



**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** : "SPR" Steel Fireproof Door with Glass Vision Size 1100x2000 mm
 The specimen is a doorset consisting of a single-sided steel door leaf with a fixed clear glass panel and a steel door frame. The dimensions of the door leaf are 2000 mm x 1100 mm x 45 mm. The door leaf has a fixed 1700 mm x 800 mm fire lite ceramic glass (5 mm) panel installed in the 150 mm-wide perimeter frame. The glass frame is constructed of 1.6-mm thick cold rolled steel sheet in-filled with rock wool with a density of 100 kg/m³. The specimen was mounted on a 15-cm thick reinforced concrete wall, which was installed on a 3 m x 3 m testing frame. The door leaf was locked with the door frame by a mortise lock (3-point lock) and 4 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.
 27 Ramintra Soi 48, Ramintra Road, Kannayao
 Kannayao, Bangkok 10230, Thailand
- DATE OF TEST** : November 13, 2019
- 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 8: Determination of the fire resistance of uninsulated 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
Integrity	3:00	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: November 27, 2019

Tested by:
 (Dr. Veerayut Komolvilas)

.....
 (Professor Dr. Thanyawat Pothisiri)

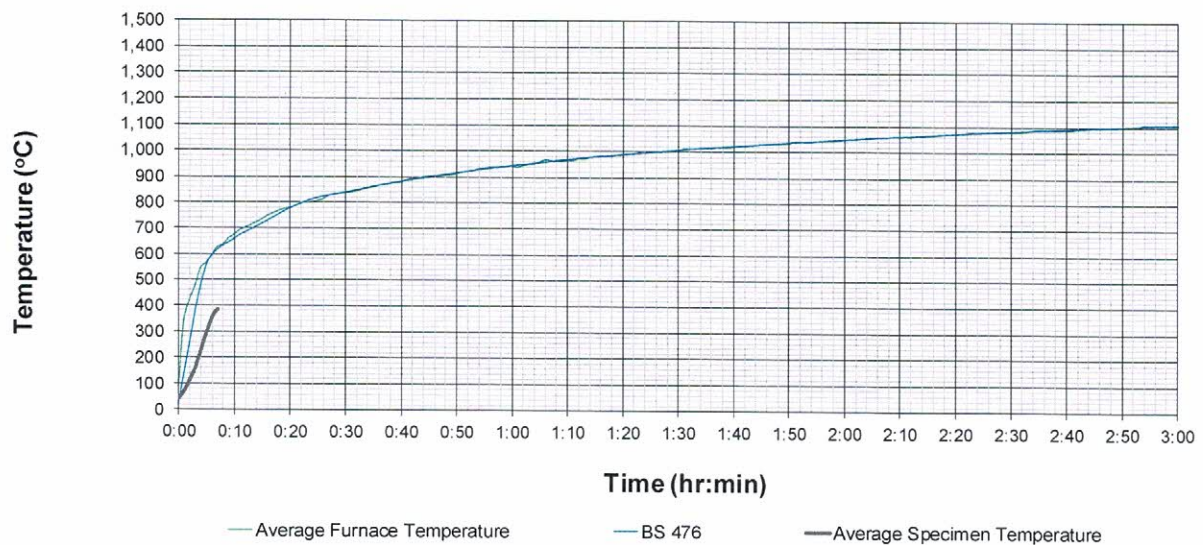
.....
 (Associate Prof. Dr. Tirawat Boonyatee)
 On Behalf of Head of Civil Engineering Department

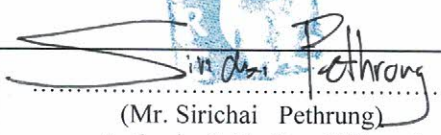


FACULTY OF ENGINEERING
CHULALONGKORN UNIVERSITY
FIRE SAFETY RESEARCH CENTER



FURNACE TEMPERATURE




(Mr. Sirichai Pethrung)
Authorized Testing Officer

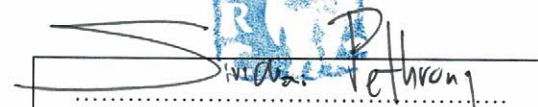
APPENDIX A: TEMPERATURE OF THE FURNACE AND THE SPECIMEN

