



Carboline Company
Executive Offices
2150 Schuetz Rd.
St. Louis, MO 63146
314/644-1000
FAX: 314/644-4617

Specification Tech Data

Subject: Southwest Type 5 MD Physical Property Test Data
Date: November 22, 2011
To: Fireproofing Specifiers and Applicators
From: John L. Wright, President - Southwest Fireproofing Products Co.

The major weight component of Type 5 Cementitious Fireproofing Products is gypsum cement with additives for improving pumping, spraying, fungi resistance and set control. This major component provides binding strength for the vermiculite aggregate which is combined with the cement in different quantities to produce the desired product density. Higher vermiculite content produces the lower density version of Type 5 designated as Type 5GP, while a lower vermiculite content produces the higher density version designated as Type 5MD.

It is apparent that the chemical makeup does not vary with the product density because the binder is unchanged. Therefore, chemical reactions are the same for the two different densities of Type 5. However, the strength properties increase with density.

This results in the physical properties of Type 5MD being either equal to or greater than type 5GP. Furthermore, if the physical properties of Type 5GP are greater than those required for Type 5MD, testing of both for a particular characteristic would serve only to determine how much the result exceeds the requirement.

For this reason, testing of Type 5MD in addition to Type 5GP was limited to only the properties for which the higher density product is required to have results better than those provided by Type 5GP. Compression and Adhesion/Cohesion are the only two properties for which higher values are required. The physical property test reports for our Type 5 products contain the following individual reports for the reasons explained above.

The following is a summary table and explanation of physical property test data reports by Intertek.

Property and Test	Report by	Type 5GP Tested Value	Type 5MD Tested or Equivalent Value
ASTM E761 Compressive Strength	Intertek	3701 pounds/ft ²	10,354 pounds/ft ²
ASTM E736 Cohesion/Adhesion	Intertek	505 pounds/ft ²	3,996 pounds/ft ²
ASTM E760 Impact	Intertek	No spalling, delamination or cracking	Equal to Type 5GP
ASTM E759 Effect of Deflection	Intertek	No spalling, delamination or cracking	Equal to Type 5GP
ASTM E859 Air Erosion	Intertek	0.009 g/ft ² total loss No loss after 6 hours	Equal or better than Type 5GP
ASTM E937 Corrosion of Steel	Intertek	0.000 (g/mm ²) weight loss	Equal to Type 5GP
ASTM E84 Surface Burning	Intertek	0 flame spread, 0 smoke developed	Equal to Type 5GP
ASTM G21 Fungi Resistance	R T Vanderbilt	No growth	No growth
ASTM E136 Combustibility	ETL Testing	Non-combustible	Equal to Type 5GP

* If further clarification is required, please contact Carboline Technical Service.

REPORT NUMBER: 3171245MID-022
ORIGINAL ISSUE DATE: October 23, 2009

EVALUATION CENTER
Intertek
8431 Murphy Drive
Middleton, WI 53562

RENDERED TO

Southwest Fireproofing Products Co.
5119 Edith Blvd. NE
Albuquerque, NM 87107

PRODUCT EVALUATED: 5GP cementitious fireproofing
EVALUATION PROPERTY: ICC-ES AC 23: Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in ASTM E759: Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

Report of Testing 5GP cementitious fireproofing for compliance with the applicable requirements of the following criteria: ICC-ES AC 23: Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in ASTM E759: Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

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2 Introduction

Intertek has conducted testing for Southwest Fireproofing Products Co. on Type 5GP cementitious fireproofing. Testing was conducted in accordance with ASTM E 759-92 (Reapproved 2005) Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members. This evaluation began April 14, 2009 and was completed September 21, 2009.

The thickness and density of the tested specimens were determined in accordance with ASTM E 605 – 93 (Reapproved 2006) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

Results are reported in accordance with the ASTM Standard specified above and compared to the conditions of acceptance provided in ICBO Evaluation Service, Inc. publication AC23, "Acceptance Criteria For Spray-Applied Fire-Protection Materials".

3 Test Samples

3.1. SAMPLE SELECTION

The products to be tested arrived by commercial carrier shipment from Southwest Fireproofing Products Co. in factory packed bags with inspection agency labels. The required mixing of materials and spray application to the specified test substrate was performed by the client with Intertek observation at the Intertek Evaluation Center.

Aluminum sulfate hydrate (alum) solution was prepared with 6.39 lbs of alum and 10 lbs of water. The alum was dissolved in water and the solution filtered for injection at nozzle to accelerate gypsum set.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The dry fireproofing material as removed from bags was mixed with water to produce a coherent pump able slurry. The mixed material was transferred to the hopper of a pump and pumped to a spray nozzle at the end of the hose. Alum solution was injected into the slurry within the hose close to the nozzle and the slurry was dispensed through the spray nozzle orifice with air injected through an air stem for dispersion.

The product identification, material weight, mix water used and the substrate of application are identified in the following table.

Product - Bag No.	Net material weight (lbs)	Water added (lbs)	Substrate of Application
Type 5GP - Bag 2	46.5	88	Cellular roof deck assembly per ASTM E 759

4 Testing and Evaluation Methods

The samples cured for 30 days at nominal conditioning levels.

4.1. TEST STANDARD 1 – E759

The substrate was a cellular 1 1/2 inch galvanized deck assembly with a flat surface, with no sprayed fire-resistive material applied to an area 13-in from each end of the specimen to allow the steel deck to bear directly on the supports. The sample was conditioned at a standard temperature and humidity until cured and dry. The fireproofing thickness is 3/4-in minimum per criteria. The sample was handled with special care to avoid impact or deflection before testing due to its size and weight.

The sample was placed on the test supports with the sprayed fire-resistive material as the lower surface. The initial reading of the dial micrometer was recorded prior to the application of the load, and deformation was recorded as the load (a bearing block) was applied to the upper face of the specimen.

4.2. TEST STANDARD 2 – E605

Thickness of each sample was determined by inserting the penetrating pin of the thickness gage perpendicular into the sprayed fire-resistive material. When the pin touched the surface of the substrate, the disk was moved to the surface of the sprayed fire-resistive material with sufficient force to register the average plane. The gage was withdrawn to read the thickness.

The densities of the tested materials were determined by removing all of the in-place material from the substrate within a measured test area of the sample, conditioning the removed material as specified by the Standard and calculating the density from the thickness, area and weight.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

E759 – Effect of Deflection

Prior to testing, the fireproofing was inspected for general appearance and condition. It was firm and monolithic with no observable defects. After deflection of the deck 1/120 of the deck span, the fireproofing had no change in appearance. Observation for cracking is not specified in the ASTM Standard, but was added at the sponsors request to provide information specified in ICC-ES AC23. Test results are tabulated below.

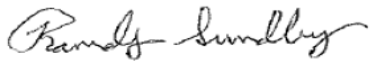
Sample Tested	Fireproofing Thickness (in.)	Density (lbs/ft ³)	Appearance after testing
5 GP	0.75	14.74	No change in appearance No spalling, delamination or cracking


6 Conclusion

Intertek has conducted testing for Southwest Fireproofing Products Co. on 5GP cementitious fireproofing. Testing was conducted in accordance with ICC-ES, following the standard methods of AC 23: *Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials* as detailed in ASTM E759: *Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members*. This evaluation began April 14, 2009 and was completed September 21, 2009.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by: 
Randy Sundby
Project Engineer, Construction Products

Reviewed by: 
Rhonda Byrne
Operations Manager



Southwest Fireproofing Products Co.
Project No. 3171245MID-022

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APPENDIX A

Test Data

ASTM E759 DATA SHEET

Project #: 3171245 Client: SWF

Date: 4/13/09 Tech/Reviewer: Randy

Sample: 5GP Temp: 73.9 F

Thickness of SFRM: 3/4 in minimum

Density of SFRM: 14.74 (lbs/ft³)

Place the specimen on the test supports with the SFRM as the lower surface.

Measure the deflection of the specimens and record the deformations as the load is applied.

Apply a vertical center load to the upper face of the specimen by means of a bearing block to develop a deflection of 1/120 of the clear span, that is, 1 inch.

Load applied. 5GP 942 lbs

Describe the final physical condition and appearance of the SFRM after Defection:
Appearance did not change.

Note any spalling, delamination, cracking: No Cracking, spalling, delamination

REVISION SUMMARY

DATE	SUMMARY
October 23, 2009	Original

REPORT NUMBER: 3171245MID-022
ORIGINAL ISSUE DATE: October 23, 2009

EVALUATION CENTER
Intertek
8431 Murphy Drive
Middleton, WI 53562

RENDERED TO

Southwest Fireproofing Products Co.
5119 Edith Blvd. NE
Albuquerque, NM 87107

PRODUCT EVALUATED: 5GP cementitious fireproofing
EVALUATION PROPERTY: ASTM E937: Standard Test Method for Corrosion
of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural
Members

**Report of Testing 5GP cementitious fireproofing for compliance with the
applicable requirements of the following criteria: *ASTM E937: Standard
Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material
(SFRM) Applied to Structural Members***

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2 Introduction

Intertek has conducted testing for Southwest Fireproofing Products Co. on Type 5GP cementitious fireproofing. Testing was conducted in accordance with ASTM E 937-93 (Reapproved 2005) Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members. This evaluation began April 14, 2009 and was completed September 21, 2009.

The thickness and density of the tested specimens were determined in accordance with ASTM E 605 – 93 (Reapproved 2006) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members. Results are reported in accordance with the ASTM Standard specified above.

