Data Types

Data Type	Description	JSON Schema Type	Examples
`Integer`	A positive or negative whole number (i.e., a number that can be written without a fractional part).	integer	3, 19, -4
`Numeric`	A number that may include a fractional part with optional leading sign and optional exponent (engineering notation).	number	3.43, 0, -4, 1.03e4
`Boolean`	True or false.	boolean	true, false
`String`	A sequence of characters of any length using any (specified) character set.	string	Indirect evaporative cooler
`ID`	A referencencable identification for a data group and sequence of characters of any length using any (specified) character set.	string	AHU-01
`Null`	Indicator that no value is provided. Only used in combination with other data types, e.g., 'Number/Null'.	null	null

MeasuredInfiltrationPressureType

Enumerator	Description	Notes
`NO_TEST_PERFORMED`	No infiltration testing performed	
`PRESSURE_50PA`	50 Pa pressure	
`PRESSURE_75PA`	75 Pa pressure	
`OTHER`	Other	

ConditioningType

Enumerator	Description	Notes
`HEATED_AND_COOLED`	Heated and cooled	
`HEATED_ONLY`	Heated only	
`SEMIHEATED`	Semiheated	
`UNCONDITIONED`	Unconditioned	

SpaceFunctionType

Enumerator	Description	Notes
`LABORATORY`	Laboratory	
`KITCHEN`	Kitchen	
`OTHER`	Other	

InfiltrationMethodType

Enumerator	Description	Notes
`WEATHER_DRIVEN`	Weather Driven. The amount of air leakage is determined by a correlation usually involving windspeed, height, and the difference between indoor and outdoor temperature.	
`PRESSURE_BASED`	Pressure Based. The amount of air leakage is determined by induced airflows from pressure differences between zones, air distribution system components, the outside due to wind speed and direction.	
`CONSTANT`	Constant. The amount of air leakage is fixed.	

SurfaceClassificationType

Enumerator	Description	Notes
`WALL`	Vertical or nearly vertical wall	
`FLOOR`	Floor	
`CEILING`	Ceiling	

SurfaceAdjacentTo

Enumerator	Description	Notes
`EXTERIOR`	Exterior wall or roof which is adjacent to the exterior environment.	
`GROUND`	Slab-on-grad or below grade surface if adjacent to ground.	
`INTERIOR`	Interior surface if adjacent to another space which is explicity modeled.	
`IDENTICAL`	Surface adjacent to a environment identical to the space. Sometimes this is described as adiabatic surface since no heat is transfered. The space on the other side of the surface is not explicity modeled.	
`UNDEFINED`	The surface adjacency cannot be determined by the software.	

SurfaceConstructionInputOptions

Enumerator	Description	Notes
`LAYERS`	Construction is entered layer-by-layer.	
`SIMPLIFIED`	Construction is entered by R-value only.	

SubsurfaceClassificationType

Enumerator	Description	Notes
`WINDOW`	Window	
`SKYLIGHT`	Skylight	
`DOOR`	Door	
`OTHER`	Other types of subsurfaces that allow light to pass	

SubsurfaceDynamicGlazingType

Enumerator	Description	Notes
`NOT_DYNAMIC`	Not dynamic	
`MANUAL_DYNAMIC`	Manual dynamic	
`AUTOMATIC_DYNAMIC`	Automatic dynamic	

LightingDaylightingControlType

Enumerator	Description	Notes
`STEPPED`	Stepped	
`CONTINUOUS_DIMMING`	Continuous Dimming	
`OTHER`	Other types of daylighting control	
`NONE`	None	No daylighting is used.

LightingOccupancyControlType

Enumerator	Description	Notes
`FULL_AUTO_ON`	Full auto on	
`PARTIAL_AUTO_ON`	Parial auto on	
`MANUAL_ON`	Manual on	
`OTHER`	Other types of occupancy control	
`NONE`	None	No occupancy controls is used.

MiscellaneousEquipmentType

Enumerator	Description	Notes
`PLUG`	Plug	
`PROCESS`	Process	
`OTHER`	Other	

TransformerType

Enumerator	Description	Notes
`DRY_TYPE`	Dry Type	
`FLUID_FILLED`	Fluid Filled	
`OTHER`	Other	

ElectricalPhase

Enumerator	Description	Notes
`SINGLE_PHASE`	Single Phase	
`THREE_PHASE`	Three Phase	

ScheduleSequenceTypeOptions

Enumerator	Description	Notes
`HOURLY`	Hourly	
`EVENT`	Event	

ScheduleTypeOptions

Enumerator	Description	Notes
`MULTIPLIER_DIMENSIONLESS`	Multiplier dimensionless	
`TEMPERATURE`	Temperature	
`POWER`	Power	
`FLOW_RATE`	Flow rate	

DayOfWeek

Enumerator	Description	Notes
`SUNDAY`	Sunday	
`MONDAY`	Monday	
`TUESDAY`	Tuesday	
`WEDNESDAY`	Wednesday	
`THURSDAY`	Thursday	
`FRIDAY`	Friday	
`SATURDAY`	Saturday	

CoolingDesignDayTypeOptions

Enumerator	Description	Notes
`COOLING_0_4`	Cooling design day 0.4% annual cumulative frequency of occurance	
`COOLING_1_0`	Cooling design day 1.0% annual cumulative frequency of occurance	
`COOLING_2_0`	Cooling design day 2.0% annual cumulative frequency of occurance	

HeatingDesignDayTypeOptions

Enumerator	Description	Notes
`HEATING_99_6`	Heating design day 99.6% annual cumulative frequency of occurance	
`HEATING_99_0`	Heating design day 99.0% annual cumulative frequency of occurance	

HeatingSystemType

Enumerator	Description	Notes
`HEAT_PUMP`	Heat Pump	
`FURNACE`	Furnace	
`ELECTRIC_RESISTANCE`	Electric resistance	
`FLUID_LOOP`	Fluid loop	
`BASEBOARD`	Baseboard	
`NONE`	None	
`OTHER`	Other	

CoolingSystemType

Enumerator	Description	Notes
`DIRECT_EXPANSION`	Direct expansion	
`FLUID_LOOP`	Fluid loop	
`NON_MECHANICAL`	Non-mechanical	
`NONE`	None	
`OTHER`	Other	

DehumidificationType

Enumerator	Description	Notes
`MECHANCIAL_COOLING`	Mechanical cooling	
`DESICCANT`	Desiccant	
`SERIES_HEAT_RECOVERY`	Series heat recovery	
`NONE`	None	
`OTHER`	Other	

HumidificationType

Enumerator	Description	Notes
`ADIABATIC`	Adiabatic	
`NONE`	None	
`OTHER`	Other	

HeatpumpAuxilliaryHeatType

Enumerator	Description	Notes
`ELECTRIC_RESISTANCE`	Electric resistance	
`NONE`	None	
`OTHER`	Other	

FanSystemPurposeType

Enumerator	Description	Notes
`SUPPLY`	Supply	
`RETURN`	Return	
`EXHAUST`	Exhaust	
`RELIEF`	Relief	
`OTHER`	Other	

FanSystemTemperatureControlType

Enumerator	Description	Notes
`CONSTANT`	Constant	
`OUTDOOR_AIR_RESET`	Outdoor air reset	
`ZONE_RESET`	Zone reset	
`SCHEDULED`	Scheduled	
`OTHER`	Other	

FanSystemSupplyFanControlType

Enumerator	Description	Notes
`CONSTANT`	Constant	
`VARIABLE_SPEED_DRIVE`	Variable speed drive	
`CYCLING`	Cycling	
`INLET_VANE`	Inlet vane	
`DISCHARGE_DAMPER`	Discharge damper	
`OTHER`	Other	

AirEconomizerType

Enumerator	Description	Notes
`FIXED_FRACTION`	Fixed Fraction	
`TEMPERATURE`	Dry-bulb temperature	
`ENTHALPY`	Enthalpy	
`DIFFERENTIAL_TEMPERATURE`	Differential dry-bulb temperature	
`DIFFERENTIAL_ENTHALPY`	Differential enthalpy	
`OTHER`	Other	
`NONE`	None	

