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European Assessment Document for

Fire-resistant reactive air transfer grilles

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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).

Contents

1 SCOPE OF THE EAD

1.1 Description of the construction product

This EAD covers fire-resistant reactive air transfer grilles, hereinafter referred to as “fire-resistant grille(s)”.

Fire-resistant grille consists of an intumescent element which takes the form of a matrix of slats or a honeycomb structure. Intumescent element may be placed in a rigid frame. If intumescent element is placed in a rigid frame, the frame is an integral part of the fire-resistant grille.

Fire-resistant grille can have protection against accidental damage. Such protection is not covered by this EAD but shall be described in the ETA.

The product is not covered by a harmonised European standard (hEN).

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, e.g., with regard to the intended end use conditions, 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 as long as the details of the assessment methods as laid down in this EAD are respected.

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

1.2.1 Intended use(s)

Fire-resistant grilles are intended to be incorporated into various elements of a building structure (walls, floors and doors) to provide paths for ventilation and to enable such paths to be sealed automatically into a fire situation. The sealing is a result of expanding of the intumescent element of fire-resistant grille in fire situation. Sealed fire-resistant grilles prevent the spread of fire and hot gases. Fire-resistant grilles are not intended to be incorporated into ducts.

Fire-resistant grilles are intended for use in internal conditions of type Z_2 in accordance with EAD 350454-00-1104, Clause 1.2.1 (with humidity lower than 85 % RH, excluding temperatures below 0 °C, without exposure to rain or UV) in walls, floors and doors.

Fire-resistant grilles intended for use in more aggressive environmental conditions are not covered by this EAD.

Fire-resistant grilles intended for use without protection, if intended to be positioned where a person can fall against, are not covered by this EAD.

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 fire-resistant grilles for the intended use of 10 years when installed in the works (provided that the fire-resistant grilles are subject to appropriate installation (see 1.1)). These provisions are based upon the current state of the art and the available knowledge and experience.

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 works[1].

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 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

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

2.1 Essential characteristics of the product

Table 2.1.1 shows how the performance of fire-resistant grille 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	2.2.1	class
2	Resistance to fire	2.2.2	class/description
Basic Works Requirement 3: Hygiene, health and the environment			
3	Flow rate/pressure	2.2.3	level
Basic Works Requirement 4: Safety and accessibility in use			
4	Expansion ratio after exposure to environmental conditions	2.2.4	level
5	Expansion pressure after exposure to environmental conditions	2.2.5	level
6	Compatibility of materials	2.2.6	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.

2.2.1 Reaction to fire

The fire-resistant grille shall be tested, using the method(s) given in EN ISO 11925-2, EN 13823, EN ISO 9239-1, EN ISO 1182, EN ISO 1716, relevant for the corresponding reaction to fire class in accordance with EN 13501-1. Annex B of EAD 350005-00-1104 shall be used for the specification of mounting and fixing provisions for testing the intumescent inlay.

The fire-resistant grille shall be classified in accordance with the Commission Delegated Regulation (EU) No 2016/364 in connection with EN 13501-1.

The reaction to fire class shall be stated in the ETA.

2.2.2 Resistance to fire

Resistance to fire of fire-resistant grilles intended for installation in walls or floors shall be tested in accordance with EN 1364-5.

Since EN 1364-5 does not cover fire-resistant grilles intended for installation in doors, in such cases the test procedure shall be based on testing in accordance with EN 1634-1. Tests shall be done on two specimens: door without the fire-resistant grille and the same door configuration with the fire-resistant grille installed. Test results shall be valid for the tested door configuration only. Clarifications of testing resistance to fire of doors including fire-resistant grille are given in Annex A.

The fire-resistant grille shall be tested with exposure to fire to each face, unless the grille is symmetrical in construction and installation.

The fire-resistant grille intended for installation in walls or floors, as well as the doors shall be classified in accordance with EN 13501-2. Direct field of application of test results shall be in accordance with EN 1364-5 and EN 1634-1. Extended field of application of test results in case of doors shall be in accordance with EN 15269-1.

In case of fire-resistant grille intended for installation in walls or floors, the resistance to fire class of fire-resistant grille shall be stated in the ETA.

In case of fire-resistant grille intended for installation in doors, a comparison of resistance to fire class of door without the fire-resistant grille and the same door configuration with the fire-resistant grille installed shall be stated in the ETA.

