

## Factory Mutual Research

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May 10, 2002

Mr. Brad Stilwell – Engineering Manager  
Fike Protection Systems, Div. Fike Corporation  
704 South 10<sup>th</sup> Street  
Blue Springs, MO 64013

Subject: FM Approvals Examination of Alternate Construction of Clean Agent Storage  
Cylinders: FM Approvals Project Identification: 3013917

Dear Mr. Stilwell:

This letter will confirm that the alternate construction design of the Fike Clean Agent Storage Cylinders (Fike Drawing Numbers 70-1800-X, 70-1801-X, 70-1802-X, 70-1803-X, 70-1804-X, 70-1805-X, S70-1800-X and S70-1801-X) representing capacities of 60 through 1000 pounds (27 through 454 kilograms) meet FM Approval requirements, including Liquid Level Indicators for the 100, 215, 375, 650 and 1000 pound capacity cylinders.

The alternate design changes the cylinder shell from a cut piece of pipe to a rolled sheet of steel with a longitudinal seam weld. This changes the DOT designation from 4BA-500 to 4BW-500, with the "500" indicating the maximum working cylinder pressure. This equates to a 1000 psi factory test pressure with a minimum burst pressure of 2000 psi.

Samples of the 100, 375, and 1000 pound capacity cylinders (representing the tallest of a given series cylinder diameter) were subjected to PVE (permanent volumetric expansion), and burst tests at the Fike facility, Blue Springs, Missouri, on March 21, 2002.

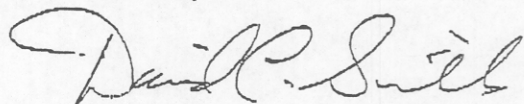
The following table tabulates the aforementioned tests. One asterisk (\*) indicates a PVE of 1100 psi because the cylinder was pretested, by FIKE, to 800 psi. Two asterisks (\*\*) indicates that the cylinder was held to 2000 psi for one minute (per UL Standard 2166, Section 25) without burst. The cylinders listed with two asterisks were not taken to burst, all of the other cylinders were burst. All bursts were longitudinal adjacent to the seam weld. These results are satisfactory.

Cylinder Size (Pounds Capacity)	Proof Test Pressure (psi)	Total Expansion (cc)	Permanent Expansion (cc)	Percent Permanent Expansion (10% Maximum)	Burst Pressure (psi)
100	1000	114	1	0.88	2130
100	1100 *	124	0.5	0.40	2000 **
375	1000	432	18	4.16	2208
375	1100 *	460	12	2.6	2000 **
1000	1000	1194	39	3.2	2238
1000	1100 *	1325	67	5.05	2000 **

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The DOT 4BW-500 longitudinal welded seam containers meet FM Approval requirements.

Sincerely,

A handwritten signature in cursive script, appearing to read "David C. Smith".

David C. Smith  
Senior Engineer - Hydraulics  
FM Approvals  
*An FM Global Enterprise*