Test Report

Hot Surface Performance Measurement According to ASTM C411 on Non-Cross Linked Polyethylene Foam Pipe Insulation Supplied by Ebrille S.r.l

Prepared For:

Mr. Simone Furiato
Ebrille S.r.l
Strada Canelli, 53/a
14049 Nizza Monferrato
(Asti)-Italy

R & D Services, Inc.
P.O. Box 2400
Cookeville, Tennessee 38502-2400

Report: RD14231

Stuart Ruis
President

May 5, 2014

P.O. Box 2400
Cookeville, Tennessee 38502-2400
Phone: 931-372-8871
Fax: 931-525-3896

Hot Surface Performance of High-Temperature Thermal Insulation

Test Number:	RD141735HS	Date of Manufacture:	Unknown
Specimen Number:	1809140416-1,3	Date of Test:	April 25-29, 2014

Description of Test Specimen: "Non Cross Linked Polyethylene Foam Pipe Insulation, 3 inch ID by ½ inch thick".

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Contact Person: Mr. Simone Furiato

Test Method: ASTM C411, "Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation".

Description of Test

ASTM C 411 tests the performance of a thermal insulation intended for high temperature applications when the insulation is in continuous contact with a hot surface at a controlled temperature for a period of 96 hours. Visible signs of flaming, glowing, smoldering, or smoking results in termination of the test. The electrical power to the heater is turned off at the end of 96 hours and the test specimen was allowed to cool to room temperature. After cooling the test specimen was removed from the hot plate for evaluation.

The test pipe diameter was nominal 80 mm (nominal 3 inch). The hot surface temperature of the pipe was measured at four (4) locations. The temperature of the insulation was measured at the surface of the insulation. The temperatures were recorded every 30 seconds until the test was completed. Thickness measurements were made at six locations before and after testing.

The insulation was weighed and measured prior to exposure. The test specimen was 24 inches in length. Additional sections of material were cut to provide guards for the remaining length of pipe apparatus not covered by the test specimen. The pipe was heated to 104.4°C (220°F). The temperature was maintained for 96 hours, then the power was turned off and the assembly allowed to cool.

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Conditions and Observations

1. The product was identified as Non Cross Linked Polyethylene Foam Pipe Insulation, 3 inch by ½ inch.
2. The dimensions of the insulation were 15 mm thick by 609 mm long.
3. The test temperature was 104.4 +/- 6 °C (220°F). The average pipe temperature during the test was 105.4 °C (221.7°F)
4. No warpage was observed.
5. No change in the flexibility was observed.
6. No cracking or delamination was observed.
7. There was no evidence of flaming, glowing or smoldering during the 96 hour test.
8. There was no discoloration observed on the inside surface of the pipe insulation.
9. No melting was observed on the inside surface of the specimen exposed to the hot surface.
10. There was no smoke observed.
11. The sag measurements indicated a change in thickness of 0.5%.
    The Table 1 contains the mass before and after testing. Table 2 contains sag measurements before and after testing.
12. Figure 1 is a photograph of the inside surface prior to testing and Figure 2 is a photograph of the inside surface after testing. Figure 3 is the temperature profile for the duration of testing.

Conclusion

The Non Cross Linked Polyethylene Foam Pipe Insulation, 3 inch by ½ inch, showed no significant physical changes when exposed to a 105.4 °C (220°F) surface in accordance with ASTM C411.

Non Cross Linked Polyethylene Foam Pipe Insulation, 3 inch by ½ inch Mass Loss During Test			
1809140416-1,3	Before	After	Weight Loss (%)
Mass (grams)	129.32	129.31	0.0

Table 1 – Mass Before and After Testing

Non Cross Linked Polyethylene Foam Pipe Insulation, 3 inch by ½ inch Sag Measurements						
	1	2	3	4	5	6
Before heating	16.0	16.0	15.0	15.5	15.5	15.0
After cooling	16.0	17.0	14.5	15.0	15.0	15.0

