



GREEN GLOBES FOR
**SUSTAINABLE
INTERIORS 2014**
TECHNICAL REFERENCE MANUAL

VERSION 1.21

DECEMBER 2019

Table of Contents

LEGAL NOTICE	Page 6
Green Globes® for Sustainable Interiors Overview	Page 8
Introduction	Page 8
Green Globes for Sustainable Interiors Process.....	Page 10
Green Globes Program Features	Page 14
Incremental Point Awards & Partial Credit.....	Page 16
Footnotes.....	Page 18
1 Project Management	Page 19
1.1 Integrated Design Process (IDP)	Page 19
1.1.1 Integrated Design Meetings.....	Page 19
1.1.2 IDP Performance Goals	Page 24
1.1.3 IDP Progress Meetings for Design	Page 32
1.2 Environmental Management During Construction	Page 36
1.2.1 Building Materials & Building Envelope.....	Page 36
1.2.2 IAQ During Construction	Page 39
1.3 Environmental Purchasing.....	Page 48
1.3 Environmental Purchasing	Page 48
1.4 Commissioning	Page 50
1.4.1 Commissioning Requirements.....	Page 50
1.4.2 Training.....	Page 57
1.4.3 Operations & Maintenance Manual.....	Page 59
2 Energy	Page 65
2.1 Energy Sub-Metering	Page 65
2.1 Energy Sub-Metering	Page 65
2.2 Building Envelope	Page 72
2.2 Building Envelope.....	Page 72
2.3 Lighting	Page 78

2.3.1	Lighting Power Density.....	Page 78
2.3.2	Interior Automatic Light Shut-Off Controls	Page 84
2.3.3	Light Reduction Controls	Page 86
2.4	Daylighting	Page 88
2.4.1	Controls for Daylighted Zones	Page 88
2.5	HVAC Systems Controls	Page 90
2.5.1	Automation Systems.....	Page 90
2.5.2	Domestic Hot Water Heaters.....	Page 93
2.6	Plug Loads	Page 96
2.6.1	Plug Load Inventory	Page 96
2.6.2	Plug Load Limiting.....	Page 99
2.6.3	Plug Load Management.....	Page 101
3	Water	Page 104
3.1	Plumbing Fixtures.....	Page 104
3.1	Plumbing Fixtures	Page 104
3.2	Residential & Commercial Food Service Fixtures & Equipment..	Page 110
3.2	Residential & Commercial Food Service Fixtures & Equipment.....	Page 110
3.3	Water Intensive Applications.....	Page 120
3.3.1	Laboratory & Medical Equipment	Page 120
3.3.2	Laundry Equipment.....	Page 125
3.3.3	Special Water Features	Page 128
3.3.4	Metering	Page 130
4	Materials & Resources.....	Page 131
4.1	Interior Fit-Outs (including Finishes and Furnishings)	Page 131
4.1	Interior Fit-Outs (including Finishes and Furnishings)	Page 131
4.2	Minimized Use of Interior Materials	Page 140
4.2	Minimized Use of Interior Materials	Page 140
4.3	Deconstruction, Disassembly, and Reassembly.....	Page 142
4.3	Deconstruction, Disassembly, and Reassembly	Page 142
4.4	Waste	Page 146

4.4.1 Construction & Operational Waste	Page 146
4.5 Building Service Life Plan.....	Page 152
4.5 Building Service Life Plan	Page 152
4.6 Reuse of Non-Structural Elements	Page 155
4.6 Reuse of Non-Structural Elements	Page 155
5 Emissions & Other Impacts.....	Page 159
5.1 Integrated Pest Management	Page 159
5.1.1 Integrated Pest Management	Page 159
5.2 Leak Detection in Commercial Refrigeration	Page 161
5.2 Leak Detection in Commercial Refrigeration	Page 161
5.3 Janitorial Equipment	Page 165
5.3 Janitorial Equipment	Page 165
6 Indoor Environment	Page 167
6.1 Ventilation.....	Page 167
6.1.1 Ventilation Air Quantity	Page 167
6.1.2 CO2 Sensing and Ventilation Control Equipment.....	Page 169
6.2 Source Control of Indoor Pollutants.....	Page 171
6.2.1 Volatile Organic Compounds (VOCs).....	Page 171
6.2.2 Moisture & Vapor Control Methods.....	Page 187
6.2.3 Ventilation & Physical Isolation for Specialized Activities	Page 190
6.3 Lighting	Page 193
6.3.1 Daylighting	Page 193
6.3.2 Lighting Design	Page 199
6.4 Thermal Comfort	Page 208
6.4.1 Thermal Comfort Design.....	Page 208
6.4.2 Thermal Comfort Strategies	Page 210
6.5 Acoustic Comfort	Page 217
6.5 Acoustic Comfort	Page 217
Appendix A: LIST OF REFERENCES	Page 239

Appendix B: SUPPORTING DOCUMENTATION	Page 244
Appendix C: DEFINITIONS	Page 247
Appendix D: ABBREVIATIONS AND ACRONYMS	Page 258

LEGAL NOTICE

© 2014-2019 GREEN BUILDING INITIATIVE, INC. ALL RIGHTS RESERVED.

This "Green Globes® for Sustainable Interiors Technical Reference Manual" ("Material") is proprietary to Green Building Initiative, Inc. ("Green Building Initiative") and/or its successors and assigns.

CONDITIONS OF USE:

This Material is provided to ("You" or Recipient) by Green Building Initiative only for your use in association with only a proposed or active new construction or modernization interiors project which seeks certification through Green Globes (the "**Scope of Use**"). The Material may only be used for and within this Scope of Use.

Without limiting the foregoing, Recipients of this Material are explicitly prohibited from doing the following (without first obtaining Green Building Initiative's prior written consent):

1. revising, altering, modifying, making derivatives of, or otherwise amending this Material in any way;
2. removing, altering, covering or obscuring this Legal Notice or any other copyright notices or other proprietary rights notices that are contained or embedded in this Material (the "**Existing Notices**") or insert any other copyright or proprietary notices that are inconsistent with the Existing Notices; or
3. using this Material for any purpose that is not within (or violates the parameters of) the Scope of Use (as set forth above)

Unauthorized use of this Material is strictly prohibited, is a violation of copyright and other intellectual property rights, and is actionable under law.

Recipient is permitted to make references to, or to cite, this Material provided the Recipient fully acknowledges Green Building Initiative's copyright ownership of this Material and gives Green Building Initiative full copyright attribution. The proper copyright notice for this Material is as follows: "**©2014-2019 Green Building Initiative, Inc. ALL RIGHTS RESERVED.**"

The Green Building Initiative®, the Green Building Initiative logo® and Green Globes logo® (among others) are trademarks, service marks and/or trade names (collectively "Marks") owned by Green Building Initiative and all rights are reserved therein.

Recipient acknowledges and agrees that Green Building Initiative is the sole and exclusive owner of all rights, title and interest in and to this Material and all Marks. Absent a separate contract between each Recipient and Green Building Initiative, nothing in this document grants (either expressly or impliedly) to any Recipient of this Material any right or license in the Material, in any information or other contents in this Material, or to any other intellectual property owned or controlled by the Green Building Initiative (including, without limitation, any of the Marks).

PROVIDED "AS IS"; DISCLAIMER:

THIS MATERIAL AND ALL INFORMATION CONTAINED HEREIN IS PROVIDED TO ALL RECIPIENTS ON AN "AS IS" BASIS. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, GREEN BUILDING INITIATIVE (ALONG WITH ALL CONTRIBUTORS TO THIS MATERIAL) HEREBY DISCLAIM ALL REPRESENTATIONS, WARRANTIES AND/OR COVENANTS, EITHER EXPRESS OR IMPLIED, STATUTORY OR AT COMMON LAW, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, VALIDITY, AND/OR NON-INFRINGEMENT.

Green Globes® for Sustainable Interiors Overview

Introduction

Green Globes is a well-established green building guidance and assessment program that offers a practical and affordable way to advance the environmental performance and sustainability of a wide variety of building types. Green Globes for Sustainable Interiors (Green Globes SI) was designed to be a rating system designed specifically for tenant improvement projects, fit-outs[1], and remodels.

Green Globes SI is a *smart alternative* for rating and certifying sustainable interior designs owing to these five key attributes:

- A comprehensive environmental assessment protocol using accepted criteria
- Best practices guidance for designing sustainable interiors, tenant improvements, and remodels
- Requirement to evaluate only those particular design measures that fall within an interior designer's or interior architect's *scope of work*
- A *practical and cost-effective* approach using licensed, independent third-party professionals as assessors to work with owners and design teams
- Based on the only *national consensus green building standard* for new commercial construction, developed in 2010 by the Green Building Initiative and acknowledged by the federal General Services Administration and the US Department of Defense

Green Globes for Sustainable Interiors

GBI created Green Globes SI to be a user-friendly tool that aids designers, building owners, property managers, and tenants in the evaluation, documentation, and improvement of the environmental performance of a leased space or interior remodel.

Green Globes SI helps Building Teams to focus on sustainability, gives them options when considering capital improvements or implementation of best practices, and allows them to benchmark and rate the benefits of various building attributes and procedures. When combined with the third-party assessment process, Green Globes' value-added features provide a streamlined and affordable approach to assessing the environmental sustainability of tenant improvements, leading to operating cost savings.

Environmental Assessment Areas

Green Globes SI addresses the same recognized areas of environmental assessments as the Green Globes for New Construction rating system, with the exception that Green Globes SI does not include a section on Site Impact. It is suitable for a wide range of commercial buildings, including large and small offices, retail stores, and institutional buildings such as healthcare facilities, government buildings, schools, colleges, and universities.

Green Globes SI ensures that environmental impacts and key sustainability issues are comprehensively assessed using a 1,000-point scale. The program covers six environmental assessment areas. Each area utilizes weighted criteria assigning points to criteria based upon the impact to sustainability.

Building Certification

A third-party assessment conducted by a GBI-trained assessor is required for a Green Globes SI rating and certification. Assessors with expertise in green building design, engineering, construction, and facility operations[2] interface with project teams and building owners during the assessment process by reviewing and evaluating documentation, conducting optional site visits, and creating comprehensive assessment reports.

To become Green Globes-certified, each project must achieve a minimum of 35% of the total applicable points. Certified projects are assigned a rating of one to four Green Globes, which is reflected in a certificate issued by the GBI.

Green Globes for Sustainable Interiors Process

Green Globes for Sustainable Interiors (Green Globes SI) is part of the Green Building Initiative's (GBI) suite of Green Globes programs. A Green Globes SI survey is completed in tandem with one of the following assessment and certification options: Final CD Review & Certification, and/or Design Review with an On-site Assessment & Certification. The survey and assessments aid the Integrated Design Process (IDP)[3] team throughout the commercial interiors process per the unique goals and needs of each individual project.

Green Globes SI Survey

The first step of the program is to register the project with GBI and order one of two third-party assessment and certification options (as described below). After purchase and receipt of payment, GBI provides survey access to the client, who with the help of the project IDP team will complete it. The survey collects information on a variety of environmental and sustainable tenant space characteristics, programs, policies, and technologies. On its own, the survey is a helpful tool, but the strength and benefits of the program are best achieved when completing the survey in tandem with one of the Green Globes SI assessment and certification options.

Final CD Review & Certification

The Final CD Review & Certification is a third-party assessment of the project's completed construction documents[4] and submittals after construction is complete. When the Post Construction - Client Survey[5] and all supporting documentation are ready for assessor review, the client (or client's project manager) submits the survey to GBI who assigns a third-party Green Globes Assessor to perform the assessment. The client works with the assigned assessor to deliver all needed documentation. The assessor will review all submitted documentation and survey responses to verify point awards.

When the review is complete, the Green Globes Assessor writes a Final CD Review report containing his/her findings. The report includes all points verified, the final score, Green Globes rating, and recommendations for improvements to future projects. GBI reviews the report and, when approved[6], issues it to the client along with the final score and Green Globes rating. After reviewing the report and sharing the results with their team, the client may order recognition items (if not pre-ordered) to celebrate and market the achievement.

Figure 1: Final CD Review & Certification Process Flowchart



Design Review (required with On-site Assessment & Certification)

The Design Review is a third-party assessment of the project's construction documents. This review can take place at any point during the interiors project after documents are available. If the client desires, the review may happen prior to the 100% set is complete. When the Construction Documents - Client Survey and supporting documentation are ready for assessor review, the client (or client's project manager) submits the survey to GBI, who assigns a third-party Green Globes Assessor to perform the Design Review. The client works with the assigned assessor to deliver all needed documentation. The Green Globes Assessor reviews the survey and submitted documentation to verify point awards.

When the review is complete, the assessor writes a Design Review report containing his/her findings. The report includes all points verified, points still needing verification, a preliminary (non-final) score, projected rating, and recommendations for the interiors project. GBI reviews the report and, when approved, issues it to the client along with the preliminary rating. The client reviews the report and shares the results with their team. The Design Review is a non-binding assessment, meaning the results are preliminary not final. To be eligible for certification and subsequent rating, a project must complete the Stage II On-site Assessment.

On-site Assessment & Certification (required with Design Review)

The On-site Assessment & Certification is a third-party assessment of the project's completed construction. A completed Design Review is required prior to an On-site Assessment & Certification. The final Green Globes rating and certification is based upon the assessor's site visit results, including review of additional supporting documentation as necessary. If there are any changes since the completion of the Design Review Report, the client will update the Post-Construction - Client survey and provide updated verification documentation as needed.

When construction is essentially complete (through the punch list) and the team is ready to schedule the site visit, the client submits the updated Post-Construction - Client survey and contacts GBI to provide the preferred visit timing. GBI schedules a third-party Green Globes Assessor to perform the On-site Assessment, and issues a formal scheduling letter to the client and assessor. The letter includes the contact information for both to facilitate direct contact. Whenever possible, GBI assigns the same assessor for both the Design Review and On-site Assessment & Certification. Please note that the site visit typically requires 30 days advance notice. In the weeks leading up to the site visit, the assigned assessor contacts the client to discuss the itinerary and specific details of the assessment.

Typically, the On-site Assessment begins with an introductory meeting in which the assessor can interview the key project players (Architect, MEP Engineers, Project Manager/Owner, General Contractor, etc.). Someone knowledgeable about all aspects of the interior project should be on-site during the entire visit to ensure the assessor receives the information needed to verify any outstanding criteria. Afterwards, one or two people can guide the assessor through the tenant improvement space. If any follow-up documentation is requested during the site visit, it should be sent to the assessor within one week.

After the visit, the assessor will create a report of his/her findings that contains the recommended score and rating. GBI will review the report and, when approved, issue it to the project manager along with the final Green Globes rating. After reviewing the report and sharing the results with their team, the client may order recognition items (if not pre-ordered) to help celebrate and market the achievement.

The duration of the site visit varies considerably based on the scope and size of the completed SI project. Please allow approximately three to six hours for the assessor to review new documentation onsite, conduct a thorough walk-through of the interior space, and interview personnel.

Figure 2: Design Review / On-site Assessment & Certification Process Flowchart



Minimum Score

In order to achieve certification through the Green Globes SI program, the tenant improvement project must score a minimum of 35% of the 1,000 point total (less non-applicables).

Green Globes Program Features

One of the defining qualities of Green Globes is its flexibility. The goal of the program is to promote the adoption of green building practices on a comprehensive scale by providing a flexible rating system that can be applied to a wide range of building types. To achieve this goal, Green Globes makes use of several important features and concepts, as follows.

Weighted Criteria

The Green Globes 1000-point scale allows for weighted criteria, wherein the assigned number of points for individual criteria reflects their relative impact and/or benefit on the sustainability of the building. For example, energy is considered to be the most important area affecting the sustainability of a building, so it carries the highest point value of all the Green Globes assessment areas within the New Construction (NC), Existing Building (EB), and Sustainable Interiors (SI) programs. This method emphasizes sustainable design while minimizing unnecessary "point chasing" for criteria that are outside of the project scope or provide relatively little environmental benefit.

No Prerequisites

Prerequisites are contrary to the objectivity and scientific accuracy of the Green Globes programs. They can be penalizing and result in building projects being excluded from green building assessment and certification. Green Globes aims to be inclusive and recognize sustainable achievements in all areas. A building is eligible for Green Globes certification when it achieves the 35% of the applicable points (1,000 maximum points less non-applicable points).

Third-Party Assessor

Green Globes Assessors are sustainability experts, with generally more than 10 years of applicable industry experience, who have successfully completed GBI's Green Globes Assessor Training Program. Once certified, Green Globes Assessors are authorized to perform Green Globes and Guiding Principles Compliance assessments for GBI as independent contractors. Their professional judgment is critical in the assessment process to verify point awards, to determine criteria applicability, as well as to provide sustainability recommendations within their assessment report. Once assigned, the client has direct access to contact the assessor for assessment guidance. Although GBI assigns Green Globes Assessors to projects, the assessor decisions and recommendations are not revised or redirected by GBI, thus ensuring assessor autonomy and their third-party status.

Non-Applicable Criteria

Within the Green Globes surveys, many criteria include a "non-applicable" (N/A) response selection. This provision increases the flexibility of the tool as points that are impossible or unreasonable for a building to achieve do not result in a penalty as they would if the criteria yielded a "No" response. This feature encourages a more regional approach and recognizes differences—and potential conflicts—between various local codes and standards.

The user should only select an available N/A response within the survey when there is a compelling, technical reason to do so. The non-applicable provision is not to be used when project teams/clients decide not to incorporate sustainability items that are part of the criteria measured in the assessment. In those cases, the client should select a "No" response, or reconsider incorporating more sustainable features and answer the question accordingly.

The Green Globes third-party assessor will validate all "N/A" responses during the third-party assessment based on four primary justifications: 1) Regional/climatic applicability; 2) Jurisdictional/code conflict or inconsistency; 3) Building occupancy related; and 4) Criteria that address a facility, design feature, or building appurtenance that is not designated or used for that particular project space, or is completely outside the control or influence of the client. Utilizing these four justifications, the Green Globes Assessor has the flexibility to use his/her professional judgment to categorize additional criteria as non-applicable.

Incremental Point Awards & Partial Credit

For some Green Globes criteria, there are threshold values, which allow the incremental award of points depending on the level of achievement. In these cases, reaching a higher threshold earns relatively more points. The third-party assessors are permitted to use their professional judgment to award partial credit where deserved, even when the thresholds don't exist within the program.

The incorporation of these flexibility features; 1000-point scale, weighted criteria, no pre-requisites, non-applicable criteria, incremental point awards, and partial credit results in the highest possible accuracy of the final Green Globes score and rating. This flexibility recognizes the vast differences in building types, and represents an accurate look at the nuances of every tenant improvement project.

Environmental Assessment Areas & Point Allocation		
1	Project Management	70
1.1	Integrated Design Process (IDP)	20
1.2	Environmental Management During Construction	10
1.3	Environmental Purchasing	10
1.4	Commissioning	30
2	Energy	300
2.1	Energy Sub-metering	65
2.2	Building Envelope	25
2.3	Lighting	95
2.4	Daylighting	30
2.5	HVAC Systems Controls	35
2.6	Plug Loads	50
3	Water	90
3.1	Plumbing Fixtures	54
3.2	Residential & Commercial Food Service Fixtures & Equipment	20
3.3	Water Intensive Applications	16

Environmental Assessment Areas & Point Allocation		
4	Materials and Resources	250
4.1	Interior Fit-outs (Including Finishes and Furnishings)	60
4.2	Minimized Use of Interior Materials	10
4.3	Deconstruction and Disassembly	60
4.4	Waste	80
4.5	Building Service Plan	20
4.6	Reuse of Non-structural Elements	20
5	Emissions and Other Impacts	40
5.1	Integrated Pest Management and Contamination Control	10
5.2	Leak Detection in Commercial Refrigeration	20
5.3	Janitorial Equipment	10
6	Indoor Environment	250
6.1	Ventilation	30
6.2	Source Control of Indoor Pollutants	80
6.3	Lighting	52
6.4	Thermal Comfort	40
6.5	Acoustic Comfort	48
TOTAL		1000

Footnotes

1. **fit-out:** interior commercial building space finish work to render the affected space ready for occupancy.
2. **facility operations:** a facility is operational during the time when the primary activity that facility is designed for is taking place. For Group A and Group M occupancies, this is the time during which the facility is open to the public.
3. **Integrated Design Process (IDP):** a process in which the project team is led by an individual and/or a team of individuals in the setting and ranking of measurable sustainable design and project delivery goals through an integrated process, and which facilitates reporting mechanisms to report to the team and owner on the progress made toward each goal, along with documentation of the process.
4. **construction documents** :****all of the written and graphic documents (including BIM, CAD, and other electronic files) prepared or assembled by the architect/engineer for communicating the design, requirements, and administration of the project. The term "Construction Documents" also includes the Project Manual that contains the bidding forms and instructions, contract forms and conditions, and specifications, as well as documentation of all modifications made after the construction agreements are signed.
5. **Construction Document-Client Survey:** the Green Globes for New Construction online system includes a total of 5 surveys (3 client, 2 assessor): 1) Predesign (optional), 2) Construction Documents – Client, 3) Construction Documents – Assessor, 4) Post Construction – Client, and 5) Post Construction – Assessor (third-party assessor only).
6. **approved:** acceptable to the code official or authority having jurisdiction.
7. **alteration:** any construction or renovation to an existing structure other than repair or addition.

Project Management

70

Integrated Design Process (IDP)

20

Integrated Design Meetings

6

GREEN GLOBES #1.1.1.1

Was an integrated design process (IDP) employed which included a minimum of three of the key design disciplines involved in the project? Check as many key disciplines below as apply.

Tooltip

Individuals representing key design disciplines should attend a pre-design planning session in the form of a meeting, charrette, or workshop during pre-design of the project. The Green Globes Assessor will ask for minutes or report of the pre-design planning workshop or charrette, and when this meeting occurred in the overall project schedule. See References for examples of Integrated Design Processes (IDP's).

Assessment Guidance

Ensuring that all goals are established at the beginning of the design process and that all team members are actively involved throughout the entirety of the project is a key factor to designing a sustainable tenant space that meets the client's needs. Moreover, a team effort usually cannot function effectively without a designated leader. Since commercial interior projects are typically smaller in scope, it is not unreasonable to have the designated project manager, typically with the architectural design firm, also function as the sustainability coordinator or green facilitator. However, as with many larger projects, it is entirely appropriate to have a separately appointed sustainability coordinator, including an outside third party professional. This individual will typically call and run the project meetings that address sustainable design and construction; guide the sustainability discussion and decision making activities among the various disciplines and stakeholders; maintain minutes and a log of inquiries, follow-up and decisions, function as the focal point of project communications related to sustainability, and would be the most efficient team member to complete the Green Globes online program and follow-up activities. It is imperative that project team members know the basic goals and aspirations of the Green Globes for

Sustainable Interiors rating system and are familiar with the criteria in each of the 6 environmental assessment areas. If commissioning is part of the project, then the Owner's Project Requirements (OPR) and the Basis of Design (BOD) key commissioning documents could be derived from the meeting notes.

According to the *Whole Systems Integrated Process Guide*, the basic elements of integrated design are:

- Assemble the right team
- Fully engage client in the design decision process
- Align team around basic aspirations, a core purpose, and core values
- Identify key systems to be addressed that will most benefit the environment and project
- Commit to specific measurable goals for key systems
- Optimization of the design of systems
- Follow through during construction process
- Commission the project, as appropriate for a Sustainable Interiors project
- Maintain the systems
- Measure performance and respond to feedback – adjust key aspects of the systems accordingly

The exact number of “all hands” project meetings that need to occur will vary from project to project, depending on size of the retrofitted space, complexity, and desired sustainability goals. The *Whole Systems Integrated Process Guide* suggests at least seven of these meetings or workshops for a new building or major renovation project. An SI project would ideally be in the range of three to four formal meetings. *ANSI/ASHRAE/IES/USGBC Standard 189.1-2014 Appendix F: Integrated Design* and *ANSI/ASHRAE/USGBC/IES Standard 189.1-2011, Appendix H: Integrated Design* suggests that the design and construction team should use a charrette process to determine the optimal building scheme but does not outline any specific number of meetings. The primary concept that both references have in common is that collaborative meetings with all key design and construction personnel should be held as early as possible in the design process and should continue through building occupancy.

The Green Globes Assessor will look for project meeting minutes and agendas detailing which project members were in attendance and the general goals and outcomes of the meetings. At a minimum, meeting minutes will cover: agenda topics discussed, key

decisions or conclusions reached, and action items assigned to whom, to be completed by when. Another valuable document to submit to the assessor is a list of key project personnel including a description of their major tasks.

References

- [Whole Systems Integrated Process Guide](#)
- ANSI/ASHRAE/IES/USGBC Standard 189.1-2014, *Standard for the Design of High-Performance Green Buildings, Appendix F: Integrated Design*
- ANSI/ASHRAE/USGBC/IES Standard 189.1-2011, *Standard for the Design of High-Performance Green Buildings Appendix H: Integrated Design*
- [Better Bricks- Integrated Design and Delivery](#)
- [IEA Solar Heating and Cooling Task 23- Examples of Integrated Design](#)
- [A Whole Systems Approach- Integrated Building Design](#)

Scoring Matrix

Response	Score	Max Points
0-2	0	6
3-15	6	6

GREEN GLOBES #1.1.1.1



•Acoustics Consultant, Acoustician, or Special Systems Engineer

GREEN GLOBES #1.1.1.2



•Architect or Interior Designer

GREEN GLOBES #1.1.1.3



•Building Facilities Manager



GREEN GLOBES #1.1.1.4

- Commissioning Agent



GREEN GLOBES #1.1.1.5

- Contractor



GREEN GLOBES #1.1.1.6

- Electrical Engineer

Tooltip

Mark “N/A” where there are no major changes to electrical system.



GREEN GLOBES #1.1.1.7

- Lighting Designer/Illuminating Engineer



GREEN GLOBES #1.1.1.8

- Mechanical Engineer - HVAC

Tooltip

Mark “N/A” where there are no major changes to HVAC and plumbing.



GREEN GLOBES #1.1.1.9

- Mechanical Engineer – Plumbing



GREEN GLOBES #1.1.1.10

- Owner and/or Leasing Company Representative

GREEN GLOBES #1.1.1.11

- ↳ •Project Manager

GREEN GLOBES #1.1.1.12

- ↳ •Structural Engineer

Tooltip

Mark “N/A” where there are no major structural changes.

GREEN GLOBES #1.1.1.13

- ↳ •Sustainable Design Coordinator

Tooltip

This is a role that can be assumed by a member of the team, e.g. the Architect or Interior Designer.

GREEN GLOBES #1.1.1.14

- ↳ •User Group Representative

GREEN GLOBES #1.1.1.15

- ↳ •Other Key Professional

GREEN GLOBES #1.1.1.15.1

- ↳ Describe other key professional, if applicable. If none, enter "None."

GREEN GLOBES #1.1.2.1

Were (qualitative) green design goals established at the pre-design phase for any or all of the following:

Tooltip

Written qualitative goals must have been established during the pre-design phase for each item receiving credit.

Assessment Guidance

The team should begin by reviewing all applicable Green Globes criteria. During “all hands” meetings or design charrettes, the main project designers should systematically identify the performance standards and the associated metrics by which the project success will be judged. Meeting minutes should reflect initial and final performance goals for the sub-criteria listed above. These performance goals should be reflected in the project’s Division 01 specifications (e.g. “Section 01 8113 Sustainable Design Requirements for New Construction and Major Renovations”) and also in the Owner’s Project Requirements document.

A distinction between goals and objectives would be that goals are broad, qualitative expressions addressing the sustainability principles that projects are trying to achieve. Performance objectives differ from goals in that they are more specific and focused on setting criteria related to quantitative outcomes.

For goals, you might say: “We will use only energy-efficient light bulbs and fixtures,” or “We want to create an environment where all occupants can do their work in space adequate for their tasks, without feeling cramped or confined.”

Corresponding objectives might be: “We will achieve a lighting power densities to meet specific targets for various spaces, in terms of Watts per sq. ft. or in percent of overall energy consumption.”

A performance objective might be to make sure that all work surfaces receive at least 50 lumens per sq.ft. of incident light, or the temperature and humidity must be kept within the 90% comfort zone of *ANSI/ASHRAE Standard 55-2010*.

References

- [Whole Systems Integrated Process Guide](#)
- ANSI/ASHRAE/IES/USGBC Standard 189.1-2014, *Standard for the Design of High-Performance Green Buildings, Appendix F: Integrated Design*
- ANSI/ASHRAE/USGBC/IES Standard 189.1-2011, *Standard for the Design of High-Performance Green Buildings Appendix H: Integrated Design*
- ANSI/ASHRAE Standard 55-2010

GREEN GLOBES #1.1.2.1.1

Acoustic comfort?



- Yes (1 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.2.1.2

Efficient lighting?



- Yes (1 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.2.1.3

Lighting quality?



- Yes (1 points)

- No (0 points)

Tooltip

“Lighting quality” refers to recognizing early in the design process the visual needs of the future occupants, such as visual comfort from glare, lighting that supports health and productivity, and whether lighting levels are adequate for the task. An example of this would be to consider avoidance of eye strain symptoms from relevant task area by considering lighting levels and other parameters such as glare and color rendition.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1



GREEN GLOBES #1.1.2.1.4

Material utilization and efficiency?

- Yes (1 points)

- No (0 points)

Tooltip

This means Life Cycle Analysis, minimal use of raw materials, recycling, deconstruction and disassembly.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.2.1.5

Space optimization and flexibility?

- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Many larger organizations have a space planning, programming and justification policy and procedures document, including most public entities. This can serve as a guidance document for this process. Otherwise, prudent consideration of the true space need, space layout and adaptability for the most efficient design for the intended occupancy should be reflected in the sustainable goal setting process.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #1.1.2.1.6

Thermal comfort and indoor air quality?



- Yes (1 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.2.1.7

Waste management and recycling for occupants?



- Yes (1 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.2.2

Were performance objectives (metrics) established at the pre-design phase for the following:

Tooltip

Written performance objectives must have been established during the pre-design phase for one or more of the items listed. Goals should be numerical in terms of percent achieved (e.g. for construction waste), or quantifiable units (e.g. W/sq.ft. for lighting), total connected kW per space or area (e.g. for plug loads), and percent reduction relative to a base (e.g. for water).

Assessment Guidance

Document project performance goals in a similar manner as the other IDP items. It is also very good best management practice to assign an individual of the project team to each performance goal to champion the follow through and implementation.

GREEN GLOBES #1.1.2.2.1

Construction waste diversion?



- Yes (1 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.2.2.2

Lighting power density?



- Yes (1 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.2.2.3

Plug load power density?



- Yes (1 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.2.2.4

Water conserving features?



- Yes (1 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.3.1

Did the integrated design process (IDP) team hold progress meetings prior to the respective completion of the following project phases:

Tooltip

Agenda items should include the following: Review established (and/or modified) performance goals and green design goals; Refine language regarding performance and green design goal outcomes into Plans and Specifications; Identify any missing requirements and required steps to correct; establish/track responsibilities for gathering documentation and review plans for operations and maintenance training.

Assessment Guidance

Integrated Design Process (IDP): a process in which the project team is led by an individual and/or a team of individuals in the setting and ranking of measurable sustainable design and project delivery goals through an integrated process, and which facilitates reporting mechanisms to report to the team and owner on the progress made toward each goal, along with documentation of the process.

The Green Globes Assessor will be looking for project meeting minutes and agendas detailing the project stage and which project members were in attendance. Project Managers should maintain an electronic meeting log to organize and efficiently present this information for review.

References

- [Whole Systems Integrated Process Guide](#)
- *ANSI/ASHRAE/IES/USGBC Standard 189.1-2014, Standard for the Design of High-Performance Green Buildings, Appendix F: Integrated Design*
- *ANSI/ASHRAE/USGBC/IES Standard 189.1-2011, Standard for the Design of High-Performance Green Buildings Appendix H: Integrated Design*
- [Whole Building Design Guide \(WBDG\): Project Planning, Delivery, Controls](#)



GREEN GLOBES #1.1.3.1.1

At the Concept Design Phase?

