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FIRE PERFORMANCE EVALUATION OF SPRAYED FIBER INSULATION IN ACCORDANCE WITH ISO 1182-90 AND PART 1 OF THE IMO FTP CODE

FINAL REPORT
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Consisting of 10 Pages

Prepared for:

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1.0 INTRODUCTION

This report describes a series of small-scale fire tests conducted according to the International Organization for Standardization (ISO) 1182:1990, "Fire tests - Building materials - Non-combustibility test," for Monoglass Incorporated located in Vancouver, British Columbia. The results of this test are used to determine whether the test material is classified as "non-combustible" based on the pass/fail criteria presented in Part 1 of Annex 1 to the International Maritime Organization (IMO) Resolution MSC.61(67), "International Code for Application of Fire Test Procedures," also referred to as the FTP Code. The tests were conducted at the Department of Fire Technology of Southwest Research Institute (SwRI), located in San Antonio, Texas.

The test method described in ISO 1182:1990 is intended to measure and describe the properties of materials or products in response to heat and flame under controlled laboratory conditions. The results should not be used alone to describe or appraise the fire hazard or the fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a complete fire hazard for fire risk assessment, which takes into account all the factors that are pertinent to an assessment of the fire hazard or risk of a particular end use.

The results presented in this report apply specifically to the specimens tested, in the manner tested, and not to the entire production of these or similar materials, nor to the performance when used in combination with other materials.

2.0 DESCRIPTION OF TEST APPARATUS AND PROCEDURE

The ISO 1182 test apparatus consists of a refractory tube furnace, 75 mm (2.95 in.) in diameter and 150 mm (5.91 in.) in height. The tube is open at the top and bottom, and air flows through the furnace due to natural convection. A conical transition piece is provided at the bottom of the furnace to stabilize the airflow. The air temperature inside the furnace is stabilized to 750°C prior to testing. A cylindrical test specimen, 45 mm (1.77 in.) in diameter and 50 mm (1.97 in.) in height, is inserted into the furnace at the start of the test. Sheathed thermocouples are used to measure the temperature of the furnace air (T_f), specimen surface (T_s), and specimen interior (T_c). The test is conducted for a fixed duration of 30 min in accordance with the IMO interpretation of the FTP code

specimen mass loss is determined based on weight measurements before testing and after removal from the furnace and cool-down in a desiccator. ISO 1182:1990 requires that a series of five tests be conducted for each sample.

A material is classified as "non-combustible" according to Part 1 of the FTP code, if for a series of five tests, the following criteria are met:

1. The average maximum furnace temperature rise, ΔT_f, (with the final temperature as the reference) does not exceed 30°C;
2. The average maximum surface temperature rise, ΔT_s, (with the final temperature as the reference) does not exceed 30°C;
3. The average duration of sustained flaming does not exceed 10 sec; and
4. The average mass loss (with respect to the original specimen mass) does not exceed 50 percent.

3.0 DESCRIPTION OF TEST SPECIMENS

Monoglass Incorporated, located in Vancouver, British Columbia, provided a sprayed fiber insulation for testing in accordance with ISO 1182 and Part 1 of Annex 1 to IMO Resolution MSC.61(67). The sample provided was greenish white in color, and sprayed into a cardboard box, which was coated with aluminum foil to prevent transfer of binders from the box into the material.

Test specimens were prepared in accordance with ISO 1182, which requires test specimens to be 45^{+0}_{-2} mm in diameter and 50 ± 3 mm in height. Five samples were cut out of a unit of sprayed insulation provided in a 12 x 12 x 3-in. cardboard box. The specimens were conditioned in a ventilated oven at 60 ± 5°C for 24 hr, and cooled to ambient temperature in a desiccator prior to testing.

4.0 TEST RESULTS

Testing was conducted on September 28, 2001. Tabular test data are presented in Appendix A, and graphs of the measured temperatures plotted with respect to time are presented in

5.0 CONCLUSIONS

The sprayed fiberglass insulation tested in this program **meets** the test criteria for non-combustibility as outlined in Part 1 of Annex 1 to IMO Resolution MSC.61 (67), "Non-combustibility test," using the end of test criteria specified in Annex 3 to IMO FP 44/18.

