



**Designation: E1971–05 (Reapproved 2011) E1971 – 19**

## Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings<sup>1</sup>

This standard is issued under the fixed designation E1971; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This guide covers a procedure to assist owners and operators of commercial and institutional buildings in the stewardship of cleaning and housekeeping operations. The focus of this guide is to address appropriate cleaning activities and processes, to promote eco-efficiency and sustainability, and to avoid adverse impacts on the building occupants, cleaning personnel, the building structure itself, and the environment. Adherence to the principles set forth in this guide can lead to greater tenant/occupant satisfaction, reduced operational costs and greater productivity (of occupants and cleaning personnel).

1.2 This guide will focus on the development of a stewardship plan and will include the assessment of cleaning processes, product selection, storage, usage, disposal, equipment, training of cleaning personnel and communication throughout the chain-of-commerce.

1.3 This guide addresses issues relating to the operation and maintenance of the heating, ventilating and air conditioning (HVAC) systems which can have a major impact on indoor air quality (IAQ) only to the extent that the HVAC system provides adequate ventilation to lower risk to cleaning personnel, building occupants and the environment during or as a result of the cleaning process.

1.4 This guide is for use in a building that is maintained by either in-house cleaning personnel or an outside cleaning contractor.

1.5 This guide is not intended for construction related activities, but may be appropriate for post construction clean-up.

1.6 This guide is not intended as a procedural guide for cleaning personnel.

1.7 This guide is not intended for use in residential buildings.

1.8 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.9 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

1.10 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate ~~safety~~ safety, health, and ~~health~~ environmental practices and determine the applicability of regulatory limitations prior to use.*

1.11 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**E631 Terminology of Building Constructions**

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee E60 on Sustainability and is the direct responsibility of Subcommittee E60.01 on Buildings and Construction. Current edition approved Oct. 15, 2011; April 15, 2019. Published December 2011; May 2019. Originally approved in 1998. Last previous edition approved in 2005; 2011 as E1971–05; E1971–05(2011). DOI: 40.1520/E1971-05R11; 10.1520/E1971-19.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[E833 Terminology of Building Economics](#)

[E2114 Terminology for Sustainability Relative to the Performance of Buildings](#)

2.2 ~~Other Standards~~: [ISO Standard](#):<sup>3</sup>

[ISO 14040 Life Cycle Assessment](#) [Environmental management -- Life cycle assessment -- Principles and framework](#)

### 3. Terminology

#### 3.1 Definitions:

3.1.1 For terms related to building construction, refer to Terminology [E631](#).

3.1.2 For terms related to sustainability relative to the performance of buildings, refer to Terminology [E2114](#). Some of these terms are reprinted here for ease of use.

3.1.3 *life-cycle, n*—(1) the length of time over which an investment is analyzed; and

**E833**

(2) consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to the final disposal.

**ISO 14040**

##### 3.1.3.1 Discussion—

Refer to the distinction between LCA and LCC. through which vapors are released from materials.

3.1.4 *2 life-cycle assessment (LCA), n*—a method of evaluating a product by reviewing the ecological impact over the life of the product.

##### 3.1.4.1 Discussion—

At each stage, the product and its components are evaluated based upon materials and energy consumed, and the pollution and waste produced. Life stages include extraction of raw materials, processing and fabrication, transportation, installation, use and maintenance, and reuse/recycling/disposal. ISO 14040 defines LCA as the compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle.

3.1.5 *life-cycle cost (LCC) method, n*—a technique of economic evaluation that sums over a given study period the costs of initial investment (less resale value), replacements, operations (including energy use), and maintenance and repair of an investment decision (expressed in present or annual value terms).

##### 3.1.5.1 Discussion—

[ASTM E1971-19](#)

<https://standards.iteh.ai/catalog/standards/sist/04585e3e-c725-4fc3-bd5f-585410edb3e2/astm-e1971-19>

LCC is distinct from LCA in that LCA is an environmental review methodology and LCC is an economic review methodology.

3.1.6 *non-renewable resource, n*—a resource that exists in a fixed amount in various places in the earth's crust and that cannot be replenished on a human time scale.

##### 3.1.6.1 Discussion—

Non-renewable resources have the potential for renewal only by geological, physical, and chemical processes taking place over hundreds of millions of years. Non-renewable resources exist in various places in earth's crust. Examples include: iron ore, coal, and oil.

3.1.7 *perpetual resource, n*—a resource that is virtually inexhaustible on a human time scale.

##### 3.1.7.1 Discussion—

Examples include solar energy, tidal energy, and wind energy.

