DEVELOPMENT TEST REPORT

Test Report No. SHL/16/2013-2014/6439/1374 **Date : 26.05.2014**

1.0	NAME AND ADDRESS OF THE CUSTOMER	SUNITI CONSTRUCTIONS 66/517, Maharashtra Housing Board, Maharshi Nagar, Pune – 411 037
2.0	CUSTOMER LETTER REF.	Email Dated 27th Feb 2014
3.0	DESCRIPTION OF TEST COMPONENTS:	Fire Resistance test of Metal Fire Door as per BS 476 part 20 & 22 for 120 minute rating as per Specification sheet of Suniti Constructions attached.
4.0	OBJECTIVE:	To carry out Fire resistance test on Metal Fire Door for 120 min duration as per BS 476 (part 20 & 22) for insulation, integrity as per customer request.
5.0	OBSERVATIONS:	Refer Clause 8.0
6.0	RESULTS :	Refer Clause 9.0

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7.0 TEST DESCRIPTION :

7.1 The fire resistance test was carried out in a diesel fired furnace of size 2.6 m (H) x 2.4 m (W) x 3.5 m (D) with a bogie door. The Door was mounted on a concrete frame and the concrete frame was mounted on to the bogie with the door opening outside the furnace.

7.2 Nine thermocouples were placed at a distance of 100 mm from the exposed side of the Door, uniformly distributed. Fig. 1 shows schematic of the thermocouples mounted in the furnace. (Refer Photograph 1)

7.3 Five surface thermocouples of 'K' type were placed on the Un-exposed side of the Door, one being at the center of the Door, four at the center of each quarter section of the Door. Fig. 2 shows schematic of the thermocouples mounted in the furnace. (Refer Photograph 2)

7.4 ARAI make 96 Channel Temperature logger was used for recording the temperature variations of all the thermocouples. The furnace temperature was controlled according to the standard heating conditions specified in Clause 3 of BS 476 (Part 20): 1987.

7.5 The fire resistance test was evaluated on 13th May 2014.

7.6 Deviation from the test procedure:

7.6.1 The Furnace is Diesel Fired Furnace. Refer Clause 6.1.5 of BS 476 (part 20): 1987.

7.6.2 The depth of ARAI furnace is 3.5 m. Refer Clause 6.1.3 of BS 476 (part 20): 1987.

7.6.3 The pressure inside the furnace was not recorded during the test Refer Clause 3.2 of BS 476 (part 20): 1987.

8.0 TEST OBSERVATIONS:

8.1 Fig. 3 compares the requirement of the standard Vs. achieved time temperature plot.

8.2 Fig. 4 shows the time temperature plot of the thermocouples mounted on the door.

8.3 The maximum temperature on the un-exposed face recorded was 291°C at LOC 02 at the end of 120 minutes.

8.4 The maximum average temperature on the un-exposed face recorded was 243°C at the end of 120 minutes.

8.5 The cotton pad did not ignite for the entire test duration of 120 minutes except the cotton pad charred at the sill level at the end of 45 minutes.

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8.6 No Flaming was observed for the entire test duration of 120 minutes.

8.7 Photos 3 & 4 show the condition of the exposed & Un-exposed side of the Door after the test respectively.

8.8 For the last 8 minutes an additional thermocouple was placed at a distance of 1 meter from the glass as per customer request.

9.0 RESULTS:

	Criteria	Requirement	Observations
9.1	Insulation	The mean Un-exposed face temperature shall not increase by more than 140 °C above its initial value.	The maximum average temperature on the un-exposed face recorded was 279°C at the end of 110 min.
		The Un-exposed face temperature of any fixed thermocouple at any point shall not increase by more than 180 °C above its initial value.	The maximum temperature on the un-exposed face recorded was 328°C at LOC 02 at the end of 110 min.
		Integrity requirements shall comply	Refer Integrity Criteria (9.2)
9.2	Integrity	6 mm diameter gap gauge shall not penetrate a through gap such that the end of the gauge projects into the furnace and the gauge be moved in the gap for a distance of at least 150 mm.	6 mm diameter gap gauge did not penetrate for the entire test duration of 120 minutes
		25 mm diameter gap gauge shall not penetrate a through gap such that the end of the gauge projects into the furnace	25 mm diameter gap gauge did not penetrate for the entire test duration of 120 minutes
		Sustained flaming shall not occur (Flaming that is visible with the naked eye and that remains visible for an uninterrupted period of not less than 10s)	No Flaming was observed for entire test duration of 120 minutes
		Flames of hot gases shall not ignite the cotton pad	The cotton pad did not ignite for the entire test duration of 120 minutes except the cotton pad charred at the sill level at the end of 45 minutes.

