



**FACULTY OF ENGINEERING
CHULALONGKORN UNIVERSITY
FIRE SAFETY RESEARCH CENTER**



- TYPE OF TEST** : DETERMINATION OF THE FIRE RESISTANCE OF NON-LOADBEARING ELEMENTS OF CONSTRUCTION
- TEST SPECIMEN** : **SANDWICH PANEL WITH ROCK WOOL CORE**
The specimen is a 3.0 m x 3.0 m vertical construction consisting of three 100-mm thick (4 in.) sandwich panels. Each sandwich panel comprises rock wool with a density of 125 kg/m³ as the core material and a single layer of 0.55-mm thick CRP antibacterial galvanized steel on each side. The specimen was installed in a perimeter frame comprising equal-angle steel sections of 50x50x3 mm on the exposed side and aluminum strips on the unexposed side. Fire-resistant silicone was used to seal the gaps between the edges of the panel and the equal-angle steel frame. The steel frame was mounted in a 15-cm thick reinforced concrete wall, which was installed on the 3.0 m x 3.0 m testing frame. The details of the specimen are shown in Appendix C. The specimen was provided and installed by the client.
- CLIENT** : **MUNKONG STEEL CO., LTD.**
1/348, Soi Onnuch 59/1, Sukhumvit 77 Road,
Prawet, Bangkok 10250, Thailand
- DATE OF TEST** : October 28, 2015
- TEST MACHINE** : Large-scale vertical furnace (Fire Tester III) at the Fire Safety Research Center (FSRC), Department of Civil Engineering, Chulalongkorn University (Thailand). The furnace is capable of producing a standard temperature-time relationship according to BS 476 Part 20: 1987.
- TEST METHOD** : The testing procedures follow the British Standard BS 476: Fire tests on building materials and structures
BS 476 Part 20: 1987: Method for determination of the fire resistance of elements of construction (general principles)
BS 476 Part 22: 1987: Methods for determination of the fire resistance of non-loadbearing elements of construction Section 5: Determination of the fire resistance of partitions.
- TEST RESULTS** : The non-loadbearing element of construction described above has the fire resistance of each criterion for the period stated:
(The test results are good only for the specimen tested.)

Criteria	Fire Resistance (hr:min)	Remarks
Insulation	2:14	The average temperature of the unexposed face of the specimen exceeded 140°C above its initial value of 32°C.
Integrity	3:44	The specimen had a passage of flame or gases hot enough to ignite the cotton pad.

Date: November 11, 2015

Tested by:
(Assistant Prof. Dr. Boonchai Sangpetngam)

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(Associate Prof. Dr. Thanyawat Pothisiri)

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(Associate Prof. Dr. Tirawat Boonyatee)

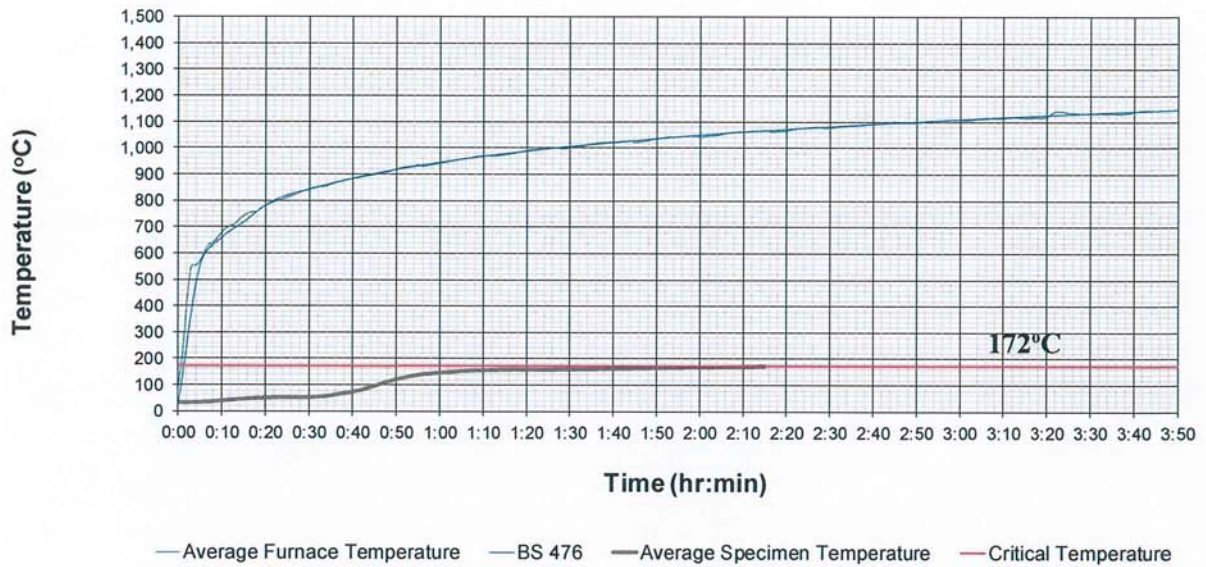
On Behalf of Head of Civil Engineering Department