3.1.8 *renewable resource, n*—a resource that is grown, naturally replenished, or cleansed, at a rate which exceeds depletion of the usable supply of that resource.

##### 3.1.8.1 Discussion—

<sup>3</sup> Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>. ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <http://www.iso.org>.

A renewable resource can be exhausted if improperly managed. However, a renewable resource can last indefinitely with proper stewardship. Examples include: trees in forests, grasses in grasslands, and fertile soil.

3.1.9 *sustainability, n*—the maintenance of ecosystem components and functions for future generations.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *chain-of-commerce*—manufacturers and suppliers of raw materials; manufacturers, marketers, and distributors of building cleaning products (and systems/equipment); building owners and managers; building cleaning contractors; and cleaning personnel.

3.2.2 *commercial and institutional buildings*—indoor or enclosed workspaces such as office buildings, educational facilities, health care facilities, retail establishments, and other similar facilities, but not including manufacturing and production facilities, warehouses, residences, and agricultural operations.

3.2.3 *eco-efficiency*—the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing negative ecological impacts and natural resource intensity throughout the life cycle, to a level at least in line with the Earth’s carrying capacity.

3.2.4 *hazard*—the potential health or physical effect(s) attributable to a specific chemical, mixture, or physical agent.

3.2.5 *material-safety data sheet (MSDS) (SDS)*—a written or printed material concerning a hazardous chemical which contains the information set forth in the OSHA Hazard Communication Standard (see paragraph (g) of 29 CFR 1910.1200) **(1)**.<sup>4</sup>

3.2.6 *pollutant*—any substance that directly or indirectly creates an adverse human health or environmental effect when introduced into any environmental media.<sup>5</sup>

3.2.7 *pollution prevention*—the act of reducing or eliminating the use, release, or generation of a pollutant or potential pollutant through source reduction, recycling, reuse, reclamation, or modification of operating practices.

3.2.8 *risk*—the probability of deleterious health or environmental effects, **(2)**.

3.2.9 *stewardship*—careful and responsible management, especially with respect to avoiding negative environmental impacts and to promoting sustainability.

3.2.10 *worker participation*—the involvement of cleaning personnel or their representatives, or both, in all aspects of the cleaning process; including product selection, evaluation and appropriate work practices, training, and communication of hazards, and “the process of work.”

#### 4. Significance and Use

4.1 Cleaning provides well documented benefits in terms of creating cleaner, safer, and healthier surroundings by extracting harmful pollutants from the indoor environment (see Ref **(3)**). An improperly maintained indoor environment could give rise to biological contaminants, and buildup of particulate matter and gases which can have serious health effects. These negative impacts may have adverse affects on worker productivity affecting both cleaning personnel and tenants through increased complaints, absenteeism, injuries, asthmatic incidents, or other symptoms. Inappropriate or improper use or selection of cleaning products and processes, along with failure to follow label directions could result in injury or illness to cleaning personnel or building occupants. In addition, it may be detrimental to the physical structure and systems of the building, or to the environment. Moreover, owners and operators maintain the liability for the proper function of the building and its impacts on the occupants and cleaning personnel.

4.1.1 This guide provides a basic reference for the development and preservation of a building environment that is considered safe and healthy for occupants, while reducing the stress on the overall environment as a result of routine maintenance. The anticipated users of this guide include building managers, cleaning personnel, product suppliers and distributors, union representatives, and building occupants who serve together in a stewardship role regarding the maintenance of the building. This guide is intended to raise pertinent questions regarding specific building environments in order that an appropriate stewardship strategy may be developed, for example:

4.1.1.1 How is the building used?

4.1.1.2 Are there any special cleaning requirements?

4.1.1.3 Are there any at-risk populations that need to be considered, such as children, asthmatics, or pregnant woman?

4.1.1.4 How are cleaning materials used?

4.1.1.5 Are there any special issues relevant to construction and furnishings?

4.1.1.6 Are there any issues relating to building age/architectural, such as historic preservation requirements?

4.1.1.7 are there any engineering concerns, such as HVAC systems and natural ventilation?

4.1.1.8 How is the quality of cleaning being evaluated or measured?

4.1.2 Regardless of the specific requirements, this guide will help in the formulation of a comprehensive plan resulting in reduced risk to cleaning personnel, building occupants, and the environment.

<sup>4</sup> The boldface numbers given in parentheses refer to the list of references at the end of this standard.

