



# Standard Practice for Measuring and Calculating Building Loss Features That Take Up Floor Area in Buildings<sup>1</sup>

This standard is issued under the fixed designation E2619/E2619M; 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.

~~<sup>e1</sup> NOTE—Units information and designation was corrected editorially in April 2009.~~

## 1. Scope

1.1 This practice specifies how to measure certain characteristics of a building, known as building loss features, inside the exterior gross area of a floor and how to calculate the amount of *actual* and *effective* floor area that will be not be available for the placement of people's workplaces, furniture, equipment, or for circulation, if using standard furnishings and orthogonal furniture systems.

1.2 This practice can be used to specify a performance requirement to limit the amount of floor area that may be taken up by building loss features.

1.3 This practice can be used to assess how well a design(s) for an office facility meets a performance requirement regarding floor area.

1.4 This practice can be used to assess how well a constructed office building has met a performance requirement regarding floor area.

1.5 This practice is not intended for and not suitable for use for regulatory purposes, fire hazard assessment, and fire risk assessment.

1.6 Users of this practice should recognize that, in some situations, the amount of certain *actual* and *effective* floor area losses may be mitigated to some degree at some cost by custom-tailoring spaces and creating specially fitted furnishings and carpentry to get some value from space which would not otherwise be usable.

1.7 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.8 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.9 *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](#)

[E1836/E1836M Practice for Building Floor Area Measurements for Facility Management](#)

2.2 *ANSI Standard:*<sup>3</sup>

[ANSI/BOMA Z65.1–1996 Standard Method for Measuring Floor Area in Office Buildings](#)

<sup>1</sup> This practice 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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<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.

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

### 2.3 Other Standards:<sup>4</sup>

**ASHRAE 62.1–2007** Ventilation for Acceptable Indoor Air Quality

## 3. Terminology<sup>5</sup>

### 3.1 Definitions:

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

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<sup>4</sup> Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, <http://www.ashrae.org>.

<sup>5</sup> Certain definitions of terms in this practice were agreed in 2007 by a Working Group established jointly by the Building Owners and Managers Association (BOMA) International and the International Facility Management Association (IFMA). Certain terms were derived from referenced ASTM standards or from referenced ANSI standard, or from published IFMA documents. Ownership of copyright to specific terms is indicated by footnotes. Certain terms are quoted from other ASTM standards, in which case the ASTM source is identified at the end of the definition.

#### 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. **E631**

3.1.2 For standard definitions of additional terms applicable to this practice, see Terminology **E631**.

#### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *actual loss, n*—of floor area, floor area not available for the placement of people’s workplaces, furniture, or equipment or for circulation because occupied by a physical building feature or required by law or regulation.

3.2.2 *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.

#### 3.2.2.1 Discussion—

It is the floor area percentage that must be used for excess circulation, oversize footprints, “dead space,” or encroachments because of floorplate configuration.

3.2.3 *building loss feature, n*—element of a building, or aspect of its design, inside the exterior gross area, that cost floor area which could otherwise be used for the placement of people’s workplaces, furniture, or equipment or for circulation.

3.2.4 *dominant portion, n*—the inside surface of the outside wall. **ANSI/BOMA Z65.1–1996<sup>6</sup>**

3.2.5 *effective loss, of floor area, n*—floor area not available for the placement of people’s workplaces, furniture, or equipment or for circulation because of configuration of building elements or legally binding document.

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<sup>6</sup> In the 1996 edition, which is copyright by BOMA, the dominant portion is defined as the inside face of the portion of the wall which is window glass where it is more than 50 % of the vertical distance from finished floor to finished ceiling, and elsewhere is the inside face of the outside wall, or of a pilaster or column attached to the outside wall where they occur. Note that the reader is cautioned that ANSI/BOMA Z65.1–1996 is developed by and subject to the authority of BOMA International, which may change it from time to time at its sole option. It is not defined as a part of this ASTM standard.

#### 3.2.5.1 Discussion—

Occurs typically if using standard or manufactured furnishings or orthogonal furniture system(s) in a floorplate with a non-orthogonal configuration, but this sometimes may be partially mitigated by using specially-built or built-in furnishings. An example of a legally binding document is a requirement in a lease.

