



**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** : **Steel Fireproof Door with Glass Vision Size 970 x 2030 mm**  
**Door Series: SFD2 (For Bumrungrad International Hospital Project)**  
The specimen is a doorset consisting of a single-sided steel door leaf with a vision panel and a steel door frame. The dimensions of the door leaf are 1987 mm x 894 mm x 45 mm. The door leaf has a fixed 150 mm x 400 mm FireLite Glass Ceramic (5 mm) vision panel located at the height of 1300 mm measured from its lower edge. The door leaf is constructed of 1.6-mm thick cold rolled steel sheets filled with rock wool with a density of 100 kg/m<sup>3</sup>. The specimen was mounted on a 15-cm thick reinforced concrete wall, which was installed on a 3.5 m x 3.5 m testing frame. The door leaf was locked with the door frame by a panic bar and four stainless steel hinges. Intumescent fire seal was installed around the inner perimeter of the door frame. The details of the specimen are shown in Appendix C. The specimen was provided and installed by the client.
- CLIENT** : **SUPA RICH CO., LTD.-VIEWTEX CO., LTD.**  
**FOR BUMRUNGRAD HOSPITAL PCL.**  
33 Sukhumvit 3 (Soi Nana Nua)  
Wattana, Bangkok 10110, Thailand
- DATE OF TEST** : June 13, 2020
- TEST MACHINE** : Large-scale vertical furnace at the Fire Safety Research Center (FSRC), Department of Civil Engineering, Chulalongkorn University in Saraburi province, 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 6: Determination of the fire resistance of fully insulated doorsets and shutter assemblies.
- 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	0:17	The average temperature of the unexposed face of the specimen exceeded 140°C above its initial value of 33°C.
Integrity	3:45	The test was terminated by the client. During the test, all integrity criteria were fulfilled (no sustained flaming and no through gap such that the 6 mm diameter gap gauge could penetrate).

Date: January 26, 2020

Tested by: .....  
(Professor Dr. Thanyawat Pothisiri)

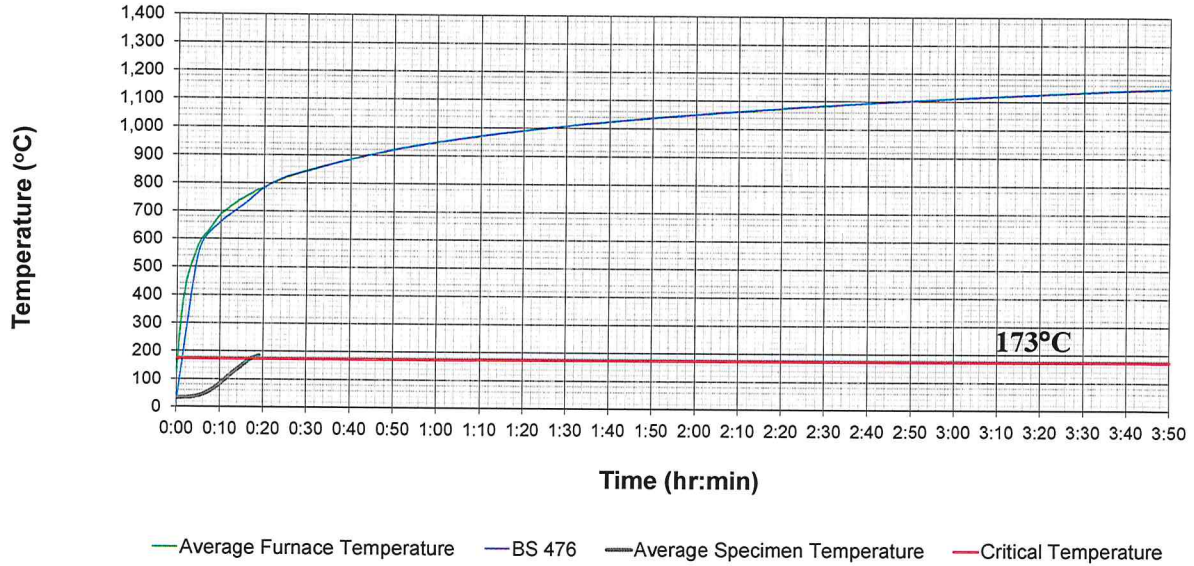
.....  
(Associate Prof. Dr. Tirawat Boonyatee)  
On Behalf of Head of Civil Engineering Department

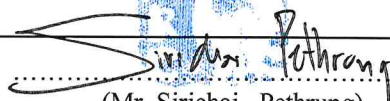


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### FURNACE TEMPERATURE




  
(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	P10	P11	P12	P13	P14	P15	P16			Average
0:00:00	187	92	110	63	191	107	67	67	207	109	85	60	246	147	86	65	118	0:00	20
0:01:00	365	340	618	136	377	358	288	211	362	267	377	168	359	353	378	149	319	0:05	556
0:02:00	453	458	710	259	466	499	449	384	456	391	469	296	462	474	487	245	435	0:10	659
0:03:00	491	518	756	334	506	547	526	458	506	459	538	391	524	532	548	310	497	0:15	718
0:04:00	524	558	789	388	543	584	565	507	545	512	582	458	564	577	595	352	540	0:20	781
0:05:00	567	595	832	434	581	626	597	558	589	566	631	508	594	627	635	372	582	0:25	821
0:06:00	590	617	834	471	610	652	620	587	616	605	654	552	613	647	648	398	607	0:30	842
0:07:00	608	632	848	498	625	665	642	611	630	627	674	581	628	665	668	418	626	0:35	865
0:08:00	626	651	865	525	643	685	667	634	647	650	690	611	647	685	684	443	647	0:40	885
0:09:00	646	671	884	563	663	704	688	658	666	670	711	628	665	700	702	463	668	0:45	902
0:10:00	665	689	900	596	682	722	707	680	686	690	731	652	684	716	714	482	687	0:50	918
0:11:00	678	700	893	623	693	731	716	691	698	702	741	669	691	726	730	504	699	0:55	932
0:12:00	691	712	907	640	706	743	728	705	709	715	749	687	702	741	742	516	712	1:00	945
0:13:00	701	722	916	653	716	752	740	719	719	727	761	695	713	748	751	534	723	1:05	957
0:14:00	711	731	927	668	725	761	750	727	728	736	771	709	725	757	764	548	734	1:10	968
0:15:00	721	739	934	681	733	771	760	740	738	745	780	719	727	769	772	559	743	1:15	979
0:16:00	730	748	947	697	744	779	769	754	749	757	790	730	738	779	773	564	753	1:20	988
0:17:00	738	758	946	703	752	787	778	761	757	766	797	740	746	786	782	575	761	1:25	997
0:18:00	746	768	956	715	759	795	786	768	766	774	806	749	757	793	793	593	770	1:30	1006
0:19:00	752	772	953	728	767	802	793	778	774	781	809	758	765	796	802	598	777	1:35	1014
0:20:00	758	778	962	737	772	805	800	781	781	786	814	766	770	804	808	607	783	1:40	1022
0:21:00	767	787	970	741	783	816	807	795	788	796	827	772	778	816	812	615	792	1:45	1029
0:22:00	775	794	977	754	790	822	817	804	796	804	831	779	784	826	821	626	800	1:50	1036
0:23:00	780	797	987	763	795	829	822	812	802	810	836	788	789	832	824	631	806	1:55	1043
0:24:00	784	804	983	771	799	831	828	825	807	816	843	797	794	835	829	647	812	2:00	1049
0:25:00	790	810	988	786	806	839	834	836	813	823	850	806	800	840	835	653	819	2:05	1055
0:26:00	794	817	987	791	809	842	839	839	820	829	853	813	806	844	841	663	824	2:10	1061
0:27:00	800	820	998	800	815	847	844	842	824	832	859	819	812	852	844	665	830	2:15	1067
0:28:00	804	824	1000	804	819	852	849	849	828	837	863	822	815	857	849	674	834	2:20	1072
0:29:00	810	829	1005	810	825	856	855	853	833	844	869	829	821	860	857	679	840	2:25	1077
0:30:00	814	837	1003	817	829	862	859	857	838	846	868	833	828	860	864	685	844	2:30	1082
0:31:00	820	840	1009	821	835	866	863	865	843	852	877	837	829	871	865	689	849	2:35	1087
0:32:00	823	844	1007	824	838	870	866	862	848	855	880	844	838	868	874	696	852	2:40	1092
0:33:00	827	846	1020	830	842	873	870	873	851	861	884	846	839	879	872	699	857	2:45	1097
0:34:00	831	852	1018	835	846	877	873	878	856	864	887	852	844	879	877	707	861	2:50	1101
0:35:00	836	854	1021	840	852	882	877	881	858	869	892	855	847	886	881	710	865	2:55	1106
0:36:00	840	860	1022	844	855	886	881	881	863	872	896	860	850	887	884	718	869	3:00	1110
0:37:00	844	862	1026	848	859	888	883	884	868	877	900	863	856	895	887	719	872	3:05	1114
0:38:00	847	867	1028	853	863	892	888	893	872	881	902	869	860	897	891	728	877	3:10	1118
0:39:00	851	872	1032	856	866	896	892	891	877	885	907	874	867	897	900	731	881	3:15	1122
0:40:00	856	876	1037	862	870	901	897	896	881	888	909	877	865	905	899	735	885	3:20	1126
0:41:00	860	878	1034	865	875	904	902	898	884	892	913	881	871	911	906	742	889	3:25	1129
0:42:00	863	881	1043	870	878	907	905	907	888	896	917	885	876	913	907	744	892	3:30	1133
0:43:00	866	882	1037	871	882	909	905	906	891	900	918	887	877	917	911	747	894	3:35	1136
0:44:00	870	891	1048	880	885	915	912	913	896	902	923	892	882	917	917	751	900	3:40	1140
0:45:00	873	890	1050	882	889	916	913	921	898	906	923	893	885	921	914	756	902	3:45	1143
0:46:00	877	895	1049	886	892	920	917	918	901	910	929	897	888	925	920	760	905	3:50	1146
0:47:00	880	901	1053	886	895	924	920	920	905	912	931	902	892	925	925	766	909		
0:48:00	883	903	1055	891	897	926	922	921	907	916	932	903	894	930	926	766	911		
0:49:00	887	907	1062	893	901	929	927	924	913	920	939	908	899	934	929	770	915		
0:50:00	889	909	1062	900	904	932	928	932	914	922	941	911	903	933	933	778	918		
0:51:00	893	910	1062	903	908	935	931	936	918	926	944	914	904	941	933	781	921		
0:52:00	895	913	1060	905	911	938	935	940	920	929	947	918	907	944	937	785	924		
0:53:00	898	917	1065	905	914	940	936	937	923	931	948	920	911	947	941	790	926		
0:54:00	901	919	1068	910	916	943	940	941	926	933	950	923	913	950	944	797	930		
0:55:00	904	920	1071	914	919	945	942	945	929	936	953	924	916	950	945	794	932		
0:56:00	907	924	1073	915	922	948	944	946	933	939	954	928	920	955	950	801	935		
0:57:00	910	927	1070	917	925	950	946	947	935	942	957	931	923	959	952	806	937		
0:58:00	914	930	1076	919	929	954	948	948	939	947	961	935	926	958	952	804	940		
0:59:00	914	932	1079	924	930	956	952	953	939	947	962	935	926	958	956	810	942		

