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Title:

Indicative fire test utilising a hydrocarbon temperature/time relationship specified in BS EN 1363-2: 1999

Date Of Test:

18th September 2021

Issue 1

10th July 2019

WF Report No:

508712/LR

Prepared for:

CFP Composites

Regus House
Central Boulevard
Blythe Valley Business Park
Solihull
B90 8AG

Indicative Fire Test

We have pleasure in enclosing the information obtained from the fire test as conducted on your behalf on the 18th September 2021.

The information enclosed relates to an investigation which utilised a temperature/time relationship typical of that which might be expected during a fire burning fuels of a hydrocarbon nature. The test was conducted utilising the time/temperature relationship specified in BS EN 1363-2: 1999 and pressure conditions given in BS EN 1363-1: 2020 using a total of four plate furnace thermometers to control the average temperature within furnace chamber and pressure conditions given in BS EN 1363-1: 2020. The four plate thermocouples were distributed over a plane 100 mm from the surface of the test construction.

The full requirements of the Standards were not, however, complied with. The information is provided for the test sponsor's information only and should not be used to demonstrate performance against the Standard nor compliance with a regulatory requirement.

The purpose of the test was to provide an indication of the performance of four mesh panels with different density of insulation when subjected to hydrocarbon heating regime. For the purpose of the test. The test was performed on four nominal 450 mm by 450 mm mesh panels and referenced for the purpose of the test as 1, 2, 3 and 4. The specimens were mounted inside separate blockwork apertures, which formed the vertical face of the furnace chamber.

All specimens were provided with type K copper disk thermocouples, which were fixed to the unexposed face using a high temperature adhesive. The average temperature of the unexposed face of each specimen was measured by means of five thermocouples, one located close to the centre of the specimen and one close to the centre of each quarter section (See Figure 1).

The test specimens were provided to the **Warringtonfire** laboratory by CFP Composites, the sponsor of the test. **Warringtonfire** was not involved in any selection or sampling procedures and has not witnessed any application of the tested components. The description is based on the information supplied by the sponsor of the test.

Detailed drawings of the test specimen and a comprehensive description of the test construction based on a detailed survey of the specimen and information supplied by the sponsor of the test are included in the Test Specimen and Schedule of Components sections at the rear of the report.

The specimens' storage, testing construction including building work and test preparation took place in the test laboratory of **Warringtonfire** over a period of approximately one week. Throughout this time the environmental temperature and humidity were recorded as in the range 10°C to 23°C and 46% to 65% RH respectively.

After the first 5 minutes of testing and for the remainder of the test, the furnace atmospheric pressure was controlled so that it complied with the requirements of BS EN 1363 - Part 1. As the position of the element in practice with respect to the notional floor level cannot be accurately determined, the calculated pressure differential relative to the laboratory atmosphere was 18 Pa at 400 mm below the soffit of the furnace roof representing the highest pressure differential described in The Standard. The pressure was then 18 (± 3) Pa after 5 minutes of testing and for the duration of the test. Due to the nature of the test and required temperature adjustments during the test, occasionally the recorded pressure differential was outside the specified limits for short durations of time. The effect of such fluctuation on the test results obtained can be neglected.

The following information relating to the test is enclosed:

- Table 1 shows information and details of the test specimens.
- Figure 1 shows diagrammatic plan of test specimens within furnace frame.
- Table 2 and Graph 1 show the mean furnace temperature together with the specified temperature/time relationship.
- Table 3 shows recorded furnace pressure.
- Tables 4, 5, 6 and 7 show the individual and mean temperatures recorded on the unexposed face of the test specimens.
- Graphs 2, 3, 4 and 5 show the mean temperatures recorded on the unexposed face of the test specimens.
- Photographs of the test specimens before, during and after the fire test.

The test was discontinued after a period of 120 minutes.

The test was witnessed by Mr. S. Price and Mr. D. Deakin, representatives of the test sponsor.

We trust that the information obtained from the test will be useful to you.

