

Classification of the fire resistance according to EN 13501-2:2016 of two doors with product 42 HW coating of Intumescent Systems LTD in a standard flexible supporting construction

Classification no.	2017-Efectis-R001148
Sponsor	Intumescent Systems Ltd Envirograf House Barfrestone CT15 7JG DOVER UNITED KINGDOM
Product name	Product 42 HW coating
Prepared by	Efectis Nederland BV
Notified body no.	1234
Author(s)	P.G.R. Scholten B.Sc. L. Schimmer – Herder BBE
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1. INTRODUCTION

This classification report defines the classification assigned to two doors with product 42 HW coating of Intumescent Systems LTD in a standard flexible supporting construction in accordance with procedures given in:

- EN 13501-2:2016: Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation services;
- EN 14600:2005: Doorsets and openable windows with fire resisting and/or smoke control characteristics – Requirements and classification.

2. SPONSOR AND MANUFACTURER

Sponsors	Manufacturer
Intumescent Systems Ltd Envirograf House Barfrestone CT15 7JG DOVER UNITED KINGDOM North Kent Joinery LTD Brunel Sawmill, Churchill Lane The Historic Dock Yard ME4 4TQ CHATHAM, KENT UNITED KINGDOM	Envirograf Envirograf House Barfrestone CT15 7JG DOVER UNITED KINGDOM

3. DETAILS OF CLASSIFIED PRODUCT

3.1 GENERAL

A fire test was carried out on two doors, five electrical installation parts (electrical boxes, switches), a timber panel with wood filler product and an animal flap. All mounted in a standard flexible wall construction. This classification only covers the two doors which are tested.

For the dimensions and specifications of the materials and components of the examined construction, also see the figures in chapter 6. Details of the assembly of the construction are given in the paragraphs below.

3.2 TEST FRAME

The test frame was constructed of steel beams with a fire resistant concrete lining.

Dimensions	
Aperture	4000 mm x 3000 mm (w x h)
Width of frame and concrete lining	250 mm

3.3 SUPPORTING CONSTRUCTION AND FREE EDGES

The doors and the penetration seals were built in a standard flexible supporting construction according to EN 1363-1, being an insulated metal stud gypsum plasterboard wall.

Specifications	
Dimensions wall	3090 x 3000 mm (w x h)
Nominal thickness	100 mm
Material cladding	Standard gypsum board
Manufacturer	Knauf
Type	Type F, EN 520
Dimensions board	1200 x 3000 x 12,5 mm (w x h x t)
Number of layers	2 on both sides
Both layers fixed with screws	Galvanised gypsum board screws
Manufacturer	Knauf
Metal profile frame	CW50, UW50 and UA50 profiles
Dimensions profiles	CW50 and UW50: 50 x 0.6 mm (w x t) UA50: 50 x 2.0 mm (w x t)
Core to core (c.t.c.) distance studs	See figures in chapter 8
Insulation	Rock wool
Manufacturer	Rockwool
Type	Rockwool PROROX SL 970
Thickness	50 mm
Density	115 kg/m ³
Number of free edges	2
Width	25 – 50 mm
Filling free edge	Strips of Rockwool PROROX SL 970

3.3.1 Restraint

The two vertical edges of the supporting construction were unrestrained according to EN 1634-1. At these positions mineral wool insulation was placed with a thickness of 50 mm and a density of 115 kg/m³.

3.4 WHITE DOOR

One white door assembly was installed made from Pine soft wood, density 470 kg/m³. The external size of the door frame was 1002 mm wide by 2140 mm high by 35 mm thick and 100 mm deep. The door construction was a flat panelled door comprising of six panels. Panel sizes were; top 262 x 262 mm, middle 262 x 562 mm and bottom 262 x 562 mm, all panels were 20 mm thick. The door size was 926 x 2095 x 45 mm (w x h x t). Panels and door sections were rebated into stiles and rails at a depth of 20 mm and glued. The door stops are 33 x 15 mm.

The door assembly was finished with the following paint application:

Exposed side	Non exposed side
1x Dulux Primer 1x Dulux Gloss Paint 1x Johnson Primer 1x Johnson Satin Top Coat 1x HWAPWB Clear Primer (12m ² per litre) 2x HW01 White Intumescent Coating (8 m ² per litre per coat) 1x HW04 White undercoat 1x Johnson White Acrylic Coating (10m ² per litre)	1x Dulux Primed Coat 1x Coat Dulux Gloss Paint 1x Johnsons Primer 1x Johnsons Satin Top Coat

Since the door was already coated when it arrived at Efectis, Efectis was not able to check the applied coatings.

