**EnergyPlus Sizing Reporting Enhancements**

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# Justification

The reporting related to sizing calculations for zone equipment and other coils is confusing. Cooling and heating coil sizes are currently reported vastly different, even for the same zone load conditions. This causes confusion for users. Inconsistencies in design values shall be clearly reported so that users can understand why different coils appear to size differently.

Here are some example outputs which show the inconsistencies across equipment types and across various reports. There are two main reports that show coil sizes: the Component Sizing Summary and the Equipment Summary. A prime example of sizing inconsistencies is the four-pipe fan coil heating coil design coil load : HW = 7965W, Electric and Gas = 3698W.

The Component Sizing Summary can include both design size and user specified values. The particular values reported are primarily driven by the autosizable fields in the component object, but there can be additional values reported as well. These outputs vary widely based on coil type.

The Equipment Summary is more consistent across coil types, although DX coils get extra tables. The tables for heating coils, cooling coils, and DX coils have different columns, and the columns are a fixed set regardless of the particular coil type. But some coil types do not populate all of the columns.

## Zone Equipment

### Baseboard heat – HotWater

#### Component Sizing Summary

**ZONEHVAC:BASEBOARD:CONVECTIVE:ELECTRIC**

|  |  |
| --- | --- |
|  | Design Size Heating Design Capacity [W] |
| SPACE1-1 BASEBOARD HEAT | 2843.41 |

### Baseboard heat – Electric

**ZoneHVAC:Baseboard:RadiantConvective:Water**

|  |  |  |
| --- | --- | --- |
|  | Design Size Maximum Water Flow Rate [m3/s] | U-Factor times Area [W/C] |
| SPACE1-1 BASEBOARD HEAT | 0.000062 | 54.46 |

#### Equipment Summary

Nothing for this equipment.

### Fan Coil – ChW Simple – Hot Water

#### Component Sizing Summary

**ZoneHVAC:FourPipeFanCoil**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Design Size Maximum Supply Air Flow Rate [m3/s] | Design Size Maximum Outdoor Air Flow Rate [m3/s] | Design Size Maximum Hot Water Flow [m3/s] | Design Size Maximum Cold Water Flow [m3/s] |
| SPACE1-1 FAN COIL | 0.298953 | 0.103840 | 0.000176 | 0.000254 |

**Coil:Cooling:Water**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Design Size Design Water Flow Rate [m3/s] | Design Size Design Air Flow Rate [m3/s] | User-Specified Design Air Flow Rate [m3/s] | Design Size Design Inlet Air Temperature [C] | Design Size Design Inlet Water Temperature [C] | Design Size Design Inlet Air Humidity Ratio | Design Size Design Outlet Air Temperature [C] | Design Size Design Outlet Air Humidity Ratio |
| SPACE1-1 COOLING COIL | 0.000254 | 0.298953 | 0.298953 | 26.38 | 7.22 | 0.010816 | 12.50 | 0.008000 |

**Coil:Heating:Water**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Design Size Rated Capacity [W] | Design Size Maximum Water Flow Rate [m3/s] | Design Size U-Factor Times Area Value [W/K] |
| SPACE1-1 HEATING COIL | 8100.66 | 0.000176 | 142.27 |

#### Equipment Summary

**Cooling Coils**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Type | Design Coil Load [W] | Nominal Total Capacity [W] | Nominal Sensible Capacity [W] | Nominal Latent Capacity [W] | Nominal Sensible Heat Ratio | Nominal Efficiency [W/W] | Nominal Coil UA Value [W/C] | Nominal Coil Surface Area [m2] |
| SPACE1-1 COOLING COIL | Coil:Cooling:Water | 7101.45 | 8174.20 | 5480.35 | 2693.85 | 0.67 | - | 1033.13 | 10.48 |

**Heating Coils**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Type | Design Coil Load [W] | Nominal Total Capacity [W] | Nominal Efficiency [W/W] |
| SPACE1-1 HEATING COIL | Coil:Heating:Water | 7965.38 | 5487.16 | - |

### Fan Coil – ChW Detailed – Electric

#### Component Sizing Summary

**ZoneHVAC:FourPipeFanCoil**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Design Size Maximum Supply Air Flow Rate [m3/s] | Design Size Maximum Outdoor Air Flow Rate [m3/s] | Design Size Maximum Cold Water Flow [m3/s] |
| SPACE1-1 FAN COIL | 0.298953 | 0.103840 | 0.000254 |

**Coil:Cooling:Water:DetailedGeometry**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Design Size Maximum Water Flow Rate [m3/s] | Design Size Number of Tubes per Row | Design Size Fin Diameter [m] | Design Size Minimum Airflow Area [m2] | Design Size Fin Surface Area [m2] | Design Size Total Tube Inside Area [m2] | Design Size Tube Outside Surface Area [m2] | Design Size Coil Depth [m] |
| SPACE1-1 COOLING COIL | 0.000254 | 4.00 | 0.117764 | 0.154675 | 27.60 | 1.02 | 1.04 | 0.104000 |

**Coil:Heating:Electric**

|  |  |
| --- | --- |
|  | Design Size Nominal Capacity [W] |
| SPACE1-1 HEATING COIL | 3698.30 |

#### Equipment Summary

**Cooling Coils**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Type | Design Coil Load [W] | Nominal Total Capacity [W] | Nominal Sensible Capacity [W] | Nominal Latent Capacity [W] | Nominal Sensible Heat Ratio | Nominal Efficiency [W/W] | Nominal Coil UA Value [W/C] | Nominal Coil Surface Area [m2] |
| SPACE1-1 COOLING COIL | Coil:Cooling:Water:DetailedGeometry | 7101.45 | 7562.84 | 5289.60 | 2273.24 | 0.70 | - |  |  |

