



THOR DUCT®

EN Fire Rated Ductwork

Understanding the new EN regulations

CE Marked Smoke Extract

EN tested fire rated kitchen extract and pressurisation

Installed under third-party certifiers firas



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SAFE4 DUCT®

EN Fire Rated Ductwork

Thor Duct® trading as Safe4 Duct® in UK and Ireland.

Understanding the new EN regulations

Thor Duct® is a fire rated ductwork, the result of 16 years of research and development, produced in an **ISO9001** quality control management environment, and installed by certified installers.

Throughout the CEN member nations, national standards have been superseded as of July 2013 and have been replaced by the new European Standard for Smoke Extract, namely EN 12101-7. For fire ductwork, kitchen extract and pressurisation the test standard is EN 1366-1 since April 2015, and classification standard EN 13501-3.

Thor Duct® have tested all products to the latest EN standards and as required by law provide CE marking on products where a harmonised standard exists.

The tests vary for different types of duct:



EN 1366 part 1

fire duct, kitchen extract & pressurisation

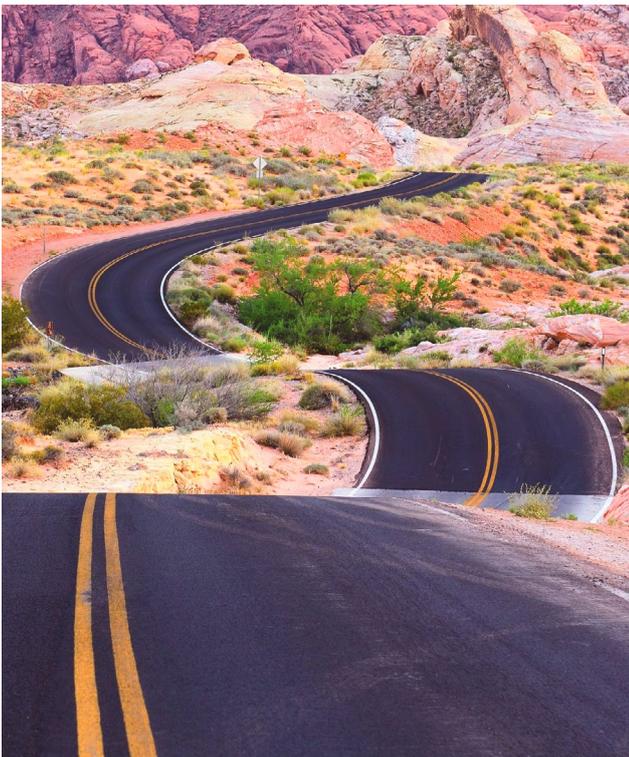
EN 1366 part 8

multi compartment smoke extract

EN 1366 part 9

single compartment smoke extract

Performance Criteria



The EN tests have a clear set of measurements to be recorded during the tests. The system components, such as access doors, fixing supports, unique insulation and penetration detail are all measured for their performance.

The system is tested as a whole and all components of the system are integral to the final declared results, issued in a classification report. The process of mixing and matching different combinations of ducts and insulation requires a classification report to prove their combined performance, E I.

The limiting criteria by which the test results are determined are insulation, integrity, smoke leakage and cross sectional area.

The ASFP states that the inclusion of non specific products, material and dimensional modifications may result in the invalidity of the final assembly, thus preventing certification of works.

Penetration seals

Penetration seals are one of the areas of great concern. They prevent fire spreading from one compartment to another. Special attention is given to their performance during the tests, and they are documented in the guidelines for installation.

Thor Duct®'s uniquely built penetration seals withstand severe fire conditions and can be easily installed from components locally available.

Thor Duct®'s penetration seals are tested in flexible walls, allowing them to be used in stud partitions, block walls and concrete floors.

The ASFP confirms that assemblies associated with block work may not be suitable for dry-lining.



Access doors (Safe Door)



Standard access doors offer no fire resistance whatsoever. The **Thor Duct**® Fire Door range has been tested at full furnace temperatures.

The UK and Ireland guidance document **DW172** states that all interior surfaces of the ductwork shall be **accessible for cleaning** and inspection purposes. It is recommended that **access doors are installed every 2 meters**.

These access doors must be the access doors tested during Type A, Type B and Type C both horizontally and vertically.

