

CONFIDENTIAL REPORT

Project Title : Indicative Fire Test Program

Client : Magboard Benelux BV

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Reference : P04191ASKR

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SUMMARY

Two separate indicative fire tests were performed on vertical panel systems constructed on behalf of Magboard Benelux BV. Each system consisted of a single test specimen built into a blockwork frame housing. The tests were conducted at CERAM using the reduced scale furnace with each specimen tested to the general principles of BS 476 part 20: 1987.

Test Panel 1

When the test specimen was subjected to temperature conditions specified in BS 476 part 20:1987 and a positive pressure equivalent to 8.5 Pa (± 2.5 Pa) at a height of 1 m, the system maintained the insulation criteria for 11 minutes and integrity criteria 23 minutes. Insulation failure occurred when the average temperature of the thermocouples attached to the non fire side reached a temperature of 160°C at 12 minutes. Integrity failure occurred when the cotton pad was ignited when applied to the specimen.

Insulation – criteria maintained for 10 minutes.

Integrity – criteria maintained for 23 minutes.

Test Panel 2

When the test specimen was subjected to temperature conditions specified in BS 476 part 20:1987 and a positive pressure equivalent to 8.5 Pa (± 2.5 Pa) at a height of 1m, the system maintained the insulation criteria for 43 minutes and integrity criteria 53 minutes. Insulation failure occurred when thermocouple 12 reached a temperature of 218°C at 44 minutes. Integrity failure occurred when flaming was observed on the specimen face.

Insulation – criteria maintained for 43 minutes.

Integrity – criteria maintained for 53 minutes.

1 INTRODUCTION

This report covers two indicative fire tests conducted at CERAM Research Ltd using a reduced scale furnace with height, width and depth dimensions of 1400 x 1380 x 1000 mm. The results relate to the integrity and insulation performance of two vertical panel systems, to the general principles of fire testing shown in BS 476: Part 22: 1987 with reference to BS 476 Part 20: 1987. The test was conducted on the 23rd September 2004 and was sponsored by Magboard Benelux BV.

The tests were witnessed by:

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Mr M Salt	(CERAM Research Ltd)
Mr A S Worswick	()
Mr G Coates	()

The testing aims were as follows:

- To determine the performance of two vertical panel systems when tested to the general principles of BS 476 Part 22: 1987 reference to BS 476 Part 20: 1987.
- To evaluate the performance of test panel 1 for up to 60-120 minutes to determine insulation and integrity criteria.
- To evaluate the performance of test panel 2 for up to 120 minutes to determine insulation and integrity criteria.
- To use as a benchmark test for future work programs.

2 SAMPLE SPECIFICATIONS

For test specimen 1, the sample supplied to CERAM consisted of a Magboard S-Line board panel of dimensions 2330 mm x 1220 mm of a nominal thickness of 9 mm. The sample appearance was of a white coloured solid board with a smooth faced surface on one side and a coarse faced surface on the other side. Product Health and data specifications are included in the APPENDIX Section of this report.

For test specimen 2, the samples supplied to CERAM were: 2 sections of Magboard 6 mm thick board cut to a height of 1380 mm and length of 1200 mm x 75 mm x 50 mm plained timber, 2 sections of 2000 mm x 800 mm x 12.5 mm thick plasterboard and intumescent sealant.

3 CONSTRUCTION DETAILS

Test Specimen 1 – Single Sheet 9 mm Magboard

A Thermalite block work base was installed into a refractory lined test frame to produce a vertical opening size to accommodate a test specimen size of 1400 mm wide x 1220 mm high. The sample of Magboard S-Line Resistant Construction Board of nominal thickness 9 mm was cut to produce a test specimen size of 1400 mm wide and 1220 mm high. Specimen installation was carried out using guidelines specified in BS 476: Part 22: 1987. The test specimen was located into the vertical opening and housed between a beading system consisting of 15 mm thick calcium silicate board. The beading system was fixed to the refractory frame housing, using

screws spaced at 100 mm distances. Gaps between the test specimen and bead system were sealed using a 4 hour rated intumescent mastic on both fireside and non fireside faces. The smooth face surface of the board was installed to the FIRE side of the furnace.

Test Specimen 2 – Vertical Panel Construction

A blockwork opening of depth 150 mm was built to the a test frame to produce a vertical opening of 1420 mm wide x 1380 mm high. Sections of plained timber were fixed to the inside face of the blockwork opening to produce the internal frame of the test specimen (frame depth of 75 mm). Intumescent sealant was used to ensure the frame was sealed to the blockwork. A total of three vertical timber joints each 1280 mm x 75 mm x 50 mm, were installed into the frame at 400 mm centres. The two plasterboard sections were cut to fit the blockwork opening size on the non-fireside face. This produced a single vertical joint at 800 mm from the right hand opening edge face, as viewed from the non-fire side. A single row of dry liner screws was used to fix the plasterboard to the face of the outer frame and to each of the vertical timber joints at 200 mm centres. At the 800 mm plasterboard intersection, a double row of screws was used in a staggered array to hold each edge of the board in place.

On the fire-side face, the Magboard S-Line board was fixed using the same method but with a single intersection vertical joint set at 1200 mm from the left hand opening edge face, as viewed from the fire side. This ensured that the plasterboard and Magboard intersection joints were not in a line of symmetry from the direction of the fire. Gaps in the edges of the plasterboard/block and Magboard/block were sealed using intumescent sealant. The test specimen contained no additional insulation material with an air gap of 75 mm separating the fire-side/non fire side boards (in between the timber joints). The location of joints and timber sections is illustrated in the Figure 2 sketch (Appendix).

Figure 1 – APPENDIX Section shows a sketch applicable to test specimen 1 showing the panel NON-FIRE side with positions for specimen thermocouples.

Figure 2 - APPENDIX Section shows a sketch of the NON FIRE side of Test Panel 2 showing the panel NON-FIRE side with positions for joints and specimen thermocouples.

Figure 3 - APPENDIX Section shows a photograph of the NON-FIRE side of Test Specimen 1 prior to test commencement.

Figure 4 - APPENDIX Section shows a photograph of the FIRE side of Test Specimen 1 prior to test commencement.

Figure 5 - APPENDIX Section shows a photograph of the NON-FIRE side of Test Specimen 2 prior to test commencement.

Figure 6 - APPENDIX Section shows a photograph of the NON FIRE side of the Test Specimen 2 prior to test commencement.

4 INSTRUMENTATION/EQUIPMENT DETAILS

4.1 Furnace Thermocouples

Furnace temperature was monitored using four type K mineral insulated thermocouples positioned equidistantly across the furnace opening. The average temperature of the four thermocouples was controlled to the limits specified in BS 476 Part 20: 1987 and BS 476 part 22: 1987 Section 10.4.3. Recorded data is in the APPENDIX.

