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DEPARTMENT OF THE ARMY
Fort Detrick
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TEST REPORT ON PORTABLE WATER-TESTING EQUIPMENT OF

- a) Membrane-Filter Manufacturing Co., Göttingen
- b) Type Isopor, Model B of Chemical Corporation, Pasadena

by

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Testing Section 53 of the West German Army

12 July 1962

SUMMARY

Both types of equipment are intended to carry out bacteriological examination of water, regardless of the degree of contamination, directly in the field. This requires robust design without delicate parts and reliable methods of operation.

After minor changes, the Göttingen membrane-filter equipment would correspond to specifications in its essential components as well as method of operation. The Isopor unit is totally inadequate for the purpose.

In contrast to the Göttingen apparatus, the Isopor design attempts to save time in the demonstration of bacteria, by providing immediate incubation in the equipment, directly in the field. However, the method employed for this is questionable and too complicated for use in the field.

The filters and dry-culture discs of both companies are effective and satisfactory in regard to storage life.

/ signed and countersigned as in original/

DETAILED REPORT

A) Equipment

a) Portable water-testing equipment, manufactured and supplied by Membranfiltergesellschaft mbH., Göttingen, Weender Landstr. 96/102.

b) Portable water-testing equipment, type "Isopor" model B, manufactured by Chemical Corporation, Pasadena, California, USA.

B) Purpose of Test

Comparative confrontation of both types of equipment as per instructions received.

Special instructions and indications: the two types of equipment ~~are~~ to be compared with each other.

C) Execution of Tests

The values and observations already embodied in the test reports on both types of equipment and already made earlier have here been grouped and compared in tabular form.

D) Test Results

The principal results of the comparative confrontation of the two types of equipment will be found in the Tables 1 and 2 and in the attached photos.

The weight of both instruments ready for operation is the same, i.e. 13.75 kg.

Absolutely necessary auxiliary items for taking and dilution of samples, cleaning of the instrument as well as spare parts and some reagents would have to accompany the equipment in both cases in a separate container with approximately the same dimensions as the portable housing of both types of equipment, i.e. 370 x 450 x 240 mm. The Göttingen design indicates in the operating instructions the necessity for bringing along sterile auxiliary equipment and reagents. However, the Isopor design does not admit this necessity. The operating instructions of the latter list methods for taking and diluting samples which can be carried out, without auxiliary equipment, only by assuming absolute reliability of sterilization with formaldehyde vapors. This method of sterilization is so inadequate, however, that it would throw doubt on all of the results of filtration. It was shown that the material of the Isopor design did not stand up under other methods of sterilization, e.g. flame

sterilization.

By comparison with the Gottingen design, the Isopor design could be termed advantageous if the incubation of the filtered samples directly and immediately in the instrument had been solved without giving rise to objections. However, the incubation apparatus is the part of the design which stands up least in operation and successful incubation is dependent on a great number of essential factors mentioned already in the earlier test report of 26 March 1962. At least for use in the field and during transportation, the method is therefore unreliable.

Subsequent to testing, the Gottingen design was used continually in the laboratory and in the field until the present time. It continues to operate satisfactorily in the examination of water samples which originates at Testing Section 53 during the testing of different types of water-treating equipment.

Table 1
Serviceability of Equipment and Components (+ = serviceable; - = unserviceable)