<sup>5</sup> It should be noted that ASTM’s definition of Pollution Prevention is different from some definitions used by the Environmental Protection Agency. See, for example, 58 Fed. Reg. 6478–58 Fed. Reg. 6478 (Jan. 29, 1993, Council on Environmental Quality), and 58 Fed. Reg. 41,981–58 Fed. Reg. 41,981 (Aug. 6, 1993, Executive Order).

4.2 This guide will help the building owner and operator understand the cleaning process through the following:

4.2.1 The development of a stewardship plan (see Section 6), will clarify the level of cleanliness that is required or expected, and will ensure that the cleaning process is carried out in a consistent manner with adequate communication feedback to promote success of the plan.

4.2.2 An understanding of extended product responsibility (see Section 7) and the importance of shared responsibility. This section includes task identification and performance requirements, process and product selection, use, storage, and disposal.

4.2.3 An identification of the training and communications issues (see Section 8) that will encourage involvement with the entire chain-of-commerce in the cleaning process. These issues are related to both procedural training and feedback opportunities for cleaning personnel, as well as information sharing with building tenants to inform them of possible cleaning process impacts.

## 5. Stewardship Principles

5.1 *Stewardship Principles*—A building owner or operator should manage the cleaning process according to the following stewardship principles:

5.1.1 Take a comprehensive process approach to cleaning. This includes:

5.1.1.1 Identifying the cleaning task and performance requirements,

5.1.1.2 Defining or outlining steps of the cleaning procedure,

5.1.1.3 Selecting the correct products and equipment,

5.1.1.4 Training cleaning personnel to use correct procedures and to understand the potential health, safety, and environmental impacts of the cleaning products and processes,

5.1.1.5 Ongoing inspection and monitoring programs,

5.1.1.6 Communicating clearly with building occupants, and

5.1.1.7 Practicing appropriate storage and disposal methods.

5.1.2 Focusing on only a single area can create unanticipated adverse impacts in other areas.

5.1.3 Foster participation of cleaning personnel and building occupants. A successful cleaning program should encourage participation and input along the entire chain-of-commerce. Cleaning personnel need to participate in the planning, implementation, and continual improvement of the cleaning program. Building occupants should be given the opportunity to participate.

5.1.4 Clean to protect health and safety. Appearances may be deceptive. Even buildings that appear to be clean can be unhealthy. Focus on cleaning for health and safety by controlling microorganisms, spills, gases, dust particles, and so forth. In most cases the appearance will be addressed at the same time.

5.1.5 Clean and maintain the building as a whole, not just separate components. Cleaning and maintenance in one area of a building can have a major impact on other areas. Appropriate actions should take place to ensure the health and safety throughout the entire building, in addition to the area where the work is being performed.

5.1.6 Recognize occupant impacts on the indoor environment. Occupants should share responsibility for maintaining health and safety. Occupants should quickly and clearly communicate with cleaning personnel to facilitate the rapid solution to problems. Furthermore, occupants should recognize how their behavior, such as food debris resulting from eating in their work areas, can contribute to additional cleaning and pest management requirements, which in turn have further impacts.

5.1.7 Ensure cleaning personnel and building occupant safety at all times. All products and processes may pose some risks, thus safety should always be considered. Safety precautions should be used during all cleaning processes, such as proper ventilation, personal protective equipment, and safety signs where necessary. Safety precautions should also apply to outside contractors, such as pest management or roofing contractors to protect building occupants from the impacts of those products and processes.

5.1.8 Be aware of the impacts to the outdoor environment. Impacts to the outdoor environment can include energy requirements, water usage, disposal of products in terms of solid waste, down-the-drain to the appropriate water treatment works, and emissions to the air during storage or use of products.

## 6. Developing A Stewardship Plan

6.1 *Plan Development*—Building owners and operators need to oversee the development of a written stewardship plan and its periodic review. This plan will help to ensure that expectations are being met and that the building is being cleaned and protected as required.

6.1.1 Components of the stewardship plan should include both scheduled routine cleaning, as well as responses to building occupant and worker related problems. Furthermore, specific sections need to be developed to address accidents and preventative maintenance programs. These sections of the plan should address common problems, as well as slip and fall accidents, weather-related problems, water leaks, smoke, or obnoxious odors.

6.1.1.1 *Building Policy and Goals*—Goals and policies for cleaning activities should be laid out clearly. The building plan should include a definition of the building's primary mission which will assist managers and staff in understanding the scope and priority of stewardship activities. For example, because the primary mission of a health care facility and that of a retail facility are different, the scope and priority of stewardship activities may be substantially different.

