

UL 263

STANDARD FOR SAFETY

FIRE TESTS
OF BUILDING
CONSTRUCTION
AND MATERIALS



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555 FIFTH STREET ROAD - NORTHBROOK, ILLINOIS 60062-2006

an independent, not-for-profit organization testing for public safety

February 8, 1989

Dow Chemical, U.S.A.
Mr. Phillip D. Hendrickson
3825 Columbus Road, S.W.
P. O. Box 515
Granville, OH 43023

Our Reference: R7721, 88NK14412

Subject: Results of A Preliminary Small-Scale
Vertical Fire Test

Dear Mr. Hendrickson:

The following is a Letter Report summarizing the construction details and results of one preliminary small-scale vertical fire test conducted in accordance with the fire exposure conditions described in the Standard, Fire Test of Building Construction and Materials, ANSI/UL 263. The small-scale furnace was fired in a similar manner as the full-scale furnace; the sample was smaller than what is required under the Standard ANSI/UL 263. The sample was submitted by Composite Technologies Inc. and is described in the proceeding section of this report entitled "Materials and Construction of Test Assembly."

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MATERIALS AND CONSTRUCTION OF TEST ASSEMBLY:

The test assembly consisted of a 2 in. layer of concrete followed by a 2 in. layer of styrofoam manufactured by Dow Chemical and then a 5-1/2 in. thick section of concrete. The insulation was held in place between the two layers of concrete with supporting anchors installed through the insulation penetrating both layers of concrete and as shown on ILL. 1.

Look For The  Listing or Classification Mark On The Product

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After receiving the sample at UL and prior to the installation within the test frame, the moisture content of the concrete sample was monitored until a relative humidity of 75 percent or lower was achieved. The sample was force cured in a curing cell designed for such purpose for 61 days at an average temperature of 120°F and relative humidity between 20 to 40 percent. At the time the sample was installed within the test frame the relative humidity of the concrete was 65 percent.

T E S T R E C O R D

TEST DATE: JANUARY 13, 1989

FIRE EXPOSURE TEST:

The fire exposure test was conducted with the furnace temperature controlled in accordance with the Standard Fire Tests of Building Construction and Materials, ANSI/UL 263.

SAMPLE

The fire test was conducted on the test assembly constructed as described previously in this report under the section entitled "Materials and Constructions of Test Assembly" and as shown on ILL. 1.

METHOD

The furnace temperatures were adjusted to follow the standard time-temperature curve as specified in the Standard ANSI/UL 263. These temperatures were measured by means of four thermocouples symmetrically located 6 in. from the exposed surface of the assembly and as shown on ILL. 2.

RESULTS

Character and Distribution of Fire - The furnace fire was luminous and well distributed, and the furnace temperatures followed the Standard time-temperature curve as outlined in the Standard ANSI/UL 263 and as shown on ILL. 2.

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Observations During the Test - The unexposed surface steamed around the edge and through the lifting holes at the top of the assembly. No cracking was evident during the 240 min. fire exposure. The exposed side showed no signs of cracking or separation from the unexposed surface during the test.

Temperatures of the Assembly - The temperatures within the cavity of the wall assembly and the unexposed surface of the assembly were measured by 12 thermocouples located as shown on ILL. 1. The unexposed surface thermocouples were covered with 6 by 6 by 0.4 in. thick dry ceramic fiber pads. The temperatures that developed during the fire test are shown in Appendix A, Pages 1 through 8.

Hose Stream - After the 240 min. fire exposure, the test sample was subjected to a hose stream test in accordance with the Standard ANSI/UL 263. The hose stream was conducted for 45 s at 45 psi. No projection of water beyond the unexposed surface was observed during the time of the hose stream test.

S U M M A R Y

The average and maximum limiting temperatures were not reached during the 240 min fire exposure. The maximum and average temperatures recorded at 240 min were 118.7 and 106.2, respectively, and as shown in Appendix A, Pages 7 and 8.

