

مرجعنا : ٢٠٢١/٠٧/٢٢١

مرجعكم: ٢٠٢١/٠٧/١٤

الموضوع: اختبار مقاومة حريق

الجهة الطالبة: شركة المعادي للمقاولات المتخصصة

تحية طيبة وبعد،،

إيماءً الى خطاب سيادتكم بتاريخ ٢٠٢١/٠٧/١٤ بخصوص الموضوع عاليه، مرفق طيه التقرير النهائي بالنتائج ، هذا وقد سددت الرسوم المقررة بالشيك رقم ٦٠٠٥٦٨٩٦ بتاريخ ٢٠٢١/٠٧/١٢ .  
وتفضلوا بقبول فائق الاحترام،،

مدير المعهد

أستاذ دكتور  
محمود علي حسن

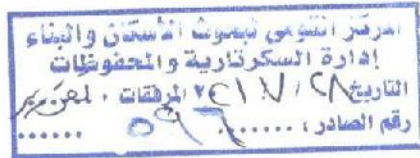
نائب رئيس مجلس الإدارة

لشئون البحوث والدراسات

CP

خالد محمد يسري

٢٠٢١/٧/١٧



٥٧٨٧٢



Housing and Building National Research Center

Building Physics Institute

Fire Department



**Client Name:** شركة المعادي للمقاولات المتخصصة

**Client Address:** Building 9/2 gazyer st. El shater 11- New maadi - first floor - flat no. 103

**Testing Name:** Fire Resistance Test

**Delivery Date:** 14/07/2021

**Supplier Code:** BPI/H/CO.221

**Testing Date:** 15/07/2021

**Test Specimen:** Raised floor assembly (1800 mm ×1800 mm)

**Project Name:** LRT ورش القطار المكهرب الخفيف بمدينة بدر

# Test Report

## Fire Resistance Test for

### Construction products and building

### Elements in accordance with

### ASTM E119

**Client:**

شركة المعادي للمقاولات المتخصصة



July 2021



## SUMMARY

The fire resistance test was carried out in HBRC-fire lab on 15 July 2021. The ambient temperature at the start of the test was about 35°C and the mean unexposed face temperature of test assembly was 36°C. The Fire resistance test was conducted in accordance with ASTM E119: standard methods of fire tests of building construction and materials.

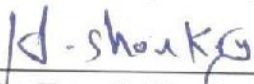
The test sample was a raised floor assembly consists of 3×3 tiles of total dimensions (1800 mm ×1800 mm); as informed by client, it consists of:

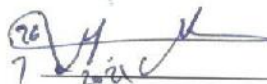
- Core is calcium sulphate panel of density  $\geq 1.500 \text{ kg/m}^3$ , reinforced by cellulosic organic fibers
- Bottom cover is **G34HA** 0.05 mm protected no-scratch and no-rip aluminum foil and **G34HT** hot dip galvanized steel tray 0.5mm thk.

The full responsibility for the test raised floor construction was to the client under the supervision of the fire lab technologist.

The raised floor assembly was tested as described in details herein after. It has withstood the action of fire for **an hour (1-h)**. The maximum temperature recorded for the un-exposed surface was about 95°C without any flame penetration.

Tested and reported by

  
Dr. Hamada Shoukry

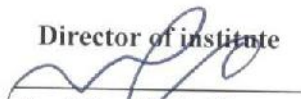
  
Ass. Res. M. M. Ibrahim

Head of Fire Dept.

  
Prof. Dr. Sayed Shebl



Director of institute

  
Prof. Dr. M. A. Hassan







## 1. INTRODUCTION

### 1.1.Scope

A Fire classification of the tested assembly was conducted in accordance with **ASTM E119** standard of fire tests, which are applicable to assemblies of masonry units and to composite assemblies of structural materials for buildings, including nonbearing and other walls and partitions, columns, girders, beams, slabs, and composite slab and beam assemblies for floors and roofs. They are also applicable to other assemblies and structural units that constitute permanent integral parts of a finished building.

It is the intent that classifications shall register performance during the period of exposure and shall not be construed as having determined suitability for use after fire exposure.

This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.

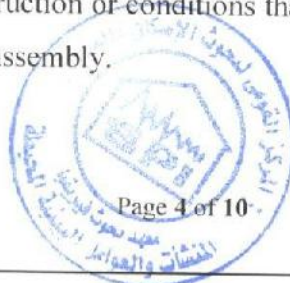
The results of these tests are one factor in assessing fire performance of building construction and assemblies. These methods prescribe a standard fire exposure for comparing the performance of building construction assemblies. Application of these test results to predict the performance of actual building construction requires careful evaluation of test conditions.