  
 (Mr. Sirichai Pethrung)  
 Authorized Testing Officer



Time (hr:min:sec)	Furnace Temperature(°C)																
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	Average
1:00:00	917	935	1085	926	932	958	953	956	943	951	965	940	931	967	958	815	946
1:01:00	920	939	1085	928	935	961	957	958	945	953	968	942	932	967	961	818	948
1:02:00	922	941	1082	931	936	963	959	959	948	955	969	944	935	971	964	819	950
1:03:00	925	944	1088	933	940	965	961	962	949	958	971	944	937	969	965	817	952
1:04:00	928	944	1086	937	943	967	963	966	953	961	975	950	941	974	967	824	955
1:05:00	930	947	1089	940	945	971	965	969	954	961	975	951	942	978	972	833	958
1:06:00	932	948	1096	941	947	973	970	969	957	964	977	953	946	979	974	828	960
1:07:00	934	951	1095	944	950	975	970	972	959	966	980	955	947	981	973	830	961
1:08:00	937	955	1094	949	952	978	975	977	963	967	982	959	951	983	979	837	965
1:09:00	939	955	1098	950	954	978	974	977	964	971	982	960	951	984	977	838	966
1:10:00	941	958	1097	949	956	980	977	979	965	972	986	961	953	987	979	840	967
1:11:00	944	962	1101	955	959	984	979	981	968	976	989	965	956	991	986	846	971
1:12:00	945	962	1100	957	960	985	981	982	970	975	991	968	959	990	987	848	972
1:13:00	948	965	1100	955	962	987	983	980	973	979	992	970	961	994	989	849	974
1:14:00	950	966	1109	959	965	989	983	986	973	983	993	971	963	997	992	851	977
1:15:00	952	969	1108	960	967	992	985	987	976	983	995	974	965	999	991	857	979
1:16:00	954	972	1110	965	969	994	989	989	979	986	997	974	967	1000	994	856	981
1:17:00	956	974	1106	966	970	996	990	992	981	986	998	977	969	999	997	858	982
1:18:00	958	975	1112	967	972	997	992	993	982	990	1001	979	972	1002	997	861	984
1:19:00	960	976	1110	970	976	999	994	995	985	992	1003	982	974	1006	999	864	986
1:20:00	962	979	1115	973	977	1001	996	998	987	994	1005	985	975	1007	1003	865	989
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1:23:00	967	984	1119	977	982	1005	1000	1002	992	999	1010	989	981	1012	1005	876	994
1:24:00	969	987	1119	978	984	1008	1003	1001	994	1000	1012	992	983	1014	1009	881	996
1:25:00	971	988	1123	980	986	1010	1004	1003	996	1003	1014	994	985	1017	1010	880	998
1:26:00	973	991	1123	984	988	1011	1006	1007	999	1005	1015	994	988	1017	1012	880	999
1:27:00	975	992	1122	988	989	1013	1008	1010	999	1007	1015	997	988	1019	1012	884	1001
1:28:00	976	994	1126	989	991	1014	1008	1013	1000	1007	1017	997	990	1020	1014	883	1002
1:29:00	979	996	1125	988	993	1016	1012	1009	1004	1009	1020	1000	993	1023	1017	887	1004
1:30:00	979	996	1127	988	994	1017	1012	1011	1003	1011	1020	1001	993	1022	1018	890	1005
1:31:00	982	997	1128	990	996	1020	1014	1013	1007	1013	1023	1002	996	1026	1019	890	1007
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1:33:00	985	1000	1129	993	1000	1022	1017	1014	1009	1018	1024	1006	999	1031	1025	899	1011
1:34:00	987	1003	1133	997	1001	1025	1018	1020	1011	1018	1027	1007	1000	1033	1025	897	1013
1:35:00	988	1007	1137	998	1003	1026	1021	1020	1012	1019	1028	1009	1002	1032	1027	898	1014
1:36:00	990	1008	1133	1000	1004	1028	1023	1020	1014	1019	1030	1014	1004	1034	1027	901	1015
1:37:00	992	1009	1140	1001	1006	1028	1022	1024	1016	1021	1031	1014	1005	1034	1027	903	1017
1:38:00	994	1010	1136	1003	1007	1030	1025	1026	1017	1023	1031	1014	1007	1034	1030	905	1018
1:39:00	995	1011	1142	1005	1009	1032	1026	1025	1019	1026	1035	1016	1009	1038	1030	907	1020
1:40:00	996	1013	1142	1007	1011	1034	1029	1027	1020	1025	1037	1017	1011	1039	1033	908	1022
1:41:00	998	1015	1142	1011	1012	1036	1029	1033	1021	1027	1037	1019	1011	1040	1033	909	1023
1:42:00	999	1016	1143	1011	1014	1037	1032	1031	1024	1029	1039	1021	1013	1044	1034	912	1025
1:43:00	1001	1018	1144	1014	1015	1037	1034	1034	1024	1030	1040	1021	1015	1043	1038	915	1026
1:44:00	1002	1018	1148	1012	1016	1040	1033	1033	1027	1031	1041	1023	1016	1043	1038	914	1027
1:45:00	1004	1021	1149	1013	1018	1041	1034	1034	1028	1033	1042	1025	1017	1047	1039	918	1029
1:46:00	1005	1024	1146	1018	1019	1044	1039	1035	1029	1032	1044	1027	1018	1047	1044	920	1031
1:47:00	1007	1022	1150	1016	1021	1043	1037	1036	1031	1036	1044	1027	1020	1047	1043	919	1031
1:48:00	1008	1027	1149	1018	1022	1046	1040	1037	1032	1037	1046	1029	1022	1050	1045	917	1033
1:49:00	1010	1026	1151	1020	1023	1047	1042	1039	1033	1038	1048	1031	1022	1050	1048	920	1034
1:50:00	1011	1027	1153	1019	1025	1048	1042	1039	1035	1039	1049	1032	1025	1052	1047	925	1036
1:51:00	1013	1030	1150	1023	1026	1050	1045	1041	1037	1040	1050	1034	1026	1054	1050	932	1038
1:52:00	1014	1032	1154	1027	1028	1051	1045	1046	1038	1043	1051	1036	1028	1057	1052	932	1040
1:53:00	1016	1032	1155	1026	1030	1052	1045	1046	1039	1045	1053	1037	1029	1057	1051	928	1040
1:54:00	1017	1034	1160	1030	1030	1052	1048	1049	1040	1046	1054	1037	1030	1059	1052	931	1042
1:55:00	1018	1034	1159	1029	1031	1054	1048	1048	1042	1047	1057	1038	1032	1059	1051	930	1042
1:56:00	1020	1035	1157	1033	1034	1056	1051	1046	1043	1049	1056	1040	1033	1060	1054	935	1044
1:57:00	1020	1038	1156	1032	1034	1057	1052	1051	1044	1049	1057	1041	1034	1061	1057	937	1045
1:58:00	1022	1038	1157	1033	1036	1059	1053	1052	1045	1051	1059	1043	1036	1064	1057	935	1046
1:59:00	1024	1040	1162	1034	1037	1060	1053	1051	1047	1052	1060	1044	1037	1065	1058	940	1048