This concludes our work anticipated under Project 88NK14412, R7721; by copy of this Letter Report we have instructed our Progress Department to terminate same. Our Accounting Department will invoice you for charges incurred in the usual manner.

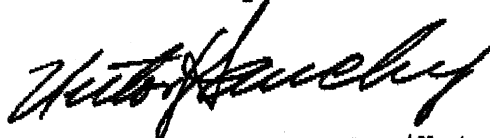
If we can be of any further assistance, please feel free to contact us.

Very truly yours,



ROBERT K. JENSEN (Ext. 3332)
Senior Laboratory Assistant
Fire Protection Department

Reviewed by:



NESTOR G. SANCHEZ (Ext. 2590)
Engineering Team Leader
Fire Protection Department

RKJ:sf
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DOW CHEMICAL USA
VERTICAL SMALL-SCALE
88NK14412/R7721
JANUARY 13, 1989

UNEXPOSED SURFACE

CHAN(NOS.) TIME MIN.	1	2	3	4
0: 0	68.7	68.7	68.4	68.5
5: 0	68.4	68.5	68.1	68.3
10: 0	68.8	68.8	68.5	68.6
15: 0	69.0	68.9	68.7	68.8
20: 0	69.1	69.0	68.8	68.8
25: 0	69.2	69.1	68.8	68.9
30: 0	69.3	69.2	68.9	69.0
35: 0	69.3	69.2	69.0	69.0
40: 0	69.4	69.3	69.0	69.1
45: 0	69.2	69.3	68.8	68.9
50: 0	69.6	69.5	69.1	69.1
55: 0	70.0	70.0	69.3	69.4
60: 0	71.2	70.9	70.3	70.2
65: 0	72.4	71.5	70.3	70.9
70: 0	74.0	72.6	69.9	70.6
75: 0	76.1	74.3	71.4	70.7
80: 0	78.0	75.9	71.3	71.2
85: 0	79.6	77.1	70.8	71.0
90: 0	81.4	78.7	71.7	72.0
95: 0	82.9	79.9	72.1	72.2
100: 0	84.4	81.1	72.5	72.4
105: 0	88.3	81.7	72.3	72.4
110: 0	90.4	82.4	72.5	72.9
115: 0	89.4	83.2	72.5	73.1
120: 0	90.1	84.0	72.7	73.0
125: 0	91.3	84.9	73.1	73.2
130: 0	92.8	85.8	73.4	73.9
135: 0	93.7	86.7	73.8	74.3
140: 0	94.4	87.4	73.8	74.5
145: 0	94.9	88.0	74.2	74.7
150: 0	95.1	88.5	74.6	75.1
155: 0	95.1	88.9	74.9	75.5
160: 0	94.7	89.4	75.5	75.9
165: 0	93.8	89.8	75.9	76.2
170: 0	92.6	90.1	76.6	76.5
175: 0	91.6	90.5	77.7	76.9

RKJ:: 1/13/89

DOW CHEMICAL USA
VERTICAL SMALL-SCALE
88NK14412/R7721
JANUARY 13, 1989

UNEXPOSED SURFACE

CHAN(NOS.)	1	2	3	4
TIME MIN.				
180: 0	91.1	90.9	79.2	77.5
185: 0	90.5	91.3	80.9	77.8
190: 0	90.8	91.5	83.0	78.3
195: 0	91.7	91.7	85.3	78.7
200: 0	92.7	92.0	88.1	79.4
205: 0	93.8	92.3	90.9	79.9
210: 0	95.3	92.7	94.4	80.7
215: 0	97.1	93.4	98.0	81.8
220: 0	99.0	94.5	101.7	83.2
225: 0	100.9	95.6	105.2	84.6
230: 0	103.2	97.5	109.6	87.1
235: 0	105.1	99.3	113.6	89.4
240: 0	108.3	102.2	118.7	92.5

