INTERPRETATION IC 90.1-2022-6 OF
ANSI/ASHRAE/IES STANDARD 90.1-2022
Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings

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Reference: This request for interpretation refers to ANSI/ASHRAE/IES Standard 90.1-2022, Section 5.5.5.5, and Tables 12.5.1 and A10.1, regarding linear thermal bridges not addressed in 5.5.5.1/5.5.5.4.

Background:

ECB: *Energy Cost Budget Method*
BBD: *Budget Building Design*
PD: *Proposed Design*

ECB, Section 12, Table 12.5.1 (5), allows (as 1 of 2 options) adjustment of clear-field U-factors of envelope assemblies (per Section A10.2) as a means of factoring *linear thermal bridging*.

As required in Table 12.5.1 (5b), **default** (i.e. compliant, mitigated) PSI factors of *linear thermal bridges* listed in Table A10.1 (ref: 5.5.5.1 through 5.5.5.4) shall be retained when modeling the BBD if such *linear thermal bridges* are indeed included in the PD.

Modelers also have the option of retaining for the PD either **default** or **unmitigated** PSI factors listed in Table A10.1, depending on actual mitigation efforts applied in the building design (to model).

The (default/unmitigated) PSI factors in Table A10.1 (ref: 5.5.5.1 through 5.5.5.4) are associated to clearly recognizable envelope intersections (as *linear thermal bridges*), such as roof **parapets** (5.5.5.1.2) and wall-to-vertical **fenestration** perimeters (5.5.5.4).

Table A10.1 also holds requirements for "Other element and assembly intersections" (those described in 5.5.5.5: "*linear thermal bridging* not addressed in Sections 5.5.5.1 through 5.5.5.4").

The following questions relate to *linear thermal bridges* described in 5.5.5.5, and how this may be applied in Section 12. Note that point thermal bridging is not considered within the scope of this interpretation request.

All units are in SI.

Further background:
https://unmethours.com/question/97085/901-2022-requirements-for-linear-thermal-bridges/

Interpretation No.1: Section 5.5.5.5 is all encompassing: its scope includes any other (non-exempted) *linear thermal bridge*, such as **corner** intersections, wall-to-(opaque)-**door** perimeters, roof-to-**skylight** perimeters, and so on.

Question No.1: Is this interpretation correct?

Answer No.1: Yes

Comments No.1: None.

Interpretation No.2: The prescriptive requirements of Section 5.5.5.5 (i.e. not ECB) require that all other *linear thermal bridging* (not addressed in Sections 5.5.5.1 through 5.5.5.4) comply with Equation 5.5.5.5. Its upper threshold is calculated as follows: 50 W/(m.K) x 0.003% x *above grade* area (m^2) of the *building envelope*. The target is an overall, building-wide maximum threshold.

Question No.2: Is this interpretation correct?

Answer No.2: Yes

Comments No. 2: The threshold limit (or allowance) of Eq. 5.5.5.5 is effectively a scope limit to the use of the standard for a prescriptively designed building envelope including Appendix C if used. As explained in the response to Question No. 3, in Section 12 it is used to establish a "surplus" that must be considered in the proposed design(if the limit of Eq. 5.5.5.5 is exceeded). In Appendix G, all thermal bridges are modeled. Note for all three compliance paths, elements that are smaller than the values in Table 5.5.5.5 do not need to be accounted for.

Interpretation No.3: The output of Equation 5.5.5.5 is of no direct use for setting ECB parameters in the BBD (nor the PD).

Question No.3: Is this interpretation correct?

Answer No.3: Yes

Comments No.3: See Table 12.5.1-sub-section 5 if determining compliance via Section 12, See Table G3.1-sub-section 5 if determining compliance via Appendix G. Each of these treat the modeling of thermal bridges in the BBD or baseline building differently because Appendix G uses performance factors (Section 4.2.1.1) for a baseline which do not include any of the thermal bridges addressed in Section 5.5.5 whereas in Section 12 the baseline or BBD is defined based on what is included in the PD (proposed design) in coordination with the requirements that apply to a prescriptively designed building using the entirety of Section 5, including Section 5.5.5. In Section 12 the equation is used to establish an "amount of thermal bridging" that must be considered in the proposed design (if the limit of Eq. 5.5.5.5 is exceeded).

Interpretation No.4: The ECB target for "other" *linear thermal bridges* (Table A10.1, 5.5.5.5, **default** values) is ultimately an CHI factor, in W/K. In other words, an individual "other" *linear*

thermal bridge (e.g. an individual corner edge) in a steel-framed BBD shall be 0.48 W/K, e.g. 0.120 W/(m.K) x 4 m in height.

Question No.4: Is this interpretation correct?

Answer No.4: No

Comments No.4: The Chi-factor in Table A10.1 for Section 5.5.5.5 was not intended to be converted to a Psi-factor. However, your question has identified the need for clarification in the standard. To address "other" thermal bridges identified in Section 5.5.5.5 the proposed design and BBD, Psi- and Chi-factors are determined in accordance with methods and data sources provided in Section A10.1, items a through d. The baseline building in Appendix G has accounted for no thermal bridges.