- Yes (1 points)
-
- No (0 points)

Tooltip

At the Concept Design Phase, the general scope, preliminary design, scale, and relationships among the components of the project are established along with budget and schedule.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.3.1.2

At the Design Development Phase?



- Yes (1 points)
-
- No (0 points)

Tooltip

At the Design Development Phase, enlarged scale drawings, detailed elevations and plans, and design mock-ups should show major elements including mechanical, electrical, structural, telecommunications, plumbing systems, and fire protection.

Assessment Guidance

Design Development Phase: refines the scope of work previously approved in the schematic design phase. In this phase the project is developed to a level of detail necessary to work out a clear, coordinated description of all aspects of the project. Major elements including equipment, fire protection, mechanical, electrical, structural, telecommunications and plumbing systems are designed and coordinated through enlarged scale drawings, detailed elevations and plans, and design mock-ups as required.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.1.3.1.3

At the Construction Documents Phase?



- Yes (1 points)
- No (0 points)

Tooltip

At the Construction Documents Phase, finalized drawings and specifications for all components and systems of the building are produced that form the basis for drawing up contracts, obtaining necessary permits, and constructing the project. The Construction Documents Phase also encompasses the majority of formal documentation for the Green Globes assessment and rating process.

Assessment Guidance

Construction Documents Phase: the last stage of the design process. The design and delivery team is focused on finalizing the drawings and specifications for all components and systems of the building, producing the Contract Documents. A complete set of Contract Documents provides a comprehensive, fully coordinated set

of construction documents and specifications for construction procurement, followed by what that the contractor uses to obtain necessary permits and construct the project.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

Building Materials & Building Envelope

GREEN GLOBES #1.2.1.1

Is there a requirement for the following construction best-practices to protect building materials and control mold:

Tooltip

Examples of building materials made of organic material include wood, gypsum board, and plasterboard. This is verified by the Green Globes Assessor. The measures should be included in the General Contractors' Environmental Management System as part of the Site and Work Instructions.

Assessment Guidance

Enhanced IAQ has been shown to reduce sick building syndrome and improve quality of life for building occupants. While many IAQ management practices apply to the occupied building after construction is complete, there are several initiatives that the contractors can implement during construction in order to reduce contaminants in the building. Two of these efforts are:

- Protecting building materials
- Ensuring a weather-tight envelope is complete prior to installing interior building systems

Building materials, especially those with absorptive properties, should be protected from moisture and airborne contaminants en route to the building site and during the entire construction phase. If these materials (drywall, acoustic ceiling tile, insulation, etc.) are exposed to rain, dust, or other construction particulates, they will absorb these contaminants and emit them over time following installation and thereby compromising the air quality within the building. These materials should be kept off the ground in a protected and isolated storage area.

Along with protecting building materials from contaminants, the interior building systems that affect indoor air quality (HVAC, flooring, interior walls, ceilings, etc.) also need to be protected. By ensuring that the entire envelope of the building (exterior walls, roofs, doors,

windows, etc.) is weather-tight when completely installed, there is a reduced risk of exterior contaminants (e.g. water, dust, fuel fumes and biological agents) infiltrating the interior systems that are eventually exposed to occupants.

Even if all materials are adequately protected and interior systems are not installed prior to envelope completion, all materials and systems should be cleaned and checked for excess moisture that may contribute to mold and mildew development in the building.

The Green Globes Assessor will be looking for an Indoor Environmental Quality Plan that addresses the above sub-criteria and, if applicable, the criteria in 1.2.2 IAQ During Construction, 6.1 Ventilation and 6.2 Source Control of Indoor Pollutants. They may also request photographs of protected building materials.

References

- [ASHRAE Indoor Air Quality Guide: Best Practices for Design, Construction, and Commissioning](#)

Recommended Documents

- *Construction Documents*
- *Manufacturer's specifications, cut sheets and performance documentation*
- *Photographs of protected building materials*

GREEN GLOBES #1.2.1.1.1

Building materials made of organic material or those that could absorb moisture are protected in transit and at the construction site from contact with moisture and from collecting organic matter such as leaves, soil or insects?



- Yes (1 points)
-
- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.2.1.1.2

The interior is weather-tight and dry before installation of interior walls, wood floors, ceilings, or HVAC systems?



- Yes (1 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1

GREEN GLOBES #1.2.2.1

Is there a requirement for **one of the following** best-practices to maintain good indoor air quality:

- The area under construction is to be flushed with 100% outdoor air for 7 consecutive days prior to occupancy, and filters changed after flush out but before it is occupied?

OR

- Baseline Indoor Air Quality testing gives acceptable results as per Environmental Protection Agency (EPA) Testing for Indoor Air Quality, Section 01 81 09 (December 2007)?
-
- Building flushed 7 days & filters changed (*3 points*)
-
- IAQ test yields acceptable results (*3 points*)
-
- No (*0 points*)

Tooltip

The measures should be included in the General Contractors' Environmental Management System as part of the Site and Work Instructions.

Optimally a building zone flush-out begins as soon as HVAC systems are operational and extends through the end of construction, furniture and finishings installation. The minimum recommended flush-out period is 7 days; it should be completed prior to occupancy. The HVAC system that covers the reconfigured space should be run continuously, 24 hours a day, with 100% outside air (no return air should be re-circulated into the space). The degree of zone control provided by the BAS (if any) will determine the overall approach to flush-out. Flush out by alternative means, such as exhaust fans in the space entry ways with direct venting to the outside or via exhaust vents, would accomplish the same purpose.

Assessment Guidance

Despite construction IAQ best management practices, the indoor environment of any building will contain pollutants and chemicals resulting from the construction process. When the building space is ready for occupancy, it is good practice to ensure airborne contaminants have been evacuated from the building. This can be done in two ways:

- Performing a building flush-out
- Indoor Air Quality testing

A building space flush-out requires the contractor to run the HVAC system at 100% outdoor air for at least 7 consecutive days in order to dilute and remove off-gassed contaminants from the structure. If the HVAC system has been running during construction, the filters should be changed prior to flush-out and again immediately after the flush-out is complete. There should be brand new filters in all HVAC systems when the building is ready for occupancy. The flush-out should be performed after testing and balancing of the HVAC systems and all commissioning functional tests have been completed, if possible. During the flush-out, it is recommended that the interior conditions remain in a temperature range that is the same as will be used when the building is occupied.

If the HVAC system is unable to perform a flush-out due to physical constraints or weather at the time the flush-out would be performed, or if the construction schedule cannot allocate 7-14 days for a flush-out, then IAQ testing may be performed to ensure major contaminants are below acceptable levels before occupancy. Green Globes requires that the IAQ testing be performed in accordance with the EPA's Testing for Indoor Air Quality document, which is written in a style that allows for incorporation into the Division 01 specifications. The EPA calls for testing to be performed after HVAC system verification by an independent contractor with a minimum of 5 years of experience. A test plan should be written prior to start of testing, and a final report shall be submitted stating concentrations of targeted pollutants including (but not limited to):

- Formaldehyde
- Volatile Organic Compound (VOC)
- Mold and mildew
- Carbon monoxide
- Other compounds applicable to the project as found on the California Office of Environmental Health Hazard Assessment's list of Chronic Reference Exposure Levels: <http://oehha.ca.gov/air/allrels.html>

Similar to the flush-out procedure, IAQ testing should be performed after testing and balancing of the HVAC systems and all commissioning tests have been completed, if possible. The testing should be performed under normal HVAC operating conditions.

The Green Globes Assessor will be looking for any IAQ requirements in the construction specifications or project manual. Either the requirements for the Indoor Air Quality/Indoor Environmental Quality Plan or for the Baseline Indoor Air Quality Test should be included in the Division 01 specifications. Results of the IAQ testing must be included as documentation that the IAQ tests were performed appropriately.

References

- *U.S. Environmental Protection Agency (EPA) Testing for Indoor Air Quality: Section 01 81 09 (December 2007)*
- [California Office of Environmental Health Hazard - Assessment list of Chronic Reference Exposure Levels](#)

Scoring Matrix

Response	Score	Max Points
Building flushed 7 days & filters changed	3	3
IAQ test yields acceptable results	3	3
No	0	3

GREEN GLOBES #1.2.2.2

Where parts of the building will be occupied during construction, which of the following five basic strategies are specified per SMACNA's IAQ Guidelines for Occupied Buildings Under Construction to control dust, odors, or irritants:

Tooltip

The control or mitigation measures should be included in the General Contractors' Environmental Controls specification as part of the Site and Work Instructions.

Assessment Guidance

Sources of air pollution are varied and include emissions/off-gassing from building materials or chemicals; outdoor sources like moisture, pesticides, and vehicle emissions; and HVAC and construction equipment. As mentioned in 1.2.1 Building Materials and Building Envelope , an IAQ Management Plan should be developed for the project that includes comprehensive procedures for optimizing IAQ during and after construction. If the project has developed an Environmental Management Systems and plan, then contractor's responsibilities for control and mitigation of pollutants would likely be addressed for criterion 3.1.2. Buildings pursuing Green Globes certification should employ an all-inclusive IAQ Management Plan that addresses, at minimum, the following topics:

- HVAC Equipment Protection. Best management practices for HVAC equipment and system components during construction include, but are not limited to, the following strategies:
 - Ventilate the project site with temporary exhaust until the HVAC system is substantially installed
 - During heavy construction periods, shut down the return side of the HVAC system and utilize temporary exhaust to increase the amount of outside air in order to dilute construction area airborne pollutants
 - Shutting down the return side of the HVAC system during heavy construction activities
 - Replace the HVAC filters at frequent intervals throughout the construction process, before flush-out or IAQ testing, and again before occupancy
 - Ductwork inlets and outlets should be covered at both ends (shrink-wrapped in plastic) when not in use
 - Equipment returns should be kept wrapped until final installation of the finish grates

Pictures should be taken at regular intervals throughout the project to document adherence to the HVAC protection requirements outlined in the IAQ Management Plan.

- Source Control. Materials and finishes used in buildings are one of the primary sources of emissions. These emissions are mainly reported in the form of Volatile Organic Compounds (VOCs) . VOCs are compounds that contain carbon and off-gas chemicals such as formaldehyde (most common), alcohols, propane, acetone, and halo-generated hydrocarbons (methyl chloroform, methylene chloride). The best strategy to reduce the level of off-gassing after the building is occupied is to specify

products that contain low levels of VOCs or none at all. When low-VOC emitting materials are specified and installed properly, VOC levels will be substantially reduced or even eliminated. The IAQ Management Plan should address acceptable VOC levels for adhesives, sealants, finishes, paints, particleboard and plywood (containing urea formaldehyde), insulation, floor and wall coverings, and ceiling tiles. For many building materials there are third-party certification programs like The Carpet and Rug Institute's Green Label Indoor Air Quality Test Program or Green Seal Standard GS-11 that owners and architects can specify to ensure building materials and components are low-VOC. Further requirements for adhesives and sealants are listed in the South Coast Air Quality Management District (SCAQMD) Rule 1168.

- Pathway Interruption. The IAQ Management Plan should provide for temporary barriers to isolate areas under construction from substantially completed, cleaned, or occupied areas. When possible, construction areas should be ventilated directly to the outdoors, when installation of VOC-emitting materials (sealants, adhesives, coatings, etc.) and/or mostly dusty operations are being performed.
- Housekeeping. The Housekeeping section should outline procedures to ensure that all materials stored onsite do not get contaminated by dirt or other particulate matter that is present on a construction site. This section should also address 1.2.1 Building Materials and Building Envelope. Additionally, an overall jobsite maintenance program should be developed that includes the storage and protection of building materials in a dry, clean location. Additional requirements for this section could include using HEPA vacuums for cleanup and training of all construction staff on project housekeeping requirements.
- Scheduling. Construction operations and scheduling should be sequenced so that absorptive materials (gypsum board, ceiling tile, carpeting, etc.) are installed only after all applications of wet and odorous materials have been completed.

The IAQ Management Plan should be composed prior to start of construction (typically at the Pre-Construction Meeting) and should be documented or referenced in the project manual. The Green Globes Assessor will be looking for IAQ construction procedures in the Indoor Air Quality/Indoor Environmental Quality Plan or in the Division 01 specifications.

References

- *SMACNA IAQ Guidelines for Occupied Buildings Under Construction*
- *South Coast Air Quality Management District (SCAQMD)- Rule 1168*

GREEN GLOBES #1.2.2.2.1

HVAC Protection?



- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where the building is entirely unoccupied during construction.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #1.2.2.2.2

Pollutant Source Control?



- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where the building is entirely unoccupied during construction or where the source of pollution is far away from occupied spaces.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #1.2.2.2.3

Pathway Interruption?



- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where the building is entirely unoccupied during construction.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0



GREEN GLOBES #1.2.2.2.4

Housekeeping?

- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where the building is entirely unoccupied during construction.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #1.2.2.2.5

Scheduling?

- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where the building is entirely unoccupied during construction or where there are operational or security constraints.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

Environmental Purchasing

10

Environmental Purchasing

10

GREEN GLOBES #1.3.1

Does the environmental purchasing plan for construction include the procurement of energy-saving, high-efficiency equipment?

- Yes (5 points)
- No (0 points)

Tooltip

Energy efficient equipment typically means ENERGY STAR® -labeled appliances and office equipment, and/or office partitions and furniture that are either certified to be energy efficient or designated by a manufacturer as energy-efficient based on some objective criteria.

Assessment Guidance

Data documenting energy efficient equipment such as ENERGY STAR®, SEER ratings on HVAC equipment, and/or nameplate data on motors and lighting, as applicable, support the Green Globes Assessor's verification.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5

GREEN GLOBES #1.3.2

Is there an environmental purchasing plan for the future occupying organization with provisions for energy and water efficient equipment, environmental attributes for consumables, and a policy and procedure to reduce and minimize the need for materials and products?

- Yes (5 points)
-
- No (0 points)

Tooltip

This document represents a commitment by the future tenant organization's decision makers to continue the practice of environmental purchasing after the project is complete and the space is occupied. It should include a policy covering environmental attributes of consumable materials, ongoing equipment purchases are energy efficient (or water efficient as applicable), safety and hazard minimization as applicable, and a plan to minimize/reduce the need for materials and products.

Assessment Guidance

A new policy specific to the newly reconfigured space, or an existing policy that applies to all occupants of the building are acceptable documentation. The document can be as explicit as possible, such as designating purchasing preference for ENERGY STAR® -labeled equipment, minimum SEER ratings, and performance requirements or standards to be applied to future-purchased items, or criteria that can be used to verify whether an order is for energy- or water-efficient items.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5

Commissioning Requirements

GREEN GLOBES #1.4.1.1

Is there a requirement that commissioning of new interior building elements or systems is to be conducted in accordance with *ASHRAE Guideline 0-2005: The Commissioning Process, Articles 5, 6, and 7* (or more recent version) for the following:

Tooltip

Inputs determined by the project's scope of work. Where no commissioning is to be done, mark "No."

Assessment Guidance

During the design phase, the CxA should review the OPR, design documents and any Basis of Design (BOD) documents assembled by the design team. The design document reviews focus on the "big picture", focusing on operability, accessibility, maintainability, efficiency, coordination between systems and controls. Approximately one-third of commissioning field problems can be traced back to design, so this process is key. At this time, the CxA should also help prepare commissioning related specifications for the design team, develop pre-functional checklists and functional performance tests for all equipment to be commissioned, and finalize the Commissioning Plan. Specification sections related to commissioning are typically included in the Division 01 sections (listing checklists, prerequisites to testing, testing requirements and reports) and also in individual sections in Divisions 02 through 48 (stating which systems are to be commissioned and requirements for contractors to complete checklists and performance tests). The CxA will also develop training and systems manual requirements.

The construction phase is where the largest amount of commissioning work takes place. The CxA's activities will include:

- Reviewing submittals against the Commissioning Plan, OPR, and BOD
- Revise the OPR, Commissioning Plan and schedule, if necessary
- Document construction observations on site and compile these into a commissioning33 issues log and photo log

- Review pre-functional test checklists completed by contractors
- Conduct Functional Performance Testing of equipment and systems
- Develop a systems manual that includes operations and maintenance manuals for commissioned equipment

During this time, the CxA might also meet with the designers and contractors to review complex systems such as the BAS and sequence of operations. Once all the above activities are complete, the CxA will develop and distribute the Commissioning Report.

More information on commissioning can be found at *ASHRAE Standard 202-2013-Commissioning Process for Buildings and Systems* and *ASHARE Guideline 1.1-2007 – HVAC&R Technical Requirements for The Commissioning Process*, the *Building Commissioning Association* (<http://www.bcx.org>) and the *AABC Commissioning Group* (<http://www.aabc.com/commissioning>).

The Green Globes Assessor will look for a final Commissioning Report. Other documents that should be submitted for the assessor's review include any commissioning issues logs. If these tasks have not been completed prior to the assessor's review, projects should submit the most recent copy of the Commissioning Plan.

References

- *ASHRAE Guideline 0-2005: The Commissioning Process, Articles 5, 6, and 7*
- *ASHRAE Standard 202-2013: Commissioning Process for Buildings and Systems*
- *NIBS Guideline 3-2012: Building Enclosure Commissioning Process BECx*
- *ASHRAE Guideline 1.1-2007 – HVAC&R Technical Requirements for The Commissioning Process*
- [*Whole Building Design Guide \(WBDG\): Building Commissioning*](#)
- [*Building Commissioning Association*](#)
- [*AABC Commissioning Group*](#)



GREEN GLOBES #1.4.1.1.1

Building automation systems?

- Yes (3 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where systems are not linked to building automation system.

Scoring Matrix

Response	Score	Max Points
Yes	3	3
No	0	3
N/A	0	0

GREEN GLOBES #1.4.1.1.2

Communication systems?

- Yes (2 points)



- No (0 points)

- N/A

Tooltip

Mark “N/A” where communications systems are not within the scope of the project.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #1.4.1.1.3

Electrical systems?



- Yes (2 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2

GREEN GLOBES #1.4.1.1.4

Fire protection system?



- Yes (2 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2

GREEN GLOBES #1.4.1.1.5

HVAC&R and controls?



- Yes (5 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5

GREEN GLOBES #1.4.1.1.6

Lighting systems and their controls?



- Yes (5 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5

GREEN GLOBES #1.4.1.1.7

Plumbing system?



- Yes (2 points)

- No (0 points)

- N/A

Tooltip

This involves spot check and verification that the flows are accurate for the different fittings, fixtures, and appliances. Mark “N/A” where plumbing systems are not within the scope of the project.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #1.4.1.2

Is there a requirement that the commissioning will be conducted in accordance with *ASHRAE Guideline 0-2005: Annex L* (or more recent version)?

- Yes (3 points)
-
- No (0 points)

Tooltip

This annex provides guidance on writing specifications for the commissioning activities that are to be performed by construction contractors. A specification guide is included with the assumption that the construction contractor is involved only during the construction phase and for the correction and warranty period. Where no commissioning is to be done, mark “No.”

Assessment Guidance

This criterion should be included in the project specifications and/or the Commissioning Plan. The Green Globes Assessor will look at these documents to determine compliance.

References

- *ASHRAE Guideline 0-2005: The Commissioning Process, Annex L*
- *ASHRAE Standard 202-2013: Commissioning Process for Buildings and Systems*
- *NIBS Guideline 3-2012: Building Enclosure Commissioning Process BECx*

Scoring Matrix

Response	Score	Max Points
Yes	3	3
No	0	3

GREEN GLOBES #1.4.2.1

Is there a requirement that there will be training for the facility operator on the systems listed above in accordance with *ASHRAE Guideline 0-2005: Article 7.2.14* (or more recent version)?

- Yes (3 points)
-
- No (0 points)

Assessment Guidance

Before building space occupancy, the CxA will also verify systems training of the building staff or end-use occupants, whichever audience is more appropriate (completed or planned). Training should identify the end user maintenance personnel, provide the end user with a “refresher” on building equipment and provide the owner and maintenance personnel with a full understanding of system equipment and design. It is recommended that this training be recorded on video recorded so the information can easily be shared with new maintenance personnel. *ASHRAE Guideline 0-2005 Article 7.2.14* requires that this training be verified by conducting a random evaluation/test of 5-10% of the trained employees. The test should measure whether the training provided the tools necessary for the staff to either know all the system operations or know where to find information if it is not known and understand how to troubleshoot and resolve any system’s problems.

The Green Globes Assessor will look for a final Commissioning Plan including training agenda. The Commissioning Report and sign-in sheets verifying systems training should be provided if commissioning is complete by the time of the assessment.

References

- *ASHRAE Guideline 0-2005: Article 7.2.14*
- *ASHRAE Standard 202-2013: Commissioning Process for Buildings and Systems*
- *NIBS Guideline 3-2012: Building Enclosure Commissioning Process BECx*

Scoring Matrix

Response	Score	Max Points
Yes	3	3
No	0	3

GREEN GLOBES #1.4.3.1

Is there a requirement to develop or modify an existing Operations and Maintenance (O&M) Manual and/or Computerized Maintenance Management System (CMMS) that contains descriptions and information on the continuous tasks related to any additional complex systems – for example communications, fire, security, cleaning instructions, lighting controls, etc.?

- There is/will be a complete, user-friendly O&M manual, relevant to the project scope (3 points)

- There is/will be a complete CMMS, or CMMS update, relevant to the project scope (3 points)

- O&M Manual meets some, but not all, requirements (1 points)

- CMMS meets some, but not all, requirements (1 points)

- No (0 points)

Tooltip

If the project does not have an Operations and Maintenance Manual, the owner's building management likely has an existing O&M manual or active CMMS program that would apply to all building space, including new tenants. Cooperation from the building owner is key in such a case.

Assessment Guidance

Close-out documents for typical new construction projects include what may be often be referred to as an Operations and Maintenance (O&M) Manual. O&M Manuals for green, sustainable buildings need to encompass all the operating aspects of the building that have an impact on its surrounding environment and occupants. For an SI project, the majority of the building systems and site features will already be addressed in an existing O&M manual and/or CMMS system for the building as a whole. It is strongly recommended that any changes or additions as a result of the SI project be addressed through integration into the

main building operation documents, records and CMMS program. Simply because a building was built green does not mean it will operate in an environmentally-friendly fashion unless thorough operating procedures are in place as soon as the building is occupied. Conventional practices may provide O&M Manuals that include mainly HVAC equipment. Manuals of this type are useful but are not sufficient to ensure the building staff can successfully operate the building post-construction. This criterion is meant to address the building's overall operating procedures, not solely the systems affected by the SI certification.

For whole buildings pursuing Green Globes certification, the O&M manual should include at least 12 of the items listed below. Since most whole buildings are operated and maintained by the owner or designated representative, the optimal compliance strategy for a client seeking Green Globes SI certification is to have the owner's O&M manuals/CMMS augmented to include the operating features of the newly renovated space. Operating plans, policies, and protocols for a variety of building aspects should allow the building engineers and managers to run the building as it was designed, continually optimizing the efficiency, and realizing the efficiency and environmental benefits of the installed systems and prescribed practices.

In general, sustainability practices that apply to the entire building should be inherited by the SI space(s). If such designated practices are not in place for the entire building, then the following list should be adapted to apply to at least the SI space(s).

Engineered Building Systems

- Calibration Strategy for Outdoor and Exhaust Air Dampers
 - Clearly define when and how all HVAC dampers will be calibrated to ensure proper air flow both in and out of the building and ensure that full closure is achieved, when appropriate.
- Schedule for HVAC and filter maintenance
 - A comprehensive maintenance schedule should be made that includes manufacturer-recommended maintenance for all major HVAC equipment.
 - A filter replacement schedule should be developed and posted to ensure continued clean air for occupants.
- Cooling Tower Operating Maintenance
 - If the project includes a cooling tower system, the HVAC maintenance vendor should be signed to an agreement detailing all preventative

maintenance.

- In-house staff may also provide the maintenance if a plan is in place.
- Frost Mitigation Strategy for Ventilation Heat Recovery
 - If the project includes a ventilation heat recovery system, a frost mitigation strategy should be included in the Basis of Design (BOD) as part of the commissioning process. If no commissioning is being pursued for the project, the HVAC design engineer should develop this strategy as part of the controls sequence of operations.
- Carbon Dioxide Monitoring Protocol
 - Refer to 6.1.2 CO₂ Sensing and Ventilation Control Equipment
 - The CO₂ Monitoring should contain the following:
 - The maximum acceptable differential between indoor and outdoor CO₂ concentrations as recommended by the lower of *ANSI/ASHRAE 62.1-2010* or the authority having jurisdiction;
 - The documentation of an alarm condition, diagnosis of the condition and documentation of any remediation necessary.
- Carbon Monoxide Monitoring Protocol
 - The Carbon Monoxide Monitoring Protocol should contain the following:
 - Instructions for review, follow-up and remediation.

General Building

- Food and Material Waste Reduction Plan
 - Refer to 4.4 Waste
- Waste Minimization Plan
 - Refer to 4.4 Waste
- General Housekeeping
 - A general housekeeping, or green cleaning, policy should be developed that contains all sustainable cleaning products, indoor janitorial equipment, and cleaning procedures (for use by both in-house staff and out-sourced service providers).
 - The policy should include specifications for sustainable cleaning materials, janitorial paper products, trash bags, and floor care products (e.g. Green Seal, Environmental Choice, or EPA labeled products, recycled content paper products and trash bags).
 - The policy should address cleaning equipment that is quiet, high-efficient,

low emissions, ergonomically designed, and has safeguards to protect building elements. Equipment should be tested by the Carpet and Rug Institutes “Green Label” or “Seal of Approval” programs. Owners should work with janitorial vendors to ensure all facets of the green housekeeping policy are incorporated into the daily cleaning routine.

- The policy should assign control for all high level chemical disinfectants and sterilants.
- For more information, review *EPA Guide for Federal Purchasers—Greening Your Purchase of Cleaning Products*: <http://www.epa.gov/epp/pubs/cleaning.htm>
- Integrated Pest Management Plan
 - Refer to 5.2 Pest and Contamination Control
- Chemical Management and Minimization Policy
 - Establish a policy that minimizes the use and storage of harmful chemicals. The policy should regulate which chemicals can be used on site specifying low VOC, non-toxic, and Green Seal products where possible.
 - It should also cover purchasing, ordering, receiving, handling, storage, and disposal of high hazard substances and the process for properly ventilating chemical storage areas (air monitoring). All chemicals should be properly labeled and only used per manufacturer’s recommendations. No chemicals shall be used for purposes other than originally specified.
 - The policy should also address staff training/ education and employee health monitoring, as appropriate, with special consideration for chemicals that have been identified as posing increased risk for occupational and community exposure.
- Low-Impact Site and Green Building Exterior Management Plan (part of existing building management plan)
 - Establish a plan that addresses building exterior management practices that have a low environmental impact and preserve the surrounding ecology. This plan should include:
 - Maintenance equipment.
 - Chemical/fertilizer/snow removal practices.
 - Building/exterior products and practices as they relate to cleaning, painting, or sealing.
 - It can also include landscape waste, plantings, and exterior pest control, although those areas might also be addressed under other

policies.

- A narrative should be included that gives an overview of the organizational management plan that highlights all included topics and quarterly reporting requirements. The narrative should also include a requirement for quartering reporting over a specified period.
- Site Maintenance Contract (part of existing building management plan)
 - The Site Maintenance Contract should include the following:
 - Site map to identify locations for meters, controllers, valves, filters, hose bibs, back flow prevention devices, and water sources;
 - Identification of site square footage of each irrigated landscape zone to use in the formulation of a site water budget by a certified or degreed irrigation designer or auditor;
 - Requirement that a certified or degreed irrigation designer or auditor check irrigation system by turning it on manually to inspect for leaks, breaks, overspray, etc. every month or more, if possible;
 - Description of actions to be taken to quickly find and fix irrigation to avoid substantial loss of water;
 - Requirement to use mulch and to renew mulch on an annual basis or as needed;
 - Requirement to grass-cycle with every mowing, if turf is used on site;
 - Requirement to use mulching mowers and to leave grass clippings on the site, instead of removing clippings and taking to the landfill;
 - Requirement for use of organic fertilizers;
 - Limitation on the use of non-organic herbicides and pesticides and that they only be applied by certified applicators;
 - Requirement that maintenance contractors are certified landscape professionals accredited by a local water provider and/or university;
 - Requirement that plant replacements be done within an approved or provided plant list, or in the context of the site goals for efficiency;
 - Requirement that “Extra” work be spelled out in the contract and agreed to by owner, manager and contractors.
- Operating Schedule for all EPA WaterSense® /Smart Water Application Technology (SWAT) smart controllers (ET or soil moisture sensors) and automatic rain shut off devices
 - When water-efficient irrigation systems are included in the project, the

Landscaping designer should include controls information on their drawings or specifications detailing the irrigation operating schedule.

All management plans and policies should include who the responsible parties are, including any outside vendors, what actions will be taken as part of the plan, why the actions are environmentally preferable versus standard operating procedures and any tracking or verifying documentation that will be required. The Green Globes Assessor will look for a final Operations and Maintenance Manual that clearly notes each of the site management items it addresses. The assessor will also be checking to ensure each management plan or policy is complete.

References

- *ANSI/ASHRAE Standard 62.1-2010: Ventilation of Acceptable Indoor Air Quality*
- [*U.S. Environmental Protection Agency \(EPA\) -Greening Your Purchase of Cleaning Products, A Guide for Federal Purchasers*](#)

Scoring Matrix

Response	Score	Max Points
There is/will be a complete, user-friendly O&M manual, relevant to the project scope	3	3
There is/will be a complete CMMS, or CMMS update, relevant to the project scope	3	3
O&M Manual meets some, but not all, requirements	1	3
CMMS meets some, but not all, requirements	1	3
No	0	3

Energy Sub-Metering

65

Energy Sub-Metering

65

GREEN GLOBES #2.1.1

Is electricity separately metered for the interior space?

- Yes (10 points)

-
- No (0 points)

Assessment Guidance

An Energy Metering and Reporting Plan should contain measurement, verification, metering, and reporting energy use information for the building systems that are within a tenant's domain of control. Only building systems that directly affect the project space are required to be addressed verified as part of this assessment.

- Primary energy systems
 - Chilled water generation;
 - Heating water or steam generation;
 - Furnaces;
 - Boilers;
- Major electrical direct end uses
 - Lighting;
 - Plug loads;
 - Electric HVAC components (such as chillers, cooling towers, AHU fans, and major pumps);
 - Specialty or process electrical equipment;
 - Secondary electric HVAC equipment as appropriate(e.g. heat pumps, fan coils, fan powered boxes);
- Status monitoring and verification of critical HVAC controls (e.g. scheduling, economizer operation, temperature/pressure resets);

- Potable hot water systems;
- On-site renewable energy power generation;
- Other sub-metered energy sources (propane, steam, natural gas, wood for example).

In setting up the Energy Metering and Reporting Plan, the anticipated energy demand and consumption values for each of the above mentioned end-uses should be estimated or extracted from the building energy model (if available). From there, the Building Automation System (BAS) or other automated building control system should be set-up to continually track and report energy usage broken down by major end-use, where possible.

Where sub-metering is not practical or possible, or where alternative logging or metering would provide better results (such as short-term logging or BAS polling), the measurement, analysis, and reporting of the alternative monitoring should be documented in the Energy Metering and Reporting Plan.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10

GREEN GLOBES #2.1.2

Is there sub-metering installed for the following:

Tooltip

Sub-metering: subdivision of the utility metering of a building that records the proportionate energy use of specific building systems and appliances.

Assessment Guidance

The Green Globes Assessor will review the mechanical and electrical plans, which should clearly show what major end-uses will be sub-metered. Additionally, designing separate circuits for different end uses—lighting, hot water, heating/cooling, plug loads, for example—will make it easier to resolve actual end uses.

Specialty or process electrical equipment should not be confused or combined with the plug loads end-use. Specialty/process electrical equipment refers to hardwired equipment, like MRI machines in hospitals, or vertical transportation in commercial buildings. Plug loads should only consist of items that are not electrically hard wired but must be physically plugged in to an electrical outlet.

GREEN GLOBES #2.1.2.1

Lighting?



- Yes (10 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10

GREEN GLOBES #2.1.2.2

Plug loads?



