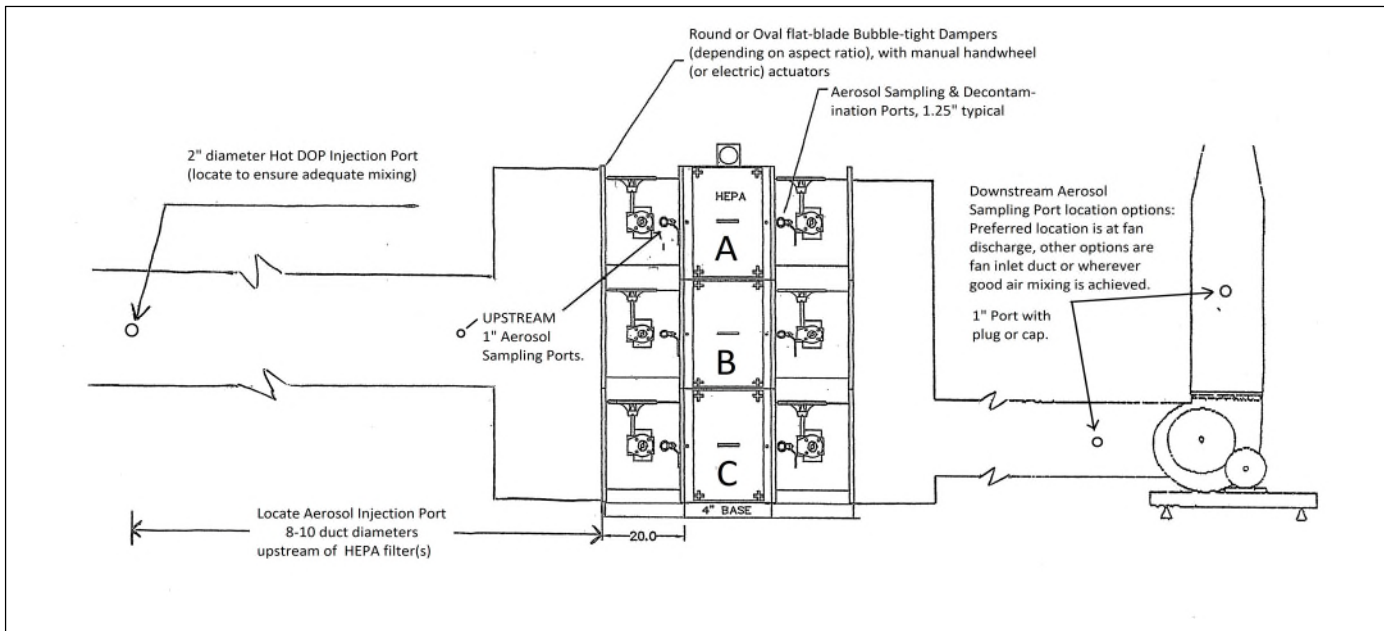


## HEPA Filter Challenge on N+1 Redundant Filter Systems, using IEST Overall Test Method (RP034)

IAS Bulletin #218-01-17



CONTAMINATION  
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CORPORATION



### IEST-RP-CC0034.1, Section 6.2.3 – Aerosol Photometer Total Leakage Test Method

#### AEROSOL INJECTION & SAMPLING PORTS – SIZING AND LOCATION GUIDELINES

Per IEST-RP-CC0034.1, Section 6.2.3, the following are guidelines for sizing and location of ports required for "Overall Total Leakage Test Method" for duct-mounted HEPA filter systems:

**Upstream Aerosol Injection:** Minimum 1" Port with Plug (Cap) is mounted at an accessible point on the upstream duct. We recommend a **1" full-bore** ball valve or pipe nipple with cap; material to suit duct. **IMPORTANT:** Injection port(s) must be several duct diameters from the HEPA/ULPA filter(s) to allow for sufficient mixing of aerosol for upstream and downstream sampling. A **minimum of 8-10 duct diameters upstream** of the filter bank is recommended by IEST.