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	115	76	59	88	85	51	103	98	86	84	0:00	20
0:01:00	283	353	282	335	454	119	368	432	422	339	0:05	556
0:02:00	345	433	508	391	501	287	397	492	435	421	0:10	659
0:03:00	399	493	548	437	531	444	442	510	473	475	0:15	718
0:04:00	542	560	544	530	566	468	537	603	550	544	0:20	781
0:05:00	571	613	537	561	584	473	573	615	570	566	0:25	821
0:06:00	615	656	564	597	606	504	603	632	595	597	0:30	842
0:07:00	659	675	601	640	639	538	629	659	599	627	0:35	865
0:08:00	672	691	586	656	647	544	645	668	623	637	0:40	885
0:09:00	696	710	613	676	667	566	666	695	652	660	0:45	902
0:10:00	706	722	629	691	687	585	678	698	665	673	0:50	918
0:11:00	726	737	649	707	703	616	701	723	673	693	0:55	932
0:12:00	742	749	661	723	713	633	709	726	658	702	1:00	945
0:13:00	753	752	658	733	723	627	721	741	693	711	1:05	957
0:14:00	762	765	675	746	734	646	734	751	698	723	1:10	968
0:15:00	772	780	686	757	741	661	745	759	708	734	1:15	979
0:16:00	783	785	705	768	762	684	755	773	730	750	1:20	988
0:17:00	792	794	710	776	764	684	771	788	750	759	1:25	997
0:18:00	800	801	729	785	773	704	779	794	757	769	1:30	1006
0:19:00	806	809	743	791	779	711	784	802	763	776	1:35	1014
0:20:00	815	814	750	795	785	725	789	809	759	782	1:40	1022
0:21:00	816	822	762	801	795	745	795	809	752	789	1:45	1029
0:22:00	821	827	773	808	799	737	802	820	800	798	1:50	1036
0:23:00	824	829	760	811	796	748	805	824	813	801	1:55	1043
0:24:00	827	831	774	812	801	749	809	828	800	803	2:00	1049
0:25:00	831	832	784	818	802	752	813	832	803	808	2:05	1055
0:26:00	837	841	790	822	813	763	818	836	813	815	2:10	1061
0:27:00	850	855	809	834	826	786	827	845	825	828	2:15	1067
0:28:00	853	857	825	838	828	783	834	849	834	833	2:20	1072
0:29:00	856	862	822	841	828	789	842	849	839	836	2:25	1077
0:30:00	856	863	819	842	829	786	842	858	845	838	2:30	1082
0:31:00	864	864	835	849	832	793	842	863	827	841	2:35	1087
0:32:00	868	866	829	853	842	797	848	867	850	846	2:40	1092
0:33:00	875	875	833	859	844	810	850	871	849	852	2:45	1097
0:34:00	877	876	851	865	850	815	856	878	856	858	2:50	1101
0:35:00	881	882	855	866	853	816	860	876	863	861	2:55	1106
0:36:00	886	887	853	872	861	825	867	884	877	868	3:00	1110
0:37:00	892	891	877	879	862	828	873	886	867	873		
0:38:00	898	896	860	881	867	832	872	893	867	874		
0:39:00	894	901	885	882	867	834	880	895	871	879		
0:40:00	900	896	874	886	869	835	880	899	878	880		
0:41:00	901	905	904	894	875	852	892	894	887	889		
0:42:00	912	906	892	898	883	856	891	910	907	895		
0:43:00	911	912	900	899	885	858	896	908	893	896		
0:44:00	916	916	899	903	888	858	900	920	909	901		
0:45:00	919	921	895	908	893	864	898	921	916	904		
0:46:00	923	919	903	911	895	865	903	923	906	905		
0:47:00	924	926	894	911	895	866	905	919	903	905		
0:48:00	925	923	899	911	895	869	905	925	920	908		
0:49:00	926	922	901	913	894	872	909	924	920	909		
0:50:00	933	924	909	919	900	870	914	935	912	913		
0:51:00	937	932	923	923	907	879	919	933	926	920		
0:52:00	938	938	916	926	909	883	919	939	924	921		
0:53:00	943	936	924	928	913	889	922	940	934	925		
0:54:00	948	944	923	934	926	894	927	953	939	932		
0:55:00	954	948	926	939	924	901	934	953	926	934		
0:56:00	953	953	930	940	925	904	938	952	946	938		
0:57:00	952	955	933	943	927	905	939	961	938	939		
0:58:00	953	952	937	945	929	903	937	958	943	940		
