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RESUME:

Periodic test of the PlasmaMade GUC 1410 Performed on 16-08-2019

INDEX:

Pag. 1: Title, resume.

Pag. 2: Introduction.

Pag. 3: methods and testing.

Pag. 5: Measurements.

Pag. 6: Conclusion.

INTRODUCTION.

In this report the plasma filters of PlasmaMade B.V. subjected to the ozone test as stated in NEN-EN-IEC 60335-2-65: 2003 clause 32. Plasma filters produce ozone as a by-product in the reaction that the plasma enters with the air to be purified passing through the filter. The ozone tests shown and discussed in this document are performed regularly. The filters are subjected to the ozone test every 3 months on average and these are the filters that have been performed with the plasma system of PlasmaMade, these are the types, GUC 1212, GUC1214, GUC1314 and the GUC 1410. Figure 1 shows the GUC 1410 .



Figure 1: GUC1410 (Wesco filter) PlasmaMade.

The plasma filters must be regularly subjected to the ozone test in clause 32 in order to pursue different goals:

- 1. Quality check: Is everything in the filters still working properly?
- 2. Safety check: Do the filters not produce too much ozone?
- 3. Product improvement: How can the product be improved?

This report is written with emphasis on point 2 of the security check. This report then has a 4th goal, to be able to constantly offer the test houses the most recent test results.

In short, this report has as main research questions:

- 1. What are the ozone emissions of all PlasmaMade GUC models according to clause 32 of the standard?
- 2. Are the filters safe for the test as stated in clause 32?

This report has the following structure. In chapter 1 we discuss clause 32 of standard NEN-EN-IEC 60335-2-65: 2003 and other general data of the tests. In chapter 2 the ozone test results are shown and analyzed. The results are tabulated per measurement for clarification. To conclude, we present a brief conclusion in Chapter 3.

1. METHODS AND TESTING.

A. TESTUITVOERING VOLGENS CLAUSULE 32 VAN DE NORM: NEN-EN-IEC 60335-2-65:2003.

The test is performed according to clause 32 of standard NEN-EN-IEC 60335-2-65: 2003. This clause states:

"32 Radiation, toxicity and similar hazards This clause of Part 1 is applicable except as follows.

Addition.

The ozone concentration produced by ionization shall not be excessive.

Compliance is checked by the following test, which is carried out in a room without openings having dimensions of $2.5 \text{ m} \times 3.5 \text{ m} \times 3.0 \text{ m}$, the walls being covered with polyethylene sheet.

The appliance is positioned in accordance with the instructions. Appliances used on a table are placed in the centre of the room approximately 750 mm above the floor. The room is maintained at approximately 25 °C and 50 % relative humidity. The appliance is supplied at rated voltage for 24 h, removable filters being removed if this is more unfavourable.

The ozone sampling tube is to be located in the air stream 50 mm from the air outlet of the appliance. The background ozone concentration measured prior to the test is subtracted from the maximum concentration measured during the test.

The percentage of ozone in the room shall not exceed 5 x 10-6."

B. ADJUSTMENT OF STANDARD TEST PERFORMANCE.

No adjustments were made to the test execution as set out in the standard.

C. USED TEST EQUIPMENT.		
Ozonmeter: Anseros	Meetbereik: 1 ppb tot 1 ppm.	
	Nulruis: < 0.2 ppb.	
	Spanruis: <0.5% van de RMS waarde van de meting, vanaf 0.1 ppb.	
	Nuldrift: 1% van de volle schaal over 24 uur,	
Rel. Luchtvochtigheidsmeter:	Meetbereik (% r.v.): 0.1 tot 99.9 %.	
Trotec BZ30 CO2 meter.	Resolutie (% r.v.): 0.1.	
	Nauwkeurigheid (% r.v): 5.	
Temperatuurmeter:	Meetbereik: -5 C° tot 50 C°.	
Trotec BZ30 CO2 meter.	Resolutie: 0.1 C°.	
	Nauwkeurighed: 1 C°.	

D. OTHER REMARKS.

The test execution is shown below in the photo in figure 2.

Figure 2: Photograph of the test arrangement of the plasma filter in the test room used for the measurements performed in this document. The measuring mouth is placed by means of a standard and on the prescribed 5 cm of the plasma filter.

2.MEASUREMENTS.

The measurement results are shown in this chapter. Each set of measurements is given its own subchapter within this chapter. The measurements shown are analyzed for each subsection. In this case, therefore, one measurement result

2.A FILTER TEST GUC1410 16-08-2019.

Figure 3 below shows the graph of the GUC1410 that has been tested according to clause 32 of the set standard. Total test 30 hours. Horizontal line value times 30sec. Vertical measuring range in PPM.

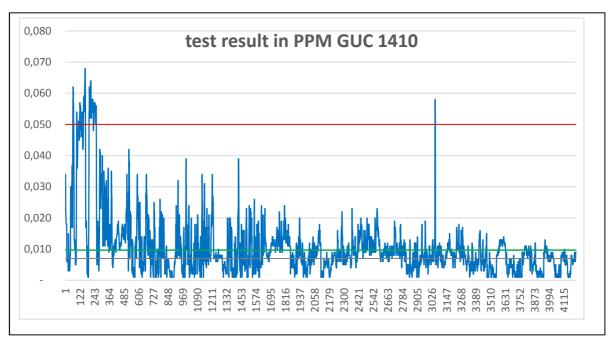


Figure 3

With the measurement shown, the time in minutes is shown on the x-axis and the ozone concentration on the y-axis. The x-axis time represents the absolute time, with point 0 being the time when the measurement was started. The red line represents the standard value of 50 ppb. The green line is the average. The blue line are the measured ozone values by the Anseros ozone analyzer. The gray line is the background value.

The test conditions and results are shown in table form below.

TABEL VOOR GUC1410 augustus 2019.		
Testconditie:	Waarde:	
Temperature during test	20 C° ± 2 C°.	
Humidity during the test:	50 % ± 5 %.	
Background ozone concentration:	7 ppb \pm 1 ppb.	
Testresultaat:	Waarde:	
Highest ozone concentration achieved in the test:	41 ppb.	
Time to reach highest ozone concentration:	n.v.t.	
Processing according to clause 32 & result test:	41 ppb – 7 ppb = 34 ppb.	
Avg measured over 24 hours	0,00965 – 0,007 ppb = 0,0026 ppb.	
Does the filter meet the requirements of clause 32:	34 ppb < 50 ppb: yes, pass	

3. CONCLUSION AND DISCUSSION.

The tested filter remains well below the 50 ppb ozone standard. This means that the PlasmaMade filter, the GUC1410, was found to be safe in this context.

Figure 3 attached as an appendix to size A2.