

**INTERPRETATION IC 90.1-2019-8 OF
ANSI/ASHRAE/IES STANDARD 90.1-2019
Energy Standard for Buildings Except Low-Rise Residential Buildings**

Date Approved: October 13, 2021

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Reference: This request for interpretation refers to the requirements presented in ANSI/ASHRAE/IES Standard 90.1-2019, Table G3.1 #5, Baseline Building Performance column, item (c), regarding Appendix G baseline fenestration modeling requirements.

Background for Interpretation 1: Question 1 is asking about the proper application of Table G3.1 part 5 item c in the baseline. Specifically, the question seeks to clarify whether the area of the *above-grade-walls* that are part of the *building envelope* that separate *conditioned spaces* or *semiheated spaces* from *unenclosed or unconditioned space* must be included when determining the baseline fenestration area following Table G3.1.1-1. Question 1 considers a *proposed design* with wall surfaces A-I as shown in Figure 1. For clarity Wall C has been separated into two parts, C1 is considered an *above-grade-wall* and C2 is considered a *below-grade-wall*.

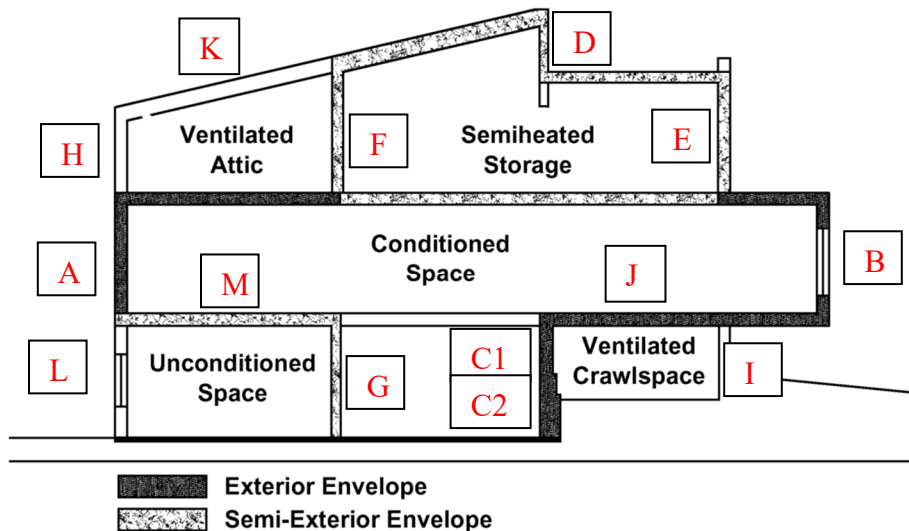


Figure 1: Small Office Building Elevation

Interpretation No.1: Appendix G requires the area of walls F, D, E, B, A, C1 and G to be included when calculating window area for the Baseline Building Design in accordance with Table G3.1 part 5 item c.

Question No.1: Is this interpretation correct?

Answer No.1: Yes

Comments No.1: The requirements for calculating window to wall area ratio in Appendix G are not the same as in Section 5 and are written to require that only the above-grade wall area of the building be included in the calculation. The rules regarding distribution of fenestration in the baseline building design would apply to the same walls. For example, if walls G, F or C1 included fenestration in the proposed design, fenestration area in the baseline would be distributed to these walls in the equal proportion as in the proposed design.

Background for Interpretation 2:

The intent of Appendix G is for the model to reflect all *spaces* included in the proposed design. However, ventilated attics, ventilated crawlspaces and parking garages that are mechanically or naturally ventilated are given special consideration within ASHRAE 90.1 when it comes to describing *building envelope* requirements. In the case where these *spaces* meet criteria for being classified as an *unconditioned space* (i.e. they are not a *conditioned space* or *semiheated space*) the definition of *unconditioned space* specifically excludes them from being classified as an *enclosed space* when determining *building envelope* requirements. 90.1 Figure 5.5.2 further clarifies the intent by showing that these spaces are treated as exterior when determining whether surfaces adjacent to *conditioned spaces* or *semiheated spaces* are part of the *exterior building envelope* or the *semiexterior building envelope*.

Interpretation No.2: When building includes *spaces* that are not classified as *enclosed spaces* per 90.1 definition including ventilated attics, ventilated crawlspaces and parking garages that are mechanically or naturally ventilated, Appendix G rules allow simplifying the modeling of the *building envelope* by excluding these spaces and their surfaces that are not part of the *building envelope* from the model, and modeling surfaces that are part of the *building envelope* as having direct exterior exposure. Therefore, either of the following approaches may be used for the office building shown in Figure 1:

- a. Model ventilated attic and ventilated crawlspace explicitly including all of the surfaces shown on design documents.
- b. Do not model ventilated attic and ventilated crawlspace, and exclude surfaces H, K and I from the model.

Question No.2: Is this interpretation correct?

Answer No.2: Yes

Comments No.2: In the special case when a *space* is not classified as an *enclosed space* per the definition of *unconditioned space*, a user may elect to simplify modeling of the *building envelope* as described. In all cases the user must use the same modeling approach in both the *baseline building design* and the *proposed design*, and all surfaces modeled in the *proposed design* must also be modeled in the *baseline design*. All other requirements of Appendix G still apply and any energy end uses in these spaces (i.e., lighting, plug loads, etc.) must be accounted for.

Background for Interpretation 3 Appendix G has historically referenced the building envelope performance Tables 5.5-1 through 5.5-8 and only recently added baseline building envelope performance Tables G3.4-1 through G3.4-8 into Appendix G. When using Tables 5.5-1 through

5.5-8, fenestration percentages used to determine U-factors and SHGC requirements are calculated separately for each space conditioning category based on the requirements of Section 5.5.4.1. Since Appendix G has historically used Tables 5.5-1 through 5.5-8 and the only differences with Tables G3.4-1 through G3.4-8 are the SHGC and U-factor requirements, it is presumed that the requirements in Section 5.5.4.1 still apply when selecting baseline fenestration performance. Section 5.5.4.1 requires that compliance with *U-factors*, *SHGC*, and *VT/SHGC* is determined based on the *gross wall areas* and *gross roof areas* calculated separately for each *space conditioning category*. Question 3 is based on the following mixed-use building located in Climate Zone 3C.

Table 1: Question 3 Envelope Description

Envelope Component Description	Proposed Design Gross wall area, SF	Baseline WWR (Table G3.1.1-1)	Baseline Fenestration area, SF
<i>Above-grade-walls that are part of the exterior envelope in nonresidential conditioned spaces in a Stand Alone Retail building area type.</i>	20,000	11%	2,200
<i>Above-grade-walls that are part of the exterior envelope in nonresidential conditioned spaces in a Hotel/Motel (>75 rooms) building area type.</i>	5,000	34%	1,700
<i>Above-grade-walls that are part of the exterior envelope in residential conditioned spaces in a Hotel/Motel (>75 rooms) building area type.</i>	10,000	34%	3,400

Interpretation No.3: The vertical fenestration SHGC for the building envelope described in Table 2 shall be calculated separately for each building area type and space conditioning category using Table G3.4-3 and shall be as follows:

1. SHGC of *vertical fenestration* in the *nonresidential exterior envelope* of the retail building area type (11% WWR): 0.39
2. SHGC of *vertical fenestration* in the *nonresidential exterior envelope* of the hotel/motel building area type (34% WWR): 0.34
3. SHGC of *vertical fenestration* in the *residential exterior envelope* of the hotel/motel building area type (34% WWR): 0.34

Question No.3: Is this interpretation correct?

Answer No 3: Yes