



CERTIFICATION CRITERIA

TSE K 39

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FIRE EXTINGUISHING BALL

Fire extinguishing ball

TURKISH STANDARDS INSTITUTION
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Preface

- This certification criteria is prepared by the System and Pressure Vessels Private Constant Board connected to Turkish Standards Institution Engineering Services Specialized Group as the revision of TSE K 39 and it is decided to be published based on the confirmation of the Secretariat General dated on 02/07/2012.
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Fire Extinguishing Ball

0 Introduction

This certification criterion is about the description, classification and the features, obtaining samples, control and tests and placing on the market of the disposable unpressurized fire extinguishing balls.

1 Scope

This criteria contains the disposable unpressurized fire extinguishing ball that is used for A and B class fire suppression.

Not 1 - The manufacturer decides on the usage of the fire extinguishing balls for gas fires (Class C fires), electric and kitchen fires.

The disposable unpressurized fire extinguishing ball which is in the scope of this criteria is not in the scope of TS 862-7 EN 3-7.

Not 2 - The description of "fire extinguishing ball" will be used instead of "the disposable unpressurized fire extinguishing ball " hereby in this criteria from now on.

2 The cross-refered standard and/or documents

In this criteria of documentation, it is cross-refered other standards and/or documents. These attributions are indicated in some suitable places in the document and they are listed below. The * marked ones are the Turkish Standards which have been published in English on the date of this criteria has been printed.

TS No	Turkish title	English Title
TS 4087	Kereste partisinin ortalama rutubet miktarının tayini	Sawn timber- Determination of the average moisture content of a lot
TS 2993	Saniyeli ateşleme fitili	Ignition core
TS EN 2	Yangın sınıfları	Classification of fires
TS 862-7 EN 3-7	Seyyar yangın söndürücüler – Bölüm 7: Özellikler, performans özellikleri ve deney metotları	Portable fire extinguishers- Part 7: Characteristics, performance requirements and test methods
TS EN 615	Yangından korunma - Yangın söndürücü maddeler-Tozlar (Sınıf D Tozları Hariç) özellikler	Fire protection-Fire extinguishing media-Specifications for powders (other than class D powders)
TS EN 10056-1:2006	Yapı çelikleri – L profiller ve köşebentler – Bölüm 1: Boyutlar	Structural steel equal and unequal leg angles - Part 1: Dimensions
T EN 14934*	İnşaat mühendisliği uygulamaları için ısı yalıtım ve hafif ağırlıklı dolgu mamulleri - Fabrikasyon olarak ekstrüzyonla imal edilmiş polistiren köpük (XPS) - Özellikler	Thermal insulation and light weight fill products for civil engineering applications - Factory made products of extruded polystyrene foam (XPS) - Specification
TS EN ISO/IEC 17025	Deney ve kalibrasyon laboratuvarlarının yeterliliği için genel şartlar	General requirements for the competence of testing and calibration laboratories

3 Descriptions

3.1 Fire extinguishing ball

Fire extinguishing ball is a mobile fire extinguishing tool which is generally produced as globular, contains fire extinguishing powder and lighting fuse in it, covered with a soft shell, has two or more components that goes out this shell with the effect of internal pressure and can effect a fire under its position and mixed with additives in order to increase its specifications and contains a fire extinguishing material in flour form and based on mono ammonium phosphate.

3.2 Class A fire

It has been described in TS EN 2.

3.3 Class B fire

It has been described in TS EN 2.

3.4 Class C fire

It has been described in TS EN 2.

4 Classifications and features**4.1 Classification**

The fire extinguishing balls which are in the scope of this criteria have only one class.

4.2 Types

The fire extinguishing balls which are in the scope of this criteria have only one type.

4.3 Features**4.3.1 Material**

The materials used to manufacture Fire Extinguishing Ball should be in conformance with Table1.

The name of the Part	Material	TS No
Body	Polystyrene foam	TS EN 14934
Initiating core	Initiating core with second data	TS 2993

The documents about materials may be provided by the manufacturer when they are demanded.

4.3.2 Manufacturing**4.3.2.1 Extinguishing Powder**

This amount of mono ammonium phosphate should be minimum %90 \pm 3 in mass. Specifications of the fire extinguishing powder are mentioned as below.

