ANSI/RESNET/ICC 380 Blower Door Test Correction Calculations[1]
For The Energy Conservatory (TEC) and Retrotec Blower Doors

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Spreadsheet calculations consist of the following steps:

Step 1: Correct indicated Blower Door air flow (Q_i), which is based on calibrations at Normal Temperature and Pressure (NTP), to measurement conditions (Q):

For depressurization: $Q = Q_i * (\rho_0/\rho_{in})^{0.5}$

For pressurization: $Q = Q_i * (\rho_0/\rho_{out})^{0.5}$

where:

ρ_0 = air density at standard conditions (NTP)

ρ_{in} = air density at indoor conditions

ρ_{out} = air density at outdoor conditions

Step 2: Convert blower door airflow (Q) to envelope air flow (Q_{env})

For a multi-point test:

For depressurization: $Q_{env} = Q*(\rho_{in}/\rho_{out})$

For pressurization: $Q_{env} = Q*(\rho_{out}/\rho_{in})$

For a single-point test (see ANSI/RESNET/ICC 380-2016 for CFM50 adjustment where tests pressure differences are unable to reach 50 Pa):

For depressurization: $Q_{env} = CFM50*(\rho_{in}/\rho_{out})$

For pressurization: $Q_{env} = CFM50*(\rho_{out}/\rho_{in})$

Step 3 (multi-point test only): For a multi-point test, determine the envelope air flow coefficient and pressure exponent using an unweighted log-linearized linear regression technique using the following equation:

$Q_{env} = C*(\Delta P)^n$

where:

C = envelope air flow coefficient

ΔP = indoor to outdoor pressure difference

n = pressure exponent

and where ΔP is adjusted by addition/subtraction for the baseline building pressure difference when blower door fan is sealed

Step 4: Convert envelope air flow to standard conditions (NTP)

For multi-point tests:

$C_0 = C*(\mu/\mu_0)^{(2n-1)}*(\rho/\rho_0)^{(1-n)}$

where:

[1] See E779-2010, Appendix X1 for appropriate equations for the calculation of air density (ρ) and viscosity (μ) as a function of temperature and elevation above sea level.

C = envelope air flow coefficient from Step 3
n = pressure exponent from Step 3
C_0 = envelope air flow coefficient at standard conditions (NTP)
μ = air viscosity at test conditions
μ_0 = air viscosity at standard conditions (NTP)
ρ = air density at test conditions
ρ_0 = air density at standard conditions (NTP)

where the test conditions are indoor air for pressurization and outdoor air for depressurization and the average of indoor and outdoor if the multipoint test includes both pressurization and depressurization conditions.

For single-point tests:

$Q_0 = Q_{env}*(\mu/\mu_0)^{(0.3)}*(\rho/\rho_0)^{(0.35)}$

where:

Q_0 = corrected cfm50 envelope air flow at standard conditions (NTP)
μ = air viscosity at test conditions (indoor air for pressurization and outdoor air for depressurization)
μ_0 = air viscosity at standard conditions (NTP)
ρ = air density at test conditions (indoor air for pressurization and outdoor air for depressurization)
ρ_0 = air density at standard conditions (NTP)

Step 5: Calculate corrected envelope leakage parameters

For multipoint tests:

$ELA\ (in^2) = C_0 * 0.567 * 4^{(n-0.5)}$
$\text{corrected cfm50} = C_0 * 50^n$
$\text{corrected ach50} = C_0 * 50^n * 60 / InfVol$

where:

C_0 = corrected envelop air flow coefficient value from Step 3
n = pressure exponent from Step 2
InfVol = Infiltration volume of building

For single point tests:

$ELA\ (in^2) = Q_0 / 18.2$
$\text{corrected cfm50} = Q_0$
$\text{corrected ach50} = Q_0 * 60 / InfVol$

where:

Q_0 = corrected cfm50 envelope air flow from Step 3
InfVol = Infiltration volume of building