

## **PORTABLE FIRE EXTINGUISHERS GUIDE**

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## **Disclaimer**

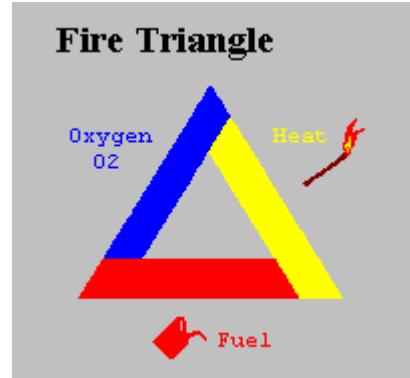
The facts and opinions set out in this document are believed to be correct in light of the information currently available, but they are not guaranteed and the author cannot accept any responsibility in respect of the contents of this document or its implementations.

The document provides a general overview and basic information on this topic. It may not apply to everyone, consequently to find out if this guide applies to you and to get more information on this subject, study all the relevant British/European Standards. Also you should seek advice from an expert on the subject or your local Fire Safety Officer or Fire Safety Professional.

## **The Fire Tetrahedron**

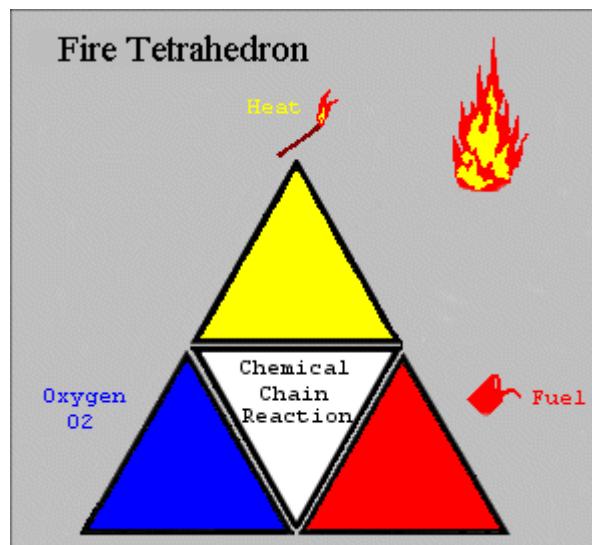
In order to understand how fire extinguishers work, you first need to know a little about combustion. Unfortunately, it is impossible in this short introduction to completely describe all the complex chemical and physical reactions that take place during a fire. However it will attempt to introduce the basic theories of fire.

For many years the concept of fire was symbolized by the Triangle of Combustion and represented, fuel, heat, and oxygen. Further fire research determined that a fourth element, a chemical chain reaction, was a necessary component of fire. The fire triangle was changed to a fire tetrahedron to reflect this fourth element. A tetrahedron can be described as a pyramid which is a solid having four plane faces. Essentially all four elements must be present for fire to occur, fuel, heat, oxygen, and a chemical chain reaction. Removal of any one of these essential elements will result in the fire being extinguished.



The four elements are oxygen to sustain combustion, sufficient heat to raise the material to its ignition temperature, fuel or combustible material and subsequently an exothermic chemical chain reaction in the material. Each of the four sides of the fire tetrahedron symbolise the Fuel, Heat, Oxygen and Chemical Chain Reaction. Theoretically, fire extinguishers put out fire by taking away one or more elements of the fire tetrahedron.

The symbol although simplistic, is a good analogy, how to theoretically extinguish a fire, by creating a barrier using foam for instance and prevent oxygen getting to the fire. By applying water you can lower the temperature below the ignition temperature or in a flammable liquid fire by removing or diverting the fuel. Flooding the fire with CO<sub>2</sub> gas displaces oxygen, smothering the fire. Finally interfering with the chemical chain reaction by mopping up the free radicals in the chemical reaction using dry powders and vaporising liquid extinguishers such as BCF or FE-36, (which also create an inert gas barrier)..

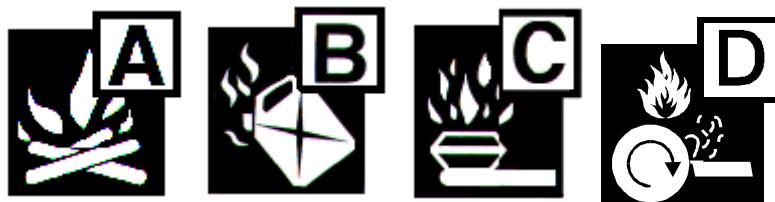


*The 2D represents a 3D model of a tetrahedron*

## CLASSES OF FIRE

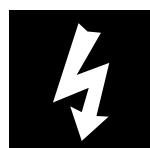
Fires have been classified into four groups A, B, C, and D

- Class A fires - are fires involving organic solids like paper, wood, etc
- Class B fires - are fires involving flammable Liquids.
- Class C fires - are fires involving flammable Gasses
- Class D fires - are fires involving Metals.



Electrical fires are not included, as they can fall into any of the classifications. However if you use a water extinguisher you must isolate the electric supply first as you could be electrocuted. In addition it must be remembered that certain electrical apparatus maintains a lethal charge for some time after it has been switch off.

In the UK extinguishers that contain a non conductive media that can be used on energised electrical equipment, such as Powder, CO<sub>2</sub> or Vaporising Liquids are marked with a symbol indicating their safe use on this equipment.



Some water with additive and spray foam extinguishers that have passed the 35kV conductivity test of BS EN 3 is also so marked.

