

# SOUTHWEST RESEARCH INSTITUTE®

6220 CULEBRA ROAD 78238-5166 • SAN ANTONIO, TEXAS, USA • 210.684.5111 • SWRI.ORG

CHEMISTRY AND CHEMICAL ENGINEERING

FIRE TECHNOLOGY DEPARTMENT  
WWW.FIRE.SWRI.ORG  
FAX (210) 522-3377

**FIRE PERFORMANCE EVALUATION OF *C286BLK-AA*, IN ACCORDANCE WITH NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 286, *STANDARD METHODS OF FIRE TESTS FOR EVALUATING CONTRIBUTION OF WALL AND CEILING INTERIOR FINISH TO ROOM FIRE GROWTH (2024)***

**MATERIAL ID: *C286BLK-AA***

**FINAL REPORT**  
**Consisting of 18 Pages**

**SwRI Project No. 01.28889.01.001**  
**Test Date: July 11, 2024**  
**Report Date: August 21, 2024**

**Prepared for:**

**Plaskolite LLC**  
**801 East Corey Street**  
**Scranton, PA 18505**

Submitted by:

Curtis Roberds  
Research Engineer  
Fire Resistance Section

Approved by:

Karen C. Carpenter, M.S., P.E.  
Director  
Fire Technology Department

This report is for the information of the client. It may be used in its entirety for the purpose of securing product acceptance from duly constituted approval authorities. This report shall not be reproduced except in full, without the written approval of SwRI. Neither this report nor the name of the Institute shall be used in publicity or advertising.



## ABSTRACT

Southwest Research Institute's® (SwRI®) Fire Technology Department, located in San Antonio, Texas, conducted testing in accordance with NFPA 286 test on a material identified as *C286BLK-AA* for Plaskolite LLC, located in Scranton, Pennsylvania. Testing was conducted on July 11, 2024. A summary of the results is provided in Table i.

**Table i. Summary of Test Results and NFPA 286 Annex C Limits.**

<b>Material ID</b>	<b>Flames Spread to Ceiling (40-kW Exposure)</b>	<b>Flames Spread to Extremity (160-kW Exposure)</b>	<b>Flashover Occurs</b>	<b>HRR<sub>PEAK</sub></b>	<b>Total Smoke Release</b>
<i>C286BLK-AA</i>	No	No	No	303 kW	119 m <sup>2</sup>
NFPA 286 Annex C Criteria	Not Allowed	Not Allowed	Not Allowed	≤ 800 kW	≤ 1,000 m <sup>2</sup>

Based on the test results, the material identified as *C286BLK-AA*, meets the acceptance criteria for interior wall finishes as described in Annex C of NFPA 286.

## 1.0 INTRODUCTION

This report presents the results testing performed in accordance with the 2024 Edition of National Fire Protection Association (NFPA) Standard 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*. Testing was conducted by Southwest Research Institute's® (SwRI®) Fire Technology Department, located in San Antonio, Texas for Plaskolite LLC, located in Scranton, Pennsylvania.

This test method is intended for the evaluation of the flammability characteristics of wall and ceiling interior finishes, other than textile wall coverings, where such materials constitute the exposed interior surfaces of buildings. It determines how much a material will contribute to a fire by measuring the amount of heat and smoke released, along with the combustion products released.

The test is conducted in a room measuring 8 × 12 × 8 ft high, instrumented to take temperature, smoke, heat flux, and rate of heat release measurements for the 15-min test duration. The ignition source is a propane gas burner calibrated to generate a 40-kW output for the first 5 min of testing, followed by a 160-kW output for the remaining 10 min of the test.

