



EUROPEAN ASSESSMENT DOCUMENT

EAD 350454-00-1104-v01

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COMBINED PENETRATION SEAL FOR DAMPERS

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Contents

1	Scope of the EAD	4
1.1	Description of the construction product	4
1.2	Information on the intended use(s) of the construction product	4
1.2.1	Intended use(s).....	4
1.2.2	Working life/Durability.....	4
1.3	Specific terms used in this EAD (if necessary, in addition to the definitions in CPR, Art 2)	4
2	Essential characteristics and relevant assessment methods and criteria	5
2.1	Essential characteristics of the product	5
2.2.	Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product	6
2.2.1.	Resistance to fire.....	6
2.2.2	Distance and spacing of services.....	6
3	Assessment and verification of constancy of performance	7
3.1	System(s) of assessment and verification of constancy of performance to be applied	7
3.2	Tasks of the manufacturer	7
3.3	Tasks of the notified body	7
4	Reference documents	8
	Annex A Resistance to Fire test and assessment	9

1 SCOPE OF THE EAD

1.1 Description of the construction product

See EAD 350454-00-1104¹ for the general description of the product.

This EAD is a variant to EAD 350454-00-1104 due to the fact that EAD 350454-00-1104 does not cover fire dampers passing through a penetration seal (see footnote 2 of EAD 350454-00-1104).

This leads to an additional characteristic to be assessed and to be stated in the ETA.

The product is a fire damper and a penetration seal in combination.

The product can be supplied as either:

- A fire damper CE marked in accordance with EN 15650 with a specified penetration seal, which has an ETA in accordance with EAD 350454-00-1104.
- A penetration seal, which has an ETA in accordance with EAD 350454-00-1104 with a specified fire damper CE marked in accordance with EN 15650.

This variant EAD covers the assessment of a product consisting of the specified fire damper and the specified penetration seal. Both the fire damper and the penetration seal are specified in the ETA.

The EAD covers only single blade fire dampers, which prevent fire and reduce smoke spreading from one fire compartment to another through the air ductwork system, which may penetrate fire separating walls.

The product is not covered by harmonized standards and EAD 350454-00-1104 for the penetration seal does not cover fire dampers (see foot note 2 of the EAD 3500454-00-1104).

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

1.2.1 Intended use(s)

See EAD 350454-00-1104 for the general description of the intended use.

The combined penetration seal for fire dampers to be used in floors and walls classified for their fire resistance.

The product is intended to allow the penetration sealing of more than one service (e.g., cables, pipes, conduits, fire dampers) in the same penetration.

1.2.2 Working life/Durability

See EAD 350454-00-1104.

1.3 Specific terms used in this EAD (if necessary, in addition to the definitions in CPR, Art 2)

See EAD 350454-00-1104.

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

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 combined penetration seals for fire dampers is assessed in relation to the essential characteristics.

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	Reaction to fire	EAD 350454-00-1104, 2.2.1	Class
2	Resistance to fire	2.2.1	Class
3	Distance and spacing of services	2.2.2	Level
Basic Works Requirement 3: Hygiene, health and the environment			
4	Air permeability	EAD 350454-00-1104, 2.2.3	Level
5	Water permeability	EAD 350454-00-1104, 2.2.4	Description
6	Content, emission and/or release of dangerous substances	EAD 350454-00-1104, 2.2.5	Description
Basic Works Requirement 4: Safety and accessibility in use			
7	Mechanical resistance and stability	EAD 350454-00-1104, 2.2.6	Description
8	Resistance to impact / movement	EAD 350454-00-1104, 2.2.7	Description
9	Adhesion	EAD 350454-00-1104, 2.2.8	Description
Basic Works Requirement 5: Protection against noise			
10	Airborne sound insulation	EAD 350454-00-1104, 2.2.10	Level
Basic Works Requirement 6: Energy economy and heat retention			
11	Thermal properties	EAD 350454-00-1104, 2.2.11	Level
12	Water vapour permeability	EAD 350454-00-1104, 2.2.12	Level
Aspects of durability			
13	Durability of the penetration seal	EAD 350454-00-1104, 2.2.9	Description
14	Durability of the damper	EN 15650, 4.3.3	Description

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.

