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BSI Standards Publication

**Fire performance of external cladding
systems – The application of results
from BS 8414-1 and BS 8414-2 tests**

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 September 2019. It was prepared by Technical Committee FSH/21, *Reaction to fire tests*. A list of organizations represented on this committee can be obtained on request to its secretary.

Relationship with other publications

This British Standard is intended to be read in conjunction with BS 8414-1:2015+A1:2017 and BS 8414-2:2015+A1:2017.

Information about this document

The rules and associated guidance in this British Standard have been compiled to reflect the current knowledge base that exists for the series of BS 8414 tests, results and experience from such tests, and insulated non-load bearing facade constructions in general. It is therefore recognized that future experience could lead to changes to the rules and guidance provided or the development of further rules and guidance. Where it is considered that there is insufficient evidence at present to create a rule then the option for change is shown as “not permissible”.

It is also intended to widen the scope of this British Standard in future to cover application rules for glazing, infill panels and curtain walling external wall construction systems.

This publication can be withdrawn, revised, partially superseded or superseded. Information regarding the status of this publication can be found in the Standards Catalogue on the BSI website at bsigroup.com/standards, or by contacting the Customer Services team.

Where websites and webpages have been cited, they are provided for ease of reference and are correct at the time of publication. The location of a webpage or website, or its contents, cannot be guaranteed.

Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

Contractual and legal considerations

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

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

Introduction

There are a number of practical limitations on the size and design of construction elements that can be evaluated by a standard method of test. For example, if these elements are larger or of a modified design or type, it is necessary to be able to confirm that the integrity of the test result would be maintained if such changes to the system were implemented. This can be achieved through the use of standardized rules. This British Standard provides the rules to be applied when assessing the implications of such modifications in relation to systems which have been subjected to tests in accordance with BS 8414-1:2015+A1 or BS 8414-2:2015+A1.

BS 8414-1:2015+A1 and BS 8414-2:2015+A1 provide test methods for determining the fire performance characteristics of non-loadbearing external cladding systems, rain-screen over-cladding systems and external wall insulation systems when applied to the face of a building and exposed to an external fire under controlled conditions. The fire exposure is representative of an external fire source or a fully-developed (post-flashover) fire in a room, venting through an opening such as a window aperture that exposes the cladding to the effects of external flames.

This British Standard is concerned with evaluating the scope of the results obtained from the BS 8414-1 and BS 8414-2 tests, defining the parameters which can or cannot be varied and to what extent. It provides direct application (DIAP) rules for a system which has been subjected to a single BS 8414-1 or BS 8414-2 test and interpolation for systems which have been subjected to multiple tests.

This British Standard addresses the nature and extent of any permitted alterations to the system as tested. The number of such changes can vary according to the complexity of the external cladding and the type of construction being considered. However, every component of the external cladding could have an impact on the fire spread performance of the system, and therefore each change needs to be the subject of a separate evaluation when considering extending the scope of the original testing.

This British Standard recognizes that when a construction product is manufactured, the process is controlled to ensure that the properties which categorize the product, such as dimensions, density, thermal performance and mechanical strengths, fall within the bounds of set product manufacturing tolerances. Where a rule is provided for varying such properties, the stated variance is based upon the tested value. If no such rule is provided for a particular characteristic then it is recognized that such properties might vary for the product when placed on the market due to manufacturing tolerances; however, it is expected that the performance for all declared performance characteristics will still be achieved.

Although tests to other standards might not be directly applicable to the evaluation of the fire performance of a BS 8414 test specimen, additional test data may be used to support extended application; for instance, to evaluate the influence of a particular component or aspect of the design, or to establish which design variations affect the performance in the most or least onerous way.

NOTE For reasons of traceability, all supporting documents used for any extension need to be included in the analysis report.

A construction product can be placed on the market with a wide range of variations in properties such as dimensions, density and mechanical strengths. When products are combined into a building system, their fire performance can depend on the underlying substrate or covering, how the products are fixed and what products are used for such fixing. It is not feasible to test all combinations of different products or system characteristics for their reaction to fire or fire resistance performances, although such characteristics can substantially influence a test result.

