

**Test Report**

**Prepared For:**  
Eco100 Systems Inc.

**Test Performed:**  
Amalgam Separator Efficiency

**Report No:** GVLT-238-2, Rev1

**Material Receive Date:** July 27, 2018  
**Test Dates:** July 27, 2018 – August 10, 2018  
**Report Date:** August 16, 2018  
**Revised:** Jan 22, 2020

## Test Summary

### Testing Overview

Test was performed under the specifications of ISO 11143:2008 Dental Equipment – Amalgam Separators. Three samples of the Eco100 Capt-all Filter was tested. A test slurry of amalgam was mixed and used according to the standard and filtered through the device, and efficiency ratings were determined.

**Test Number:** GVLT-238-2

**Test Specimen(s):** Eco100 Capt-all Filter

### Personnel in Charge of the Test:

<u>Personnel</u>	<u>Client</u>
T.C. Beinke Test Engineer Office: 864.293.8421	Charles McCary Eco100 Systems Inc.

## General Test Results

### Before Test

The sample had no visible issues.

### After Test

Target Efficiency: 95%

Average Efficiency: 95.4%

Met Requirement?: **Yes**

**Client**

Eco100 Systems Inc.  
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Huntsville AL, 35805  
Contact Name: Charles McCary

**Test Facility**

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Phone: 864.293.8421  
Contact Person: T.C. Beinke

The following persons verified and guarantee the accuracy and validity of the information presented in this report in accordance the specifications required by the client:



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T.C. Beinke  
Test Engineer  
J.A. King

**Report Revision History**

Revision	Description	Date
0	Original Release	8/16/2018

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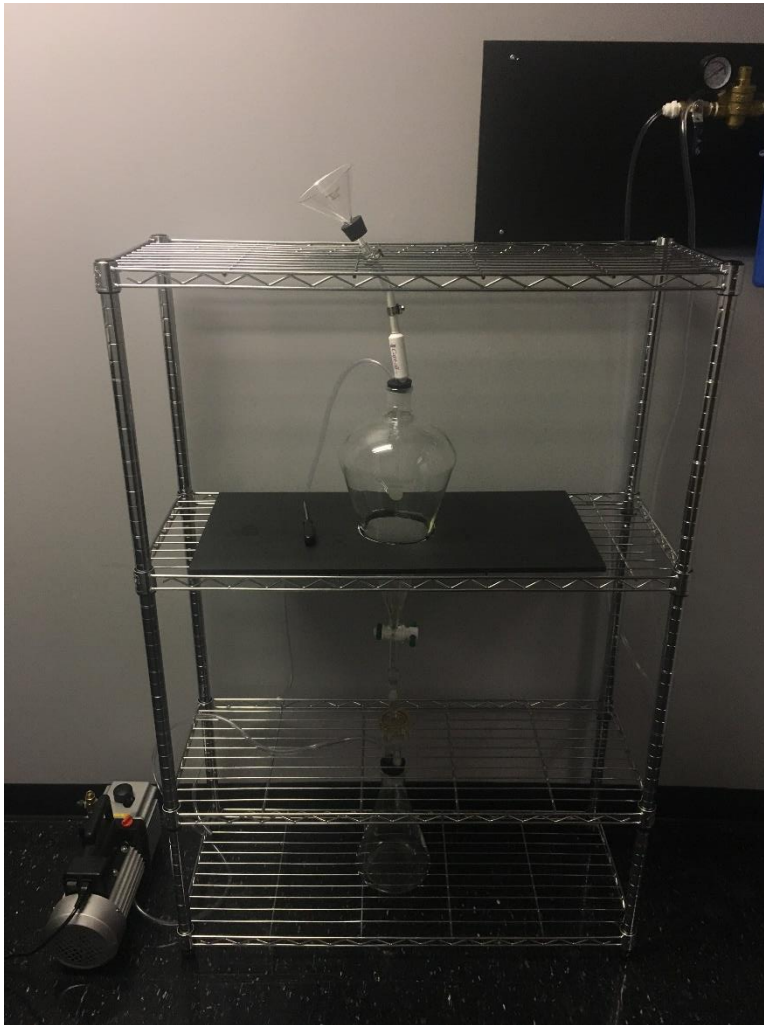
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## 1 Preliminary