(Mr. Sirichai Pethrong)  
Authorized Testing Officer

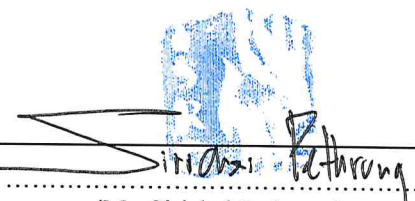


Time (hr:min:sec)	Furnace Temperature(°C)																
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	Average
2:00:00	1024	1041	1161	1036	1038	1060	1055	1053	1046	1052	1060	1045	1038	1065	1059	943	1049
2:01:00	1026	1042	1166	1037	1039	1061	1056	1054	1049	1055	1063	1046	1040	1067	1060	944	1050
2:02:00	1028	1044	1164	1041	1041	1064	1058	1057	1051	1056	1064	1047	1041	1068	1062	944	1052
2:03:00	1029	1045	1166	1038	1042	1065	1058	1055	1052	1056	1064	1049	1042	1069	1062	941	1052
2:04:00	1030	1046	1166	1040	1042	1066	1059	1058	1052	1057	1066	1050	1043	1070	1064	949	1053
2:05:00	1031	1048	1170	1042	1044	1068	1060	1060	1054	1058	1067	1052	1044	1071	1065	950	1055
2:06:00	1033	1049	1167	1044	1046	1069	1062	1062	1055	1061	1068	1054	1046	1072	1068	950	1056
2:07:00	1034	1050	1168	1045	1047	1069	1063	1064	1057	1062	1070	1054	1047	1075	1066	954	1058
2:08:00	1035	1051	1168	1047	1049	1070	1064	1063	1057	1064	1070	1056	1050	1076	1068	950	1059
2:09:00	1036	1052	1169	1050	1049	1071	1065	1066	1059	1064	1071	1056	1050	1077	1068	955	1060
2:10:00	1037	1053	1171	1048	1051	1073	1066	1066	1060	1066	1073	1058	1051	1080	1069	956	1061
2:11:00	1038	1055	1172	1050	1052	1073	1067	1066	1061	1067	1074	1058	1053	1079	1073	957	1062
2:12:00	1040	1056	1175	1052	1053	1075	1069	1068	1062	1068	1075	1059	1054	1081	1071	957	1063
2:13:00	1041	1056	1174	1050	1054	1075	1069	1065	1064	1068	1076	1061	1054	1081	1074	959	1064
2:14:00	1042	1057	1178	1050	1055	1077	1070	1069	1065	1069	1077	1062	1056	1080	1075	957	1065
2:15:00	1043	1059	1177	1054	1056	1078	1072	1071	1065	1070	1077	1063	1056	1083	1077	965	1067
2:16:00	1045	1061	1176	1055	1058	1080	1074	1073	1067	1073	1079	1066	1059	1084	1078	966	1068
2:17:00	1045	1062	1181	1055	1058	1081	1074	1073	1068	1072	1080	1066	1060	1084	1079	966	1069
2:18:00	1047	1062	1179	1057	1059	1081	1075	1073	1069	1073	1081	1067	1060	1085	1078	963	1069
2:19:00	1047	1063	1178	1057	1060	1082	1076	1075	1071	1074	1081	1068	1061	1088	1081	969	1071
2:20:00	1049	1064	1180	1057	1062	1083	1077	1074	1071	1077	1083	1069	1062	1089	1082	969	1072
2:21:00	1050	1066	1178	1060	1064	1085	1078	1077	1073	1077	1083	1071	1064	1090	1083	977	1073
2:22:00	1051	1066	1179	1062	1064	1085	1079	1078	1074	1078	1085	1070	1065	1091	1083	972	1074
2:23:00	1053	1067	1182	1063	1065	1086	1079	1079	1075	1080	1088	1072	1067	1092	1086	972	1075
2:24:00	1053	1069	1178	1065	1066	1088	1083	1082	1076	1079	1089	1074	1066	1094	1086	975	1076
2:25:00	1054	1070	1188	1064	1067	1089	1082	1081	1077	1081	1089	1074	1068	1093	1087	973	1077
2:26:00	1056	1070	1182	1065	1069	1090	1083	1080	1078	1083	1088	1076	1070	1095	1089	976	1078
2:27:00	1056	1071	1185	1066	1070	1091	1084	1082	1079	1083	1089	1077	1071	1096	1089	977	1079
2:28:00	1057	1073	1186	1066	1070	1092	1085	1080	1080	1084	1091	1078	1071	1096	1090	979	1080
2:29:00	1059	1074	1186	1070	1072	1094	1087	1086	1081	1085	1092	1079	1073	1097	1093	979	1082
2:30:00	1060	1075	1187	1071	1073	1094	1087	1087	1082	1087	1093	1080	1074	1099	1092	985	1083
2:31:00	1061	1075	1187	1070	1073	1094	1088	1088	1083	1087	1093	1082	1075	1099	1093	982	1083
2:32:00	1061	1077	1187	1070	1075	1096	1088	1087	1084	1089	1095	1082	1076	1101	1094	984	1084
2:33:00	1062	1078	1189	1073	1075	1097	1091	1089	1085	1090	1095	1083	1077	1102	1095	987	1085
2:34:00	1064	1079	1189	1075	1077	1097	1091	1090	1087	1091	1097	1084	1079	1105	1095	985	1086
2:35:00	1065	1080	1190	1076	1079	1099	1092	1091	1088	1093	1099	1085	1080	1104	1097	987	1088
2:36:00	1065	1080	1189	1078	1078	1099	1093	1092	1088	1092	1098	1086	1080	1104	1098	990	1088
2:37:00	1067	1082	1193	1078	1080	1101	1094	1092	1089	1093	1099	1086	1081	1106	1099	990	1089
2:38:00	1068	1082	1194	1077	1080	1101	1095	1093	1090	1093	1101	1087	1082	1107	1100	992	1090
2:39:00	1068	1083	1193	1079	1081	1102	1095	1095	1091	1095	1100	1088	1083	1107	1101	992	1091
2:40:00	1070	1086	1197	1082	1082	1103	1097	1099	1092	1096	1102	1091	1084	1108	1102	995	1093
2:41:00	1070	1085	1192	1082	1082	1104	1098	1097	1093	1095	1102	1092	1084	1109	1104	996	1093
2:42:00	1071	1087	1198	1086	1083	1105	1099	1099	1094	1098	1103	1092	1087	1109	1104	995	1094
2:43:00	1072	1087	1196	1083	1084	1106	1100	1096	1095	1097	1105	1093	1087	1110	1105	999	1095
2:44:00	1074	1089	1199	1084	1086	1107	1100	1098	1095	1100	1105	1093	1088	1111	1102	997	1095
2:45:00	1074	1089	1196	1087	1087	1108	1101	1103	1097	1101	1105	1094	1088	1112	1106	997	1096
2:46:00	1076	1091	1199	1084	1088	1108	1102	1099	1098	1101	1107	1095	1090	1115	1107	999	1097
2:47:00	1076	1091	1197	1087	1089	1110	1103	1101	1100	1103	1108	1096	1091	1118	1108	1000	1099
2:48:00	1078	1093	1202	1088	1090	1111	1104	1101	1101	1104	1109	1099	1092	1115	1110	1004	1100
2:49:00	1078	1093	1203	1087	1090	1111	1105	1101	1101	1105	1109	1098	1093	1118	1110	1006	1101
2:50:00	1079	1093	1199	1090	1092	1112	1105	1105	1102	1106	1110	1099	1094	1117	1110	1006	1101
2:51:00	1080	1094	1203	1089	1092	1113	1106	1103	1102	1103	1112	1098	1094	1119	1112	1007	1102
2:52:00	1081	1096	1201	1092	1093	1114	1108	1104	1103	1107	1112	1100	1095	1118	1112	1005	1103
2:53:00	1082	1096	1202	1091	1094	1115	1108	1105	1104	1109	1113	1101	1096	1122	1113	1008	1104
2:54:00	1084	1098	1205	1094	1096	1116	1109	1108	1105	1108	1115	1103	1097	1121	1114	1011	1105
2:55:00	1083	1099	1206	1096	1095	1116	1110	1109	1105	1108	1113	1103	1097	1119	1112	1009	1105
2:56:00	1085	1099	1207	1096	1097	1119	1111	1108	1106	1109	1115	1103	1098	1120	1114	1011	1106
2:57:00	1086	1100	1207	1097	1099	1120	1114	1112	1107	1110	1117	1105	1099	1124	1117	1012	1108
2:58:00	1086	1102	1205	1098	1099	1120	1112	1112	1108	1112	1118	1106	1101	1125	1117	1009	1108
2:59:00	1087	1102	1207	1099	1100	1120	1113	1113	1110	1113	1118	1107	1102	1124	1118	1012	1109