APPENDIX A

TABULAR DATA

(Consisting of 1 Page)

SECTION 1 – TEST DATA

	Run 1	Run 2	Run 3	Run 4	Run 5
Test ID	2711-1.dat	2711-2.dat	2711-3.dat	2711-4.dat	2711-5.dat
Initial Mass (g)	5.25	5.39	5.28	5.26	5.21
Final Mass (g)	4.82	4.76	5.01	5.03	4.93
Mass Loss (g)	0.43	0.63	0.27	0.23	0.28
Mass Loss (%)	8.2	11.7	5.1	4.4	5.4
Initial T_f (°C)	749	747	748	748	747
Maximum T_f (°C)	771	769	773	769	762
Final T_f (°C)	761	757	757	756	752
Maximum T_c (°C)	766	766	767	773	766
Final T_c (°C)	759	758	757	764	759
Maximum T_s (°C)	757	767	779	761	759
Final T_s (°C)	745	753	754	753	751
Sustained Flaming (s)	0	0	0	0	0

SECTION 2 – DETAILED TEMPERATURE RISE (ΔT) DATA

	Furnace: ΔT_f (°C)	Center: ΔT_c (°C)	Surface: ΔT_s (°C)
Run 1	10	7	12
Run 2	12	8	14
Run 3	16	10	25
Run 4	13	9	8
Run 5	10	7	8
Average	12.2	8.2	13.4

SECTION 3 – AVERAGE TEST RESULTS FOR CLASSIFICATION

- Average Furnace Temperature Rise: 12.2°C
- Average Surface Temperature Rise: 13.4°C
- Average Mass Loss: 6.9%
- Average Duration of Sustained Flaming: 0 s

SECTION 4 – OBSERVATIONS

- Sample shrank to a glass-like material approximately the size of a quarter, and about ½-in. thick

APPENDIX B

TEMPERATURE GRAPHS

(Consisting of 3 Pages)

