Designation: E1664 – 95a (Reapproved 2012)

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 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 layout and building factors.

1.2 Within that aspect of serviceability, each pair of scales, shown in Figs. 1-3, are for classifying one topic of serviceability. Each paragraph in an Occupant Requirement Scale (see Figs. 1-3) summarizes one level of serviceability on that topic, which occupants might require. The matching entry in the Facility Rating Scale (see Figs. 1-3) 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. 1-3) 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 Practice E1334. Each requires the other.

2. Referenced Documents

2.1 *ASTM Standards:*[3]

E631 Terminology of Building Constructions

E1334 Practice for Rating the Serviceability of a Building or Building-Related Facility

E1679 Practice for Setting the Requirements for the Serviceability of a Building or Building-Related Facility

2.2 *ISO Document:*[4]

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

2.3 *ASHRAE Standard:*[5]

ASHRAE 62-89 Ventilation for Acceptable Indoor Air Quality

2.4 *ANSI Document:*[4]

ANSI Z65.1 Method for Measuring Floor Area in Office Buildings

3. Terminology

3.1 *Definitions:*

3.1.1 *facility*—a physical setting used to serve a specific purpose. **E631**

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.

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. **E631**

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.

[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.

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[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.

[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.

A.7. Layout and Building Features

Scale A.7.1. Influence of HVAC on layout

Occupant Requirement Scale		Facility Rating Scale
9 ❑	○ **CHOICE OF OPEN OR CLOSED OFFICES**: Occupants require that with a minimum of adjustment, HVAC can accommodate all basic types of layout, e.g. all or mostly open plan, all or mostly enclosed rooms, or mixed. ○ **CONSTRAINTS ON USE OF CLOSED OFFICES**: No restriction on the extent or location of enclosed rooms or open plan areas, placement of screens or furniture. ○ **CONSTRAINTS ON POPULATION DENSITY**: The unit's population density can be as high as 1 person per 12 m².	9 ❑ ○ **Type of layout**: With a minimum of adjustment, the HVAC system design will suit all basic types of layout, e.g. all or mostly open plan, all or mostly enclosed rooms, or mixed. ○ **Location of rooms**: The HVAC systems do not limit the extent or location of rooms or open plan areas. Systems have ample capacity to provide additional air and thermal control for meeting rooms and for places requiring exhaust to the outside. ○ **Screens and furniture**: The flow of air to the occupied zone is not affected by screens, walls or furniture, or any type of layout. ○ **Population density**: The required range for temperature, humidity and indoor air conditions, can be achieved or exceeded with densities up to an average space per occupant of 12 m² of usable area.
		8 ❑ ○ **Upgrade**: Adjustments of HVAC services, to meet special requirements or changes to layout, could be done at low cost, e.g. an additional 5% to 15% of fitup cost.
7 ❑	○ **CHOICE OF OPEN OR CLOSED OFFICES**: Occupants require that with a moderate amount of effort and cost, HVAC can be adjusted to accommodate all basic types of layout, e.g. all or mostly open plan, all or mostly enclosed offices, or mixed. ○ **CONSTRAINTS ON USE OF CLOSED OFFICES**: No restriction on the extent or location of rooms or open plan areas. Have some dense areas of screens or screens/furniture that trap air at floor level. ○ **CONSTRAINTS ON POPULATION DENSITY**: The unit's population density may be as high as 1 person per usable 13.5 m².	7 ❑ ○ **Type of layout**: With a moderate amount of effort and cost, the HVAC system design suits all basic types of layout, e.g. all or mostly open plan, all or mostly enclosed rooms, or mixed. ○ **Location of rooms**: With a moderate amount of effort and cost, the HVAC system design suits all basic types of layout, e.g. all or mostly open plan, all or mostly enclosed rooms, or mixed. ○ **Screens and furniture**: The flow of air to the occupied zone is found to be only slightly affected by screens, walls or furniture. The flow is, or would be, impeded by dense installations of screens, or screens and furniture systems that trap air at floor level. Changing diffusers and air injection rates would likely solve the problem, and air supply capacity is practicable.
		6 ❑ ○ **Population density**: The required range for temperature, humidity and indoor air conditions, can be achieved with densities up to an average space per occupant of 13.5 m² per person of usable area. ○ **Upgrade**: Adjustments of HVAC services, to meet special requirements or changes to layout, could be done at moderate cost, e.g. an additional 10% to 25% of fitup cost.
5 ❑	○ **CHOICE OF OPEN OR CLOSED OFFICES**: The layout may be either mostly open plan, e.g. 70% to 80% of the workplace area, or mostly enclosed rooms, e.g. 60% to 80% of the workplace area. Able to be flexible in the arrangement of rooms and open areas. Require a small number of meeting rooms. ○ **CONSTRAINTS ON USE OF CLOSED OFFICES**: Can accept constraints of using only screens with good clearance above floor for air movement, and layouts of furniture, file cabinets and screens that do not trap air, to suit location	5 ❑ ○ **Type of layout**: HVAC suits some combinations of open plan and enclosed rooms, when one or the other is predominant, e.g. open plan, 70% to 80% of the workplace area, or, enclosed rooms, 60% to 80% of the workplace area. ○ **Location of rooms**: HVAC systems partly limit provision and location of rooms or open plan areas. Systems are capable of providing additional air and thermal control for meetings in a limited number of meeting rooms. ○ **Screens and furniture**: Screens, walls and furniture are found to affect the flow of air to the occupied zone. The extent of obstruction depends on the type of furniture/screen system, location and direction of screens, walls and large items of furniture. Changing diffusers and injection rates to mitigate the problem would be difficult or expensive, because of constraints in the air supply system, or existing variable-air-volume mixing boxes.
(continued)		(continued)

