



**BSR/ASHRAE/IES Addendum ae  
to ANSI/ASHRAE/IES Standard 90.1-2019**

**Public Review Draft**

# **Proposed Addendum ae to Standard 90.1-2019, Energy Standard for Buildings Except Low-Rise Residential Buildings**

**First Public Review (May 2021)  
(Draft Shows Proposed Changes to Current Standard)**

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## FOREWORD

Table 8.4.4 shows minimum efficiency requirements for low-voltage dry-type transformers that are used in commercial buildings. Federal efficiency standards were updated in 2016, and the revised values were incorporated into the Table.

However, in the federal requirements, there is language that provides information on the efficiency levels for transformers with kVA ratings that are not shown in the table. See the following web site links for the language:

<https://www.govinfo.gov/content/pkg/CFR-2016-title10-vol3/pdf/CFR-2016-title10-vol3-part431-subpartK.pdf> Section 431.196, file page 4 of 18, document page 716

[https://www.ecfr.gov/cgi-bin/text-idx?node=pt10.3.431&rgn=div5#se10.3.431\\_1196](https://www.ecfr.gov/cgi-bin/text-idx?node=pt10.3.431&rgn=div5#se10.3.431_1196)

This addendum updates the table to include this language in a footnote, along with language that is needed to show that there are no requirements for transformers below minimum kVA ratings or above maximum kVA ratings shown in the table.

As an example, for a single-phase dry-type transformer, the minimum efficiency requirement for a 15 kVA unit is 97.7% and the minimum efficiency requirement for a 25 kVA unit is 98.0%. If someone purchased a 20 kVA unit, then the minimum efficiency required for that transformer, using linear interpolation, would be 97.85%.

This addendum also updates the language in several places in section 8.4.4 to reference the Code of Federal Regulations (CFR) rather than the Energy Policy Act of 2005 and to align the list of exceptions to distribution transformers with the current regulatory language.

## Economic Analysis

The cost-effectiveness for these transformers was determined by DOE in a rulemaking. As this is an update to match the existing table of US federal minimum efficiency requirements that have been in place since 2016, no additional economic analysis was performed.

*[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~striking through~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]*

## Addendum ae to 90.1-2019

In section 8.4.4, make the following changes for both IP and SI

### 8.4.4 Low-Voltage Dry-Type Distribution Transformers

Low-voltage ~~dry-type~~dry-type distribution transformers shall comply with ~~the provisions of the Energy Policy Act of 2005, where applicable, as shown~~ the requirements shown in Table 8.4.4. Transformers that are not included in ~~the scope of the~~ definition of distribution transformers as defined in 10 CFR 431.192~~Energy Policy Act of 2005~~ have no performance requirements in this section and are listed for ease of reference as exceptions.

#### Exception to 8.4.4

Transformers that meet any of the following exclusions in the DOE definition of Distribution Transformers found in 10 CFR 431.192~~of the Energy Policy Act of 2005 based on 10 CFR 431 definition:~~

- ~~1. Special purpose applications.~~
- ~~2. Not likely to be used in general purpose applications.~~
  1. Transformers with tap range of 20 percent or more~~multiple voltage taps~~, where the highest tap is at least 20% more than the lowest tap.
  2. Drive (isolation) transformer.
  3. Rectifier transformer.
  4. Auto-transformer.
  5. Uninterruptible power ~~supply system~~ transformer.
  6. Special impedance transformer.
  7. Regulating transformer.
  8. Sealed and nonventilating transformer.
  9. Machine-tool (control) transformer.
  10. Welding transformer.
  11. Grounding transformer.
  12. Testing transformer.
  13. Nonventilated transformer

...  
**Table 8.4.4 Minimum Nominal Efficiency Levels for Low-Voltage Dry-Type Distribution Transformers<sup>a,b</sup>**

Single-Phase Transformers		Three-Phase Transformers	
kVA <sup>bc</sup>	Efficiency,% <sup>cd</sup>	kVA <sup>bc</sup>	Efficiency,% <sup>cd</sup>

(...contents of table are unchanged...)

- a. A low-voltage dry-type distribution transformer is a transformer that is air-cooled, does not use oil as a coolant, has an input voltage  $\leq 600$  V, and is rated for operation at a frequency of 60 Hz.
- b. A low-voltage dry-type distribution transformer with a kVA rating not listed in the table shall have its minimum efficiency level determined by linear interpolation of the kVA and efficiency values listed in the table immediately above and below its kVA rating. Extrapolation shall not be used below the minimum values or above the maximum values shown for single-phase transformers and three-phase transformers.
- bc. Kilovolt-ampere rating.
- cd. Nominal efficiencies shall be established in accordance with the 10 CFR 431.193 test procedure for low-voltage ~~dry-type~~ dry-type distribution transformers.