Yours faithfully,

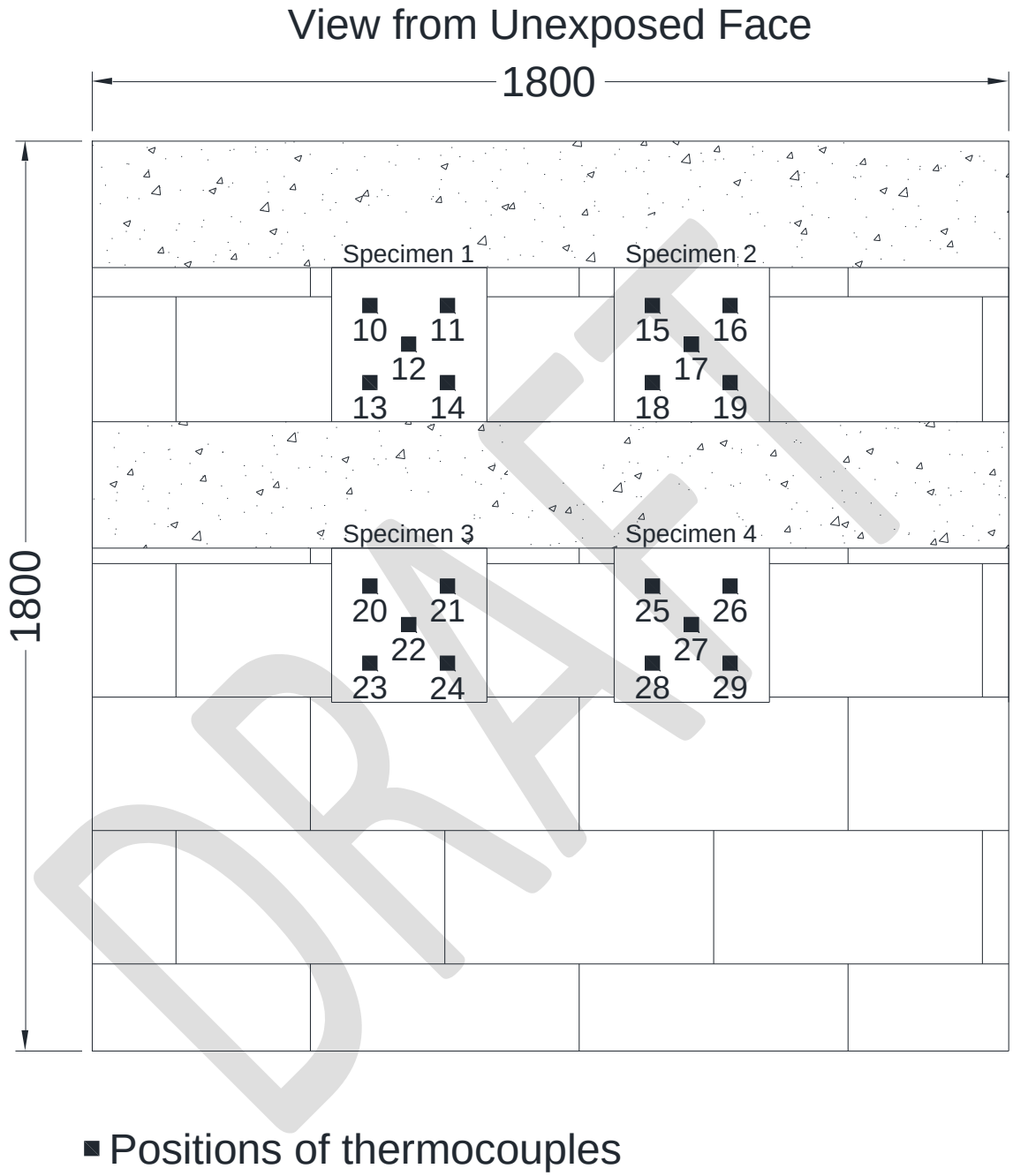
I. White
Structural Steelwork Testing Manager
Fire Resistance Department
Warringtonfire

Table 1

Specimen Reference	Weight kg/m^2	Maximum Thickness Density Kg/cm^3	Maximum Thickness mm
1	0.755	188.79	4
2	1.030	257.42	4
3	0.894	223.44	4
4	6.877	85.97	80

The information in table 1 above has been provided by the test sponsor. The measurements are not witnessed or verified by **Warringtonfire**.

Figure 1 – Diagrammatic Plan of the specimens within Furnace Frame from the unexposed face



Do not scale. All dimensions are in mm

Table 2

Time Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	20
5	948	955
10	1034	1024
15	1071	1078
20	1088	1089
25	1095	1095
30	1098	1103
35	1099	1102
40	1100	1106
45	1100	1097
50	1100	1091
55	1100	1100
60	1100	1102
65	1100	1106
70	1100	1100
75	1100	1102
80	1100	1105
85	1100	1105
90	1100	1105
95	1100	1106
100	1100	1107
105	1100	1101
110	1100	1100
115	1100	1098
120	1100	1099

