



Standard Practice for Transfilling and Safe Handling of Small CO₂ Cylinders for Use in Paintball¹

This standard is issued under the fixed designation F2856; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice is intended to satisfy the demand for information on the basic procedures for the safe handling and transfilling of small (not bulk) paintball CO₂ cylinders commonly used with a paintball marker for propulsion of a paintball. This standard does not address issues dealing with the transfilling, storage, and handling of supply cylinders that may be used in transfilling smaller cylinders.

1.2 The CO₂ fill procedures are written for the pressure cycling cylinder transfilling method most commonly used by paintball field and/or store operators.

1.3 This practice should not be confused with federal, state, provincial, or municipal specifications or regulations; insurance requirements; or national safety codes.

1.4 *This practice does not purport to address all of the safety problems, if any, associated with the safe handling and transfilling of small paintball cylinders. It is the responsibility of the user of this standard to establish appropriate safety practices and determine the applicability of regulatory limitations, such as and not limited to DOT, CGA, and OSHA, prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

[F1979 Specification for Paintballs Used in the Sport of Paintball](#)

[F2030 Specification for Paintball Cylinder Burst Disk Assemblies](#)

[F2553 Specification for Warnings on Refillable CO₂ Cylinders Used In the Sport of Paintball](#)

2.2 CGA Standards:³

[CGA G-6.3 Carbon Dioxide Cylinder Filling and Handling Procedures](#)

[CGA C-6-2005 Standards for visual inspection of steel compressed gas cylinders](#)

[CGA C-6.1 – 2006 Standards for visual inspection of high pressure aluminum compressed gas cylinders](#)

[CGA G-6.8 – 2007 Transfilling and safe handling of small carbon dioxide cylinders](#)

[TB-14 Torque Guidelines For Sealing CGA Valve Outlet Connections](#)

2.3 Other Standards:

[CFR 49 Parts 100 to 185](#)⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *authorized retester, n*—facility registered with and approved by DOT for the requalification of cylinders.

3.1.2 *blow-down valve, n*—valve which is part of a fill station assembly, and which is intended to vent gas from the paintball cylinder and fill station being filled.

¹ This practice is under the jurisdiction of ASTM Committee F08 on Sports Equipment, Playing Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.24 on Paintball and Equipment.

Current edition approved May 1, 2012 April 1, 2016. Published May 2012 April 2016. Originally approved in 2011. Last previous edition approved in 2011 as F2856 – 11a; F2856 – 12. DOI: 10.1520/F2856-12.10.1520/F2856-12R16.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151.

⁴ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

3.1.3 *fill station, n*—device designed to attach to a supply cylinder and to a paintball cylinder, which facilitates transfilling the paintball cylinder.

3.1.4 *paintball, n*—spherical ball, commonly with a diameter of 17.3 mm (0.68 in.), comprised of a shell and a fill, designed to be expelled from a paintball marker and conforming to Specification **F1979**.

3.1.5 *valve twist test, n*—test done by hand where as the user grasp the valve with one hand and the bottle with the other and attempts to turn the valve by hand in a counter- clockwise direction (left).

3.1.5.1 *Discussion*—

If the valve does move, the valve and bottle should not be filled and should be repaired and/or serviced by the manufacturer or its authorized representative. If the valve does not move then the valve passes the test and may be filled provided it passes all other requirements. The test should only be done when the cylinder is empty and without any tools.

3.2 *Acronyms:*

3.2.1 *DOT*—department of transportation

3.2.2 *RIN*—retester identification number

3.2.3 *TC*—transport Canada

4. General Considerations

4.1 Persons, who are transfilling carbon dioxide (CO₂), must be trained in the hazards associated with liquid carbon dioxide. Contact between exposed skin and cold piping, or carbon dioxide can cause frost burns or can present other hazardous situations.

4.2 Always wear heavy gloves and eye protection while filling cylinders.

4.3 Always have the MSDS at the location that the filling takes place.

4.4 Always read and understand all fill station instructions.

4.5 Ensure that there is proper ventilation in the filling area.

4.6 Warning posters should be posted near the filling operation. These shall be of appropriate size and posted in a clearly visible location. See **Fig. 1** and **Fig. 2**.

4.7 The receiving cylinder (paintball cylinder) must be of a refillable type (that is, not disposable) and the net weight or volume of gas that it can safely hold stamped on the shoulder or marked on the cylinder.

4.8 Supply cylinders must be secured and supported, such as fastened to a wall or similar immovable structure (that is, not free standing).

4.9 It is recommended that siphon type bulk tank be used for filling. Avoid using inverted bulk tanks unless done properly, as shown in CGA G-6.8.

4.10 Warning signs should be placed at the entrance to confined areas where high concentrations of carbon dioxide gas can accumulate. These shall be of appropriate size and posted in a clearly visible location.

5. Fill Stations

5.1 Fill stations and related equipment should be rated to at least 1800 psi working pressure.

5.2 The transfer hose shall be compatible with liquid CO₂ and shall have a minimum service pressure of 3000 psi.

5.3 Fill stations shall be supplied with instructions for operation by the manufacturer or distributor of the product. See **Fig. 3** and **Fig. 4**.

5.4 Fill stations should be marked or tagged with the following safety warnings:

5.4.1 Read owners manual before using.

5.4.2 Use only with CO₂.

5.4.3 Close bulk tank valve when not in use.

5.4.4 Vent down system.

6. Cylinder Inspection

6.1 Conduct a valve twist test on empty cylinders to determine if the valve is securely attached to the cylinder. Any cylinders which have valves that can be twisted by hand, or which show signs of the valve having been partially removed, must not be filled. The owners of such cylinders should be warned to have the valve repaired by the manufacturer or its authorized representative, prior to using the cylinder or attaching it to a marker. See **Fig. 5**.

6.2 Look for a rotation indication mark between valve and bottle. Ensure line matches between two pieces. **IF THE LINE DOES NOT MATCH DO NOT FILL THE CYLINDER**. See **Fig. 6**.



FIG. 1 Example of Warning Poster A

6.3 If no line is present place a non removable, non etching marking between the valve and bottle for future checks. A paint pen is a good item to use to apply the rotation indication mark.

6.4 Visually inspect the cylinder condition before each fill.

6.4.1 Cylinders must be stamped on the shoulder with a DOT (Department of Transportation) and potentially a TC (Transport Canada) mark, working pressure, manufacturer's code or name, serial number, hydrostatic test date and rated CO₂ capacity. If no stamping is present or stamping has been altered or non legible, do not use the cylinder. See Fig. 7.

6.4.2 The pressure rating stamped on the cylinder must be at least 1800 psi.

6.4.3 Cylinders must be in good condition: free of stickers, large dents, scrapes, bulges, obvious corrosion, pits, evidence of fire damage and leaks.

6.4.4 Cylinders should not be buffed or polished.

6.4.5 Cylinders having valves without a rupture disk or pressure relief mechanism must not be filled.

6.4.6 Pressure relief or rupture disk assembly should be tight, and all pressure relief passages should be clear of obstructions. See Fig. 8.