FACULTY OF ENGINEERING
CHULALONGKORN UNIVERSITY
FIRE SAFETY RESEARCH CENTER




FURNACE TEMPERATURE




.....
(Mr. Sirichai Pethrung)
Authorized Testing Officer

APPENDIX A: TEMPERATURE OF THE FURNACE AND THE SPECIMEN

Time (hr:min:sec)	Furnace Temperature(°C)										Time (hr:min:sec)	BS 476 (°C)
	P1	P2	P3	P4	P5	P6	P7	P8	P9	Average		
0:00:00	145	65	58	45	65	135	151	71	54	88	0:00	20
0:01:00	284	367	287	122	122	161	188	115	319	218	0:05	556
0:02:00	437	565	501	315	324	322	433	324	545	418	0:10	659
0:03:00	537	625	590	451	516	515	612	538	565	550	0:15	718
0:04:00	553	617	566	476	552	536	573	572	528	553	0:20	781
0:05:00	595	651	593	500	564	536	561	575	561	571	0:25	821
0:06:00	625	679	629	536	596	568	597	611	597	604	0:30	842
0:07:00	649	695	654	567	628	600	629	650	617	632	0:35	865
0:08:00	657	700	653	581	641	613	635	665	619	640	0:40	885
0:09:00	676	715	682	601	657	629	654	681	643	660	0:45	902
0:10:00	694	737	695	623	678	650	676	704	663	680	0:50	918
0:11:00	704	744	713	641	695	667	690	722	674	694	0:55	932
0:12:00	713	752	725	654	707	677	699	733	681	705	1:00	945
0:13:00	724	754	728	663	715	685	706	743	686	711	1:05	957
0:14:00	740	768	750	679	727	698	724	756	708	728	1:10	968
0:15:00	749	786	761	695	744	715	741	772	718	742	1:15	979
0:16:00	758	795	769	706	754	726	750	783	726	752	1:20	988
0:17:00	763	799	773	713	761	729	749	786	729	756	1:25	997
0:18:00	770	797	778	719	762	729	747	782	738	758	1:30	1006
0:19:00	782	806	790	731	772	743	769	795	754	771	1:35	1014
0:20:00	787	817	797	741	783	754	783	807	762	781	1:40	1022
0:21:00	795	819	803	749	791	762	788	818	768	788	1:45	1029
0:22:00	800	827	806	757	798	769	797	826	776	795	1:50	1036
0:23:00	802	833	813	763	803	773	801	831	781	800	1:55	1043
0:24:00	811	835	815	770	809	779	805	836	786	805	2:00	1049
0:25:00	813	842	823	777	815	786	815	843	795	812	2:05	1055
0:26:00	819	849	826	784	822	793	822	849	803	819	2:10	1061
0:27:00	827	850	832	790	827	799	828	854	809	824	2:15	1067
0:28:00	832	857	837	798	835	807	839	863	819	832	2:20	1072
0:29:00	838	866	843	804	842	814	847	872	822	839	2:25	1077
0:30:00	844	869	846	810	847	820	852	878	833	844	2:30	1082
0:31:00	855	874	847	815	852	825	857	884	831	849	2:35	1087
0:32:00	855	876	853	819	856	829	857	886	838	852	2:40	1092
0:33:00	859	875	857	821	856	829	856	886	836	853	2:45	1097
0:34:00	860	877	860	825	857	831	856	886	842	855	2:50	1101
0:35:00	864	885	867	831	863	837	868	892	851	862	2:55	1106
0:36:00	870	890	870	838	870	844	876	900	857	868	3:00	1110
0:37:00	872	891	875	843	875	849	880	905	860	872	3:05	1114
0:38:00	880	898	878	847	879	852	884	908	861	876	3:10	1118
0:39:00	881	904	880	851	883	855	887	911	866	880	3:15	1122
0:40:00	885	908	883	855	886	858	890	914	877	884	3:20	1126
0:41:00	889	905	887	857	889	862	893	918	875	886	3:25	1129
0:42:00	892	913	891	862	894	865	897	922	877	890	3:30	1133
0:43:00	894	915	892	866	896	869	899	924	881	893	3:35	1136
0:44:00	898	916	897	868	899	872	902	927	882	896	3:40	1140
0:45:00	901	919	898	872	902	876	905	931	884	899	3:45	1143
0:46:00	906	927	902	875	905	879	909	934	889	903	3:50	1146
0:47:00	909	929	903	881	908	883	915	938	899	907		
0:48:00	912	928	906	884	911	886	916	941	899	909		
0:49:00	917	933	912	889	917	892	924	945	900	914		
0:50:00	922	936	914	894	922	897	930	951	907	919		
0:51:00	927	943	919	900	925	900	934	954	913	924		
0:52:00	928	946	924	903	929	903	937	958	918	927		
0:53:00	935	947	928	904	931	906	937	961	914	929		
0:54:00	937	946	929	908	932	907	938	962	920	931		
0:55:00	937	957	932	914	933	911	941	963	932	936		
0:56:00	937	948	931	911	931	907	931	960	915	930		
0:57:00	938	952	933	912	931	909	937	960	920	932		
0:58:00	939	954	936	915	935	913	941	962	927	936		
0:59:00	942	958	936	918	937	915	945	965	928	938		


 (Mr. Sirichai Pethrung)
 Authorized Testing Officer

Time (hr:min:sec)	Furnace Temperature(°C)									Average
	P1	P2	P3	P4	P5	P6	P7	P8	P9	
1:00:00	947	959	939	921	941	919	948	969	935	942
1:01:00	948	963	943	923	944	923	952	973	937	945
1:02:00	953	968	945	927	947	927	958	978	937	949
1:03:00	957	969	947	931	951	930	961	980	942	952
1:04:00	959	974	950	935	955	933	962	983	944	955
1:05:00	962	973	954	937	958	936	965	986	945	957
1:06:00	963	979	956	941	960	939	968	988	955	961
1:07:00	967	977	958	943	962	941	970	990	951	962
1:08:00	970	982	960	947	964	944	972	993	962	966
1:09:00	969	988	964	950	967	946	975	995	967	969
1:10:00	976	986	966	952	969	948	976	997	961	970
1:11:00	974	987	969	953	969	949	975	998	962	971
1:12:00	976	986	969	952	969	948	973	996	960	970
1:13:00	976	985	969	954	969	948	973	996	963	970
1:14:00	979	988	970	955	971	950	977	998	961	972
1:15:00	979	992	972	956	974	953	979	1000	966	975
1:16:00	980	993	974	960	976	956	982	1003	969	977
1:17:00	984	996	974	963	978	958	986	1004	973	980
1:18:00	986	1003	978	967	982	963	992	1009	980	984
1:19:00	992	1004	981	970	986	966	994	1013	982	987
1:20:00	994	1004	984	974	989	969	998	1016	985	990
1:21:00	995	1007	988	976	992	972	1002	1019	987	993
1:22:00	996	1009	989	979	994	973	1001	1021	987	994
1:23:00	999	1010	991	979	994	974	1001	1020	989	995
1:24:00	1000	1011	994	981	995	975	1002	1022	989	997
1:25:00	1003	1012	994	984	996	977	1004	1024	994	999
1:26:00	1005	1015	995	985	999	979	1006	1026	990	1000
1:27:00	1005	1014	997	985	1000	979	1005	1027	990	1000
1:28:00	1003	1013	996	984	997	977	1000	1024	986	998
1:29:00	1004	1015	995	983	996	976	999	1023	989	998
1:30:00	1007	1016	998	987	999	979	1006	1026	1000	1002
1:31:00	1009	1020	1000	989	1001	982	1008	1028	1000	1004
1:32:00	1012	1020	1000	992	1004	986	1010	1031	1004	1006
1:33:00	1014	1019	1003	993	1006	987	1013	1032	1000	1007
1:34:00	1017	1025	1004	998	1010	992	1020	1037	1010	1013
1:35:00	1021	1026	1009	1000	1014	996	1023	1041	1008	1015
1:36:00	1021	1032	1010	1005	1017	998	1025	1043	1016	1018
1:37:00	1023	1034	1015	1006	1019	1000	1028	1047	1020	1021
1:38:00	1026	1033	1016	1007	1019	1001	1027	1046	1014	1021
1:39:00	1028	1033	1017	1008	1020	1001	1027	1047	1017	1022
1:40:00	1029	1036	1016	1010	1021	1002	1028	1047	1021	1023
1:41:00	1030	1035	1017	1011	1021	1004	1029	1048	1020	1024
1:42:00	1030	1038	1020	1012	1023	1005	1030	1050	1022	1026
1:43:00	1032	1039	1023	1014	1024	1007	1032	1052	1019	1027
1:44:00	1033	1037	1023	1015	1025	1008	1031	1053	1023	1027
1:45:00	1030	1034	1021	1010	1020	1001	1020	1047	1011	1021
1:46:00	1030	1037	1020	1011	1021	1003	1026	1047	1018	1024
1:47:00	1032	1042	1022	1013	1024	1006	1032	1049	1023	1027
1:48:00	1035	1040	1023	1016	1025	1009	1033	1052	1025	1029
1:49:00	1036	1043	1028	1021	1029	1013	1039	1056	1029	1033
1:50:00	1040	1048	1029	1024	1033	1016	1043	1059	1030	1036
1:51:00	1041	1051	1031	1026	1036	1019	1044	1062	1031	1038
1:52:00	1046	1052	1034	1028	1039	1022	1046	1065	1034	1041
1:53:00	1045	1054	1037	1031	1040	1022	1048	1067	1041	1043
1:54:00	1048	1052	1037	1030	1040	1023	1046	1067	1034	1042
1:55:00	1050	1053	1038	1031	1040	1024	1048	1067	1036	1043
1:56:00	1049	1056	1040	1032	1041	1024	1049	1068	1040	1044
1:57:00	1051	1057	1039	1034	1042	1025	1050	1069	1044	1046
1:58:00	1052	1056	1041	1035	1044	1027	1051	1070	1042	1046
1:59:00	1053	1056	1041	1034	1043	1026	1048	1071	1035	1045