The ambient temperature was measured using a type K mineral insulated thermocouple protected from the test element by a screen.

4.2 Test Specimen 1

Specimen surface temperature (non fire side) was measured using five type K thermocouples as specified in BS 476 Part 20: 1987 section 6.4.2.1. Four thermocouples were positioned on the board face, approximately 50 mm from the panel corners and the bead joints. A fifth thermocouple was located on the centre of the panel face. Thermocouple location details are shown on the specimen sketch Figure 1 in the APPENDIX.

4.3 Test Specimen 2

Specimen surface temperature (non fire side) was measured using seven type K thermocouples as specified in BS 476 Part 20: 1987 section 6.4.2.1. Four thermocouples were positioned on the board face, approximately 50 mm from the panel corners and the bead joints. A fifth thermocouple was located on the centre of the panel face. Two additional thermocouples were positioned adjacent to the perpendicular joint. Thermocouple location details are shown on the specimen sketch Figure 2 in the APPENDIX.

4.4 System Details

All thermocouple temperatures were recorded using an SR mini multizone temperature monitoring system, with a Specview purpose written software package to provide real time information.

Furnace pressure was monitored throughout the test.

5 TEST RESULTS

5.1 Test Specimen 1

The test specimen was fixed to the furnace and the furnace was operated according to the CERAM Fire Test procedures. A pressure target setting of 8.5 Pa and controlled to ± 2.5 Pa was set at the mid-height of the test specimen. This target setting applied throughout the test duration. The furnace temperature was controlled to conditions specified in BS 476 Part 22:1987 with reference to BS 476 Part 20:1987.

The ambient laboratory temperature at the start of the test was 17°C. The average specimen thermocouple temperature at the start of the test was 19°C.

Up to the time of test termination, the specimen was monitored for its performance against the criteria of insulation and integrity as defined in BS 476 Part 22: 1987.

The following results were achieved:

Insulation – criteria maintained for 10 minutes.

Integrity – criteria maintained for 23 minutes.

The furnace temperature conditions were maintained within the specifications given in BS 476 part 22: 1987.

The APPENDIX section contains details of the observations, test data and Figures 7 to 11.

5.2 Test Specimen 2

The test specimen was fixed to the furnace and the furnace was operated according to the CERAM Fire Test procedures. A pressure target setting of 8.5 Pa and controlled to ± 2.5 Pa was set at the mid-height of the test specimen. This target setting applied throughout the test duration. The furnace temperature was controlled to conditions specified in BS 476 Part 22:1987 with reference to BS 476 Part 20:1987.

The ambient laboratory temperature at the start of the test was 18°C. The average specimen thermocouple temperature at the start of the test was 20°C.

Up to the time of test termination, the specimen was monitored for its performance against the criteria of insulation and integrity as defined in BS 476 Part 22: 1987.

The following results were achieved:

Insulation – criteria maintained for 43 minutes.

Integrity – criteria maintained for 53 minutes.

The furnace temperature conditions were maintained within the specifications given in BS 476 part 22: 1987.

The APPENDIX section contains details of the observations, test data and Figures 12 to 18 although some specific results are noted below:

- Flaming was seen on the exposed face from positions relative to the timber upright joints. This was evident although the Magboard S-Line board was “intact” apart from blistering and surface lines.
- The failure at the exposed face was in an area not supported by the vertical timber joints.
- Post test observation showed that the Magboard S-Line board was still fixed to the frame although damage to the timber joints was evident. The Magboard S-Line board fell from the frame during the furnace emptying

procedure. The final Figure 18 shows the post test observation after the board had collapsed.

6 CONCLUSIONS

6.1 Test Specimen 1

When exposed to the temperature and pressure conditions approximating to those given in BS 476 part 22: 1987 the specimen maintained insulation criteria for a total of 10 minutes and integrity criteria for 23 minutes.

6.2 Test Specimen 2

When exposed to the temperature and pressure conditions approximating to those given in BS 476 part 22: 1987 the specimen the specimen maintained insulation criteria for a total of 43 minutes and integrity criteria for 53 minutes.

7 LIMITATIONS

The results only relate to the behaviour of the specimen of the element of construction under the particular conditions of the test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.

APPENDIX

FIGURES

Figure 1 - Non-Fire Side of Specimen 1 - Sketch of Thermocouple Locations

The numbers relate to the thermocouple details given in the test data section. Sketch is not to scale.

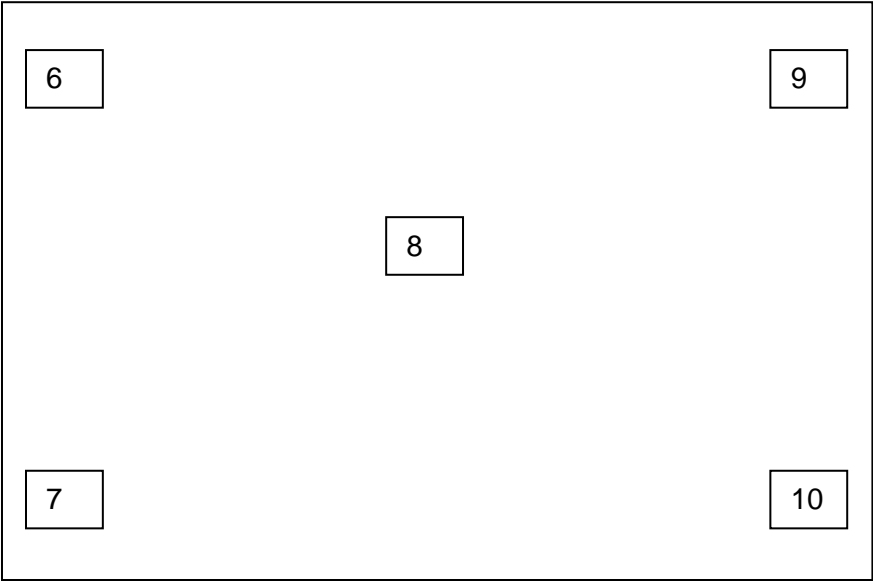
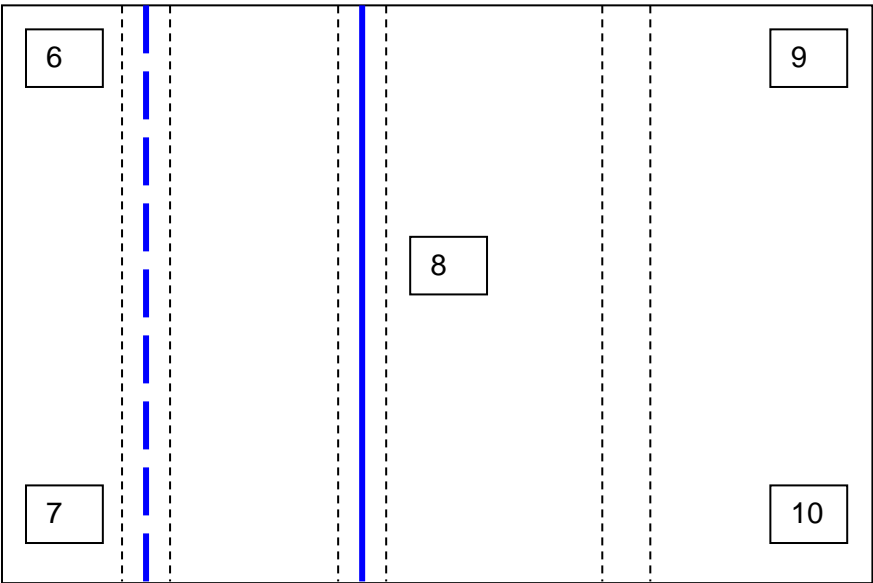


