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.

Designation: E1664 – 19

An American National Standard

Standard Classification for Serviceability of an Office Facility for Layout and Building Factors[1,2]

This standard is issued under the fixed designation E1664; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This classification covers matched sets of scales for classifying an aspect of the serviceability of an office facility, that is, the capability of an office facility to meet certain possible requirements for layout and building factors.

1.2 Within that aspect of serviceability, each matched set of scales, shown in Figs. 1-12, are for classifying one topic of serviceability. Each topic is typically broken down into two or more demand functions or supply features. Each paragraph in an Occupant Requirement Scale (see Figs. 1-12) summarizes one level of serviceability on that function, which occupants might require. The matching entry in the Facility Rating Scale (see Figs. 1-12) is a translation of the requirement into a description of certain features of a facility which, taken in combination, indicate that the facility is likely to meet that level of required serviceability.

1.3 The entries in the Facility Rating Scale (see Figs. 1-12) are indicative and not comprehensive. They are for quick scanning to estimate approximately, quickly, and economically, how well an office facility is likely to meet the needs of one or another type of occupant group over time. The entries are not for measuring, knowing, or evaluating how an office facility is performing.

1.4 This classification can be used to estimate the level of serviceability of an existing facility. It can also be used to estimate the serviceability of a facility that has been planned but not yet built, such as one for which single-line drawings and outline specifications have been prepared.

1.5 This classification indicates what would cause a facility to be rated at a certain level of serviceability but does not state how to conduct a serviceability rating nor how to assign a serviceability score. That information is found in Practice E1679. The scales in this classification are complimentary to and compatible with Practice E1679. Each requires the other.

1.6 The scales are intended to identify the levels of various requirements unique to a particular user, and the serviceability (capability) of a building to meet those requirements. The scales thus supplement rather than include code requirements. It remain the responsibility of designers, builders, and building managers to meet applicable code requirements relative to their respective roles in facility design, construction, and ongoing management.

1.7 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.8 *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:*[3]

E631 Terminology of Building Constructions

E1662 Classification for Serviceability of an Office Facility for Sound and Visual Environment

E1679 Practice for Setting the Requirements for the Serviceability of a Building or Building-Related Facility, and for Determining What Serviceability is Provided or Proposed

E1836/E1836M Practice for Building Floor Area Measurements for Facility Management

E2320 Classification for Serviceability of an Office Facility for Thermal Environment and Indoor Air Conditions

E2619/E2619M Practice for Measuring and Calculating Building Loss Features That Take Up Floor Area in Buildings

[1] This classification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.25 on Whole Buildings and Facilities.

Current edition approved April 1, 2019. Published May 2019. Originally approved in 1995. Last previous edition approved in 2018 as E1664–95a (2018). DOI: 10.1520/E1664–19.

[2] Portions of this document are based on material originally prepared by the International Centre for Facilities (ICF) and © 1993 by ICF and Minister of Public Works and Government Services Canada. Their cooperation in the development of this standard is acknowledged.

[3] 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.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. United States

Documents
Document Sharing Hub

Full document details: ASTM E1664-19

DEMAND A.7.1.	**Layout and building features**

Demand Scales in this Topic:

- A.7.1.1 Constraints on layout
- A.7.1.2 Constraints of population density
- A.7.1.3 Cost of upgrade

Subject Matter: Occupants' requirements for the ability of a building's HVAC system to support their needed mix and location of enclosed offices and open plan workstations at a relative cost.

Notes:

1. Related occupant requirement scales for the environmental quality provided by HVAC systems are found in Aspect A.4 of E2320.
2. The general approach to density in this topic is spatial efficiency. Qualitative impacts of density are found in Aspect A.3 of E1662.

From the options below, please select the level that best describes the REQUIREMENT.

