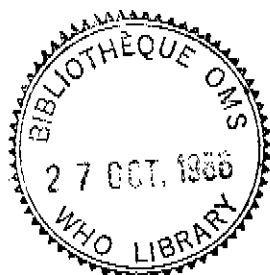




*vaccines
 drug storage
 refrigeration
 659-8*



Expanded Programme on Immunization

DEVELOPMENT OF FIBREGLASS WICKS
 FOR VACCINE REFRIGERATORS

Summary of Progress
 May 1986

Table of contents

1. Fibreglass Wicks 1
 2. Field Tests 2
 3. Laboratory Tests 2
 4. Conclusion 4

1. FIBREGLASS WICKS

The Silver Trading Company, Osaka, Japan have developed for EPI, a series of wicks for kerosene refrigerators made from fibreglass instead of the traditional cotton. These wicks are available in the four standard sizes commonly used in vaccine refrigerators, as follows:-

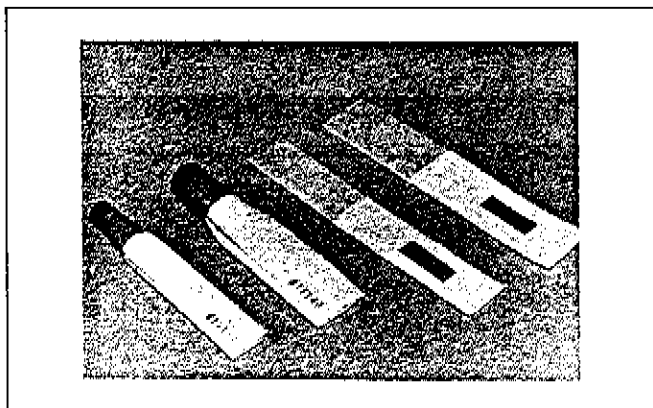
Burner type	Wick Number	Unit Wick Costs (US\$)*	
		Fibreglass	Cotton
Kosmos 8"	SWM-001UF	0.47	0.67
Kosmos 10"	SWM-002UF	0.51	1.39
Aladdin 23E	SWM-231UF	1.03	2.96
Aladdin 32	SWI-141UF	0.94	1.45

* Prices based on manufacturer's quotation for fibreglass wicks dated May 1985, and 1985 UNIPAC catalogue price for cotton wicks.

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Four fibreglass wicks



Field and laboratory tests have been carried out on these new wicks, and trials to establish their working life are continuing. Normal cotton wicks have a working life reported to range from 3 to 12 months, depending on the conditions of use. By comparison, the manufacturer of the fibreglass wicks claims a 3-year working life. At the time of writing (July 1986) two fibreglass Aladdin 32 type wicks have been burning continuously for 18 months with no significant reduction in the performance or length of the wick.

2. FIELD TESTS

200 wicks of the different types listed above were divided between a total of 10 countries in Africa, South East Asia and the Western Pacific. A questionnaire was sent with the wicks to identify any difficulties that field workers had with fitting or using them. Fitting instructions were deliberately not sent in order to establish what additional training, if any, would be needed for the new type of wick. Although replies were received from only five health centres (in Tanzania, Nepal and Indonesia), these showed that all four types of wick were easy to fit and simple to use. The two types of wick for the Aladdin burner were reported to give no special problems, but the wicks for the Kosmos burner were said to be affected by polluted kerosene. The reduction in performance was not, however, so bad as to cause the health workers to stop using the wicks.

3. LABORATORY TESTS

The "working life tests" are still continuing and the results will be published either after the wicks fail or after they have been burning continuously for more than two years.

Four other tests were carried out by the British Standards Institution:

- heat output;
- fuel consumption;
- quantity of CO₂ in the exhaust gases; and
- reduction in length by burning.

These tests were carried out using high grade kerosene and kerosene polluted with 15% diesel fuel. (Experience has shown that this degree of pollution exceeds the level of kerosene pollution found in most developing countries.) The results of the tests are summarized below:

3.1 Heat output:

At normal working temperatures the heat output of the fibreglass wicks can be adjusted to fine tolerances. The table below gives the comparison of the heat output that can be achieved using a fibreglass wick compared to a cotton wick. The fibreglass wicks fitted in the Aladdin burners are slightly better than the wicks fitted in the Kosmos burners in this regard.

Comparison of heat output

Burner type	Cotton wicks	Fibreglass wicks	% change
Kosmos 8"	60°C	58°C	-3.3%
Kosmos 10"	56°C	58°C	+3.3%
Aladdin 23	56°C	57°C	+1.7%
Aladdin 32	141°C	143°C	+1.4%

3.2 Fuel consumption:

The fuel consumption is lower for all of the fibreglass wicks except for the Kosmos 8" type.

Comparison of fuel consumptions in grams per hour

Burner type	Cotton wicks	Fibreglass wicks	% change
Kosmos 8"	30	34	+13%
Kosmos 10"	30	28	-7%
Aladdin 23	55	50	-9%
Aladdin 32	38	27	-28%

3.3 Exhaust gases

At the beginning of the tests, in all cases, except for the Kosmos 8" type wick, the CO₂ exhaust gases were lower than for the cotton equivalents. After 120 hours burning without attention, the levels of CO₂ in the exhaust gases stayed the same (or reduced) to the levels of the cotton wicks. In all cases the final level of CO₂ in the exhaust gas was acceptable.

Comparison of levels of CO₂ in the exhaust gases

Burner type	Cotton wicks		Fibreglass wicks	
	Start	Finish	Start	Finish
Kosmos 8"	.003	.002	.007	.004
Kosmos 10"	.003	.002	.002	*
Aladdin 23	.001	*	.002	.002
Aladdin 32	.007	.004	.001	*

(* indicates failure to complete 120 hours unattended burning)

3.4 Reduction in length after burning:

In all cases, except for the Aladdin 23 type wick, the reduction in length after burning was considerably less for the fiberglass wicks than for the cotton equivalents.

Comparison of reduction of wick length after 300 hours burning

Burner type	Cotton wicks	Fibreglass wicks	% change
Kosmos 8"	-1.50 mm	-0.90 mm	+40%
Kosmos 10"	-1.34 mm	-0.56 mm	+58%
Aladdin 23	-0.47 mm	-0.99 mm	-111%
Aladdin 32	-1.50 mm	-0.24 mm	+84%

All the results given above are taken from the tests made with kerosene polluted with 15% diesel fuel. The results from the high quality (C1 grade) kerosene tests are similar.

4. CONCLUSION

These tests indicate that the fiberglass wicks are superior to the cotton equivalents in almost every test performed. They will probably, in time, replace cotton wicks in areas where fuel supplies and supply of replacement wicks are difficult. Until manufacturers adopt these fiberglass wicks as standard fittings in their new refrigerators, they can be purchased as replacement wicks for existing refrigerators. Fiberglass wicks are available directly from:

Silver Trading Company
7-15, Kita Kamei Cho, 2 chome
Yao City, Osaka 581, Japan.
Telephone: 0729-91-1234
Telex: 05353560 SILVER J

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