### 1.2.Significance

This standard is intended to evaluate the duration for which the types of assemblies will contain a fire, or retain their structural integrity or exhibit both properties dependent upon the type of assembly involved during a predetermined test exposure.

The tests expose a specimen to a standard fire exposure that is controlled to achieve specified temperatures throughout a specified time period, followed by the application of a specified standard fire hose stream.

Any variation from the construction or conditions that are tested may substantially change the performance characteristics of the assembly.





**The test methods do not provide the following:**

1. Full information as to performance of assemblies constructed with materials, components or lengths other than those tested.
2. Evaluation of the degree to which the assembly contributes to the fire hazard through generation of smoke, toxic gases, or other products of combustion.
3. A measurement of the degree of control or limitation of the passage of smoke products of combustion through the assembly.
4. A measurement that determines a temperature limit on the unexposed side of the assembly.
5. Simulation of the fire behavior of joints between building elements such as floor-wall or wall-wall, etc., connections.
6. Measurement of flame spread over surface of tested element.
7. The effect of fire endurance of conventional openings in the assembly that is electrical receptacle outlets, plumbing pipe, etc., unless specifically provided for in the construction tested."

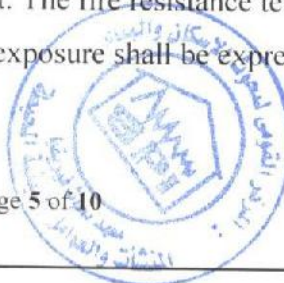
**1.3.Objective**

The objective of this standard test is to determine at the request of the client, the fire resistance of tested assembly when tested in accordance with **ASTM E119** or equivalents such as (ISO 834,..).

**2. TEST PROCEDURE**

**2.1.General**

The design, construction, materials workmanship, hardware, and size of the fire test assembly shall represent those for which a fire protection rating is desired. A record of the materials and construction details to be used for the purpose shall be kept. The fire test assembly shall be installed in the test opening in the manner in which it is intended to be used. The test samples identification is as provided by the client. Building Physics Institute (BPI) accepts no responsibility for any inaccuracies therein. BPI did not select the test samples and has not verified the composition, manufacturing techniques or quality assurance procedures. Manufacturing, construction and installation is completely prepared by the client. The fire resistance test methods may be cited as the "Standard Fire Tests," and the performance or exposure shall be expressed as "2-h, 6-h, 1/2-h, etc".







## 2.2. Test Furnace Control

The furnace temperature was measured by means of nine chromel/Alumel (type K) thermocouples arranged symmetrically in three rows of three in the furnace with exposed length not less than 305 mm and their measuring junctions located 150 mm away from the exposed face of the specimen. The furnace was controlled so that the mean of these thermocouples readings followed the time/temperature relationship of ASTM E119.

During the performance of a fire exposure test, the furnace temperatures are recorded at least every 60 seconds and displayed for the furnace operator to allow control along the specified temperature curve.

## 2.3. Specimen Unexposed Surface Temperature Measurement

Temperatures of unexposed surfaces are monitored using Copper /Constantan thermocouples (Type T) that placed under (15×15) cm square dry, felted pads. Temperature readings were taken at not less than three points on the surface, with at least one thermocouple for each 1.5 m<sup>2</sup> at intervals not exceeding 1.0 minute.

## 2.4. Fire Endurance Test

The fire test assembly exposure temperature during the fire test shall be controlled to conform to the standard temperature time relation as shown in the following Table.

**Standard Temperature Time Relation**

<b>Time (min.)</b>	5	10	30	60	120	240	480
<b>Furnace Temperature (°C)</b>	538	704	843	927	1010	1093	1260

The fire exposure is continued on the specimen until the desired fire endurance rating period is reached, or until failure to meet any of the performance criteria specified hereinafter.





### 3. CONDITIONS OF ACCEPTANCE (PERFORMANCE CRITERIA)

*Raised floor* assembly shall meet the performance criteria when:

- The test specimen assembly has withstood the fire endurance test without passage of flame or gases hot enough to ignite cotton waste.
- The average temperature rises on the unexposed face limited to 140 °C above the initial average temperature.