RKJ:: 1/13/89

DOW CHEMICAL USA
VERTICAL SMALL-SCALE
88NK14412/R7721
JANUARY 13, 1989

CHAN(NOS.) TIME MIN.	UNEXPOSED SURFACE		
	5	6	7
0: 0	68.4	68.8	68.8
5: 0	68.2	68.4	68.4
10: 0	68.5	68.8	68.8
15: 0	68.6	69.0	68.9
20: 0	68.8	69.2	69.0
25: 0	68.8	69.2	69.1
30: 0	68.8	69.3	69.2
35: 0	68.9	69.3	69.2
40: 0	69.0	69.4	69.3
45: 0	68.9	69.3	69.3
50: 0	69.1	69.6	69.5
55: 0	69.3	69.8	69.6
60: 0	69.9	70.9	70.2
65: 0	70.9	73.4	71.0
70: 0	71.1	79.3	72.0
75: 0	72.6	88.1	73.0
80: 0	73.7	95.3	74.6
85: 0	74.3	99.9	76.2
90: 0	75.4	101.9	77.8
95: 0	76.5	102.3	78.8
100: 0	77.3	102.0	79.9
105: 0	77.6	100.7	81.2
110: 0	78.0	99.1	82.1
115: 0	78.3	97.3	82.2
120: 0	78.3	95.3	82.1
125: 0	78.5	93.7	82.1
130: 0	78.9	92.7	82.2
135: 0	79.0	91.5	82.3
140: 0	79.0	90.5	82.5
145: 0	79.1	89.8	82.8
150: 0	79.3	89.1	83.2
155: 0	79.5	88.7	83.6
160: 0	79.6	88.3	84.1
165: 0	79.6	87.7	84.5
170: 0	79.8	87.6	85.0
175: 0	80.0	87.6	85.6

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DOW CHEMICAL USA
VERTICAL SMALL-SCALE
88NK14412/R7721
JANUARY 13, 1989

CHAN(NOS.) TIME MIN.	UNEXPOSED SURFACE		
	5	6	7
180: 0	80.5	87.6	86.3
185: 0	80.7	87.4	86.9
190: 0	81.1	87.5	87.7
195: 0	81.9	87.8	88.6
200: 0	83.0	88.3	89.6
205: 0	84.5	88.8	90.9
210: 0	86.5	90.0	92.3
215: 0	88.9	91.8	94.3
220: 0	91.6	93.9	96.6
225: 0	94.5	96.2	99.2
230: 0	98.0	99.3	102.4
235: 0	101.2	102.2	105.7
240: 0	105.5	106.2	110.0

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DOW CHEMICAL USA
 VERTICAL SMALL-SCALE
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INSIDE SAMPLE

CHAN(NOS.) TIME MIN.	8	9	10	11	12
0: 0	68.7	68.8	68.8	68.8	68.8
5: 0	68.8	68.4	68.4	68.3	68.4
10: 0	78.1	68.6	68.6	68.6	68.6
15: 0	115.5	68.7	68.8	68.6	68.6
20: 0	213.7	69.0	69.3	68.7	68.7
25: 0	220.0	69.9	71.3	68.7	68.7
30: 0	229.0	72.4	77.1	68.8	68.8
35: 0	233.7	78.0	88.3	68.8	68.9
40: 0	238.6	87.6	106.9	68.9	69.1
45: 0	245.0	160.5	144.4	68.9	69.2
50: 0	251.6	188.0	167.9	69.1	69.9
55: 0	256.1	181.7	180.3	69.3	100.7
60: 0	263.4	196.4	197.5	69.6	138.0
65: 0	276.9	205.5	202.9	70.0	133.5
70: 0	288.7	210.9	203.5	70.5	131.0
75: 0	297.0	212.3	204.1	71.0	134.1
80: 0	305.1	207.3	203.9	71.7	131.9
85: 0	313.3	203.3	203.3	72.4	128.4
90: 0	327.9	197.1	201.6	73.0	120.1
95: 0	342.6	187.2	200.0	73.7	114.0
100: 0	357.7	177.8	198.1	74.3	108.1
105: 0	372.5	173.0	196.9	75.0	102.9
110: 0	387.3	166.1	195.9	75.5	98.2
115: 0	401.9	163.5	195.1	76.0	94.6
120: 0	416.4	163.2	194.3	76.5	92.2
125: 0	430.6	164.1	193.4	76.9	90.3
130: 0	444.7	165.6	192.6	77.3	89.0
135: 0	458.6	168.2	192.2	77.8	88.1
140: 0	472.3	171.9	192.1	78.2	87.4
145: 0	485.8	175.6	192.7	78.5	86.8
150: 0	499.3	177.9	195.2	78.9	86.4
155: 0	512.9	182.8	199.6	79.3	86.1
160: 0	526.5	187.9	206.3	79.7	86.1
165: 0	540.2	193.5	215.1	80.1	86.1
170: 0	554.3	199.3	245.7	80.6	86.3
175: 0	568.3	205.7	265.8	81.0	86.7