0:59:00	958	950	933	946	925	905	942	959	953	941		

(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	954	954	941	944	928	906	944	962	954	943
1:01:00	952	956	945	943	925	907	948	946	930	939
1:02:00	958	955	940	947	934	912	946	958	957	945
1:03:00	962	955	950	953	934	914	950	965	960	949
1:04:00	968	959	956	955	936	918	951	966	949	951
1:05:00	968	968	974	961	942	926	960	971	961	959
1:06:00	976	971	964	970	949	934	969	983	979	966
1:07:00	977	974	969	967	950	931	964	979	960	963
1:08:00	977	971	959	967	946	927	964	980	964	962
1:09:00	975	971	965	966	942	933	966	973	969	962
1:10:00	979	973	962	967	950	932	965	983	967	964
1:11:00	981	976	964	971	952	934	967	980	957	965
1:12:00	984	980	970	973	955	937	969	988	976	970
1:13:00	985	981	963	975	957	940	968	986	965	969
1:14:00	988	987	975	978	962	946	975	990	983	976
1:15:00	990	984	988	980	964	947	981	988	989	979
1:16:00	989	988	989	983	965	949	984	994	994	981
1:17:00	992	986	988	985	963	951	985	996	990	982
1:18:00	995	987	994	986	966	951	983	997	981	982
1:19:00	992	990	992	987	969	954	988	998	991	984
1:20:00	998	991	990	987	970	954	986	998	988	985
1:21:00	1003	999	991	991	974	960	984	1005	990	989
1:22:00	1005	1000	993	994	977	963	991	1005	996	991
1:23:00	1003	1006	996	996	977	967	995	1006	1006	995
1:24:00	1008	1005	993	996	980	966	990	1010	1001	994
1:25:00	1004	1002	1017	998	978	968	1003	1002	998	997
1:26:00	1009	1006	1008	997	979	972	998	1008	1007	998
1:27:00	1009	1004	1008	1001	982	971	997	1007	999	998
1:28:00	1013	1007	1006	1002	983	972	997	1009	1007	999
1:29:00	1014	1010	1004	1002	984	975	1002	1014	1013	1002
1:30:00	1018	1016	1010	1005	986	982	1002	1014	1013	1005
1:31:00	1022	1016	1022	1013	993	985	1008	1025	1017	1011
1:32:00	1019	1015	1026	1012	992	983	1017	1016	1011	1010
1:33:00	1022	1018	1016	1013	992	983	1012	1022	1015	1010
1:34:00	1016	1021	1021	1013	992	987	1018	1025	1012	1012
1:35:00	1022	1023	1025	1013	995	988	1014	1021	1017	1013
1:36:00	1024	1022	1021	1013	995	985	1014	1029	1015	1013
1:37:00	1025	1022	1022	1017	994	988	1015	1029	1025	1015
1:38:00	1027	1021	1025	1018	997	988	1016	1031	1019	1016
1:39:00	1026	1023	1022	1017	998	989	1016	1031	1017	1015
1:40:00	1025	1026	1042	1019	1000	998	1023	1022	1024	1020
1:41:00	1030	1028	1038	1022	1000	996	1023	1032	1025	1022
1:42:00	1035	1029	1036	1023	1007	999	1016	1037	1030	1023
1:43:00	1033	1030	1035	1024	1007	998	1024	1035	1030	1024
1:44:00	1034	1034	1030	1028	1009	1002	1028	1036	1031	1026
1:45:00	1034	1033	1047	1028	1007	1005	1031	1035	1036	1029
1:46:00	1040	1036	1044	1029	1006	1007	1026	1036	1031	1028
1:47:00	1040	1038	1051	1029	1009	1009	1031	1039	1033	1031
1:48:00	1043	1037	1048	1032	1011	1006	1029	1039	1030	1030
1:49:00	1039	1041	1056	1031	1009	1011	1032	1036	1034	1032
1:50:00	1039	1037	1055	1031	1010	1009	1035	1041	1029	1032
1:51:00	1047	1043	1063	1040	1018	1019	1039	1046	1041	1039
1:52:00	1044	1048	1065	1039	1019	1020	1044	1042	1042	1040
1:53:00	1050	1049	1041	1039	1021	1016	1036	1052	1042	1038
1:54:00	1043	1043	1054	1039	1018	1018	1045	1044	1034	1038
1:55:00	1045	1047	1062	1040	1017	1019	1046	1051	1046	1041
1:56:00	1047	1048	1063	1040	1019	1019	1044	1047	1043	1041
1:57:00	1050	1052	1064	1041	1018	1023	1044	1047	1049	1043
1:58:00	1052	1046	1063	1045	1021	1021	1045	1055	1041	1043
1:59:00	1052	1052	1059	1045	1023	1025	1045	1055	1055	1045