EnergyRecoveryType

Enumerator	Description	Notes
`SENSIBLE_HEAT_EXHANGE`	Sensible heat exchange	
`ENTHALPY_HEAT_EXHANGE`	Enthalpy heat exchange	
`SENSIBLE_HEAT_WHEEL`	Sensible heat wheel	
`ENTHALPY_HEAT_WHEEL`	Enthalpy heat wheel	
`HEAT_PIPE`	Heat pipe	
`OTHER`	Other	
`NONE`	None	

EnergyRecoveryOperation

Enumerator	Description	Notes
`WHEN_FANS_ON`	When fans on	
`WHEN_MINIMUM_OUTSIDE_AIR`	When minimum outside air	
`SCHEDULED`	Scheduled	
`OTHER`	Other	
`NONE`	None	

EnergyRecoverySupplyAirTemperatureControl

Enumerator	Description	Notes
`FIXED_SETPOINT`	Fixed setpoint	
`MIXED_AIR_RESET`	Mixed air reset	
`OTHER`	Other	
`NONE`	None	

DemandControlVentilationControlType

Enumerator	Description	Notes
`CO2_RETURN_AIR`	CO2 return air	
`CO2_ZONE`	CO2 zone	
`OTHER`	Other	
`NONE`	None	

AirTerminalType

Enumerator	Description	Notes
`VARIABLE_AIR_VOLUME_BOX`	Variable air volume box	
`PARALLEL_FAN_POWERED_BOX`	Parallel fan powered box	
`SERIES_FAN_POWERED_BOX`	Parallel fan powered box	
`OTHER`	Other	

ReheatSourceType

Enumerator	Description	Notes
`ELECTRIC`	Electric	
`HOT_WATER`	Hot water	
`NONE`	None	
`OTHER`	Other	

FluidLoopFlowControlOptions

Enumerator	Description	Notes
`FIXED_FLOW`	Fixed flow	
`VARIABLE_FLOW`	Variable flow	

FluidLoopTypeOptions

Enumerator	Description	Notes
`HEATING`	Heating	
`COOLING`	Cooling	
`HEATING_AND_COOLING`	Heating and cooling	
`CONDENSER`	Condenser	
`OTHER`	Other	

TemperatureResetTypeOptions

Enumerator	Description	Notes
`NO_RESET`	No Reset	
`CONSTANT`	Constant	
`OUTSIDE_AIR_RESET`	Outside air reste	
`LOAD_RESET`	Load Reset	
`OTHER`	Other	

FluidLoopOperationOptions

Enumerator	Description	Notes
`CONTINUOUS`	Continuous	
`INTERMITTENT`	Intermittent	

PumpSpeedControlOptions

Enumerator	Description	Notes
`FIXED_SPEED`	Fixed speed	
`VARIABLE_SPEED`	Variable speed	

PumpSpecificationMethodOptions

Enumerator	Description	Notes
`SIMPLE`	Simple	Specify the electric power input of pump
`DETAILED`	Detailed	Specify the motor nameplate power, design head, impelllor efficiency, motor efficiency

BoilerCombustionOptions

Enumerator	Description	Notes
`NATURAL`	Natural	
`FORCED`	Forced	

BoilerEfficiencyMetricTypeOptions

Enumerator	Description	Notes
`ANNUAL_FUEL_UTILIZATION`	Annual fuel utilization efficiency	
`THERMAL`	Thermal efficiency	
`COMBUSTION`	Combustion efficiency	

ChillerPartLoadEfficiencyMetricTypeOptions

Enumerator	Description	Notes
`INTEGRATED_PART_LOAD_VALUE`	Integrated part load value efficiency expressed as a coefficient of performance (COP)	
`NONSTANDARD_PART_LOAD_VALUE`	Nonstandard part load value efficiency expressed as a coefficient of performance (COP)	
`OTHER`	Other part load efficiency metric	

ChillerCompressorTypeOptions

Enumerator	Description	Notes
`SCREW`	Screw	
`CENTRIFUGAL`	Centrifugal	
`RECIPROCATING`	Reciprocating	
`SCROLL`	Scroll	
`POSITIVE_DISPLACEMENT`	Positive displacement	
`SINGLE_EFFECT_INDIRECT_FIRED_ABSORPTION`	Single-effect indirect-fired absorption	
`DOUBLE_EFFECT_INDIRECT_FIRED_ABSORPTION`	Double-effect indirect-fired absorption	
`SINGLE_EFFECT_DIRECT_FIRED_ABSORPTION`	Single-effect direct-fired absorption	
`DOUBLE_EFFECT_DIRECT_FIRED_ABSORPTION`	Double-effect direct-fired absorption	
`OTHER`	Other	

HeatRejectionTypeOptions

Enumerator	Description	Notes
`OPEN_CIRCUIT_COOLING_TOWER`	Open-circuit cooling tower	
`CLOSED_CIRCUIT_COOLING_TOWER`	Closed-circuit cooling tower or fluid cooler	
`DRY_COOLER`	Dry-cooler or air-cooled fluid cooler	
`EVAPORATIVE_CONDENSER`	Evaporative condenser	
`AIR_COOLED_CONDENSER`	Air cooled condenser	
`OTHER`	Other	

HeatRejectionFanTypeOptions

Enumerator	Description	Notes
`AXIAL`	Axial or Propellor	
`CENTRIFUGAL`	Centrifugal	
`OTHER`	Other	

HeatRejectionFluidOptions

Enumerator	Description	Notes
`WATER`	Water	
`REFRIGERANT`	Refrigerant	Including R-448A
`AMMONIA`	Ammonia	
`OTHER`	Other	

HeatRejectionResetOptions

Enumerator	Description	Notes
`CONSTANT`	Constant	
`LOAD_RESET`	Load reset	
`OTHER`	Other	

HeatRejectionFanSpeedControlOptions

Enumerator	Description	Notes
`CONSTANT`	Constant	
`TWO_SPEED`	Two Speed	
`VARIABLE_SPEED`	Variable Speed	
`OTHER`	Other	

ExternalFluidSourceTypeOptions

Enumerator	Description	Notes
`CHILLED_WATER`	Chilled water	
`HOT_WATER`	Hot water	
`STEAM`	Steam	

ServiceWaterHeatingDistributionCompactness

Enumerator	Description	Notes
`NOT_COMPACT`	Not compact	
`BASIC_COMPACT`	Basic compact	
`EXPANDED_CREDIT`	Expanded credit	
`OTHER`	Other	

ServiceWaterHeatingDistributionType

Enumerator	Description	Notes
`DEMAND_CONTROL`	Demand control	
`NO_CONTROL`	No control	
`NO_LOOP_OR_CENTRAL_SYSTEM_PUMP`	No loop or central system pump	
`TEMPERATURE_MODULATTION`	Temperature modulation	
`TEMPERATURE_MODULATION_AND_MONITORING`	Temperature modulation and monitoring	
`OTHER`	Other	

ServiceWaterHeatingConfigurationType

Enumerator	Description	Notes
`HERS_PARALLEL_PIPING`	HERS parallel piping	
`HERS_PIPE_INSULATION_ALL_LINES`	HERS pipe insulation of all lines	
`HERS_RECIRCULATION_DEMAND_CONTROL_OCCUPANCY_SENSOR`	HERS recirculation demand control occupancy sensor	
`HERS_RECIRCULATION_DEMAND_CONTROL_BUTTON`	HERS recirculation demand control pull botton	
`HERS_RECIRCULATION_NON_DEMAND_CONTROL`	HERS recirculation non-demand control	
`INSULATED_AND_PROTECTED_PIPE_BELOW_GRADE`	Insulated and protected pipe below grade	
`PARALLEL_PIPING`	Parallel piping	
`PIPE_INSULATION_ALL_LINES`	Pipe insulation of all lines	
`POINT_OF_USE`	Point of use	
`RECIRCULATION_DEMAND_CONTROL_OCCUPANCY_SENSOR`	Recirculation demand control occupancy sensor	
`RECIRCULATION_DEMAND_CONTROL_BUTTON`	Recirculation demand control pull botton	
`RECIRCULATION_NON_DEMAND_CONTROL`	Recirculation non-demand control	
`STANDARD`	Standard	
`OTHER`	Other	

ServiceWaterHeatingEnteringWaterTemperatureInputOptions

Enumerator	Description	Notes
`ANNUAL_MAIN`	Annual main entering water temperature option	
`MONTHLY_MAIN`	Monthly main entering water temperature option	
`ANNUAL_GROUND`	Annual ground entering water temperature option	
`MONTHLY_GROUND`	Monthly ground entering water temperature option	

