M18A1 Repackaging Efforts

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Background

Filter packaging integrity is critical to performance of the filters, ease of use when removing the filters from the cans, and impact Warfighter safety if the release mechanism has exposed sharp edges.

The M18A1 filters are Tank-automotive and Armaments Command (TACOM) managed items and have been fielded in the last 15 years. Edgewood Chemical Biological Center (ECBC) manages the technical data package for the filters. The filters are each packed inside a hermetically sealed, cylindrical, tin metal can that features a key opener for unwinding the specially scored area around the top body of the container. Two canned filters are placed in a fiberboard box to serve as the unit of issue. During recent fielding initiates, there have been visible packaging issues discovered on the metal cans. Some of the metal cans were dented when received at depots or in the field.

(Configuration 1)
Current Configuration

Scope

This repackaging effort included investigation and research of potential packaging alternatives or designs to replace the original configuration for the M18A1 filters. The ECBC Packaging Branch along with Advanced Design and Manufacturing (ADM) developed three potential proposed packaging prototype designs. Each prototype along with the current configuration of the M18A1 filters were then subjected to various tests for evaluation and assessment.

Tests

The following tests were conducted:

- Packaging Validation Testing per ASTM D4169, Distribution Cycle 18
- 9-week Accelerated Aging Storage Tests
- Airflow Resistance and DMMP Gas Life performance testing

Approved for Public Release

Concept Samples

(Configuration 2)
Prototype Cradle Concept

(Configuration 3)
Prototype PVC Concept

(Configuration 4)
Prototype Poly Box Concept

Results

Configuration 2 (Cradle Concept) and Configuration 4 (Ploy Box Concept) successfully survived both packaging validation and accelerated aging storage testing and received favorable and positive results in airflow resistance and DMMP testing (reported in the table below).

If packaging changes are implemented, cost savings could be achieved:
Cradle Concept - $15.71 reduction or 35% cost savings
Poly Box Concept – $5.66 reduction or 13% cost savings

Table 1. Airflow Resistance and DMMP Gas Life IAW MIL-PRF-51193 (EA)

Packaging Configuration	Serial Number	Initial Weight	Airflow Resistance	Relative Humidity	DMMP Concentration	DMMP Gas Life	Normalized Gas Life
AS-1A	104697	1662.4 g	25.8 mm H_20	9.5-15.3%	3.079 mg/L	259 min	266 min
AS-1A	107428	1662.0 g	25.8 mm H_20	5.3-8.3%	3.079 mg/L	261 min	268 min
AS-2A	104221	1679.8 g	25.8 mm H_20	7.0-12.6%	3.154 mg/L	275 min	289 min
AS-2A	106804	1708.5 g	27.1 mm H_20	5.3-8.6%	3.254 mg/L*	266 min	288 min
AS-2B	107242	1693.3 g	25.8 mm H_20	4.6-19.2%	3.089 mg/L	288 min	296 min
AS-2B	104901	1675.5 g	24.9 mm H_20	6.7-10.5%	3.185 mg/L	280 min	297 min
AS-3A	105862	1712.5 g	28.4 mm H_20	7.8-13.5%	3.084 mg/L	280 min	287 min
AS-3A	105884	1713.8 g	27.1 mm H_20	11.4-23.9%	3.074 mg/L	287 min	294 min
AS-3B	106802	1710.2 g	28.4 mm H_20	7.4-11.2%	3.084 mg/L	277 min	285 min
AS-3B	106626	1680.4 g	27.1 mm H_20	6.6-11.1%	3.088 mg/L	275 min	283 min
AS-4A	106516	1682.8 g	24.5 mm H_20	2.9-9.5%	3.136 mg/L	311 min	325 min
AS-4A	106188	1704.8 g	25.8 mm H_20	7.9-12.5%	3.131 mg/L	305 min	318 min
AS-4B	106538	1693.2 g	28.3 mm H_20	11.2-15.7%	3.069 mg/L	313 min	321 min
AS-4B	107996	1685.5 g	25.8 mm H_20	9.1-23.0%	3.042 mg/L	280 min	284 min

*SN 106804 was over challenged IAW MIL-PRF-51193E. Required challenge is 3.0 ± 2 mg/L. The normalized gas life exceeded the minimum DMMP gas life requirement of 100 minutes.

Airflow Resistance Results

Environmental Testing

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