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Bombardier SMP 800-C Toxic Gas Generation of "Moniflex as manufactured by Isoflex AB"

A Report To: **Ciucevich**
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Attention: Robert Ciucevich

Submitted By: Fire Testing

Report No. 11-002-682(D)(Revision 1)
3 pages + appendix

Date: October 15, 2013

ACCREDITATION To ISO/IEC 17025 for a defined Scope of Testing by the International Accreditation Service

SPECIFICATIONS OF ORDER

Determine toxic gas production according to Bombardier SMP 800-C, as per our Proposal# 11-006-08128 RV1-S accepted September 22, 2011.

Note: This report supersedes 11-002-682(D) issued November 28, 2011. It is revised herein by request to reference the sample thickness in the identification section of the report.

IDENTIFICATION

Cellulose based insulation material, approximately 20 mm in thickness, identified as "Moniflex as manufactured by Isoflex AB".

(Exova sample identification number 11-002-S0682)

TEST RESULTS

Bombardier SMP 800-C (Rev. 6 2009-08-31)

Toxic Gas Generation

		Flaming Mode	Non-Flaming Mode	Specified Maxima
Carbon Monoxide (CO ppm)	at 1.5 minutes	<10	<10	-
	at 4.0 minutes	35	<10	-
	at maximum	240	30	3500
Carbon Dioxide (CO2 ppm)	at 1.5 minutes	150	<50	-
	at 4.0 minutes	1550	<50	-
	at maximum	11800	<50	90000

TEST RESULTS (continued)**Bombardier SMP 800-C (Rev. 6 2009-08-31)**Toxic Gas Generation

	Flaming <u>Mode</u>	Non-Flaming <u>Mode</u>	Specified <u>Maxima</u>
Nitrogen Oxides (as NO ₂ ppm)	<1	<1	100
Sulfur Dioxide (SO ₂ ppm)	<1	<1	100
Hydrogen Chloride (HCl ppm)	<2	<2	500
Hydrogen Fluoride (HF ppm)	<2	<2	100
Hydrogen Bromide (HBr ppm)	<1	<1	100
Hydrogen Cyanide (HCN ppm)	<1	<1	100
Original Weight (g)	1.5	1.5	-
Final Weight (g)	<u>Not determinable</u>	<u>0.9</u>	-
Weight Loss (g)	-	0.6	-
Weight Loss (%)	-	41.89	-
Time to Ignition (s)	130	Did not ignite	-
Burning Duration (s)	120	-	-

CONCLUSIONS

The cellulose based insulation identified in this report, meets Bombardier requirements as they pertain to toxic gas production (Bombardier SMP 800-C).

Note: This is an electronic copy of the report. Signatures are on file with the original report.

Mel Garces,
Fire Testing.

Ian Smith,
Fire Testing.

Note: This report and service are covered under Exova Canada Inc. Standard Terms and Conditions of Contract which may be found on the Exova website (www.exova.com), or by calling 1-866-263-9268.

APPENDIX

(1 Page)

Summary of Test Procedure

Bombardier SMP 800-C (Rev. 6 2009-08-31)Toxic Gas Sampling and Analytical ProceduresToxic Gas Generation

Gases produced for analysis are generated in a specified, calibrated smoke chamber during standard rate of smoke generation testing (typically ASTM E 662), in both flaming combustion and non-flaming pyrolytic decomposition test modes.

Carbon Monoxide (CO) and Carbon Dioxide (CO₂)

CO and CO₂ are monitored continuously during the 20 minute test using a non-dispersive infrared (NDIR) analyzer. Data are reported in ppm by volume at 1.5 and 4.0 minutes and at maximum concentration.

Acid Gas Sampling

HCN, HF, HCl, HBr, NO_x and SO₂ are sampled by drawing 6 litres of the chamber atmosphere through two midget impingers, each containing 10 ml of 0.25N NaOH, at a rate of 375 ml per minute. The 16 minute sampling period is commenced at the 4 minute mark. All determinations are performed in both the flaming and non-flaming modes and all data are reported in parts per million (ppm) by volume in air.

Analysis of Impingers for Hydrogen Cyanide (HCN)

Cyanide in the NaOH impinger, as NaCN, is converted to CNCl by reaction with chloramine-T at pH greater than 8 without hydrolyzing to CNO⁻. After the reaction is complete, CNCl forms a red-blue colour on addition of a pyridine-barbituric acid reagent. Cyanide is quantified by spectrometric measurement of the increase in colour 578 nm.

Reference: In-house SOP 00-13-SP-1216 based on ASTM Method D 2036-91

Analysis of Impingers for Hydrogen Fluoride (HF)

Fluoride, as NaF, in the NaOH impinger is determined using SPADNS colorimetry.

Reference: In-house SOP 01-13-SP-1295

Analysis of Impingers for Hydrogen Chloride (HCl) and Hydrogen Bromide (HBr)

Alkali halides (chloride and bromide) formed in the NaOH solution are measured using ion chromatography and conductivity detection.

Reference: In-house SOP 02-13-SP-1402

Analysis of Impingers for Nitrogen Oxides (NO_x)

Nitrite and nitrate formed in the alkaline solution are determined using ion chromatography and conductivity detection. The nitrite and nitrate results are combined and the total expressed as nitrogen dioxide (NO₂).

Reference: In-house SOP 02-13-SP-1402

Analysis of Impingers for Sulfur Dioxide (SO₂)

SO₂ is trapped in the NaOH impinger as sulfite and sulfate (SO₃⁻² and SO₄⁻²). Hydrogen peroxide is added to convert SO₃⁻² to SO₄⁻². Resulting sulfate is determined using ion chromatography and conductivity detection.

Reference: In-house SOP 02-13-SP-1402