An external cladding system comprises a number of individual products (cladding, insulation, fixation systems, substrates, cavity barriers, etc.). The external cladding system has a number of different functions and performance requirements, including weather resistance, thermal performance, acoustic performance and aesthetics. The products are combined in such a way that they are effective in resisting the spread of fire when tested as part of a complete system in accordance with BS 8414-1:2015+A1 or BS 8414-2:2015+A1. Each of the products and the way they are assembled could potentially influence how the complete external cladding system performs in such fire tests, and therefore it is necessary to evaluate their individual characteristics and how these interact. Rules for conducting this analysis are given in [Clause 5](#).

The number of variables which can affect the outcome of such large-scale fire tests on potentially complex structures such as an insulated building facade, with or without a ventilated cavity, is considerable. Changing one of more of these variables might be possible without endangering the integrity of the tested system, but others might require supplementary testing, through either large or smaller scale fire tests. This is to ensure that any changes do not compromise the integrity of the original test result performed in accordance with BS 8414-1:2015+A1 or BS 8414-2:2015+A1.

A result obtained in a fire test is that which is reported. In a separate exercise, it is possible to vary the values of the different product characteristics to extend the field of application of the individual test results. This process of extended application uses rules which are based only on worst-case scenarios and interpolation techniques.

Extended application enables a prediction to be made on the expected fire performance of a system under specified fire conditions if one or more of the components or parameters evaluated as part of the test specimen were to be changed. In the specific case of external cladding systems, such predictions are based upon the need to abide strictly with the fundamental principle that the fire performance of the modified system would be equal or better if it were to be subjected to a BS 8414-1 or BS 8414-2 test.

This British Standard relates only to the extension of results of an external facade system which has previously been tested in some form in accordance with BS 8414-1:2015+A1 or BS 8414-2:2015+A1. It does not provide a means of assessing external facade constructions which incorporate multiple cladding systems.

1 Scope

This British Standard specifies procedures and rules used to evaluate variations and changes to products and systems which have been tested in accordance with BS 8414-1:2015+A1:2017 or BS 8414-2:2015+A1:2017, and, where appropriate, defines options and limits for preparing reports based on the direct and extended application criteria provided.

The following systems are covered:

- rain-screens;
- external thermal insulated composite systems (ETICS);
- self-supporting double skin metal faced insulating (sandwich) panels.

This British Standard covers specific parameters and product characteristics associated with the design of non-loadbearing external cladding systems which have been tested in accordance with BS 8414-1:2015+A1 or BS 8414-2:2015+A1.

This British Standard does not cover the performance of systems that include glazed elements, infill panels or external insulation finishing systems (EIFS).

This British Standard does not cover systems that have been tested in accordance with BS EN 1364.

NOTE Guidance for extending the scope of application for BS EN 1364 tests is given in BS EN 15254-2, BS EN 15254-4, BS EN 15254-5, BS EN 15254-6 and BS EN 15254-7.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document¹⁾. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 8414-1:2015+A1:2017, *Fire performance of external cladding systems – Part 1: Test method for non-loadbearing external cladding systems applied to the masonry face of a building*

BS 8414-2:2015+A1:2017, *Fire performance of external cladding systems – Part 2: Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame*

BS EN 1996-1-1, *Eurocode 6 – Design of masonry structures – Part 1-1: General rules for reinforced and unreinforced masonry structures*

BS EN 1996-1-2, *Eurocode 6 – Design of masonry structures – Part 1-2: General rules – Structural fire design*

BS EN 1996-2, *Eurocode 6 – Design of masonry structures – Part 2: Design considerations, selection of materials and execution of masonry*

BS EN 16382, *Thermal insulation products for building applications – Determination of the pull-through resistance of plate anchors through thermal insulation products*

BS EN 13501-1:2018, *Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests*

BS EN ISO 1716, *Reaction to fire tests for products – Determination of the gross heat of combustion (calorific value)*

¹⁾ Documents that are referred to solely in an informative manner are listed in the Bibliography.