NFPA 286 does not have criteria for passing or failing a product due to performance during the fire test; however, Annex C of the standard lists the acceptance criteria used by NFPA 101, *Life Safety Code*, NFPA 5000, *Building Construction and Safety Code*, the *International Building Code*, and the *International Fire Code*. In general, this test is used as a tool for ranking material performance in a standard configuration. However, a major event that this test can identify is the propensity of a material to cause a standard room to “flashover,” which according to NFPA 286, is determined to have occurred when two of five specified conditions are attained. These conditions are listed in Table 2 with the test results. The material being tested may perform differently when it is placed in a room of a different size or shape, or in different environmental conditions. The test data cannot be generalized to apply to these different conditions.

The heat release rate is measured using the oxygen consumption technique. This technique requires the measurement of gas concentrations in the exhaust duct, as well as the volumetric flow of these gases. The products of combustion and entrained air are collected in a hood and extracted through an exhaust duct by a fan. A gas sample is drawn from the exhaust duct and analyzed for oxygen, carbon dioxide, and carbon monoxide concentrations. The gas temperature and differential pressure across a bi-directional probe are measured for calculating the mass flow rate of the exhaust gases.

Smoke release rate is determined by the measured light obscuration in the exhaust duct using a vertically oriented, white-light extinction photometer located close to the gas sampling point. Temperature measurements were recorded using thermocouples positioned according to NFPA 286. The results apply specifically to the specimens tested, in the manner tested, and not to similar materials, nor to the performance when used in combination with other materials.

## 2.0 MATERIAL DESCRIPTION

A pallet containing *C286BLK-AA* was received by SwRI on June 20, 2024. The samples were placed into a conditioned environment of  $70\text{ }^{\circ}\text{F} \pm 37\text{ }^{\circ}\text{F}$  and  $50\% \pm 5\%$  relative humidity until immediately prior to installation in the test room. Additional material details are provided in Table 1.

