U.S. Department
of Transportation
Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave., S.E.
Washington, DC 20590

JUN 28 2007

Ms. Mia R. Daniels
Director of Engineering
Sherwood, Harsco Corporation
2200 North Main Street
Washington, PA 15301

Ref. No. 07-0072

Dear Ms. Daniels:

This is in response to your March 23, 2007 letter requesting clarification on thermal resistance testing required by new Appendix D to Part 178 of the Hazardous Materials Regulations (HMR; 49 CFR parts 171-180). The thermal resistance testing requirement was added to the HMR on January 31, 2007, under the Final Rule, "Transportation of Compressed Oxygen, Other Oxidizing Gases and Chemical Oxygen Generators on Aircraft (72 FR 4442), under Docket HM-224B. In addition, this Final Rule amended the HMR to: (1) require cylinders of compressed oxygen and other oxidizing gases and packages of chemical oxygen generators to be placed in an outer packaging that meets certain flame penetration and thermal resistance requirements when transported aboard an aircraft; (2) revise the pressure relief device (PRD) setting limit on cylinders of compressed oxygen and other oxidizing gases transported aboard aircraft; (3) limit the types of cylinders authorized for transporting compressed oxygen aboard aircraft; and (4) convert most of the provisions of an oxygen generator approval into requirements in the HMR.

In your letter, you state that both type CG-4 (a combination rupture disk/fusible plug device using a fusible alloy with a yield temperature not over 170 °F or less than 157 °F), and type CG-5 (a combination rupture disk/fusible plug device using a fusible alloy with a yield temperature not over 224 °F or less than 208 °F) pressure relief devices are currently authorized for use on oxygen cylinders in accordance with the Compressed Gas Association (CGA) Pamphlet S-1.1. You state that a temperature of 199 °F as specified in the thermal resistance testing method would melt the fusible metal in a CG-4 device, and would likely melt the fusible metal in a CG-5 device. You ask whether this is an acceptable test result.

Under your scenario, the melting of fusible metals in CG-4 and CG-5 pressure relief devices is an acceptable result during the thermal resistance testing specified in Appendix D to Part 178 of the HMR. A report entitled "Evaluation of Oxygen Cylinder Overpacks Exposed to Elevated Temperature" can be located in the public docket for HM-224B at www.dms.dot.gov.

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178. Appendix D

In your letter, you also state the instructions under Section 4 "Preparation for Testing" of Appendix D to Part 178 recommend that the cylinder be configured as when filled with a valve and pressure relief device. You state this scenario is not the configuration of the cylinder during transportation because a valve protection cap may be installed on the cylinder. You ask: (1) was it the intention that the cylinder be configured as when filled rather than as when transported; and (2) was it assumed, or determined through testing, that the absence of a transport cap would have a negligible effect on the results of the thermal resistance testing.

It is the intention of the HM-224B Final Rule that a cylinder being tested for thermal resistance be configured to most closely resemble conditions normally incidental to the transportation of hazardous materials. It was determined through testing that the absence of a transport cap would have a negligible effect on the results of the thermal resistance testing.

I hope this information is helpful.

Sincerely,

John A. Gale,
Chief, Standards Development
Office of Hazardous Materials Standards

Foster
3178. Appendix D (HM-224B)
Cylinders
07-0072

Sherwood
Harsco

3/23/07

Dear Ms. Mitchell, (Department of Transportion):

Sherwood, Harsco Corporation requests clarifications to certain amendments to 49 CFR, effective October 1, 2007, imposed by HM-224B. Specifically, the **Appendix D to Part 178---Thermal Resistance Test,** *7 Requirements* read: "7.1 For a cylinder, the outer package must provide adequate protection such that the outer surface of the cylinder and valve does not exceed a temperature of 93 °C (199 °F) at any of the three points where the thermocouples are located."

Section 2.2 *Thermocouples* requires "--- one (thermocouple) must be placed on the cylinder valve body near the pressure relief device." and 4. *Preparation for Testing* reads in part, "4.1 It is recommended that the cylinder be closed at ambient temperature and configured as when filled with a valve and pressure relief device."

Both a type CG-4 (a combination rupture disk/fusible plug device using a fusible alloy with a yield temperature not over 170 °F or less than 157 °F) and a type CG-5 (a combination rupture disk/fusible plug device using a fusible alloy with a yield temperature not over 224 °F or less than 208 °F) pressure relief device has been authorized on oxygen cylinders since the original edition of CGA Pamphlet S-1.1 referenced in 49 CFR.

A temperature of 199 °F would melt out the fusible metal in a CG-4 device and would be very close to melting out a CG-5 device. In regards to the latter, the fusible metal could be as little as 9 F° below its melting point. Therefore, thermocouple accuracy, slight differences in outer package construction and other thermal resistance test variations could absorb this 9 F° resulting in the possibility of a CG-5 device melting out also. Melting out of the fusible metal in either a CG-4 or CG-5 device would convert these pressure relief devices to a rupture disk only type CG-1 device.

This raises the questions: (1) Is the possibility of this conversion acceptable to PHMSA? and (2) What type device was used in development of the thermal resistant test?

In section 4.*Preparation for Testing* it is recommended the cylinder be "configured as when filled with a valve and pressure relief device". This is not the configuration of the cylinder during transportation since a valve protection cap may be installed on the cylinder. The presence of such a cap separates the thermocouple on the valve from the heat source.

This therefore raises the additional questions: (3) Was it the intention that the cylinder be configured as when filled rather than as when transported? and (4) Was it assumed,

or determined by test, the absence of a transport cap would have a negligible on test results?

HM224B will require changes to CGA S-1.1 which the Final Rule does not address.. These changes could be minor or major depending on how the matters above are to be interpreted. Our customers are concerned if the changes are major requiring change-outs of pressure relief devices the change-outs would be disruptive and very costly.

Sherwood would appreciate consideration be given to these requests for clarification as soon as possible to alleviate the possibility of misinterpreting HM224B by us and our customers.

Sincerely yours,

Mia R. Daniels
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Bill Kalaskie
Consultant, Sherwood

Cc: Jack Wert, Compressed Gas Association