Testing will be limited only to the essential characteristics which the manufacturer intends to declare. 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

The combined penetration seal for fire dampers as specified by the manufacturer in accordance with section 1.1 of this EAD shall be tested, using the test method relevant for the corresponding fire resistance class, to be able to refer to characteristic fire resistance properties and fire resistance behaviour data according to EN 13501-2 and EN 13501-3.

Note. The penetration seal itself is classified in accordance with EN 13501-2 and the damper is classified in itself in accordance with EN 13501-3.

The test configuration shall be based on the desired field of application, taking account of the rules given in EN 1366-3 and annex A of this EAD.

2.2.2 Distance and spacing of services

The distance between services in a penetration seal and a mechanical fire damper is assessed in accordance with Annex A. The distances s, a, b, c, d and e as described in figure A.4.3.2.1 shall be taken from the test and classification reports and stated in the ETA in mm.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

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

EAD 350454-00-1104 applies.

3.2 Tasks of the manufacturer

EAD 350454-00-1104 table 4 applies.

3.3 Tasks of the notified body

EAD 350454-00-1104 table 5 applies.

4 REFERENCE DOCUMENTS

EAD 350454-00-1104 section 4 applies

EAD 350454-00-1104:2017 Fire stopping and fire sealing products - Penetration seals

EN 1366-2:2015 Fire resistance tests for service installations – Part 2: Fire dampers

EN 1366-3:2021 Fire resistance tests for service installations – Part 3: Penetration seals

EN 1363-1:2020 Fire resistance tests – Part 1: General requirements

EN 13501-2:2016 Fire classification of construction products and building elements – Part 2: Classification using data from fire resistance tests, excluding ventilation

EN 13501-3:2009 Fire classification of construction products and building elements — Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers

EN 15650:2010 Ventilation for buildings — Fire dampers

ANNEX A RESISTANCE TO FIRE TEST AND ASSESSMENT

A.1 General

The purpose of the fire test is to evaluate the ability of a combined penetration seal in a separating element to maintain the fire resistance performance in conjunction with services as fire dampers, pipes and cables.

- a) Existing test data according to EN 1366-3 shall be used for the determination of the fire performance of the penetration seal (with services passing through).
- b) Existing test data according to EN 1366-2 shall be used for the determination of the performance of the fire damper. All situations for installation of a fire damper shall be tested according to EN 1366-2 including all relevant installation details as described in EN 1366-2, 6.2 (e.g., blade pivot axes, components, actuators, etc.). An assessment of the most critical installation situation shall be made by the testing body for determining the combined test together with the descriptions under A.1. To define the covered installation details of the fire damper for the combined penetration seal the results of the existing test according to EN 1366-2 shall be taken into account.
- c) Fire tests of a fire damper to be used for the combined test according to this EAD shall be conducted in the identical type (of the same manufacturer) of the penetration seal.
- d) Test data of both test methods, EN 1366-2 and EN 1366-3 and the rules according to Annex A shall be considered together with all relevant parameters (blade pivot axes, components, actuators, etc.) by the testing laboratory to determine a combined test according to Annex A.

For the selection of services other than cables/cable trays to be used in the combined test the critical service approach according to EN 1366-3, Annex G shall be used. For cables/cable trays a test configuration according to Annex A shall be used. Otherwise, the field of application is limited to services used in the combined test.

- e) By conducting the combined test, it shall be assessed at which distance the services (e.g., cables, pipes) and fire damper installed in one seal the fire resistance performance is achieved.
- f) The product based on this EAD shall be provided either as a Fire damper according to EN 15650 in a penetration seal with a CE-marking based on EAD 350454-00-1104 or as a penetration seal with CE-marking according to EAD 350454-00-1104 which includes a fire damper with a CE-marking based on EN 15650.

For wall applications, the following basic test shall include; a separate test where the damper is tested and classified in a wall configuration (according EN 1366-2) and a separate test where the penetration seal is tested and classified in a wall configuration (according EN 1366-3).

