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**Carleton, Pressure Technology Division, Technical Bulletin - 06/25/01****I. E-11194 (6<sup>th</sup> revision) Carbon Filament “CFFC” Cylinder Requirements***CFFC Requirements*

Documentation required by DOT and retest procedure specified:	<ul style="list-style-type: none"> <li>• Copy of exemption (6<sup>th</sup> revision)</li> <li>• No CGA pamphlet currently published</li> <li>• DOT CFFC basic requirements (3<sup>rd</sup> revision) CFFC-13(a) Hydrostatic Test</li> <li>• Valid US-DOT retest identification number (RIN)</li> </ul>
Retest period:	<ul style="list-style-type: none"> <li>• 5 years per D.O.T. Exemption E-11194 (6<sup>th</sup> revision). This applies to all CFFC cylinders manufactured or retested after 07/01/01.</li> <li>• 3 years per Transport Canada TC-SU-5303 permit</li> </ul>
Maximum service life from month of manufacture:	15 years
Test pressure:	5/3 times service
Hold time at test pressure:	60 seconds
Cylinder permanent expansion rejection criteria – percent PE:	None specified
Cylinder elastic rejection criteria – percent REE:	Reject cylinder if REE marked on label by manufacturer is exceeded
If equipment failure, number of times cylinder may be retested:	Two times
Test date marking:	Label & epoxy coating

**II. E-11194 Carbon Filament “CFFC” Cylinder Test Procedure**

Carleton Technologies Inc, Pressure Technology Division, recommends the following process for the periodic hydrostatic retesting of composite cylinders manufactured with the manufacturer’s marks and under exemption numbers DOT-E-11194. Due to the nature of both the materials and design of the composite cylinders, it is not uncommon for the cylinder retest to be highly sensitive to the test water temperature and porous glass composite surface. These attributes can lead to a false, or higher than actual volumetric displacement.

This procedure is in accordance with US D.O.T. and T.C. regulations for the re-test of cylinders. Please note if a cylinder fails during retesting; be certain to check your equipment, o-rings and sealing surfaces for leaks or damage.

- The retest cylinder and the test water must be the same temperature. To achieve this, fill the cylinder with water and allow it to set for no longer than four hours. This allows the fiberglass, aluminum and water to be at the same temperature. The water in the water jacket must be also be at the same temperature (+/- 3° Fahrenheit) of the water inside the cylinder. Filtered or deionized water should be used during the retesting. After retesting, make certain to clean/dry the interior of cylinder free of all water deposits.

- Immerse the cylinder in the water jacket and allow for it to soak for several minutes (at least 5 minutes, but no more than 60 minutes) before continuing the test.
- Pre-pressurize the cylinder to no more than 90% of its test pressure. The test pressure is  $\frac{5}{3}$  times the service pressure that immediately follows the exemption number on the manufacturer's label. Hold this pressure for 90 seconds, or until stable, whichever is greater. Initially pressurize at no more than 200 psig per second, with the last psig at a rate of less than 50 psig per second.
- Return to 0 psig and carefully zero the burette.
- Pressurize to test pressure and hold for 60 seconds or until stable, whichever is greater. Carefully read and record the total expansion. Initially pressurize at no more than 200 psig per second, with the last psig at a rate of less than 50 psig per second.
- Return to 0 psig. Wait 90 seconds (until obvious movements of the water in the burette stabilize) prior to taking and recording the final expansion.