

# GASTEC GV-100 GAS SAMPLING PUMPS

## TEST REPORT No. PE11649-21-01

Six Gastec GV-100 gas sampling pumps supplied by Gastec Corporation, Ayase-City, Japan were tested at the Health and Safety Executive (HSE), Harpur Hill, Buxton SK17 9JN in July 2021. Testing comprised the following performance tests which were carried out in accordance with the procedures described in ISO Standard ISO 17621:2015.<sup>[1]</sup>

- **Stroke Volume Test** (Paragraph 6.2.1 of the ISO Standard)
- **Leakage Test** (Paragraph 6.2.2 of the ISO Standard)
- **Mechanical Strength Test** (Paragraph 6.2.3 of the ISO Standard)
- **Mechanical Durability Test** (Paragraph 6.2.4 of the ISO Standard)

In addition, the instruction manual supplied with the pumps was also assessed against the criteria shown in Paragraph 4.3.7 of the ISO Standard.

Prior to use the pumps were also subjected to the Leak Test and Flow Finish Indicator Tests specified in the Instruction Manual provided with each pump by Gastec.

### **1. Stroke Volume Test**

The Stroke Volume test was carried out on five GV-100 gas sampling pumps supplied by Gastec using a volume setting of 100 ml. As specified in Paragraph 6.2.1 of the ISO Standard, volume measurements were taken at both the end of the pump stroke, as indicated by Flow Finish Indicator, and 30 seconds later. At the end of the pump stroke the average stroke volume obtained from the five pumps was 98.5 ml. 30 seconds later the average stroke volume was 100.3 ml, an increase of 1.8 ml. These results represent deviations from the set volume of -1.5 ml and +0.3 ml. Both values meet the acceptance criteria of  $100 \pm 5$  ml stated in ISO 17621:2015.<sup>[1]</sup>

### **2. Leakage Test**

The Leakage test was carried out on the same five GV-100 gas sampling pumps tested in the Stroke Volume Test (and using the same volume setting). Volume measurements were taken at the end of the pump stroke, as indicated by Flow Finish Indicator, and 30 seconds later. At the end of the pump stroke the average stroke volume obtained from the five pumps was 98.2 ml. 30 seconds later the average stroke volume was 99.1 ml, an increase of 0.9 ml. These results represent deviations from the values obtained from the same pumps in the Stroke Volume test of -0.3 ml and -1.2 ml. Both values meet the acceptance criteria of  $\pm 3$  ml stated in ISO 17621:2015.<sup>[1]</sup>

### **3. Mechanical Strength Test**

The Mechanical Strength test was carried out on a single GV-100 gas sampling pump supplied by Gastec that had been subjected to the shock treatment specified in Paragraph 6.2.3 of the ISO Standard. Volume measurements were taken at the end of the pump stroke, as indicated by Flow Finish Indicator, and 30 seconds later. At the end of the pump stroke the average stroke volume obtained from the pump tested was 98.5 ml. 30 seconds later the average stroke volume was 100.5 ml, an increase of 2.0 ml. These results represent deviations from the set volume of -1.5 ml and +0.5 ml. Both values meet the acceptance criteria of  $100 \pm 5$  ml stated in ISO 17621:2015.<sup>[1]</sup>

#### **4. Mechanical Durability Test**

The Mechanical Durability test was carried out on one of the five pumps used in the Stroke Volume and Leakage tests. The selected pump was operated one thousand times, as specified in Paragraph 6.2.4 of the ISO Standard, using a stroke volume of 100 ml and then subjected to the Stroke Volume test. Volume measurements were taken at the end of the pump stroke, as indicated by Flow Finish Indicator, and 30 seconds later. At the end of the pump stroke the average stroke volume obtained from the pump tested was 98.5 ml. 30 seconds later the average stroke volume was 100.4 ml, an increase of 2.0 ml. These results represent deviations from the set volume of -1.5 ml and +0.4 ml. Both values meet the acceptance criteria of  $100 \pm 5$  ml stated in ISO 17621:2015.<sup>[1]</sup>

#### **5. Instruction for Use**

The 'Instructions for Use' booklet supplied with each pump complied with all of the criteria stated in the ISO Standard.

**Signed**

A handwritten signature in black ink that reads "Ian Pengelly". The signature is written in a cursive, slightly slanted style.

**Ian Pengelly**

Analytical Chemistry Technical Lead  
Health and Safety Executive, Harpur Hill  
Buxton SK17 9JN, United Kingdom

**26 August 2021**

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#### Test Method

Tubes were tested in accordance with the evaluation procedures described in Sections 6.2.1, 6.2.2, 6.2.3 and 6.2.4 of ISO Standard EN 17621:2015<sup>[1]</sup>. Full details of the tests may be found in HSE Report HG/2021/24.<sup>[2]</sup>

#### Traceability

The volume of the glass syringe used for collection of the stroke volume measurements was verified using a mass flow controller calibrated using a UKAS (United Kingdom Accreditation Service) accredited flow meter.

#### Legal Notice

The results quoted in this test report are HSE's best estimate of the true values within the stated uncertainties and based upon the techniques and procedures described. HSE will not assume any liability with respect to, or for damages resulting from, the use of any information disclosed in this test report save for the procurement value of said materials in circumstances where the materials or their assigned values have been proven faulty (HSE proved negligence).

[1] ISO 17621:2015 - Workplace atmospheres – Short term detector tube measurement systems – Requirements and test methods

[2] Testing of Gastec GV-100 Gas Sampling Pumps, Health & Safety Executive Report HG/2021/24