3 Test Samples

3.1. SAMPLE SELECTION

The products to be tested arrived by commercial carrier shipment from Southwest Fireproofing Products Co. in factory packed bags with inspection agency labels. The required mixing of materials and spray application to the specified test substrate was performed by the client with Intertek technical personnel observation at the Intertek Evaluation Center. Aluminum sulfate hydrate (alum) solution was prepared with 6.39 lbs of alum and 10 lbs of water. The alum was dissolved in water and the solution filtered for injection at nozzle to accelerate gypsum set.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The SFRM was applied in accordance with the manufacturer's published instructions and were representative of application in the field. The dry fireproofing material as removed from bags was mixed with water to produce a coherent pumpable slurry. The mixed material was transferred to the hopper of a pump and pumped to a spray nozzle at the end of the hose. Alum solution was injected into the slurry within the hose close to the nozzle and the slurry was dispensed through the spray nozzle orifice with air injected through an air stem for dispersion.

The product identification, material weight, mix water used and the substrate of application are identified in the following table. The product was prepared and conditioned for testing in the as sprayed surface condition. No finishing techniques such as tamping, troweling, surface sealing or similar operations were made.

Product	Substrate of Application
Type 5GP	Bare, coated and galvanized steel plates per ASTM E 937

4 Testing and Evaluation Methods

The samples cured for 30 days at nominal conditioning levels.

4.1. TEST STANDARD – E937

The substrates were twelve each 12-gauge plates measuring 8" x 8", four sheets were in each set of bare, shop coated and galvanized. Samples I and III of each set were conditioned for 240 hours and samples II and IV of each set were conditioned for 240 hours. The fireproofing thickness was 3/4" +/- 1/8". The samples were handled with special care to accommodate safe handling.

Each sheet of each set was weighed to the nearest 0.1 g and recorded as IA, IIA, IIIA and IVA. The edges and the sides opposite the fireproofing of each sheet were protected with a suitable coating. The sprayed fire-resistive material and protective coating were removed from the steel sheets identified as I and III from each set. All surface rust was removed from I and III of each set with a wire brush and cleaned with solvent. Sheets I and III of each set were weighed and recorded as Ib and IIIb. The remaining sheets, specimens II and IV of each set, were placed in the temperature humidity cabinet and kept at 95 +/- 3 0F and a 95 +/- 3% relative humidity for 240 hours. After 240 hours elapsed, the specimens were removed from the cabinet. The surface rust, sprayed fire-resistive material and protective coating were removed with a wire brush and cleaned with solvent. The sheets were weighed to the nearest 0.1 g and recorded as IIb and IVb.

4.2. TEST STANDARD 2 - ASTM E 605

Thickness of the applied material was determined by inserting the penetrating pin of the thickness gage perpendicular into the sprayed fire-resistive material. When the pin touched the surface of the substrate, the disk was moved to the surface of the sprayed fire-resistive material with sufficient force to register the average plane. The gage was withdrawn to read the thickness.

The density of the material was determined from separate sample plates prepared at the same time as the test samples by removing all of the in-place material from the substrate within a measured test area of the sample, conditioning the removed material as specified by the Standard and calculating the density from the thickness, area and weight.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

Initial weights of the four test plates in each of the three sets, final weights of two of the test plates in each set (sets I and III), and final weights of the other two test plates in each set (sets II and IV) were determine as specified in the standard. Data for Southwest Fireproofing Type 5GP are tabulated below. The fireproofing was applied at a thickness of 3/4 inch and density of 14.06 pcf. The weight loss of each set expressed in g/ mm² is tabulated below.

E937 – Corrosion of Steel

	<i>Initial Weights (g)</i>			<i>Final Weights (g)</i>		
	Bare	Coated	Gal. Steel	Bare	Coated	Gal. Steel
I	802.9	801.6	822.9	800.7	800.8	822.5
II	798.7	813.4	822.9	797.1	812.7	821.5
III	801.2	805.6	828.6	799.3	805.2	828.0
IV	797.3	814.5	816.3	796.2	813.8	815.4

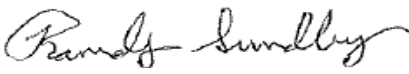
	<i>Average Weight Loss (g/mm²)</i>		
	Bare	Coated	Gal. Steel
I	0.0000533	0.0000194	0.0000097
II	0.0000388	0.0000170	0.0000339
III	0.0000460	0.0000097	0.0000145
IV	0.0000266	0.0000170	0.0000218


6 Conclusion

Intertek has conducted testing for Southwest Fireproofing Products Co. on 7GP, 5GP, 5MD and 7HD cementitious fireproofing. Testing was conducted in accordance with ICC-ES, following the standard methods of AC 23: *Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials* as detailed in ASTM E937: *Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members*. This evaluation began April 14, 2009 and was completed September 21, 2009.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by: 
Randy Sundby
Project Engineer, Construction Products

Reviewed by: 
Rhonda Byrne
Operations Manager



Southwest Fireproofing Products Co.
Project No. 3171245MID-022

October 23, 2009
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APPENDIX A

Test Data

Test: Corrosion of Steel by Spray Fire-Resistive Material (SFRM) Applied to Structural Members

Test Date: Room Temp Corrosion on 4.23.09 Humidified Corrosion on 4.30.09

Client: Southwest Fireproofing

Project #: 3171245

Product: 5GP

Date of Manufacture: Prepared on 3.3.09

Test Standard(s): ASTM E937-93 (2005) - *Standard Test Method for Corrosion of Steel by SFRM Applied to Structural Members*

Conditioning: Samples I & III: 20 days at 68 ± 9°F and a Relative Humidity < 60 %

Samples II & IV: 240 hours at 95 ± 3°F and a Relative Humidity of 95 ± 3%

Equipment: Scale: Ohaus Scout Pro 4001 - MID Asset #1120 (Calibration due 11/18/09)

Conditioning: Cincinnati Sub-Zero Z32+ Environmental Chamber - MID Asset #1059 (Cal. due 11/10/09)

Area of Sheet: 64 in² 41290.24 mm²

	Initial Weights (g)			Final Weights (g)		
	Bare	Coated	Gal. Steel	Bare	Coated	Gal. Steel
I	802.9	801.6	822.9	800.7	800.8	822.5
II	798.7	813.4	822.9	797.1	812.7	821.5
III	801.2	805.6	828.6	799.3	805.2	828.0
IV	797.3	814.5	816.3	796.2	813.8	815.4

	Average Weight Loss (g/mm ²)		
	Bare	Coated	Gal. Steel
I	0.0000533	0.0000194	0.0000097
II	0.0000388	0.0000170	0.0000339
III	0.0000460	0.0000097	0.0000145
IV	0.0000266	0.0000170	0.0000218



Southwest Fireproofing Products Co.
Project No. 3171245MID-022

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REVISION SUMMARY

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REPORT NUMBER: 3171245MID-022
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EVALUATION CENTER

Intertek
8431 Murphy Drive
Middleton, WI 53562

RENDERED TO

Southwest Fireproofing Products Co.
5119 Edith Blvd. NE
Albuquerque, NM 87107

PRODUCT EVALUATED: 5GP cementitious fireproofing
EVALUATION PROPERTY: ICC-ES AC 23: Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in ASTM E760: Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

Report of Testing 5GP cementitious fireproofing for compliance with the applicable requirements of the following criteria: ICC-ES AC 23: Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in ASTM E760: Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

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2 Introduction

Intertek has conducted testing for Southwest Fireproofing Products Co. on Type 5GP cementitious fireproofing. Testing was conducted in accordance with ASTM E 760 - 92 (Reapproved 2005) Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members. This evaluation began April 14, 2009 and was completed September 21, 2009.

The thickness and density of the tested specimens were determined in accordance with ASTM E 605 – 93 (Reapproved 2006) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

Results are reported in accordance with the ASTM Standard specified above and compared to the conditions of acceptance provided in ICBO Evaluation Service, Inc. publication AC23, "Acceptance Criteria For Spray-Applied Fire-Protection Materials".

3 Test Samples

3.1. SAMPLE SELECTION

The products to be tested arrived by commercial carrier shipment from Southwest Fireproofing Products Co. in factory packed bags with inspection agency labels. The required mixing of materials and spray application to the specified test substrate was performed by the client with Intertek observation at the Intertek Evaluation Center.

Aluminum sulfate hydrate (alum) solution was prepared with 6.39 lbs of alum and 10 lbs of water. The alum was dissolved in water and the solution filtered for injection at nozzle to accelerate gypsum set.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The dry fireproofing material as removed from bags was mixed with water to produce a coherent pumpable slurry. The mixed material was transferred to the hopper of a pump and pumped to a spray nozzle at the end of the hose. Alum solution was injected into the slurry within the hose close to the nozzle and the slurry was dispensed through the spray nozzle orifice with air injected through an air stem for dispersion.

The product identification, material weight, mix water used and the substrate of application are identified in the following table.

Product - Bag No.	Net material weight (lbs)	Water added (lbs)	Substrate of Application
Type 5GP - Bag 1	45.5	87	Concrete deck assembly per ASTM E 760

4 Testing and Evaluation Methods

The samples cured for 30 days at nominal conditioning levels.

4.1. TEST STANDARD 1 – ASTM E760

The substrate was a cellular deck assembly with concrete topping and a galvanized flat surface. The sample was conditioned at a standard temperature and humidity until cured and dry. The fireproofing thickness is 3/4" minimum per criteria. The sample was handled with special care to avoid impact before testing due to its size and weight.

The specimen was placed on the test supports with the sprayed fire-resistive material as the lower surface and the concrete as the upper surface. The 60-lb. leather bag filled with shot was hoisted to a height of 4 ft, measured from the upper face of the specimen to the bottom of the bag. The bag was dropped, thus applying an impact load once to the middle of the upper face of the specimen.

4.2. TEST STANDARD 2 – ASTM E605

Thickness of each sample was determined by inserting the penetrating pin of the thickness gage perpendicular into the sprayed fire-resistive material. When the pin touched the surface of the substrate, the disk was moved to the surface of the sprayed fire-resistive material with sufficient force to register the average plane. The gage was withdrawn to read the thickness.

The densities of the tested materials were determined by removing all of the in-place material from the substrate within a measured test area of the sample, conditioning the removed material as specified by the Standard and calculating the density from the thickness, area and weight.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

E760 – Effect of Impact on Bonding

Prior to testing, the fireproofing was inspected for general appearance and condition. It was firm and monolithic with no observable defects. After testing, specimen had no change in appearance. Test results are tabulated below.