Thor Duct® ducting is designed with specific emphasis on strength with a minimum load bearing rate per square meter because of its uniquely built structure.

Thor Duct®'s EN range is unique in having one of the lowest kg weight per square meter.

Fixing & supports

Prescribed fixing and supports are an integral part of the system and have been tested under full fire conditions.

It is important that the system is installed as tested.

Insulation

Fire rated insulation ensures that the temperature measured (outside in Type A, and inside in Type B) does not exceed 140°C mean average above ambient during the test and is deemed automatically failed if any thermocouple rises to 180°C.

Thor Duct® insulation is a compact calcium-magnesium silicate blanket made from low bio-persistence wool with a thickness of 38mm.

It is totally inorganic and exonerated from classification under Nota Q of EU Directive 97/69/EC. It is a lightweight easy to install insulation with an attractive finish similar to the finish of standard thermal insulation.

It has a resistance to both thermal shock and mould growth (anti-microbial), and can be used in hospitals because it has the required encapsulated insulation to ensure there are no migration of fibres. The encapsulation is an aluminium foil/glass fibre reinforced aluminised polyester scrim.



This scrim provides additional handling strength in addition to providing protection against moisture absorption.

Thor Duct® insulation has exceptional insulation properties withstanding temperatures of 1200°C. At a typical ambient temperature of 25°C the thermal conductivity would be 0.044 W/mK.

Integrity



The integrity of the entire system is based on the performance of all elements from penetration seals, to smoke leakage to cross sectional area.

When all of the components perform to the required standard, only then can the integrity be classified.

Thor Duct® achieved exceptional results in all areas and therefore have a level of integrity others can only hope to achieve.

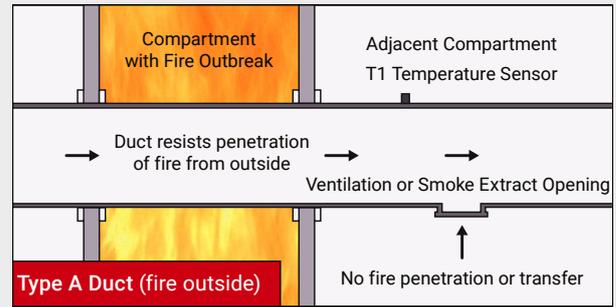
Thor Duct® achieved a benchmark result for the type of steel ductwork tested which was noted in the independent accredited Warrington Exova test laboratory as not having been achieved before.

Test Type A

Type A testing involves fire outside the duct. The test furnace is raised to operating temperatures of 1000°C with the specimen suspended within. The duct passes through the dedicated penetration seal where various measurements and observations are used to determine its suitability and performance.

In this test no fire passes through the duct. The duct is tested for leakage, integrity and the rise in temperature where the duct is insulated.

Uniquely, the kitchen rating is measured by including 4 thermocouples, fixed to the inside of the ductwork, inside the furnace.

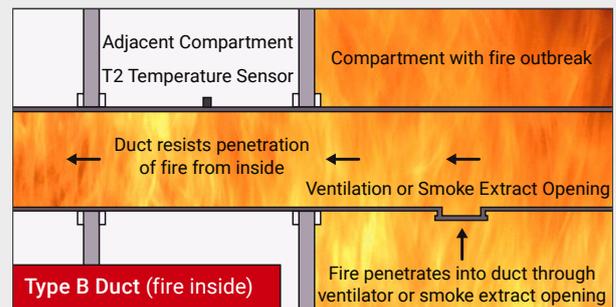


Test Type B

Type B involves fire inside the duct. There is an opening in the duct within the furnace which allows the fire to pass through the duct unimpeded.

A fan connected to the duct extracts hot furnace gas at a velocity of 3 m/s at up to 500pa negative pressure exposing the internal skin to the full fire conditions.

The duct is tested for leakage, integrity and the rise in temperature where the duct is insulated. For this Type B test up to 60 thermocouples are mounted outside the furnace determining the smoke insulation value.



Test Type C

Type C is carried out on smoke extract only. It can only be tested once Type A has been completed at a pressure of 500pa. The insulation value achieved in Type B is the one that is used for this classification.

The cross sectional area is measured uniquely in the Type C test when it is placed under full fire conditions and under pressure of either 150pa, 300pa or 500pa. A test at 1500pa is also conducted at ambient temperatures.