What should you do if you discover a fire? You must get everyone out as quickly as possible and call the fire brigade. However you may discover a fire in its very early stages and think that you can deal with it yourself. The first thing that you should remember is that fire spreads very quickly. Even a small contained fire can quickly spread, producing smoke and fumes which can kill in seconds. If you are in any doubt do not tackle the fire, no matter how small. You can put yourself at risk by fighting the fire. If in doubt get out, call the Fire Service out and stay out.

### **Class F fire extinguishers**

The British Standards Institution (BSI) published a standard which introduced a new fire classification for cooking oil and fat fires, Class F, which was BS 7937 and now has been replaced by BS EN 3-7 2004 + A1 : 2007 Characteristics, performance requirements and test methods



The standard includes a detailed description of the rigorous testing extinguishers must successfully undergo to achieve the Class F test fire rating.

### **TYPES OF EXTINGUISHER**

The type of fire extinguisher is determined by;

- a) The method of expelling the contents
- b) The extinguishing media contained within

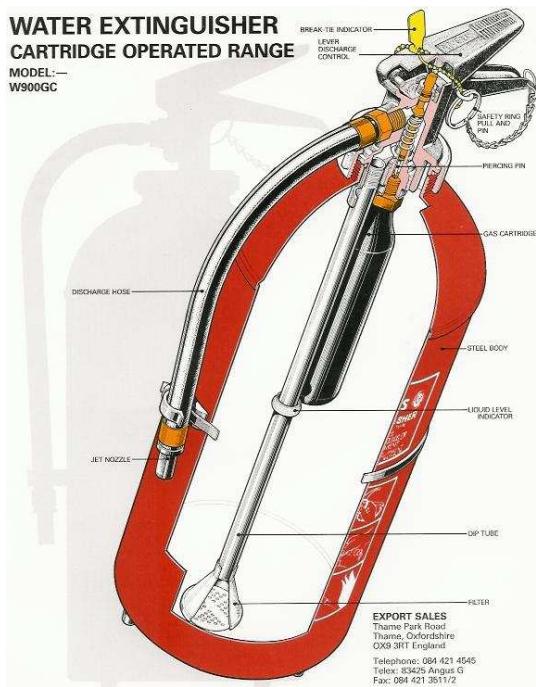
#### **Methods of expelling the contents**

Two methods exist;

- Gas Cartridge pressure
- Stored Pressure

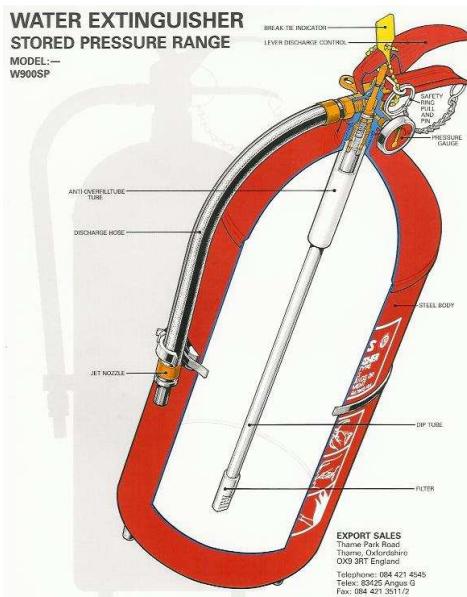
#### **Gas cartridge pressure**

In these extinguishers a small cylinder of compressed gas (usually CO<sub>2</sub>) is screwed into the head cap inside the main extinguisher body. Upon operation the cartridge seal is pierced allowing the CO<sub>2</sub> inside to pressure the main body and expel the contents



### Stored pressure

In these extinguishers the body of the extinguisher is permanently pressurised with a propellant gas (usually air or nitrogen). Upon operation a valve is opened allowing the pressurised contents to escape. These types often have a pressure gauge to allow the user to easily check the serviceability of the extinguisher. CO2 extinguishers operate on the stored pressure method with the CO2 stored as a liquid under its own vapour pressure



## **EXTINGUISHING MEDIA**

### **Water**

Plain water is an effective cooling agent, absorbing the latent heat from a fire. It is especially effective on Class A fires.

Water is not safe for use on other classes of fire, it will spread a class B fire, conduct electricity from energised equipment, release explosive hydrogen from Class D fires and will boil over on class f fires

### **Water additives**

To increase the effectiveness of water detergent based surfactants can be added to improve the penetration of the water into the burning material. This allows greater fire fighting capacity and a 3 litre water additive extinguisher can extinguish the same area of fire as a 9 litre plain water extinguisher.

As with water its use is limited to Class A fires

### **Foams**

Detergent or protein based compounds added to water to produce a film or froth that can float over the surface of Class B fires forming a vapour proof seal that smothers a fire.

Effective on Class A fires as well as Class B fires, Foam allows partial extinction of a liquid fire and can prevent re-ignition.

Foams are normally unsafe on energised electrical equipment due to their water content which also precludes them from use on Class D fires. On Class F fires the tremendous heat of the burning fat destroys the foam blanket rendering it ineffective. Certain flammable liquids (polar solvents) also destroy normal foam solutions reducing them ineffective.