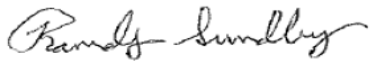
Sample Tested	Fireproofing Thickness (in.)	Density (lbs/ft ³)	Appearance after testing
5 GP	0.75	14.7	No change in appearance No spalling, delamination or cracking


6 Conclusion

Intertek has conducted testing for Southwest Fireproofing Products Co. on 5GP cementitious fireproofing. Testing was conducted in accordance with ICC-ES, following the standard methods of AC 23: *Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials* as detailed in ASTM E760: *Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members*. This evaluation began April 14, 2009 and was completed September 21, 2009.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by: 
Randy Sundby
Project Engineer, Construction Products

Reviewed by: 
Rhonda Byrne
Operations Manager



Southwest Fireproofing Products Co.
Project No. 3171245MID-022

October 23, 2009
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APPENDIX A

Test Data

ASTM E760 DATA SHEET

Project #: 3171245

Client: SWF

Date: 4/13/09

Tech/Reviewer: Randy

Sample: .5GP

Temp: 73.9 F

Weight of bag (Asset # 1137): 60 lbs

Cal. Due date: N/A

Thickness of SFRM: 3/4 in minimum

Density of SFRM: 14.74 (lbs/ft³)

Place the specimen on the test supports with the SFRM as the lower surface and the concrete as the upper surface.

Hoist the impact bag to a height of 4 feet (1.2 m) as measured from the upper face of the specimen to the bottom of the impact bag.

Apply an impact load once to the middle of the upper face of the specimen by dropping the impact bag.

Describe the final physical condition and appearance of the SFRM after impact: Appearance did not change.

Note any spalling, delamination, cracking: No Cracking, spalling, delamination

REVISION SUMMARY

DATE	SUMMARY
October 23, 2009	Original

REPORT NUMBER: 3171245MID-022
ORIGINAL ISSUE DATE: October 23, 2009

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Intertek
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RENDERED TO

Southwest Fireproofing Products Co.
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Albuquerque, NM 87107

PRODUCT EVALUATED: 5MD cementitious fireproofing
EVALUATION PROPERTY: ICC-ES AC 23: Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in ASTM E736: Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

Report of Testing 5MD cementitious fireproofing for compliance with the applicable requirements of the following criteria: ICC-ES AC 23: *Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials* as detailed in ASTM E736: *Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members*

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2 Introduction

Intertek has conducted testing for Southwest Fireproofing Products Co. on Type 5MD cementitious fireproofing. Testing was conducted in accordance with ASTM E 736 - 00 (Reapproved 2006) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members. This evaluation began April 14, 2009 and was completed September 21, 2009.

The thickness and density of the tested specimens were determined in accordance with ASTM E 605 – 93 (Reapproved 2006) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

Results are reported in accordance with the ASTM Standard specified above and compared to the conditions of acceptance provided in ICBO Evaluation Service, Inc. publication AC23, "Acceptance Criteria For Spray-Applied Fire-Protection Materials".

3 Test Samples

3.1. SAMPLE SELECTION

The products to be tested arrived by commercial carrier shipment from Southwest Fireproofing Products Co. in factory packed bags with inspection agency labels. The required mixing of materials and spray application to the specified test substrate was performed by the client with Intertek observation at the Intertek Evaluation Center.

Aluminum sulfate hydrate (alum) solution was prepared with 6.39 lbs of alum and 10 lbs of water. The alum was dissolved in water and the solution filtered for injection at nozzle to accelerate gypsum set.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The dry fireproofing material as removed from bags was mixed with water to produce a coherent pumpable slurry. The mixed material was transferred to the hopper of a pump and pumped to a spray nozzle at the end of the hose. Alum solution was injected into the slurry within the hose close to the nozzle and the slurry was dispensed through the spray nozzle orifice with air injected through an air stem for dispersion.

The product identification, material weight, mix water used and the substrate of application are identified in the following table.

Product - Bag No.	Net material weight (lbs)	Water added (lbs)	Substrate of Application
Type 5MD - Bag 3	58	95	Steel plates per ASTM E 736

4 Testing and Evaluation Methods

The samples cured for 30 days at nominal conditioning levels.

4.1. TEST STANDARD 1 – ASTM E736

The substrate was a 16 gauge galvanized steel sheet measuring 12" x 12". The sample was conditioned at 72 hours at a room temperature of 68 +/- 18 °F followed by oven drying at 110 +/- 10°F at humidity not exceeding 60% until a constant weight was reached. The fireproofing thickness is 1/2" to 1". The sample was restrained to prevent flexing during the test. The hook and pulling force was centered in the cap.

Adhesive was applied at sufficient volume to secure the plug, and the plug was placed against the surface of the sprayed fire-resistive material. The cap was supported until the adhesive dried, and any excess adhesive was removed. The sample was placed with the sprayed fire-resistive material facing up, and restrained to prevent movement and flexing. A scale with hook was engaged and exerted an increasing force perpendicular to the surface until failure occurred.

4.2. TEST STANDARD 2 – ASTM E605

Thickness of each sample was determined by inserting the penetrating pin of the thickness gage perpendicular into the sprayed fire-resistive material. When the pin touched the surface of the substrate, the disk was moved to the surface of the sprayed fire-resistive material with sufficient force to register the average plane. The gage was withdrawn to read the thickness.

The densities of the tested materials were determined by removing all of the in-place material from the substrate within a measured test area of the sample, conditioning the removed material as specified by the Standard and calculating the density from the thickness, area and weight.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

E736 – Cohesion / Adhesion

Test results including the applied force, cup diameter, calculated Adhesive/Cohesive force, failure mode and the sample thickness and density are tabulated below. The density of the sample was determined on a second plate sprayed with the same batch of wet material prepared at the same time as the test sample.

The specified 3 1/4 inch bottle screw cap called for by the ASTM Standard Procedure was replaced by the 1 3/8 inch wood disk described in Appendix B of AWCI Technical Manual 12-A for fireproofing having bond strengths exceeding 1,146 psf.

Sample Tested	Applied force (lbf)	Cap diameter (in)	Cohesive Adhesive force (psf)	Mode of failure	Thickness (in.)	Density (lbs/ft ³)
5 MD	41.20916	1 3/8	3996	Cohesive	0.75 avg	22.42

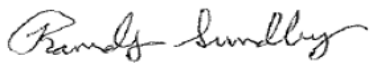
6 Conclusion


The Adhesive/Cohesive force at failure of the tested material is 3996 pounds per square foot. This exceeds the 150 psf or 20 times the weight of the fireproofing requirement of ICC-ES AC23 acceptance criteria for this physical property.

Intertek has conducted testing for Southwest Fireproofing Products Co. Type 5MD cementitious fireproofing. Testing was conducted in accordance ASTM E 736 - 00 (Reapproved 2006) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members. This evaluation began April 14, 2009 and was completed September 21, 2009.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by: 
Randy Sundby
Project Engineer, Construction Products

Reviewed by: 
Rhonda Byrne
Operations Manager



Southwest Fireproofing Products Co.
Project No. 3171245MID-022

October 23, 2009
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APPENDIX A

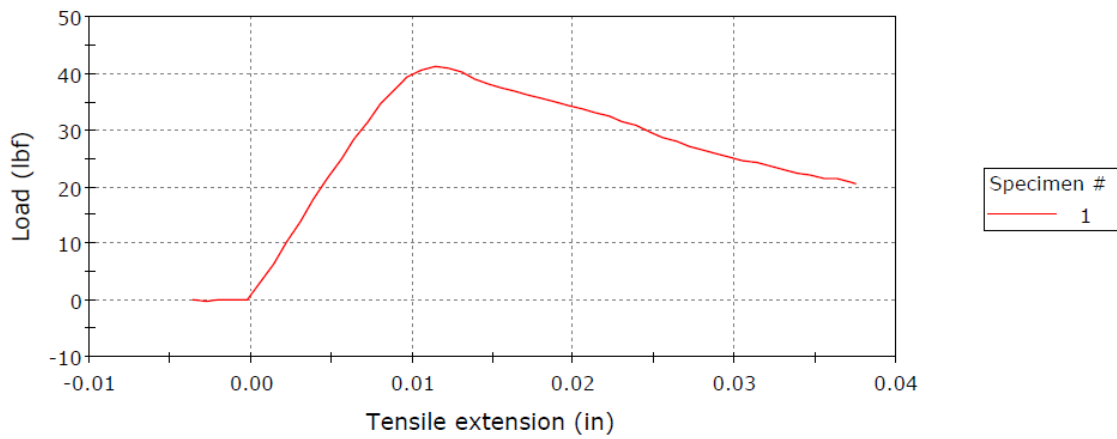
Test Data

Southwest Fireproofing Products Company
Project #3171245
April 15, 2009

ASTM E736: Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

Type 5MD
Substrate: 16ga Galvanized Steel Sheet, 12"x12"
Fireproofing Thickness: 1/2" to 1"

Specimen 1 to 1



	Maximum Load (lbf)
1	41.20916
Mean	41.20916

REVISION SUMMARY

DATE	SUMMARY
October 23, 2009	Original

REPORT NUMBER: 3171245MID-022
ORIGINAL ISSUE DATE: October 23, 2009

EVALUATION CENTER

Intertek
8431 Murphy Drive
Middleton, WI 53562

RENDERED TO

Southwest Fireproofing Products Co.
5119 Edith Blvd. NE
Albuquerque, NM 87107

PRODUCT EVALUATED: 5GP cementitious fireproofing
EVALUATION PROPERTY: ICC-ES AC 23: Acceptance Criteria for Spray-
Applied and Intumescent Mastic Coating Fire-Protection Materials
ASTM E 859-93 (Reapproved 2006) Air Erosion of Sprayed Fire-Resistive
Materials

Report of Testing 5GP cementitious fireproofing for compliance with the applicable requirements of the following criteria: ICC-ES AC 23: *Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in. ASTM E 859-93 (Reapproved 2006) Air Erosion of Sprayed Fire-Resistive Materials*

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2 Introduction

Intertek has conducted testing for Southwest Fireproofing Products Co. on Type 7GP cementations fireproofing. Testing was conducted in accordance with ASTM E 859-93 (Reapproved 2006) Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members. This evaluation began April 14, 2009 and was completed September 21, 2009.