Table 2 – Sag Measurements Before and After Testing

The average change in thickness was -0.5%

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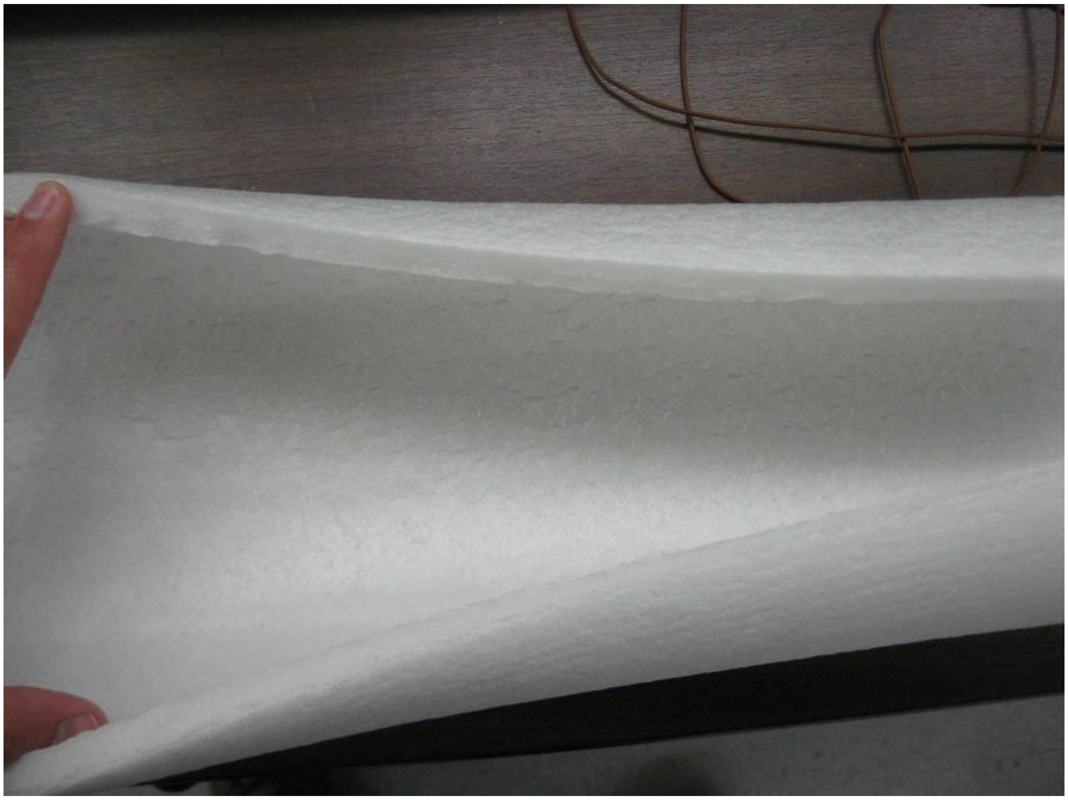

Figure 1. Inside Surface Before Testing

Figure 2. Inside Surface After Testing

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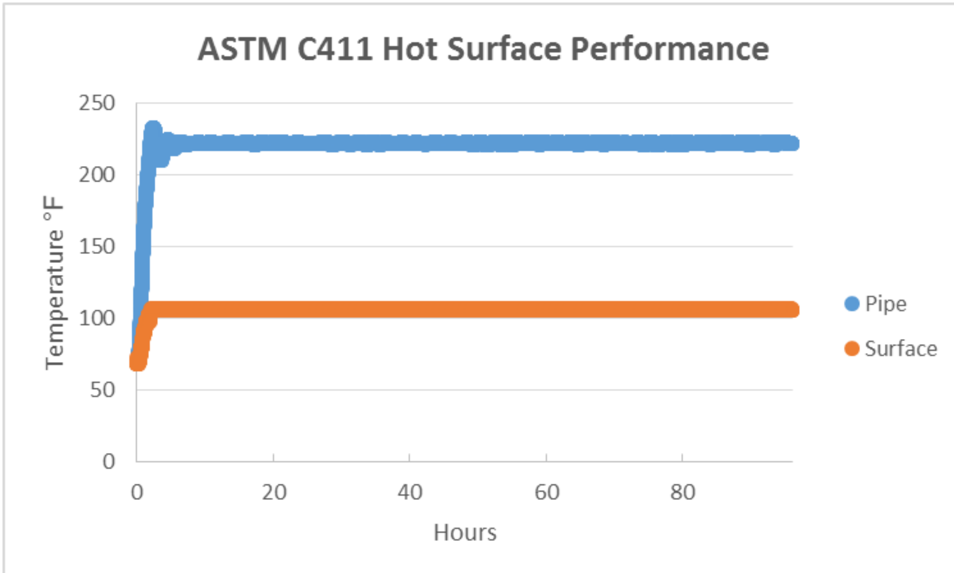

Figure 3- Temperature Profile for the Duration of Testing