Type of Equipment	Membrane-Filter Unit	Isopor Unit
1. Evaluation of Unit as a Whole		
During operation	+	-
During transport	+	-
2. Evaluation of Components		
Portable housing	+	-
Filter component	+	-
Vacuum flask & tubes	-	+
Manual vacuum pump	+	+
Petri-dish container w/inserts	+	-
Petri dishes	+	-
Flame source	+	-
Measuring pipette	-	+
Incubation component	not part of design	-
Filtering method	+	+
Supports	+	-
Diluting method	+	-
Sterilizing method	+	-
Incubation method	not part of design	-
Procurement of spare parts	+	-
	<p>w/reservations; should be made tight and provided w/lock(cf.Fig.1)</p> <p>nipples break off, cleaning is difficult, tubing is not flexible</p> <p>Cf. Fig. 3 and 4</p> <p>Cf. Fig. 5</p> <p>measures very inaccurately(Cf. Fig. 6)</p>	<p>negative due to objections to components listed below as well proposed methods</p> <p>sensitive to mechanical and climatic factors as well as positions other than upright, cannot be stacked</p> <p>sensitive, cannot be stacked, combustible (cf. Fig. 2)</p> <p>cannot be sterilized during operation, has corroding parts</p> <p>w/reservations: wooden handle split</p> <p>not tight, cannot be adequately sterilized, space too small, (cf. Fig. 3 and 4)</p> <p>fragile, inadequate number (24) (Cf. Fig. 5)</p> <p>very weak, extinguished by draft</p> <p>Cf. Fig. 6</p> <p>easily breakable, not tight</p> <p>w/reservations: only as long as filter component is tight, dosage very inaccurate</p> <p>very weak</p> <p>inaccurate, filtrate cannot be used as diluting medium as stated</p> <p>formaldehyde vapor: do not kill germs 100% by method indicated here</p> <p>components sensitive, method difficult, success depends on many factors:</p> <p>According to report 28 Oct. 59 not procurable - not serviceable without auxiliary components notwithstanding manufacturer's assertion</p>
	<p>w/reservations: sharp edges</p>	
	<p>not serviceable without auxiliary components, according to manufacturer's advice</p>	

Table 2
Comparison between Membrane-Filter and Culture-Disc Combination of Both Units

Type of Unit	Göttingen filter "Coli 5"	Isopor Model B filter	Remarks
Filter (cf. Fig. 7)		47mm	
Diameter	50 mm	both units	
Filter fits	only Coli 5		Göttingen filter too large for Isopor but specially made filter and culture discs for latter can be purchased in lots of 1,000 (telephonic agreement of Göttingen manufacturer Feb. 62)
Surface covered by germs	11.33 cm ²	6.54 cm ² (Isopor unit) 11.33 cm ² (Coli 5 unit)	due to larger diameter, position of germs on Göttingen filter is not as close and more easily counted
Lattice			
On surface covered by germs	about 48 squares	about 97 squares	subdivision on Göttingen filter is clearer, lattice still sharp after incubation, more favorable for count
Side length of square	5 mm	3 mm	
Marking	sharp green	indistinct black	
Color			
Protective disc	cellophane with printed designation: protective disc	parchment with print	edge of protective disc of Göttingen type scarcely visible and very difficult to remove with pincers
Culture discs (MRS)			Isopor protective discs raise no objections
Type	Standard	General I General II	all types of both companies suitable
Water absorption as indicated	3 ml	End - Wilson Blair 2.3 ml	
Water absorption in practice	2.5-2.8 ml	2.3 ml	
Packing	suitable	suitable	both companies furnish the combinations absolutely sterile in solid double packing which extensively protects from ambient temperature and light factors
Storage life as indicated	more than 1 year	more than 2 years	both packings omit date of manufacture

Fig. 1
Göttingen Unit

Weight of units ready for operation

13.75 kg

Overall dimensions of closed units

height - 385 mm

width - 450 mm

depth - 253 mm

Fig. 2
Isopor Unit

13.75 kg

height - 370 mm w/rubber
supports

width - 450 mm

depth - 240 mm

Fig. 3
Petri-dish containers

.... on left for Göttingen unit: satisfactory sterilization, non-corroding capacity 69 dishes in 3 containers.

.... on right for Isopor unit: unsatisfactory sterilization, small capacity, 24 dishes in 2 containers.

Fig. 4
Petri-dish racks

Fig. 5
Petri dishes

on left: for Göttingen unit, non-corroding and non-deformable
metal, flat, space-saving, w/cover
on right: for Isopor unit, glass, breakable, w/o cover, closed
by foil.

Fig. 6
Measuring pipettes

on left: for Göttingen
unit, does not measure
with riser pipette, un-
suitable arrangement;

on right: ball pipette
for Isopor unit, dose
exactly measurable through
adjustment of stroke,
heavy-wall glass flask,
suitable arrangement.

Fig. 7

Filter Lying on Culture Discs (Cf. Table 2)

on left: Coli 5 filter

on right: Isopor filter

- END -