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**ASFP Technical Guidance Document - TGD 20**

**BESA VG005**

**ADCAS TGD 01/20.08**

**Fire test standards and the Construction Products Regulation in relation to fire resisting ventilation and smoke control ductwork**

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## **Introduction**

Following the implementation of the construction products regulations (CPR) in July 2013, it is a legal requirement to comply with any harmonised European product standard and provide tested products covered by that standard. With regards to fire resisting ventilation and smoke control duct sections not all the required standards are published and consequently this limits what can be supplied. The purpose of this Guidance document is to provide an understanding of what these limitations are, when they will change and what can individual stakeholders do in the intervening period.

This document has been written in collaboration with the trade bodies ASFP, BESA and ADCAS to provide an industry wide position.

## **Overview**

This document comprises of six sections:

- 1) The CPR and when it applies to fire resisting ductwork.
- 2) The European (EN) Product standards, classification standards, test standards and Extended Application standards and the relationship between them.
- 3) The status of the EN standards and what this means.
- 4) ASFP / BESA / ADCAS guidance to its membership/specifiers in this transition period.
- 5) FAQ's currently in the industry related to fire resisting ducts
- 6) A table of the status of all the relevant standards as at the date of publication of this document.

This publication is only intended to provide a brief understanding on the subject, for more detailed information regarding fire resisting ductwork the ASFP Blue book publications should be consulted.

## 1) The CPR and when it applies to fire resisting ductwork.

It is a mandatory requirement<sup>(1)</sup> that any fire resisting ducts falling within the scope of a harmonised product standard (hEN), with test and classification standards in place must be tested and classified to EN Standards under the CPR.

*(1) Construction Products Regulation - EU 305/2011*

This applies to products being sold within the European Economic Area (EEA). This would mean that the national standard BS 476-24 will be withdrawn from use, British Standards Institute (BSi) provide the following statement: -

*“This standard has been superseded by the current BS EN 1366-1, BS EN 1366-8 and BS EN 1366-9, but it has been retained based on legitimate need for the standards within non-EU markets”*

However, it has been acknowledged by BSi this is technically incorrect. British Standards can still be used in existing markets where no harmonised standard (hEN) is in place.

A kitchen extract duct should be tested under BS EN 1366-1 (test for combustible linings) as this would be considered a more technically robust method than defaulting back to BS 476-24. See also clause 5.9.

## 2) The European (EN) Product standards, classification standards, test standards and Extended Application standards and the relationship between

Firstly, ductwork has been considered separately into 2 types: **Fire resisting ventilation duct sections** and **smoke control duct sections**. The table in Section 6, at the end of this document, shows the relationship between the standards for the two types of duct and what is currently published and available. This is a continuously developing situation and readers should ensure they have the latest version of this document to ensure they have the most up to date information.

### 2.1 Product standards

Product standards define the scope of the product and the control measures required, including:

- what tests should be undertaken and
- how these tests are interpreted and classified
- factory production control requirements
- installation and maintenance information that should be provided
- CE marking and how to label products

**prEN15871** scope covers **fire resisting ventilation duct sections** intended to be installed in heating, ventilation and air conditioning (HVAC) distribution systems. This product standard has not yet been published. Therefore, fire resisting ventilation duct sections currently do not require compliance with this standard and therefore the BS476 Part 24 fire test can continue to be used, if accepted by the Fire consultant. However the testing standard BS EN1366 part 1 has been in place for some time and therefore ASFP, BESA & ADCAS would recommend the use of BS EN1366 part 1 tested duct where applicable as best practise.

Note: the ‘pr’ prefix means ‘draft’; the standard has not yet been published.

**BS EN12101-7** scope covers **smoke control duct sections** intended to operate as part of a pressure differential system or smoke and heat exhaust system. This product standard is published and must be complied with for those ducts falling within its scope, this is limited to a maximum size of 1250mm wide x 1000mm high or 1000mm diameter.

## 2.2 Classification standards

These documents BS EN13501-3 & BS EN13501-4 detail how the results of the tests and any Extended Application are converted into classifications, they define the symbols to be used with their meanings and, also, they identify what can be classified.

## 2.3 Fire test standards

These documents detail the method of test and how they are reported. The fire test standard *BS 476-24:1987: Method for the determination of the fire resisting of ventilation ducts* has been used for many years. The European test standards BS EN1366-1, BS EN1366-8 & BS EN1366-9 have a number of associated standards which also have to be complied with. The European fire resistance test also includes a 'direct field of application'. These are changes to the tested duct that can be made by the manufacturer within the scope of the test parameters without reference to any authority such as a test laboratory or fire consultant.

