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EFFECTIS ERA AVRASYA TEST VE BELGELENDİRME A.Ş.

TOSB TAYSAD Organize San. Böl. 1. CD. ,15. Yol No: 1

Şekerpınar – Çayırova, KOCAELİ

DENEY RAPORU

TEST REPORT

AB-0556-T

09.10.2015

RFTR15126

Müşterinin adı/adresi : MELSAN LASTİK PLASTİK MAK. VE METAL SAN. TİC. LTD. ŞTİ.
Customer name/address
Velibaba Mah. Yakacık Cad. Yeldeğirmeni Sok. No:3 Pendik/ İSTANBUL /
TURKEY

İstek numarası : EEA-15-000379
Order No.

Numunenin adı ve tarifi : PRONİL Intumescent seals "INTUFLAME, INTUFLAME H"
Name and identity of test sample

Numunenin kabul tarihi : 18.08.2015
The date of receipt of sample

Açıklamalar :
Remarks

Deneyin yapıldığı tarih : 19.08.2015
Date of test

Raporun sayfa sayısı : 10 (22 pages including appendixes)
Number of pages of the Report

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The test and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report

Mühür

Seal



Tarih

Date

09.10.2015

Deney Sorumlusu

Person in charge of test

Sinem ÖZTÜRK

Laboratuvar Müdürü

Head of Testing Laboratory

Onur DAĞ

Bu rapor, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz.

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FR1106/REV00/02.04.2012

1. SCOPE

Fire resistance test, in conformity with the general requirements of standards EN1363-1:2012, with substitute or additional methods of standard EN1363-2:1999 and with the particular requirements of standard EN 1366-4+A1:2010 "Fire resistance tests for service installations - Part 4: Linear joint seals".

2. TEST LABORATORY

Name : Efectis Era Avrasya Test ve Belgelendirme A.S.
Address : TOSB TAYSAD Organize San. Böl. 1. CD. ,15. Yol No: 1
Şekerpınar – Çayırova, KOCAELİ, TURKEY.

3. DESCRIPTION OF THE TEST SPECIMEN**3.1. General**

Product identification : PRONİL Intumescent seals "INTUFLAME, INTUFLAME H"
Manufacturer of foam : MELSAN LASTİK PLASTİK MAK. VE METAL SAN. TİC. LTD. ŞTİ.
Velibaba Mah. Yakacak Cad. Yeldeğirmeni Sok. No:3
Pendik/ İSTANBUL / TURKEY
Sponsor of test : MELSAN LASTİK PLASTİK MAK. VE METAL SAN. TİC. LTD. ŞTİ.
Velibaba Mah. Yakacak Cad. Yeldeğirmeni Sok. No:3
Pendik/ İSTANBUL / TURKEY

3.2. Construction

PRONİL Intumescent seals were applied to the metal surfaces. Between the metal surface and supporting construction ceramic wool with density of 128 kg/m³ was used in accordance with EN1366-4+A1:2010 standard. The thickness of the metal is 8 mm.

The supporting construction was supplied by the test laboratory (Efectis Era Avrasya) and consisted of aerated concrete blocks which have a density of 650 kg/m³ and thickness of 100 mm.

➤ Joints:

- Aerated concrete – mild steel angle with cement mortar bedding:
 - Width of joints: 2 mm for each (8 joints totally)

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3.3. Components

Two different types of intumescent seals were applied to the metal surface. Each type had 4 specimens with different depths.

- Type: *PRONIL Intumescent seal - INTUFLAME – Graphite based*
 - Density: 1267 kg/m³
 - Adhesive: Two sided acrylic based adhesive, mass per unit area was 210 g/m²
 - Length of joints: 1000 mm.
- Type: *PRONIL Intumescent seal - INTUFLAME-H – Graphite based with high concentration*
 - Density: 1267 kg/m³
 - Adhesive: Two sided acrylic based adhesive, mass per unit area was 210 g/m²
 - Length of joints: 1000 mm.

Seal Ref.	Seal width/depth	Orientation	Surface
Intuflame 15	2/15 mm	Vertical	Metal
Intuflame 20	2/20 mm	Vertical	Metal
Intuflame 30	2/30 mm	Vertical	Metal
Intuflame 40	2/40 mm	Vertical	Metal
Intuflame-H 15	2/15 mm	Vertical	Metal
Intuflame-H 20	2/20 mm	Vertical	Metal
Intuflame-H 30	2/30 mm	Vertical	Metal
Intuflame-H 40	2/40 mm	Vertical	Metal

See figure 1-2 for details.



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4. PRE-TEST PROCESSES

4.1. Verification of specimen

Efectis Era Avrasya A.S. verified the used materials and parts against the supplied data and drawings during installation of the test specimen and not involved in the selection of test specimen.

The test product was implemented by sponsor (MELSAN LASTİK PLASTİK MAK. VE METAL SAN. TİC. LTD. ŞTİ.).

4.2. Conditioning

From the moment of installation until the fire resistance test, the construction was stored in the laboratory of Efectis Era Avrasya A.S. under the following conditions:

Temperature : 33,9 ± 3,6 °C
Relative humidity : 48 ± 10 %.

5. TEST PROCESS

5.1. Method

The fire test was conducted according to the European standard EN 1366-4+A1:2010. The heating of the furnace followed the standard fire curve, as specified in the European standard EN 1363-1:2012.

The target overpressure in the furnace was 15 Pa at centre of joints (1,25 m height).

5.2. Measurements

Following test data were measured during the test:

- Ambient temperatures inside the furnace with six plate thermocouples (Furnace TC1 to TC6), evenly distributed over the directly heated surface (see figure A1).
- The pressure in the furnace (see figure A3).
- Ambient temperature in the laboratory (see figure A4)
- The surface temperatures on the unexposed side of the test specimen (TC 3 up to TC34), see figure B2—B5).
- Deformation of test construction (see figure B6)

The positions of the thermocouple are given in figure B1.