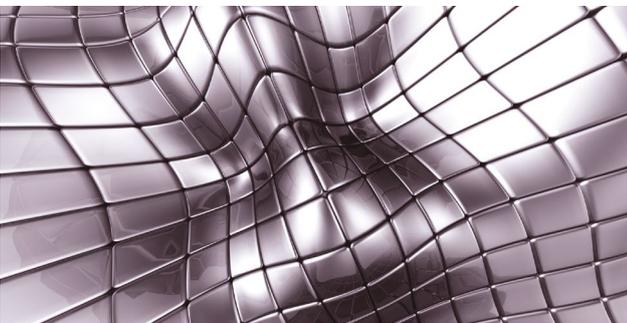
Leakage

Smoke ductwork and fire ductwork have different leakage criteria. Smoke extract is tested to a maximum of 10m³/hr/m² and a low of 5m³/hr/m². Fire duct is tested at a higher rate to a maximum of 15m³/hr/m² and a low of less than 10m³/hr/m².

Thor Duct® received a classification of "S" in both tests, "S" being the highest classification in this category.



Cross Sectional Area



Cross sectional area is the mechanical stability of the duct being tested. Failure occurs when the duct has a deflection and the cross sectional area is reduced by more than 10%. This is when the duct weakens as a result of full fire conditions and negative pressure causing the duct to convex. The duct becomes redundant when it changes shape sufficiently impairing its functionality and it loses the ability to perform.

Previously under BS the cross sectional area was far more generous than the new stringent EN standards.

This is because the new EN standard has identified this as a critical requirement to maintain 90% of the cross sectional area throughout the duration of the test.

Thor Duct® meets and exceeds this requirement with an exceptional level of integrity.

Test pressure

Test pressure is typically carried out at a minimum of 300pa for fire duct and 500pa for smoke extract. During testing there is an option to increase the pressure to a maximum of 1500 pascals.

Thor Duct® has tested all ducts to the maximum pressure of 1500pa.



Horizontal & Vertical

The system must be subjected to tests in both a horizontal and vertical orientation.

Orientation can radically change the products performance.

If only one orientation is tested, only that tested orientation can be certified. For example if you test Type A, B & C horizontally, you can only certify horizontal applications and any duct installed vertically cannot be certified.



Classification

The classification shall indicate if the performance criteria are satisfied by fire from inside or fire from outside or both and whether it applies to vertical or horizontal orientations or both.

For example a classification of EI 30 (Ve Ho i ↔ o) indicates a ventilation duct capable of satisfying 30 minutes integrity and insulation from both inside to outside and vice versa in both vertical and horizontal applications.

It is important to note that “t” class in time differs for smoke extract, fire rated ductwork and kitchen extract.

Smoke Extract

30, 60, 90 and 120 minutes

Fire rated/Kitchen Extract

EI 15, 20, 30, 45, 60, 90, 120, and 240

E (uninsulated duct) 30, 60

The classification is based on the first fail of the test. For example, if the test achieves an insulation value of 120 minutes but the penetration seal fails at 70 minutes, a classification of 60 minutes is awarded. The awarded classification is based on the weakest element of the test.

Classification symbols used:

E	Integrity
I	Insulation
S	Smoke leakage
t	class in time
Ve	Vertical Duct
Ho	Horizontal Duct
i	fire inside the test (Type B or C)
o	fire outside the test (Type A)
i → o	tested for fire inside duct
i ← o	tested for fire outside the duct
i ↔ o	tested for both respectively

The classification awarded is based on your performance as a whole and categorised into the nearest time bracket, always rounding down.

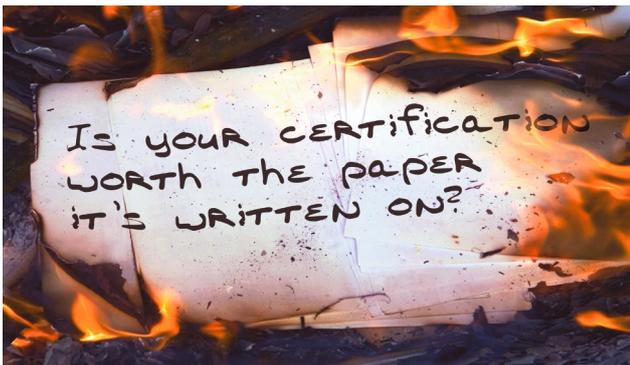
For example, if the test achieved a result of 88 minutes, the awarded classification would be 60 minutes, because the result falls short of the next classification of 90 minutes.

