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An American National Standard

Standard Classification for Serviceability of an Office Facility for Management of Operations and Maintenance[1,2]

This standard is issued under the fixed designation E 1670; 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 operations and maintenance.

1.2 Within that aspect of serviceability, each pair of scales, shown in Figs. 1-4, are for classifying one topic of serviceability. Each paragraph in an Occupant Requirement Scale (see Figs. 1-4) summarizes one level of serviceability on that topic, which occupants might require. The matching entry in the Facility Rating Scale (see Figs. 1-4) 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. 1-4) are indicative and not comprehensive. They are for quick scanning and rating a facility and not for evaluating or diagnosing it.

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 E 1334. The scales in this classification are complimentary to and compatible with Practice E 1334. Each requires the other.

2. Referenced Documents

2.1 *ASTM Standards:*

E 631 Terminology of Building Constructions[3]

E 1334 Practice for Rating Serviceability of a Building or Building-Related Facility[3]

E 1679 Practice for Setting Requirements for Serviceability of a Building or Building-Related Facility[3]

2.2 *ISO Document:*[4]

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

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 E 631).

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 E 631).

3.1.3 *office*—a place, such as a room, suite, or building, in which business, clerical or professional activities are conducted (see Terminology E 631).

3.1.4 For standard definitions of additional terms applicable to this classification, see Terminology E 631.

[1] This classification is under the jurisdiction of ASTM Committee E-6 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] *Annual Book of ASTM Standards*, Vol 04.11.

[4] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

4. Significance and Use

4.1 Each Facility Rating Scale (see Figs. 1-4) 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 following:

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

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

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

4.4 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.

4.5 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.)

4.6 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. 1-4 contain the basis for classification.

5.2 Instructions for the use of this classification are contained in Practices E 1334 and E 1679.

6. Keywords

6.1 building; competences; data base; facility; facility occupants; function; maintenance; management; occupant satisfaction; office; operations; outsourcing contractors; performance; rating; rating scale; requirements; serviceability; training; unit costs

B.3. Management of Operations and Maintenance

Scale B.3.1. Strategy and program for operations and maintenance

Facility Management Requirement Scale

9 ❑
- ❍ **LEVEL OF MAINTENANCE AND OPERATION**: Require buildings to be maintained and operated at a high level, helping occupants to be fully productive within their work environment.
- ❍ **TOLERANCE FOR OCCUPANT LOSS OF PRODUCTIVITY**: Any loss of productivity due to breakdown of building services cannot be tolerated.
- ❍ **AVAILABILITY OF SUPPORT SERVICES**: Need highly organized and responsive support service available to supplement in-house staff.

7 ❑
- ❍ **LEVEL OF MAINTENANCE AND OPERATION**: Require buildings to be operated and maintained at a higher than average level.
- ❍ **TOLERANCE FOR OCCUPANT LOSS OF PRODUCTIVITY**: Breakdowns must be rare, having negligible effect on productivity, and be repaired in hours, not days.
- ❍ **AVAILABILITY OF SUPPORT SERVICES**: Require readily available outside support services to support in-house maintenance staff.

5 ❑
- ❍ **LEVEL OF MAINTENANCE AND OPERATION**: Require buildings to be operated and maintained in a manner acceptable to the typical occupant in that locality.
- ❍ **TOLERANCE FOR OCCUPANT LOSS OF PRODUCTIVITY**: Breakdown of building services can be tolerated if rarely occurring, having minor effect on productivity, causing only minimal disruption, and requiring same-day repair.
- ❍ **AVAILABILITY OF SUPPORT SERVICES**: Require support services to be available.

Facility Rating Scale

9 ❑
- ❍ **Strategy and program**: Clearly documented O&M strategy to go beyond simple maintenance to make the building(s) as comfortable and flexible as is cost-effective in response to changing occupant needs, e.g. cooling, ventilating and power. Explicit objectives and criteria are adopted for performance measurement.
- ❍ **Adequacy of budget**: Budget is appropriate to carry out strategy and program.
- ❍ **Human resources**: One maintenance person per 40,000 gross sq ft. About 25% of their time is spent on preventative maintenance.
- ❍ **Availability of replacement parts**: All parts are readily available on site.
- **maintenance contractors**: Outside resources are readily available and retained by firm contractual agreements.