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6. OBSERVATIONS

Table 1: Observations during heating

0	Heating started. See photo C1 and C2.
5	Seals started to expand.
28	Smoke release from bottom of the seals.
37	Temperature increased at Thermocouple Nr. 19, $\Delta T > 180$ °C. I failed for Intuflame-H 15.
38	Temperature increased at Thermocouple Nr. 25, $\Delta T > 180$ °C. I failed for Intuflame-H 20.
39	Temperature increased at Thermocouple Nr. 27, $\Delta T > 180$ °C. I failed for Intuflame-H 30.
40	Temperature increased at Thermocouple Nr. 7, $\Delta T > 180$ °C. I failed for Intuflame 20.
42	Temperature increased at Thermocouple Nr. 11, $\Delta T > 180$ °C. I failed for Intuflame 30.
44	Temperature increased at Thermocouple Nr. 3, $\Delta T > 180$ °C. I failed for Intuflame 15.
	Temperature increased at Thermocouple Nr. 15, $\Delta T > 180$ °C. I failed for Intuflame 40.
46	Temperature increased at Thermocouple Nr. 33, $\Delta T > 180$ °C. I failed for Intuflame-H 40.
60	No considerable changes, specimens continue to satisfy Integrity (E) criteria.
120	No considerable changes, specimens continue to satisfy Integrity (E) criteria.
181	Test was terminated after consulted with the customer. See photo C3-C4.

7. TEST RESULTS

7.1 Results

The results are given in Table 2 and appendixes B and C.

During the heating the temperature in the furnace complied with the standard EN 1363-1:2012

7.2 Uncertainty of measurements

Due to the nature of fire resistance testing, in which several non-linear effects are present in both the test configuration and the test specimen, which influence each other, it is at this moment not yet possible to give a stated degree of uncertainty of measurement.

8. SUMMARY

The most important results of the examination are given in table 2.



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Table 2: Summary of test results of the test specimen

Seal reference	Examination		
	Integrity (E)		Insulation (I)
	Cotton pad	Flames longer than 10 s.	
Intuflame 15	N.A.	N	44 minutes by TC 3
Intuflame 20	N.A.	N	40 minutes by TC 7
Intuflame 30	N.A.	N	42 minutes by TC 11
Intuflame 40	N.A.	N	44 minutes by TC 15
Intuflame-H 15	N.A.	N	37 minutes by TC 19
Intuflame-H 20	N.A.	N	38 minutes by TC 25
Intuflame-H 30	N.A.	N	39 minutes by TC 27
Intuflame-H 40	N.A.	N	46 minutes by TC 33

Test was terminated at 180 minutes after consulted with the sponsor.

"N": No failure/not observed

"N.A.": Not applied

9. FIELD OF DIRECT APPLICATION OF TEST RESULTS

9.1 General

This report details the method of construction, the test conditions and the results obtained when the specific elements of construction described herein was tested following the procedure outlined in EN 1363-1:2012, and when appropriate EN 1363-2:1999. Any significant deviation with respect to size, constructional details, load stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report

9.2 Orientation

The possible orientation and the scope of application are defined in EN 1366-4+A1:2010 and Table 3. According to the table the specimens were tested B orientation which means the scope of application is B.

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Table 3: Scope of orientation

Tested Orientation	Application
A	A, D, E ^a
B	B
C	C , D ^b
^a Orientation E will only be covered by test orientation A if shear movement was chosen and one face of the joint was fixed and the other face was moved.	
^b Orientation D will only be covered by test orientation C if shear movement was chosen and one face of the joint was fixed and the other face was moved.	

Key

- A linear joint in a horizontal test construction
- B vertical linear joint in a vertical test construction
- C horizontal linear joint in a vertical test construction
- D horizontal wall joint abutting a floor, ceiling or roof
- E horizontal floor joint abutting a wall

9.3 Supporting construction

Results obtained with the steel angle standart supporting construction apply to separating element constructions made of metals with a melting point higher than 1000°C.

9.4 Seal position

Test results are valid only for the position in which the seals were tested (Seals were fitted to unexposed side).

9.5 Mechanically induced movement

The movement capability of the linear joint seal is not allowed to exceed $\pm 7,5\%$ due to be tested without mechanically induced movement.

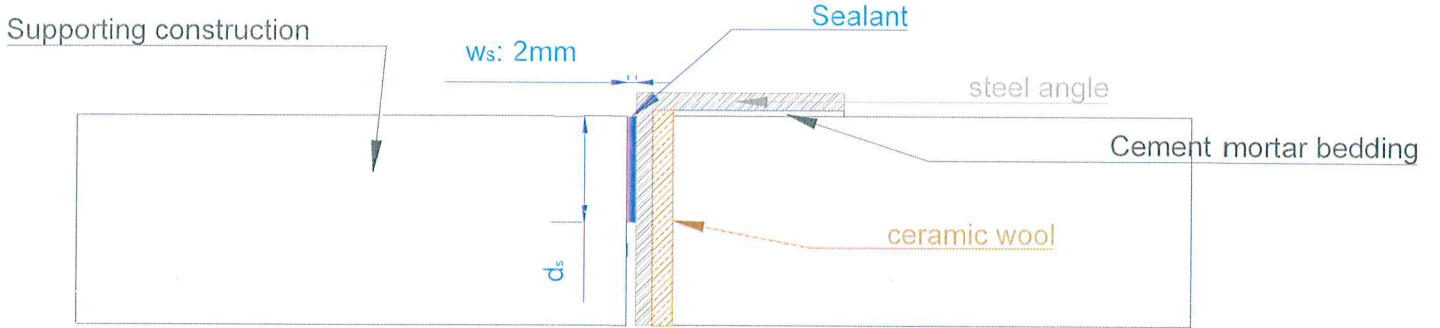


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UNEXPOSED SIDE



EXPOSED SIDE

Figure 2: Cross section view of the test specimens.



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APPENDIXES:

Appendix A: Furnace and laboratory conditions

Appendix B: Test results

Appendix C: Photos



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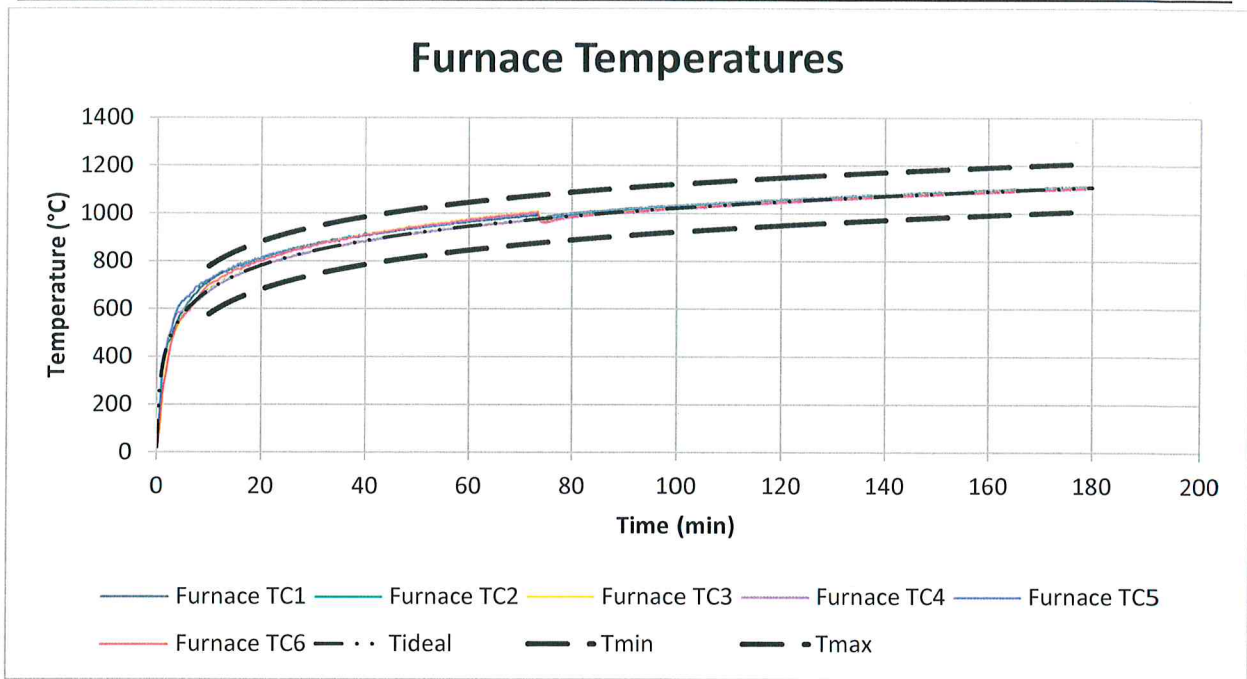


Figure A1: Furnace Temperatures

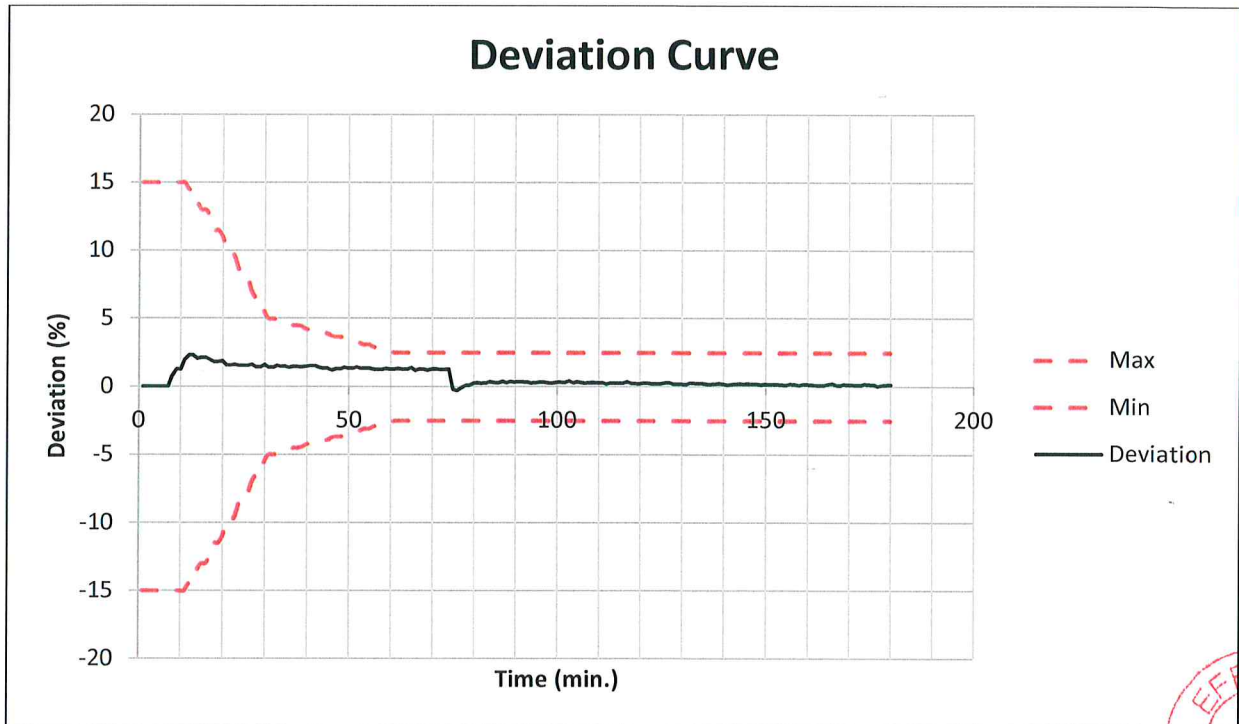


Figure A2: Deviation of furnace temperature

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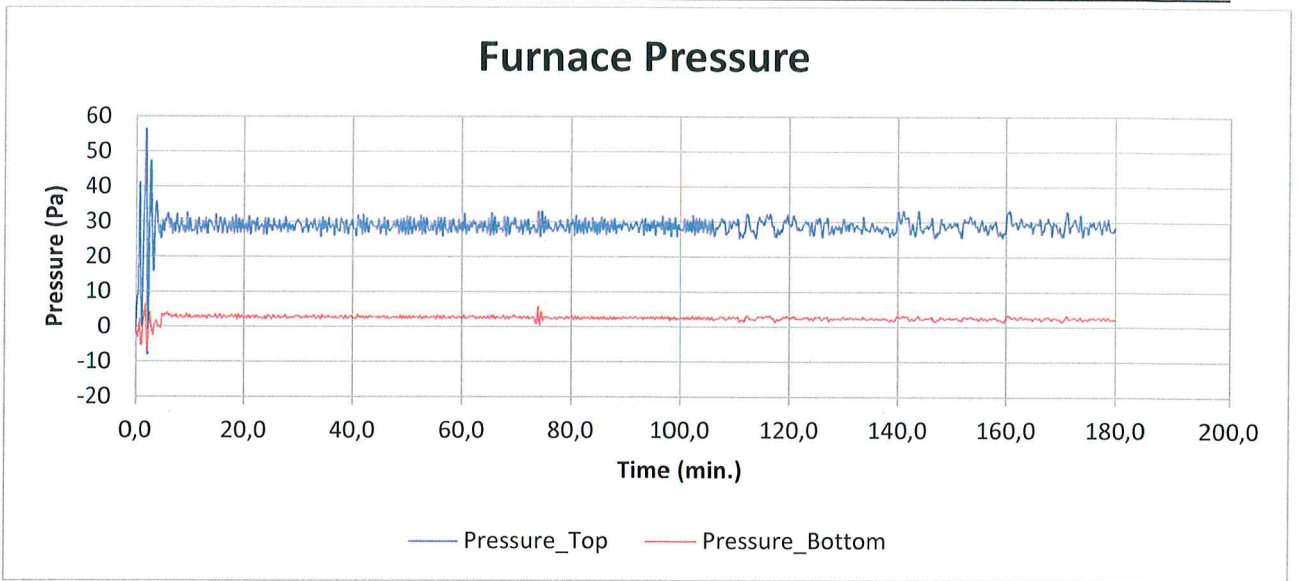


