



Designation: E1663 – 03 (Reapproved 2019)

# Standard Classification for Serviceability of an Office Facility for Typical Office Information Technology<sup>1, 2</sup>

This standard is issued under the fixed designation E1663; 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 classification covers pairs 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 performance to support typical office equipment for information technology.

1.2 Within that aspect of serviceability, each pair of scales, shown in Figs. 1-6, are for classifying one topic of serviceability. Each paragraph in an Occupant Requirement Scale (see Figs. 1-6) summarizes one level of serviceability on that topic, which occupants might require. The matching entry in the Facility Rating Scale (see Figs. 1-6) 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. 1-6) 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

E1334. The scales in this classification are complimentary to, and compatible with, Practices E1334 and E1679. Each requires the other.

1.6 *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>3</sup>

E631 Terminology of Building Constructions

E1334 Practice for Rating the Serviceability of a Building or Building-Related Facility (Withdrawn 2013)<sup>4</sup>

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

2.2 *ISO Document:*<sup>5</sup>

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

2.3 *Other Document:*<sup>5</sup>

ANSI/TIA/EIA-569–A Commercial Building Standards for Telecommunications Pathways and Spaces

## 3. Terminology

3.1 *Definitions:*

3.1.1 *facility*—a physical setting used to serve a specific purpose.

3.1.1.1 *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 (see Terminology E631).

<sup>1</sup> 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 Jan. 1, 2019. Published January 2019. Originally approved in 1995. Last previous edition approved in 2010 as E1663–03 (2010). DOI: 10.1520/E1663–03R19.

<sup>2</sup> 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.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>4</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>5</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

**A.5. Typical Office Information Technology**

**Scale A.5.1. Office computers and related equipment**

Occupant Requirement Scale	Facility Rating Scale
<p><b>9</b> <input type="checkbox"/> ○ <b>LOCATION OF WORKPLACES:</b> Must be able to locate or relocate many densely-equipped workplaces anywhere on the office floor.</p> <p>○ <b>QUALITY WORKPLACE ENVIRONMENT:</b> Must be able to maintain the highest quality environment for work with electronic equipment, including VDUs.</p> <p>○ <b>ELECTRONIC EQUIPMENT AT THE WORKSTATION:</b> All staff to have a PC or larger computer workstation. Most staff also have other electronic equipment which cause heat or noise or other effects, such as a laser printer.</p>	<p><b>9</b> <input type="checkbox"/> ○ <b>Zones for high density of equipment:</b> Any location on the floorplate is suitable for an area or room with much office machinery, e.g. word-processing, computer-aided drafting.</p> <p>○ <b>HVAC services:</b> Services are provided to an enhanced level, or can be at minimal effort and fitup cost. Exhaust air from areas with office machines is not recirculated within the building.</p> <p>○ <b>Illumination:</b> There are dimmer switches on lights. In open office areas, general lighting is by fixtures that shine upward to the ceiling, not fixtures in the ceiling that shine down. Each luminaire can be individually switched by occupants.</p> <p>○ <b>Acoustic control:</b> There is acoustic control in the ceiling, floor and vertical surfaces, so machine noise does not disturb people nearby.</p>
<p><b>8</b> <input type="checkbox"/></p> <p><b>7</b> <input type="checkbox"/> ○ <b>LOCATION OF WORKPLACES:</b> Must be able to locate or relocate many densely-equipped workplaces anywhere on the office floor.</p> <p>○ <b>QUALITY WORKPLACE ENVIRONMENT:</b> Must be able to maintain a basic quality environment for work with electronic equipment, including VDUs.</p> <p>○ <b>ELECTRONIC EQUIPMENT AT THE WORKSTATION:</b> At least one PC with VDU now at all or almost all individual workplaces. The majority but less than three quarters of staff also have other electronic equipment which cause heat or noise or other effects, such as a laser printer.</p>	<p><b>8</b> <input type="checkbox"/></p> <p><b>7</b> <input type="checkbox"/> ○ <b>Zones for high density of equipment:</b> Up to two-thirds of the floorplate is suitable for an area or room with much office machinery, e.g. word-processing, computer-aided drafting.</p> <p>○ <b>HVAC services:</b> Services to high-density areas, or where there are many printers, are provided to a basic level at minimal effort and fitup cost, or an enhanced level is possible at moderate effort and fitup cost, e.g. exhaust air is not recirculated within the building.</p> <p>○ <b>Illumination:</b> In open office areas, general lighting is by fixtures that shine upward to the ceiling, not fixtures in the ceiling that shine down. Groups of luminaires can be switched at control points on the floor.</p> <p>○ <b>Acoustic control:</b> There is acoustic control so that intermittent machine noise does not disturb people nearby and sufficient absorption to keep overall sound levels within recommended targets.</p>
<p><b>6</b> <input type="checkbox"/></p> <p><b>5</b> <input type="checkbox"/> ○ <b>LOCATION OF WORKPLACES:</b> Operations now require some densely-equipped workplaces. Can tolerate limited building-imposed constraints on where such areas can be located.</p> <p>○ <b>QUALITY WORKPLACE ENVIRONMENT:</b> Need to maintain a basic quality environment for work with electronic equipment, including VDUs.</p> <p>○ <b>ELECTRONIC EQUIPMENT AT THE WORKSTATION:</b> Assume one VDU at all or most individual workplaces now or in a year or two. Assume that many have or will have other electronic equipment which cause heat or noise or other effects, such as a laser printer, but it will be possible to cluster such added equipment.</p>	<p><b>6</b> <input type="checkbox"/></p> <p><b>5</b> <input type="checkbox"/> ○ <b>Zones for high density of equipment:</b> Limited parts of the floorplate are suitable for a room with much office machinery, e.g. word-processing, drafting.</p> <p>○ <b>HVAC services:</b> Services exist to target level for typical open office, or capable of fitup to target at moderate effort and cost. Air exhausted from the high-density area (CAD, word-processing, etc.) is mixed with air that is available for recirculation from other office areas.</p> <p>○ <b>Illumination:</b> There are low-glare lenses or parabolic grilles on the ceiling light fixtures. Lights for a whole floor or large area are switched as a group.</p> <p>○ <b>Acoustic control:</b> Sound absorption of the ceiling, etc. is typical for the building.</p>
<p><b>4</b> <input type="checkbox"/></p>	

