

January 22, 1969

TESTING PROJECT: 4-913

SUBJECT: Evaluate coating systems for repairing welds on Carbo Zinc 11 primed steel plate.

REFERENCE: Lloyd Parks - Duke Power

PURPOSE: To determine whether coatings could be applied over Carbo Zinc 11 and hand cleaned welds with various degrees of rust.

CONCLUSION: From the results of this test, it seems that:

- 1) Both systems evaluated performed satisfactorily under the described MHA conditions over the various degrees of rusted hand cleaned panels tested.
- 2) Because of the slightly superior performance and greater ease of application, the Carbo Weld 11 plus Phenoline 305 system is recommended.

PROCEDURE:

- A) Test Coupons
  - 1) 2 - 2-1/2" x 6" x 3/8" sandblasted steel. Panels welded together.
  - 2) 1 coat of Carbo Zinc 11 was applied, leaving 1" bare steel on each side of the weld.
- B) Rusting of Welds

Panels were exposed in the water fog cabinet to varying degrees of rust. Colored photographs were taken to illustrate the degree of rusting. These degrees are described as:

  - 1) Control - not exposed but kept under laboratory conditions (to simulate conditions if the welds were covered with protective tape).
  - 2) Slight Rust - uniform but fine rust.
  - 3) Heavy Rust - uniform dense rust, no scale.

**carboline**  
C O M P A N Y

TESTING PROJECT: 4-913 (Contd.)

January 22, 1969

PROCEDURE -  
CONTD.

C) Panel Preparation  
After exposure for rusting, panels were prepared as follows:

- 1) Thorough hand wirebrushing.
- 2) Degreasing with trichloroethylene.
- 3) Coating systems applied and cured.

D) Coating Systems  
 1) 1c Carbo Weld 11 1 mil  
     1c Phenoline 305 Finish 4 mils  
 2) 1c Carbo Zinc 11 3 mils  
     1c Phenoline 305 Finish 4 mils

RESULTS:

SYSTEMS		Heavy Rust		Light Rust		Control	
		Blisters	Adhesion	Blisters	Adhesion	Blisters	Adhesion
Carbo Weld 11 + Phenoline 305	Over bare steel	NE	Good	NE	Good	NE	Good
	Over-lapped over Carbo Zinc 11	2% Scattered Blisters	Good	NE	Good	NE	Good
Carbo Zinc 11 + Phenoline 305	Over bare steel	10% Scattered Blisters	Good	NE	Good	NE	Good
	Over-lapped over Carbo Zinc 11	10% Scattered Blisters	Fair	Few Scattered Blisters	Good	NE	Good

KEY: NE = No effect.

**carboline**  
C O M P A N Y

TESTING PROJECT: 4-913 (Contd.)