Scale A.7.1. continued on next page

FIG. 1 Scale A.7.1 for Influence of HVAC on Layout

A.7. Layout and Building Features

Scale A.7.1. Influence of HVAC on layout (continued)

Occupant Requirement Scale		Facility Rating Scale
5 (continued) of ceiling vents and planned air movement, e.g. from perimeter to core of building. ○ **CONSTRAINTS ON POPULATION DENSITY**: The unit's population density may be no higher than 1 person per usable 15 m².	4 ❑	5 (continued) ○ **Population density**: To achieve target for temperature and indoor air, the average space per occupant should be at least 15 m² per person of usable area. ○ **Upgrade**: Adjustments of HVAC services, while maintaining basic standard of fitup, is or would be at moderate cost. Upgrade for enhanced serviceability would substantially add to the total cost of office installation.
3 ❑ ○ **CHOICE OF OPEN OR CLOSED OFFICES**: It is acceptable that the space be predominantly open plan (90%). ○ **CONSTRAINTS ON USE OF CLOSED OFFICES**: Few screens or high furniture. Few rooms, located at perimeter or core, are used only for short meetings. ○ **CONSTRAINTS ON POPULATION DENSITY**: The unit's population density can be as low as 1 person per 18 to 20 m².	2 ❑	3 ❑ ○ **Type of layout**: HVAC suits predominantly open plan, e.g. 90%, or predominantly enclosed rooms with openable windows for ventilation. ○ **Location of rooms**: Ventilation and temperature control systems limit the provision and location of rooms, e.g. rooms cannot total more than 10% of usable area, with rooms mostly located at perimeter or mostly at core. Rooms, if installed, become stuffy if used for meetings lasting more than two hours, or for consecutive meetings. ○ **Screens and furniture**: Standard screens and furniture are found to obstruct the flow of air to the occupied zone, regardless of the type of furniture or screen system, or layout. This could be partially mitigated by changing diffusers and air injection volumes and rates, but at great expense and disruption to office workers while ceiling is opened for work. ○ **Population density**: To achieve tolerable working conditions, the average space per occupant must be in the range of 18 m² to 20 m² per person of usable area. ○ **Upgrade**: An upgrade of HVAC services to basic standard would greatly add to the total cost of office installation, e.g. up to double the fitup cost.
1 ❑ ○ **CHOICE OF OPEN OR CLOSED OFFICES**: The occupant requires no enclosed rooms and few screens or high furniture. ○ **CONSTRAINTS ON USE OF CLOSED OFFICES**: Few meetings last over an hour. ○ **CONSTRAINTS ON POPULATION DENSITY**: The unit's population density is lower than 20 to 25 m² per person.		1 ❑ ○ **Type of layout**: HVAC suits 100% open plan, but not enclosed rooms. ○ **Location of rooms**: Ventilation and temperature control systems severely dictate and limit the provision and location of rooms, e.g. rooms cannot total more than 5% of usable area, with rooms only located at the perimeter or only at the core. Rooms, if installed, become stuffy if used for meetings lasting more than an hour, or for consecutive meetings. ○ **Screens and furniture**: Standard screens and furniture are found to obstruct the flow of air to the occupied zone, regardless of the type of furniture or screen system, or layout, and it is not feasible to remedy the problem. ○ **Population density**: To achieve tolerable working conditions, the average space per occupant must be in the range of 20 m² to 25 m² per person of usable area. ○ **Upgrade**: An upgrade of HVAC services to basic standard would greatly add to the total cost of office installation, e.g. more than doubles fitup cost..

