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Extended application of results from fire resistance tests for service installations - Part 2: Dampers

Application étendue des résultats des essais de résistance au feu pour les installations de service - Partie 2: Clapets coupe-feu

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13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements

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Extended application of results from fire resistance tests for service installations - Part 2: Dampers

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (prEN 15882-2:2010) has been prepared by Technical Committee CEN/TC 127 “Fire safety in buildings”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of 89\106\EEC.

Introduction

It should be noted that fire-resisting dampers are special products that are exposed to different conditions to other elements of construction; in particular they are subjected to significantly different pressure regimes. Also integrity is evaluated by leakage measurements. Consequently, this European standard may adopt a different approach to other extended field of application standards, with more emphasis on testing.

1 Scope

This standard provides guidance and rules to notified or accredited bodies (for Fire Dampers) to allow them to define the extended field of application for fire dampers. This standard identifies the parameters that affect the fire resistance of dampers. It also identifies the factors that need to be considered when deciding whether, or by how much, the parameter can be extended when contemplating the fire resistance performance of an untested, or untestable variation in the construction.

The standard gives the principles behind how a conclusion on the influence of specific parameters/constructional details relating to the relevant criteria (E,I,S) can be achieved.

The standard does not cover dampers used for smoke control.

This document only applies to extended fields of application based on tests successfully undertaken to EN 1366-2. Leakage determined during such tests shall be at least 10 % below the leakage limits for E, or for ES, dependent on classification achieved, given in EN 13501-3 before the EXAP rules can be applied.

By application of this standard, it should be possible to identify what specifications should be tested to maximise the field of application. Some information on test programmes is given for guidance purposes.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1363-1, *Fire resistance tests — Part 1: General requirements*

EN 1366-2, *Fire resistance tests for service installations — Part 2: Fire dampers*

EN 1366-3, *Fire resistance tests for service installations — Part 3: Penetration seals*

EN 13501-3, *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 ISO 13943, *Fire safety — Vocabulary*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply together with the definitions given in EN 1363-1 and EN 1366-2:

3.1
Cross sectional area of leakage gap
total area of gaps around damper perimeter and blade(s), and between the blades, inside the damper, when the damper is closed

3.2
multiple section assemblies
assemblies of individual damper units of sizes up to and including the maximum individual unit size tested to EN 1366-2 to form larger units

3.3
3.3 a
horizontal orientation of damper
position of the damper mounted horizontally when installed in a floor or a ceiling

3.3 b
vertical orientation of damper
position of the damper mounted vertically when installed in a wall

3.4
supporting construction
A construction used as part of the test assembly to support the test specimen and to fill in the furnace aperture

3.5
standard supporting construction
A construction similar to above, but which has known fire behaviour and for which a Direct Field of Application has been established

4 Determination of worst case

In certain circumstances a rule may call for a new test to be undertaken. To save having to re-test everything, a determination must be made of “worst case”.

Firstly consider the classification required: E, EI, ES, EIS, Consider all the test reports that give the required classification.

Only test reports that have a total test time that is in excess of the required classification period by a of either 10% or 12 minutes, whichever is the least, may be considered.

Determine which criteria failed first in each test. The resulting “worst case” will be the one where the time to failure of each and any of the parameters was the lowest.

If the test periods show that none of the criteria failed before the classification period plus 10% or 12 minutes, then the supporting construction must be considered. The worst case will be with the fire damper mounted in the lightest construction. The sponsor may pick a heavier supporting construction, but then any extended field of applications will only apply to this supporting construction and those heavier and more dense as per direct field of application.

The method of determination of worst case and the related extended fields of application shall be reported in the extended field of application report

5 Conditions and application rules

5.1 Change of fixing damper to supporting construction

a) No change in the location of the fixings relative to the damper and the supporting construction shall be permitted. The pitch between the fixings shall not be increased

b) Alternative fixings may be used if their performance is proven by supporting data, including, but not necessarily limited to fire test and loading information.

c) Any alternative fixings shall be included as part of the extended field of application report

5.2 Multiple damper assemblies

To allow the use of multiple assemblies of fire dampers, either side by side or on top of each other, a test shall be undertaken. An assembly consisting of fire dampers that have already successfully gained a classification to EN13501-3 shall be made and installed into a supporting construction using the proposed method.

A fire damper selected using the worst case method described above shall be made into an assembly as shown below. This will allow the other EXAP rules from the tables which follow to apply to multi-section units, as they do to single section units.

The unit to be tested shall be constructed so as to be made up of at least four sections and shall have a maximum overall size of 2600mm x 2600mm. This is to allow for a small gap around the outside of the damper and a minimum span of supporting construction of 300mm all round.

The test method will be generally as EN1366-2 (note: also refer to intumescent fire damper test, if this becomes relevant), but instead of a closed plenum with a fan, an extended open duct 1m long shall be fixed to the dampers. This will allow the placing of the thermocouples described in EN1366-2 to be fixed in their normal positions.