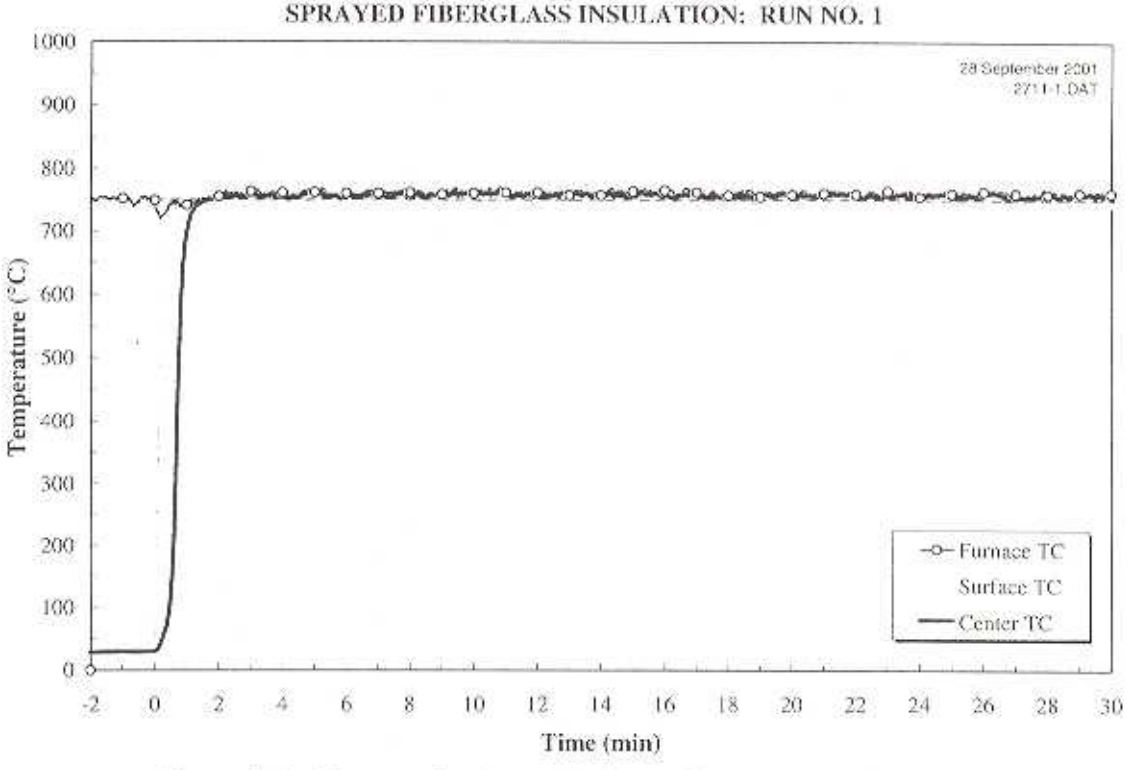

Figure B-1. Furnace, Surface, and Center Temperature Graphs.

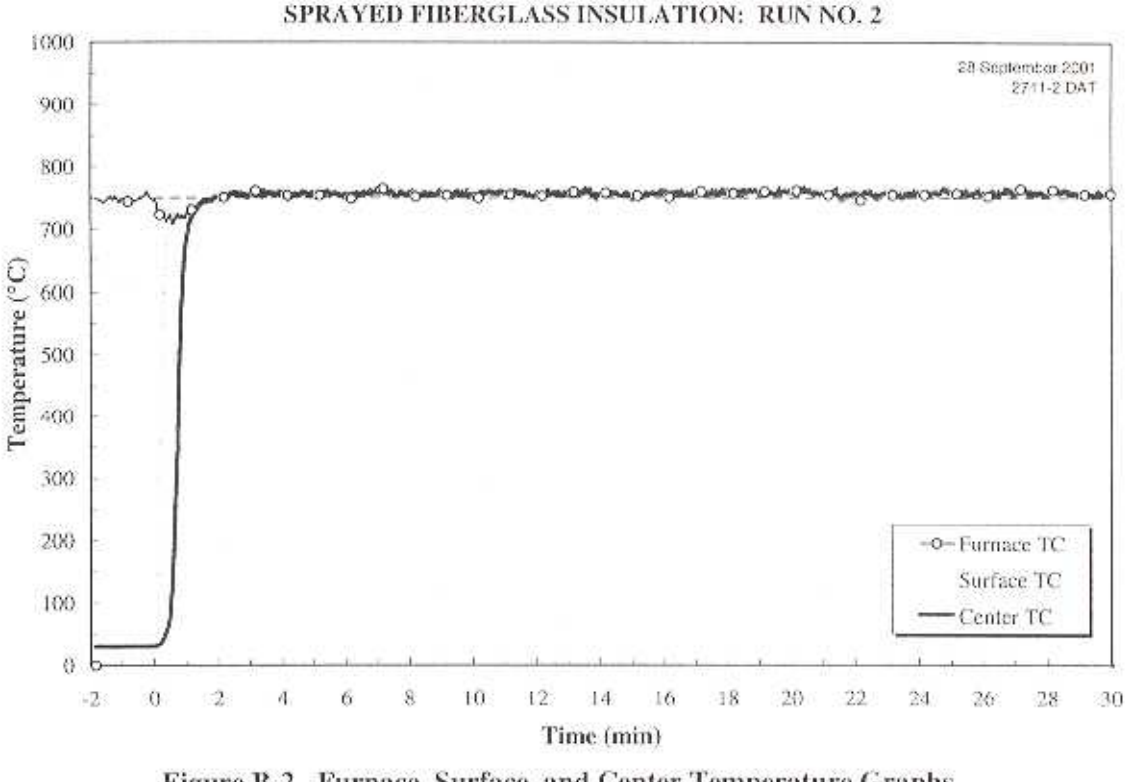

Figure B-2. Furnace, Surface, and Center Temperature Graphs.