3 Terms and definitions

For the purposes of this British Standard, the definitions given in BS 8414-1:2015+A1, BS 8414-2:2015+A1 and the following apply.

NOTE Typical systems are described in [Annex A](#), with details shown in [Figure A.1](#) to [Figure A.8](#).

3.1 application evaluation report

document reporting extended application results, including all details of the process leading to those results

3.2 base coat render

layer of render which can incorporate an embedded reinforcement

3.3 breather membrane

product placed in an external cladding system to contribute to the water-tightness of a wall whilst allowing the movement of moisture vapour from the inside of a building to the outside

3.4 cavity width

distance between internal vertical surfaces forming a concealed space within an external cladding system

3.5 class A1 product or material

product or material classified as A1 in accordance with BS EN 13501-1:2018

NOTE National classifications for reaction to fire are given in [Annex B](#).

3.6 class A2-s3, d2 or better product or material

product or material classified as A2-s3, d2 or better in accordance with BS EN 13501-1:2018

NOTE National classifications for reaction to fire are given in [Annex B](#).

3.7 class B-s1, d0 or lower product or material

product or material classified as B-s1, d0 or lower in accordance with BS EN 13501-1:2018

NOTE National classifications for reaction to fire are given in [Annex B](#).

3.8 decorative coat

component which is applied to the finishing coat contributing to the aesthetic finishing and protection against weathering

3.9 finishing coat render

component applied to the reinforced base coat with or without a key coat

3.10 fire barriers

3.10.1 firebreak

non-loadbearing vertically or horizontally oriented element designed to restrict fire spread within one or more layers of an external cladding system

3.10.2 cavity barrier

product used to close or separate a concealed space, the purpose of which is to restrict the spread of smoke and/or fire

NOTE This includes both closed state (3.10.3) and open state (3.10.4) cavity barriers.

3.10.3 closed state cavity barrier

non-loadbearing vertically or horizontally oriented element designed to provide fire separation within or at the edges of a concealed space (cavity) by forming a tight seal (possibly under compression) between the inner and outer surfaces of the cavity

3.10.4 open state cavity barrier

non-loadbearing vertically or horizontally oriented element designed to provide fire separation in a concealed space (cavity), which is open to allow ventilation and drainage in the cold state, but which closes when exposed to a developed fire

3.11 gross heat of combustion (PCS)

heat of combustion of a substance when combustion is complete and any water produced is entirely condensed under specific conditions, as tested in accordance with BS EN ISO 1716

3.12 insulation

product used for the purposes of minimizing heat loss from a building and applied to the external surface of a substrate, either directly or with an intervening cavity

3.13 insulation fixing

mechanical fixing device used for securing an insulation product to a substrate

NOTE For example, anchors or a proprietary support system.

3.14 internal dry lining insulation

product used for the purposes of providing thermal insulation, located and supported within an internal dry lining steel frame system (SFS)

3.15 key coat

component applied to the base coat as a preparation for the application of the finishing coat

3.16 pull-out resistance

<of fixings> ability to withstand extraction from a substrate as a consequence of an applied tension force

3.17 pull-through resistance

<of fixings> ability to withstand being drawn through a specific insulation product or system as a consequence of an applied tension force

3.18 test result

outcome of a testing process and its associated procedures detailed within a specific standard

NOTE 1 This might include some processing of the results from the testing of a number of specimens.

NOTE 2 A test result is expressed in terms of one or more performance parameters.

3.19 thermal break

thermal insulator that can be used in both horizontal and vertical connections of internal and external elements to reduce thermal transmittance and cold bridging through connection(s)

3.20 thermal conductivity (k or λ)

property of a material to conduct heat from its warmer surface through the material to its colder surface

NOTE Thermal conductivity is defined by the following relation, in watts per kelvin metre [W/(m·K)]:

$$\vec{q} = -\lambda \text{grad}T$$

where:

$\vec{q}$ is the density of heat flow rate, in watts per metre (W/m);

λ is the thermal conductivity, in watts per kelvin metre [W/(m·K)];

$\text{grad}T$ is the (thermodynamic) temperature gradient, in Kelvin (K).