Leakage will not be measured. A 300Pa differential pressure will not be set across the unit. The criteria used will be the integrity round the joint between the damper installation and the supporting construction, sustained flaming at any point, and the insulation criteria on the outside of the duct section.

NOTE The above was decided, because equipment may not be readily available at laboratories to allow the pressure differential and required volumes to be set up.

Classification will be as the original single section units with regard to E, EI, ES and EIS as long as the above integrity criteria are fulfilled and any insulation criteria are met.

If, due to the size restriction of 2600 x 2600, the assembly is made up of four individual units which are smaller, or of the same, size as the original single unit tested, assemblies for application may be made of units up to the single unit size tested:

> e.g. an assembly of four units with an overall size of 2600mm x 2600mm, made from individual units with overall size 1300 x1300, representing a single section size tested of 1500 x 1300, allows an assembly of overall size 3000 x 2600 to be used.

If the assembly is made up of four or more units, leading to whatever overall size, the size of unit to be used must have been tested previously as a single unit. For application, the units then used to make up assemblies must not exceed the size of the units tested as part of the assembly. This test may not be used to allow larger units to be back assessed to single sections for classification to EN13501-3:

> e.g. an assembly of 6 units individual overall size 600 x 600, giving an assembly 1200 x 1800, allows the use of multiple assemblies of units of individual size 600 x 600.

If the individual unit tested was 1000 x 1000, the use of this to build assemblies is not now allowed as this could have been assembled to form a unit 2000 x 2000, which could be tested (i.e. is less than 2600 x 2600).

If the 600 x 600 size has not been tested individually and only a 500 x 500 unit has been tested previously, this is not allowed and back assessment of the 500 x500 is also not allowed as there is no pressure differential in this EXAP test.

For dampers tested following these directions, the standard direct field of application from EN1366-2 shall apply.

All details with respect to multiple damper assemblies, and their associated testing, and any direct field of application and further EXAP, shall be included in the extended application report

Using the information gained above, larger assemblies of individual dampers are allowed, providing that they are also structurally supported to a fire-safe design provided by structural fire engineers.

See Figure 1

5.3 Alternative penetration seals

Alternative penetration seals shall be tested in association with a fire damper in accordance with EN1366-2.

Alternatively, penetration seals with a density and application method similar to one already tested with the specific fire damper may be used, provided that they (the penetration seal) have successfully passed a test in accordance with EN 1366-3.

All details of alternative penetration seals shall be included in the extended field of application report.

6 Influence of parameters and factors on fire damper performance

This standard takes into account the parameters and factors that may affect the fire resistance performance of fire resisting dampers when tested to the method of test defined in EN 1366-2. These have been listed in the following tables

The influence on integrity, insulation and where appropriate smoke leakage, shall be appraised in accordance with the clauses and tables in this standard. .

The parameters and factors of the anticipated influence on damper performance are given in the tables of clause 7.

Consideration of the parameters and factors in clause 7 have lead to the development of the rules in clause 8, which state what conclusions may be drawn or the requirement for further testing, whichever is relevant.

7 Critical parameters and factors

7.1 General

The following parameters and factors are considered to affect the fire resistance performance of a fire damper and shall be taken into account when determining the field of extended application.

7.2 Common operational parameters and factors

Table 1: Common operational parameters and factors

Line	Parameter and rule reference	Factor
1	Fire exposure	Exposed or not exposed
2	Changes in pressure (positive or negative)	Lower or higher

7.3 Constructional parameters

Table 2: Constructional parameters

Line	Parameter	Factor
1	Change in symmetry	Symmetrical or non-symmetrical
2	Change in location of damper blade according to the housing	Closer or further from exposed flange
3	Change in axis position according to the housing	Horizontal or vertical or any angle
4	Change in location of temperature sensing element	Lower or higher from horizontal center plane, further or closer (to fire), in front or behind damper blade
5	Change in location of operating mechanism and actuator	Fully exposed, partially exposed (in the wall/floor) or fully non exposed
6	Change in geometrical shape	Rectangular to circular or oval or vice versa
7	Change in height of cross section	Greater or less than tested
8	Change in width of cross section	Greater or less than tested
9	Change in height/width aspect ratio	Greater or less than tested
10	Change in diameter of cross section	Greater or less than tested
11	Change in length of damper housing	Greater or less than tested
12	Change in number of blades (multi-blade dampers)	More or less than tested

7.4 Parameters of components of damper

Table 3: Parameters of components of damper

Line	Parameter	Factor
1	Change in operating mechanism	Change of type
2	Change in actuator	Change of type and operating time
3	Change in connection flange	Change of material, Change of shape and dimensions
4	Change in temperature sensing element	Change of type, material and release temperature
5	Change in material of damper blade	Change of material
6	Change in material of damper housing	Change of material
7	Change in insulating material of damper housing	Change of material
8	Change in insulating material of damper blade	Change of material
9	Change in thickness of damper blade	Greater or less than tested
10	Change in thickness of damper housing	Greater or less than tested
11	Change in retaining profile/ stop	Change of material, Change of shape and dimensions