Figure A3: Pressure in the furnace

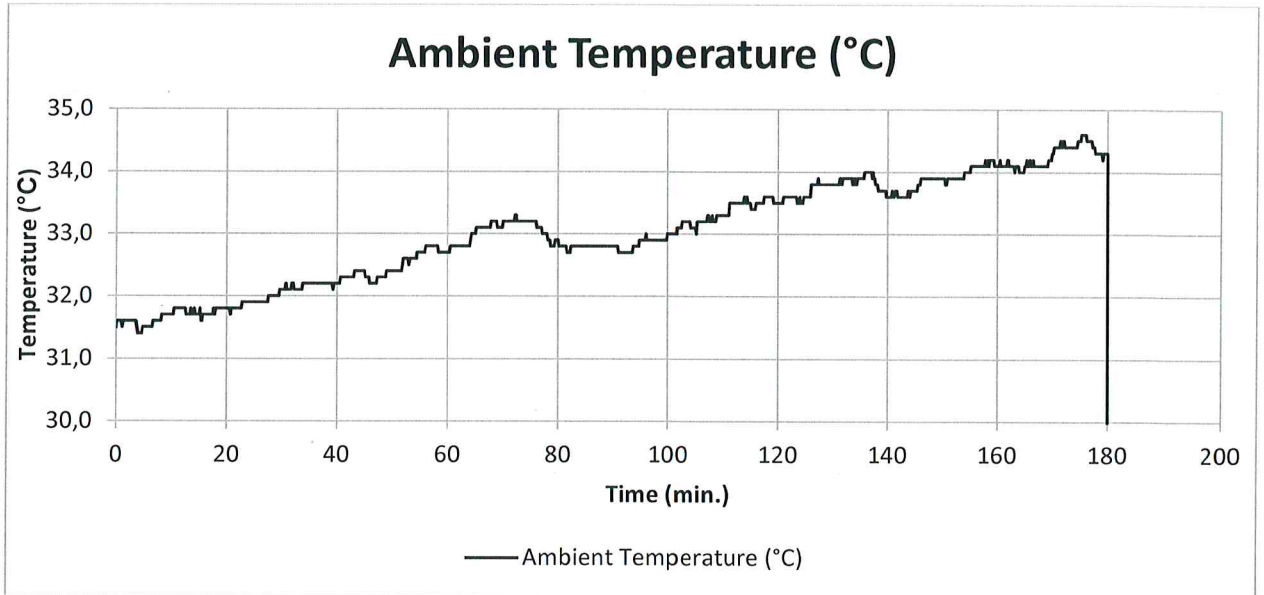


Figure A4: Ambient temperature at laboratory



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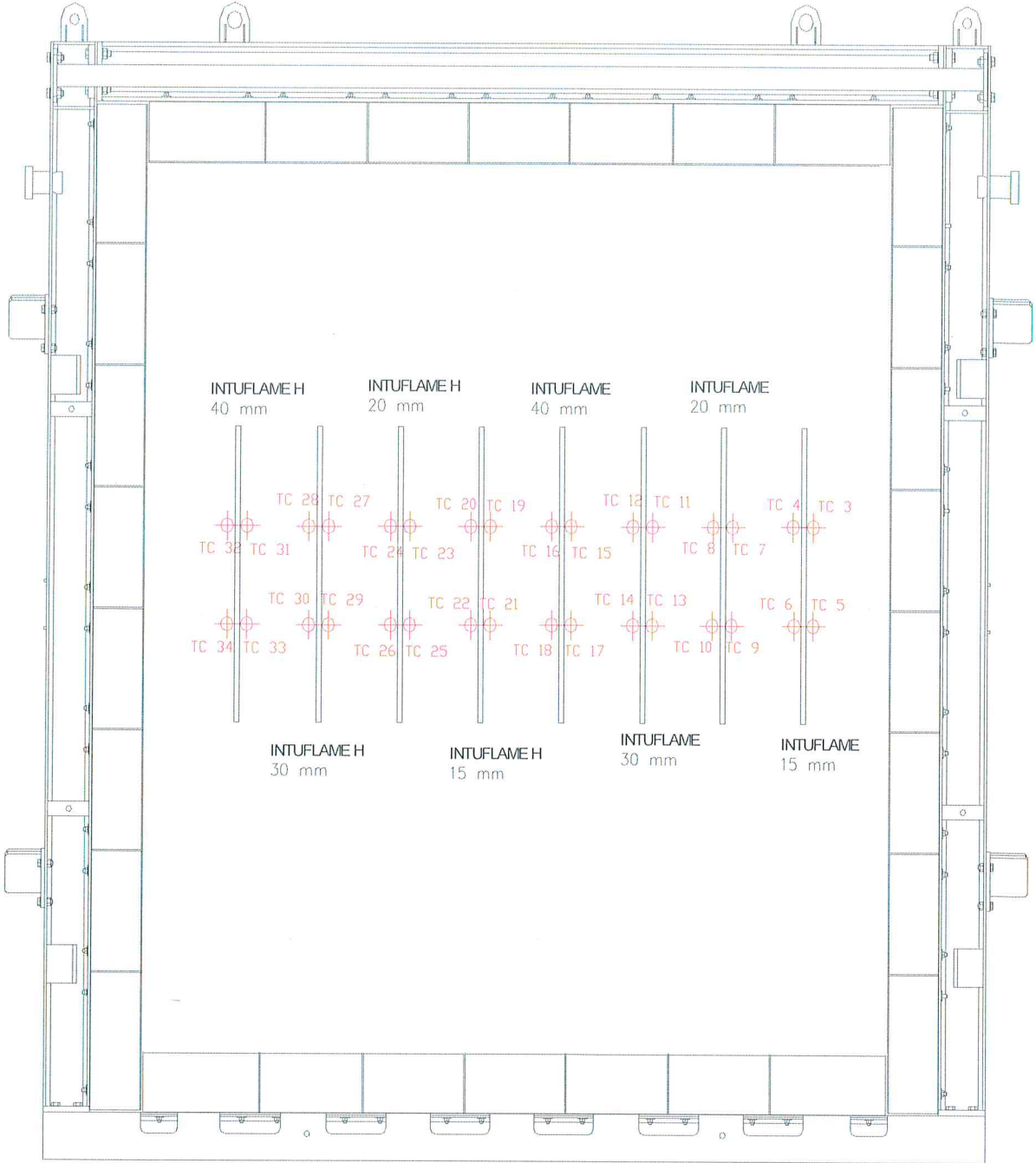


