

TITLE: Leak Checking the URG 3000N Filter Cassette

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Annual Review			
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1.0 Introduction

1.1 Purpose of Procedure

The URG 3000N filter cassettes are used in the Chemical Speciation Network (CSN) for the collection of aerosol samples on 25 mm diameter quartz fiber filters. In order for the filter sample to be valid, the sampling train must not have any substantial leaks between the sampling pump and the sampler inlet. The flow rate through the filters cassette is set to 22 actual liters per minute (LPM) and controlled by the mass flow controller in the sampler. The filter pack's structural integrity is checked annually to ensure that in-use cassettes have not developed leaks that would allow air into the system that has not passed through the sampler inlet and size cut device.

This document describes procedure for the annual maintenance leak checking of the in-use URG 3000N filter cassettes. New cassettes provided by URG are not subject to this leak check procedure.

1.2 Measurement Principle

The URG 3000N filter cassette will be checked for leaks by drawing 22 actual LPM of air through the filter pack with a vacuum pump and monitoring the flow with a flow meter. The pump, cassette and flow meter will be connected in series and a vacuum gauge will be used to measure the change in vacuum pressure when the line is isolated.

The criteria for the URG 3000N sampler to pass a leak test is for it to have a vacuum drop of less than 225 mm Hg in 35 seconds. This same criteria will be used for leak checking the filter cassettes.

1.3 Responsibilities of Personnel for Carrying out Portions of this Procedure

CSN Filter Shipping and Handling Unit (FiSH) personnel performing this procedure must receive documented training – *GLO-3110-001 Training Chemical Speciation Network Filter Shipping and Handling Personnel*. The procedures outlined in this document are to be followed unless otherwise informed by the laboratory supervisor or an updated version is available.

The FiSH technical area supervisor is responsible for: 1) ensuring compliance with operating procedures by personnel, 2) specifying instruments to be used for the procedure (e.g. pump, vacuum gauge etc.), and 3) delivering results to the program manager within a specified time period.

1.4 Related Procedures

Relevant information on sampler operation and maintenance can be found in *Standard Operating Procedure for the URG-3000N Sequential Particulate Speciation System, Version 2.0* (<https://www3.epa.gov/ttnamti1/files/ambient/pm25/spec/URG3000NSOP.pdf>).

2.0 Apparatus, Instrumentation, Reagents, and Forms

2.1 Apparatus and Instrumentation

2.1.1 Description

Filter cassette leak checks are conducted through connecting all of the filter cassette inlets with Tygon or equivalent tubing to a vacuum pump capable of pulling at least 22 actual LPM. The inlet side of the filter cassette is sealed by placing it against an impermeable plastic membrane. The pump is then turned on applying a vacuum to the empty filter cassette (i.e., a cassette without filters). The upstream side of the cassette is connected to a vacuum gauge to measure the pressure held by the cassette on each inlet (Figure 1).

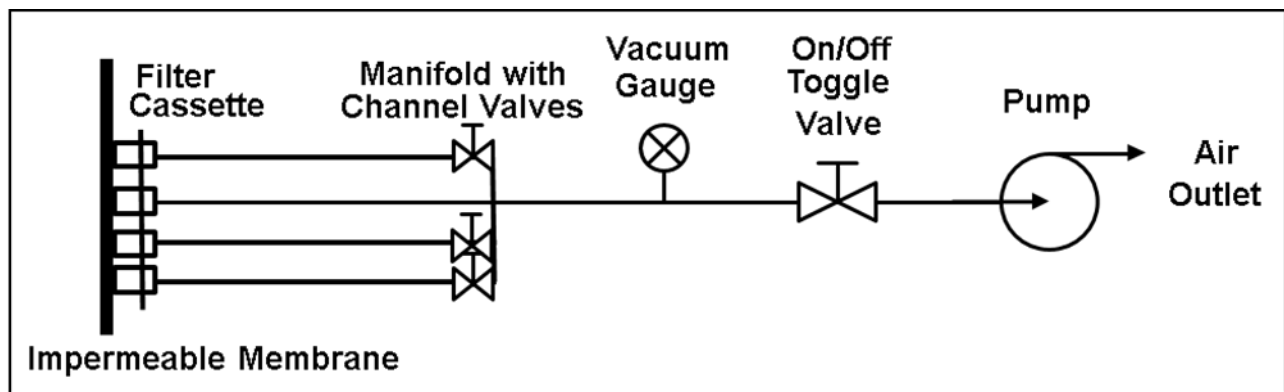


Figure 1. Schematic of the connections during the leak test of a URG-3000N filter cassette

3.0 Procedures

3.1 Operational Instructions

Make the proper plumbing connections (Figure 2). Connect the vacuum pump line to the underside of the filter cassette. The top of the filter cassette will be mated to the vacuum gauge to measure the pressure. Place the impermeable membrane over the inlet sides of the filter cassette.

Turn the pump on and draw down the vacuum until the reading on the vacuum gauge no longer increases. This should take less than 30 seconds. Once the reading is stable record it in the URG Pressure Testing file on the network drive, and then close the valve to the pump and the outlet valve. After 35 seconds record the final vacuum reading.