 (Mr. Sirichai Pethrung)
 Authorized Testing Officer


Time (hr:min:sec)	Furnace Temperature(°C)									Average
	P1	P2	P3	P4	P5	P6	P7	P8	P9	
2:00:00	1048	1053	1040	1032	1039	1022	1042	1065	1035	1042
2:01:00	1050	1055	1041	1033	1039	1022	1046	1064	1040	1043
2:02:00	1051	1058	1042	1036	1041	1026	1050	1067	1052	1047
2:03:00	1052	1058	1044	1037	1044	1028	1052	1069	1043	1047
2:04:00	1054	1060	1043	1038	1046	1030	1053	1071	1044	1049
2:05:00	1056	1064	1046	1040	1049	1033	1059	1074	1049	1052
2:06:00	1059	1066	1049	1044	1052	1037	1062	1078	1052	1055
2:07:00	1060	1072	1052	1049	1054	1039	1065	1081	1065	1060
2:08:00	1062	1069	1054	1051	1056	1041	1066	1082	1065	1060
2:09:00	1065	1072	1056	1051	1057	1042	1068	1083	1059	1061
2:10:00	1066	1073	1056	1051	1059	1043	1066	1085	1058	1062
2:11:00	1067	1073	1058	1053	1059	1043	1066	1085	1063	1063
2:12:00	1068	1073	1058	1053	1059	1044	1067	1085	1064	1064
2:13:00	1069	1075	1059	1056	1060	1045	1068	1086	1067	1065
2:14:00	1070	1075	1060	1056	1061	1047	1070	1088	1066	1066
2:15:00	1072	1077	1063	1058	1063	1048	1071	1089	1067	1067
2:16:00	1072	1074	1059	1056	1063	1046	1064	1088	1060	1065
2:17:00	1071	1072	1059	1054	1059	1043	1062	1084	1061	1063
2:18:00	1070	1075	1060	1056	1060	1045	1067	1084	1068	1065
2:19:00	1071	1075	1061	1057	1061	1046	1068	1085	1067	1066
2:20:00	1071	1077	1061	1059	1062	1047	1069	1086	1067	1067
2:21:00	1075	1082	1064	1061	1066	1051	1075	1090	1077	1071
2:22:00	1076	1085	1067	1066	1069	1055	1079	1093	1079	1074
2:23:00	1078	1087	1068	1068	1072	1056	1081	1096	1082	1076
2:24:00	1079	1086	1070	1070	1073	1058	1082	1097	1076	1077
2:25:00	1083	1088	1073	1071	1075	1060	1082	1099	1084	1079
2:26:00	1084	1090	1074	1072	1076	1061	1084	1100	1082	1080
2:27:00	1084	1092	1075	1072	1077	1062	1084	1102	1081	1081
2:28:00	1084	1088	1075	1070	1075	1059	1079	1099	1077	1078
2:29:00	1084	1088	1074	1070	1074	1058	1078	1097	1079	1078
2:30:00	1084	1088	1074	1071	1074	1059	1079	1097	1080	1078
2:31:00	1086	1091	1075	1073	1076	1061	1082	1099	1081	1080
2:32:00	1086	1094	1079	1075	1078	1063	1085	1100	1084	1083
2:33:00	1088	1094	1079	1076	1079	1064	1085	1102	1087	1084
2:34:00	1089	1096	1081	1078	1080	1065	1087	1103	1089	1085
2:35:00	1090	1096	1082	1078	1082	1067	1086	1105	1085	1086
2:36:00	1091	1098	1083	1080	1083	1067	1088	1105	1087	1087
2:37:00	1092	1097	1083	1080	1084	1068	1089	1106	1088	1088
2:38:00	1093	1099	1084	1083	1085	1069	1090	1107	1093	1089
2:39:00	1093	1101	1086	1084	1086	1071	1091	1107	1096	1091
2:40:00	1094	1105	1088	1085	1088	1072	1093	1109	1095	1092
2:41:00	1097	1102	1090	1086	1089	1073	1093	1110	1097	1093
2:42:00	1097	1104	1090	1087	1090	1074	1095	1111	1097	1094
2:43:00	1099	1107	1092	1089	1092	1075	1095	1112	1101	1096
2:44:00	1100	1109	1093	1091	1093	1077	1097	1113	1103	1097
2:45:00	1102	1107	1094	1091	1094	1077	1095	1115	1099	1097
2:46:00	1101	1107	1094	1091	1093	1076	1095	1113	1098	1096
2:47:00	1101	1109	1095	1090	1093	1076	1094	1113	1099	1097
2:48:00	1102	1108	1095	1091	1093	1077	1096	1113	1099	1097
2:49:00	1103	1107	1095	1092	1094	1077	1096	1113	1097	1097
2:50:00	1103	1109	1096	1092	1095	1078	1096	1115	1098	1098
2:51:00	1103	1113	1097	1094	1095	1079	1097	1114	1098	1099
2:52:00	1104	1110	1098	1094	1096	1080	1099	1116	1100	1100
2:53:00	1105	1114	1100	1097	1099	1082	1102	1119	1104	1102
2:54:00	1105	1117	1101	1099	1100	1083	1104	1120	1107	1104
2:55:00	1108	1117	1102	1100	1102	1085	1106	1121	1111	1106
2:56:00	1109	1116	1103	1101	1103	1086	1106	1122	1108	1106
2:57:00	1111	1120	1103	1102	1104	1087	1108	1123	1110	1107
2:58:00	1110	1121	1105	1104	1106	1087	1109	1124	1111	1109
2:59:00	1113	1120	1106	1104	1106	1089	1108	1125	1111	1109