4.3.2.1.1 Bulk density

It should be in conformance with TS EN 615.

4.3.2.1.2 Sifter analysis

It should be in conformance with TS EN 615.

4.3.2.1.3 Chemical content

It should be in conformance with TS EN 615.

4.3.2.1.4 Resistance to hardening and getting lumpy

It should be in conformance with TS EN 615.

4.3.2.1.5 Water impulsion

It should be in conformance with TS EN 615.

4.3.2.1.6 Humidity content

It should be in conformance with TS EN 615.

4.3.2.2 General

There should not be any crackles or tears or paint removals depending on any leakages or crackles on the fire extinguishing ball.

4.3.2.3 Surfaces

Extinguishers may not have any roughness, break or damage which could affect the size and endurance on their outer and inner surfaces of the fire extinguishers.

4.3.2.4 Thermal Resistance

When the fire extinguishing balls are experienced according to the Article 5.3.1, there should not be any crackles or tears or paint removals depending on any leakages or crackles on them.

4.3.2.5 Explosion Resistance

When the fire extinguishing balls are experienced according to the Article 5.3.2, the glasses that are used in the experiment should not be broken or cracked.

4.3.2.6 Sound level

When the fire extinguishing balls are experienced according to the Article 5.3.3, the level of the sound that spreads out the explosion should be in conformance with the values indicated in the Regulation of Noise Control.

4.3.2.6 Pressure Resistance

When the fire extinguishing balls are experienced according to the Article 5.3.4, there should not be any spillages, crackles or tears on them.

4.3.2.7 Crash Resistance

When the fire extinguishing balls are experienced according to 5.3.5, there should not be any crackles or tears or paint removals depending on any leakages or crackles on them. Moreover, there should not be any break, crash or dislocation on the plastic handle.

4.3.3 Fire performance

4.3.3.1 Class A

When the fire extinguishing balls are experienced according to the Article 5.3.6.1, they should extinguish the sample fire and fresh outbreak fire should not occur in 3 minutes.

4.3.3.2 Class B

When the fire extinguishing balls are experienced according to the Article 5.3.6.2, they should extinguish the fire which is conformance with the fire class declared by the manufacturer according to TS 862-7 EN 3-7, Annex I, in the time which is indicated on the Schedule I.3 and fresh outbreak fire should not occur.

4.4 Size and Tolerances

The size of the fire extinguishing ball and its equipments should be in conformance with the technical pictures declared by the manufacturer.

4.5 Features, Controls and Tests

The features and related controls and test article numbers provisioned in this criteria has been indicated in Table 2.

Table 2 – Features, controls and tests

Feature article no	Feature	Control and test article no
4.3.2.2	General	5.2.1
4.3.2.3	Surfaces	5.2.1
4.3.2.4	Thermal Resistance	5.3.1
4.3.2.5	Explosion Resistance	5.3.2
4.3.2.6	Sound Level	5.3.3
4.3.2.7	Pressure Resistance	5.3.4
4.3.2.8	Crash Resistance	5.3.5
4.3.3	Fire Performance	5.3.6
4.4	Size and Tolerances	5.2.2

5 Obtaining samples, control and tests

5.1 Obtaining Samples

The same size Fire Extinguishers which are tested at the same time together may be assumed as a party. The one who affect the test may choose the tester units randomly from the party. The quantity of samples may be arranged as it is demonstrated in Table 3.

Table 3 – The quantity of the samples obtained and the rejection according to the size of the party

Size of the party	Sample quantity	Rejection quantity
Up to 50	5	1
51 – 90	8	1
91- 150	13	2
151-280	20	3
281-500	32	4
501- 1200	50	6
1201-3200	80	8

5.2 Controlling

5.2.1 Controlling by Sight

The samples chosed according to the Article 5.1 may be checked by eye and it is checked if the result is in conformance with the Articles 4.3.2.2 and the Article 4.3.2.3.

5.2.2 Size Control

The samples chosed according to the term 5.1 may be checked for size and it is checked if the result is in conformance with the Article 4.4.

5.3 Tests

5.3.1 Thermal resistance test

The fire extinguishing ball may be placed in the drying train adjusted to °C (85 ± 5) and it is left in this temperture for ($24 \text{ h} \pm 15 \text{ min}$) and it is checked if the result is in conformance with the Article 4.3.2.4.