3.2.6 *exterior gross area, n*—the area of the floor measured to the outside face of the walls that enclose the floor(s) of the building.

#### 3.2.6.1 Discussion—

Areas which are not enclosed, such as patios and balconies, are not part of exterior gross area. Cornices, pilasters, buttresses, and so forth that extend beyond the wall face are disregarded. The exterior gross area of a basement space includes the area measured to the outside face of basement or foundation walls. A balcony that is *not fully enclosed*, whether or not it extends beyond the line of the outside wall face, is not included in the exterior gross area.

3.2.7 *floor area, n*—area in the horizontal plane of the bottom level of a story or stories in a building.

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

3.2.9 *interior encroachment, n*—base building element that is located inside a building, not on an outer wall, and prevents the use of the floor area for furniture, equipment, circulation, or other occupant function.<sup>7</sup>

<sup>7</sup> ASTM International copyright is shared with BOMA International.

3.2.9.1 *Discussion*—

Examples include but are not limited to: pilaster, convactor, baseboard heating unit, radiator.

3.2.10 *interior gross area, n*—portion of the floor(s) that is totally enclosed within the dominant portion.<sup>7</sup>

3.2.11 *occupied zone, n*—region within an occupied space between planes 75 and 1800 mm (3[3 and 72 in.] above the floor and more than 600 mm (2 ft) [2 ft] from the walls or fixed air-conditioning equipment (see ASHRAE 62.1–2007).

3.2.12 *orthogonal, n*—relating to or composed of right angles.

3.2.13 *perimeter encroachment, n*—base building element or restricted area that is located inside the dominant portion of a building on the outer wall and that prevents the use of the floor area for furniture, equipment, circulation, or other occupant function.<sup>7</sup>

3.2.13.1 *Discussion*—

Examples are windowsills inside the dominant portion, pilasters, and columns attached to the outside walls and convectors.

3.2.14 *plannable area, n*—plannable gross area less the area taken up by major vertical penetrations, void areas, service areas, and either primary circulation on an occupied or planned floor or base building circulation on an empty floor.

3.2.15 *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.<sup>8</sup>

<sup>8</sup> New term for which copyright is shared by ASTM International and BOMA International.

3.2.15.1 *Discussion*—

Plannable gross area typically excludes perimeter encroachments that prevent the placement of the occupant's furniture and equipment.

3.2.16 *planning grid, n*—grid to which building elements such as the ceiling, the partitions, and the columns are aligned.

3.2.17 *primary circulation, n*—minimum path on a floor for access to egress stairs, elevator lobbies, toilet rooms, refuge areas, building lobbies, and entrances.<sup>7</sup>

3.2.18 *standard space module, n*—unit of floor area with dimensions set as standard for a category of offices or workstations.

## 4. Significance and Use

4.1 Use this practice to identify and measure the amount of *actual* and *effective* floor area that will be unavailable to occupants for the placement of people's workplaces, furniture, and equipment or for circulation.

4.2 Findings from use of this practice are intended for optional inclusion with reports of floor area measured in accordance with Practice **E1836/E1836M** or in accordance with ANSI/BOMA Z65.1–1996.

NOTE 1—The choice between using Practice **E1836/E1836M** or ANSI/BOMA Z65.1–1996 as the basis for measurement depends on the objectives of the analysis. Practice **E1836/E1836M** is oriented to the traditional interests of design professionals and would be particularly suitable for single-tenant buildings whereas some categories of space measured by ANSI/BOMA Z65.1–1996 are oriented to the leasing of multi-tenant buildings by real estate professionals.

4.3 this practice is not intended for use for regulatory purposes, nor for fire hazard assessment, nor for fire risk assessment.

