

Input Output Reference

Version 1.2.0

The Encyclopedic Reference to OpenStudio Input
and Output

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Input-Output Reference

This document is intended to be an encyclopedic reference for the OpenStudio Input Data Dictionary (IDD), Input Data File (IDF) and potential resultant outputs (various output files).

The following descriptions are “grouped” by the elements in the IDD.

What is OpenStudio Input and Output?

OpenStudio Input and Output is a subset of EnergyPlus Input and Output plus OpenStudio-specific data. The OpenStudio IDD explicitly includes the EnergyPlus IDD, and then removes objects that are translated by the `openstudio::energyplus::ReverseTranslator` when translating from EnergyPlus IDF to OpenStudio IDF.

IDD Conventions

A basic description of the IDD format may be found in the Energy+.idd file, and in the EnergyPlus Input-Output Reference. The following is a description of the extension of the IDD format used by OpenStudio.

```
!IDD_Version VERSION NUMBER
! *****
! This file is the Input Data Dictionary (IDD) for OpenStudio Model.
!
! Please see the EnergyPlus IDD Header for data formatting information. In
! addition to the syntax listed there, we add the following commands for
! inserting subsets of other IDD files:
!
! \include-file      Name of an IDD file to include in this IDD file. Inclusion
!                   means that a collection of IDF objects conforming to this
!                   IDD must actually conform to the union of this IDD and the
!                   included IDD, minus any removed objects.
!
! \remove-object     Name of an object in an included IDD file that is to be
!                   ignored, that is, not subsumed into this IDD.
!
! *****
```

Supported EnergyPlus Objects

The OpenStudio IDD explicitly includes a subset of the EnergyPlus IDD, per the following excerpt from OpenStudio.idd.

```
\include-file EnergyPlus

\remove-object Version

\remove-object GlobalGeometryRules

\remove-object Wall:Detailed

\remove-object RoofCeiling:Detailed

\remove-object Floor:Detailed
```

```
\remove-object Wall:Exterior
\remove-object Wall:Adiabatic
\remove-object Wall:Underground
\remove-object Wall:Interzone
\remove-object Roof
\remove-object Ceiling:Adiabatic
\remove-object Ceiling:Interzone
\remove-object Floor:GroundContact
\remove-object Floor:Adiabatic
\remove-object Floor:Interzone
\remove-object Window
\remove-object Door
\remove-object GlazedDoor
\remove-object Window:Interzone
\remove-object Door:Interzone
\remove-object GlazedDoor:Interzone

\remove-object DaylightingDevice:Shelf

\remove-object Parametric:SetValueForRun
\remove-object Parametric:Logic
\remove-object Parametric:RunControl
\remove-object Parametric:FileNameSuffix

\remove-object Output:Table:SummaryReports
\remove-object Output:SQLite
```

We now describe how each removed object is translated when importing EnergyPlus IDF into the OpenStudio building model.

Version

The EnergyPlus Version object is removed in favor of the OS_Version object in the OpenStudio Model group. OpenStudio IDD is versioned independently of EnergyPlus IDD, with the understanding that OpenStudio will increment versions at least as frequently as EnergyPlus.

GlobalGeometryRules

ADD TEXT HERE.

Simple Geometry Objects

ADD TEXT HERE

DaylightingDevice:Shelf

ADD TEXT HERE.

Parametric Objects

EnergyPlus Parametric objects are removed in favor of setting up parametric analyses in OpenStudio. Explicit support for such studies is planned; at this time, researchers can set up their own parametric studies using the Ruby bindings.

Output:Table:SummaryReports

ADD TEXT HERE.

Output:SQLite

ADD TEXT HERE.

Group – OpenStudio Model

Additional data needed by OpenStudio for basic building energy modeling is listed in this group. Types of objects range from direct replacements for the corresponding EnergyPlus objects, extensions of the corresponding EnergyPlus objects, data implicitly known by EnergyPlus but not listed in the IDD/IDF, and completely new data objects.

