GreenSeam®

Sealed Snap-Lock Pipe System

Patent # 7,708,034

Submittal Package

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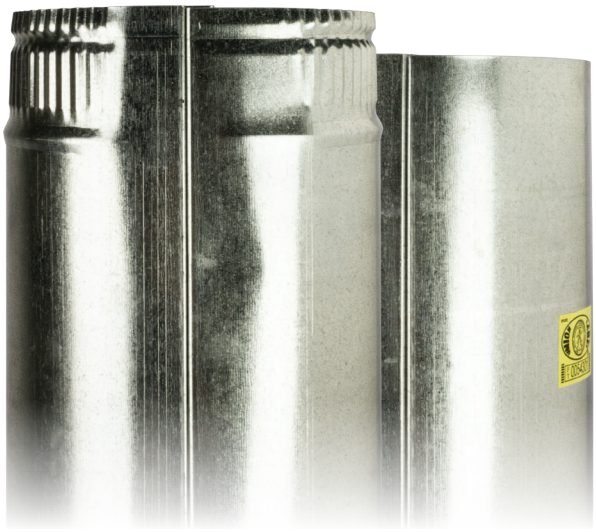
GSI™
A DMI COMPANY

Rev - 09-18

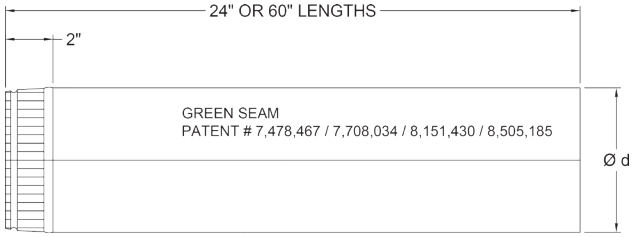
GreenSeam®

Factory Sealed Snap-Lock Pipe



Technical Data

- GreenSeam Pipe is designed and tested to surpass SMACNA Class 3 Leakage Standards.
- Longitudinal seam is pre-sealed with gasket made of EPDM rubber and proprietary co-polymer
- Galvanized Steel (ASTM A653 and A924)
- Standard product is supplied in 26 GA, G-60 coating (ASTM A653 and ASTM A90)
- Available in Specialty Metals:
  - G-90 Galvanized Steel
  - Aluminum (ASTM B209 Alloy 3003 Temper H14)
  - 304 Stainless Steel (ASTM A480 2B Finish)
- Zero VOCs
- Pressure Rating: -1 w.g. to +2 w.g.
- SPBG - Button Lock Pipe meets SMACNA RL-8
- Exclusive technology:
  - Patent # 7,478,467
  - Patent # 7,708,034
  - Patent # 8,151,430
  - Patent # 8,505,185



Product Availability

Size (Ød)	24" Lengths					60" Lengths				
	Gauge			Quantity		Gauge			Quantity	
	28 Ga.	26 Ga.	24 Ga.	Bundle	Skid/Rack	28 Ga.	26 Ga.	24 Ga.	Bundle	Skid/Rack
4"	Yes	‡	-	10	720	Yes	‡	-	5	355
5"	Yes	‡	-	10	490	Yes	‡	-	5	245
6"	Yes	Yes	Yes	10	360	Yes	Yes	Yes	5	150
7"	Yes	Yes	Yes	10	220	Yes	Yes	Yes	5	100
8"	Yes	Yes	Yes	10	160	Yes	Yes	Yes	5	100
9"	Yes	Yes	Yes	10	140	Yes	Yes	Yes	5	80
10"	Yes	Yes	Yes	10	120	Yes	Yes	Yes	5	60
12"	Yes	Yes	Yes	10	90	Yes	Yes	Yes	5	45
14"	Yes	Yes	Yes	10	70	Yes	Yes	Yes	5	30

‡ Consult factory for availability.