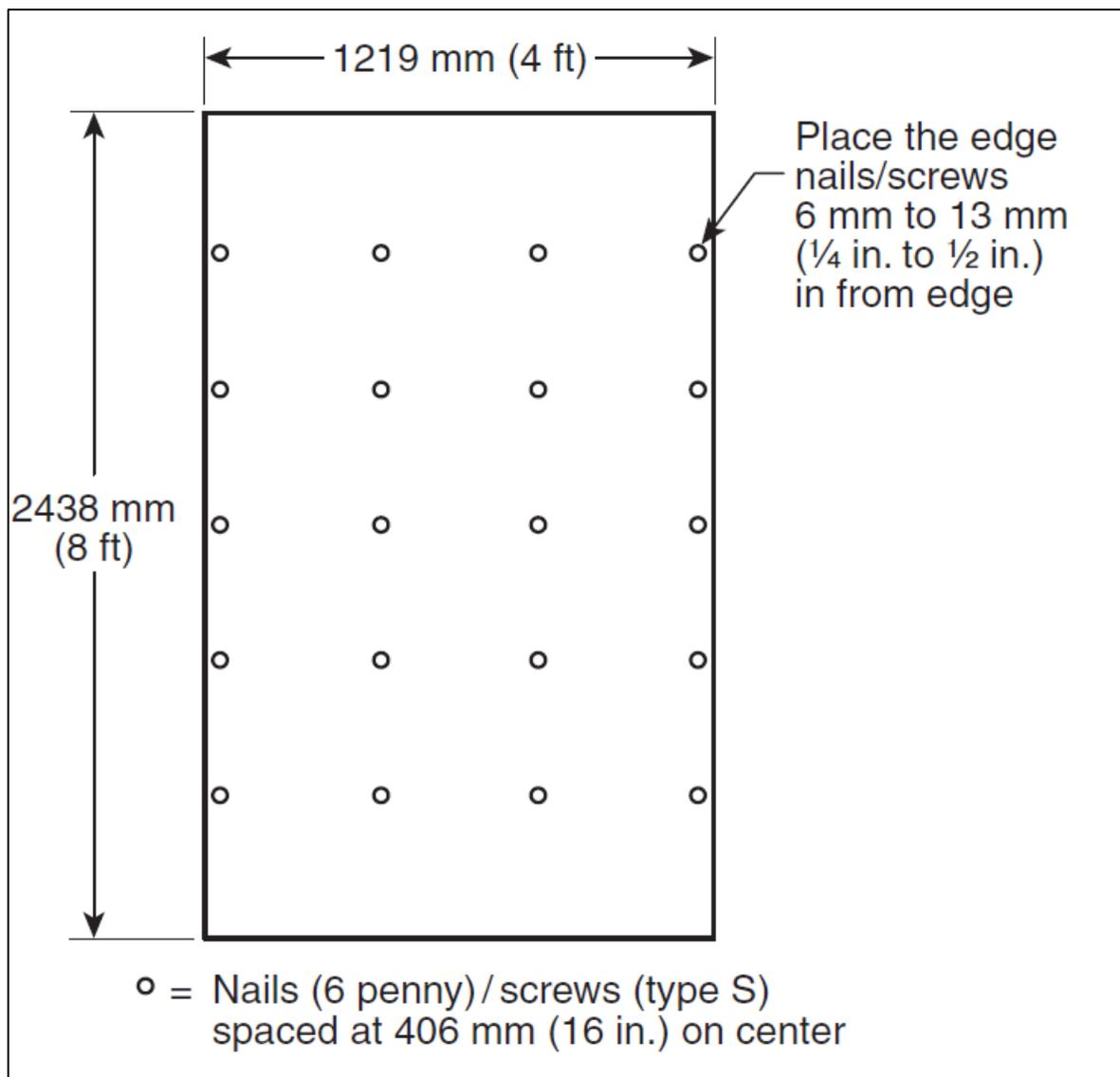
**Table 1. Material Details.**

<b>Trade Name*</b>	<i>C286BLK-AA</i>
<b>Description*</b>	High-Density Polyethylene (HDPE) Sheet
<b>Color*</b>	Black
<b>Thickness*</b>	1 in.
<b>Dimensions*</b>	55 in. $\times$ 84 in.
<b>Density*</b>	1.43 g/cm <sup>3</sup>
<b>Substrate</b>	None

\* Information provided by the Client.

## 3.0 CONSTRUCTION DETAILS

SwRI provided a test room, constructed in accordance with NFPA 286, using  $\frac{5}{8}$ -in. thick Type X gypsum wallboard for the inside surface. The completed room with samples installed was constructed such that the finished interior dimensions were  $8 \times 12 \times 8$  ft. The *C286BLK-AA* panels sized 55 in.  $\times$  84 in. were cut by SwRI so that they were 48 in.  $\times$  84 in. The panels were then installed and fastened to the walls by SwRI personnel, using  $\frac{1}{4} \times 2\frac{1}{4}$ -in. drywall screws and  $1\frac{1}{4}$ -in. diameter fender washers. Due to the panel height being 7 ft tall, a 1-ft tall section of panel had to be added to each panel to make it cover the full height of the wall. The 1-ft section was alternated on the top and bottom so that the joints were staggered. The panels were attached using the pattern shown in Figure 1 with the modification that the 1-ft section had two rows of screws installed at 16 in. on center. The sheets of *C286BLK-AA* were installed such that they completely covered the two  $8 \times 12$ -ft walls, the  $8 \times 8$ -ft rear wall. The doorway was left uncovered in accordance with the standard.



**Figure 1. Hardware Attachment Pattern.**

#### **4.0 TEST RESULTS**

Testing was conducted on July 11, 2024, at SwRI’s Fire Technology Department located in San Antonio, Texas. The test room and building were at approximately 79.5 °F and 66.3% relative humidity just prior to the test.

A summary of the test results is given in Tables 2 and 3. Visual observations can be found in Table 4. Selected photographic documentation is provided in Appendix A. The test results are summarized in Appendix B. Photographic and video documentation have been provided electronically.