2.2.3 Flow rate/pressure

Flow rate/pressure characteristics shall be tested in accordance with EN 13141-1 (the pressure difference ranges shall be taken in accordance with Table 5 of EN 13141-1). Fire-resistant grille shall be mounted on a board which represents the thickness of the element of a building structure in which it is intended to be used, as specified in the Manufacturers Product Installation Instructions (MPII), in accordance with Clause 5.1.2.1 and Annex B of EN 13141-1.

In the ETA, the flow rate/pressure characteristics shall be presented in accordance with Table 5 of EN 13141-1, as air flow rates in l/s for each pressure difference in Pa. Additionally, the flow rate/pressure characteristic curve, if relevant, shall be presented in the ETA.

2.2.4 Expansion ratio after exposure to environmental conditions

Expansion ratio shall be tested in accordance with Annex B, after exposure to environmental conditions of type Z_2 in accordance with EAD 350454-00-1104, Clause 1.2.1.

The expansion ratio after exposure to environmental conditions and test temperature [°C] shall be stated in the ETA.

2.2.5 Expansion pressure after exposure to environmental conditions

Expansion pressure shall be tested in accordance with Annex C, after exposure to environmental conditions of type Z_2 in accordance with EAD 350454-00-1104, Clause 1.2.1.

The expansion pressure [N/mm^2] after exposure to environmental conditions and test temperature [°C] shall be stated in the ETA.

2.2.6 Compatibility of materials

Compatibility of materials from which the fire-resistant grille is made shall be tested in accordance with EAD 350454-00-1104, Clause 2.2.9.4, after exposure to environmental conditions of type Z_2 in accordance with EAD 350454-00-1104, Clause 1.2.1.

The description of change of appearance after contact between materials (if relevant) after exposure to environmental conditions 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 1999/454/EC, as amended by Commission Decision 2001/596/EC.

The system is 1.

3.2 Tasks of the manufacturer

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

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]					
Intumescent component					
1	Mass per unit area	According to Control plan	According to Control plan	According to Control plan	once per batch
2	Expansion ratio	Annex A	According to Control plan	According to Control plan	once per batch
3	Ash content	EN ISO 3451-1	According to Control plan	According to Control plan	once per 10 batches
4	Content of non-volatile components	EN ISO3251	According to Control plan	According to Control plan	once per 10 batches
Assembled product					
5	Dimensions	According to Control plan	According to Control plan	According to Control plan	once per batch

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for the fire-resistant grille 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 fire-resistant grille.	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	Twice a year

4 REFERENCE DOCUMENTS

EN 1363-1:2020	Fire resistance tests. Part 1: General requirements
EN 1364-5:2017	Fire resistance tests for non-loadbearing elements. Part 5: Air transfer grilles
EN 1634-1+A1:2018	Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware. Part 1: Fire resistance test for door and shutter assemblies and openable windows
EN 10216-5:2021	Seamless steel tubes for pressure purposes. Technical delivery conditions. Part 5: Stainless steel tubes
EN 13141-1:2019	Ventilation for buildings. Performance testing of components/products for residential ventilation. Part 1: Externally and internally mounted air transfer devices
EN 13501-1:2018	Fire classification of construction products and building elements. Part 1: Classification using data from reaction to fire tests
EN 13501-2:2023	Fire classification of construction products and building elements. Part 2: Classification using data from fire resistance and / or smoke control tests, excluding ventilation services
EN 13823+A1:2022	Reaction to fire tests for building products. Building products excluding floorings exposed to the thermal attack by a single burning item
EN 15269-1:2019	Extended application of test results for fire resistance and/or smoke control for door, shutter and openable window assemblies, including their elements of building hardware. Part 1: General requirements
EN ISO 1182:2020	Reaction to fire tests for products. Non-combustibility test
EN ISO 1716:2018	Reaction to fire tests for products. Determination of the gross heat of combustion (calorific value)
EN ISO 3251:2019	Paints, varnishes and plastics. Determination of non-volatile-matter content
EN ISO 3451-1:2019	Plastics. Determination of ash. Part 1: General methods
EN ISO 9239-1:2025	Reaction to fire tests for floorings. Part 1: Determination of the burning behaviour using a radiant heat source
EN ISO 11925-2:2020	Reaction to fire tests. Ignitability of products subjected to direct impingement of flame. Part 2: Single-flame source test
EAD 350005-00-1104	Intumescent products for fire sealing and fire stopping purposes
EAD 350454-00-1104	Fire stopping and fire sealing products. Penetration seals

ANNEX A – CLARIFICATIONS FOR TESTING RESISTANCE TO FIRE OF FIRE-RESISTANT GRILLES INSTALLED IN DOORS

A.1 General

A.1.1 Introduction

This Annex clarifies test procedures for both criteria of resistance to fire for fire-resistant grilles: integrity (E), thermal insulation (I) and radiation (W).

