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TEST REPORT

LABORATORY NUMBER:
2774-10-02

EVALUATION OF:
Thermal Conductivity (ASTM C177-04)
Accessibility (ADA) Insulation for Under-Lav Piping

PREPARED FOR:
Plumberex Specialty Products, Inc.
PO Box 1684
Palm Springs, CA 92263

TEST CONDUCTED AT:
Ramtech Laboratories
14104 Orange Avenue
Paramount, CA 90723

APPROVED BY:

Steven Berggren

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STEVEN BERGGREN
LABORATORY ADMINISTRATOR

DATE ISSUED: May 6, 2010

5/6/10

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INTRODUCTION:

In accordance with the client's request, Ramtech Laboratories conducted a Steady-State Heat Flux and Thermal Transmission Test on submitted samples of "Accessibility (ADA) Insulation for Under-Lav Piping" in general accordance with ASTM C177-04.

The following Summary of Results and test data is presented in general accordance with Ramtech's accreditation under ISO 17025

Summary of Results (See notes to table)

Sample ID	Thermal Conductivity λ = (W / mK)
(a & b)	0.028

Note 1. Temperature measured in Celsius (C) and converted to Kelvin (K)

1 **The identification of the test method used:**
- 1.1 Testing was conducted in general accordance with ASTM C-177

2 **A description of the items tested:**
- 2.1 The samples are described by the client as an "Accessibility Insulation for Under-Lav Piping" material having the following dimensional attributes:
  - 2.1.1 Length: 0.3048 Meters (Nominal)
  - 2.1.2 Width: 0.3048 Meters (Nominal)
  - 2.1.3 Depth: 0.0029 Meters (Nominal)

3 **Unambiguous identification of the items tested:**
- 3.1 The tested samples were identified by the client as follows:
  - 3.1.1 Product Name: Handy-Shield Maxx & Trap Gear
  - 3.1.1 Sample ID: (a & b)

4 **Sampling:**
- 4.1 Ramtech Laboratories did not independently sample the material tested and makes no comment as to sampling procedures that may have been conducted by others.

5 **The date of receipt of the test items:**
- 5.1 Ramtech Laboratories received the test specimens on February, 2010

6 **The date of performance of the test:**
- 6.1 Testing was conducted in March 2010

7 **Clarification of any deviations, additions and exclusions from the test method:**
- 7.1 Ramtech Laboratories tested the submitted samples in general accordance with the prescribed test methods.
- 7.2 For the purpose of this test, temperature measurements were measured in Degrees Celsius with the final calculations converted in Kelvin

TEST RESULTS

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A Thermal Transmission (ASTM C177-04)

A1 General

Thermal conductivity test has been conducted on your submitted Accessibility (ADA) Insulation for Under-Lav Piping samples in general accordance with ASTM C177-04 as titled:

Steady-State Thermal Transmission Properties by Means of the Guarded Hot Plate

A2 Test Procedure and Test Apparatus Description:

National Research Council (Type) Guarded Hot Plate: DYNATECH Model TCFG –R4-6

The main/guard heater assembly consists of a square inner (main) heater surrounded by a guard heater. The overall dimensions are 0.6096m x 0.6096m. A 3-mm wide gap separates the main heater from the guard heater. A 64-junction thermopile with junctions attached alternately to the main and guard heater measures the average temperature difference between the heater and the test sample.

Heat flows from the main/guard heater assembly through the test sample in the direction of the heat sinks. Auxiliary heaters are placed between the samples and heat sinks to control the temperature of the cold side of the sample surface. The temperature of the hot side surface on the sample is controlled by steady state power input. The heat flow occurs from the hot side surface of the sample to the cold side surface of the sample.

During the test, the test area is surrounded by a sheet metal enclosure and test stack is filled with an insulating loose-fill material i.e., vermiculite, to prevent excessive heat loss from the edge of the heaters and test samples.

The temperature gradient through the samples T_h-T_c = Temperature difference is determined with copper/constantan thermocouples. On each side of the test stack, mounted on the base plate, is a 10-position terminal for thermocouples. The 32 thermocouples (TC1 though TC32) are used to measure the hot and cold surface temperature of two test specimens, eight for each surface. The position of the test sample and the thermocouple layout as indicated in ASTM C177-04.

The power to the main heater is supplied by a regulated DC power supply having a maximum output of 60V and a capacity of 360W. The input power to the main heater is steady and the main heater temperature rise initially during the test until it reaches a level where the heat flow from the main heater equals the electrical power input. The main heater input power is measured by determining the steady DC voltage across the main heater and the current flow through the heater.

A3 Test Results:

A summary of results are presented below along with detailed data presented in the appendix to this report

Specimen ID	Oven-Dried Weight (Grams)	Nominal Thickness (d) (meters)	Thermal Conductivity λ = (W / mK)
Sample (a & b)	102.0 & 102.7	0.0029	0.028

Definitions: d = Measured (full) thickness of the test specimen in Meters
K = Kelvin
W = Watts
Oven Dried = Oven drying until constant weight

Note: For the purpose of this report the following Thermal Resistance "R" values are presented:

R-Value (SI Units)	R-Value (English Units)
0.088	0.504

APPENDIX 1

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1.0 Thermal Conductivity:

Reporting Requirements of ASTM C17-047:

The following information is provided as required under ASTM C177-04 (Section 10.1.2):

1.1 Unique numbering system to allow traceability to the individual measurements:

1.1.1 Test specimens were identified by the client as an "Accessibility (ADA) Insulation" for Under-Lav Piping material (See Page 3, Section 3 of this report)

1.2 The following information as obtained from the test:

1.2.1 Date of Test: March 2010
1.2.2 Operator: Steven Berggren
1.2.3 Specimen ID: Specimen A & B
1.2.4 Specimen Characteristics: Unknown to Ramtech Laboratories
1.2.5 Specimen Conditioning: Per Client, oven-dried (Constant Weight)
1.2.6 Specimen Properties:
1.2.6.1 Length: 0.3048 meters (Nominal)
1.2.6.2 Width: 0.3048 meters (Nominal)
1.2.6.3 Thick: 0.0029 meters (Nominal)

1.2.7 Apparatus Description:
1.2.7.1 Plate Orientations: Horizontal
1.2.7.2 Operation: Double Sided

Variable (See Definitions)	Measured Values
Q, W	0.49
Th_1, °C (K)	22.687 (295.84)
Tc_1, °C (K)	22.444 (295.59)
Th_2, °C (K)	22.713 (295.86)
Tc_2, °C (K)	22.488 (295.64)
Tm, °C (K)	22.58 (295.73)
Delta T, °C (K)	0.23
A, m^2	0.0948
d, m	0.00292

1.3 Definitions:

1.3.1 Q-----Heat flow in the metered section, ----(Watts).
1.3.2 Th----Hot surface temperature, ----(Celsius or Kelvin).
1.3.3 Tc----Cold surface temperature, ----(Celsius or Kelvin).
1.3.4 Tm---Mean temperature, (Th + Tc)/2 ----(Celsius or Kelvin).
1.3.5 A-----Metered section area normal to heat flow, m^2
1.3.6 d-----Nominal specimen thickness, ----(meters)

Thermal Conductivity (λ) where:

$$\lambda = \frac{Q}{A}\left[\frac{1}{\left[\frac{\Delta T}{d}\right]_1 + \left[\frac{\Delta T}{d}\right]_2}\right]$$