## 2.4 Extended field of application standards (EXAP)

There are a number of practical limitations on the size and design of elements that can be tested by the standard methods of fire resistance test. When these elements are larger, or are of a modified design, it is necessary to confirm their performance. To achieve this, extended application documents (BS EN15882-1 : Ventilation Duct & prEN15882-xx : Smoke Control Duct) for the various elements define parameters and also the factors that need to be considered when deciding whether, or by how much a parameter can be extended beyond that covered under the direct field of application. The Extended Application standards currently has an upper limit and will only allow ductwork to be classified up to a maximum of size of 2500mm x 1250mm for Rectangular and 1250mm diameter for Circular for both ducts A & B.

As the extended application document for ventilation ducts, BS EN 15882-1 has been ratified/published then ducts tested to BS EN 1366-1 can be utilised.

## 3) The status of the EN standards and what that means (see Section 6)

### 3.1 Smoke control duct sections

The product standard for smoke control duct sections BS EN12101-7 is published and therefore any ducts falling under its scope must be supplied accordingly. BS EN12101-7 calls up two fire tests:

- BS EN1366-8 (systems passing through multiple compartments)
- BS EN1366-9 (systems within a single compartment – not penetrating a compartment barrier).

Note! The temperature in the part 9 test is limited to 600°C (i.e. Up to flash over only)

The extended application standard is prEN 15882-xx, but this has not been published and therefore specific details on how to assess duct sizes beyond those given in the fire test standard are not yet available. This restricts the ability to supply duct sections larger than 1250mm wide x 1000mm deep or 1000mm diameter. These are then classified to BS EN13501-4.

### 3.2 Fire resisting ventilation duct sections

The product standard for fire resisting ducts prEN 15871 has not yet been published. Therefore, fire resisting ductwork currently does not require legal compliance with it. This document is currently at final vote stage and expected to be published soon. The fire tests used is BS EN1366-1; the extended application standard which covers larger sizes of ducts is BS EN15882-1 and the classification standard is BS EN13501-3.

### 3.3 Consequences – what it means

#### Smoke control duct sections

**Smoke control duct sections that fall within the scope of BS EN 12101-7 up to 1250mm x 1000mm or 1000mm diameter are the only systems that must be supplied in compliance with the CPR.**

When the (EXAP) prEN15882-xx standard is published there is a 12month period to allow transition at which point it will then become mandatory to comply with the CPR. **This will mean ductwork up to 2500mm x 1250mm or 1250mm diameter for smoke control will have to be tested and classification document produced to the European standards.**

#### Fire resisting ventilation duct sections

When prEN15871 is published there is a transition period after which point it will then become mandatory to comply with the CPR for duct sections within its scope. **This will mean ductwork up to 2500mm x 1250mm or 1250mm diameter for fire resisting ducts will have to be tested and a classification document provided to European standards.**

BS476-24 fire tested products that fall within the scope of the product standard prEN15871 may be used with agreement with the Fire system designer until publication of the product standard.

However, since the fire test standards are all in place for the EN1366 range clients/designers should request compliance with these.

Manufacturers in the industry are at various stages with regards to re-testing to meet the European standards and therefore designers / specifiers should consult directly with them to understand their product range offerings.

### 4) ASFP, BESA & ADCAS guidance to their membership/specifiers in this transition period.

#### 4.1 Manufacturers

The test standards under the BS EN1366 regime are well established and although they are considered more onerous, they are similar to the BS476-24 tests. The tests within BS EN1366-1 are a pre-requisite to the BS EN1366-8 tests. ASFP, BESA & ADCAS strongly recommend manufacturers to complete the testing to the European standards as soon as possible, since the demand for the test houses furnace time is high.

In order to supply Fire Resistant Ductwork, the following must be undertaken: -

- Manufacturer should nominate a notified certification body (NB).
- Detailed discussions with NB should be made to clarify what products are to be tested and its limitations. Also, what potential risks are perceived by the NB with the status of the standards as noted above.
- The notified certification body will carry out a Factory Production Control (FPC) audit
- Testing will be conducted – (sampling of test specimens by Notified Body is **essential** for the issue of the Classification document)
- The Notified body issues the Classification Document.
- A certificate of constancy of performance will be issued by the notified body on completion of certification process.
- Where possible, (ducts tested to BS EN1366-9, covered in BS EN12101-7) a declaration of performance shall be made, and CE Marking shall be applied to the products.
- The Notified Certification Body will conduct annual FPC audits.

## 4.2 Specifiers/designers

Specifiers / designers need to consider whether the products being requested are available. It is recommended to contact the preferred manufacturer / supplier during the design stage and discuss and agree the necessary details to provide a compliant system. Consultation of the ASFP blue book EN version is highly recommended.

The ASFP, BESA & ADCAS support the move over to the BS EN 1366 series of tests. They actively work with BSI and CEN to improve the standards and have them in place, however we must acknowledge that Approved Document B (AD-B) still permits the use of BS476-24 tested products, where the current scope of EN standards does not meet the requirements of the system design.

