CONFIDENTIAL REPORT

Project Title	:	Indicative Fire Test on 12 mm Thick Fire Retardant Construction Board
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Date of Issue	:	5 August 2003
Circulation	:	

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SUMMARY

An indicative fire test was performed on 12 mm thick Fire Retardant Construction Board built onto a vertical surround comprising refractory brick and block work and held in position using a calcium silicate board beading system. The test was conducted at CERAM using the reduced scale furnace with the specimen tested to the general principles of BS 476 part 20: 1987.

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 the mid height of the specimen, the system achieved the following insulation and integrity criteria:

Insulation = 14 minutes.
Integrity = 152 minutes.

Integrity failure occurred as a result of separation of a horizontal bead section of the fixing system from the refractory brickwork, which exposed a fissure between the construction board edge and test frame brick work. At this juncture, there was no evidence of integrity failure to the 12 mm thick Fire Retardant Construction Board and the test was continued for a further 28 minutes (total test time of 180 minutes). The test was terminated after 180 minutes with no evidence of integrity failure to the 12 mm thick Fire Retardant Construction Board.

The test was originally set for a 120 minute period but was extended at the request of the sponsor due to the specimen maintaining its integrity criteria after the two hour period.

1 INTRODUCTION

This report covers an indicative fire test 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 a vertical panel of 12 mm thick Fire Resistant Construction Board 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 1st August 2003

The testing aims were as follows:

- To determine the performance of 12 mm thick Fire Resistant Construction Board when tested to the general principles of BS 476 Part 22: 1987 reference to BS 476 Part 20: 1987.
- To test for a minimum of 120 minutes to determine insulation and integrity criteria with the option of extending the test period dependent on performance of the test specimen.
- To use as a benchmark test for future work programs.

2 SAMPLE SPECIFICATION

The sample supplied to CERAM consisted of a construction board panel of dimensions 2330 mm x 1220 mm of a nominal thickness of 12 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.

3 CONSTRUCTION DETAILS

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 Fire Resistant Construction Board of nominal thickness 12 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.

Figure 1 – APPENDIX Section shows a sketch of the panel NON-FIRE side with positions for specimen thermocouples

Figure 2 - APPENDIX Section shows a photograph of the FIRE side of the test specimen prior to test commencement

Figure 3 - APPENDIX Section shows a photograph of the NON-FIRE side of the test specimen prior to test commencement

4 INSTRUMENTATION/EQUIPMENT DETAILS

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.

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.

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

The 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

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 20°C. The average specimen thermocouple temperature at the start of the test was 22°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 specimen achieved the following Insulation and Integrity criteria:

Insulation	14 minutes
Integrity	152 minutes

Integrity failure occurred as a result of separation of a section of horizontal bead from the refractory frame, which exposed a fissure between the construction board edge and test frame brick work. Integrity failure of the system was confirmed by ignition of the cotton pad which was applied against the said fissure. At this juncture, there was no evidence of integrity failure to the 12 mm thick Fire Retardant Construction Board and the test was continued for a further 28 minutes (total test time of 180 minutes). The test was terminated after 180 minutes with no evidence of integrity failure to the 12 mm thick Fire Retardant Construction Board.

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

The APPENDIX section contains details of the observations and test data although some specific results are noted below:

- Insulation failure occurred after 14 minutes due to: (a) the average thermocouple temperature (175°C) exceeding the maximum permissible temperature of 140°C plus ambient (22°C) and (b) Thermocouple 10 exceeding the maximum permissible temperature for a single thermocouple of 180°C plus ambient (22°C).
- After 13 minutes, the exposed face of the panel showed evidence of random surface cracks combined with a flaky appearance. After initial discolouration, this appearance was maintained throughout the test duration and is shown on the post test photograph Figure 12 in the APPENDIX.
- After 116 minutes, the exposed panel face began to bow into the furnace with the maximum bow of circa 50 mm noted at the mid point of the specimen.
- The calcium silicate board bead at position A-B (see Observation sheet in APPENDIX for reference), developed a crack after a period of 120 minutes.
- A section of the said bead became detached from the test frame surround after a period of 152 minutes to reveal a fissure between the frame surround and the 12 mm thick Fire Retardant Construction Board. At his point of proceedings, the system failed the cotton pad integrity test. It was noted that the 12 mm thick Fire Retardant Construction Board displayed no signs of integrity damage.
- The test was continued at the request of the sponsor until a total time of 180 minutes had elapsed. No deterioration in the condition of the 12 mm thick Fire Retardant Construction Board from the period 152 minutes to test termination was noted.
- Post test observation revealed that the board had bowed by 85 mm at the mid-point.

6 CONCLUSIONS

When exposed to the temperature and pressure conditions approximating to those given in BS 476 part 22: 1987, 12 mm thick Fire Resistant Construction Board satisfied insulation criteria for 14 minutes and integrity for 152 minutes. Integrity failure occurred due to separation of a section of the bead system used to fix the specimen to the furnace opening, thus exposing a gap between furnace lining and test specimen.

The 12 mm thick Fire Resistant Construction Board did not evidence of integrity failure after the total test time of 180 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 - Sketch of Thermocouple Locations