ServiceWaterHeatingLoopPipeLocation

Enumerator	Description	Notes
`CONDITIONED`	Conditioned	
`SEMICONDITIONED`	Semiconditioned	
`UNCONDITIONTED`	Unconditioned	
`UNDERGROUND`	Underground	
`OTHER`	Other	

ServiceWaterHeatingHeatRecoveryType

Enumerator	Description	Notes
`NOT_APPLICABLE`	Not applicable	
`VERTICAL`	Vertical	
`HORIZONTAL`	Horizontal	
`OTHER`	Other	

ServiceWaterHeaterType

Enumerator	Description	Notes
`CONVENTIONAL`	Conventional	
`HEAT_PUMP_PACKAGED`	Heat pump packaged	
`HEAT_PUMP_SPLIT`	Heat pump split	
`OTHER`	Other	

ServiceWaterHeaterTankType

Enumerator	Description	Notes
`CONSUMER_INSTANTANEOUS`	Consumer instantaneous	Uses UEF
`COMMERCIAL_INSTANTANEOUS`	Commercial instantaneous	Uses TE
`CONSUMER_STORAGE`	Consumer storage	Uses UEF
`COMMERCIAL_STORAGE`	Consumer storage	Uses TE and SBL
`RESIDENTIAL_DUTY_COMMERCIAL_INSTANTANEOUS`	Residential-Duty Commercial Instantaneous	Uses UEF
`INDIRECT`	Indirect	
`BOILER`	Boiler	
`COMMERCIAL_PACKAGED_BOILER`	Commercial Packaged Boiler	
`OTHER`	Other	

ServiceWaterHeatingLocation

Enumerator	Description	Notes
`CONDITIONED`	Conditioned	
`OUTSIDE`	Outside	
`GARAGE`	Garage	
`ATTIC`	Attic	
`CRAWL_SPACE`	Crawl space	
`UNCONDITIONED`	Unconditioned	
`OTHER`	Other	

ServiceWaterHeatingServesType

Enumerator	Description	Notes
`SHOWER`	Shower	
`BATH`	Bath	
`DISHWASHER`	Dishwasher	
`KITCHEN_SINK`	Kitchen sink	
`WASH_SINK`	Wash sink	
`CLOTHES_WASHER`	Clothes washing machine	
`OTHER`	Other	

ServiceWaterHeatingUseUnits

Enumerator	Description	Notes
`POWER_PER_PERSON`	Power per person	
`POWER_PER_AREA`	Power per area	
`POWER`	Power	
`VOLUME_PER_PERSON`	Volume per person	
`VOLUME_PER_AREA`	Volume per area	
`VOLUME`	Volume	
`OTHER`	Other	

EnergySourceTypeOptions

Enumerator	Description	Notes
`ELECTRICITY`	Electricity	
`NATURAL_GAS`	Natural gas	
`OTHER`	Other	

RefrigerationType

Enumerator	Description	Notes
`COMMERCIAL_REFRIGERATION`	Commercial refrigeration	
`COMMERCIAL_REFRIGERATOR_SOLID_DOOR`	Commercial refrigerator solid door	
`COMMERCIAL_REFRIGERATOR_TRANSPARENT_DOOR`	Commercial refrigerator transparent door	
`COMMERCIAL_FREEZER_SOLID_DOOR`	Commercial freezer solid door	
`COMMERCIAL_FREEZER_TRANSPARENT_DOOR`	Commercial freezer transparent door	
`COMMERCIAL_PULLDOWN_REFRIGERATOR`	Commercial pulldown refrigerator	
`COMMERCIAL_REFRIGERATOR_FREEZER_SOLID_DOOR`	Commercial refrigerator freezer solid door	
`OTHER`	Other	

RefrigerationCategory

Enumerator	Description	Notes
`HORIZONTAL_OPEN`	Horizontal open	
`HORIZONTAL_SOLID_DOOR`	Horizontal solid door	
`HORIZONTAL_TRANSPARENT_DOOR`	Horizontal transparent door	
`SEMIVERTICAL_OPEN`	Semivertical open	
`SERVICE_OVER_COUNTER`	Service over counter	
`VERTICAL_OPEN`	Vertical open	
`VERTICAL_SOLID_DOOR`	Vertical solid door	
`VERTICAL_TRANSPARENT_DOOR`	Vertical transparent door	
`OTHER`	Other	

ApplicationTemperatureType

Enumerator	Description	Notes
`MEDIUM`	Medium temperature	3.3 C +/- 1.1 C (38 F +/- 2 F)
`LOW`	Low temperature	-17.8 C +/- 1.1 C (0 F +/- 2 F)
`ICE_CREAM`	Ice cream	-26.1 C +/- 1.1 C (-15 F +/- 2 F)
`OTHER`	Other	

ASHRAE229

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group.	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`transformers`	Electrical transformers at the building site	`[{Transformer}]`				Contains a list of transformers that convert electricity from a higher voltage to one used by the building, exterior lighting, and other services at the site.
`buildings`	Buildings on the site	`[{Building}]`				Contains a list of buildings on the site (often just one).
`calendar`	Information on the calendar used with the simulation.	`{Calendar}`				
`schedules`	Schedules for internal loads, thermostats, equipment operation and control, and any other need.	`[{Schedule}]`				Contains a list of schedules used in model.
`weather`	Information on the local weather conditions used with the simulation.	`{Weather}`				
`measured_infiltration_pressure_difference`	Differential pressure difference used during measurement for infiltration values.	`<MeasuredInfiltrationPressureType>`				Used as rating conditions for air leakage for a building.
`overall_simulation_outputs`	Outputs from the simluation summed for all buildings in the simulation.	`{OverallSimulationOutputs}`				
`category`	Indicates which category the current model represents for rulesets with multiple simulation models	`<CategoryType2019ASHRAE901>`				
`compliance_path`	Indicates the chosen compliance path if the ruleset has multiple compliance paths such as 90.1 Appendix G has code compliance and beyond code	`<CompliancePathType2019ASHRAE901>`				
`building_rotation_angles`	A list of angles that building simulations are performed and results are provided.	`[Numeric]`	degrees			List of angles that the building has been rotated.

Name	Description	Data Type	Units	Range	Req	Notes
`fluid_loops`	Fluid loops on the site	`[{FluidLoop}]`				Contains a list of fluid loops on the site.
`service_water_heating_distribution_systems`	Service water heating systems on the site	`[{ServiceWaterHeatingDistributionSystem}]`				Contains a list of service water heating distribution systems at the site.
`conditioning_components`	Links to all conditioning components used on the site	`[{Pump},{Boiler},{Chiller}, {HeatRejection}, {DistrictFluidMeter}]`				Contains a list of all components related to conditioning.
`site_zone_type`	Site zone type for Sec 9.4.2	`<ExteriorLightingZones2019ASHRAE901>`				

Building

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`building_segments`	Large portions of a building that share a building area type	`[{BuildingSegment}]`				Contains a list of building segments in the building.
`elevators`	Elevators	`[{Elevator}]`				Contains a list of elevators in the building.
`exterior_lighting`	Exterior lighting systems	`[{ExteriorLighting}]`				Contains a list of exterior lighting systems for the building.
`refrigeration_components`	Refrigeration	`[{Refrigeration}]`				Contains a list of refrigeration components in the building.
`building_open_schedule`	Reference to the schedule containing indicating when the building is open	`$ID`			✓	One represent when the building is open and zero when closed. Constraint to use when implemented :Schedule:
`has_site_shading`	Indicates whether the site has features that cast shadows on the building	`Boolean`				

BuildingSegment

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`number_of_floors_above_grade`	Number of floors above grade	`Numeric`		`≥0`		JG to verify if used in test case description.
`number_of_floors_below_grade`	Number of floors below grade	`Numeric`		`≥0`		JG to verify if used in test case description.
`is_all_new`	Indicates whether the building segment is completely new construction (true) or existing (false).	`Boolean`				Projects that include additions should have a building segments that are existing (false) and for the addition (true). Curtain rules such as baseline fenestration area will apply differently to each portion.
`zones`	Zones in the building	`[{Zone}]`				Contains a list of zones in the building.
`heating_ventilation_air_conditioning_systems`	HVAC systems in the building	`[{HeatingVentilationAirConditioningSystem}]`				Contains a list of HVAC systems in the building.
`area_type_vertical_fenestration`	Building area classification used for vertical fenestration	`<VerticalFenestrationBuildingAreaType2019ASHRAE901>`				The enumeration is based on the standard used.
`lighting_building_area_type`	Building area lighting area type	`<LightingSpaceType2019ASHRAE901T951TG38>`				
`area_type_heating_ventilation_air_conditioning_system`	Classification used for HVAC	`<HeatingVentilationAirConditioningBuildingAreaType2019ASHRAE901>`				The enumeration is based on the standard used. JG to verify if used in test case description.

