

TECHNICAL BULLETIN

FLAME RETARDANCY - "The inside story"

The Standards:

B.S. 3119: 1959 - Withdrawn

B.S. 3120: 1959 - Withdrawn

CP413 - An old Greater London Council Authority (GLC) Regulation, which included clauses about the equipment to be used in the ventilation of buildings, and their fire retardancy. Tests of components were performed by L.S.S. who developed various test methods, as those covered by British Standards were not felt to be appropriate as they were for testing such items as children's night clothing and soft furnishings. Now not relevant due to demise of GLC.

B.S. 5588: 1989 - Fire Precautions in the design and construction of buildings.

- Part 9 being the Code of Practice for ventilation and air conditioning ductwork.
- Section 3 of this includes the following RECOMMENDATION "Surfaces of air filters, attenuators and similar components of ventilating systems exposed to the air flow should be inherently non-flammable or so treated that they retain these qualities throughout their recommended working life. Viscous liquids in air filters should have a flash point of not less than 177 Deg C.

A Test Method for evaluating the compliance of air filters to CP413 was developed by the LSS, and this same standard is used by a current Testing Service of Stranger Science and Environment. This Test House uses Edition III dated 31.13.1990 of the LSS specification.

The test method looks at:

- **Ignitability** - where in the presence of a small flaming ignition source, the filter, its housing, fixings etc. may ignite and continue to burn but must not spread flame, nor must it produce any flaming debris
- **Smoke Test** - the rate of production and overall amount of smoke shall be judged by comparison with a standard, that "if involved in a fire all such materials and liquids should generate the minimum amount of smoke".
- **Toxic Gases** - "If involved in fire all such materials and liquids should generate the minimum amount of toxic gases", on the basis of their chemical composition and measured concentration of toxic gases when compared with the H.S.E. guide EH40/91.

UL900: An American Standard written by the Underwriters Laboratory. It has 2 classes within our area of concern:

Class 1 – for which filters using glass only media and kevlar thread would conform.

Class 2 - for which the pleated medias being used by ourselves conform.

DIN 53438 – Parts 1-3 see attached sheets for detailed information concerning the test methods.

This tests for the reaction of materials to the flame of a gas burner. There are three classes for this test, which are effectively:

Class F1 - the spread of flame does not reach the mark 150mm above the flame

Class F2 - the spread of flame takes in excess of 20 seconds to reach the mark 150mm above the flame point on the material.

Class F3 - the spread of flame reaches the mark in less than 20 seconds.

COMMENT:

The use of Fire Retardant Materials can only be of benefit to all of us. But this has to be tempered with reality.

- Eliminating the use of cardboard frames to filters is an obvious reduction in flammability and easily achieved.
- The dust that the air filters are removing will burn and support combustion, admittedly the filter does not have to assist in this burning process.
- The quantity of material involved is quite minimal, in comparison with the size and quantity of other materials within the buildings, and these materials are likely to be on the plant room side of fire dampers.
- The use of non-flammable materials is only a recommendation within this standard, which would suggest that if required it must be specified as a particular requirement in a specification, i.e. the recommendation is to be met, and not just the equipment shall conform to BS5588: 1989 etc..., at the Consultant specification stage..
- The F6 grade pleats meets Class 2 UL900.
- The F6 grade pleats meets Class F1/F2 of DIN 53438 Part 3 (Copy attached)
- The G4 grade pleats meets Class 2 of UL900.

Addendum

DIN 53438 PART 1

Testing of Combustible materials

REACTION AGAINST THE FLAME OF A BURNER

General remarks

1.) Scope and application

The test of products are suitable to control and compare the consistency of products regarding the reaction against the flame of a burner. The test results give only a rough indication of flame reaction if the testing conditions are different.

2.) Brief description of the testing procedures

The flame of a gas burner is applied to a horizontally held test filter;
- at the bottom edge (K / DIN 53 438 part 2) of the sample, and
- to the body of the rest of the test material itself (F / DIN 53 438 part 3).
It is to be determined if and in what length of time the flamepeak reaches a certain measurement mark on the test sample.

Note: Due to international experience it is correct to say that the results of testing combustible materials in fixed conditions in research laboratories cannot be taken as proven evidence of a general fire risk.
Conclusions referring to the test results of DIN 53 438 must not be valid in general if the testing conditions are different from the above mentioned standards.

DIN 53 438 PART 2

Testing of combustible **materials:**

REACTION AGAINST THE FLAME OF A BURNER

Edging flame action (K)

2.) Test samples

2.1 10 sample pieces have to be taken out of the quality that has to be tested.

Five of these samples are going to be tested.

2.2 The length of the test samples is 190mm and the width is 90mm.

Test samples with a thickness of +/- 10% at all measurement marks, of the average of all testing samples, must be used.

2.3 A measurement mark is attached to 150mm above the bottom edge of each sample.

3.) Preliminary treatment of the testing samples.

According to DIN 50 014 – 23/50 – 2 the test samples have to be stored in standard climatic conditions for a minimum time of 24 hours.

4.) Testing performance

4.1 According to DIN 50 014 there must be standard room temperature in the laboratory at the beginning of the test.

- 4.2 The thickness is measured at the middle length-axis in distances of 10,70 and 130mm from the bottom edge of the test sample, to +/- 0.1mm exactly.
The test sample is put in the bipartite frame so that the bottom edge is 40mm above the bottom edge of the frame.
The burner is started in vertical position and the flame is adjusted to a length of 20mm. The flame has to keep to it's exact length for one minute (if necessary readjusting). Afterwards the burner has to be inclined to an angle of 45 Deg.
- 4.3 The burner has to be moved towards the test sample so that the flamepeak reaches the bottom edge in the middle of it's thickness (or at least 1.5mm away from the burner facing bottom edge).
The distance of the burner edge (stabilizer front edge) to the impact point is 16mm. The flame is applied to the test sample for 15 seconds and afterwards the burner has to be moved back.
One has to take care that no interrupting draught of air occurs.
The measured length of time is from starting to flame the sample until the burning sample reaches the measurement mark, provided that the sample's flame doesn't extinguish before.
It has to be assessed if the flame smoulders after the sample's flame has extinguished.
- 4.4 Before starting a new test the frame and all other involved parts have to cool down to normal room temperature.

5.0 Review and Assessment

5.1 REVIEW

The Flame peak (highest point of the flame) of the burning sample does not reach the upper measurement mark	Class K1 /mm F1 / Thickness of sample
The upper measurement mark is reached by the flamepeak within 20 seconds or more	Class K2 /mm F2 /mm
The upper measurement mark is reached by the flamepeak in less than 20 seconds	Class K3 /mm F3 /mm

5.2 ASSESSMENT

- a) If two out of five samples are to be classified worse then the whole tested quality has to be assessed in the worst classification.



P.O.Box 147, MAIDSTONE, ME14 2LA
Tel: +44 (0)1622 832777
Fax: +44 (0)1622 832507
sales@airclean.co.uk

b) If one out of five test samples is to be classified worse, a re-testing with five new test samples has to be done. If one or more test samples was to be classified worse again re-testing then the overall tested quality has to be assessed in the worst classification.