Third Party Certification

The necessity for installers to provide evidence of competency has become the subject of legislation in many of the CEN member countries. The practice is encapsulated in the BCar regulation in Ireland and CDM regulations in the UK to name two.

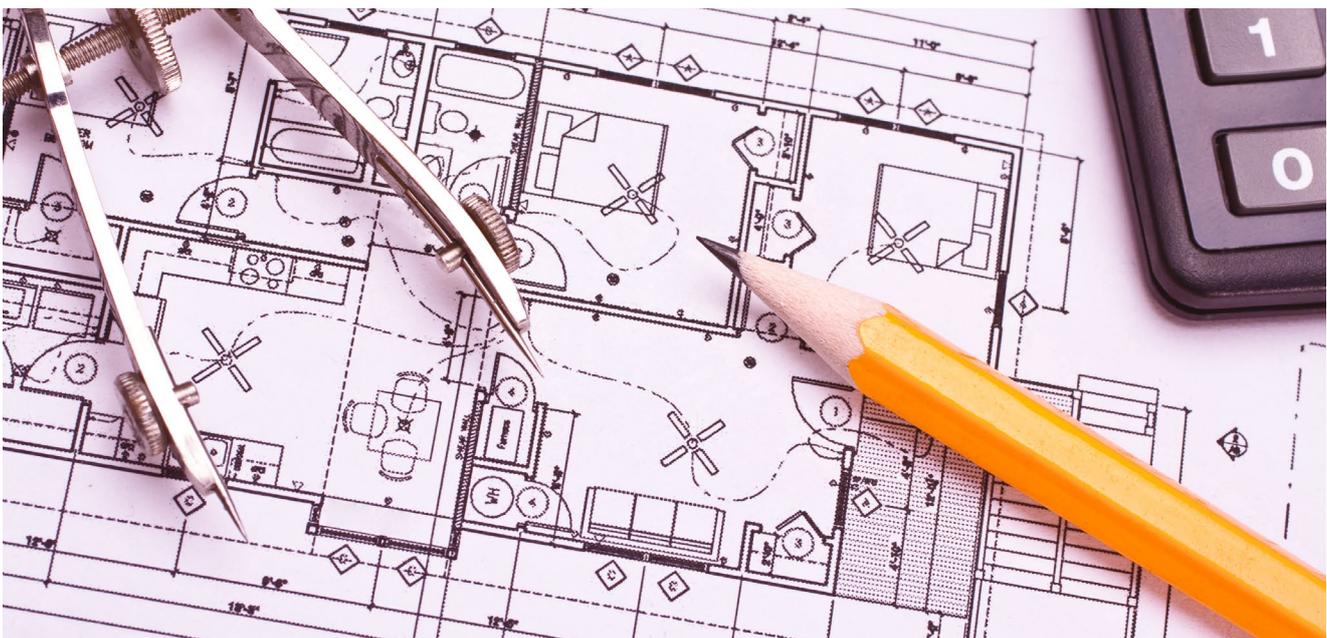


The use of independent certification schemes such as FIRAS provides clients and specifiers with confidence regarding the competence of potential contractors. It helps them to fulfil their own duty of care under the CDM regulations and it gives the responsible person confidence of compliance with the Regulatory Reform Order and national equivalents (**ASFP Technical Guidance Document 18: Code of practise for the installation & inspection of fire resisting ductwork**).



The ASFP (Association for Specialist Fire Protection) strongly promotes the use of specialist third party certificated installers and consequently requires all ASFP installer/contractor members to hold third party certification.

The use of non-specialist installers is not recommended because they cannot provide the same level of competency as distinct from using a specialist third party certificated installer.



CE Marking of the fire rated duct

CE marking of products with harmonised (hEN) standards became mandatory on the 1st of July 2013 as stated within the requirements of the European directive. Consequently smoke extract duct covered by product standard BS EN 12101-7 must be CE marked (DW144).



National standards, such as **BS476 (UK and Ireland)**, cannot support CE marking of construction products and has been **withdrawn** where a harmonised standard exists.

Fire resistant ductwork, kitchen extract and pressurisation covered by product standard **prEN 15871** will require mandatory CE marking one year after the publication of the standard is qualified in the **Official Journal of the EU**. This will be harmonised shortly, however under Irish law **IS EN 1366-1** became statute in April 2015.