6.1.1.2 By carefully considering the traffic level, time to perform the task, types of soil, soil load, safety and hygiene performance requirements, and so forth. for each part of the building the cleaning process can be optimized. This should result in

adequate cleanliness for the function of the building, optimal occupant/tenant satisfaction, improved productivity, optimal cleaning cost effectiveness, appropriate choice of cleaning processes and products, and the greatest achievable eco-efficiency and sustainability.

6.1.2 *Management Commitment*—The success of the stewardship plan is contingent upon top management commitment. The building owner/operator should be personally committed to success and ensure that senior building management follow through on the stewardship program. Management commitment may be demonstrated through:

- 6.1.2.1 Selecting a stewardship coordinator and outlining his/her responsibilities,
- 6.1.2.2 Establishing a stewardship task force with adequate representation by staff from all key areas of the building, such as cleaning personnel, tenants, parents of students, and safety and health professionals,
- 6.1.2.3 Committing staff,
- 6.1.2.4 Committing funding,
- 6.1.2.5 Purchasing equipment (such as new vacuums, if required) and ensuring their maintenance,
- 6.1.2.6 Training programs, and
- 6.1.2.7 Ongoing communications with cleaning personnel and occupants.

6.1.2.8 The stewardship plan should discuss progress in each of these areas and plan for the future.

6.1.3 *Baseline Study/Benchmarking*—A baseline study or benchmarking will promote the development and implementation of a stewardship plan that may reduce the environmental, health and safety impacts of cleaning activities. This is a key element in the stewardship process. Two primary reasons for benchmarking are goal setting and process development. Baseline study or benchmarking can provide the building owner/manager with measurements to control and manage his/her operations. The key is that the building owner/manager should first define the goal to be achieved, whether it be a desired level of cleanliness, occupant satisfaction, or addressing a particular problem. A baseline study or benchmarking can be accomplished through facility auditing and should focus on the entire cleaning process from which one can identify the greatest risks and opportunities for risk reduction. In scoping the need, cleaning/maintenance management and the building owner/manager should be encouraged to evaluate or audit their operations, procurement, and processes to identify, prioritize, and focus on the greatest opportunities to reduce or eliminate the volume of environmental or human health impacts, while adequately performing the cleaning task.

6.1.4 The study should include a review of the:

- 6.1.4.1 Use of space within the building, including any potential changes in use or occupancy,
  - 6.1.4.2 Occupant habits, such as smoking or eating at work stations,
  - 6.1.4.3 Existing or cleaning personnel complaints,
  - 6.1.4.4 Existing information from occupants and cleaning personnel regarding cleaning products or processes,
  - 6.1.4.5 Indoor air quality (IAQ) assessment or test results, if available,
  - 6.1.4.6 Existing cleaning processes/methodologies,
  - 6.1.4.7 Current cleaning schedules,
  - 6.1.4.8 Utilization of cleaning personnel,
  - 6.1.4.9 Training programs,
  - 6.1.4.10 Communications,
  - 6.1.4.11 Document handling,
  - 6.1.4.12 Current product usage, handling, storage, and environmental attributes,
  - 6.1.4.13 Hazard Communications, including Material Safety Data Sheets for cleaning products, and
  - 6.1.4.14 Relevant OSHA injury/illness records or workers compensation claims, or both.
- 6.1.4.15 Some examples of existing forms, outlines, and communication tools (letters) to assist in the development of the baseline study can be found in Refs (4), (5), and (6). The stewardship plan should summarize the information.

6.1.5 *Identification of Needs, Opportunities and Options*—Based on the results of the baseline study, brainstorming sessions should be held among staff and managers to identify systematically needs, opportunities and options for instituting stewardship measures. The plan should summarize the results of these efforts. Paragraphs 6.1.5.1 through 6.1.5.3 identify some of the key issues that can be considered.

6.1.5.1 *Cost*—The major cost element in cleaning is labor and thus will have a critical impact when identifying opportunities and options. In reviewing the overall cost of cleaning it is important to ensure that sufficient provisions are made for initial and continuing worker training and that appropriate staffing levels are allocated to achieve the desired performance requirements. Inadequate training of cleaning personnel and inadequate staffing levels may lead to improper handling of cleaning products and the failure to meet required performance criteria. This, in turn, may lead to increased risk of worker and occupant exposure and the possible improper use of cleaning materials.

6.1.5.2 *Performance*—The question building owner/operator should ask is: “How clean is clean enough?” Building owners/operators should clearly understand the use of the building and the expectations of occupants/tenants. These expectations for cleaning performance should be clearly defined. The cleaning requirements should be agreed upon with cleaning personnel and translated into the size of the cleaning crew, time required on the job and choice of cleaning processes and products.