Graph 1

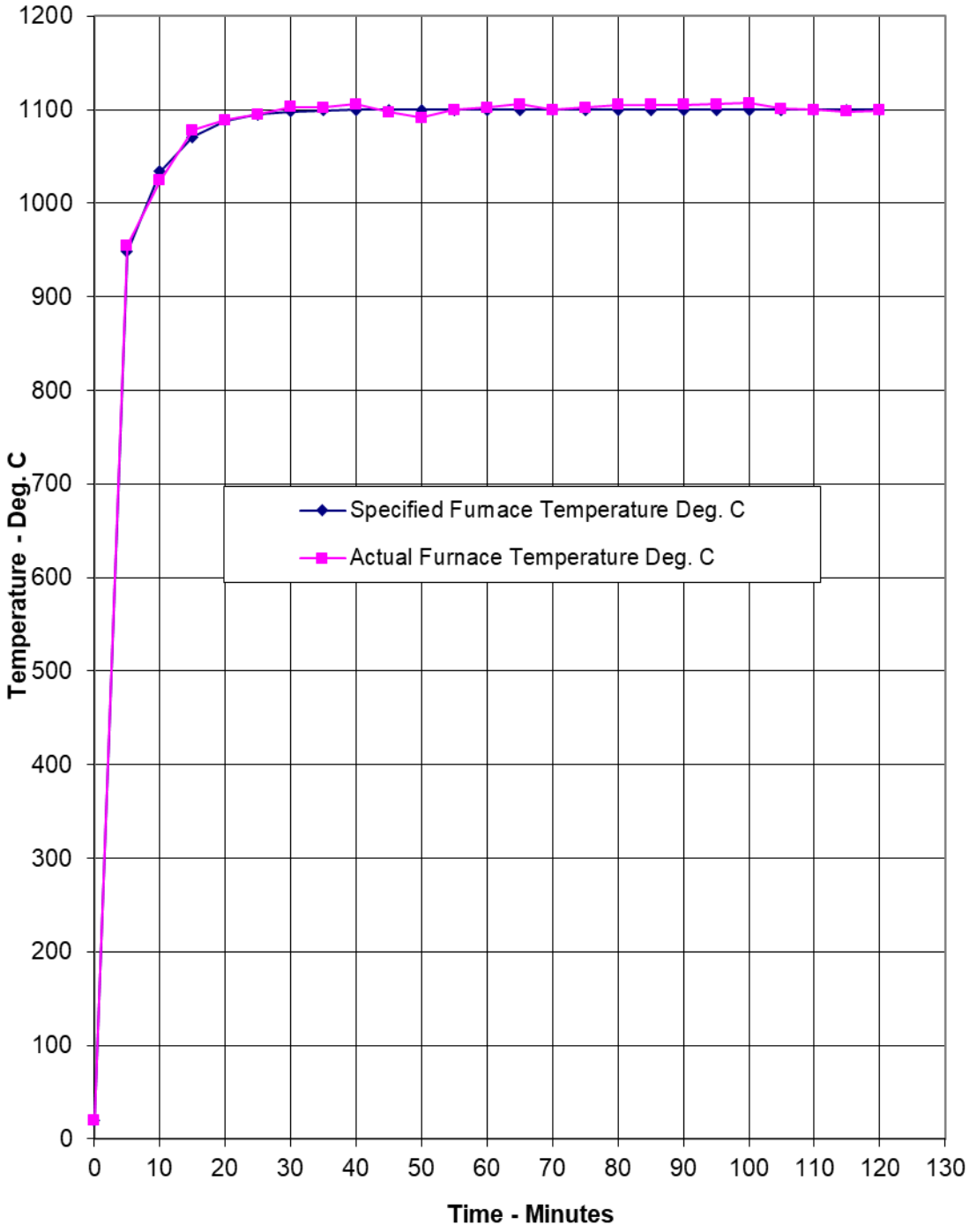

1200
1100
1000
900
800
700
600
500
400
300
200
100
0
Temperature - Deg. C
0
10
20
30
40
50
60
70
80
90
100
110
120
130
Time - Minutes
Specified Furnace Temperature Deg. C
Actual Furnace Temperature Deg. C

Table 3

Time Mins	Recorded Pressure Pascals
0	0
5	18
10	19.8
15	18.8
20	19.2
25	19.8
30	19.5
35	19.1
40	21.7
45	17.4
50	20.1
55	18.6
60	17.9
65	20.9
70	18.1
75	18.2
80	19.9
85	18.2
90	17.4
95	16.9
100	18.3
105	18.7
110	17.1
115	18.4
120	17.2

