APPENDIX Q TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF POOL HEATERS


3. Measurements. Measure the quantities delineated in section 2.9 of ANSI Z21.56–1994. The measurement of energy consumption for oil-fired pool heaters in Btu is to be carried out in appropriate units, e.g., gallons.

4. Calculations

4.1 Thermal efficiency. Calculate the thermal efficiency, \( E_{\text{in}} \) (expressed as a percent), as specified in section 2.9 of ANSI Z21.56–1994. The expression of fuel consumption for oil-fired pool heaters shall be in Btu.

4.2 Average annual fossil fuel energy for pool heaters. The average annual fossil fuel energy for pool heater, \( E_{\text{in}} \), is defined as:

\[
E_{\text{in}} = \text{BOH} \frac{(Q_{\text{in}} + \text{PE})}{100} + \text{POH} - \text{BOH} Q_{\text{f}}
\]

where:

- \( \text{BOH} \) = average number of burner operating hours = 104 h
- \( \text{POH} \) = average number of pool operating hours = 4864 h
- \( Q_{\text{in}} \) = rated fuel energy input as defined according to 2.9.1 or 2.9.2 of ANSI Z21.56–1994, as appropriate
- \( \text{PE} \) = energy consumption of continuously operating pilot light if employed, in Btu/h

4.3 Average annual auxiliary electrical energy consumption for pool heaters. The average annual auxiliary electrical energy consumption for pool heaters, \( E_{\text{AE}} \), is expressed in Btu and defined as:

\[
E_{\text{AE}} = \text{BOH} \text{PE}
\]

where:

- \( \text{PE} \) = 2.0 if heater tested according to 2.9.1 of ANSI Z21.56–1994
- \( \text{PE}_{\text{rated}} \) = 3.412 if heater tested according to 2.9.2 of ANSI Z21.56–1994, in Btu/h
- \( E_{\text{in}} \) = Electrical consumption of the heater (converted to equivalent unit of Btu), including the electrical energy to the recirculating pump if used, during the 30-minute thermal efficiency test, as defined in 2.9.1 of ANSI Z21.56–1994, in Btu per 30 min.
- \( \text{PE}_{\text{rated}} \) = nameplate rating of auxiliary electrical equipment of heater, in Watts
- \( \text{BOH} \) = as defined in 4.2 of this appendix

4.4 Heating seasonal efficiency.

4.4.1 Calculate the seasonal useful output of the pool heater as:

\[
E_{\text{OUT}} = \text{BOH} \left( \frac{E_{\text{in}}}{100} (Q_{\text{in}} + \text{PE}) \right)
\]

where:

- \( \text{BOH} \) = as defined in 4.2 of this appendix
- \( E_{\text{in}} \) = thermal efficiency as defined in 4.1 of this appendix
- \( Q_{\text{in}} \) = as defined in 4.2 of this appendix
- \( \text{PE} \) = as defined in 4.3 of this appendix
- 100= conversion factor, from percent to fraction

4.4.2 Calculate the seasonal input to the pool heater as:

\[
E_{\text{IN}} = \text{BOH} \left( Q_{\text{in}} + \text{PE} \right) + \left( \text{POH} - \text{BOH} \right) Q_{\text{f}}
\]

where:

- \( \text{BOH} \) = as defined in 4.2 of this appendix
- \( Q_{\text{in}} \) = as defined in 4.2 of this appendix
- \( \text{PE} \) = as defined in 4.3 of this appendix
- \( Q_{\text{f}} \) = as defined in 4.2 of this appendix

4.4.3 Calculate the pool heater heating seasonal efficiency (in percent).

4.4.3.1 For pool heaters employing a continuous pilot light:

\[
\text{EFFF}_{\text{in}} = 100 \frac{E_{\text{OUT}}}{E_{\text{IN}}}
\]

where:

- \( E_{\text{OUT}} \) = as defined in 4.4.1 of this appendix
- \( E_{\text{IN}} \) = as defined in 4.4.2 of this appendix
- 100= to convert a fraction to percent

4.4.3.2 For pool heaters without a continuous pilot light:

\[
\text{EFFY}_{\text{in}} = E_{\text{in}}
\]

where:

- \( E_{\text{in}} \) = as defined in 4.1 of this appendix


APPENDIX Q TO SUBPART B OF PART 430—UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF FLUORESCENT LAMP BALLASTS

1. Definitions

1.1 AC control signal means an alternating current (AC) signal that is supplied to the ballast using additional wiring for the purpose of controlling the ballast and putting the ballast in standby mode.

1.2 ANSI Standard means a standard developed by a committee accredited by the American National Standards Institute.

1.3 Ballast input voltage means the rated input voltage of a fluorescent lamp ballast.

1.4 DC control signal means a direct current (DC) signal that is supplied to the ballast using additional wiring for the purpose of controlling the ballast and putting the ballast in standby mode.

1.5 F4OT12 lamp means a nominal 40 watt tubular fluorescent lamp which is 48 inches in length and one and a half inches in diameter, and conforms to ANSI C78.81–2003 (Data