5.3.3 Explosion Resistance

The fire extinguishing ball is placed in the middle of the container with dimensions 56 cm x 56 cm x 56 cm attached with a frame made of an enduring material which is made of 5 mm glass and the upper and lower parts can be opened. Please see Figure 1. 10-15 cm³ flammable liquid is poured on the ball and the ball is fired. After the ball is activated, it is checked whether the result is in conformance with the Article 4.3.2.5.

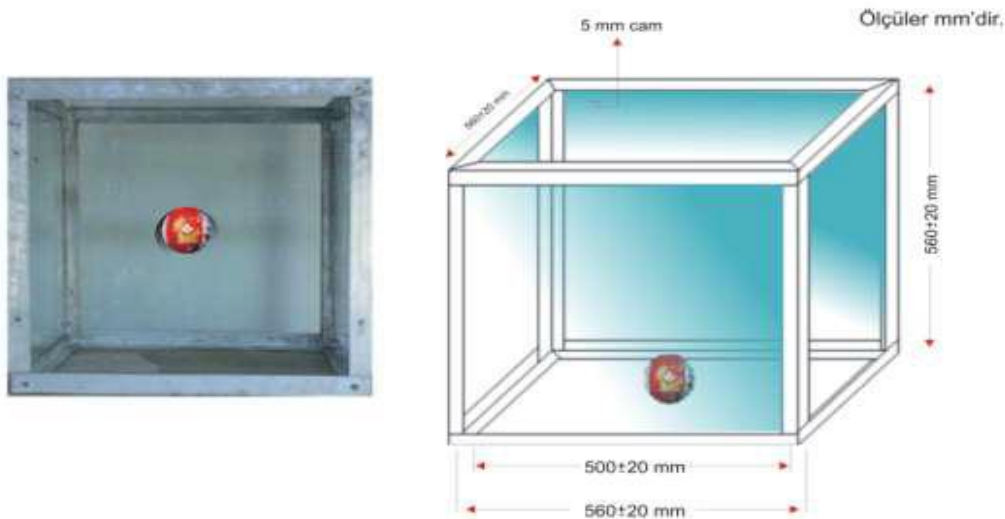


Figure 1 – The Explosion Container

5.3.3 Sound Level Test

Sound level meter is placed in the distance to the fire extinguishing ball as it demonstrated in the Figure 2. 10-15 cm³ flammable liquid is poured on the ball and the ball is fired. The sound level during the explosion is recorded. It is checked if the result is in conformance with the article 4.3.2.6.

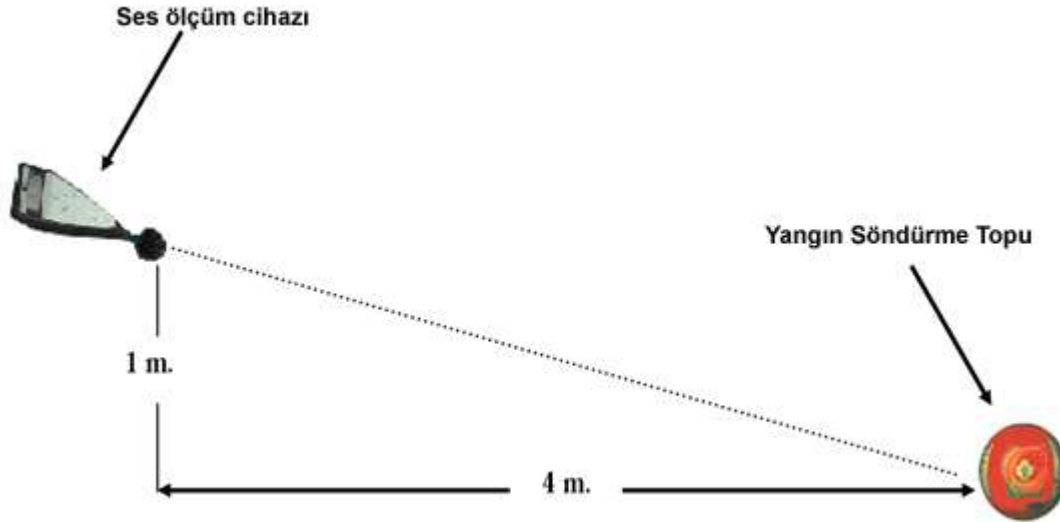


Figure 2 – The sound level test setup

5.3.4 Pressure Resistance Test

Fire extinguishing ball is placed as it is seen in the Figure 3. A load of 5 mm/minute speed to 1472 N is applied. After that the load is released and it is checked if the result is in conformance with the Article 4.3.2.7.