Figure 2 - Non-Fire Side of Specimen 2 - Sketch of Thermocouple Locations

The numbers relate to the thermocouple details given in the test data section. Sketch is not to scale.



— Magboard S-Line Joint - - - - - Vertical timber Centres
— Plasterboard Joint

Figure 3 - Test Specimen 1 - Pre-test – Non Fire Side

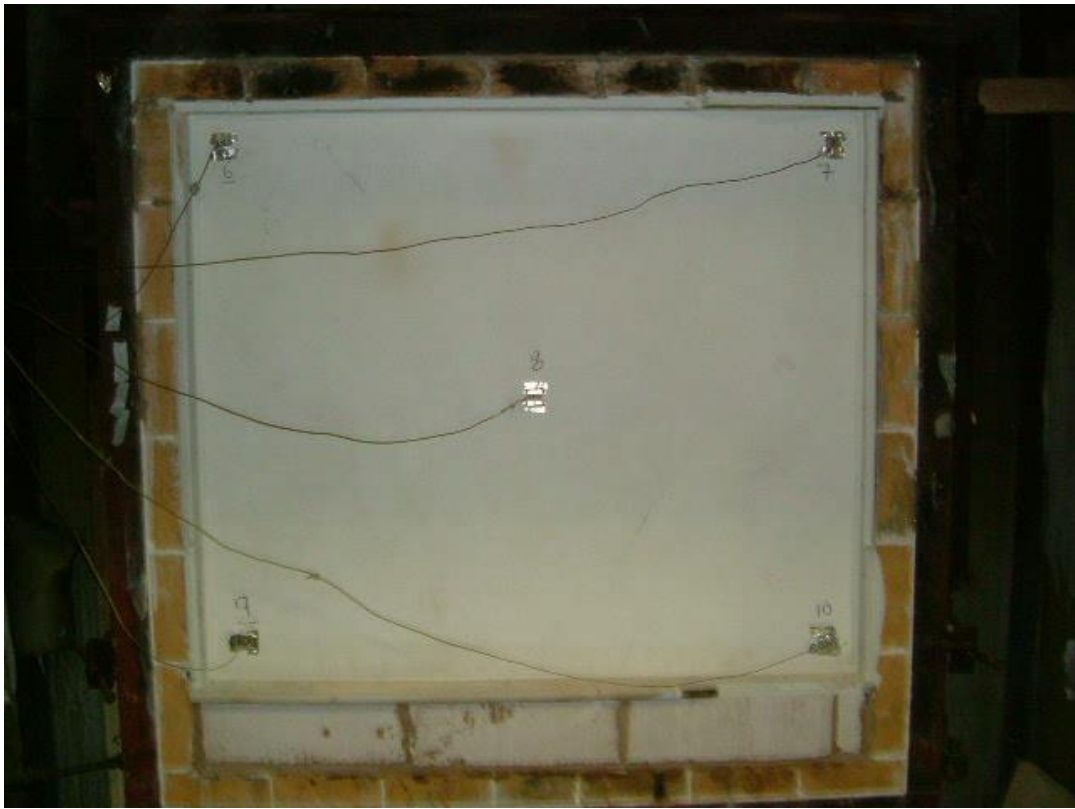


Figure 4 - Test Specimen 1 - Pre-test – Fire Side



Figure 5 - Test Specimen 2 - Pre-test - Non Fire Side

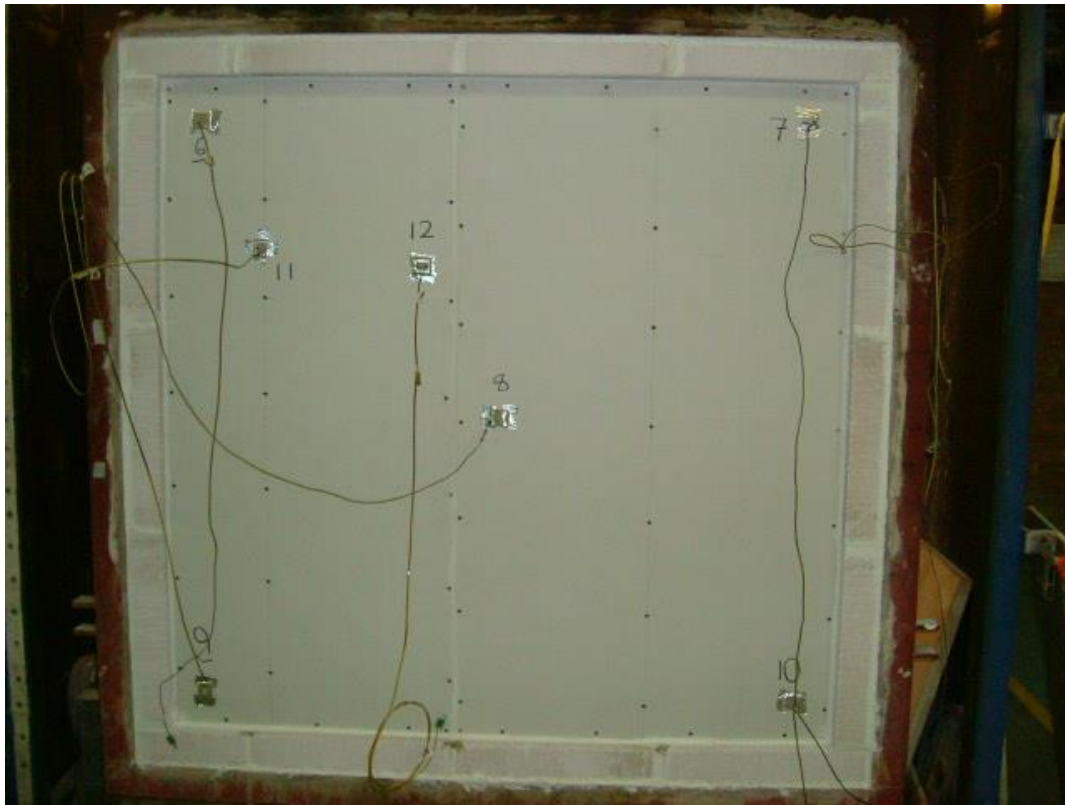


Figure 6 - Test Specimen 2 - Pre-test - Fire Side



Figure 7 - Test Specimen 1 - Observation 10 Minutes



Figure 8 - Test Specimen 1 - Observation 20 Minutes



