Designation: E 2320 – 04

An American National Standard

Standard Classification for Serviceability of an Office Facility for Thermal Environment and Indoor Air Conditions[1, 2]

This standard is issued under the fixed designation E 2320; 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 contains 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 suitable thermal environment and indoor air conditions.

1.2 Within this aspect of serviceability, each pair of scales, shown in Figs. 1-5[3], is for classifying one topic of serviceability. Each paragraph in an Occupant Requirement Scale (see Figs. 1-5) summarizes one level of requirement for serviceability on that topic, which occupants might require. The matching paragraph in the Facility Rating Scale (see Figs. 1-5) 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 paragraphs in the Facility Rating Scale (see Figs. 1-5) are indicative and not comprehensive. They are for quick scanning to estimate approximately, quickly, and economically how well a facility is likely to meet the needs of one or another type of occupant group over time. The paragraphs 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 schematic or preliminary drawings and outline specifications have been prepared.

1.5 This standard indicates what would cause a facility to be rated (classified) at a certain level of serviceability but does not state how to conduct a serviceability rating or how to assign a serviceability score. That information is found in Practice E 1334. The scales in this classification are complimentary to and compatible with Practice E 1334. Each requires the other.

1.6 This standard indicates what would cause a requirement to be classified as being at a specific level, but does not state how to ascertain a requirement, or how to assign a specific level. This information is found in Practice E 1679. The scales in this classification are complimentary to and compatible with Practice E 1679. Each requires the other.

1.7 *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 and health practices and determine the applicability of regulatory requirements prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 631 Terminology of Building Constructions

E 1334 Practice for Rating Serviceability of a Building or Building-Related Facility

E 1480 Terminology of Facility Management (Building-Related)

E 1679 Practice for Setting Requirements for Serviceability of a Building or Building-Related Facility

2.2 *ASHRAE Standards:*[4]

ANSI/ASHRAE 52.1-1992 Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices used in General Ventilation for Removing Particulate Matter

ANSI/ASHRAE 55-1992 Thermal Environmental Conditions for Human Occupancy

ANSI/ASHRAE 62-2001 Ventilation for Acceptable Indoor Air Quality

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

[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] Text in Figs. 1–5 is derived from Davis, et al., *Serviceability Tools, Vol 2, Scales for Setting Occupant Requirement and Rating Buildings*, International Centre for Facilities, Ottawa, Ontario, Canada, 1993, 2003, and Davis, et al., *Serviceability Tools, Vol 4, Requirement Scales for Office Buildings,* and *Vol 5, Rating Scales for Office Buildings*, International Centre for Facilities, Ottawa, Ontario, Canada, 1993, 2003.

[4] Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329.

Occupant Requirement Scale		Facility Rating Scale
9 ❑	O **THERMAL COMFORT FOR OCCUPANTS:** The temperature should feel comfortable at all times. No hot or cold areas near windows or external walls. O **THERMAL CONDITIONS FOR MACHINES:** Require conditions in the typical range specified for large computers, servers and printers, e.g. ambient temperatures not greater than 30°C (86°F) in all areas where these computers are operated. Require not greater than 35°C (95°F) in all other areas where personal computers are operated. O **HUMIDITY FOR OCCUPANTS:** Levels of humidity should be comfortable at all times. No stuffy areas. O **HUMIDITY FOR MACHINES:** Require conditions in the range specified for large computers, servers and printers, e.g. effective control of relative humidity in range of 40% to 70% in all areas where these computers are operated. Require in range of 20% to 80% in all other areas where personal computers are operated. Require conditions that do not cause problems for other humidity-sensitive equipment. O **AIR MOVEMENT:** Air movement should normally be barely perceptible. No drafty areas.	9 ❑	O **Air temperature**: Temperatures throughout the facility and in different zones are very similar and are comfortable throughout the facility at all times. Targets are met, e.g.: 20-23.5°C (68-75°F) in winter and 23-26°C (73-79°F) in summer. O **Solar gain near window**: There are no complaints. External walls and windows are very well insulated and screened from solar gains by suitable materials or devices. O **Heat loss near windows and external walls**: There are no complaints, e.g. occupants do not complain of feeling cold even during very cold weather. O **Humidity**: Humidity control is provided where required, and is effective. The building is not stuffy in any areas. In spaces for large computers and servers, humidity is within range of 40% to 70%. O **Air movement**: Air movement is just perceptible in all zones without the use of portable fans. Air movement is increased in hot humid weather. The building is not stuffy in any area, and there are no drafts.
7 ❑	O **THERMAL COMFORT FOR OCCUPANTS:** An acceptable range of thermal comfort must be met almost all the time, at almost all workplaces, except when outdoor conditions are extreme, e.g. met for all but a few workstations, for all but a few hours at a time on all but a few working days each year, and then only minor discomfort. O **THERMAL CONDITIONS FOR MACHINES:** Require conditions in the range specified for desktop computers and printers, e.g. temperatures not greater than 35°C (95°F) in all areas where these computers are operated. O **HUMIDITY FOR OCCUPANTS:** Can tolerate minor discomfort when outdoor conditions are extreme, e.g. insufficient dehumidification when 80% relative humidity creates a stuffy feeling. O **HUMIDITY FOR MACHINES:** Require conditions in the range specified for desktop computers and printers, e.g. relative humidity in range of 20% to 80% in all areas where these computers are operated. O **AIR MOVEMENT:** There should be no drafts in the building.	8 ❑	O **Air temperature**: Temperatures throughout the building and in different zones are similar, and almost always within an acceptable range for comfort. Targets, e.g.: 20-23.5°C (68-75°F) in winter and 23-26°C (73-79°F) in summer, are met for all but a few hours at a time on all but 3 days or less per year. O **Solar gain near window**: There are very few complaints. External walls and windows are well insulated and screened from solar gains by suitable materials or devices. O **Heat loss near windows and external walls**: There are few complaints, e.g. a few occupants may sometimes feel cold during very cold weather. O **Humidity**: In very dry or very humid climates, humidification or dehumidification is only partly effective during peak heat or cold, and adequately effective during balance of the year. O **Air movement**: Air movement is just perceptible in most areas without the use of portable fans. The building is not stuffy and there are no drafts.
		7 ❑
		6 ❑