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

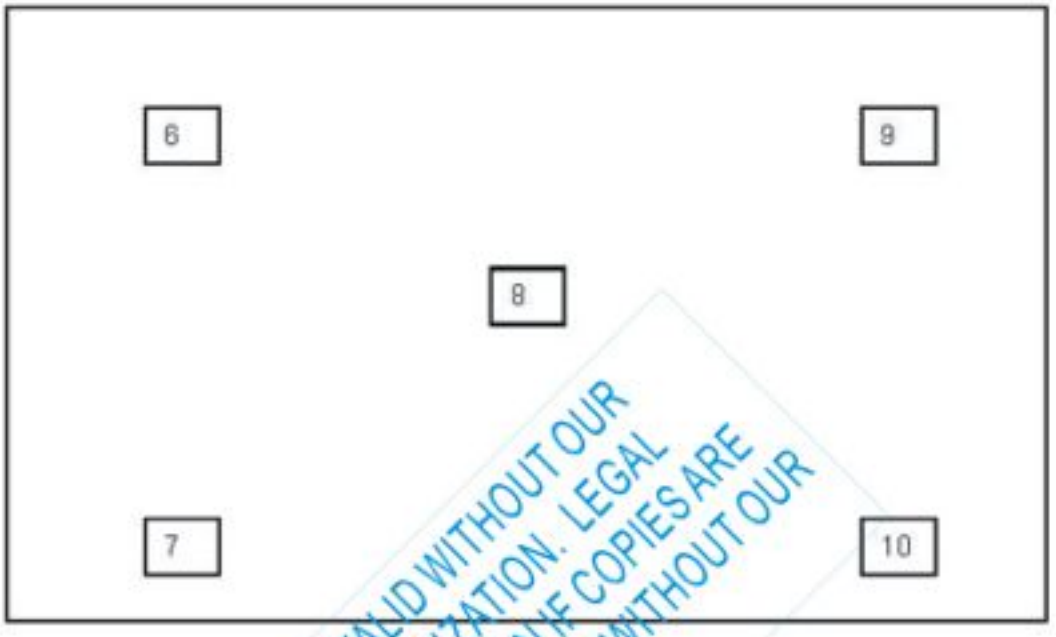

Figure 2 - Pre Test View: Non Fire Side

Figure 3 – Pre Test View : Fire Side

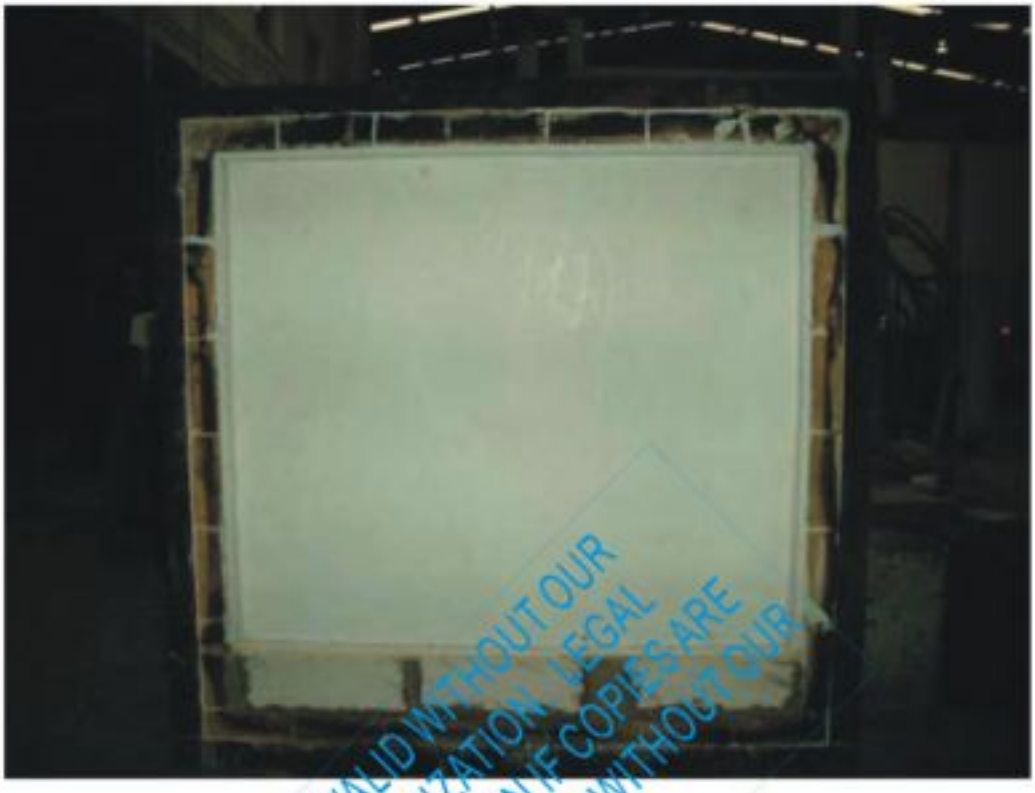

Figure 4 – Observation at 25 Minutes

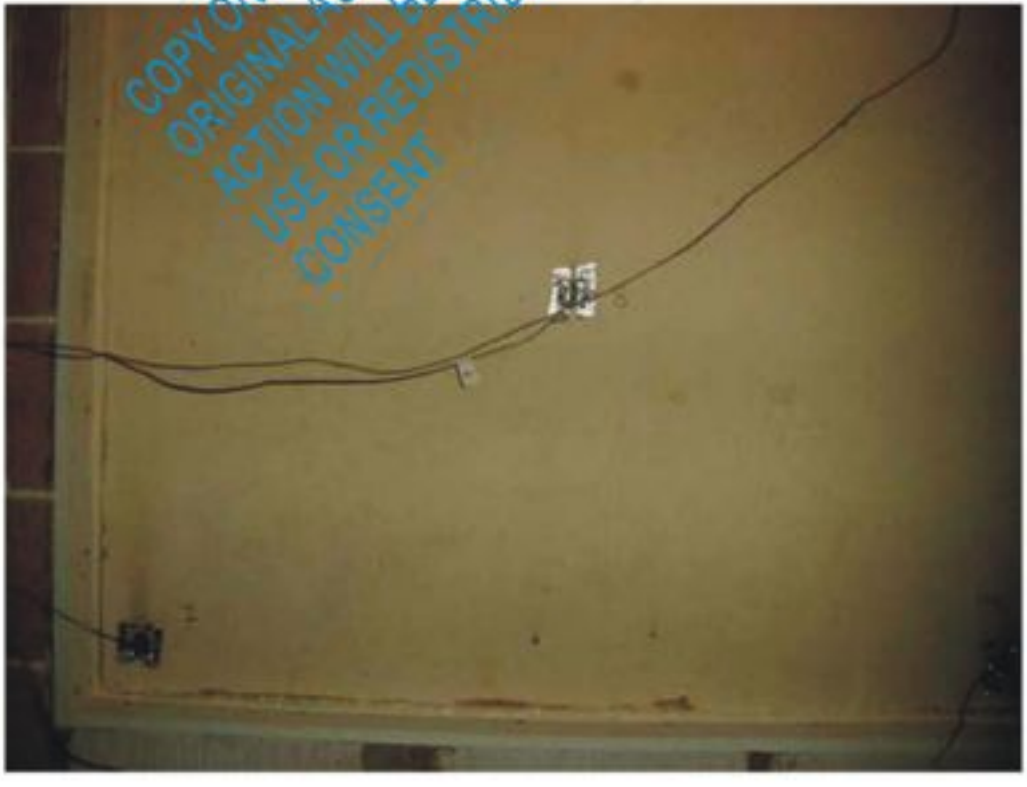

Figure 5 – Observation at 53 Minutes

Figure 6 – Observation at 105 Minutes

Figure 7 – Observation at 120 Minutes

Figure 8 – Observation at 145 Minutes

Figure 9 – Observation at 155 Minutes

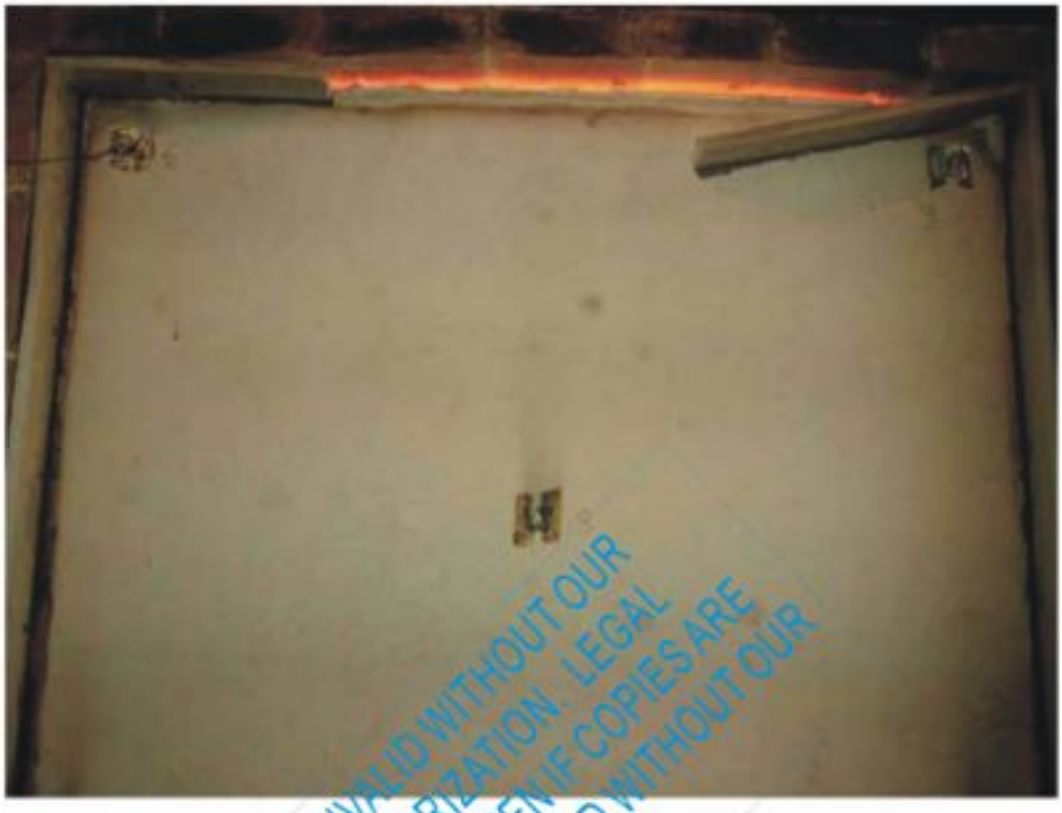

Figure 10 – Observation at 180 Minutes

Figure 11 – Post Test Observation Fire Side Face

Figure 12 – Post Test Observation Fire Side Magnified

Figure 13 – Post Test Observation : Non Fire Side

Figure 14 – Post Test Observation : Fire Side

TEST DATA

Furnace Data

Time	Run time	BS Curve	AverageF	TC1	TC2	TC3	TC4	TC5
01/08/2003 10:11	0:00:00	20	27	26	27	27	28	20
01/08/2003 10:12	0:00:58	349	245	207	237	263	272	20
01/08/2003 10:13	0:01:58	445	328	296	314	343	360	20
01/08/2003 10:14	0:02:57	502	407	369	389	422	447	20
01/08/2003 10:15	0:03:56	544	472	437	459	478	515	20
01/08/2003 10:16	0:04:57	576	520	498	504	527	551	20
01/08/2003 10:17	0:05:56	603	561	536	541	564	604	20
01/08/2003 10:18	0:06:56	626	596	573	582	595	633	20
01/08/2003 10:19	0:07:58	645	640	623	621	637	680	20
01/08/2003 10:20	0:08:56	663	655	631	643	648	696	20
01/08/2003 10:21	0:09:56	678	682	669	664	674	719	20
01/08/2003 10:22	0:10:58	693	711	700	689	706	749	20
01/08/2003 10:23	0:11:56	705	721	712	704	716	752	20
01/08/2003 10:24	0:12:57	717	716	710	699	712	743	20
01/08/2003 10:25	0:13:57	728	727	715	712	723	756	20
01/08/2003 10:26	0:14:58	730	739	723	725	733	765	20
01/08/2003 10:27	0:15:57	748	745	735	732	741	770	20
