### ENERGY STAR Dehumidifier

###### Description

A dehumidifier meeting the minimum qualifying efficiency standard established by the current ENERGY STAR (Version 2.1 or 3.0)[[1]](#footnote-1) is purchased and installed in a residential setting in place of a unit that meets the minimum federal standard efficiency.

This measure was developed to be applicable to the following program types:  TOS, NC.

If applied to other program types, the measure savings should be verified.

###### Definition of Efficient Equipment

To qualify for this measure, the new dehumidifier must meet the ENERGY STAR standards as defined below:

Until 9/30/2012:

|  |  |
| --- | --- |
| **Capacity**  **(pints/day)** | **ENERGY STAR Criteria**  **(L/kWh)** |
| ≤25 | ≥1.20 |
| > 25 to ≤35 | ≥1.40 |
| > 35 to ≤45 | ≥1.50 |
| > 45 to ≤ 54 | ≥1.60 |
| > 54 to ≤ 75 | ≥1.80 |
| > 75 to ≤ 185 | ≥2.50 |

After 10/1/2012[[2]](#footnote-2):

|  |  |
| --- | --- |
| **Capacity**  **(pints/day)** | **ENERGY STAR Criteria**  **(L/kWh)** |
| <75 | ≥1.85 |
| 75 to ≤185 | ≥2.80 |

Qualifying units shall be equipped with an adjustable humidistat control or shall require a remote humidistat control to operate.

###### Definition of Baseline Equipment

The baseline for this measure is defined as a new dehumidifier that meets the Federal Standard efficiency standards. The Federal Standard for Dehumidifiers changed as of October 2012 as defined below:

Until 9/30/2012:

|  |  |
| --- | --- |
| **Capacity**  **(pints/day)** | **Federal Standard Criteria**  **(L/kWh)** |
| ≤25 | ≥1.0 |
| > 25 to ≤35 | ≥1.20 |
| > 35 to ≤45 | ≥1.30 |
| > 45 to ≤ 54 | ≥1.30 |
| > 54 to ≤ 75 | ≥1.50 |
| > 75 to ≤ 185 | ≥2.25 |

Post 10/1/2013

|  |  |
| --- | --- |
| **Capacity**  **(pints/day)** | **Federal Standard Criteria**  **(L/kWh)** **[[3]](#footnote-3)** |
| Up to 35 | ≥1.35 |
| > 35 to ≤45 | ≥1.50 |
| > 45 to ≤ 54 | ≥1.60 |
| > 54 to ≤ 75 | ≥1.70 |
| > 75 to ≤ 185 | ≥2.50 |

###### Deemed Lifetime of Efficient Equipment

The assumed lifetime of the measure is 12 years[[4]](#footnote-4).

###### Deemed Measure Cost

The assumed incremental capital cost for this measure is $40 for units purchased prior to 10/1/2012 and $60 for units purchased after 10/1/2012[[5]](#footnote-5).

###### Deemed O&M Cost Adjustments

N/A

###### Loadshape

Loadshape R12 - Residential - Dehumidifier

###### Coincidence Factor

The coincidence factor is assumed to be 37% [[6]](#footnote-6).

**Algorithm**

###### Calculation of Savings

###### Electric Energy Savings

ΔkWh = (((Avg Capacity \* 0.473) / 24) \* Hours) \* (1 / (L/kWh\_Base)– 1 / (L/kWh\_Eff))

Where:

Avg Capacity = Average capacity of the unit (pints/day)

0.473 = Constant to convert Pints to Liters

24 = Constant to convert Liters/day to Liters/hour

Hours = Run hours per year

= 1620 [[7]](#footnote-7)

L/kWh = Liters of water per kWh consumed, as provided in tables above

Annual kWh results for each capacity class are presented below:

Until 9/30/2012 (V 2.1):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Annual kWh** | | |
| **Capacity** | **Capacity Used** | **Federal Standard Criteria** | **ENERGY STAR Criteria** | **Federal Standard** | **ENERGY STAR** | **Savings** |
| **(pints/day) Range** | **(≥ L/kWh)** | **(≥ L/kWh)** |
| ≤25 | 20 | 1.0 | 1.2 | 643 | 536 | 107 |
| > 25 to ≤35 | 30 | 1.2 | 1.4 | 804 | 689 | 115 |
| > 35 to ≤45 | 40 | 1.3 | 1.5 | 990 | 858 | 132 |
| > 45 to ≤ 54 | 50 | 1.3 | 1.6 | 1237 | 1005 | 232 |
| > 54 to ≤ 75 | 65 | 1.5 | 1.8 | 1394 | 1161 | 232 |
| > 75 to ≤ 185 | 130 | 2.25 | 2.5 | 1858 | 1673 | 186 |
| Average | 46 | 1.31 | 1.55 | 1129 | 953 | 176 |