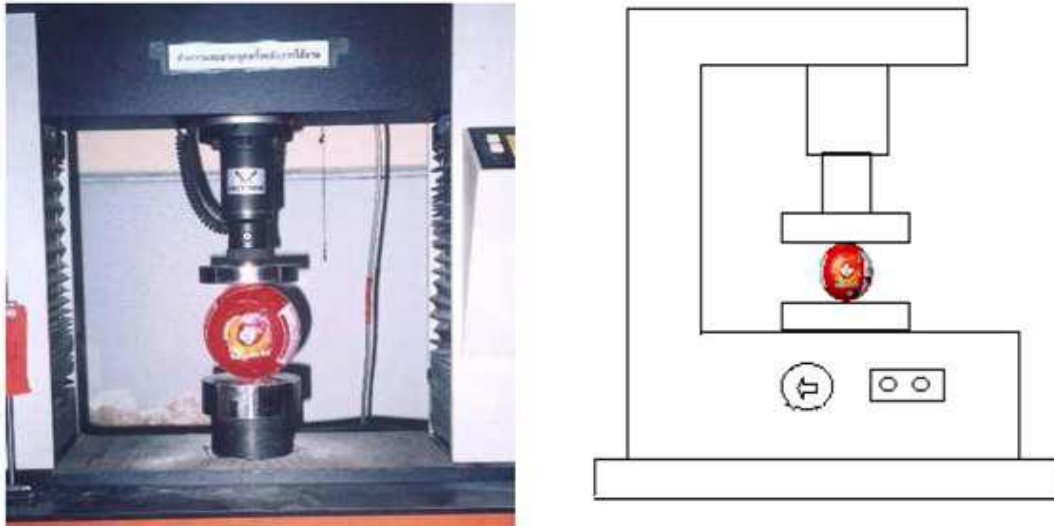


Figure 3- Pressure resistance test setup

5.3.5 Crash resistance test

Fire extinguishing ball is hang up 2.5 m height from the concrete floor in up position. Please see Figure 4. The rope is cut with the scissors and it is provided that the ball falls onto the concrete floor freely. Then it is checked that whether the result is in conformance with the Article 4.3.2.8.

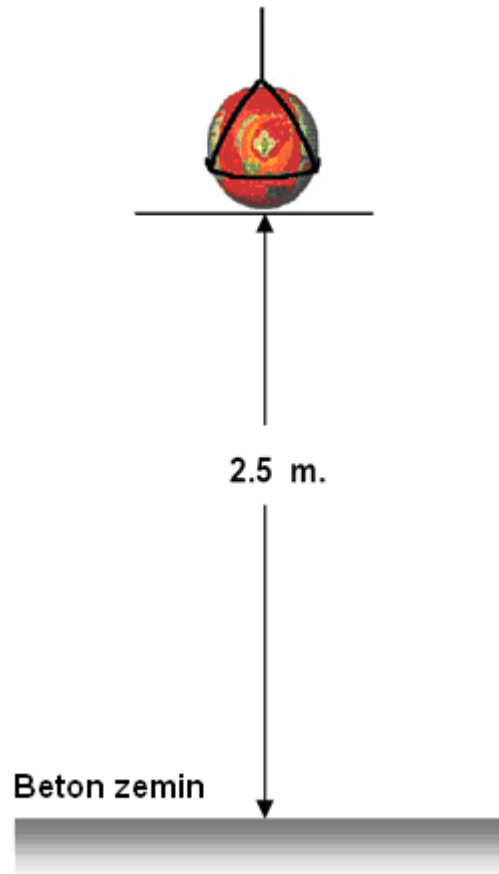


Figure 4 – Crash resistance test setup

5.3.6 Fire Performance

5.3.6.1 A Class fire tests

A Class fire tests should compose of a batch of wooden sticks that are attached to a metal fire grate which has a 250 mm height, 900 mm width and an equal length to the length of the experiment fire. (Figure 5 and Figure 6) The metal grate should be formed by 50 x 50 mm (Length x Width) corner pieces as it is mentioned in TS EN 100056-1.