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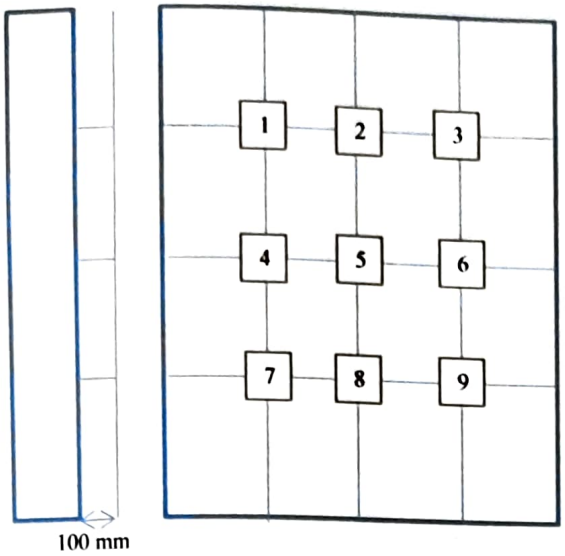

Fig 1: Schematic of the thermocouples mounted in the furnace

Photograph 1: Photograph of the thermocouples mounted in the furnace

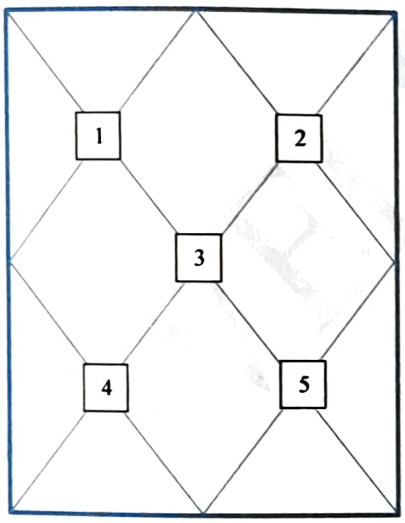

Fig 2: Schematic of the thermocouples mounted on the specimen

Photograph 2: Photograph of the thermocouples mounted on the Door

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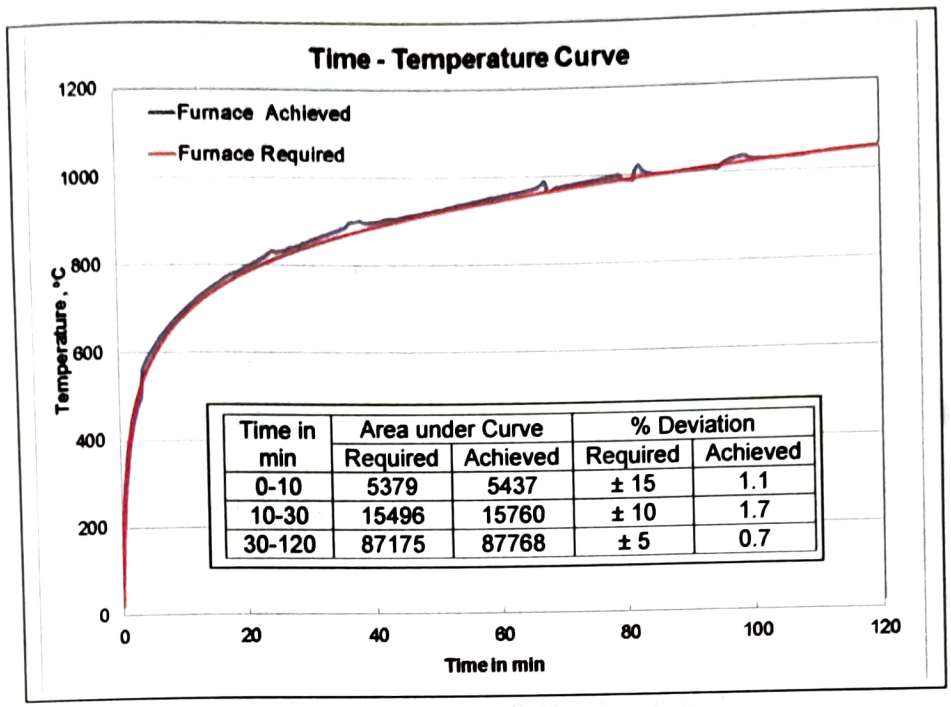