**Heating Coils**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Type | Design Coil Load [W] | Nominal Total Capacity [W] | Nominal Efficiency [W/W] |
| SPACE1-1 HEATING COIL | Coil:Heating:Electric |  | 3698.30 | 1.00 |

### PTAC – Single-Speed DX – Hot Water

#### Component Sizing Summary

**ZoneHVAC:PackagedTerminalAirConditioner**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Design Size Cooling Supply Air Flow Rate [m3/s] | Design Size Heating Supply Air Flow Rate [m3/s] | User-Specified No Load Supply Air Flow Rate [m3/s] | Design Size Outdoor Air Flow Rate During Cooling Operation [m3/s] | Design Size Outdoor Air Flow Rate During Heating Operation [m3/s] | Design Size Outdoor Air Flow Rate When No Cooling or Heating is Needed [m3/s] |
| SPACE1-1 PTAC | 0.298953 | 0.298953 | 0.000000 | 0.103840 | 0.103840 | 0.000000 |

**Coil:Heating:Water**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Design Size Rated Capacity [W] | Design Size Maximum Water Flow Rate [m3/s] | Design Size U-Factor Times Area Value [W/K] |
| SPACE1-1 PTAC HEATING COIL | 14696.65 | 0.000319 | 336.41 |

**Coil:Cooling:DX:SingleSpeed**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Design Size Rated Air Flow Rate [m3/s] | Design Size Gross Rated Total Cooling Capacity [W] | Design Size Gross Rated Sensible Heat Ratio |
| SPACE1-1 PTAC COOLING COIL | 0.298953 | 7055.30 | 0.713881 |

#### Equipment Summary

**Cooling Coils**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Type | Design Coil Load [W] | Nominal Total Capacity [W] | Nominal Sensible Capacity [W] | Nominal Latent Capacity [W] | Nominal Sensible Heat Ratio | Nominal Efficiency [W/W] | Nominal Coil UA Value [W/C] | Nominal Coil Surface Area [m2] |
| SPACE1-1 PTAC COOLING COIL | Coil:Cooling:DX:SingleSpeed |  | 7055.30 | 5036.65 | 2018.66 | 0.71 | 3.00 |  |  |

**DX Cooling Coils**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | DX Cooling Coil Type | Standard Rated Net Cooling Capacity [W] | Standard Rated Net COP [W/W] | EER [Btu/W-h] | SEER [Btu/W-h] | IEER [Btu/W-h] |
| SPACE1-1 PTAC COOLING COIL |  | 6823.0 | 2.64 | 9.01 | 9.57 | 9.43 |

**DX Cooling Coil ASHRAE 127 Standard Ratings Report**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | DX Cooling Coil Type | Rated Net Cooling Capacity Test A [W] | Rated Electric Power Test A [W] | Rated Net Cooling Capacity Test B [W] | Rated Electric Power Test B [W] | Rated Net Cooling Capacity Test C [W] | Rated Electric Power Test C [W] | Rated Net Cooling Capacity Test D [W] | Rated Electric Power Test D [W] |
| SPACE1-1 PTAC COOLING COIL | Coil:Cooling:DX:SingleSpeed |  |  |  |  |  |  |  |  |

**Heating Coils**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Type | Design Coil Load [W] | Nominal Total Capacity [W] | Nominal Efficiency [W/W] |
| SPACE1-1 PTAC HEATING COIL | Coil:Heating:Water | 14696.65 | 13230.94 | - |

### PTAC – Single-Speed DX – Electric

#### Component Sizing Summary

**Coil:Heating:Electric**

|  |  |
| --- | --- |
|  | Design Size Nominal Capacity [W] |
| SPACE1-1 PTAC HEATING COIL | 8715.89 |

#### Equipment Summary

**Heating Coils**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Type | Design Coil Load [W] | Nominal Total Capacity [W] | Nominal Efficiency [W/W] |
| SPACE1-1 PTAC HEATING COIL | Coil:Heating:Electric |  | 8715.89 | 1.00 |

### PTAC – Single-Speed DX – Gas

**Coil:Heating:Fuel**

|  |  |
| --- | --- |
|  | Design Size Nominal Capacity [W] |
| SPACE1-1 PTAC HEATING COIL | 8715.89 |

#### Equipment Summary

**Heating Coils**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Type | Design Coil Load [W] | Nominal Total Capacity [W] | Nominal Efficiency [W/W] |
| SPACE1-1 PTAC HEATING COIL | Coil:Heating:Fuel |  | 8715.89 | 0.80 |

## Air Loop Equipment

### VAV Reheat – ChW Simple – HotWater

### VAV Reheat – ChW Detailed – Electric

### VAV Reheat – ChW Simple – Gas

# E-mail and Conference Call Conclusions

* Trane will contribute code for the “Coil Selection Table” which produces a table of up to 87 columns for each coil. This same table will be implemented as an optional output table.
* An abbreviated version of this table may also be implemented to provide a summary of the most pertinent outputs.

# Approach

The proposed approach is to add a new table to provide a consistent set of information about each coil. Trane has contributed code for extended sizing tables which reports a consistent set of up to 87 values (some of which do not apply to all coil types). The Trane “Coil Selection Table” is described below under “Outputs Description”. This table will be made available as a standard table output report.

A subset of the Coil Selection Table will also be implemented which includes less detail. Proposed values to include in the abbreviated table are listed below.