Table 4

Specimen: 1

Time Mins	T/C Number 10 Deg. C	T/C Number 11 Deg. C	T/C Number 12 Deg. C	T/C Number 13 Deg. C	T/C Number 14 Deg. C	Mean Temp Deg. C
0	26	25	27	24	25	25
5	569	545	610	600	581	581
10	600	579	657	630	612	616
15	640	618	703	679	653	659
20	666	641	720	712	684	685
25	689	657	737	734	703	704
30	807	747	928	914	796	838
35	1051	1004	1080	1082	1044	1052
40	1079	1034	1112	1107	1068	1080
45	1092	1046	1113	1119	1079	1090
50	1098	1059	1109	1114	1087	1093
55	1105	1089	1116	1124	1073	1101
60	1107	1097	1118	1126	1090	1108
65	1112	1126	1121	1130	1086	1115
70	1108	1068	1117	1122	1091	1101
75	1110	1085	1118	1125	1099	1107
80	1114	1090	1121	1127	1102	1111
85	1113	1128	1112	1128	1099	1116
90	1113	1113	1112	1126	1098	1112
95	1113	1103	1113	1129	1100	1112
100	1116	1105	1116	1129	1101	1113
105	1111	1102	1110	1123	1097	1109
110	1109	1101	1101	1122	1098	1106
115	1110	1097	1101	1122	1099	1106
120	1109	1099	1109	1121	1101	1108