### **Dry Powders**

Finely divided chemical compounds that extinguishes by separating the four parts of the fire tetrahedron. It prevents the chemical reaction between heat, fuel and oxygen, thus extinguishing the fire three types are found;

- BC Powder: A Sodium or Potassium Bicarbonate compound designed for Class B & C fires. Does not conduct electricity. High performance blends (Monnex, Purple K) are used in the petrochemical industry
- ABC Powder. Mono-ammonium Phosphate compound that melts and flows to seal and smother Class A fires in addition to its chemical inhibition properties used on Class B & C fires. Does not conduct electricity.
- D Powder. Sodium Chloride, Graphite or Copper compounds that are designed to melt and form a crust around burning metals, smothering the fire and allowing the metal to cool

Powders are almost multipurpose and knock down most fires in seconds but have some drawbacks – they do not cool, reducing their effectiveness on Class A fires, the discharge is messy and obscures vision and on Class B fires the flames will flashback if the whole fire is not extinguished in one go or if an ignition source remains (unlike foam which is not affected

either way). Enclosed electrical equipment is difficult to tackle and the powder (especially if ABC) will damage electronic components

ABC Powder is ineffective on Class F fires as the heat of the oil causes flashback once the extinguisher is empty, although BC Powder can have a limited effect.

### **Carbon Dioxide (CO<sub>2</sub>)**

Carbon dioxide is a non conductive gaseous agent that displaces oxygen to smother a fire.

CO<sub>2</sub> is especially suited for energised electrical equipment as it penetrates & floods enclosures and leaves no residue. It is also effective on small indoor Class B fires

It is ineffective against Class A, D or F fires and like Powders has the same flashback risks on Class B fires.

### **Vaporising Liquids**

Complex chemical compounds that extinguish by separating the four parts of the fire tetrahedron. They prevent the chemical reaction between heat, fuel and oxygen, thus extinguishing the fire

The most common used to be BCF (Halon 1211) effective against Class A & B fires, energised electrical equipment and particularly popular for vehicle and computer protection.

Halon extinguishers are now illegal to possess, service or fill except for a very narrow list of exempted uses (e.g. on aircraft) and although environmentally friendly replacements are available they are rarely found in portable extinguishers.

### **Wet Chemical**

An alkaline solution of potassium acetate that reacts with the burning fat of a Class F fire to saponify it and turn the surface into a soapy crust, sealing it from the air and allowing it to cool.

It is the definitive extinguishing agent for all Class F fires in fryers over 3 litre capacity/300mm diameter (the limits for using a fire blanket) and due to its water content is effective on Class A fires. It is a conductor of electricity.

## **MANUFACTURE**

### **Definition of portable extinguisher**

An extinguisher which is designed to be carried and operated by hand and which, in working order, has a mass of not more than 20KG.

### **Markings**

The following information should be on the same label:

- The word 'extinguisher'
- Extinguishing medium and nominal charge
- Types of fires
- Instructions for use (pictograms and text)

- Restrictions or dangers of use
- Unsuitability for use on electrical equipment (water based) where applicable
- Manufacturer/suppliers name and address

\*Operating instructions include pictograms to enable non-English speaking people to quickly and easily identify the method of operation.

This does not detract from the need for staff at any premises to be trained in the correct use of the fire equipment provided.

The following information may be found on a separate label:

- Instructions to refill after use
- Instructions to check periodically
- Instructions to use conforming spare parts
- Identification of extinguishing medium
- Identification of percentages of additives for water-based extinguishers
- Propelling gas
- Number of references of the approval
- Manufacturer's model number
- Temperature limits
- Warning against freezing (if applicable)
- Reference to EN3.

### **Colour**

The colour of the body shall be red. A zone of colour up to 5% of the body maybe used to identify the extinguishing agent.

### **Pressure test**

The test pressure shall not be less than 1.3 times the working pressure or at least 20 bars. The body shall not leak or show any visible signs of permanent deformation.

### **Burst test**

The burst pressure shall not be less than 2.7 times the working pressure or at least 55 bars. The burst test shall not cause the body to fragment.

### **Plastic components**

Plastic components on extinguishers subject to pressure undergo artificial ageing conditions and ultra violet light tests. These components are subjected to burst pressure tests at different temperature ranges.

The burst pressure shall be at least equal to 3.4 times the working pressure or at least 55 bars. Plastic components are fitted to charged extinguishers and impact tested.

### **Safety devices**

The operating mechanism shall be provided with a safety device to prevent accidental operation. It shall be possible to determine whether the extinguisher has been operated by means of a safety element (used indicator) e.g. used/empty indicator, gauge reading zero, non-returnable pin.

## **Water based extinguishers**

The discharge tube shall be made from materials resistant to the extinguishing agent.

A strainer shall be provided with the following design features:

- Each orifice shall have an area smaller than the smallest cross section of the discharge passage
- The total area of the holes on the strainer shall be, at least, equal to eight times the smallest cross section of the discharge passage.

## **Performance testing**

Performance testing is carried out at ambient temperatures and at both ends of its operating range:

- -200C to +600C for powder and CO<sub>2</sub>
- -100C to +600C for water/foam.

## **Internal and external corrosion tests**

Prescribed tests are carried out to satisfy these criteria.

## **Mounting**

Bodies for extinguishers that may be free standing shall either have the means to raise the pressure retaining part 5mm off the floor or if in contact with the floor this area shall be at least 1.5 times the minimum wall thickness.

## **Dielectric test**

This test is to establish the suitability of water based extinguishers for use on live electrical equipment. Other types of extinguisher are not subject to this test.

## **Special provision**

Controlled Discharge - Extinguishers shall be fitted with a self-closing control to enable discharge to be interrupted temporarily.

## **Operating position**

Extinguishers shall operate without being inverted. The operating devices shall be located on the upper part of the extinguisher or partly on the upper part and partly on the lower part and partly at the end of the hose or nozzle.

## **Hose assembly**

Extinguishers with a mass of extinguishing medium or volume greater than 3kg or 3 litres shall be provided with a discharge hose. The flexible section of the hose shall be 400mm or greater.