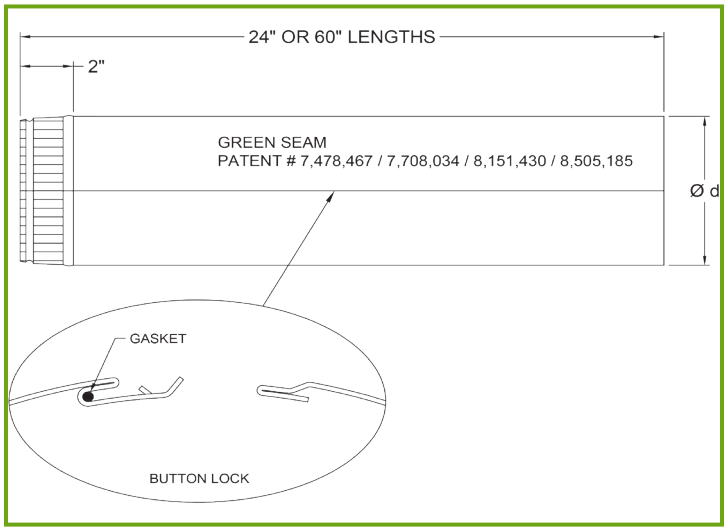
Part Number Schematic

Example: **60SPBG10GA26**** = 60" long, 10" round GreenSeam® Snap Pipe in 26Ga. Galvanized Steel

60	**SP**	**B**	**G**	**10**	**GA**	**26**
Pipe Length 24 - 2' 0" 60 - 5' 0" 48 - 4' 0" AL, S4 Only	Snap Pipe	Lock Type B - Button	GreenSeam	Pipe Diameter (Ød)	Material GA-Galvanized (Std.) AL - Aluminum S4 - 304 S.S	Gauge GA: 28, 26, 24 AL: 25 S4: 26

*** Add 90 for G90 Galvanized Coating*
Items in green denote available options
Check with your sales representative for availability of any size, gauge, or specialty metal item not shown here.

Gasket Specification



Longitudinal Gasket Composition

This material is made of butyl and E.P.D.M. rubbers, and proprietary co-polymer. It contains some process aids, antioxidants, tackifying resins, and is fungi resistant.

Test Data

Color: Black
Odor: None
Melt Point: Ball & Ring, 300º F
Slump: ⅜" Bd @ 250º F — no slump or sag.
Solids Content (% by weight): 100%
Elongation (0º F, 77º F): 450%, 900%
Tensile Strength: ASTM D412 Die C — 65 psi
Plasticizer Migration: ASTM C772-74; no bleed or stain.
Cold Temperature Flexibility: ASTM C765-73 — passes.
Water Resistance: ASTM D1056 — 0.01%
Shelf and Service Life: 20 years min.
Force to Compress: As measured when one cubic inch of ⅜" thick material is compressed to 3⁄16" thick material at 2" per min.

0º F — 60 psi
77º F — 30 psi
120º F — 15 psi

Aging Characteristics: ASTM D750-68 (1000 hrs.) on surface — slight haze
VOCs: 0
Surface Burning Characteristics: ASTM E-84 Test

Test Results: Flame Spread Index - 0
Smoke Developed Index - 30

Full test report available upon request

GreenSeam®
Sealed Snap-Lock Pipe System

EASTERN REGIONAL OFFICE
100 Industrial Boulevard, Aliquippa, PA 15001
Phone: (724) 378-3900 Fax: (724) 378-3940
Web: www.nondestructivetesting.com Email: ndtgpa@ndtg.net

NDT Non•Destructive Testing Group

INSPECTION REPORT

Mr. Vince Bloom
Ductmate Industries
210 5th Street
Charleroi, PA 15025

Report #: 1 Page 1 of 4
PO #: QAF-07-136
Lab #: 060786
Date Received: 06/02/06
Date Tested: 06/02/06

Date: June 19, 2006

Work Order: G2984

On June 2, 2006, our Mechanical Testing Department representative, Mr. Peter J. Mether, PE, went to the Ductmate facility located in Monongahela, PA to witness breakage testing on the 6" x 12" Ductmate Snap Lock Pipe and Ductmate Green Seam Snap Lock Pipe.

Test Set-Up and Results:

The pipe sections of each size consisted of ten (10), five foot long sections totaling 50 foot in length. The seams were prepared in accordance with the manufacturer's installation instructions and then solvent was applied to each joint, per the manufacturer's instructions.

A blower assembly was attached to one (1) end of the 50' long pipe with a pressure tap to monitor internal pressure. At the inflow section, a 3" diameter luminous flow element was connected to measure the pressure differential in order to determine leakage.