Graph 2

Specimen: 1

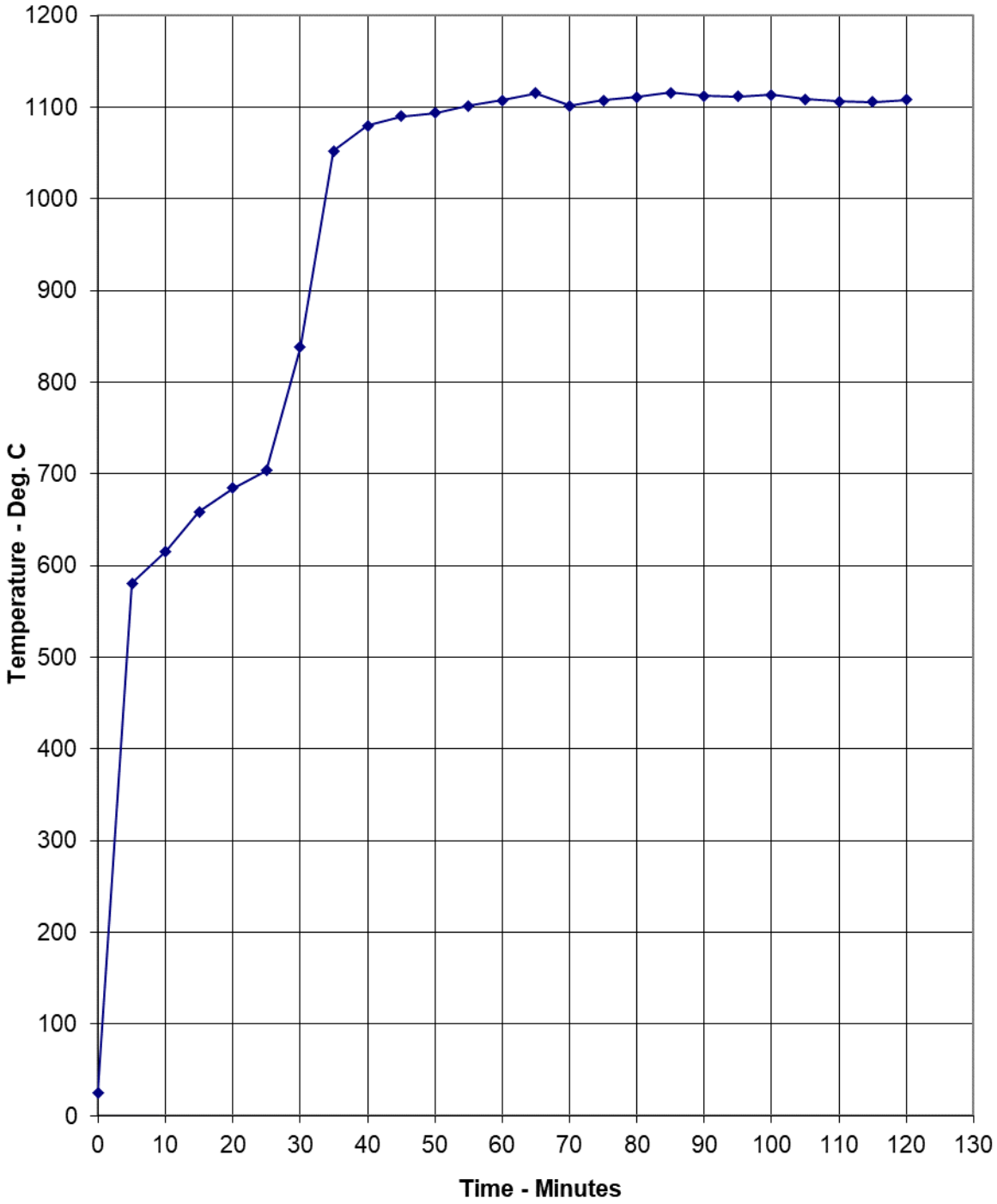


Table 5

Specimen: 2

Time Mins	T/C Number 15 Deg. C	T/C Number 16 Deg. C	T/C Number 17 Deg. C	T/C Number 18 Deg. C	T/C Number 19 Deg. C	Mean Temp Deg. C
0	30	27	28	29	25	28
5	629	556	610	718	589	620
10	673	592	650	765	627	661
15	709	626	688	804	665	698
20	731	651	705	829	693	722
25	738	670	711	805	710	727
30	1058	1009	*	1121	979	1042
35	1068	1029	*	1132	1004	1058
40	1097	1041	*	1119	1026	1071
45	1095	1064	*	1098	1038	1074
50	1089	1062	*	1085	1065	1075
55	1099	1072	*	1090	1061	1081
60	1104	1074	*	1091	1061	1083
65	1111	1081	*	1098	1066	1089
70	1104	1078	*	1094	1062	1085
75	1107	1081	*	1108	1065	1090
80	1110	1085	*	1113	1069	1094
85	1112	1086	*	1117	1071	1097
90	1111	1087	*	1118	1073	1097
95	1112	1087	*	1120	1076	1099
100	1115	1091	*	1123	1079	1102
105	1108	1084	*	1118	1075	1096
110	1109	1086	*	1118	1075	1097
115	1107	1085	*	1118	1076	1097
120	1107	1084	*	1119	1077	1097