Door seals were Envirograf product 69 ES/SDS surface mounted on the frames white. The lock area is protected with Envirograf product 71 hinge, lock and door closer protector, and a set of three hinges Envirograf product 71 self-closing door hinge. The door included an aluminium lever latch Felan FN42 and a 60 mm tubular latch surface.

3.5 BROWN DOOR

One brown door assembly was installed made from Sapele hard wood, density 675 kg/m³. The external size of the door frame was 1002 mm wide by 2140 mm high by 35 mm thick and 100 mm deep. The door construction was a flat panelled door compromising of six panels. Panel sizes were; top 262 x 262 mm, middle 262 x 562 mm and bottom 262 x 562 mm, all panels were 20 mm thick. The door size was 926 x 2095 x 45 mm (w x h x t). Panels and door sections were rebated into stiles and rails at a depth of 20 mm and glued. The door stops were 33 x 15 mm.

The door assembly was finished with the following paint application:

Exposed side	Non exposed side
1x Sadolin Oak Stain 1x Sikkens Dark Oak Stain 1x Envirograf® HWAP/WB Clear Primer (12m ² per litre per coat) 2x HW02/N Clear Intumescent Coating (8m ² per litre per coat) 1x Johnsons Jacobean Wood Stain (8m ² per litre)	1 Coat Sadolin Oak Stain 1 x Sikkens Dark Oak Stain 1 x Johnsons Jacobean Wood Stain (8m ² per litre)

Since the door was already coated when it arrived at Efectis, Efectis was not able to check the applied coatings.

Door seals were Envirograf product 69 ES/SDS surface mounted on the frames brown. The lock area is protected with Envirograf product 71 hinge, lock and door closer protector, and a set of three hinges Envirograf product 71 self-closing door hinge.

The door included an aluminium lever latch Felan FN42 and a 60 mm tubular latch surface.

3.6 METHOD OF ASSEMBLY

- Attaching the steel C edge profiles to the concrete lining of the test frame;
- Attaching the vertical and horizontal steel profiles to the edge profiles with screws;
- Placing the first layer of gypsum on the steel profiles with screws at the non-fire side;
- Placing the second layer of gypsum on the steel profile with screws at the non-fire side;
- Filling up the joints with gypsum plaster;
- Placing the insulation between the steel profiles;
- Placing the first layer of gypsum on the steel profiles with screws at the fire side;
- Placing the second layer of gypsum on the steel profile with screws at the fire side;
- Filling up the joints with gypsum plaster;
- Installation of the doors.

4. MANUFACTURING OF THE CONSTRUCTION

4.1 MANUFACTURING OF THE SPECIMEN

Efectis Nederland BV	Supplying test frame Production of the supporting construction
Intumescent Systems Ltd	Installation of doors

4.2 VERIFICATION OF THE SPECIMEN

During the assembly, the materials and parts used were verified on the basis of the data provided. Since the doors were already coated when they arrived at Efectis, Efectis was not able to check the applied coatings.

5. TEST REPORT AND TEST RESULTS FOR SUPPORT OF CLASSIFICATION

5.1 TEST REPORT

Name of laboratory	Name of sponsor	Report no.	Test method
Efectis Nederland BV	Intumescent Systems Ltd Envirograf House Barfrestone CT15 7JG DOVER UNITED KINGDOM	2017-Efectis-R000741 Test date: 17.03.2017	EN 1634-1:2014 EN 14600:2005

5.2 TEST RESULTS

Table 1: Summary of test results

Test results		Time of reaching a criterion according to EN 1363-1, measured from the start of the test	
Material	Service	Integrity 'E' (minutes)	Radiation 'W' (minutes)
White door		Gap gauge Ø 6 mm, 64 Gap gauge Ø 25 mm, 64 Flames > 10 s, 64 Cotton pad, 64	64
Brown door		Gap gauge Ø 6 mm, 64 Gap gauge Ø 25 mm, 64 Flames > 10 s, 56 Cotton pad, 64	64*

The heating was terminated after 64 minutes after consulting the client.

6. CLASSIFICATION

6.1 REFERENCE OF CLASSIFICATION

This classification has been carried out in accordance with:

- clause 7 of EN 13501-2:2016;
- EN 14600:2005.

6.2 CLASSIFICATION

The white door with product 42 HW coating of Intumescent Systems LTD in a standard flexible supporting construction is classified according to the following combinations of performance parameters and classes as appropriate. No other classifications are permitted based on the test evidence mentioned in clause 5.1.

**Fire resistance classification:
E 20, E 30, E 45, E 60
EW 20, EW 30, EW 60**

The brown door with product 42 HW coating of Intumescent Systems LTD in a standard flexible supporting construction is classified according to the following combinations of performance parameters and classes as appropriate. No other classifications are permitted based on the test evidence mentioned in clause 5.1.

