



GEOSCIENCE LTD
a research and development organization

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TO: Raphael Helfatz (FAX# 011-972-4633-1447)
Y.S.M.

FROM: Heinz F. Poppendiek, PhD, P.E.
President

SUBJECT: Discussion of Geoscience's
Test Results for Y.S.M.'s
CTI Insulation System

DATE: May 9, 2001

I. INTRODUCTION

Geoscience measured the R values of the subject system (for the heat flow down direction) over the temperature range that is found in Israel. Both a 1 1/2" air space above the batt system, as well as a 3 1/2" air space above the batt system were considered. In addition, two external foil surface emissivities were evaluated. Specifically, the emissivities of the foil surface facing the air space above the batt insulation as well as the emissivities of the foil surface facing the air under the insulation system were controlled. The measurements were made in a 64" X 64" Guarded Hot Box (Test Method ASTM C-236).

II. TEST RESULTS

For a horizontal air space of 1 1/2" above the 54mm batt/foil insulation

For the case of external surface foil emissivities of 0.05, the total R values (air to air) ranged from 13 to 16 hr ft² °F/Btu. In the case for external foil surface emissivities of 0.25 (a dusty surface simulation), the total R values (air to air) ranged from 8 to 11 hr ft² °F/Btu.

For a horizontal air space of 3 1/2" above the 54mm batt/foil insulation

For the case of external surface foil emissivities of 0.05, the total R values (air to air) ranged from 15.8 to 18.8 hr ft² °F/Btu.

In the case for external foil surface emissivities of 0.25 (a dusty surface simulation), the total R values (air to air) ranged from 8.5 to 11.5 hr ft² °F/Btu.

III. CONCLUDING COMMENTS

Geoscience has compared the experimental R value measurements with theoretical predictions and finds the agreement to be good. In addition, the good performance of the CTI insulation system should be favorable in energy conservation.

It is also pointed out that if two layers of 54mm batt/foil insulation are used, the total R values would be further increased (to approximately 18 to 24 for the case where the foil emissivities are 0.05).

Test sample details are given below*.

H. F. Poppendiek
H. F. Poppendiek



* Sample Identification/Description:

64" X 64" of reflective insulation product was supplied by the client and identified as CTI 300 reflective insulation. The sample comprised of a non woven polyester fibers batt, 54 mm thick, density = 0.34 pounds/cu. ft. (5.5 kg/cu. meter, 300 gr./sq. m.) bordered by aluminum foil on both sides. The aluminum foil emissivities were 0.05. The foils were bonded to the fibers in less than 2% of their surfaces.



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GEOSCIENCE LABORATORY ACCREDITATIONS

Geoscience's Thermal Property Testing Laboratory has received accreditation, certification, approval or acceptance from the following agencies:

1. California Energy Commission (CEC) and the Bureau of Home Furnishings.

Approved for the following tests:

- ASTM C-167 Thickness and Density of Blanket
- ASTM C-177 Guarded Hot Plate
- ASTM C-236 Guarded Hot Box
- ASTM C-518 Heat Flow Meter

2. National Voluntary Laboratory Accreditation Program (NVLAP-NIST).

Accredited for the following tests:

- ASTM C-177 Guarded Hot Plate
- ASTM C-236 Guarded Hot Box
- ASTM E-136 Non-Combustibility

3. International Conference of Building Officials (ICBO) and Southern Building Code Congress International, Inc. (SBCCI).

Geoscience prepares R value test reports for insulation manufacturers and distributors which are in turn presented to ICBO and SBCCI (at their request). Geoscience has been surveyed by ICBO and Geoscience's reports are evaluated and accepted by that organization. Geoscience's reports are also evaluated and accepted by SBCCI.

4. MIL-C-45662A through Loral Aeronutronic (Aeronutronic Ford Corporation).

Geoscience has been certified in thermal conductivity and specific heat measurements under MIL-C-45662A by Aeronutronic Ford Corporation in connection with their USN Trident materials program. Geoscience measures thermal conductivity, specific heat and thermal diffusivity of ceramic insulators using ASTM C-177, ASTM C-2766 and transient slab method, respectively. Geoscience results are used as high accuracy quality control checks by the Navy.

5. Special Process Supplier's Certification through Aerojet Liquid Rocket Company.

Geoscience has been certified as a laboratory that can perform the following tests for the aerospace industry in connection with federal insulation programs:

- Thermal conductivity ASTM C-177
- Specific heat ASTM C-351
- Ablation tests ASTM No. 67

The following is a list of organizations from whom Geoscience has received approval and recommendation:

1. **Pacific Gas & Electric Company** approves Geoscience as a qualified insulation testing laboratory.
2. **Puget Sound Power** approves Geoscience as a qualified testing laboratory.
3. **San Diego Gas & Electric Company** approves Geoscience as a qualified testing laboratory.
4. **Oregon Department of Energy** approves Geoscience as a qualified insulation testing laboratory.
5. **Canadian General Standards Board** has reviewed Geoscience's testing laboratory and finds it to be qualified to perform tests for Canadian insulation manufacturers.
6. **ICI Fiberite** has certified Geoscience as a high quality control laboratory service organization.
7. **Governmental Acceptance of Geoscience's Thermal Testing and Evaluation Capabilities**
For over 30 years, Geoscience has performed contract research for governmental agencies such as AEC, ERDA, DOE, NASA, ONR, USAF, and the USN's Civil Engineering Laboratory at Port Hueneme in connection with thermal property measurement activities (thermal conductivity, thermal expansion coefficient, specific heat, emissivity, viscosity, etc.). The contract monitors of these agencies visit Geoscience to review measurement techniques. In all cases, over this long time period, the government has accepted and utilized Geoscience's data in energy and conservation programs (see, for example, the monograph NASA SP 5102).

Geoscience is also involved in a number of cooperative thermal property activities with institutional organizations and technical societies (i.e., the Canadian National Research Council, National Institute of Standards and Technology, ASTM C-16 Committee and ASHRAE).

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<http://www.geoscienceltd.com/accred.html>

United States Department of Commerce
National Institute of Standards and Technology

NVLAP[®]

ISO/IEC GUIDE 25:1990
ISO 9002:1987

Certificate of Accreditation



GROSCIENCE LTD.
SAN DIEGO, CA

is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:

THERMAL INSULATION MATERIALS

December 31, 2001

Effective through

David E. Alderman

For the National Institute of Standards and Technology

NVLAP Lab Code: 100142-0

National Institute
of Standards and Technology



National Voluntary
Laboratory Accreditation Program

ISO/IEC GUIDE 25:1990
ISO 9002:1987

Scope of Accreditation



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NVLAP LAB CODE 100142-0

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NVLAP Code Designation & Short Title

Flammability

01/F05 ASTM E136
Behavior of Materials in a Vertical Tube Furnace at 750 °C

Thermal Resistance

01/T01 ASTM C177
Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

01/T04 ASTM C236
Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box

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