  
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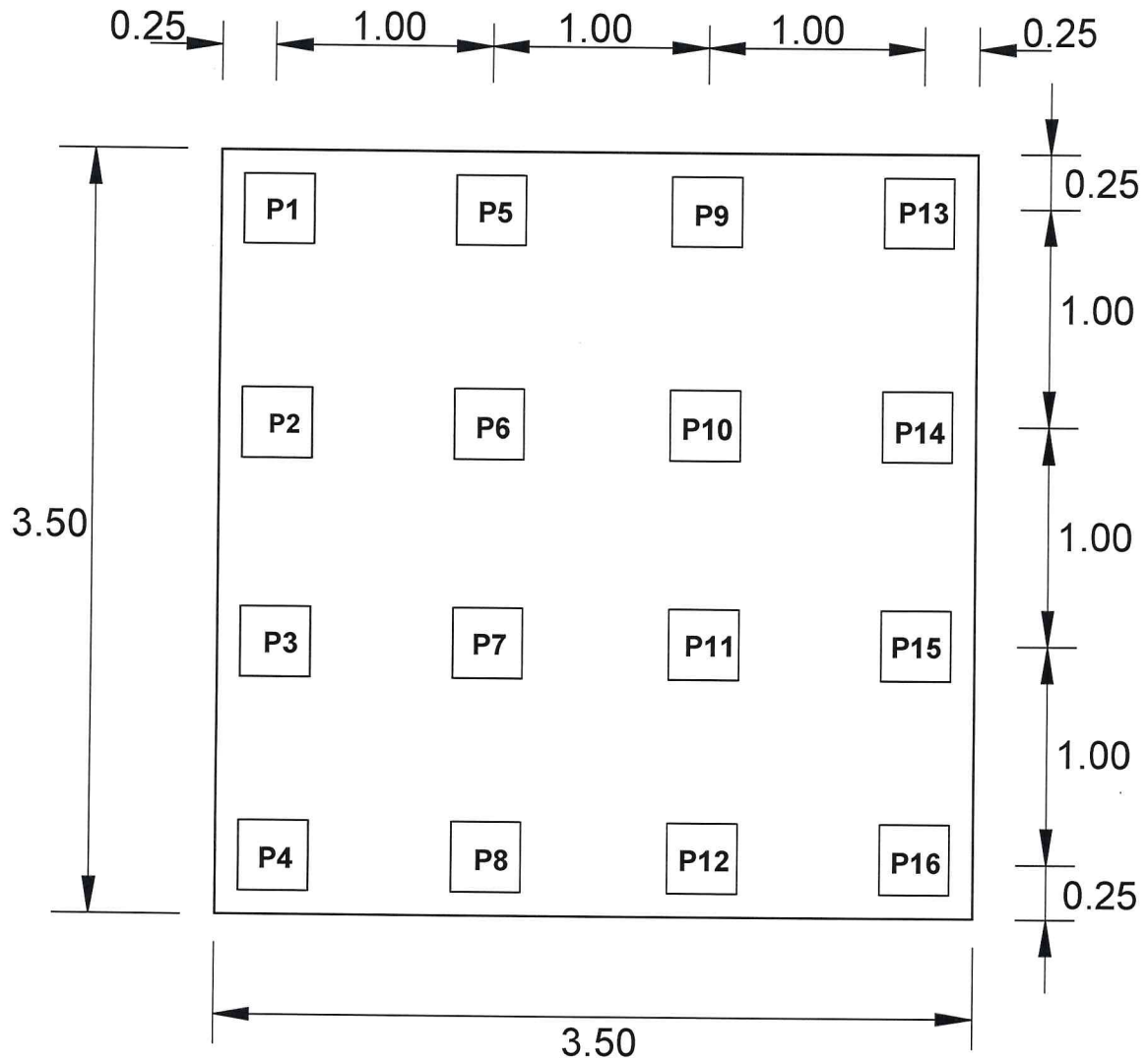