The duct was then positively pressurized to the below pressures, and the differential pressure was notded. Both the internal and differential pressure was monitored using a Smart Digital Monometer.

After the positive pressure testing was completed on each size, the blower was changed in order to provide a vacuum to the duct work. The duct work was then pressurized to the below pressures and the differential pressures noted using the same equipment noted above.

The differential pressures were then converted to leakage on cfm using the attached calibration chart.

Following are the results:

NDT Non-Destructive Testing Group

INSPECTION REPORT

Mr. Vince Bloom
Ductmate Industries
210 5th Street
Charleroi, PA 15025

Report #: 1
PO #: QAF-07-136
Lab #: 060786
Date Received: 06/02/06
Date Tested: 06/02/06

Date: June 19, 2006

Work Order: G2984

Sample ID: 6" Diameter Ductmate Snap Lock Pipe				
Pressure Inches H_2O	Differential Pressure Position H_2O	Positive Leakage cfm	Differential Pressure Negative H_2O	Negative Leakage cfm
½"	0.78	10.01	0.84	10.46
1"	1.97	16.66	2.50	19.02
2"	4.40	25.03	NR	NR
4"	8.70	36.36	NR	NR
6"	11.80	43.00	NR	NR

Sample ID: 6" Diameter Ductmate Green Seam Snap Lock Pipe				
Pressure Inches H_2O	Differential Pressure Position H_2O	Positive Leakage cfm	Differential Pressure Negative H_2O	Negative Leakage cfm
½"	.02	0.80	0.03	1.19
1"	.02	0.80	0.03	1.19
2"	.02	0.80	NR	NR
4"	.02	0.80	NR	NR
6"	.03	1.19	NR	NR
10"	.08	3.18	NR	NR

NDT Non•Destructive Testing Group

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Mr. Vince Bloom
Ductmate Industries
210 5th Street
Charleroi, PA 15025

Report #: 1
PO #: QAF-07-136
Lab #: 060786
Date Received: 06/02/06
Date Tested: 06/02/06

Date: June 19, 2006

Work Order: G2984

Sample ID: 12" Diameter Ductmate Snap Lock Pipe				
Pressure Inches H_2O	Differential Pressure Position H_2O	Positive Leakage cfm	Differential Pressure Negative H_2O	Negative Leakage cfm
½"	1.1	12.23	1.3	13.39
1"	2.4	18.57	3.8	23.41
2"	4.4	25.03	NR	NR
4"	6.5	31.82	NR	NR
6"	7.9	34.28	NR	NR
9"	10.3	40.23	NR	NR

DTG-0094
January 30, 2004
ddk

Non•Destructive Testing Group

INSPECTION REPORT

Mr. Vince Bloom
Ductmate Industries
210 5th Street
Charleroi, PA 15025

Report #: 1
PO #: QAF-07-136
Lab #: 060786
Date Received: 06/02/06
Date Tested: 06/02/06

Date: June 19, 2006

Work Order: G2984

Sample ID: 12" Diameter Ductmate Green Seam Snap Lock Pipe				
Pressure Inches H_2O	Differential Pressure Position H_2O	Positive Leakage cfm	Differential Pressure Negative H_2O	Negative Leakage cfm
½"	.02	.80	.02	.80
1"	.02	.80	.02	.80
2"	.02	.80	NR	NR
4"	.02	.80	NR	NR
6"	.05	1.99	NR	NR
9"	.17	4.91	NR	NR
10"	.33	6.23	NR	NR

NR = Not Required

Respectfully submitted,

Joseph R. Stiger
Mechanical Laboratory Manager
Non-Destructive Testing Group, Inc.

Test Report

Intertek ETL SEMKO

ntertek

L SEMKO

TEST REPORT

ASTM E84-05

SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS

Report No. 3102778SAT-001

Ductmate Green Seam

August 16, 2006

Prepared for:
Ductmate Industries, Inc.
1502 Industrial Drive
Monongahela, PA 15063

Intertek Testing
Services NA, Inc.
015 Shady Falls Road
lmendorf, TX 78112
voice) 210-635-8100
(fax) 210-635-8101
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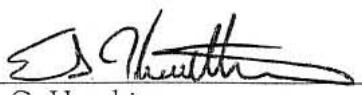
etlsemko.com