Figure 9 - Test Specimen 1 - Observation at Test Termination



Figure 10 - Test Specimen 1 - Post Test Observation - Non Fire Side



Figure 11 - Test Specimen 1 - Post Test Observation - Fire Side



Figure 12 - Test Specimen 2 – Observation 40 Minutes



Figure 13 - Test Specimen 2 - Observation 44 Minutes



Figure 14 - Test Specimen 2 - Observation 47 Minutes



Figure 15 - Test Specimen 2 - Observation 51 Minutes



Figure 16 - Test Specimen 2 Observation at Failure

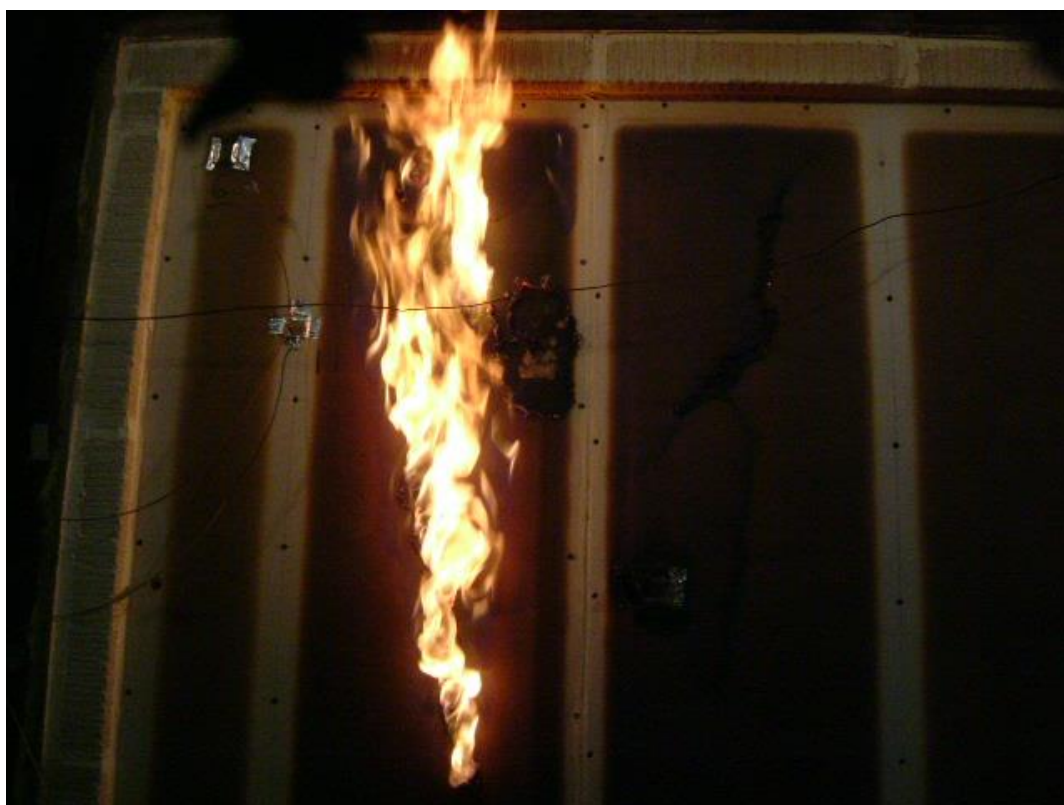


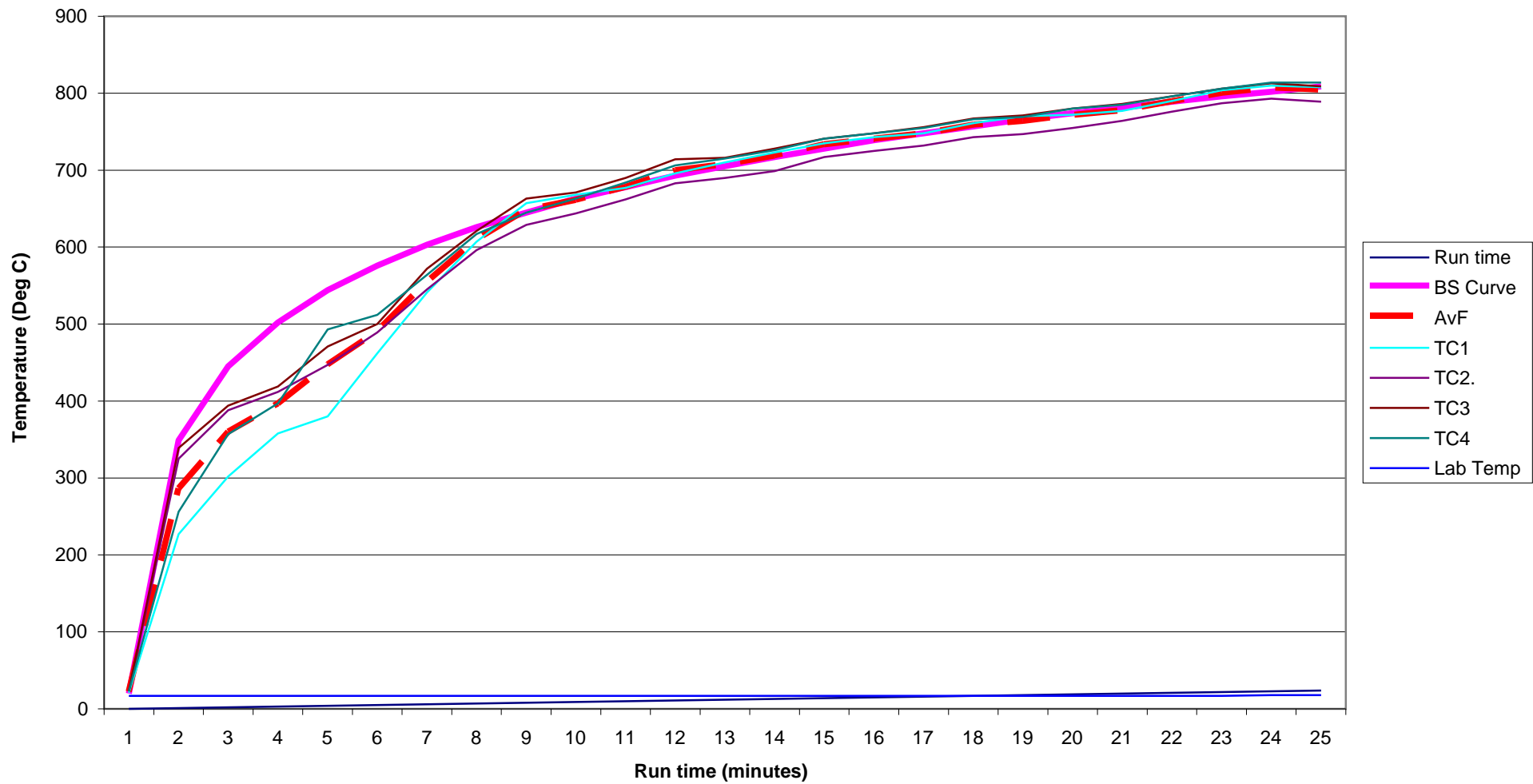
Figure 17 - Test Specimen 2 - Post Test Observation - Non Fire Side