**Table 2. Summary of Test Results and Flashover Limits.**

Material ID	Maximum Heat Release Rate (Total)	Total Heat Flux to the Floor	Maximum Average Upper Layer Temperature	Flames Exiting Doorway?	Auto-Ignition of Paper Target?
C286BLK-AA	303 kW	6.2 kW/m <sup>2</sup>	504 °C	No	No
Flashover Limits per Section 9.1(10) of NFPA 286	1,000 kW	20 kW/m <sup>2</sup>	600 °C	Not Allowed	Not Allowed

NFPA 101, NFPA 5000, the *International Building Code*, and the *International Fire Code* use the following acceptance criteria, from Annex C of NFPA 286, for interior wall or ceiling finishes tested in accordance with NFPA 286:

1. During the 40-kW exposure, flames should not spread to the ceiling.
2. During the 160-kW exposure, the interior finish should comply with the following:
  - a. Flame should not spread to the outer extremity of the sample on any wall or ceiling.
  - b. Flashover, as defined in NFPA 286, should not occur.
3. The peak rate of heat release throughout the NFPA 286 test should not exceed 800 kW.
4. The total smoke released throughout the NFPA 286 test should not exceed 1,000 m<sup>2</sup>.

**Table 3. Summary of Test Results and NFPA 286 Annex C Limits.**

Material ID	Flames Spread to Ceiling (40-kW Exposure)	Flames Spread to Extremity (160-kW Exposure)	Flashover Occurs	HRR <sub>PEAK</sub>	Total Smoke Release
C286BLK-AA	No	No	No	303 kW	119 m <sup>2</sup>
NFPA 286 Annex C Criteria	Not Allowed	Not Allowed	Not Allowed	≤ 800 kW	≤ 1,000 m <sup>2</sup>

Based on the test results, the material identified as C286BLK-AA, meets the acceptance criteria for interior wall finishes as described in Annex C of NFPA 286.

**Table 4. Test Observations.**

Time (min:s)	Observations
-02:08	Baseline
00:00	Start of Test, <i>burner set at 40 kW.</i>
01:45	Slight smoke layer at 5 ft.
03:00	Slight discoloration/charring in burner corner where flame is directly impinging.
05:00	<b><i>Burner increased to 160 kW.</i></b>
05:15	Flames reach the ceiling above the burner corner.
07:00	Smoke layer is slowly thickening.
08:30	Increased discoloration of panels in burner corner.
12:30	Smoke layer lightening.
15:00	<b><i>Test is ended.</i></b> The burner was extinguished, slight flaming in burner corner extinguished with water hose after test.