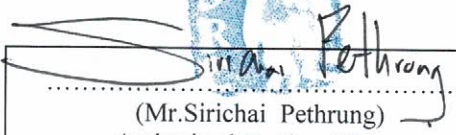

 (Mr. Sirichai Pethrung)
 Authorized Testing Officer

Time (hr:min:sec)	Furnace Temperature(°C)									
	P1	P2	P3	P4	P5	P6	P7	P8	P9	Average
2:00:00	1054	1054	1067	1045	1027	1026	1049	1056	1055	1048
2:01:00	1054	1054	1070	1046	1024	1029	1052	1053	1054	1048
2:02:00	1055	1061	1070	1047	1027	1029	1051	1053	1051	1049
2:03:00	1057	1057	1072	1049	1028	1030	1052	1054	1059	1051
2:04:00	1056	1063	1063	1048	1029	1032	1051	1060	1058	1051
2:05:00	1062	1060	1077	1052	1032	1034	1053	1058	1056	1054
2:06:00	1066	1066	1084	1054	1035	1038	1057	1063	1059	1058
2:07:00	1063	1067	1078	1051	1033	1037	1057	1063	1057	1056
2:08:00	1064	1063	1079	1056	1032	1037	1061	1064	1061	1058
2:09:00	1067	1063	1077	1057	1033	1038	1060	1067	1074	1059
2:10:00	1067	1067	1080	1057	1034	1039	1059	1066	1063	1059
2:11:00	1068	1067	1076	1057	1039	1037	1058	1070	1063	1059
2:12:00	1065	1069	1076	1058	1035	1037	1061	1067	1058	1058
2:13:00	1065	1069	1091	1059	1039	1044	1064	1064	1064	1062
2:14:00	1067	1072	1086	1060	1038	1046	1064	1067	1060	1062
2:15:00	1070	1074	1088	1060	1040	1046	1063	1068	1062	1064
2:16:00	1070	1077	1079	1059	1043	1045	1064	1076	1064	1064
2:17:00	1077	1077	1074	1063	1042	1047	1065	1076	1077	1066
2:18:00	1074	1077	1097	1065	1045	1049	1073	1073	1065	1069
2:19:00	1076	1081	1092	1064	1046	1052	1069	1075	1068	1069
2:20:00	1078	1080	1096	1068	1047	1053	1074	1080	1067	1071
2:21:00	1078	1085	1097	1069	1049	1054	1077	1075	1069	1072
2:22:00	1077	1083	1105	1069	1050	1057	1077	1073	1075	1074
2:23:00	1079	1089	1105	1070	1049	1060	1078	1077	1086	1077
2:24:00	1077	1079	1102	1073	1050	1058	1079	1078	1075	1075
2:25:00	1083	1078	1100	1074	1052	1058	1076	1084	1074	1076
2:26:00	1078	1085	1113	1074	1049	1060	1081	1074	1078	1077
2:27:00	1080	1090	1102	1072	1054	1059	1080	1082	1074	1077
2:28:00	1082	1081	1103	1075	1053	1060	1079	1082	1082	1077
2:29:00	1079	1090	1105	1072	1049	1062	1080	1083	1089	1079
2:30:00	1082	1086	1104	1073	1052	1063	1081	1082	1093	1080
2:31:00	1083	1089	1102	1076	1055	1062	1085	1084	1081	1079
2:32:00	1082	1091	1111	1075	1054	1063	1082	1079	1080	1080
2:33:00	1084	1093	1109	1077	1058	1067	1085	1087	1084	1083
2:34:00	1089	1097	1118	1081	1061	1071	1090	1087	1088	1087
2:35:00	1094	1098	1115	1084	1064	1071	1088	1093	1090	1088
2:36:00	1090	1099	1110	1084	1062	1072	1089	1095	1092	1088
2:37:00	1094	1100	1114	1084	1064	1074	1092	1090	1093	1089
2:38:00	1091	1096	1110	1083	1062	1072	1092	1092	1085	1087
2:39:00	1091	1094	1118	1085	1061	1072	1093	1093	1091	1089
2:40:00	1090	1100	1113	1083	1064	1072	1092	1093	1094	1089
2:41:00	1091	1096	1113	1084	1063	1074	1092	1093	1090	1088
2:42:00	1093	1102	1114	1087	1065	1076	1095	1098	1105	1093
2:43:00	1096	1104	1121	1087	1067	1078	1094	1095	1094	1093
2:44:00	1095	1102	1122	1088	1067	1076	1098	1096	1106	1094
2:45:00	1098	1102	1120	1088	1068	1079	1100	1096	1105	1095
2:46:00	1096	1108	1124	1088	1069	1081	1099	1099	1097	1095
2:47:00	1102	1105	1118	1089	1067	1079	1098	1103	1108	1097
2:48:00	1099	1107	1121	1090	1074	1079	1097	1103	1096	1096
2:49:00	1101	1108	1126	1090	1073	1082	1099	1101	1094	1097
2:50:00	1100	1110	1126	1092	1074	1083	1104	1101	1095	1098
2:51:00	1102	1110	1123	1093	1075	1085	1100	1108	1101	1100
2:52:00	1100	1110	1130	1094	1076	1084	1103	1102	1094	1099
2:53:00	1102	1114	1124	1093	1071	1085	1102	1103	1101	1100
2:54:00	1108	1120	1136	1098	1082	1092	1110	1115	1106	1107
2:55:00	1108	1115	1129	1100	1083	1089	1111	1113	1107	1106
2:56:00	1107	1117	1134	1101	1081	1092	1112	1110	1112	1107
2:57:00	1106	1118	1138	1101	1083	1091	1111	1112	1110	1108
2:58:00	1106	1115	1135	1101	1080	1093	1115	1110	1106	1107
2:59:00	1107	1117	1127	1101	1080	1090	1113	1115	1108	1106
3:00:00	1106	1115	1128	1100	1082	1089	1112	1111	1106	1105