It is discussed in more detail in BS EN ISO 7345:2018, Annex A.

3.21 thermal resistance (R)

measure of resistance to heat flow through a given thickness of material

NOTE 1 The thermal resistance (R-value) for homogeneous products is calculated using the following formula, in metres squared Kelvin per watt [(m²K)/W]:

$$R = l/\lambda$$

where:

l is the thickness of the material, in metres (m);

λ is the thermal conductivity, in watts per kelvin metre (W/m·K).

NOTE 2 The thermal resistance (R-value) for voided masonry units, e.g. hollow concrete blocks or those containing insulated voids, is calculated utilizing the “combined” method provided in BS EN ISO 6946:2017, 6.2, for a building component consisting of homogeneous and non-homogeneous layers, using surface resistances of zero on both sides of the block.

3.22 unventilated cavity

air space within an external cladding system where, under normal building operation, the through flow of air is effectively zero

NOTE Any airflow through the cavity is not intended to fulfil a functional purpose for ventilation, e.g. to control moisture accumulation.

3.23 vapour control layer

product or material which reduces the amount of moisture (water vapour) that diffuses through the layer and which can be used to reduce the risk of condensation and dampness in wall assemblies

3.24 ventilated cavity

air space within an external cladding system that has been designed to allow the free flow of air under the normal operating conditions of the building

4 Procedure for performing an application evaluation

NOTE 1 This procedure is illustrated in Figure 1.

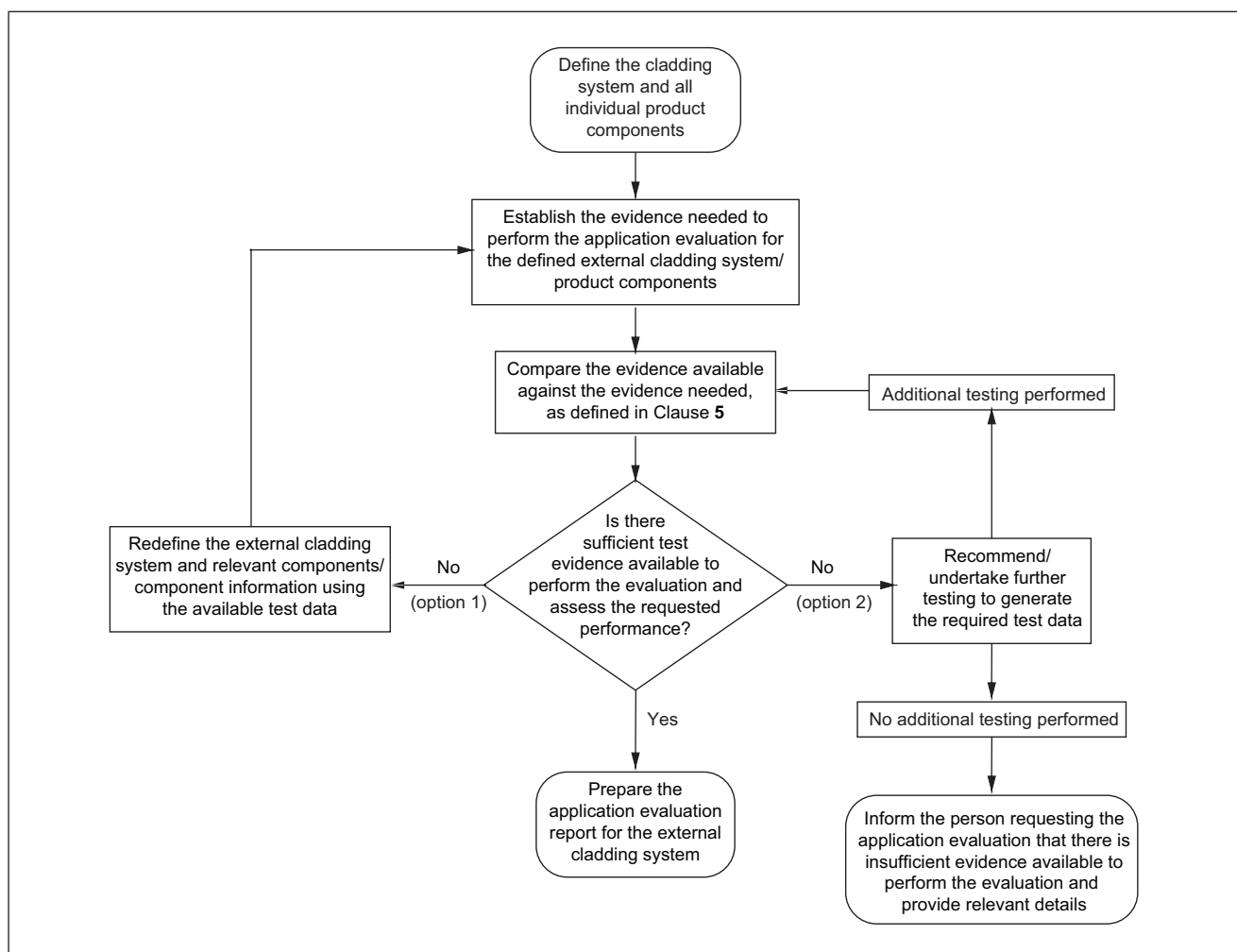
The following steps shall be followed when performing an application evaluation.