❑ Exceptionally important. ❑ Important. ❑ Minor Importance.	
Minimum Threshold level =	❑ NA ❑ NR ❑ Zero ❑ DP

NOTES *Space for handwritten notes on Requirements or Ratings*

FIG. 1 Scale A.7.1 for Influence of HVAC on Layout *(continued)*

A.7. Layout and Building Features

Scale A.7.2. Influence of sound and visual features on layout

Occupant Requirement Scale		Facility Rating Scale
9 ❑ ○ **TOLERANCE OF SOUND AND VISUAL CONDITIONS:** Operations require that there be a lot of flexibility in the arrangement of main aisles, individual workstations, and group areas, to achieve a high level of speech privacy and intelligibility and a minimum of distraction and disruption, e.g. a high level of privacy and/or concentration is needed. ○ **AVOIDING GLARE ON VDU SCREENS:** Require that VDU screens can be placed in any location without glare.		9 ❑ ○ **Main Aisles**: Main aisles can be planned within a range of optional widths and locations so distraction and disruption due to traffic in main aisles are avoided. ○ **Location of workstations**: Individual workstations, group areas and enclosed rooms can be located in any part of the floor and achieve a high level of speech privacy and intelligibility without modification to the building or services. ○ **VDU locations**: VDU screens can be located in any part of the floor and facing any direction without resulting in glare off screens due to lights or windows. ○ **Type of layout**: Sound and visual conditions can be provided to a high level, regardless of the kind of office layout, e.g. all in any form of open plan, all in enclosed rooms, or combinations of open and enclosed. ○ **Upgrade**: Good conditions are achievable without modification, or with only minor added cost.
7 ❑ ○ **TOLERANCE OF SOUND AND VISUAL CONDITIONS:** Operations require that main aisles, individual workstations, and group areas can be arranged for a basic level of speech privacy and intelligibility and a minimum of distraction and disruption, regardless of the type of office layout. ○ **AVOIDING GLARE ON VDU SCREENS:** Require that there be flexibility in the placement of VDU screens, vis-a-vis glare and reflections.	8 ❑	7 ❑ ○ **Main aisles**: Main aisles can be planned within a range of optional widths and locations which limit or avoid distraction and disruption. ○ **Location of workstations**: Individual workstations, group areas and enclosed rooms can be located in any part of the floor and achieve a basic level of speech privacy and intelligibility without modification to the building or services. ○ **VDU locations**: VDU screens can be located in any part of the floor and facing any direction except toward windows, with only slight glare due to light sources. ○ **Type of layout**: Sound and visual conditions can be provided to a basic level with any kind of office layout, e.g. all in any form of open plan, all in enclosed rooms, or combinations of open and enclosed. ○ **Upgrade**: Conditions are acceptable and achievable without modification to the building or services, or with minor modification and added cost.
5 ❑ ○ **TOLERANCE OF SOUND AND VISUAL CONDITIONS:** Operations can accommodate prearranged layouts of main aisles. Operations require that individual workstations, group areas and enclosed rooms can be arranged for a basic level of speech privacy and intelligibility, with the potential for enhancement by modifying building and/or services. ○ **AVOIDING GLARE ON VDU SCREENS:** It is acceptable that VDU screens must be set up in a specific direction to avoid glare.	6 ❑	5 ❑ ○ **Main aisles**: Space planning is constrained by given widths and locations of main aisles resulting in unavoidable distraction or disruption, if prearranged locations are not maintained. ○ **Location of workstations**: Individual workstations, group areas and enclosed rooms can be located in any part of the floor and achieve a basic level of speech privacy and intelligibility. Enhanced levels require some modification to the building or services, or both. ○ **VDU locations**: VDU screens can be located anywhere on the floor (subject to a suitable illumination level). Must face a specific direction to avoid glare, e.g. parallel to windows or parallel to light fittings. ○ **Type of layout**: Sound and visual conditions can be provided to a basic level with any one or two but not all three kinds of office layout, e.g. all in some form of open plan, all in enclosed rooms, or combinations of open and enclosed. ○ **Upgrade**: Achieving acceptable conditions requires modification with substantial added cost.
	4 ❑	