## **Installation and guidance**

BS5306: Part 8 has been recently updated to recognise class F risks and now provides guidance for selection and installations for class F fire extinguishers.

References: BS EN 3-6

Go to <http://www.firesafe.org.uk/html/fsequip/exting.htm> Further Information for the latest British Standards.

## **COLOUR CODING OF EXTINGUISHERS**

Fire extinguishers may be colour-coded to indicate their type. Previously, the entire body of the extinguisher has been colour-coded, but British Standard EN3: Part 7: requires that all new fire extinguisher bodies should be red. A zone of colour of up to 5% of the external area, positioned immediately above or within the section used to provide the operating instructions, may be used to identify the type of extinguisher. This zone should be positioned so that it is visible through a horizontal arc of 1800 when the extinguisher is correctly mounted.

The colour-coding should follow the recommendations of British Standard 7863. Fire extinguishers, if properly maintained and serviced, may be in service for at least 20 years. So there may be situations where a building will have a mixture of new and old fire extinguishers with the same type of extinguishing medium but with different colour-coded markings.

In these cases and to avoid any confusion, it is advisable to ensure that extinguishers of the same type but with different colour-coded markings are not mixed, either at the same location in single-storey buildings or on the same floor level in multi-storey buildings.

Old style fire extinguishers must not be painted red in an effort to comply with the new standard as this would contravene British Standard EN3.

The type of extinguisher is identified by a colour coding as indicated below. The old standard the whole of the body of the extinguisher was painted the appropriate colour code. You will find these in many premises and are legal, you do not need to change them unless the extinguisher is defective and need to be replaced. New extinguisher uses the new standard.

The new standard is BS EN 3 part 7 “Characteristics, performance requirements and test methods”

Water extinguishers are coloured signal red.

Other extinguishers will be predominantly signal red with the manufacturers label, a band or circle covering at least 5% of the surface area of the extinguisher of a second colour to indicate the contents of the extinguisher. I prefer the band around the extinguisher to be used because it can be seen from any angle.

The old standard, the entire body of the extinguisher was colour-coded.

You may find extinguishers colour coded green, they were vaporising liquids (BCF), and have been phased out as the result of the Montreal protocol Consequently you may see any of the above methods of colour coding but the indicating colour always indicates the same type of extinguisher medium.

Type	Old Code	BS EN 3 Colour Code	Fire Class
Water	Signal Red	Signal Red	A
Foam	Cream	Signal Red with a cream panel above the operating Instructions	A B
Dry Powder	French Blue	Signal Red with a Blue panel above the operating instructions	A, B, C
Carbon Dioxide	Black	Signal Red with a Black panel above the operating instructions	A B
Halon	Emerald Green	No longer produced - illegal in the UK (with some exceptions)	A
Wet Chemical	Not in use	Signal Red with a Canary Yellow panel above the operating instructions	A, F
Special Powder	French Blue	Signal Red with a Blue panel above the operating instructions	D



Stainless steel extinguishers	Water	CO2
<p>Where aesthetics are important, you may find extinguishers that are neither red nor colour coded, but of polished aluminium or stainless steel. It is important you familiarise yourself with their contents before there is a fire.</p>		

## References

BS 7863

Go to <http://www.firesafe.org.uk/html/fsequip/exting.htm> Further Information for the latest British Standards.

## FIRE RATINGS

Extinguishers display a fire rating which indicates the type of fire the extinguisher can be used on and the size of test fire they can extinguish. The type (Class) of fire is identified by a letter A B C D F and the size of fire is identified by a number. The larger the number, the larger the test fire it can extinguish i.e. 13A/113B. This rating indicates the extinguisher is capable of extinguishing a Class A fire to the size 13A and a Class B fire to the size 113B under test conditions.

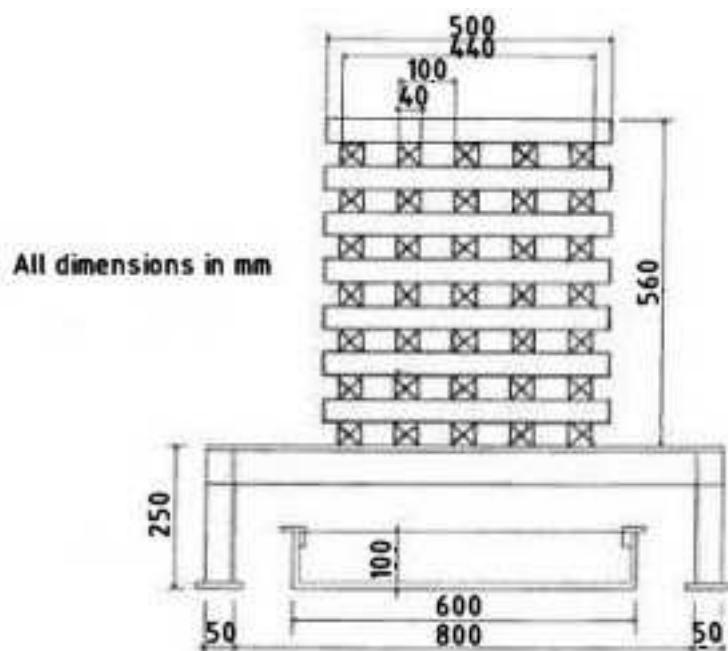
Extinguishers indicate the Class and area of fire for which they are suitable for when used by a person trained in their use.