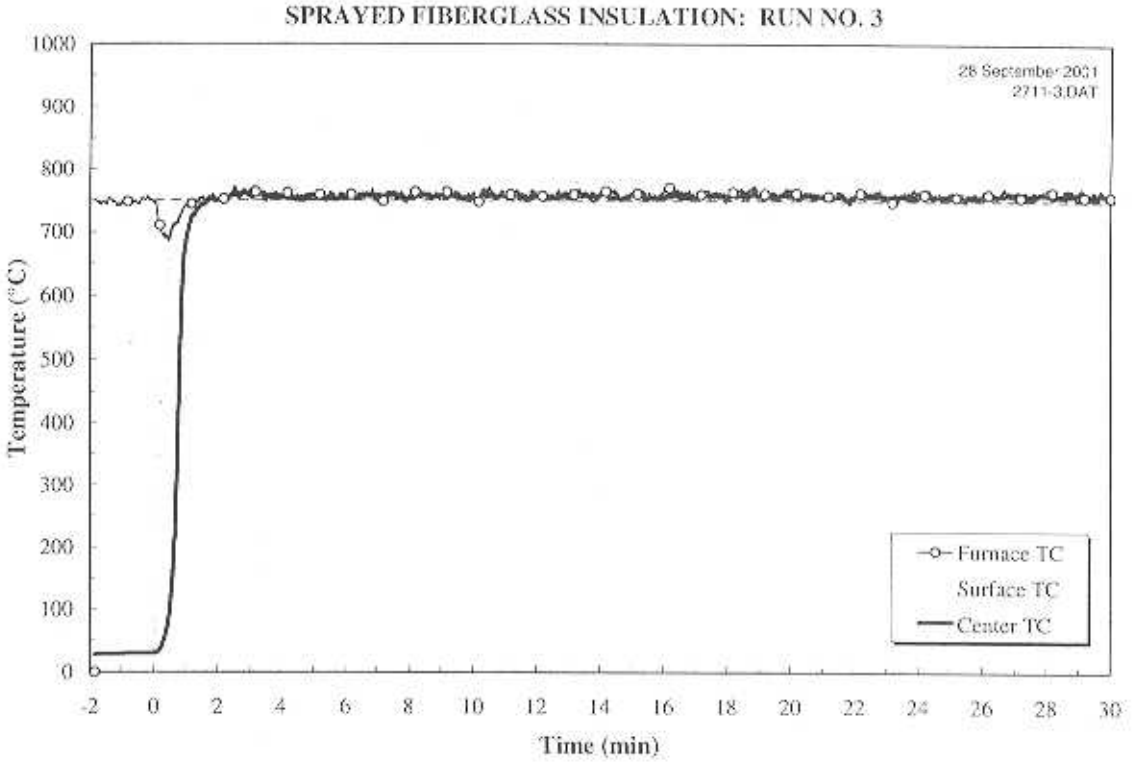

Figure B-3. Furnace, Surface, and Center Temperature Graphs.