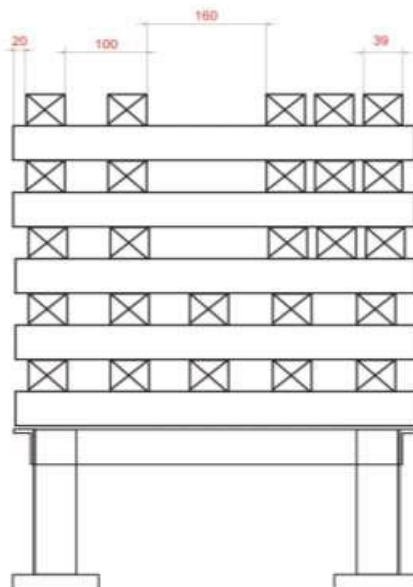


Figure 5 – A Class fire setup (front view)

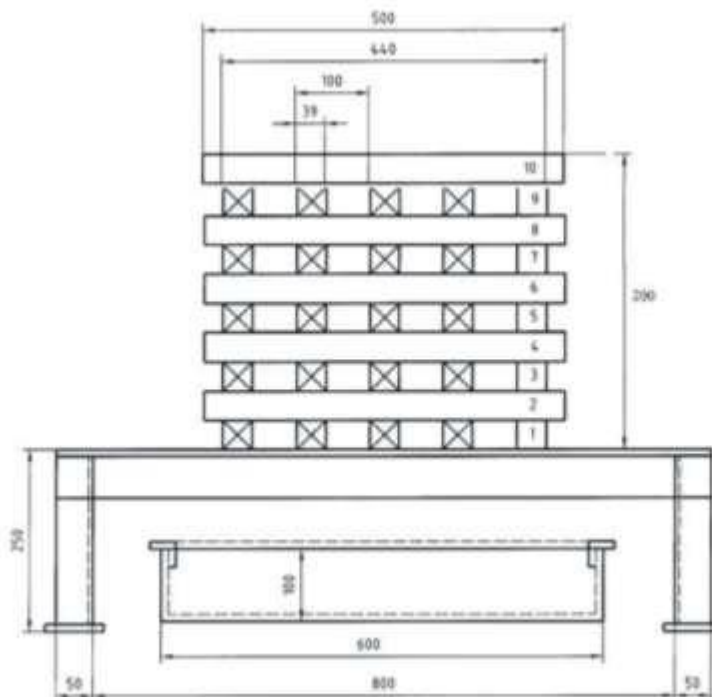


Figure 6 – A Class fire setup (side view)

The length of the fire test setup, in other words the length of the wooden sticks that are placed longitudinal for the test fire and the number and the length of the wooden sticks placed in each case which are set adversely in the fire test setup are demonstrated in Table 4.

Table 4 – The quantity and the length of the wooden sticks used for the A Class fires.

The number of wooden sticks in each case (pcs)	The length of the wooden stick in each case (mm)	Test fire class
5	500	A*
* The manufacturer should indicate the fire class for which the fire extinguishing ball can be used (like 5A, 8A etc.) The length of the fire test setup should be arranged in conformance with the manufacturer’s demand and TS 862-7 EN 3-7, Annex I, Table 1.		

The humidity content of the wood should be arranged in conformance with TS 4087. The measuring should be done with at least 5 samples of which length are (500 ± 10) mm.

The wooden sticks which are fixed according to the explanation above should be yellow pine (*Pinus silvestris*). These sticks should be cut and its lateral section should be (39 ± 2) . The wood density should be between $0,40 \text{ kg/dm}^3$ and $0,65 \text{ kg/dm}^3$.

The sticks in each case should be placed as demonstrated in Table 5 and in a way that they should leave space so that the fire extinguishing ball can be placed. The tops of the sticks which are placed lengthways should be touch one another’s top.

