



**BSR/ASHRAE/IES Addendum BP  
to ANSI/ASHRAE/IES Standard 90.1-2016**

**Public Review Draft**

# **Proposed Addendum BP to Standard 90.1-2016, Energy Standard for Buildings Except Low-Rise Residential Buildings**

**Third Public Review Draft (May 2019)  
(Draft Shows Proposed Independent Substantive  
Changes to Previous Public Review Draft)**

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## **FOREWORD**

For the third public review ISC the following changes have been made;

- Add back footnote f and g and renumber the footnotes that follow. Footnote f and g were incorrectly deleted as part of the 2<sup>nd</sup> public review ISC
- In the SI version of table F-5 the footnote c and d have been revised to have the correct reference to the appropriate requirement in alignment with the IP table F-5
- In Table 6.8.1-6 (both IP and SI versions), test procedure references made to the CFR should not include “Part”. For example, the Test Procedure reference for Oil fired hot water boilers >300,000 Btu/h should be “10 CFR 431.86” instead of “10 CFR Part 431.86” so this change has been included in the third public review ISC

*[Note to Reviewers: This public review draft makes proposed independent substantive changes to the previous public review draft. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the previous draft 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 substantive changes.]*

## Addendum BP to 90.1-2016

Make the follow modifications to the revised 6.8.1-6 IP and the new table F-5;

**Table 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements**

Equipment Type <sup>a</sup>	Subcategory or Rating Condition	Size Category (Input)	Minimum Efficiency <sup>fi</sup>	Efficiency as of 3/2/2022 <sup>fi</sup>	Test Procedure
Boilers, hot water	Gas fired	<300,000 Btu/h <sup>lg</sup> for applications outside US <sup>ig</sup>	82% AFUE	82% AFUE	10 CFR 430 Appendix N
		≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	80% E <sub>t</sub> <sup>c</sup>	80% E <sub>t</sub> <sup>c</sup>	10 CFR Part 431.86
	Oil fired <sup>e</sup>	>2,500,000 Btu/h <sup>a</sup>	82% E <sub>c</sub> <sup>b</sup>	82% E <sub>c</sub> <sup>b</sup>	
		<300,000 Btu/h <sup>lg</sup> for applications outside US <sup>ig</sup>	84% AFUE	84% AFUE	10 CFR 430 Appendix N
		≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	82% E <sub>t</sub> <sup>c</sup>	82% E <sub>t</sub> <sup>c</sup>	10 CFR Part 431.86
		>2,500,000 Btu/h <sup>a</sup>	84% E <sub>c</sub> <sup>b</sup>	84% E <sub>c</sub> <sup>b</sup>	
Boilers, steam	Gas fired	<300,000 Btu/h <sup>l</sup> for applications outside US <sup>l</sup>	80% AFUE	80% AFUE	10 CFR 430 Appendix N
	Gas fired—all, except natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	79% E <sub>t</sub> <sup>c</sup>	79% E <sub>t</sub> <sup>c</sup>	10 CFR Part 431.86
		>2,500,000 Btu/h <sup>a</sup>	79% E <sub>t</sub> <sup>c</sup>	79% E <sub>t</sub> <sup>c</sup>	
	Gas fired—natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	77% E <sub>t</sub> <sup>c</sup>	79% E <sub>t</sub> <sup>c</sup>	10 CFR Part 431.86
		>2,500,000 Btu/h <sup>a</sup>	77% E <sub>t</sub> <sup>c</sup>	79% E <sub>t</sub> <sup>c</sup>	
	Oil fired <sup>e</sup>	<300,000 Btu/h <sup>lf</sup> for applications outside US <sup>l</sup>	82% AFUE	82% AFUE	10 CFR 430 Appendix N
		≥300,000 Btu/h and ≤2,500,000 Btu/h <sup>d</sup>	81% E <sub>t</sub> <sup>c</sup>	81% E <sub>t</sub> <sup>c</sup>	10 CFR Part 431.86
		>2,500,000 Btu/h <sup>a</sup>	81% E <sub>t</sub> <sup>c</sup>	81% E <sub>t</sub> <sup>c</sup>	

a. These requirements apply to *boilers* with rated input of 8,000,000 Btu/h or less that are not packaged *boilers* and to all packaged *boilers*. Minimum *efficiency* requirements for *boilers* cover all capacities of packaged *boilers*.

b. E<sub>c</sub> = combustion *efficiency* (100% less flue losses). See reference document for detailed information.

c. E<sub>t</sub> = thermal *efficiency*. See reference document for detailed information.

d. Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's *controls*.

e. Includes oil-fired (residual).

f. *Boilers* shall not be equipped with a constant burning pilot light.