For floor applications the following basic tests shall include; a separate test where the damper is tested and classified in a floor configuration (according EN 1366-2) and a separate test where the penetration seal is tested and classified in a floor configuration (according EN 1366-3).

Fire dampers covered by this EAD are situated within the construction and they are installed in a combined penetration seal with other services according to EN 1366-3.

Tests shall be performed starting with the fire damper in the open position to expose the thermal release mechanism of the fire damper to furnace conditions.

Temperature and integrity measurements shall be carried out on the penetrations in the test assembly during the test. The impermeability of the fire damper system shall be measured by direct flow measurements whilst maintaining a constant pressure differential across the closed fire damper of 300 Pa or 500 Pa. The leakage rate of dampers requiring an S classification shall be measured at ambient temperature in accordance with EN 1366-2 section 10.3.

A.2 Test equipment

A.2.1 General

See EN 1363-1, EN 1366-2 and EN 1366-3.

A.2.2 Connecting duct

See EN 1366-2, clause 4.2 and figure 1.

A.2.3 Volume flow measuring station

See EN 1366-2, clause 4.3.

A.2.4 Condensing unit

See EN 1366-2, clause 4.4.

A.2.5 Gas temperature measuring devices

See EN 1366-2, clause 4.5.

A.2.6 Exhaust fan system

See EN 1366-2, clause 4.6.

A.3 Test conditions

See EN 1363-1 for general conditions, the rules and conditions according to EN 1366-2 for the fire damper and EN 1366-3 for the penetration seal apply. For the specific test set-up, see figure A.4.3.2.1.

Installation of the fire damper shall be according to the rules given in EN 1366-2, clause 6, installation of the services (e.g., cables, pipes) shall be according to EN 1366-3, clause 7.3.

Heating conditions and furnace atmosphere shall conform to those given in EN 1363-1, clause 5.1 and clause 5.3, or if applicable according to EN 1363-2. Furnace pressure shall be controlled according to EN 1363-1, clause 5.2, except in case of testing fire dampers installed in a vertical separating element when the pressure shall be controlled to 15 ± 3 Pa at mid height of the damper. If two fire dampers are being tested simultaneously, this pressure shall be established at mid height of the lower fire damper. For fire dampers installed in a horizontal separating element the pressure shall be controlled to (20 ± 3) Pa at 100 mm below the underside of the separating element to which it is fixed. Details of pressure conditions within the connecting duct are given in 1366-2, clause 9.2.

A.4 Test specimen

A.4.1 Size

For the fire test the maximum size of the chosen fire damper shall be chosen from the range of product varieties to be assessed. For the determination of leakage at ambient temperature test the largest size fire dampers shall be tested.

A.4.2 Number of tests

A.4.2.1 General

The number of test specimens shall be defined according to EN 1366-2, 6.2 and in accordance with Figure A.4.3.2.1 with different distances s, a, b, c, d and e in order to determine the most effective combination of distance “s” and fire resistance of the product.

For the test layout see A.4.3.2.

A.4.2.2 Supporting construction

Test results are only applicable to the orientation were tested, i.e., in a wall or floor.

A.4.3 Test setup

A.4.3.1 General

The test specimen shall be:

- a) Fully representative of the services and penetration seal used in practise, including any special features which are unique to that installation or
- b) Service configuration determined by applying the critical service approach according to EN 1366-3, Annex G for services other than cables/cable trays. The selection of pipes shall be selected according to the standard configurations as described rules given in EN 1366-3, Annex G and Annex F, depending on the desired field of application

A.4.3.2 Test configuration

The test shall be made on a test specimen as specified by the manufacturer. The general test layout and equipment references are shown in Figure A.4.3.2.1.

Note. TAB's may suggest to change e.g., "s" to find the most effective combination of parameters or e.g., fix default critical (minimum) "s" to get comparable results and to allow for use of other "s" values in addition.