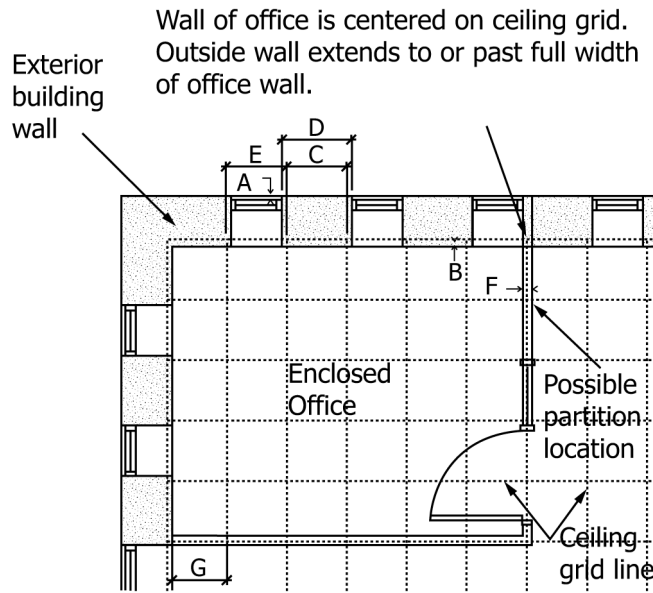
## 5. Basis of Practice

5.1 Use this practice to specify a performance requirement to limit the amount of floor area that is permitted to be taken up, or is actually taken up by, building features inside the exterior gross area, as measured in accordance with Practice **E1836/E1836M**.

5.2 Use this practice to assess how well a design(s) for an office facility meets such a performance requirement.

5.3 Use this practice to assess how well an existing office facility has met a performance requirement.

5.4 Use this practice to compare how well different buildings or facilities meet a performance requirement. This practice is applicable despite differences such as location, structure, mechanical systems, age, and building shape.



NOTE 1—A = 50 mm (2-in.) [2 in.]  
 B = 100 mm (4-in.) [4 in.]  
 C = 600 mm (24-in.) [24 in.]  
 D = 700 mm (28-in.) [28 in.]

FIG. 1 No Actual or Effective Loss Due to Exterior Wall and Its Relation to Ceiling Grid

5.5 Use this practice to calculate the amount of variance from a performance target about floor area during design and construction phases.

## 6. Procedure for Measurement and Calculation

6.1 This practice practice uses imperial units to measure floor area. Other measurement units can be used to measure floor area.

6.2 For each building element or aspect of design, measure the *actual* loss of floor area and the *effective* loss using the method and measurement sequence in this practice.

6.3 *Location of the Dominant Portion:*

6.3.1 Determine the location(s) of the Dominant Portion of the inside face of the exterior walls, as defined in ANSI/BOMA Z65.1-1996.

6.4 *Exterior Walls—Size, Shape, and Dimensions:*

6.4.1 Buildings vary in their capacity to accommodate different sizes and categories of occupants without excessive waste of floor area, while maintaining other levels of service.

6.4.2 The geometry of a building's typical floors (for example, shape and dimensions formed by the exterior building walls and dimensions of its grid) will affect how much space will be lost because it cannot be subdivided into rooms or workstations.

6.4.3 If designs for the geometry and building grid dimensions do not take this into account, then the amount of floor area available for planning and fitup may be substantially reduced.

6.4.4 Irregular exterior walls, non-orthogonal exterior walls, and the dimensions of the space can severely limit and even dictate the nature of the fitup on a floor.

6.5 *Exterior Wall and Its Relation to the Ceiling Grid:*

6.5.1 The example shown in shows a condition in which there is no *effective* loss due to either the design of the floorplate, the resulting dimensions formed by the building's exterior building walls and dimensions of the ceiling grid.

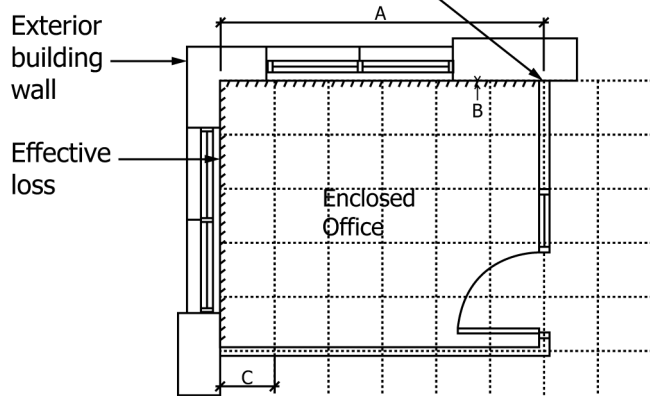
6.5.2 In this example, the ceiling grid line is located 50 mm (2-in.) [2 in.] (for example, one-half the thickness of a partition wall) inside the exterior wall and a result there is no *actual* or *effective* loss for this feature.