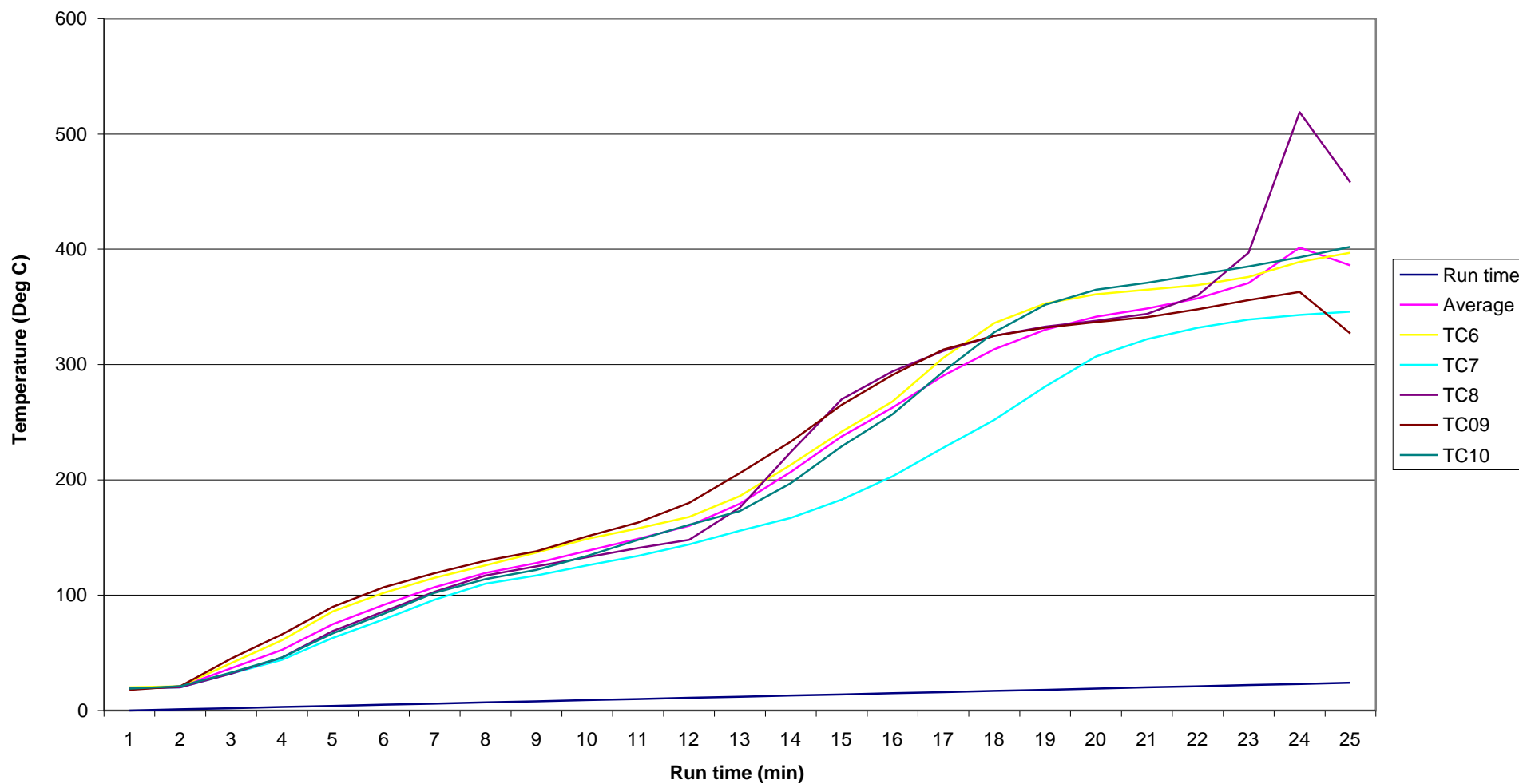
Figure 18 - Test Specimen 2 - Post Test Observation - Fire Side



