

## Carbon Dioxide and Nitrous Oxide Valve Safety Device Requirements

The specifications for the proper pressure relief device for Carbon Dioxide and Nitrous Oxide high pressure cylinders are not easy to find.

- 49 CFR Part 172.101 "Hazardous materials table" specifies that for Carbon Dioxide & Nitrous Oxide, note 304 and other notes apply to "non-bulk packaging" notes. Note 304 is found in 173.304. 173.304 refers to 173.301(f).
- § 173.301 General requirements for shipment of compressed gases in cylinders and spherical pressure vessels.  
(f) Pressure relief device systems. (1) Except as provided in paragraphs (f)(5) and (f)(6) of this section, a cylinder filled with a gas and offered for transportation must be equipped with one or more pressure relief devices sized and selected as to type, location, and quantity, and tested in accordance with CGA Pamphlets S-1.1 (incorporated by reference; see § 171.7 of this subchapter; compliance with paragraph 9.1.1.1 of CGA Pamphlet S-1.1 is not required) and S-7 (incorporated by reference; see § 171.7 of this subchapter). The pressure relief device must be capable of preventing rupture of the normally filled cylinder when subjected to a fire test conducted in accordance with CGA Pamphlet C-14 (incorporated by reference; see § 171.7 of this subchapter), or, in the case of an acetylene cylinder, CGA Pamphlet C-12 (incorporated by reference; see § 171.7 of this subchapter).
- 173.301(f) refers to 171.7 for the incorporation by reference...
- § 171.7 Reference material.  
(A)(3) Table of material incorporated by reference.  
CGA Pamphlet S-1.1., Pressure Relief Device Standards\_Part 1\_Cylinders for Compressed Gases, 1994 (with the exception of paragraph 9.1.1.1). 173.301; 173.304a.
- CGA S1.1-2002 is where the actual pressure relief device specifications are documented. See pages 5, 30, 33, and 35 to see that a type CG-1 (rupture disk) is the correct type for high pressure cylinders filled with Carbon Dioxide and Nitrous Oxide. Note "S" on page 35 specifically states that fusible metal safeties are "no longer authorized for refilling."

It's a long path to find the correct safety device for CO<sub>2</sub> and N<sub>2</sub>O, but in the end, fusible safety devices are not permitted. Also, several accidents have occurred where fusible safety devices did not stop the CO<sub>2</sub> (or other high pressure liquefied gas) cylinder from bursting.

If you have further questions, please contact me at 508-883-0927.

Thank you,

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