6.5.3 In contrast to Fig. 1, the location of the ceiling grids in have slightly different alignments and demonstrates how *effective* loss has been introduced into the design.

6.5.4 *If the Condition Is*—The ceiling grid is at the interior face of the exterior wall or some distance from the interior face of the exterior wall, then there is *effective* loss of floor area for people, furniture, and equipment, as shown in Figs. 2 and 3.

6.5.5 *Then the Measurement Rule Is*—Measure the *effective* loss from the finished surface of the interior face of the exterior wall to the next ceiling grid. (Refer to Figs. 2 and 3.) The hatched areas in each of these figures indicate the *effective* loss, which is the amount of extra floor area that will be required to align the office wall with the first ceiling grid. Sum the measurements to determine the *effective* loss for this feature.

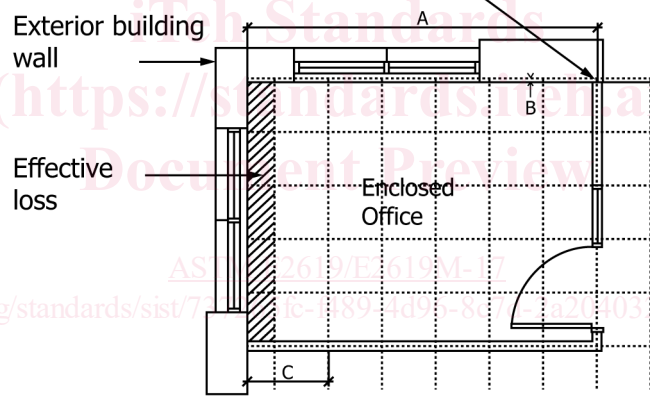
Wall of office is centered on ceiling grid.  
Outside wall extends to or past full width of office wall.



NOTE 1—A = 3660 mm (12 ft, 0 in.)  
B = 50 mm (2 in.)  
C = 600 mm (24 in.)

FIG. 2 Effective Loss Due to Alignment of Ceiling Grid at Face of Exterior Wall

Wall of office is centered on ceiling grid.  
Outside wall extends to or past full width of office wall.



NOTE 1—A = 3900 mm (13 ft, 0 in.)  
B = 50 mm (2 in.)  
C = 900 mm (36 in.)

FIG. 3 Effective Loss Due to Ceiling Grid Not Being Aligned at Face of Exterior Wall

### 6.6 Exterior Wall That Deviates from the Orthogonal:

6.6.1 *If the Condition Is*—The exterior wall(s) deviates from the orthogonal and reduces the proportion of floor area available for planning and fitup.

6.6.2 When an enclosed office is next to a non-orthogonal, or irregular, wall the *actual* floor area that would be required to layout the office would be larger than the area allowed for in the programming document. The floor area in excess of the allowed area is *effective loss*, as indicated by the hatched area in Figs. 4 and 5.

6.6.3 The same situation occurs when an open workstation is next to non-orthogonal wall. In Fig. 4, the exterior wall deviates from the orthogonal and creates *effective loss* as indicated by the hatched area.

6.6.4 *Then the Measurement Rule Is*—Measure the area between the interior face of the exterior wall and the first planning grid line at which a complete open workstation module or enclosed office module can be placed. Sum the measurements to determine the *effective loss*.

### 6.7 Perimeter Encroachments:

6.7.1 The size, shape, and location of perimeter encroachments at the exterior wall can reduce the density and efficiency, or both, of floor area usage on a floorplate.