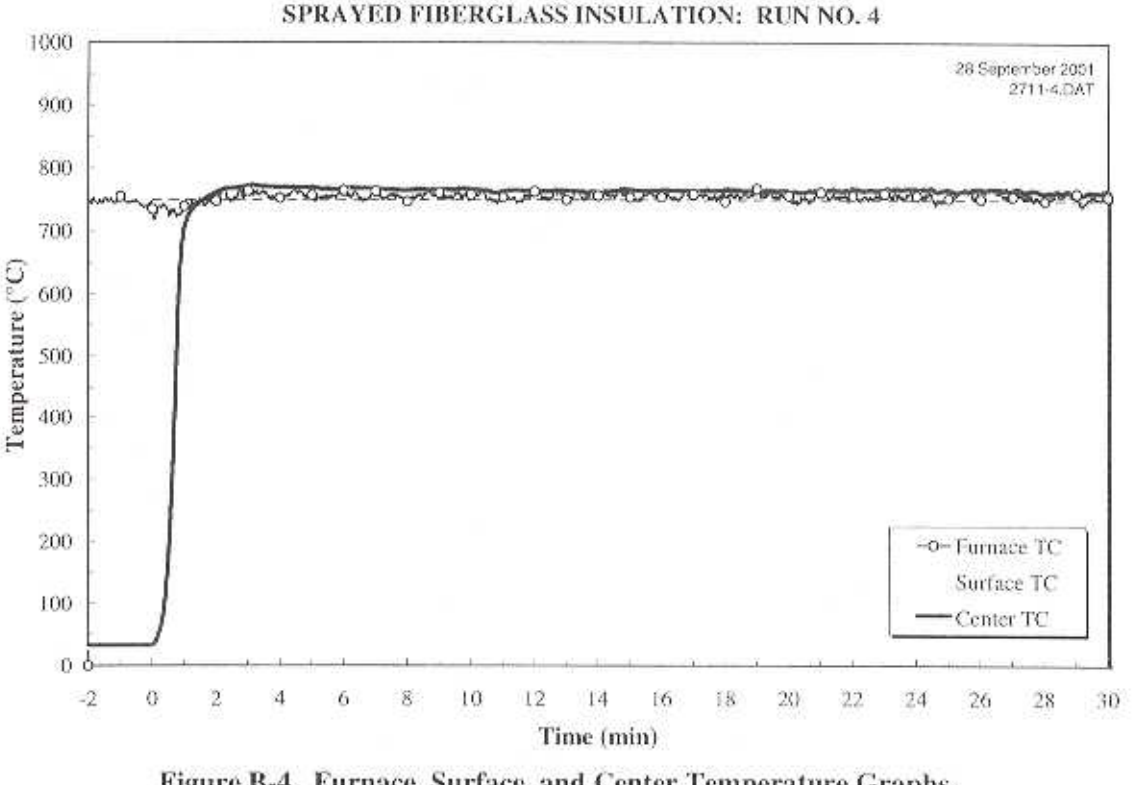

Figure B-4. Furnace, Surface, and Center Temperature Graphs.

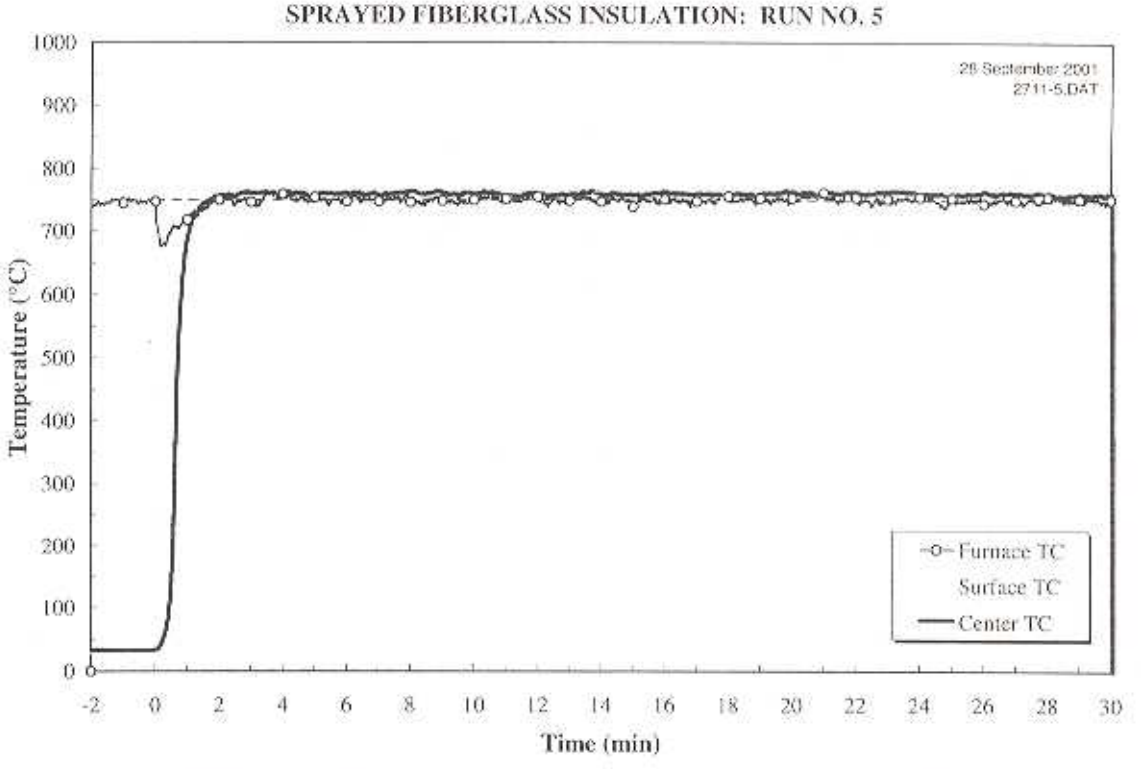

Figure B-5. Furnace, Surface, and Center Temperature Graphs.