1. Nominal/Rated Capacity (Sensible, Latent, and Total [gross])
2. Design Coil Load (Sensible, Latent, and Total [gross])
3. Design Air Flow Rate
4. Design Inlet Air Dry-Bulb Temperature
5. Design Inlet Air Humidity Ratio
6. Design Outlet Air Dry-Bulb Temperature
7. Design Outlet Air Humidity Ratio
8. Design Water Flow Rate
9. Coil Object Capacity Value (this could be capacity or UA – this should already be reported)
10. Design Outdoor Air Fraction (even though we have inlet conditions, this makes it easier to confirm appropriate OA fraction)
11. Design Outdoor Air Dry-Bulb Temperature
12. Design Outdoor Air Humidity Ratio
13. Sizing Factors (if applicable)

# Testing/Validation/Data Sources

The example tables in this NFP were produced using many idf files for various types of equipment and coil combinations, all based on the 5Zone example building. A new set of simulation input files will be created with multiple instances of the same zone served by different combinations of equipment, so that all coil types for a given type of equipment can be seen in the same table. The initial thought is to prepare a set of input files to cover the following equipment combinations. These will be added to “testfiles” for CI testing, but will not be included in the distribution example files.

## Zone HVAC Equipment

Every forced air zone HVAC equipment type with all supported coil types, 28 cases total.

* Four Pipe Fan Coil
  + 3 cooling coil types, 2 heating coil types
* Window Air Conditioner
  + 3 cooling coil types, 0 heating coil types
* PTAC
  + 3 cooling coil types, 4 heating coil types
* PTHP
  + 3 cooling coil types, 2 heating coil types, 4 supplemental heating coil types
* WSHP
  + 2 cooling coil types, 2 heating coil types, 4 supplemental heating coil types
* Unit Ventilator
  + 3 cooling coil types, 4 heating coil types
* Unit Heater
  + 0 cooling coil types, 4 heating coil types
* VRF
  + 2 cooling coil types, 2 heating coil types

## Air Loop Equipment (if budget allows)

Every central air loop equipment type with all supported coil types, 40 cases total.

* Unitary System
  + 13 cooling coil types, 13 heating coil types, 5 supplemental heating coil types
* Unitary – Heat-Only
  + 3 cooling coil types, 4 heating coil types
* Unitary – Heat-Cool
  + 3 cooling coil types, 4 heating coil types
* Heat Pump – Air-to-Air
  + 4 cooling coil types, 3 heating coil types, 4 supplemental heating coil types
* Heat Pump – Water-to-Air
  + 3 cooling coil types, 3 heating coil types, 4 supplemental heating coil types
* Unitary – Heat-Cool – VAV Changeover Bypass
  + 4 cooling coil types, 6 heating coil types
* Heat Pump – Air-to-Air Multi-Speed
  + 1 cooling coil type, 5 heating coil types

## Air Terminal Units (if budget allows)

Every air terminal unit type with all supported coil types, 28 cases total.

* Single-Duct Constant-Volume Reheat
  + 4 reheat coil types
* Single-Duct Variable-Volume Reheat
  + 4 reheat coil types
* Single-Duct Variable-Volume Reheat with Variable Speed Fan
  + 4 reheat coil types
* Single-Duct Variable-Volume Heat-and-Cool Reheat
  + 4 reheat coil types
* Single-Duct Series PIU Reheat
  + 4 reheat coil types
* Single-Duct Parallel PIU Reheat
  + 4 reheat coil types
* Single-Duct Four Pipe Induction
  + 2 cooling coil types, 1 heating coil type
* Single-Duct Four Pipe Bean
  + Built-in coils, 1 type
* Single-Duct Cooled Beam
  + Built-in coils, 1 type

# Input Output Reference Documentation

The extended sizing tables will be triggered by a new report name in Output:Table:SummaryReports, “CoilSizingDetails” or “CoilSelection”.

# Outputs Description

|  |  |  |  |
| --- | --- | --- | --- |
| **Trane E+ Contribution: Coil Selection Table** | | |  |
|  |  |  |  |
| • Coil components only available when "Do Zone Sizing Calculation" and/or "Do System Sizing Calculation" is flagged | | |  |
|  |  |  |  |
| • Meta data. The meta data fields include string names to identify the coil, where it is being used, names and types of IDF objects involved, what some of the various sizing method input choices were set to, and information about the supply fan and plant found to be associated with the coil. 40 fields. | | |  |
|  |  |  |  |
| • Ideal loads sizing summary. The collection of fields whose names end with ”at Ideal Loads Peak” are all related to the sizing calculations done by the ideal loads zone sizing routines and the system sizing routines based on them. Many of the values reported here come from Sizing:Zone and/or Sizing:System input. The operating conditions occuring during Ideal Loads sizing calculations are unlikely to match the conditions used in the definitions for coil input data. 36 fields. | | |  |
|  |  |  |  |
| • Rating point summary. This is a collection of fields with names that end in ”at Rating Conditions.” The model input data for many types of coils is based on defined set of conditions variously referred to as the rating point, reference, nominal, or design. The coil models are calculated with conditions set to match the rating point and the inputs and outputs from that are reported here. Many of the values here are from the input documentation that defines the conditions at the rating point. The coil capacities and leaving conditions are the results from the running complete coil model. Some coil models do not have a rating point as part of the model definition, because the models are not sensitive to operating conditions, and those coils will have -999.0 in these fields. 11 fields. | | |  |
|  |  |  |  |
| (Note: Output fields below have been transposed from horizontal table to vertical format for easier reviewing) | | | |