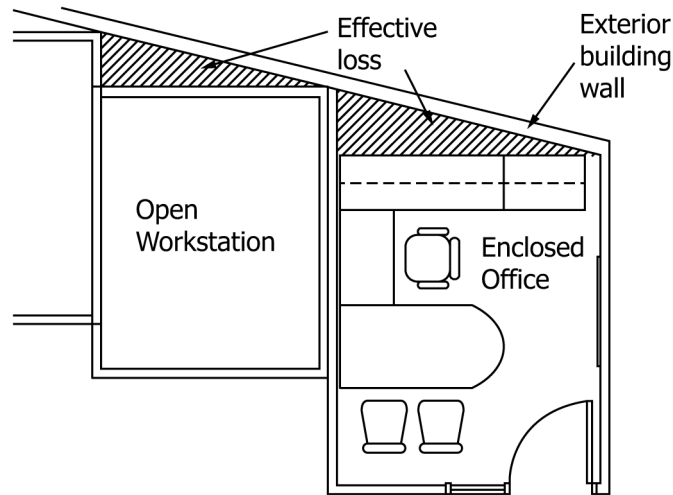


FIG. 4 Effective Loss Due to Non-Orthogonal Exterior Wall

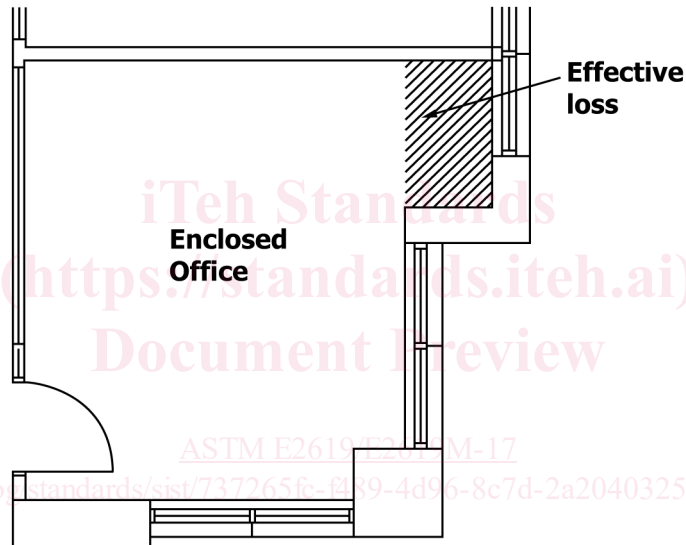


FIG. 5 Effective Loss Due to an Irregular Exterior Wall

6.7.2 Perimeter encroachments in the form of convector heaters or cooling units usually occur under the windows. While a projection may be very small (for example, a 75-mm (3-in.) [3-in.] protrusion into the interior) when it repeats around the outside of a floor, the total floor area taken up by these 75-mm (3-in.) [3-in.] projections can easily equate to the floor area of one or two workstations on a floor.

6.7.3 Projections and pilasters, or both, that occur at the exterior wall may also be intermittent, such as when columns and earthquake bracing embed only part of the way into an exterior wall—with the rest protruding into the interior space. When they are not aligned with the grid, or are intermittent, they interfere with the layout of workstations and offices, which can lead to significant amount of *actual* and *effective* losses. *Effective* losses will be even greater if perimeter projections are not uniformly projecting into the interior of the floor. However, if their location enables partitions that are aligned under the ceiling grid lines to meet the outside wall at the projection, the amount of *actual* and *effective* loss, or both, may be reduced.

6.7.3.1 *If the Condition Is*—The floor area between adjacent projecting perimeter encroachments cannot be used to place workstations at the inside face of the exterior wall. (Refer to Fig. 6.)

6.7.3.2 *Then the Measurement Rule Is*—Measure the *effective* loss to the inside finished face of the encroachment that most projects into the floor to determine the *effective* loss. Sum the measurements to determine the *effective* loss.

6.7.3.3 *If the Condition Is*—The floor area between uniformly projecting encroachments cannot be used effectively to place workstations at the inside face of the exterior wall.

6.7.3.4 *Then the Measurement Rule Is*—Measure to the inside finished face of the projecting encroachment to determine the *effective* loss. (Refer to example in Fig. 7.) Sum the measurements to determine the *effective* loss.