The thickness and density of the tested specimens were determined in accordance with ASTM E 605 – 93 (Reapproved 2006) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

Results are reported in accordance with the ASTM Standard specified above and compared to the conditions of acceptance provided in ICBO Evaluation Service, Inc. publication AC23, "Acceptance Criteria For Spray-Applied Fire-Protection Materials".

3 Test Samples

3.1. SAMPLE SELECTION

The products to be tested arrived by commercial carrier shipment from Southwest Fireproofing Products Co. in factory packed bags with inspection agency labels. The required mixing of materials and spray application to the specified test substrate was performed by the client with Intertek technical personnel observation at the Intertek Evaluation Center.

Aluminum sulfate hydrate (alum) solution was prepared with 6.39 lbs of alum and 10 lbs of water. The alum was dissolved in water and the solution filtered for injection at nozzle to accelerate gypsum set.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The SFRM was applied in accordance with the manufacturer's published instructions and were representative of application in the field. The dry fireproofing material as removed from bags was mixed with water to produce coherent pump able slurry. The mixed material was transferred to the hopper of a pump and pumped to a spray nozzle at the end of the hose. Alum solution was injected into the slurry within the hose close to the nozzle and the slurry was dispensed through the spray nozzle orifice with air injected through an air stem for dispersion.

The product identification, material weight, mix water used and the substrate of application are identified in the following table. The product was prepared and conditioned for testing in the as sprayed surface condition. No finishing techniques such as tamping, toweling, surface sealing or similar operations were made.

Product	Substrate of Application
Type 5GP	Rigid plates per ASTM E 859

4 Testing and Evaluation Methods

The samples cured for 30 days at nominal conditioning levels.

4.1. TEST STANDARD 1 –ASTM E859

The substrate was a rigid plate to cover a 4 square foot duct opening with a minimum 2 inch edge overlap. The sample was cured and dried to a constant weight. The fireproofing thickness is 3/4" +/- 1/8". The sample was handled with special care to avoid damage to the fireproofing surface.

After following the procedure for E605 (below), the first sample was measured to determine the thickness and density. The collecting filter was dried at 120f for one hour, weighed and placed in the apparatus. The second sample was placed into the duct opening so the face of the sample and inside face of the duct are flush and in the same plane. The tube was placed 4-in. from the upstream edge of the sample at the center line of the duct and 2-in. below the top side of the duct. The blower was maintained at a velocity of 20 ft/sec. At 1, 6 and 24 hours, the blower was stopped. The collecting filter was removed, folded and dried at 120f. The test was continued until a constant weight was reached.

4.2. TEST STANDARD 2 –ASTM E605

Thickness of the duplicate sample was determined by inserting the penetrating pin of the thickness gage perpendicular into the sprayed fire-resistive material. When the pin touched the surface of the substrate, the disk was moved to the surface of the sprayed fire-resistive material with sufficient force to register the average plane. The gage was withdrawn to read the thickness.

The density of the materials on the duplicate sample was determined by removing all of the in-place material from the substrate within a measured test area of the sample, conditioning the removed material as specified by the Standard and calculating the density from the thickness, area and weight.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

E859 – Air Erosion

A weight of the collecting filter before and after each test period is tabulated below along with the accumulative weight gains and the tested specimen thickness and density. Calculation of sample weight loss per square foot is not specified in the ASTM Standard, but was added at the sponsors request to provide information specified in ICC-ES AC23. Test results are tabulated below.

Type 5GP Filter weights	Weight prior to test (g)	Weight after 1hour (g)	Weight prior to test (g)	Weight after 6 hours (g)	Weight prior to test (g)	Weight after 24 hours (g)	Thickne ss (in.)	Density (lbs/ft3)
Original test	11.465	11.487	11.482	11.499	11.499	11.499	0.75	14.06
Weight gain	NA	0.022	NA	0.017	NA	0	NA	NA
Accumulative weight gain	NA	0.022	NA	0.039	NA	0.039	NA	NA
Sample weight loss g/sq.ft.	NA	0.006	NA	0.009	NA	0.009	NA	NA

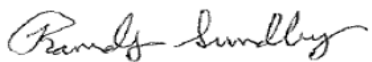
6 Conclusion

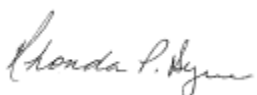
Intertek has conducted testing for Southwest Fireproofing Products Co. on Type 7GP cementations fireproofing. Testing was conducted in accordance with ASTM E 859-93 (Reapproved 2006) Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members. This evaluation began April 14, 2009 and was completed September 21, 2009.

The thickness and density of the tested specimens were determined in accordance with ASTM E 605 – 93 (Reapproved 2006) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

Results are reported in accordance with the ASTM Standard specified above and compared to the conditions of acceptance provided in ICBO Evaluation Service, Inc. publication AC23, "Acceptance Criteria For Spray-Applied Fire-Protection Materials".

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

Reported by: 
Randy Sundby
Project Engineer, Construction Products

Reviewed by: 
Rhonda Byrne
Operations Manager



Southwest Fireproofing Products Co.
Project No. 3171245MID-022

October 23, 2009
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APPENDIX A

Test Data

ASTM E859 DATA SHEET

Project #: 3171245 Client: SWF

Date: 4-14-09 Tech/Reviewer: RS/JT

Sample: 5GP Temp: 73°F, 35% R.H.

Scale (# 1045) cal due date: 2-4-10

Thickness of SFRM: 3/4 in minimum

Density of SFRM: 14.06 (lbs/ft³)

Weight of dried filter prior to test (grams): 11.465

Weight of dried filter after 1 hour (grams): 11.487

Weight of dried filter prior to test (grams): 11.482

Weight of dried filter after 6 hours (grams): 11.499

Weight of dried filter prior to test (grams): 11.499

Weight of dried filter after 24 hours (grams): 11.499

If the collecting filter continues to show a weight gain at 24 hours, continue the test, making measurements every 24 hours until a constant weight is reached.

REVISION SUMMARY

DATE	SUMMARY
October 23, 2009	Original

REPORT NUMBER: 3171245MID-022
ORIGINAL ISSUE DATE: June 11, 2010

EVALUATION CENTER

Intertek
8431 Murphy Drive
Middleton, WI 53562

RENDERED TO

Southwest Fireproofing Products Co.
5119 Edith Blvd. NE
Albuquerque, NM 87107

PRODUCT EVALUATED: 5MD cementitious fireproofing
EVALUATION PROPERTY: ICC-ES AC 23: Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in ASTM E761: Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.

Report of Testing 5MD cementitious fireproofing for compliance with the applicable requirements of the following criteria: ICC-ES AC 23: Acceptance Criteria for Spray-Applied and Intumescent Mastic Coating Fire-Protection Materials as detailed in ASTM E761: Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.

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5	TESTING AND EVALUATION RESULTS	4
5.1.	RESULTS AND OBSERVATIONS.....	4
6	CONCLUSION	5

2 Introduction

Intertek has conducted testing for Southwest Fireproofing Products Co. on Type 5MD cementitious fireproofing. Testing was conducted in accordance with ASTM E 761 - 92 (Reapproved 2005) Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members. This evaluation began April 14, 2009 and was completed June 11, 2010.

The thickness and density of the tested specimens were determined in accordance with ASTM E 605 – 93 (Reapproved 2006) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

Results are reported in accordance with the ASTM Standard specified above and compared to the conditions of acceptance provided in ICBO Evaluation Service, Inc. publication AC23, "Acceptance Criteria For Spray-Applied Fire-Protection Materials".

3 Test Samples

3.1. SAMPLE SELECTION

The products to be tested arrived by commercial carrier shipment from Southwest Fireproofing Products Co. in factory packed bags with inspection agency labels. The required mixing of materials and spray application to the specified test substrate was performed by the client with Intertek observation at the Intertek Evaluation Center.

Aluminum sulfate hydrate (alum) solution was prepared with 6.39 lbs of alum and 10 lbs of water. The alum was dissolved in water and the solution filtered for injection at nozzle to accelerate gypsum set.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The dry fireproofing material as removed from bags was mixed with water to produce a coherent pumpable slurry. The mixed material was transferred to the hopper of a pump and pumped to a spray nozzle at the end of the hose. Alum solution was injected into the slurry within the hose close to the nozzle and the slurry was dispensed through the spray nozzle orifice with air injected through an air stem for dispersion.

The product identification, material weight, mix water used and the substrate of application are identified in the following table.

Product - Bag No.	Net material weight (lbs)	Water added (lbs)	Substrate of Application
Type 5MD - Bag 1	58	95	Steel plates per ASTM E 761

4 Testing and Evaluation Methods

The samples cured for 30 days at nominal conditioning levels.

4.1. TEST STANDARD 1 – ASTM E761

The substrate was a 16 gauge galvanized steel sheet measuring 7" x 24". The sample was conditioned at 72 hours at a room temperature of 68 +/- 18°F followed by oven drying at 110 +/- 10°F at humidity not exceeding 60% until a constant weight was reached. The fireproofing thickness is a minimum of 3/4" with a variation of thickness less than or equal to +/- 1/8". The surface was evened on opposite ends of the sample for testing.

The load (bearing block) of 0.1 psi was applied perpendicular to the face of the sample. The initial thickness, the distance between the plane bearing surface of the assembly and the steel plane, was recorded. The sample was compressed until a deformation of 10% or ultimate load was reached.