Scale A.7.2. continued on next page

FIG. 2 Scale A.7.2 for the Influence of Sound and Visual Factors on Layout

A.7. Layout and Building Features

Scale A.7.2. Influence of sound and visual features on layout (continued)

Occupant Requirement Scale		Facility Rating Scale
3 ❑ ○ **TOLERANCE OF SOUND AND VISUAL CONDITIONS**: Location and width of main aisles or corridors is irrelevant or not important. Poor sound and visual conditions can be tolerated. ○ **AVOIDING GLARE ON VDU SCREENS**: Few VDU screens, or screens are used only for a short time.	2 ❑	3 ❑ ○ **Main aisles**: Because of floorplate configuration, main aisle or corridor locations and widths result in serious distraction and disruption to many people and groups, requiring special design measures, e.g. extra-high screens, extra meeting rooms and retreat spaces for occupants, extra distance between workstations, and avoiding regular use of workstations next to aisles. ○ **Location of workstations**: Almost regardless of the location, individual workstations, enclosed rooms and group areas experience poor conditions. It is possible to fix these conditions. ○ **VDU locations**: From most locations, VDU screens reflect glare from light or windows. Some operators suffer eyestrain, headaches, etc., if working for several hours at a screen. ○ **Type of layout**: Acoustic and/or visual conditions best suit only one type of office planning e.g. all or most occupants in enclosed rooms, or almost all in open plan. ○ **Upgrade**: Upgrade is possible but very costly.
1 ❑ ○ **TOLERANCE OF SOUND AND VISUAL CONDITIONS**: Location and width of main aisles or corridors is irrelevant or not important. Sound and visual conditions are irrelevant or not important. ○ **AVOIDING GLARE ON VDU SCREENS**: There is little use of VDU screens.		1 ❑ ○ **Main aisles**: Because of floorplate configuration, main aisle or corridor locations and widths result in serious distraction and disruption to many people and groups, requiring special design measures, e.g. extra-high screens, extra meeting rooms and retreat spaces for occupants, extra distance between workstations, and avoiding regular use of workstations next to aisles. Also, required locations of aisles or corridors make it impossible to have workstations for more than 15 people grouped together. ○ **Location of workstations**: Regardless of location, individual workstations, enclosed rooms and group areas experience poor or very poor sound and visual conditions for work. It is impossible to fix these conditions. ○ **VDU locations**: Wherever located, VDU screens reflect glare from light and windows. Many operators suffer eyestrain, headaches, etc., if working for several hours at a screen. ○ **Type of layout**: It is only practicable to do one type of office planning, e.g. all or most occupants in enclosed rooms, or almost all in open plan. ○ **Upgrade**: It is not possible to upgrade the building or systems to provide adequate conditions.

❑ Exceptionally important. ❑ Important. ❑ Minor Importance.	
Minimum Threshold level =	❑ NA ❑ NR ❑ Zero ❑ DP

NOTES *Space for handwritten notes on Requirements or Ratings*

FIG. 2 Scale A.7.2 for the Influence of Sound and Visual Factors on Layout *(continued)*