Note: The possible fire classifications are: E, EI or EW.

A.1.2 Installation and position of fire-resistant grille

For the purposes of the test, the installation shall be in conformity with Manufacturer's Product Installation Instructions (MPII), including the fitting of specific cover grilles if these are always to be used in practice.

Where the substrate includes voids, e.g., where fitting the grille into a hollow core door, voids shall be covered or filled, e.g., by framing around the opening. If a framing is used in the fire test, it shall be considered as part of the system. Results presented in the ETA are valid only for configuration of the product with the same frame.

If the product is intended to be used at the upper (lower) part of the door it shall be tested at the upper (lower) part of the test furnace because of the difference in pressure at different levels. The grille shall be tested with exposure to fire to each face, unless the grille is symmetrical in construction.

A.1.3 Field of direct application of test results

The results of the fire test are directly applicable to similar constructions where one or more of the changes listed are made:

a) decrease in the linear dimensions of the fire-resistant grille,

b) decrease in the distance between the horizontal or vertical slats,

c) increase in number of fixings,

d) the material, used to seal the gap between fire-resistant grille and the door as tested, provided the reaction to fire classification of the gap filling material is equal to or higher than that tested (for mineral wool: every mineral wool of the same melting point may be used).

Because the performance of the fire-resistant grille can be affected by its position in the vertical plane any classification is restricted to the position tested. This is in a positive pressure zone or a negative pressure zone between the pressure levels tested.

The test results are applicable only for distance between the edges of the fire-resistant grille and the perimeter of the door leaf or the distance between the fire-resistant grilles not lower than the one tested and provided along with test results.

Other positioning within the door can only be modified if this does not involve the removal or re-positioning of structural members of the door leaf.

A.2 Integrity criterion (E) and radiation criterion (W)

The tests shall be done in accordance with EN 1363-1.

A.3 Clarifications for testing the insulation criterion (I)

If the insulation criterion is to be evaluated, thermocouples of the type specified in EN 1363-1 shall be attached to the unexposed face for the purpose of obtaining the mean and maximum surface temperatures. The general principles of the attachment and exclusion of thermocouples are given in EN 1363-1.

All rules regarding thermocouple positioning in accordance with EN 1363-1 and EN 1634-1 are to be followed. Additional thermocouples shall be placed on the fire-resistant grille in accordance with the rules given in EN 1364-5.

ANNEX B – EXPANSION RATIO – TEST METHOD

B.1 Introduction

The expansion ratio shall be determined on at least 6 specimens to assess the ability of the material to create a foam/char in the event of fire. The mean value and the standard deviation shall be recorded in the test report.

The thickness of the specimens shall be determined before and after expansion. If the expansion of the material is not uniform, the thickness after expansion shall be determined from the average value of the maximum and minimum thickness.

Suitable equipment for determining the expansion ratio is shown in Figure B.5.1.

B.2 General

The principle of testing the expansion ratio is to expose an intumescent material to a certain temperature for a particular duration, to restrict the expansion to one direction, to measure the changed thickness after expansion (foam height) and to express this in relation to the original thickness (before heat exposure).

If the specific intumescent material is manufactured of more than one nominal thickness or more than one nominal density, the maximum thickness/density and the minimum thickness/density shall be tested.

B.3 Determination of the suitable test temperature

The test temperature required for the determination of the foam height of a specific intumescent material shall be determined in pre-tests.

In order to find out the appropriate test temperature for the specific intumescent material, the temperature in the oven shall be increased in steps of 50 K (300 °C, 350 °C, 400 °C, 450 °C etc.). Leave the specimens in the oven until the material has completely reacted. A specimen is considered completely reacted when the foam height reaches and maintains a maximum at the test temperature.

The duration of the test depends on the intumescent capacity of the material and can differ at different temperatures. Normally 30 min are considered as suitable. The duration may be increased if the maximum foam height is not reached in 30 minutes. The same duration shall be used for test series of all temperatures.