4.2. TEST STANDARD 2 – ASTM E605

Thickness of each sample was determined by inserting the penetrating pin of the thickness gage perpendicular into the sprayed fire-resistive material. When the pin touched the surface of the substrate, the disk was moved to the surface of the sprayed fire-resistive material with sufficient force to register the average plane. The gage was withdrawn to read the thickness.

The densities of the tested materials were determined by removing all of the in-place material from the substrate within a measured test area of the sample, conditioning the removed material as specified by the Standard and calculating the density from the thickness, area and weight.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

E761 – Compressive Strength

Sample Number	Compressive Load (lbf)	Compressive Strength (psi)	Maximum extension (in)	Mode of failure	Thickness (in.)	Density (lbs/ft ³)
5 MD (1)	2638.08157	73.28	.10073	Maximum extension	1.0	22.42
5 MD (2)	2537.19556	70.48	.10027	Maximum extension	1.0	22.42


6 Conclusion


The average compressive strength of the two determinations is 71.9 pounds per square inch. This equates to 10354 pounds per square foot which exceeds the 750 psf requirement of ICC-ES AC23 acceptance criteria for this physical property.

Intertek has conducted testing for Southwest Fireproofing Products Co. Type 5MD cementitious fireproofing. Testing was conducted in accordance ASTM E 761 - 92 (Reapproved 2005) Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members. This evaluation began April 14, 2009 and was completed June 11, 2010.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by: 
Randy Sundby
Project Engineer, Construction Products

Reviewed by: 
Rhonda Byrne
Operations Manager
Reviewer



Southwest Fireproofing Products Co.
Project No. 3171245MID-022

June 11, 2010
Page 6 of 8

APPENDIX A

Test Data

ASTM E761 DATA SHEET

Project #: 3171245

Client: SWF

Date: 6/11/10

Tech/Reviewer: Randy

Sample: .5MD

Temp: 74.2 F

Thickness of SFRM: 1 inch.

Density of SFRM: 22.42 (lbs/ft³)

Mode of Failure: Maximum Extension

	Compressive load at Maximum Compressive extension (lbf)	Maximum Compressive extension (in)
1	2638.08157	0.10073
2	2537.19556	0.10027

REVISION SUMMARY

DATE	SUMMARY
June 11, 2010	Original



TEST REPORT

ASTM E84-09

**SURFACE BURNING
CHARACTERISTICS
OF BUILDING MATERIALS**

Report No. 3171245SAT-003A Rev.1

Type 5GP Cementitious Fireproofing

June 8, 2009

Prepared for:
Southwest Fireproofing Products Co.
5119 Edith Blvd.Ne
Albuquerque, NM 87107

**Intertek Testing
Services NA, Inc.**
16015 Shady Falls Road
Elmendorf, TX 78112
(voice) 210-635-8100
(fax) 210-635-8101
[www.intertek-
etlsemko.com](http://www.intertek-etlsemko.com)

ABSTRACT

Test Specimen:	Type 5GP Cementitious Fireproofing		
Test Standard:	ASTM E84-09		
Test Date:	May 07, 2009		
Test Sponsor:	Southwest Fireproofing Products Co.		
Test Results:	FLAME SPREAD INDEX	=	0
	SMOKE DEVELOPED INDEX	=	0
		=	N/A ft. Beyond Burners Centerline

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Teodoro Alvarado Jr
E84 Operator

June 8, 2009

Reviewed and approved:

Miguel Zamarripa
Project Manager

June 8, 2009



I INTRODUCTION

This report describes the results of the ASTM E84-09 Standard Test Method for SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS, a method for determining the comparative surface burning behavior of building materials. This test is applicable to exposed surfaces, such as ceilings or walls, provided that the material or assembly of materials, by its own structural quality or the manner in which it is tested and intended for use, is capable of supporting itself in position or being supported during the test period.

The purpose of the method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke density developed are reported, however, there is not necessarily a relationship between these two measurements.

“The use of supporting materials on the underside of the test specimen may lower the flame spread index from that which might be obtained if the specimen could be tested without such support. This method may not be appropriate for obtaining comparative surface burning behavior of some cellular plastic materials. Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by testing materials that remain in place.”

This test method is also published under the following designations:

ANSI 2.5
NFPA 255
UBC 8-1 (42-1)
UL 723

This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.

II PURPOSE

The ASTM E84-09 (25 foot tunnel) test method is intended to compare the surface flame spread and smoke developed measurements to those obtained from tests of fiber cement board and select grade red oak flooring. The test specimen surface (18 inches wide and 24 feet long) is exposed to a flaming fire exposure during the 10 minute test duration, while flame spread over its surface and density of the resulting smoke are measured and recorded. Test results are presented as the computed comparisons to the standard calibration materials.

The furnace is considered under calibration when a 10 minute test of red oak decking will pass flame out the end of the tunnel in five minutes, 30 seconds, plus or minus 15 seconds. Fiber cement board forms the zero point for both flame spread and smoke developed indexes, while the red oak flooring smoke developed index is set as 100.

III DESCRIPTION OF TEST SPECIMEN

Specimen Identification:	Type 5GP Cementitious Fireproofing
Date Received:	3/27/2009
Date Prepared:	3/27/2009
Conditioning (73°F & 50% R.H.):	41 days
Specimen Width (in):	24
Specimen Length (ft):	24
Specimen Thickness:	1.3400-in.
Material Weight:	N/A oz./sq. yd
Total Specimen Weight:	216-lbs.
Adhesive or coating application rate:	N/A

Mounting Method:

The specimen was self-supporting and was placed directly on the inner ledges of the tunnel.

Specimen Description:

The test specimen was described by the client as the "Type 5GP Cementitious Fireproofing received in bags with Underwriters Laboratories Inc. Labels. The Type 5GP was mixed with water and spray applied at the Intertek Laboratories to cement board Provided by Intertek with observation by laboratory personnel. Mixing and spraying used typical job site equipment and job experienced workmen. The samples were left with Intertek personnel for curing, conditioning and testing". The specimen consisted of (5) 5-ft. long x 24-in. wide x 1.3400-in. thick, panels. The specimen was identified by the client as "Type 5GP Cementitious Fireproofing." The samples were received in good condition.

IV TEST PROCEDURE

The tests were conducted in accordance with the procedures outlined in the American Society for Testing and Materials ASTM E84-09. The self-supporting specimens were placed directly on the tunnel ledges. As required by the standard, one or more layers of 0.25 inch thick reinforced concrete board was placed on top of the test sample between the sample and the tunnel lid. After the tests, the samples were removed from the tunnel, examined and disposed of.

The test was conducted on 5/7/2009, and not witnessed by any third parties.

V TEST RESULTS

The test results, computed on the basis of observed flame front advance and electronic smoke density measurements are presented in the following table. In recognition of possible variations and limitations of the test method, the results are computed to the nearest number divisible by five, as outlined in the test method for smoke developed index results greater than 200 the calculated value is rounded to the nearest 50 points.

While no longer a part of this standard test method, the Fuel Contributed Value has been computed, and may be found on the computer printout sheet in the Appendix.

Test Specimen	E84 (10 Minute) Flame Spread Index	E84 (10 Minute) Smoke Developed Index	NFPA 703 (30Minute) ft
Fiber Cement Board	0	0	N/A
Red Oak Flooring		100	N/A
Type 5GP Cementitious Fireproofing	0	0	N/A

The data sheets are included in the Appendix. These sheets are actual print-outs of the computerized data system which monitors the ASTM E84-09 apparatus, and contain all calibration and specimen data needed to calculate the test results.

VI OBSERVATIONS

During the test, the specimen was observed to behave in the following manner: sample never ignited. The test continued for the 10:00 duration.

After the test the specimen was observed to be damaged as follows:

The panels were discolored from 0-ft. -4.5-ft. and no visible damage was seen from 4.5-ft. -24-ft.

APPENDIX

ASTM E84-09

Data Sheets

Client: SOUTHWEST FIRE PROOF INC
Date: 5-7-09
Project Number: 3171245SAT-003A Rev.1
Test Number: 1
Operator: TA/AM
Specimen ID: TYPE 5 GP CEMENTITIOUS FIRE-PROOFING, CEMENT BOARD
PRODUCT THE SPECIMEN WAS SELF-SUPPORTING

TEST RESULTS

FLAMESPREAD INDEX: 0
SMOKE DEVELOPED INDEX: 0

SPECIMEN DATA

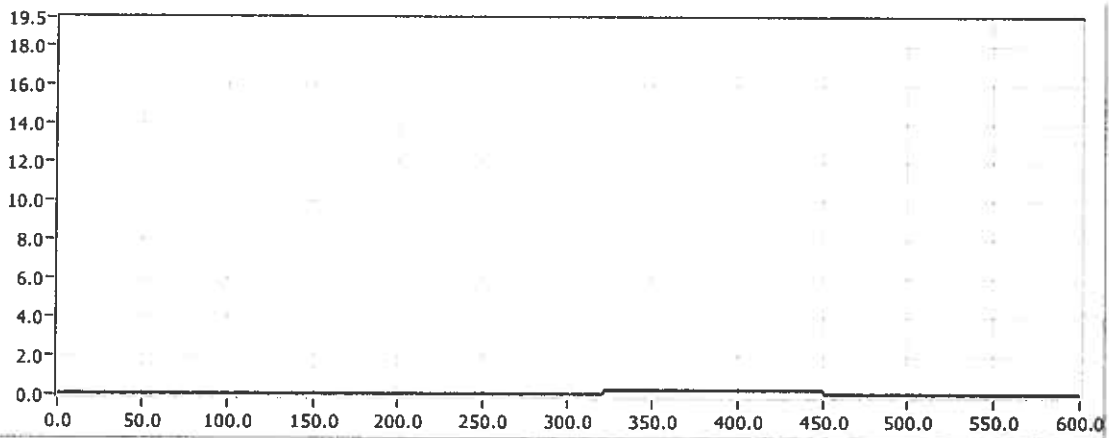
Time to Ignition (sec): 0
Time to Max FS (sec): 327
Maximum FS (feet): 0.3
Time to 980 F (sec): Never Reached
Time to End of Tunnel (sec): Never Reached
Max Temperature (F): 587
Time to Max Temperature (sec): 547
Total Fuel Burned (cubic feet): 50.94