A.7. Layout and Building Features

Scale A.7.3. Influence of building loss features on space needs

Occupant Requirement Scale		Facility Rating Scale
9 ❑ ○ There is NO occupant requirement for this topic. Building loss factor should not affect occupants. It should only affect the total amount of 'usable' floor area which will be made available to the occupants.		9 ❑ ○ **Usable area lost**: Building factor results in negligible loss of usable area, e.g. less than 3%, (refer to Table A7-1). Occupiable floor area is 98% or more of usable area.
	8 ❑	
7 ❑ ○ There is NO occupant requirement for this topic. Building loss factor should not affect occupants. It should only affect the total amount of 'usable' floor area which will be made available to the occupants.		7 ❑ ○ **Usable area lost**: Building factor results in some loss of usable area, e.g. 3%-7%, (refer to Table A7-1). Occupiable floor area is between 93% and 97% of usable area.
	6 ❑	
5 ❑ ○ There is NO occupant requirement for this topic. Building loss factor should not affect occupants. It should only affect the total amount of 'usable' floor area which will be made available to the occupants.		5 ❑ ○ **Usable area lost**: Building factor results in an average loss of usable area, e.g. 8%-12%, (refer to Table A7-1). Occupiable floor area is between 88% and 92% of usable area.
	4 ❑	
3 ❑ ○ There is NO occupant requirement for this topic. Building loss factor should not affect occupants. It should only affect the total amount of 'usable' floor area which will be made available to the occupants.		3 ❑ ○ **Usable area lost**: Building factor results in serious loss of usable area, e.g. 13%-20%, (refer to Table A7-1). Occupiable floor area is between 80% and 87% of usable area.
	2 ❑	
1 ❑ ○ There is NO occupant requirement for this topic. Building loss factor should not affect occupants. It should only affect the total amount of 'usable' floor area which will be made available to the occupants.		1 ❑ ○ **Usable area lost**: Building factor results in severe loss of usable area, e.g. more than 20%, (refer to Table A7-1). Occupiable floor area is 79% or less of usable area.

❑ Exceptionally important. ❑ Important. ❑ Minor Importance.	
Minimum Threshold level =	❑ NA ❑ NR ❑ Zero ❑ DP

NOTES *Space for handwritten notes on Requirements or Ratings*

FIG. 3 Scale A.7.3 for the Influence of Building Loss Factors on Space Needs

3.1.3 *office*—a place, such as a room, suite, or building, in which business, clerical or professional activities are conducted. **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 *building loss factor*—in a facility, expressed as a percentage of a facility's usable floor area, the space not effective for planning because of building design. It is the floor area percentage that must be used for excess circulation, oversize footprints, or "dead space," because of floorplate configuration.

3.2.2 *building projection*—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.

3.2.3 *floorplate*—an entire floor of a building, thought of as a solid plane with specific shape and dimensions.

3.2.4 *occupiable area*—that portion of usable area that is actually available for efficient space planning and furniture layout for office functions, after deducting the area of any building elements or design features that prevent floor area from being so used, for example, columns, perimeter convectors, and projections from walls; or a narrow space between a column and a wall, which cannot be used for placement of furniture or for people to walk; or an angle in a wall, or diagonal alignment of a wall, leaving a zone where furniture cannot be placed.

3.2.5 *occupied zone*—the region within an occupied space between planes 3 and 72 in. (75 and 1800 mm) above the floor and more than 2 ft (600 mm) from the walls or fixed air-conditioning equipment (see ASHRAE 62-1989).

3.2.6 *primary circulation*—the portion of a building that is a public corridor, lobby, or the common-use portion of the base floor of an atrium; or is required for access by all occupants on a floor to stairs, elevators, toilet rooms, or building entrances or emergency exits or refuge areas.

3.2.7 *secondary circulation area*—the portion of a building required for access to some subdivision of space whether bounded by walls or not, that does not serve all occupants on a floor, and that is not defined as primary circulation area.

3.2.8 *usable area*—the sum of all floor areas of a facility assigned to, or available for assignment to, occupant groups, including interior walls, building columns and projections, and secondary circulation.

4. Significance and Use

4.1 Each Facility Rating Scale (see Figs. 1-3) in this classification provides a means to estimate the level of serviceability 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.

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.

4.4.3 Serviceability (potential) of a facility for which remodeling has been planned.

4.5 Use of this classification does not result in building evaluation or diagnosis. Building evaluation or diagnosis generally requires a special expertise in building engineering or technology and the use of instruments, tools, or measurements.

4.6 This classification applies only to facilities that are building constructions, or parts thereof. (While this classification may be useful in rating the serviceability of facilities that are not building constructions, such facilities are outside the scope of this classification.)

4.7 This classification is not intended for, and is not suitable for, use for regulatory purposes, nor for fire hazard assessment nor for fire risk assessment.

