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Test Report

Report Date: 23 March 2020
Report Number: 202003231
Lab ID Number: 43895

Client: Dr. Peter Zhou
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Baton Rouge, LA 70806

Subject: The subject of this report is the Hot Surface Performance of Lewco Super Mat blanket insulation.

The test results in this report apply only to the specimens tested. The test ~~were pre~~^{was per}formed according to the instructions printed in the ASTM test procedure. This report shall not be reproduced without written approval of the Client. Any reproduction must include the entire report. This report must not be used by the Client or other party to claim product endorsement by TSRK Enterprises Inc.

Samples: The materials for this project were identified as Lewco Super Mat. The nominal dimensions were 610 x 610 x 18 mm, (24 x 24 x 0.71 in). The manufacturer specified six (6) layers of specimens for the test assembly. The total test thickness was 108 mm (4.3 inches).

Specimens were cut to 152 x 152 mm (6 x 18). The test area was 457 x 457 mm (18 x 18 inches). Each layer has 3 specimens. There were six layers. Each layer was rotated 90° from the previous layer to cover joints. Thermocouples were placed near the middle of the assembly. Additional specimens were placed along the outside edges of each layer.

Testing: The Lewco Super Mat blanket insulation was evaluated for hot surface performance according to the method published in ASTM C411-17, "*Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation*". The hot surface temperature and the inter-layer temperatures were recorded every 30 seconds until the test was completed. Graphs of the temperatures are in Appendix 2. The identification of the inter-layer temperatures shown in the graphs are L1-2, L2-3, L3-4, L4-5, L5-6 and Surface.

The heat up time from room temperature to 649°C was 4.0 hours. The heat-up rate was 156°C/hr (281°F/hr). After 96 hours at 650°C (1200°F), the power was turned off and the assembly allowed to

cool. The maximum and average temperatures during the timed exposure are shown in Tables 1 and 2. The weights and dimensions before and after exposure are listed in Table 3.

Results:

1. The color of the layers closest to the heat plate changes from dark to white. There was no evidence of warpage, flaming, smoldering, melting, or other visible damage. A photograph of the exposed face of the inner layer is included in the Appendix 1.

The column headings in Tables 1 and 2 are the location between layers

Table 1 – Average Temperatures (°C) During the Timed Portion of the Test

	Heating Plate	L1-2	L2-3	L3-4	L4-5	L5-6	Surf
Average	649.3	582.4	507.5	423.4	323.5	213.2	61.1
Maximum	660.4	642.5	631.9	617.1	593.0	453.8	115.5

Table 2 – Average Temperatures (°F) During the Timed Portion of the Test

	Heating Plate	L1-2	L2-3	L3-4	L4-5	L5-6	Surf
Average	1200.8	1080.4	945.5	794.1	614.3	415.8	142.0
Maximum	1220.7	1188.5	1169.4	1142.8	1099.5	848.8	239.9

Table 3 – Dimensions and Weights of Test Specimens.

	Layer 1				Layer 2	
	1	2	3	4	5	6
Weight, gr	317	311	302	337	331	315
Length, mm	457	457	457	457	457	457
Width, mm	152	152	152	152	152	152
Thickness, mm	18	18	17	17	18	17
Weight After, gm	289	280	280	312	292	291
Thickness After, mm	18	18	18	18	19	19
Weight Chg, %	8.8	10.0	7.3	7.4	11.8	7.6

	Layer 3				Layer 4	
	7	8	9	10	11	12
Weight, gr	302	323	354	333	317	334
Length, mm	457	457	457	457	457	457
Width, mm	152	152	152	152	152	152
Thickness, mm	18	17	18	18	18	18
Weight After, gm	279	292	344	322	297	325
Thickness After, mm	19	19	19	19	18	18
Weight Chg, %	7.6	9.6	2.8	3.3	6.3	2.7

	Layer 5				Layer 6	
	13	14	15	16	17	18
Weight, gr	333	299	331	284	303	324
Length, mm	457	457	457	457	457	457
Width, mm	152	152	152	152	152	152
Thickness, mm	18	18	17	18	17	17
Weight After, gm	332	288	331	277	303	324
Thickness After, mm	18	18	17	18	17	17
Weight Chg, %	0.3	3.7	0	2.5	0	0

Conclusion:

1. When tested in accordance with Test Method C411 and Practice C447 at the maximum thickness specified by the manufacturer, the internal temperatures of the Lewco Super Mat did not exceed the hot surface temperature at any time by more than 200°F (111°C) with thermocouples installed between each material layer.

Tested and Reported by:

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Appendix I - Photographic Evidence

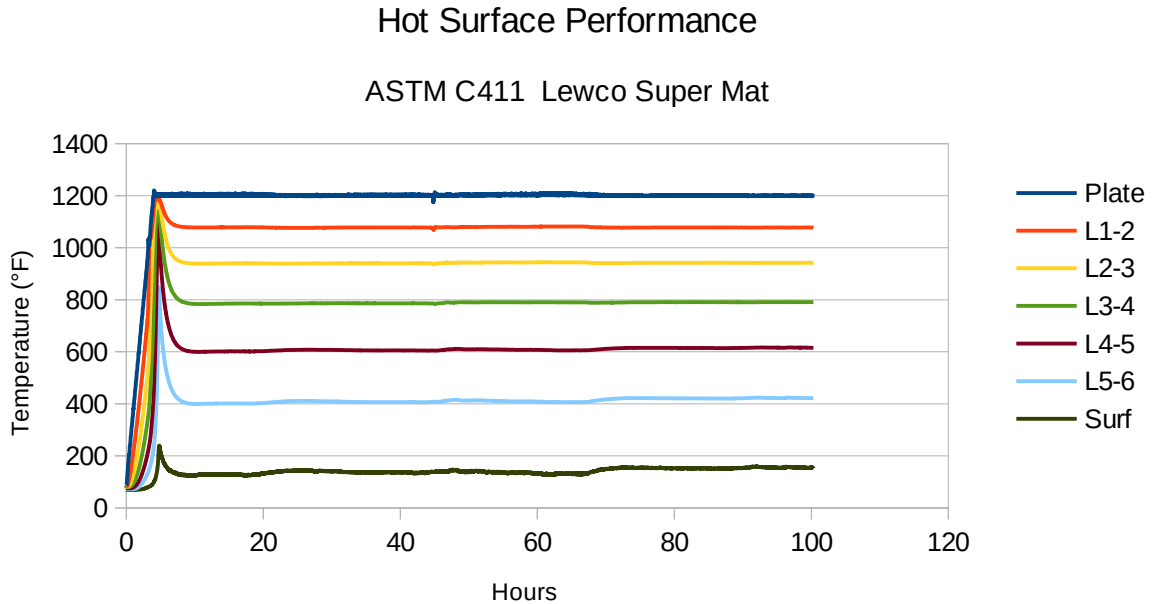
Photo 1 – Exposed Surface of the Inner Layer After 96 hours at 649°C



Appendix 2 - Measured Temperatures

The temperatures were recorded at 30 second intervals for the duration of the test. The designations represent temperatures between Layers.

Graph X2.1 – US Customary Units



Graph X2.2 – SI Units