8 ❑

7 ❑
- ❍ **Strategy and program**: Well documented O&M strategy to go beyond simple maintenance to make the building(s) as comfortable and flexible within set-point ranges optimized for operating economy. Some objectives and criteria for performance measurement.
- ❍ **Adequacy of budget**: Budget is lean, but adequate to carry out strategy and program.
- ❍ **Human resources**: One maintenance person per 50,000 gross sq ft. About 25% of their time is spent on preventative maintenance.
- ❍ **Availability of replacement parts**: Critical and routine maintenance parts are readily available on-site.
- **maintenance contractors**: With some exceptions, outside support services are under firm contract.

6 ❑

5 ❑
- ❍ **Strategy and program**: Brief written O&M strategy for responding to changing occupant needs, e.g. cooling, ventilating and power.
- ❍ **Adequacy of budget**: Budget is tight, barely sufficient for carrying out strategy and program.
- ❍ **Human resources**: One maintenance person per 75,000 gross sq ft. Preventative maintenance budget is less than 10% of total maintenance budget.
- ❍ **Availability of replacement parts**: Ample supply of critical repair parts is available. Non-critical parts are available through alternative sources, usually within 24 hours.
- ❍ **Maintenance contractors**: In-hours staff only adequate for basic maintenance and tasks requiring basic skills. Contractors provide maintenance requiring specialized skills, and extra staff at peak workload times.

4 ❑

Scale B.3.1. continued on next page

FIG. 1 Scale B.3.1 for Strategy and Program for Operations and Maintenance

B.3. Management of Operations and Maintenance

Scale B.3. 1. Strategy and program for operations and maintenance (continued)

Facility Management Requirement Scale		Facility Rating Scale
3 ❑ ○ **LEVEL OF MAINTENANCE AND OPERATION**: Require minimal operation and maintenance. ○ **TOLERANCE FOR OCCUPANT LOSS OF PRODUCTIVITY**: Even lengthy or disruptive breakdown need not be costly for the organization.	2 ❑	3 ❑ ○ **Strategy and program**: Strategy is to be seen to answer complaints, but actually do minimum to get by. ○ **Adequacy of budget**: Budget is not adequate for a basic but effective O&M program. ○ **Human resources**: One maintenance person per 100,000 or more gross sq ft. No separate budget for preventative maintenance. ○ **Availability of replacement parts**: Few repair parts available. Critical parts usually available within 48 hours. ○ **Maintenance contractors**: Repair of breakdowns is staff's primary responsibility. Some service companies are under contract.
1 ❑ ○ **LEVEL OF MAINTENANCE AND OPERATION**: Very few occupants. ○ **TOLERANCE FOR OCCUPANT LOSS OF PRODUCTIVITY**: Little consequence if frequent or major disruptions.		1 ❑ ○ **Strategy and program**: No O&M strategy or program for responding to occupant complaints. ○ **Adequacy of budget**: O&M budget is negligible and does not permit an organized or planned O&M program. ○ **Human resources**: No maintenance staff. ○ **Availability of replacement parts**: No repair parts available on-site. Critical parts usually available within 48 hours. ○ **Maintenance contractors**: No firm contracts exist with outside contractors.

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

NOTES *Space for handwritten notes on Requirements or Ratings*

FIG. 1 Scale B.3.1 for Strategy and Program for Operations and Maintenance *(continued)*

B.3. Management of Operations and Maintenance

Scale B.3.2. Competences of in-house staff

Facility Management Requirement Scale		Facility Rating Scale
9 ❑ ○ **REQUIRED LEVEL OF TRAINING AND SKILLS:** Require training and skill levels suitable for highly cost-effective and highly reliable operations and maintenance.	8 ❑	9 ❑ ○ **Training**: Staff are very knowledgeable about current trade practices and changes in relevant codes, as indicated by productive relations with trade suppliers and by reference, when needed for the job, to latest editions of codes and interim updates. Own staff can cover a wider range of O&M tasks than available from outside contractors within one-hour driving distance. ○ **Cross-trade qualifications**: Staff able to rotate assignments between buildings and roles within a team without notice. ○ **Electrical systems**: Staff able to install home-run circuits for lighting and 110 and 3-phase power, open and close breakers, replace small breakers, isolate defective circuits in power panels using signal-generating device, trouble-shoot circuits using power analyzers. ○ **Electronic systems and controls**: Staff able to read ladder diagrams, use true RMS meters effectively, isolate and jump-start troubled circuits. ○ **HVAC equipment**: Staff able to take primary readings, e.g. static pressure, cfm levels, visually trouble-shoot drive components and operation, balance air quantities and adjust thermal set-points. Able to start and stop equipment using direct digital controls. Certification in refrigerant recycling. ○ **Piping systems and repair**: Staff able to isolate damaged sections, make temporary and permanent repairs, and run new sections to points of use. ○ **Minor carpentry**: Staff able to make small cabinets, cut various stock materials to size, make crates.
7 ❑ ○ **REQUIRED LEVEL OF TRAINING AND SKILLS:** Require training and skill levels to be adequate for cost-effective and reliable operations and maintenance.	6 ❑	7 ❑ ○ **Training**: Staff are sufficiently knowledgeable about current trade practices and code changes, which are adequate for most routine O&M tasks. Only rely on outside contractors for certain specialist or journeyman level tasks. ○ **Cross-trade qualifications**: At least one-half of staff able to rotate assignments between buildings and roles within a team with little notice, and less than one shift of refresher training. ○ **Electrical systems**: Staff able to check home-run circuits for lighting and 110 and 3-phase power, open and close breakers, replace small breakers, test for defective circuits in power panels using signal-generating device, and trouble-shoot simple circuits using power analyzers. ○ **Electronic systems and controls**: Staff able to read simple ladder diagrams, work with true RMS meters, and isolate troubled circuits. ○ **HVAC equipment**: Staff able to take primary readings, e.g. static pressure, cfm levels, visually trouble-shoot drive components and operation, and adjust thermal set-points. Able to start and stop equipment using direct digital controls. ○ **Piping systems and repair**: Staff able to isolate damaged sections, make temporary repairs, and run new sections to points of use. ○ **Minor carpentry**: Staff able to cut various stock materials to size, and make crates.