- Yes (10 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10



GREEN GLOBES #2.1.2.3

Large specialized equipment (e.g. servers, medical equipment, MRI units, etc.) that are likely to produce more than 10% of annual energy use?

- Yes (10 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” for a facility less than 20,000 ft² or where these types of large equipment or systems are not present.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10
N/A	0	0

GREEN GLOBES #2.1.2.4

Other equipment or systems that impact energy?



- Yes (10 points)

- No (0 points)

- N/A

Tooltip

For example, a chiller plant retro-fitted for waste heat . Mark “N/A” where no systems other than lighting, plug loads, or specialized equipment are in place that can be sub-metered or logged.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10
N/A	0	0

GREEN GLOBES #2.1.2.4.1



Describe the sub-metering used for any other equipment or systems that impact energy use. If none, enter "None."

Tooltip

This criterion is informational only and is not scored. Points for sub-metering additional equipment or systems are awarded under criterion 2.1.2.4.

GREEN GLOBES #2.1.3

Is there a monitoring feature that includes continuous or regular updates shared with tenants for different energy end uses, plug loads, and high energy use equipment?

- Yes (10 points)
- No (0 points)

Tooltip

Mark “N/A” if tenants have no influence over the metering or logging of energy use in their space, only if building lessor or owner does not permit or support energy use tracking and apportioning source energy to the tenant space.

Assessment Guidance

Aside from electric sub-metering, data collected from the building automation system (BAS) or other data tracking systems (such as temporary loggers) can be developed to generate time series profiles of actual energy end uses in a space. Use of interval metering or programming the BAS is one way to capture energy use patterns. Such data can be tabulated, charted or further developed to review trends and anomalies. Regularly-reported data is the key to determining possible causes of problems, such as control drift, set point overrides, scheduling errors, and other operational issues. With this information, corrective action can be taken to modify operational parameters (such as set points, ventilation requirements, HVAC resets, schedules or behavior changes to bring energy use back to acceptable ranges.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10

GREEN GLOBES #2.1.4

Is there a formal written plan, approved and signed by building management, with provisions that the monitored data is analyzed, configured and reported in such a way that tenants can take corrective action to reduce loads based on the reported results?

- Yes (5 points)
-
- No (0 points)

Tooltip

A relevant, useful plan would address the who, what, when, and how the data is collected, analyzed, reported, reviewed, and the processes for following up on reported information to improve energy efficiency.

Assessment Guidance

A typical plan would include the following kinds of information and details:

- The type, frequency, and units of the data to be collected.
- Description of the algorithms or methods used to analyze the data (e.g. equations imbedded in a spreadsheet tool).
- Persons responsible for collecting and analyzing the data.
- A flow chart identifying the key tasks in the overall process of data collection, analysis, reporting, review, and follow-up.
- Sample of mock-up of an actual or typical report.
- Example of the kinds of summaries and recommendations associated with the report.
- Example of the kinds of corrective actions or procedures to be followed that could be taken to follow up on recommendations.
- Goals or target results to be achieved.
- Cumulative historical results (such as bar charts, pie charts or tables) that graphically display progress toward goals.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5

GREEN GLOBES #2.2.1

Are windows energy efficient, or were inefficient windows retrofitted to improve energy efficiency by the following:

Tooltip

This criterion applies to the portion of windows directly related to (bordering) the specific space. “Energy efficient” here means U-factor and SHGC values less than reported in Table 2.2.1 (adapted from *ANSI/ASHRAE/IES Standard 90.1-2010, Tables 5.5-1 through Tables 5.5-8*). Determine the weighted average assembly U-factor values and the SHGC on a weighted area average for all windows. The code compliance documentation, such as details from COM check of the main building, should provide the details needed for this calculation.

Table 2.2.1: Building Envelope Requirements

CLIMATE ZONE	1	2	3	4 (Except Marine)	5 (And Marine 4)	6	7	8
Framing materials other than metal with or without metal reinforcement or cladding								
U-factor	1.20	0.75	0.65	0.40	0.35	0.35	0.30	0.30
Metal framing with or without thermal break								
Curtain / Storefront U-factor	1.20	0.70	0.60	0.50	0.45	0.45	0.40	0.40
Entrance Door U	1.20	1.10	0.90	0.85	0.80	0.80	0.75	0.75
All Other U-Factor ^a	1.20	0.75	0.65	0.55	0.50	0.50	0.45	0.45
Skylights (3% maximum)								
U-factor	0.75	0.75	0.65	0.60	0.60	0.60	0.60	0.50
SHGC-All Frame Types								
SHGC: North ^b	0.45	0.45	0.45	0.50	0.50	0.50	0.65	NR
SHGC: E, S & W PF < 0.25	0.25	0.25	0.25	0.40	0.40	0.40	0.50	NR
SHGC: E, S & W 0.25 ≤ PF < 0.5	0.30	0.30	0.30	0.50	0.50	0.50	NR	NR
SHGC: E, S & W PF ≥ 0.5	0.40	0.40	0.40	0.65	0.65	NR	NR	NR
Skylights (3% maximum)								
SHGC	0.20	0.20	0.30	0.40	0.40	0.50	0.60	NR
NR = No requirement.								
PF = Projection factor								
a. All other includes operable windows, fixed windows and non-entrance doors.								
b. North-Facing within 45 degrees of true north (Northern Hemisphere).								

Assessment Guidance

Provide manufacturer's product literature and approved submittals thoroughly describing energy efficiency ratings and performance. Construction documents should detail the fenestration schedule and installation.

A list of thermal transmittance values for each type of building fenestration system shall be provided as either part of the code compliance permit drawings/specifications or building energy model documentation or as a separate document to the Green Globes Assessor for review.

When window assembly thermal transmittance values are not available, projects shall use a program such as WINDOW 6.3 that provides heat transfer analysis consistent with *ISO 15099:2003*. This free program can be found here: <http://windows.lbl.gov/software/window/window.html>. Calculations performed by hand or through another third-party software shall ensure that framing and edge-of-glass contributions are included in the overall assembly U-factor.

References

- *ANSI/ASHRAE/IES Standard 90.1-2010*
- *ISO 15099 Standard*
- [WINDOW 6.3](#)

GREEN GLOBES #2.2.1.1

The thermal transmittance (U-factor) of the building's fenestration system is less than or equal to the values in Table 2.2.1?



- Yes (5 points)

- No (0 points)

- N/A

Tooltip

Mark N/A if windows are not part of the SI scope.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0



GREEN GLOBES #2.2.1.2

The Solar Heat Gain Coefficient (SHGC) of the building's fenestration system is less than or equal to the values in Table 2.2.1?

- Yes (5 points)

- No (0 points)

- N/A

Tooltip

Mark N/A if windows are not part of the SI scope.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0

GREEN GLOBES #2.2.2

Have existing windows been sealed to reduce infiltration?

- Yes (5 points)

- No (0 points)

- N/A

Tooltip

The design drawings and specs must show where and how existing windows have been sealed. Mark “N/A” if there are no existing windows designated for the project space, or if the project scope does not include changes to the existing windows.

Assessment Guidance

Specifications from window manufacturers should be sufficient to provide details about whether window assemblies are sealed to prevent moisture and air leakage.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0

GREEN GLOBES #2.2.3

Are the auxiliary (non-central HVAC) systems used for space heating, cooling, or ventilation specified as high efficiency units (e.g. cooling in server rooms)?

- Yes (10 points)

- No (0 points)

- N/A

Tooltip

High efficiency units should meet or exceed a Seasonal Energy Efficiency Ratio (SEER) of 13 or higher (whichever meets local codes or standards), and an Energy Efficiency Ratio (EER) of 11.2 or higher (whichever meets local codes or standards). Mark “N/A” where there are no supplementary heating or cooling units. Efficiencies for tenant-space HVAC systems should be equal to or better than the values listed in *ANSI/ASHRAE/IES Standard 90.1-2010*, Tables 6.81A through 6.81J.

Assessment Guidance

Any HVAC unit or system that can be operated and controlled independently of the building's master or central HVAC systems would qualify under this criterion. Some tenant spaces are designed to be conditioned by separate rooftop units, for example, or by branches of central heat pump or hydronic heating/cooling systems. Split systems can be credited to comply with this criterion if the overall efficiency of the individual units, when coupled with a corresponding high boiler thermal efficiency or chiller kW/ton operation, can be determined to deliver equivalent SEER and EER results.

References

- *ANSI/ASHRAE/IESNA Standard 90.1-2010*

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10
N/A	0	0

Lighting Power Density

40

GREEN GLOBES #2.3.1.1

Is the total installed interior lighting power density (LPD) of the space at or below the lighting power density requirement in Table 2.3.1.1-A Building Area Method or Table 2.3.1.1-B Space-by-Space Method)?

- Yes, Building Area Method (40 points)

- Yes, Space-by-Space Method (40 points)

- No (0 points)

Tooltip

Lighting power density for connected lighting circuits is the energy use (in watts) per square foot for lighting. The values in these tables are adapted directly from *ANSI/ASHRAE/IESNA Standard 90.1-2010* and addendum (Tables 9.5.1 and Table 9.6.1). Provide calculations to the Green Globes Assessor for verification.

Table 2.3.1.1-A: Building Area Method

Building Type	LPD (W/m ²)	LPD (W/ft ²)
Automotive Facility	8.83	0.82
Convention Center	11.63	1.08
Court House	11.30	1.05
Dining: Bar Lounge/Leisure	10.66	0.99
Dining: Cafeteria/Fast Food	9.69	0.90
Dining: Family	9.58	0.89
Dormitory	6.57	0.61
Exercise Center	9.47	0.88
Fire Station	7.64	0.71
Gymnasium	10.76	1.00
Health Care-Clinic	9.36	0.87
Hospital	13.02	1.21
Hotel	10.76	1.00
Library	12.70	1.18
Manufacturing Facility	11.95	1.11
Motel	9.47	0.88
Motion Picture Theater	8.93	0.83
Multi-Family	6.46	0.60
Museum	11.41	1.06
Office	9.69	0.90
Parking Garage	2.69	0.25
Penitentiary	10.44	0.97
Performing Arts Theater	14.96	1.39
Police Station	10.33	0.96
Post Office	9.36	0.87
Religious Building	11.30	1.05
Retail	15.07	1.40
School/University	10.66	0.99
Sports Arena	8.40	0.78
Town Hall	9.90	0.92
Transportation	8.29	0.77
Warehouse	7.10	0.66
Workshop	12.92	1.20

Table 2.3.1.1-B: Space-by-Space Method

Common Space Types	LPD (W/m ²)	LPD (W/ft ²)
Office-Enclosed	11.95	1.11
Office-Open Plan	10.55	0.98
Conference/Meeting/Multipurpose	13.24	1.23
Classroom/Lecture/Training	13.35	1.24
<i>For Penitentiary</i>	14.42	1.34
Lobby	9.69	0.90
<i>For Elevator</i>	6.89	0.64
<i>For Hotel</i>	11.41	1.06
<i>For Performing Arts Theater</i>	21.53	2.00
<i>For Motion Picture Theater</i>	5.60	0.52
Audience/Seating Area - Permanent	8.83	0.82
<i>For Auditorium</i>	8.50	0.79
<i>For Gymnasium</i>	4.63	0.43
<i>For Exercise Center</i>	8.50	0.79
<i>For Convention Center</i>	8.83	0.82
<i>For Penitentiary</i>	4.63	0.43
<i>For Religious Building</i>	16.47	1.53
<i>For Sports Arena</i>	4.63	0.43
<i>For Performing Arts Theater</i>	26.16	2.43
<i>For Motion Picture Theater</i>	12.27	1.14
<i>For Transportation</i>	5.81	0.54
Atrium – First 40 ft. in height	0.32	0.03 per ft.
Atrium – Height above 40 ft.	0.22	0.02 per ft.
Lounge/Recreation	7.86	0.73
Dining Area	7.00	0.65
<i>For Penitentiary</i>	11.52	1.07
<i>For Hotel</i>	8.83	0.82
<i>For Motel</i>	9.47	0.88
<i>For Bar Lounge/Leisure Dining</i>	14.10	1.31
<i>For Family Dining</i>	9.58	0.89
Food Preparation	10.66	0.99
Laboratory for Classrooms	13.78	1.28
Laboratory for Medical/Industrial	19.48	1.81
Restrooms	9.36	0.98
Dressing/ Fitting Room	9.36	0.87
Dressing Room/Performing Arts	4.31	0.40
Locker Room	8.07	0.75
Stairway	7.43	0.69

Storage	6.78	0.63
Electrical/Mechanical	10.23	0.95
Workshop	17.11	1.59

Building Specific Space Types	LPD (W/m ²)	LPD (W/ft ²)
Gymnasium/Exercise Center		
<i>Playing Area</i>	12.92	1.20
<i>Exercise Area</i>	7.75	0.72
Courthouse/Police Station/Penitentiary		
<i>Courtroom</i>	18.51	1.72
<i>Confinement Cells</i>	11.84	1.10
<i>Judges Chambers</i>	12.59	1.17
Fire Stations		
<i>Fire Station Engine Room</i>	6.03	0.56
<i>Sleeping Quarters</i>	2.69	0.25
Post Office – Sorting Area	10.12	0.94
Convention Center – Exhibit Space	15.61	1.45
Library		
<i>Card File and Cataloging</i>	7.75	0.72
<i>Stacks</i>	18.41	1.71
<i>Reading Area</i>	10.01	0.93
Hospital		
<i>Corridor/Transition</i>	9.58	0.89
<i>Emergency</i>	24.33	2.26
<i>Recovery</i>	12.38	1.15
<i>Lounge/Recreation</i>	11.52	1.07
<i>Nurse Station</i>	9.36	0.87
<i>Exam/Treatment</i>	17.87	1.66
<i>Pharmacy</i>	12.27	1.14
<i>Patient Room</i>	6.67	0.62
<i>Operating Room</i>	20.34	1.89
<i>Nursery</i>	9.47	0.88
<i>Medical Supply</i>	13.67	1.27
<i>Physical Therapy</i>	9.80	0.91
<i>Radiology/Imaging</i>	14.21	1.32
<i>Laundry – Washing</i>	6.46	0.60
Automotive – Service/Repair	7.21	0.67
Manufacturing		
<i>Extra High Bay (>50 ft. Floor to Ceiling Height)</i>	11.30	1.05

<i>High Bay (25 - 50 ft. Floor to Ceiling Height)</i>	13.24	1.23
<i>Low Bay (<25 ft. Floor to Ceiling Height)</i>	12.81	1.19
<i>Detailed Manufacturing</i>	13.89	1.29
<i>Equipment Room</i>	10.23	0.95
<i>Corridor/Transition</i>	4.41	0.41
Hotel/Motel Guest Rooms	11.95	1.11
Highway Lodging Guest Rooms	8.07	0.75
Dormitory – Living Quarters	4.09	0.38
Museum		
<i>General Exhibition</i>	11.30	1.05
<i>Restoration</i>	10.98	1.02
Bank/Office – Banking Activity Area	14.85	1.38
Religious Buildings		
<i>Worship Pulpit, Choir</i>	16.47	1.53
<i>Fellowship Hall</i>	6.89	0.64
Retail		
<i>Sales Area</i>	18.08	1.68
<i>Mall Concourse</i>	11.84	1.10
<i>Dressing/Fitting Room</i>	9.36	0.87
Sports Arena		
<i>Ring Sports Arena</i>	28.85	2.68
<i>Court Sports Arena – Class 4</i>	7.75	0.72
<i>Court Sports Arena – Class 3</i>	12.92	1.20
<i>Court Sports Arena – Class 2</i>	20.67	1.92
<i>Court Sports Arena – Class 1</i>	32.40	3.01
Warehouse		
<i>Fine Material Storage</i>	10.23	0.95
<i>Medium/Bulky Material Storage</i>	6.24	0.58
Parking Garage – Garage Area	2.05	0.19
Transportation		
<i>Airport – Concourse</i>	3.88	0.36
<i>Air/Train/Bus – Baggage Area</i>	8.18	0.76
<i>Terminal – Ticket Counter</i>	11.63	1.08

Assessment Guidance

The values in the tables are from *ANSI/ASHRAE/IESNA Standard 90.1-2010* and addendum.

LPD calculations and results shall be provided to the Green Globes Assessor for review. Such calculations are typically included with permit set drawings and specifications.

References

- *ANSI/ASHRAE/IES Standard 90.1-2010*

Scoring Matrix

Response	Score	Max Points
Yes, Building Area Method	40	40
Yes, Space-by-Space Method	40	40
No	0	40

GREEN GLOBES #2.3.2.1

How many light fixtures have time-scheduling devices and/or individual occupant-sensing devices?

- >50% (30 points)
- 30% - 50% (20 points)
- 10% - 29% (10 points)
- <10% (0 points)
- No (0 points)

Tooltip

Time-scheduling devices must control zones no more than 25,000 ft² (2,320 m²) per floor. There must be manual override switching devices that control zones no more than 5,000 ft² (465 m²), and these must allow lighting to stay on for no more than two hours. Individual occupant-sensing devices must control zones no more than 2,500 ft² (232 m²) in spaces smaller than 10,000 ft² (930 m²). For spaces that are larger than 10,000 ft² (930 m²), the control zones must be no greater than 10,000 ft² (930 m²). The occupant-sensing devices should also turn off all lighting in controlled areas within 30 minutes of all occupants leaving the area.

Assessment Guidance

Time scheduling controls can be provided via a centralized system or via a digital fully-addressable system. Centralized controls can be used to automatically turn on, turn off, and/or dim lighting at specific times. Centralized control strategies can also integrate lighting controls with other building systems such as mechanical or security systems. A digital fully-addressable lighting control system can address an individual ballast or groups of ballasts. These systems are local, or integral, to the luminaire itself and are not housed in a central cabinet. The "control wiring" is independent of the "power wiring" and generally

provides the highest degree of flexibility. When space configuration or occupant needs change, the system can respond by reassigning the ballasts accordingly. These lighting systems can be integrated with building automation or energy management system.

For the Green Globes Assessor's review, the project manager can submit the electrical engineer's lighting plans as long as there is sufficient controls information listed or noted on the plan. In lieu of controls information on the drawings, a separate lighting controls plan should be presented that outlines different lighting controls zones and the control strategy used in each.

Scoring Matrix

Response	Score	Max Points
>50%	30	30
30% - 50%	20	30
10% - 29%	10	30
<10%	0	30
No	0	30

GREEN GLOBES #2.3.3.1

How many interior light fixtures have lighting controls that can reduce the total connected lighting load by at least 50% from full lighting using any of the following technologies:

- Dual switching of alternate rows or luminaires?

AND/OR

- Switching of individual lamps independently of adjacent lamps within a luminaire?

AND/OR

- AND/OR Switching of each lamp or luminaire?

AND/OR

- Occupancy sensors within the space?

- >50% (25 points)

- 30% - 50% (20 points)

- 10% - 29% (10 points)

- <10% (0 points)

- No (0 points)

Tooltip

This criterion is based upon total light fixtures that have controls. For example, if a 2,000 sf tenant space on a floor has sensors and lighting fixtures throughout, then 50% of the light fixtures would be controlled by sensors, apportioned by total connected kW load.

Dual switches allow occupants to control one half of the lamps in a luminaire or light fixture independently with a separate switch. A luminaire is defined as the lighting unit consisting of a lamp or lamps, while the lamp is the actual light source.

A luminaire is defined as the lighting unit consisting of a lamp or lamps, while the lamp is the actual light source.

Mark “N/A” for spaces that use less than 0.5 W/ft² (0.1 W/m²). Overall, the total connected lighting load (in kW) would need to be controllable so that the lighting energy across all fixtures can be reduced by at least half.

Assessment Guidance

For the Green Globes Assessor’s review, the project manager can submit the electrical engineer’s lighting plans as long as there is sufficient controls information listed or noted on the plan. If there is insufficient information, then a lighting controls plan should be created that outlines different lighting controls zones and the control strategy used in each. A side-by-side comparison of fixtures at full connected load lighting in an area relative to the same set of fixtures at half-connected load, with corresponding descriptions, would be one way to represent compliance with this criterion.

Scoring Matrix

Response	Score	Max Points
>50%	25	25
30% - 50%	20	25
10% - 29%	10	25
<10%	0	25
No	0	25

Daylighting

30

Controls for Daylighted Zones

30

GREEN GLOBES #2.4.1.1

Do all small daylit areas have automatic photocell lighting controls?

- Yes (15 points)

- No (0 points)

- N/A

Tooltip

"Small daylit area" means 250 - 2,500 ft² (23 -232 m²), and may have automatic controls.

"Automatic lighting photocell controls" includes stepped switching, stepped dimming and/or continuous dimming.

Mark "N/A" where there are no sidelit and/or toplit areas larger than 250 ft² (23 m²).

Assessment Guidance

Product submittals, control schematic and diagram in construction documents, and control sequence description required for verification.

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15
N/A	0	0

GREEN GLOBES #2.4.1.2

Do all large daylit areas have automatic photocell lighting controls?

- Yes (15 points)

- No (0 points)

- N/A

Tooltip

"Large daylit area" means larger than 2,500 ft² (232 m²), and must have automatic controls.

"Automatic lighting photocell controls" includes stepped switching, stepped dimming or continuous dimming.

Mark "N/A" where there are no sidelit and/or toplit areas larger than 250 ft² (23 m²).

Assessment Guidance

Product submittals, control schematic and diagram in construction documents , and control sequence description required for verification.

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15
N/A	0	0

HVAC Systems Controls

35

Automation Systems

15

GREEN GLOBES #2.5.1.1

Is there automation system controllability for energy systems (e.g. programmable thermostats, time clocks, occupancy sensors, etc.)?

- Yes (10 points)
- No (0 points)

Assessment Guidance

For this criterion the space should have independent control and/or monitoring capability for systems that affect energy usage, lighting and thermal comfort. Either single controls per unit or programmable access to a central Building Automation System (BAS) would be sufficient, as long as the master BAS does not override zone programming. Small, constant systems like single toilet exhausts and plug loads need not be controlled by the BAS, though the BAS should carry the necessary fault alarms for building systems.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10

GREEN GLOBES #2.5.1.2

Can the heating, ventilation and air-conditioning serving interior zones be controlled independently of the heating, ventilation and air-conditioning serving adjacent spaces that are not part of the interiors project?

- Yes (5 points)
-

- No (0 points)
-

- N/A

Tooltip

The tenant space either has its own dedicated HVAC systems or the space systems are extensions of a larger building HVAC system. Check “Yes” if there are dedicated HVAC systems controllable by tenants. Or check “Yes” if the heating, cooling, and ventilation loads of the space are served by building HVAC systems, are controlled by the tenants, and the loads of other spaces do not limit the HVAC systems capacities or efficiencies. NOTE: Independent control of HVAC systems, as used for a tenant space, is an eligibility requirement for SI certification.

Assessment Guidance

The purpose of this criterion is to ensure that tenants have direct control over how their space heating, cooling, and ventilation requirements are met. If the building’s central HVAC system serves multiple zones, including tenant spaces, the tenant needs to have independent control over how the central HVAC system serves the tenant space. If adjacent spaces, for example, induce large cooling loads from a server room, or adjacent spaces require over-ventilation of the tenant space because supply air cannot be modified by the SI tenant, then this criterion cannot be met.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0

GREEN GLOBES #2.5.2.1

Are the new hot water heaters tankless instant hot-water heaters or do they meet the efficiency requirements of *ANSI/ASHRAE/IES Standard 90.1-2010*?

- Tankless instant hot-water heaters (10 points)

- Meets ANSI/ASHRAE/IES Standard 90.1-2010 (10 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” if hot water is centralized for the whole building, and the tenant has no control. If the tenant purchases water heating equipment—e.g. for a break room—then either Yes the equipment is tankless and/or complies with *ASHRAE Standard 90.1-2010*, or No the equipment is neither.

Assessment Guidance

This criterion is also considered N/A when the central boilers are used to produce domestic hot water via a heat exchanger.

References

- *ANSI/ASHRAE/IES Standard 90.1-2010*

Scoring Matrix

Response	Score	Max Points
Tankless instant hot-water heaters	10	10
Meets ANSI/ASHRAE/IES Standard 90.1-2010	10	10
No	0	10
N/A	0	0

GREEN GLOBES #2.5.2.2

Are all building gas domestic hot water heaters equipped with intermittent electrical igniters and low NO_x burners?

- Yes (10 points)
-

- No (0 points)
-

- N/A

Tooltip

Mark “N/A” if there are no domestic hot water heaters dedicated to the space.

Assessment Guidance

Natural gas water heaters can have electric ignition instead of a constantly burning pilot light. The electric ignition can be of the intermittent type that will only light the pilot (and then main burners) when the system calls for heat. This saves on auxiliary natural gas usage.

When fossil fuels are burned, nitric oxide and nitrogen dioxide are produced. These pollutants initiate reactions which result in the production of ozone and acid rain. The nitrous oxides (NO_x) come from two sources: high-temperature combustion (thermal NO_x) and nitrogen bound to the fuel (fuel NO_x). For clean-burning fuels like natural gas, fuel NO_x generation is insignificant. Almost all water heater manufacturers offer models with low NO_x or ultra-low NO_x burners.

During Stage I, provide specifications and/or product submittals showing all non-electric domestic water heaters have intermittent electrical igniters and have low-NO_x burners.

This criterion is also considered N/A when the central boilers are used to produce domestic hot water via a heat exchanger.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10
N/A	0	0

Plug Loads

50

Plug Load Inventory

16

GREEN GLOBES #2.6.1.1

Is there an inventory of plug load items and equipment (based on name plate specifications) that is kept current, reviewed and revised as space occupancy and systems change?

- Yes (5 points)
- No (0 points)

Tooltip

Create an editable electronic tabulation of all plug load equipment that is introduced into the space. The file should include nameplate specifications and locations of the equipment, updated at least quarterly and whenever new equipment is introduced or old equipment is replaced.

Assessment Guidance

Since this is a new space, there should be either a new separate inventory or an addition to a current inventory, which is kept current with a formal policy and procedure. Then, verify that the contents of the inventory, and the procedures for maintaining it, are current.

References

- [Advanced Buildings, Plug Load Best Practices Guide for Office](#)

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5

GREEN GLOBES #2.6.1.2

Is there separate metering and monitoring – either real-time continuous or interval metering (down to 15 minute resolution) – that distinguishes between plug loads and major equipment loads and allows occupants to view plug load profiles?

- Yes (6 points)
-
- No (0 points)

Tooltip

For plug load metering to be possible, plug load circuits need to be on separate circuits and the energy draw on these circuits would need to be incorporated in a Building Automation System (BAS) monitoring system or alternate plug load tracking system.

Assessment Guidance

For plug load tracking to work, a building automation system—or alternate system—would need to be programmed to log plug load usage on plug load circuits. Data would have to be collected on regular cycles and reduced or analyzed to show trends and patterns of usage. Documents consisting of metering plans, programming details, analysis methods, and reporting samples would be appropriate to assess this credit.

Scoring Matrix

Response	Score	Max Points
Yes	6	6
No	0	6

GREEN GLOBES #2.6.1.3

Is there a system in place to track plug loads (from metered data) on at least a monthly basis, and which provides feedback to occupants for recommended strategies they can use to limit plug loads over which they have control?

- Yes (5 points)

- No (0 points)

- N/A

Tooltip

Incorporate a data tracking, analysis, and reporting method as part of the space automation system or similar data collection alternative. Mark “N/A” if there is no sub-metering for plug loads.

Assessment Guidance

The development of plug load use data needs to be specific enough to resolve which plug loads, or groups of plug loads, are dominant energy users. The reporting should be simple enough that clear anomalies, trends, and patterns are evident or there is analysis as part of the report to draw reasonable conclusions. The information in the reports should lend itself to corrective action. For example, if one printer is identified as an outlier of high energy use, and the intensity of use (pages printed per month) is not much different than other printers, then the “energy hog” might be earmarked for replacement with a more energy-efficient model when the equipment lease expires.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0

GREEN GLOBES #2.6.2.1

Are there policies in place that limit or prohibit “plug load accumulation” – the introduction or use of personal electrical equipment that increase plug loads (e.g. space heaters, fans, task lamps, coffee makers, charging stations, additional personal computers, etc.)?

- Yes (6 points)

- No (0 points)

Tooltip

Written criteria or restrictions for both the kinds of plug-in equipment allowed and corresponding limitations can be developed and made available to all occupants.

Assessment Guidance

A policy manual or chapter can be developed that identifies acceptable plug-in equipment, criteria or restrictions for use, and remedial measures to remove or replace non-compliant equipment.

Scoring Matrix

Response	Score	Max Points
Yes	6	6
No	0	6

GREEN GLOBES #2.6.2.2

Is there a policy in place that requires all new equipment purchases to be based on energy efficient criteria, such as ENERGY STAR® or other applicable standards?

- Yes (6 points)

- No (0 points)

- N/A

Tooltip

Identify the basis for what kind of plug-in systems and equipment are allowed when purchasing or leasing equipment, whether ENERGY STAR® or other energy-efficient criteria. Mark “N/A” if no future purchases are anticipated, or the kind of purchases anticipated would not lend themselves to ENERGY STAR® or other energy efficient standard.

Assessment Guidance

Verify that the tenant has a purchasing policy requiring specification of energy-efficient equipment.

Scoring Matrix

Response	Score	Max Points
Yes	6	6
No	0	6
N/A	0	0

GREEN GLOBES #2.6.3.1

Are there the following software-based power management control systems that can be programmed to minimize plug loads:

Tooltip

These criteria apply to spaces in which plug-load circuits are separate and plug-load management software and systems can be installed and programmed.

Assessment Guidance

Review the plug-load management strategy and applications that are implemented in the tenant's space. Verify that the strategies are effective in turning off or reducing plug loads and that user over-rides or exempted uses, such as late nights or weekends, do not undo the effective management of plug loads.

GREEN GLOBES #2.6.3.1.1

Power management strategies to control plug loads?



- Yes (7 points)
- No (0 points)
- N/A

Tooltip

Examples include load-sensing plug strips that use a master/slave approach, which can be set so that when turning off computers everything else in the plug strip also turns off; occupancy-sensing plug strips that detect the presence or absence of a user and automatically turn equipment on or off in response; and programmed time-of-use circuits that limit when, and for how long, plug load circuits are energized. Mark "N/A" if such plug load systems cannot be installed in context of the tenant's operations.

Scoring Matrix

Response	Score	Max Points
Yes	7	7
No	0	7
N/A	0	0

GREEN GLOBES #2.6.3.1.2

The power management system has been commissioned and is actively in use?



- Yes (7 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” if such plug load systems cannot be installed in context of the tenant’s operations.

Scoring Matrix

Response	Score	Max Points
Yes	7	7
No	0	7
N/A	0	0

GREEN GLOBES #2.6.3.2

Is there a policy in place for education occupants on how to best manage plug loads to minimize load energy use?

- Yes (8 points)
-
- No (0 points)

Tooltip

Mark “Yes” if you have a policy that gives occupants instructions on what plug-loads are in place, which plug loads are under their control, and what responsibilities they have to affect this control.

Assessment Guidance

This policy can vary broadly depending on the level of data collection, information, analysis, and reporting that applies to plug loads in this tenant space. At minimum, that policy should identify the plug loads, make occupants aware of what information is available and developed for managing the plug loads, and what influence occupants have to modify their behaviors using plug load equipment. Behavior modifications can run the gamut of limiting the kinds of equipment occupants bring in or use, to identifying which parts of the space are the responsibility of which occupants (e.g. IT personnel for computers and printers; admin staff for break room items; lights off switching at the end of the day for all occupants). The key is to make sure that occupants are informed about what are the plug loads in their space – what equipment/systems contribute to these loads; how those loads are used by whom, when; what mechanisms are available for managing the loads (ON/OFF switches or timers; programmable features); and how to access and use information that explains how to reduce or minimize loads, from user manuals or regular load reports, for example.

Scoring Matrix

Response	Score	Max Points
Yes	8	8
No	0	8

GREEN GLOBES #3.1.1

Are any plumbing fixtures and fittings dedicated to the space certified as being compliant with the requirements of the U.S. EPA's WaterSense® program?