**APPENDIX A**  
**SETUP, TEST, AND POSTTEST PHOTOS**  
**(CONSISTING OF 4 PAGES)**



**Figure A-1. View of the Burner Corner with C286BLK-AA Installed.**



**Figure A-2. View of Test Room at the Start of Test.**



**Figure A-3. View at 1 min and 15 s into Test.**



**Figure A-4. View at 5 min and 9 s into Test.**



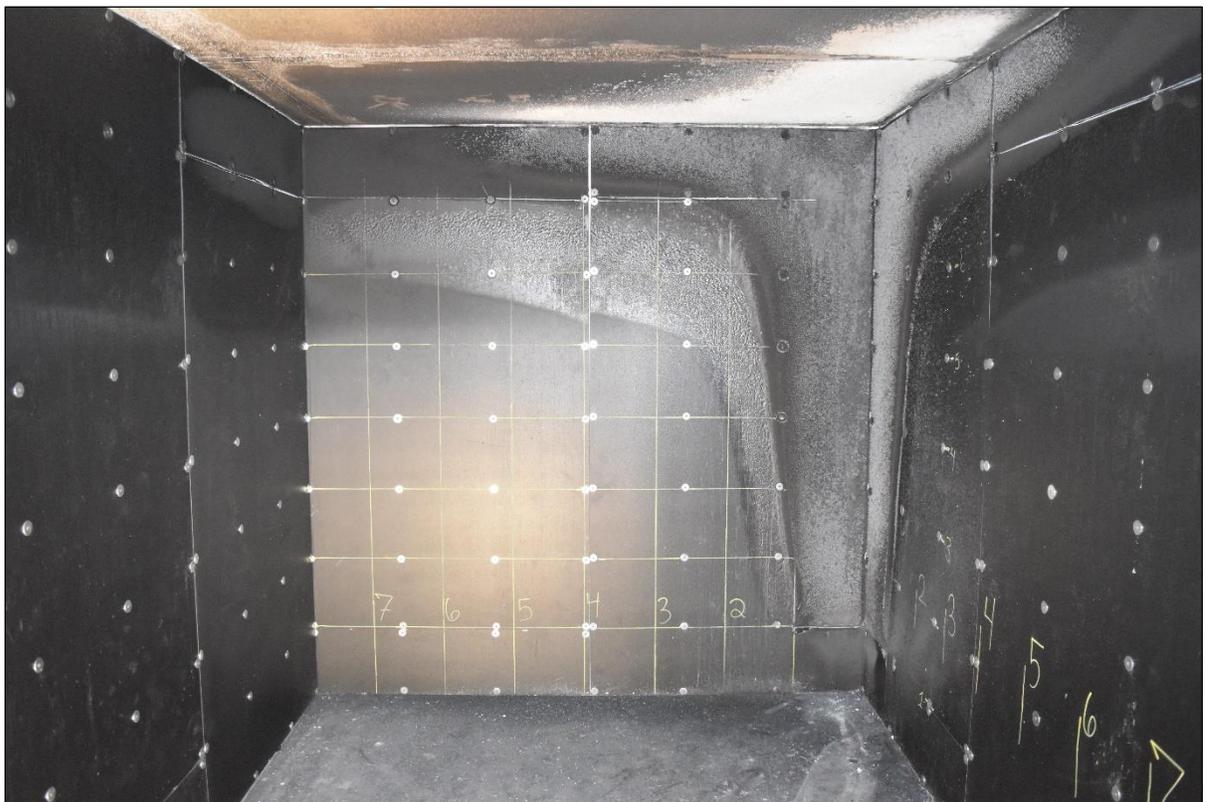
**Figure A-5. View at 9 min and 1 s into Test.**



**Figure A-6. View at 14 min and 9 s into Test.**



**Figure A-7. View at 15 min into Test.**



**Figure A-8. Post-Test View of the Room.**

**APPENDIX B**  
**TEST DATA**  
**(CONSISTING OF 5 PAGES)**

**SUMMARY OF  
TEST RESULTS**

**Material ID: C286BLK-AA**

Maximum HRR <sub>total</sub>	303 kW	at	11 min 4 sec
Average HRR <sub>total</sub>	171 kW		
Total Heat Released	153 MJ		
Maximum HRR <sub>excl. burner</sub>	142 kW	at	11 min 4 sec
Average HRR <sub>excl. burner</sub>	54 kW		
Total Heat Released (Excluding Burner)	48 MJ		
Maximum Smoke Release Rate	0.40 m <sup>2</sup> /s	at	9 min 46 sec
Average Smoke Release Rate	0.13 m <sup>2</sup> /s		
Total Smoke Released	119 m <sup>2</sup>		
Maximum Optical Density	0.08 1/m	at	9 min 46 sec
Maximum Duct Flow Rate	2.18 m <sup>3</sup> /s		
Average Optical Density	0.024 1/m		
Average Volumetric Duct Flow Rate	2.17 m <sup>3</sup> /s		
Total Heat Flux to the Floor	6.2 kW/m <sup>2</sup>	at	13 min 46 sec
Max. Average Upper Layer Temperature	504°C 940°F	at	11 min 3 sec
Maximum Doorway Temperature	384°C 722°F	at	14 min 35 sec