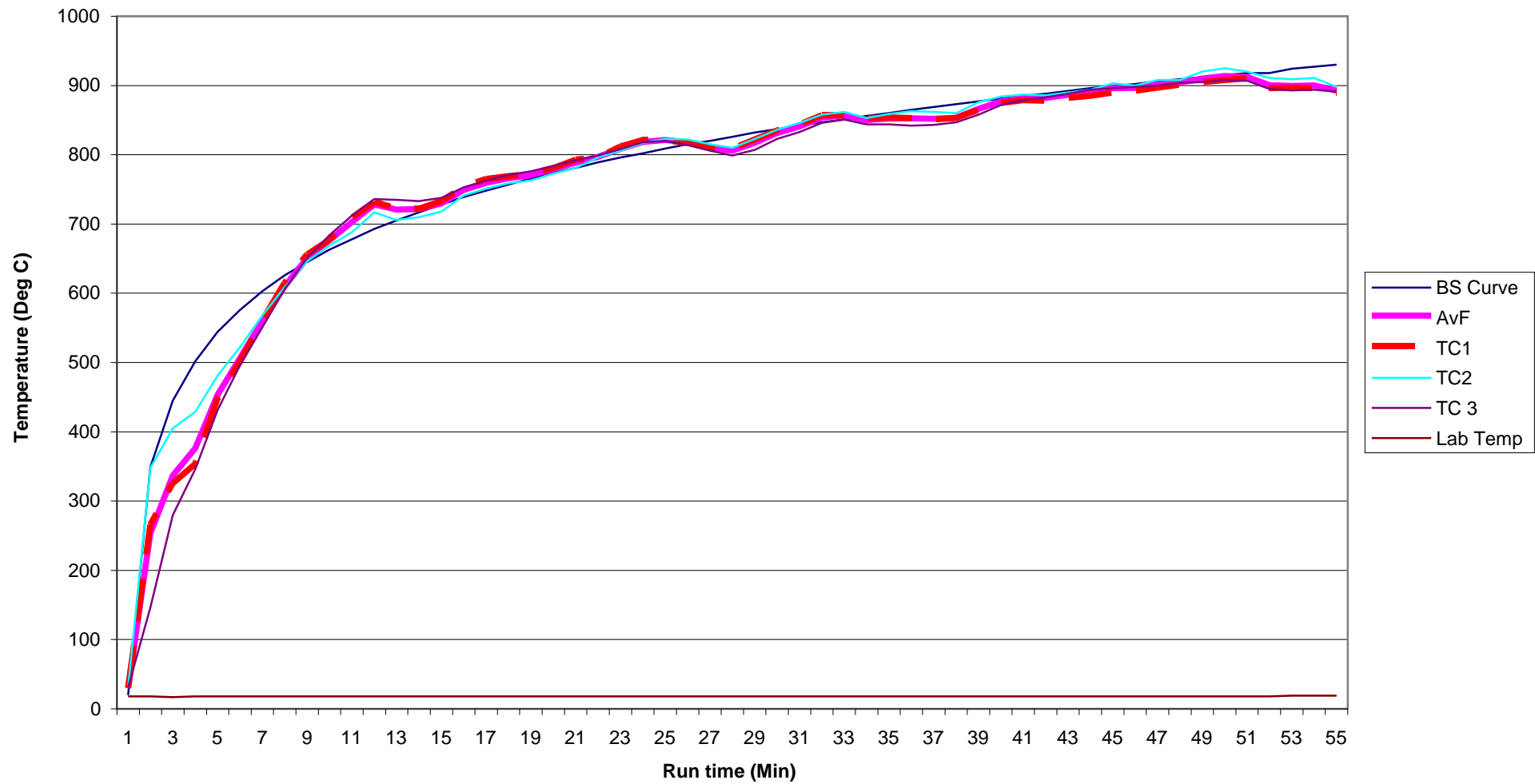
**CERAM Fire Test reference: P04191ASKR – Magboard Benelux BV - Test Specimen 1 - 23/09/04 -
Furnace Thermocouple Data**



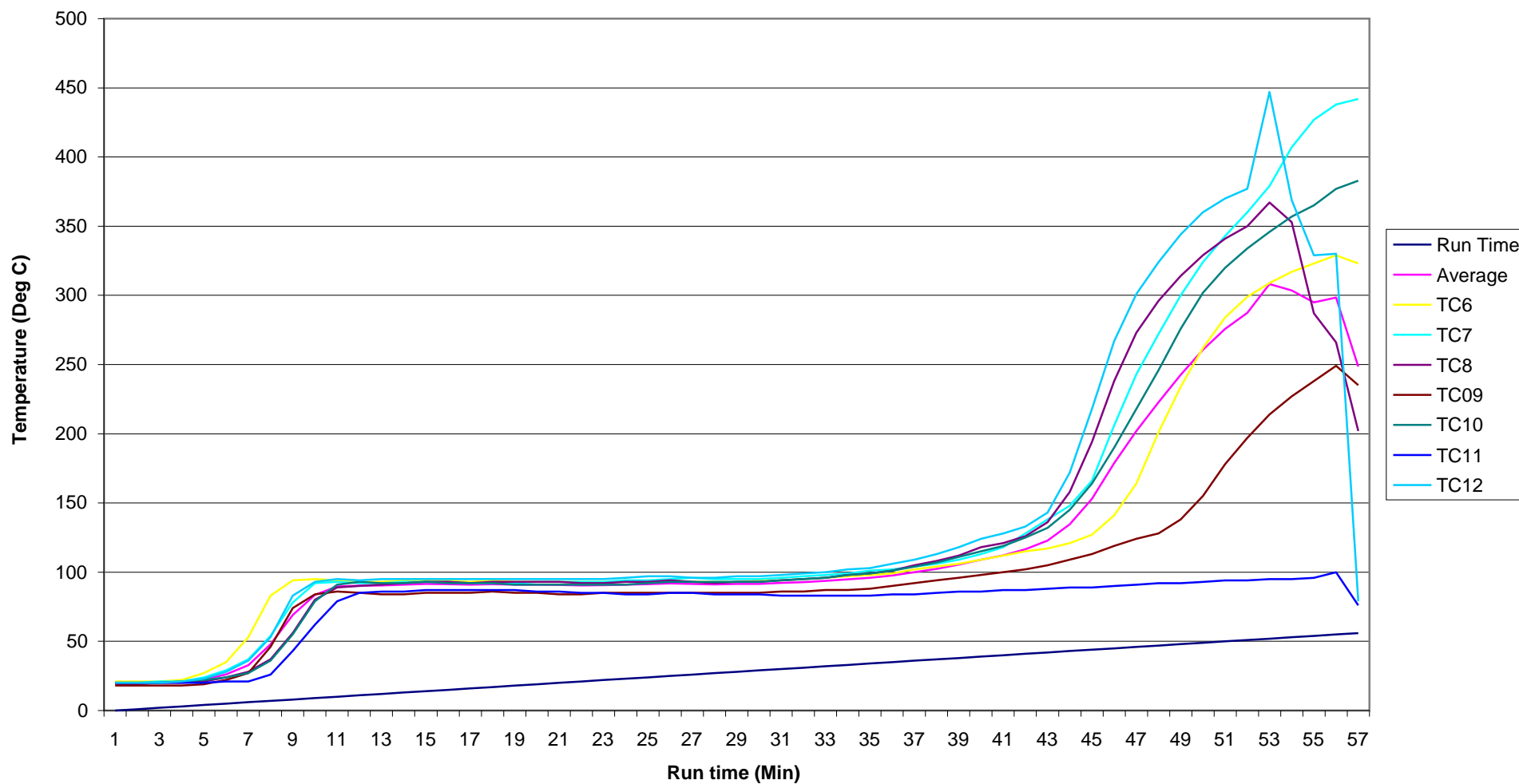
**CERAM Fire Test Ref: P04191ASKR - Magboard Benelux BV - Test Specimen 1 - 23/09/04 -
Specimen Thermocouple Data**



CERAM Fire Test Ref: P04191ASKR - Test Specimen 2 - Magboard Benelux BV - 23/09/04 - Furnace Thermocouple Data



CERAM Fire Test Ref: P04191ASKR - Test Specimen 2 - Magboard Benelux BV - 23/09/04 - Specimen Thermocouple Data



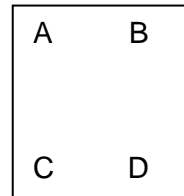
Test Observation Sheet : Test Panel 1
CERAM Test reference No: P04191ASKR
 Customer: Magboard Benelux BV

Date: 23/09/04

A	B
C	D

[illegible]

U = Test specimen unexposed face, E = test specimen exposed face.