## 5) FAQs currently in the industry related to fire resisting ductwork.

### 5.1 Is it possible to CE Mark fire resisting duct sections with site applied insulation?

Currently only Smoke control duct sections up to 1250mm x 1000mm or 1000mm diameter can be CE marked; provided the insulation is fixed to the duct section before leaving the factory and hence the duct and insulation is covered under the FPC.

However, all/most Companies install the insulation on site and hence the insulation is not covered under the FPC. Therefore, these companies will not be able to affix a CE label.

The ASFP, BESA & ADCAS guidance is that the following should be the minimum requirements an authority having jurisdiction should request from the company placing the product on the market to satisfy an EI (Integrity and Insulation) Classification:

- Testing to EN1366-1 & EN1366-8
- 3<sup>rd</sup> party certified Factory Production Control Systems.
- Control of all the components to ensure constancy of performance.

The ASFP, BESA & ADCAS support third party installation schemes where a certificate of conformity of the installation would be supplied.

The ASFP, BESA & ADCAS are involved with the appropriate BSI & CEN committees to allow modification of the product standards to allow CE marking of Duct sections as kits, which will allow CE marking of site applied insulation.

### 5.2 Is it possible to CE Mark un-insulated duct sections?

No, for multi compartment smoke control ducts (tested to BS EN1366-8), the European classification document BS EN13501-4 stipulates that only insulated ducts can be classified for 30, 60, 90 & 120 mins.

Yes, for single compartment smoke control duct sections tested to BS EN1366-9 and classified to BS EN13501-4.

No, for ventilation duct sections tested to BS EN 1366-1 and classified to BS EN13501-3.

### 5.3 BS476-24 is superseded and cannot be used?

Until such time that the product standard prEN15871 is published this is not the case (refer to clause 1.1). However, care needs to be taken as to what is sold using BS476-24 since smoke control ducts must be supplied to BS EN12101-7 albeit with some restrictions. Note, agreement with the Fire Consultant responsible for the system design should be made.

It should be noted that the test standards BS EN1366-1, 8 & 9 are published so testing and ducting can be supplied to these.

#### **5.4 Can duct sizes beyond 2500 x 1250 or 1250 diameter be supplied?**

As these sizes fall outside the scope of the harmonised standards the ASFP, BESA & ADCAS recommend that designers are encouraged to re-design systems to compliant size restrictions. If this is not possible, the only option available is to have a project specific Engineering Judgement by a notified body if they are willing to provide this.

#### **5.5 Projects with smoke control ducts above and below 1250x1000 or 1000 diameter, what should be supplied?**

Only the ductwork up to the maximum size 1250x1000 or 1000 diameter can be supplied to the product standard BS EN 12101-7. A battery of ductwork systems may be considered, another option is for the ductwork above this size to be supplied as tested or assessed against BS476-24 until the extended application document BS EN 15882-xx is published. A further option is to have an engineering judgement by a notified body where the ductwork is based on the EN construction and support sizes, this cannot be classified and therefore no CE marking can be applied.

#### **5.6 What does the 'S' rating mean on the classification and where should this be used?**

The 'S' rating on the classification denotes that the test has been completed and achieved a higher performance against leakage. An example of use, a Fire resisting ductwork passing through protected corridor should have this classification (see fig 31 of BS 9999:2017).

#### **5.7 Can additional access doors be fitted into fire resisting ducts? (primarily kitchen extracts)**

In the first instance, the existing fire resisting ductwork manufacturer must be identified and requested to supply, install, and certify the new doors as part of their products.

As a last resort, if the manufacturer cannot be identified, then a manufacturer of fire resisting ductwork products should be engaged to ensure the doors are suitably tested, installed, and certified. The ASFP, BESA & ADCAS would advise that the owner should seek to engage a third-party installer certification body of fire resisting ductwork to inspect and advice on the installation to satisfy themselves that the system is correctly installed. These would include FIRAS / LPCB etc.

#### **5.8 Can the insulation criteria be removed or reduced on fire resisting ducts?**

It is sometimes misunderstood that insulation is always necessary. It should be established whether 'insulation' is necessary for the particular circumstances. For the purpose of compartmentation (Requirement B3 in the Building Regulations), there are three options described in the current BS 9999 known as Method 1, 2 and 3. Method 1 (fire dampers) does not require ductwork to be insulated, however in such a case the 'Housekeeping' note in BS 9999 W.4 should be observed and materials should not be located within 500mm of any uninsulated metal ductwork.

However, the 500mm distance from combustibles should not be regarded as an alternative solution where insulation is required by BS 9999 (e.g. kitchen extract ducts).

The ASFP, BESA & ADCAS advise that removal or reduction of insulation should only be accepted if it is detailed within a fire risk assessment that is written and agreed with the local authority and fire system designer.