The experiment fire arrangement should be placed in a closed experiment room and it should be protected from air circulations. External environment temperature should be between $0 \text{ }^\circ\text{C}$ and $30 \text{ }^\circ\text{C}$.

The experiment room should have the following characteristics (Figure 7):

- Minimum height of the room (internal) should be 2 m.
- Minimum weight of the room should be 1,70 m,
- Minimum depth of the room should be 1,50 m,
- There should be minimum 0,30 m distance between the room wall and the grate.
- Air and environment conditions: During the test, minimum O₂ concentration should be % 19 in a height between 0,8 m and 1,5 m. The measuring device should be depend on the user.
- Maximum air speed before the ignition, for the horizontal air speed, should be 0,2 m height over the center of the fire grate and 0,2 m/s height while its height is 1 m over the highest stick of the batch. Measurement should be made before the ignition of the batch. It is not permitted to change the characteristics of the air and the air condition during the test and 3 minutes after the test. The test starts with the measurement of the air speed.

A metal lighting tray with 600 mm width, 600 mm length and 100 mm depth should be used. The length of the tray should be 100 mm larger than the fire size.

The lighting tray should be placed symmetrically under the batch that forms the test fire.

Water should be added to the tray until 30 mm height. Then sufficient amount of heptan that can provide 2 minutes and 30 seconds of fire period and which has equivalent quality with the one used in B Class fires.

Heptan should be ignited. After the fire continues for 2 minutes, the tray should be pulled out under the batch. Then the batch should be left to burning for 6 minutes. When the total pre-test period is completed to 8 minutes, at that point it might be considered that the test fire is ready and extinguishing process should be started. After this process, the fire extinguishing ball is placed in the middle of the batch. It is checked whether the result is in conformance with the Article 4.3.3.1.