- a) Define the external cladding system.
- b) Collect the evidence from the various sources.
- c) Use the tables in Clause 5 to determine whether the proposed variation is permissible, then apply the corresponding rule(s), using interpolation techniques where relevant/required.

NOTE 2 It is essential that there is clear justification when combinations of changes/parameters are proposed.

- d) Establish whether the evidence available is sufficient to support the fire performance required for the required change. If it is not, decide on what action is needed, i.e. either redefine the system (option 1 in Figure 1) or undertake further testing (option 2 in Figure 1).
- e) Report the application evaluation in accordance with Clause 6.

Figure 1 — Procedure for performing an application evaluation



5 Rules for application evaluation

5.1 General

The application evaluation shall be based on facade systems which have been subjected to one or more tests conducted in accordance with BS 8414-1:2015+A1 or BS 8414-2:2015+A1.

NOTE It is expected that the applicant requesting the application evaluation will either be the owner (i.e. the test sponsor) of all referenced tests and any previously existing test data being submitted for the extension, or have written permission from the owner to use the submitted test evidence.

When analysing the request for the application evaluation, the assessor shall take into account the feasibility of installing the proposed facade system in practice. If the assessor has any doubts regarding this issue, these shall be fully discussed with the applicant with a view of modifying the design or the installation guidance. If the assessor is still of the opinion that the system cannot be installed in accordance with normal facade design standards and practices, they shall record their concerns, inform the applicant accordingly and terminate the application evaluation.

5.2 Changes directly related to the test methods

5.2.1 Interchange between BS 8414-1 and BS 8414-2 test methods

5.2.1.1 General procedure

For a given parameter or product evaluated as part of the tested system, it shall be established, using the relevant row in [Table 1](#), whether the proposed variation is permissible. If [Table 1](#) indicates that the variation is permissible, the corresponding rule shall be followed when implementing the change.

Table 1 — Interchanging test results obtained from testing to BS 8414-1:2015+A1 and BS 8414-2:2015+A1

Tested substrate	Variation proposed	Sub-groups	Option for change	Additional evidence required	For rule, see clause reference
Masonry (BS 8414-1 test)	From a masonry substrate (BS 8414-1) test to a board faced steel framed system (SFS) (BS 8414-2) test	—	Not permissible	—	—
Faced SFS (BS 8414-2 test)	From a board faced SFS (BS 8414-2) test to a masonry (BS 8414-1) test	Brick	Permissible	1. Temperature in insulation layer 2. Fire resistance of substrate 3. Thickness of brick, block or concrete	5.2.1.2
		Block	Permissible		
		Pre-cast concrete	Permissible		

5.2.1.2 Use of BS 8414-2 test results to show conformity to BS 8414-1

Results obtained from a test performed in accordance with BS 8414-2:2015+A1 using a board faced steel framed system (SFS) shall be deemed to be valid for a BS 8414-1 test using a masonry substrate where:

- the fire resistance of the masonry is equal to or greater than the SFS and associated lining and sheathing boards tested with the sheathing board exposed to the fire; and
- the thermal resistance of the masonry is equal to or lower than the SFS insulation tested.