Scale B.3.2. continued on next page

FIG. 2 Scale B.3.2 for Competences of In-house Staff

B.3. Management of Operations and Maintenance

Scale B.3.2. Competences of in-house staff (continued)

Facility Management Requirement Scale		Facility Rating Scale
5 ❑ ○ **REQUIRED LEVEL OF TRAINING AND SKILLS:** Require training and skill levels of own staff to be adequate for basic operation. Outside contractors are required for repair and specialized maintenance.	4 ❑	5 ❑ ○ **Training**: Staff know the limits of their skills and knowledge, which are adequate for simple and repetitive O&M tasks. Rely on outside contractors for journeyman level tasks. ○ **Cross-trade qualifications**: At least one-quarter of staff able to rotate assignments between buildings and roles within a team, if there is at least one shift of refresher training. ○ **Electrical systems**: Staff able to check home-run circuits for lighting and 110 and 3-phase power, open and close breakers, and test for defective circuits in power panels using signal-generating device. ○ **Electronic systems and controls**: Staff able to read simple ladder diagrams, and isolate troubled circuits. ○ **HVAC equipment**: Staff able to take primary readings, e.g. static pressure, cfm levels, visually trouble-shoot drive components and operation, and adjust thermal set-points. At least one person on each shift able to start and stop equipment using direct digital controls. ○ **Piping systems and repair**: Staff able to isolate damaged sections, and make temporary repairs. ○ **Minor carpentry**: Staff able to cut various stock materials to size, and make simple crates.
3 ❑ ○ **REQUIRED LEVEL OF TRAINING AND SKILLS:** Do not require skilled operation. Equipment is no more complicated than that in an apartment building. Rely on outside contractors for any complex O&M task.	2 ❑	3 ❑ ○ **Training**: Staff have limited skills and knowledge, adequate only for simple and repetitive O&M tasks. Rely on outside contractors for all skilled and specialized tasks. ○ **Cross-trade qualifications**: Most staff not able to rotate assignments between buildings or roles within a team. ○ **Electrical systems**: Staff able to check only simple circuits for lighting and 110 power, and to open and close breakers. ○ **Electronic systems and controls**: Staff able to read simple ladder diagrams. ○ **HVAC equipment**: Staff able to take primary readings, e.g. static pressure, cfm levels, and adjust thermal set-points. ○ **Piping systems and repair**: Staff able to isolate damaged sections. ○ **Minor carpentry**: Staff able to cut various stock materials to size.
1 ❑ ○ **REQUIRED LEVEL OF TRAINING AND SKILLS:** Only require the low level of O&M capability typical of a resident in a single-family house in a large city.		1 ❑ ○ **Training**: Staff have no skills or knowledge for O&M tasks. Rely on outside contractors for O&M. ○ **Cross-trade qualifications**: No capability. ○ **Electrical systems**: Staff only able to open and close breakers. ○ **Electronic systems and controls**: No capability. ○ **Hvac equipment**: Staff able to adjust thermal set-points. ○ **Piping systems and repair**: No capability. ○ **Minor carpentry**: No capability.

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

NOTES *Space for handwritten notes on Requirements or Ratings*

FIG. 2 Scale B.3.2 for Competences of In-house Staff *(continued)*