01/08/2003 10:28	0:16:56	757	756	748	745	750	781	20
01/08/2003 10:29	0:17:57	766	767	761	756	760	791	20
01/08/2003 10:30	0:18:57	774	778	772	766	773	800	20
01/08/2003 10:31	0:19:56	781	786	783	775	778	808	20
01/08/2003 10:32	0:20:58	789	798	794	786	791	820	20
01/08/2003 10:33	0:21:58	796	803	798	792	797	824	20
01/08/2003 10:34	0:22:57	802	800	799	790	792	819	20
01/08/2003 10:35	0:23:58	809	805	803	794	798	823	20
01/08/2003 10:36	0:24:58	815	809	808	798	803	826	20
01/08/2003 10:37	0:25:57	820	813	811	803	807	830	21
01/08/2003 10:38	0:26:57	826	817	815	807	813	834	21
01/08/2003 10:39	0:27:57	832	835	833	825	829	853	21
01/08/2003 10:40	0:28:58	837	849	847	839	842	868	21
01/08/2003 10:41	0:29:57	842	859	858	849	852	878	21
01/08/2003 10:42	0:30:56	847	848	850	838	840	862	21
01/08/2003 10:43	0:31:57	851	850	847	840	844	867	21
01/08/2003 10:44	0:32:58	856	855	855	845	849	870	21
01/08/2003 10:45	0:33:56	860	858	856	850	854	873	21
01/08/2003 10:46	0:34:57	865	863	861	854	857	878	21
01/08/2003 10:47	0:35:58	869	866	865	857	861	881	21
01/08/2003 10:48	0:36:56	873	870	867	863	863	886	21
01/08/2003 10:49	0:37:57	877	874	873	865	868	889	21
01/08/2003 10:50	0:38:58	881	875	873	868	871	889	21

01/08/2003 10:51	0:39:57	885	881	881	871	875	895	22
01/08/2003 10:52	0:40:58	888	892	892	884	885	908	22
01/08/2003 10:53	0:41:56	892	899	898	890	892	915	22
01/08/2003 10:54	0:42:56	896	905	905	897	898	919	22
01/08/2003 10:55	0:43:57	899	908	907	899	901	923	22
01/08/2003 10:56	0:44:56	902	901	901	893	895	915	22
01/08/2003 10:57	0:45:57	906	900	900	893	893	913	22
01/08/2003 10:58	0:46:58	909	904	905	896	898	917	22
01/08/2003 10:59	0:47:58	912	911	911	904	904	925	22
01/08/2003 11:00	0:48:58	915	914	913	907	908	928	22
01/08/2003 11:01	0:49:58	918	918	917	910	912	932	22