 (Mr. Sirichai Pethrung)
 Authorized Testing Officer

Time (hr:min:sec)	Furnace Temperature(°C)									Average
	P1	P2	P3	P4	P5	P6	P7	P8	P9	
3:00:00	1112	1120	1105	1103	1105	1088	1105	1125	1107	1108
3:01:00	1112	1120	1105	1102	1105	1087	1104	1123	1108	1107
3:02:00	1114	1119	1105	1102	1104	1087	1105	1124	1105	1107
3:03:00	1113	1122	1107	1104	1106	1089	1109	1125	1110	1109
3:04:00	1114	1125	1108	1106	1108	1090	1111	1127	1112	1111
3:05:00	1115	1125	1109	1108	1109	1091	1112	1127	1114	1112
3:06:00	1116	1123	1111	1108	1110	1093	1111	1129	1117	1113
3:07:00	1117	1124	1112	1109	1111	1093	1113	1129	1116	1114
3:08:00	1117	1127	1112	1110	1112	1094	1113	1130	1115	1114
3:09:00	1118	1126	1111	1110	1112	1095	1113	1130	1116	1114
3:10:00	1119	1125	1111	1110	1113	1095	1114	1130	1114	1114
3:11:00	1119	1128	1113	1112	1114	1096	1116	1131	1118	1116
3:12:00	1120	1129	1113	1113	1115	1097	1117	1133	1121	1118
3:13:00	1120	1128	1113	1113	1116	1098	1117	1133	1118	1117
3:14:00	1120	1126	1112	1111	1115	1097	1115	1133	1115	1116
3:15:00	1117	1126	1109	1111	1114	1095	1114	1131	1119	1115
3:16:00	1115	1126	1109	1111	1114	1095	1115	1131	1119	1115
3:17:00	1116	1127	1109	1113	1115	1096	1119	1132	1122	1116
3:18:00	1119	1125	1110	1112	1116	1098	1117	1134	1116	1116
3:19:00	1117	1125	1110	1112	1116	1097	1116	1133	1119	1116
3:20:00	1122	1137	1119	1116	1118	1099	1121	1133	1126	1121
3:21:00	1132	1144	1131	1126	1128	1110	1133	1142	1137	1131
3:22:00	1140	1152	1137	1135	1137	1119	1144	1153	1145	1140
3:23:00	1143	1147	1137	1135	1141	1121	1140	1158	1138	1140
3:24:00	1143	1147	1135	1134	1139	1119	1137	1155	1135	1138
3:25:00	1140	1144	1132	1130	1135	1115	1130	1151	1132	1134
3:26:00	1139	1146	1133	1128	1133	1113	1128	1149	1130	1133
3:27:00	1138	1143	1131	1127	1132	1113	1127	1148	1129	1132
3:28:00	1139	1142	1131	1127	1131	1112	1127	1147	1129	1132
3:29:00	1139	1143	1131	1127	1131	1113	1128	1147	1127	1132
3:30:00	1139	1140	1131	1126	1131	1113	1126	1148	1126	1131
3:31:00	1138	1140	1131	1126	1130	1112	1126	1147	1126	1131
3:32:00	1138	1146	1133	1126	1130	1112	1127	1147	1128	1132
3:33:00	1138	1146	1131	1126	1130	1111	1127	1146	1131	1132
3:34:00	1139	1145	1130	1127	1130	1112	1128	1145	1130	1132
3:35:00	1138	1146	1131	1127	1130	1112	1128	1146	1131	1132
3:36:00	1138	1143	1131	1126	1130	1112	1127	1146	1127	1131
3:37:00	1139	1141	1130	1126	1129	1112	1127	1147	1125	1131
3:38:00	1140	1144	1131	1127	1131	1114	1131	1148	1130	1133
3:39:00	1140	1144	1133	1129	1132	1115	1133	1149	1129	1134
3:40:00	1141	1146	1135	1135	1135	1118	1136	1153	1138	1137
3:41:00	1145	1148	1137	1140	1139	1122	1140	1157	1142	1141
3:42:00	1146	1148	1139	1141	1141	1124	1140	1160	1144	1142
3:43:00	1148	1149	1141	1142	1142	1124	1142	1161	1145	1144
3:44:00	1146	1149	1141	1141	1139	1122	1140	1161	1145	1143


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Time (hr:min:sec)	Specimen Temperature(°C)										Max. (A-J)	Average (A-E)
	A	B	C	D	E	F	G	H	I	J		
0:00:00	33	33	32	32	32	33	33	33	33	32	33	32
0:01:00	33	34	32	32	32	33	33	33	33	32	34	33
0:02:00	34	34	32	32	32	34	33	34	33	32	34	33
0:03:00	34	34	33	32	32	34	34	34	33	32	34	33
0:04:00	34	35	33	32	32	34	34	34	33	32	35	33
0:05:00	35	36	33	32	33	35	34	34	34	33	36	34
0:06:00	36	37	34	33	33	36	37	34	34	33	37	34
0:07:00	37	38	35	33	34	37	38	35	35	34	38	35
0:08:00	38	39	36	34	35	38	40	36	37	35	40	36
0:09:00	39	41	38	36	36	39	41	37	38	36	41	38
0:10:00	41	42	39	37	38	41	43	39	40	38	43	39
0:11:00	42	44	41	39	39	42	44	40	41	39	44	41
0:12:00	44	45	42	40	41	43	45	42	43	41	45	42
0:13:00	45	46	44	42	42	45	46	-	44	43	46	44
0:14:00	46	48	45	43	44	46	47	-	45	44	48	45
0:15:00	47	49	46	45	45	47	48	-	47	45	49	46
0:16:00	48	49	47	46	46	48	49	-	48	46	49	47
0:17:00	49	50	48	47	48	49	50	-	49	48	50	48
0:18:00	49	51	49	48	48	49	51	-	50	49	51	49
0:19:00	50	51	50	48	49	50	51	-	50	49	51	50
0:20:00	51	52	50	49	50	51	52	-	51	50	52	50
0:21:00	51	53	51	50	51	51	52	-	52	51	53	51
0:22:00	52	53	51	50	51	51	53	-	52	52	53	51
0:23:00	52	53	52	51	52	52	53	-	53	52	53	52
0:24:00	52	53	52	51	52	52	53	-	53	52	53	52
0:25:00	52	53	52	51	52	52	53	-	53	52	53	52
0:26:00	52	53	52	51	52	52	53	-	53	52	53	52
0:27:00	53	53	52	51	51	52	53	-	53	51	53	52
0:28:00	53	53	52	51	51	52	53	-	53	50	53	52
0:29:00	52	53	52	51	51	52	53	-	53	50	53	52
0:30:00	52	54	53	51	51	51	53	-	53	51	54	52
0:31:00	53	54	54	51	51	51	53	-	53	51	54	53
0:32:00	54	56	55	52	52	52	53	-	54	52	56	54
0:33:00	55	57	57	54	54	53	54	-	56	53	57	55
0:34:00	56	59	59	55	55	54	56	-	58	55	59	57
0:35:00	58	61	61	57	57	55	57	-	59	57	61	59
0:36:00	61	66	67	61	61	59	60	-	63	62	67	63
0:37:00	63	68	69	63	63	61	62	-	66	64	69	65
0:38:00	66	71	72	66	66	63	64	-	68	67	72	68
0:39:00	68	73	75	68	69	65	66	-	71	69	75	71
0:40:00	71	76	79	71	72	68	69	-	74	73	79	74
0:41:00	73	79	84	73	75	70	71	-	76	76	84	77
0:42:00	76	84	90	76	78	73	74	-	80	80	90	81
0:43:00	78	89	96	80	82	76	77	-	84	85	96	85
0:44:00	83	95	102	85	87	81	79	-	90	90	102	90
0:45:00	88	101	108	90	92	85	83	-	95	95	108	96
0:46:00	93	107	113	95	97	90	87	-	100	99	113	101
0:47:00	99	112	118	101	103	96	91	-	105	105	118	107
0:48:00	104	117	123	106	109	100	96	-	110	109	123	111
0:49:00	109	122	127	110	114	105	101	-	116	113	127	116
0:50:00	113	126	131	115	118	109	106	-	120	117	131	121
0:51:00	117	130	135	119	122	113	110	-	124	121	135	125
0:52:00	121	133	139	123	126	117	115	-	128	125	139	128
0:53:00	125	137	142	126	129	120	118	-	132	128	142	132
0:54:00	128	140	145	130	133	123	122	-	135	131	145	135
0:55:00	130	143	148	132	136	126	125	-	139	133	148	138
0:56:00	132	145	150	135	139	129	128	-	-	136	150	140
0:57:00	134	147	151	135	139	130	130	-	-	137	151	141
0:58:00	136	149	153	136	141	133	132	-	-	139	153	143
0:59:00	138	151	155	138	143	134	134	-	-	149	155	145


