

# POSITION STATEMENT

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## CARBON MONOXIDE MIXTURES IN CARBON STEEL CYLINDERS

### Question

Should the fill pressure restriction for carbon steel cylinders filled with pure carbon monoxide in Title 49 of the U.S. *Code of Federal Regulations* (49 CFR) section 173.302a(d) be applied equivalently to carbon steel cylinders containing mixtures with carbon monoxide at a concentration greater than 0.10% mol/mol [1]?

### Answer

Yes. The pressure restriction requirements for pure carbon monoxide shall also apply to mixtures of carbon monoxide at a concentration greater than 0.10% mol/mol when filled in carbon steel cylinders.

NOTE—This position statement does not apply to tube trailers or low pressure nonrefillable carbon steel cylinders.

### Reasons

Incidents have occurred in the past with carbon monoxide and carbon monoxide mixtures in carbon steel cylinders. These incidents led to either leak or rupture of the carbon steel cylinders. CGA P-57, *Avoidance of Failure of Steel Cylinders Containing Carbon Monoxide and Carbon Monoxide/Carbon Dioxide Mixtures*, provides guidance and direction [2].

See CGA P-57 for details on the mechanism where stress corrosion cracking can occur in a carbon steel cylinder filled with carbon monoxide [2].

ISO 11114-1, *Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials* provides a similar caution when carbon monoxide mixtures are filled in carbon steel cylinders with a concentration of 0.10% mol/mol or greater [3].

### References

Unless otherwise specified, the latest edition shall apply.

[1] *Code of Federal Regulations*, Title 49 (Transportation) Parts 100-180, U.S. Government Printing Office.  
[www.gpo.gov](http://www.gpo.gov)

[2] CGA P-57, *Avoidance of Failure of Steel Cylinders Containing Carbon Monoxide and Carbon Monoxide/Carbon Dioxide Mixtures*, Compressed Gas Association, Inc. [www.cganet.com](http://www.cganet.com)

[3] ISO 11114-1, *Gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 1: Metallic materials*, American National Standards Institute. [www.ansi.org](http://www.ansi.org)

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