g. A boiler not equipped with a tankless domestic water-heating coil shall be equipped with an automatic means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.

hf. For new construction refer to Section 6.4.1.1.1 for additional system compliance requirements.

ig. See appendix F table F-4 for US minimum efficiencies for residential products covered by DOE requirements for US applications

*Make the following modifications to the new IP table F-5*

Table F-5 Residential Boiler<sup>a</sup> Minimum Efficiency Requirements for US applications  
(Refer to 10 CFR 430)

Product Class	Minimum Efficiency prior to January 15, 2021 <sup>b</sup>	Minimum Efficiency as of January 15, 2021 <sup>eb</sup>	Standby Mode and Off Mode Power Consumption as of January 15, 2021 <sup>c</sup>	Design Requirements
Gas Fired hot water boiler	82% AFUE	84% AFUE	$P_{W,SB} \leq 9 \text{ W}$ $P_{W,OFF} \leq 9 \text{ W}$	Constant burning pilot not permitted. Automatic means for adjusting water temperature required (except for boilers equipped with tankless domestic water heating coils) <sup>d</sup> .
Gas-Fired steam boiler	80% AFUE	82% AFUE	$P_{W,SB} \leq 8 \text{ W}$ $P_{W,OFF} \leq 8 \text{ W}$	Constant burning pilot not permitted.
Oil-fired hot water boiler	84% AFUE	86% AFUE	$P_{W,SB} \leq 11 \text{ W}$ $P_{W,OFF} \leq 11 \text{ W}$	Automatic means for adjusting temperature required (except for boilers equipped with tankless domestic water heating coils) <sup>d</sup> .
Oil-fired steam boiler	82% AFUE	85% AFUE	$P_{W,SB} \leq 11 \text{ W}$ $P_{W,OFF} \leq 11 \text{ W}$	None
Electric hot water boiler	none	none	$P_{W,SB} \leq 8 \text{ W}$ $P_{W,OFF} \leq 8 \text{ W}$	Automatic means for adjusting temperature required (except for boilers equipped with tankless domestic water heating coils) <sup>d</sup> .
Electric steam boiler	none	none	$P_{W,SB} \leq 8 \text{ W}$ $P_{W,OFF} \leq 8 \text{ W}$	None

<sup>a</sup> Has a heat input rate of less than 300,000 Btu per hour for electric boilers and low-pressure steam or hot water boilers (per § 430.2)

<sup>b</sup> Annual Fuel Utilization Efficiency, as determined in § 430.23(n)(2)

<sup>c</sup> Standby mode and off mode electric power consumption as determined in § 430.23(n)(5)

<sup>d</sup> See § 430.32(e)(2)(iv) for additional details regarding automatic means for adjusting water temperature.

Make the following modifications to table 6.8.1-6 SI and to the new table F-5;

**Table 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements**

<b>Equipment Type<sup>a</sup></b>	<b>Subcategory or Rating Condition</b>	<b>Size Category (Input)</b>	<b>Minimum Efficiency<sup>fi</sup></b>	<b>Efficiency as of 3/2/2022<sup>fi</sup></b>	<b>Test Procedure</b>
<i>Boilers, hot water</i>	Gas fired <sup>h</sup>	<88 kW <sup>l,g</sup> for applications outside US <sup>9,i</sup>	82% <i>AFUE</i>	82% <i>AFUE</i>	10 CFR Part 430 Appendix N
		≥88 kW and ≤733 kW <sup>d</sup>	80% <i>E<sub>t</sub><sup>c</sup></i>	80% <i>E<sub>t</sub><sup>c</sup></i>	10 CFR Part 431.86
		>733 kW <sup>a</sup>	82% <i>E<sub>c</sub><sup>b</sup></i>	82% <i>E<sub>c</sub><sup>b</sup></i>	
	Oil fired <sup>e</sup>	<88 kW <sup>l,g</sup> for applications outside US <sup>9,i</sup>	84% <i>AFUE</i>	84% <i>AFUE</i>	10 CFR Part 430 Appendix N
		≥88 kW and ≤733 kW <sup>d</sup>	82% <i>E<sub>t</sub><sup>c</sup></i>	82% <i>E<sub>t</sub><sup>c</sup></i>	10 CFR Part 431.86
		>733 kW <sup>a</sup>	84% <i>E<sub>c</sub><sup>b</sup></i>	84% <i>E<sub>c</sub><sup>b</sup></i>	
<i>Boilers, steam</i>	Gas fired	<88 kW <sup>l,f</sup> for applications outside US <sup>9,i</sup>	80% <i>AFUE</i>	80% <i>AFUE</i>	10 CFR Part 430 Appendix N
	Gas fired— all, except natural draft	≥88 kW and ≤733 kW <sup>d</sup>	79% <i>E<sub>t</sub><sup>c</sup></i>	79% <i>E<sub>t</sub><sup>c</sup></i>	10 CFR Part 431.86
		>733 kW <sup>a</sup>	79% <i>E<sub>t</sub><sup>c</sup></i>	79% <i>E<sub>t</sub><sup>c</sup></i>	
	Gas fired— natural draft	≥88 kW and ≤733 kW <sup>d</sup>	77% <i>E<sub>t</sub><sup>c</sup></i>	79% <i>E<sub>t</sub><sup>c</sup></i>	10 CFR Part 431.86
		>733 kW <sup>a</sup>	77% <i>E<sub>t</sub><sup>c</sup></i>	79% <i>E<sub>t</sub><sup>c</sup></i>	
	Oil fired <sup>e</sup>	<88 kW <sup>l,f</sup> for applications outside US <sup>9,i</sup>	82% <i>AFUE</i>	82% <i>AFUE</i>	10 CFR Part 430 Appendix N
		≥88 kW and ≤733 kW <sup>d</sup>	81% <i>E<sub>t</sub><sup>c</sup></i>	81% <i>E<sub>t</sub><sup>c</sup></i>	10 CFR Part 431.86
		>733 kW <sup>a</sup>	81% <i>E<sub>t</sub><sup>c</sup></i>	81% <i>E<sub>t</sub><sup>c</sup></i>	