## TEST FIRES FOR CLASS A

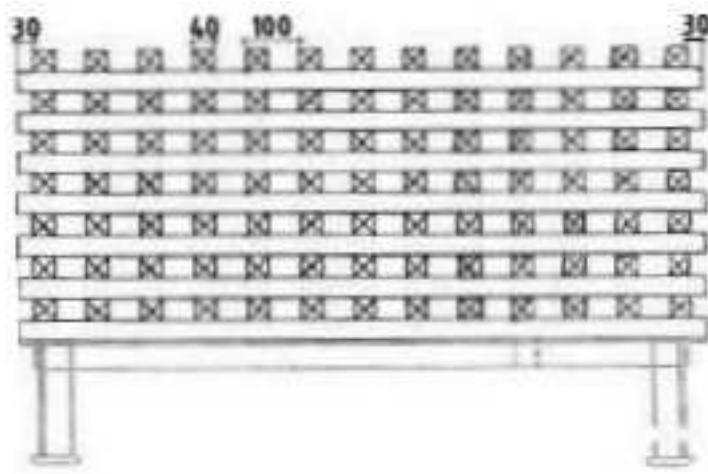
### Apparatus

A metal frame support of 250mm high on top of which is placed wooden sticks in the form of a crib shape. The height of the crib is 560mm and the width is standard at 500mm (see drawing for further details). The length of the crib is determined by the rating to be assessed.

**Front View.**



**Side View**



Ratings	Length of Crib (M)	No of 0,5M Sticks in each Transverse Section	Construction
5A	0.5	5	
8A	0.8	8	
13A	1.3	13	
21A	2.1	21	
27A	2.7	27	
34A	3.4	34	21A + 13A
43A	4.3	43	8A + 27A + 8A
55A	5.5	55	21A + 13A + 21A

## **Fuel**

Industrial heptane is used.

## **Procedure**

Test fires are conducted indoors. Water to a depth of 30mm is added to the tray along with the fuel. Ignite the fuel. Allow to burn for 2 minutes and withdraw the tray. Permit burning for a further 6 minutes then attack the fire.

## **Result Criteria**

The fire should be extinguished within 5 minutes for fires up to and including 21A and 7 minutes for fires greater. There shall be no re-ignition within 3 minutes of extinction.

Example - A 13A rating should be achieved by an extinguisher no larger than 9 litres (water based) or a 4Kg ABC dry powder extinguisher.

## **TEST FIRES FOR CLASS B**

### **Apparatus**

These tests are carried out using welded steel, cylindrical trays. Dimensions of which are given in the accompanying table.

## **Fuel**

Industrial heptane is used.

## **Procedure**

The trays are filled with a third water base and two-thirds fuel. The fuel is ignited and allowed to burn for 1 minute. The fire is then attacked.

## **Results Criteria**

All flames to be extinguished and there is a minimum of 5mm depth of fuel left in the tray. There is a minimum duration of discharge for extinguishers.

**DIAGRAM OF TRAY USED FOR B TEST FIRES**

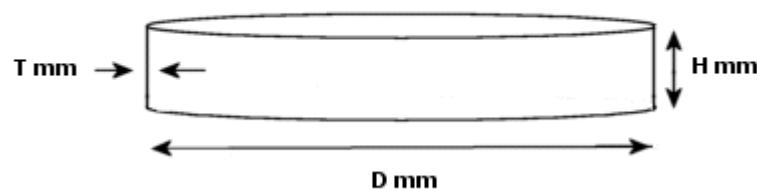


TABLE OF PERMITTED B RATINGS AND TRAY SIZES FOR TEST FIRES							
RATING	VOL OF LIQUID Litres	VOL OF FUEL (APPROX) Litres	VOL OF WALTER Litres	AREA OF FIRE (APPROX) M2	TRAY DIA D mm	TRAY DEPTH H mm	TRAY WALL THICKNESS T mm
21B	21	14	7	0.66	920+/-10	150	2.0
34B	34	23	11	1.07	1170+/-10	150	2.5
55B	55	37	18	1.73	1480+/-15	150	2.5
70B	70	47	23	2.20	1670+/-15	150	2.5
89B	89	60	29	2.80	1890+/-20	200	2.5
113B	113	76	37	3.55	2130+/-20	200	2.5
144B	144	96	48	4.52	2400+/-25	200	2.5
183B	183	122	61	5.75	2710+/-25	200	2.5
233B	233	156	77	7.32	3000+/-30	200	2.5

## CLASS A and B FIRES

A successful test is achieved when two fire tests of a series are extinguished. A series is complete after 3 fires or when the first 2 fires are extinguished or not. There is no restriction on the number of series.

There is a minimum performance for maximum charge weights

## TEST FIRES FOR CLASS F

All extinguishers capable of extinguishing class F fires have a rating based on 4 benchmark tests using 5, 15, 25 and 75 litres of sunflower oil. The oil is heated to auto-ignition and allowed to pre burn for 2 minutes. Fire is extinguished and no re-ignition shall occur within 10 minutes of extinguishing the fire. This section will be updated in the near future.

References: BS EN 3-7

Go to <http://www.firesafe.org.uk/html/fsequip/exting.htm> Further Information for the latest British Standards.

## PROVISION

### CLASS A RISKS

#### Multi-storey

- On each storey there should be at least two extinguishers sited
- The total Class A rating of all extinguishers on that storey should be not less than  $0.065 \times \text{floor area (m}^2\text{)}$  and in no case less than 26A
- A 13A rated extinguisher covers 200m<sup>2</sup>.

#### Single occupancy

- The above applies but on upper floors in single occupancy buildings if the floor area does not exceed 100m<sup>2</sup> the minimum aggregate rating is 13A.

