

4.6.b.13 Volume Measurements

With the release of BSR/RESNET/ICC 380-2015 RESNET expanded its definition of the term volume. In RESNET 380-2015 RESNET defines three different types of volume:

1. Conditioned Space Volume (CSV) The volume within a space that is deliberately heated or cooled
2. Unconditioned Space Volume (USV) Space that is not deliberately conditioned but is part of the shell of the building: attics, crawlspaces, garages, sunrooms.
3. Infiltration Volume (IV) This is the volume of concern for pollutants in the home. Used to convert air leakage in cfm to air exchange in ACH. Used for checking air tightness criteria

Both CSV and UCSV depend on location of insulation and air barrier and is used in house preparation for envelope leakage testing.

Raters should use the following guidelines to classify spaces within a building:

Conditioned Space Volume CSV:

- If the volume both above and below a floor cavity meets this definition, then the volume of the floor cavity shall also be included. Otherwise the volume of the floor cavity shall be excluded.
- If the volume of one or both of the spaces horizontally adjacent to a wall cavity meets this definition, then the volume of the wall cavity shall also be included. Otherwise, the volume of the wall cavity shall be excluded.
- The volume of an attic that is not air sealed and insulated at the roof deck shall be excluded.
- The volume of a vented crawlspace shall be excluded.
- The volume of a garage shall be excluded, even when it is conditioned.
- The volume of a thermally isolated sunroom shall be excluded.
- The volume of an attic that is air sealed and insulated at the roof deck or an unvented crawlspace shall only be included if the Rater has obtained an ACCA Manual J, S, and either B or D report and verified that both the heating and cooling equipment and distribution system are designed to offset the entire design load of the volume.
- The volume of a basement shall only be included if the Rater has either:
 - Obtained an ACCA Manual J, S, and either B or D report and verified that both the heating and cooling equipment and distribution system are designed to offset the entire design load of the volume, or,
 - Verified through visual inspection that both the heating and cooling equipment and distribution system serve the volume and, **in the Rater's judgement**, are capable of maintaining the heating and cooling temperatures specified by the Thermostat section in Table 4.2.2(1) of ANSI/RESNET 301-2104.

Unconditioned Space Volume (USV)

- The volume within a building that is not Conditioned Space Volume but which contains heat sources or sinks that influence the temperature of the area or room. The following specific spaces are addressed to ensure consistent application of this definition:
- The volume of a floor cavity shall be included, unless the volume both above and below the floor cavity meets the definition of Conditioned Space Volume.
- The volume of a wall cavity shall be included, unless the wall cavity meets the definition of Conditioned Space Volume.
- The volume of a vented attic shall be included.
- The volume of a vented crawlspace shall be included.
- The volume of a garage shall be included, even when it is conditioned.
- The volume of a thermally isolated sunroom shall be included.
- The volume of an attic sealed and insulated at the roof deck, an unvented crawlspace, or a basement shall be included unless it meets the definition of Conditioned Space Volume.

Infiltration Volume (IV) The sum of the Conditioned Space Volume and Unconditioned Space Volume in the dwelling unit, minus the volume of:

- Floor cavities that have Unconditioned Space Volume both above and below,
- Unconditioned wall cavities,
- Attics,
- Vented crawlspaces,
- Garages,
- Basements, if the door between the basement and Conditioned Space Volume is closed during enclosure air leakage testing (Section 3.2.5), and,
- Thermally isolated sunrooms.

The table below summarizes how a space within a building shell should be classified. Any space that falls within the Infiltration Volume column should be included in the blower door test setup.

	CSV	UCSV	CFA	IV
Space conditioned to 68/78F				
Vented Attic				
Unvented attic				
Unvented attic with conditioning				
Vented Crawlspace				
Unvented Crawlspace				
Unvented Crawlspace with conditioning				
Basement				**
Basement with conditioning			*	**
Garage				
Garage with conditioning				
Wall Cavity - both sides unconditioned space				
Wall Cavity - at least one side facing conditioned space				
Floor Cavity - both sides unconditioned space				
Floor Cavity - at least one side facing conditioned space				
Sunroom				

* some rater discretion

** basement included only if door between basement and house open during testing; Door is closed if the space between the basement and house is air sealed and insulated

Shaded spaces in the chart indicate this area of the home SHOULD be included in the following area or volume calculations.

- CSV: Conditioned Space Volume
- UCSV: Unconditioned Space Volume
- CFA: Conditioned Floor Area
- IV: Infiltration Volume

These terms are defined in detail above the chart.

Multiply the floor area by the floor-to-ceiling height (measured on the interior) to get the volume of a space. When calculating volumes of spaces with sloped ceilings, calculate the cross-sectional area of the room times the length of the room (or use the floor area times the average ceiling height, if the slope is consistent throughout the room) to determine volume.

TABLE 4.6 (11): Software Inputs: Conditioned Floor Area and Volume Measurements