After 10/1/2012 (V 3.0):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Annual kWh** | | |
| **Capacity** | **[[8]](#footnote-8)Capacity Used** | **Federal Standard Criteria** | **ENERGY STAR Criteria** | **Federal Standard** | **ENERGY STAR** | **Savings** |
| **(pints/day) Range** | **(≥ L/kWh)** | **(≥ L/kWh)** |
| ≤25 | 20 | 1.35 | 1.85 | 477 | 348 | 129 |
| > 25 to ≤35 | 30 | 1.35 | 1.85 | 715 | 522 | 193 |
| > 35 to ≤45 | 40 | 1.5 | 1.85 | 858 | 695 | 162 |
| > 45 to ≤ 54 | 50 | 1.6 | 1.85 | 1005 | 869 | 136 |
| > 54 to ≤ 75 | 65 | 1.7 | 1.85 | 1230 | 1130 | 100 |
| > 75 to ≤ 185 | 130 | 2.5 | 2.8 | 1673 | 1493 | 179 |
| Average | 46 | 1.51 | 1.85 | 983 | 800 | 183 |



**Summer Coincident Peak Demand Savings**

ΔkW = ΔkWh/Hours \* CF

Where:

Hours = Annual operating hours

= 1632 hours [[9]](#footnote-12)

CF = Summer Peak Coincidence Factor for measure

= 0.37 [[10]](#footnote-13)

Summer coincident peak demand results for each capacity class are presented below:

Until 9/30/2012 (V 2.1):

|  |  |
| --- | --- |
| **Capacity**  **(pints/day) Range** | **Annual Summer peak kW Savings** |
| ≤25 | 0.024 |
| > 25 to ≤35 | 0.026 |
| > 35 to ≤45 | 0.030 |
| > 45 to ≤ 54 | 0.053 |
| > 54 to ≤ 75 | 0.053 |
| > 75 to ≤ 185 | 0.042 |
| Average | 0.040 |

After 10/1/2012 (V 3.0):

|  |  |
| --- | --- |
| **Capacity**  **(pints/day) Range** | **Annual Summer peak kW Savings** |
| ≤25 | 0.029 |
| > 25 to ≤35 | 0.044 |
| > 35 to ≤45 | 0.037 |
| > 45 to ≤ 54 | 0.031 |
| > 54 to ≤ 75 | 0.023 |
| > 75 to ≤ 185 | 0.041 |
| Average | 0.042 |



###### Natural Gas Savings

N/A

###### Water Impact Descriptions and Calculation

N/A

###### Deemed O&M Cost Adjustment Calculation

N/A

###### Measure Code: RS-APL-ESDH-V01-120601

1. Energy Star Version 3.0 will become effective 10/1/12 [↑](#footnote-ref-1)
2. <http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/dehumid/ES_Dehumidifiers_Final_V3.0_Eligibility_Criteria.pdf?d70c-99b0> [↑](#footnote-ref-2)
3. The Federal Standard for Dehumidifiers changed as of October 2012; https://www.federalregister.gov/articles/2010/12/02/2010-29756/energy-conservation-program-for-consumer-products-test-procedures-for-residential-dishwashers#h-11 [↑](#footnote-ref-3)
4. ENERGY STAR Dehumidifier Calculator <http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerDehumidifier.xls> [↑](#footnote-ref-4)
5. Based on extrapolating available data from the Department of Energy’s Life Cycle Cost analysis spreadsheet and weighting based on volume of units available:

   <http://www1.eere.energy.gov/buildings/appliance_standards/residential/docs/lcc_dehumidifier.xls>

   See ‘DOE life cycle cost\_dehumidifier.xls’ for calculation. [↑](#footnote-ref-5)
6. Assume usage is evenly distributed day vs. night, weekend vs. weekday and is used between April through the end of September (4392 possible hours). 1620 operating hours from ENERGY STAR Dehumidifier Calculator. Coincidence peak during summer peak is therefore 1620/4392 = 36.9% [↑](#footnote-ref-6)
7. ENERGY STAR Dehumidifier Calculator <http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerDehumidifier.xls> [↑](#footnote-ref-7)
8. [↑](#footnote-ref-8)
9. Based on 68 days of 24 hour operation; ENERGY STAR Dehumidifier Calculator <http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/appliance_calculator.xlsx?f3f7-6a8b&f3f7-6a8b> [↑](#footnote-ref-12)
10. Assume usage is evenly distributed day vs. night, weekend vs. weekday and is used between April through the end of September (4392 possible hours). 1620 operating hours from ENERGY STAR Dehumidifier Calculator. Coincidence peak during summer peak is therefore 1620/4392 = 36.9% [↑](#footnote-ref-13)