**Fire resistance classification:
E 20, E 30, E 45
EW 20, EW 30**

7. FIELD OF DIRECT APPLICATION OF TEST RESULTS

7.1 GENERAL

The field of direct application defines the allowable changes to the test specimen following a successful fire resistance test. These variations can be applied automatically without the need for the sponsor to seek additional evaluation, calculation or approval.

NOTE When extended product size requirements are envisaged, the dimensions of certain components within the test specimen can be less than those intended to be used at full size in order to maximize the extrapolation of the test results by modelling the interaction between components at the same scale.

Where referred to annex B or annex C in this paragraph, the annexes in EN 1634-1 are meant.

7.2 MATERIALS AND CONSTRUCTION

7.2.1 General

Unless otherwise stated in the following text, the materials and construction of the doorset or openable window shall be the same as that tested. The number of leaves and the mode of operation (e.g. sliding, single action or double action) shall not be changed.

7.2.2 Specific restrictions on materials and construction

7.2.2.1 Timber construction

The thickness of the door panel(s) shall not be reduced but may be increased.

The door panel thickness and/or density may be increased provided the total increase in weight is not greater than 25%.

For timber based board products (e.g. particle board, blockboard, etc.), the composition (e.g. type of resin) shall not change from that tested. The density shall not be reduced but may be increased.

The cross-sectional dimensions and/or the density of the timber frames (including rebates) shall not be reduced but may be increased.

7.2.3 Decorative finishes

7.2.3.1 Paint

Where the paint finish contributes to the fire resistance of the door (e.g. intumescent paints) then no change shall be permitted.

7.2.4 Fixings

The number of fixings per unit length used to attach doorsets to supporting constructions may be increased, but shall not be decreased and the distance between fixings may be reduced but shall not be increased.

7.2.5 Building hardware

The number of hinges and dog bolts may be increased but shall not be decreased.

NOTE 1 The number of movement restrictors such as locks and latches is not covered by direct application.

NOTE 2 Interchange of building hardware is not covered by the field of direct application.

7.3 PERMISSIBLE SIZE VARIATIONS

7.3.1 General

Doorsets of sizes different from those of tested specimens are permitted within certain limitations, but the variations are dependent on product type and the length of time that the performance criteria are fulfilled.

The increase and decrease of dimensions permitted by the field of direct application are applicable to the overall size and to each door leaf, each side panel and each over panel independently.

7.3.2 Test periods

The amount of variation of size permitted is dependent on whether the classification time was just reached (Category 'A') or whether an extended time (Category 'B') in accordance with the values shown in Table 1 were fulfilled before the test was concluded.

For category 'B':

Table 1 — Category B overrun requirements

Classification time (min)	All performance criteria fulfilled for at least minutes
15	18
20	24
30	36
45	52
60	-

7.3.3 Size variation related to product type

7.3.3.1 General

The rules to cover increase or decrease of size without additional considerations are applicable only to six main product groups:

- a) hinged and pivoted doorsets and openable windows;

No increases in size are permitted for doorsets which are required to satisfy radiation control levels unless the insulation criteria are also satisfied. This is because any increase in size will increase the radiation received at a fixed distance away from the door. There are calculation methods which can be used to determine acceptable size increases for such doors; however, these are beyond the scope of direct application. Doors that satisfy both the radiation control levels and insulation criteria may have their sizes increased as outlined in Annex B of EN 1634-1. This is accepted because the increase in radiation resulting from a size increase allowed

under this section, for an insulated door, will be such that it will still satisfy the required radiation control levels. Size decreases are permitted for both doors which satisfy radiation control levels and those which satisfy insulation criteria and radiation control levels.

7.3.3.2.2 Other changes

For smaller doorset sizes the relative positioning of movement restrictors (e.g. hinges and latches) shall remain the same as tested or any change to the distances between them will be limited to the same percentage reduction as the decrease of test specimen size.

7.3.3.2.4 Timber constructions

The number, size, location and orientation of any joints in the timber framing shall not be changed.

Where decorative veneers of 1,5 mm or greater thickness, or other claddings which themselves provide constructive benefits, are part of the test specimen, they shall not be substituted with alternatives of lesser thickness or strength.

7.3.3.2.5 Gaps

The maximum size of the primary gaps identified in 7.3 of EN 1634-1 is restricted to the following sizes in practice:

$$x = (a + b)/2 + 2 \text{ mm}$$

where

- x is the maximum permitted gap size;
- a is the maximum measured gap size;
- b is the mean measured gap size.