Where a relaxation in the insulation performance criterion is given, the resulting duct system, with the reduced amount of insulation material, must have been successfully fire tested.

### **5.9 Why is Kitchen extract insulation greater than normal fire resisting ductwork?**

When testing the “Duct A” scenario there is an optional requirement for measuring insulation performance for kitchen extracts (the ASFP, BESA & ADCAS recognise the reference to combustible linings in the test standard to mean kitchen extract). The T3 thermocouples are placed on the inside of the duct inside the furnace which requires a greater insulation performance than a “Duct B” arrangement (BS EN1366-1:2014 clause 9.1.2.3 refers to ducts with combustible linings). This is a scenario where the fire resisting kitchen extract passes through another compartment that is on fire which is external to the duct and tries to ignite the grease inside the duct. If the fire engineer should design areas with very low risk of fire, then this requirement maybe reduced/removed and a Duct B performance on insulation applied. This generally means a reduction of thickness of insulation. Please see note 5.8 and ensure this is part of the documented fire risk assessment.

### **5.10 When is it acceptable to use low temperature smoke control systems?**

Smoke control systems can specify fire resisting ductwork up to 400 °C or 600 °C. Test standard BS EN 1366-9 utilizes the ISO834 curve but is limited to a maximum of 600 °C, which does not consider ducts passing through a fire compartment barrier. It is anticipated that the fire zone has the heat and smoke extracted and therefore will prevent it becoming a fully developed fire.

Systems that penetrate fire barriers must be tested to the full fire curve as in BS EN1366-8 which ensures the ductwork, insulation and penetration seal is adequate in the case of a fully developed fire.



## 6 Status of Test, Classification and Product standards at date of publication.

FIRE RESISTING DUCT SECTIONS Status August 2020		SMOKE CONTROL DUCT SECTIONS Status August 2020	
<b>Product standard</b> prEN 15871 Fire resisting duct sections	Cannot satisfy this or CE mark as not yet published	<b>Product standard</b> BS EN12101-7 Smoke & heat control duct systems	Can satisfy this and is within its scope as it is published
<b>Classification standard</b> BS EN 13501-3 Fire classification of construction products and building elements - part 3: classification using data from fire resistance tests on components of normal building service installations	Can classify from fire test and EXAP standards above, but cannot use for CE marking until prEN 15871 published	<b>Classification standard</b> BS EN 13501-4 Fire classification of construction products and building elements - part 4: classification using data from fire resistance tests on components of smoke control systems	Can classify based on fire test standards listed below and must CE mark products that are within the scope of BS EN 12101-7 as it is published (see dimension tolerances below)
<b>Fire test standard</b> BS EN 1366-1 Fire resistance tests for service installations: Ducts	Can test to this, but cannot use for CE marking until prEN 15871 published	<b>Fire test standard</b> BS EN 1366-8 Fire resistance tests for service installations: Smoke extraction ducts (multi compartment)  <b>Test standard BS EN 1366-9</b> Fire resistance tests for service installations: Single compartment smoke extraction ducts	Can test to these within the scope of BS EN 12101-7 as it is published  Can test to these within the scope of BS EN 12101-7 as it is published
<b>Extended field of application standard</b> BS EN 15882 -1 Extended applications of test results for fire resistance tests for service installations: Ducts	Can develop an Extended Application, but cannot use for CE marking until prEN 15871 published	<b>Extended field of application standard</b> prEN 15882 -xx Extended applications of test results for Smoke control ducts	Cannot develop an Extended Application as EXAP standard is not yet published. (this limits sizes to those tested and covered by Direct Application)
<b>Products covered that can be CE marked</b>	None	<b>Products covered that can be CE marked</b>	Only single compartment ducting tested to BS EN 1366-9.
<b>Products outside of CE marking</b>	Any sizes covered by fire test, Extended Application or assessment.	<b>Products outside of CE marking</b>	Multi compartment ducts tested to BS EN 1366-8 and Single compartment ducts tested to BS EN 1366-9 with sizes over 1250mm wide x 1000mm deep or 1000mm diameter.
<b>ASFP, BESA &amp; ADCAS position</b>	Test or assessment can be against BS 476: Part 24 or BS EN 1366-1.  Any sizes covered by fire test, Extended Application or assessment.  <u>Only applicable at national level</u>	<b>ASFP, BESA &amp; ADCAS position</b>	Must use BS EN 1366 part 8 or 9 tested ductwork.  Any sizes over 1250mm wide x 1000mm deep or 1000mm diameter ideally should be covered by fire test or assessment against European standards.  <u>Only applicable at national level</u>

It is an ASFP / BESA / ADCAS Policy that fire resisting ductwork performance should be third party certified or CE marked, and installers should be third party certified for their work.