OS:Version

ADD TEXT HERE.

Field: Version Identifier

ADD TEXT HERE.

```
OS:Version,  
  \unique-object  
  \required-object  
  \format singleLine  
A1; \field Version Identifier  
  \required-field
```

OS:Facility

ADD TEXT HERE.

```
OS:Facility;  
  \unique-object  
  \required-object
```

OS:WeatherFile

ADD TEXT HERE.

Field: City

Field: State Province Region

Field: Country

Field: Data Source

Field: WMO Number

Field: Latitude

Field: Longitude

Field: Time Zone

Field: Elevation

Field: Url

Field: Checksum

```
OS:WeatherFile,
  \unique-object
  \min-fields 8
  \memo WeatherFile object uniquely identifies a weather file for lookup in a database
A1, \field City
  \required-field
  \type alpha
A2, \field State Province Region
  \required-field
  \type alpha
A3, \field Country
  \required-field
  \type alpha
A4, \field Data Source
  \required-field
  \type alpha
A5, \field WMO Number
  \required-field
  \type alpha
N1, \field Latitude
  \required-field
  \units deg
  \minimum -90.0
  \maximum +90.0
  \note + is North, - is South, degree minutes represented in decimal (i.e. 30 minutes is
.5)
  \type real
N2, \field Longitude
  \required-field
  \units deg
  \minimum -180.0
  \maximum +180.0
  \note - is West, + is East, degree minutes represented in decimal (i.e. 30 minutes is .5)
  \type real
N3, \field Time Zone
  \required-field
  \units hr
  \minimum -12.0
  \maximum +14.0
  \note Time relative to GMT. Decimal hours.
  \note basic these limits on the WorldTimeZone Map (2003)
  \type real
N4, \field Elevation
  \units m
  \minimum -300.0
  \maximum< 8900.0
  \default 0.0
```

```
A6, \type real
    \field Url
    \type alpha
A7; \field Checksum
    \type alpha
```

OS:ConstructionSet

ADD TEXT HERE.

Field: Name

Field: Outside Boundary Condition

Field: Facade

Field: Surface or SubSurface Type

Field: Construction Name

```
OS:ConstructionSet,
  \extensible:4
  \memo ConstructionSet specifies constructions for Surfaces and SubSurfaces based on
  \memo classification. An input file can contain several ConstructionSet objects, these
  \memo objects may be 'applied' to a selection of objects by an interface, used to set
  \memo constructions for Surfaces or SubSurfaces with no construction before simulation,
  \memo or used to automatically specify constructions for newly created surfaces.
A1, \field Name
    \required-field
    \type alpha
A2, \field Outside Boundary Condition
    \begin-extensible
    \required-field
    \type choice
    \key Adiabatic
    \key Outdoors
    \key Ground
    \key Conditioned Zone
    \key Unconditioned Zone
A3, \field Facade
    \type choice
    \key All
    \key North
    \key South
    \key East
    \key West
    \default All
A4, \field Surface or SubSurface Type
    \required-field
    \type choice
    \key Floor
    \key Roof
    \key Wall
    \key Window
    \key Skylight
    \key Door
    \key NonSwingingDoor
    \key GlassDoor
    \key TubularDaylightDome
    \key TubularDaylightDiffuser
A5; \field Construction Name
    \required-field
    \note To be matched with a construction in this input file
    \type object-list
    \object-list ConstructionNames
```

OS:ScheduleSet

ADD TEXT HERE.

