

# FESHM 5034.1: RETESTING PROCEDURES FOR D.O.T. GAS STORAGE CYLINDERS INCLUDING TUBE TRAILERS

(Formerly Fermilab Engineering Standard SD-36)

## Revision History

<b>Author</b>	<b>Description of Change</b>	<b>Revision Date</b>
Dave Pushka	<ul style="list-style-type: none"><li>• Added requirement for an engineering note for derated cylinders.</li><li>• Expanded scope to include all DOT vessels.</li><li>• Clarified testing and documentation requirements.</li></ul>	October 2017
Thomas Page	Added FESHM Chapter template.	September 2011

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## 1.0 INTRODUCTION

Gas storage cylinders are a separate class of pressure vessels, loaded to nominally 80% higher stress values than permitted by the A.S.M.E. Code, the established pressure vessel standard at the Laboratory. These cylinders are built to rigorous specifications for fabrication, inspection and testing published by the Department of Transportation (DOT)<sup>1</sup>.

This chapter states the reinspection and retesting procedures policy regarding cylinders owned by Fermilab (or by experimenters when used onsite). Commercially owned cylinders must be maintained to Department of Transportation standards by their owners.

This chapter applies only to the cylinder specifications listed in 49 CFR 173.34.

## 2.0 RESPONSIBILITIES

Division/Section heads are responsible for assuring proper integrity of the Fermilab-owned gas storage cylinders in their custody.

## 3.0 PROCEDURES

### 3.1 Retest and Re-inspection Options

When cylinders become due for re-inspection and for retesting (every five years or as required in 49 CFR 180.209), division/section heads controlling their use have the option of continuing their registration by maintaining the cylinders as DOT cylinders, or derating the cylinders to the requirements of the A.S.M.E. Pressure Vessel Code.

A cylinder that was filled prior to its requalification period, may remain filled until emptied. If a re-qualification is due, the cylinder cannot be re-filled until the requalification has been successfully completed.

### 3.2 Maintaining the Cylinders as DOT Certified

Retesting and re-inspection of the cylinders to maintain their DOT certification includes rigorous pressure testing conducted by outside firms involving disassembly of the tube bank and volumetric expansion determination of the cylinders at 5/3 of

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<sup>1</sup>Cylinders are fabricated under Articles starting with 178.37 in Title 49 of the Federal Code of Regulations. The qualification, maintenance and use of these cylinders is covered by Article 173.34 of the same Title. In addition, care, handling and inspection requirements are stated beginning with OSHA Article 1910.166. Contact the ES&H Section for the latest revision of these documents.



the operating pressure. Bore scope inspection for indications of internal corrosion and refurbishment and testing of relief devices is included.

### 3.3 Derating and Retesting Cylinders to A.S.M.E Code

Cylinders that are used exclusively onsite may be taken out of DOT classification and derated to 55%<sup>2</sup> of their DOT operating pressure. This is the maximum operating pressure allowed by the A.S.M.E. Pressure Vessel Code. These cylinders shall be subjected to the above DOT inspection requirements except a hydrostatic or pneumatic pressure test at ~~3/2 for hydrostatic and 5/4 for pneumatic~~ in accordance with current ASME Section VIII, Division 1 of the "derated maximum operating pressure" shall substitute for the hydrostatic expansion test. This test shall be witnessed by the Division Safety Officer (DSO) or designee. Members of the Mechanical Safety Subcommittee are available for consultation.

#### 3.3.1. Cylinder Marking

Such derated cylinders shall each be identified with a metal collar, permanently attached to the neck. It shall be stamped or permanently printed with the following text:

**DERATED CYLINDERS  
SHALL NOT BE USED  
IN PRESSURIZED MODE  
OFF FERMILAB SITE  
DERATED MAXIMUM OPERATING PRESSURE  
\_\_\_\_\_ PSI  
INSPECTED AND TESTED TO  
\_\_\_\_\_ PSI ON DATE \_\_\_\_\_  
RETEST ON OR BEFORE \_\_\_\_\_**

In addition, each separately used cylinder shall have imprinted in letters 1" high, or for tube trailers both sides shall have imprinted in letters 3" high:

**"DERATED CYLINDERS, DO NOT USE OFF FERMILAB SITE"**

#### 3.3.2. Reports

An inspection and test report listing cylinder serial number(s) shall be filled out with suitable inspection comments and test pressures. It shall be signed by the test operator, the division/section safety officer and a member of the

<sup>2</sup>For cylinders built to DOT Specification 107A, the derating factor is 75%.



80 Mechanical Safety Subcommittee and shall be filed by the responsible  
81 division/section in a FESHM 5031 engineering note.

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83 **3.3.3. Relief Devices**

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85 Relief devices shall be refurbished, rupture disks changed and relief valves  
86 cleaned and tested. The "begin to discharge" settings of the rupture disks and  
87 relief valves shall be no greater than 100% of the derated maximum allowable  
88 pressure.

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90 Relief devices are subject to the relief device inspection period as detailed in  
91 FESHM 5031.4. Derated cylinder may require de-pressurizing for periodic  
92 relief device inspection and testing.

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94 **3.3.4. Engineering note requirement and FESHM 5031**

95 Derated cylinders shall have a FESHM 5031 engineering note prepared to  
96 document the use as a pressure vessel.

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