Assessment Guidance

Plumbing engineers and architects for the project should specify plumbing fixtures that comply with the WaterSense® program. WaterSense® is a program that partners with the U.S. EPA in hopes to reduce water usage by providing information on water-efficient fixtures, new homes and services. WaterSense® created a certification program that provides third-party validation that plumbing fixtures utilize at least 20% less water than the average peer product without sacrificing performance. Products that go through this certification can display the WaterSense® label.

Currently, not all plumbing products can be certified through WaterSense®. The following items can be found with the label:

- Lavatory faucets and accessories
- Showerheads
- Toilets
- Urinals
- Weather-based irrigation controllers

Designers can verify with their fixture manufacturers which of their products have the label or can check online at http://www.epa.gov/watersense/product_search.html.

Early in the green building timeline, some building engineers were hesitant about using lower flow fixtures, especially toilets. It was feared the performance would not be comparable to its higher flow counterpart and that plumbing drain lines would get clogged more frequently. Unfortunately there was insufficient industry data at the time to prove

performance in existing buildings would not suffer. Finally, a study was conducted by the Plumbing Efficiency Research Coalition and a report released in November 2012. This report concluded that the use of 1.28 gallons per flush (gpf) toilets perform similar to 1.6 gpf when all other factors, including pipe slope, are considered.

Large advances have been made in plumbing fixture design and users can be more confident that the low-flow/high efficiency products on today's market have been tried and tested. However, this is not to say that all products perform alike. Designers should carefully consider which products to use and weigh the anticipated use, ease of maintenance, warranties, and published performance criteria for all fixtures. Once a decision has been made, the required maximum flow and flush rates should be called out for the project on the design drawings (in a plumbing fixture schedule) or in the specifications.

To avoid performance and maintenance problems, it is important to adhere to manufacturer recommendations and guidelines for the installation and operation of lowflow fixtures and connected plumbing components. When specifying lower flow fixtures, there are some recommended design tips that should be considered to ensure the plumbing drainage system is easy to maintain and kept clear of blockages. For example, drain lines for low flow toilets should be sloped at 2% (standard is 1%). Also, toilets should be placed at the end of the drain line, with low flow urinals and lavatory faucets placed closer to the riser.

Waterless urinals are available for even greater water savings but some authorities having jurisdiction do not allow their use and they should only be used in applications where the special trap fluid will be adequately maintained.

Public lavatory faucets should be kept to 0.5 gallons per minute or less and metering faucets with a flow rate of less than 0.25 gallons per 10 second cycle.

For the review, the Green Globes Assessor will be looking for published fixture flush and flow rates for all plumbing fixtures utilized in the design. The assessor will also verify that these fixtures were installed during construction.

References

- [*The Green Spotlight - Switch to High-Efficiency Plumbing Fixtures to Save Water, Energy, and Money, August 25, 2010*](#)
- [*U.S. Environmental Protection Agency \(EPA\) - WaterSense Program*](#)



GREEN GLOBES #3.1.1.1

Toilets (maximum effective flush volume 1.28 gallons)?

- Yes (18 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no toilets dedicated to the project space and/or they are centralized and not under control of the tenants.

Scoring Matrix

Response	Score	Max Points
Yes	18	18
No	0	18
N/A	0	0



GREEN GLOBES #3.1.1.2

Urinals that achieve one of the following:

- Use no water?

OR

- Maximum effective flush volume of 1 pint?

OR

- Maximum effective flush volume of 0.5 gallons?

- No water *(18 points)*
-

- Max flush $\leq$ 1 pint *(16 points)*
-

- Max flush $\leq$ 0.5 gallons *(14 points)*
-

- No *(0 points)*
-

- N/A

Tooltip

Mark “N/A” where there are no urinals dedicated to the project space and/or they are centralized and not under control of the tenants.

Scoring Matrix

Response	Score	Max Points
No water	18	18
Max flush $\leq$ 1 pint	16	18
Max flush $\leq$ 0.5 gallons	14	18
No	0	18
N/A	0	0

GREEN GLOBES #3.1.1.3

Showerheads (maximum effective flow rate 2.0 gallons per minute)?

- Yes (10 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no showerheads dedicated to the project space and/or they are centralized and not under control of the tenants.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10
N/A	0	0

GREEN GLOBES #3.1.1.4

Non-residential lavatory faucets (maximum flow rate 0.5 gallons per minute)?

- Yes (8 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no non-residential dedicated to the project space and/or they are centralized and not under control of the tenants.

Scoring Matrix

Response	Score	Max Points
Yes	8	8
No	0	8
N/A	0	0

Residential & Commercial Food Service Fixtures & Equipment

20

Residential & Commercial Food Service Fixtures & Equipment 20

GREEN GLOBES #3.2

Green Globes provides two paths for assessing either residential plumbing fixtures or commercial food service equipment (as applicable):

- **Path A:** Residential Plumbing Fixtures – up to 20 points
- **Path B:** Commercial Food Service Equipment – up to 20 points

Points cannot be combined between paths. Please review and select the appropriate pathway for the project. Select N/A if neither path applies.

- Path A (up to 20 points)

- Path B (up to 20 points)

- N/A

Scoring Matrix

Response	Score	Max Points
Path A (up to 20 points)	0	0
Path B (up to 20 points)	0	0
N/A	0	0

↔ Criterion only visible if 3.2 is answered with "Path A (up to 20 points)"

GREEN GLOBES #3.2.1.1

Do residential lavatory faucets conform to WaterSense®?

- Yes (5 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no lavatory faucets dedicated to the project space and/or they are centralized and not under control of the tenants.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0

↔ Criterion only visible if 3.2 is answered with "Path A (up to 20 points)"

GREEN GLOBES #3.2.1.2

Do residential kitchen faucets conform to WaterSense®?

- Yes (8 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no residential kitchen faucets dedicated to the project space and/or they are centralized and not under control of the tenants.

Assessment Guidance

Plumbing engineers and architects for the project should specify plumbing fixtures that comply with the WaterSense® program. WaterSense® is a program that partners with the U.S. EPA in hopes to reduce water usage by providing information on water-efficient fixtures, new homes and services. WaterSense® created a certification program that provides third-party validation that plumbing fixtures utilize at least 20% less water than the average peer product without sacrificing performance. Products that go through this certification can display the WaterSense® label.

Currently, not all plumbing products can be certified through WaterSense®. The following items can be found with the label:

- Lavatory faucets and accessories
- Showerheads
- Toilets
- Urinals
- Weather-based irrigation controllers

Designers can verify with their fixture manufacturers which of their products have the label or can check online at http://www.epa.gov/watersense/product_search.html.

Early in the green building timeline, some building engineers were hesitant about using lower flow fixtures, especially toilets. It was feared the performance would not be comparable to its higher flow counterpart and that plumbing drain lines would get clogged more frequently. Unfortunately there was not sufficient industry data at the time to prove performance in existing buildings would not suffer. Finally, a study was conducted by the Plumbing Efficiency Research Coalition and a report released in November 2012. This report concluded that the use of 1.28 gallons per flush (gpf) toilets perform similar to 1.6 gpf when all other factors, including pipe slope, are considered.

Large advances have been made in plumbing fixture design and users can be more confident that the low-flow/high efficiency products on today’s market have been tried and tested. However, this is not to say that all products perform alike. Designers should carefully consider which products to use and weigh the anticipated use, ease of maintenance, warranties, and published performance criteria for all fixtures. Once a

decision has been made, the required maximum flow and flush rates should be called out for the project on the design drawings (in a plumbing fixture schedule) or in the specifications.

When specifying lower flow fixtures, there are some recommended design tips that should be considered to ensure the plumbing drainage system is easy to maintain and kept clear of blockages. First, drain lines for low flow toilets should be sloped at 2% (standard is 1%). Second, toilets should be placed at the end of the drain line, with low flow urinals and lavatory faucets placed closer to the riser.

Waterless urinals are available for even greater water savings but some authorities having jurisdiction do not allow their use and they should only be used in applications where the special trap fluid will be adequately maintained.

Public lavatory faucets should be kept to 0.5 gallons per minute or less and metering faucets with a flow rate of less than 0.25 gallons per 10 second cycle.

For the review, the Green Globes Assessor will be looking for published fixture flush and flow rates for all plumbing fixtures utilized in the design. The assessor will also verify that these fixtures were installed during Stage II with spot checking.

Scoring Matrix

Response	Score	Max Points
Yes	8	8
No	0	8
N/A	0	0

↔ Criterion only visible if 3.2 is answered with "Path A (up to 20 points)"

GREEN GLOBES #3.2.1.3

Do residential clothes washers have an ENERGY STAR® label and a maximum water factor of 6.0 gal/ft³ (23 L/m³) per full cycle?

- Yes (3 points)
- No (0 points)
- N/A

Tooltip

Mark “N/A” where there are no clothes washers dedicated to the project space and/or they are centralized and not under control of the tenants.

Assessment Guidance

The Green Globes Assessor will be looking for published water use rates and ENERGY STAR® labeling for all clothes washers in the design.

Scoring Matrix

Response	Score	Max Points
Yes	3	3
No	0	3
N/A	0	0



Criterion only visible if 3.2 is answered with "Path A (up to 20 points)"

GREEN GLOBES #3.2.1.4

Are residential dishwashers have an ENERGY STAR® label and a maximum water factor of 5.8 gal/ft³ (22 L/m³) per full cycle?

- Yes (4 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no dishwashers dedicated to the project space and/or they are centralized and not under control of the tenants.

Assessment Guidance

The Green Globes Assessor will be looking for published water use rates and ENERGY STAR® labeling for all residential dishwashers in the design.

Scoring Matrix

Response	Score	Max Points
Yes	4	4
No	0	4
N/A	0	0

↩ Criterion only visible if 3.2 is answered with "Path B (up to 20 points)"

GREEN GLOBES #3.2.2.1

Do food services avoid water intensive equipment by having no water-fed garbage disposal?

- Yes (5 points)
- No (0 points)
- N/A

Tooltip

Mark “N/A” where there are no garbage disposals.

Assessment Guidance

A number of food service establishments are eliminating water-fed garbage disposals in favor of more thorough scraping into garbage cans and the use of “scrapper baskets” or strainers to collect food and scraps for solid waste disposal.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0



Criterion only visible if 3.2 is answered with "Path B (up to 20 points)"

GREEN GLOBES #3.2.2.2

Do the following appliances meet the prescribed limits for water usage:

Assessment Guidance

Standard combination ovens and steamers can use up to 40 gallons of water per hour regardless of whether the oven is being used or not. Much of this water goes straight down the drain. Boilerless combination ovens can deliver the same quality as standard models but use a fraction of the water.

Commercial kitchen pre-rinse spray valves should be specified to use 1.5 gpm or less and meet *ASTM F2323-03*. Pre-rinse spray valves should also be chosen that can be easily taken apart and cleaned. This will increase operational life and ease of maintenance.

Commercial dishwashers are very different than residential models. Their run times are around 1 to 3 minutes and one machine can handle hundreds of loads per day, so even a small decrease in water usage per load results in substantial savings. ENERGY STAR® labeled dishwasher requirements vary by machine type, and they have high and low temperature efficiency requirements. The label covers conveyor machines and stationary rack machines.

↔ Criterion only visible if 3.2 is answered with "Path B (up to 20 points)"

GREEN GLOBES #3.2.2.1

Combination ovens or steamers consume 2 gal/hr. (7.6 L/hr.) or less?



- Yes (3 points)

- No (0 points)

- N/A

Tooltip

Mark "N/A" where there are no combination ovens.

Scoring Matrix

Response	Score	Max Points
Yes	3	3
No	0	3
N/A	0	0

↔ Criterion only visible if 3.2 is answered with "Path B (up to 20 points)"

GREEN GLOBES #3.2.2.2

Pre-rinse spray valves for dish-rinsing consume 1.5 gal/min (5.7 L/min) or less?



- Yes (8 points)

- No (0 points)

- N/A

Tooltip

Mark "N/A" where there is no pre-rinsing.

Scoring Matrix

Response	Score	Max Points
Yes	8	8
No	0	8
N/A	0	0



↔ Criterion only visible if 3.2 is answered with "Path B (up to 20 points)"

GREEN GLOBES #3.2.2.2.3

Dishwashers consume 1.5 gal/rack/cycle (6 L/cycle) or less?

- Yes (4 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no dishwashers.

Scoring Matrix

Response	Score	Max Points
Yes	4	4
No	0	4
N/A	0	0

GREEN GLOBES #3.3.1.1

Are steam sterilizers equipped with the following:

GREEN GLOBES #3.3.1.1.1

Mechanical vacuum systems?



- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Where volume of equipment needing to be sterilized is high or where equipment needs to be sterilized quickly, a vacuum can be used to draw on the chamber, allowing better contact with the steam. Mark “N/A” where there are no sterilizers.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0



GREEN GLOBES #3.3.1.2

Water tempering devices that only allow water to flow when the discharge of condensate or hot water from the sterilizer exceeds 140°F (60°C)?

- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Sterilizers need cold water to cool the hot condensate created during sterilization before it can be sent down the drain. A condensate tempering system monitors the temperature of the draining water temperature and applies cold water only when needed (e.g. when the water from the sterilizer is hotter than 60°C (140°F)). Mark “N/A” where there are no sterilizers.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #3.3.1.2

Does laboratory or medical equipment use non-potable water for once-through cooling?

- Yes (2 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there is no laboratory or medical equipment.

Assessment Guidance

Closed loop chillers for medical and laboratory equipment dramatically reduce the water consumption by reusing treated water and eliminating a direct feed connection to the potable water supply. Alternatively, air cooled specialty equipment has certain applications to medical and dental equipment, which also avoids direct connection to the potable water supply. For verification, the Green Globes Assessor may need to see equipment specifications if the equipment cannot be visually inspected.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #3.3.1.3

Are dry vacuum systems specified for all medical/dental purposes?

- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Examples of dry vacuum systems include suction devices used by dentists and surgeons to remove body fluids, and large surgical-unit vacuum pumps that remove gases used for anesthesia. Mark “N/A” where there will be no medical/dental vacuum systems.

Assessment Guidance

Dry vacuum systems eliminate the need for continuous supply of water from the potable water system. For verification, the Green Globes Assessor may need to see equipment specifications if the equipment cannot be visually inspected.

References

- [Arizona Municipal Water Users Association, Building Water Efficiency - Vacuum Systems](#)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #3.3.1.4

Do X-rays, MRIs, CT scans, and other imaging equipment employ digital technologies?

AND/OR

Do large X-ray film systems (capable of processing X-ray films of more than 5.9 (150 mm) in length or width) employ recycling technology to reduce water waste?

- Yes (2 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there will be no imaging systems or where film imaging will be required or where films will be less than 5.0 in. (150 mm) in length or width.

Assessment Guidance

Digital technologies as applied to medical imaging equipment eliminate the photographic development process, which consumes potable water as well as generates hazardous chemical waste. For verification, the Green Globes Assessor may need to see equipment specifications if the equipment cannot be visually inspected.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #3.3.2.1

Do coin or card-operated laundromat machines meet the prescribed water factor (WF) performance as follows (if applicable):

- Single-load, soft- or hard-mounted laundromat washing machines with a WF of 8 gal/ft³ or less?

AND/OR

- Multi-load washing machines with a WF of 9.5 gal/ft³ or less?

- Yes (2 points)
-

- No (0 points)
-

- N/A

Tooltip

“Water Factor (WF)” means volume of water per unit of capacity of the washing machine (in gal/ft³ or L/m³) for a full cycle. “Soft-mount” means not bolted to the floor. “Hard-mount” means bolted to the floor. “Single load” means up to 22 lbs. (10 kg). “Multi-load washing machine” means a washer that can take over 22 lbs. (10 kg) per load. Mark “N/A” where there are no coin- and card-operated machines.

Assessment Guidance

If the WF value is not displayed on the affixed nameplate, or is not assessable, provide the relevant manufacturer’s documentation.

References

- [ENERGY STAR- What are “Modified Energy Factor” and “Water Factor” on ENERGY STAR qualified clothes washers list?](#)

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #3.3.2.2

If an institutional/industrial laundry, are there the following types of washing machines:

- Tunnel washing machine that is programmable to use a specific amount of water depending on the soiling of the material to be washed?
- That has a water consumption of 0.96 gal/lb. (8 L/kg); or less than 1.44 gal/lb. (12 L/kg)?
- That has a water recycling system?

• Yes (2 points)

• No (0 points)

• N/A

Tooltip

Prescribed efficiency is 8 L/kg (0.96 gal/lb.) (preferred) or less than 12 L/kg (1.44 gal/lb.) (acceptable). Mark “N/A” where there is no institutional or industrial laundry or where volumes are not sufficient - e.g. approximately 363 lbs. (800 kg) per hour.

Assessment Guidance

Verification by the Green Globes Assessor for institutional/industrial washers is best accomplished by having the manufacturer’s technical documentation available.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #3.3.3.1

Do special water features (e.g. swimming pools, spas, ornamental fountains, water playscapes, etc.) filter and re-circulate water for reuse within the system?

- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no special water features.

Assessment Guidance

These systems, depending on the type, usually have some level of built-in water recycling. Since many of these are customer designed, as-built record drawings and specifications as well as manufacturer’s technical literature may be required for verification by the Green Globes Assessor.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #3.3.3.2

Do special water features use alternate sources of water for make-up water?

- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no special water features, or where alternate sources of water would be unsuitable.

Assessment Guidance

The most common alternative sources of water include rainwater, gray water, and in some cases irrigation water, treated as necessary.

References

- [*Extension America's Research-based Learning Network - Water Features, Conserving Water*](#)

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #3.3.4.1

Is there sub-metering for all water-intensive indoor applications such as commercial kitchens, commercial laundry, labs, pools, spas, etc.?

- Yes (3 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no water-intensive applications.

Assessment Guidance

Where sub-meters are installed, they should either report automatically to a Meter Data Management System, or a schedule should be implemented to have a responsible party record the meter values on a regular basis. A “responsible party” can be the building engineer(s), owner’s representative, or the tenant.

Scoring Matrix

Response	Score	Max Points
Yes	3	3
No	0	3
N/A	0	0

Interior Fit-Outs (including Finishes and Furnishings)60

Interior Fit-Outs (including Finishes and Furnishings)

60

GREEN GLOBES #4.1

Green Globes provides two paths for assessing Interior Fit-outs (including finishes and furnishings):

- Path A: Performance Path for Interior Fit-outs – up to 60 points

OR

- Path B: Prescriptive Path for Interior Fit-outs – up to 50 (out of 60) points

Points cannot be combined between paths for 4.1 Interior Fit-outs (including Finishes and Furnishings). Please review and select answers from one of the two paths as appropriate for your project.

- Path A: Performance Path for Interior Fit-outs

- Path B: Prescriptive Path for Interior Fit-outs

Scoring Matrix

Response	Score	Max Points
Path A: Performance Path for Interior Fit-outs	0	0
Path B: Prescriptive Path for Interior Fit-outs	0	0



Criterion only visible if 4.1 is answered with "Path A: Performance Path for Interior Fit-outs"

GREEN GLOBES #4.1.1.1

Was life cycle assessment and relative comparison of a minimum of two alternative interior fit-outs (including finishes and furnishings) performed during design, which resulted in the selection of an interior fit-out that has the least anticipated environmental impact based upon comparable applications?

- Yes (60 points)
-

- No (0 points)

Tooltip

The interior fit-out with the least anticipated environmental impact of the two alternative comparable interior fit-outs must be implemented for potentially receiving full credit. Third-party peer reviewed life cycle assessment must conform to *ISO 14040:2006* and *ISO 14044:2006*.

Assessment Guidance

At least two alternative interior fit-outs for the interior space should be evaluated using an LCA tool. A small narrative should accompany the LCA results to demonstrate to the Green Globes Assessor what type of fit-outs were chosen and when this evaluation took place. The intent of this criterion is for this LCA comparison to occur prior to the Construction Document Phase.

The assessor may also request comparisons of alternative interior fit-outs as well as an outline and description of LCA methodology and any software tools utilized.

Supporting Documentation:

- Submittal package including software files for the proposed and referenced buildings, or a signed statement from a qualified professional affirming compliance to the assessment guidance for 4.1.1.1
- Report asserting compliance to the building interior fit-out with the least anticipated environmental impact, including performance targets
- Description of the interior fit-outs, and identification of the time period used
- Bill of materials for all interior fit-outs
- Assumptions and material substitutions, if appropriate

- LCA results for all interior fit-outs by life cycle phase
- Report with narrative on the LCA process during design

References

- *ISO 14040:2006 Environmental Management – Life Cycle Assessment – Principles and Framework*
- *ISO 14044:2006: Environmental Management – Life Cycle Assessment – Requirements and Guidelines*
- [*ASHRAE Indoor Air Quality Guide: Best Practices for Design, Construction, and Commissioning*](#)

Scoring Matrix

Response	Score	Max Points
Yes	60	60
No	0	60



Criterion only visible if 4.1 is answered with "Path B: Prescriptive Path for Interior Fit-outs"

GREEN GLOBES #4.1.2.1

Based upon the appropriate application and specification of comparable products, what percentage of the interior fit-out materials and products (including finishes and furnishings) selected (based upon cost) have:

- Environmental Product Declarations (EPDs) that utilize Program Operator verified EPD, conform to ISO standards, and minimally include cradle-to-gate scope:
 - Industry Wide (Generic) EPD: Products specified for the interior fit-out shall include Type III Environmental Product Declaration (EPD)?

AND/OR

- Brand Specific EPD: Products specified for the interior fit-out shall include Type III Environmental Product Declaration (EPD), where the EPDs are manufacturer specific products?

AND/OR

- Third-party certifications that are based upon a multiple attribute standard(s) developed by a consensus based process from an approved standards development organization? Examples include NSF sustainability assessment standards, UL Environment sustainability standards, Sustainable Minds Transparency Report™ Framework, and other consensus based assessment standards that are multiple attribute-based.

AND/OR

- Third-party verified product life cycle assessment based upon *ISO 14040:2006* and *ISO 14044:2006* and minimally covers cradle-to-gate scope?

AND/OR

- Third-party sustainable forestry certifications?

- >39% (50 points)
-

- 25% - 39% (35 points)
-

- 10% - 24% (20 points)
-

- 1% - 9% (0 points)
-

Tooltip

A minimum of 10% by cost (EPDs, third-party certifications, and/or product life cycle assessments) is necessary to be awarded points.

A “Program Operator” is required to have published General Program Instructions that cover the basic process and procedures for the development of Product Category Rules (PCRs) and EPDs within its program. The Program Operator ensures that the key steps in creating an EPD are followed in accordance with ISO standards. “Cradle-to-gate” considers reuse and recyclability of materials resulting from deconstruction, rather than only waste to be disposed. See the ICC Evaluation Service website for further definition, <http://www.icc-es.org/ep/epd-index.shtml>.

“Brand Specific” is specific to a product family.

EPDs must conform to *ISO 14040:2006*, *ISO 14044:2006*, *ISO 14025:2006*, and *ISO 21930:2007* or *BS EN 15804:2012 + Amendment 1:2013* (which Provides core product category rules – PCR’s – for Type III Environmental Product Declarations – EPD’s – for any construction product and construction service). “Product Specific” is manufacturer specific for a product family.

Examples of third-party sustainable forestry certifications include American Tree Farm System (ATFS), Forest Stewardship Council Standard (FSC), and the Sustainable Forestry Initiative Standard (SFIS), amongst others.

Assessment Guidance

Path B allows a maximum of 50 points (out of 60 total possible points for Interior Fit-outs). The final percentage for awarding points is tabulated by summing the total cost of each item, and apportioning the percent of each item’s cost relative to the aggregated cost for each item listed for Path B: Prescriptive Path for Interior Fit-outs.

Example: If a building project compared and specified 5% of the cost of their products, which include Environmental Product Declarations (either Industry Wide or Product Specific) for the interior fit-outs, they would have 5% of the requirement completed. Then, if the project had 5% that had multiple attribute standards, 5% third-party reviewed product life cycle assessments, and another 5% with sustainable forestry certifications, the project’s interior fit-out products would have a total of 20%, translating to a total of 20 points for Path

B: Prescriptive Path for Interior Fit-outs. Note that some products may fall into more than one category. If this is the case, then the product may be counted for more than one category.

Environmental Product Declarations (Type III eco-labels, known as EPDs) are verified documents that report environmental data of products based on life cycle assessment (LCA) and other relevant information in accordance with the international ISO 14025:2006 (Type III eco-labels, known as EPDs). EPDs include quantified environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function. Type III EPDs are completed in accordance with standard Product Category Rules (PCR) to ensure that EPDs of products produced by different organizations for the same functional use category use the same metrics. The goal is for design professionals and specifiers to use EPDs to evaluate and utilize them to compare different products for the same application. EPDs stand apart from Type I and Type II eco-labels for their transparency, for the underlying rigor due to PCRs and ISO LCA standards, and because they are always based on LCA.

If utilizing EPD criteria, the design professional or specifier must provide documentation that compares product selections based upon application; utilizing EPDs as the basis for comparison. There are two EPD options:

1. Industry Wide (Generic) EPDs that are for an entire industry; for example, North American softwood lumber; and
2. Manufacturer Specific EPDs that are for brand-name products; for example, Weyerhaeuser 2x4s from a specific mill.

A minimum of 10% or more of the interior fit-out materials and products (including finishes and furnishings) have to comply with Industry-wide or Manufacturer Specific EPDs to be eligible for points. Percentage for this criterion is based on product cost.

The project can also provide third-party certifications from the examples listed below for 10% or more of the interior fit-out materials and products (including finishes and furnishings) to be eligible for points.

Additionally, the project can provide LCA documentation that does not fall under the methods described above for 10% or more of the interior fit-out materials and products (including finishes and furnishings) to be eligible for points. Documentation must be shown to comply with ISO 14040:2006 and ISO 14044:2006 and minimally covers cradle-to-gate

scope. Cradle to gate is an assessment of a partial product life cycle from cradle (resource extraction) to the factory gate (before it is transported to the consumer). The use phase and disposal phase of the product may be omitted.

The fourth sub-criterion is for 10% more of the interior fit-out materials and products by cost (including finishes and furnishings) to meet sustainable forestry certifications to be eligible for points.

Note that the four approaches for evaluating products used in an interior fit-out listed above are not mutually exclusive. The percentages may be a combination of EPDs, multiple attribute certifications and verifications, individual product life cycle assessments, and sustainable forestry certifications; all utilized to compare products and their impacts to the environment.

EPD Sources:

EPDs are available from relevant manufacturers and industry associations, some green product directories, and from EPD program operators such as UL Environment, NSF International, and ASTM International.

References (ISO Standards):

- *ISO 14040:2006 Environmental Management-Life cycle Assessment-Principles and Framework*
- *ISO 14044:2006 Environmental Management- Life Cycle Assessment-Requirements and Guidelines*
- *ISO 14025:2006 Environmental labels and declarations-Type III environmental declarations-Principles and procedures*
- *ISO 21930:2007 Sustainability in Building Construction-Environmental Declaration of Building Products*
- *BS EN 15804:2012 + Amendment 1:2013 Sustainability of construction works-Environmental product declarations*

References (Third-party Certification):

- *NSF/ANSI 140: Sustainability Assessment for Carpet*
- *NSF/ANSI 332: Sustainability Assessment for Resilient Flooring*
- *NSF/ANSI 342 Sustainability Assessment for Wallcovering Products*

- *NSF/ANSI 336 Sustainability Assessment for Commercial Furnishings Fabric*
- *Sustainable Minds (SM) Transparency Report™ Program*
- *ANSI/NSC 373 Sustainable Production of Natural Dimension Stone*
- *ANSI/BIFMA e3-2014e: Furniture Sustainability Standard*
- *ANSI A138.1 Green Squared-American National Standard Specifications for Sustainable Ceramic Tiles, Glass Tiles, and Tile Installation Materials.*
- *UL 100: Standard for Sustainability for Gypsum Boards and Panels*
- *UL 102: Standard for sustainability for Swinging Door Leafs*
- *UL (STP) 106: Sustainability for Luminaires*
- *UL (STP) 115: Thermal Insulation*

References (Sustainable Forestry Certification):

- *American Tree Farm System® (ATFS): 2010-2015 Standards of Sustainability*
- *CAN/CSA-Z809-08 (R2013)- Sustainable Forest Management*
- *FSC-STD-40-004 V2-1 EN: Forest Stewardship Council Standard for Chain of Custody Certification*
- *Sustainable Forestry Initiative Program (SFI)*
- *Other third-party certification programs recognized by the Programme for Endorsement of Forest Certification (PEFC) - Technical Documentation* <http://www.pefc.org/resources/technical-documentation>

Recommended Documents

- *Product comparison documentation*
- *EPD documentation*
- *Third-party certification documentation*
- *LCA documentation*
- *Sustainable forestry certification documentation*

Scoring Matrix

Response	Score	Max Points
>39%	50	60
25% - 39%	35	60
10% - 24%	20	60
1% - 9%	0	60
No	0	60

Minimized Use of Interior Materials

10

Minimized Use of Interior Materials

10

GREEN GLOBES #4.2.1

Are furnishings used that can be converted to serve multiple functions (e.g. seating that can also be used for sleeping)?

- Yes (10 points)

- No (0 points)

- N/A

Tooltip

Examples of furnishings that can be converted to serve multiple functions include tables that can be used for conferencing as well as training, Murphy beds or convertible sleeping furniture that allows for a space to be used for multiple functions, and height adjustable and/or adaptable surfaces that allow for both wheelchairs and chairs to be used at the same location.

Recommended Documents

- Furniture space plan documentation
- Keyed furniture plan
- Furniture schedule
- Casework documentation
- Furniture and casework specifications

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10
N/A	0	0

↔ Criterion only visible if 4.2.1 is answered with "Yes"

GREEN GLOBES #4.2.1.1

Describe any such furnishings:

Tooltip

This criterion is informational only and is not scored. Points for furnishings used to serve multiple functions are awarded under criterion 4.2.1.

Deconstruction, Disassembly, and Reassembly

60

GREEN GLOBES #4.3.1

Does the interior fit-out design facilitate future deconstruction, demounting and disassembly, and re-configuration by utilizing the following:

Tooltip

Flexible design involves designing a space around products that can be disassembled and reassembled for easier maintenance, repair, recovery, reuse of components/materials, and reconfiguration of components/materials without substantial damage to the materials or their surroundings. Benefits include less waste, on-site dust, and easier on-site storage. Provide examples of furniture systems and demountable and reconfigurable casework partitions that are easily disassembled and/or reassembled to the Green Globes Assessor for verification.

Assessment Guidance

Some examples of ways to design for disassembly and reassembly include:

- Coordinate with Architect regarding detailing materials and fastening systems to facilitate interior fit-out disassembly.
 - To ease future disassembly, use bolt and nut fasteners before screws, screws before nails, nails before strippable adhesives, and strippable adhesives before permanent glues, such as contact cement or epoxy. Use standard fasteners easily found to accommodate future disassembly: trim, for example, can be used to hide fasteners for a cleaner look.
- Check for standard sized construction materials and minimal use of adhesives, to promote reuse.
- Interior fit-out systems should use mechanical connections in lieu of chemical, where possible.
- Utilize modular components and systems where possible.
- In commercial applications, consider demountable partition systems that can be moved as interior uses change.
- Minimize the number of different types of components.

- Provide permanent identification for each component as part of as-built documentation.

The following are examples of proprietary companies that provide products conforming to 4.3.1.1, 4.3.1.2 and 4.3.1.3. This is not an all-inclusive list, but is provided as illustration only, with no performance criteria or endorsement provided by Green Globes.

- 4.3.1.1 Modular furniture systems: Steelcase, Haworth, Herman Miller, Teknion, Allsteel, Krug
- 4.3.1.2 Modular casework systems: Midmark, Herman Miller, Nurture, Neocase, Amcase
- 4.3.1.3 Interior demountable partitions: DIRT, KI, Steelcase, Avanti Systems

References

- *CSA Z782-06: Guideline for Design for Disassembly and Adaptability in Buildings*
- *ASTM E1692-95 Standard Classification for Serviceability of an Office Facility for Change and Churn by Occupants*

GREEN GLOBES #4.3.1.1

Modular furniture systems?