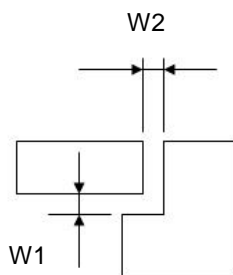


Figure 7.1: position of maximum gap widths

Permitted gap widths brown door		
	Unexposed side (W1)	Exposed side (W2)
Top of door leaf	6.5 mm	8.2 mm
Bottom of door leaf	4.6 mm	4.5 mm
Hinge side of door leaf	3.6 mm	4.1 mm
Latch side of door leaf	7.1 mm	7.4 mm

Permitted gap widths white door		
	Unexposed side (W1)	Exposed side (W2)
Top of door leaf	8.0 mm	9.8 mm
Bottom of door leaf	6.4 mm	6.2 mm
Hinge side of door leaf	3.0 mm	3.9 mm
Latch side of door leaf	9.0 mm	7.2 mm

The minimum size of the primary gaps may be reduced.

The permitted gap size may be different for different parts of the door or window.

7.4 ASYMMETRICAL ASSEMBLIES

7.4.1 General

EN 1363-1 states that for separating elements required to be fire resisting from both sides, two test specimens shall be tested (one from each direction) unless the element is fully symmetrical, i.e. the construction of the door set is identical on both sides of the centre line when viewed in plan (from above). However, in some cases it is possible to develop rules whereby the fire resistance of an asymmetrical door assembly tested in one direction can apply when the fire exposure is from the other direction. The possibility to develop such rules increases if the consideration is limited to certain types of door assembly and on the criteria being applicable (e.g. integrity only doors). The following rules represent the minimum level of common agreement which shall be followed. The rationale behind the rules is given in Annex C of EN 1634-1.

7.4.2 Specific rules

The rules governing the applicability of tests carried out in one direction to other directions are given in Table 2 and are based on the following premises:

- that each of the door leaves are themselves of symmetrical construction with the exception of the edges (e.g. lock/leading edge and hinge edge or double rebated doors);
- that any restraining/supporting elements of building hardware has been included in a test to EN 1634-1 when exposed in both directions so that they will retain their function when exposed to the heat of the test;
- that there is no change in the number of leaves or the mode of operation (e.g. sliding, swinging, single action or double action);
- that side, over and transom panels are excluded from Table 2 unless they are fully symmetrical.

Table 7.1 lists the type of door assembly for which rules can be generated and gives the direction in which it should be tested to cover the opposite direction. The separate columns for the integrity and insulation criteria reflect the different ability to make rules for integrity only doors as opposed to those which satisfy both criteria. A 'Yes' means that it is possible to identify the direction of test which covers the opposite direction. A 'No' indicates that it is not possible to identify the direction which will cover the opposite direction.

Table 7.1 Type of door set and direction to be tested to cover the opposite direction

Type of doorset	Direction to be tested to cover opposite direction	Integrity	Insulation	Radiation
Hinged or pivoted, timber leaf, timber frame	Opening into the furnace	Yes	Yes	Yes

7.5 SUPPORTING CONSTRUCTIONS

7.5.1 General

The fire resistance of a door assembly tested in one form of standard supporting construction may or may not apply when it is mounted in other types of construction. Generally, the rigid and flexible types are not interchangeable and rules governing the direct application within each group are given in 13.5.2 to 13.5.4 of EN 1634-1. However, in some cases it is possible for the result of a test on a particular type of door assembly tested in one form of standard supporting construction to be applicable to that door assembly when mounted in a different type of standard supporting construction. Specific rules governing the situation for hinged and pivoted door assemblies are given in 13.5.4 of EN 1634-1. The rationale behind the rules is given in Annex C of EN 1634-1.

7.5.2 Flexible standard supporting constructions

The fire resistance of a door tested in one of the flexible standard supporting constructions specified in EN 1363-1 can be applied to a door mounted in the same manner in a wall or partition which is of the board covered type with studs made from metal or timber.

The fire resistance of the door is only applicable to a door mounted in a partition with a fire resistance equal to or greater than the partition in which it was tested.

The fire resistance of the partition shall have been established separately in a previous test.

7.5.3 Specific rules for hinged or pivoted door sets

- a) For timber door leaves hung in timber frames, the result of a test in a flexible standard supporting construction is applicable to that door assembly mounted in a rigid construction.

The rules above assume that the fixing methods used in each type of supporting construction are appropriate to that construction.

8. LIMITATIONS

This classification report does not represent any type approval or certification of the product.



