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EXAMINATION OF POLYTHENE LINED FOAM/GAS PRESSURE EXTINGUISHERS AFTER PROLONGED STORAGE UNDER PRESSURE

by

J. A. GORDON

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Fire Research Station.
Boreham Wood.
Herts.
('phone ELStree 1341)

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Introduction

Anti-corrosive protection of the steel bodies of fire extinguishers has always been one of the major problems confronting the manufacturers of fire extinguishers.

Since the introduction of polythene as a lining material in about 1955, there has been some controversy between manufacturers and others as to the ability of polythene adequately to protect a steel body from the corrosive effects of water and foam compounds, particularly if the extinguisher were under pressure.

Various suggestions of possible defects in this method of protection have been made, including:-

(1) Poor adhesion of the polythene to the body, allowing moisture to become trapped and start corrosion.

(2) Permeability under pressure of the polythene to water, causing corrosion.

(3) Air bubbles in the polythene which would expand and burst with an increase in temperature.

In order that some assessment could be made of the efficiency of polythene as a lining, the opportunity was taken to examine twenty-four 2 gallon foam/gas pressure polythene-lined extinguishers supplied by the Ministry of Works. The extinguishers had been in use as containers to test the keeping qualities of aqueous solutions of different proteinous foam compounds, when stored under a pressure of 150 lb/sq.in for periods up to 2 years.

Description of extinguishers

During manufacture, application of the polythene lining is made by shot-blasting and preheating the bodies and spraying the polythene in powder form, causing it to adhere to the bare metal. The bodies are then passed on a conveyor to an oven where their temperature is raised sufficiently to cause fusion of the polythene into a homogeneous lining about 0.020 in thick.

For the purpose of the foam test, the extinguishers were modified to retain air pressure. The operating plungers were removed and replaced by Schrader valves and the discharge hose connection on the dome was sealed by a blank union nut.

Description of tests

In 23 extinguishers, 4 different types of foam solution were stored at a pressure of 150 lb/in^2 for periods varying from 13 to 107 weeks. Another extinguisher was used as a container for a laboratory foam generator for a period of over two years, during which time it was charged, pressurized to 100 lb/in^2 and discharged at least 500 times.

On completion of the tests the extinguishers were filled with water, allowed to stand for a period of 24 hours and the electrical resistance between a central electrode and the body of the extinguisher was measured.

Visual examination of the conditions of the linings was also made.

Result of tests

The result of the tests are given in the accompanying table.

On 22 of the extinguishers which were subjected to storage conditions under pressure, the condition of the linings appeared to be good. There was slight loss of adhesion on the domes but not on the walls of four extinguishers, but no corrosion had occurred. On another extinguisher a small pinpoint of corrosion had developed on the longitudinal weld where a small irregularity in the weld may have pierced the lining.

Foam compounds B, C and D caused staining of the polythene but this did not appear to have any harmful effects on the lining.

The electrical resistance of the linings was in no case less than 15 megohms and in 74 per cent of the extinguishers under storage tests the resistance was 50 megohms or greater.

On the extinguisher which was used for the foam generator and recharged at least 500 times, the polythene had separated from the lip of the brass neck ring for a depth of about $\frac{1}{2}$ in, probably due to mechanical rubbing when the discharge tube was removed during recharging. This may have been due to the fact that a steel tube had been used in place of the polythene discharge tube normally fitted. The condition of the lining appeared to be good with no visible signs of corrosion of the body; the electrical resistance when measured was 500 ohms.

Conclusions

The tests show that a polythene lining properly applied to a steel extinguisher body will provide a suitable protective coating for resisting the corrosive effects of water and proteinous foam compounds.

Foam Storage Tests in 2 gal. Polythene Lined Extinguishers

Extinguisher No.	Storage period	Pressure maintained	Foam	Resistance of lining (megohms)	Condition of polythene lining
1	48 weeks	150 lb in^2	A	20	Good condition
2	48 "	"	A	15	Good condition
3	107 "	"	A	50	New condition
4	107 "	"	A	50	New condition
5	48 "	"	B	50+	Lining stained - good condition
6	48 "	"	B	50+	Lining stained - good condition
7	107 "	"	B	40	Lining stained - good condition
8	107 "	"	B	50+	Lining stained - good condition
9*	13-26 "	"	-	50+	New condition
10*	13-26 "	"	-	50+	New condition
11*	13-26 "	"	-	50+	New condition
12*	13-26 "	"	-	50	New condition
13	Pressurized to 100 lb in^2 and discharged approx. 500 times			500 ohms	Lining loose at neckring, stained, otherwise in good condition
14*	13-26 weeks	150 lb in^2	-	15	Lining stained, corrosion pinhole at weld
15*	13-26 "	"	-	50	New condition
16*	13-26 "	"	-	50+	New condition
17	48 "	"	C	50+	Lining stained - good condition
18	48 "	"	C	50+	Lining stained - good condition
19	107 "	"	C	50	Lining stained - good condition
20	107 "	"	C	50	Lining stained - loss of adhesion at dome
21	48 "	"	D	40	Lining stained - good condition
22	48 "	"	D	50+	Lining stained - loss of adhesion at dome
23	107 "	"	D	25	Lining stained - loss of adhesion at dome
24	107 "	"	D	50+	Lining stained - loss of adhesion at dome

*Exploratory tests only.
The plungers were replaced by Schrader valves, for use on an air line, and the extinguishers maintained at an air pressure of 150 lb in^2 for the periods stated.
Foam compounds, A, B, C, D made from proteinous material.