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Time (hr:min:sec)	Specimen Temperature(°C)											Max. (A-J)	Average (A-E)
	A	B	C	D	E	F	G	H	I	J			
1:00:00	140	153	156	139	144	136	136	-	-	141	156	147	
1:01:00	142	154	158	140	146	137	138	-	-	142	158	148	
1:02:00	144	155	158	141	147	139	139	-	-	142	158	149	
1:03:00	145	156	159	142	147	140	141	-	-	142	159	150	
1:04:00	146	158	160	144	149	143	143	-	-	143	160	151	
1:05:00	148	159	161	145	150	144	144	-	-	144	161	153	
1:06:00	149	160	162	147	151	146	145	-	-	146	162	154	
1:07:00	150	161	163	148	152	147	147	-	-	147	163	155	
1:08:00	151	162	163	148	152	148	148	-	-	148	163	155	
1:09:00	152	163	163	148	152	148	148	-	-	148	163	156	
1:10:00	153	163	163	148	152	149	149	-	-	148	163	156	
1:11:00	153	164	164	149	153	150	150	-	-	148	164	156	
1:12:00	153	165	164	149	154	151	151	-	-	149	165	157	
1:13:00	154	165	164	149	154	151	152	-	-	149	165	157	
1:14:00	155	165	165	150	154	152	152	-	-	150	165	158	
1:15:00	156	165	165	151	155	153	153	-	-	151	165	158	
1:16:00	156	166	165	151	155	154	154	-	-	152	166	159	
1:17:00	156	166	166	152	156	155	154	-	-	153	166	159	
1:18:00	156	166	166	151	156	155	155	-	-	153	166	159	
1:19:00	156	165	165	151	156	155	155	-	-	153	165	158	
1:20:00	156	165	165	151	156	155	156	-	-	153	165	159	
1:21:00	156	166	165	151	156	155	156	-	-	154	166	159	
1:22:00	156	165	164	151	156	156	156	-	-	154	165	158	
1:23:00	156	165	164	150	156	156	-	-	-	155	165	158	
1:24:00	156	165	165	151	157	156	-	-	-	155	165	159	
1:25:00	157	165	165	151	156	156	-	-	-	155	165	159	
1:26:00	157	165	164	150	157	156	-	-	-	155	165	159	
1:27:00	157	166	165	151	158	156	-	-	-	156	166	159	
1:28:00	157	166	165	152	158	157	-	-	-	157	166	159	
1:29:00	157	166	165	152	158	158	-	-	-	157	166	160	
1:30:00	157	166	165	152	159	158	-	-	-	157	166	160	
1:31:00	157	166	165	152	159	158	-	-	-	158	166	160	
1:32:00	158	166	165	152	159	158	-	-	-	158	166	160	
1:33:00	158	166	165	152	159	159	-	-	-	158	166	160	
1:34:00	158	166	165	152	160	158	-	-	-	159	166	160	
1:35:00	158	167	165	152	160	159	-	-	-	159	167	160	
1:36:00	159	167	166	154	160	160	-	-	-	160	167	161	
1:37:00	159	167	166	154	160	160	-	-	-	161	167	161	
1:38:00	159	167	166	154	160	160	-	-	-	161	167	161	
1:39:00	160	167	167	155	161	161	-	-	-	162	167	162	
1:40:00	160	167	167	155	161	161	-	-	-	162	167	162	
1:41:00	161	168	168	156	162	161	-	-	-	163	168	163	
1:42:00	161	168	168	156	162	162	-	-	-	164	168	163	
1:43:00	162	168	168	156	162	162	-	-	-	164	168	163	
1:44:00	162	168	168	156	163	162	-	-	-	164	168	163	
1:45:00	163	168	169	157	162	163	-	-	-	165	169	164	
1:46:00	164	168	169	158	163	163	-	-	-	165	169	164	
1:47:00	164	168	169	158	163	164	-	-	-	165	169	165	
1:48:00	165	168	169	159	163	164	-	-	-	166	169	165	
1:49:00	165	169	170	159	163	165	-	-	-	166	170	165	
1:50:00	166	169	170	160	163	165	-	-	-	167	170	165	
1:51:00	166	169	170	160	163	165	-	-	-	167	170	166	
1:52:00	167	169	170	160	164	165	-	-	-	167	170	166	
1:53:00	167	170	171	160	164	166	-	-	-	168	171	166	
1:54:00	167	170	171	160	165	166	-	-	-	168	171	167	
1:55:00	167	171	171	161	165	166	-	-	-	168	171	167	
1:56:00	168	171	171	160	165	167	-	-	-	168	171	167	
1:57:00	168	172	172	161	166	167	-	-	-	169	172	168	
1:58:00	169	172	172	161	166	167	-	-	-	169	172	168	
1:59:00	169	172	173	162	165	167	-	-	-	170	173	168	


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Time (hr:min:sec)	Specimen Temperature(°C)											Max. (A-J)	Average (A-E)
	A	B	C	D	E	F	G	H	I	J			
2:00:00	169	172	173	161	165	166	-	-	-	170	173	168	
2:01:00	168	173	172	160	166	165	-	-	-	169	173	168	
2:02:00	168	173	172	161	167	166	-	-	-	170	173	168	
2:03:00	168	173	172	161	167	166	-	-	-	170	173	168	
2:04:00	169	173	173	161	167	165	-	-	-	170	173	169	
2:05:00	170	174	173	160	167	164	-	-	-	170	174	169	
2:06:00	170	174	173	161	168	165	-	-	-	170	174	169	
2:07:00	170	174	174	162	168	165	-	-	-	170	174	170	
2:08:00	171	174	173	161	168	164	-	-	-	170	174	170	
2:09:00	171	174	173	161	168	164	-	-	-	170	174	170	
2:10:00	171	175	174	161	168	163	-	-	-	170	175	170	
2:11:00	171	175	174	161	169	164	-	-	-	171	175	170	
2:12:00	171	176	175	162	170	164	-	-	-	172	176	171	
2:13:00	171	176	175	162	171	164	-	-	-	172	176	171	
2:14:00	171	176	176	163	171	164	-	-	-	173	176	171	
2:15:00	172	177	177	163	171	164	-	-	-	173	177	172	