L. Schimmer – Herder BBE
Project leader resistance to fire



P.G.R. Scholten B.Sc.
Project leader resistance to fire

9. FIGURES

- Figure 8.1 Overview of the flexible wall, non-exposed side
- Figure 8.2 Overview hardwood door (brown door)
- Figure 8.3 Overview softwood door (white door)
- Figure 8.4 Primary gaps (unexposed side)
- Figure 8.5 Primary gaps (exposed side)

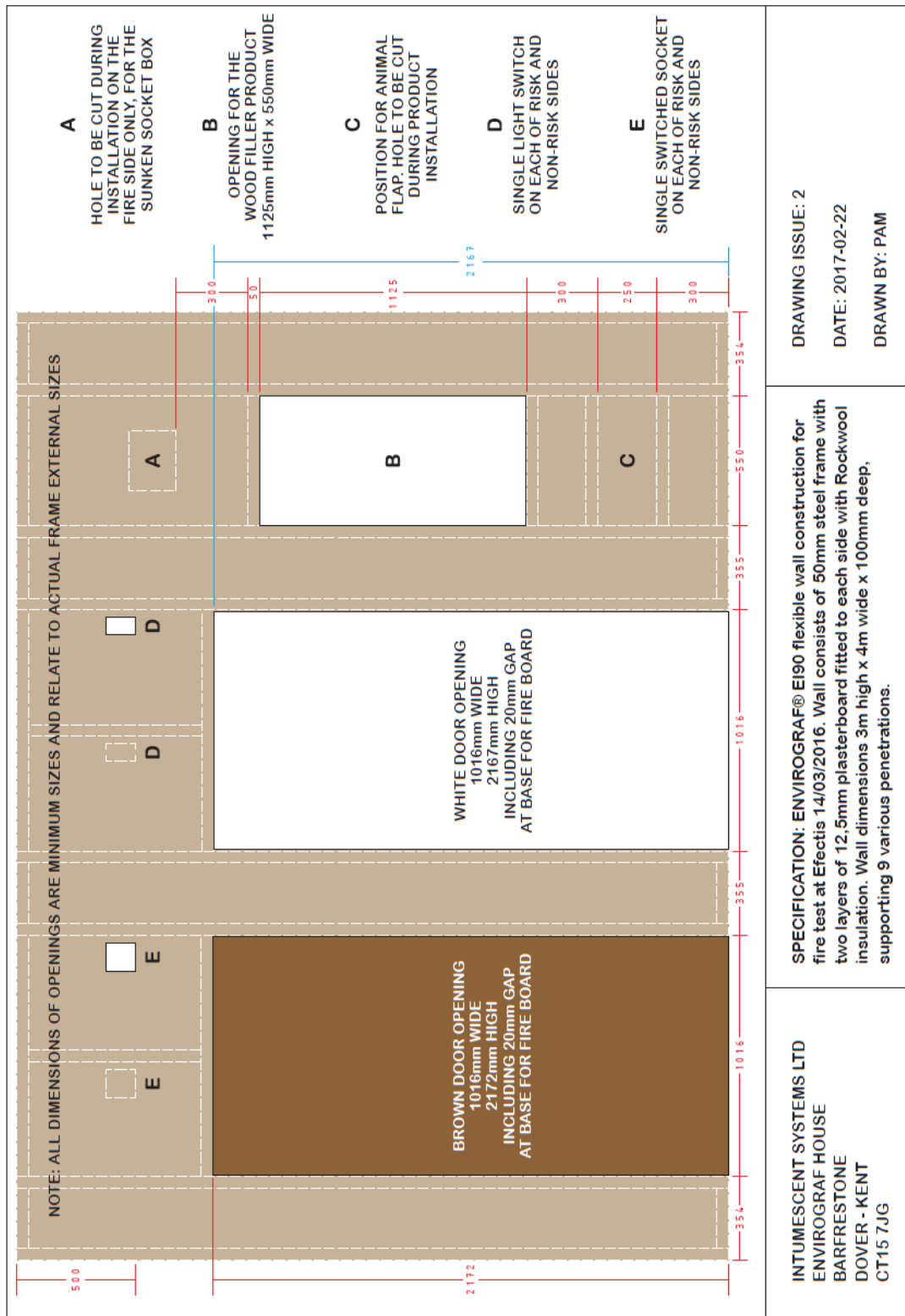


Figure 8.1 Overview of the flexible wall, non-exposed side

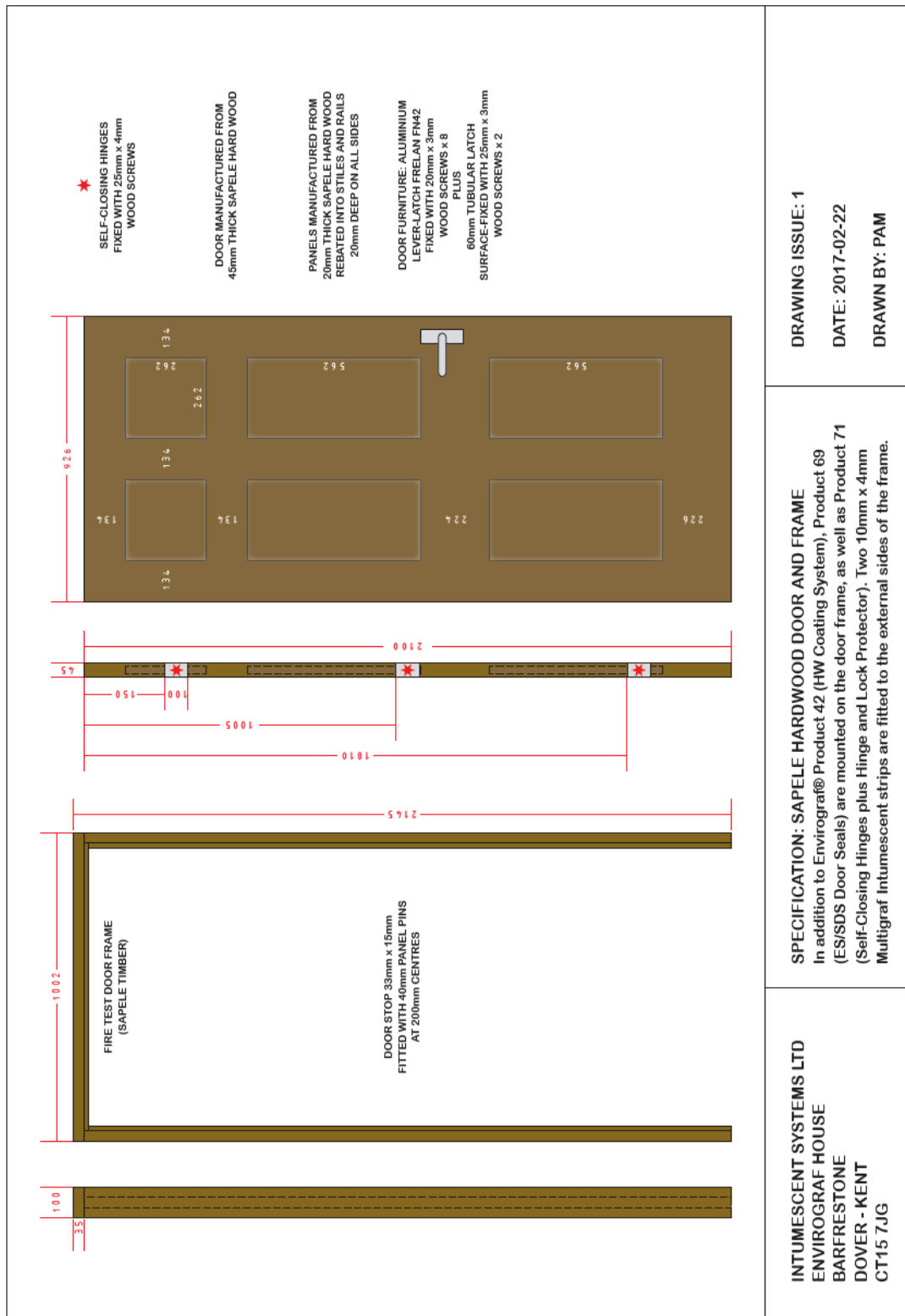


Figure 8.2 Overview hardwood door (brown door)