Field: Name

Field: Schedule Type

Field: Schedule Name

```
OS:ScheduleSet,
  \extensible:2
  \memo ScheduleSet specifies schedules for common purposes.  An input file can contain
  \memo several ScheduleSet objects.  These objects may be 'applied' to a selection of
objects
  \memo by an interface, used to set unspecified schedules before simulation,
  \memo or used to automatically specify schedules for newly created objects.
A1, \field Name
  \required-field
  \type alpha
A2, \field Schedule Type
  \begin-extensible
  \required-field
  \type choice
  \key Lights
  \key ElectricEquipment
  \key Elevators
  \key GasEquipment
  \key HotWaterEquipment
  \key SteamEquipment
  \key OtherEquipment
  \key ExteriorLights
  \key ExteriorFuelEquipment
  \key ExteriorWaterEquipment
  \key People
  \key Clothing
  \key AirVelocity
  \key WorkEfficiency
  \key Activity
  \key Infiltration
  \key ServiceWaterHeating
  \key HoursOfOperation
  \key HVACAvailability
  \key PlantAvailability
  \key FanAvailability
  \key ReheatCoilAvailability
  \key CoolingCoilAvailability
  \key HeatingSetpoint
  \key CoolingSetpoint
  \key HumiditySetpoint
  \key MinHumiditySetpoint
  \key MaxHumiditySetpoint
  \key HeatingSupplyAirTemperatureSetpoint
  \key CoolingSupplyAirTemperatureSetpoint
  \key SeasonalResetSupplyAirTemperatureSetpoint
  \key HeatingWaterLoopTemperatureSetpoint
  \key CoolingWaterLoopTemperatureSetpoint
  \key ServiceWaterHeatingWaterLoopTemperatureSetpoint
  \key MinimumOutdoorAir
A3; \field Schedule Name
  \required-field
  \type object-list
  \object-list ScheduleNames
```

OS:ShadingSurfaceGroup

ADD TEXT HERE.

Field: Name

Field: Shading Surface Type

Field: Zone Name

Field: Shading Surface Name

Field: Construction Name

```
OS:ShadingSurfaceGroup,  
  \extensible:2  
  A1, \field Name  
    \required-field  
    \type alpha  
    \reference ShadingSurfaceGroupNames  
  A2, \field Shading Surface Type  
    \required-field  
    \type choice  
    \key Site  
    \key Building  
    \key Zone  
  A3, \field Zone Name  
    \note Required if Shading Surface Type is Zone  
    \type object-list  
    \object-list ZoneNames  
  A4, \field Shading Surface Name  
    \begin-extensible  
    \required-field  
    \type object-list  
    \object-list AllShadingSurfNames  
  A5; \field Construction Name  
    \note Used to compute front and back side reflectance.  
    \type object-list  
    \object-list ConstructionNames
```

OS:InteriorPartitionSurfaceGroup

ADD TEXT HERE.

Field: Name

Field: Zone Name

```
OS:InteriorPartitionSurfaceGroup,  
  A1, \field Name  
    \required-field  
    \type alpha  
    \reference InteriorPartitionSurfaceGroupNames  
  A2; \field Zone Name  
    \required-field  
    \type object-list  
    \object-list ZoneNames
```

OS:InteriorPartitionSurface:Detailed

ADD TEXT HERE.

Field: Name

Field: Construction Name

Field: Interior Partition Surface Group Name

Field: Convert to Internal Mass

Field: Number of Vertices

Field: Vertex X-coordinate

Field: Vertex Y-coordinate

Field: Vertex Z-coordinate

```
OS:InteriorPartitionSurface:Detailed,
  \extensible:3
  \format vertices
  A1 , \field Name
      \required-field
      \type alpha
      \reference InteriorPartitionSurfaceNames
  A2 , \field Construction Name
      \type object-list
      \object-list ConstructionNames
  A3 , \field Interior Partition Surface Group Name
      \required-field
      \type object-list
      \object-list InteriorPartitionSurfaceGroupNames
  A5 , \field Convert to Internal Mass
      \required-field
      \type choice
      \key Yes
      \key No
      \default No
  N1 , \field Number of Vertices
      \autocalculatable
      \minimum 3
      \default autocalculate
  N2,  \field Vertex X-coordinate
      \begin-extensible
      \units m
      \type real
  N3 , \field Vertex Y-coordinate
      \units m
      \type real
  N4 ; \field Vertex Z-coordinate
      \units m
      \type real
```

OS:DaylightingDevice:Shelf

ADD TEXT HERE.