5. Basis of Classification

5.1 The scales in Figs. 1-3 contain the basis for classification.

5.2 Instructions for the use of this classification are contained in Practices E1334 and E1679.

5.3 Detailed instructions for using the table shown in Fig. 4 are contained within that table.

6. Keywords

6.1 building; building layout factors; building loss factors; facility; facility occupants; function; HVAC; layout factors; office; performance; rating; rating scale; requirements; serviceability

A.7. Layout and Building Features

A7–1. Estimating the Building Loss Factor

Instructions for using the table:

- Identify which statements are true. Circle each applicable negative or positive percentage number. Complete calculation at end of the table.
- The columns headed **open** and **rooms** contain the percentages to use depending on the required ***capability*** to accommodate rooms about 30 m^2 (about 300 sq ft) or smaller: **open** means less than about 20% of usable floor area in small rooms; **rooms** means more than about 20%

Features that REDUCE usable area	open	rooms	Features that ENHANCE usable area	open	rooms
1. Columns, projections and obstructions *Note: If window glass is more than 50% of floor-to-ceiling dimension in more than half of width of outside wall, measure from face of glass, not face of wall.*					
1A •Wide columns, e.g. 400–600 mm (1.3–2.0 ft)	–1%	–1%			
OR •Very wide columns, over 750 mm (2.5 ft)	–2%	–2%			
1B Projecting convectors or pilasters (on grid) or other obstructions to placing furniture or equipment total less than 1/3 of wall:			**1B** No projections, or average projection is negligible, e.g. less than 30 mm (1.2 in)	+1%	+1%
•Projections average 100 mm (4 in)	–1%	–1%			
OR •Projections average 150 mm (6 in)	–2%	–2%			
OR •Projections average 200 mm (8 in)	–3%	–3%			
ADD •If projections are not on same grid as interior columns		–1%			
ADD •If projections total more than 1/3 of wall .	–1%	–1%			
OR •Measure actual loss due to projections	–___%	–___%			
1C •Sheer walls or utility walls in open floor area, e.g. between selected columns	–1%	–1%			
1D •Ducts through floor, or openings in floor, or access to telecom rooms or closets, or large openings to floor ducts for cables, if constrain layout within usable area	–1%	–1%			
ADD •If cause inefficient layout, more than just constraint .	–1%	–1%			
OR •Measure actual area loss due to these features	–___%	–___%			
2. Dimensions and proportions of space					
2A Floorplate dimensions and aisle positions or irregular perimeter wall cause cramped or wasteful layouts of work-stations and rooms; or otherwise wasteful layouts; or dimensions are not multiples of standard workstation sizes and aisle widths; or need single-loaded or "extra" aisles or corridors:			**2A** Floorplate dimensions and aisle positions are well-suited to standard workstation and room sizes and configurations, and aisle widths:		
			•Over entire floor, within a wide range of layout options	+3%	+3%
•In some areas, say about 10%–20% of the floor	–1%	–1%	***OR*** •In at least 3/4 of the floor area, within a wide range of layout options	+2%	+2%
OR •In large areas, say about half the floor	–3%	–3%	***OR*** •In at least 1/2 the floor area within a wide		
OR •In most or all areas of the floor	–5%	–5%	range of layout options	+1%	+1%
2B •Ceiling grid dimensions vary in different directions and are not standard, e.g. not multiple of 600 mm or 1.5 m (2 ft or 5 ft). (In open, only if coffers or grid are very visually prominent)	-1%	–2%	**2B** •Ceiling grid is same in both directions and is standard, e.g. 1.2 m or 1.5 m (4 ft or 5 ft)		+1%
2C •Ceiling grid changes direction, e.g. part of ceiling grid is rotated 45°, or ceiling grid is rotated relative to perimeter walls, which constrains where partition walls and workstations can be placed	–1%	–2%	**2C** •Ceiling heights and construction above hung ceiling in some locations allow for special facilities such as large conference rooms, computer centre, conference centre, etc. which require high ceiling, e.g. 3.2 m (10.5 ft) or more, and space for extra air ducts	+1%	+1%
In open, add if coffers or gris are very visually prominent	-1%				
2D •Columns badly spaced, e.g. very close to each other or to other fixed structure, such as perimeter walls or building core; or less than 4.5 m (15 ft) apart; or not spaced at a multiple of workstation dimensions	–3%	–3%			
OR •Affects less than 10% of floor	–1%	–1%			

Acknowledgements: John Gray invented this method while at the International Centre for Facilities, with Gerald Davis and Françoise Szigeti. Carroll Thatcher led the team that originally tested, refined, and validated it, using CAD/CAFM technology and data from field measurements.