01/08/2003 11:02	0:50:58	918	921	922	913	915	935	22
01/08/2003 11:03	0:51:58	924	923	921	915	919	937	22
01/08/2003 11:04	0:52:57	927	927	927	919	922	940	22
01/08/2003 11:05	0:53:58	930	929	929	921	923	942	22
01/08/2003 11:06	0:54:58	932	930	931	923	925	942	22
01/08/2003 11:07	0:55:56	935	934	935	926	927	946	22
01/08/2003 11:08	0:56:58	938	936	938	929	929	946	22
01/08/2003 11:09	0:57:58	940	937	939	930	931	950	22
01/08/2003 11:10	0:58:58	943	939	938	932	935	951	23
01/08/2003 11:11	0:59:58	945	941	941	934	936	954	22
01/08/2003 11:12	1:00:58	948	943	943	936	937	954	23
01/08/2003 11:13	1:01:56	950	948	949	940	942	961	22
01/08/2003 11:14	1:02:58	953	952	952	944	945	965	23
01/08/2003 11:15	1:03:58	955	955	955	947	949	967	23
01/08/2003 11:16	1:04:58	957	957	957	950	953	968	23
01/08/2003 11:17	1:05:58	960	959	961	953	953	970	23
01/08/2003 11:18	1:06:57	962	963	963	955	957	976	23
01/08/2003 11:19	1:07:57	964	964	966	957	959	975	23
01/08/2003 11:20	1:08:58	966	967	968	960	961	978	23
01/08/2003 11:21	1:09:58	967	969	971	962	962	981	23
01/08/2003 11:22	1:10:57	968	971	973	964	965	982	23
01/08/2003 11:23	1:11:57	970	972	974	966	966	983	23
01/08/2003 11:24	1:12:57	972	974	974	967	969	985	23
01/08/2003 11:25	1:13:56	974	976	977	969	970	987	23
01/08/2003 11:26	1:14:57	976	978	979	971	972	989	23
01/08/2003 11:27	1:15:58	979	979	980	972	974	990	23
01/08/2003 11:28	1:16:58	981	981	982	974	974	992	23
01/08/2003 11:29	1:17:57	983	981	982	975	976	992	23
01/08/2003 11:30	1:18:57	985	983	985	976	977	994	24
01/08/2003 11:31	1:19:57	987	985	986	978	979	996	23
01/08/2003 11:32	1:20:56	988	986	987	980	981	996	24
01/08/2003 11:33	1:21:58	990	989	992	981	982	999	24
01/08/2003 11:34	1:22:58	992	989	992	982	983	1000	24
01/08/2003 11:35	1:23:58	994	991	992	985	984	1001	24