(Mr.Sirichai Pethrung)
Authorized Testing Officer

Time (hr.min:sec)	Specimen Temperature(°C)															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Max. (A-N)	Average (A-E)
0:00:00	47	47	44	40	40	33	33	31	31	31	33	38	32	30	47	44
0:01:00	83	81	79	59	59	34	33	31	32	32	34	40	32	30	83	72
0:02:00	126	123	124	99	93	35	33	32	32	33	35	45	33	31	126	113
0:03:00	172	167	177	156	142	38	34	32	33	35	37	51	35	32	177	163
0:04:00	246	235	241	224	207	40	35	33	35	38	39	62	40	34	246	231
0:05:00	321	299	305	289	267	45	36	35	36	40	43	73	45	39	321	297
0:06:00	383	359	360	345	328	48	37	37	38	44	48	85	52	46	383	355
0:07:00	-	364	-	397	384	56	40	40	41	71	53	100	60	52	397	382
0:08:00	-	-	-	434	420	87	42	43	45	186	59	114	69	58	434	427
0:09:00	-	-	-	467	463	100	45	48	49	-	67	129	81	66	467	465
0:10:00	-	-	-	498	504	101	49	53	56	-	76	145	94	72	504	501

Note: The thermocouples were removed from the specimen after this point.


 (Mr. Sirichai Pethrung)
 Authorized Testing Officer

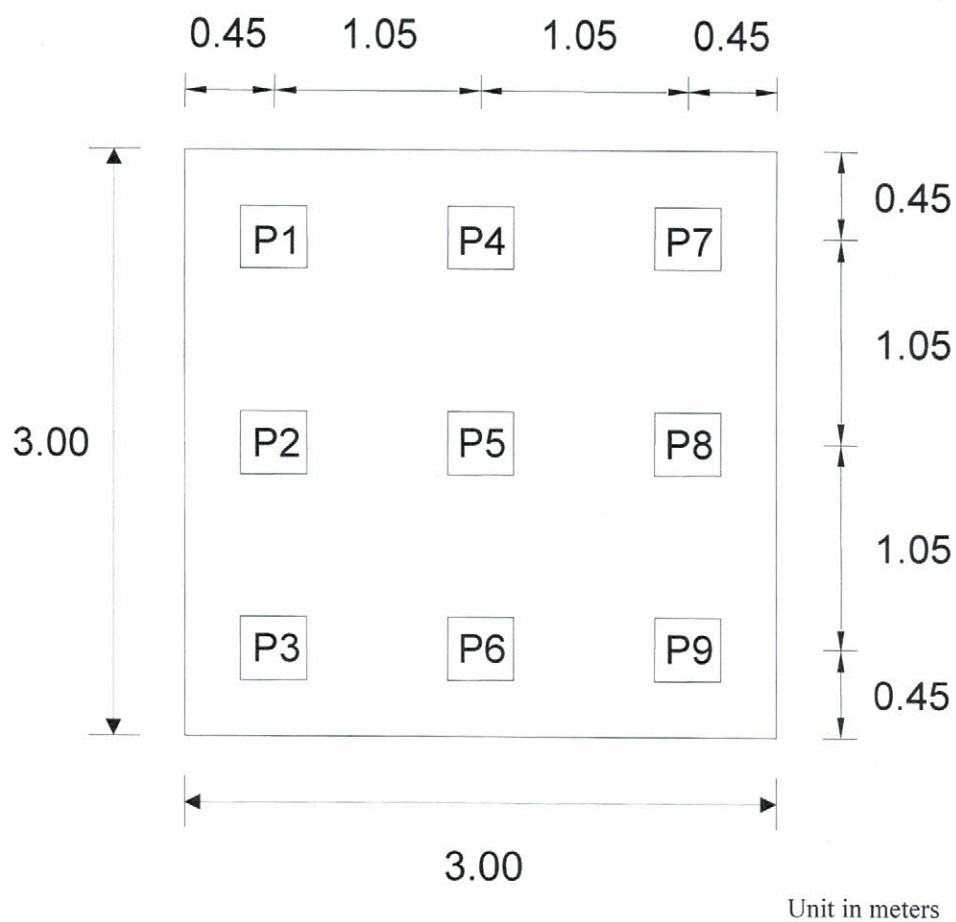
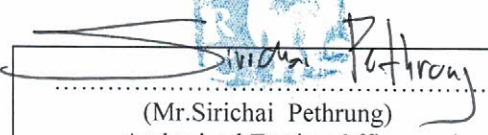


Figure A-1: Location of thermocouples inside the furnace


(Mr. Sirichai Pethrung)
Authorized Testing Officer

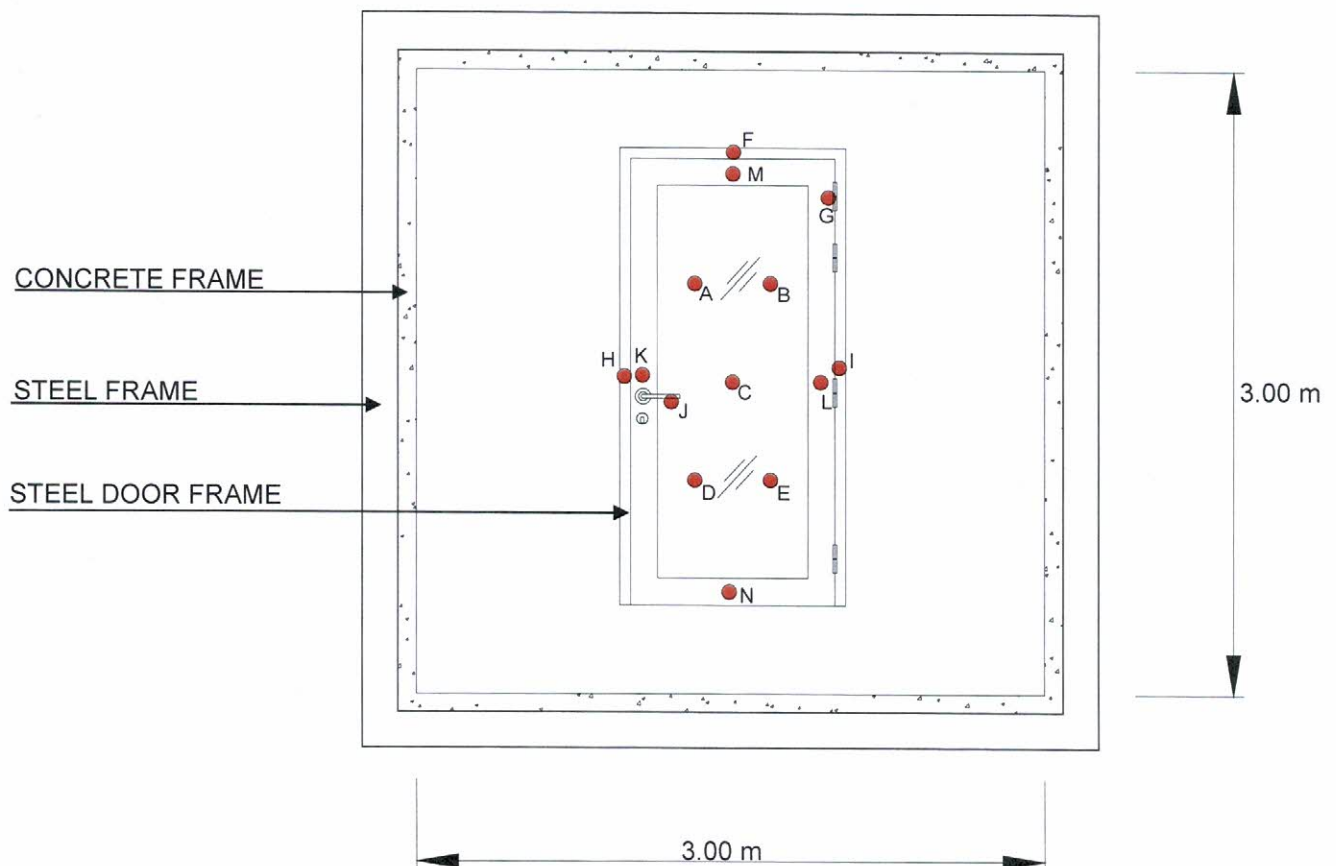
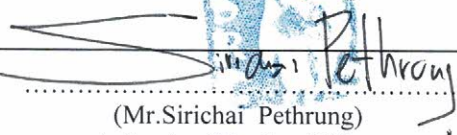
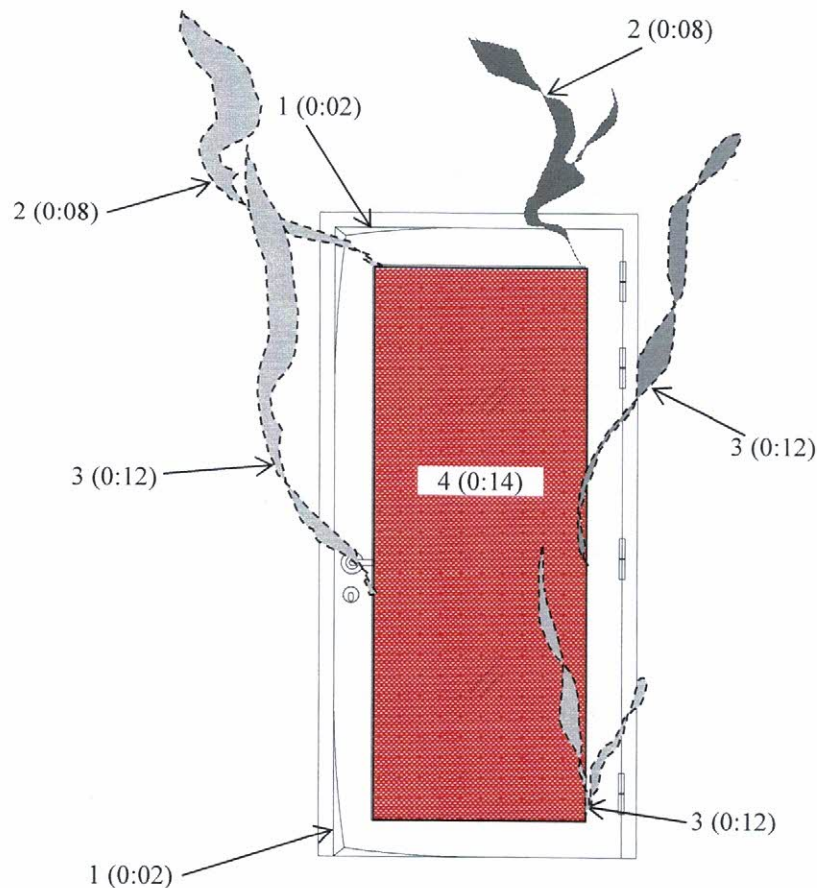