NOTE The alternative substrate should be not less resistant to fire penetration and/or result in an increase of temperatures on external (fire-exposed) surface.

5.2.2 Alternative substrates

5.2.2.1 General

For a given parameter or product evaluated as part of the tested system, it shall be established, using the relevant row in [Table 2](#), whether the proposed variation is permissible. If [Table 2](#) indicates that the variation is permissible, the corresponding rule shall be followed when implementing the change.

Table 2 — Changing of substrates to which test specimen is attached

Tested substrate	Variation proposed	Option for change	Additional evidence required (of tested and alternative products)	For rule, see clause reference
Change of masonry ^{A)} (BS 8414-1 test)	From tested solid block to brick	Permissible	1. Thickness of alternative substrate 2. Fire resistance (REI) of alternative substrate	5.2.2.2
	From tested solid block to pre-cast concrete	Permissible		
	From tested solid block type to alternative block type	Permissible		
	From tested solid block to hollow core block	Not permissible	—	—
Change of board type applied to the external face of the structural steel test frame (BS 8414-2 test)	—	Not permissible ^{B)}	—	—

^{A)} BS 8414-1:2015+A1 stipulates that the tested masonry substrate is to be constructed of block with a nominal minimum specification as follows:

- compressive strength 7.3 N/mm²;
- density 730 kg/m³;
- thermal conductivity 0.18 W/m·K.

^{B)} The substrate used in a BS 8414-2 test can perform a number of functions that can contribute to the overall performance of the facade system in the event of a fire, including mechanical stability (racking strength) and fire resistance (including the transfer of heat from the external exposed face). Therefore, no rule is currently proposed for substituting the tested board product with an alternative product. This is also applicable for a sheathing board which is applied to a dry-lining frame intended to perform any loadbearing function associated with supporting the external cladding system.

5.2.2.2 Change of solid masonry substrates

The test result shall be deemed to be valid when the thickness of an alternative masonry substrate is at least 100 mm, with a thermal resistance equal to or lower than the tested masonry substrate, and a fire resistance (REI) of at least 120 min.

NOTE These requirements are intended to ensure that the facade system is adequately supported during the test period, and to prevent additional heat being retained on the exposed surface of the facade system compared to that experienced during the test.

5.3 Internal dry lining (applicable to facade systems tested to BS 8414-2:2015+A1 only)

NOTE 1 Typical internal dry lining systems are described in [Annex A, A.1](#).

NOTE 2 This subclause is applicable to all external insulated facade systems detailed in [5.4](#), [5.5](#) and [5.6](#).

5.3.1 General

For a given parameter or product evaluated as part of the tested system, it shall be established, using the relevant row in [Table 3](#), whether the proposed variation is permissible. If [Table 3](#) indicates that the variation is permissible, the corresponding rule shall be followed when implementing the change.