Figure B1: Locations of thermocouples and deflection sensors.



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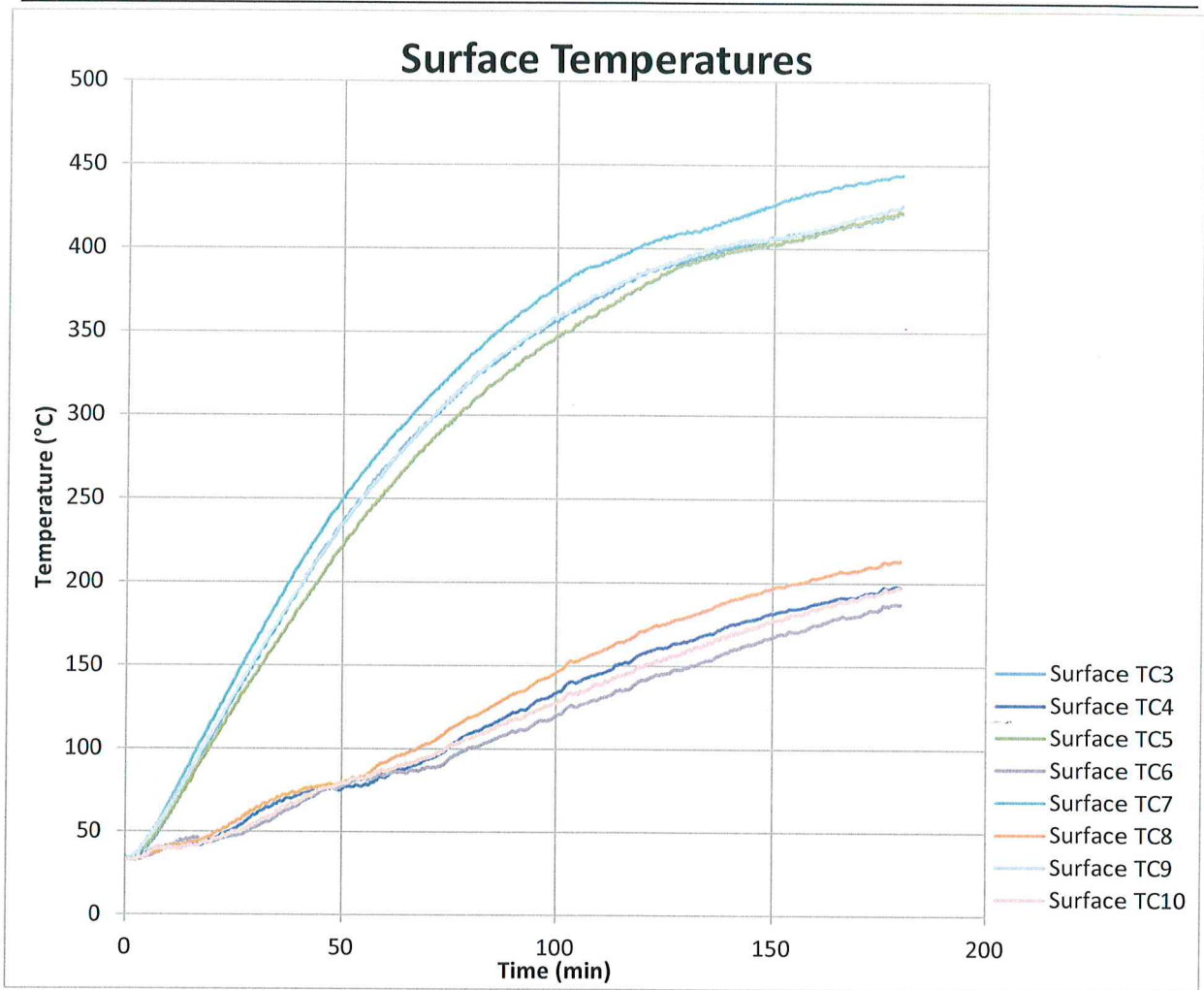


Figure B2: Surface temperatures of Intuflame 15 and Intuflame 20.