January 22, 1969

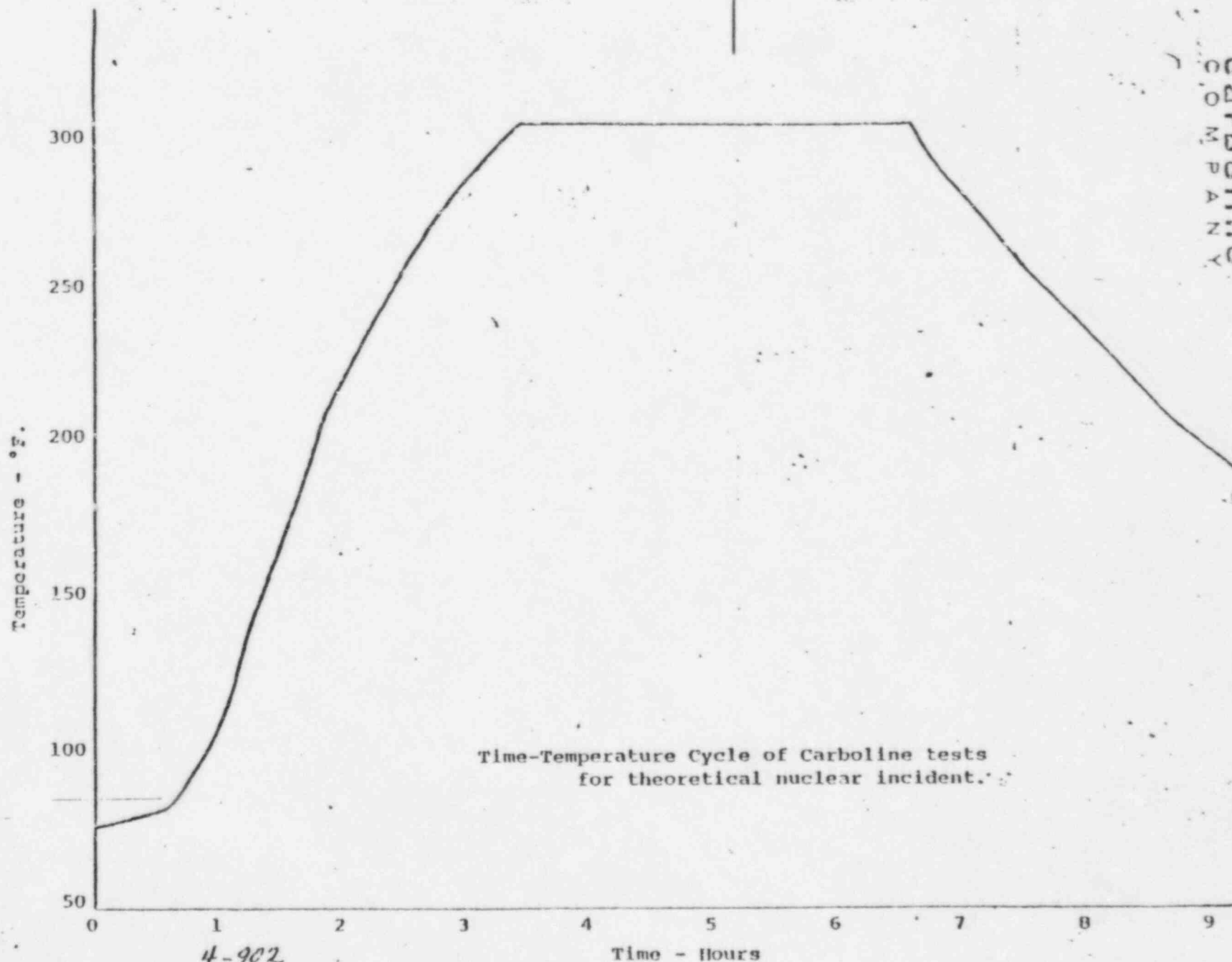
TEST  
EXPOSURE:

Panels were exposed for 3 hours at 285°F (see attached time-temperature curve) to the following solution:

3000 PPM Boron as Boric Acid  
1% Sodium Thiosulfate  
Adjust with NaOH to pH of 9.2-9.5

*David L. Krombach*  
David L. Krombach  
Testing Department

DLK/bcm  
Or: Testing Dept.  
xc: HDT  
cc: L. E. Parks (3) (with enclosure)  
cc: JFM  
cc: EWS  
cc: SLL-RRR  
cc: PSL-DCC-LG  
cc: File



Report 4-902

6801 Silsbee Avenue  
Post Office Box 33327  
Houston, Texas 77033  
(713) 644-5662 Telex: 775384

**AMERON**  
Protective Coatings  
Division

November 8, 1979


Mr. Gordon McPhail  
Brown & Root, Inc.  
P.O. Box 1001  
Glan Rose, Texas 76043

Dear Gordon:

Comanche Peak

Enclosed is a copy of LSR-1842 which DBA testing of the system CZ-11/Dimetecote 6/Amercoat 66 (samples 6a, 6b, 6A1, 6A2, and 6A3). A copy of this LSR had been sent earlier with my letter of August 24, 1979, concerning repair procedures using Amercoat 71.

Very truly yours,



Noel C. Duvic  
Area Technical Service Manager

NCD:gf  
Enc.

cc: H. H. Kline/Ameron-Brea  
R. R. McMurchy/Ameron-Houston  
G. Centofanti/Ameron-Houston

David Lewis - Ohio -

Manufacturer: Ameron  
Protective Coatings Division

Ameron Coatings Lab  
Date: August 19, 1977

Table 1. ODA Solution Composition, Distilled Water.

13,000 ppm Boric Acid  
2,000 ppm Lithium Hydroxide  
☒ Sodium Thiosulfate  
Sodium Hydroxide to pH 9.5 to 10.0 at 50°F

Table 2. ODA Test Conditions.