|  |  |  |
| --- | --- | --- |
| Coil Name | GUID13\_ZONE\_1\_ZFPFC-1\_COOLING COIL | GUID13\_ZONE\_1\_ZFPFC-1\_HEATING COIL |

|  |  |  |  |
| --- | --- | --- | --- |
| Coil Type | COIL:COOLING:WATER | COIL:HEATING:WATER | The input object class name in IDF syntax. Text string. |
| Coil Location | Zone Equipment | Zone Equipment | The broad type of HVAC this coil is being used in. ”AirLoop” means the coil is part of a central air system, such as a main coil in a multizone air handler. ”Zone Equipment” means that the coil is part of Zone equipment like a PTAC, or in the zone terminal unit of an airhandler like a VAV reheat coil. Text string. |
| HVAC Type | ZONEHVAC:FOURPIPEFANCOIL | ZONEHVAC:FOURPIPEFANCOIL | This is more specifically what HVAC the coil is used in. The values are the input object class name, in IDF syntax, found to be associated with the coil. Text string. |
| HVAC Name | GUID13\_ZONE\_1\_ZFPFC-1 | GUID13\_ZONE\_1\_ZFPFC-1 | This is the unique user name input for the HVAC Type. The strings will be converted to upper case compared to what is in the actual input data file. Text string. |
| Zone Name(s) | GUID13\_ZONE\_1 | GUID13\_ZONE\_1 | This is the zone, or list of zones, found to be associated with this coil. The zone name is defined by the user in the Zone object. For multizone systems, the coils can have a list of zone names with the individual names separated by a semicolon. The zones listed here are those used to generate (aggregate and volume-weighted average) values for the room conditions and loads. Text string. |
| System Sizing Method Concurrence | N/A | N/A | This field applies to ”AirLoop” coils. It describes if the central air system sizing was done using ”Coincident” or ”Non-Coincident” method. This refers to how the ideal loads sizing routines process the time sequence of zone loads. The concurrent sum of peaks, or coincident or ”block”, is often lower than the sum of the individual peaks regardless of when they occur, or non-conicident sum. This field is not applicable to ”Zone Equipment” coils and will show ”N/A” here. This corresponds to the input field called Type of Zone Sum to Use in the Sizing:System input object. Text string. |
| System Sizing Method Capacity | N/A | N/A | This field applies to ”AirLoop” coils. It describes what was chosen for the method of determining coil capacity during ideal loads sizing routines. The values here will match the input key choices available for the the Sizing:System object’s input fields called Cooling Design Capacity Method, for cooling coils, and Heating Design Capacity Method, for heating coils. Values here of ”HeatingDesignCapacity” or ”CoolingDesignCapacity” mean that the coil was sized using the design loads calculated from the zone ideal loads results. When sizing was scaled using floor area the value here would be ”CapacityPerFloorArea.” Values of FractionOfAutosized-HeatingCapacity and FractionOfAutosizeCoolingCapacity mean that the usual design load based results were further scaled by a separate user scaling factor. This field is not applicable to ”Zone Equipment” coils and will show ”N/A” here. Text string. |
| System Sizing Method Air Flow | N/A | N/A | This field applies to ”AirLoop” coils. It describes what was chosen for the method of determining the system air flow rate during ideal loads sizing routines. This field is not applicable to ”Zone Equipment” coils and will show ”N/A” here. Text string. |
| Autosized Coil Capacity? | Yes | Yes | This field describes if the coil capacity was autosized or not. Values here will be ”Yes” or ”No”. A ”No” means that the size of the coil was set at input, hard sized, and no capacity sizing calculations were done for the coil. A ”Yes” means that coil’s capacity was autosized. Text string. |
| Autosized Coil Airflow? | Yes | Yes | This field describes if the coil’s airflow rate was autosized or not. Values here will be ”Yes” or ”No”. A ”No” means that the airflow rate used to size the coil’s capacity was set at input, hard sized. This means that the coil’s capacity was set for an airflow rate that was not autosized. A ”Yes” means that the airflow rate for the coil came from sizing calculations. Text string. |
| Autosized Coil Water Flow? | Yes | Yes | This field describes if the coil’s water flow rate was autosized or not. Values here will be ”Yes” or ”No”. A ”No” means that the water flow rate used to size the coil’s capacity was set at input, hard sized. This means that the coil’s capacity was set for a water flow rate that was not autosized. A ”Yes” means that the water flow rate for the coil came from sizing calculations. This field is only applicable to water-to-air coils. Text string. |
| OA Pretreated prior to coil inlet? | No | No | This field describes if the coil’s sizing calculations are based on the outdoor air being preconditioned, as with a separate coil, or if the outdoor air is unconditioned. Values here will be ”Yes” or ”No”. A ”No” means that the outdoor air is not preconditioned. A ”Yes” means that the outdoor is preconditioned. This field only really applies to central air system coils. The outdoor air may be mixed with return air before the coil, but that mixed air may be based on either treated or untreated outdoor air, depending on Sizing:System input. Text string. |
| Coil Final Gross Total Capacity [W] | 6464.842 | 3315.991 | This field describes the coil’s gross total capacity, in units of W. No fan impact. This field will generally be the main value the model uses for capacity as a result of the sizing calculations. However if a coil was not autosized, the capacity was hard sized on input, then this field will be filled with the hard sized coil capacity (if that is a parameter in the coil model). This field is very similiar to the field called Coil Total Capacity at Rating Conditions with the difference being that this one is the model input while that other one is the result of running the full coil model at the rating point conditions. Water heating coil models using UA and design water flow rate performance input method do not have a single design capacity in Watts and this field will show as -99999.0 (and the coil is better characterized using the field called Coil U-value Times Area Value). Real number. |