Requirement Level	***DEMAND*** **A.7.1.1. Constraints on layout**
9 ○	Occupants require ***no restriction*** on the mix or placement of enclosed offices or screens and furnishings in open plan areas.
8 ○	
7 ○	Occupants accept ***moderate constraints*** to the mix or placement of enclosed offices or screens and furnishings in open plan areas, e.g. all basic types of layout can be accommodated with minor compromises to the office layout or adjustments to the HVAC system.
6 ○	
5 ○	Occupants accept ***reasonable constraints*** to the mix or placement of enclosed offices or screens and furnishings in open plan areas, e.g. interior improvements can be mostly enclosed rooms or mostly open plan in response to HVAC system layout and/or performance.
4 ○	
3 ○	Occupants accept ***many constraints*** to the mix or placement of enclosed offices or screens and furnishings in open plan areas, e.g. interior improvements can be mostly open plan, the use of high screens is limited, or enclosed offices are limited to few locations in response to HVAC system layout and/or performance.
2 ○	
1 ○	Occupants accept ***extensive constraints*** to the mix or placement of enclosed offices or screens and furnishings in open plan areas, e.g. interior improvements must be mostly open plan, high screens cannot be used, or enclosed offices are limited to specific locations in response to HVAC system layout and/or performance.
0 ○	***No*** requirement.

Select **Relative Importance of scale =** ○ Extremely Important ○ Important ○ Minor Importance

Select **Threshold Level of Scale:** First, indicate whether Threshold Level of **scale** is a ○ **Minimum** OR ○ **Maximum** OR, if there is NO Maximum or Minimum Threshold level, then select ○ **None**.

Then, (unless there is none) select the **Threshold Level** of this **scale**
○**9** ○**8** ○**7** ○**6** ○**5** ○**4** ○**3** ○**2** ○**1**

If unable to choose scale level, select ☐ ***OTHER*** *and indicate reason below:*

☐ Lack Information ☐ Postpone decision ☐ In-depth evaluation required ☐ Not applicable
☐ Refer question to someone else: Whom? e-mail or phone?

FIG. 1 Demand Scale A.7.1.1 for Constraints on Layout

Documents
Document Sharing Hub

Full document details: ASTM E1664-19

Requirement Level	DEMAND	A.7.1.2. Constraints of population density
9 ○	The unit's population density can be as high as 1 person per assignable ***130 sq. ft. (12 m²)***.	
8 ○		
7 ○	The unit's population density can be as high as 1 person per assignable ***145 sq. ft. (13.5 m²)***.	
6 ○		
5 ○	The unit's population density can be as high as 1 person per assignable ***160 sq. ft. (15 m²)***.	
4 ○		
3 ○	The unit's population density can be in the range of 1 person per assignable ***195 to 215 sq. ft. (18 to 20 m²)***.	
2 ○		
1 ○	The unit's population density can be in the range of 1 person per assignable ***215 to 270 sq. ft. (20 to 25 m²)***.	
0 ○	***No*** requirement.	

Select **Relative Importance of scale =** ○ Extremely Important ○ Important ○ Minor Importance

Select **Threshold Level of Scale:** First, indicate whether Threshold Level of **scale** is a
○ **Minimum** OR ○ **Maximum** OR, if there is NO Maximum or Minimum Threshold level, then select ○ **None**.

Then, (unless there is none) select the **Threshold Level** of this **scale**
○9 ○8 ○7 ○6 ○5 ○4 ○3 ○2 ○1

If unable to choose scale level, select ☐ ***OTHER*** *and indicate reason below:*

☐ Lack Information ☐ Postpone decision ☐ In-depth evaluation required ☐ Not applicable
☐ Refer question to someone else: Whom? e-mail or phone?

FIG. 2 Demand Scale A.7.1.2 for Constraints of Population Density

2.2 *ISO Document:*[4]

ISO 6240 International Standard, Performance Standards in Building—Contents and Presentation

2.3 *ANSI/ASHRAE Standard:*[5]

ANSI/ASHRAE Standard 62.1-2016 Ventilation for Acceptable Indoor Air Quality

3. Terminology

3.1 *Definitions:*

3.1.1 *assignable area, n*—portion of the plannable area on a floor than can be assigned to occupant groups or functions.