Time	Temperature (°F)	Pressure (psig)	Comments
Start	70	0	opened automatic steam valve
25 seconds	300	70	Start circulating pump & heaters
100 seconds	290	50-60	Released pressure
16 minutes	250	40	
2.75 hrs.	220	10	Closed steam valve
27.75 hrs.	160	0	
End of Test			

Approved: \_\_\_\_\_

Test Reference No. 1240

1001

1842-1 CZ-11 (SWEED BLAST)/77/66  
 1842-2 CZ-11 (SWEED BLAST)/77/66  
 1842-3 CZ-11/D-6/66  
 1842-4 CZ-11 (SWEED BLAST)/D-6/66  
 1842-5 CZ-11 (SWEED BLAST)/D-6/66  
 1842-6 CZ-11 (SWEED BLAST)/D-6/66  
 1842-7A CZ-11/D-6/66  
 1842-7B CZ-11/D-6/66  
 1842-7A1 CZ-11 (SWEED BLAST)/D-6/66  
 1842-7A2 CZ-11 (SWEED BLAST)/D-6/66  
 1842-7A3 CZ-11 (SWEED BLAST)/D-6/66  
 1842-8 CZ-11/D-6/66  
 1842-9A1 CZ-11 (SWEED BLAST)/D-6/66  
 1842-9A2 CZ-11 (SWEED BLAST)/D-6/66  
 1842-9A3 CZ-11 (SWEED BLAST)/77/66  
 1842-9A4 CZ-11 (SWEED BLAST)/77/66  
 1842-9A5 CZ-11 (SWEED BLAST)/77/66  
 1842-9A6 CZ-11 (SWEED BLAST)/77/66  
 1842-9A7 CZ-11 (SWEED BLAST)/77/66  
 1842-9A8 CZ-11 (SWEED BLAST)/77/66  
 1842-9A9 CZ-11 (SWEED BLAST)/77/66  
 1842-9B CZ-11/D-6/66  
 1842-9C CZ-11/D-6/66  
 1842-9D CZ-11/D-6/66  
 1842-9E CZ-11 (SWEED BLAST)/77/66  
 1842-9F CZ-11 (SWEED BLAST)/77/66  
 1842-9G CZ-11 (SWEED BLAST)/77/66  
 1842-9H CZ-11 (SWEED BLAST)/77/66  
 1842-9I CZ-11 (SWEED BLAST)/77/66  
 1842-9J CZ-11 (SWEED BLAST)/77/66  
 1842-9K CZ-11 (SWEED BLAST)/77/66  
 1842-9L CZ-11 (SWEED BLAST)/77/66  
 1842-9M CZ-11 (SWEED BLAST)/77/66  
 1842-9N CZ-11 (SWEED BLAST)/77/66  
 1842-9O CZ-11 (SWEED BLAST)/77/66  
 1842-9P CZ-11 (SWEED BLAST)/77/66  
 1842-9Q CZ-11 (SWEED BLAST)/77/66  
 1842-9R CZ-11 (SWEED BLAST)/77/66  
 1842-9S CZ-11 (SWEED BLAST)/77/66  
 1842-9T CZ-11 (SWEED BLAST)/77/66  
 1842-9U CZ-11 (SWEED BLAST)/77/66  
 1842-9V CZ-11 (SWEED BLAST)/77/66  
 1842-9W CZ-11 (SWEED BLAST)/77/66  
 1842-9X CZ-11 (SWEED BLAST)/77/66  
 1842-9Y CZ-11 (SWEED BLAST)/77/66  
 1842-9Z CZ-11 (SWEED BLAST)/77/66

Applied according to application  
 instructions for the product to  
 recommended dry film thickness.

DATE AND TIME DURING COATING OR FINISH APPLIED

1. PRODUCT TO BE TESTED CZ-11, DOWCOR 6, AEROCOR 71, AEROCOR 80, AEROCOR 85
2. TEST SUBSTRATE Steel SIZE: 2 x 5 x 1/16"
3. SURFACE PREPARATION (DESCRIPTION): Sandblasted SSPC SP-10 or better
4. PRODUCT DATA: SWEEP NO. (S): 1 AS LISTED
5. DATE AND TIME DURING COATING OR FINISH APPLIED

TEST METHOD: STANDARD METHOD

Date: August 19, 1977

American Coatings Lab.