Time in min	Area under Curve		% Deviation	
	Required	Achieved	Required	Achieved
0-10	5379	5437	± 15	1.1
10-30	15496	15760	± 10	1.7
30-120	87175	87768	± 5	0.7

Fig 3: Time-Temperature Curve for furnace

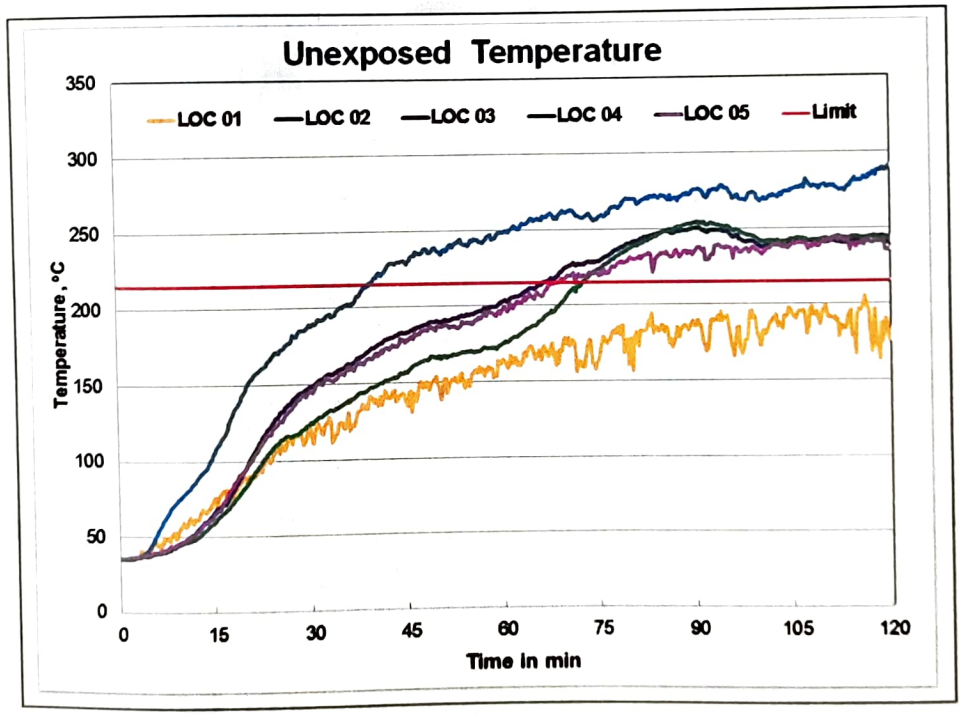

Fig 4: Time-Temperature Curve on the un-exposed side of the Dry wall System

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Photograph 3: Photograph of Exposed Side of Door

Photograph 4: Photograph of Un-exposed Side of Door

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Data of the unexposed face at 5 min interval for the test duration of 120 minutes

Time, min	Un-exposed temperature, °C						Furnace Temp, °C
	Loc 1	Loc 2	Loc 3	Loc 4	Loc 5	Average	
0	27	26	26	26	27	26	27
5	27	27	27	27	29	27	528
10	30	30	29	29	30	30	653
15	40	42	38	37	32	38	740
20	59	59	53	51	39	52	783
25	71	71	65	64	46	63	816
30	78	75	72	72	51	69	849
35	81	78	76	76	52	72	871
40	81	80	81	79	59	76	887
45	81	81	83	82	63	78	905
50	84	81	83	83	64	79	923
55	84	79	83	83	60	78	941
60	83	82	83	83	62	78	948
65	83	83	85	82	61	79	958
70	88	89	96	85	69	85	970
75	94	97	97	94	81	93	986
80	101	96	100	99	75	94	990
85	98	100	107	100	87	98	1002
90	99	110	118	106	72	101	1007
95	108	138	168	131	74	124	1017
100	129	191	202	168	103	159	1025
105	186	255	253	205	191	218	1039
110	243	328	317	257	249	279	1039