ABSTRACT

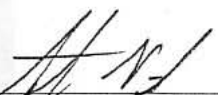
Test Specimen:	**Ductmate Green Seam**		
Test Standard:	ASTM E84-05		
Test Date:	**August 15, 2006**		
Test Sponsor:	**Ductmate Industries, Inc.**		
Test Results:	FLAME SPREAD INDEX	=	0
	SMOKE DEVELOPED INDEX	=	30
		=	N/A ft. Beyond Burners Centerline



Eric G. Hutchinson
Project Manager

August 16, 2006

Reviewed and approved:



C. Anthony Peñaloza
Flammability Testing Team Leader

August 16, 2006

I INTRODUCTION

This report describes the results of the ASTM E84-05 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 E84-05 (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:	Ductmate Green Seam
Date Received:	8/14/2006
Date Prepared:	8/14/2006
Conditioning (73°F & 50% R.H.):	1 days
Specimen Width (in):	20
Specimen Length (ft):	24
Specimen Thickness:	2.0805-in.
Material Weight:	N/A oz./sq. yd
Total Specimen Weight:	171.30-lbs.
Adhesive or coating application rate:	76.2 g total.

Mounting Method:

The specimen was placed on galvanized steel screening with approximate 3/64-in. openings supported on a test frame 20 in. wide by 2 in. deep made from 2 by 3 by 3/16-in. steel angles.

Specimen Description:

The test specimen was described by the client as the "Foam-In-Place gasket used in Ductmate Green Seam sealed snap lock pipe." The specimen consisted of (3) 8-ft. long x 20-in. wide x 2.0035-in. thick, metal frames with a fine mesh wire screen with 3/64-in. openings. Two strips of the foam in place gasket was placed on the screen at 7-in. and 14-in. O.C. The foam in place gasket was black in color. The foam in place gasket was 0.1640-in. wide x 0.0720-in. thick. Each strip of the foam in place gasket weighed 38.1 grams. The specimen was identified by the client as "Ductmate Green Seam".

IV TEST PROCEDURE

The tests were conducted in accordance with the procedures outlined in the American Society for Testing and Materials ASTM E84-05. 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 thermocouple probe at 23.25-ft. malfunctioned during the test and the temperature was recorded at 2000 F°. This data does not have any impact on the F.S.I. and S.D.I. results.

The test was conducted on 8/15/2006, and witnessed by Vince Bloom of Ductmate Industries, Inc..

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	85	80	N/A
Ductmate Green Seam	0	30	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 E84-05 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: The foam in place gasket began to melt at 0:04 (min:sec.). The foam in place gasket material ignited at 0:05 (min:sec.). The test continued for the 10:00 duration.

After the test the specimen was observed to be damaged as follows:
The foam in place gasket material was consumed from 0-ft. - 5-ft., and melted from 5-ft. - 24-ft.

APPENDIX

ASTM E84-05
Data Sheets

ASTM E84 DATASHEETS

Client: DUCTMATE INDUSTRIES
Date: 8/15/06
Time: 10:13 AM
Test Number: 2
Project Number: 3102778SAT-001
Operator: EH/EA
Specimen ID: "DUCTMATE GREEN SEAM, FOAM IN PLACE GASKET USED IN DUCTMATE GREEN SEAM SEALED SNAP LOCK PIPE". THE SPECIMEN WAS SUPPORTED BY 2-IN. THICK, METAL FRAMES WITH A 3/64-IN. SQUARE MESH FINE WIRE SCREEN. THE TEST WAS WITNESSED BY CHEMICAL ENGINEER VINCE BLOOM FROM DUCTMATE INDUSTRIES.

TEST RESULTS

FLAMESPREAD INDEX: 0

SMOKE DEVELOPED INDEX: 30

SPECIMEN DATA . . .