DLA



Date: August 10, 1971TEST PANEL PREPARATION DATA1. PRODUCT TO BE TESTED CZ-11, Dimetacote 6, Amercoat 71, Amercoat 902. TYPE SUBSTRATE: Steel SIZE: 2 x 6 x 1/16"3. SURFACE PREPARATION (describe): Sandblasted SSPC SP-10 or better4. PRODUCT DATA: SAMPLE No. (s) as listed

5. DATE AND TIME CURING COMPOUND OR PRIMER APPLIED

<u>SAMPLE NUMBER</u>	<u>COATING SYSTEM</u>	<u>APPLICATION METHOD</u>	<u>CONDITIONS 3/M (TEMP, RH, etc.)</u>	<u>THICKNESS (mil.)</u>	<u>TIME (hrs.)</u>
1842- 9a	CZ-11/66				
1842- 9b	CZ-11/66				
1842-10a	D-6 (aged)/66				
1842-10b	D-6 (aged)/66				
1842-10c	D-6 (aged)/66				
1842-11a	D-6 (24 hrs.)/66				
1842-11b	D-6 (24 hrs.)/66				
1842-11c	D-6 (24 hrs.)/66				
1842-11d	D-6 (24 hrs.)/66				
1842-12a	D-6 (24 hrs.)/90				
1842-12b	D-6 (24 hrs.)/90				
1842-12c	D-6 (24 hrs.)/90				
1842-12d	D-6 (24 hrs.)/90				

Applied according to application  
instructions for the products to  
recommended dry film thickness.

6. CURING CONDITIONS: AMBIENT TEMP        °F REL. HUMIDITY        %MINIMUM CURE        DAYS AFTER TOPCOAT APPLICATION7. TEST PROCEDURE: ANSI N101.2 - per attached PSA conditions8. TESTING PERFORMED BY: Amaron Protective Coatings Division DATE SUBMITTED 1971

\* Typical ambient laboratory conditions.  
Specific temperature and humidity not  
recorded.

TEST REPORT NO. 1010



Manufacturer Aercon

Address 1000

Protective Coatings Division

Date August 19, 1977

SYSTEM IDENTIFICATION:

X

STEEL

CONCRETE COX

TEST RESULTS: All samples scribed

SAMPLE NO.	COATING SYSTEM	CBA PHASE	RESULTS
1842- 1	CZ-11 (aged)/71/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 2	CZ-11 (sweep blast)/71/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 3	CZ-11/D-6/66	1/2 Spray-1/2 Immersed	One #4 blister at edge
1842- 4	CZ-11 (sweep blast)/D-6/66	1/2 Spray-1/2 Immersed	Five #7 blisters both sides
1842- 5a	CZ-11 (cured 24 hrs.)/71/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 5b	CZ-11 (cured 24 hrs.)/71/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 5A1	CZ-11 (sweep blast)/71/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 5A2	CZ-11 (sweep blast)/71/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 5A3	CZ-11 (sweep blast)/71/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 6a	CZ-11/D-6/66	1/2 Spray-1/2 Immersed	One #2 blister
1842- 6b	CZ-11/D-6/66	1/2 Spray-1/2 Immersed	Two #2 blisters
1842- 6A1	CZ-11 (sweep blast)/D-6/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 6A2	CZ-11 (sweep blast)/D-6/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 6A3	CZ-11 (sweep blast)/D-6/66	1/2 Spray-1/2 Immersed	Two #2 blisters
1842- 7a	CZ-11/D-6/66	1/2 Spray-1/2 Immersed	Coating intact-no defect
1842- 7b	CZ-11/D-6/66	1/2 Spray-1/2 Immersed	Coating intact-no defect