It will be helpful to create an expansion-time-temperature curve. The relationship between foam height and test temperature may be visualized for a set test duration by plotting maximum foam height (y-axis) against test temperature (x-axis). The complete reaction corresponds to the lowest temperature at which a maximum (or plateau at the maximum value) is observed on this curve.

The determined test temperature and the relating time of exposure to heat shall be recorded and shall be used for all further tests for determining the foam height of this specific material.

B.4 Preparation of the specimens

At least six circular specimens of a diameter corresponding to the inner diameter of the specimen holder with a tolerance of ± 0,5 mm shall be cut out of the intumescent material. The thickness of the specimen shall be measured with an accuracy of 0,1 mm at least at three points. The mean value shall be recorded together with the standard deviation.

If necessary, the thickness of the specimens may be reduced such that the foam height does not exceed the height of the specimen holder. Such handling shall be recorded.

B.5 Test device

Key

Pipes: in accordance with EN 10216-5, wall thickness 2 mm
C specimen holder
D upper frame
E lower frame
F spacer bar

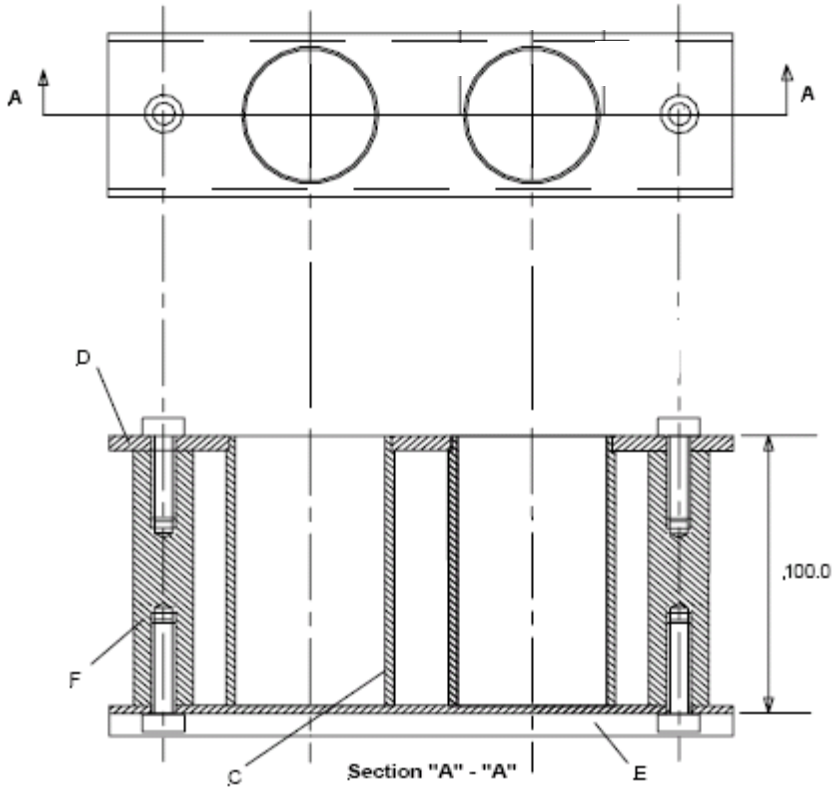

Figure B.5.1 – Test device

B.6 Test procedure

A temperature-controlled muffle oven being able to reach a stable temperature of at least 600 °C is needed. The oven shall be pre-heated to the stable temperature as required for the test and as determined during the pre-test.

The specimen shall be placed into the specimen holder of the test device (Figure B.5.1).

The test device shall be placed quickly (to minimise heat loss) into the centre of the muffle oven at the particular temperature for the pre-defined duration. The test temperature shall be re-established within 5 min in the oven.

Wearing protective clothing and gloves the test device shall be removed from the oven as soon as reasonably practicable after the test. The foam height shall be determined within 5 minutes after the specimens have been removed from the oven.

After the heat exposure the measurements shall be carried out at the at least three points as done before testing.

The mean value of the measurement represents the "maximum foam height" at a certain temperature after a certain time of heat exposure. Minor voids or cavities within the structure of the foamed specimens shall not be taken into consideration.

The expansion ratio is the quotient of the mean value of thickness [mm] of an expanded specimen of the intumescent specimen divided by the mean value of the original thickness of the same specimen before expansion.

ANNEX C – EXPANSION PRESSURE – TEST METHOD

C.1 Introduction

The expansion pressure shall be determined on at least 6 specimens to assess the ability of the material to develop pressure during foaming. The mean value and the standard deviation shall be recorded in the test report.