FS*Time Area (ft*min): 1.6
Smoke Area (%A*min): 0.8
Unrounded FSI: 0.8

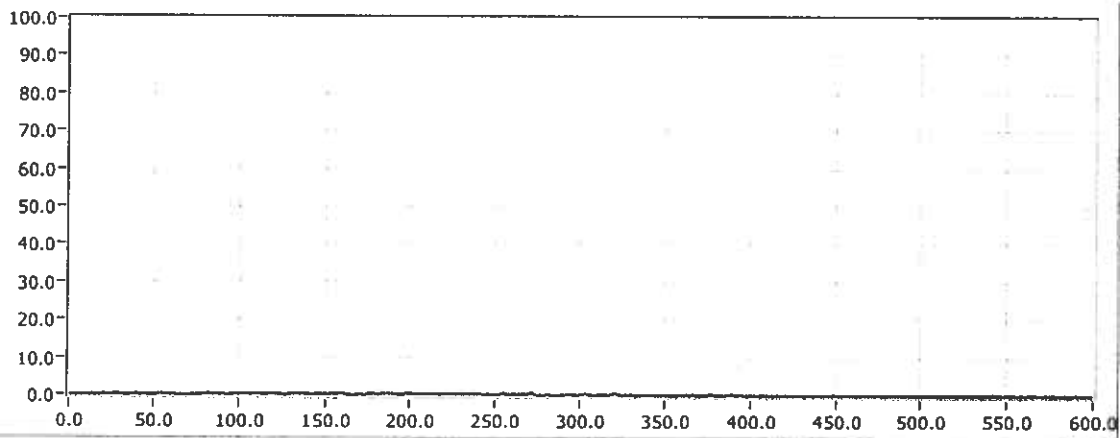
CALIBRATION DATA

Time to Ignition of Last Red Oak (Sec): 39.0
Red Oak Smoke Area (%A*min): 111.0

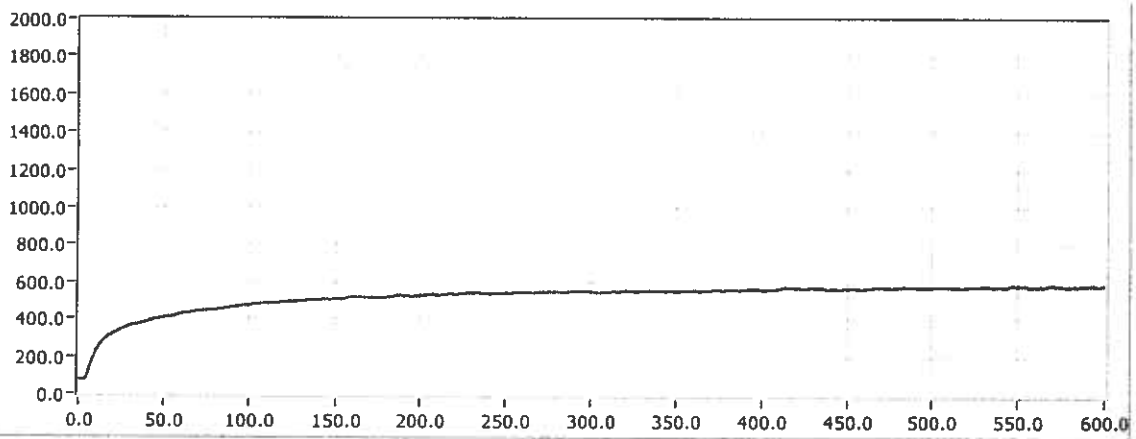
FLAME SPREAD (ft)



Smoke (%A)



Temperature (°F)



Time (sec)

600



INTERNATIONAL SPECIALTY PRODUCTS

BIOCIDES TECHNICAL SERVICE REPORT

ASTM G-21

**“DETERMINING THE RESISTANCE OF
SYNTHETIC POLYMERIC MATERIALS TO
FUNGI”**

TYPE 5MD

**SOUTHWEST FIREPROOFING PRODUCTS
COMPANY**

CRM # 3807

DATE: 8/1/2007

This information is furnished without warranty, representation, inducement or license of any kind, except that it is accurate to the best of International Specialty Products (ISP) knowledge or obtained from sources believed by International Specialty Products (ISP) to be accurate, and International Specialty Products (ISP) does not assume any legal responsibility for use or reliance upon same. Tests should be carried out only by chemists or chemically qualified lab technicians. Before using any chemical, read its label and Material Safety Data Sheet.



OBJECTIVE

To evaluate customer submitted Type 5MD with Nuocide 960 @ 0.025% for resistance to fungal defacement in accordance with ASTM G-21 entitled “*Determining the Resistance of Synthetic Polymeric Materials to Fungi*”.

EXPERIMENTAL

The evaluation for resistance to fungal growth was performed in accordance with the American Society for Testing and Materials, Method G-21, entitled “*Determining Resistance of Synthetic Polymeric Materials to Fungi*”. Briefly, the samples were prepared as per customers mixing instructions. After mixing, the samples were poured into forms and allowed to dry for 48 hours. After drying, the samples were removed from the forms and placed on the surface of solidified potato dextrose agar plates and inoculated with a mixed fungal spore suspension containing *Aspergillus niger* (ATCC 9642), *Penicillium funiculosum* (ATCC 11797), *Chaetomium globosum* (ATCC 6205), *Gliocladium virens* (ATCC 9645), and *Aureobasidium pullulans* (ATCC 15233). All plates were incubated at 28° C, 85-90% relative humidity for four weeks. Observations of growth were recorded weekly.

DISCUSSION

The results of the ASTM G-21 test are presented in Table I. Growth ratings are on a scale of “0” to “4” where “0” corresponds to no growth and “4” corresponds to heavy growth (60-100% coverage).

CONCLUSION

Sample 1 No Nuocide 960 (Control) was susceptible to defacement.

Sample 2 With Nuocide 960 @ 0.025% provided complete resistance to fungal defacement.



RESULTS

TABLE I

FUNGAL RESISTANCE EVALUATION ASTM G-21													
Sample ID#	Nuocide 960 Loading	Fungal Growth rating											
		Week #1			Week #2			Week #3			Week #4		
		<u>1</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>4</u>
#1	0.0%	0	0	0	3	3	3	3	3	3	3	3	3
#2	0.025%	0	0	0	0	0	0	0	0	0	0	0	0

Legend:

1. Growth Ratings:

- 0 = None
- 1 = Traces of Growth (less than 10%)
- 2 = Light Growth (10-30%)
- 3 = Medium Growth (30-60%)
- 4 = Heavy Growth (60% to complete coverage)

2. The samples were tested in triplicate.



**Testing carried out
by:**

Name: Daniel H. Brown

Position: Senior Microbiologist

Project Dates:

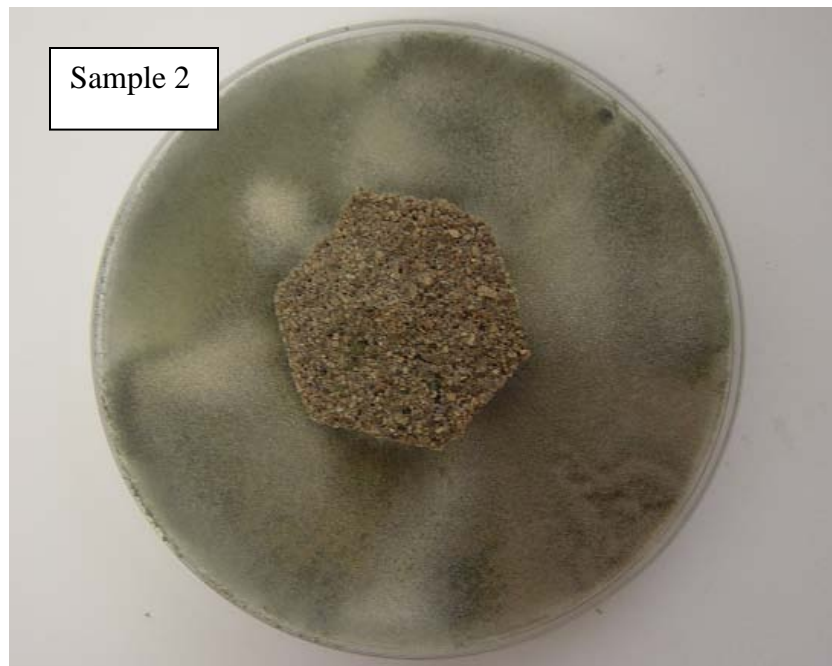
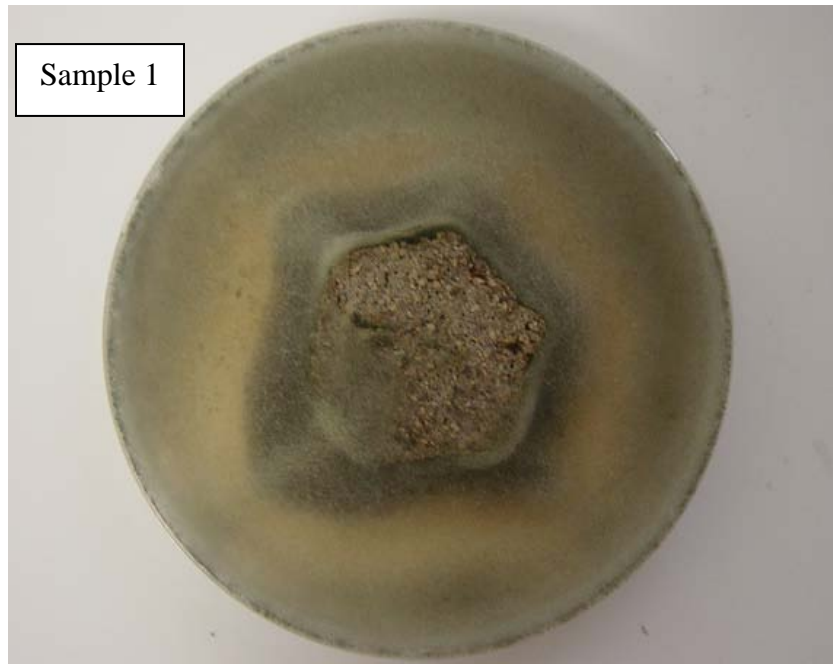
Start: 6/15/2007

Finish: 7/13/2007

Reference:

N.B. Ref. 11555-28

Figure A
ASTM G-21
Fungal Resistance





SOUTHWEST FIREPROOFING PRODUCTS CO

CRM # 3807

Date 8/1/2007

COPIES TO:

Gadstar

J. Bailey (orig)

R. Fahmy

G. Hertenberger

P. Varin

K. Winkowski

W. Woods



REPORT
ETL TESTING LABORATORIES, INC.