Time (hr:min:sec)	Furnace Temperature(°C)																
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	Average
3:00:00	1088	1102	1206	1097	1100	1121	1114	1111	1109	1114	1118	1108	1103	1127	1119	1015	1109
3:01:00	1089	1104	1208	1100	1101	1121	1115	1113	1111	1114	1120	1109	1103	1126	1118	1019	1111
3:02:00	1090	1106	1210	1100	1103	1123	1116	1113	1113	1116	1122	1110	1105	1128	1120	1013	1112
3:03:00	1090	1106	1210	1101	1103	1123	1116	1114	1113	1117	1122	1111	1105	1128	1119	1015	1112
3:04:00	1091	1106	1210	1102	1103	1124	1118	1115	1113	1116	1122	1111	1106	1127	1123	1019	1113
3:05:00	1092	1107	1208	1102	1105	1125	1118	1116	1114	1118	1122	1111	1107	1129	1121	1016	1113
3:06:00	1093	1108	1211	1104	1106	1126	1119	1118	1115	1119	1125	1113	1109	1133	1124	1020	1115
3:07:00	1094	1109	1213	1105	1106	1126	1120	1119	1116	1120	1125	1113	1108	1131	1125	1023	1116
3:08:00	1095	1109	1212	1104	1107	1127	1121	1118	1117	1121	1126	1115	1110	1133	1125	1024	1116
3:09:00	1095	1110	1213	1106	1108	1128	1120	1119	1117	1120	1126	1115	1110	1133	1126	1020	1117
3:10:00	1097	1110	1214	1105	1109	1128	1122	1118	1119	1123	1126	1116	1110	1136	1127	1023	1118
3:11:00	1097	1111	1214	1108	1109	1130	1123	1121	1119	1122	1128	1116	1112	1135	1128	1024	1118
3:12:00	1098	1113	1215	1109	1111	1130	1124	1121	1120	1123	1129	1118	1112	1135	1127	1028	1119
3:13:00	1099	1113	1215	1109	1111	1131	1124	1121	1121	1124	1128	1118	1113	1137	1128	1026	1120
3:14:00	1100	1114	1217	1108	1112	1133	1125	1121	1122	1125	1129	1117	1114	1137	1128	1026	1120
3:15:00	1100	1115	1217	1109	1113	1133	1125	1123	1123	1124	1129	1118	1114	1138	1130	1030	1121
3:16:00	1101	1116	1215	1114	1114	1132	1126	1126	1123	1127	1132	1121	1116	1138	1131	1029	1122
3:17:00	1102	1117	1219	1112	1114	1135	1127	1125	1124	1126	1133	1122	1117	1140	1133	1031	1124
3:18:00	1102	1117	1216	1114	1115	1134	1128	1127	1124	1128	1132	1123	1117	1139	1133	1031	1124
3:19:00	1103	1118	1221	1113	1116	1136	1129	1125	1125	1128	1133	1122	1118	1141	1133	1034	1124
3:20:00	1105	1120	1223	1114	1117	1137	1130	1126	1125	1130	1134	1123	1119	1141	1132	1032	1125
3:21:00	1105	1120	1221	1114	1118	1139	1131	1127	1128	1131	1136	1126	1120	1145	1137	1035	1127
3:22:00	1106	1121	1223	1116	1119	1139	1132	1129	1128	1131	1136	1126	1121	1144	1137	1036	1128
3:23:00	1107	1121	1219	1117	1119	1138	1133	1131	1128	1132	1136	1126	1121	1144	1137	1036	1128
3:24:00	1107	1122	1221	1117	1119	1139	1133	1131	1128	1132	1137	1127	1122	1144	1136	1036	1128
3:25:00	1107	1122	1223	1116	1120	1140	1133	1128	1129	1132	1138	1127	1122	1144	1139	1039	1129
3:26:00	1109	1124	1223	1120	1121	1141	1135	1130	1130	1132	1138	1129	1123	1145	1139	1037	1130
3:27:00	1110	1124	1225	1120	1122	1143	1135	1133	1131	1134	1139	1128	1124	1146	1140	1040	1131
3:28:00	1110	1125	1224	1120	1122	1142	1135	1132	1131	1134	1139	1129	1124	1146	1139	1039	1131
3:29:00	1111	1126	1224	1122	1123	1144	1137	1133	1132	1134	1140	1131	1125	1147	1142	1044	1132
3:30:00	1112	1127	1226	1123	1124	1144	1138	1135	1133	1136	1141	1132	1126	1148	1141	1043	1133
3:31:00	1113	1127	1226	1125	1125	1145	1138	1136	1133	1137	1142	1131	1127	1149	1142	1044	1134
3:32:00	1113	1128	1227	1125	1125	1146	1139	1137	1134	1137	1142	1132	1127	1150	1142	1045	1134
3:33:00	1114	1128	1229	1123	1126	1146	1139	1135	1135	1137	1143	1134	1128	1150	1143	1047	1135
3:34:00	1115	1129	1226	1126	1128	1147	1141	1137	1137	1139	1145	1134	1129	1152	1144	1043	1136
3:35:00	1115	1130	1228	1125	1128	1148	1140	1136	1137	1138	1145	1135	1130	1153	1146	1047	1136
3:36:00	1116	1130	1228	1126	1128	1148	1142	1138	1138	1140	1146	1136	1131	1154	1148	1053	1138
3:37:00	1116	1130	1228	1128	1129	1148	1141	1139	1139	1141	1146	1136	1132	1153	1146	1047	1137
3:38:00	1117	1132	1232	1127	1129	1149	1143	1139	1139	1141	1147	1137	1132	1153	1147	1048	1138
3:39:00	1118	1133	1224	1130	1130	1150	1147	1139	1139	1141	1147	1138	1133	1153	1152	1057	1139
3:40:00	1119	1133	1229	1131	1130	1150	1145	1140	1140	1142	1147	1138	1133	1155	1148	1049	1140
3:41:00	1119	1135	1230	1130	1131	1151	1145	1141	1140	1142	1147	1138	1133	1155	1148	1049	1140
3:42:00	1120	1135	1228	1131	1133	1152	1146	1142	1142	1144	1150	1140	1136	1159	1149	1052	1141
3:43:00	1121	1136	1231	1130	1134	1153	1145	1143	1143	1145	1150	1141	1136	1158	1150	1052	1142
3:44:00	1122	1137	1229	1133	1134	1153	1146	1146	1144	1148	1150	1141	1137	1158	1152	1054	1143
3:45:00	1123	1136	1232	1132	1135	1153	1147	1142	1145	1147	1152	1143	1138	1160	1154	1060	1144

  
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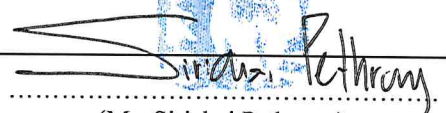
Time (hr:min:sec)	Specimen Temperature(°C)										Max. (A-I)	Average (A-E)
	A	B	C	D	E	F	G	H	I	J		
0:00:00	33	33	33	33	33	36	33	33	33	31	36	33
0:01:00	33	34	34	33	33	44	33	36	33	31	44	33
0:02:00	33	35	34	33	33	54	36	40	35	32	54	33
0:03:00	34	37	35	33	33	62	39	44	37	32	62	34
0:04:00	35	40	37	34	35	65	43	49	41	32	65	36
0:05:00	38	46	41	37	37	69	48	56	45	32	69	40
0:06:00	43	53	47	40	41	77	53	70	52	32	77	45
0:07:00	49	62	56	46	46	92	60	85	64	33	92	52
0:08:00	57	74	67	54	53	97	70	98	73	33	98	61
0:09:00	65	88	80	63	60	103	76	110	82	34	110	71
0:10:00	76	104	96	75	68	109	83	117	91	35	117	84
0:11:00	88	120	112	89	77	115	90	122	98	37	122	97
0:12:00	100	134	129	104	89	120	98	127	104	38	134	111
0:13:00	112	144	149	118	101	126	103	133	109	41	149	125
0:14:00	122	155	155	132	115	134	110	140	114	43	155	136
0:15:00	135	166	166	147	127	140	119	152	119	46	166	148
0:16:00	147	175	180	160	142	145	128	161	125	50	180	161
0:17:00	159	175	195	174	155	151	137	170	130	53	195	172
0:18:00	170	150	211	188	168	156	146	177	134	57	211	177