## **Multiple-occupancy**

- As each storey could be occupied by separate companies the minimum provision of 26A applies.

The above provision is based on minimal risk in a building. Provision of fire equipment should be increased depending on fire load of the building.

Additional Reference: BS 5306 Part 8: 2000 Section 6.2

### **Example:**

$$40\text{m} \times 40\text{m} = 1600\text{m}^2 \text{ (floor area)} \times 0.065 = 104 \text{ Class A rating}$$

In the above example, the following options are available:

- 8 x 13A rated extinguishers = 104A
- 2 x 27A and 7 x 8A rated extinguishers = 110A
- 4 x 27A rated extinguishers = 108A
- 3 x 43A rated extinguishers = 129A
- 1 x 43A and 5 x 13A rated extinguishers = 108A.

Additional Reference: BS 5306 Part 8: 2000

## **CLASS B RISKS**

The following factors should be taken into account when providing extinguishers for Class B risks in a building:

- Each room or enclosure to be considered separately
- Fire risks more than 20m apart consider separately
- Fire risks sited within 20m of another fire risk should be assessed either as individual groups or as divided groups

### **Undivided Group**

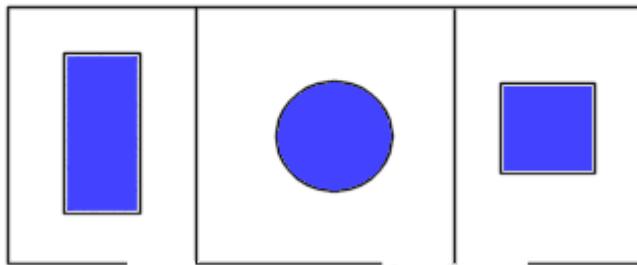
Containers less than 2 metres apart

### **Divided Group**

Two or more containers more than 2m but less than 20m apart the spillage should be calculated from the anticipated volume of spillage – recommended minimum rating 10 x volume (in litres) of spillage

## GROUPINGS OF CLASS B RISKS

Each room or enclosure to be considered separately

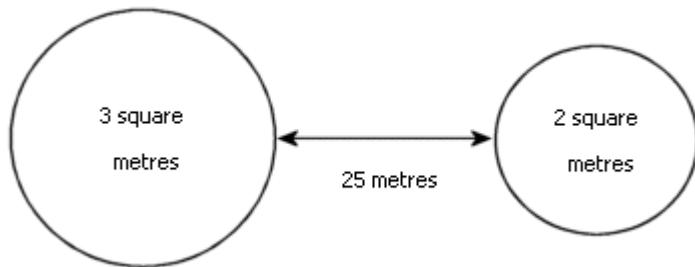


## CONTAINED CLASS B RISKS

To determine the fire protection requirement for a contained Class B risk, we need to consider the surface area of the container and the separation distance from other contained Class B risks.

## SEPARATE RISKS

Risks more than 20m apart need to consider separately e.g.



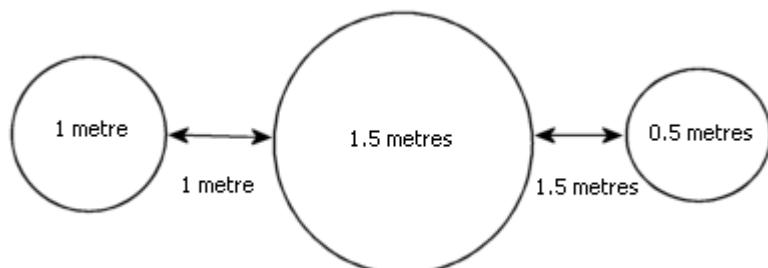
Provide one set of fire protection to deal with a 3 square metre container and

Provide one set of fire protection to deal with a 2 square metre container.

## GROUPED RISKS

**Undivided Group - Less than 2 metres apart**

Treat as a single risk equivalent to the combined surface areas of the individual risks



E.g. Combined risk equivalent to =  $1 + 1.5 + 0.5 = 3$  square metres

Need to provide fire protection to deal with the equivalent combined risk of 3 square metres

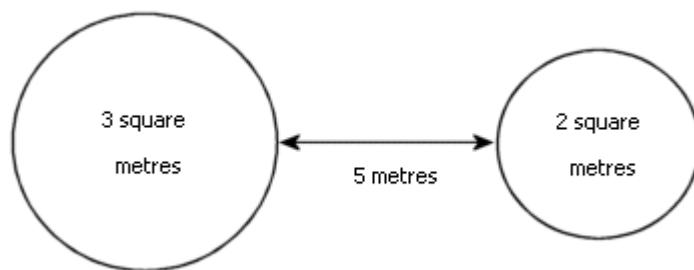
## GROUPED RISKS

### Divided Group

Less than 20 metres but more than 2 metres apart

Method B1 - Treat this as a single risk which is equivalent to the largest of the surface areas of the individual risks or

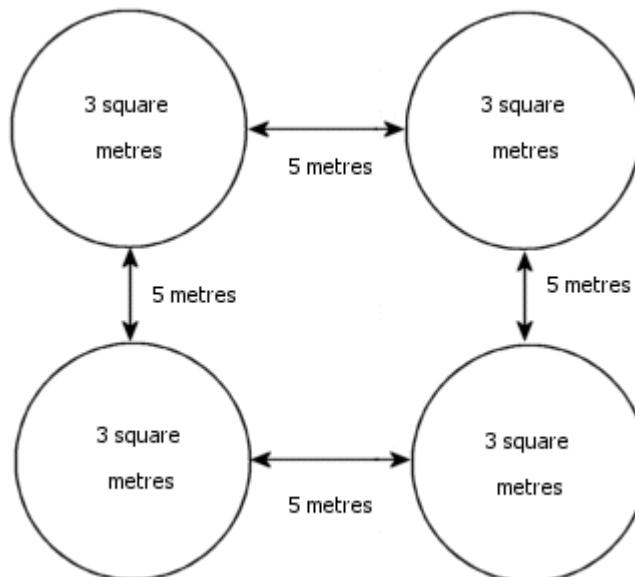
Method B2 - Treat as a single risk by combining all surface areas of the individual risks then divided by three.