3.1.1.1 *Discussion*—Assignable area includes interior walls, building columns and projections, and secondary circulation. **E1836/E1836M**

3.1.2 *building loss factor, n—in a facility*, expressed as a percentage of a facility's *exterior gross area*, the space not actually or effectively available for planning because of building configuration. **E2619/E2619M**

3.1.3 *facility, n*—a physical setting used to serve a specific purpose. **E631**

3.1.3.1 *Discussion*—A facility may be within a building, a whole building, or a building with its site and surrounding environment; or it may be a construction that is not a building. The term encompasses both the physical object and its use.

3.1.4 *facility serviceability*—the capability of a facility to perform the function(s) for which it is designed, used, or required to be used. **E631**

3.1.4.1 *Discussion*—The scope of this performance is of the facility as a system, including its subsystems, components and materials and their interactions, such as acoustical, hydrothermal, air purity, and economic; and of the relative importance of each performance requirement.

3.1.5 *HVAC, n*—the mechanical system(s) providing heating, ventilation, and air conditioning to a building.

3.1.6 *office, n*—a place, such as a room, suite, or building, in which business, clerical, or professional activities are conducted. **E631**

3.1.7 *monitor, n*—a visual display for computer information.

3.1.7.1 *Discussion*—Monitor has become common usage replacing the term "VDU" for visual display unit previously used in this standard classification.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[5] Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, http://www.ashrae.org.

AVA Documents
Document Sharing Hub

Full document details: ASTM E1664-19

Requirement Level	DEMAND	A.7.1.3. Cost of upgrade
9 ○	HVAC services must be capable of adjustment to a ***premium*** standard for the vicinity at the commensurate cost for this aspect of tenant improvements. Upgrade to meet special requirements or changes to layout may add ***little*** to total HVAC system or renovation costs, e.g. add up to ***15%*** to total fitup cost.	
8 ○		
7 ○	HVAC services must be capable of adjustment to an ***above average*** standard for the vicinity at the commensurate cost for this aspect of tenant improvements. Upgrade to meet special requirements or changes to layout may add ***moderately*** to total HVAC system or renovation costs, e.g. add up to ***25%*** to total fitup cost.	
6 ○		
5 ○	HVAC services must be capable of adjustment to the ***typical*** standard for the vicinity at the commensurate cost for this aspect of tenant improvements. Upgrade to meet special requirements or changes to layout may add ***substantially*** to total HVAC system or renovation costs, e.g. add up to ***60%*** to total fitup cost.	
4 ○		
3 ○	HVAC services must be capable of adjustment to a ***below average*** standard for the vicinity at the commensurate cost for this aspect of tenant improvements. Upgrade to meet special requirements or changes to layout may add ***very substantially*** to total HVAC system or renovation costs, e.g. add up to ***100%*** to total fitup cost.	
2 ○		
1 ○	HVAC services must be capable of adjustment to a ***low*** standard for the vicinity at the commensurate cost for this aspect of tenant improvements. Upgrade to meet special requirements or changes to layout may add ***prohibitively*** to total HVAC system or renovation costs, e.g. add ***greater than 100%*** to total fitup cost.	
0 ○	***No*** requirement.	

Select **Relative Importance of scale =** ○ Extremely Important ○ Important ○ Minor Importance

Select **Threshold Level of Scale:** First, indicate whether Threshold Level of **scale** is a
○ **Minimum** OR ○ **Maximum** OR, if there is NO Maximum or Minimum Threshold level, then select ○ **None**.

Then, (unless there is none) select the **Threshold Level** of this **scale**
○**9** ○**8** ○**7** ○**6** ○**5** ○**4** ○**3** ○**2** ○**1**

If unable to choose scale level, select ☐ ***OTHER*** *and indicate reason below:*

☐ Lack Information ☐ Postpone decision ☐ In-depth evaluation required ☐ Not applicable
☐ Refer question to someone else: Whom? e-mail or phone?