  
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Unit in meters

Figure A-1: Location of thermocouples inside the furnace

  
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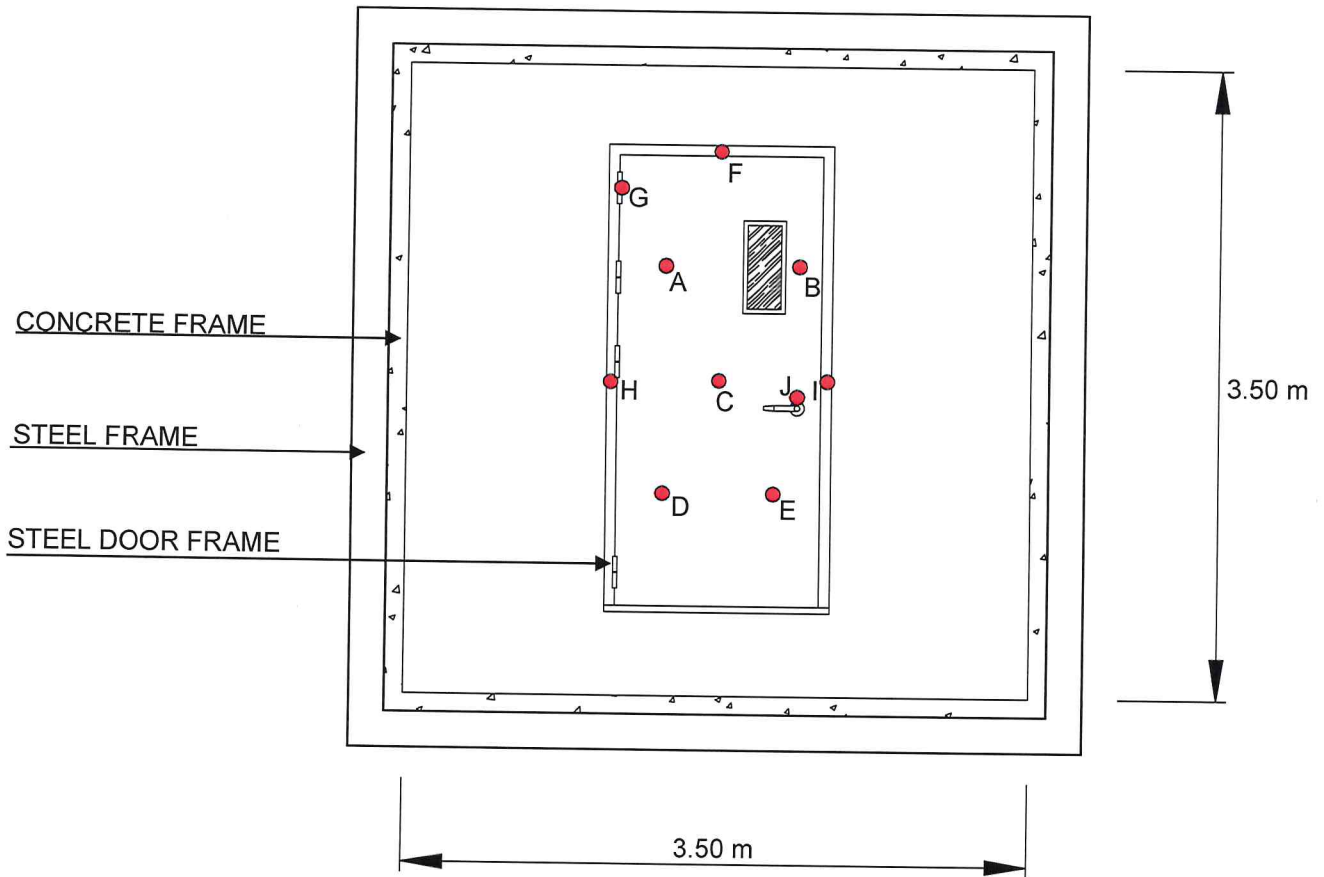
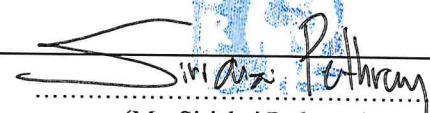
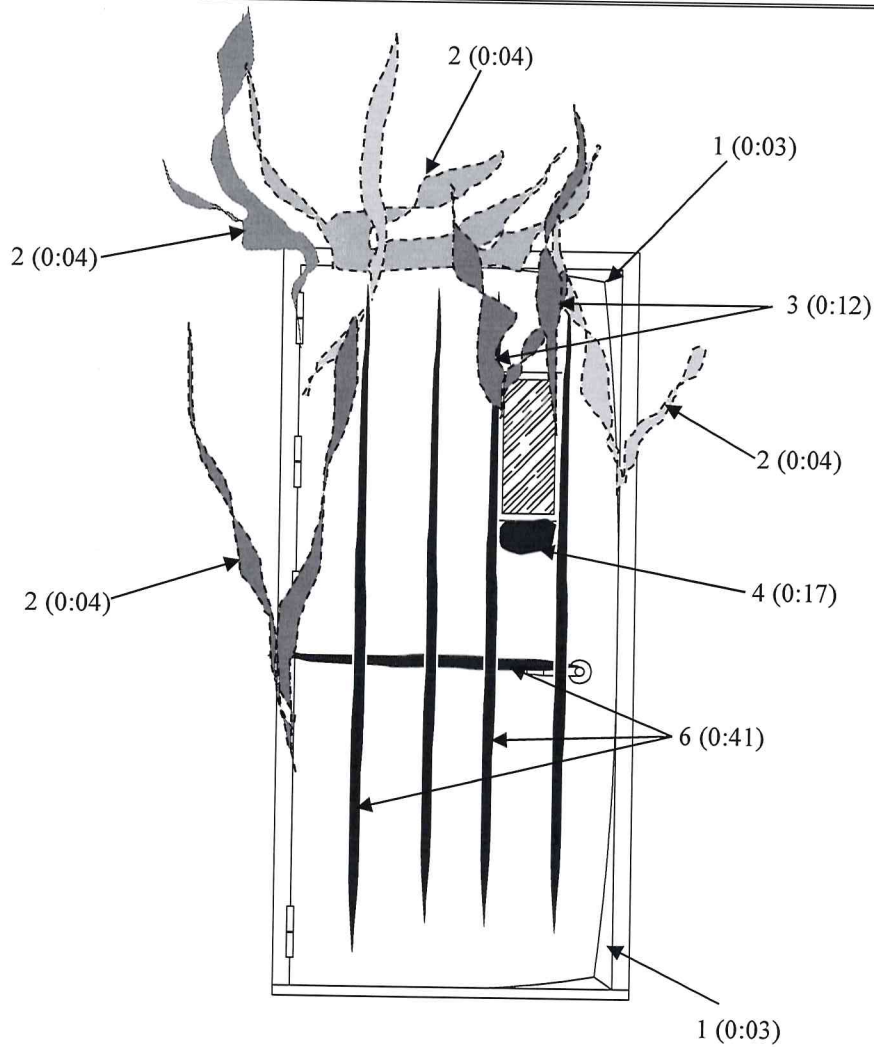



Figure A-2: Location of thermocouples on the specimen

  
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APPENDIX B: OBSERVATIONS

No.	Time (hr:min)	Observations
1	0:03	The door leaf deflected outward at the upper and lower right corners.
2	0:04	Smoke leaking from the upper edge and the side edges of the door.
3	0:12	Smoke leaking from the vision panel.
4	0:17	A dark area was observed on the unexposed face of the door.
5	0:30	No significant change was observed.
6	0:41	Multiple dark areas were observed on the unexposed face of the door.
7	1:00	No significant change was observed.
8	1:30	No significant change was observed.
9	2:00	No significant change was observed
10	2:30	No significant change was observed.
11	3:00	No significant change was observed.
12	3:45	No significant change was observed. The test was terminated by the client.



  
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APPENDIX C: DRAWINGS & DETAILS OF THE SPECIMEN

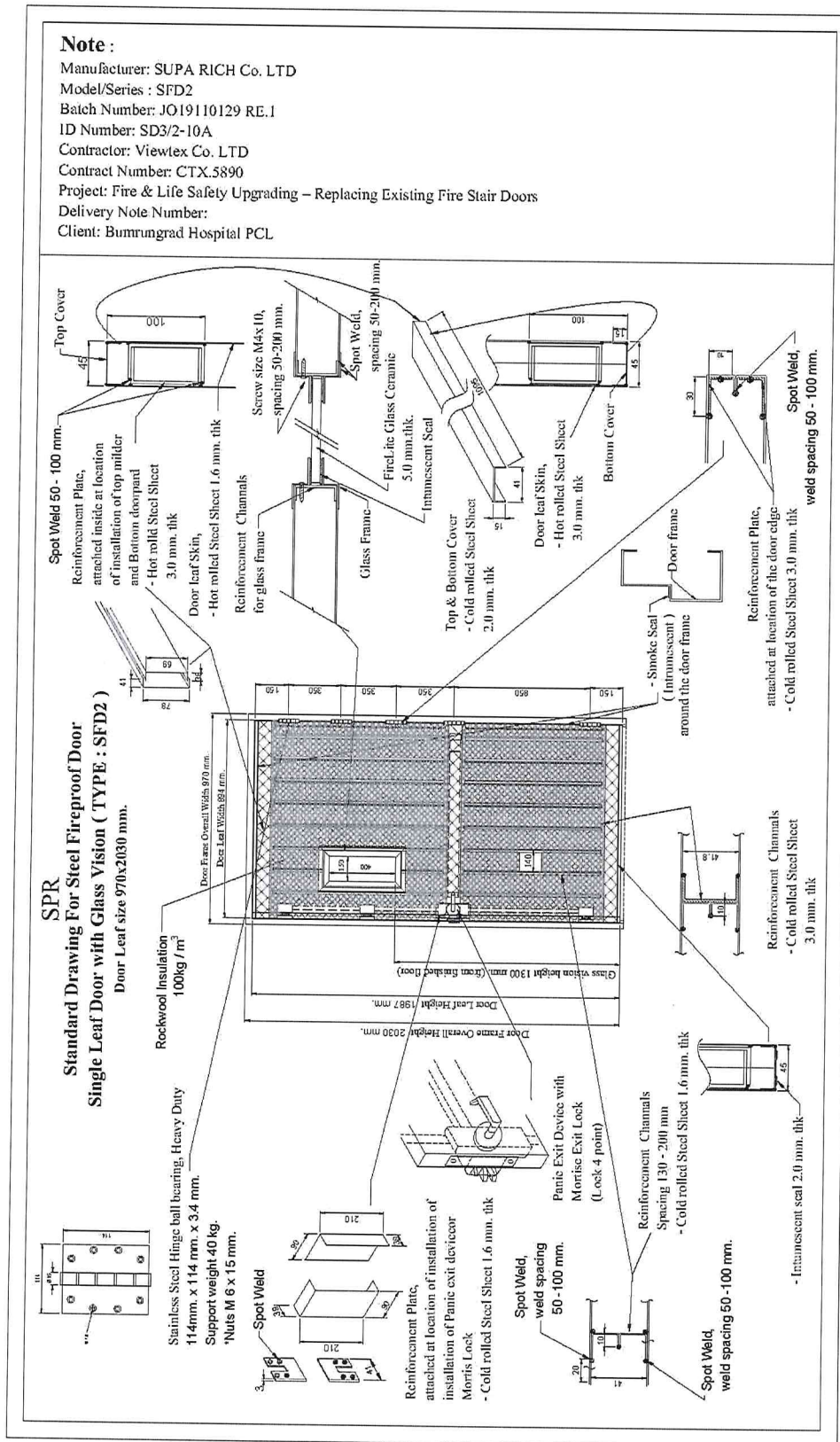



Figure C-1: Details of the specimen (as provided by the client)