### 4. RESULTS AND OBSERVATIONS

- Fire resistance test was conducted in accordance to ASTM E119 (Standard Methods Tests of Fire Resistance of Building Construction and Materials).
- The test specimen was raised floor assembly consists of 3×3 tiles of total dimensions (1800 mm ×1800 mm) with structural support system.
- **Figure (1)** shows a photo of the test assembly the un-exposed face before the test.
- **Figure (2)** shows a photo of the tested assembly during the fire resistance test. Lifting/ bubbling of the top layer of the tested tiles has been observed after 28 minutes of fire exposure.
- **Figure (3)** shows the standard time-temperature curve, the actual average furnace temperature and the average temperature of unexposed surface temperature. The maximum temperature recorded for the un-exposed surface was about 95°C. No flame was observed on the un-exposed surface up to an hour.
- **Figure (4):** shows a photo of the tested raised floor assembly after the fire test.







## 5. CONCLUSION

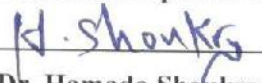
Raised floor system was subjected to fire resistance test in accordance with the test procedure ASTM E119. The fire resistance was specified as **an hour** as shown in the following Table.

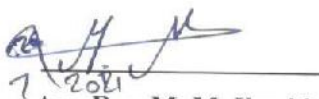
Test Sample	Property	Result
Raised floor assembly	Fire Resistance	1-h

### Remarks


- The sample was delivered to the laboratory by the entity requesting the test
- The aforementioned data according to what was mentioned in the letter of the body requesting the test without any responsibility on the center.
- The attached results apply only to the results are not valid and are not valid for the approval of any quantitative production / and practices / supplies / as well as export and is not considered as a conformity certificate
- The Egyptian code must be referred to if there is a mechanism to determine the periodicity of conducting the test.
- This report is valid for 3 months. It is not allowed to reproduce this report except with the written consent of the center.
- The laboratory is bound by the terms of the international standard for accreditation of laboratories ISO 17025 of 2017 in terms of confidentiality of data, transparency and neutrality with customer

Tested and reported by

  
 Dr. Hamada Shoukry

  
 Ass. Res. M. M. Ibrahim

Head of Fire Dept.

  
 Prof. Dr. sayed. Shebl



Director of institute

  
 Prof. Dr. M. A. Hassan



Figure (1): Un-exposed surface of tested assembly before the fire resistance test



Figure (2) Un-exposed surface of tested assembly during the fire resistance test.





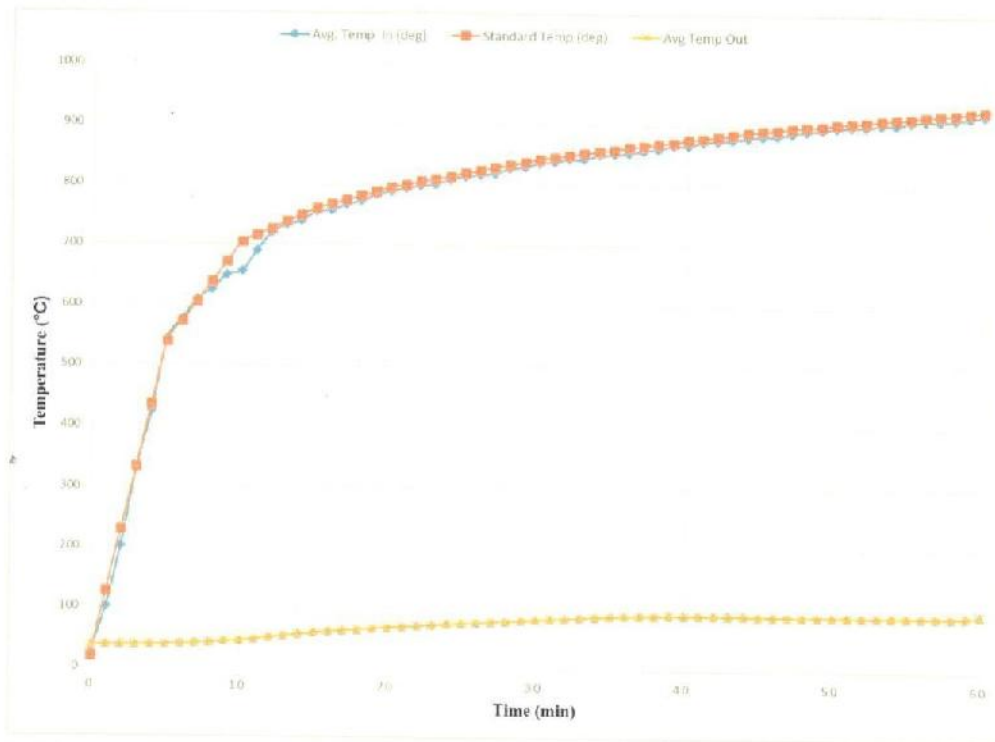


Figure (3): The standard time-temperature curve, the actual average furnace temperature and the average temperature of unexposed surface.



Figure (4): the tested sample after the fire resistance test.