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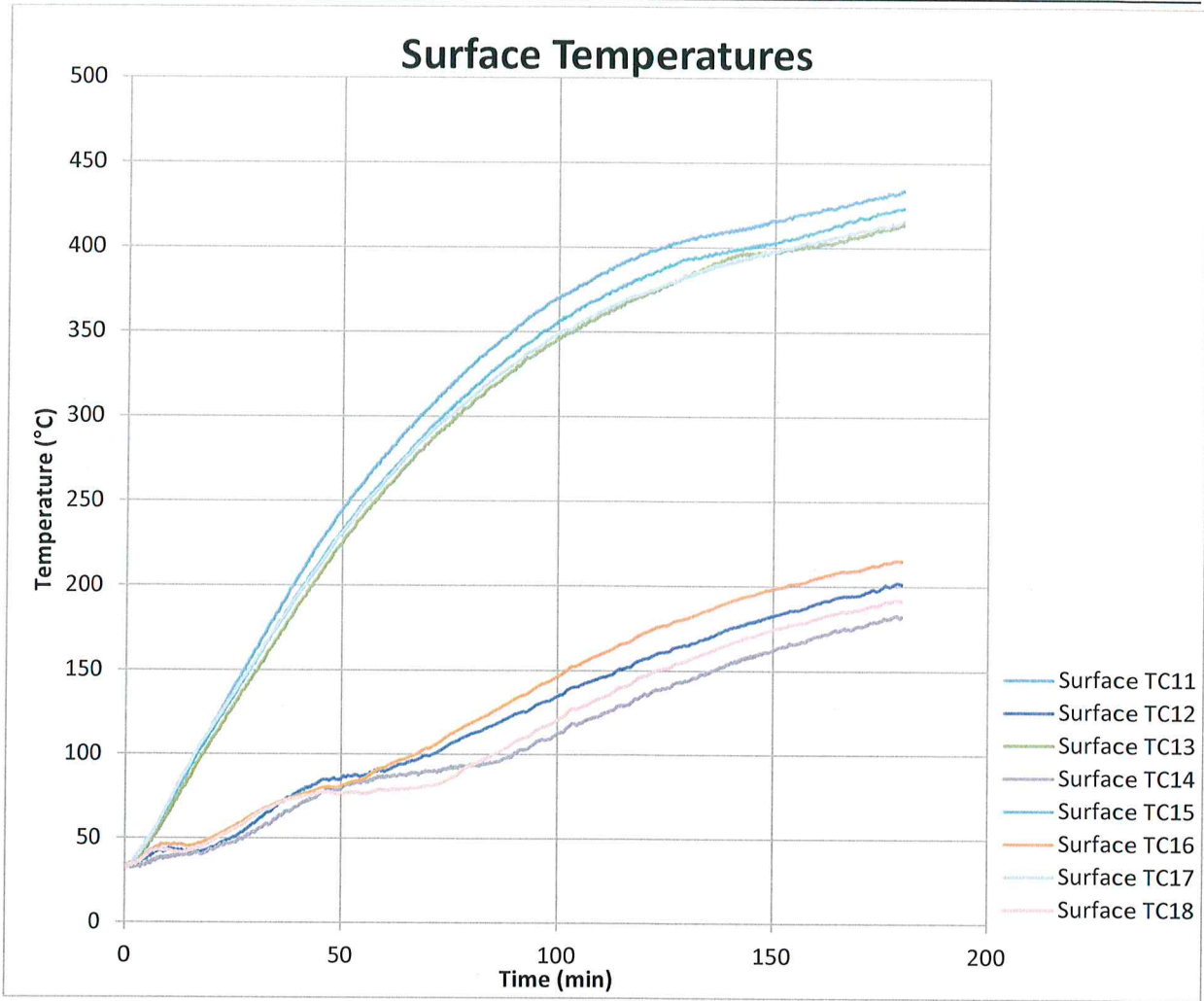


Figure B3: Surface temperatures of Intuflame 30 and Intuflame 40.

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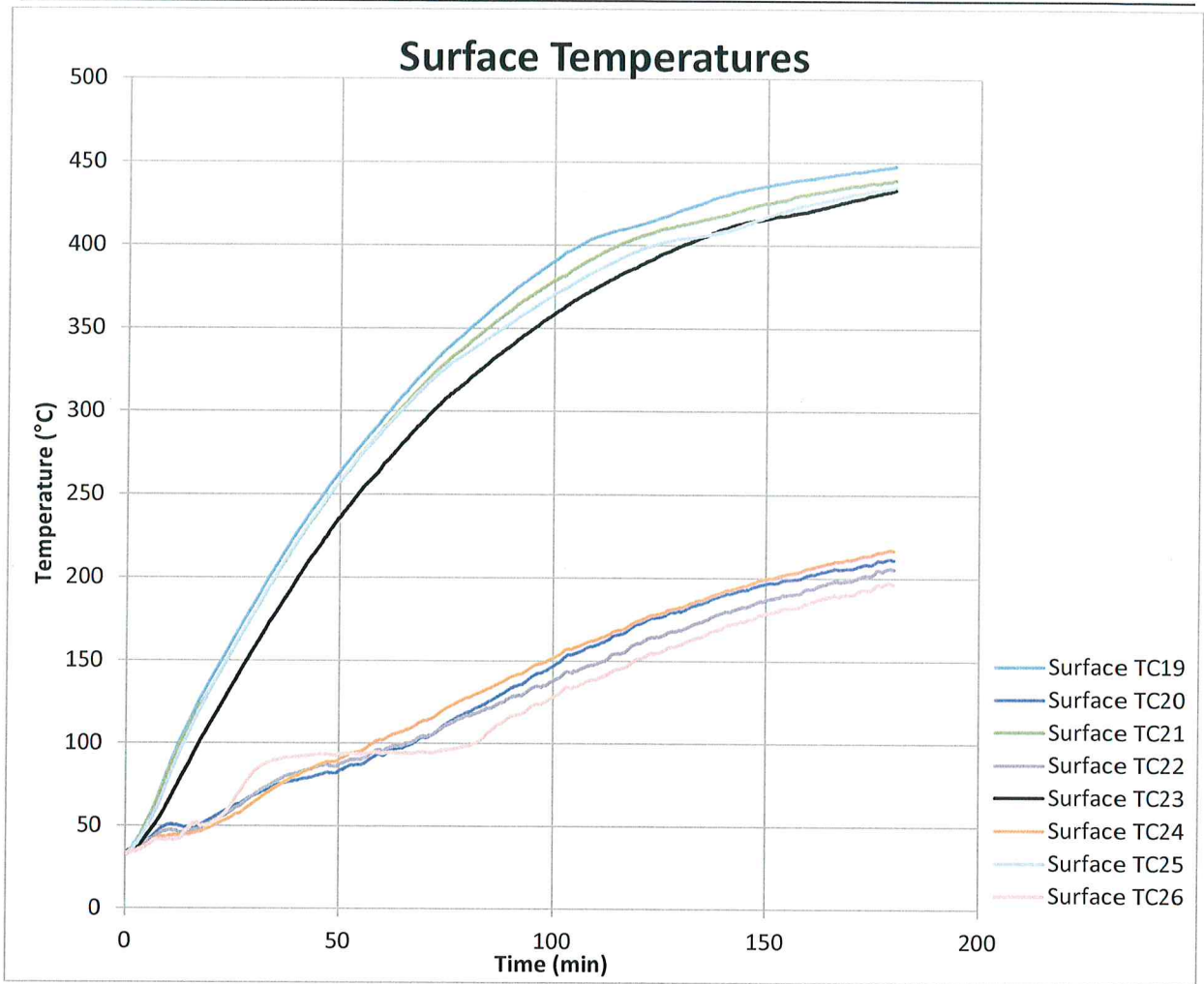


Figure B4: Surface temperatures of Intuflame-H 15 and Intuflame-H 20.