  
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APPENDIX D: PHOTOGRAPHS

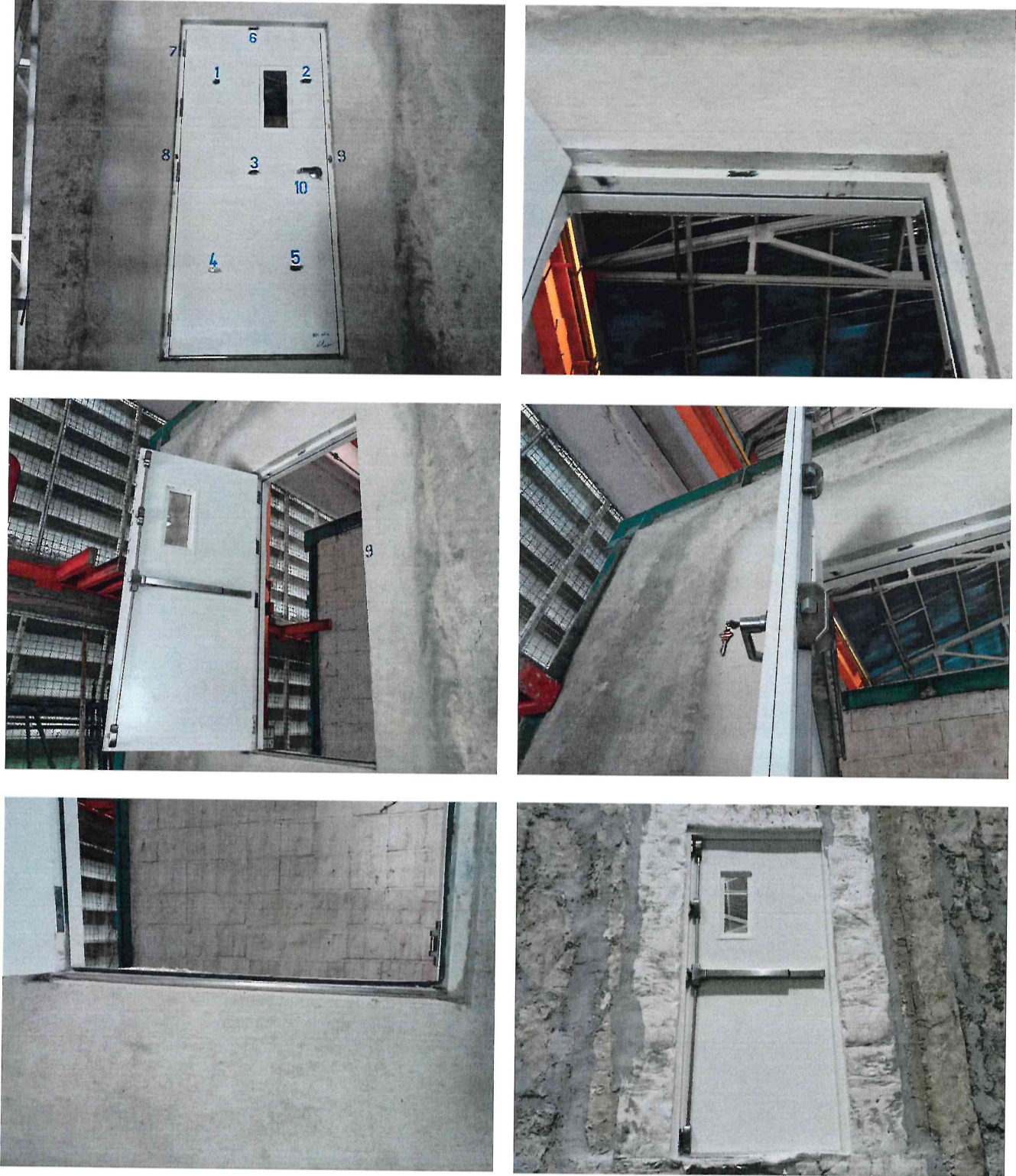



Figure D-1: Specimen preparation prior to the test

  
.....  
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( a ) 0:00 hr



( b ) 0:15 hr



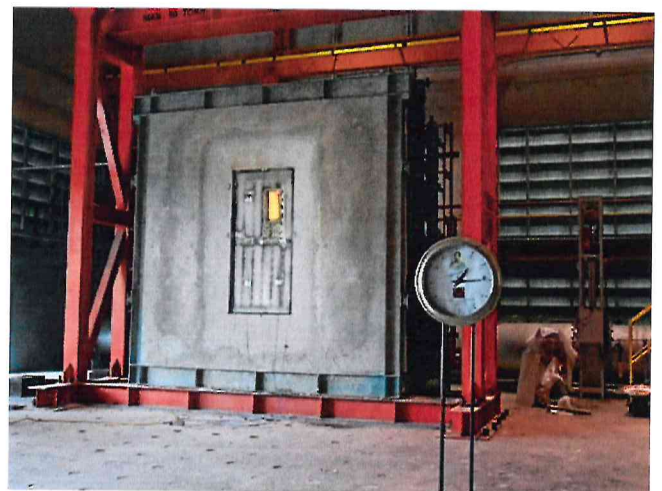
( c ) 0:30 hr



( d ) 0:45 hr




( e ) 1:00 hr



( f ) 1:15 hr

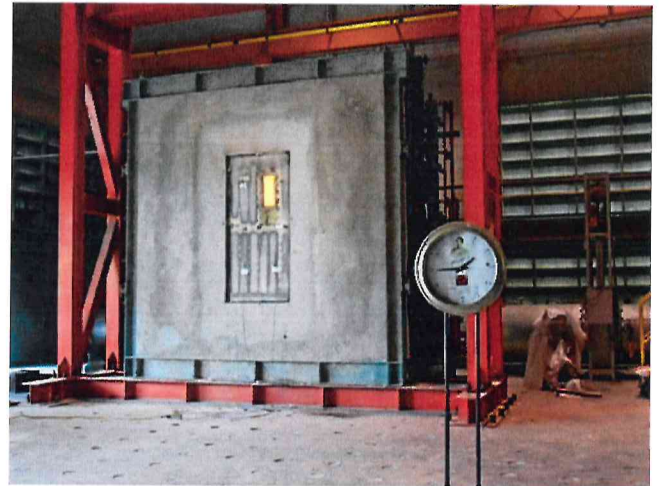
Figure D-2: The specimen during the test