a. These requirements apply to *boilers* with rated input of 2346 kW or less that are not packaged *boilers* and to all packaged *boilers*. Minimum *efficiency* requirements for *boilers* cover all capacities of packaged *boilers*.

b. *E<sub>c</sub>* = combustion *efficiency* (100% less flue losses). See reference document for detailed information.

c. *E<sub>t</sub>* = thermal *efficiency*. See reference document for detailed information.

d. Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's *controls*.

e. Includes oil-fired (residual).

f. *Boilers* shall not be equipped with a constant burning pilot light.

g. A boiler not equipped with a tankless domestic water-heating coil shall be equipped with an automatic means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.

h. For new construction refer to Section 6.4.1.1.1 for additional system compliance requirements.

i. See appendix F table F-4 for US minimum efficiencies for residential products covered by DOE requirements for US applications

*Make the following modifications to new table F-5 SI*

Table F-5 Residential Boiler<sup>a</sup> Minimum Efficiency Requirements for US applications  
(Refer 10 CFR Part 430)

Product Class	Minimum Efficiency prior to January 15, 2021 <sup>b</sup>	Minimum Efficiency as of January 15, 2021 <sup>eb</sup>	Standby Mode and Off Mode Power Consumption as of January 15, 2021 <sup>de</sup>	Design Requirements <sup>e</sup>
Gas Fired hot water boiler	82% AFUE	84% AFUE	$P_{W,SB} \leq 9 \text{ W}$ $P_{W,OFF} \leq 9 \text{ W}$	Constant burning pilot not permitted. Automatic means for adjusting water temperature required (except for boilers equipped with tankless domestic water heating coils). <sup>ed</sup>
Gas-Fired steam boiler	80% AFUE	82% AFUE	$P_{W,SB} \leq 8 \text{ W}$ $P_{W,OFF} \leq 8 \text{ W}$	Constant burning pilot not permitted.
Oil-fired hot water boiler	84% AFUE	86% AFUE	$P_{W,SB} \leq 11 \text{ W}$ $P_{W,OFF} \leq 11 \text{ W}$	Automatic means for adjusting temperature required (except for boilers equipped with tankless domestic water heating coils). <sup>ed</sup>
Oil-fired steam boiler	82% AFUE	85% AFUE	$P_{W,SB} \leq 11 \text{ W}$ $P_{W,OFF} \leq 11 \text{ W}$	None
Electric hot water boiler	none	none	$P_{W,SB} \leq 8 \text{ W}$ $P_{W,OFF} \leq 8 \text{ W}$	Automatic means for adjusting temperature required (except for boilers equipped with tankless domestic water heating coils). <sup>ed</sup>
Electric steam boiler	none	none	$P_{W,SB} \leq 8 \text{ W}$ $P_{W,OFF} \leq 8 \text{ W}$	None

<sup>a</sup> Has a heat input rate of less than 88 kW for electric boilers and low-pressure steam or hot water boilers (per § 430.2)

<sup>b</sup> Annual Fuel Utilization Efficiency, as determined in § 430.23(n)(2)

<sup>c</sup> Standby mode and off mode electric power consumption as determined in § 430.23(n)(5)

<sup>d</sup> See § 430.32(e)(2)(iv) for additional details regarding automatic means for adjusting water temperature.