



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

(Formerly Fermilab Engineering Standard SD-36)

## Revision History

Author	Description of Change	Revision Date
Thomas Page	Re-release of Chapter 5034.1 with no revisions to content. Added FESHM Chapter template.	September, 2011



## TABLE OF CONTENTS

<b>1.0</b>	INTRODUCTION.....	2
<b>2.0</b>	RESPONSIBILITIES .....	2
<b>3.0</b>	PROCEDURES.....	2
<b>3.1</b>	Retest and Reinspection Options .....	2
<b>3.2</b>	Maintaining the Cylinders As DOT Certified .....	2
<b>3.3</b>	Derating and Retesting Cylinders to A.S.M.E Code.....	2
<b>3.3.1.</b>	Cylinder Marking.....	3
<b>3.3.2.</b>	Reports.....	3
<b>3.3.3.</b>	Relief Devices.....	3



## 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.

## 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 Reinspection Options

When cylinders become due for reinspection and for retesting (every five years), 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.

### 3.2 Maintaining the Cylinders As DOT Certified

Retesting and reinspection 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 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

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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.



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 of the "derated maximum operating pressure" shall substitute for the hydrostatic expansion test. This test shall be witnessed by the division/ section safety officer 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 Mechanical Safety Subcommittee and shall be filed by the responsible division/ section.

### 3.3.3. Relief Devices

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



Relief devices shall be refurbished, rupture disks changed and relief valves cleaned and tested. The "begin to discharge" settings of the rupture disks and relief valves shall be no greater than 110% of the derated maximum allowable pressure.