  
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(g) 1:30 hr



(h) 1:45 hr



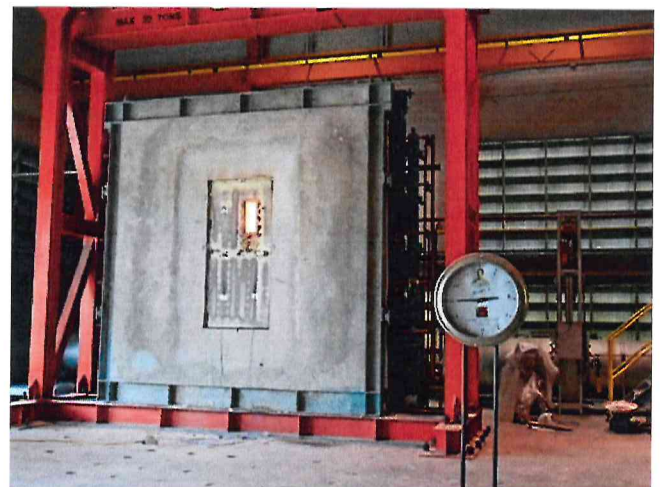
(i) 2:00 hr



(j) 2:15 hr




(k) 2:30 hr

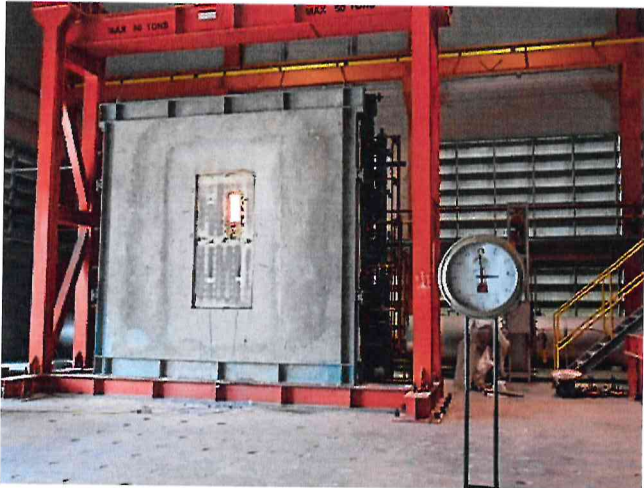


(l) 2:45 hr

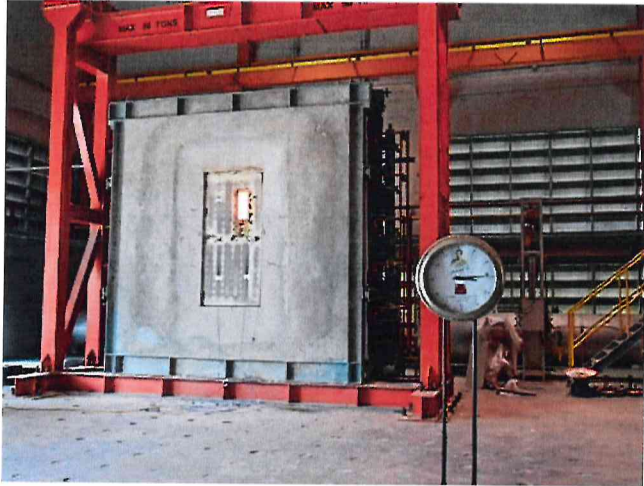
Figure D-2 (continued): The specimen during the test

  
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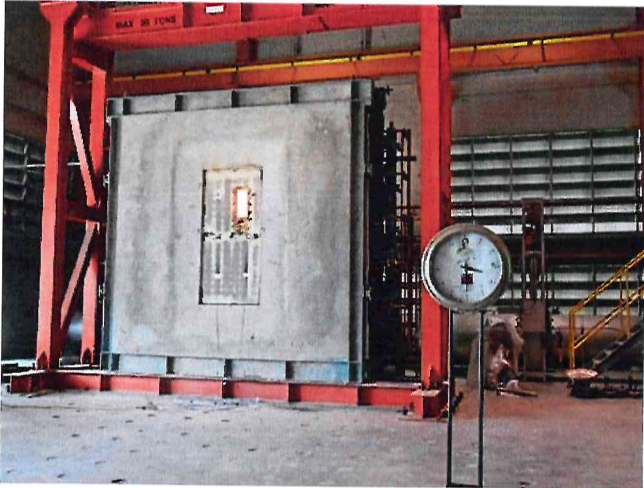




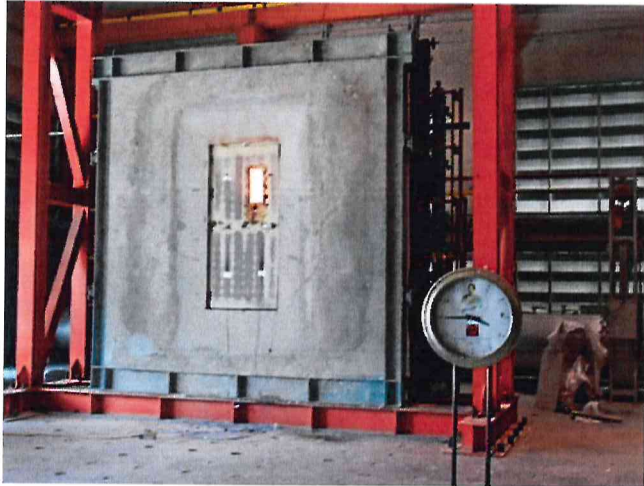
( m ) 3:00 hr



( n ) 3:15 hr

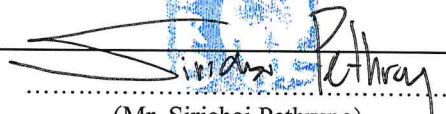


( o ) 3:30 hr



( p ) 3:45 hr

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

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



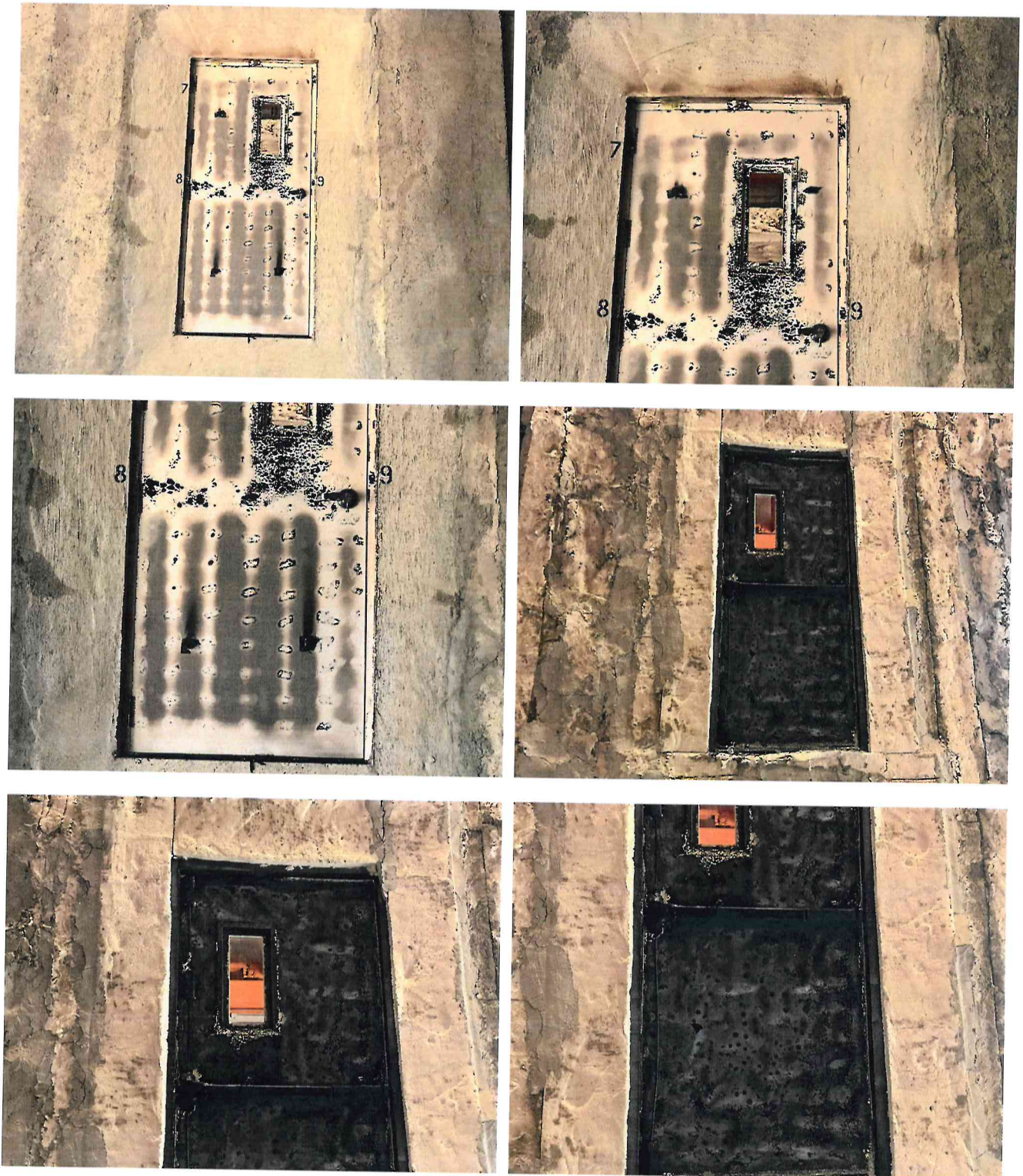



Figure D-3: The specimen after the test

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