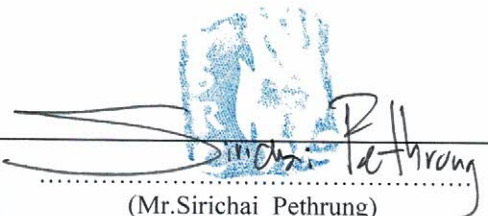
Figure A-2: Location of thermocouples on the specimen


(Mr. Sirichai Pethrung)
Authorized Testing Officer

APPENDIX B: OBSERVATIONS

No.	Time (hr:min)	Observations
1	0:02	The door leaf deflected outward at the upper and lower left corners.
2	0:08	Smoke leaking from the upper edge of the glass panel.
3	0:12	Smoke leaking from the side edges of the glass panel.
4	0:14	The glass panel turned red.
5	0:30	No significant change was observed.
6	1:00	No significant change was observed.
7	1:30	No significant change was observed.
8	2:00	No significant change was observed.
9	2:30	No significant change was observed.
10	3:00	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).




 (Mr. Sirichai Pethrung)
 Authorized Testing Officer

APPENDIX C: DRAWINGS & DETAILS OF THE SPECIMEN

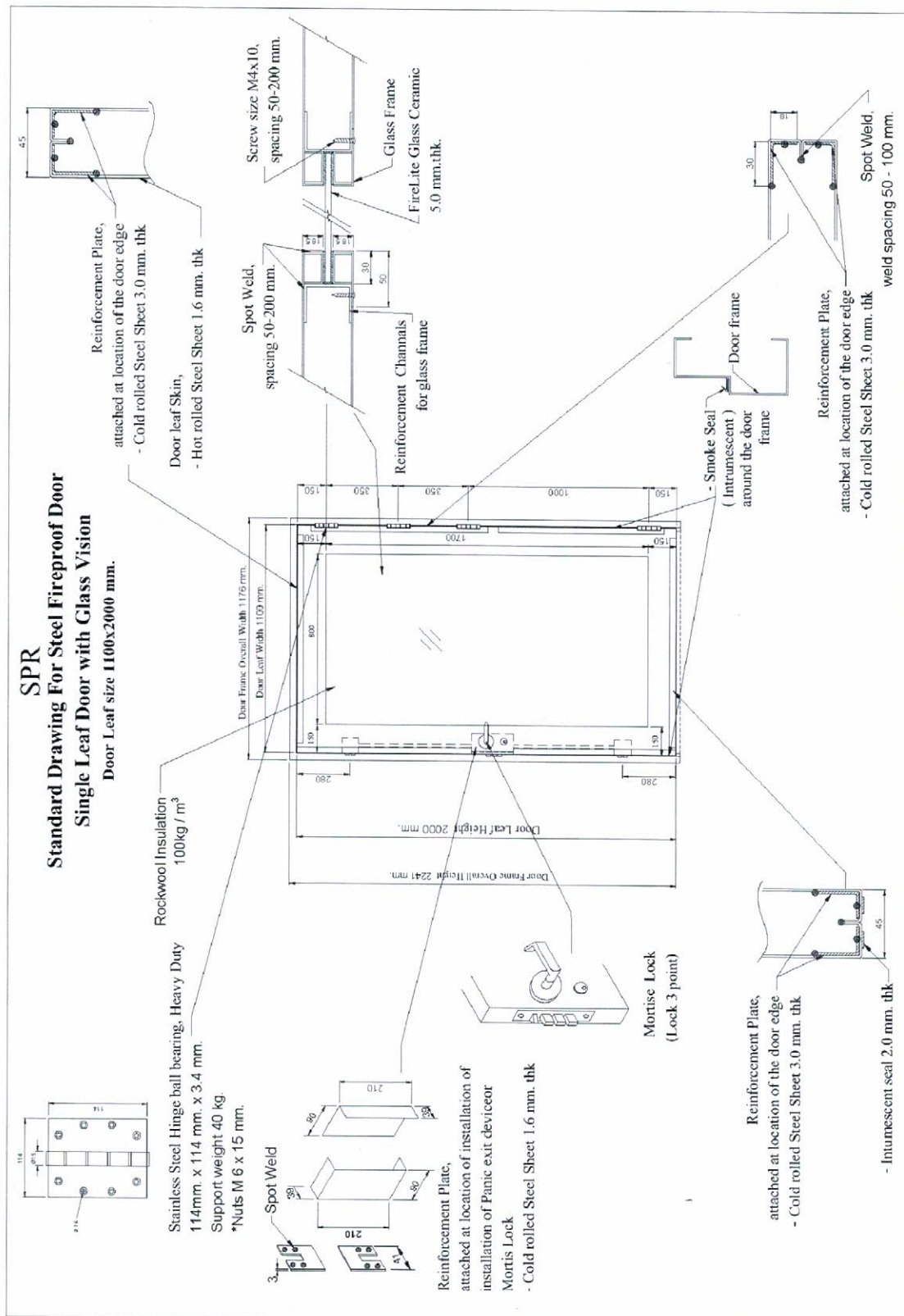


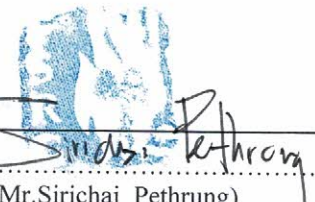
Figure C-1: Details of the specimen (as provided by the client)