01/08/2003 11:36	1:24:57	996	992	996	984	986	1001	24
01/08/2003 11:37	1:25:57	997	993	994	987	987	1003	24
01/08/2003 11:38	1:26:57	999	994	995	988	989	1004	24
01/08/2003 11:39	1:27:58	1001	996	999	989	989	1006	24
01/08/2003 11:40	1:28:58	1003	996	998	990	990	1005	24
01/08/2003 11:41	1:29:57	1005	997	998	990	991	1007	24
01/08/2003 11:42	1:30:57	1006	998	1000	992	992	1008	24
01/08/2003 11:43	1:31:56	1008	999	1001	993	993	1010	24
01/08/2003 11:44	1:32:56	1010	1000	1002	994	995	1010	24
01/08/2003 11:45	1:33:58	1012	1001	1003	994	996	1011	24
01/08/2003 11:46	1:34:58	1014	1002	1004	996	997	1012	25
01/08/2003 11:47	1:35:58	1016	1001	1004	995	996	1010	25
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01/08/2003 11:49	1:37:57	1019	999	1001	993	994	1009	25
01/08/2003 11:50	1:38:57	1020	1005	1006	997	1000	1016	25
01/08/2003 11:51	1:39:56	1021	1010	1012	1004	1004	1020	25
01/08/2003 11:52	1:40:56	1022	1013	1016	1007	1007	1023	25
01/08/2003 11:53	1:41:58	1023	1016	1017	1009	1011	1026	25
01/08/2003 11:54	1:42:58	1024	1019	1021	1012	1012	1029	25
01/08/2003 11:55	1:43:57	1026	1020	1022	1012	1015	1029	25
01/08/2003 11:56	1:44:57	1028	1023	1025	1016	1016	1032	25
01/08/2003 11:57	1:45:57	1029	1024	1027	1016	1018	1033	25
01/08/2003 11:58	1:46:56	1031	1025	1028	1019	1020	1034	25
01/08/2003 11:59	1:47:56	1032	1026	1028	1021	1020	1036	25
01/08/2003 12:00	1:48:58	1034	1028	1030	1022	1023	1038	25
01/08/2003 12:01	1:49:58	1035	1030	1033	1023	1024	1038	26
01/08/2003 12:02	1:50:57	1036	1031	1033	1025	1025	1041	26
01/08/2003 12:03	1:51:57	1038	1032	1034	1026	1026	1042	26
01/08/2003 12:04	1:52:56	1039	1033	1034	1027	1028	1043	26
01/08/2003 12:05	1:53:55	1041	1034	1036	1028	1030	1043	26
01/08/2003 12:06	1:54:56	1042	1035	1035	1030	1030	1044	26
01/08/2003 12:07	1:55:58	1043	1036	1037	1030	1031	1047	26
01/08/2003 12:08	1:56:58	1045	1037	1038	1030	1032	1048	26
01/08/2003 12:09	1:57:57	1046	1038	1038	1031	1034	1048	26
01/08/2003 12:10	1:58:57	1048	1039	1040	1033	1034	1048	26
01/08/2003 12:11	1:59:58	1049	1041	1044	1034	1035	1050	26
01/08/2003 12:12	2:00:57	1049	1041	1043	1035	1035	1050	26
01/08/2003 12:13	2:01:57	1051	1044	1046	1038	1039	1054	26
01/08/2003 12:14	2:02:57	1052	1048	1051	1041	1042	1057	26
01/08/2003 12:15	2:03:57	1054	1049	1052	1043	1044	1058	27
01/08/2003 12:16	2:04:57	1055	1053	1055	1046	1048	1062	27
01/08/2003 12:17	2:05:56	1055	1056	1057	1049	1051	1066	27
01/08/2003 12:18	2:06:58	1057	1058	1061	1051	1053	1067	27
01/08/2003 12:19	2:07:58	1058	1060	1061	1054	1056	1070	27

01/08/2003 12:20	2:08:58	1060	1063	1064	1056	1058	1072	27
01/08/2003 12:21	2:09:57	1061	1064	1065	1057	1060	1073	27
01/08/2003 12:22	2:10:57	1061	1065	1066	1060	1060	1075	27
01/08/2003 12:23	2:11:56	1063	1067	1068	1060	1062	1076	27
01/08/2003 12:24	2:12:56	1064	1068	1069	1062	1064	1077	27
01/08/2003 12:25	2:13:58	1066	1070	1070	1064	1065	1080	27
01/08/2003 12:26	2:14:57	1067	1071	1071	1065	1067	1080	28
01/08/2003 12:27	2:15:57	1068	1072	1073	1066	1067	1080	28
01/08/2003 12:28	2:16:57	1069	1073	1073	1067	1069	1083	28
01/08/2003 12:29	2:17:57	1070	1074	1076	1068	1070	1082	28
01/08/2003 12:30	2:18:57	1071	1076	1076	1070	1071	1085	28
01/08/2003 12:31	2:19:57	1072	1076	1077	1071	1072	1085	28
01/08/2003 12:32	2:20:56	1072	1076	1078	1070	1072	1084	28
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01/08/2003 12:34	2:22:58	1074	1074	1074	1069	1071	1083	28
01/08/2003 12:35	2:23:58	1075	1078	1077	1071	1072	1084	28
01/08/2003 12:36	2:24:58	1076	1078	1078	1073	1073	1086	29
01/08/2003 12:37	2:25:57	1077	1078	1078	1073	1074	1087	29
01/08/2003 12:38	2:26:56	1078	1080	1080	1074	1076	1088	29
01/08/2003 12:39	2:27:58	1079	1080	1081	1074	1076	1090	29
01/08/2003 12:40	2:28:57	1080	1081	1081	1075	1077	1090	29
01/08/2003 12:41	2:29:58	1081	1082	1082	1076	1078	1090	29
01/08/2003 12:42	2:30:57	1082	1083	1084	1077	1079	1091	29
01/08/2003 12:43	2:31:56	1083	1083	1084	1077	1079	1091	29
01/08/2003 12:44	2:32:57	1084	1084	1084	1079	1080	1092	29
01/08/2003 12:45	2:33:57	1085	1084	1084	1079	1080	1093	29
01/08/2003 12:46	2:34:58	1086	1084	1085	1079	1080	1093	30
01/08/2003 12:47	2:35:57	1087	1087	1090	1080	1082	1094	30
01/08/2003 12:48	2:36:58	1088	1087	1091	1080	1082	1094	30
01/08/2003 12:49	2:37:57	1089	1088	1090	1081	1083	1096	30
01/08/2003 12:50	2:38:56	1090	1088	1092	1082	1083	1095	30
01/08/2003 12:51	2:39:56	1091	1087	1089	1082	1083	1095	31
01/08/2003 12:52	2:40:58	1092	1089	1090	1083	1085	1097	31
01/08/2003 12:53	2:41:56	1093	1089	1089	1083	1085	1098	31
01/08/2003 12:54	2:42:58	1094	1089	1090	1083	1085	1097	31
01/08/2003 12:55	2:43:58	1095	1089	1090	1083	1086	1098	31
01/08/2003 12:56	2:44:57	1096	1090	1091	1084	1086	1099	31
01/08/2003 12:57	2:45:57	1097	1091	1092	1085	1086	1099	31
01/08/2003 12:58	2:46:57	1098	1092	1093	1086	1088	1100	32
01/08/2003 12:59	2:47:58	1099	1092	1093	1087	1088	1100	32
01/08/2003 13:00	2:48:58	1100	1092	1093	1087	1088	1099	32
01/08/2003 13:01	2:49:57	1101	1095	1095	1089	1091	1103	32
01/08/2003 13:02	2:50:58	1101	1097	1097	1091	1093	1105	32
01/08/2003 13:03	2:51:57	1102	1098	1098	1092	1094	1106	32