CE marking ensures that the fire duct manufacturer has tested all products to the present relevant BS EN tests 1366-1, 1366-8 and 1366-9 at a notified certification body.

There is a requirement for the fire duct manufacturer to have a quality management system (ISO 9001), and also having passed a FPC (factory production control) for the manufacturing and to have third party certification for the installation of fire duct systems.



Specification

Thor Duct® Fire Rated Ductwork

All fire rated and pressurisation ductwork **Thor Duct**® EN will be to **prEN standard 15871** and tested to **EN 1366-1** vertically and horizontally for Type A (fire outside) and Type B (fire inside).

All ductwork rated "S" for low leakage. All fire rated ductwork will be tested in a flexible wall and be suitable for installation in stud partition, block wall and concrete floor. A classification report to **EN 13501-3** must be provided.

All fire rated ductwork is to be installed under a third-party certifier such as **Firas** (Ireland and UK) as identified in the **ASFP TGD 18**, with a third-party certificate issued on completion.

Where duct sizes exceed 1250 × 1000, **Thor Duct**® XL may be provided for sizes up to 2500 × 1250, with test evidence must be provided to **EN 1366-1**.

Thor Duct® Smoke Extract

All smoke extract ductwork will be **Thor Duct**® SE to **(hEN) standard 12101-7** and tested to **EN 1366-8** for multi compartment or **EN 1366-9** for single compartment.

Where multi compartment ductwork is required it must be insulated to the same period of time as the compartment through which it passes.

Insulation to be used must be as tested during **EN 1366-8** test, (**EN 1366-8 Part 6.3**). Alternatives are not acceptable.

A classification report to **EN 13501-4** must be provided. Evidence of a **Factory Production Control (FPC)** being in place must be provided.

All smoke extract will carry CE marking from July 2013 and is to be installed under a third-party certifier such as **Firas** (Ireland and UK) as identified in **ASFP TGD 18**. All ductwork must have classification for testing outside (A), inside (B) and smoke extract (C) in both a horizontal and vertical position.

All ductwork rated "S" for smoke leakage and have been tested to high pressure 1500 PA. All smoke extract will be tested in a flexible wall and be suitable for installation in stud partition, block wall and concrete floor.

All smoke extract ductwork is to be installed under a third-party certifier such as **Firas** as identified in the **ASFP TGD 18**, with a third-party certificate issued on completion.

Thor Duct® Kitchen Extract

All kitchen extract will be **Thor Duct® KE** to the **prEN standard 15871** and tested to **EN 1366-1**, and must be insulated to the same period of time as the compartment through which it passes. Insulation to be used must be included in the manufacturers test. Alternatives are not acceptable.

All kitchen extract ducting must be accessible for cleaning and inspection purpose and have a cleaning door (to the same fire rating, and tested in the proposed system) installed every 2 linear meters. The cleaning doors must be as tested in the system.

All ductwork must have classification for testing outside (A) and inside (B) in both a horizontal and vertical position. All ductwork rated "S" for low leakage. A classification report to **EN 13501-3** must be provided. Insulation ratings must be both Type B and Type A.

Training and support

Thor Duct® has developed a training module for specifiers, licencees and installers to ensure that our fire ductwork systems are ready to perform in the event of a fire incident.

Our product range is a critical part of any fire strategy, and one we all rely on when our worst fears are realised.

For a CPD, please contact your local distributor. Details of support offering can be found at **www.safe4fireduct.co.uk** and **www.thor duct.com**.

Thor Duct® fire duct systems trades as **Safe4 Duct®** in the UK and Ireland.

All kitchen extract ductwork will be tested in a flexible wall and be suitable for installation in stud partition, block wall and concrete floor.

All kitchen extract ductwork is to be installed under a third-party certifier such as **Firas** as identified in the **ASFP TGD 18**, with a third-party certificate issued on completion.





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Becoming a **Thor Duct®** Licensee allows you to add state-of-the-art EN tested and certified ductwork to your product mix. Our licensing model ensures you get the highest standards of manufacture and installation with training and support. Visit thorduct.com/licensees

Thor Duct® offer an extensive training program through our online CPD scheme for specifiers and consulting engineers. To access our knowledge base, visit thorduct.com/resources/cpds



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