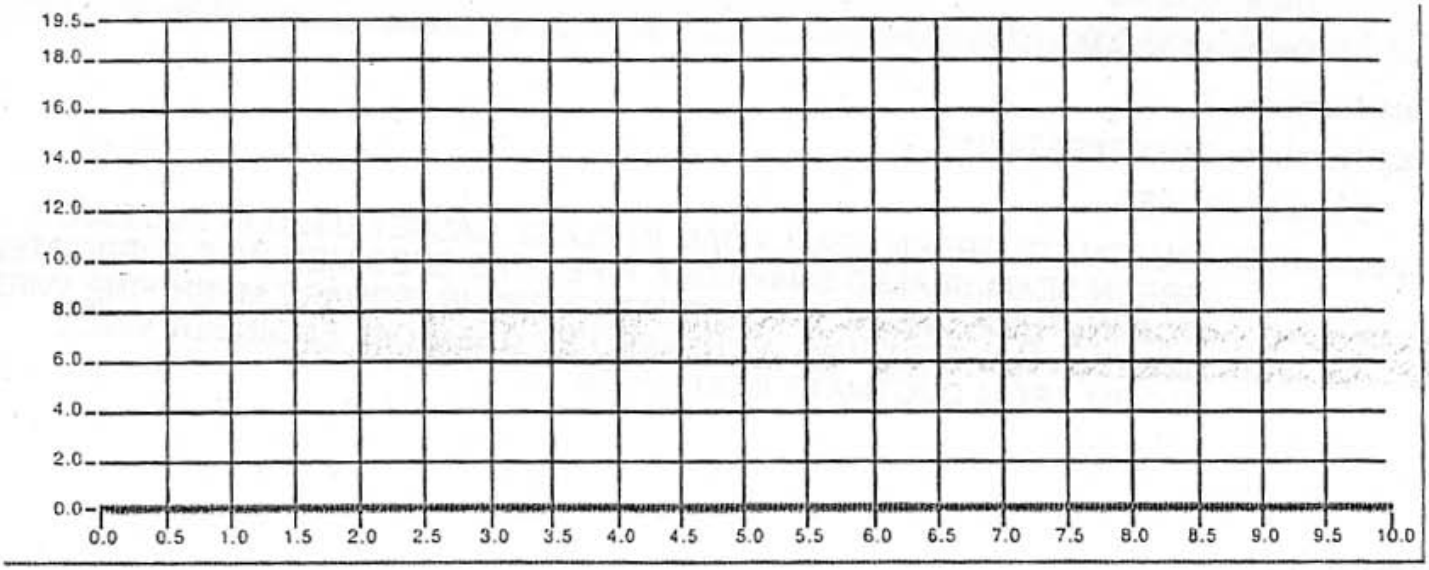
Time to Ignition (sec): 5
Time to Max FS (sec): 30
Maximum FS (feet): 0.1
Time to 980 °F (sec): 1
Max Temperature (°F): 2000
Time to Max Temperature (sec): 0
Total Fuel Burned (cubic feet): 50.19

FS*Time Area (ft*min): 0.7
Smoke Area (%A*min): 18.6
Fuel Area (°F*min): 20016.7
Fuel Contributed Value: 423
Unrounded FSI: 0.4

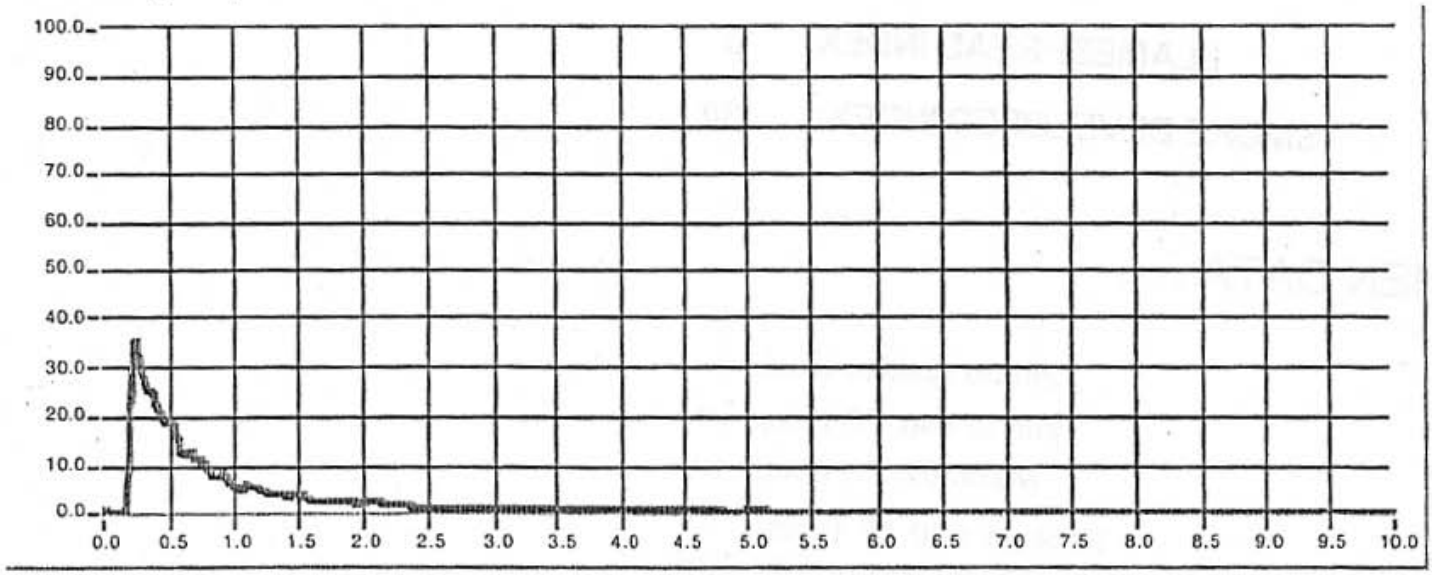
CALIBRATION DATA . . .

