period of extreme values: 4 hours
- Cooling/ heating period: 2 hours (temperature gradient of 0,5°C/min).

The bending strength shall be assessed on samples conditioned as defined above after 2, 4, 6, and 12 weeks of storage. For each series 5 specimens shall be tested.

The lowest mean bond strength σ of the individual test series shall be higher than 1,25 N/mm², according to the scope of this EAD.

2.2.9.4 Resistance against hydrolysis

Test specimens prepared according to Clause 2.2.9.1 shall be cured at ambient temperature (23 °C \pm 2 °C) for 1 week.

After curing, the test specimens shall be placed in a water bath for 12 weeks. The bending strength shall be assessed on specimens conditioned as defined above after 2, 4, 6, and 12 weeks of storage. For each series 5 specimens shall be tested.

The lowest mean bond strength σ of the individual test series shall be higher than 1,25 N/mm², according to the scope of this EAD.

2.2.9.5 Resistance against alkaline substances

Test specimens prepared according to Clause 2.2.9.1 shall be cured at ambient temperature (23 °C \pm 2 °C) for 1 week.

After curing, the test specimens shall be fully submerged in a sodium hydroxide bath (pH=12 set at the start of the test) for 12 weeks.

The bending strength shall be assessed on specimens conditioned as defined above after 2, 4, 6, and 12 weeks of storage. For each series 5 specimens shall be tested.

The lowest mean bond strength σ of the individual test series shall be higher than 1,25 N/mm², according to the scope of this EAD

Expression of results

If all requirements stated above are met, the ETA shall state “durable”. If not, the ETA shall state “not durable”.

2.2.10 Resistance to freeze/thaw

Purpose of the assessment

The resistance of the flue liner and damage under freeze-thaw changes and / or the outer shell of the chimney kit shall be assessed.

Assessment method

For the assessment of resistance to freeze/thaw of the flue liner, the outer wall and the covering made of concrete EN 13063-1, Clause 5.5 applies.

In case of a covering made of fibre cement, resistance to freeze/thaw shall be assessed according to EN 12467, Clause 5.5.2.

Expression of results

In the ETA, it shall be separately stated for the flue liner, outer wall and covering made of concrete: fulfilled / not fulfilled. For the covering made of fibre cement, it shall be stated in relation to the concerned category (A): “fulfilled”, otherwise the covering made of fibre cement is not applicable according to the scope of this EAD.

2.2.11 Wind load

Purpose of the assessment

The bending moment resistance of the chimney kit assessed in the test shall be related to the maximum height of the chimney kit outside the building.

Assessment method

The assessment shall be carried out according to EN 13063-1, Annex A.2.4, whereas instead of mortar the polyurethane-based adhesive is used for jointing the outer wall elements and the reduction in the bond strength due to ageing of the adhesive, assessed according to Clause 2.2.9, shall be taken into account adequately. At least 3 specimens shall be tested.

Expression of results

The lowest measured bending moment resistance in kNm shall be stated in the ETA.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 System(s) of assessment and verification of constancy of performance to be applied

For the products covered by this EAD the applicable European legal act is Commission Decision 95/467/EC (EU), amended by 2001/596/EC (EU) and 2002/592/EC (EU) and 2010/679/ EU.

The system is: 2+

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the chimney kit in the procedure of assessment and verification of constancy of performance are laid down in Table 3.2.1.

The manufacturer (regarding the components he buys from the market with DoP) shall take into account the Declaration of Performance issued by the manufacturer of that component. No retesting is necessary.