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

APPENDIX D: PHOTOGRAPHS



Figure D-1: Specimen preparation prior to the test

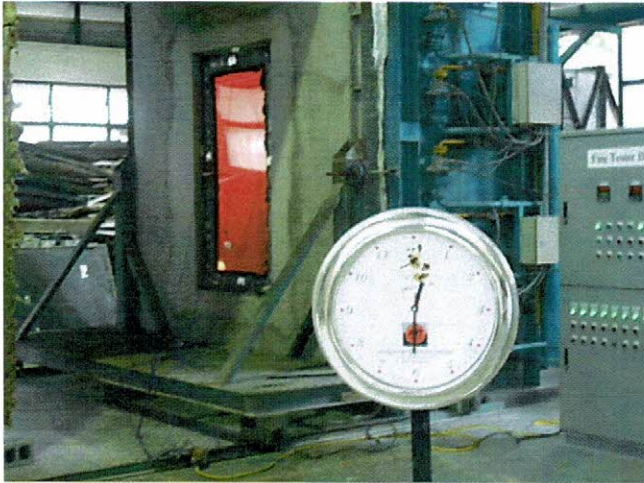

(Mr. Sirichai Pethrung)
Authorized Testing Officer



(a) 0:00 hr



(b) 0:15 hr



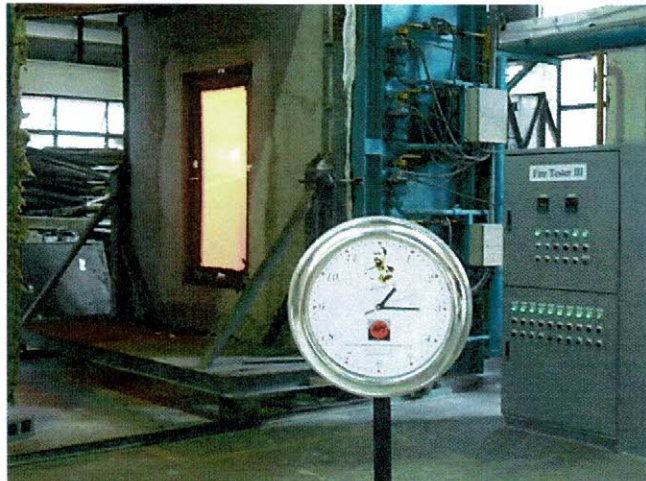
(c) 0:30 hr



(d) 0:45 hr



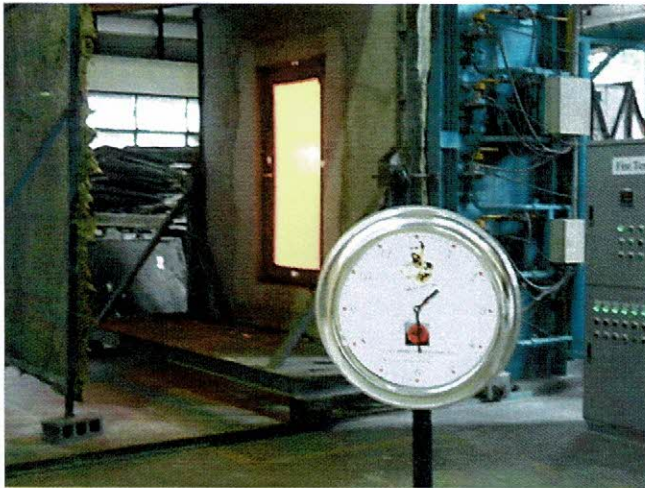
(e) 1:00 hr



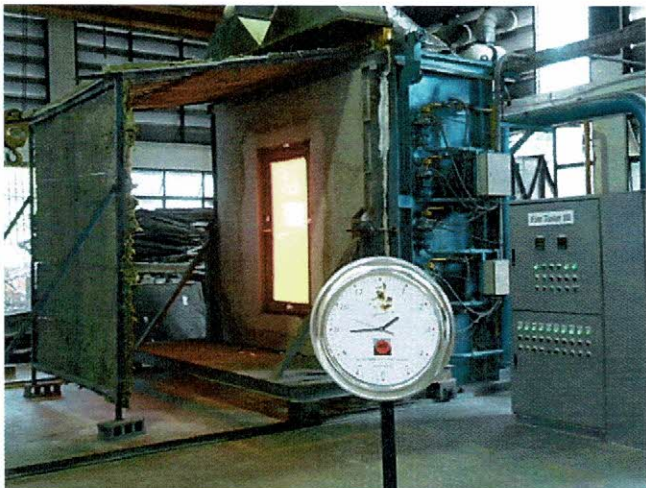
(f) 1:15 hr

Figure D-2: The specimen during the test

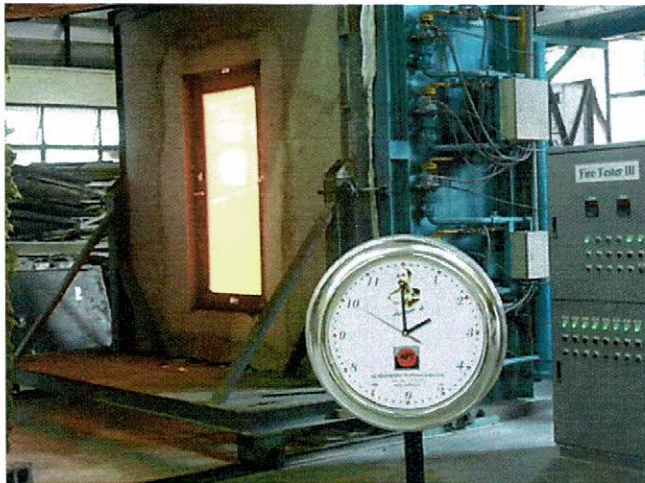

(Mr. Sirichai Pethrung)
Authorized Testing Officer



(g) 1:30 hr



(h) 1:45 hr



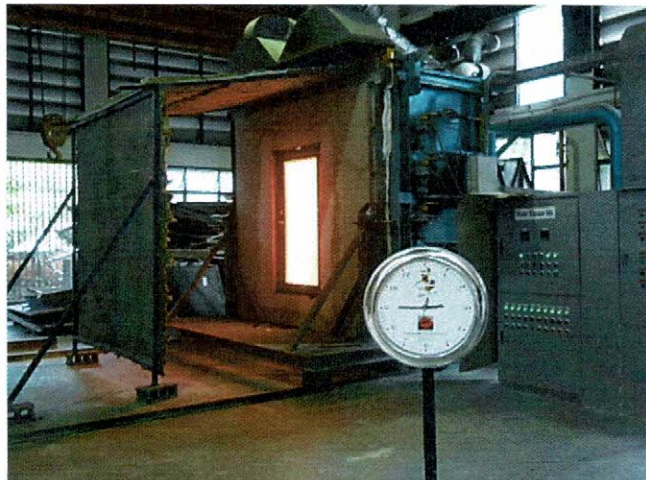
(i) 2:00 hr



(j) 2:15 hr



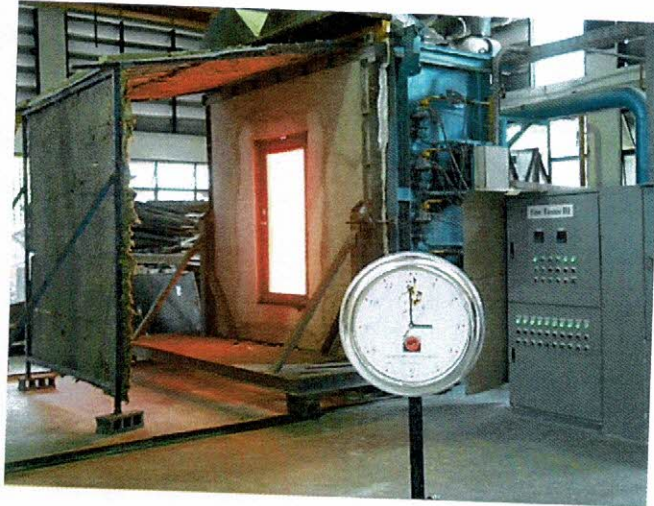
(k) 2:30 hr



(l) 2:45 hr

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


(Mr.Sirichai Pethrung)
Authorized Testing Officer



(m) 3:00 hr

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

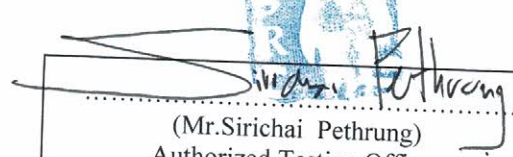

(Mr. Sirichai Pethrung)
Authorized Testing Officer



Figure D-3: The specimen after the test

6 R 100
Sirichai Pethrung

(Mr. Sirichai Pethrung)
Authorized Testing Officer