| Coil Final Gross Sensible Capacity [W] | -999 | 3315.991 | This field describes the coil’s gross sensible capacity, if available, in units of W. No fan impact. This field is generally the total capacity multiplied by the sensible heat ratio if both are defined in the model. Real number. |
| Coil Final Reference Air Volume Flow Rate [m3/s] | 0.451121 | 0.217941 | This field describes the coil’s rated/reference/nominal air flow rate, in units of m3/s. This field will generally be the model input (or autosize result) for the process air flow rate through the coil at the rating point. Some coil models do not have any rated/reference/nominal air flow rate as part of the model description (d.g. electric and gas heating coils) and these will have -999.0 in this field. Real number. |
| Coil Final Reference Plant Fluid Volume Flow Rate [m3/s] | 0.00027722 | 0.00007132 | This field describes the coil’s rated/reference/nominal water flow rate, in units of m3/s. This field will be the model input or autosize result for the source water, or other plant fluid type, flow rate through the coil at the design or rating point. Many coils have no water source and these will have -999.0 in this field. Real number. |
| Coil U-value Times Area Value [W/K] | -999 | 70.86 | This field describes the coil’s overall UA value, in units of W/K. This is mainly for the Coil:Heating:Water coil using the Performance Input method of UFactorTimesAirAndDesignWaterFlowRate and is not avaliable for other coils. This will be the result from the ideal loads sizing calculations or the hard sized entry. Real number. |
| Terminal Unit Reheat Coil Multiplier | -999 | 1 | This field describes the coil sizing multiplier that might have affected the calculated size of a coil used as a reheat coil in a zone air terminal unit. This is a non-dimensional scaling factor. Real number. |
| DX Coil Capacity Increase Ratio from Too Low Flow/Capacity Ratio | 1 | 1 | This field describes sizing adjustments that can occur for DX coils when the combination of capacity and air flow rate is outside of prescribed limits. If the air flow to capacity ratio was too low this will ratio will show how the capacity was increased to force the result into the prescribed range. Real Number. |
| DX Coil Capacity Decrease Ratio from Too High Flow/Capacity Ratio | 1 | 1 | This field describes sizing adjustments that can occur for DX coils when the combination of capacity and air flow rate is outside of prescribed limits. If the air flow to capacity ratio was too high this will ratio will show how the capacity was decreased to force the result into the prescribed range. Real Number. |
| Moist Air Heat Capacity [J/kg-K] | 1004.8586 | 1006.065 | This is the moist air heat capacity, cp, that is applicable to coil calculations. Real number. |
| Dry Air Heat Capacity [J/kg-K] | 1004.8586 | 1004.8586 | This is the dry air heat capacity, cp, that is applicable to coil calculations. Real number. |
| Standard Air Density Adjusted for Elevation [kg/m3] | 0.9914 | 0.9914 | This is the dry air density, adjusted for elevation above sea level, that is applicable to coil calculations. Real number. |
| Supply Fan Name for Coil | GUID13\_ZONE\_1\_ZFPFC-1\_SUPPLY FAN | GUID13\_ZONE\_1\_ZFPFC-1\_SUPPLY FAN | The program tries to detect the supply fan associated with the coil. This field is the user-defined name for that fan. Text string. |
| Supply Fan Type for Coil | Fan:SystemModel | Fan:SystemModel | The program tries to detect the supply fan associated with the coil. The values are the input object class name, in IDF syntax, for the fan. Text string. |
| Supply Fan Maximum Air Volume Flow Rate [m3/s] | 0.451121 | 0.451121 | This field is the design volume flow rate, in units of m3/s, for the fan found to be associated with the coil. Real number |
| Supply Fan Maximum Air Mass Flow Rate [kg/s] | 0.44723392 | 0.44723392 | This field is the design mass flow rate, in kg/s, for the fan found to be associated with the coil. Real number |
| Plant Name for Coil | CHW Plant 1 | HW Plant 1 | If the coil is a water-to-air or steam coil, then the program tries to detect the central plant system serving the coil. This field is the user-defined name for that plant system. This will be the name in the PlantLoop and Sizing:Plant objects. The next nine fields provides various results for that the central plant loop system. If the coil is not a water or steam coil, then this field will have ”unknown” as the value. Text string. |
| Plant Fluid Specific Heat Capacity [J/kg-K] | 4197.93 | 4197.93 | This is the specific heat of the fluid circulating through the plant and serving the coil, in units of J/kg-K. This is evaulated at the temperature used for sizing calculations. The plant need not always be water, glycol mixtures and steam are supported and this value will be adjusted accordingly. If the coil is not served by a plant, then this field will have -999.0 as the value. Real number. |
| Plant Fluid Density [kg/m3] | 999.898 | 999.898 | This is the density of the fluid circulating through the plant and serving the coil, in units of kg/m3. This is evaulated at the temperature used for sizing calculations. The plant need not always be water, glycol mixtures are supported and this value will be adjusted accordingly. If the coil is not served by a plant, then this field will have -999.0 as the value. Real number. |
