ADDENDA

ANSI/ASHRAE Addendum d to
ANSI/ASHRAE Standard 90.4-2019

Energy Standard for Data Centers

Approved by ASHRAE and the American National Standards Institute on October 30, 2020.

This addendum was approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Instructions for how to submit a change can be found on the ASHRAE® website (https://www.ashrae.org/continuous-maintenance).

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FOREWORD

Interpretation IC 90.4-2016-1-OF of was approved on January 8, 2020, in response to a Request for Interpretation of the Standard 90.4 consideration of diesel-rotary UPS systems (DRUPS) and the corresponding accounting of these systems in the electrical loss component (ELC). In crafting the IC, the committee identified several marginal changes to Standard 90.4 definitions and passages in Section 8 that would further clarify the issue.

Addendum d includes those changes and other minor corrections to spelling and text, incorporates the latest ELC values into Section 11, and updates normative references to the standard.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum d to Standard 90.4-2019

Modify the definition of uninterruptable power supply (UPS) as shown.

uninterruptable power supply (uninterruptible power system) (UPS): a *system* intended to deliver continuous, stable power to the critical load. The majority of modern *UPS systems* are of two fundamental types: (a) "static," in which incoming alternating current (AC) power is rectified to direct current (DC) and then inverted back to AC, with batteries in the DC portion that assume the load when incoming power fails or anomalies occur, and (b) "rotary," in which incoming AC power drives a propulsion unit that turns a generating device, with a heavy flywheel storing kinetic *energy* that continues to turn the generating portion when incoming power fails or anomalies occur. It may also include a driven engine for emergency backup (commonly referred to as a "diesel rotary *UPS"* [DRUPS], regardless of fuel type), which is decoupled from the rotary *UPS* components during normal operation and is not included in *efficiency* calculations. Either type can be made up of one or more modules running in parallel to add capacity or *redundancy* or both. DC *UPS systems*, which eliminate the inverter and deliver DC power to the *ITE*, are also used.

Modify the language in Sections 8.4.1.4 and 8.4.1.8 as shown.

Exception to 8.4.1.4: Emergency or stand-by power *systems* are not considered a part of the *incoming electrical service segment,* with the exception of individual elements such as associated transfer switches, *transformers*, or other devices that are also included between the *design ELC demarcation* and the *UPS*. Diesel rotary *UPS* (DRUPS) *systems* shall be calculated as part of the *UPS segment* with the engine element decoupled.

[. . .]

8.4.1.8 Alternate Designs. In the event that a *UPS* is not used in the design, the incoming and distribution segments shall meet at the point(s) where a *UPS* would logically be inserted under normal operating conditions. Where another device, such as, but not limited to, a rectifier, voltage regulator or harmonic neutralizing *transformer*, is used in place of ~~the~~ a *UPS*, or where a DRUPS *system* is used, the *efficiency* and *loss* for that device shall be used in the *efficiency* calculation in the same manner as that defined for a *UPS*. In the case of a DRUPS *system*, this calculation shall be performed with the engine decoupled. DRUPS operation under engine-generator power shall be considered a short-term emergency condition and is excluded from the requirements of this standard in the same manner as are other on-site emergency or standby generators. (See the exception to Section 8.4.1.4.)

Correct all instances of "uninterruptable power supply" to the commonly accepted spelling: "uninterruptible power supply."

Update Section 12 as shown to remove a redundant climate zone reference already covered by Standard 169.

Reference	Title
ASHRAE **1791 Tullie Circle NE** **Atlanta, GA 30329-2305, United States** **1-404-636-8400; www.ashrae.org**	
[. . .]	
~~R.S. Briggs, R.G. Lucas, and Z.T. Taylor (paper)~~	~~Climate Classification for Building Energy Codes and Standards Part 1—Thermal Guidelines for Data Processing Environments~~

Update Section 11.2 as shown to incorporate the current ELC values.

Examples

For a ~~particular design~~ *data center* in Climate Zone 1A with a single-feed *UPS* at 100% load and *Data Center ITE Design Power* > 300 *kW*, the maximum MLC = 0.260 from Table 6.5, and the maximum ELC = ~~0.297~~0.245 from Table 8.5. Adding the two values together provides a maximum overall *systems* design value of ~~0.557~~0.505.

Maximum MLC Value [0.260] + Maximum ELC Value [~~0.297~~0.245]
= Maximum Overall *Systems* Value [~~0.557~~0.505]

If the electrical *system* design produces a *design ELC* of ~~0.328~~0.276, which exceeds the maximum ELC value, a more efficient mechanical *system* can be used to offset this. If the mechanical *system* had an *annualized MLC* of 0.190 then the overall *systems* design value would be less than the maximum overall *systems* design value and would demonstrate compliance with the standard.

Annualized MLC Value [0.190] + *Design ELC* Value [~~0.327~~0.276]
= Overall *Systems* Design Value [~~0.517~~0.466]

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ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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