

## Department of Energy

## Pt. 430, Subpt. B, App. Q

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

1. *Test method.* The test method for testing pool heaters is as specified in American National Standards Institute Standard for Gas-Fired Pool Heaters, Z21.56-1994.

2. *Test conditions.* Establish the test conditions specified in section 2.9 of ANSI Z21.56-1994.

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,  $E_t$  (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 fuel energy for pool heater,  $E_F$ , is defined as:

$$E_F = BOH Q_{IN} + (POH - BOH) Q_P$$

where:

BOH=average number of burner operating hours=104 h

POH=average number of pool operating hours=4464 h

$Q_{IN}$ =rated fuel energy input as defined according to 2.9.1 or 2.9.2 of ANSI Z21.56-1994, as appropriate

$Q_P$ =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,  $E_{AE}$ , is expressed in Btu and defined as:

$$E_{AE} = BOH PE$$

where:

PE=2 $E_c$  if heater tested according to 2.9.1 of ANSI Z21.56-1994

=3.412 PE<sub>rated</sub> if heater tested according to 2.9.2 of ANSI Z21.56-1994, in Btu/h

$E_c$ =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.

2=Conversion factor to convert unit from per 30 min. to per h.

PE<sub>rated</sub>=nameplate rating of auxiliary electrical equipment of heater, in Watts

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:

$$E_{OUT} = BOH [(E_t/100)(Q_{IN} + PE)]$$

where:

BOH=as defined in 4.2 of this appendix

$E_t$ =thermal efficiency as defined in 4.1 of this appendix

$Q_{IN}$ =as defined in 4.2 of this appendix

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:

$$E_{IN} = BOH (Q_{IN} + PE) + (POH - BOH) Q_P$$

where:

BOH=as defined in 4.2 of this appendix

$Q_{IN}$ =as defined in 4.2 of this appendix

PE=as defined in 4.3 of this appendix

POH=as defined in 4.2 of this appendix

$Q_P$ =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:

$$EFFY_{HS} = 100(E_{OUT}/E_{IN})$$

where:

$E_{OUT}$ =as defined in 4.4.1 of this appendix

$E_{IN}$ =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:

$$EFFY_{HS} = E_t$$

where:

$E_t$ =as defined in 4.1 of this appendix.

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### 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 *F40T12 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