Zone

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`spaces`	Spaces in the zone	`[{Space}]`				Contains a list of spaces in the building.
`volume`	Volume of the space	`Numeric`	m3	`≥0`		
`surfaces`	Surfaces surrounding the zone	`[{Surface}]`				Contains a list of surfaces that define the zone.
`conditioning_type`	Space conditioning category	`<ConditioningType>`				
`infiltration`	Airleakage into the zone.	`{Infiltration}`				References a single infiltration data group.
`design_thermostat_cooling_setpoint`	Setpoint temperature for cooling during occupied hours	`Numeric`	C			JG to verify if used in test case description.
`thermostat_cooling_setpoint_schedule`	Reference to the schedule containing the cooling setpoint temperatures	`$ID`			✓	Constraint to use when implemented :Schedule:
`design_thermostat_heating_setpoint`	Setpoint temperature for heating during occupied hours	`Numeric`	C			JG to verify if used in test case description.
`thermostat_heating_setpoint_schedule`	Reference to the schedule containing the heating setpoint temperatures	`$ID`			✓	Constraint to use when implemented :Schedule:
`served_by_heating_ventilation_air_conditioning_systems`	HVAC systems serving the zone	`[$ID]`				Contains a list of IDs of the HVAC systems serving the zone - from Unique Identification Number in HeatingVentilationAirConditioningSystem. Constraint to use when implemented :HeatingVentilationAirConditioningSystem:
`served_by_service_water_heating_system`	A service water heating system serving the zone	`$ID`				Contains a single ID of the service water heating system serving the zone - from Unique Identification Number in ServiceWaterHeatingSystem. Constraint to use when implemented :ServiceWaterHeatingSystem:
`transfer_airflow_rate`	Transfer airflow rate	`Numeric`	L/s	`≥0`		JG to verify if used in test case description.
`exhaust_airflow_rate`	Number of occupants in the space	`Numeric`	L/s	`≥0`		JG to verify if used in test case description.
`non_mechanical_cooling_fan_power`	Non-mechanical cooling fan power	`Numeric`	W	`≥0`		JG to verify if used in test case description.
`non_mechanical_cooling_fan_airflow`	Non-mechanical cooling fan power	`Numeric`	L/s	`≥0`		JG to verify if used in test case description.
`air_distribution_effectiveness`	Air distribution effectiveness	`Numeric`		`≥0`		JG to verify if used in test case description.

Space

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`interior_lighting`	Internal lighting that produce internal gains for a space.	`[{InteriorLighting}]`				
`miscellaneous_equipment`	Miscellaneous equipment loads that produce internal gains for a space.	`[{MiscellaneousEquipment}]`				
`floor_area`	The floor area of the space.	`Numeric`	m2	`≥0`		The floor area of a space within the building, including basements, mezzanine and intermediate-floored tiers, and penthouses with a headroom height of 7.5 ft or greater. It is measured from the exterior faces of walls or from the center-line of walls separating buildings, but excluding covered walkways, open roofed-over areas, porches and similar spaces, pipe trenches, exterior terraces or steps, chimneys, roof overhangs, and similar features. This is the floor area that is modeled.
`number_of_occupants`	Number of occupants in the space	`Numeric`		`≥0`		
`occupant_multiplier_schedule`	Reference to the schedule containing the multiplier for the number of occupants	`$ID`			✓	Constraint to use when implemented :Schedule:
`occupant_sensible_heat_gain`	Sensible heat gain of each occupant.	`Numeric`	W	`≥0`		JG to verify if used in test case description.
`status_type`	Choice of new, existing, addition, or alteration.	`<SpaceStatusType2019ASHRAE901>`				
`space_function`	Generic function for the space.	`<SpaceFunctionType>`				The enumeration is based on the standard used.
`lighting_space_type`	Lighting space type classification	`<LightingSpaceType2019ASHRAE901TG37>`				The enumeration is based on the standard used.
`ventilations_space_type`	Ventilation space type classification	`<VentilationSpaceType2019ASHRAE901>`				The enumeration is based on the standard used.

Name	Description	Data Type	Units	Range	Req	Notes
service_water_heating_space_type	Service water heating space type classification	<ServiceWaterHeatingSpaceType2019ASHRAE901>				The enumeration is based on the standard used.
service_weater_heating_uses	List of service water heating uses	[<ServiceWaterHeatingUse>]				

Infiltration

Name	Description	Data Type	Units	Range	Req	Notes
id	Scope-unique reference identifier for instances of this data group	ID			✓	
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String				
notes	Supplementary information to provide context to the model reviewer	String				
modeling_method	The software methodology chosen for modeling infiltration	<InfiltrationMethodType>				
algorithm_name	Name of the algorithm used for modeling infiltration in the specific simulation engine.	String				
measured_air_leakage_rate	Meaured air leakage rate from infiltration of outside air	Numeric	m3/s	≥0		Based on the pressure described in ASHRAE229.measured_infiltration_pressure_difference.
infiltration_flow_rate	Design infiltration flow rate	Numeric	m3/s	≥0		Infiltration flow rate for simulation infiltration models unadjusted for temperature difference or windspeed or schedule often with a windspeed at 10 mph (4.5 m/s). This may vary in meaning between simulation engines.
multiplier_schedule	Referenced to the schedule containing the multiplier for the infiltration	$ID				Constraint to use when implemented :Schedule:

Surface

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`subsurfaces`	Suburfaces that are on the surface	`[{Subsurface}]`				Contains a list of surfaces that define the space.
`classification`	Classification for the surface.	`<SurfaceClassificationType>`				Options for surface being interior or exterior wall, floor, or ceiling.
`area`	area of the surface	`Numeric`	m2	`≥0`		Measured from interior face area. It is the gross area of the wall and includes the area of all subsurfaces.
`tilt`	Angle between vertical and the surface outward normal	`Numeric`	degrees			Example value would be 0 = roof, 90 = wall, 180 = downward facing surface (exterior floor)
`azimuth`	Clockwise angle between North and the horizontal projection of the wall's outward normal.	`Numeric`	degrees	`≥0`		Example values would be 0 = north, 90 = East, 180 = South, 270 = West
`adjacent_to`	Used to classify the conditions on the surface.	`(<SurfaceAdjacentTo>, <AdditionalSurfaceAdjacentToRESNET>, <AdditionalSurfaceAdjacentTo2019ASHRAE901>)`				Determines whether the other side of the surface is modeled and if not what assumptions should be used.
`adjacent_zone`	ID of the adjacent zone for interior surface. Only required when adjacent zone is explicity modeled when adjacent_to is set to INTERIOR.	`$ID`				Constraint to use when implemented :Zone:
`does_cast_shade`	Determines whether the surface is modeled as casting shade on other exterior surfaces	`Boolean`				
`construction`	Construction description of surface.	`{Construction}`				
`surface_optical_properties`	Optical properties of the surface.	`{SurfaceOpticalProperties}`				

Construction

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`surface_construction_input_option`	Identifies whether construction is entered layer-by-layer or simplified (R-value)	`<SurfaceConstructionInputOptions>`				
`fraction_framing`	Fraction of the construction that is framing.	`Numeric`		`≥0,≤1`		Fraction of the construction using framing_layers, the remaining portion uses the primary_layers. If blank, assume zero framing.
`primary_layers`	List of names of layer descriptions starting from the outside surface for primary heat path	`[{Material}]`				For constructions with framing and cavity heat transfer paths, use this for the cavity. For constructions with homogeneous layer, use this element only. Air films should not be included in the list of layers.
`framing_layers`	List of names of layer descriptions starting from the outside surface for the framing heat path	`[{Material}]`				For constructions with framing and cavity heat transfer paths, use this for the framing otherwise leave blank. Air films should not be included in the list of layers.
`insulation_location`	The location of the insulation related to the surface	`String`				
`u_factor`	suface U-factor	`Numeric`	W/m2-K	`≥0`		Includes interior and exterior air films as specified by the referenced standard.
`c_factor`	surface C-factor	`Numeric`	W/m2-K	`≥0`		
`f_factor`	surface F-factor	`Numeric`	W/m-K	`≥0`		
`r_value`	r-value of the insulation for the surface	`Numeric`	K-m2/W	`≥0`		
`has_radiant_heating`	Includes embedded radiant heating elements	`Boolean`				
`has_radiant_cooling`	Includes embedded radiant cooling elements	`Boolean`				

Material

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`thickness`	The thickness of the material layer	`Numeric`	m	`>0`		
`thermal_conductivity`	The thermal conductivity of the material layer	`Numeric`	W/m-K	`≥0`		When thermal_conductivity is specified, r_value should not be provided.
`density`	The density of the material layer	`Numeric`	kg/m3	`≥0`		
`specific_heat`	The specific heat of the material layer	`Numeric`	J/kg-K	`≥0`		
`r_value`	r-value of the insulation for the material layer	`Numeric`	K-m2/W	`≥0`		When r_value is specified, thermal_conductivity should not be provided. Typically used for insulation or air gaps.