FIG. 3 Demand Scale A.7.1.3 for Cost of Upgrade

3.1.8 *plannable area, n*—the sum of the following areas: restricted areas, interior encroachments, occupant void areas, unassignable areas, assignable areas, and secondary circulation. **E1836/E1836M**

3.1.9 *plannable gross area, n*—portion of a floor that is totally enclosed within the interior face of perimeter encroachments at the floor plane and where there are no perimeter encroachments enclosed at the inside finished surface of the exterior walls. **E1836/E1836M**

3.1.10 *primary circulation area, n*—minimum path on a floor for access to egress stairs, elevator lobbies, toilet rooms, refuge areas, building lobbies, and entrances. **E1836/E1836M**

3.1.11 *secondary circulation area, n*—portion of a floor required for access to some subdivision of a floor, that does not serve all occupants on a floor and that is not defined as primary circulation area. **E1836/E1836M**

3.1.12 *unassigned area, n*—portion of the plannable area on a floor that is not assigned to occupant groups or functions. **E1836/E1836M**

3.1.13 For standard definitions of additional terms applicable to this classification, see Terminology E631.

AVA Documents
Document Sharing Hub

Full document details: ASTM E1664-19

SUPPLY A.7.1.	**Layout and building features**

Supply Scales in this Topic:

- A.7.1.1 Constraints on layout
- A.7.1.2 Population density supported
- A.7.1.3 Cost of upgrade

Subject Matter: The ability of a building's HVAC system to support their needed mix and location of enclosed offices and open plan workstations at a relative cost.

Notes: Related supply scales for the environmental quality provided by HVAC systems are found in Aspect A.4 of E2320.

From the options below, please select the level that best describes the RATING.

Rating Level	SUPPLY A.7.1.1. Constraints on layout
9 ○	The building poses ***no constraints*** to the mix or placement of enclosed offices or screens and furnishings in open plan areas, e.g. HVAC systems and performance ***do not limit*** the extent and location of rooms or open plan areas. The flow of air to the breathing zone is ***not affected*** by screens, walls and furnishings.
8 ○	
7 ○	The building poses ***moderate constraints*** to the mix or placement of enclosed offices or screens and furnishings in open plan areas, e.g. HVAC systems and performance require ***compromises in 15% to 25%*** of the desired extent and location of rooms or open plan areas. The flow of air to the breathing zone is ***slightly affected*** by screens, walls and furnishings.
6 ○	
5 ○	The building poses ***reasonable constraints*** to the mix or placement of enclosed offices or screens and furnishings in open plan areas, e.g. HVAC systems and performance require ***60% to 80%*** enclosed rooms or mostly open plan with the location of each limited to ***particular zones***. The flow of air to the breathing zone is ***affected*** by screens, walls and furnishings.
4 ○	
3 ○	The building poses ***many constraints*** to the mix or placement of enclosed offices or screens and furnishings in open plan areas, e.g. HVAC systems and performance require ***90%*** enclosed rooms or open plan with the location of each limited to ***specific locations***. The flow of air to the breathing zone is ***highly affected*** by screens, walls and furnishings.
2 ○	
1 ○	The building poses ***extensive constraints*** to the mix or placement of enclosed offices or screens and furnishings in open plan areas, e.g. HVAC systems and performance require ***100%*** enclosed rooms with multiple workstations in larger offices. The flow of air to the breathing zone is ***obstructed*** by screens, walls and furnishings.
0 ○	***No*** information is available.

If unable to choose scale level, select ☐ ***OTHER*** *and indicate reason below:*

☐ Lack Information ☐ Postpone decision ☐ In-depth evaluation required ☐ Not applicable

☐ Refer question to someone else: Whom? e-mail or phone?

FIG. 4 Supply Scale A.7.1.1 for Constraints on Layout

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *building projection, n*—a pilaster, convector, baseboard heating unit, radiator, or other building element located in the interior of a building adjacent to a building wall that prevents the use of that space for furniture, equipment, circulation, or other functions.

Documents
Document Sharing Hub

Full document details: ASTM E1664-19