

American Research and Testing Inc.

14934 SOUTH FIGUEROA STREET
GARDENA, CALIFORNIA 90248
(310) 538-9709 FAX (310) 538-9965

CLIENT: Tucker Industries
3555 N. Prospect St.
Colorado Springs CO 80907

NUMBER
95206-1
December 26, 1995

SUBJECT: Coated Fabrics

REFERENCE:

Tests and charges were authorized by Mr. Vince Tucker on 12/18/95.

SAMPLE DESCRIPTION:

The Client submitted and identified two coated fabrics:

- 1) VaporGuard: white rubber coating on light green woven fabric
- 2) Neoprene (BIX): black rubber on light green non-woven fabric

REQUEST:

Determine toxic gas evolution after 5, 10, and 15 seconds flame impingment.

METHOD:

A specimen of known dimensions was secured in a horizontal orientation, coated side down, in a chamber of known dimensions (0.082 M³). A propane flame was applied to the tip of the underside of the specimen for 5, 10, or 15 seconds. After the designated burn time, the chamber air was sampled for hydrogen cyanide using Drager color indicator tubes. Toxic gas concentration in the chamber was determined directly from the indicator tubes. The values were converted to milligrams toxic gas per square inch of fabric burned, based on the average char length for each time point.

RESULTS:

	VaporGuard		Neoprene (BIX)	
	mg/M ³	mg/in ²	mg/M ³	mg/in ²
Hydrogen Cyanide (limit of detection 1.1 mg/M ³)				
5 seconds*	ND	ND	ND	ND
10 seconds	ND	ND	1.1	1.9
15 seconds	ND	ND	2.3	3.8

*flame time

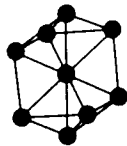
Observations: Both products self-extinguished. The Neoprene (BIX) produced more smoke than the VaporGuard.

B. Belmont
B. Belmont
Senior Chemist

SIGNED FOR THE COMPANY

by

Rita R. Boggs, Ph.D.
Rita R. Boggs, Ph.D.
President



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CLIENT: Tucker Industries
3555 N. Prospect St.
Colorado Springs CO 80907

NUMBER
95206-2
December 26, 1995

SUBJECT: Coated Fabrics

REFERENCE:

Tests and charges were authorized by Mr. Vince Tucker on 12/18/95.

SAMPLE DESCRIPTION:

The Client submitted and identified two coated fabrics:

- 1) VaporGuard: white rubber coating on light green woven fabric
- 2) Neoprene (BIX): black rubber on light green non-woven fabric

REQUEST:

Determine toxic gas evolution after 5, 10, and 15 seconds flame impingement.

METHOD:


A specimen of known dimensions was secured in a horizontal orientation, coated side down, in a chamber of known dimensions (0.082 M³). A propane flame was applied to the tip of the underside of the specimen for 5, 10, or 15 seconds. After the designated burn time, the chamber air was sampled for sulfur oxides using Drager color indicator tubes. Toxic gas concentration in the chamber was determined directly from the indicator tubes. The values were converted to milligrams toxic gas per square inch of fabric burned, based on the average char length for each time point.

RESULTS:

	VaporGuard		Neoprene (BIX)	
	mg/M ³	mg/in ²	mg/M ³	mg/in ²
Sulfur Oxides (limit of detection 1.3 mg/M ³)				
5 seconds	ND	ND	ND	ND
10 seconds	ND	ND	5.3	8.8
15 seconds	ND	ND	8.0	13.2

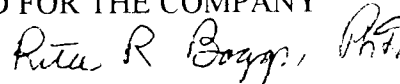
*flame time

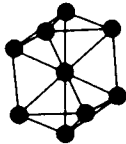
Observations: Both products self-extinguished. The Neoprene (BIX) produced more smoke than the VaporGuard.


B. Belmont
Senior Chemist

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CLIENT: Tucker Industries
3555 N. Prospect St.
Colorado Springs CO 80907

NUMBER
95206-3
December 26, 1995

SUBJECT: Coated Fabrics

REFERENCE:

Tests and charges were authorized by Mr. Vince Tucker on 12/18/95.

SAMPLE DESCRIPTION:

The Client submitted and identified two coated fabrics:

- 1) VaporGuard: white rubber coating on light green woven fabric
- 2) Neoprene (BIX): black rubber on light green non-woven fabric

REQUEST:

Determine toxic gas evolution after 5, 10, and 15 seconds flame impingment.

METHOD:

A specimen of known dimensions was secured in a horizontal orientation, coated side down, in a chamber of known dimensions (0.082 M³). A propane flame was applied to the tip of the underside of the specimen for 5, 10, or 15 seconds. After the designated burn time, the chamber air was sampled for hydrogen chloride using Drager color indicator tubes. Toxic gas concentration in the chamber was determined directly from the indicator tubes. The values were converted to milligrams toxic gas per square inch of fabric burned, based on the average char length for each time point.

RESULTS:

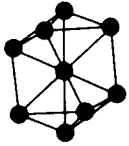
	VaporGuard		Neoprene (BIX)	
	mg/M ³	mg/in ²	mg/M ³	mg/in ²
Hydrogen Chloride (limit of detection 1.5 mg/M ³)				
5 seconds	ND	ND	4.6	7.5
10 seconds	ND	ND	16.7	27.4
15 seconds	ND	ND	18.2	29.9
*flame time				

Observations: Both products self-extinguished. The Neoprene (BIX) produced more smoke than the VaporGuard.

B. Belmont
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Senior Chemist

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CLIENT: Tucker Industries
3555 N. Prospect St.
Colorado Springs CO 80907

NUMBER
95206-4
December 26, 1995

SUBJECT: Coated Fabrics

REFERENCE:

Tests and charges were authorized by Mr. Vince Tucker on 12/18/95.

SAMPLE DESCRIPTION:

The Client submitted and identified two coated fabrics:

- 1) VaporGuard: white rubber coating on light green woven fabric
- 2) Neoprene (BIX): black rubber on light green non-woven fabric

REQUEST:

Determine breaking strength before and after high temperature exposure.


METHOD:

Breaking strength specimens were suspended in an oven at 400°F for 24 hours. Breaking strength for the woven fabric was determined before and after oven aging per FTMS 191 5102. Breaking strength for the non-woven fabric was determined before and after oven aging per ASTM D-412.

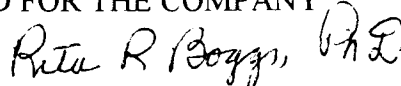
RESULTS:

	VaporGuard	Neoprene (BIX)
Breaking Strength (lbs/in)		
Before Oven Aging	158.8	50.2
After Oven Aging (24 hrs @ 400 °F)	152.1	43.8
Percent Change	-4.4%	-12.7%

Observations: Twenty-four hours oven aging at 400 °F caused the black rubber on the Neoprene (BIX) sample to discolor and embrittle.


B. Belmont
Senior Chemist

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