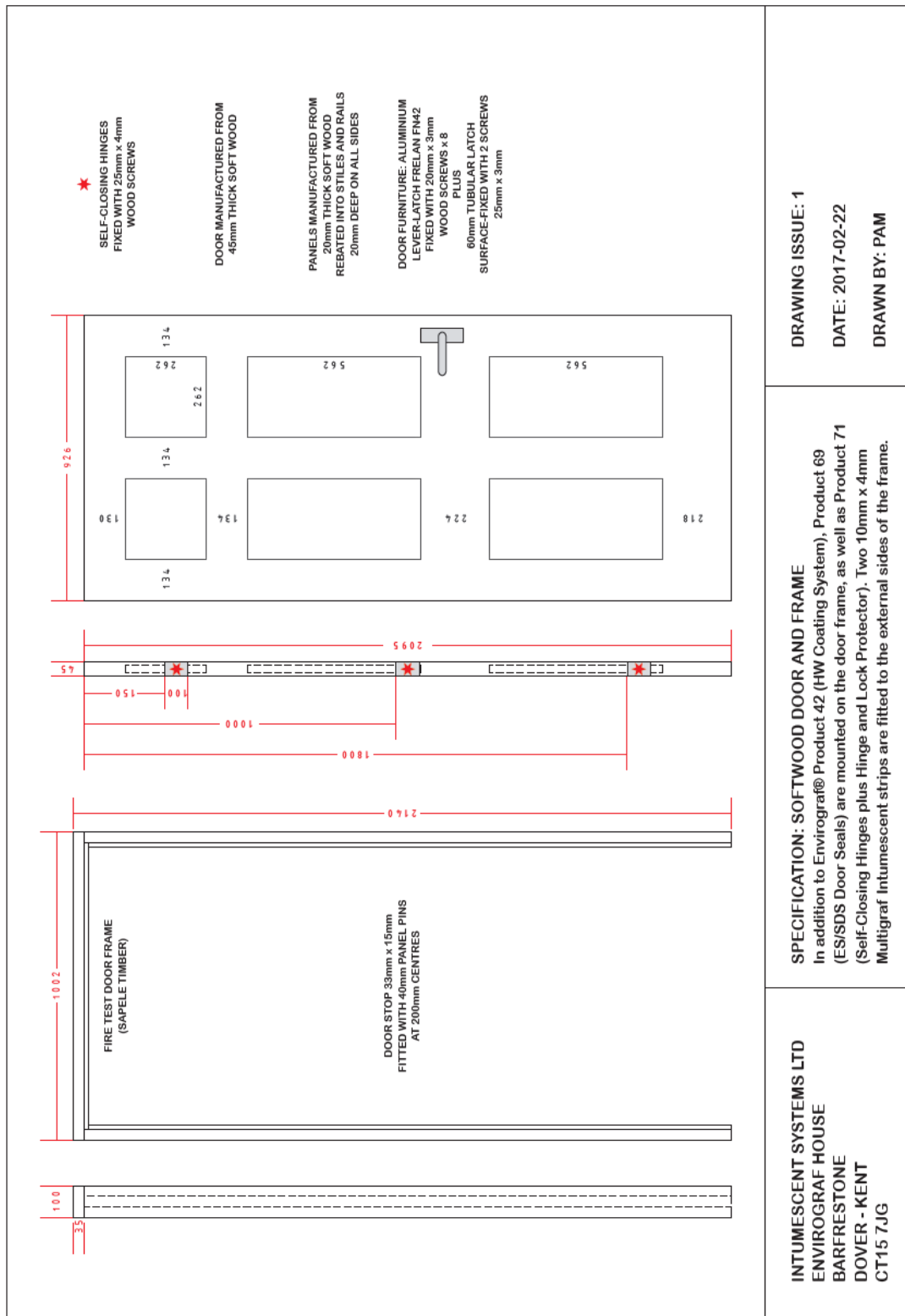


Figure 8.3 Overview softwood door (white door)