FIG. 1 Scale A.4.1 for Temperature and Humidity

environment; or it may be a construction that is not a building. The term encompasses both the physical object and its use.

Occupant Requirement Scale		Facility Rating Scale
5 ❑ O **THERMAL COMFORT FOR OCCUPANTS:** An acceptable range of comfort must be met almost all the time. Can tolerate minor differences in temperature between parts of the building. Can tolerate minor discomfort some days, e.g. on about 10 working days per year in very cold weather, possibly chilly near external walls. O **THERMAL CONDITIONS FOR MACHINES:** Require conditions in the range specified for desktop computers and printers, e.g. temperatures not greater than 40°C (104°F) in all areas where these computers are operated not more than 5 days per year. O **HUMIDITY FOR OCCUPANTS:** Can tolerate moderate discomfort when outdoor conditions are extreme, e.g. insufficient dehumidification in 80% relative humidity. O **HUMIDITY FOR MACHINES:** Require conditions in the range specified for desktop computers and printers, e.g. relative humidity normally in range of 20% to 80% in all areas where these computers and printers are operated, except 10% to 90% not more than 5 days per year. O **AIR MOVEMENT:** Some slightly drafty areas are acceptable, but not where individuals must sit or stand.		5 ❑ O **Air temperature**: Minor discrepancies in air temperatures exist throughout the building and in different zones, mostly within an acceptable range for comfort. Targets, e.g.: 20-23.5°C (68-75°F) in winter and 23-26°C (73-79°F) in summer, are met for all but a few hours at a time on all but 10 days or less per year. O **Solar gain near window**: There are few complaints. External walls and windows are acceptably insulated and screened from solar gains by suitable materials or devices. O **Heat loss near windows and external walls**: There are some complaints in some parts of the facility, e.g. feel cold near external walls when windows are in shade or during very cold weather. O **Humidity**: In very dry weather, insufficient humidification, or insufficient dehumidification in very humid weather. O **Air movement:** There is no local control of the mechanical air supply by occupants. Conference rooms and boardrooms have additional supply or exhaust, controlled from within the space by occupants. There are some minor drafts, but few at individual workstations.
3 ❑ O **THERMAL COMFORT FOR OCCUPANTS:** Can tolerate building temperature that is moderately uncomfortable in some areas, e.g. differences in air temperature in various parts of the facility, or overheating on sunny side of a building, or feeling chilled near windows and external walls. O **THERMAL CONDITIONS FOR MACHINES:** Can tolerate temperature not greater than 40°C (104°F), and lack of air movement. O **HUMIDITY FOR OCCUPANTS:** Can tolerate poor humidity control. O **HUMIDITY FOR MACHINES:** Can tolerate relative humidity normally in range of 10% to 90%. O **AIR MOVEMENT:** Can tolerate lack of apparent air movement from building systems.	4 ❑ 2 ❑	3 ❑ O **Air temperature**: There are some complaints, e.g. overheating and being cold in different parts of the facility at the same time. Adjustments in one zone can worsen conditions in others. O **Solar gain near window**: There are more than a few complaints, e.g. overheating due to solar gains near east and west facing windows. O **Heat loss near windows and external walls**: There are more than a few complaints, e.g. if working near external walls in shade, sometimes feel cold during cold weather, and frequently feel cold at some locations in the building during very cold weather. There are some drafts. O **Humidity**: In very dry or very humid climates, humidification or dehumidification is installed but it is inoperable or only partly effective. O **Air movement**: In some areas there is no perceptible air movement, or too much air movement. Portable fans are common. The building is stuffy or drafty in many places, including at individual workstations.
1 ❑ O **THERMAL COMFORT FOR OCCUPANTS:** Air temperature same as exterior is acceptable when temperatures are above freezing. O **THERMAL CONDITIONS FOR MACHINES:** Air temperature same as exterior is acceptable when temperatures are above freezing.		1 ❑ O **Air temperature**: There are frequent complaints, e.g. occupants on one side of the building feel cold while occupants in another part feel hot. Adjustments in one zone worsen conditions in others.

FIG. 1 Scale A.4.1 for Temperature and Humidity *(continued)*

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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