**State of Illinois**

**Energy Efficiency**

**Technical Reference Manual**

**Updating New Federal Standard**

**Dehumidifier [5.1.3]**

**Revision to Version 1.0**

**Sam Dent, VEIC**

**1/21/2013**

TABLE OF CONTENTS

[1 Summary 5](#_Toc340474594)

[1.1 Measure Components Affected 5](#_Toc340474595)

[1.2 Algorithm and Input Components Affected 5](#_Toc340474596)

[1.3 Rational for the Change 6](#_Toc340474597)

[1.3.1 Methodology 6](#_Toc340474598)

[1.3.2 Sample Size 6](#_Toc340474599)

[1.3.3 Other Rational 6](#_Toc340474600)

[1.4 PLEASE SPECIFY THE PROPOSED CHANGE 6](#_Toc340474601)

[2 Components of TRM Measure Characterizations 7](#_Toc340474602)

[2.1 Measure Description 8](#_Toc340474603)

[2.2 Definition of Efficient Equipment 8](#_Toc340474604)

[2.3 Definition of Baseline Equipment 8](#_Toc340474605)

[2.4 Deemed Lifetime of Efficient Equipment 8](#_Toc340474606)

[2.5 Deemed Measure Cost 8](#_Toc340474607)

[2.6 Deemed O&M Cost Adjustments 8](#_Toc340474608)

[2.7 Loadshape 8](#_Toc340474609)

[2.8 Coincidence Factor 8](#_Toc340474610)

[2.9 Net to Gross Ratio 8](#_Toc340474611)

[3 Algorithms 9](#_Toc340474612)

[3.1 Calculation of Energy Savings 9](#_Toc340474613)

[3.2 Electric Energy Savings 9](#_Toc340474614)

[3.3 Summer Coincident Peak Demand Savings 9](#_Toc340474615)

[3.4 Natural Gas Savings 9](#_Toc340474616)

[3.5 Water Impact Descriptions and Calculation 9](#_Toc340474617)

[3.6 Deemed O&M Cost Adjustment Calculation 9](#_Toc340474618)

[4 References 10](#_Toc340474619)

TABLES & FIGURES

[Table.1 Revision History 4](#_Toc340474919)

[Table. 2 Summary of Proposed Change 6](#_Toc340474920)

Table.1 Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **MM/DD/YY** | **Author/Affiliation** | **Summary of Changes** |
|  |  |  |  |
|  |  |  |  |

# Summary

VEIC realized that the Dehumidifier measure did not capture the Federal Standard change that came in to effect on October 1st, 2012.

The TRM has therefore been updated and shows the savings before 10/1/2012 and after.

## Measure Components Affected

Please check all that apply.

###### Description

###### Definition of Efficient Equipment

###### Definition of Baseline Equipment

###### Deemed Lifetime of Efficient Equipment

###### Deemed Measure Cost

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

###### Loadshape

###### Coincidence Factor

###### Net To Gross Ratio

Algorithm

###### Calculation of Energy Savings

###### Electric Energy Savings

###### Summer Coincident Peak Demand Savings

###### Natural Gas Savings

###### Water Impact Descriptions and Calculation

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

**Measure code**

## Algorithm and Input Components Affected

### Algorithm / Input 1

### Algorithm / Input 2

## Rational for the Change

### Methodology

### Sample Size

### Other Rational

## Please Specify the Proposed Change

Table. 2 Summary of Proposed Change

|  |  |  |  |
| --- | --- | --- | --- |
| **ITEM** | **ORIGINAL SPECIFICATION** | **PROPOSED SPECIFICATION** | **CITATION FOR PROPOSED SPECIFICATION** |
| **New Federal Baseline** | **Only showed baseline effective up to 10/1/2012** | **Added new baseline** | **See Redline version attached.** |
|  |  |  |  |
|  |  |  |  |

# Components of TRM Measure Characterizations

Each measure characterization uses a standardized format that includes at least the following components. Measures that have a higher level of complexity may have additional components, but also follow the same format, flow and function.

###### Description

###### Definition of Efficient Equipment

###### 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)** **[[1]](#footnote-1)** |
| 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

###### 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[[2]](#footnote-2).

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

###### Loadshape

###### Coincidence Factor

###### Net To Gross Ratio

Algorithm

###### Calculation of Energy Savings

###### Electric Energy Savings

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** | **[[3]](#footnote-3)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 [[4]](#footnote-5)

CF = Summer Peak Coincidence Factor for measure

= 0.37 [[5]](#footnote-6)

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

###### Water Impact Descriptions and Calculation

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

**Measure code**

## Measure Description

## Definition of Efficient Equipment

## Definition of Baseline Equipment

## Deemed Lifetime of Efficient Equipment

## Deemed Measure Cost

## Deemed O&M Cost Adjustments

## Loadshape

## Coincidence Factor

## Net to Gross Ratio

# Algorithms

## Calculation of Energy Savings

## Electric Energy Savings

## Summer Coincident Peak Demand Savings

## Natural Gas Savings

## Water Impact Descriptions and Calculation

## Deemed O&M Cost Adjustment Calculation

# References

Please refer to the Chicago style for how to format citations for different sources.

<http://www.chicagomanualofstyle.org/tools_citationguide.html>

###### Section 1.X

1. Citation 1
2. Citation 2
3. Citation 3

###### Section 1.X

1. Citation 1
2. Citation 2
3. Citation 3

1. 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-1)
2. 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-2)
3. [↑](#footnote-ref-3)
4. 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-5)
5. 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)