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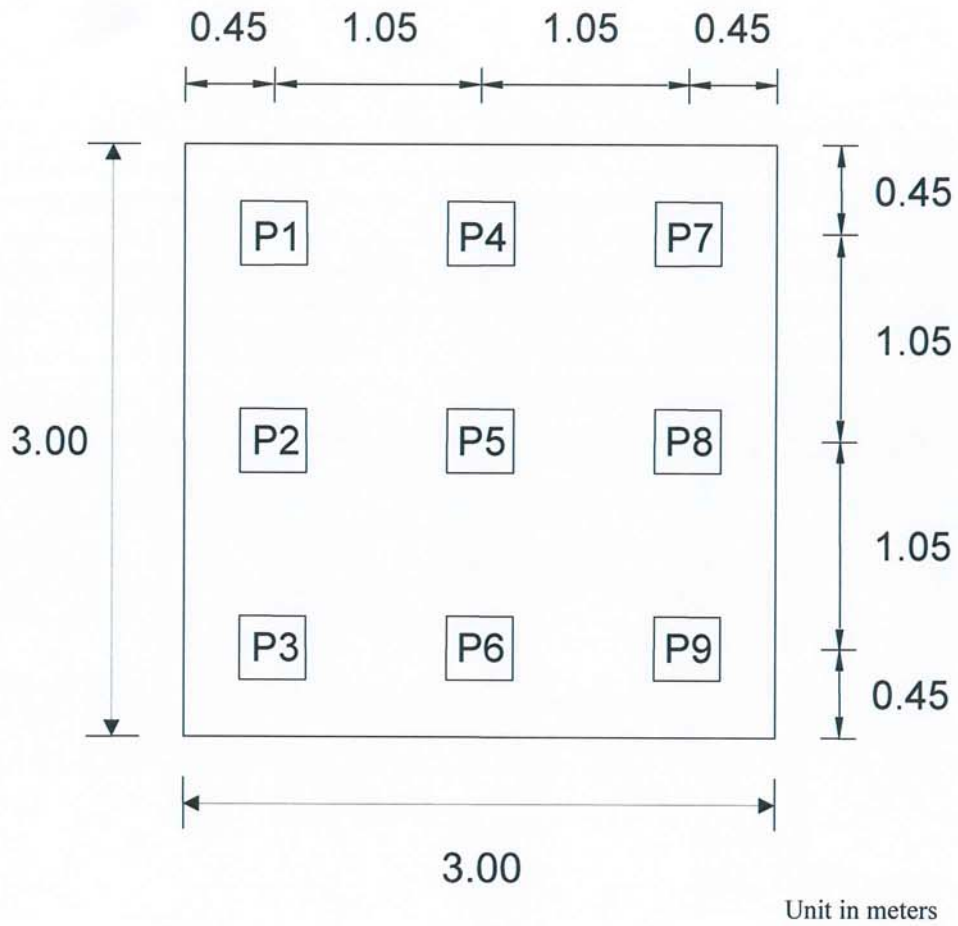


Figure A-1: Location of thermocouples inside the furnace


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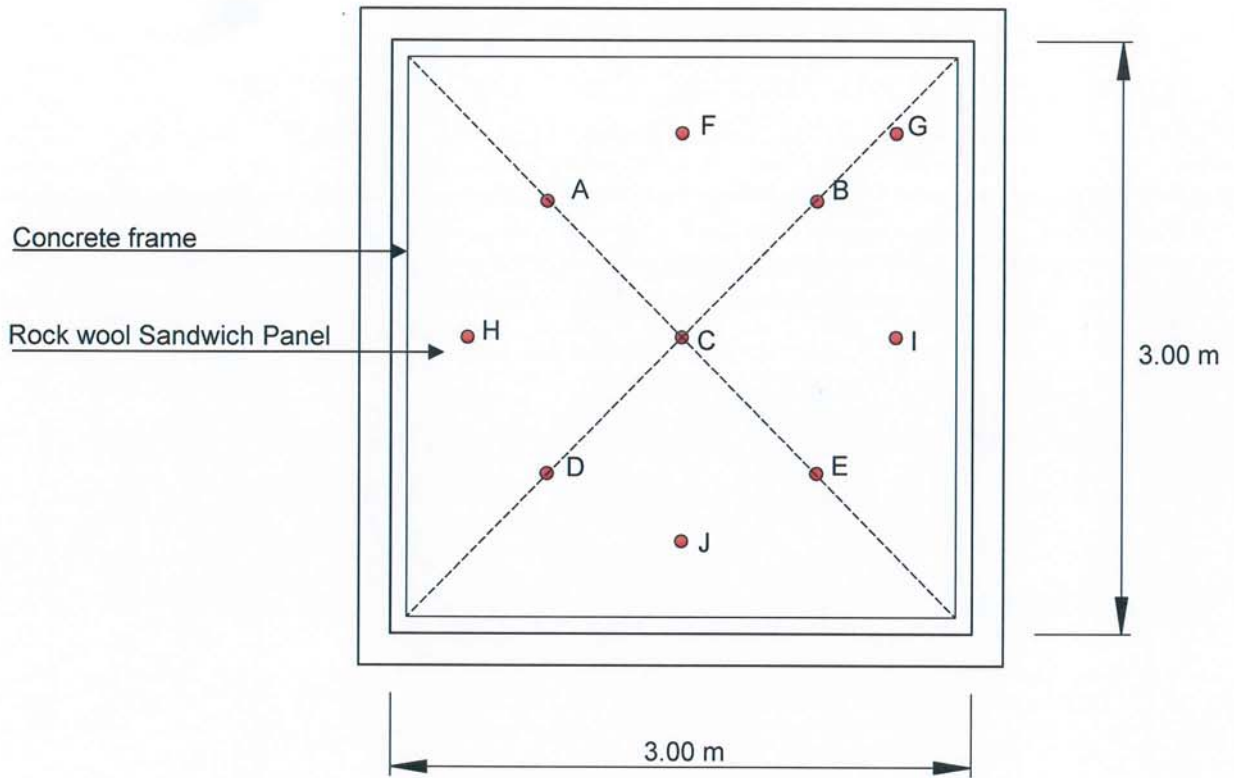