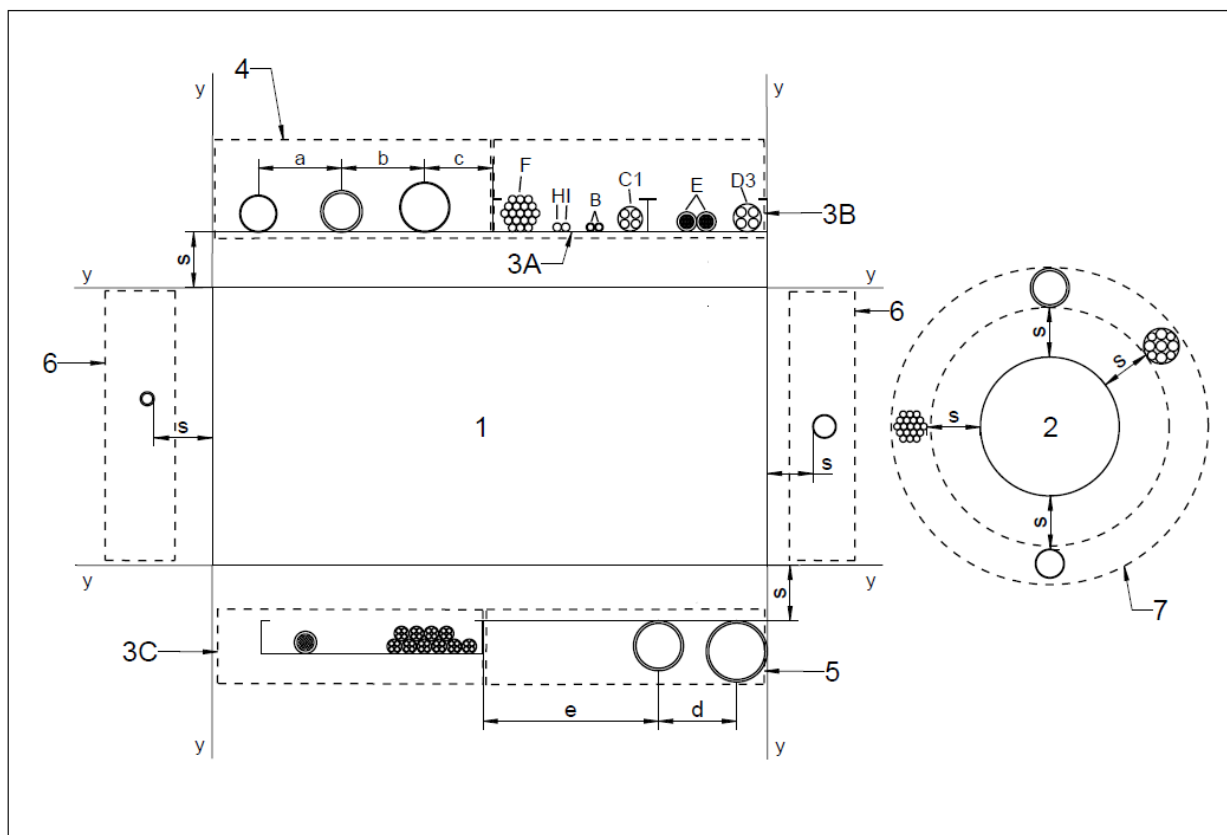


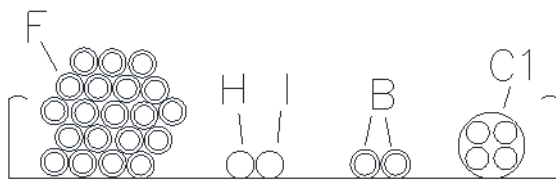
Figure A.4.3.2.1 – General test layout

Table A.4.3.2.1 Services

Service	Description	
1, 2	Fire damper – circular or rectangular	Tested according to EN 1366-2
3A	Cable/Cable tray configuration	see A.4.3.2 a)
3B	Cable/Cable tray configuration	see A.4.3.2 b)
3C	Cable/Cable tray configuration	see A.4.3.2 c)
4	Pipes installed above the fire damper	Critical pipes defined by using EN 1366-3, Annex G – critical service approach for a defined field of application according to EN 1366-3
5	Pipes installed below the fire damper	Critical pipes defined by using EN 1366-3, Annex G – critical service approach for a defined field of application according to EN 1366-3 if space above the fire damper is installed with minimum one pipe of each pipe material group ¹ and no remaining space is left above the fire damper and/or Particular pipes selected by the test sponsor shall be tested but the field of application is limited to those pipes used in the combined test and the location below the fire damper
6	Services installed at the side of the fire damper	Non-combustible pipes defined by using EN 1366-3, Annex G – critical service approach for a defined field of application according to EN 1366-3 and/or Alu-composite pipes defined by using EN 1366-3, Annex G – critical service approach for a defined field of application according to EN 1366-3 and/or Particular pipes selected by the test sponsor shall be tested but the field of application is limited to those pipes used in the combined test and the location below the fire damper
7	Services installed around a circular damper	Critical pipes defined by using EN 1366-3, Annex G – critical service approach for a defined field of application according to EN 1366-3 and/or Particular pipes selected by the test sponsor shall be tested but the field of application is limited to those pipes used in the combined test For cables see A.4.3.2.1 d)
¹⁾	Pipe material groups are e.g., single layer plastic pipes, multi-layer plastic pipes, composite pipes, metal pipes	
s	Distances of services to fire damper	
y	Limit of the installation area for services (depends on the size of the fire damper)	

Cable configuration

a)



F cable bundle made of F-cables with overall diameter 100mm according to EN 1366-3, Annex A
 H,I,B,C1 cables according to EN1366-3, Annex A

Cable tray/ladder 300mm wide

b)