01/08/2003 13:04	2:52:56	1103	1100	1102	1094	1095	1108	32
01/08/2003 13:05	2:53:57	1104	1103	1106	1097	1099	1111	33
01/08/2003 13:06	2:54:57	1105	1105	1105	1099	1101	1114	33
01/08/2003 13:07	2:55:56	1106	1106	1106	1100	1103	1115	33
01/08/2003 13:08	2:56:58	1107	1108	1109	1102	1104	1115	32
01/08/2003 13:09	2:57:58	1108	1109	1110	1103	1105	1117	32
01/08/2003 13:10	2:58:57	1109	1110	1111	1103	1106	1118	32
01/08/2003 13:11	2:59:56	1110	1111	1113	1105	1108	1119	31

BS Curve = Target temperature; Average F = Average of Furnace thermocouples 1-4.
TC5 = Ambient laboratory temperature

Specimen TC Data

Time	Run time	Average	TC6	TC7	TC8	TC9	TC10
01/08/2003 10:11	0:00:00	22	23	22	22	21	22
01/08/2003 10:12	0:00:58	22	23	23	22	21	22
01/08/2003 10:13	0:01:58	27	28	32	26	25	26
01/08/2003 10:14	0:02:57	36	35	47	34	32	33
01/08/2003 10:15	0:03:58	53	52	70	49	44	49
01/08/2003 10:16	0:04:57	71	69	91	66	57	70
01/08/2003 10:17	0:05:56	88	85	109	83	72	92
01/08/2003 10:18	0:06:56	102	98	119	97	85	110
01/08/2003 10:19	0:07:58	113	105	127	110	98	125
01/08/2003 10:20	0:08:58	122	113	133	119	109	137
01/08/2003 10:21	0:09:56	129	119	140	125	117	144
01/08/2003 10:22	0:10:58	136	125	148	131	123	151
01/08/2003 10:23	0:11:56	143	132	155	138	130	160
01/08/2003 10:24	0:12:57	151	141	163	146	136	168
01/08/2003 10:25	0:13:57	161	150	176	152	144	185
01/08/2003 10:26	**0:14:58**	**175**	159	196	158	153	**209**
01/08/2003 10:27	0:15:57	188	170	215	167	160	230
01/08/2003 10:28	0:16:56	205	187	235	183	168	254
01/08/2003 10:29	0:17:57	226	205	259	201	179	284
01/08/2003 10:30	0:18:57	248	224	287	219	196	312
01/08/2003 10:31	0:19:56	266	243	308	237	214	330
01/08/2003 10:32	0:20:58	288	270	324	264	236	344
01/08/2003 10:33	0:21:56	300	288	331	282	250	348
01/08/2003 10:34	0:22:57	316	310	339	303	278	352
01/08/2003 10:35	0:23:58	328	322	343	315	302	357
01/08/2003 10:36	0:24:56	338	332	346	322	323	366
01/08/2003 10:37	0:25:57	346	343	350	327	338	374
01/08/2003 10:38	0:26:57	357	361	355	331	349	388

01/08/2003 10:39	0:27:57	368	378	360	334	356	410
01/08/2003 10:40	0:28:58	384	408	369	337	361	443
01/08/2003 10:41	0:29:57	399	440	377	341	364	474
01/08/2003 10:42	0:30:56	417	476	389	346	368	504
01/08/2003 10:43	0:31:57	438	515	417	355	373	529
01/08/2003 10:44	0:32:58	457	546	462	359	378	541
01/08/2003 10:45	0:33:56	454		512	365	384	553
01/08/2003 10:46	0:34:57	463		523	373	390	566
01/08/2003 10:47	0:35:58	453			382	398	578
01/08/2003 10:48	0:36:56	459			391	406	581
01/08/2003 10:49	0:37:57	465			400	415	579
01/08/2003 10:50	0:38:58	471			410	422	580
01/08/2003 10:51	0:39:57	436			440	431	
01/08/2003 10:52	0:40:58	459			460	438	
01/08/2003 10:53	0:41:56	467			489	445	
01/08/2003 10:54	0:42:56	454				454	
01/08/2003 10:55	0:43:57	462				462	
01/08/2003 10:56	0:44:56	468				468	
01/08/2003 10:57	0:45:57	475				475	
01/08/2003 10:58	0:46:59	480				480	
01/08/2003 10:59	0:47:58	487				487	
01/08/2003 11:00	0:48:56	495				495	
01/08/2003 11:01	0:49:58	505				505	
01/08/2003 11:02	0:50:58	524				524	
01/08/2003 11:03	0:51:58	545				545	
01/08/2003 11:04	0:52:57	561				561	
01/08/2003 11:05	0:53:58	577				577	

Insulation failure is denoted in **bold.**
Blank cells denote thermocouple failure or detachment of thermocouple from specimen.