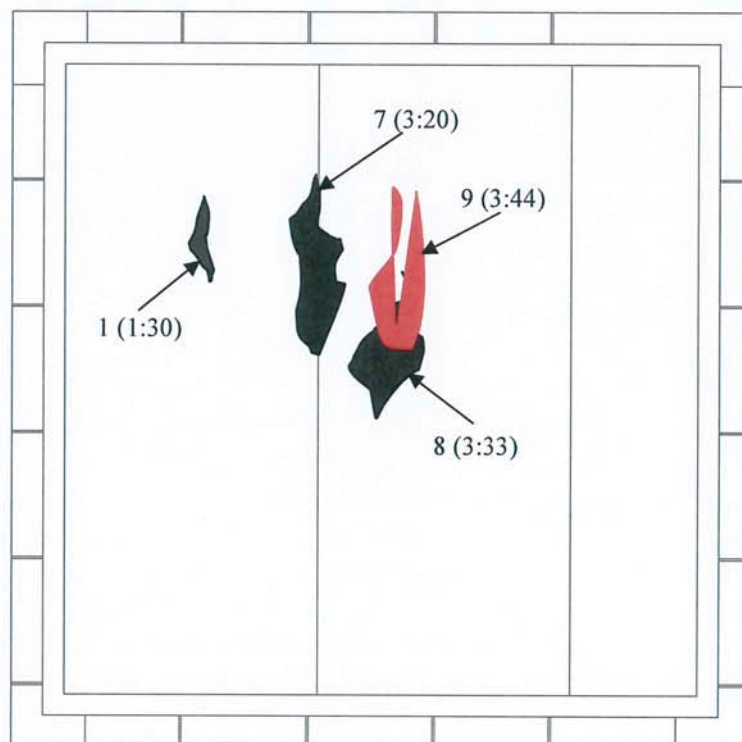


Figure A-2: Location of thermocouples on the specimen


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.....
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APPENDIX B: OBSERVATIONS

No.	Time (hr:min)	Observations
1	1:30	A dark area was observed at the left part of the partition.
2	1:00	No significant change was observed.
3	1:30	No significant change was observed.
4	2:00	No significant change was observed.
5	2:30	No significant change was observed.
6	3:00	No significant change was observed.
7	3:20	A dark area was observed along the vertical joint between the sandwich panels.
8	3:33	A dark area was observed at the middle of the partition.
9	3:44	The specimen had a passage of flame or gases hot enough to ignite the cotton pad.




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APPENDIX C: DRAWINGS & DETAILS OF THE SPECIMEN

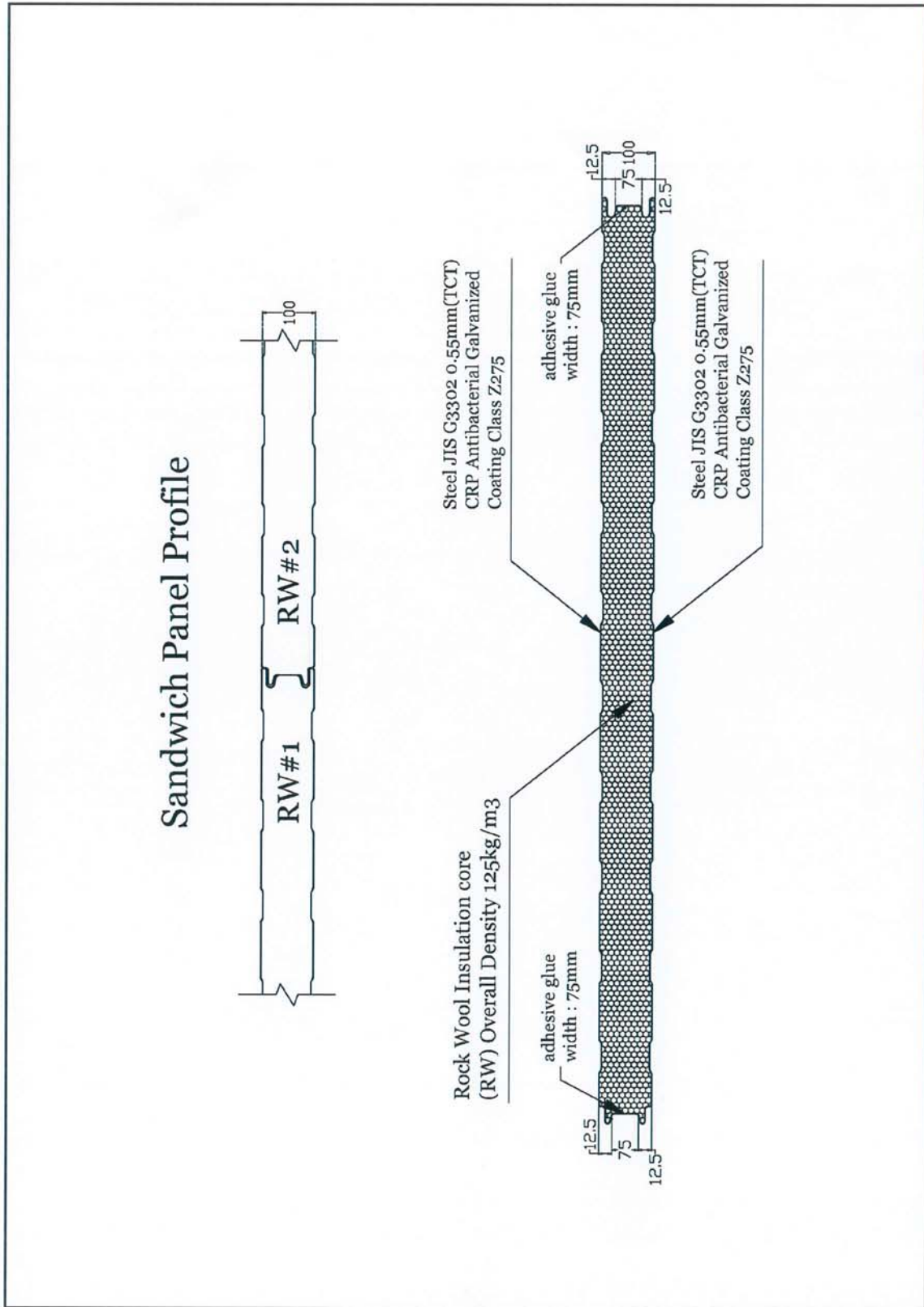


Figure C-1: Details of the specimen (as provided by the client)