INDUSTRIAL PARK

CORTLAND, NEW YORK 13045

Order No. 117227-405

Date: September 5, 1996

Report No.: 568300

Rendered To:

A/D Fire Protection Systems, Inc.
420 Tapscott Road
Ontario, Canada M1B1Y4

STANDARD USED: ASTM E136-92

TEST: Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

AUTHORIZATION OF TEST: The test was authorized by A/D Fire Protection Systems, Inc. Purchase Order No. 010567, dated August 7, 1996, by Don Falconer, representing the client A/D Fire Protection Systems, Inc..

DATE OF TEST: August 29, 1996

SPECIMEN DESCRIPTION: The test was performed on a specimen identified by the client as A/D Type 5.

An independent organization testing for safety, performance, and certification.

All services undertaken subject to the following general policy: Reports are submitted for exclusive use of the clients to whom they are addressed. Their significance is subject to the adequacy and representative character of the samples and to the comprehensiveness of the tests, examinations or surveys made. No quotations from reports or use of ETL's name is permitted except as expressly authorized by ETL in writing.

INTRODUCTION

This report describes the results of the ASTM E136-82 Standard Test Method for Behavior of Materials In a Vertical Tube Furnace at 750°C, performed on specimens, previously described, submitted by A/D Fire Protection Systems, Inc.. The specimens were prepared and test evaluations were conducted at ETL Testing Laboratories, Inc.

TEST OBJECTIVE AND PROCEDURE

The method covers the performance of elementary building materials when exposed to 1382°F (750°C), to indicate those materials which do not act to aid combustion or add appreciable heat to an ambient fire. It is not intended to apply to laminated or coated materials. It should be used to measure and describe the properties of materials, products or systems in response to heat and flame under controlled laboratory conditions and should not be used for the description or appraisal of the fire hazards of materials, products or systems under actual fire conditions.

Each Specimen (minimum of four) is exposed to a temperature of $1382 \pm 10^\circ\text{F}$ ($750 \pm 5.5^\circ\text{C}$) in the center of an air stream in a furnace tube at an air velocity of 10 ft/minute (3 m/minute) for a 15-minute period. The surface and internal temperature of the specimen was measured. The weight loss is also determined.

TEST REQUIREMENTS

To be reported as passing this test, the following criteria must be met:

1. Specimen interior and surface temperatures do not increase more than 54°F (30°C) above the initial furnace temperature;
2. No flaming from the specimen after 30 seconds;
3. Average specimen weight loss less than 50 percent.

RESULTS:Client: A/D Fire Protection Systems, Inc.Date Received: 08/06/96Order No.: 117227-405Date Completed: 08/29/96Test No.: 1Engineer: Amy RiceDamage (yes/no): NoTechnician: Lisa PhinneySPECIMEN DESCRIPTION: A/D Type 5Specimen Length (in): 2 Width(in): 1 1/2 Thickness(in): 1 1/2**RESULTS:**EQUILIBRIUM FURNACE TEMP. PRIOR TO TESTING = 758 °C

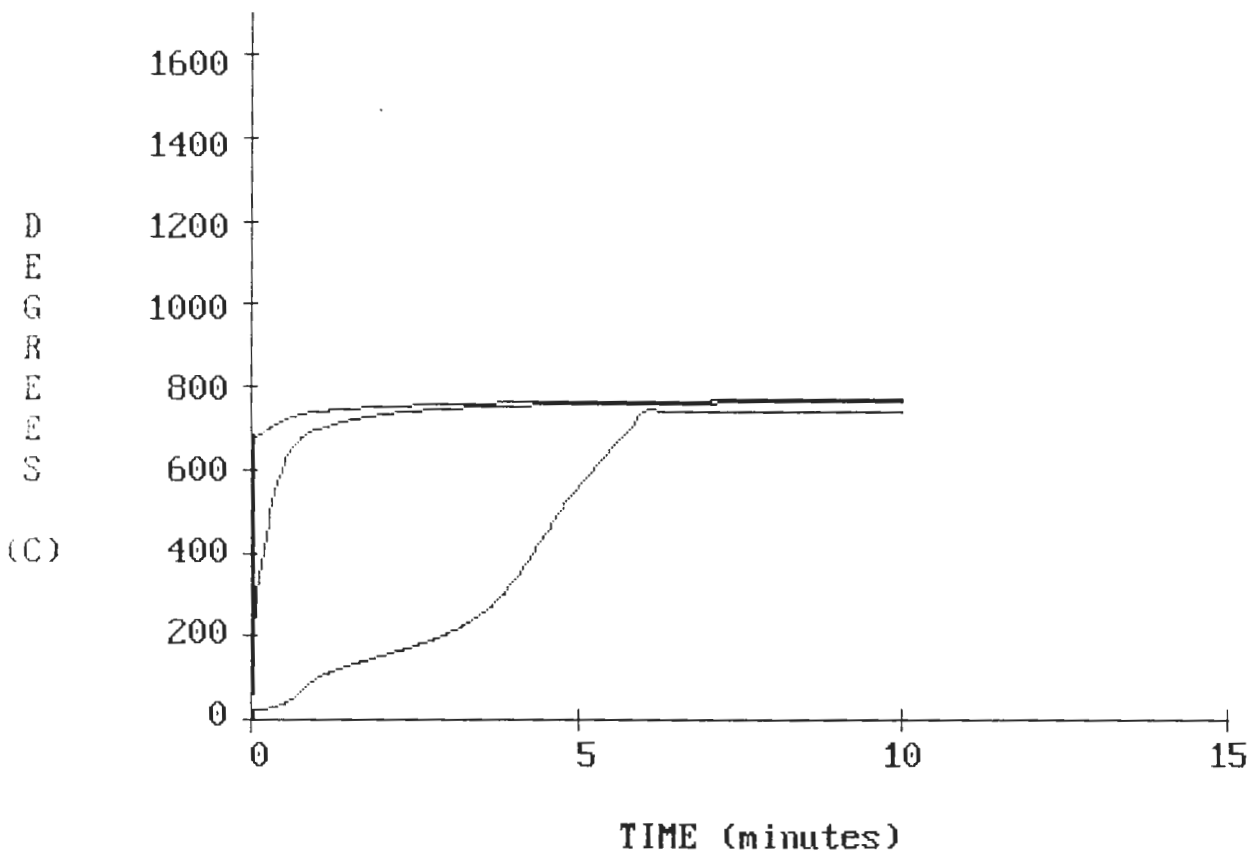
THERMOCOUPLE #1 IS LOCATED IN THE CENTER OF THE TEST SPECIMEN
 THERMOCOUPLE #2 IS LOCATED ON THE SURFACE OF THE TEST SPECIMEN
 THERMOCOUPLE #3 IS THE AIR TEMP. INSIDE THE FURNACE DURING THE TEST