Area Under the Curve Data - CERAM Fire Test P03157ASKR

Time (min)		Area Std		Area actual		% Diff.		% Tol
0-10		5651		5132		-9.2		± 15
11-30		15576		15632		0.4		± 10
31-180		152075		151700		-0.2		± 5

Figure 15 - Furnace Thermocouple Data - Fire Retardent Construction Board - CERAM Fire Test P03157ASKR tested 01/08/03

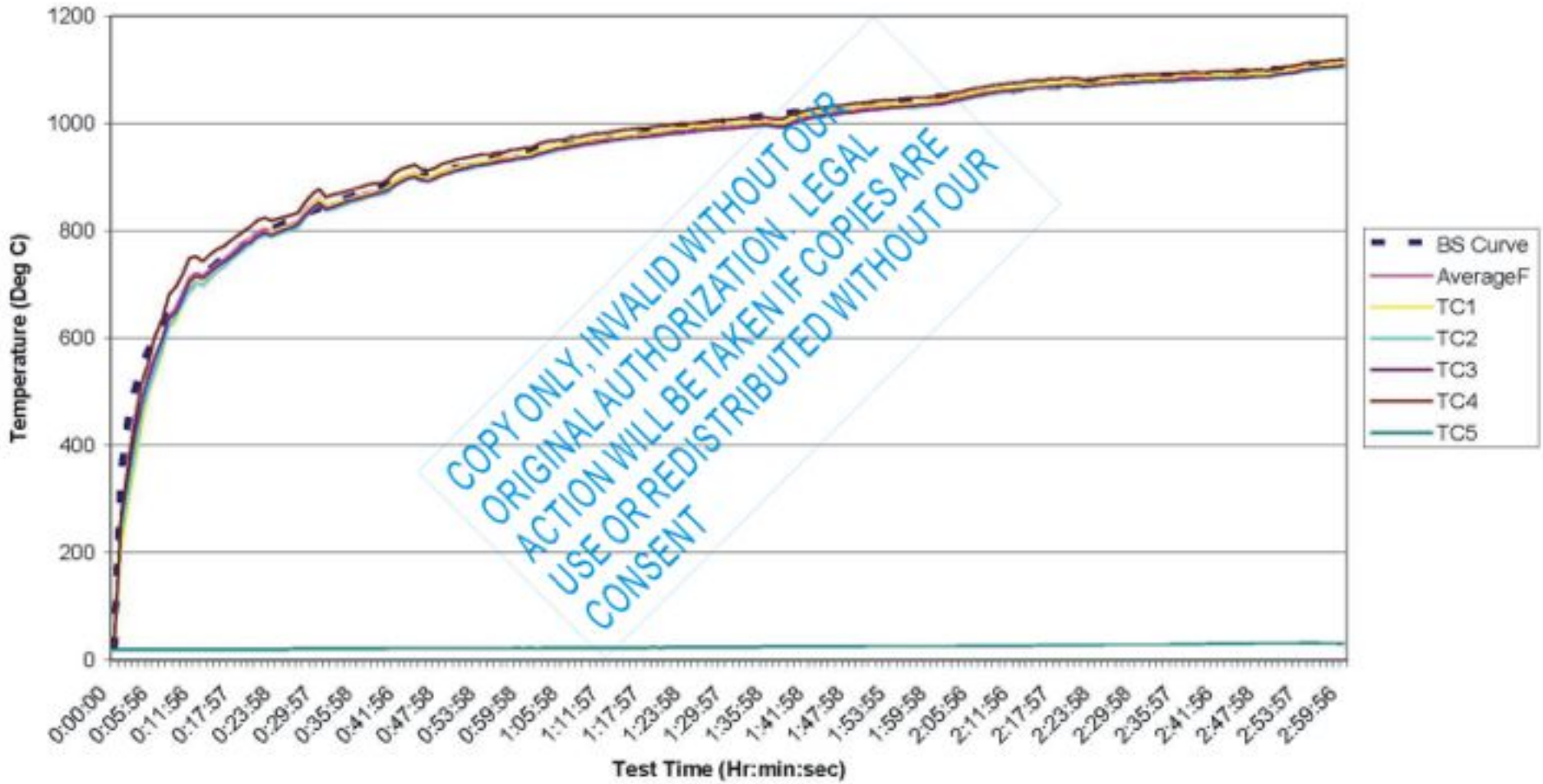
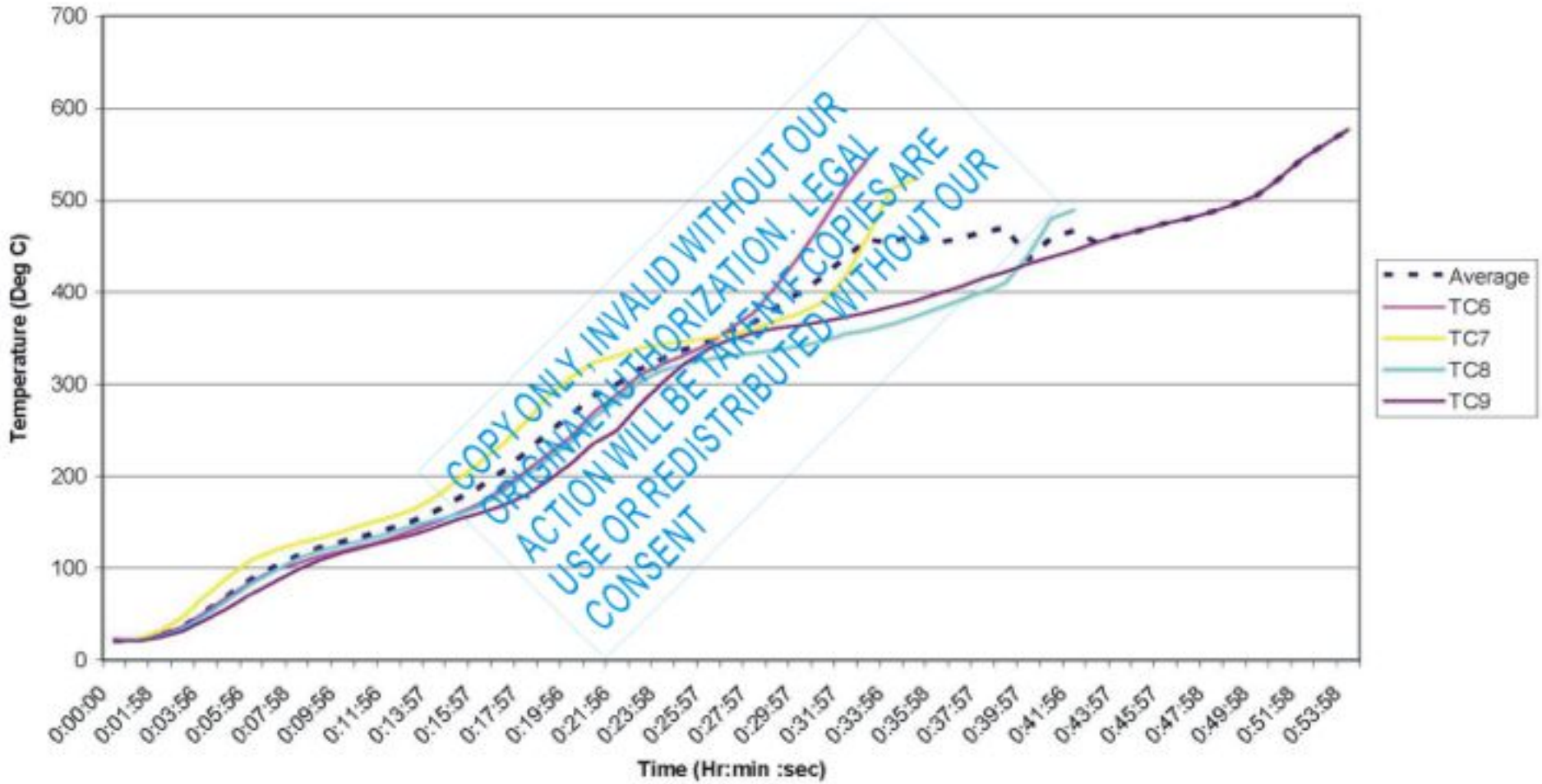