**NOTE: The installing contractor is responsible for provision of the Upstream Aerosol Injection port.**

**Upstream Sampling Port:** Upstream sampling of DOP (Dispersed Oil Particulate) aerosol concentration can be taken via a 1" minimum diameter port located in the duct (or in the inlet transition) or wherever there is good air mixing upstream of the HEPA filter(s).

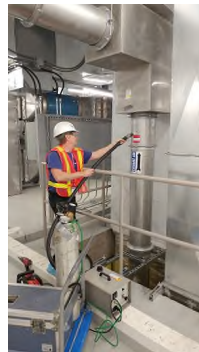
**Downstream Sampling Port:** Downstream sampling of DOP aerosol (Emery 3004 Aerosol or equal) concentration can be taken via a 1" minimum diameter port located in the outlet duct or discharge stack in a location deemed to have good air mixing and/or providing a representative sample of filtered air.

Step 1) Carefully unpack, inspect, prepare (grease gasket) and install HEPA/ULPA filter(s) in the Bag-in/Bag-out (BIBO) filter housing. It's best to leave this process to the testing contractor who's thoroughly trained at handling the delicate filters. They are also then responsible for any damage sustained during filter installation.

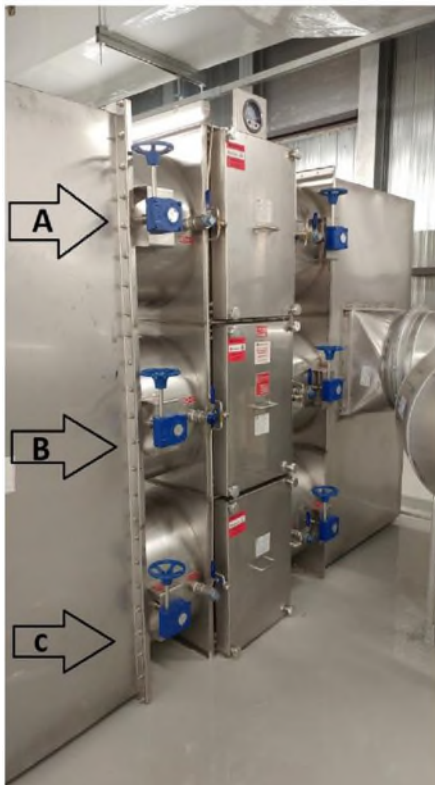
Step 3) Start the exhaust fan(s) and take flow measurements to ensure there is adequate draw to pull the challenge aerosol into the filters being challenged. Accredited technician injects the challenge aerosol into the preselected injection port, note that the port should be at an easily accessible location whenever possible (*lower right*).



Step 2) Select the location on the duct for both the injection and sampling ports. Drill appropriate sized holes and then label the port for future testing requirements.



Step 4) After testing is completed ensure the port is plugged (or capped) to eliminate air leakage (*lower right*).



## TESTING N+1 REDUNDANT FILTER SYSTEMS:

**CONSTRUCTION:** N+1 Redundant BIBO filter systems are constructed in "building block fashion" where each block (or module) is in independent assembly. These modules are completed damper-to-damper at the factory and then pressure-tested as individual modules. In the photo (left) we have a 3-module BIBO assembly. This assembly would come from the factory with three separate pressure-test reports, one for Module "A", "B" and "C".

**TESTING:** Likewise, when this assembly is tested for In-Situ DOP (Dispersed Oil Particulate) Penetration, the assembly should be tested 3 times, one test for each module. To test one module all dampers are closed except for the dampers of the module being tested. Challenge aerosol (Emery 3004 or similar DOP) is injected in the upstream ductwork and then sampled downstream (per instructions and pics above). Thus, leakage can be pinpointed to an individual module, and reports are provided for every module in the assembly.