| Plant Maximum Fluid Mass Flow Rate [kg/s] | 0.27719611 | 0.07131164 | This field is the design flow rate for the (entire) central plant system serving the coil, in units of kg/s. This value is the final outcome from plant sizing calculations, or perhaps from the hard-sized value entered in the PlantLoop object for the maximum volume flow rate. If the coil is not served by a plant, then this field will have -999.0 as the value. Real number. |
| Plant Design Fluid Return Temperature [C] | 12.22 | 71.11 | This is the value, in degrees Celsius, used in sizing calculations for the temperature of the fluid returning to the supply side of the plant system. It is derived from values entered in the Sizing:Plant object (except for steam which depends on subcooling input). If the coil is not served by a plant, then this field will have -999.0 as the value. Real number. |
| Plant Design Fluid Supply Temperature [C] | 6.67 | 82.22 | This is the value, in degrees Celsius, used in the sizing calculations for the temperature of the fluid leaving the supply side of the plant system and going into the coils. This is the value entered in the Sizing:Plant object in the input field called Design Loop Exit Temperature (except for steam which is 100 C). If the coil is not served by a plant, then this field will have -999.0 as the value. Real number. |
| Plant Design Fluid Temperature Difference [Delta C] | 5.56 | 11.11 | This is the value, in degrees Celsius (difference), used in the sizing calculations for the temperature difference between the plant supply and return temperatures. This is the value entered in the Sizing:Plant object in the input field called Loop Design Temperature Difference (except for steam it is the amount of subcooling in the coil). If the coil is not served by a plant, then this field will have -999.0 as the value. Real number. |
| Plant Design Capacity [W] | 6464.72 | 3326.24 | This is the design capacity of the central plant system, in Watts, that is the result of the sizing calculations. For steam plants it is the capacity of the steam boiler attached to the supply side of the plant. If the coil is not served by a plant, then this field will have -999.0 as the value. Real number. |
| Coil Capacity Percentage of Plant Design Capacity [%] | 100.0019 | 105.241 | The coil being reported on here will be one among many others that might be also be attached to the same plant. This field compares this coil’s (design gross) total capacity to the central plant’s design capacity, W/W, and gives a value in percentage from 0.0 to 100.0. If the coil is not served by a plant, then this field will have -999.0 as the value. Real Number. |
| Coil Fluid Flow Rate Percentage of Plant Design Flow Rate [%] | 100 | 100 | The coil being reported on here will be one among many others that might be also be attached to the same plant. This field compares this coil’s design flow rate to the central plant’s design flow rate, kg/s/kg/s, and gives a value in percentage from 0.0 to 100.0. If the coil is not served by a plant, then this field will have -999.0 as the value. Real Number. |
| Design Day Name at Sensible Ideal Loads Peak | ANNUAL COOLING DESIGN CONDITION9 | USAANNUAL HEATING DESIGN CONDITION | This field is the name of the design day selected to have the sensible load peak for ideal loads sizing calculations. The text here will be from the user-defined names entered in the name field of the SizingPeriod:DesignDay objects. If this is a cooling coil, the load peak will be for sensible cooling loads and the name here will be from one of the cooling design days. If this is a heating coil, the load peak will be for sensible heating loads and the name from the heating design days. Text String. |
| Date/Time at Sensible Ideal Loads Peak | 10/21/2017 13:00 | 12/21/2017 9:30 | This field provides the result for the date and time of day when the sensible load peak was found to occur. The format is (M)M/(D)D HH:MM:00, eg. 1/1 06:00:00 or 12/11 06:00:00. There is no specific year associated with design days. Text String. |
| Design Day Name at Total Ideal Loads Peak | unknown | unknown | The name of the design day selected to have the total load peak for ideal loads sizing calculations. The text here will be from the user-defined names entered in the name field of the SizingPeriod:DesignDay objects. If this is a cooling coil, the load peak will be for total cooling loads and the name here will be from one of the cooling design days. If this is a heating coil, this field usually ”unknown” because EnergyPlus does not use a total load for heating sizing. Text String. |
| Date/Time at Total Ideal Loads Peak | unknown | unknown | This field provides the result for the date and time of day when the total load peak was found to occur during ideal loads sizing. The format is (M)M/(D)D HH:MM:00, eg. 1/1 06:00:00 or 12/11 06:00:00. There is no specific year associated with design days. If the ideal loads sizing calculations never determine a total load the value here will be ”unknown.” Text String. |
| Design Day Name at Air Flow Ideal Loads Peak | unknown | USAANNUAL HEATING DESIGN CONDITION | This field is the name of the design day selected to have the air flow peak for ideal loads sizing calculations. The text here will be from the userdefined names entered in the name field of the SizingPeriod:DesignDay objects. If this is a cooling coil, the air flow peak might be calculated seperately and the name here will be from one of the cooling design days. If this is a heating coil, the air flow peak will be the same as the sensible load peak. Text String. |
| Date/Time at Air Flow Ideal Loads Peak | 10/21/2017 13:00 | 12/21/2017 9:30 | This field provides the result for the date and time of day when the air flow peak was found to occur. The format is (M)M/(D)D HH:MM:00, eg. 1/1 06:00:00 or 12/11 06:00:00. There is no specific year associated with design days. Text String. |