FIG. 4 Estimating the Building Loss Factor

A.7. Layout and Building Features

A7–1. (continued)

Features that REDUCE usable area	open	rooms	Features that ENHANCE usable area	open	rooms
3. Shape of usable area					
3A •Complex shape floorplate, many sub-areas with different shapes and sizes	–3%	–3%	**3A** •Uninterrupted spaces with regular shape, approximately square	+1%	+1%
OR •Some sub-areas cause inefficient layouts	–1%	–1%	***ADD*** •In buildings with central core, variation in distance between core and external walls gives different sizes and proportions of regular-shaped sub-areas	+1%	+1%
ADD •Floorplate forces layouts with many angles other than right angles	–3%	–3%			
ADD •Usable areas are very long and narrow, e.g. 45 m (150 ft) by under 10 m (30 ft) wide; or are more than 30 m (100 ft) deep	–3%	–3%			
4. Integration of systems and building elements					
4A •Ceiling grid and window grid not aligned		–2%	**4A** •"Wide grid", i.e. partitions can be located in a wide range of positions and not limited to exact alignment with ceiling systems grid lines or vertical mullions in the outside wall, e.g. wide space of solid wall panel between windows		+2%
ADD •In-floor ducts for cables not aligned with ceiling or wall grids		–1%	***ADD*** •No internal columns	+1%	+1%
ADD •Partitions can only be located on grids (no lateral tolerance without serious interference with windows, lights or ventilation, etc., and changed only at great expense)		–2%			
ADD •Internal columns not aligned with ceiling grid or not aligned with window mullions, or both	–1%	–1%			
ADD •Window bays of more than 1.5 m (5 ft) and windows cannot be subdivided between two rooms because no window mullion		–2%			
5. Location of exits, closets and rooms for services, and washrooms					
5A •In buildings with a single central core that includes the elevator lobby, and no remote stairs, the access to service closets and rooms for services, is from "usable" areas.	–1%	–1%	**5A** •In buildings with a single central core, and no remote stairs, access to all closets and rooms for services is from the public zone, i.e. *not* through occupant's reception or operational zones	+1%	+1%
OR •In buildings with a single core at perimeter of office areas: main aisles change direction or go at an angle across the space	–2%	–2%	***OR*** •In buildings with a single core at perimeter of office area, there are no restrictions on the location of main aisles	+2%	+2%
ADD •In buildings with elevators that open directly into "usable" space: - if one or two elevators	–1%	–1%			
- if three or four elevators	–2%	–2%			
- if five or six elevators	–3%	–3%			
5B •In buildings with two cores at perimeter, or central core plus remote core, e.g. elevators plus fire stair at one place and toilets plus second fire stair at another, estimate area of shortest primary (main) circulation route 1.5 m (5 ft) wide, to connect toilets, elevators and stairs. What percent is this of total floor area?	–___%	–___%			
6. Distance to windows or atrium					
6A Proportion of usable floor area that is more than 15 m (50 ft) from windows to outside, or to atrium:			**6A** Portion of usable floor area no more than 2 workstations (6 m, 20 ft) away from windows is: •100%	+2%	+2%
•More than 30%	–2%	–2%	***OR*** •70%	+1%	+1%
OR •More than 0% but less than 30%	–1%	–1%			
7. Floor loads					
7A For on-floor storage, e.g. heavy files in shelves, floor loading requirements are that:					
•Storage must be located in a specific part of the floor	–1%	–1%			
ADD •If no area on-floor for heavy loads, then shelves and files must be spaced apart, with wide aisles to distribute the load	–3%	–3%			

CALCULATIONS:					
Sub-total: Sum of all REDUCTIONS in usable area	–___%	–___%	**Sub-total: Sum of all ENHANCEMENTS in usable area**	+___%	+___%
BUILDING LOSS FACTOR	**open**	**rooms**			
Net total of reductions (minus numbers) and enhancements (plus numbers):	_____%	_____%	= percent to deduct from ANSI Z65.1 usable area		

FIG. 4 Estimating the Building Loss Factor *(continued)*