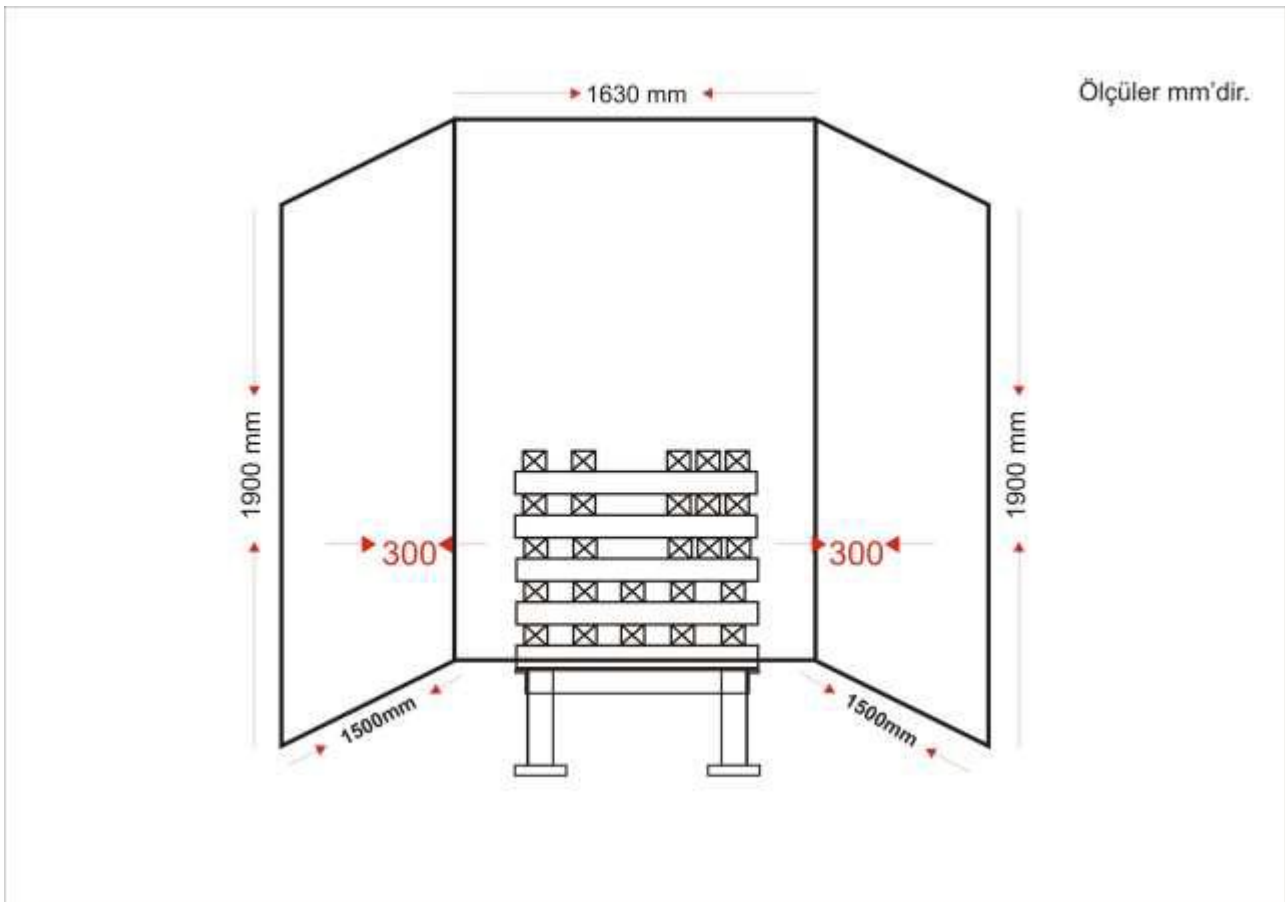


Figure 7 – A Class fire test room

5.3.6.2 B Class fire tests

B Class Fire tests should be applied in the concrete chamber of which dimensions are 1200 mm x 1800 mm x 100 mm in the cabinet of which dimensions are 1200 mm x 1800 mm x 2100 mm demonstrated in Figure 8. The floor should be in the same evocation thickness with the walls and the thickness tolerance of the floor and wall materials should conform with the related national standards.

The oil and the water compound demonstrated according to TS 862-7 EN 3-7, Annex I, Table I.3, is poured into the tray and which is in conformance with the fire size (21B) for which fire extinguishing ball can be used by the manufacturer's demand. The fire extinguishing ball is placed on 1 m of height from the surface of burning chamber as demonstrated in Figure 8. The air and the environment conditions should be as described for A Class fires. Moreover, the fuel for the tests should be industry type Heptan that has the following specifications:

- Distillation curve : between 84 ° C and 105 ° C
- Difference between the start and the end of distillation : ≤ 10 ° C
- Aromatic compound content (v/v) : ≤ 1 %
- Density in 15 ° C : between 0,680 and 0,720

The flammable liquid should be ignited and the door of the cabinet should be closed.