### 1.1 Procedure/Setup

#### 1.1.1 Testing Apparatus

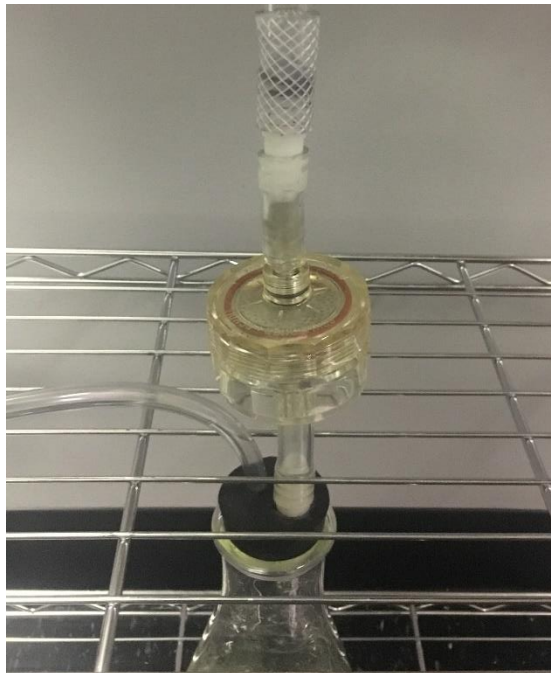
A testing apparatus was built to be compliant to section 7.1 of ISO 11143:2008. The Eco100 Capt-all Filter was placed within the apparatus.



The testing apparatus



The setup of the Capt-all filter within the apparatus



The Microfilter-holding system within the apparatus

### 1.1.2 Membrane Filters

Three filters were used in series with separating gauze in a membrane filter holder, which is pictured in section 1.1.1 of this report. The system of filters with the gauze is pictured and described in section 1.4 of this report. The following are descriptions of the individual filters:

1. 12  $\mu\text{m}$  nominal pore size, polycarbonate membrane filter, 50mm diameter
2. 3.0  $\mu\text{m}$  nominal pore size, mixed cellulose ester membrane filter, 50mm diameter
3. 1.2  $\mu\text{m}$  nominal pore size, cellulose nitrate membrane filter, 50mm diameter

### 1.1.3 Preparation of the Test Slurry

The dry samples of amalgam (section 8.3) were obtained from “enretec GmbH”. Each sample consisted of 10 g dental amalgam, and at the correct particle size distribution, per section 8.3 of ISO 11143:2008.

Particle size distribution:

- 3000 $\pm$ 5mg, <100  $\mu\text{m}$
- 1000 $\pm$ 5mg, 100-500  $\mu\text{m}$
- 6000 $\pm$ 10mg, 500-3150  $\mu\text{m}$

Amalgam Sample Lot number

- Charge 001-02/18

A test slurry was mixed based on section 8.5 of ISO 11143:2008. A dry sample of amalgam (described above) was mixed with 1 g of sodium pyrophosphate and 20 mL of filtered tap water. Once the slurry was well mixed, the beaker was filled to a total of 1 L. The slurry was stirred with a stirring rod until the dry sample was completely dispersed. This procedure was repeated for each sample tested.

## 1.2 Test Methods

All testing methods comply with section 9.3 of ISO 11143:2008 Dental Equipment – Amalgam Separators.

Deviations in the test method are listed below:

- Effluent Collecting Vessel (7.1.7 of ISO)
  - Volume of vessel = 4L, standard calls for 40L minimum
  - Constructed of glass, standard calls for stainless steel
- Flow rate meter (7.1.3)
  - Flow was determined by calculation and thus a meter was not used
- Rinsing procedure (9.3.2.7)



- This procedure calls for air pressure ( $1.5-2 \times 10^5$  Pa) to force the fluid through the membrane filters. A vacuum was used in place of this.