SPECIMEN NUMBER

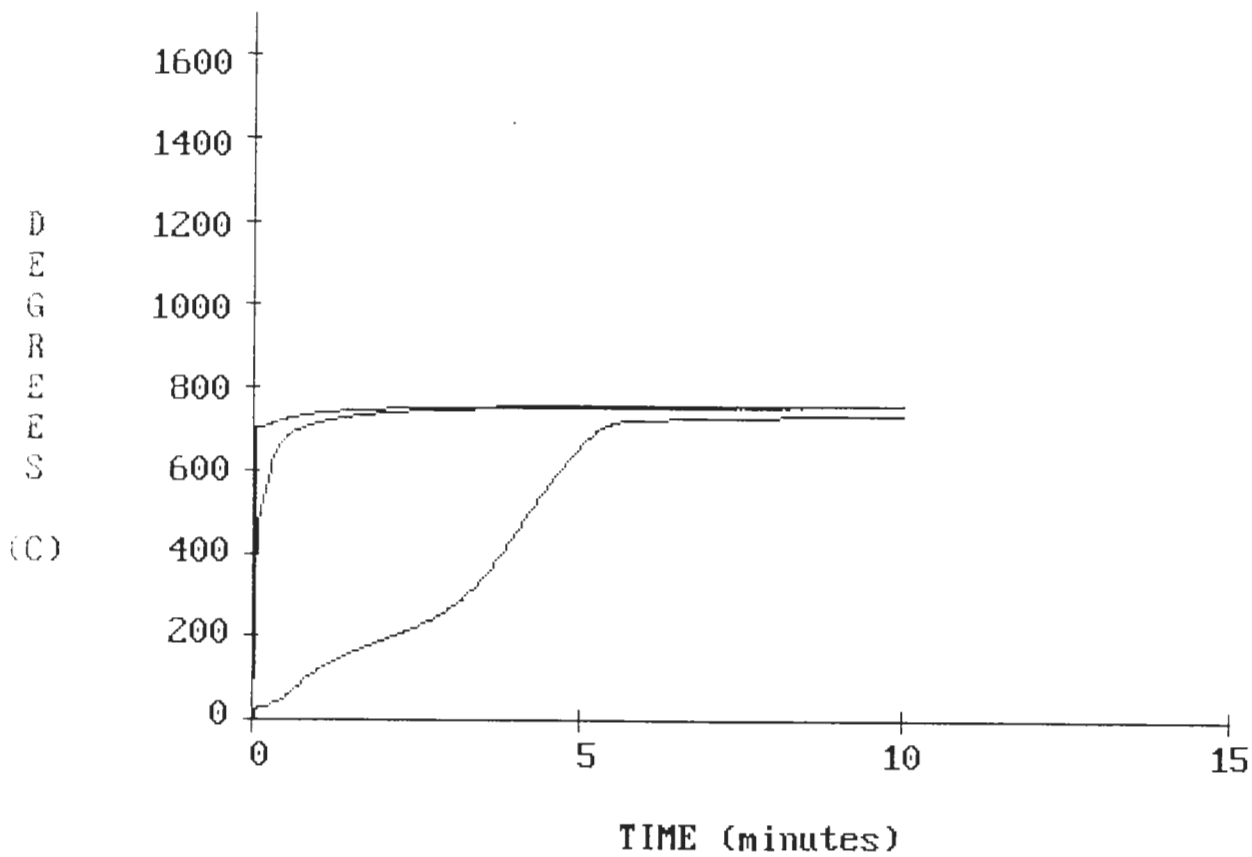
	1	2	3	4
INITIAL WEIGHT (g)	27.77	26.43	25.36	27.17
FINAL WEIGHT (g)	23.93	22.37	21.56	23.23
TIME TO FLAMING (min:sec)	---	---	---	---
FLAME OUT (min:sec)	---	---	---	---
MAX. TEMP. THERMOCOUPLE #1 (°C)	744.2	733.5	733.2	736.1
MAX. TEMP. THERMOCOUPLE #2 (°C)	764.2	755.9	764.2	758.4
TEMP. RISE ABOVE INITIAL FURNACE TEMP. #1 (°C)	---	---	---	---
TEMP. RISE ABOVE INITIAL FURNACE TEMP. #2 (°C)	6.2	---	6.2	0.4
PASS/FAIL	PASS	PASS	PASS	PASS

RESULTS (Cont'd):

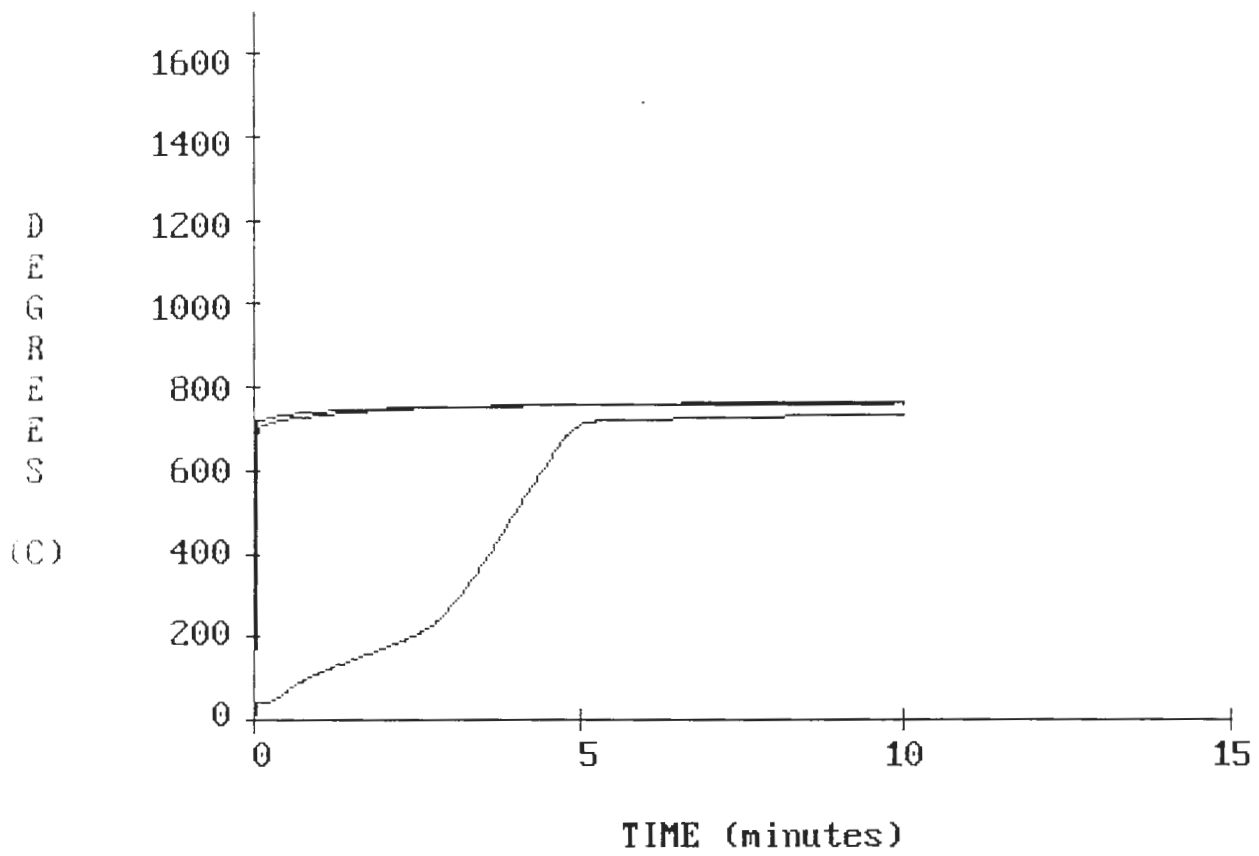
Temperature vs. Time



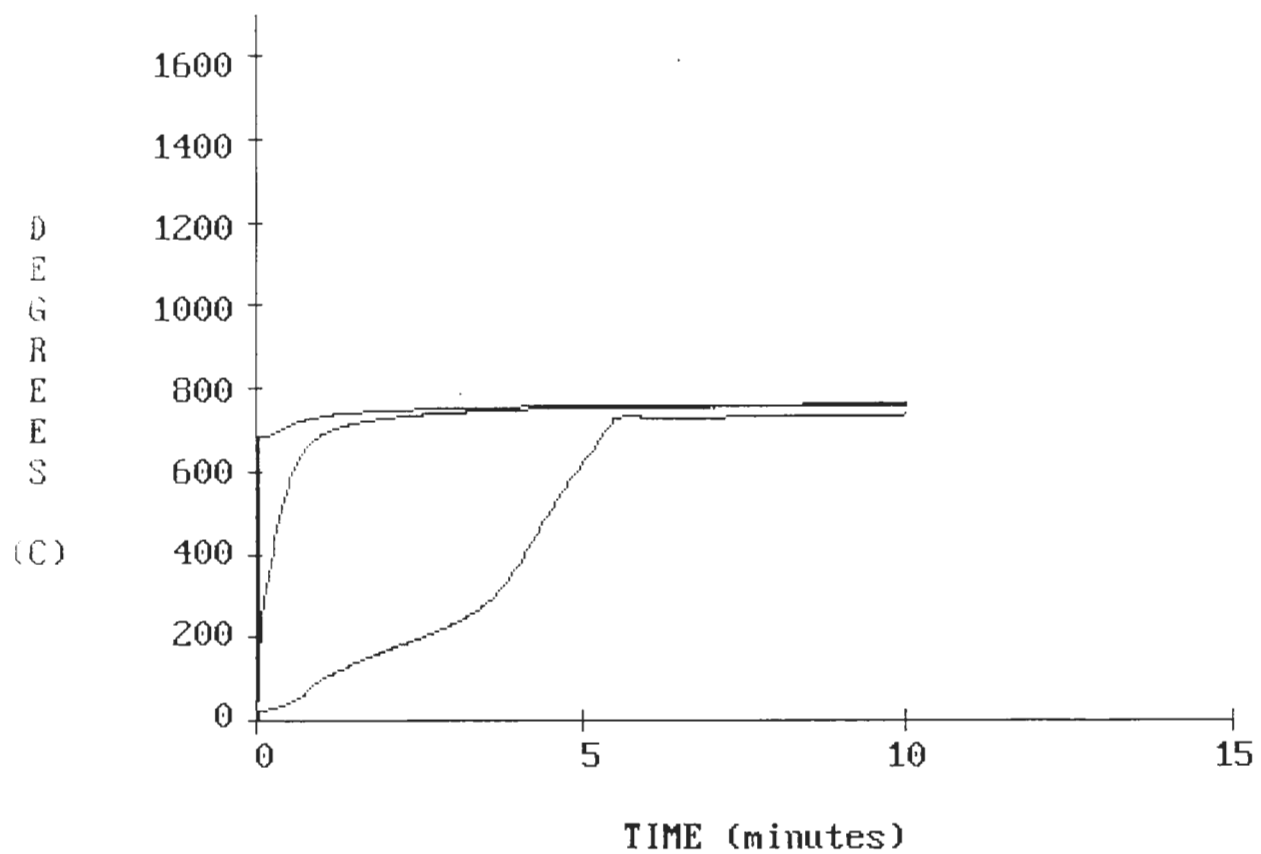
Temperature vs. Time



Temperature vs. Time



Temperature vs. Time



CONCLUSION

The A/D Type 5, previously described, submitted by A/D Fire Protection Systems, Inc., was evaluated in accordance with ASTM E136-82 Standard Test Method for Behavior of Materials In a Vertical Tube Furnace at 750°C on 08/29/96.


The specimen was judged to be in compliance with the applicable standard.

Reviewed by:

Lisa Phinney
Technician
Performance Division

jaa

Approved by:


Amy Rice
Engineer
Performance Division