- Yes (15 points)
- No (0 points)
- N/A

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15
N/A	0	0

GREEN GLOBES #4.3.1.2

Modular casework solutions?



- Yes (15 points)

- No (0 points)

- N/A

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15
N/A	0	0

GREEN GLOBES #4.3.1.3

Interior demountable partitions?



- Yes (15 points)

- No (0 points)

- N/A

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15
N/A	0	0

GREEN GLOBES #4.3.2

Are assemblies constructed to be erected by easily removable and reusable fastening methods?

- Yes (15 points)
-
- No (0 points)

Tooltip

Assemblies of furniture, casework, demountable partitions, or other adaptive assemblies shall use fastening methods that are easy to utilize with simple tools (i.e. an allen wrench, screw driver, etc.). Some fasteners require no tools, but use a movement that allows a component to slide and then be removed from the overall assembly (i.e. replaceable chair caps or arm components).

Recommended Documents

- *Furniture space plan documentation*
- *Keyed furniture plan*
- *Furniture schedule*
- *Casework documentation*
- *Furniture and casework specifications*

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15

Construction & Operational Waste

80

GREEN GLOBES #4.4.1.1

What percentage of the construction waste, including interior building demolition waste, will be diverted from the landfill?

- >74% (20 points)
- 50% - 74% (15 points)
- <50% (0 points)
- N/A

Tooltip

When calculating percentage of construction waste, be consistent with units used – either by weight or by volume. Develop a waste management/reduction plan and strategy, which should include a waste audit and waste diversion strategy report. In retrofit situations, check that there is an asbestos removal plan; a procedure to minimize the risk of exposure to lead-based paint; instructions for a waste audit; a dismantling and source separation plan; a list of construction materials that are to be source-separated on-site for reuse and recycling; addresses universal waste (i.e. fluorescent tubes, ballasts, batteries, etc.); and a contractual means of ensuring that all recyclable materials and equipment are diverted from landfill. Estimates of waste diversion will be verified by the Green Globes Assessor. Mark N/A if there will be no construction waste or there is clearly no material that can be repurposed or diverted from a landfill.

Assessment Guidance

Construction recycling requirements should be discussed with the General Contractor before start of work. Licensed haulers of recyclables should be identified and what materials they will or will not accept. The owner should make the contractor and hauler aware that demolition waste should be tracked separately from construction waste and that

the demolition waste should be separated into hazardous and non-hazardous materials. Salvaged materials, intended to be used on this project site or another, shall be kept separate from the recyclables for the hauler.

Hazardous waste by-products of construction include paints, solvents, oils, lubricants, etc. A separate procedure should be developed for disposing and recycling of these wastes. The procedure should conform to all federal, state, and local regulations.

References

- [*Northeast Recycling Council, Hauler Terms and Waste Conversion Factors*](#)

Scoring Matrix

Response	Score	Max Points
>74%	20	20
50% - 74%	15	20
<50%	0	20
N/A	0	0

GREEN GLOBES #4.4.1.2

Does the building design address operations-related recycling programs through one or more of the following:

Tooltip

Storage areas must include collection of mixed paper, corrugated cardboard, glass, plastics, and metals. There should be at least 20 ft² (1.86 m²) of designated storage space for recyclables per 10,000 ft² (929 m²) of space, or 100 ft² (9 m²) for buildings greater than 50,000 ft² (4,645 m²). It is preferable to locate storage areas near a loading dock, when applicable. There should also be adequate space for the temporary sorting and storage of recyclables at collection points near the sources of waste - either in each office or on each floor. Chutes may also be used to separate materials. Review the construction documents for details of a recycling system and facilities for handling and storing recyclables.

Assessment Guidance

A Waste Minimization Plan should be developed and should include waste minimization measures through requirements in the following areas:

- Zoning permits
- Conditions, Covenants and Restrictions (deed restrictions) (CC&Rs)
- Lease agreements

When the construction documents do not specifically call out recycling or composting areas, a narrative should be provided to the Green Globes Assessor explaining the facilities proposed recycling and composting program.

GREEN GLOBES #4.4.1.2.1

Operational flow for waste handling and storage facilities for recycling?



- Yes (15 points)
- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15

GREEN GLOBES #4.4.1.2.2

Storage areas for recyclable waste at points of service?



- Yes (15 points)
- No (0 points)

Tooltip

All gaps and cracks should be sealed within designated storage areas for recyclable waste protect against pests.

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15

GREEN GLOBES #4.4.1.2.3

Storage areas for recyclable waste at pick-up areas?



- Yes (15 points)

- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15

GREEN GLOBES #4.4.1.2.4

Operational flow for handling and storage facilities for composting?



- Yes (10 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” for buildings that do not have compostable organic waste, and/or have no grounds except minimal hardscape, and/or are prohibited to compost onsite by the local jurisdiction.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10
N/A	0	0

GREEN GLOBES #4.4.1.3

Are any components of the interior fit-out made utilizing prefabricated construction methods?

- Yes (5 points)
-
- No (0 points)

Tooltip

Pre-fabricated versus conventional construction methods often reduce waste; both from a manufacturing perspective, as well as the at the actual construction site for an interior fit-out. Examples include wall and partition panels built off-site for installation on-site.

Recommended Documents

- *Construction documentation for interior fit-out*
- *Specifications for any pre-fabricated components of the interior fit-out (including wall and partition panels, excluding movable furnishings)*

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5

Building Service Life Plan

20

GREEN GLOBES #4.5.1

Is there a schedule for maintenance, repair and replacement for each interior element for the duration of the building design service life?

- Yes (10 points)
-

- No (0 points)

Tooltip

This plan and policy may be specific for the space being assessed or part of an overall building document. The objective of a “Building Service Life Plan” is to provide reasonable assurance that the new space or building will be serviceable for the estimated period of time as a result of using quality systems and components that are properly installed and well maintained. *CSA S478-95 (R2007): Guideline on Durability in Buildings* outlines how to develop and implement a Building Durability Plan.

Assessment Guidance

A Building Service Life Plan (BSLP) should include the following:

- Expected service life for building assemblies and materials that require inspection and/or need to be replaced during the service life of the interior fit-out , where service life was based on the following:
 - Temporary interior fit-outs < 3 years
 - Medium-life interior fit-out 3 - 10 years
 - Long life interior fit-out types > 10 years
- Documentation of the project design service life, the basis for determination and the following details for each assembly or component used in the interior fit-out:
 - Interior fit-out and material description
 - Design service life in years
 - Predicted service life in years
 - Effects of failure

- Maintenance frequency and maintenance access

It should be noted that a Building Service Life Plan is not the same as an LCA. The BSLP should examine the full life cycle of the building and its components and provide guidance to help realize the LCA projections. By analyzing the maintenance, repair, and replacement costs for the interior fit-out components' design life, BSLPs can encourage durability, interoperability, adaptability, reuse, and recyclability.

Other references for building a BSLP can be found in the *International Green Construction Code (IgCC) Section 505*, *ANSI/ASHRAE/USGBC/IES Standard 189.1-2009 Paragraph 10.3.2.3*, and in the *Whole Building Design Guide* – <http://www.wbdg.org/tools>.

References

- *CSA S478-95 (R2007): Guideline on Durability in Buildings*
- *International Green Construction Code (IgCC): Section 505*
- *ANSI/ASHRAE/USGBC/IES Standard 189.1-2009: Section 505, Paragraph 10.3.2.3*
- [Whole Building Design Guide \(WBDG\)](http://www.wbdg.org/tools)

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10

GREEN GLOBES #4.5.2

Is there a building housekeeping plan and policy for requiring environmentally preferable cleaning products and procedures for the new renovated space?

- Yes (10 points)
-
- No (0 points)

Tooltip

This plan and policy may be specific for the space being assessed or part of an overall facility/building document.

Assessment Guidance

Key building management personnel signature(s), role(s), and responsibilities should be included on policy.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10

Reuse of Non-Structural Elements

20

Reuse of Non-Structural Elements

20

GREEN GLOBES #4.6.1

What percentage of the existing interior ceilings, interior partitions, doors and frames, and/or cabinetry will be reused within the project?

- >95% (10 points)

- 81% - 95% (9 points)

- 66% - 80% (8 points)

- 41% - 65% (7 points)

- 26% - 40% (6 points)

- 10% - 25% (5 points)

- <10% (0 points)

- N/A

Tooltip

Areas are calculated as the projected area of the element. For example, if an interior partition is re-used the area is calculated as length x height of the wall, doors and frames would be width x height, and cabinetry would be length x width/2 for base and/or wall cabinets and length x width for full height cabinetry.

Percentage = $100 \times (A \div B)$, where:

- A = Total area of re-used existing interior ceiling, interior partitions, demountable walls, doors and frames, and/or cabinetry

- B = Total area of existing interior ceiling, interior partitions, demountable walls, doors and frames, and/or cabinetry.

Mark “N/A” where there are no existing interior partitions, demountable walls, ceilings, doors and frames, and cabinetry.

Assessment Guidance

If the construction documents do not indicate calculations for existing versus new interior ceilings, interior partitions, demountable walls, doors and frames, and/or cabinetry; a narrative and separate calculations should be provided under a separate cover and given to the Green Globes Assessor during their review.

The assessor may also request existing conditions documentation, calculations of quantities, and a space plan for the new building denoting existing interior ceilings, interior partitions, demountable walls, doors and frames, and/or cabinetry reused.

Scoring Matrix

Response	Score	Max Points
>95%	10	10
81% - 95%	9	10
66% - 80%	8	10
41% - 65%	7	10
26% - 40%	6	10
10% - 25%	5	10
<10%	0	10
N/A	0	0

GREEN GLOBES #4.6.2

What percentage of the existing furnishings (including systems furniture) will be re-used and/or refurbished for reuse within the project?

- >65% (10 points)

- 41% - 65% (8 points)

- 26% - 40% (6 points)

- 10% - 25% (4 points)

- <10% (0 points)

- N/A

Tooltip

Areas are calculated as follows:

- A = Total re-used existing area of furnished space
- B = Total area of existing space

Mark "N/A" where there are no existing furnishings or where they are clearly not suitable. Areas are to be used consistently for determining calculations.

Assessment Guidance

If the construction documents do not indicate calculations for existing versus new furnishings (including systems furniture), a narrative and separate calculations should be provided under a separate cover and given to the Green Globes Assessor during the Design Review.

The assessor may also request existing conditions documentation, a furnishing inventory & furniture specifications, and a space plan for the new interior fit-out denoting reused or refurbished furnishings.

Scoring Matrix

Response	Score	Max Points
>65%	10	10
41% - 65%	8	10
26% - 40%	6	10
10% - 25%	4	10
<10%	0	10
N/A	0	0

Emissions & Other Impacts

40

Integrated Pest Management

10

Integrated Pest Management

10

GREEN GLOBES #5.1.1

Has an integrated pest management policy been developed for the interior space that includes roles and responsibilities?

- Yes (10 points)
-
- No (0 points)

Tooltip

Verify that an Integrated Pest Management plan is signed off on and in place.

Assessment Guidance

The University of California, Davis, describes Integrated Pest Management (IPM) as follows:

"An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment."

A comprehensive IPM plan would include:

- Identification of type of likely or identified pests, and the potential damage, health risks, or other hazards they pose.
- Rationale for mitigation of pests (addressing the problems pests are likely to cause).
- Description of pest management mitigation and control methods for each anticipated type of pest (insecticides and alternatives, and others).

- Addressing the environmental impacts (toxicity for example) introduced by proposed pest management methods.
- Requirements for purchases, storage, application of pest management materials, such as pesticides, fungicides, traps, and other containment/elimination methods.
- Description of the roles and responsibilities of those assigned to manage and carry out the Integrated Pest Management plan.
- Process for review and update of the plan.
- Documentation requirements for reporting/recording pest infestation incidents and the outcomes of pest management interventions.

The IPM plan should also include strategies for the following:

- Building and maintaining healthy soils
- Site-appropriate plants
- Efficient watering practices
- Integrated pest management
- Natural lawn-care management
- Building design features that minimize potential pest entry
- Specifications for pest control products that can be used on the project site, preferably non-toxic
- Building notification for when toxic pesticides are applied on site
- Contracting of a Green Shield Certified pest control vendor (www.greenshieldcertified.org)

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10

Leak Detection in Commercial Refrigeration

20

Leak Detection in Commercial Refrigeration

20

GREEN GLOBES #5.2.1

Is there a requirement that equipment installer(s) test remote commercial systems (e.g. supermarket refrigeration) as per GreenChill Best Practices Guideline Ensuring Leak-Tight Installations of Commercial Refrigeration Equipment?

- Yes (8 points)

-
- No (0 points)

-
- N/A

Tooltip

Verify that remote commercial refrigerating system equipment was tested prior to the building's occupancy to guarantee the system is leak tight according to procedures described in *GreenChill Best Practices Guideline for Leak-Tight Installations of Commercial Refrigeration Equipment*. Mark "N/A" if there is no commercial refrigeration.

Assessment Guidance

The project specifications should detail the method in which all commercial refrigerating equipment will be installed and tested for leaks. Testing procedures should not only comply with the GreenChill guide but should also meet local codes and should never exceed system design pressures. If these tests are to be part of the Commissioning scope, projects should include the necessary information for the Commissioning Agent.

GreenChill's best practices guide includes all steps for properly leak testing a commercial refrigeration equipment system. It covers the step-by-step process including pre-check, pressure testing, evacuation, charge, and final check. The main aspects of pressure testing should include:

- Utilize dry nitrogen and appropriate tracer gas for pressure testing
- Test branches in segments to reduce time needed to detect leaks but before the

final test ensure all valves are open

- Check the piping for leaks, repair leaks, and retest
- Let system stand for 24 hours at 300 psig. Ensure no more than 1 psig pressure change (taking into account ambient air temperature fluctuations)
- Evacuate system if 300 psig pressure holds

It is important to properly evacuate the system before charging with the refrigerant. Vacuum requirements for evacuation should be dictated by the project specifications and should meet code minimum requirements. After charging, a final check should always be performed with a leak detector to confirm no leaks have developed due to vibration or pipes rubbing together.

References

- *GreenChill Best Practices Guideline Ensuring Leak-Tight Installations of Commercial Refrigeration Equipment*

Scoring Matrix

Response	Score	Max Points
Yes	8	8
No	0	8
N/A	0	0

GREEN GLOBES #5.2.2

Are there refrigerant leak detectors capable of detecting leakage rates down to 2.0% per year for each refrigerant?

- Yes (6 points)

- No (0 points)

- N/A

Tooltip

Refrigerant monitors, as required by *ANSI/ASHRAE Standard 15-2010*, are considered safety devices, and are not considered leak detection devices. Any HVAC refrigerants used in the building must comply with the U.S. Environmental Protection Agency (EPA), *Significant New Alternative Policy (SNAP) Listing*. Mark “N/A” where there are no refrigerants.

Assessment Guidance

For projects with chillers, a leak detection system should be in place that monitors for leaks. This system should be documented in the mechanical drawings and specifications. The Green Globes Assessor will verify compliance with this criterion during their review.

References

- *ANSI/ASHRAE Standard 15-2010, Safety Standard for Refrigeration Systems*
- *U.S. Environmental Protection Agency (EPA), Significant New Alternatives Policy (SNAP) Listing*

Scoring Matrix

Response	Score	Max Points
Yes	6	6
No	0	6
N/A	0	0

GREEN GLOBES #5.2.3

Is there an alarm system capable of alerting the building operator to leakage thresholds?

- Yes (6 points)

- No (0 points)

- N/A

Tooltip

Refrigerant monitors, as required by *ANSI/ASHRAE Standard 15-2010*, are considered safety devices, and are not considered leak detection devices. Mark “N/A” where there are no refrigerants

Assessment Guidance

For projects with chillers, a leak detection system should be in place that has a leakage alarm. This system should be documented in the mechanical drawings and specifications. The Green Globes Assessor will verify compliance with this criterion during their review.

References

- *ANSI/ASHRAE Standard 15-2010, Safety Standard for Refrigeration Systems*

Scoring Matrix

Response	Score	Max Points
Yes	6	6
No	0	6
N/A	0	0

Janitorial Equipment

10

Janitorial Equipment

10

GREEN GLOBES #5.3.1

Are there designated storage areas for hazardous materials/janitorial supplies with full-height, floor-to-floor walls and mechanical ventilation?

- Yes (10 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” if there are no janitorial storage areas dedicated to the project space and/or they are centralized and not under control of the tenants.

Assessment Guidance

Janitorial rooms or closets typically contain cleaning products that have strong, corrosive fumes. In order to maintain good indoor air quality in the building, these spaces should be negatively pressurized via exhaust systems. Also, full-height walls should be installed to prevent any odors or airborne contaminants from crossing into other spaces via the ceiling cavity. If flammable materials are to be kept in this room, the doors and wall should be fire-rated and the outlets should be fire dampered.

Construction documents should note storage rooms with cleaning supplies, partition type, and show that the room will be negatively pressurized with an exhaust rate as required by code or 50 CFM, whichever is more stringent. The make-up air can be either directly supplied into the room or via transfer air from a grille or undercut door. There should be no return from this area.

Scoring Matrix

Response	Score	Max Points
Yes	10	10
No	0	10
N/A	0	0

Ventilation

30

Ventilation Air Quantity

15

GREEN GLOBES #6.1.1.1

Is the quantity of ventilation air for the space compliant with *ANSI/ASHRAE Standard 62.1-2010*, or applicable local codes or standards (if more stringent)?

- Yes (15 points)
-

- No (0 points)

Tooltip

Compliance with *ANSI/ASHRAE Standard 62.1-2010* – or applicable local codes or standards if more stringent – is required for full credit. If existing building systems prevent compliance per above, document the actual level of compliance, citing applicable standards.

Assessment Guidance

Documentation will be a combination of existing building operational parameters and project specific ventilation design for the new space.

To comply with *ANSI/ASHRAE Standard 62.1-2010*, there are two procedures that can be utilized to meet the standard's requirements for mechanically ventilated spaces: the IAQ procedure or the Ventilation Rate Procedure.

1. The Ventilation Rate Procedure is the most commonly used and requires calculating the outdoor air intake rate based on space type/application, occupancy level, floor area, zone distribution effectiveness, and system ventilation efficiency. This procedure should be permitted to be used for any zone or system.
2. The IAQ Procedure is performance based. It determines the outdoor air intake rates and additional system design parameters based on an analysis of contaminant sources, contaminant concentration limits, and level of perceived indoor air

acceptability.

For either procedure used, it is important to determine the minimum required exhaust. This exhaust airflow requirement must be met no matter which of the two methods used to determine minimum outdoor airflow rates. Exhaust rates are given in terms of cfm/ft².

Some jurisdictions require that the ventilation schedule, showing room name; number; square footage; occupancy classification; and supply, exhaust, and outdoor airflow, be shown on the construction documents. Other jurisdictions do not require a ventilation schedule, though it is good design practice to have this information on the documents. If a ventilation schedule is not present on the construction documents, a separate calculation will need to be provided to the Green Globes Assessor to verify compliance with the standard or code required in the project's jurisdiction.

NOTE: The original ventilation air schedules for a building will likely need to be modified for the re-fit of a tenant space. Therefore, it is important that the HVAC system to be used has the capacities and controls to adapt to tenant changes.

The Green Globes Assessor may also request the following documentation:

- Balancing reports for the ventilation systems
- Ventilation schedules
- Manufacturing specifications for ventilation systems, CO₂ sensing and ventilation control equipment
- Ventilation air quantity design data
- Local ventilation codes or standards
- Drafts

References

- *ANSI/ASHRAE Standard 62.1-2010 - The Standards For Ventilation & Indoor Air Quality*

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15

GREEN GLOBES #6.1.2.1

Does the HVAC system design and operation comply with the demand control ventilation requirements *ANSI/ASHRAE/IESNA Standard 90.1-2010 Section 6.4.3.9- Ventilation Controls for High-Occupancy Areas*?

- Yes (15 points)
-

- No (0 points)
-

- N/A

Tooltip

Mark “N/A” if spaces are regularly occupied, the ventilation requirements are mainly fixed, or the tenant has no effective control over ventilation rate changes by the HVAC system.

Assessment Guidance

Per *ANSI/ASHRAE/IESNA Standard 90.1-2010, Section 6.4.3.9*, demand control ventilation (DCV) is required for spaces larger than 500 ft² (47 m²), and with a design occupancy for ventilation of greater than 40 people per 1000 ft² (93 m²) of floor area and served by systems with one or more of the following:

- an air-side economizer;
- automatic modulating control of the outdoor air damper;
- a design outdoor airflow greater than 3000 cfm.

Exceptions per Section 6.4.3.9 include systems with energy recovery, multiple-zone systems without DDC of individual zones communicating with a central control panel, systems with a design outdoor airflow less than 1200 cfm, and spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1200 cfm.

The DCV system should be design in accordance with *ANSI/ASHRAE Standard 62.1-2010, Section 6.2.7*.

References

- *ANSI/ASHRAE Standard 62.1-2010, Section 6.2.7*
- *ANSI/ASHRAE/IESNA Standard 90.1-2010, Section 6.4.3.9*

Scoring Matrix

Response	Score	Max Points
Yes	15	15
No	0	15
N/A	0	0

Volatile Organic Compounds (VOCs)

60

GREEN GLOBES #6.2.1.1

Is there a requirement that adhesives and sealants comply with prescribed limits of VOCs and/or be certified?

- Yes (9 points)
- No (0 points)

Tooltip

“Certified” means complies with any of the certifications listed in Table 6.2.1.1: Adhesives and Sealants VOC Limits and the assessment guidance below. The “prescribed limits” are based on *South Coast Air Quality Management District (SCAQMD) Rule 1168* for Volatile Organic Compounds (VOCs). Refer to *Table 6.2.1.1: Adhesives and Sealants VOC Limits* for the types of adhesives and sealants and the test methods used to determine VOCs in these products.

Assessment Guidance

Project specifications should include provisions for limiting VOC content in building materials that emit contaminants that deteriorate the indoor air quality. Most green building projects will incorporate a section in the Division 01 specification that addresses all the environmental requirements, including emissions, of all materials to be used on the project. In order to comply with these criteria, these specifications should include the specific VOC content or emissions criteria for all applicable products. The performance criteria listed in the specification should match the limits in the Table below.

In Table 6.2.1.1, percentages are determined by weight (grams / liter). Alternatively, a VOC budget can be used for adhesives and sealants covered in the table. Documentation must demonstrate the overall low-VOC performance has been attained, comparing between a baseline and design case. When the design or actual case is less than the baseline, this criterion is satisfied. The total VOC for the design case is determined by multiplying the

volume of the product used by the threshold VOC levels for the baseline case and actual product VOC level for the design case. The baseline cannot be greater than the design case.”

Table 6.2.1.1: Adhesives and Sealants VOC Limits

Product Area	Product Sub-area	VOC Content ¹	VOC Emissions Criteria ²
Adhesives – Architectural Applications	Carpet / Carpet Pads	50 g/L	To determine acceptability of the emission results, the estimated building concentrations are compared to ½ their corresponding chronic RELs (Indoor Reference Exposure Levels). The two exceptions to this requirement are (1) formaldehyde for which the calculated building concentration shall not exceed ½ of the indoor REL of 33µg/m³ and (2) acetaldehyde in which the full chronic REL of 9µg/m³ shall not be exceeded.
	Wood Flooring	100 g/L	
	Rubber Flooring	60 g/L	
	Subfloor	50 g/L	
	Ceramic Tile	65 g/L	
	VCT / Asphalt Tile	50 g/L	
	Dry Wall Panel	50 g/L	
	Cove Base	50 g/L	
	Multipurpose Construction	70 g/L	
	Structural Glazing	100 g/L	
Adhesives – Substrates	Single Ply Roof Membrane	250 g/L	
	Metal to Metal	30 g/L	
	Plastic Foams	50 g/L	
	Porous Material (except wood)	50 g/L	
	Wood	30 g/L	
Adhesives – Specialty	Fiberglass	80 g/L	
	PVC Welding	510 g/L	
	CPVC Welding	490 g/L	
	ABS Welding	325 g/L	
	Plastic Cement Welding	250 g/L	
	Adhesive Primer for Plastic	550 g/L	
	Contact Adhesive	80 g/L	
Sealants	Special Purpose Contact Adhesive	250 g/L	
	Architectural	250 g/L	
	Non-membrane Roof	300 g/L	
	Single Ply Roof Membrane	450 g/L	
1. VOC content is determined by subtracting water and exempt compounds and expressed as grams per liter, with no exception granted to chlorinated chemical species. VOC limits must be in accordance with the <i>South Coast Air Quality Management District (SCAQMD) Rule 1168</i>. 2. VOC emissions results are determined by either of the following test methods: <i>Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers CA/DHS/EHLB/R-174, July 14, 2004 with Addendum 2004-01, October 19, 2004</i> or <i>GREENGUARD Environmental Institute: Standard Method for Measuring and Evaluating Chemical Emissions From Building Materials, Finishes and Furnishings Using Dynamic Environmental Chambers (GGTM.P066.R8, 10/29/2008)</i>. 3. Indoor REL developed by the California Office of Environmental Health and Hazard Assessment (OEHHA).			

Alternatively, projects can require that certain products have third-party certifications showing compliance to predetermined indoor air quality standards. Programs include the following:

- EcoLogo® (Paints & Adhesives) – Environmental Choice
 - *EcoLogo Standard for Adhesives: CCD-046*
 - *EcoLogo Standard for Paints: Architectural Surface Coatings CCD-047*
 - *EcoLogo Standard for Recycled Paints: Architectural Surface Coatings – Recycled Water-borne CCD-048*
- Green Seal® (Paints & Adhesives)
 - *Green Seal Environmental Standard for Paints and Coatings, GS-11*
 - *Green Seal Environmental Standard for Commercial Adhesives, GS-36*
- GREENGUARD Children & Schools – GREENGUARD Environmental Institute
 - *Program Manual For GREENGUARD Product Certification Programs, GG.PM.01 2009*
 - *GREENGUARD Environmental Institute: Standard Method for Measuring and Evaluating Chemical Emissions From Building Materials, Finishes and Furnishings Using Dynamic Environmental Chambers (GGTM.P066.R8, 10/29/2008)*
- Indoor Advantage Gold™ – Scientific Certification Systems
 - *California Department of Health Services Standard Practice for the Testing Of Volatile Organic Emissions Sources Using Small Scale Environmental Chambers (CA/DHS/EHLB/R-174, JULY 15, 2004 with Addendum 2004-01)*
 - *SCS - EC10.2 -2007, Environmental Certification Program—Indoor Air Quality Performance, May, 2007*

During their review, the Green Globes Assessor will verify that the above VOC limits or third-party certifications have been incorporated into the project specifications. If available, product submittals should also be reviewed by the assessor.

References

- *South Coast Air Quality Management District (SCAQMD)- Rule 1168*

Scoring Matrix

Response	Score	Max Points
Yes	9	9
No	0	9

GREEN GLOBES #6.2.1.2

Is there a requirement that carpet, carpet pad, and under-carpet adhesives comply with the Carpet and Rug Institute's (CRI) Green Label Plus program?

- Yes (9 points)

- No (0 points)

- N/A

Tooltip

Carpet and Rug Institute's (CRI) Green Label Plus program is designed for architects, builders, specifiers, and facility managers who want assurances that carpet and adhesive products meet the most stringent criteria for low chemical emissions. Mark "N/A" if there will be no carpeting.

Assessment Guidance

The Green Globes Assessor will verify that the carpet specified is labeled with CRI's Green Label Plus program. Complete information is available on the CRI's website.

References

- [The Carpet and Rug Institute \(CRI\), Commercial Green Label / Green Label Plus](#)

Scoring Matrix

Response	Score	Max Points
Yes	9	9
No	0	9
N/A	0	0

GREEN GLOBES #6.2.1.3

Is there a requirement that paints comply with prescribed limits of VOCs and/or be certified?

- Yes (9 points)
-
- No (0 points)

Tooltip

“Certified” means compliance with any of the certifications listed in Table 6.2.1.3: Paint VOC Limits and the assessment guidance below. For other types of interior coatings containing VOC’s, refer to the manufacturer’s data and, where possible, cite the same *ASTM D6886 – 03 Standard Test Method for Speciation of the VOCs in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography*. Refer to Table 6.2.1.3: Paint VOC Limits for the types of paints and the test methods used to determine VOCs in these products. The “prescribed limits” are based on *ASTM D6886-03 Standard Test Method for Speciation of the VOCs in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography* for volatile organic compounds. For other types of interior coatings containing VOC’s, refer to the manufacturer’s data and, where possible, cite the same *ASTM D6886 – 03* standard.

Assessment Guidance

Project specifications should include provisions for limiting VOC content in building materials that emit contaminants that deteriorate the indoor air quality. Most green building projects will incorporate a section in the Division 01 specification that addresses all the environmental requirements, including emissions, of all materials to be used on the project. In order to comply with these criteria, these specifications should include the specific VOC content or emissions criteria for all applicable products. The performance criteria listed in the specification should match the limits in the Table below. In the case of specialty interior coatings, consult manufacturer’s product data related to VOC content, and determine level of equivalent compliance with paint products.

In Table 6.2.1.3: Paint VOC Limits, determining whether the VOC content of paint complies with this criterion can be shown by either the use of MSDS sheets that shows that the VOCs for every paint used on the project meets the criteria OR by using a "VOC budget" approach. This calculation shows the total VOCs of the design and base cases, allowing

evaluation and comparison for coating systems specified versus what is allowed under this criterion. The calculation indicates total VOCs in grams and indicates whether the design case total lies within the base case requirement for total VOCs. In order for the calculation to work, the following information must be identified by the user:

- Total square footage of area(s) to be painted.
- VOC content of specified coating systems.
- Coverage rates of coatings specified (from manufacturer's data sheet).
- Number of coats specified (primer and topcoats).
- Sheen of each coating based on *ASTM D523-08: Standard Test Method for Specular Gloss*.

Table 6.2.1.3: Paint VOC Limits

Product Area	Product Sub-area	VOC Content ¹	VOC Emissions Criteria ²
Walls	Paints - Interior Latex Coatings flat	50 g/L	To determine acceptability of the emission results, the estimated building concentrations are compared to ½ their corresponding chronic RELs. The two exceptions to this requirement are (1) formaldehyde for which the calculated building concentration shall not exceed ½ of the indoor REL of 33µg/m³ and (2) acetaldehyde in which the full chronic REL of 9µg/m³ shall not be exceeded.
	Paints - Interior Latex Coatings non flat	150 g/L	
	Untreated Masonry or Concrete	Not applicable	

1. VOC content is determined by subtracting water and exempt compounds and expressed as grams per liter, with no exception granted to chlorinated chemical species. For VOC content, a VOC is any organic compound that participates in atmospheric photochemical reactions as defined by the U.S. EPA in 40 CFR §51.100 (s) and has an initial boiling point lower than or equal to 280°C measured at standard conditions of temperature and pressure. The VOC concentration of the product shall not exceed those listed below in grams of VOC per liter of product as determined by ASTM D6886-03: *Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography*. Source of test method and criteria is Green Seal (GS-11).
2. VOC emissions results are determined by either of the following test methods: *Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers* CA/DHS/EHLB/R-174, July 14, 2004 with Addendum 2004-01, October 19, 2004 or GREENGUARD Environmental Institute: *Standard Method for Measuring and Evaluating Chemical Emissions From Building Materials, Finishes and Furnishings Using Dynamic Environmental Chambers* (GGTM.P066.R8, 10/29/2008).
3. Indoor REL developed by the California Office of Environmental Health and Hazard Assessment (OEHHA).