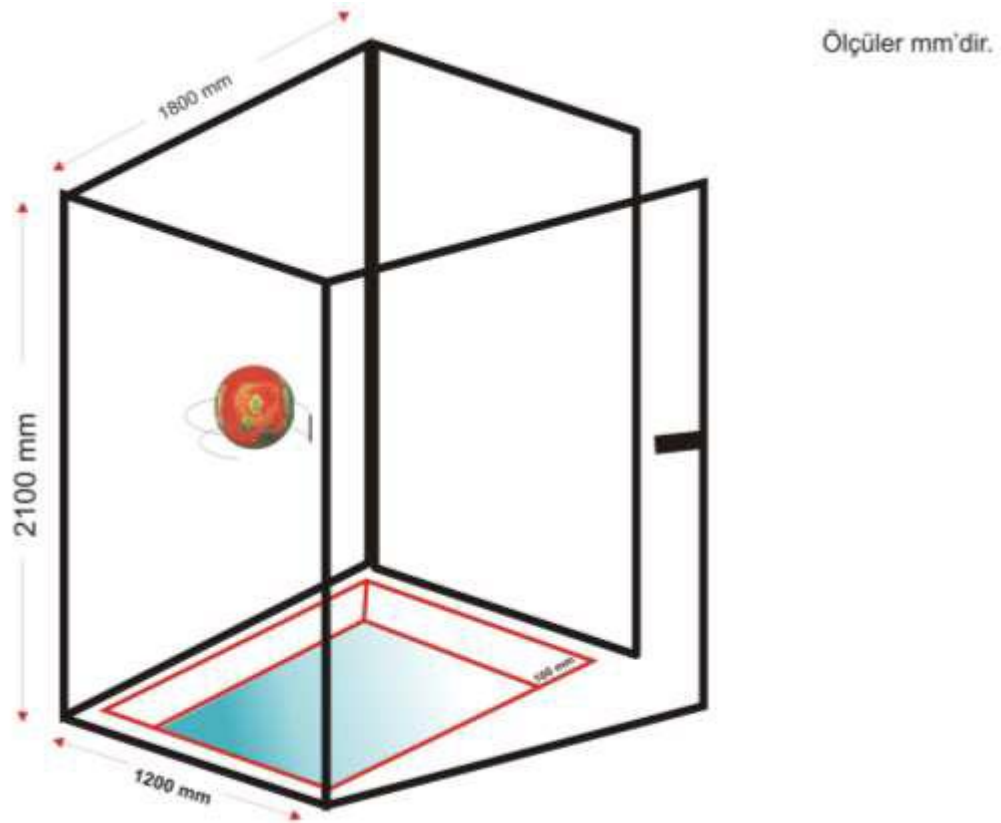


Figure 8 – The cabinet which is made of non flammable material

Heptan will be ignited and the door of the cabinet will be closed. It is fired for the period which is demonstrated in TS 862-7 EN 3-7, Annex I, Table I.3 which is suitable for the fire class for which fire extinguishing ball can be used according to the manufacturer's demand. It is checked if the result conforms with the Article 4.3.3.2.

5.4 Control and test report ¹⁾

Minimum the following information must be mentioned in the control and the test report:

- The names of the place and the laboratory where the control and the test reports are issued and the names, positions and professions of the staff who performed the inspection and experiment and/or signed the report.
- Inspection and experiment date.
- Description of the sample.
- Standard numbers that are used in the inspection and experiment.
- Test results,
- Measures that are taken to remove the disadvantages of the factors that might change the results of the inspection and experiment.
- Processes that are not mentioned or that do not have to be mentioned in the applied inspection and experiment methods but that take place in the inspection and experiment procedure.
- Whether they are in conformance with this standard.
- Report date and number.

6 Placing to the market

6.1 Packaging

Each fire extinguishing ball should be covered with a polyethylene package.

6.2 Marking

There should be tightly tied label attached (in a way that it will not move) to each package and it should be printed with at least the following information with relief or cavitation.

- Commercial name of the product and the expression 'FIRE EXTINGUISHING BALL',
- Diameter of the fire extinguishing ball (mm) and net mass of the extinguisher (kg),
- Fire classes that the fire extinguishing ball is suitable for (Class A or Class B etc.)
- Fire size for which the fire extinguishing ball can be used (TS 862-7 EN 3-7, Annex I, Table 1.1 for Class A fire, Table 1.3 for Class B fire) (5A, 8A, 21B, 34B etc),
- Production date (month and year) and party or filling number,
- Expiry date (month and year),
- Recommendations about storing conditions,
- Name and address of the supplier,
- "Contains mono ammonium phosphate dry chemical powder" expression,
- There should be written instructions and warnings that show the correct using method to the users or appropriate security information on all fire extinguishing balls.
- Security information should be mentioned all fire extinguishing balls with a separate word that a close relationship with this information in meaning as "WARNING" and should contain the following expressions:
 - When the ball is mounted, be careful that the arrow is always in the up direction.
 - "KEEP AWAY FROM CHILDREN"
- In case of powder removals due to leakages or cracks, sweep the area and wash with water.

7 Several Provisions

The manufacturer or the seller have the obligation to provide and submit the conformity declaration form to this criteria for the fire extinguishing ball, upon request. In this declaration form, the following articles should be indicated:

- a) It has the specifications indicated in the Article 4.3,
- b) The controls and the tests mentioned in the Article 5.2 and 5.3 have been applied and the suitable results have been achieved.

1) **TSE Note:** The experiment report might be arranged by covering the information mentioned in TS EN ISO/IEC 17025 in addition to the information provided here.

Resources

ANS/NZS 1850: 1997
ANSI/UL711: 1995
TIS 332: 1998

Portable fire Extinguishers-Classification,Rating and Performance Testing
Rating and Fire Testing of Fire Extinguishers
Standard for Dry Chemical Fire Brigade of Thailand Year 2002