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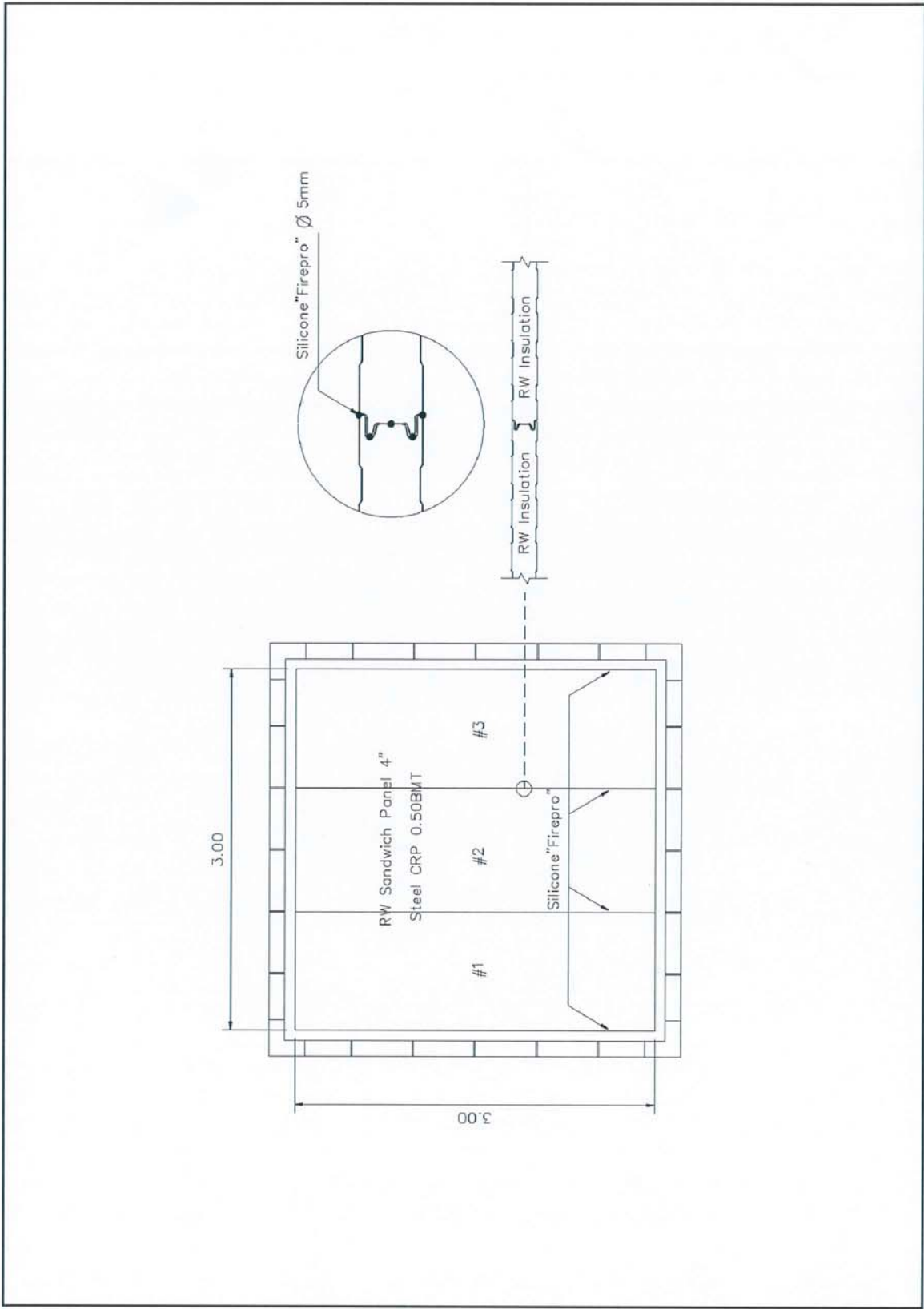



Figure C-2: Details of the specimen (as provided by the client)


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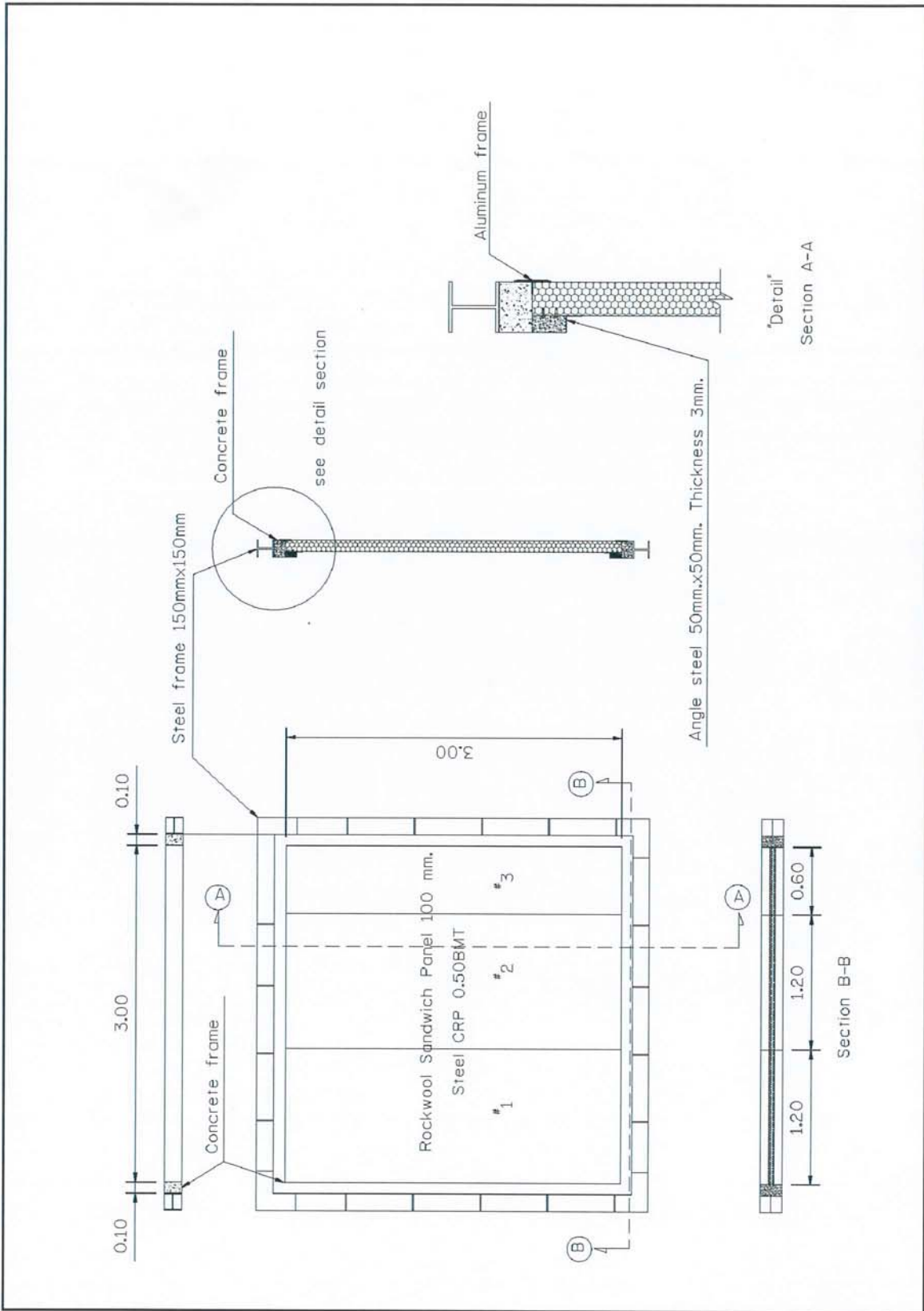



Figure C-3: Details of the specimen (as provided by the client)


.....
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APPENDIX D: PHOTOGRAPHS



Figure D-1: Specimen preparation prior to the test


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(a) 0:00 hr



(b) 0:30 hr



(c) 0:45 hr



(d) 1:00 hr




(e) 1:15 hr



(f) 1:30 hr

Figure D-2: The specimen during the test


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(g) 1:45 hr



(h) 2:00 hr



(i) 2:30 hr



(j) 2:45 hr




(k) 3:00 hr



(l) 3:15 hr

Figure D-2 (continued): The specimen during the test


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(m) 3:30 hr



(n) 3:44 hr

Figure D-2 (continued): The specimen during the test



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Figure D-3: The specimen after the test


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