Alternatively, projects can require that certain products have third-party certifications showing compliance to predetermined indoor air quality standards. Programs include the following:

- EcoLogo® (Paints & Adhesives) – Environmental Choice
 - *EcoLogo Standard for Adhesives: CCD-046*
 - *EcoLogo Standard for Paints: Architectural Surface Coatings CCD-047*

- *EcoLogo Standard for Recycled Paints: Architectural Surface Coatings – Recycled Water-borne CCD-048*
- Green Seal® (Paints & Adhesives)
 - *Green Seal Environmental Standard for Paints and Coatings, GS-11*
 - *Green Seal Environmental Standard for Commercial Adhesives, GS-36*
- GREENGUARD Children & Schools – GREENGUARD Environmental Institute
 - *Program Manual For GREENGUARD Product Certification Programs, GG.PM.01 2009*
 - *GREENGUARD Environmental Institute: Standard Method for Measuring and Evaluating Chemical Emissions From Building Materials, Finishes and Furnishings Using Dynamic Environmental Chambers (GGTM.P066.R8, 10/29/2008)*
- Indoor Advantage Gold™ – Scientific Certification Systems
 - *California Department of Health Services Standard Practice for the Testing Of Volatile Organic Emissions Sources Using Small Scale Environmental Chambers (CA/DHS/EHLB/R-174, JULY 15, 2004 with Addendum 2004-01)*
 - *SCS - EC10.2 -2007, Environmental Certification Program—Indoor Air Quality Performance, May, 2007*

During their review, the Green Globes Assessor will verify that the above VOC limits or third-party certifications have been incorporated into the project specifications. If available, product submittals should also be reviewed by the assessor.

References

- *ASTM D6886-03 Standard Test Method for Speciation of the VOCs in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography*
- *ASTM D523-08: Standard Test Method for Specular Gloss*

Scoring Matrix

Response	Score	Max Points
Yes	9	9
No	0	9

GREEN GLOBES #6.2.1.4

Is there a requirement that floors, floor coverings (including resilient and other non-carpet flooring) comply with prescribed limits of VOCs and/or be certified?

- Yes (8 points)
-
- No (0 points)

Tooltip

“Certified” means compliance with any of the certifications listed in Table 6.2.1.4: Floor & Floor Coverings VOC Limits and the assessment guidance below. The “prescribed limits” are given in the Indoor Reference Exposure Levels (REL) developed by the California Office of Environmental Health and Hazard Assessment (OEHHA) for volatile organic compounds. “Floor coverings” include carpeting, resilient and other non-carpet flooring. Refer to Table 6.2.1.4: Floors & Floor Coverings VOC Limits for the types of products, the test methods used to determine VOC emissions from these products, and the VOC emissions criteria.

Assessment Guidance

Project specifications should include provisions for limiting VOC content in building materials that emit contaminants that deteriorate the indoor air quality. Most green building projects will incorporate a section in the Division 01 specification that addresses all the environmental requirements, including emissions, of all materials to be used on the project. In order to comply with these criteria, these specifications should include the specific VOC content or emissions criteria for all applicable products. The performance criteria listed in the specification should match the limits in the Table below.

Table 6.2.1.4: Floors & Floor Coverings VOC Limits

Product Area	VOC Emissions Criteria ¹
Floors / Floor Coverings (including carpeting, resilient and other non-carpet flooring)	To determine acceptability of the emission results, VOC building concentrations are estimated for the Standard Private Office Scenario in CDPH Standard Method V1.1 Tables 4.4 and 4.5 and are compared to the maximum allowable concentrations in CDPH Standard Method V1.1, Table 4.1. The maximum allowable concentrations shall not be exceeded. Additionally, floors/floor coverings, ceiling systems and wall systems categories made with nonstructural composite wood and composite wood cores (particleboard, MDF, and hardwood plywood) are compliant with the California Air Resources Board Airborne Toxic Control Measure (CARB/ATCM (to control formaldehyde emissions from composite wood (Sections 93120-93120.12, Title 17, California Code of Regulations) and U.S. EPA's Formaldehyde Standards for Composite Wood Products Act, Title VI of the Toxic Substances Control Act (TSCA) 40 CFR Part 770. For products containing composite wood, provide copies of product labels, chain-of-custody records, or documentation demonstrating compliance with the CARB/ATCM and EPA TSCA Title VI formaldehyde regulations.
VOC emissions results are determined by California Department of Public Health (CDPH) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," V 1.1, 2010, Standard Private Office Scenario. Alternatively, VOC emission results are determined by UL 2821 "GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings," March 2013, Table 2 Office Model and Section 34.1 Allowable Limits for GREENGUARD Certification Gold.	

Alternatively, projects can require that certain products have third-party certifications showing compliance to predetermined indoor air quality standards:

- FloorScore® (Resilient Flooring) – Resilient Floor Covering Institute
 - California Department of Public Health (CDPH), "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," V 1.1, 2010, Standard Private Office Scenario.
 - SCS - EC10.2 -2007, Environmental Certification Program—Indoor Air Quality Performance. May, 2007
- GREENGUARD Gold – UL Environment
 - UL 2821, "GREENGUARD Certification Program Method for Measuring and Evaluating Chemical emissions from Building Materials, Finishes and Furnishings," March 2013, Table 2 Office Model and Section 34.1 Allowable Limits for GREENGUARD Certification Gold.

- *UL 2818, “GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings,” March 2013.*
- Indoor Advantage Gold™ – Scientific Certification Systems
 - *California Department of Public Health (CDPH), Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, V 1.1, 2010, Standard Private Office Scenario.*
 - *SCS - EC10.2 -2007, “Environmental Certification Program—Indoor Air Quality Performance”, May, 2007.*

During their review, the Green Globes Assessor will verify that the above VOC limits or third-party certifications have been incorporated into the project specifications. If available, product submittals should also be reviewed by the assessor.

Scoring Matrix

Response	Score	Max Points
Yes	8	8
No	0	8

GREEN GLOBES #6.2.1.5

Is there a requirement that interior ceiling products (including insulation, acoustical ceilings, etc.) comply with prescribed limits of VOCs and/or be certified?

- Yes (8 points)

-
- No (0 points)

Tooltip

“Certified” means compliance with any of the certifications listed in Table 6.2.1.5: Interior Ceiling Product VOC Limits and the assessment guidance below. The “prescribed limits” are given in the Indoor Reference Exposure Levels (REL) developed by the California Office of Environmental Health and Hazard Assessment (OEHHA) for volatile organic compounds.

“Interior ceiling products” include insulation and acoustical ceilings. Refer to Table 6.2.1.5: Interior Ceiling Product VOC Limits for the types of products, the test methods used to determine VOC emissions from these products, and the VOC emissions criteria.

Assessment Guidance

Project specifications should include provisions for limiting VOC content in building materials that emit contaminants that deteriorate the indoor air quality. Most green building projects will incorporate a section in the Division 01 specification that addresses all the environmental requirements, including emissions, of all materials to be used on the project. In order to comply with these criteria, these specifications should include the specific VOC content or emissions criteria for all applicable products. The performance criteria listed in the specification should match the limits in the Table below.

Table 6.2.1.5: Interior Ceiling Product VOC Limits

Product Area	VOC Emissions Criteria ¹
Interior ceiling products (including insulation acoustical ceilings, etc.)	To determine acceptability of the emission results, VOC building concentrations are estimated for the Standard Private Office Scenario in CDPH Standard Method V1.1 Tables 4.4 and 4.5 and are compared to the maximum allowable concentrations in CDPH Standard Method V1.1, Table 4.1. The maximum allowable concentrations shall not be exceeded. Additionally, floors/floor coverings, ceiling systems and wall systems categories made with nonstructural composite wood and composite wood cores (particleboard, MDF, and hardwood plywood) are compliant with the California Air Resources Board Airborne Toxic Control Measure (CARB/ATCM (to control formaldehyde emissions from composite wood (Sections 93120-93120.12, Title 17, California Code of Regulations) and U.S. EPA’s Formaldehyde Standards for Composite Wood Products Act, Title VI of the Toxic Substances Control Act (TSCA) 40 CFR Part 770. For products containing composite wood, provide copies of product labels, chain-of-custody records, or documentation demonstrating compliance with the CARB/ATCM and EPA TSCA Title VI formaldehyde regulations. VOC emissions results are determined by California Department of Public Health (CDPH) “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers,” V 1.1, 2010, Standard Private Office Scenario. Alternatively, VOC emission results are determined by UL 2821 “GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings,” March 2013, Table 2 Office Model and Section 34.1 Allowable Limits for GREENGUARD Certification Gold.

Alternatively, projects can require that certain products have third-party certifications showing compliance to predetermined indoor air quality standards:

- GREENGUARD Gold – UL Environment
 - *UL 2821, “GREENGUARD Certification Program Method for Measuring and Evaluating Chemical emissions from Building Materials, Finishes and Furnishings,” March 2013, Table 2 Office Model and Section 34.1 Allowable Limits for GREENGUARD Certification Gold.*
 - *UL 2818, “GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings,” March 2013.*
- Indoor Advantage Gold™ – Scientific Certification Systems
 - *California Department of Public Health (CDPH), Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, V 1.1, 2010, Standard Private Office Scenario.*
 - *SCS - EC10.2 -2007, “Environmental Certification Program—Indoor Air Quality Performance”, May, 2007.*

During their review, the Green Globes Assessor will verify that the above VOC limits or third-party certifications have been incorporated into the project specifications. If available, product submittals should also be reviewed by the assessor.

Scoring Matrix

Response	Score	Max Points
Yes	8	8
No	0	8

GREEN GLOBES #6.2.1.6

Is there a requirement that interior wall products (including insulation, wall coverings, etc.) comply with prescribed limits of VOCs and/or be certified?

- Yes (8 points)
-
- No (0 points)

Tooltip

“Certified” means compliance with any of the certifications listed in Table 6.2.1.6: Interior Wall Product VOC Limits and the assessment guidance below. The “prescribed limits” are given in the Indoor Reference Exposure Levels (REL) developed by the California Office of Environmental Health and Hazard Assessment (OEHHA) for volatile organic compounds. “Interior wall products” include insulation and wall coverings. Does not apply to countertops, casework, cabinetry, and shelving. Refer to Table 6.2.1.5: Interior Ceiling Product VOC Limits for the types of products, the test methods used to determine VOC emissions from these products, and the VOC emissions criteria.

Assessment Guidance

Project specifications should include provisions for limiting VOC content in building materials that emit contaminants that deteriorate the indoor air quality. Most green building projects will incorporate a section in the Division 01 specification that addresses all the environmental requirements, including emissions, of all materials to be used on the project. In order to comply with these criteria, these specifications should include the specific VOC content or emissions criteria for all applicable products. The performance criteria listed in the specification should match the limits in the Table below.

▲ Table 6.2.1.6: Interior Wall Product VOC Limits

Product Area	VOC Emissions Criteria ¹
Interior wall products (including insulation and wall coverings, etc.)	To determine acceptability of the emission results, VOC building concentrations are estimated for the Standard Private Office Scenario in CDPH Standard Method V1.1 Tables 4.4 and 4.5 and are compared to the maximum allowable concentrations in CDPH Standard Method V1.1, Table 4.1. The maximum allowable concentrations shall not be exceeded. Additionally, floors/floor coverings, ceiling systems and wall systems categories made with nonstructural composite wood and composite wood cores (particleboard, MDF, and hardwood plywood) are compliant with the California Air Resources Board Airborne Toxic Control Measure (CARB/ATCM (to control formaldehyde emissions from composite wood (Sections 93120-93120.12, Title 17, California Code of Regulations) and U.S. EPA's Formaldehyde Standards for Composite Wood Products Act, Title VI of the Toxic Substances Control Act (TSCA) 40 CFR Part 770. For products containing composite wood, provide copies of product labels, chain-of-custody records, or documentation demonstrating compliance with the CARB/ATCM and EPA TSCA Title VI formaldehyde regulations.

VOC emissions results are determined by California Department of Public Health (CDPH) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," V 1.1, 2010, Standard Private Office Scenario. Alternatively, VOC emission results are determined by UL 2821 "GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings," March 2013, Table 2 Office Model and Section 34.1 Allowable Limits for GREENGUARD Certification Gold.

Alternatively, projects can require that certain products have third-party certifications showing compliance to predetermined indoor air quality standards:

- GREENGUARD Gold – UL Environment
 - UL 2821, "GREENGUARD Certification Program Method for Measuring and Evaluating Chemical emissions from Building Materials, Finishes and Furnishings," March 2013, Table 2 Office Model and Section 34.1 Allowable Limits for GREENGUARD Certification Gold.
 - UL 2818, "GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings," March 2013.
- Indoor Advantage Gold™ – Scientific Certification Systems
 - California Department of Public Health (CDPH), Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, V 1.1, 2010, Standard Private Office Scenario.

- *SCS - EC10.2 -2007, “Environmental Certification Program—Indoor Air Quality Performance”, May, 2007.*

During their review, the Green Globes Assessor will verify that the above VOC limits or third-party certifications have been incorporated into the project specifications. If available, product submittals should also be reviewed by the assessor.

Scoring Matrix

Response	Score	Max Points
Yes	8	8
No	0	8

GREEN GLOBES #6.2.1.7

Is there a requirement that systems furniture and seating comply with prescribed limits of VOCs and/or be certified?

- Yes (9 points)

- No (0 points)

- N/A

Tooltip

Reference *ANSI/ASHRAE/USGBC/IES Standard 189.1-2009*, office furniture systems and seating installed prior to occupancy shall be tested according to *ANSI/BIFMA Standard M7.1-2011* and shall not exceed the limit requirements listed in *Normative Appendix E* of this standard. Alternatively, Green Guard certification constitutes compliance with this criterion. Mark “N/A” if purchase of new furniture is not within the scope of the project.

Assessment Guidance

Approved product submittals and corresponding purchase records, testing, and certification documentation are all required for verification by the Green Globes Assessor.

References

- *ANSI/ASHRAE/USGBC/IES Standard 189.1-2009*
- *ANSI/BIFMA Standard M7.1-2011 Test Method for Determining VOC Emissions, Normative Appendix E*

Scoring Matrix

Response	Score	Max Points
Yes	9	9
No	0	9
N/A	0	0

GREEN GLOBES #6.2.2.1

Are there any of the following measures to avoid mold:

Tooltip

All appropriate spaces within the scope of the project should incorporate operational floor drains—shown on drawings or specified in the project manual—and include consideration of separate drain and holding tanks for hazardous or toxic materials.

Assessment Guidance

HVAC designers should be aware that the relative humidity (RH) and dew point of the air are relevant as they affect moisture content of the food source of the fungi. Potential cold surfaces should be identified in the project so the engineer can design the HVAC system to prevent condensation on these surfaces.

Architects should specify materials that are naturally resistant to mold or have been chemically treated to resist mold growth since these may be able to resist higher surface RH and/or be able to resist for longer periods. The Manufacturer's specification and performance criteria should be checked for these properties. Some materials that would be appropriate include concrete, masonry, glass, metals, greenboard, etc.

ANSI/ASHRAE Standard 62.1-2010 recommends that the following items be incorporated into the building's envelope:

- A weather barrier to prevent liquid water penetration into the envelope.
- An appropriately placed vapor retarder to prevent condensation on cold surfaces within the envelope.
- All exterior joints, seams or penetrations in the envelope should be properly caulked, gasketed, weather-stripped, provided with an air barrier, or sealed.
- For areas with high radon concentration sub-slab depressurization should be considered.
- Insulating all pipes, ducts, and other surfaces whose surface temperatures are expected to fall below the surrounding dew point temperature. All insulation thermal resistance and characteristics shall be sufficient to prevent condensation from forming on the surface and within the insulating material.

Another factor to consider in a building's mold/mildew prevention plan is to ensure that areas where equipment failure will cause large amount of water to be spilled onto the floor have appropriate drainage capabilities including a floor drain and flooring sloped toward the drain. Plumbing engineers should coordinate floor drain locations with large pieces of architectural or mechanical equipment.

The Green Globes Assessor may also request documentation demonstrating compliance with *ANSI/ASHRAE Standard 62.1-2010* and *ICC's International Building Code® (IBC)*.

References

- *ANSI/ASHRAE Standard 62.1-2010: Ventilation of Acceptable Indoor Air Quality*
- *ANSI/ASHRAE Standard 160-2009: Criteria for Moisture Control Design Analysis in Buildings*
- *International Building Code® (IBC)*

GREEN GLOBES #6.2.2.1.1

Materials and finishes are resistant to mold growth in spaces that generate high humidity (e.g. kitchens, toilet rooms, pools, laundry facilities, shower areas, etc.)?



- Yes (5 points)

- No (0 points)

Tooltip

Examples of resistant materials and finishes include concrete, masonry, glass, metals, medium density fiberboard (MDF), mold-resistant board products and finishes, etc..

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5



GREEN GLOBES #6.2.2.1.2

There are floor drains located in all project space areas where equipment failures may cause plumbing leaks or where certain operations may cause spills or overflows?

- Yes (5 points)

- No (0 points)

- N/A

Tooltip

Floor drains designed as part of the project space should be directed to the appropriate building drain piping. Potential hazardous liquid waste from equipment or processes should be evaluated as part of the project design. Floor drain discharges should incorporate one or more holding facilities at a location where servicing and waste removal would not pose a significant health hazard. In some cases, the building may already have facilities available to accept hazardous drainage. Mark “N/A” if there are no floor drains required.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0

GREEN GLOBES #6.2.3.1

Are there separate ventilation and/or physical isolation for specialized activities that generate pollutants (e.g. healthcare settings, hair salons, nail salons, janitor closets, labs, testing areas, etc.)?

- Yes (5 points)

- No (0 points)

- N/A

Tooltip

“Specialized activities” include, but are not limited to medical isolation rooms, printing, smoking, cooking, photo processing, laundry, dry-cleaning, laboratory work, and workshop activities. Mark “N/A” if there are no specialized activities.

Assessment Guidance

Construction Documents and design data required for verification. Details showing specific features of designs and controls that support special ventilation and isolation should be clearly noted, including physical features, and mechanical systems and controls. Submittals for special equipment may also be required by the Green Globes Assessor.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0



GREEN GLOBES #6.2.3.1

Describe any such specialized activities. If none, enter "None."

Tooltip

This criterion is informational only and is not scored. Points are awarded under criterion 6.2.3.1.

GREEN GLOBES #6.2.3.2

Are the separate ventilation systems for specialized activities capable of maintaining, on average, a negative pressure at least 5.0 Pascals (0.02 inches of water gauge)?

- Yes (5 points)

- No (0 points)

- N/A

Tooltip

Negative pressure is with respect to adjacent spaces with doors closed. Mark "N/A" if there are no specialized activities that generate pollutants.

Assessment Guidance

Specialized areas that should be isolated, physically and ventilation wise, from adjacent spaces include:

- Janitor's closets and other areas of cleaning chemical storage
- Any area where there will be chemical usage
- Garages
- Laundry areas
- Large volume copy/printing areas
- Photo laboratories
- Bathrooms
- Trash chutes and rooms
- Office break rooms with microwaves and other areas where strong food smells are

likely to occur

The exhaust rates for these areas are sometimes specified by local mechanical codes. In order to ensure that the space will be maintained at a 5.0 Pascals (0.02 inches of water gauge) negative pressure, many factors come into play like the exact size and air tightness of the subject area. Since air tightness is typically not known in the design stage, mechanical engineers should design these spaces with the ASHRAE or local code, whichever is more stringent, keeping the recommended air changes per hour and the exhaust airflow rate slightly higher than the supply or makeup airflow rate. After construction, blower door testing can be performed to ensure the room leakage rate as built will result in the desired pressure differential between rooms.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0

GREEN GLOBES #6.2.3.2.1

↳ Describe any separate ventilation systems for such specialized activities. If none, enter "None."

Tooltip

This criterion is informational only and is not scored. Points are awarded under criterion 6.2.3.2.

GREEN GLOBES #6.3.1.1

What percentage of the total regularly-occupied tenant space floor area achieves a daylight factor (DF) greater than 2 (excluding all direct sunlight penetration)?

- >60% (10 points)
- 31 % - 60% (6 points)
- 10% - 30% (2 points)
- <10% (0 points)

Tooltip

“Daylight factor” means the ratio of internal light level to external light level. Levels between 2 and 5 indicate adequate daylighting and possibly the need for artificial lighting for part of the time. Levels greater than 5 indicate a well daylit area, but glare and solar gain may cause problems. Consult the Whole Building Design Guide (WBDG) for recommended DF for various types of spaces.

Daylight Factor Calculation:

$$DF = (E_i / E_o) \times \%$$

- where, E_i = illuminance due to daylight at a point on the indoors working plane; and
- E_o = simultaneous outdoor illuminance on a horizontal plane from an unobstructed hemisphere of overcast sky.

In order to calculate E_i , one must establish the amount of light received from the outside to the inside of a building.

A simple rule of thumb to estimate the daylight factor for a daylit space that has vertical windows is:

$DF = 0.1 \times PG$, where:

- DF = daylight factor
- PG = Percentage of glass to floor area (area of the windows/floor area)

Assessment Guidance

The Green Globes Assessor may also request percentages and calculations for occupied areas with daylight illumination levels as well as lighting plans.

“Regularly-occupied” means any space where an occupant is expected to be working for more than a few minutes at a time. A regularly-occupied space would not include interior copy or mail rooms, break rooms, shelving or storage areas, work tables that are set up mainly for storage or brief layout of drawings, or any space where it is not expected that an occupant would likely want to sit down to be working.

Additional note: Since bedrooms are just that—bed rooms—it doesn’t make sense to stipulate daylighting requirements for a space that is used primarily at night (for sleeping, in the dark). Also, energy code has historically bypassed regulating lighting levels and lighting controls in residential spaces. So, the DF would apply only to non-residential spaces. However, in cases where bedrooms comprise an integral part of a healthcare facility, the rooms are not exclusive for sleeping only.

References

- [*International Commission on Illumination*](#)
- [*Whole Building Design Guide \(WBDG\) : Daylighting*](#)
- *CIBSE Lighting Guide (LG10-1999)*

Scoring Matrix

Response	Score	Max Points
>60%	10	10
31 % - 60%	6	10
10% - 30%	2	10
<10%	0	10

GREEN GLOBES #6.3.1.2

What percentage of the floor area of primary occupied space offers a view to the exterior (i.e. is within 25 ft. (7.6 m) from a window)?

- >60% (6 points)
- 31% - 60% (4 points)
- 10% - 30% (2 points)
- <10% (0 points)

Tooltip

The percentage is based on the number of task areas that have a view to the building exterior over the total number of task areas in the space.

Assessment Guidance

Providing exterior views to occupants enhances their wellbeing and work place comfort. Projects should utilize glazing on interior partitions to allow for the maximum number of regularly occupied spaces to have a direct line of sight to the outdoors or an atrium. Architects should consider exterior wall layout, window to wall ratios, interior partition layout and height, furniture layout for interior spaces, and height of any partial walls along the perimeter of the space. In order to accomplish the highest percentage of occupants with views, a common strategy for an office building is locate open office areas along the

perimeter and private office along the interior with fully glazed or partially glazed partitions between. Green Globes further specifies that the maximum distance from the occupant to the view shall be 25 feet. If this criterion is to be pursued by the project, the architect should take this maximum distance into account at the conceptual design stage to ensure that the building footprint allows for this type of space layout.

The Green Globes Assessor may also request percentages and calculations for view to building exterior or atria.

Scoring Matrix

Response	Score	Max Points
>60%	6	6
31% - 60%	4	6
10% - 30%	2	6
<10%	0	6

GREEN GLOBES #6.3.1.3

What percentage of interior treatments provides sun control for interior spaces (e.g. shades, roller blinds, sunscreening, window treatments, etc.)?

- >75% (3 points)

- 50% - 75% (2 points)

- 25% - 49% (1 points)

- <25% (0 points)

Tooltip

Provide percent of treated or shaded window area to the total fenestration area that is directly adjacent to the project space.

Assessment Guidance

A schedule of windows indicating respective shading and/or treatments shown on the plans will help the Green Globes Assessor verify percentage during the site visit. Submittals that fully describe any treatments used may also be required by the assessor for verification.

Scoring Matrix

Response	Score	Max Points
>75%	3	3
50% - 75%	2	3
25% - 49%	1	3
<25%	0	3

GREEN GLOBES #6.3.1.4

What percentage of the floor area contains photo-sensors in daylit areas to maintain consistent lighting levels throughout the day using both daylighting and artificial lighting?

- >75% (3 points)
- 50% - 75% (2 points)
- 25% - 49% (1 points)
- <25% (0 points)

Tooltip

This applies to areas with a Daylight Factor of at least 2.

Assessment Guidance

Shading and solar control devices can be incorporated into many aspects of the building such as:

- Vertical fins or overhangs for exterior glazing. This is generally for southern facing windows.

- Interior light shelves will reflect daylighting from higher windows into the space and will provide a shade for lower windows.
- Exterior glazing that has low transmittance (5-10%).
- Interior glare control devices like vertical or horizontal blinds or curtains (manual or automatically operated). Horizontal shading should be used for southern exposures and vertical for east and west.
- Exterior landscaping features such as adult trees are good for controlling East and West exposure glazing that is harder to shade with overhangs or fins.

Motorized interior shades are a great way to control glare from the sun, daylighting, and solar heat gain. Systems now can be provided that accomplish all this by adjusting the levels of the shades with reference to the measured daylighting level in specific areas of the building, time of day, and aesthetics (the level of adjacent shades to maintain a continuous appearance from the exterior). These systems can also be tied into the electric lighting system to ensure that the electric lighting ramps up on especially cloudy days and dims down or turns off when there is adequate daylight. The architect and electrical engineer should coordinate all aspects of the electric lighting system and its controls.

Scoring Matrix

Response	Score	Max Points
>75%	3	3
50% - 75%	2	3
25% - 49%	1	3
<25%	0	3

GREEN GLOBES #6.3.2.1

Do primary occupied spaces have the prescribed lighting levels for the types of tasks anticipated in the various building spaces as per IESNA standards?

- Yes (12 points)
-

- No (0 points)

Tooltip

“Prescribed lighting levels” are found in the most recent *Illuminating Engineering Society (IES): The Lighting Handbook* and in *Tables 6.3.2.1-A: IESNA Illuminance Categories* and *6.3.2.1-B: IESNA Location/Task Categories* below. Lighting levels should take into account special needs and circumstances.

Assessment Guidance

The lighting design for the project should take into account a number of factors including:

- IESNA recommended light levels
- Owner’s Project Requirements for light levels
- Applicable energy code’s maximum lighting power density

The tables below list some of IESNA’s illuminance recommendations (lux) typical facilities. This is the height off of the floor at which the average measured illuminance should be at least as high as the IESNA recommended value. This is an average illuminance value, so multiple measurements in a space should be averaged at this height to ensure compliance with the recommended levels. The information below is listed as an example; designers should consult the IESNA lighting design guide for detailed information about how to properly utilize their recommendations.

Table 6.3.2.1–A: IESNA Illuminance Categories

Illuminance Category	Description	Recommended Illuminance (lux/footcandles)
A	Public Spaces	30 / 3
B	Simple orientation for short visits	50 / 5
C	Working spaces where simple visual tasks are performed	100 / 10
D	Performance of visual tasks of high contrast and large size	300 / 30
E	Performance of visual tasks of high contrast and small size or visual tasks of low contrast and large size	500 / 50
F	Performance of visual tasks of low contrast and small size	1,000 / 100
G	Performance of visual tasks near threshold	3,000-10,000 / 300-1,000

Table 6.3.2.1–B: IESNA Location/Task Categories

Interior Location/Task	Horizontal Category	Vertical Category
Auditoriums – Assembly	C	-
CAD drafting stations	C	A
Conference Rooms – Meeting	D	B
Conference Rooms – Video Conference	E	D
Hospital patient rooms – general	B	A
Hospital nursing stations – general	D	B
Hospital lobby	B	A
Hospital anesthetizing locations	E	C
Hospital general critical care	B	A
Hotel guest rooms – general	C	-
Hotel lobby general lighting	C	-
Library reading stacks	D	-
Museum exhibit cases	D	B
Open Office – Intensive VDT	D	B
Open Office – Intermittent VDT	E	B
Office lobby	C	A
Office copy room	C	A
Stairways and corridors	B	-
Toiles and washrooms	B	A

Lighting designers and electrical engineers should also keep in mind that the lighting design also needs to meet energy code lighting power density watts per square foot values. With the advances within the lighting industry, designing a lighting system that meets both the energy codes and recommended illuminance values can be achieved.

Illuminance level verification can be sent in Stage I review via calculations and/or lighting plans showing illuminance values or during Stage II handheld measurements can be recorded and presented to the Green Globes Assessor for verification. If any areas have special circumstances, a narrative should be provided for the assessor's review.

The assessor may also request percentages and calculations for primary occupied spaces with IESNA recommended task lighting levels (IES HB-10) as well as lighting plans.

References

- *Illuminating Engineering Society (IES): The Lighting Handbook*

Scoring Matrix

Response	Score	Max Points
Yes	12	12
No	0	12

GREEN GLOBES #6.3.2.2

Has a lighting designer signed off on calculations that show that luminance ratios do not exceed the following as per IESNA for office tasks:

- 3:1 between the task and adjacent surroundings?

AND

- 10:1 between the task and remote (non-adjacent) surfaces?

AND

- 20:1 between the brightest and darkest surface in the field of view?

AND

- 8:1 between rows of luminaires where there is indirect lighting and where ceiling luminance exceeds 124.1 fL (425 cd/m²)?

- Yes (6 points)
-

- No (0 points)
-

- N/A

Tooltip

The lighting designer can also be an electrical engineer or architectural project team member. Mark “N/A” if spaces were designed such that source/task eye geometry did not require IESNA Standard VDT compliant luminaires.

Assessment Guidance

A maximum luminance ratio of 3:1 for tasks to adjacent surroundings is recommended. The luminance of a color monitor can average around 50 cd/m², so in order to meet this criterion the adjacent walls should have a maximum luminance of about 17 cd/m².

For the Green Globes Assessor's review, point-by-point computer calculations must be provided to accurately predict the illuminance levels for the project's specific parameters. Alternatively, handheld readings can be taken from a controlled mock-up of a typical project space. These readings should be properly documented and submitted to the assessor for review .

Scoring Matrix

Response	Score	Max Points
Yes	6	6
No	0	6
N/A	0	0

GREEN GLOBES #6.3.2.3

Has a lighting designer signed off on the design showing that where there is direct lighting, the average luminance does not exceed the following values for given luminaire angles:

- 248.1 fL (850 cd/m²) at 65° from the vertical?

AND

- 102.2 fL (350 cd/m²) at 75° from the vertical?

AND

- 51.1 fL (175 cd/m²) at 85° from the vertical?

- Yes (4 points)

- No (0 points)

- N/A

Tooltip

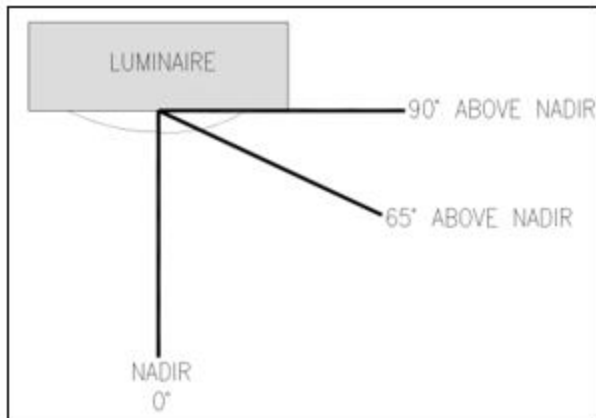
The lighting designer can also be an electrical engineer or architectural project team member. Mark “N/A” if spaces were designed such that source/task eye geometry did not require IESNA Standard VDT compliant luminaires.

Assessment Guidance

Reflective glare, or indirect glare, occurs when lighting from a luminaire is in the 65° to 90° degrees from nadir area and is spaced close enough to the work space that the light at these angles bounces off computer screens and into the user’s eyes.

The Green Globes Assessor may also request percentages and calculations for primary occupied spaces with IESNA recommended task lighting levels; percentages and calculations for occupied areas with daylight illumination levels; and lighting plans.

Figure 6.3.2.3: Luminaire Reflective Glare



For the assessor’s review, photometric data and/or product submittals for all interior luminaires should be provided showing luminance and luminaire angles. Glare levels will also be spot checked during the on-site review.

Scoring Matrix

Response	Score	Max Points
Yes	4	4
No	0	4
N/A	0	0

GREEN GLOBES #6.3.2.4

Do enclosed perimeter offices have full height + width glazing interior walls and doors to allow daylight into the inner spaces?