6.1.5.3 *Time Available to do the Task*—The time available to do a task affects the frequency and duration of the task. Processes and products should be compatible with any unique challenges this poses. For example, there will be greater flexibility in

scheduling and completing a cleaning task in a building that is not occupied at night, than a facility that is used 24 hours a day. Sometimes, cleaning processes and products may need to address the requirement for rapid execution of a cleaning task in order to avoid interruption of the use of the building by occupants. If the allotted time is shortened to the point where only the most aggressive cleaning processes must be used to successfully accomplish the task, this demand may place cleaning personnel and building occupants at higher risk requiring additional training and more rigorous risk management steps to protect cleaning personnel and occupants when compared to using additional time with less aggressive products/processes. It should also be noted that the need for personnel resources has its own environmental impacts in the amount of employee hours necessary to accomplish any cleaning task.

6.1.6 *Ranking of Options*—Criteria should be developed for prioritizing the needs and opportunities identified and for ranking the options developed. The stewardship plan should explain the criteria used and present the results of the ranking. Typical criteria include (not in order of importance):

- 6.1.6.1 Worker safety,
- 6.1.6.2 Tenant and occupant requirements,
- 6.1.6.3 Costs (life cycle costs should be developed to the degree possible),
- 6.1.6.4 Liability,
- 6.1.6.5 Regulatory compliance,
- 6.1.6.6 Implementation feasibility,
- 6.1.6.7 Time and staff limitations,
- 6.1.6.8 Appearance and performance requirements,
- 6.1.6.9 Environmental impacts, and
- 6.1.6.10 Staff experience.

6.1.7 *Implementation and Evaluation*—The implementation section of the plan should set schedules for completion of major milestones, such as the completion of the stewardship plan, identify roles and responsibilities, identify barriers encountered or expected, outline communication and training needs for both cleaning personnel and tenants, indicate how success will be measured and evaluated, and outline priorities for future activities.

6.1.8 *New Goals*—After the stewardship plan has been developed, implemented and fully evaluated, the plan should be periodically reevaluated to identify opportunities for improvement.

## 7. Extended Product Responsibility

7.1 *Impacts of Extended Product Responsibility*—Extended product responsibility is an approach to identifying environmental considerations such as pollution prevention and conservation opportunities for renewable resources and non-renewable resources. It identifies the underlying theme of shared responsibility, which includes the role played by those throughout the chain-of-commerce. In this case, the responsibility for reducing impacts is shared among product manufacturers and distributors, cleaning personnel, building owners/managers, and occupants.

7.2 *Process and Product Selection*—By evaluating cleaning procedures, a determination can be made as to which processes are truly necessary, which can be eliminated, and which can be replaced by other technologies. Cleaning procedures should be reviewed to identify and manage hazards.

7.2.1 *General Considerations*—The cleaning process (that includes equipment) and product selection should consider performance, cost, workplace health and safety, and environmental impacts. There is a role for both cleaning personnel and suppliers in ensuring proper process and product selection.

7.2.1.1 Employees responsible for procurement can influence the reduction of environmental impacts and maximize the environmental benefits across many stages of the product's life cycle. It is important to keep in mind that an environmental improvement in one stage of a life cycle may sometime occur at the expense of another life cycle stage. For example, some products that are packaged in a concentrated form may reduce packaging, but could also increase the potential that the product user may be exposed to the concentrate. Exposure to the concentrate may place the product user at greater risk than exposure to the ready-to-use product. Thus, in order to reduce negative environmental impact across both packaging and use stage of the product's life cycle, it is preferable in this example, that products shipped as concentrates are provided in packaging that minimizes concentrate exposure or are accompanied by additional appropriate precautionary measures, or both, and instructions or include the use of portion control equipment designed to minimize exposure to the concentrate, or both. Furthermore, even products that are considered "safe" when used as directed, can pose problems if misused. Risks associated with the use of products classified as "hazardous" can be minimized when all specified directions are followed.

7.2.1.2 It is important that process and product selections be made that consider the capability of the manufacturer/distributor to provide, in addition to fulfilling price and performance requirements, the necessary training and technical support. With proper training, cleaning process and product selection that take into account safety, health and environmental aspects during storage, handling, use, maintenance, and disposal can be assured. Manufacturers/distributors should also be able to demonstrate their capability to receive and act upon feedback from cleaning personnel regarding product performance, use and disposal, as well as health, safety and environmental related matters.

7.2.2 *Workplace Health And Safety Considerations:*