SurfaceOpticalProperties

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`absorptance_thermal_exterior`	Thermal absorptance of long wavelength radiation on the exterior surface.	`Numeric`		`≥0`		May also be called thermal emittance, emittance or emissivity and represents the fraction of incident long wavelength radiation that is absorbed by the material
`absorptance_solar_exterior`	Thermal absorptance of short wavelength radiation on the exterior surface.	`Numeric`		`≥0`		Equals one minus the solar reflectance (for opaque materials) and represents the fraction of incident solar radiation that is absorbed by the material

Name	Description	Data Type	Units	Range	Req	Notes
`absorptance_visible_exterior`	Thermal absorptance of visible radiation on the exterior surface.	`Numeric`		`≥0`		Equals one minus the visible reflectance (for opaque materials) and represents the fraction of incident visible wavelength radiation that is absorbed by the material
`absorptance_thermal_interior`	Thermal absorptance of long wavelength radiation on the interior surface.	`Numeric`		`≥0`		May also be called thermal emittance, emittance or emissivity and represents the fraction of incident long wavelength radiation that is absorbed by the material
`absorptance_solar_interior`	Thermal absorptance of short wavelength radiation on the interior surface.	`Numeric`		`≥0`		Equals one minus the solar reflectance (for opaque materials) and represents the fraction of incident solar radiation that is absorbed by the material

Name	Description	Data Type	Units	Range	Req	Notes
`absorptance_visible_interior`	Thermal absorptance of visible radiation on the interior surface.	`Numeric`		`≥0`		Equals one minus the visible reflectance (for opaque materials) and represents the fraction of incident visible wavelength radiation that is absorbed by the material

Subsurface

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`classification`	Classification for the subsurface being window, skylight, door.	`<SubsurfaceClassificationType>`				
`subclassification`	Standard specific subclassification for subsurfaces	`<SubsurfaceSubclassificationType2019ASHRAE901>`				
`is_operable`	Identifies whether window subsurface can be opened and closed including by pivoting or sliding.	`Boolean`				This applies to windows and skylights but not to doors.
`has_open_sensor`	Has sensor and reports to building control system when the window or door is open.	`Boolean`				
`framing_type`	The material of the framing.	`<SubsurfaceFrameType2019ASHRAE901>`				This applies to windows and skylights but not to doors.
`glazed_area`	Area of subsurface including glass and transparent surfaces	`Numeric`	m2	`≥0`		
`opaque_area`	Area of subsurface framing for a window or skylight or opaque portion for a door.	`Numeric`	m2	`≥0`		
`u_factor`	Overall Subsurface U-factor	`Numeric`	W/m2-K	`≥0`		Includes interior and exterior air films as specified by the referenced standard.
`dynamic_glazing_type`	Type of dynamic glazing for the window subsurface	`<SubsurfaceDynamicGlazingType>`				Indicates if the glazed subsurface can change it's performance properties and if it is automatic or not.
`solar_heat_gain_coefficient`	Subsurface SHGC	`Numeric`		`≥0`		For dynamic glazing represents the minimum SHGC
`maximum_solar_heat_gain_coefficient`	Maximum Subsurface SHGC for Dynamic Glazing	`Numeric`		`≥0`		Only used for dynamic glazing
`visible_transmittance`	Subsurface VT	`Numeric`		`≥0`		For dynamic glazing represents the maximum visible transmittance
`minimum_visible_transmittance`	Minimum Subsurface VT for Dynamic Glazing	`Numeric`		`≥0`		Only used for dynamic glazing

Name	Description	Data Type	Units	Range	Req	Notes
`depth_of_overhang`	Distance from the edge of the overhang to the subsurface.	`Numeric`	m	`≥0`		
`has_shading_overhang`	Identifies whether subsurface has overhangs	`Boolean`				
`has_shading_sidefins`	Identifies whether subsurface has sidefins	`Boolean`				
`has_manual_interior_shades`	Are there manually-operated interior shading such as blinds, curtains or shades	`Boolean`				
`solar_transmittance_multiplier_summer`	Solar transmittance multiplier for summer	`Numeric`		`≥0`		Often used to account for interior shading such as drapes.
`solar_transmittance_multiplier_winter`	Solar transmittance multiplier for summer	`Numeric`		`≥0`		Often used to account for interior shading such as drapes.
`has_automatic_shades`	Are there automatic interior shading such as blinds, curtains or shades	`Boolean`				

InteriorLighting

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`purpose_type`	Lighting space type classification	`<LightingPurposeType2019ASHRAE901>`				The enumeration is based on the standard used.
`power_per_area`	Total power for lights divided by the area of the space.	`Numeric`	W/m2			When computing the power per area use the area of the entire space.
`lighting_multiplier_schedule`	Reference to the schedule containing the multiplier for lighting	`$ID`			✓	Constraint to use when implemented :Schedule:
`occupancy_control_type`	Indicates the type of occupancy controls	`<LightingOccupancyControlType>`				
`daylighting_control_type`	Indicates the type of daylighting controls	`<LightingDaylightingControlType>`				
`are_schedules_used_for_modeling_occupancy_control`	Indicates that schedule values are used for modeling the impacts of occupancy controls on lighting.	`Boolean`				
`are_schedules_used_for_modeling_daylighting_control`	Indicates that schedule values are used for modeling the impacts of daylighting controls on lighting.	`Boolean`				For simulations that are modeling daylighting by computing the illumance this should be false.

MiscellaneousEquipment

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`energy_type`	Source of energy for the miscelleous equipment in the space	`<EnergySourceTypeOptions>`				
`peak_usage`	Peak energy usage per hour by the miscelleous equipment in the space.	`Numeric`	W			
`multiplier_schedule`	Referenced to the schedule containing the multiplier for the miscellenous equipment	`$ID`			✓	Constraint to use when implemented :Schedule:
`sensible_fraction`	Fraction of energy that is a sensible load on the space.	`Numeric`		`≥0, ≤1`		Sensible plus latent do not necessarily add up to 1.0.
`latent_fraction`	Fraction of energy that is a latent load on the space.	`Numeric`		`≥0, ≤1`		Sensible plus latent do not necessarily add up to 1.0.
`miscellaneous_equipment_type`	Type of miscellaneous equipment	`<MiscellaneousEquipmentType>`				
`has_automatic_control`	Indicates that the receptacles have automatic controls	`Boolean`				

Transformer

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`type`	The type of transformer	`<TransformerType>`				
`phase`	The number of electrical phases	`<ElectricalPhase>`				
`efficiency`	Transformer efficiency	`Numeric`		`≥0`, `≤1`		Expresses the efficiency of the transformer as a fraction from 0 to 1, where 1 would represent 100% efficiency.
`capacity`	Rated Capacity of the Transformer	`Numeric`	V-A	`≥0`		
`peak_load`	Annual Peak electric load on the transformer	`Numeric`	W	`≥0`		Peak electric load on the transfomer based on an annual simulation with typical weather file.