Table 3.2.1 Control plan for the manufacturer; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1 Components covered by relevant harmonised technical specification					
1.1	Components where all needed characteristics are covered by the DoP	Check of delivery documents	Conformity with the order	Testing is not required	Each delivery
1.2	Components where not all needed characteristics are covered by the DoP	According to relevant harmonised technical specification*	According to relevant harmonised technical specification*	According to relevant harmonised technical specification*	According to relevant harmonised technical specification*
* Only applies for the characteristic which is not covered by relevant DoP, otherwise No. 1.1 applies.					
2 Outer wall					
2.1	Flatness of faces in case of jointing by polyurethane-based adhesive	EN 772-20	According to Control plan	According to Control plan	According to Control plan
2.2	Plane parallelism in case of jointing by polyurethane-based adhesive	EN 772-16	According to Control plan	According to Control plan	According to Control plan
2.3	Surface treatment (foamed concrete):				
2.3.1	Bulk density	EN 772-13	According to Control plan	3	1 per month
2.3.2	Composition	According to Control plan	According to Control plan	According to Control plan	According to Control plan
3 Thermal separating outer wall element					
3.2	Compressive strength	According to Control plan	According to Control plan	According to Control plan	According to Control plan

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
4	Chimney base				
4.1	Outer wall (prefabricated chimney base)				
4.1.1	Compressive strength	According to Control plan	According to Control plan	According to Control plan	According to Control plan
4.2	Plate of chimney base				
4.2.1	Bulk density in case of concrete	EN 12390-7	EN 206, Cl. 5.5.2	3	Each charge
4.3	Suspension device made of metal				
4.3.1	Dimensions	Measurement by means of gauge	According to Control plan	1 per diameter	Each delivery
4.3.2	Material	According to Control plan	According to Control plan	1 per diameter	Each delivery
5	Upper cleaning and inspection door for designation W3Gxx (not covered by EN 13063-1, EN 13063-2)				
5.1	Cleaning and inspection door of the outer wall:				
5.1.1	Functioning ability: Leakage	According to Control plan	According to Control plan	10	Each delivery
5.2	Cleaning and inspection door of flue liner				
5.2.1	Leakage	According to Control plan	According to Control plan	3	Once a year
5.2.2	Condensate resistance	According to Control plan	According to Control plan	3	Once a year
6	Polyurethane-based adhesive				
6.1	Pot life time / Tack free time in minutes	According to control plan	According to control plan	According to control plan	Each delivery
6.2	Pressure of the can	According to control plan	According to control plan	According to control plan	Each delivery
6.3	Hardening at -5°C	According to control plan	According to control plan	According to control plan	Each delivery
6.4	Tensile strength	According to control plan	According to control plan	According to control plan	Each delivery
6.5	Elongation at break	According to control plan	According to control plan	According to control plan	Each delivery
6.6	Bending strength	Clause 2.2.16	Clause 2.2.16	According to control plan	Each delivery
7	Closing devices				
7.1	Fitting accuracy	According to control plan	According to control plan	According to control plan	According to control plan
7.2	Closure mechanism	According to control plan	According to control plan	According to control plan	According to control plan
8	Complete Kit				
8.1	Conformity to the specification drawings e.g. correct elements, dimensions, pre assembly.	According to Control plan	According to Control plan	According to Control plan	Each delivery

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
8.2	General aspects EN 13063-1, EN 13063-2	EN 13063-1, EN 13063-2 Details laid down in control plan	EN 13063-1, EN 13063-2 Details laid down in control plan	Each kit	Each kit
8.3	Thermal insulation material applied for increased thermal insulation				
8.3.1	Thermal conductivity	According to Control Plan	According to Control Plan	According to Control Plan	Each delivery
8.3.2	Bulk density	According to Control Plan	According to Control Plan	According to Control Plan	Each delivery

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 3.3.1.