### 1.2.1 Number of Tests performed

Three empty efficiency tests were run. For each, a new, empty sample was provided by the customer. Further testing on multiple components is defined in the standard, but was not completed due to the one-use nature of the Capt-all Filter. The following is a list of tests that were not performed:

- Efficiency test – full amalgam separator
- Test of warning system for removable collecting container
- Test of alarm system for removable collecting container
- Test of alarm system for malfunction of amalgam separator

### 1.2.2 Maximum Water Flow Rate

The maximum water flow rate is generally established per the manufacturer's instructions for use, at a minimum of 1 L/min, per ISO 11143:2008. This was not defined by the customer, and thus was established at the minimum requirement.

$$0.5 \text{ L/min (test slurry)} + 0.5 \text{ L/min (filtered tap water)} = 1 \text{ L/min}$$

### 1.2.3 Efficiency Equation

The efficiency ( $\eta$ ) of the amalgam separator was calculated using the following equation, per ISO 11143 manual.

$$\eta = \frac{100[m_1 - (m_3 - m_2)]}{m_1}$$

Where:

- $m_1$  is the mass, in grams, of the dry test sample described in 1.2.2 below
- $m_2$  is the mass, in grams, of the series of membrane filters before the efficiency test
- $m_3$  is the mass, in grams, of the series of membrane filters after the efficiency test

### 1.3 Parts Tested

Three Eco100 Capt-all Filters were tested compliant to ISO 11143:2008. These classify as a Type 3 amalgam separator.

### 1.4 Photographs – Pre Test



Example of the Capt-all Filter



Example of the Microfilter setup (top to bottom): 12µm filter, separating gauze, 3µm filter, separating gauze, 1.2µm filter, separating gauze

#### 1.4.1 Evaluations

All parts had no visible issues

## 2 Test Results

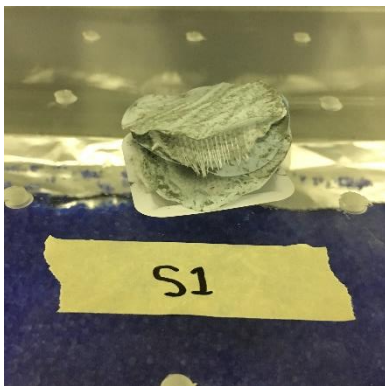
### 2.1 Test Data

The results from efficiency testing are shown in the following table:

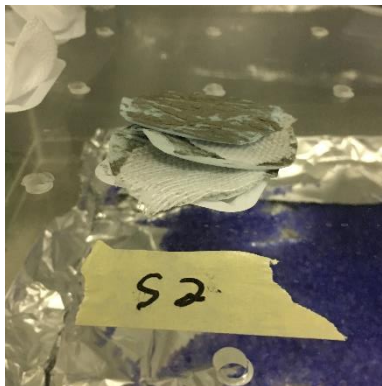
Sample #	Mass of Amalgam Sample [m1] (g)	Mass of Microfilters before test [m2] (g)	Mass of Microfilters after test [m3] (g)	Efficiency [ $\eta$ ] (%)	Average Efficiency [ $\eta$ ] (%)
1	9.725	0.593	1.037	95.434	<b>95.430</b>
2	9.875	1.186	1.633	95.478	
4	9.922	1.393	1.852	95.378	

The efficiency value for the Eco100 Capt-all Filter is 95.4%, which meets the EPA Final Rulings for a Equivalent Device:441.30 (a)(2)(i-iii).

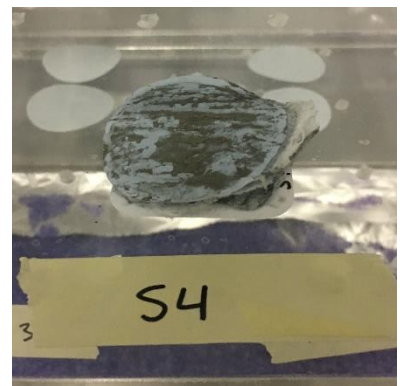
### 2.2 Photographs – Post Test



Sample 1



Sample 2



Sample 4