

# Catholic Church Museum - Vending (3/29/2018)



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## ASHRAE 62.1 Space Contamination Calculations Using Appendix D Equations

### PROJECT INFORMATION

Date	3/29/2018
Project Name	Catholic Church Museum
Project Location	Philadelphia
Engineering Firm	Aerisa
Engineer	Andy Weiller
Rep Firm	Not specified
Representative	Not specified

### ZONE INFORMATION

Name (ID)	Vending
Floor Area (Az), ft <sup>2</sup>	760
Zone Population (Pz)	38
Supply Air (cfm)	1025
Height (ft)	11.0
Category	Office Buildings
Subcategory	Breakrooms (Office Buildings)
Activity Level	Met=1.1
Zone Air Distribution Effectiveness (Ez)	Ez-1: Ceiling supply of cool air

### RECIRCULATION INFORMATION

Filter (Ionizer) Location	B
Flow	Constant
Outdoor Airflow	Constant
Design Flow Reduction Fraction Factor (Fr)	N/A

#### VENTILATION RATE PROCEDURE

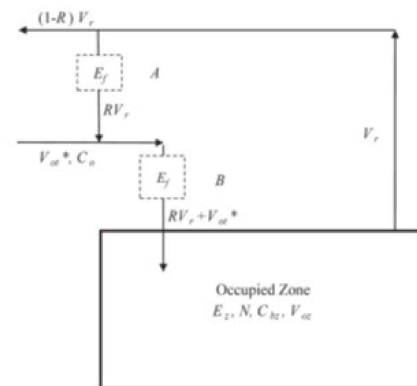
OA/Person (Rp)	5 cfm
OA/Floor Area (Ra)	0.12 cfm/ft <sup>2</sup>
OA Breathing Zone (Vbz)	Rp * Pz + Ra * Az
Vbz	281 cfm
Zone Outdoor Airflow (Voz)	Vbz/Ez
Ez	1
Voz	281 cfm
Voz	7964 L/min
Return Air (Vr)	744 cfm
Vr	21064 L/min
Voz/Person	7.40 cfm/person
Air Exchanges/Hour	7.36 cfm

#### IAQ PROCEDURE

Recommended OA	141 cfm
Utilized OA (Voz)	141 cfm
Voz	3982 L/min
Voz/Person	3.70 cfm/person
Return Air (Vr)	884 cfm
Vr	25046 L/min

#### IAQ PROCEDURE SAVINGS

OUTDOOR AIR SAVINGS	141 cfm
OA Savings	3982 L/min



$$C_{bz} = \frac{N + E_z V_{oz} (1 - E_f) C_o}{E_z (V_{oz} + R V_r E_f)}$$

### INDOOR CONTAMINANTS OF CONCERN

Contaminant Compound (CAS#)	Max Allowable Conc. Limit (ppm)	Max Allowable Conc. Limit	VRP - Steady State Without Ionization ( $\mu\text{g}/\text{m}^3$ )	IAQP - Steady State With Ionization ( $\mu\text{g}/\text{m}^3$ )	Conc. Change Using IAQP	IAQP Conc. As % of Max	Less Than Max with Reduced OA?
Acetaldehyde 75-07-0	7.7725E-02	1.4000E+02	6.1835E+00	2.1172E+00	-65.76%	1.512%	TRUE
Acetone 67-64-1	2.4837E+00	5.9000E+03	4.6376E+01	1.9930E+01	-57.03%	0.338%	TRUE
Ammonia 7664-41-7	2.5000E+00	1.7382E+03	1.2418E+03	6.8844E+02	-44.56%	39.606%	TRUE
Benzene 71-43-2	1.8781E-02	6.0000E+01	4.2725E+00	8.1031E-01	-81.03%	1.351%	TRUE
Carbon Dioxide 124-38-9	5.0000E+03	9.0000E+06	3.2067E+06	5.7835E+06	80.35%	64.261%	TRUE
Carbon Monoxide 630-08-0	9.0000E+00	1.0310E+04	2.7953E+03	3.5906E+03	28.45%	34.825%	TRUE
Chloroform 67-66-3	6.1437E-02	3.0000E+02	1.2386E+00	4.6123E-01	-62.76%	0.154%	TRUE
Dioxane (1,4-) 123-91-1	8.3248E-01	3.0000E+03	3.1811E-02	1.4052E-02	-55.83%	0.000%	TRUE
Hydrogen Sulfide 7783-06-4	2.8697E-02	4.0000E+01	1.6929E+00	8.1594E-01	-51.80%	2.040%	TRUE
Methane 74-82-8	1.0000E+02	6.5603E+04	1.2360E+03	6.9211E+02	-44.00%	1.055%	TRUE
Methanol 67-56-1	1.1447E+00	1.5000E+03	4.7717E-01	3.2309E-01	-32.29%	0.022%	TRUE
Methyl Chloroform (1,1,1-Trichloroethane) 71-55-6	1.8327E-01	1.0000E+03	4.2202E+00	2.7167E+00	-35.63%	0.272%	TRUE
Methyl Ethyl Ketone (2-Butanone) 78-93-3	1.0000E+01	2.9493E+04	7.7283E+02	3.7211E+02	-51.85%	1.262%	TRUE
Methylene chloride 75-09-2	1.1514E-01	4.0000E+02	9.3985E+00	6.1000E+00	-35.10%	1.525%	TRUE
Phenol 108-95-2	5.1960E-02	2.0000E+02	3.3080E+01	1.1846E+01	-64.19%	5.923%	TRUE
Propane 74-98-6	1.0000E+02	1.8037E+05	1.8103E+01	4.1064E+00	-77.32%	0.002%	TRUE
Tetrachloroethane 79-34-5	1.0197E-03	7.0000E+00	1.1134E-01	9.2356E-02	-17.05%	1.319%	TRUE
Tetrachloroethylene 127-18-4	5.1604E-03	3.5000E+01	2.5795E+00	2.5408E-01	-90.15%	0.726%	TRUE
Toluene 108-88-3	7.9607E-02	3.0000E+02	6.9292E+00	1.0364E+00	-85.04%	0.345%	TRUE
Vinyl Chloride Monomer (Chloroethene) 75-01-4	1.0000E+00	2.5562E+03	3.8662E+00	5.3338E-01	-86.20%	0.021%	TRUE
Xylenes 1330-20-7, 95-47-6	1.6120E-01	7.0000E+02	4.4002E+00	1.5501E-01	-96.48%	0.022%	TRUE

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