Field: Name

Field: Window Name

Field: Inside Shelf Name

Field: Outside Shelf Name

Field: View Factor to Outside Shelf

```
OS:DaylightingDevice:Shelf,
```

```
A1 , \field Name
    \required-field
    \type alpha
A2 , \field Window Name
    \required-field
    \type object-list
    \object-list SubSurfNames
A3 , \field Inside Shelf Name
    \type object-list
    \object-list InteriorPartitionSurfaceNames
A4 , \field Outside Shelf Name
    \note This must refer to a Shading:Zone:Detailed object
    \type object-list
    \object-list AttachedShadingSurfNames
N1 ; \field View Factor to Outside Shelf
    \type real
    \minimum 0.0
    \maximum 1.0
```

OS:Material:AirWall

ADD TEXT HERE.

Field: Name

```
OS:Material:AirWall,
  A1 ; \field Name
      \required-field
      \type alpha
```

OS:Material:RenderingSettings

ADD TEXT HERE.

Field: Name

Field: Material Name

Field: Red Value

Field: Green Value

Field: Blue Value

Field: Alpha Value

Field: Texture Image Path

```
OS:Material:RenderingSettings,
  A1, \field Name
      \required-field
      \type alpha
  A2, \field Material Name
      \required-field
      \type object-list
      \object-list MaterialName
  N1, \field Red Value
      \type integer
      \minimum 0
      \maximum 255
  N2, \field Green Value
      \type integer
      \minimum 0
      \maximum 255
```

```
N3, \field Blue Value
    \type integer
    \minimum 0
    \maximum 255
N4, \field Alpha Value
    \type integer
    \minimum 0
    \maximum 255
A3; \field Texture Image Path
    \type alpha
```

OS:Construction:AirWall

ADD TEXT HERE.

Field: Name

```
OS:Construction:AirWall,
  A1 ; \field Name
      \required-field
      \type alpha
```

OS:Node

ADD TEXT HERE.

```
OS:Node,
  A1, \field Name
      \type alpha
      \required-field
  N1, \field Inlet Port
      \type integer
      \minimum 0
  N2; \field Outlet Port
      \type integer
      \minimum 0
```

OS:Connection

ADD TEXT HERE.

```
OS:Connection,
  A1, \field Name
      \type alpha
      \required-field
  A2, \field Source Object
      \type alpha
  N1, \field Outlet Port
      \type integer
      \minimum 0
  A3, \field Target Object
      \type alpha
  N2; \field Inlet Port
      \type integer
      \minimum 0
```

OS:Splitter

ADD TEXT HERE.

```
OS:Splitter,  
  \extensible:1 Just duplicate last field and comments (changing numbering, please)  
  A1, \field Name  
    \required-field  
  A2, \field Inlet Node Name  
    \required-field  
  A3; \field Outlet 1 Node Name  
    \begin-extensible  
    \required-field
```

OS:AirLoopHVAC:OutdoorAirSystem

ADD TEXT HERE.

```
OS:AirLoopHVAC:OutdoorAirSystem,  
  \min-fields 3  
  A1, \field Name  
    \required-field  
    \type alpha  
  A2, \field Controller List Name  
    \note Enter the name of an AirLoopHVAC:ControllerList object.  
    \required-field  
    \type object-list  
    \object-list ControllerLists  
  A3, \field Outdoor Air Equipment List Name  
    \note Enter the name of an AirLoopHVAC:OutdoorAirSystem:EquipmentList object.  
    \required-field  
    \type object-list  
    \object-list AirLoopOAEquipmentLists  
  A4, \field Availability Manager List Name  
    \note Enter the name of an AvailabilityManagerAssignmentList object.  
    \type object-list  
    \object-list SystemAvailabilityManagerLists  
  A5, \field Mixed Air Node Name  
    \note Name of Mixed Air Node  
    \required-field  
  A6, \field Outdoor Air Stream Node Name  
    \note Name of Outdoor Air Stream Node  
    \required-field  
  A7, \field Relief Air Stream Node Name  
    \note Name of Relief Air Stream Node  
    \required-field  
  A8; \field Return Air Stream Node Name  
    \note Name of Return Air Stream Node  
    \required-field
```