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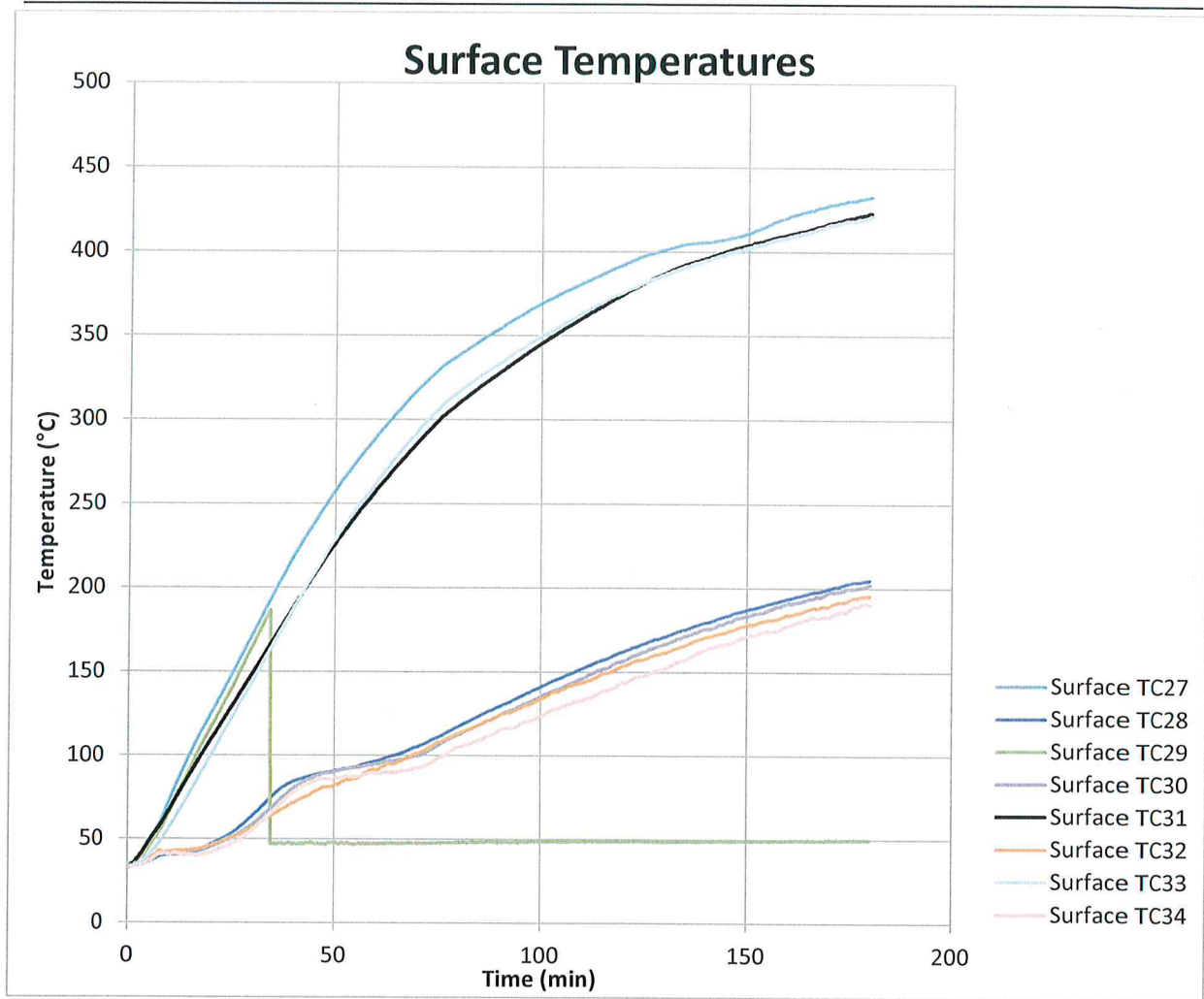


Figure B5: Surface temperatures of Intuflame-H 30 and Intuflame-H 40
(The connection of TC 29 sensor lost after 34 minutes).

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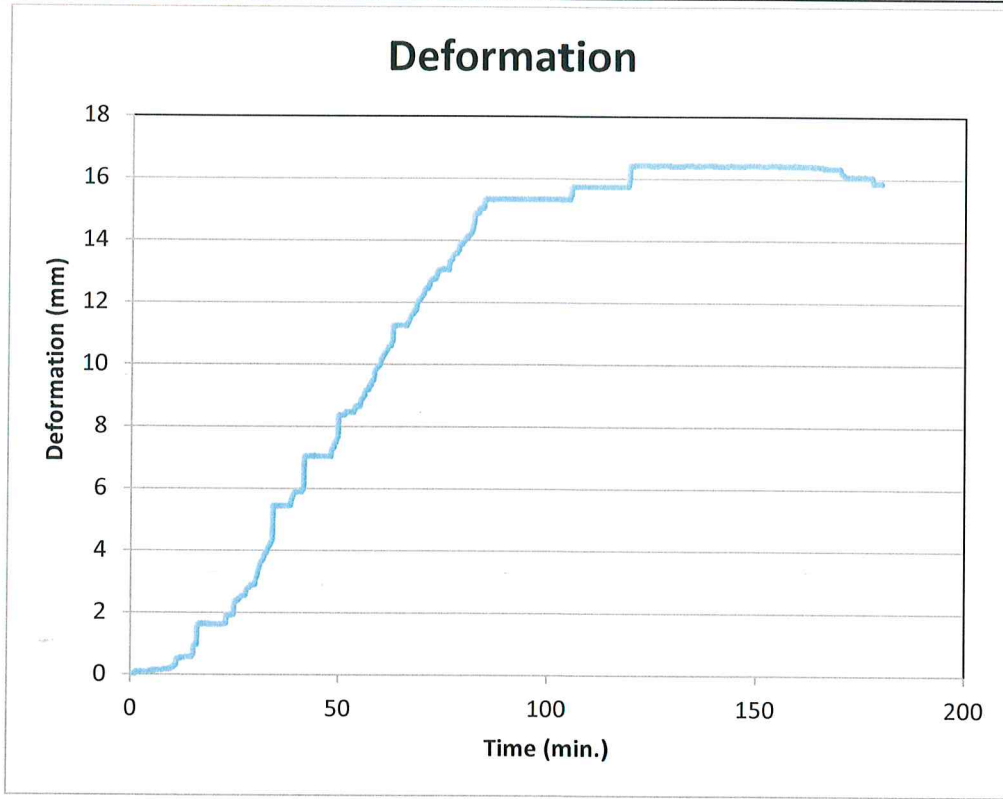


Figure B6: Deformation of the construction.