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DOW CHEMICAL USA
VERTICAL SMALL-SCALE
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CHAN(NOS.) TIME MIN.	INSIDE SAMPLE				
	8	9	10	11	12
180: 0	582.4	211.1	284.6	81.7	87.9
185: 0	596.6	218.4	314.8	82.7	89.2
190: 0	610.8	251.4	336.4	84.2	91.6
195: 0	624.9	293.9	357.6	86.4	94.9
200: 0	638.7	331.2	369.8	89.3	99.2
205: 0	652.4	351.9	376.1	92.7	103.9
210: 0	665.8	362.7	382.3	96.6	109.0
215: 0	678.8	369.5	386.5	101.0	114.6
220: 0	691.5	374.0	391.3	105.7	120.5
225: 0	703.8	378.0	394.9	110.8	126.6
230: 0	715.7	381.9	400.3	116.2	132.6
235: 0	726.8	384.2	403.2	121.3	138.2
240: 0	738.3	388.2	403.9	127.4	144.8

RKJ:: 1/13/89

DOW CHEMICAL USA
 VERTICAL SMALL-SCALE
 68NK14412/R7721
 JANUARY 13, 1989

UNEXPOSED SURFACE

TIME MIN.	MAXIMUM INDIVIDUAL		AVG.
	TEMPERATURE	CHAN.	
0: 0	68.8	6	68.6
5: 0	68.5	2	68.3
10: 0	68.8	1	68.7
15: 0	69.0	1	68.8
20: 0	69.2	6	69.0
25: 0	69.2	1	69.0
30: 0	69.3	1	69.1
35: 0	69.3	1	69.1
40: 0	69.4	1	69.2
45: 0	69.3	2	69.1
50: 0	69.6	1	69.4
55: 0	70.0	1	69.6
60: 0	71.2	1	70.5
65: 0	73.4	6	71.5
70: 0	79.3	6	72.8
75: 0	88.1	6	75.2
80: 0	95.3	6	77.1
85: 0	99.9	6	78.4
90: 0	101.9	6	79.8
95: 0	102.3	6	80.7
100: 0	102.0	6	81.4
105: 0	100.7	6	82.0
110: 0	99.1	6	82.5
115: 0	97.3	6	82.3
120: 0	95.3	6	82.2
125: 0	93.7	6	82.4
130: 0	92.8	1	82.8
135: 0	93.7	1	83.0
140: 0	94.4	1	83.2
145: 0	94.9	1	83.4
150: 0	95.1	1	83.6
155: 0	95.1	1	83.7
160: 0	94.7	1	83.9
165: 0	93.8	1	83.9
170: 0	92.6	1	84.0
175: 0	91.6	1	84.3