Figure 16 - Specimen Thermocouple Data - Fire Retardent Construction Board - CERAM
Fire Test P03157ASKR tested 01/08/03.



Test Observation Sheet :
CERAM Test reference No: P03157ASKR **Date: 01/08/03**
Specimen: Fire Retardent Construction Board – 12 mm thick.

A	B
C	D

TIME (min;sec)	FACE (U/E) *	PRESSURE (Pa)	OBSERVATION DETAILS MADE BY TEST OPERATOR
0			Test start at 10:11 am.
8:45	U	8.8-9.1	"Bubbling" of intumescent seal at panel/bead joint at D.
11	U	7.6-8.7	"Bubbling" of intumescent seal at panel/bead joint between A - C.
13	E	7.4 - 8.6	Dark discolouration on panel face and random small cracks developed.
14	U	7.4 - 8.6	Smoke exiting at panel bead joints, insulation failure noted.
23:40	U	7.4 - 8.6	Smoke exiting panel adjacent to all thermocouple locations.
25	U	8.5-8.9	Development of horizontal line mark on panel face circa 100 mm from C-D joint – Figure 2.
26	E	8.5-8.9	Panel discolouration has cleared, random cracks still evident combined with flaky appearance.
28	U+E	8.5-8.9	Smoke receded, both U + E faces appear stable.
28:30	U	7.7-9.3	All bead/panel intumescent joints now discoloured.
34:54	U	7.7-9.3	TC 6 fallen away from panel surface.
36	U	7.7-9.3	TC 7 fallen away from panel surface.
43	U	6.9-9.3	TC 8 and 10 not in contact with panel surface.
53-55	U	7.8-9.1	Figures 3 and 4 – TC 9 not in contact with panel surface.
55-100	U+E	7.6-8.7	No change
105	U	7.5-8.9	As above, Figures 5 and 6.
106	U	7.7-9	A-B bead bowing.
112	U	7.5-9.2	A-B bead bowing, two fixing pins fallen out.
116	U	8.1-9.4	Panel bowing into furnace with bow at maximum at panel centre point, bow circa 50 mm.
118	U	8.1-9	All bead/panel joints cracked.
119	U	8.3-8.5	Figure 7.
120	U	8.6-9.1	A-B bead cracked.

Test Observation Sheet :
CERAM Test reference No: P03157ASKR **Date: 01/08/03**
Specimen: Fire Retardent Construction Board – 12 mm thick.

136	U	8.1-9.6	As above, crack opened.
145	U	8.5-9	Figure 8 showing bead joint open.
153	U	7.9-8.5	A-B bead partially separated.
154	U	7.9-8.6	Cotton pad ignited at open joint, integrity failure. Panel showing no signs of integrity damage.
155	U	7.6-9.3	Figure 9 – test continued
173	U	8.1-8.9	No change to condition noted at 154 minutes.
180	U	8.1-8.9	As above, test terminated Figure 10.
POST TEST OBSERVATIONS			
The maximum bow at the specimen centre was 65 mm, no surface cracks observed on the unexposed face. The exposed face showed a vertical open crack and a blistered surface (observations seen during early test stage). Figure 11 to 14 show post test illustrations.			

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