Data of the thermocouple placed at 1 meter from the glass for the last 8 minutes

Time	Temperature	Time	Temperature	Time	Temperature
112.00	40	114.75	54	117.50	47
112.25	40	115.00	50	117.75	46
112.50	43	115.25	49	118.00	46
112.75	42	115.50	48	118.25	46
113.00	44	115.75	48	118.50	46
113.25	45	116.00	47	118.75	46
113.50	46	116.25	47	119.00	46
113.75	46	116.50	47	119.25	46
114.00	48	116.75	47	119.50	47
114.25	57	117.00	47	119.75	47
114.50	57	117.25	47	120.00	46

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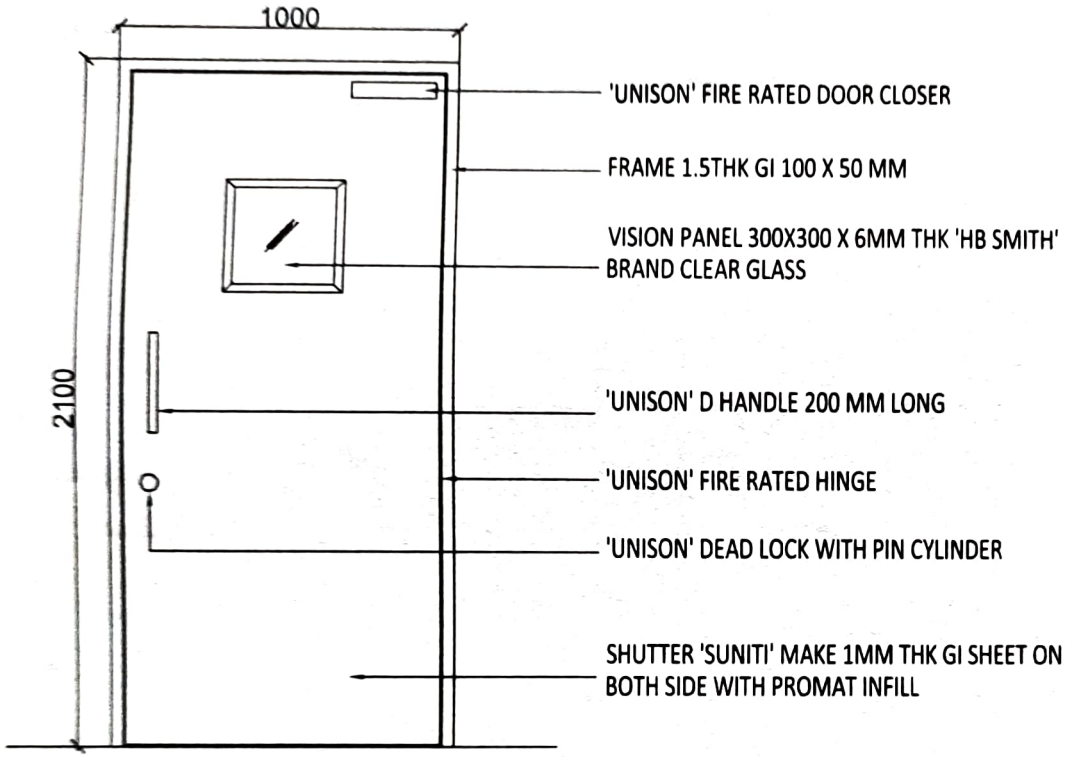
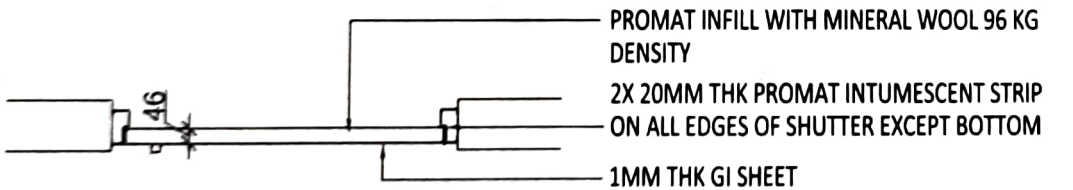


FRONT ELEVATION



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SUNITI MAKE 2 HOURS METAL FIRE DOOR

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