E, D3 cables according to EN1366-3, Annex A

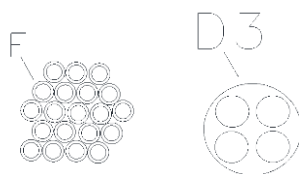
Cable tray/ladder 200mm wide

c)



C2, A3 cables according to EN1366-3, Annex A
 Cable tray/ladder 500mm wide

d)



D3 cable according to EN1366-3, Annex A
 cable bundle made of F-cables with overall diameter 100mm according to EN 1366-3

A.5 Installation of test specimen in the test

A.5.1 General

The test specimen shall be installed, as far as possible, in a manner of representative of practice.

The fire damper and other services in conjunction with the combined penetration seal for fire dampers shall be installed in accordance with the manufacturer's instructions in a supporting construction.

Methods of installation in the supporting construction according to EN 1366-2 and EN 1366-3 shall be followed.

A.5.2 Supporting construction

In case standard flexible vertical supporting construction is used, it shall be selected using the specifications as described in detail in EN 1363-1. The wall shall have one free edge and one fixed edge. Any sample to be installed in a flexible wall shall have at least one vertical stud and that the sample is installed in the centre of the wall to show response to maximum deflection.

A.5.3 Distance for separation

See EN1366-3, Annex A.

A.6 Conditioning

See EN 1366-2, clause 8 and EN 1366-3, clause 8.

A.7 Application of instrumentation

A.7.1 Thermocouples

A.7.1.1 Furnace thermocouples (plate thermometers)

See EN 1363-1, clause 9.1.

A.7.1.2 Unexposed surface temperature – mechanical fire damper

See EN 1366-2, clause 9.1.2 and EN 1363-1, clause 9.1.2.

A.7.1.3 Unexposed surface temperature – penetration seal

See EN 1366-3 and EN 1363-1, clause 4.5.1.3 Unexposed surface temperature – roving thermocouple.

A roving thermocouple shall be used additional evaluation of maximum temperature. For further information and limitation see EN 1366-3, clause 9.1.3.

A.7.2 Furnace pressure

A.7.2.1 General

Furnace temperature shall be measured in accordance with EN 1363-1.

A.7.2.2 Pressure differential measurement, furnace and connecting duct

See EN 1366-2, clause 9.2.2.

A.8 Test procedure

A.8.1 Determination of leakage of connecting duct and measuring station

See EN 1366-2, clause 10.1.

A.8.2 Opening and closing test

See EN 1366-2, clause 10.2.

A.8.3 Determination of leakage at ambient temperature

See EN 1366-2, clause 10.3.

A.8.4 Fire test procedure

See EN 1366-2, clause 10.4 and EN 1366-3, clause 10.