Scale A.5.1. continued on next page

FIG. 1 Scale A.5.1 for Office Computers and Related Equipment

**A.5. Typical Office Information Technology**

**Scale A.5.1. Office computers and related equipment (continued)**

Occupant Requirement Scale	Facility Rating Scale
<p><b>3</b> <input type="checkbox"/> <b>LOCATION OF WORKPLACES:</b> Operations require only a very few workplaces densely equipped with electronic equipment.</p> <p><input type="checkbox"/> <b>QUALITY WORKPLACE ENVIRONMENT:</b> Can tolerate some features of the work environment that are of marginal quality.</p> <p><input type="checkbox"/> <b>ELECTRONIC EQUIPMENT AT THE WORKSTATION:</b> Electronic equipment is not used for extended periods.</p> <p style="text-align: center;"><b>2</b></p> <p><input type="checkbox"/> <b>LOCATION OF WORKPLACES:</b> No densely-equipped workplaces, or only a very few, or used only occasionally.</p>	<p><b>3</b> <input type="checkbox"/> <b>Zones for high density of equipment:</b> No high density zone is possible, e.g. word-processing must occur in typical open office areas, and very difficult or expensive to accommodate multiple CAD stations.</p> <p><input type="checkbox"/> <b>HVAC services:</b> Services are barely adequate with upgrade to basic level at substantial effort and cost, e.g. local switching of lights. Exhaust air is mixed with makeup air and recirculated within the building.</p> <p><input type="checkbox"/> <b>Illumination:</b> Ceiling fluorescent light fixtures have plastic lenses that give bright glare, not just when sitting under them, but also when looking towards the ceiling while seated three or four fixtures away.</p> <p><input type="checkbox"/> <b>Acoustic control:</b> Ceiling and wall surfaces are mostly hard, acoustically reflective.</p> <p style="text-align: center;"><b>1</b></p> <p><input type="checkbox"/> <b>Zones for high density of equipment:</b> No high density zone is possible, e.g. word-processing must be spread out in the open office.</p> <p><input type="checkbox"/> <b>HVAC services:</b> Services are inadequate with upgrade not feasible, e.g. many glare sources, poor air supply, and no added exhaust.</p> <p><input type="checkbox"/> <b>Illumination:</b> Bare fluorescent tubes exist (no lenses or grid) and traditional ballasts.</p> <p><input type="checkbox"/> <b>Acoustic control:</b> All surfaces are reflective.</p>
<p><input type="checkbox"/> Exceptionally important. <input type="checkbox"/> Important. <input type="checkbox"/> Minor Importance.</p>	
<p>Minimum Threshold level = <input type="checkbox"/> NA <input type="checkbox"/> NR <input type="checkbox"/> Zero <input type="checkbox"/> DP</p>	

**NOTES Space for handwritten notes on Requirements or Ratings**

FIG. 1 Scale A.5.1 for Office Computers and Related Equipment (continued)

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

3.1.2.1 *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 (see Terminology E631).