*Thermocouple malfunction

Graph 3

Specimen: 2

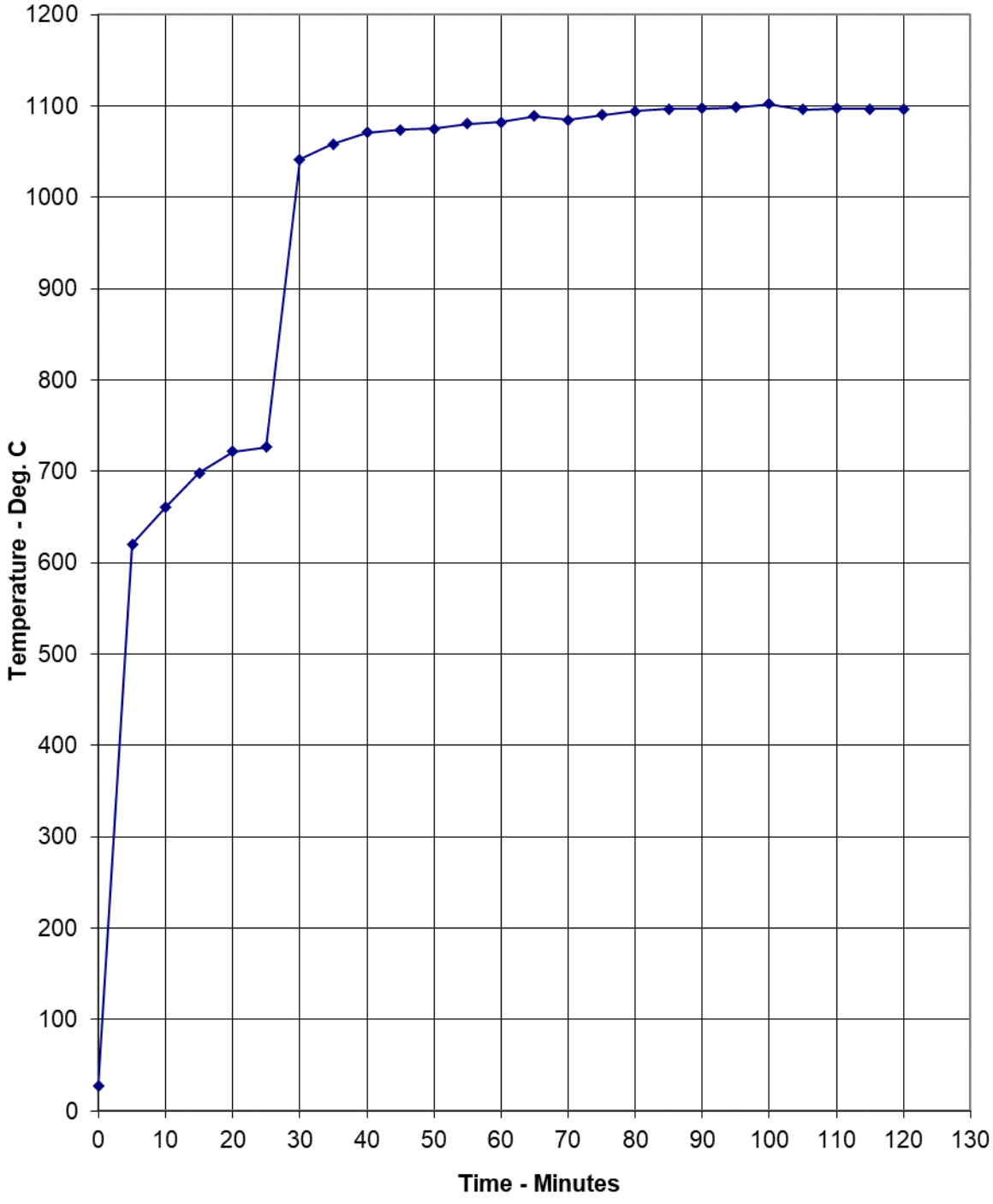


Table 6

Specimen: 3

Time Mins	T/C Number 20 Deg. C	T/C Number 21 Deg. C	T/C Number 22 Deg. C	T/C Number 23 Deg. C	T/C Number 24 Deg. C	Mean Temp Deg. C
0	22	27	27	25	24	25
5	*	634	640	675	586	634
10	*	685	704	735	647	693
15	*	743	755	790	702	748
20	*	774	778	819	745	779
25	*	1050	1001	960	930	985
30	*	1089	1059	1015	993	1039
35	*	1085	1083	1032	990	1048
40	*	1094	1085	1064	1014	1064
45	*	1088	1081	1072	1032	1068
50	*	1094	1074	1062	1029	1065
55	*	1108	1085	1071	1042	1077
60	*	1083	1091	1074	1046	1074
65	*	1091	1096	1080	1049	1079
70	*	1059	1090	1074	1048	1068
75	*	1093	1092	1078	1050	1078
80	*	1093	1098	1081	1055	1082
85	*	1091	1098	1082	1058	1082
90	*	1103	*	1084	1059	1082
95	*	1093	*	1086	1061	1080
100	*	1093	*	1089	1063	1082
105	*	1091	*	1085	1061	1079
110	*	1087	*	1087	1059	1078
115	*	1115	*	1191	1060	1122
120	*	1108	*	1373	1061	1181