A.9 Performance

The following performance shall apply after 5 min from the start of the test:

- a) Integrity
See EN 1366-2, clause 11 + EN 1366-3, clause 11.1
- b) Insulation
See EN 1366-2, clause 11 + EN 1366-3, clause 11.2
- c) Leakage
See EN 1366-2, clause 11.

A.10 Test report

In addition to the items required by EN 1363-1, the following shall also be included in the test report together with information on the sources of the data by reference to clauses of standards or EAD's where relevant:

- A detailed technical specification and description of the fire damper, including blade pivot axis (h_0 or v_e) and the materials, components, actuators, etc. used in its construction;
- A description of the seal used for the test;
- A description of the wall/floor used for the test;
- Details of the dimension from the exposed face of the supporting construction to the centre line of the plane of operation of the fire damper, with a clear statement whether that dimension was in the direction of the furnace or away from it;
- Reference that the test was carried out in accordance with this EAD;
- Where appropriate, a record of the following relating to the leakage at ambient temperature before the fire test
 - o A record of the determined leakage of the connecting duct and measuring station;
 - o For the damper leakage – measuring station pressure differential;
 - o For the damper leakage – calculated volume flow rate.
- A record of the following relating to the fire test as a function of time:
 - o Connecting duct pressure differential against furnace pressure;
 - o Gas temperature at exit of connecting duct;
 - o Measuring station gas temperature
 - o Measuring station pressure differential;
 - o Calculated volume flow rate corrected to 20°C;
- The time at which the fire damper closed after the start of the test and the test duration;

- All observations which were made during the course of the test;
- Times from the start of the fire test at which each of the performance criteria was exceeded.
- Separation distances with drawings.

A.11 Direct field of application

The following direct field of application applies:

- a) Opening size – the combined seal test gives the maximum opening size of the combined seal. Therefore, the opening size can be decreased, but not increased.
- b) Damper type – type of damper shall be as tested.
- c) Damper size - can be decreased but not increased.
- d) Penetration seal type - cannot be changed.
- e) Separation distance from services to the mechanical fire damper can be increased but not decreased. The distance between services and the fire damper shall be measured at the outer diameter/outer surface of the service including insulation to the outer surface of the fire damper.
- f) The distance from a service to the aperture edge of the opening and between services shall be minimum as tested according to EN 1366-3. The distances from the fire damper to the aperture edge shall be minimum as tested according to EN 1366-2.
- g) Penetrating services (pipes) - the rules for the critical pipe approach according to EN 1366-3 apply. Penetrating services (cables) – the rules for the direct field of application according to EN 1366-3, Annex A apply. In case the cable configuration according to Figure A.1 and Table A.1 have been used all cables according to EN 1366-3 up to 80mm shall be used in practice.
- h) Service layout – Services tested above a fire damper shall be installed on each side or below in practice. In case the cable configuration according to Figure A.1 is used, cables/cable trays shall be located at each side of the damper in the minimum distance as tested.
- i) Fire rating – the achieved fire rating of the combined penetration seal for fire dampers shall not be higher than the lowest classification of the basic tests according to EN 1366-2 and EN 1366-3.
- j) Test results can be extended to existing test data, according to A.1, a) for the penetration seal and according to A.1, b) for the fire damper.

Supporting construction:

- Test results obtained with the flexible wall constructions can be applied to rigid wall constructions of an overall thickness equal to or greater than that of the element used in the tests and a minimum density of 450 kg/m³.
- Test results obtained with rigid supporting construction according to EN 1363-1, clause 7.2.2.2, made from aerated concrete blocks with an overall density of 500 (± 250) kg/m³ can be applied to high density rigid constructions according to EN 1363-1, clause 7.2.2.1 made of block work, masonry or homogenous concrete with an overall density ≥ 850 kg/m³ with an overall thickness equal to or greater than that of the element used in the tests test.
- Test results obtained in a horizontal supporting construction shall not be used for vertical supporting constructions and vice versa.

A.12 Evaluation of test results

Evaluation of characteristic and fire resistance performance according to EN 13501-2 and EN 13501-3.

In accordance with chapter A.9, EN 13501-2 and EN 13501-3 for characteristics related to fire resistance performance and particularly EN 13501-2, clause 7.5.8.