3.1.3 *office*—a place, such as a room, suite, or building, in which business, clerical, or professional activities are conducted (see Terminology E631).

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

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *conduit capacity*—a conduit is considered full when the internal area occupied by cable has reached 50 % of the

cross-sectional area of the conduit. Therefore, when additional future capacity is required, it must be part of the original 50 % permissible area.

3.2.2 *dedicated circuit*—an electric power supply circuit with its own circuit breaker and only one outlet box, so that its full capacity is dedicated to only one piece of electrical equipment.

3.2.2.1 *Discussion*—Dedicated circuits often are installed with an orange plug receptacle, so they can easily be recognized. A dedicated circuit may or may not be connected to an uninterruptible power supply (UPS); in most buildings, an orange plug receptacle does not normally indicate UPS.

3.2.3 *isolated circuit*—a dedicated electric power supply circuit with an isolated ground, separate from the ground of other circuits at its main panel.

3.2.4 *local area network (LAN)*—connecting computers in a single building or part of a building.



**A.5. Typical Office Information Technology**

**Scale A.5.2. Power at workplace**

Occupant Requirement Scale	Facility Rating Scale
<p><b>9</b> <input type="checkbox"/> ○ <b>LOCATION OF AVAILABLE POWER:</b> Operations require power supplied unobtrusively and easily to any workstation on any part of the floor.</p> <p>○ <b>PLUG-IN POINTS AT WORKSTATION:</b> Each workplace requires up to 8 plug-in points (4 duplex outlets), with 2 or more dedicated for computers, and 1 of these an isolated circuit.</p> <p>○ <b>PROTECTION FROM POWER FLUCTUATION:</b> Require UPS system now, and future capacity.</p>	<p><b>9</b> <input type="checkbox"/> ○ <b>Power distribution:</b> In open plan, distribution is through the furniture system, or raised access floor, or a pre-wired modular furniture partition.</p> <p>○ <b>Plug-in points per workplace:</b> There are 8 electrical plug-in points per workplace (4 duplex). Of the circuits feeding the plug-in points, at least 1 is dedicated for computer equipment, and one is isolated.</p> <p>○ <b>Uninterruptible power supply (ups):</b> An existing UPS system is installed in the building. Suitable space exists for additional UPS equipment, if needed.</p>
<p><b>8</b> <input type="checkbox"/></p>	<p><b>8</b> <input type="checkbox"/></p>
<p><b>7</b> <input type="checkbox"/> ○ <b>LOCATION OF AVAILABLE POWER:</b> Operations require power supplied to any workstation on any part of the floor.</p> <p>○ <b>PLUG-IN POINTS AT WORKSTATION:</b> Each workplace requires up to 6 plug-in points (3 duplex outlets), of which 1 is dedicated for computer equipment.</p> <p>○ <b>PROTECTION FROM POWER FLUCTUATION:</b> No immediate need for UPS system but foresee a need in the near future.</p>	<p><b>7</b> <input type="checkbox"/> ○ <b>Power distribution:</b> Distribution is from the ceiling by power pole, with locations governed by the ceiling grid dimensions and fixtures, or from ducts in the floor which are not more than half full in any location, and which have access points on a grid 1.4 m × 1 m (5 ft × 3 ft) or less. All power cables in ceiling are in conduit or cable trays, and separated from data cables; in floor all power cables are in separate ducts from data cables.</p> <p>○ <b>Plug-in points per workplace:</b> There are 6 electrical plug-in points per workplace (3 duplex). Of the circuits feeding the plug-in points, at least 1 is dedicated for computer equipment.</p> <p>○ <b>Uninterruptible power supply (ups):</b> No existing UPS system is installed in the building. Spare space exists in the building, suitable for UPS equipment, and well located near vertical risers for power.</p>
<p><b>6</b> <input type="checkbox"/></p>	<p><b>6</b> <input type="checkbox"/></p>
<p><b>5</b> <input type="checkbox"/> ○ <b>LOCATION OF AVAILABLE POWER:</b> Operations require power supplied to any workstation on any part of the floor.</p> <p>○ <b>PLUG-IN POINTS AT WORKSTATION:</b> Each workplace requires up to 4 plug-in points (2 duplex outlets). Some workstations need dedicated circuits for computers.</p> <p>○ <b>PROTECTION FROM POWER FLUCTUATION:</b> No immediate need for UPS system but foresee a possible need in the future.</p>	<p><b>5</b> <input type="checkbox"/> ○ <b>Power distribution:</b> Distribution is from the ceiling by power pole, with positions governed by ceiling grid dimensions and fixtures, or from ducts in the floor which have sufficient spare capacity that pulling additional cables is never a problem, and which have access points on a grid 1.5 m × 1.5 m (5 ft × 5 ft) or less. If cables are in ceiling, some are in conduit or cable trays.</p> <p>○ <b>Plug-in points per workplace:</b> There are 4 electrical plug-in points per workplace (2 duplex). Some dedicated circuits are available for specific workstations, but not all.</p> <p>○ <b>Uninterruptible power supply (ups):</b> No existing UPS system is installed in the building. Space could be made available in the building for UPS equipment, e.g. by giving up basement storage space.</p>
<p><b>4</b> <input type="checkbox"/></p>	<p><b>4</b> <input type="checkbox"/></p>