Suitable equipment for determining the expansion pressure is shown in Figure C.3.1.

If the specific intumescent material is manufactured of more than one thickness or more than one density, the maximum thickness/density and the minimum thickness/density shall be tested.

C.2 Preparation of the specimens

At least 6 circular specimens of a diameter of at least 50 mm with a tolerance of ± 0,5 mm (the specimens shall be as large as possible to reduce the edge influences, but the actual size shall depend on the apparatus), shall be cut out the intumescent material.

The thickness of the specimen shall be measured with an accuracy of ± 0,1 mm at the centre of the disc and at four symmetrically placed points approximately 10 mm from the edge of the specimen. The mean value of the thickness of the specimen shall be recorded with the standard deviation.

C.3 Test device

Key

1	base plate	6	guide system	11	spindle
2	pillars	7	guide system	12	hand wheel
3	pressure plate	8	lever	13	heated upper pressure receptor (upper heating plate)
4	top plate	9	lever	14	heated lower pressure receptor (lower heating plate)
5	guide system	10	force transducer		

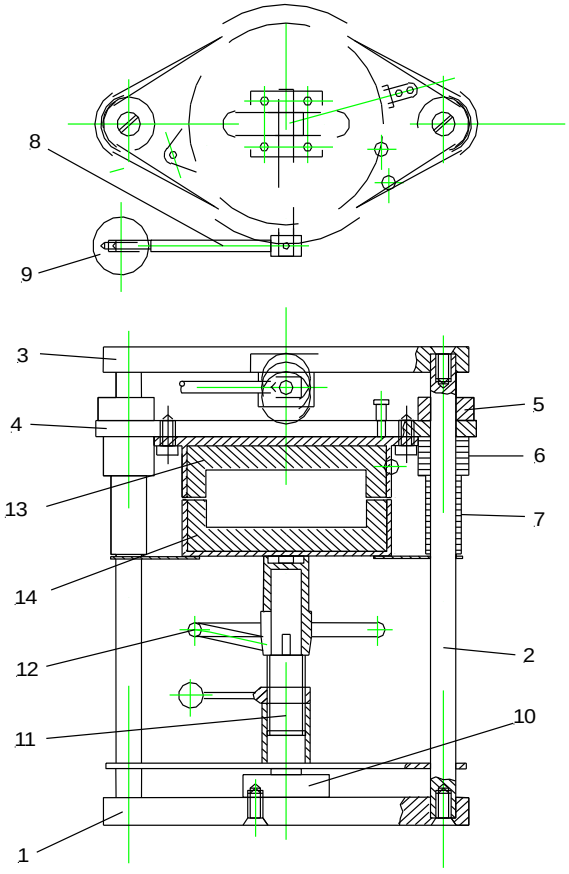

Figure C.3.1 – Test device

The measuring device for determining the expansion pressure, acting at given temperatures by an intumescent material, is built into a frame consisting of a base plate (1), two pillars (2) and a pressure plate (3).

The heated upper pressure receptor (13) is rigid during the test but can be swung out for cleaning purposes, is connected with the frame through a guide system (5, 6, 7). In order to enable the specimens to be quickly inserted, the top plate can be adjusted in height by 15 mm by means of the lever (8, 9).

The heated lower pressure receptor (14) transmits the force occurring during the test via a transmission device to the force transducer (10) mounted on the base plate.

The transmission device has a hand wheel adjustment that allows specimen thickness of up to 32 mm. The spindle (11) serves as a locking device for the mechanism.

C.4 Test procedure

The specimen, arranged in two aluminium foils, shall be placed centrally between the upper and lower heating plates into the apparatus according to Figure C.3.1.

In the neutral/zero position of the heating plates a pre-pressure of approximately 60 N shall exist. It means that the force with which the specimen (regardless diameter and thickness of a specimen) is compressed shall not exceed 60 N. To take into account the thickness of the specimen, the heater plates shall be set so that the force compressing the specimen does not exceed 60 N. The starting positions for the heating plates required for the test and the appropriate spacing between them shall be established by measurement.

The expansion pressure [N/mm^2], temperature [°C] and time elapsed [s] shall be continuously recorded. The test shall be performed until the maximum pressure is clearly exceeded, but not longer than 10 min.

The test report shall qualify the maximum expansion pressure for each specimen thickness.