Approved

Test Report No. 1842

Manufacturer Ameron  
Protective Coatings Division

Ameron Coating Lab  
 Date August 19, 1977

SYSTEM IDENTIFICATION: X STEEL CONCRETE & MUR

SSA TEST RESULTS: All samples scribed

<u>SAMPLE NO:</u>	<u>COATING SYSTEM</u>	<u>SSA PHASE</u>	<u>COMMENT</u>
1842- 7A1	CZ-11 (sweep blast)/ D-6/90	1/2 Spray-1/2 immersed	Coating intact-no defect
1842- 7A2	CZ-11 (sweep blast)/ D-6/90	1/2 Spray-1/2 immersed	Coating intact-no defect
1842- 7A3	CZ-11 (sweep blast)/ D-6/90	1/2 Spray-1/2 immersed	Coating intact-no defect
1842- 8a	CZ-11/90	1/2 Spray-1/2 immersed	Coating intact-no defect
1842- 8b	CZ-11/90	1/2 Spray-1/2 immersed	Coating intact-no defect
1842- 9a	CZ-11/66	1/2 Spray-1/2 immersed	Coating intact-no defect
1842- 9b	CZ-11/66	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-10a	D-6 (aged)/66	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-10b	D-6 (aged)/66	1/2 Spray-1/2 immersed	Two #6 blisters
1842-10c	D-6 (aged)/66	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-10d	D-6 (aged)/66	1/2 Spray-1/2 immersed	Medium #2 blisters one side
1842-11a	D-6 (24 hrs.)/66	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-11b	D-6 (24 hrs.)/66	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-11c	D-6 (24 hrs.)/66	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-11d	D-6 (24 hrs.)/66	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-12a	D-6 (24 hrs.)/90	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-12b	D-6 (24 hrs.)/90	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-12c	D-6 (24 hrs.)/90	1/2 Spray-1/2 immersed	Coating intact-no defect
1842-12d	D-6 (24 hrs.)/90	1/2 Spray-1/2 immersed	Coating intact-no defect

Approved JK

Test Report No. 1842

Testing Project # 01514

SURFACE BURNING CHARACTERISTICS OF  
NINE COATING SYSTEMS

SUBMITTED BY:

JOHNS-MANVILLE SALES CORPORATION  
RESEARCH & DEVELOPMENT CENTER  
KEN-CARYL RANCH, DENVER, COLORADO 80217

FOR  
CARBOLINE COMPANY

PREPARED BY:

K.N. Smith

K.N. SMITH  
SENIOR RESEARCH ENGINEER

APPROVED BY:

G.R. Kinzer

G.R. KINZER  
MANAGER, MATERIALS PERFORMANCE





Johns-Manville

Research and Development Center

Report No. 500-113

46.

Date August 12, 1977

Title: SURFACE BURNING CHARACTERISTICS OF NINE COATING SYSTEMS

Requested by: Carboline Company

#### SUMMARY

Surface burning characteristics tests, essentially as prescribed by ASTM E84-76a, were conducted on nine coating systems submitted by the Carboline Company, St. Louis, Missouri. Five samples had asbestos-cement board for the substrate and four were prepared over steel sheets.

#### OBJECTIVE

The objective of these tests was to evaluate the surface burning characteristics of nine coating systems. This evaluation was to consist of flame spread, fuel contributed, and smoke developed values.

#### MATERIAL

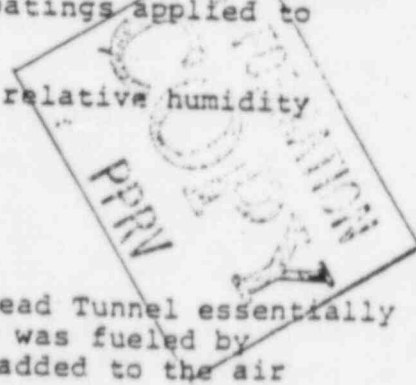
Nine sets of samples were submitted by the Carboline Company, 350 Hanley Industrial Court, St. Louis, Missouri. Each set consisted of three panels, each 21 x 96 in. Five sets had an asbestos-cement substrate and the other four had the coatings applied to 14 gage steel sheet.

The panels were stored at 70°F and 40 percent relative humidity for ten days prior to testing.

#### TEST METHOD

Each set of panels was tested in the Flame Spread Tunnel essentially as prescribed by ASTM E84. The igniting flame was fueled by methane and 6 cu ft per minute of oxygen were added to the air entering the tunnel.

The tunnel had not been rigorously calibrated, but tests on materials of known fire hazard classification produced good checks.





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Research and Development Center

Report No. 500-113

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## RESULTS

The results, along with the descriptions of the coating systems, are presented in the appendix.



AP-11X  
RESULTS OF E-84 TESTS ON COATING SYSTEMS  
PREPARED BY CARBOLINE COMPANY

Substrate	Surfacer	Finish Coat	Flame Spread	Fuel Contributed	Smoke Developed	Max Flame Adv., ft.	Time for Max. Flame Adv.
Steel	-	Carbo Zinc 11 1 coat-3 mils*	5.6	0	0.6	1	1:45

\*Average dry film thickness - applies to all thicknesses stated.

Note: These numerical flame spread ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

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