Table 3 — *Changes to internal dry lining*

Tested component/ product	Variation proposed	Sub-groups	Option for change	Additional evidence required (of tested and alternative/ modified products)	For rule, see clause reference
Parameter 1: INTERNAL LINING BOARD(S)					
Internal lining board(s)	Change of product type	—	Permissible	1. Fire resistance test data 2. Reaction to fire test data	5.3.2
	Increase of thickness	—	Permissible	Thickness measurements	5.3.3
	Decrease of thickness	—	Not permissible	—	—
Parameter 2: VAPOUR CONTROL LAYER (VCL) – between an internal lining board and support frame insulation within SFS					
VCL membranes	Change of product type	—	Permissible	Reaction to fire test data	5.3.4
	Addition of membrane(s)	—	Not permissible	—	—
	Removal of membrane(s)	—	Permissible	—	5.3.5
Parameter 3: INTERNAL (dry lining) STEEL FRAME SYSTEM (SFS)					
Internal dry lining steel frame support system	Change of system, components or manufacturer	Performing a loadbearing support function to all or part of the weight of the external cladding system	Permissible	Fire resistance test data	5.3.6
		Only performing a support function to the internal lining board and insulation contained within the frame system	Permissible	Fire resistance test data	5.3.7
	Increase of yield stress of steel of I or C channels	—	Permissible	Yield stresses	5.3.8
	Decrease of yield stress of steel of I or C channels	—	Not permissible	—	—
	Increase of depth of I or C channels	Uninsulated	Permissible	Dimensional specifications	5.3.9
	Increase of depth of I or C channels	Insulated	Not permissible	—	—
	Decrease of depth of I or C channels	—	Not permissible	—	—
	Increase of gauge of I or C channels	—	Permissible	Dimensional specifications	5.3.10
	Decrease of gauge of I or C channels	—	Not permissible	—	—

Table 3 — Changes to internal dry lining (continued)

Tested component/ product	Variation proposed	Sub-groups	Option for change	Additional evidence required (of tested and alternative/ modified products)	For rule, see clause reference
	Increase of spacing between I or C channels (studs)	—	Not permissible	—	—
	Decrease of spacing between I or C channels (studs)	—	Permissible	Installation specifications	5.3.11
Parameter 4: INTERNAL DRY LINING INSULATION WITHIN STEEL FRAME SYSTEM (SFS)					
Internal dry lining insulation within SFS	Change of insulation material type	Class B-s1, d0 or lower to class A1 or class A2-s3, d2 or better	Permissible	Thermal resistance	5.3.12
		Class A1/class A2-s3, d2 or better to class B-s1, d0 or lower	Not permissible	—	—
		Alternative class B-s1, d0 or lower products	Not permissible ^{A)}	—	—
		Alternative class A1 or class A2-s3, d2 or better products	Permissible	1. Reaction to fire test data 2. Thermal conductivity 3. Melting temperature	5.3.13
	Introduction of insulation where none tested	—	Not permissible ^{B)}	—	—
	Total removal of insulation to that tested	—	Not permissible ^{C)}	—	—
	Increase of thickness	Class B-s1, d0 or lower insulation	Not permissible ^{B)}	—	—
	Decrease of thickness	Class B-s1, d0 or lower insulation	Not permissible ^{C)}	—	—
	Increase of thickness	Class A1/class A2-s3, d2 or better insulation	Not permissible ^{B)}	—	—
	Decrease of thickness	Class A1/class A2-s3, d2 or better insulation	Not permissible ^{C)}	—	—

Table 3 — *Changes to internal dry lining (continued)*

Tested component/ product	Variation proposed	Sub-groups	Option for change	Additional evidence required (of tested and alternative/ modified products)	For rule, see clause reference
	Increase of density	Class B-s1, d0 or lower insulation	Not permissible	—	—
	Decrease of density		Not permissible	—	—
	Increase of density	Class A1/class A2-s3, d2 or better insulation	Not permissible	—	—
	Decrease of density		Not permissible	—	—
Parameter 5: SHEATHING BOARD (applied to internal dry lining system)					
Sheathing boards applied to SFS	Adding a sheathing board to a system tested without a sheathing board	Class A1/class A2-s3, d2 or better sheathing	Permissible	Reaction to fire test data	5.3.14
		Class B-s1, d0 or lower sheathing	Not permissible	—	—
	Change of product to a system tested with a sheathing board	Where the sheathing board performs a function associated with supporting the load of the external cladding system	Not permissible ^{b)}	—	—
		Change of product – where the sheathing board does not perform any function associated with supporting the load of the external cladding system	Not permissible	—	—
	Increase of thickness	Class B-s1, d0 or lower boards	Not permissible	—	—
	Decrease of thickness		Not permissible	—	—
	Increase of thickness	Class A1/class A2-s3, d2 or better boards	Permissible	1. Thickness tested 2. Number of fixings/area	5.3.15
	Decrease of thickness		Not permissible	—	—

