



COMPRESSED GAS ASSOCIATION, INC.

POSITION STATEMENT

PS-15—2003

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TOXICITY CONSIDERATIONS OF NONMETALLIC MATERIALS IN MEDICAL OXYGEN CYLINDER VALVES

Question

What are the recommended nonmetallic materials for use in medical oxygen cylinder valves?

Answer

While at the current time no specific recommendations can be made, nonmetallic materials used in medical oxygen cylinder valves should be evaluated with regard to balancing the material's resistance and the valve design's susceptibility to ignition with the potential generation of toxic compounds, and considering the quantity of nonmetallic materials with respect to the potential amount of generated toxic by-products.

Nonmetallic materials such as plastics, elastomers, and lubricants are commonly used in high pressure oxygen supply systems. Of particular concern are materials in the flowing stream such as valve seats. Nonmetallic materials are used as seat materials due to their positive shut-off characteristics; however, they present a potential source of fuel which, once ignited, could produce toxic combustion by-products.

Nonmetallic materials commonly used in medical oxygen cylinder valves, upon combustion/decomposition, can generate toxic by-products. Materials such as polytetrafluoroethylene (PTFE), polychlorotrifluoroethylene (PCTFE), and fluoroelastomers (FKM) can produce toxic chlorinated or fluorinated combustion/decomposition by-products. Some materials such as polyamide (NYLON), polyetheretherketone (PEEK), and ethylene-propylene (EPDM) generate less toxic combustion/decomposition by-products than the aforementioned fluorinated compounds. However these materials are more susceptible to ignition.

Factors to consider when selecting nonmetallic materials for medical oxygen cylinder valves include:

- a material's potential toxic by-products, quantity of toxic by-products generated, and hazard if combustion/decomposition occurs;
- a material's resistance to ignition in oxygen service; and
- the valve design's susceptibility to ignition.

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Docket 01-45

Cylinder Valve and Connections Committee

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