Time (min)	Face (U/E) *	Pressure (Pa)	Observation details made by Test Operator.
4	U	-	Slight smoke exiting frame/furnace seal at A-B.
9	E	8.5 – 9.5	Board blackening, surface blistering predominantly in alignment with timber vertical joint positions.
12	E	7.5	Surface blistering now covering board face.
16	E	7.5	Increase in surface marking in alignment with timber vertical joint positions.
25	E	7.5 – 8.3	Flaming on board face in alignment with 2 nd timber vertical joint position (as viewed from the fire side).
31	E	7.5	Flaming on board face in alignment with 2 nd and 3 rd timber vertical joint positions.
35	E	9 – 9.5	Flaming on board face in alignment with all timber vertical joint positions as viewed from the fire side).
35	U	9 – 9.5	No change from 4 minutes.
38	U	9.7	Slight smoke exiting from puncture (circa 10mm vertical slit) in plaster face in centre of board.
40	U	8.1 – 8.8	As above see Figure 12
42	U	7.9 – 8.6	Slight brown discolouration in centre panel sections between timber joint positions.
44	U	7.9 – 8.6	As above see Figure 13
47	U	7.9 – 8.6	Further discolouration see Figure 14
49	U	Pressure Surge	Temporary surge in pressure noted
49	E	7.9 – 8.6	Extreme flaming now evident on board face in alignment with all timber vertical joint positions as viewed from the fire side).
50	U	9.5	Plasterboard face showing closed cracks in A-C area between timber joint positions.
51	U	9.3	Glowing evident in crack areas see Figure 15
53	U	8.5 – 9.3	Open cracks now evident on board face at A-C area between timber joint section.
53	E	8.5 – 9.3	As noted at 49 minutes – board still intact.
54	U	8.5 – 9.3	Flaming at position noted at 53 minutes, see Figure 16 Integrity failure – test terminated.

* U = Test specimen unexposed face, E = test specimen exposed face.

Report Data Test 1 – Furnace Data

Time	Run time	BS Curve	AvF	TC1	TC2.	TC3	TC4	Lab Temp
23/09/2004 09:06	0	20	23	21	23	23	23	17
23/09/2004 09:07	1	349	287	227	325	339	256	17
23/09/2004 09:08	2	445	360	302	388	394	357	17
23/09/2004 09:09	3	502	397	358	412	419	397	17
23/09/2004 09:10	4	544	448	380	447	471	493	17
23/09/2004 09:11	5	576	491	462	489	500	512	17
23/09/2004 09:12	6	603	556	541	545	572	564	17
23/09/2004 09:13	7	626	610	607	596	621	617	17
23/09/2004 09:14	8	645	649	657	629	663	645	17
23/09/2004 09:15	9	663	662	668	644	671	663	17
23/09/2004 09:16	10	678	678	677	662	690	684	17
23/09/2004 09:17	11	693	700	696	683	714	706	17
23/09/2004 09:18	12	705	708	710	690	716	715	17
23/09/2004 09:19	13	717	719	723	699	728	726	17
23/09/2004 09:20	14	728	734	735	717	741	741	17
23/09/2004 09:21	15	739	741	743	725	748	748	17
23/09/2004 09:22	16	748	748	748	732	756	755	17
23/09/2004 09:23	17	757	759	761	743	767	766	17
23/09/2004 09:24	18	766	764	770	747	771	769	17
23/09/2004 09:25	19	774	772	772	755	780	780	17
23/09/2004 09:26	20	781	778	777	764	786	785	17
23/09/2004 09:27	21	789	790	790	776	796	796	17
23/09/2004 09:28	22	796	801	804	787	806	806	17
23/09/2004 09:29	23	802	808	810	793	813	814	18
23/09/2004 09:30	24	809	805	808	789	809	814	18

Report Data Test 1 – Specimen Data

Time	Run time	Average	TC6	TC7	TC8	TC09	TC10
23/09/2004 09:06	0	19	20	19	19	18	19
23/09/2004 09:07	1	21	21	20	20	21	21
23/09/2004 09:08	2	37	41	32	32	45	33
23/09/2004 09:09	3	53	61	44	46	66	46
23/09/2004 09:10	4	75	86	63	69	90	67
23/09/2004 09:11	5	92	102	79	86	107	84
23/09/2004 09:12	6	107	115	96	103	119	102
23/09/2004 09:13	7	119	126	110	117	130	114
23/09/2004 09:14	8	128	137	117	125	138	122
23/09/2004 09:15	9	139	149	126	133	151	134
23/09/2004 09:16	10	149	158	134	141	163	148
23/09/2004 09:17	11	160	168	144	148	180	161
23/09/2004 09:18	12	179	186	156	176	206	173
23/09/2004 09:19	13	207	213	167	224	233	197
23/09/2004 09:20	14	238	242	183	270	265	229
23/09/2004 09:21	15	263	268	203	294	291	257
23/09/2004 09:22	16	291	306	228	312	313	294
23/09/2004 09:23	17	313	336	252	325	325	328
23/09/2004 09:24	18	330	353	281	333	332	352
23/09/2004 09:25	19	342	361	307	338	337	365
23/09/2004 09:26	20	349	365	322	344	341	371
23/09/2004 09:27	21	357	369	332	360	348	378
23/09/2004 09:28	22	371	376	339	397	356	385
23/09/2004 09:29	23	401	389	343	519	363	393
23/09/2004 09:30	24	386	397	346	458	327	402

Report Data Test 1 – Area under Curve

Test Time (min)		Area Std		Area Act		% Diff		% Tol (+/-)
0 to 10		5651		5159		-8.70		15
11 to 25		10604		10625		0.2		10