OpenStudio Standards

Group – OpenStudio Standards

This group of objects provides additional data needed for applying and analyzing building energy standards.

OS:StandardsTag:BuildingEnumValues

This object specifies one or more enum values from a Data Dictionary enum attribute that applies to the building as a whole. If multiple values are supplied, the intent is for the first value that meets the needs of the user/application/operation to be used.

Field: Data Dictionary Enum Attribute

This field lists the name of a DataDictionary enum attribute that is applicable to the building as a whole.

Field: Enum Value

This field, which may be repeated indefinitely, lists a value of the enum attribute listed in A1 that is applicable to the building.

```
OS:StandardsTag:BuildingEnumValues,
  \memo This object can be used to tag the building with one or more values corresponding
  \memo to a DataDictionary enum attribute such as "Building Type".
  \extensible:1
  \min-fields 1
  A1 , \field Data Dictionary Enum Attribute
      \type alpha
      \required-field
  A2 ; \field Enum Value
      \type alpha
      \begin-extensible
```

OS:StandardsTag:ZoneEnumValues

This object specifies one or more enum values from a Data Dictionary enum attribute that applies to the indicated zone. If multiple values are supplied, the intent is for the first value that meets the needs of the user/application/operation to be used.

Field: Zone Name

The name of the zone to which the enum values listed in this object apply.

Field: Data Dictionary Enum Attribute

This field lists the name of a DataDictionary enum attribute that is applicable to an individual zone or space.

Field: Enum Value

This field, which may be repeated indefinitely, lists a value of the enum attribute listed in A2 that is applicable to the zone listed in A1.

```
OS:StandardsTag:ZoneEnumValues,  
  \memo This object can be used to tag a zone with one or more values corresponding to a  
  \memo DataDictionary enum attribute such as "Occupancy Type".  
  \extensible:1  
  \min-fields 2  
  A1 , \field Zone Name  
    \type object-list  
    \object-list ZoneNames  
    \required-field  
  A2 , \field Data Dictionary Enum Attribute  
    \type alpha  
    \required-field  
  A2 ; \field Enum Value  
    \type alpha  
    \begin-extensible
```

OpenStudio Radiance

Group – OpenStudio Radiance

This group of objects allows users to do detailed daylighting analysis with the Radiance simulation engine largely based on their EnergyPlus/OpenStudio/OpenStudio model.

OS:LightingFixture

ADD TEXT HERE.

Field: Name

Field: IlluminanceDistributionName

```
OS:LightingFixture,
  \min-fields 2
  \memo This object describes position and orientation of a light fixture
  A1 , \field Name
      \required-field
      \type alpha
      \reference LightingFixtureNames
  A2 ; \field IlluminanceDistributionName
      \required-field
      \type object-list
      \object-list ZoneNames
```

OS:IlluminanceDistribution

ADD TEXT HERE.

Field: Name

```
OS:IlluminanceDistribution,
  \min-fields 1
  \memo This object describes the illuminance distribution of a luminaire by an IES file
  A1 ; \field Name
      \required-field
      \type alpha
      \reference IlluminanceDistributionNames
```

OS:VisualMaterialProperties

ADD TEXT HERE.

Field: Material Name

```
OS:VisualMaterialProperties,
  \min-fields 1
  \memo This object describes the visual properties of a material
  A1 ; \field Material Name
      \required-field
      \type object-list
      \object-list MaterialName
```