Method B1 gives a combined risk equivalent to the surface area of the largest container = 3 square metres

Method B2 gives a combined risk equivalent of one third of the combined surface areas of the individual risks =  $(3+2)/3 = 5/3 = 1.67$  square metres

Since Method B1 gives the higher value the equivalent risk is 3 square metres and fire protection needs to be selected to deal with this size of Class B risk



E.g. Method B1 gives a combined risk equivalent to the surface area of the largest container = 3 Square metres

Method B2 gives a combined risk equivalent to one third of the combined surface areas of the individual risks =  $1/3 \times (3+3+3+3) = 12/3 = 4$  square metres

Since Method B2 gives the bigger value the combined risk is equivalent to 4 square metres and fire protection needs to be selected to deal with this size of risk.

## **SELECTING FIRE PROTECTION EQUIPMENT FOR CONTAINED B RISK**

Consult BS 5306 Part 3

Look in “Table 1 Maximum area of Class B fire (deep liquid) for which extinguishers are suitable”

Look up the nearest value to the surface area of the contained Class B risk

Read across to find the number and minimum fire rating of extinguishers needed to deal with a risk of that surface area

E.g. If the contained B risk is 1.5 square metres this can be dealt with by:

3 x 89B foam extinguishers (1.78m<sup>2</sup>) or

2 x 144B powder or foam extinguishers (but not a combination) (1.8m<sup>2</sup>) or

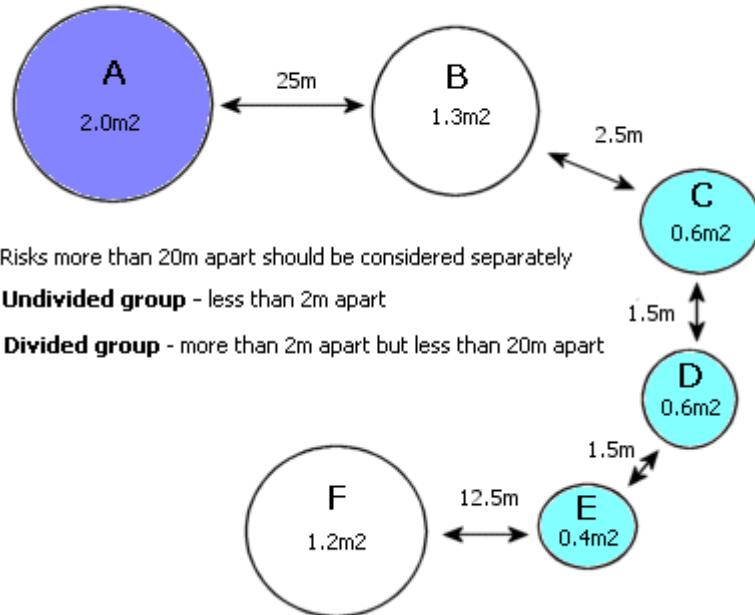
1 x 233B powder or foam extinguisher (1.55m<sup>2</sup>)

<b>TABLE 1 MAXIMUM AREA OF CLASS B FIRE (DEEP LIQUID) FOR WHICH EXTINGUISHERS ARE SUITABLE</b>			
<b>Extinguisher Rating</b>	<b>Max. Area for 3 Exts. (Foam Only) m<sup>2</sup></b>	<b>Max. Area for 2 Extinguishers m<sup>2</sup></b>	<b>Max. Area for 1 Extinguisher m<sup>2</sup></b>
13B	0.26	0.16	0.09
21B	0.42	0.26	0.14
34B	0.68	0.42	0.23
55B	1.10	0.69	0.37
70B	1.40	0.88	0.47
89B	1.78	1.11	0.59
113B	2.26	1.41	0.75
144B	2.88	1.80	0.96
183B	3.66	2.29	1.22
233B	4.66	2.91	1.55
296B	5.92	3.70	1.97
377B	7.54	4.71	2.51
470	9.58	6.00	5.19
610B	12.20	7.62	4.07

Notes:

The shaded rows represent extinguisher ratings no longer applicable under BS EN3 but applicable under the previous standard BS 5423. If three extinguishers are used they must all be foam. If two extinguishers are used they must either be either foam or powder. A foam and powder combination is not permitted. If a single extinguisher is used it may be either powder or foam.

## GROUP OF CLASS B RISKS



Tank A is considered separately. Tanks C, D and E are an undivided group. Tanks B, (C, D, E) and F are a divided group.

Additional Reference: BS EN 3-7

## PURCHASING

The purchase and installation of independently tested and certified extinguishers is part of a Responsible Person's measures for protecting their staff and others from fire.

It is recommended portable extinguishers should conform to European Standard BS EN3 and be compliant with the BS 7863 colour coding specification.

Purchase from companies that provide extinguishers to these standards and install and maintain to BS 5306.