Report Data Test 2 – Furnace Data

Time	Run Time	BS Curve	AvF	TC1	TC2	TC 3	Lab Temp
23/09/2004 12:56	0	20	31	30	31	31	18
23/09/2004 12:57	1	349	253	266	348	146	18
23/09/2004 12:58	2	445	337	326	405	280	17
23/09/2004 12:59	3	502	376	354	429	346	18
23/09/2004 13:00	4	544	453	448	481	431	18
23/09/2004 13:01	5	576	506	501	522	496	18
23/09/2004 13:02	6	603	560	561	568	551	18
23/09/2004 13:03	7	626	610	615	609	606	18
23/09/2004 13:04	8	645	651	656	646	651	18
23/09/2004 13:05	9	663	677	677	669	684	18
23/09/2004 13:06	10	678	703	709	688	712	18
23/09/2004 13:07	11	693	728	732	717	736	18
23/09/2004 13:08	12	705	721	722	706	735	18
23/09/2004 13:09	13	717	722	722	710	733	18
23/09/2004 13:10	14	728	730	733	718	738	18
23/09/2004 13:11	15	739	749	754	741	753	18
23/09/2004 13:12	16	748	760	765	751	763	18
23/09/2004 13:13	17	757	766	769	759	771	18
23/09/2004 13:14	18	766	771	773	763	776	18
23/09/2004 13:15	19	774	779	781	773	784	18
23/09/2004 13:16	20	781	789	793	781	792	18
23/09/2004 13:17	21	789	797	796	796	799	18
23/09/2004 13:18	22	796	809	812	806	808	18
23/09/2004 13:19	23	802	819	821	817	818	18
23/09/2004 13:20	24	809	821	821	823	820	18
23/09/2004 13:21	25	815	818	817	822	814	18
23/09/2004 13:22	26	820	810	810	815	806	18
23/09/2004 13:23	27	826	806	809	810	799	18
23/09/2004 13:24	28	832	817	822	823	807	18
23/09/2004 13:25	29	837	831	835	836	823	18
23/09/2004 13:26	30	842	841	844	846	833	18
23/09/2004 13:27	31	847	854	857	858	846	18
23/09/2004 13:28	32	851	857	857	862	851	18
23/09/2004 13:29	33	856	850	853	853	844	18
23/09/2004 13:30	34	860	852	854	859	844	18
23/09/2004 13:31	35	865	853	853	863	842	18
23/09/2004 13:32	36	869	852	851	862	843	18
23/09/2004 13:33	37	873	853	853	860	847	18
23/09/2004 13:34	38	877	866	865	876	858	18
23/09/2004 13:35	39	881	877	875	884	872	18
23/09/2004 13:36	40	885	882	879	887	879	18
23/09/2004 13:37	41	888	882	878	886	883	18
23/09/2004 13:38	42	892	887	882	890	888	18
23/09/2004 13:39	43	896	891	885	894	894	18
23/09/2004 13:40	44	899	896	890	903	896	18
23/09/2004 13:41	45	902	897	892	900	898	18
23/09/2004 13:42	46	906	902	897	908	900	18
23/09/2004 13:43	47	909	904	901	908	904	18
23/09/2004 13:44	48	912	910	905	920	905	18
23/09/2004 13:45	49	915	914	908	925	908	18
23/09/2004 13:46	50	918	912	910	920	907	18
23/09/2004 13:47	51	918	901	896	911	895	18
23/09/2004 13:48	52	924	900	897	909	893	19
23/09/2004 13:49	53	927	900	896	911	894	19
23/09/2004 13:50	54	930	893	890	898	891	19

Report Data Test 2 – Specimen Data

Time	Run Time	Average	TC6	TC7	TC8	TC09	TC10	TC11	TC12
23/09/2004 12:56	0	20	21	20	19	18	20	20	20
23/09/2004 12:57	1	20	21	20	19	18	20	20	20
23/09/2004 12:58	2	20	21	21	20	18	20	20	20
23/09/2004 12:59	3	20	22	21	20	18	21	20	21
23/09/2004 13:00	4	22	27	24	21	19	22	20	23
23/09/2004 13:01	5	26	35	29	24	22	24	21	28
23/09/2004 13:02	6	33	53	37	28	27	27	21	36
23/09/2004 13:03	7	48	83	54	37	46	36	26	53
23/09/2004 13:04	8	69	94	78	56	74	55	43	83
23/09/2004 13:05	9	84	95	92	80	84	79	62	93
23/09/2004 13:06	10	90	94	93	89	86	91	79	95
23/09/2004 13:07	11	90	93	92	90	85	93	85	94
23/09/2004 13:08	12	90	93	92	91	84	92	86	95
23/09/2004 13:09	13	91	94	93	92	84	92	86	95
23/09/2004 13:10	14	91	94	93	93	85	93	87	95
23/09/2004 13:11	15	91	94	93	93	85	92	87	95
23/09/2004 13:12	16	91	93	92	92	85	92	87	95
23/09/2004 13:13	17	91	94	92	93	86	92	87	95
23/09/2004 13:14	18	91	93	92	93	85	91	87	95
23/09/2004 13:15	19	91	93	93	93	85	91	86	95
23/09/2004 13:16	20	91	93	93	93	84	91	86	95
23/09/2004 13:17	21	90	93	93	92	84	91	85	95
23/09/2004 13:18	22	91	93	93	92	85	91	85	95
23/09/2004 13:19	23	91	93	94	93	85	91	84	96
23/09/2004 13:20	24	91	94	94	93	85	92	84	97
23/09/2004 13:21	25	92	94	95	94	85	93	85	97
23/09/2004 13:22	26	92	93	96	93	85	93	85	96
23/09/2004 13:23	27	91	93	95	92	85	93	84	96
23/09/2004 13:24	28	91	93	95	93	85	93	84	97
23/09/2004 13:25	29	92	94	95	93	85	93	84	97
23/09/2004 13:26	30	92	94	96	94	86	94	83	98
23/09/2004 13:27	31	93	95	97	95	86	95	83	99
23/09/2004 13:28	32	94	96	98	96	87	96	83	100
23/09/2004 13:29	33	95	97	99	98	87	98	83	102
23/09/2004 13:30	34	96	98	101	99	88	99	83	103
23/09/2004 13:31	35	98	99	102	101	90	101	84	106
23/09/2004 13:32	36	100	102	104	105	92	104	84	109
23/09/2004 13:33	37	102	104	106	108	94	107	85	113
23/09/2004 13:34	38	105	106	109	112	96	111	86	118
23/09/2004 13:35	39	109	109	113	118	98	115	86	124
23/09/2004 13:36	40	112	112	118	121	100	119	87	128
23/09/2004 13:37	41	117	115	128	126	102	125	87	133
23/09/2004 13:38	42	123	117	138	136	105	132	88	143
23/09/2004 13:39	43	135	121	148	158	109	145	89	172
23/09/2004 13:40	44	153	127	166	194	113	164	89	218
23/09/2004 13:41	45	179	141	206	238	119	190	90	267
23/09/2004 13:42	46	202	164	243	273	124	218	91	301
23/09/2004 13:43	47	223	201	272	296	128	246	92	324
23/09/2004 13:44	48	243	234	300	314	138	276	92	344
23/09/2004 13:45	49	261	262	324	329	155	302	93	360
23/09/2004 13:46	50	276	284	343	341	178	320	94	370
23/09/2004 13:47	51	287	299	360	350	197	334	94	377
23/09/2004 13:48	52	308	309	379	367	214	346	95	447
23/09/2004 13:49	53	304	317	407	353	227	357	95	369
23/09/2004 13:50	54	295	323	427	287	238	365	96	329
23/09/2004 13:51	55	298	329	438	266	249	377	100	330
23/09/2004 13:52	56	249	323	442	202	235	383	76	79

Report Data Test 2 – Area under Curve

Test Time (min)	Area Std		Area Act		% Diff		% Tol (+/-)
0 to 10	5651		5158		-8.70		15
11 to 54	36976		36868		0.3		10