*Thermocouple malfunction

Graph 4

Specimen: 3

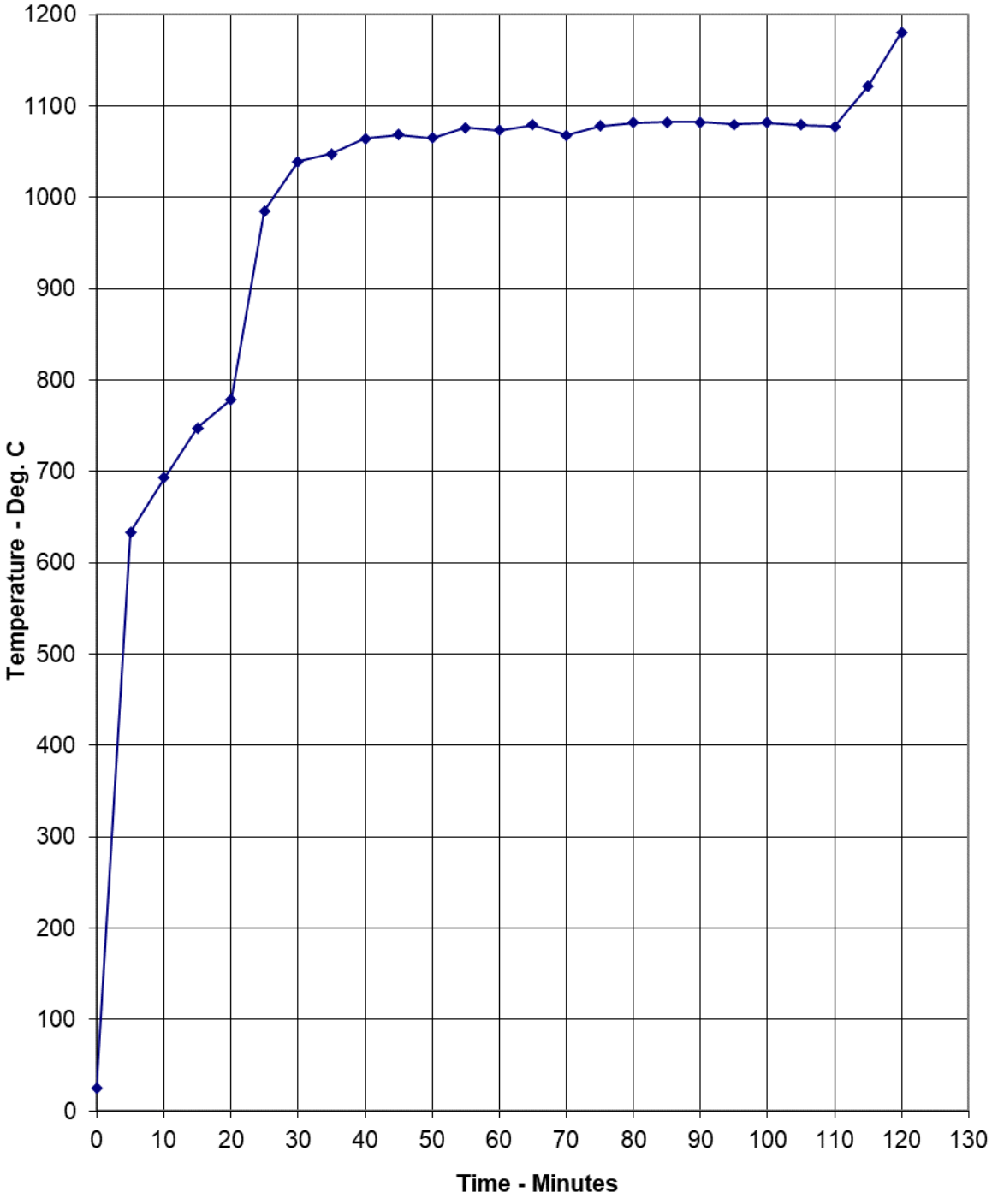


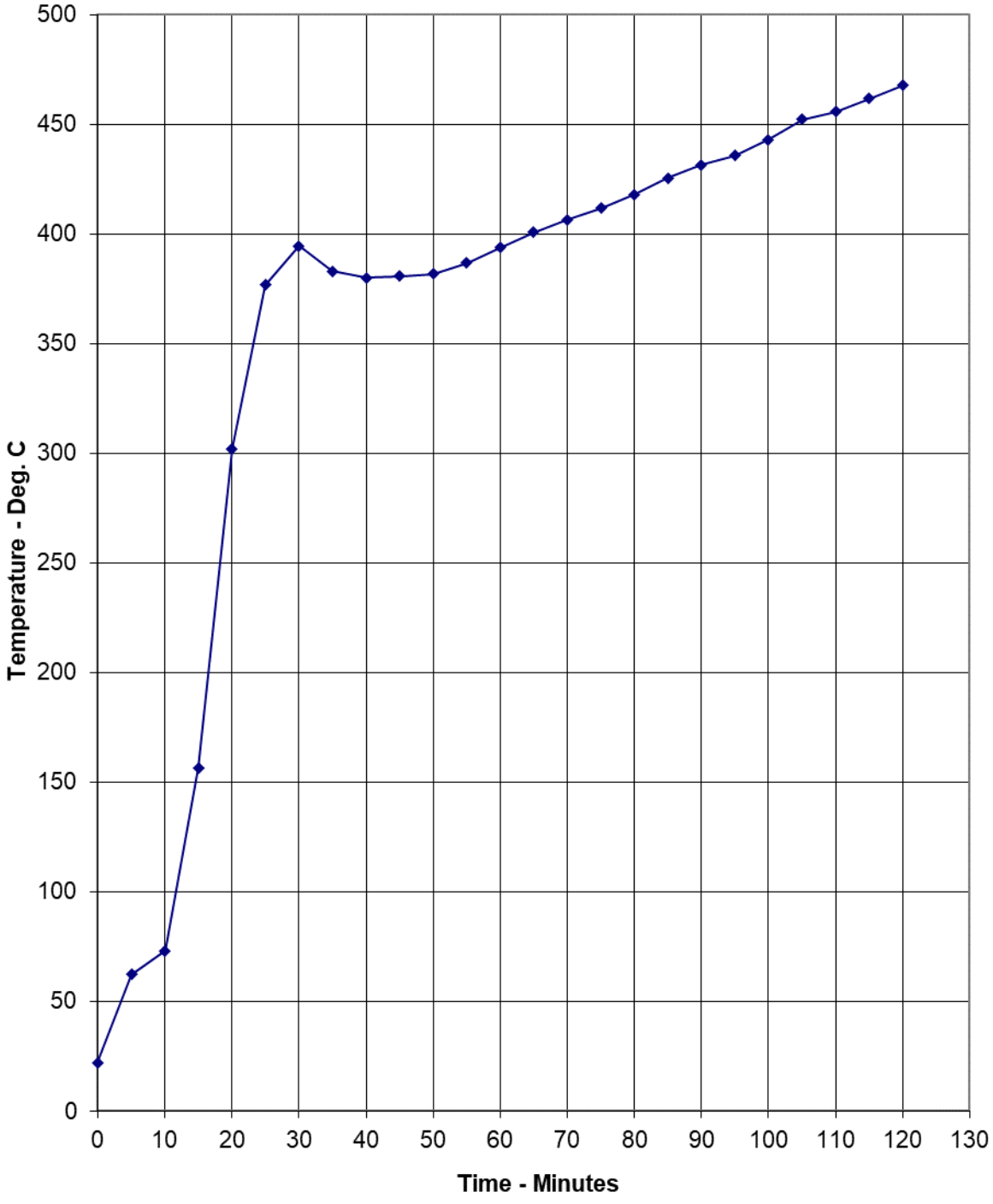
Table 7

Specimen: 4

Time Mins	T/C Number 25 Deg. C	T/C Number 26 Deg. C	T/C Number 27 Deg. C	T/C Number 28 Deg. C	T/C Number 29 Deg. C	Mean Temp Deg. C
0	22	22	22	22	22	22
5	62	64	62	61	62	62
10	62	62	81	60	100	73
15	86	125	236	100	235	156
20	189	268	453	226	374	302
25	280	378	455	343	428	377
30	340	419	437	385	391	394
35	340	388	437	367	383	383
40	334	382	441	359	384	380
45	331	382	445	358	388	381
50	331	383	445	360	390	382
55	332	389	449	364	399	387
60	337	396	457	372	406	394
65	344	403	463	380	413	401
70	348	410	468	387	419	406
75	353	416	472	393	425	412
80	357	425	478	399	431	418
85	363	434	484	407	439	425
90	368	441	488	414	446	431
95	374	445	492	419	449	436
100	379	455	497	427	457	443
105	387	467	504	437	466	452
110	390	473	506	441	469	456
115	394	482	509	447	476	462
120	399	491	514	452	482	468

Graph 5

Specimen: 4

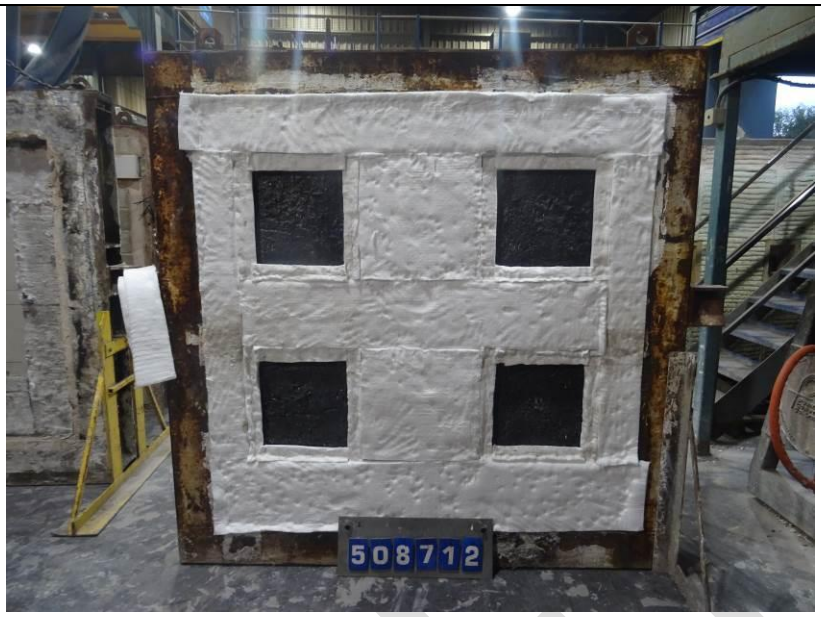


Test Observations

Time		All observations are from the unexposed face of the test specimens unless noted otherwise
00	00	**The test commences.**
00	30	Specimen 2 – significant glowing occurred but seems to have calmed down.
05	00	No significant visible change to remaining specimens, specimen 2 has significant glow on the bottom left corner
10	00	Glowing now visible on specimens 1, 2 and 3. More significant on specimen 2 which is close to collapsing exposing furnace conditions.
17	00	Specimen 2 and 3 are glowing significantly. Specimen 1 also glowing but not as significant . No significant visible change to specimen 4.
20	00	No significant visible change
21	00	Pressure in the furnace is vibrating specimens 1, 2 and 3.
23	00	Specimen 3 blanked off
25	00	Specimen 2 blanked off
30	00	Specimen 1 blanked off
120	00	**Test discontinued.**

Test Photographs

The exposed face prior to testing



The unexposed face prior to testing

The unexposed face 10 minutes into testing.

The unexposed face 16 minutes into testing.

The unexposed face 20 minutes into testing.

The unexposed face 24 minutes into testing.

The unexposed face 28 minutes into testing.

The unexposed face 31 minutes into testing.

The unexposed face 90 minutes into testing.

The unexposed face 120 minutes into testing.

The exposed face immediately after testing