Time to Ignition of Last Red Oak (sec): 46
Red Oak Smoke Area (%A*min): 64.23
Red Oak Fuel Area (°F*min): 8430
Glass Fiber Board Fuel Area (°F*min): 4858

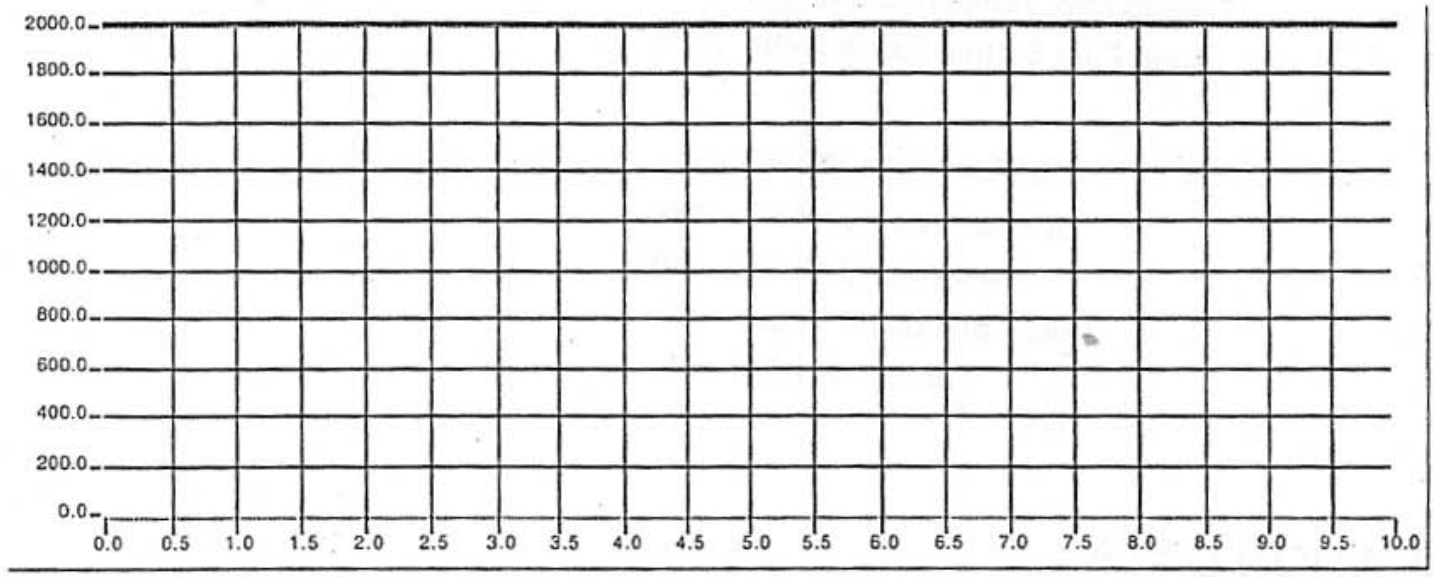
FLAME SPREAD (ft)



Smoke (%A)



Temperature (°F)



Time (min)