Schedule

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`purpose`	The purpose of schedule	`String`				Describe the purpose of the schedule and how it can be used. Not an enumerations. The purpose assigned by BEM tool should match across RMRs. Examples include thermostat, multiplier for lighting, availability for equipment.
`schedule_sequence_type`	Schedule sequence type	`<ScheduleSequenceTypeOptions>`				
`hourly_values`	Hourly Values of Schedule	`[Numeric][8760]`				Used when schedule_sequence_type is HOURLY. Can also use functions like EFLH(), MAX(), MIN() to determine overall characteristics for the list of schedule values.
`event_times`	Event times when the schedule changes	`[Numeric]`	s			Used when schedule_sequence_type is EVENT to describe the time of the year in seconds that the schedule changes value.
`event_values`	Event value at corresponding event time.	`[Numeric]`				Used when schedule_sequence_type is EVENT. New values starting at corresponding to the event time until following event time minus one second. Can also use functions like EFLH(), MAX(), MIN() to determine overall characteristics for the list of schedule values.
`type`	The type of schedule	`<ScheduleTypeOptions>`				Primarily indicates if the values may be represented by units such as C for temperature or W for power or m3/s for flow rate or are dimensionless multipliers.
`prescribed_schedule`	True if any schedule values have changed from what appears in the schedule library	`<PrescribedSchedules2019ASHRAE901>`				
`is_schedule_modified_for_workaround`	True if any schedule has been modified for a workaround	`Boolean`				

Calendar

Name	Description	Data Type	Units	Range	Req	Notes
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`day_of_week_for_january_1`	Day of the week for January 1	`<DayOfWeek>`				
`is_leap_year`	The schedules assume it is a leap year	`Boolean`				
`has_daylight_saving_time`	The schedules adjust for Daylight Saving Time	`Boolean`				

Weather

Name	Description	Data Type	Units	Range	Req	Notes
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`monthly_ground_temperature`	Modeled monthly ground temperatures	`[Numeric][1..12]`	C			For annual ground temperatures provide 12 equal numbers
`weather_file_name`	The file name for the weather file including extension.	`String`				The file name for the annual weather file such as from TMY, TRY, CWEC, CTZ, WYEC or other sources.
`climate_zone`	The designation of the climate zone where the building is located	`<ClimateZone2019ASHRAE901>`			✓	The enumeration is based on the standard used.
`cooling_design_day_type`	The frequency of occurance type for cooling design day	`<CoolingDesignDayTypeOptions>`				
`heating_design_day_type`	The frequency of occurance type for heating design day	`<HeatingDesignDayTypeOptions>`				

Elevator

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`motor_power`	Elevator peak motor power	`Numeric`	W			The motor power can be provided either together with or, instead of, the detailed elements used to calculate it.
`cab_counterweight`	Elevator car counterweight	`Numeric`	kg			
`cab_weight`	Weight of elevator car	`Numeric`	kg			
`design_elevator_load`	Elevator load at which to operate	`Numeric`	kg			
`speed`	Design speed of the elevator	`Numeric`	m/s			
`cab_area`	Floor area of elevator cab	`Numeric`	m2			
`cab_lighting_power`	Lighitng power of cab	`Numeric`	W			
`cab_ventilation_fan_power`	Ventilation fan power of cab	`Numeric`	W			
`cab_ventilation_fan_flow`	Airflow of cab ventfan	`Numeric`	L/s			
`cab_motor_multiplier_schedule`	Elevator motor operation multiplier schedule name	`$ID`				Constraint to use when implemented :Schedule:
`cab_ventilation_fan_multiplier_schedule`	Elevator ventilation fan operation mulitplier schedule name	`$ID`				Constraint to use when implemented :Schedule:
`cab_lighting_multiplier_schedule`	Elevator lighting multiplier schedule name	`$ID`				Constraint to use when implemented :Schedule:

HeatingVentilationAirConditioningSystem

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`fan_systems`	List of fan systems	`[{FanSystem}]`				JG to verify if used in test case description.
`air_terminals`	List of air terminals	`[{AirTerminal}]`				JG to verify if used in test case description.
`heating_system_type`	Heating system type	`<HeatingSystemType>`				JG to verify if used in test case description.
`hot_water_loop`	Referenced to the hot water fluid loop	`$ID`				Constraint to use when implemented :FluidLoop:
`heating_coil_setpoint`	Setpoint of the air leaving the heating coil	`Numeric`	C			JG to verify if used in test case description.
`heating_package`	Furnace or heating portion of the heat pump	`{HeatingPackage}`				JG to verify if used in test case description.
`cooling_system_type`	Cooling system type	`<CoolingSystemType>`				JG to verify if used in test case description.
`chilled_water_loop`	Referenced to the Chilled water fluid loop	`$ID`				Constraint to use when implemented :FluidLoop:
`condenser_water_loop`	Referenced to the Condenser water fluid loop	`$ID`				Constraint to use when implemented :FluidLoop:
`cooling_direct_expansion`	Direct expansion cooling or cooling portion of the heat pump	`{CoolingDirectExpansion}`				JG to verify if used in test case description.
`preheat_loop`	Referenced to the Preheat fluid loop	`$ID`				Constraint to use when implemented :FluidLoop:
`reheat_loop`	Referenced to the reheat fluid loop	`$ID`				Constraint to use when implemented :FluidLoop:
`peak_cooling_load`	Peak cooling load	`Numeric`	W	`≥0`		JG to verify if used in test case description.
`peak_heating_load`	Peak cooling load	`Numeric`	W	`≥0`		JG to verify if used in test case description.
`total_cool_capacity`	Total cooling capacity	`[Numeric]`	W/m2	`≥0`		JG to verify if used in test case description.

Name	Description	Data Type	Units	Range	Req	Notes
`sensible_cool_capacity`	Sensible cooling capacity	`[Numeric]`	W/m2	`≥0`		May be design value or result from the simulation. If multiple values are provided, they correspond to rotated building orientations
`heat_capacity`	Heating capacity	`[Numeric]`	W/m2	`≥0`		May be design value or result from the simulation. If multiple values are provided, they correspond to rotated building orientations
`dehumidification_type`	Dehumidification type	`<DehumidificationType>`				JG to verify if used in test case description.
`humidification_type`	Humidification type	`<HumidificationType>`				JG to verify if used in test case description.
`cooling_turndown_ratio`	Cooling turndown ratio	`Numeric`				Cooling capacity turndown before simultanenous heating and cooling occurs. JG to verify if used in test case description.
`does_serve_computer_room`	Determines whether a computer room is served by the system	`Boolean`				JG to verify if used in test case description.
`does_serve_zone_with_refrigerator_cases`	Determines whether a zone with refrigeration cases is served by the system	`Boolean`				JG to verify if used in test case description.

HeatingPackage

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`full_load_efficiency`	Full Low Efficiency expressed as a coefficient of performance or thermal efficiency	`Numeric`	W/W			JG to verify if used in test case description.
`part_load_efficiency`	Efficiency value based on the selected part_load_efficiency_metric	`Numeric`		`≥0, ≤1`		JG to verify if used in test case description.
`heatpump_auxilliary_heat_type`	Heatpump auxilliary heat type	`<HeatpumpAuxilliaryHeatType>`				JG to verify if used in test case description.
`heatpump_auxilliary_heat_high_temperature_shutoff`	Heatpump auxilliary heat high temperature shutoff	`Numeric`	C			JG to verify if used in test case description.
`heatpump_low_temperature_shutoff`	Heatpump low temperature shutoff	`Numeric`	C			JG to verify if used in test case description.

CoolingPackage

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`full_load_efficiency`	Full Low Efficiency expressed as a coefficient of performance (COP)	`Numeric`	W/W			JG to verify if used in test case description.
`part_load_efficiency`	Efficiency value based on the selected part_load_efficiency_metric	`Numeric`		`≥0, ≤1`		JG to verify if used in test case description.