- Yes (2 points)

- No (0 points)

- N/A

Assessment Guidance

Construction Documents required for verification. Not applicable where there are no perimeter offices.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #6.3.2.5

Are workstation wall panels low (at or below 54 in.) to allow daylight to penetrate throughout the open office?

- Yes (2 points)

- No (0 points)

- N/A

Assessment Guidance

Construction Documents and systems furniture schedule and design required for verification. Not applicable where there is no open office.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #6.3.2.6

Are there unique lighting solutions that enhance the space and use lighting technology in innovative ways?

- Yes (2 points)
- No (0 points)

Tooltip

This is a strictly non-prescriptive criterion in which projects must demonstrate an innovative lighting solution, and not necessarily required for all project space for full credit.

Assessment Guidance

Demonstrate how the lighting solution for the identified space is innovative, including smart controls and integration with natural light. Include in the documentation how the design is particularly suited for the application (task, conference, etc.). Also, the Green Globes Assessor will need to know the percentage of the total project space has incorporated innovatively designed lighting.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2

GREEN GLOBES #6.3.2.7

Is there a wayfinding system provided within the interior fit-out (e.g. artwork, plants, views, interesting objects and décor, etc.)?

- Yes (2 points)
-
- No (0 points)

Tooltip

Wayfinding design can strictly be a signage system or other appurtenances, including artwork and decorations, to both enhance the indoor environment and promote wayfinding.

Assessment Guidance

Provide the Green Globes Assessor with a written description on how signage, plants, views, and décor promote wayfinding and enhance the ambiance of the indoor environment. Having this description originate from an interior design professional is a plus.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2

GREEN GLOBES #6.4.1.1

Has an engineer signed off on the design that shows that the building conforms to *ANSI/ASHRAE Standard 55-2010*?

- Yes (18 points)
-
- No (0 points)

Assessment Guidance

Most mechanical designers will cite *ASHRAE Standard 55* in their project specifications or their design standards but that does not necessarily mean the actual HVAC design complies with the specific requirements of the standard. In order to comply with *ANSI/ASHRAE Standard 55-2010*, calculations need to be performed to determine the predicted percentage of dissatisfied (PPD) occupants. These calculations will include factor such as metabolic rate, clothing, supply air temperature, radiant temperature, supply air speed, and humidity level in the space. These calculations can be performed by hand but the typical program used to determine the PPD for the project's design parameters is ASHRAE's Thermal Comfort Tool. For general comfort conditions, ASHRAE recommends a PPD level less than 10. The 2010 version of this standard has taken into account the fact that higher air speeds can be used to increase the upper temperature limits of the air while maintaining an acceptable comfort range for occupants. Projects claiming to meet *ANSI/ASHRAE Standard 55-2010* need to list the standard in the Basis of Design (BOD) document and/or specifications. Also calculations showing a PPD less than 10 for the heating and cooling design operating conditions should be provided.

References

- *ANSI/ASHRAE Standard 55-2010*

Scoring Matrix

Response	Score	Max Points
Yes	18	18
No	0	18

GREEN GLOBES #6.4.2.1

Do very large functional areas (such as big box stores) have thermal control zones that are 5,000 ft² (465 m²) or less?

- 2,000 ft² (186 m²) or less (5 points)

- 5,000 ft² (465 m²) or less (3 points)

- More than 5,000 ft² (186 m²) (0 points)

- No (0 points)

- N/A

Tooltip

“Thermal zone” means a segment of a building with similar thermal requirements serviced by the same mechanical equipment and controls. Mark “N/A” where there are no such areas.

Assessment Guidance

Thermal control zones, for this criterion’s purpose, can be defined as a space or group of spaces with similar desired thermal conditions (temperature, humidity, etc.) that are maintained using a dedicated sensor (thermostat, humidistat, etc.). Mechanical designers typically call these simply HVAC zones and will usually develop a zone plan early in the design stage showing which rooms/areas will fall into each zone. This zone plan should be updated throughout the design and final zone plan should be issued to the owner’s building staff for their records and use. Thermal control zones should be laid out based on following parameters:

- Client requests for individual control in special areas (President’s office, etc.)
- Heating and cooling load profiles for rooms and spaces
- Thermal design conditions for rooms and spaces
- Occupancy/usage schedules for rooms and spaces

In order for the Green Globes Assessor to easily verify the above criterion sought, projects should submit the zone plan, including space names and square footages, for the assessor's review.

Scoring Matrix

Response	Score	Max Points
2,000 ft ² (186 m ²) or less	5	5
5,000 ft ² (465 m ²) or less	3	5
More than 5,000 ft ² (186 m ²)	0	5
No	0	5
N/A	0	0

GREEN GLOBES #6.4.2.2

Do large functional areas (such as large classrooms and auditoria) have thermal control zones of 1,500 ft² (140 m²) or less?

- 1,500 ft² (140 m²) or less *(5 points)*
- More than 1,500 ft² (140 m²) *(0 points)*
- No *(0 points)*
- N/A

Tooltip

"Thermal zone" means a segment of a building with similar thermal requirements serviced by the same mechanical equipment and controls. Mark "N/A" where there are no such areas.

Assessment Guidance

Thermal control zones, for this criterion's purpose, can be defined as a space or group of spaces with similar desired thermal conditions (temperature, humidity, etc.) that are maintained using a dedicated sensor (thermostat, humidistat, etc.). Mechanical designers typically call these simply HVAC zones and will usually develop a zone plan early in the design stage showing which rooms/areas will fall into each zone. This zone plan should be updated throughout the design and final zone plan should be issued to the owner's building staff for their records and use. Thermal control zones should be laid out based on following parameters:

- Client requests for individual control in special areas (President's office, etc.)
- Heating and cooling load profiles for rooms and spaces
- Thermal design conditions for rooms and spaces
- Occupancy/usage schedules for rooms and spaces

In order for the Green Globes Assessor to easily verify the above criterion sought, projects should submit the zone plan, including space names and square footages, during the assessor's review.

Scoring Matrix

Response	Score	Max Points
1,500 ft ² (140 m ²) or less	5	5
More than 1,500 ft ² (140 m ²)	0	5
No	0	5
N/A	0	0

GREEN GLOBES #6.4.2.3

Do open circulation areas (such as open offices and healthcare general patient areas) have thermal control zones that are 1,000 ft² (93 m²) or less?

- 500 ft² (46 m²) or less (5 points)

- 1,000 ft² (93 m²) or less (3 points)

- More than 1,000 ft² (93 m²) (0 points)

- No (0 points)

- N/A

Tooltip

“Thermal zone” means a segment of a building with similar thermal requirements serviced by the same mechanical equipment and controls. Mark “N/A” where there are no such areas.

Assessment Guidance

Thermal control zones, for this criterion’s purpose, can be defined as a space or group of spaces with similar desired thermal conditions (temperature, humidity, etc.) that are maintained using a dedicated sensor (thermostat, humidistat, etc.). Mechanical designers typically call these simply HVAC zones and will usually develop a zone plan early in the design stage showing which rooms/areas will fall into each zone. This zone plan should be updated throughout the design and final zone plan should be issued to the owner’s building staff for their records and use. Thermal control zones should be laid out based on following parameters:

- Client requests for individual control in special areas (President’s office, etc.)
- Heating and cooling load profiles for rooms and spaces
- Thermal design conditions for rooms and spaces
- Occupancy/usage schedules for rooms and spaces

In order for the Green Globes Assessor to easily verify the above criterion sought, projects should submit the zone plan, including space names and square footages, during the assessor's review.

Scoring Matrix

Response	Score	Max Points
500 ft ² (46 m ²) or less	5	5
1,000 ft ² (93 m ²) or less	3	5
More than 1,000 ft ² (93 m ²)	0	5
No	0	5
N/A	0	0

GREEN GLOBES #6.4.2.4

Do smaller functional areas such as offices, meeting rooms, and hospital/hotel rooms have thermal control zones that are 1,200 ft² (111 m²) or less?

- 750 ft² (70 m²) or less (5 points)
- 1,200 ft² (111 m²) or less (3 points)
- More than 1,200 ft² (111 m²) (0 points)
- No (0 points)
- N/A

Tooltip

"Thermal zone" means a segment of a building with similar thermal requirements serviced by the same mechanical equipment and controls. Mark "N/A" where there are no such areas.

Assessment Guidance

Thermal control zones, for this criterion’s purpose, can be defined as a space or group of spaces with similar desired thermal conditions (temperature, humidity, etc.) that are maintained using a dedicated sensor (thermostat, humidistat, etc.). Mechanical designers typically call these simply HVAC zones and will usually develop a zone plan early in the design stage showing which rooms/areas will fall into each zone. This zone plan should be updated throughout the design and final zone plan should be issued to the owner’s building staff for their records and use. Thermal control zones should be laid out based on following parameters:

- Client requests for individual control in special areas (President’s office, etc.)
- Heating and cooling load profiles for rooms and spaces
- Thermal design conditions for rooms and spaces
- Occupancy/usage schedules for rooms and spaces

In order for the Green Globes Assessor to easily verify the above criterion sought, projects should submit the zone plan, including space names and square footages, during the assessor’s review.

Scoring Matrix

Response	Score	Max Points
750 ft ² (70 m ²) or less	5	5
1,200 ft ² (111 m ²) or less	3	5
More than 1,200 ft ² (111 m ²)	0	5
No	0	5
N/A	0	0

GREEN GLOBES #6.4.2.5

Are IT closets and rooms conditioned independently from the base building system with separate controls?

- Yes (2 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no such areas.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

Acoustic Comfort

48

Acoustic Comfort

48

GREEN GLOBES #6.5.1

Is the tenant space acoustic design consistent with the intended requirements for the use?

- Yes (5 points)
- No (0 points)

Tooltip

A written acoustic control design strategy should be developed to serve as the basis of design for each type of space.

Assessment Guidance

An acoustic control design strategy, and incorporated acoustic control measures, as shown in the construction documents and submittals, will serve as thorough documentation for the Green Globes Assessor.

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5

GREEN GLOBES #6.5.2

Does the space design include the following interior sound control strategies:

Tooltip

“Acoustically separated areas” means an enclosed space that, to function properly, requires separation from other adjacent spaces by wall, floor, and ceiling assemblies that have an STC rating adequate to allow clear, intelligible communication between sender and receiver within the space (e.g. meeting rooms, auditoria, lecture halls, libraries, classrooms, conference rooms, private offices, private rooms in health care facilities, sleeping rooms etc.).

Assessment Guidance

Most of the design decisions and construction procedures for these criteria will be detailed on the architectural drawings. The architect should be made aware if a project is pursuing these criteria early in the design, when space planning is being coordinated. In general, architectural acoustic design attempts to optimize isolation (keeping noise within or preventing it from entering a space) and/or sound quality (judicious use of surfaces, shaping, and finishes to achieve a desired effect). Although these goals often go together, there are many examples where one is targeted with little concern for the other. For example, a mechanical equipment room may be designed with heavy walls, high-quality doors, and structural breaks to keep noise and vibration from being transmitted to occupied spaces; however, the quality of the noise within the mechanical equipment room is perceived as irrelevant and no thought is given to the room finishes or layout with regard to room acoustic response. Similarly, a large space used for a marching band to practice indoors in the event of inclement or uncomfortable weather may incorporate specific architectural features and finishes to provide a good listening environment for the users but there may be little concern about noise leaking out of the building due to its location or the expectations of adjacent users. Designers should remember that not every area that is 'acoustically separated' requires both good isolation and good quality – the requirements depend on whether the room houses sources or receivers, as well as the function of the rooms.

For sub-criteria 6.5.2.2, “mechanical rooms” refers to both mechanical and electrical equipment rooms since electrical equipment can also have high, tonal noise levels.

Entry doors to acoustically sensitive areas are often the weak point in the design of the enclosure. Exterior doors should be vestibules/double-doors or should incorporate bubble/brush gaskets and/or drop seals. Interior doors should be staggered for rooms opposite each other on the same corridor.

Construction Documents , HVAC design documents required for verification.

References

- *ASHRAE Systems Application Handbook-2007, Chapter 47*
- *ANSI S12.60-2010/Part 1*
- *ASTM E1374-06*

GREEN GLOBES #6.5.2.1

Toilets are located remotely from acoustically separated areas?



- Yes (2 points)

- No (0 points)

- N/A

Tooltip

Mark "N/A" where there are no such areas or restrooms are existing and therefore cannot effectively be acoustically separated from acoustically separated areas due to space configuration limitations.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0



GREEN GLOBES #6.5.2.2

Acoustically separated areas are located away from noise producing areas such as dance studios, music rooms, cafeterias, indoor swimming pools, mechanical rooms, and gymnasias?

- Yes (2 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no such areas or noise producing areas are existing and cannot effectively be acoustically separated from acoustically separated areas due to space configuration limitations.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #6.5.2.3

Entry doors to rooms opposite each other on the same corridor are staggered?



- Yes (2 points)

- No (0 points)

- N/A

Tooltip

Mark "N/A" where there are no such areas.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #6.5.2.4

Through-wall penetrations comply with Annex B of *ANSI/ASA S12.60-2010/Part 1*?



- Yes (2 points)
- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2

GREEN GLOBES #6.5.2.5

Walls separating acoustically separated areas from other areas are constructed full height to underside of the next floor above or the roof deck?



- Yes (2 points)
- No (0 points)

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2

GREEN GLOBES #6.5.2.6

Walls separating quiet areas from other areas have all joints and penetrations sealed with acoustical sealant?



- Yes (2 points)

- No (0 points)

- N/A

Tooltip

Mark "N/A" where there are no such areas.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0



GREEN GLOBES #6.5.2.7

Areas with high floor impact activities (dance studios, shops, gymnasias, etc.) are not located above acoustically separated areas?

- Yes (2 points)

- No (0 points)

- N/A

Tooltip

This is in reference to physical adjacencies of spaces within the overall space plan of a tenant fit-out that is multiple stories. Mark “N/A” where there are no such areas.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #6.5.3

Has an Acoustics Consultant or Acoustician signed off on the design that shows that open office areas conform to *ASTM E1573-02* with respect to spatial uniformity, temporal uniformity, spectrum shape, and sound level?

- Yes (5 points)

- No (0 points)

- N/A

Tooltip

Strategies may include minimum 54 inch high open office furniture, high performance ceiling tile 180 Articulation Class (AC), and sound masking. Mark “N/A” where there are no open office areas.

Assessment Guidance

The Green Globes Assessor may request sound level measurements taken at the property line; description of acoustic design strategies and all design targets; FIIC value for flooring assemblies ; acoustic mitigation measures for mechanical equipment and plumbing systems; and Test Report indicating compliance with *ANSI S12.60-2010/Part 1*.

References

- *ASHRAE Systems Application Handbook-2007, Chapter 47*
- *ANSI S12.60-2010/Part 1*
- *ASTM E1374-06*

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0

GREEN GLOBES #6.5.4

Has an Acoustics Consultant or Acoustician signed off on a design that complies with minimum Sound Transmission Class (STC) ratings of floor/ceiling assemblies, walls and doors between acoustically separated areas (learning spaces), and adjacent spaces as follows and as applicable:

Tooltip

Verify that construction documents include that ambient sound levels in enclosed, occupied spaces fall within specified STC ratings . Review the acoustical analysis prepared by an acoustical designer and the design and construction drawings showing the details required for optimum acoustic performance.

Assessment Guidance

The STC rating indicates the maximum noise reduction performance of an architectural element based on its performance relative to an ideal defined curve but allows for significant deviations within narrow frequency bands. Projects pursuing this criterion should provide acoustical consultant report/diagrams or architectural drawings that detail and describe the STC ratings of walls, floors, ceiling, doors, and windows. STC ratings that meet or exceed the above criteria will count for points.

GREEN GLOBES #6.5.4.1

STC-45 where the adjacent space is a corridor, stair, office, or conference room?

- 
- Yes (1 points)

-
- No (0 points)

-
- N/A

Tooltip

Mark “N/A” where there are no such areas.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #6.5.4.2

STC-50 where the adjacent space is a quiet area, speech clinic, health clinic, classroom, or an exterior wall?

- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no such areas.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #6.5.4.3

STC-50 for doors to quiet areas?

- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no such areas.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #6.5.4.4

STC-40 for doors to music rooms, cafeterias, natatoria (e.g. swimming pool), or gymnasias?



- Yes (1 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no such areas.

Scoring Matrix

Response	Score	Max Points
Yes	1	1
No	0	1
N/A	0	0

GREEN GLOBES #6.5.5

Does the Impact Insulation Class (IIC) design of all floor-ceiling assemblies have a minimum rating of IIC-50?

- Yes (5 points)
-
- No (0 points)

Tooltip

Verify that sound transmission from the outside and between rooms and floors will be attenuated, and that primary spaces will be effectively insulated from undesirable impact noise (stairways, mechanical transportation, etc.) when adjacent spaces are fully occupied and being used normally. Check that the appropriate Impact Insulation Class (IIC) values have been specified. Check that engineering design calculations and drawings by a licensed Acoustical Consultant or Acoustician are included.

Assessment Guidance

Since not every state has a separate designation for acoustical engineers and, since few Acoustics Consultants or Acousticians are registered engineers, IIC calculations and drawings should, at minimum, be prepared by a firm that specializes in or has a department that specializes in acoustics.

References

- ASTM E989-06

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5

GREEN GLOBES #6.5.5.1

↳ Indicate the Impact Insulation Class (IIC) value:

Tooltip

This criterion is informational only and is not scored.

GREEN GLOBES #6.5.6

Has an Acoustics Consultant or Acoustician signed off on a design that shows Reverberation Time (RT) in quiet areas and all other areas where speech intelligibility is important does not exceed the following values as applicable:

- 0.6 seconds in spaces less than 10,000 ft³ in volume?

AND

- 0.7 seconds in spaces 10,000 - 20,000 ft³ in volume?

AND

- Compliance with Annex C of *ANSI/ASA S12.60-2010/Part 1* in spaces larger than 20,000 ft³ in volume?

- Yes (5 points)
-

- No (0 points)
-

- N/A

Tooltip

This ensures that room resonance levels support activities such as face-to-face communication, conferences, or individual work. In offices, measures also include: work stations that are zoned and isolated as necessary, and use of sound absorbing materials such as carpeting and acoustic tiles to attenuate noise in office areas. Mark “N/A” for MURBs.

Assessment Guidance

Acoustical Design Documents affixed with professional stamp or signature required for verification.

References

- *ANSI S12.60-2010/Part 1*

Scoring Matrix

Response	Score	Max Points
Yes	5	5
No	0	5
N/A	0	0

GREEN GLOBES #6.5.7

Does the predominant lighting type utilize low-noise ballasts in quiet areas and all other areas where speech intelligibility is important?

- Yes (2 points)
-
- No (0 points)

Assessment Guidance

Ballast noise from electromagnetic and electronic ballasts used in fluorescent lighting systems is typically characterized by a “humming” sound. Ballast manufacturers assign a sound rating to their ballasts from “A” through “F”, with “A” being the quietest. Because electronic ballasts have smaller components, they tend to have the lowest sound rating. However, there is no standard for this rating; it is left entirely up to the manufacturers to rate their ballasts. This sound rating can be found listed under the ballast’s specifications. In situations where the required light output necessitates using ballasts with a higher sound rating, the ballasts should be remotely located.

ANSI S12.60-2010/Part 1 covers the acoustical performance criteria, design requirements, and guidelines for permanent schools, though this standard is used for other learning or sound critical spaces as well. Noise from light fixtures or other electrical equipment is not dictated in the standard by ratings or sound levels of the equipment. In order to comply with the standard, the interior-source background noise cannot exceed the limits specified in the table below. Although the table separates sound level limits by HVAC type, the limits include all building services, including lighting. Section 5.2.2.1 of the standard indicates: “The one-hour average A- or C- weighted sound levels of any other building sounds (e.g.

lighting) for which sound power data are available, shall be combined on time-means-square basis with calculated one-hour average A- or C- weighted sound level of the HVAC noise before determining conformance. Where sound power data are not available, estimated one-hour average A- or C- weighted sound levels shall be used.” Table 6.5.7: ANSI/ASA S12.60-2010 Noise Limits, are on one-hour average A- and C-weighted sound levels—designated by X/Y in the table below—from sources associated with the building services and utilities.

Table 6.5.7 ANSI/ASA S12.60-2010 Noise Limits

Room Type	HVAC Operating Condition	Building Services ^{a)} sound level limits (dB) ^{c) d)}	
		Single mode HVAC Type 1	Multiple mode HVAC Type 2
Core learning space	Design or maximum capacity heating or cooling	35 / 55	37 / 57
	Reduced or low capacity heating or cooling or ventilation ^{b)}	N/A	34 / 54
Ancillary space	Design or maximum capacity heating or cooling	40 / 60	42 / 62
	Reduced or low capacity heating or cooling or ventilation ^{b)}	N/A	39 / 59
Type 1 – represents systems that have a single operational mode of performance Type 2 – represents systems that have multiple stages of cooling or heating, multiple or variable fan speeds, or ventilation-only models			
a) The level for HVAC sound shall be combined with the level of the sound from other building systems such as lights, plumbing, etc., if applicable. If present, the contribution of an outdoor condenser or chiller to the classroom sound level shall be combined with the sound from the other building services. b) The operating condition is one that occurs frequently and represents airflow less than design or reduced refrigeration capacity of both. c) The HVAC design location shall be at the loudest position that is at a height of 1 m above the floor and no closer than 1 m from a wall or fixed object such as HVAC supply or return opening. d) An HVAC unit designed to provide climate control and ventilation for individual classrooms that conforms to the <u>35 dB</u> hourly equivalent level requirements of ANSI/ASA S12.60 Part 2 shall be considered to conform to the requirements of ANSI/ASA S12.60 Part 1.			

Beyond the above requirements, *ANSI S12.60-2010* has requirements from the tonal sounds generated from building utilities (e.g. ballast noise). Any tonal sounds from lighting ballasts need to be quantified using the methods in *ANSI/ASA S1.13-2005* ensuring no “prominent discrete tones.” A prominent discrete tone can be defined as a sound (often perceived as a whine or hum) that can be heard distinctly as a single pitch or a set of pitches. Technically, a prominent discrete tone exists if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure levels of the 2 contiguous one-third octave bands by:

- 5 dB for center frequencies of 500 Hz and above
- 8 dB for center frequencies between 160 and 400 Hz
- 15 dB for center frequencies less than or equal to 125 Hz

For compliance with 6.5.7, cut sheets should be provided during the Green Globes Assessor’s review for all ballasts specified on the project showing the manufacturer’s sound rating. A narrative should be provided, justifying areas with ballasts rated lower than “A.”

Additional strategies to mitigate the noise from the electrical system include:

- Transformers often emit strong tonal noise and vibration characteristics. Identify location of transformers and hang with isolation hangers or mount resiliently. Ensure the feeder enters at the top or side to avoid transmitting vibration to structure.
- If dimmers are to be employed, use sine-wave dimmers or specify dimmers with high 'rise-times' to avoid having the filaments and fixtures 'sing' when partly loaded.
- Conduit penetrations at equipment rooms and other noisy spaces should be sealed to the same standard of care and detail as piping and ductwork.

The assessor may also request sound level measurements taken at the property line; description of acoustic design strategies and all design targets; FIIC value for flooring assemblies ; acoustic mitigation measures for mechanical equipment and plumbing systems; specification which includes Annex E of *ANSI S12.60-2010/Part 1*; and Test Report indicating compliance with *ANSI S12.60-2010/Part 1*.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2

GREEN GLOBES #6.5.8

Does the noise from light fixtures and other electrical fixtures not exceed values indicated in *ANSI S12.60-2010/Part 1*?

- Yes (2 points)
-
- No (0 points)

Assessment Guidance

Ballast noise from electromagnetic and electronic ballasts used in fluorescent lighting systems is typically characterized by a “humming” sound. Ballast manufacturers assign a sound rating to their ballasts from “A” through “F”, with “A” being the quietest. Because electronic ballasts have smaller components, they tend to have the lowest sound rating. However, there is no standard for this rating; it is left entirely up to the manufacturers to rate their ballasts. This sound rating can be found listed under the ballast’s specifications. In situations where the required light output necessitates using ballasts with a higher sound rating, the ballasts should be remotely located.

ANSI S12.60-2010/Part 1 covers the acoustical performance criteria, design requirements, and guidelines for permanent schools, though this standard is used for other learning or sound critical spaces as well. Noise from light fixtures or other electrical equipment is not dictated in the standard by ratings or sound levels of the equipment. In order to comply with the standard, the interior-source background noise cannot exceed the limits specified in the table below. Although the table separates sound level limits by HVAC type, the limits include all building services, including lighting. Section 5.2.2.1 of the standard indicates: “The one-hour average A- or C- weighted sound levels of any other building sounds (e.g. lighting) for which sound power data are available, shall be combined on time-means-square basis with calculated one-hour average A- or C- weighted sound level of the HVAC noise before determining conformance. Where sound power data are not available, estimated one-hour average A- or C- weighted sound levels shall be used.” Table 6.5. 8: ANSI/ASA S12.60-2010 Noise Limits, are on one-hour average A- and C-weighted sound levels—designated by X/Y in the table below—from sources associated with the building services and utilities.

Table 6.5.8: ANSI/ASA S12.60-2010 Noise Limits

Room Type	HVAC Operating Condition	Building Services ^{a)} sound level limits (dB) ^{c,d)}	
		Single mode HVAC Type 1	Multiple mode HVAC Type 2
Core learning space	Design or maximum capacity heating or cooling	35 / 55	37 / 57
	Reduced or low capacity heating or cooling or ventilation ^{b)}	N/A	34 / 54
Ancillary space	Design or maximum capacity heating or cooling	40 / 60	42 / 62
	Reduced or low capacity heating or cooling or ventilation ^{b)}	N/A	39 / 59

Type 1 – represents systems that have a single operational mode of performance
Type 2 – represents systems that have multiple stages of cooling or heating, multiple or variable fan speeds, or ventilation-only models

a) The level for HVAC sound shall be combined with the level of the sound from other building systems such as lights, plumbing, etc., if applicable. If present, the contribution of an outdoor condenser or chiller to the classroom sound level shall be combined with the sound from the other building services.
b) The operating condition is one that occurs frequently and represents airflow less than design or reduced refrigeration capacity of both.
c) The HVAC design location shall be at the loudest position that is at a height of 1 m above the floor and no closer than 1 m from a wall or fixed object such as HVAC supply or return opening.
d) An HVAC unit designed to provide climate control and ventilation for individual classrooms that conforms to the 35 dB hourly equivalent level requirements of *ANSI/ASA S12.60 Part 2* shall be considered to conform to the requirements of *ANSI/ASA S12.60 Part 1*.

Beyond the above requirements, *ANSI S12.60-2010* also has requirements from the tonal sounds generated from building utilities (e.g. ballast noise). Any tonal sounds from lighting ballasts need to be quantified using the methods in *ANSI/ASA S1.13-2005* ensuring no “prominent discrete tones.” A prominent discrete tone can be defined as a sound (often perceived as a whine or hum) that can be heard distinctly as a single pitch or a set of pitches. Technically, a prominent discrete tone exists if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure levels of the 2 contiguous one-third octave bands by:

- 5 dB for center frequencies of 500 Hz and above
- 8 dB for center frequencies between 160 and 400 Hz
- 15 dB for center frequencies less than or equal to 125 Hz

For compliance with criteria 6.5.8, calculations should be performed by an Acoustical Consultant or Acoustician for all relevant building systems (HVAC, lighting, etc.) sources and paths or testing shall be required for each learning space (or other acoustically sensitive) to ensure that the requirements of Table 6.5.8: ANSI/ASA S12.60-2010 Noise Limits above are met. The testing shall also include provisions for measuring tonal sounds emitted by

electrical equipment and lighting fixtures. Annex A of *ANSI/ASA S12.60-2010* outlines how to verify the conformance to the standard by field measurements and so should be referenced in the project's specifications. These test results should be submitted to the Green Globes Assessor prior to the on-site visit for review.

Additional strategies to mitigate the noise from the electrical system include:

- Transformers often emit strong tonal noise and vibration characteristics. Identify location of transformers and hang with isolation hangers or mount resiliently. Ensure the feeder enters at the top or side to avoid transmitting vibration to structure.
- If dimmers are to be employed, use sine-wave dimmers or specify dimmers with high 'rise-times' to avoid having the filaments and fixtures 'sing' when partly loaded.
- Conduit penetrations at equipment rooms and other noisy spaces should be sealed to the same standard of care and detail as piping and ductwork.

The assessor may also request sound level measurements taken at the property line; description of acoustic design strategies and all design targets; FIIC value for flooring assemblies ; acoustic mitigation measures for mechanical equipment and plumbing systems; specification which includes Annex E of *ANSI S12.60-2010/Part 1*; and Test Report indicating compliance with *ANSI S12.60-2010/Part 1*.

References

- *ANSI S12.60-2010/Part 1*
- *ANSI/ASA S1.13-2005*

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2

GREEN GLOBES #6.5.9

Does the layout provide the possibility of designating “Quiet Zones” or “Privacy Areas” for focused, concentrated work and private conversations?

- Yes (2 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there is no need for these zones.

Assessment Guidance

Space planning and programming activities should address the need for specific quiet and privacy areas, allowing streamlined pre-design and design of special acoustical spaces. Space planning and construction documents required for verification.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

GREEN GLOBES #6.5.10

Are there small enclosed meeting rooms to take conference calls on speaker phones?

- Yes (2 points)

- No (0 points)

Assessment Guidance

Construction Documents and/or the assessment site visit will cover the requirements required for verification.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2

GREEN GLOBES #6.5.11

Is there a sound masking system (white noise) or fabric solution for noise absorption used in open office areas?

- Yes (2 points)

- No (0 points)

- N/A

Tooltip

Mark “N/A” where there are no open office areas.

Assessment Guidance

Open office areas can have acoustical problems depending on the design of the building shell, as well as other building structural and occupancy factors, including activities above and below adjacent floors. There may be instances where an acoustical problem will not be identified until construction is complete and furnishings are in place; this situation may require some remedial measures at occupancy. Construction Documents, submittals, testing results, and follow up remedial plays may be required for verification.

Scoring Matrix

Response	Score	Max Points
Yes	2	2
No	0	2
N/A	0	0

Appendix A: LIST OF REFERENCES

The following is an alphabetical list of References recommended within this Technical Reference Manual. Click on the criteria number to link back to the corresponding subsection heading within the manual (references with website links listed at end of Appendix A).

