

ASHRAE 189.1 Design Implications for Solatube Daylighting Systems

1. What are the top 2-3 elements of ASHRAE 189.1 and why is it important?

The American Society for Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) has long been the reference organization for developing North American building design standards relative to energy efficiency and performance. Their reference standard, ASHRAE/IES 90.1, in its many revised versions (ASHRAE/IES 90.1-2007 being the current version), has served as the global benchmark for baseline design of energy efficient buildings, and has been used to develop codified energy standards and design practices around the world.

In an attempt to address the ever-growing sustainable design movement and to produce a globally recognized, sustainable design guide that provides a more scientifically-rigorous and integrated process than is currently outlined through the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) benchmarking tools, ASHRAE is developing a new standard for sustainable design that works in concert with existing ASHRAE standards while addressing sustainable issues and factors currently outlined in the USGBC LEED rating tools. As such, this new draft design standard, ASHRAE/IES 189.1, which is currently in its fourth revision for public comment, builds upon the minimally accepted Architectural Product and construction system performance ratings and benchmarks as defined by ASHRAE/IES 90.1 and adds additional details, performance considerations, and product rating requirements that allow the design and codification entities throughout the world to apply a rigorous sustainable design standard that can be used by architects and building owners to produce sustainable buildings that meet or exceed minimum industry standards for the practice. ASHRAE/IES 189 is envisioned to be used in conjunction with ASHRAE/IES Standard 90.1-2007, and ASHRAE Standards 62.1-2007 and 55-2004.

As with the current standard for minimally compliant energy efficient building design (ASHRAE/IES 90.1-2007), it is envisioned that ASHRAE 189.1 will be viewed and adopted by code- and construction-governing authorities around the world as a sustainable design standard. In this regard, architectural products that wish to participate in the sustainable design industry need to pay careful attention to the requirements outlined in this new standard, and proactively develop and test new products to achieve, or preferably surpass, and support the performance ratings and documentation referenced in the standard. Similar to ASHRAE/IES 90.1, ASHRAE/IES 189.1 will also go through regular updates, ensuring that regulations and codes continue to reflect current industry design and construction standards.

Relevance to Daylighting Products

ASHRAE/IES 189.1 establishes performance rating benchmarks that are either in addition to, or more enhanced than, those outlined in ASHRAE/IES 90.1, and includes requirements for ratings, product re-evaluations, and tested factors relative to:

Daylight Diffusion, U-factor, SHGC, Sound Ratings, recycled content, Equivalent CO₂ emission reductions, Life Cycle Assessment, and VOC emission. ASHRAE/IES 189.1 applies to new construction, major retrofits and remodels, and the installation of new equipment and improvements to existing systems of existing buildings.

While ASHRAE/IES 189.1 does reference Tubular Daylighting Devices (TDDs) as a new and unique type of daylighting technology, most related performance attributes are still stipulated within the master product classification for skylights. Specific factors and/or exclusions are established for TDD products within the ASHRAE/IES 189.1 Document.

Implications on Solatube Products and Supporting Documentation

Solatube International's daylighting systems are directly and indirectly addressed in ASHRAE/IES 189.1 with design elements, specific product ratings, product and system testing requirements, and system commissioning requirements being stipulated in the following nine document sections.

Section 3 – Definitions, Abbreviations, and Acronyms,

Section 7 – Energy Efficiency

Section 8 – Indoor Environmental Quality (IEQ)

Section 9 – Building's Impact on the Atmosphere, Materials, and Resources

Section 10 – Construction and Plans for Operation

Appendix A: Prescriptive Building Envelope Tables

Appendix B: Prescriptive Continuous Air Barrier

Appendix C: Prescriptive Equipment for Energy Efficiency

Appendix D: Performance Option for Energy Efficiency.

2 How can the Solatube Daylighting System help me meet ASHRAE 189.1 standards?

By using a building's carbon footprint as one of the primary benchmarking tools for evaluating design options (as opposed to the traditional first-cost approach), ASHRAE 189.1 is establishing a new and highly beneficial approach to justifying energy-conserving technologies. With this new approach, the key goal in building design and technology evaluation will be to identify technologies and design approaches which reduce annual energy consumption and, hence, the building's effective CO₂ footprint. Thus, as an advanced optical daylighting system, Solatube products (when used with effective daylight harvesting lighting control systems) can play a critical role in reducing a building's annual energy consumption and, therefore, its carbon footprint. Also, with the highly predictable and consistent daylight distribution that Solatube Daylighting Systems provide, daylighting solution design and implementation are easily achieved, and post-construction commissioning and metering / monitoring are greatly simplified.

3. How do other daylighting systems compare in meeting ASHRAE standards?

When properly designed and applied, all daylighting technologies can be used in building design to reduce annual energy consumption. The unique optical capabilities and predictable performance of Solatube Daylighting Systems, however, make them highly desirable to the design community. In addition, the small aperture size, modular assembly, and ability to easily displace rooftop apertures from interior daylight fixtures allow Solatube products to be uniquely friendly to photovoltaic systems. The Solatube Daylighting System design is distinct in how it can harmonize with the ASHRAE 189.1's requirement for photovoltaic and/or building-skin-based power generation technologies. Unlike Solatube International daylighting solutions, other fenestration systems and daylighting technologies will compete with photovoltaic systems for exterior building envelope real estate.