Table 3 — *Changes to internal dry lining (continued)*

Tested component/ product	Variation proposed	Sub-groups	Option for change	Additional evidence required (of tested and alternative/ modified products)	For rule, see clause reference
Parameter 6: BREATHER MEMBRANES					
Breather membranes	Change of product type	On face of external insulation	Not permissible	—	—
		Between layers of insulation	Permissible	Reaction to fire test data	5.3.16
	Addition of a membrane	On face of external insulation	Not permissible	—	—
		Between layers of insulation	Not permissible	—	—
	Removal of a membrane	On face of external insulation	Not permissible	—	—
		Between layers of insulation	Not permissible	—	—
A) This is deemed to be not permissible owing to concern that any flame puncture through sheathing might ignite class B-s1, d0 or lower insulation.					
B) This is deemed to be not permissible owing to concern that an introduction or addition could lead to an increased temperature on the external face of the facade system, particularly above the combustion chamber.					
C) This is deemed to be not permissible owing to concern that the removal or reduction of insulation could lead to increased heat on inner surface of the system.					
D) See 5.2.2 (test substrates) for further guidance.					

5.3.2 Change from a tested lining board product to an alternative lining board product

The test result shall be deemed to be valid when a tested lining board product is replaced with an alternative lining board product having a fire resistance (EI) equal to or greater than the tested product, when tested as part of a similar dry lining system. In addition, the alternative internal dry lining board shall have a gross heat of combustion in MJ/kg equal to or less than the tested product.

NOTE Internal lining boards would have a negligible thermal resistance compared to insulation products used in a facade system, and therefore such a change would not be expected to affect the thermal dynamics of a BS 8414 test.

5.3.3 Increase of thickness of a tested lining board product

The test result shall be deemed to be valid when the thickness of lining board product is equal to or greater than the tested thickness.

5.3.4 Replacement of a tested VCL between the internal lining board and the internal dry lining insulation with an alternative VCL

The test result shall be deemed to be valid when a tested VCL is replaced with an alternative VCL having a gross heat of combustion in MJ/m² equal to or less than the tested product.

NOTE This applies where the VCL is on the warm (internal) side of any insulation and therefore protected from direct attack from the fire source of the test.

5.3.5 Removal of a VCL product from the tested system

The test result shall be deemed to be valid if a VCL is removed from the tested system.

NOTE Care should be taken not to introduce the risk potential for interstitial condensation or water penetration to occur when removing membranes.

5.3.6 Change of an SFS performing a loadbearing support function to all or part of the weight of the external cladding system

The test result shall be deemed to be valid when the tested SFS (including any plasterboards, insulation and sheathing boards) is replaced with an alternative SFS having an equal or greater fire resistance (REI) than the tested system and the capability of supporting both the internal dry lining system and the external cladding system.

5.3.7 Change of an SFS performing only a support function to the internal lining board and insulation contained within the frame system

The test result shall be deemed to be valid when the SFS, which has been tested as part of a dry lining system, is replaced with an alternative SFS having an equal or greater fire resistance (EI) than the tested system.

NOTE 1 The fire resistance comparison should be evaluated using the same lining and sheathing boards used in the BS 8414 test.

NOTE 2 For frame systems that perform a loadbearing support function for the external facade, see 5.3.6.

5.3.8 Increase of the yield stress of I or C support frame channels

The test result shall be deemed to be valid when the tested products are replaced with alternative steel products having an equal or greater yield stress than the tested products.

5.3.9 Increase of the depth of uninsulated I or C support frame channels

The test result shall be deemed to be valid when the tested products are replaced with alternative steel products having a channel stud depth equal to or greater than the tested products.

5.3.10 Increase of the gauge of I or C support frame channels

The test result shall be deemed to be valid when the tested products are replaced with alternative products having a steel gauge (thickness) equal to or greater than the tested products.