Scale A.5.2. continued on next page

FIG. 2 Scale A.5.2 for Power at the Workplace

**A.5. Typical Office Information Technology**

**Scale A.5.2. Power at workplace (continued)**

Occupant Requirement Scale		Facility Rating Scale	
<b>3</b> <input type="checkbox"/>	<p><b>LOCATION OF AVAILABLE POWER:</b> Operations require power supplied to workstations on most parts of the floor.</p> <p><b>PLUG-IN POINTS AT WORKSTATION:</b> Each workplace requires up to 2 plug-in points (1 duplex outlet).</p> <p><b>PROTECTION FROM POWER FLUCTUATION:</b> Local spike protectors are sufficient protection for computer equipment. No foreseeable need for UPS system.</p>	<b>3</b> <input type="checkbox"/>	<p><b>Power distribution:</b> Distribution is from the ceiling by power pole, with positions governed by ceiling grid dimensions and fixtures. There are no cable trays. If there are floor ducts for cables, they are full in some parts of the building.</p> <p><b>Plug-in points per workplace:</b> There are 2 electrical plug-in points per workplace (1 duplex). Circuit capacity permits an additional 2 points by using a multi-circuit spike protector.</p> <p><b>Uninterruptible power supply (ups):</b> No existing UPS system in the building. No space in the building is suitable for UPS equipment.</p>
<b>1</b> <input type="checkbox"/>	<p><b>LOCATION OF AVAILABLE POWER:</b> Operations require power supplied to most workstations on most parts of the floor.</p> <p><b>PLUG-IN POINTS AT WORKSTATION:</b> Most workplaces require up to 2 plug-in points (1 duplex outlet).</p> <p><b>PROTECTION FROM POWER FLUCTUATION:</b> Minimal use of computers, so no need for local spike protectors or UPS system.</p>	<b>1</b> <input type="checkbox"/>	<p><b>Power distribution:</b> It is difficult to run cables, and outlets are poorly located, e.g. horizontal distribution is through in-floor ducts that are mostly full, or by surface conduit, or by poke-through from the ceiling below. There is no accessible ceiling space, or, space is insufficient for cable trays.</p> <p><b>Plug-in points per workplace:</b> There are 2 electrical plug-in points per individual workstation (1 duplex). A multi-circuit spike protector cannot be added.</p> <p><b>Uninterruptible power supply (ups):</b> No existing UPS system in the building. No space in the building is suitable for UPS equipment.</p>

Exceptionally important.    Important.    Minor Importance.

Minimum Threshold level =    NA    NR    Zero    DP

FIG. 2 Scale A.5.2 for Power at the Workplace (continued)

3.2.5 *uninterruptible power supply (UPS)*—a source of electrical power that is protected from dropping below standard voltage for even milliseconds, so that computer operation is effectively continuous.

3.2.5.1 *Discussion*—A UPS is typically provided from batteries that are always connected to the circuit. A UPS typically provides power long enough to either shut down computers in an orderly way if outside power fails, or to start a standby generator. A UPS system of many large batteries may be used to protect a group of electrical circuits. Small UPS systems, capable of protecting a single personal computer and its accessory equipment, weigh only a few kilos and may be plugged into conventional electric power outlets at an office workstation.