Most workplaces will require a minimum provision of a 26A rated extinguishers as primary protection. In addition all other classes of risks such as electrical equipment and flammable liquids need to be separately assessed and the relevant extinguishers provided.

For extra assurance, you should look for the British Standard Kitemark, the British Approvals for Fire Equipment (BAFE) mark or the Loss Prevention Certification Board (LPCB) mark.

## Which Portable Fire Extinguishers to Select

		W	F	BC	ABC	D	CO2	WC
	Fires involving freely burning materials. For example wood, paper, textiles and other carbonaceous materials	✓	✓	OK	✓			OK
	Fires involving flammable liquids. For example petrol and spirits. Not alcohol or cooking oil		✓	✓	✓		OK	
	Fires involving flammable gasses. For example propane and butane			✓	✓			
	Fires involving flammable metals. For example magnesium and lithium					✓		
	Fires involving electrical equipment. For example photocopiers, fax machines and computers			OK	OK		✓	
	Fires involving cooking oil and fat. For example olive oil, maize oil, lard and butter.							✓

W	WATER TYPE fire extinguisher the rating is shown on the label and should conform to the relevant British Standard. It includes water, water & an additive or water spray.
F	FOAM TYPE fire extinguisher the rating is shown on the label and should conform to the relevant British Standard. It includes multi-purpose and Aqueous film-forming foam.
BC	DRY POWDER TYPE - STANDARD fire extinguisher the rating is shown on the label and should conform to the relevant British Standard.
ABC	DRY POWDER TYPE - MULTIPURPOSE fire extinguisher the rating is shown on the label and should conform to the relevant British Standard.
D	SPECIAL POWDER TYPE fire extinguisher. It is a specialist powder designed to tackle fires involving combustible metals such as lithium, magnesium, sodium or aluminium when in the form of swarf or powder.
CO2	CARBON DIOXIDE TYPE fire extinguishers and conforming to the relevant British Standard.
WC	WET CHEMICAL TYPE fire extinguisher and conforming to the relevant British Standard.
✓✓✓	Especially effective on this type of fire
OK	Safe for this type of fire, but of limited capability – select a more appropriate type

## **SITING OF EXTINGUISHERS**

Extinguishers should be located in conspicuous positions, available at all times for immediate use and fitted on brackets or stands where they will be readily seen by persons following an escape route. Fire extinguishers should be securely hung on wall brackets. Where this is impractical extinguishers should be located on suitable stands (not on the floor). If wall mounted the carrying handle of larger, heavier extinguishers should be 1 metre from the floor but smaller extinguishers should be mounted so the carrying handle is 1.5 metres from the floor. Extinguishers should be sited in such a way that it is not necessary to travel more than 30 metres from the site of a fire to reach an extinguisher. To avoid confusion, all extinguishers installed in any one building or single occupancy should have the same method of operation and if intended for the same function should be similar in shape, appearance and colour. Wherever possible, portable extinguishers should be grouped to form a fire point.

Extinguishers should normally be sited

- In prominent positions on brackets or stands
- On escape routes and in similar locations on all floors
- Near room exits, corridors, stairways, landings and lobbies.

The following factors should be considered when siting fire extinguishers:

- Extinguishers should be on an escape route
- Elevated to a height so that the carrying handle is 1m from the floor for heavier units and 1.5m for smaller units
- Adjacent to the risk but not too close to prevent use in the event of fire occurring
- Near a door, inside or outside according to occupancy
- In multi-storey buildings at the same position on each storey
- In groups forming ‘fire points’
- In shallow recesses where possible
- Away from extremes of temperature within extinguisher temperature ranges
- Maximum 30m travelling distance from a fire to an extinguisher.

Additional Reference: BS 5306 Part 8

The following factors should also be considered when siting fire extinguishers as additions to existing fire protection equipment in a building:

### **Method of Operation**

All extinguishers, where possible, operate by the same method

### **Ease of Handling**

The occupiers should be capable of handling the types and sizes recommended

### **Labelling**

Where different types of extinguishers for different risk types are sited together they must be properly labelled to prevent confusion

### **Suitability for Risk**

Extinguishers with suitable jet or spray nozzles or flexible hoses to suit the risk involved

### **Maintenance Arrangements**

Extinguishers to be serviced to the latest standard

### **Rating**

The fire rating must be covered.

Reference: BS 5306 Part 8

## **MAINTENANCE**

### **Maintenance**

Extinguishers should be routinely inspected by the user at not less than quarterly and preferably at monthly intervals to make sure that appliances are in their proper position and have not been discharged or lost pressure. The user should replace extinguishers not available for use, by serviceable extinguishers. Annual inspection, service and test discharging should be carried out by a competent person. The UK servicing standard BS 5306 Part 3 puts the onus on the user (i.e. the Company) to use a competent person and those extinguishers should be serviced to that standard and the manufacturers recommended procedure.

To ensure a person is competent it is recommended that they should be able to prove he/she has completed a feta registered maintenance course and has attended a refresher course within the last three years. This will ensure he/she has been trained on the maintenance to be followed for portable fire extinguishers installed in industrial and commercial premises. When selecting a maintenance technician use the same procedures you would use when selecting a builder for instance never ever go on price alone.

The servicing procedures include three levels of maintenance and when these are required to be undertaken:

- Basic. Annual inspection and servicing by competent person.
- Extended. Every 5 years a basic service plus test by discharge and internal examination of stored pressure extinguishers.
- Overhaul. Every 10 years for carbon dioxide extinguishers only- detailed inspection and hydraulic pressure test to meet Pressure Systems Safety Regulations 2000.