

Air Sampling Tubing Acid Resistance Comparative Test Report

Prepared by Antrum, Inc.

Testing conducted July 2026 by an ISO 9001:2015 certified third-party materials laboratory



Background and Purpose

Antrum commissioned an independent materials test to evaluate the chemical resistance of air sampling tubing used in centralized demand-controlled ventilation (DCV) systems when exposed to acids representative of laboratory and life science environments.

Three tubing samples were evaluated:

Sample	Description	Source
Sample A	Clear flexible tubing	Taken from a competing centralized DCV system installation -- panel-internal tubing connecting air samples into and out of sensors
Sample B	Green rigid tubing	Taken from a competing centralized DCV system installation -- field sampling tubing used between zone locations and the central panel
Sample C (Antrum CFEP)	Carbon-impregnated FEP (CFEP) tubing	AntrumX system tubing -- used throughout the air sample path from zone entry to panel exit

Samples A and B were physically obtained from active installations of a competing centralized DCV system and submitted without modification. Sample C is the carbon-impregnated FEP (CFEP) tubing Antrum specifies throughout the AntrumX air sample path.



Test 1: Temperature Response

Date of test: 05/27/2026

Tubing samples were subjected to elevated temperatures to evaluate thermal stability under conditions representative of building mechanical environments.

At 120 degrees C -- 15 minute exposure

Sample	Test Temp (C)	Exposure Time (min)	Observation
Sample A	120	15	No change
Sample B	120	15	No change
Sample C (CFEP)	120	15	No change

At 165 degrees C -- 5 minute exposure

Sample	Test Temp (C)	Exposure Time (min)	Observation
Sample A	165	5	Softening, no melting observed
Sample B	165	5	Softening, no melting observed
Sample C (CFEP)	165	5	No change

At normal laboratory and mechanical room operating temperatures, all three samples performed adequately. Softening onset for Samples A and B was observed at 165 C -- well above typical installation conditions.



Test 2: Density

Date of test: 05/29/2026

Density was assessed by flotation in water to determine specific gravity.

Sample	Fluid	Observation	Specific Gravity
Sample A	Water	Floats	< 1.0
Sample B	Water	Floats	< 1.0
Sample C (CFEP)	Water	Sinks	> 1.0

Samples A and B have specific gravity below 1.0, consistent with polypropylene or thermoplastic elastomer materials. Sample C (CFEP) has specific gravity above 1.0, consistent with fluoropolymer composition.



Test 3: Acid Resistance

Date of test: 06/26/2026 through 07/01/2026

This is the primary test. Samples were immersed in hydrochloric acid and nitric acid at two temperatures and two exposure durations to simulate cumulative exposure in laboratory environments where these acids are commonly used.

Hydrochloric Acid

Sample	Temp (C)	Exposure (hrs)	Color	Flexibility	Smoothness
Sample A	104 / 48	5 / 120	Yellow	No change	Mild roughening
Sample B	104 / 48	5 / 120	Mild OD fading	No change	Mild roughening
Sample C (CFEP)	104 / 48	5 / 120	No change	No change	No change

Nitric Acid

Sample	Temp (C)	Exposure (hrs)	Color	Flexibility	Smoothness
Sample A	104 / 48	5 / 120	White/opaque	Reduced	Smoother
Sample B	104 / 48	5 / 120	Discoloration	No change	Mild roughening
Sample C (CFEP)	104 / 48	5 / 120	No change	No change	No change



Summary of Findings

Sample A -- Clear tubing (panel-internal, source: competing DCV installation)

Property	Identification / Result
Material type	Non-crystalline polymer -- possibly Tygon or block copolymer thermoplastic elastomer
Specific gravity	< 1.0
Hydrochloric acid	Yellowing of tubing material
Nitric acid	White/opaque discoloration, reduced flexibility (vitrification)
Assessment	Exhibits measurable physical change under both acid types tested

Sample B -- Green tubing (field sampling tubing, source: competing DCV installation)

Property	Identification / Result
Material type	Semicrystalline polymer -- thermal response characteristic of poly(propylene), likely co-extruded
Specific gravity	< 1.0
Hydrochloric acid	Mild outer diameter fading, mild surface roughening
Nitric acid	Discoloration of outer diameter, mild surface roughening
Assessment	Exhibits measurable physical change under both acid types tested

Sample C -- Antrum CFEP (carbon-impregnated FEP, AntrumX system tubing)

Property	Identification / Result
Material type	Semicrystalline fluoropolymer (FEP) -- carbon-impregnated
Specific gravity	> 1.0
Hydrochloric acid	No change in color, flexibility, or surface smoothness
Nitric acid	No change in color, flexibility, or surface smoothness
Assessment	No measurable physical change under either acid type or at either exposure duration

Testing methodology, raw observations, and the testing laboratory's credentials are on file with Antrum, Inc. Testing was conducted by an ISO 9001:2015 certified materials laboratory. For more information about AntrumX tubing specifications, visit antrum.com/resources/specify.