- [A Whole Systems Approach- Integrated Building Design](#)
 - [Green Globes #1.1.1.1](#)
- [AABC Commissioning Group](#)
 - [Green Globes #1.4.1.1](#)
- ANSI S12.60-2010/Part 1
 - [Green Globes #6.5.2](#)
 - [Green Globes #6.5.3](#)
 - [Green Globes #6.5.6](#)
 - [Green Globes #6.5.8](#)
- ANSI/ASA S1.13-2005
 - [Green Globes #6.5.8](#)
- ANSI/ASHRAE Standard 15-2010, Safety Standard for Refrigeration Systems
 - [Green Globes #5.2.2](#)
 - [Green Globes #5.2.3](#)
- ANSI/ASHRAE Standard 160-2009: Criteria for Moisture Control Design Analysis in Buildings
 - [Green Globes #6.2.2.1](#)
- ANSI/ASHRAE Standard 55-2010
 - [Green Globes #1.1.2.1](#)
 - [Green Globes #6.4.1.1](#)
- ANSI/ASHRAE Standard 62.1-2010 - The Standards For Ventilation & Indoor Air Quality
 - [Green Globes #6.1.1.1](#)
- ANSI/ASHRAE Standard 62.1-2010, Section 6.2.7
 - [Green Globes #6.1.2.1](#)
- ANSI/ASHRAE Standard 62.1-2010: Ventilation of Acceptable Indoor Air Quality
 - [Green Globes #1.4.3.1](#)
 - [Green Globes #6.2.2.1](#)
- ANSI/ASHRAE/IES Standard 90.1-2010
 - [Green Globes #2.2.1](#)
 - [Green Globes #2.3.1.1](#)
 - [Green Globes #2.5.2.1](#)
- ANSI/ASHRAE/IES/USGBC Standard 189.1-2014, Standard for the Design of High-

Performance Green Buildings, Appendix F: Integrated Design

- [Green Globes #1.1.1](#)
- [Green Globes #1.1.2.1](#)
- [Green Globes #1.1.3.1](#)
- ANSI/ASHRAE/IESNA Standard 90.1-2010
 - [Green Globes #2.2.3](#)
- ANSI/ASHRAE/IESNA Standard 90.1-2010, Section 6.4.3.9
 - [Green Globes #6.1.2.1](#)
- ANSI/ASHRAE/USGBC/IES Standard 189.1-2009
 - [Green Globes #6.2.1.7](#)
- ANSI/ASHRAE/USGBC/IES Standard 189.1-2009: Section 505, Paragraph 10.3.2.3
 - [Green Globes #4.5.1](#)
- ANSI/ASHRAE/USGBC/IES Standard 189.1-2011, Standard for the Design of High-Performance Green Buildings Appendix H: Integrated Design
 - [Green Globes #1.1.1.1](#)
 - [Green Globes #1.1.2.1](#)
 - [Green Globes #1.1.3.1](#)
- ANSI/BIFMA Standard M7.1-2011 Test Method for Determining VOC Emissions, Normative Appendix E
 - [Green Globes #6.2.1.7](#)
- ASHRAE Guideline 0-2005: The Commissioning Process, Articles 5, 6, and 7
 - [Green Globes #1.4.1.1](#)
- ASHRAE Guideline 0-2005: Article 7.2.14
 - [Green Globes #1.4.2.1](#)
- ASHRAE Guideline 0-2005: The Commissioning Process, Annex L
 - [Green Globes #1.4.1.2](#)
- ASHRAE Guideline 11-2007 – HVAC&R Technical Requirements for The Commissioning Process
 - [Green Globes #1.4.1.1](#)
- [ASHRAE Indoor Air Quality Guide: Best Practices for Design, Construction, and Commissioning](#)
 - [Green Globes #1.2.1.1](#)
 - [Green Globes #4.1.1.1](#)
- ASHRAE Standard 202-2013: Commissioning Process for Buildings and Systems
 - [Green Globes #1.4.1.1](#)
 - [Green Globes #1.4.1.2](#)
 - [Green Globes #1.4.2.1](#)

- ASHRAE Systems Application Handbook-2007, Chapter 47
 - [Green Globes #6.5.2](#)
 - [Green Globes #6.5.3](#)
- ASTM D523-08: Standard Test Method for Specular Gloss
 - [Green Globes #6.2.1.3](#)
- ASTM D6886-03 Standard Test Method for Speciation of the VOCs in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography
 - [Green Globes #6.2.1.3](#)
- ASTM E1374-06
 - [Green Globes #6.5.2](#)
 - [Green Globes #6.5.3](#)
- ASTM E1692-95 Standard Classification for Serviceability of an Office Facility for Change and Churn by Occupants
 - [Green Globes #4.3.1](#)
- ASTM E989-06
 - [Green Globes #6.5.5](#)
- [Advanced Buildings, Plug Load Best Practices Guide for Office](#)
 - [Green Globes #2.6.1.1](#)
- [Arizona Municipal Water Users Association, Building Water Efficiency - Vacuum Systems](#)
 - [Green Globes #3.3.1.3](#)
- [Better Bricks- Integrated Design and Delivery](#)
 - [Green Globes #1.1.1.1](#)
- [Building Commissioning Association](#)
 - [Green Globes #1.4.1.1](#)
- CIBSE Lighting Guide (LG10-1999)
 - [Green Globes #6.3.1.1](#)
- CSA S478-95 (R2007): Guideline on Durability in Buildings
 - [Green Globes #4.5.1](#)
- CSA Z782-06: Guideline for Design for Disassembly and Adaptability in Buildings
 - [Green Globes #4.3.1](#)
- [California Office of Environmental Health Hazard - Assessment list of Chronic Reference Exposure Levels](#)
 - [Green Globes #1.2.2.1](#)
- [ENERGY STAR- What are “Modified Energy Factor” and “Water Factor” on ENERGY STAR qualified clothes washers list?](#)
 - [Green Globes #3.3.2.1](#)
- [Extension America’s Research-based Learning Network - Water Features, Conserving Water](#)

- [Green Globes #3.3.3.2](#)
- GreenChill Best Practices Guideline Ensuring Leak-Tight Installations of Commercial Refrigeration Equipment
 - [Green Globes #5.2.1](#)
- [IEA Solar Heating and Cooling Task 23- Examples of Integrated Design](#)
 - [Green Globes #1.1.1.1](#)
- ISO 14040:2006 Environmental Management – Life Cycle Assessment – Principles and Framework
 - [Green Globes #4.1.1.1](#)
- ISO 14044:2006: Environmental Management – Life Cycle Assessment – Requirements and Guidelines
 - [Green Globes #4.1.1.1](#)
- ISO 15099 Standard
 - [Green Globes #2.2.1](#)
- Illuminating Engineering Society (IES): The Lighting Handbook
 - [Green Globes #6.3.2.1](#)
- International Building Code®(IBC)
 - [Green Globes #6.2.2.1](#)
- [International Commission on Illumination](#)
 - [Green Globes #6.3.1.1](#)
- International Green Construction Code (IgCC): Section 505
 - [Green Globes #4.5.1](#)
- NIBS Guideline 3-2012: Building Enclosure Commissioning Process BECx
 - [Green Globes #1.4.1.1](#)
 - [Green Globes #1.4.1.2](#)
 - [Green Globes #1.4.2.1](#)
- [Northeast Recycling Council, Hauler Terms and Waste Conversion Factors](#)
 - [Green Globes #4.4.1.1](#)
- SMACNA IAQ Guidelines for Occupied Buildings Under Construction
 - [Green Globes #1.2.2.2](#)
- South Coast Air Quality Management District (SCAQMD)- Rule 1168
 - [Green Globes #1.2.2.2](#)
- South Coast Air Quality Management District (SCAQMD)- Rule 1168
 - [Green Globes #6.2.1.1](#)
- [The Carpet and Rug Institute \(CRI\), Commercial Green Label / Green Label Plus](#)
 - [Green Globes #6.2.1.2](#)
- [The Green Spotlight - Switch to High-Efficiency Plumbing Fixtures to Save Water, Energy, and Money, August 25, 2010](#)

- [Green Globes #3.1.1](#)
- [U.S. Environmental Protection Agency \(EPA\) - WaterSense Program](#)
 - [Green Globes #3.1.1](#)
- [U.S. Environmental Protection Agency \(EPA\) -Greening Your Purchase of Cleaning Products, A Guide for Federal Purchasers](#)
 - [Green Globes #1.4.3.1](#)
- U.S. Environmental Protection Agency (EPA) Testing for Indoor Air Quality: Section 01 81 09 (December 2007)
 - [Green Globes #1.2.2.1](#)
- U.S. Environmental Protection Agency (EPA), Significant New Alternatives Policy (SNAP) Listing
 - [Green Globes #5.2.2](#)
- [WINDOW 6.3](#)
 - [Green Globes #2.2.1](#)
- [Whole Building Design Guide \(WBDG\)](#)
 - [Green Globes #4.5.1](#)
- [Whole Building Design Guide \(WBDG\) : Daylighting](#)
 - [Green Globes #6.3.1.1](#)
- [Whole Building Design Guide \(WBDG\): Building Commissioning](#)
 - [Green Globes #1.4.1.1](#)
- [Whole Building Design Guide \(WBDG\): Project Planning, Delivery, Controls](#)
 - [Green Globes #1.1.3.1](#)
- [Whole Systems Integrated Process Guide](#)
 - [Green Globes #1.1.1.1](#)
 - [Green Globes #1.1.2.1](#)
 - [Green Globes #1.1.3.1](#)

Appendix B: SUPPORTING DOCUMENTATION

The following is a comprehensive list of Supporting Documentation recommended within this Technical Reference Manual and the Pre-Assessment Checklist organized by assessment area.

Section 1 – Project Management

- Owner's Project Requirements (OPR)
- Division 01 specifications
- List of written performance goals
- Progress meeting agendas and meeting minutes
- List of key personnel and a description of their major tasks
- EMS plan covering mold control, IAQ, and environmental purchasing as incorporated in the contract
- Construction documents*
- Manufacturer's specifications, cut sheets and performance documentation (needed for a significant number of criteria in the other Environmental Assessment Areas)
- Photographs of protected building materials
- IAQ Management Plan as submitted by general contractor and approved by Owner's PM
- Basis of Design (BOD) documents
- Commissioning Plan
- Commissioning reports (including field testing results)
- Operations and maintenance manual (including all plans, protocols, strategies and contracts)

Section 2 – Energy

- Energy design, modeling and simulation program's input and results
- Construction documents*
- Manufacturer's specifications, cut sheets, and performance documentation
- Current telecommuting and meeting plan and policy
- Design documentation for lighting and integration
- Energy metering reporting plan
- Measurement and verification program details
- Energy certifications or labels
- Manufacturer's programming data, schematics, and sequence of operation for BAS and Energy Monitoring equipment
- References to specifications and drawings of sub-metering equipment
- Cut sheets for meters and meter reading equipment
- Effective aperture for vertical fenestration calculations

- Equipment specifications, control schedules and diagrams
- Results of leak and continuity testing

Section 3 – Water

- Construction documents*
- Manufacturer's specifications, cut sheets, and performance documentation for all plumbing fixtures, fittings and appliances (if finished restrooms and/or kitchens are part of project)
- Plumbing plans
- Manufacturer's specifications, cut sheets, and performance documentation for pre-rinse spray valves, ice machines, food steamers, dishwashers and combination ovens
- Manufacturer's specifications, cut sheets, and performance documentation for all meters
- Manufacturer's specifications, cut sheets and performance documentation for filtration systems, pressure drop gauges, reverse osmosis systems, water softeners, and recharge controls (if part of project)
- Manufacturer's specifications, cut sheets and performance documentation for the Meter Data Management System and meters

Section 4 – Resources

- Construction documents*
- Input and results from any BEES or other LCA instrument
- Manufacturer's specifications, cut sheets and performance documentation
- List of recycled content materials and percentage calculation
- Wood-based products certification documentation
- Manufacturer's description and specifications for flooring as applies to maintenance and serviceability
- Waste minimization plan

Section 5 – Pollution Control

- Construction documents* and specifications
- Manufacturer's specifications, cut sheets, and performance documentation
- Hazardous Materials Survey Document
- Implemented Pest and Contamination Control Plan

Section 6 – Indoor Environment

- Construction documents* and specifications
- Manufacturer's specifications, cut sheets, and performance documentation
- Ventilation design and schedules, including integration of mechanical and natural ventilation

- Manufacturing specifications for ventilation systems, CO₂ sensing and ventilation control equipment
- Ventilation air quantity design data
- Local ventilation codes or standards
- Manufacturer's specifications, cut sheets, and performance documentation for HVAC systems, humidification/dehumidification systems, CO₂ monitoring devices, wet cooling towers and domestic hot water systems list of mold resistant materials
- Documentation demonstrating compliance with ANSI/ASHRAE Standard 62.1-2007: section 5.14, "HVAC Duct Construction Standards: Metal and Flexible"
- Materials Safety Data Sheets or proof of certification for low-VOC products or materials
- Manufacturer's data and specification for mold resistant materials
- Percentages and calculations for occupied areas with daylight illumination levels
- Percentages and calculations for views to building exterior or atria
- Design documentation showing daylighting integration
- Percentages and calculations for primary occupied spaces with IESNA recommended task lighting levels
- Specifications for solar shading devices and luminaires
- Lighting plans
- Documentation demonstrating compliance with ANSI/ASHRAE Standard 55-2010
- Design documentation indicating thermal comfort strategies employed
- Description of acoustic design strategies and all design targets
- FIIC value for flooring assemblies
- Specification that includes Annex E of ANSI S12.60 – 2010
- Test report indicating compliance with ANSI S12.60 – 2010

*Construction documents are defined as all of the written and graphic documents prepared or assembled by the architect/engineer for communicating the design and administering the project. The term "Construction Documents" also includes the Project Manual that contains the bidding forms and instructions, contract forms and conditions, and specifications as well as documentation of all modifications made after the construction agreements are signed.

Appendix C: DEFINITIONS

The following is a list of definitions for many terms used within this Technical Manual. Definitions not found in this section may be found in standards referenced throughout this Manual. Where definitions in this Manual differ from those in a referenced standard or any other source, definitions found in this Manual shall be used.

air economizer :**** system found on HVAC air handling systems that takes advantage of favorable weather conditions to reduce mechanical cooling by introducing cooler outdoor air into a building.

alteration: any construction or renovation to an existing structure other than repair or addition.

approved: acceptable to the code official or authority having jurisdiction.

area, total building floor: the total of the total floor areas on all stories of the building.

area, total floor: the total area of a story as measured from the interior side of the exterior walls.

assemblies :**** building systems categorized as exterior walls, internal partitions, windows, interim floors, roofs, beams and columns.

Basis Of Design (BOD): a document that records the concepts, calculations, decisions, and product selections used to meet the owner's project requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

bio-based product :commercial or industrial product using at least 50% (by weight), biologically-generated substances, including but not limited to cellulosic materials (e.g. wood, straw, natural fibers) and products derived from crops (e.g. soy-based, corn-based).

Building Automation System (BAS): a computerized, intelligent network of electronic devices, designed to automatically monitor and control the energy using systems and other systems, such as security, in a building.

building envelope :**** the element of a building that separates the conditioned interior space from the exterior, such as walls, roofs, floors, slabs, foundations, doors, and *fenestration*.

CAS number : assignment by the Chemical Abstracts Service (CAS), a division of the American Chemical Society, which assigns numbers to chemicals to allow for database searches. Most molecule databases allow searching by CAS number.

change of occupancy: a change in the purpose or level of activity within a building that involves a change in application of the requirements of this code.

charrette : a collaborative session in which a project team creates a solution to a design or project problem. The structure may vary, depending on the complexity of the problem or desired outcome and the individuals working in the group. Charrettes can take place over multiple sessions in which the group divides into sub-groups. Each sub-group then presents its work to the full group as material for future dialogue. Charrettes can serve as a way of quickly generating solutions while integrating the aptitudes and interests of a diverse group of people.

climate zone .**** see Section 5.1.4 of ANSI/ASHRAE/IESNA Standard 90.1-2007, or Section 301 of the 2009 International Energy Conservation Code (IECC).

commissioning: a process that verifies and documents that the selected building and site systems have been designed, installed, and function in accordance with the owner's project requirements and construction documents, and minimum code requirements.

Composite wood products: hardwood plywood, particleboard, and medium-density fiberboard. Composite wood products do not include the following:

1. Hardboard and structural plywood as specified in DOC PS-1;
2. Structural panels as specified in DOC PS-2;
3. Structural composite lumber as specified in ASTM D 5456;
4. Oriented strand board and glued laminated timber as specified in ANSI A190.1;
5. Prefabricated wood I-joists as specified in ASTM D 5055; and
6. Finger-jointed lumber.

Computerized Maintenance Management System (CMMS): a commercial software program that facilitates operation and maintenance activities, including scheduling, record management, and inventories.

construction documents .****all of the written and graphic documents (including BIM, CAD, and other electronic files) prepared or assembled by the architect/engineer for communicating the design, requirements, and administration of the project. The term "Construction Documents" also includes the Project Manual that contains the bidding forms and instructions, contract forms and conditions, and specifications, as well as documentation of all modifications made after the construction agreements are signed.

Construction Documents - Client Survey: the Green Globes for Sustainable Interiors online system includes a total of 5 surveys (4 client, 2 assessor): 1) Predesign (optional), 2) Construction Documents – Client, 3) Construction Documents – Assessor (third-party assessor only), 4) Post Construction – Client, and 5) Post Construction – Assessor (third-party assessor only).

Construction Documents Phase :**** the last stage of the design process. The *design and delivery team* is focused on finalizing the drawings and specifications for all components and systems of the building, producing the Contract Documents. A complete set of Contract Documents provides a comprehensive, fully coordinated set of construction documents and specifications for construction procurement, followed by what that the contractor uses to obtain necessary permits and construct the project.

control: a specialized automatic or manual device or system used to regulate the operation of lighting, equipment or appliances.

daylight saturation: the percentage of daylight hours throughout the year when not less than 28 foot candles (300 lux) of natural light is provided at a height of 30 inches (760 mm) above the floor.

daylighting :**** the use of natural light to minimize the need for artificial lighting during the day using strategies such as effective *orientation* and placement of windows, use of light wells, light shafts or tubes, skylights, clerestory windows, light shelves, reflective surfaces, and shading, and the use of interior glazing to allow light into adjacent spaces.

deconstruction: the process of systematically disassembling a building, structure, or portion thereof, so that the materials, products, components, assemblies and modules can be salvaged for repurpose, reuse or recycling.

demolition: the process of razing, relocation, or removal of an existing building or structure, or a portion thereof.

Design Development Phase :**** refines the scope of work previously approved in the *Schematic Design Phase*. In this phase the project is developed to a level of detail necessary to work out a clear, coordinated description of all aspects of the project. Major elements including equipment, fire protection, mechanical, electrical, structural, telecommunications and plumbing systems are designed and coordinated through enlarged scale drawings, detailed elevations and plans, and design mock-ups as required.

distribution pipe: pressurized or non-pressurized piping used within the plumbing system.

district cooling :** distributes chilled water or other media to multiple buildings for air conditioning or other uses. The cooling (actually heat rejection) is usually provided from a dedicated cooling plant.

drift eliminator :** structure to control water lost from cooling towers as liquid droplets are entrained in the exhaust air. A drift eliminator does not prevent water lost by evaporation.

drought tolerant plants :** plants that can withstand long periods with little or no water and/or that have relatively low water requirements.

ENERGY STAR®: a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) designed to identify and promote energy-efficient products and practices.

ENERGY STAR® qualified: appliances or equipment that has been found to comply with ENERGY STAR requirements by a third-party organization recognized by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE).

existing buildings :** a building or portion thereof that was previously occupied or approved for occupancy by the authority having jurisdiction.

exterior insulation finishing systems (EIFS): a non-load bearing exterior wall finishing system that consists of expanded polystyrene foam insulation panels attached adhesively or mechanically to the substrate, a trowel-applied base coat with fiber glass reinforcing mesh, and a trowel-applied finish coat.

exterior wall, obstructed: that portion of an exterior wall with limited access to natural light due to shading from buildings, structures, or geological formations.

facility operations: a facility is operational during the time when the primary activity that facility is designed for is taking place. For Group A and Group M occupancies, this is the time during which the facility is open to the public.

feeder conductors: the circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.

fenestration: all areas (including frames) in the building envelope that transmit light including windows, translucent panels, clerestory windows, skylights, and glass block walls. For doors where the glazed vision area is less than 50% of the door area, the *fenestration area* is the

glazed vision area. For all other doors, the *fenestration area* is the door area (including frames). **Fenestration area** is the total area of the fenestration measured using the rough opening and including glass, sash, and frame.

fit-out: interior commercial building space finish work to render the affected space ready for occupancy.

floor area, net: the actual occupied area not including unoccupied accessory areas such as corridors, stairways, toilet rooms, mechanical rooms and closets.

Finishes, furnishings, and fit-outs :**** products and materials permanently installed on the interior of a building. This definition includes casework, shelving and cabinets as well as finish materials used on floors, walls and ceilings. This definition does not include moveable furniture such as desks, tables and chairs.

global warming potential (GWP): an index, describing the radiative characteristics of well mixed greenhouse gases, that represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in absorbing outgoing infrared radiation. This index approximates the time-integrated warming effect of a unit mass of a given greenhouse gas in today's atmosphere, relative to that of carbon dioxide. (See *carbon dioxide equivalent*)

gray water **:** Untreated waste water that has not come into contact with toilet waste, kitchen sink waste, dishwasher waste or similarly contaminated sources. Graywater includes waste water from bathtubs, showers, and bathroom wash basins, clothes washers and laundry tubs.

greenhouse gas: a gas in the atmosphere that absorbs and emits radiation within the thermal infrared range.

Indoor Environmental Quality Plan :**** refers to the quality of the air and environment inside buildings, based on pollutant concentrations and conditions that can affect the health, comfort and performance of occupants-including temperature, relative humidity, light, sound and other factors.

Integrated Design Process (IDP):a process in which the project team is led by an individual and/or a team of individuals in the setting and ranking of measurable sustainable design and project delivery goals through an integrated process, and which facilitates reporting mechanisms to report to the team and owner on the progress made toward each goal, along with documentation of the process.

Integrated Design Process (IDP) team: the group of individuals selected or appointed to represent the various disciplines relevant to the project throughout the *integrated design__process (IDP)*.

integrated pest management :**** the use of different techniques to control pests, used singly or in combination, such as selection of pest-resistant plant varieties, regular monitoring for pests, use of pest-resistant materials or use of natural predators of the pest, to control pests, with an emphasis on methods that are least injurious to the environment and most specific to the particular pest.

life cycle assessment (LCA): a technique to evaluate the relevant energy and material consumed and environmental emissions associated with the entire life of a building, product, process, material, component, assembly, activity or service.

luminaire :**** a complete lighting unit, consisting of a lamp or lamps together with the components required to distribute the light, position the lamps, and connect the lamps to a power supply (often referred to as a "fixture").

major renovation :**** has occurred when 50% of the gross area (measured to the exterior footprint) of the building has been renovated.

minimum efficiency reporting value (MERV): minimum efficiency-rated value for the effectiveness of air filters.

municipally reclaimed water: *non-potable water* delivered by a municipal authority that meets or as a result of treatment, meets water quality requirements for its intended uses. The level of treatment and quality of the reclaimed water shall be approved by the authority having jurisdiction.

non-potable water: water that is not potable water (see *potable water*).

occupant load: the occupant load as calculated in accordance with the requirements of Chapter 10 of the International Building Code® (IBC).

occupant sensor control: a device or system that detects the presence or absence of people within an area and causes lighting, equipment, or appliances to be regulated accordingly.

on-site renewable energy : energy derived from sun, wind, water, Earth's core, and biomass that is captured, stored and used on the building site, using such technologies as wind turbines, photovoltaic solar panels, transpired solar collectors, solar thermal heaters, small-scale hydroelectric power plants, fuel cells, and ground-source heat pumps.

once-through cooling: the use of water as a cooling medium where the water is passed through a heat exchanger one time and then discharged to the drainage system. This also includes the use of water to reduce the temperature of condensate or process water before discharging it to the drainage system.

organic mulch : any material, that used to be living and will decompose, applied to the soil surface for protection or improvement of the area covered such as tree bark, pine needles, grass or hay clippings, leaves, straw, shredded hardwood, etc.

orientation :** the relation of a building and its associated *fenestration* and interior surfaces to compass direction and, therefore, to the location of the sun, usually given in terms of angular degrees away from south, (e.g. a wall facing due Southeast has an orientation of 45 degrees east of south).

overhang : a horizontal projection for a window or wall.

ozone depletion potential (ODP): a number that refers to the amount of ozone depletion caused by a substance.

The ODP is the ratio of the impact on ozone of a chemical compared to the impact of a similar mass of CFC-11. Thus, the ODP of CFC-11 is defined to be 1.0. Other CFCs and HCFCs have ODPs that range from 0.01 to 1.0. The halons have ODPs ranging up to 10. Carbon tetrachloride has an ODP of 1.2, and methyl chloroform's ODP is 0.11. HFCs have zero ODP because they do not contain chlorine. Manufacturers publish tables of all ozone depleting substances showing their ODPs, GWPs, and *CAS numbers*.

post-consumer recycled content :** proportion of *recycled material* in a product that is generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain (see *recycled material*).

potable water :** water from public drinking water systems or from natural freshwater sources such as lakes, streams, and aquifers where water from such natural sources would or could meet federal drinking water standards.

pre-consumer recycled content :** proportion of *recycled material* in a product that is diverted from the waste stream during the manufacturing process. Content not considered to be pre-consumer recycled includes the re-utilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it (see *recycled material*).

pre-design: initial phase of the project delivery process whereby pre-planning, planning, programming, and conceptual design activities are completed.

primary occupied space :** a room or enclosed space designed for human occupancy in which individuals perform activities for which the space has been specifically designed.

proposed design: a description of the proposed building used to estimate annual energy use for determining compliance based on total building performance including improvements in design such as the use of passive solar energy design concepts and technologies, improved building thermal envelope strategies, increased equipment and systems efficiency, increased use of daylighting, improved control strategies and improved lighting sources that will result in a decrease in annual energy.

r-value (thermal resistance): the inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area.

rain sensor (rain shutoff device): a device connected to an irrigation controller that overrides scheduled irrigation when significant precipitation is detected

rainwater :** untreated water from natural precipitation that has not been contaminated by use.

rainwater catchment :** collection and conveyance of precipitation from a rooftop or other manmade, above ground collection surface.

rainwater harvesting : utilizing *rainwater* for potable, *non-potable*, industrial or irrigation applications.

recycled content :** proportion, by cost or weight, of *recycled material* in a product or packaging. Only *pre-consumer* and *post-consumer*__*recycled materials* are considered to be recycled content (see *recycled material*).

recycled materials: materials that have been diverted from the waste stream and reprocessed and remanufactured to form part, or all of a new product.

remediation :** cleanup or other methods used to remove or contain a toxic spill, contamination or hazardous material.

renewable energy :** energy that is continuously replenished on the Earth, such as wind, solar thermal, solar electric, geothermal, hydropower, and various forms of biomass.

renovation:**** changing in-kind, strengthening, refinishing, or replacing of structural elements or upgrading of existing materials, equipment and/or fixtures.

reuse:**** object, material or resource that is used again, either for its original purpose or for a similar purpose, without significantly altering the physical form of the object or material.

salvaged materials: discarded or unused construction materials or products that have value and can be directly substituted for new materials or products with minimal reprocessing.

Schematic Design Phase:**** a critical phase where expectations are set, budget and schedule are established, and the project is submitted for approval (where applicable). Schematic Design determines the general scope, preliminary design, scale and relationships among the components of the project. The primary objective is to develop a clearly defined design with a comprehensive scope, budget and schedule, and to precede the resource intensive activity to turn selected design concepts and strategies into a finished project design ready for construction.

sequence of operations (HVAC): a fully descriptive detailed account of the intended operation of HVAC systems covering the operation of systems in narrative terms, accounting for all of the equipment that makes up the systems, how the systems are designed to operate, and how they are to be controlled.

service life:**** the expected lifetime of a product.

soil moisture sensor : a device to measure the moisture level in the soil and which is, in some instances, connected to an irrigation system in order to signal the bypass of the scheduled irrigation cycle if the soil moisture is above a specified level.

solar heat gain coefficient (SHGC): the ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation which is then reradiated, conducted or convected into the space.

solar reflectance: a measure of the ability of a surface material to reflect sunlight. It is the fraction of incident sunlight reflected by a surface, expressed on a scale of 0 to 1. Solar reflectance is also referred to as "albedo."

solar reflectance index (SRI): a value that incorporates both solar reflectance and thermal emittance in a single measure to represent a surface's relative temperature in the sun. SRI compares a surface's temperature to those of standard black and standard white surfaces. It typically ranges from 0 for standard black to 100 for standard white, but can be less than 0 or greater than 100.

STC rating :**** the rating of a finished structural building assembly of systems furniture related to the transmission of sound and noise.

structural system :**** the load-resisting system of a structure that transfers loads to the soil or supporting structure through interconnected structural components or members.

sub-metering :**** subdivision of the utility metering of a building that records the proportionate energy use of specific building systems and appliances.

substantial improvement: any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50% of the market value of the structure before the improvement or repair is started. If the structure has sustained substantial damage, any repairs are considered substantial improvement regardless of the actual repair work performed. The term does not include either of the following:

1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the code official and that are the minimum necessary to assure safe living conditions.
2. Any alteration[7] of a historic structure provided that the alteration will not preclude the structure's continued designation as a historic structure.

Sustainable Design Coordinator :**** the individual with primary responsibility for coordinating, facilitating, documenting and reporting on the *integrated design__process*.

task lighting :**** light that is directed to a specific surface or area to provide illumination for visual tasks.

u-factor (thermal transmittance): the coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films.

vapor retarder :**** a membrane that restricts the migration of moisture by diffusion from an area of higher vapor pressure.

vegetated roof : a roof system that may include a water proofing and root repellant system, a drainage system, filter cloth, a lightweight growing medium and plants. Vegetated roof systems can be modular, with drainage layers, filter cloth, growing media and plants already prepared in movable, interlocking grids or each component can be installed separately.

visible transmittance (VT): the ratio of visible light entering the space through the fenestration product assembly to the incident visible light. VT includes the effects of glazing material and frame and is expressed as a number between 0 and 1.

Volatile Organic Compound (VOC): a volatile chemical compound based on carbon chains or rings that typically contain hydrogen and sometimes contain oxygen, nitrogen and other elements, and that has a vapor pressure of greater than 0.1 mm of mercury at room temperature.

WaterSense®: a program of the U.S. Environmental Protection Agency (EPA) designed to identify and promote water-efficient products and practices.

waste heat : **** waste heat from industrial processes and power stations rated at more than 10MWe and with a power efficiency of greater than 35%.

wetland : **** natural or constructed areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

whole building commissioning or total building commissioning : **** a quality-focused process for enhancing the delivery of a project. The process focuses upon assessing and documenting that the facility and all of its systems and *assemblies* are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

Appendix D: ABBREVIATIONS AND ACRONYMS

The following is a list of abbreviations and acronyms found throughout this Technical Manual along with their entire word, phrase, or name.

25-year, 24-hour storm event : means the maximum 24-hour precipitation event with a probable recurrence interval of once in 25 years, as defined by the National Weather Service.

AAMA** : ** American Architectural Manufacturers Association.

ACI** : ** American Concrete Institute.

AGC** : ** Associated General Contractors of America.

ARMA** : ** Asphalt Roofing Manufacturers Association.

ASHRAE** : ** American Society of Heating, Refrigerating and Air-Conditioning Engineers.

ASTM** : ** ASTM International.

ATFS** : ** American Tree Farm System.

BUG** : ** Backlight-Uplight-Glare rating system.

CAS** : ** Chemical Abstracts Service.

CBECS** : ** Commercial Building Energy Consumption Survey. Developed by the U.S. Department of Energy's

Energy Information Administration (EIA).

CO₂e** : ** *Carbon Dioxide Equivalent* Emissions Rate.

EMS** : ** Environmental Management System.

EPA : Environmental Protection Agency.

EVO** : ** Efficiency Valuation Organization.

FYN** : ** Florida Yards and Neighborhoods Program/University of Florida –IFAS Extension.

GDDC** : ** Green Design and Delivery Coordination.

HVAC&R** : ** heating, ventilating, air-conditioning, and refrigerating.

IAPMO : International Association of Plumbing and Mechanical Officials.

ICC** .** International Code Council®.

IDA** .** International Dark-Sky Association.

IES** .** Illuminating Engineering Society.

IESNA** .** Illuminating Engineering Society of North America.

ISO** .** International Organization for Standardization.

LCA** .** life cycle assessment.

MERV** .** Minimum Efficiency Reporting Value.

MLO** .** Model Lighting Ordinance.

NEMA** .** National Electrical Manufacturers Association.

NIBS** .** National Institute of Building Sciences.

NIST** .** National Institute of Standards and Technology.

NOX** .** nitrogen oxide, produced by the burning of fossil fuels.

NREL** .** National Renewable Energy Laboratory.

PCI** .** Pre-Cast/Prestressed Concrete Institute.

PEFC** .** Programme for Endorsement of Forest Certification.

SCAQMD** .** South Coast Air Quality Management District.

SMACNA** .** Sheet Metal and Air Conditioning Contractors' National Association.

SPRI** .** Single Ply Roofing Institute.

TPZ** .** Tree Protection Zone.

ULSD : Ultra Low Sulfur Diesel.

USDA : United States Department of Agriculture.

VOC : Volatile Organic Compounds.

WBDG** : ** Whole Building Design Guide.