**4. Significance and Use**

4.1 Each Facility Rating Scale (see Figs. 1-6) in this classification provides a means to estimate the level of service-

ability of a building or facility for one topic of serviceability and to compare that level against the level of any other building or facility.

4.2 This classification can be used for comparing how well different buildings or facilities meet a particular requirement for serviceability. It is applicable despite differences such as location, structure, mechanical systems, age, and building shape. Further information may be found in ISO 6240.

4.3 This classification can be used to estimate the amount of variance of serviceability from target or from requirement, for a single office facility, or within a group of office facilities.

4.4 This classification can be used to estimate the following:

4.4.1 Serviceability of an existing facility for uses other than its present use.

4.4.2 Serviceability (potential) of a facility that has been planned but not yet built.

**A.5. Typical Office Information Technology**

**Scale A.5.3. Building power**

Occupant Requirement Scale	Facility Rating Scale
<p><b>9</b> <input type="checkbox"/> <b>POWER FOR EQUIPMENT AT WORKSTATION:</b> Operations require power for one personal computer and one laser printer or other major electronic machine per person, plus normal desk equipment, e.g. calculator.</p> <p><b>POWER FOR FUTURE EQUIPMENT:</b> Operations require 50% added capacity, over present demand, for future needs.</p> <p><b>RELIABILITY AND QUALITY OF SUPPLY:</b> Need a very reliable power supply, of good quality.</p>	<p><b>9</b> <input type="checkbox"/> <b>Present capacity:</b> Building power, transformers and switches, etc. and vertical power risers, provide for one personal computer and one laser printer, or equivalent, per person, equivalent to 43 w/m<sup>2</sup> (4 w/sf) occupant load, and the additional cooling load for that occupant load.</p> <p><b>Potential increase:</b> A future increase up to half of present capacity for occupant on-floor demand, plus consequent additional cooling load, can be accommodated. Ample space is available in risers.</p> <p><b>Reliability and quality of supply:</b> The external supply is very reliable e.g. less than one outage per year. The supply is subject to only slight surges.</p>
<p><b>7</b> <input type="checkbox"/> <b>POWER FOR EQUIPMENT AT WORKSTATION:</b> Operations require power for one personal computer per person, plus other normal desk equipment, e.g. calculator.</p> <p><b>POWER FOR FUTURE EQUIPMENT:</b> Operations require 25% added capacity over present demand, for future needs.</p> <p><b>RELIABILITY AND QUALITY OF SUPPLY:</b> Need a reliable power supply, mainly free of surges.</p>	<p><b>7</b> <input type="checkbox"/> <b>Present capacity:</b> Building power, transformers and switches, etc. and vertical power risers, provide for one personal computer per person, and one large laser printer or equivalent per 5 people, equivalent to 32 w/m<sup>2</sup> (3 w/sf) occupant load, and the additional cooling load for that occupant load.</p> <p><b>Potential increase:</b> A future increase up to one third of present capacity for occupant on-floor demand, plus consequent additional cooling load, can be accommodated. Sufficient space is available in risers.</p> <p><b>Reliability and quality of supply:</b> The external supply is mostly reliable, e.g. one or two outages in a year. The power supply is subject to occasional surges at predictable times, e.g. late afternoon.</p>
<p><b>5</b> <input type="checkbox"/> <b>POWER FOR EQUIPMENT AT WORKSTATION:</b> Operations require power for one personal computer per person, plus other normal desk equipment, e.g. calculator.</p> <p><b>POWER FOR FUTURE EQUIPMENT:</b> Operations require 10% added capacity over present demand, for future needs.</p> <p><b>RELIABILITY AND QUALITY OF SUPPLY:</b> Need a reliable power supply, mainly free of surges.</p>	<p><b>5</b> <input type="checkbox"/> <b>Present capacity:</b> Building power, transformers and switches, etc. and vertical power risers, provide for one personal computer per person, equivalent to 22 w/m<sup>2</sup> (2 w/sf) occupant load, and the additional cooling load for that occupant load.</p> <p><b>Potential increase:</b> A future increase up to one quarter of present capacity for occupant on-floor demand, and consequent additional cooling load, can be accommodated. Riser capacity can be increased at moderate cost.</p> <p><b>Reliability and quality of supply:</b> The external supply is mostly reliable, e.g. one or two outages in a year. The power supply is subject to occasional surges at anytime, but most often in early morning or late afternoon.</p>

Scale A.5.3. continued on next page

FIG. 3 Scale A.5.3 for Building Power