| Coil Total Capacity at Ideal Loads Peak [W] | 6464.84 | 3500.57 | This field is the coil’s gross total capacity, in Watts, resulting from the ideal loads sizing calculations. This is the total, sensible plus latent, capacity under the conditions used for ideal loads sizing described in other ”Ideal Loads Peak” fields. This does not include the supply fan impacts. Real Number. |
| Coil Sensible Capacity at Ideal Loads Peak [W] | 6464.84 | 3315.99 | This field is the coil’s gross sensible capacity, in Watts, resulting from the ideal loads sizing calculations. This is the sensible capacity under the conditiosn used for ideal loads sizing described in the other ”Ideal Loads Peak” fields. This does not include the supply fan impacts. Real number. |
| Coil Off-Rating Capacity Modifier at Ideal Loads Peak [ ] | 1 | 1 | This field is the capacity modification factor for the conditions during ideal loads sizing. The coil model may have performance curves that alter the capacity as a function of the conditions experienced by the coil. When the ideal loads sizing conditions are different than the conditions that the performance curves are normalized to, the rating point, the coil is being sized at ”Off-rating.” This value can be used to convert the Coil Total Capacity at Ideal Loads Peak to what the capacity should be at the rating point. The ideal loads sizing is often not at the rating point because of a fraction of outdoor air has been mixed into the entering air. Real number. |
| Coil Air Mass Flow Rate at Ideal Loads Peak [kg/s] | 0.44723392 | 0.21606358 | This field is the coil’s air mass flow rate, in kg/s, resulting from, and/or used during, the ideal loads sizing calculations. Real number. |
| Coil Air Volume Flow Rate at Ideal Loads Peak [m3/s] | 0.451121 | 0.217941 | This field is the coil’s air volume flow rate, in m3/s, resulting from, and/or used during, the ideal loads sizing calculations. Real number. |
| Coil Entering Air Drybulb at Ideal Loads Peak [C] | 27 | 20 | This field is the drybulb temperature, in degrees Celsius, of the air entering the coil during ideal loads sizing calculations. Real number. |
| Coil Entering Air Wetbulb at Ideal Loads Peak [C] | 13.43 | 5.13 | This field is the wetbulb temperature, in degrees Celsius, of the air entering the coil during ideal loads sizing calculations. Real number. |
| Coil Entering Air Humidity Ratio at Ideal Loads Peak [kg-H2O/kg-DryAir] | 0.00614908 | 0.00065633 | This field is the humidity ratio, in kg-water/kg-dryAir, of the air entering the coil during ideal loads sizing calculations. Real number. |
| Coil Entering Air Enthalpy at Ideal Loads Peak [J/(kg-C)] | 42819.3 | 21762.6 | This field is the enthalpy, in J/kg-C (base 0.0 at drybulb = 0.0C), of the air entering the coil during ideal loads sizing calculations. Real number. |
| Coil Leaving Air Drybulb at Ideal Loads Peak [C] | 12.78 | 35 | This field is the drybulb temperature, in degrees Celsius, of the air leaving the coil during the ideal loads sizing calculations for the coil. Real number. |
| Coil Leaving Air Wetbulb at Ideal Loads Peak [C] | 8.09 | 11.39 | This field is the wetbulb temperature, in degrees Celsius, of the air leaving the coil during ideal loads sizing calculations. Real number. |
| Coil Leaving Air Humidity Ratio at Ideal Loads Peak [C] | 0.00614908 | 0.00065896 | This field is the humidity ratio, in kg-water/kg-dryAir, of the air leaving the coil during ideal loads sizing calculations. Real number. |
| Coil Leaving Air Enthalpy at Ideal Loads Peak [J/(kg-C)] | 28603.5 | 36860.3 | This field is the enthalpy, in J/kg-C (base 0.0 at drybulb = 0.0C), of the air leaving the coil during ideal loads sizing calculations. Real number. |
| Coil Plant Fluid Mass Flow Rate at Ideal Loads Peak [kg/s] | 0.27719611 | 0.07131164 | This field is the design or maximum water flow rate, in kg/s, of the plant fluid serving the coil during ideal loads sizing calculations. If the coil is not a water coil then this field will have a value of -999.0. Real number. |
| Coil Entering Plant Fluid Temperature at Ideal Loads Peak [C] | 6.67 | 60 | This field is the water temperature, in degrees Celsius, of the plant fluid entering the coil during ideal loads sizing calculations. If the coil is not a water coil then this field will have a value of -999.0. Real number. |
| Coil Leaving Plant Fluid Temperature at Ideal Loads Peak [C] | 10.61 | 48.89 | This field is the water temperature, in degrees Celsius, of the plant fluid leaving the coil during ideal loads sizing calculations. If the coil is not a water coil then this field will have a value of -999.0. Real number. |
| Coil Plant Fluid Temperature Difference at Ideal Loads Peak [Delta C] | 5.56 | 11.11 | This field is the water temperature difference across the coil, in degrees Celsius (difference), of the plant fluid passing through the coil during ideal loads sizing calculations. If the coil is not a water coil then this field will have a value of -999.0. Real number. |
| Supply Fan Air Heat Gain at Ideal Loads Peak [W] | 0 | 0 | This field is the fan load that was included in the ideal loads sizing calculations. This may only be included in calculations for central air system cooling coils. If the coil was not sized with fan heat gain taken into account, then this value will be 0.0 (even though there still is a fan with heat during normal operation). Real number. |
| Coil and Fan Net Total Capacity at Ideal Loads Peak [W] | 6464.84 | 3500.57 | This field shows the net coil total capacity which is the gross total capacity with the fan heat gain, if any was calculated. Real number. |
| Outdoor Air Drybulb at Ideal Loads Peak [C] | 22.25 | -17.5 | This field is the outdoor air drybulb temperature, in degrees Celsius, used during the ideal loads sizing calculations. Real number. |
| Outdoor Air Humidity Ratio at Ideal Loads Peak [kg-H2O/kg-DryAir] | 0.00373963 | 0.00062842 | This field is the outdoor air humidity ratio, in kg of water per kg of dry air, used during the ideal loads sizing calculations. Real number. |