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Photo C1: Unexposed side of the test construction before the test



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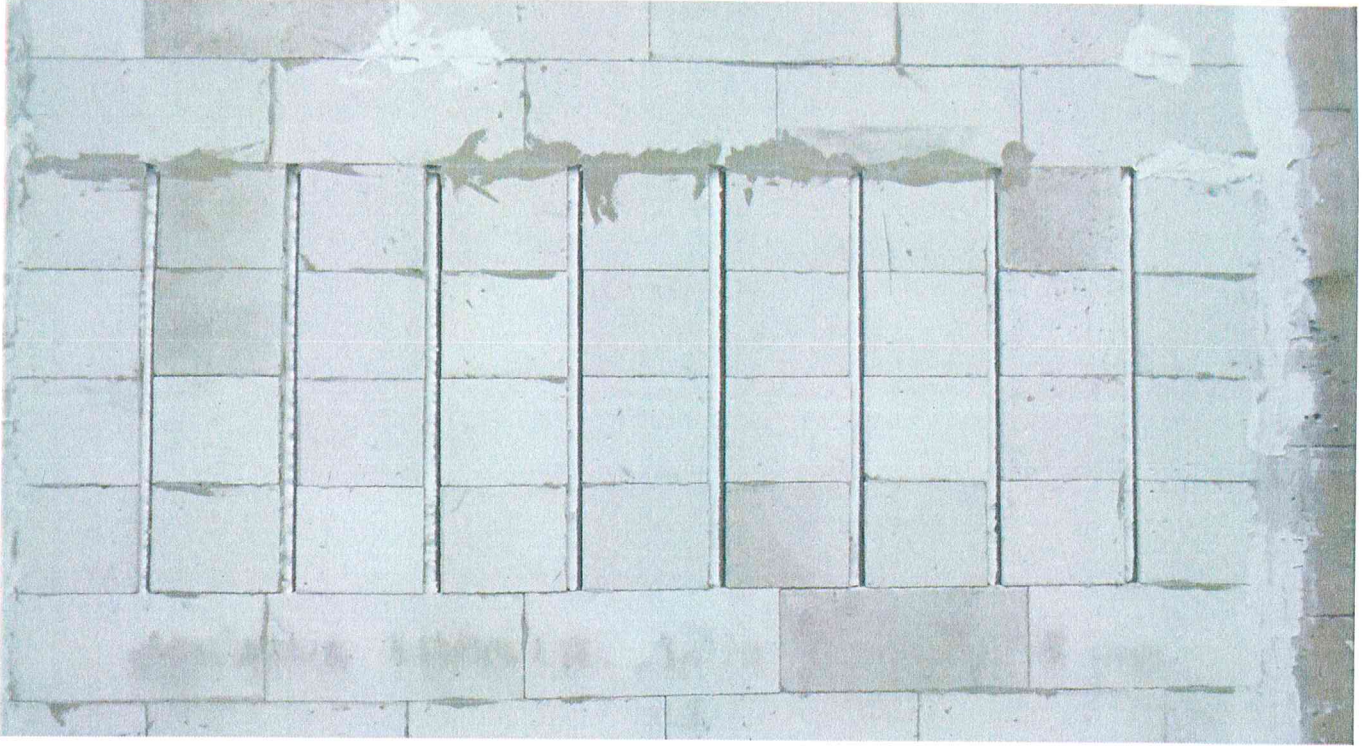


Photo C2: Exposed side of the test construction before the test

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Photo C3: Unexposed side of the test specimens after the test.



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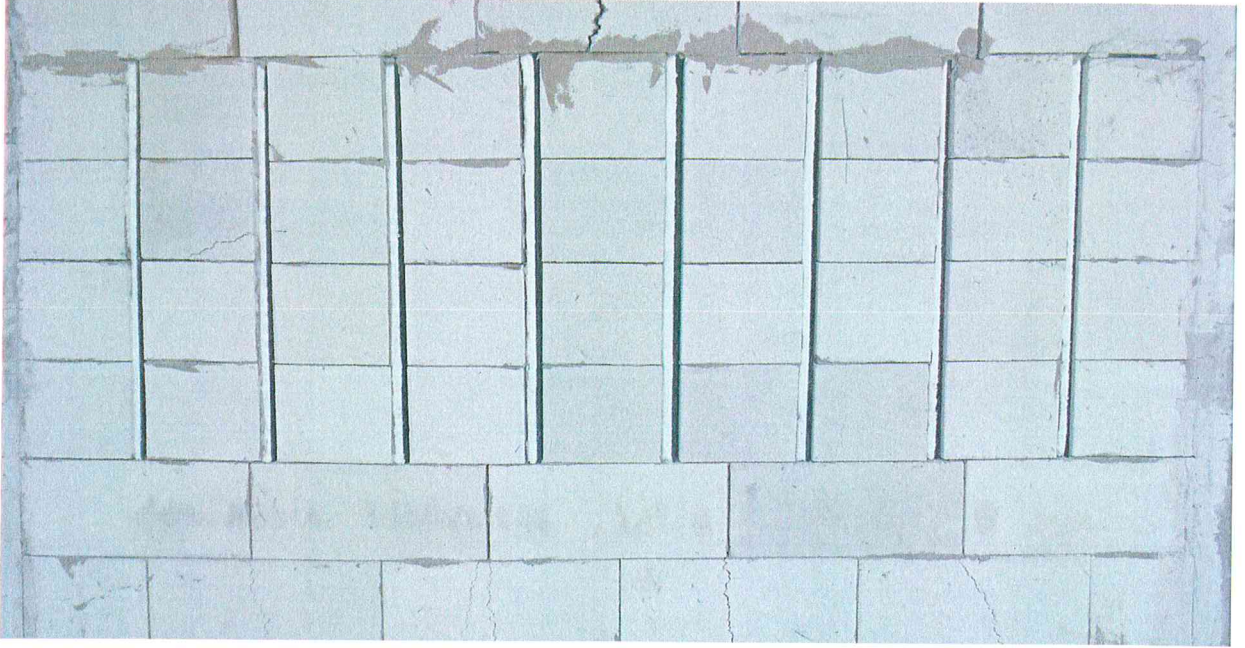


Photo C4: Exposed side of the test specimens after the test.



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