Table 3.3.1 Control plan for the notified body; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control					
1	Notified Body will ascertain that the factory production control with the staff and equipment are suitable to ensure a continuous and orderly manufacturing of the chimney kit	Verification of the complete FPC as described in the control plan agreed between the TAB and the manufacturer	According to Control plan	According to Control plan	When starting the production or a new line
Continuous surveillance, assessment and evaluation of factory production control					
2	The Notified Body will ascertain that the system of factory production control and the specified manufacturing process are maintained taking account of the control plan.	Verification of the controls carried out by the manufacturer as described in the control plan agreed between the TAB and the manufacturer with reference to the raw materials, to the process and to the product as indicated in Table 3.2.1	According to Control plan	According to Control plan	1/year

4 REFERENCE DOCUMENTS

EAD 060009-00-0802	"Kit for system stove - chimney consisting of chimney kit with clay/ceramic flue liner and integrated stove unit"
EAD 060011-00-0802	"Sootfire resistant chimney kits with clay/ceramic flue liner, working under wet conditions and negative/positive pressure"
EN 206:2013+A1:2016	"Concrete - Specification, performance, production and conformity"
EN 772-13:2000	"Methods of test for masonry units — Part 13: Determination of net and gross dry density of masonry units (except for natural stone)"
EN 772-16:2011	"Methods of test for masonry units — Part 16: Determination of dimensions"
EN 772-20:2000+A1:2005	"Methods of test for masonry units – Part 20: Determination of flatness of faces of masonry units"
EN 1443:2003	"Chimneys — General requirements"
EN 1457-1:2012	"Chimney — Clay/ceramic flue liners — Part 1: Flue liners operating under dry conditions — Requirements and test methods"
EN 1457-2:2012	"Chimneys - Clay/ceramic flue liners — Part 2: Flue liners operating under wet conditions - Requirements and test methods"
EN 1857:2010	"Chimneys — Components — Concrete flue liners"
EN 1859:2009+A1:2013	"Chimneys — Metal chimneys — Test methods"
EN 12390-7:2009	"Testing hardened concrete — Part 7: Density of hardened concrete"
EN 12446:2011	"Chimneys - Components — Concrete outer wall elements"
EN 12467:2012+A2:2018	"Fibre-cement flat sheets — Product specification and test methods"
EN 13063-1:2005+A1:2007	"Chimneys — System chimneys with clay/ceramic flue liners — Part 1: Requirements and test methods for sootfire resistance"
EN 13063-2:2005+A1:2007	"Chimneys — System chimneys with clay/ceramic flue liners — Part 2: Requirements and test methods under wet conditions"
EN 13063-3:2007	"Chimneys — System chimneys with clay/ceramic flue liners — Part 3: Requirements and test methods for air flue system chimneys"
EN 13069:2005	"Chimneys – Clay/ceramic outer walls for system chimneys – Requirements and test methods"
EN 13216-1:2004	"Chimneys — Test methods for system chimneys — Part 1: General test methods"
EN 13216-1:2019	"Chimneys — Test methods for system chimneys — Part 1: General test methods"
EN 13501-1:2018	"Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests"
EN ISO 7500-1:2018	"Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system (ISO 7500-1:2018)"

ANNEX A: TEST SEQUENCE FOR THE CHIMNEY KIT WITH CLAY/CERAMIC FLUE LINER FOR CLASSIFICATION W3 G

The testing of the chimney kit with clay/ceramic flue liner shall be carried out with the following test sequence:

- a) Gas tightness according to Clause 2.2.3
- b) Thermal test on operating conditions according to Clause 2.2.1
- c) Gas tightness according to Clause 2.2.3
- d) Relative movement according to EN 13063-1, Clause 5.2.2³
- e) Thermal test under soot fire conditions according to Clause 2.2.1
- f) Gas tightness according to Clause 2.2.3
- g) Relative movement according to EN 13063-1, Clause 5.2.2³ and abrasion resistance of the clay/ceramic flue liner according to EN 1457-2, Clause 16.12
- h) Condensate resistance and water resistance according to Clause 2.2.5
- i) Flow resistance according to Table 2.1.1
- j) Thermal resistance according to Table 2.1.1.

³ Noted in the test sequence for the chimney kit with clay/ceramic flue liner equal to the test sequences given in EN 13063-1 and EN 13063-2, Annex A.1.