| Outdoor Air Wetbulb at Ideal Loads Peak [C] | 9.44 | -18.22 | This field is the outdoor air wetbulb temperature, in degrees Celsius, used during the ideal loads sizing calculations. Real number. |
| Outdoor Air Volume Flow Rate at Ideal Loads Peak [m3/s] | 0 | 0 | This field is the outdoor air volume flow rate, in m3/s, that occurred during the ideal loads sizing calculations. Real number. |
| Outdoor Air Flow Percentage at Ideal Loads Peak [%] | 0 | 0 | This field is the percentage of outdoor air in the air entering the coil that occurred during the ideal loads sizing calculations. Real number. |
| System Return Air Drybulb at Ideal Loads Peak [C] | 27 | 20 | This field is the drybulb temperature, in degrees C, of air returning into the HVAC system that occurred during the ideal loads sizing calculations. Real number. |
| System Return Air Humidity Ratio at Ideal Loads Peak [kg-H2O/kg-DryAir] | 0.00614908 | 0.00065633 | This field is the humidity ratio, in kg of water per kg of dry air, of air returning into the HVAC system that occurred during the ideal loads sizing calculations. Real number. |
| Zone Air Drybulb at Ideal Loads Peak [C] | 27 | 20 | This field is the drybulb temperature, in degrees C, of the zone air that occurred during the ideal loads sizing calculations. For multizone system this is the volume-weighted average. Real number. |
| Zone Air Humidity Ratio at Ideal Loads Peak [kg-H2O/kg-DryAir] | 0.00614908 | 0.00065633 | This field is the humidity ratio, in kg of water per kg of dry air, of the zone air that occurred during the ideal loads sizing calculations. For multizone system this is the volume-weighted average. Real number. |
| Zone Air Relative Humidity at Ideal Loads Peak [%] | 22.8877 | 3.7594 | This field is the percent relative humidity of the zone air that occurred during the ideal loads sizing calculations. For multizone system this is the volume-weighted average. Real number. |
| Zone Sensible Heat Gain at Ideal Loads Peak [W] | 6465.96 | 3260.62 | This field is the zone sensible load, in Watts, found during ideal loads sizing. For multizone system it is the sum of all the zones on the air system. Real number. |
| Zone Latent Heat Gain at Ideal Loads Peak [W] | -107.23 | -1.4 | This field is the zone latent load, in Watts, found during ideal loads sizing. For multizone system it is the sum of all the zones on the air system. Real number. |
| Coil Total Capacity at Rating Conditions [W] | 5201.07 | 3496.17 | This field is the gross total capacity of the coil when operated at the rating point conditions, in units of Watts. This is the result from calculating the full coil model under the operating conditions specified for the rating point. Real number. |
| Coil Sensible Capacity at Rating Conditions [W] | 5201.07 | 3496.17 | This field is the gross sensible capacity of the coil when operated at the rating point conditions, in units of Watts. This is the result from calculating the full coil model under the operating conditions specified for the rating point. Real number. |
| Coil Air Mass Flow Rate at Rating Conditions [kg/s] | 0.44723392 | 0.21606358 | This field is the air mass flow rate, in units of kg/s, used when calculating the full coil model under the operating conditions specified for the rating point. Real number. |
| Coil Entering Air Drybulb at Rating Conditions [C] | 27 | 16.6 | This field is the coil air inlet drybulb temperature, in degrees Celsius, used when calculating the full coil model under the operating conditions specified for the rating point. The value should match the definition of the rating point as described in the coil model input documentation. For DX cooling coils, this will be 26.6667C or 80F. Real number. |
| Coil Entering Air Wetbulb at Rating Conditions [C] | 15.38 | 4.9 | This field is the coil air inlet wetbulb temperature, in degrees Celsius, used when calculating the full coil model under the operating conditions specified for the rating point. The value should match the definition of the rating point as described in the coil model input documentation. For DX cooling coils, this will be 19.444C or 67F. Real number |
| Coil Entering Air Humidity Ratio at Rating Conditions [kg-H20/kg-DryAir] | 0.00614908 | 0.00065633 | This field is the coil air inlet humidity ratio, in kg-water/kg-dryAir, used when calculating the full coil model under the operating conditions specified for the rating point. Real number. |
| Coil Entering Air Enthalpy at Rating Conditions [J/(kg-C)] | 42819.3 | 18342.1 | This field is the coil air inlet enthalpy, in J/kg-C with zero base at 0.0C, used when calculating the full coil model under the operating conditins specified for the rating point. Real number. |
| Coil Leaving Air Drybulb at Rating Conditions [C] | 15.56 | 32.68 | This field is the coil air outlet drybulb, in degrees Celsius, from calculating the full coil model under the operating conditions specified for the rating point. Real number. |
| Coil Leaving Air Wetbulb at Rating Conditions [C] | 10.84 | 12.31 | This field is the coil air outlet wetbulb, in degrees Celsius, from calculating the full coil model under the operating conditions specified for the rating point. Real number. |
| Coil Leaving Air Humidity Ratio at Rating Conditions [kg-H20/kg-DryAir] | 0.00614908 | 0.00065633 | This field is the coil air outlet humidity ratio, in kg-water/kg-dryair, from calculating the full coil model under the operating conditions specified for the rating point. Real number. |
| Coil Leaving Air Enthalpy at Rating Conditions [J/(kg-C)] | 31189.9 | 34523.2 | This field is the coil air outlet enthalpy, in J/kg-C with zero base at 0.0C, from calculating the full coil model under the operating conditions specified for the rating point. Real number. |

# Engineering Reference

No engineering reference changes are anticipated.

# Design