2017-2018 URG Pressure Testing

Inventory ID	Initial Pressure LPM	Pressure after 35 seconds LPM	P/F less than 35 mm	Retest P/F	Date	Checked By	Notes
I10177T			P				
I10208J			P				
I10211E			P				
I10303H			P				
I10309N			P				
I10310G			P				
I10369Z			P				
I10375X			F				
I103780			F				
I10500K			P				
I10560W			P				
I10601O			P				
I10609W			P				
I106483			P				
I10650X			P				
I106654			P				
I106687			P				
I109324			P				
I109346			P				
I109368			P				
I10938A			P				
I109404			P				
I109426			P				

Figure 2. URG Pressure Testing File

3.2 Quality Control and Quality Assurance

The vacuum reading should not drop by more than 225 mm Hg in 35 seconds. If this criterion is not met the cassette has failed the leak check and should not be used for sampling, must be noted and set aside with other failed cassettes.

If individual inlets fail, then the o-rings should be replaced and the test repeated to ascertain whether replacing the o-rings solved the problem. If the leak check still fails, the filter cassette is removed from the inventory permanently.

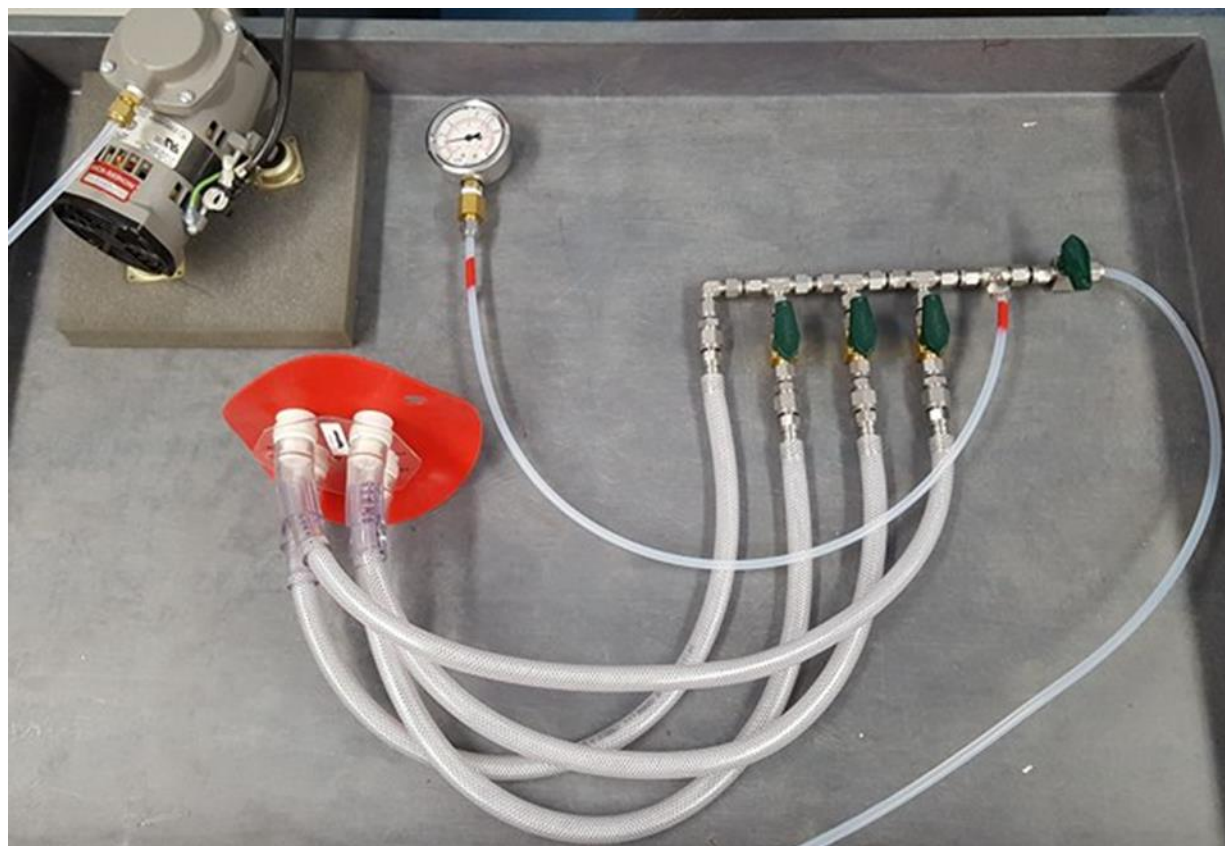


Figure 3. URG Pressure Testing Assembly

4.0 References

GLO-3110-001 Training Chemical Speciation Network Filter Shipping and Handling Personnel – 2017, Wood.

Standard Operating Procedure for the URG-3000N Sequential Particulate Speciation System, Version 2.0 – 2011, EPA Office of Air Quality Planning and Standards.