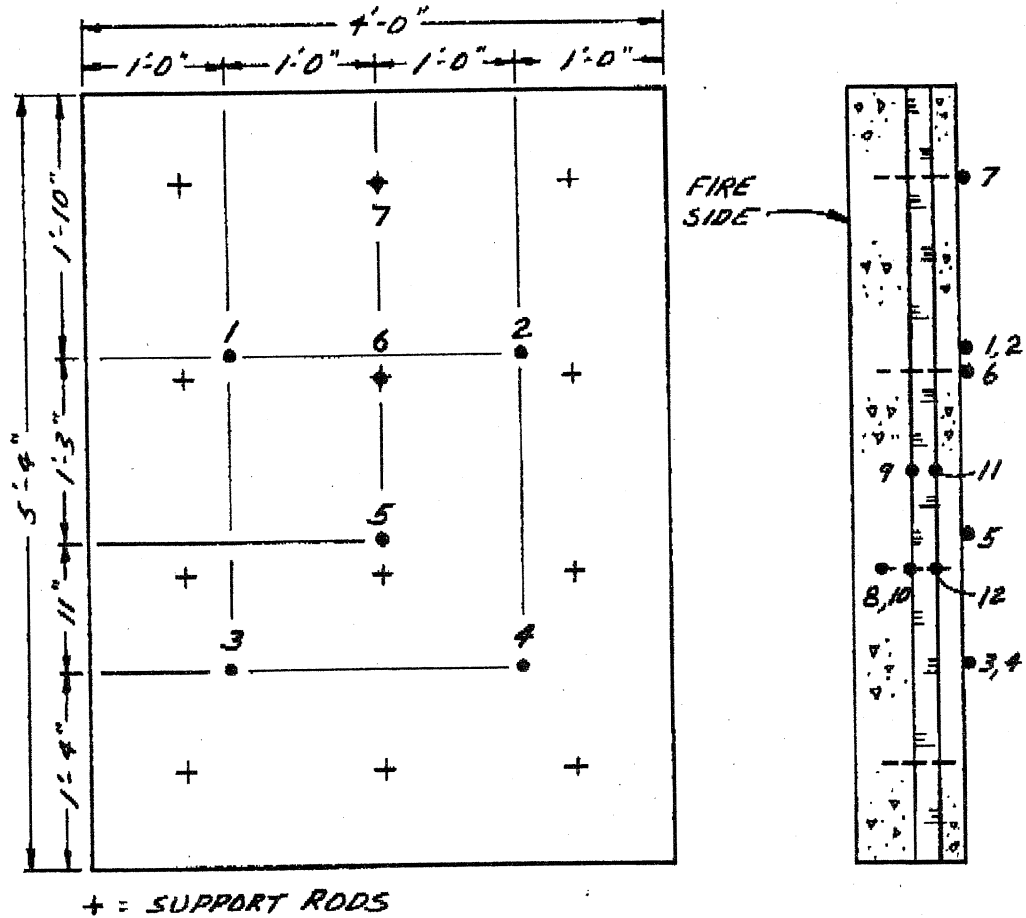
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DOW CHEMICAL USA
VERTICAL SMALL-SCALE
88NK14412/R7721
JANUARY 13, 1989

UNEXPOSED SURFACE

TIME MIN.	MAXIMUM INDIVIDUAL		AVG.
	TEMPERATURE	CHAN.	
180: 0	91.1	1	84.7
185: 0	91.3	2	85.1
190: 0	91.5	2	85.7
195: 0	91.7	1	86.5
200: 0	92.7	1	87.6
205: 0	93.8	1	88.7
210: 0	95.3	1	90.3
215: 0	98.0	3	92.2
220: 0	101.7	3	94.4
225: 0	105.2	3	96.6
230: 0	109.6	3	99.6
235: 0	113.6	3	102.4
240: 0	118.7	3	106.2

RKJ:: 1/13/89



<u>TC. NO.</u>	<u>LOCATION</u>
1-5	UNEXPOSED SURFACE
6, 7	UNEXPOSED SURFACE, OVER SUPPORT RODS
8-12	INTERIOR OF SAMPLE

THERMOCOUPLE LOCATIONS