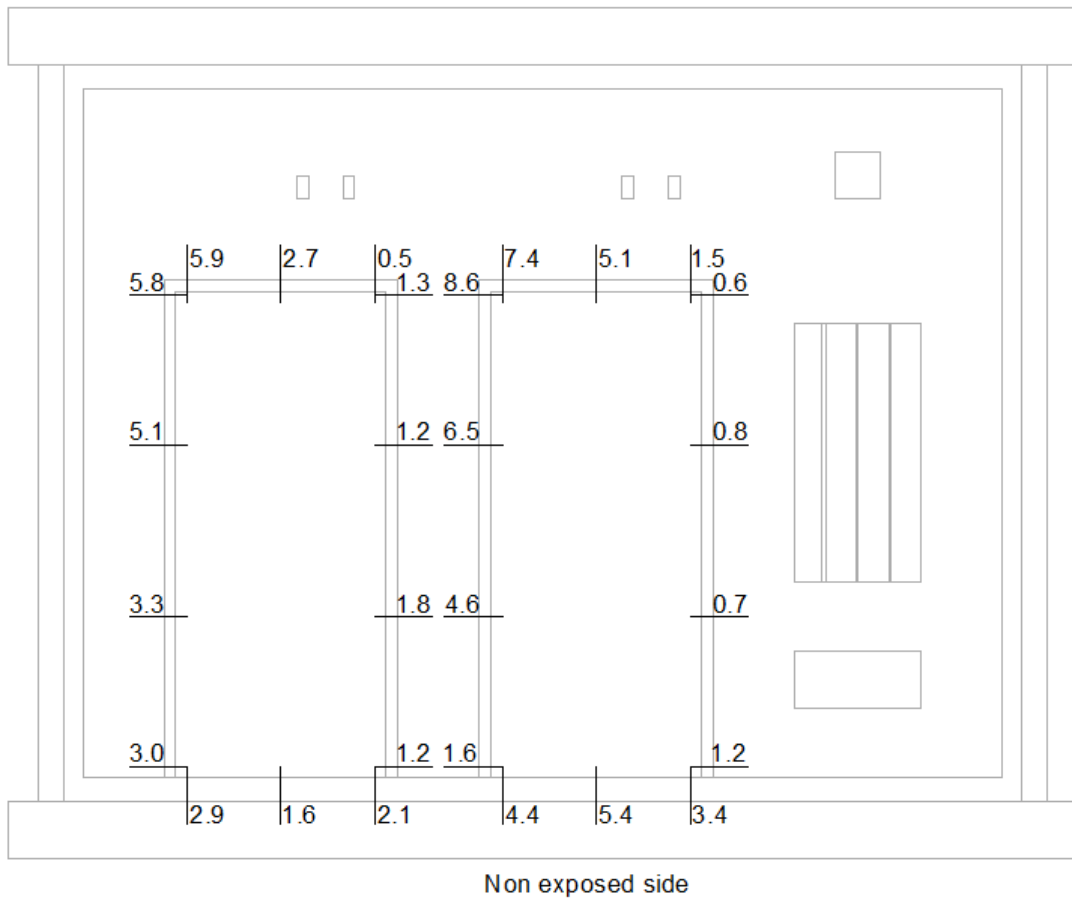


Figure 8.4 Primary gaps (unexposed side)

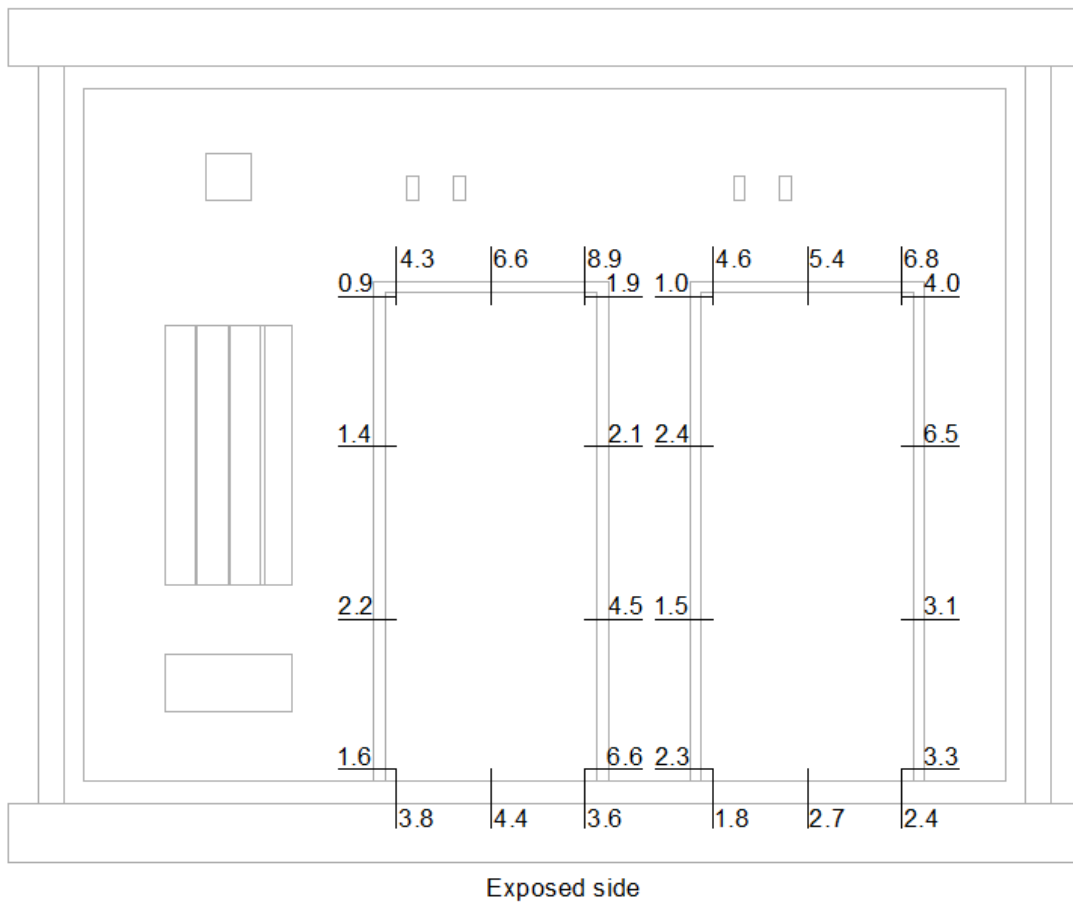


Figure 8.5 Primary gaps (exposed side)