FanSystem

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`purpose_type`	Purpose of the fan system	`<FanSystemPurposeType>`				JG to verify if used in test case description.
`is_multi_zone`	If the fan system serves muliple zones	`Boolean`				JG to verify if used in test case description.
`is_variable_air_volume`	If the fan system is variable air volume.	`Boolean`				JG to verify if used in test case description.
`temperature_control`	Supply air temperature control type	`<FanSystemTemperatureControlType>`				JG to verify if used in test case description.
`supply_air_temperature_setpoint`	Supply air temperature setpoint temperarue	`Numeric`	C			JG to verify if used in test case description.
`reset_differential_temperature`	Supply air temperature reset differential temperature at minimum cooling load	`Numeric`	C			JG to verify if used in test case description.
`supply_air_temperature_reset_schedule`	Supply air temperature reset schedule	`$ID`				JG to verify if used in test case description. Constraint to use when implemented :Schedule:
`operating_schedule`	Operating schedule name	`$ID`				Zero when fan is off. JG to verify if used in test case description. Constraint to use when implemented :Schedule:
`airflow`	Design supply airflow	`Numeric`	L/s			JG to verify if used in test case description.
`power`	Design supply fan power	`Numeric`	W			JG to verify if used in test case description.
`fan_power_adjustment_factor`	Fan power adjustment factor	`Numeric`				JG to verify if used in test case description.
`motor_efficiency`	Fan motor efficiency	`Numeric`	W			JG to verify if used in test case description.
`fan_control`	Supply fan control type	`<FanSystemSupplyFanControlType>`				JG to verify if used in test case description.
`minimum_airflow`	Minimum volume airflow	`Numeric`	L/s			JG to verify if used in test case description.
`minimum_outdoor_airflow`	Minimum outdoor air volume airflow	`Numeric`	L/s			JG to verify if used in test case description.

Name	Description	Data Type	Units	Range	Req	Notes
`maximum_outdoor_airflow`	Maximum outdoor air volume airflow	`Numeric`	L/s			JG to verify if used in test case description.
`air_economizer_type`	Air economizer type	`<AirEconomizerType>`				JG to verify if used in test case description.
`economizer_high_limit_temperature_shutoff`	Economizer high limit temperature shutoff	`Numeric`	C			JG to verify if used in test case description.
`has_gas_phase_air_cleaning`	True if the fan system includes gas phase air cleaning	`Boolean`				JG to verify if used in test case description.
`energy_recovery_type`	Energy recovery type	`<EnergyRecoveryType>`				JG to verify if used in test case description.
`enthalpy_recovery_ratio`	Enthalpy recovery ratio	`Numeric`				JG to verify if used in test case description.
`energy_recovery_operation`	Energy recovery operation	`<EnergyRecoveryOperation>`				JG to verify if used in test case description.
`energy_recovery_supply_air_temperature_control`	Energy recovery supply air temperature control	`<EnergyRecoverySupplyAirTemperatureControl>`				JG to verify if used in test case description.
`economizer_design_sensible_effectiveness`	Economizer design sensible effectiveness	`Numeric`				JG to verify if used in test case description.
`economizer_design_latent_effectiveness`	Economizer design sensible effectiveness	`Numeric`				JG to verify if used in test case description.
`demand_control_ventilation_control_type`	Demand control ventilation control type	`<DemandControlVentilationControlType>`				JG to verify if used in test case description.
`supply_air_to_room_air_humidity_ratio`	Supply air to room air humidity ratio	`Numeric`				JG to verify if used in test case description.

AirTerminal

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`type`	Type of air terminal	`<AirTerminalType>`				JG to verify if used in test case description.
`reheat_source`	Source of reheat	`<ReheatSourceType>`				JG to verify if used in test case description.
`fan_power`	Fan powered box fan power	`Numeric`	W			JG to verify if used in test case description.
`primary_airflow`	Zone terminal primary airflow	`Numeric`	L/s			JG to verify if used in test case description.
`secondary_airflow`	Zone terminal secondary_airflow	`Numeric`	L/s			JG to verify if used in test case description.
`supply_temperature_setpoint`	Zone terminal supply temperature setpoint	`Numeric`	C			JG to verify if used in test case description.
`minimum_airflow`	Zone terminal minimum volume airflow	`Numeric`	L/s			JG to verify if used in test case description.
`minimum_outdoor_airflow`	Zone terminal minimum outdoor air volume airflow	`Numeric`	L/s			JG to verify if used in test case description.
`minimum_outdoor_airflow_multiplier_schedule`	Zone terminal minimum outdoor air volume airflow multiplier schedule name	`$ID`				JG to verify if used in test case description. Constraint to use when implemented :Schedule:

FluidLoop

Name	Description	Data Type	Units	Range	Req	Notes
id	Scope-unique reference identifier for instances of this data group	ID			✓	
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String				
notes	Supplementary information to provide context to the model reviewer	String				
type	Type of loop	<FluidLoopTypeOptions>				
pump_power_per_flow_rate	Total design pump power divided by the loop design flow rate	Numeric	W/s-L			This is the pump power per flow rate for the entire pumping system on the current FluidLoop. The power and flow rate should be for the current FluidLoop only and does not include power and flow rate in any child loops.
child_loops	Other fluid loops connected to this one as children.	[{FluidLoop}]				Secondary loops should be described as child loops.
cooling_or_condensing_design_and_control		{FluidLoopDesignAndControl}				
heating_design_and_control		{FluidLoopDesignAndControl}				

FluidLoopDesignAndControl

Name	Description	Data Type	Units	Range	Req	Notes
id	Scope-unique reference identifier for instances of this data group	ID			✓	
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String				
notes	Supplementary information to provide context to the model reviewer	String				
design_supply_temperature	Design Supply Temperature	Numeric	C			
design_return_temperature	Design Return Temperature	Numeric	C			
is_sized_using_coincident_load	True if the loop is sized based on coincident load	Boolean				
minimum_flow_fraction	Minimum fraction of full flow allowed	Numeric				
operation	Type of operation used by loop	<FluidLoopOperationOptions>				
flow_control	Flow control options	<FluidLoopFlowControlOptions>				
temperature_reset_type	Type of temperature reset used by loop	<TemperatureResetTypeOptions>				
outdoor_high_for_loop_supply_temperature_reset	Outdoor high for loop supply temp reset	Numeric	C			
outdoor_low_for_loop_supply_temperature_reset	Outdoor low for loop supply temp reset	Numeric	C			
loop_supply_temperature_at_outdoor_high	Loop supply temperature at outdoor high temperature	Numeric	C			
loop_supply_temperature_at_outdoor_low	Loop supply temperature at outdoor low temperature	Numeric	C			

Pump

Name	Description	Data Type	Units	Range	Req	Notes
id	Scope-unique reference identifier for instances of this data group	ID			✓	
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String				
notes	Supplementary information to provide context to the model reviewer	String				
loop	Referenced to the fluid loop or service water heating distribution system	$ID			✓	Constraint to use when implemented :FluidLoop:
specification_method	Options for how the pump is specified	<PumpSpecificationMethodOptions>				
design_electric_power	Pump design electric power	Numeric	W			Pump electric power at design conditions. Only used when specification_method is set to Simple
motor_nameplate_power	Pump motor nameplate power	Numeric	W			Only used when specification_method is set to Detailed
design_head	Head of the pump at design flow conditions	Numeric	m			Only used when specification_method is set to Detailed
impeller_efficiency	Full load efficiency of the impeller	Numeric		≥0, ≤1		Only used when specification_method is set to Detailed
motor_efficiency	Full load efficiency of the pump motor	Numeric		≥0, ≤1		Only used when specification_method is set to Detailed
speed_control	Options for pump speed control	<PumpSpeedControlOptions>				
design_flow	Design Pump Flowrate	Numeric	L/s			
is_flow_autosized	True if the design_flow is autosized	Boolean				
is_variable_speed	True if variable speed drive such a VFD	Boolean				

Boiler

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`loop`	Referenced to the fluid loop	`$ID`			✓	Constraint to use when implemented :FluidLoop:
`design_capacity`	Heating capacity	`Numeric`	W			
`rated_capacity`	Heating capacity	`Numeric`	W			At rating conditions.
`minimum_load_ratio`	Minimum fraction of full load allowed	`Numeric`				
`draft_type`	Combustion option	`<BoilerCombustionOptions>`				
`energy_source_type`	Source of energy for the boiler	`<EnergySourceTypeOptions>`				
`efficiency_metric`	The type of efficiency metric used	`<BoilerEfficiencyMetricTypeOptions>`				
`efficiency`	Efficiency value based on the selected efficiency_metric	`Numeric`		`≥0, ≤1`		
`output_validation_points`	Energy validation points	`[{BoilerOutputValidationPoint}]`				Load is input to each validation point and energy output is the result. A minimum number of four points is recommended.
`auxiliary_power`	Auxiliary power	`Numeric`	W			Power for boiler pump, combustion fan, or other auxiliary that operates when boiler operates.
`operation_lower_limit`	Heating load range operation, lower limit	`Numeric`	W			
`operation_upper_limit`	Heating load range operation, upper limit	`Numeric`	W			

BoilerOutputValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes
`load`	Load	`Numeric`	W			No name and id is needed since typically used as one of a series.
`result`	Result	`Numeric`	W			

Chiller

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`cooling_loop`	Referenced to the cooling fluid loop	`$ID`			✓	Constraint to use when implemented :FluidLoop:
`condensing_loop`	Referenced to the condensing fluid loop	`$ID`				No condensing loop name implies air-cooled chiller. Constraint to use when implemented :FluidLoop:
`compressor_type`	Compressor Type	`<ChillerCompressorTypeOptions>`				
`energy_source_type`	Source of energy for the chiller	`<EnergySourceTypeOptions>`				
`design_capacity`	Chiller Design Cooling Capacity	`Numeric`	W			
`rated_capacity`	Chiller Design Cooling Capacity	`Numeric`	W			At rating conditions.
`minimum_load_ratio`	Minimum fraction of full load allowed	`Numeric`				
`design_flow_evaporator`	Chiller evaporator design flow	`Numeric`	L/s			
`design_flow_condenser`	Chiller condenser design flow	`Numeric`	L/s			
`full_load_efficiency`	Full Low Efficiency expressed as a coefficient of performance (COP)	`Numeric`	W/W			
`part_load_efficiency`	Efficiency value based on the selected part_load_efficiency_metric	`Numeric`		`≥0, ≤1`		
`part_load_efficiency_metric`	The type of part load efficiency metric used	`<ChillerPartLoadEfficiencyMetricTypeOptions>`				
`capacity_validation_points`	Capacity validation points	`[{ChillerCapacityValidationPoint}]`				
`power_validation_points`	Energy validation points	`[{ChillerPowerValidationPoint}]`				

ChillerCapacityValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes
`chilled_water_supply_temperature`	Chilled water supply temperature	`Numeric`	C			No name and id is needed since used as one of a series. The temperature is leaving the chiller.
`condenser_temperature`	Second temperature	`Numeric`	C			Outside air dry-bulb temperature for air cooled chillers and condenser water temperature for water cooled chillers. For water cooled chillers, this is the temperature as the water enters the chiller. For air cooled chilers this the temperature of the ambient air.
`result`	Result	`Numeric`	W			

ChillerPowerValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes
`chilled_water_supply_temperature`	Chilled water supply temperature	`Numeric`	C			No name and id is needed since used as one of a series. The temperature is leaving the chiller.
`condenser_temperature`	Second temperature	`Numeric`	C			Outside air dry-bulb temperature for air cooled chillers and condenser water temperature for water cooled chillers. For water cooled chillers, this is the temperature as the water enters the chiller. For air cooled chilers this the temperature of the ambient air.
`load`	Load	`Numeric`	W			
`result`	Result	`Numeric`	W			

HeatRejection

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`loop`	Referenced to the fluid loop	`$ID`			✓	Constraint to use when implemented :FluidLoop:
`type`	Heat Rejection Type	`<HeatRejectionTypeOptions>`				
`fan_type`	Heat Rejection Fan Type	`<HeatRejectionFanTypeOptions>`				
`fluid`	Fluid Cooled by Heat Rejection	`<HeatRejectionFluidOptions>`				
`range`	Heat rejection Range	`Numeric`	C			
`approach`	Heat rejection Approach	`Numeric`	C			
`reset_type`	Leaving Temperature reset strategy	`<HeatRejectionResetOptions>`				
`minimum_reset_temperature`	Minimum leaving temperature setpoint	`Numeric`	C			
`fan_power`	Fan Power	`Numeric`	W			
`fan_speed_control`	Fan Speed Control Type	`<HeatRejectionFanSpeedControlOptions>`				
`design_supply_temperature`	Design leaving water temperature	`Numeric`	C			
`design_wetbulb_temperature`	Design wetbulb temperature	`Numeric`	C			0.4% ASHRAE MCWB
`design_water_flowrate`	Design condenser water flow rate	`Numeric`	L/s			
`rated_water_flowrate`	Rated condenser water flow rate	`Numeric`	L/s			At rating conditions.

ExternalFluidSource

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`loop`	Referenced to the fluid loop	`$ID`			✓	Constraint to use when implemented :FluidLoop:
`type`	Type of external fluid source	`<ExternalFluidSourceTypeOptions>`				
`energy_source_type`	Source of energy for the external fluid source	`<EnergySourceTypeOptions>`				

ServiceWaterHeatingDistributionSystem

Name	Description	Data Type	Units	Range	Req	Notes
id	Scope-unique reference identifier for instances of this data group	ID			✓	
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String				
notes	Supplementary information to provide context to the model reviewer	String				
design_supply_temperature	Design supply temperature setpoint of service water heating loop	Numeric	C			From CBECC-Com.
design_supply_temperature_difference	Design supply temperature difference (deltaT) of service water heating loop	Numeric	C			From CBECC-Com.
tank_storage_capacity	Storage capacity of tank in distribution system	Numeric	L	≥0		From CBECC-Com.
tank_storage_insulation	Storage tank insulation R-value	Numeric	K-m2/W	≥0		From CBECC-Res.
is_central_system	Indicates whether it is a central service water heater distribution system	Boolean				From CBECC-Com.
solar_angle_from_true_north	Solar water heater angle from true north, clockwise	Numeric				From CBECC-Com.
annual_solar_fraction	Solar water heater annual fraction	Numeric				From CBECC-Com.
solar_area	Solar water heater area	Numeric				From CBECC-Com.
solar_collector_area	Solar water heater area	Numeric				From CBECC-Com.
solar_collector_type_description	Description of solar collector type	String				From CBECC-Com.
solar_collector_slope	Solar water heater slope from horizontal	Numeric				From CBECC-Com.
distribution_compactness	Type of compact distribution system	<ServiceWaterHeatingDistributionCompactness>				From CBECC-Com.
distribution_type	Type of distribution system	<ServiceWaterHeatingDistributionType>				From CBECC-Com.
configuration_type	Type of configuration	<ServiceWaterHeatingConfigurationType>				From CBECC-Com.
is_recovered_heat_from_drain_used_by_water_heater	Indicates whether the recovered heat from the shower drain used by the service water heater	Boolean				From CBECC-Res.
drain_heat_recovery_efficiency	Shower heat drain recovery efficiency	Numeric	m	≥0		From CBECC-Com. May use the Canadian Standards Association Rated Recovery Efficiency.
drain_heat_recovery_type	Drain heat recovery type	<ServiceWaterHeatingHeatRecoveryType>				From CBECC-Res.
loop_pipe_insulation_thickness	Loop pipe insulation thickness	Numeric	m	≥0		From CBECC-Com.
loop_pipe_location	Loop pipe location	<ServiceWaterHeatingLoopPipeLocation>				From CBECC-Com.
pipe_length	Pipe length	Numeric	m	≥0		From RESNET
recirculation_loop_pipe_section_length	Recirculation loop pipe section length	Numeric	m	≥0		From CBECC-Res.
recirculation_loop_pipe_section_diameter	Recirculation loop pipe section diameter	Numeric	m	≥0		From CBECC-Res.
recirculation_loop_pipe_section_location	Recirculation loop pipe section location	<ServiceWaterHeatingLoopPipeLocation>				From CBECC-Res.
recirculation_loop_pipe_insulation_thickness	Recirculation loop pipe insulation thickness	Numeric	m	≥0		From CBECC-Res.
flow_multiplier_schedule	service water heating Loop flow muliplier schedule name	$ID				Constraint to use when implemented :Schedule:
annual_entering_water_temperature	Annual service main or annual ground temperature used for service water heating calculations entering water temperature degrees	Numeric	C			
monthly_entering_water_temperature	Monthly service main or ground temperatures used for service water heating entering water temperature degrees	[Numeric][1..12]	C			Arrayed variable with 12 values for monthly entering water temperature
entering_water_temperature_type	Method of determining service water heating entering water temperature	<ServiceWaterHeatingEnteringWaterTemperatureInputOptions>				

ServiceWaterHeatingEquipment

Name	Description	Data Type	Units	Range	Req	Notes
id	Scope-unique reference identifier for instances of this data group	ID			✓	
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String				
notes	Supplementary information to provide context to the model reviewer	String				
heater_fuel_type	Service water heating heater fuel type	<EnergySourceTypeOptions>				
service_water_heating_distribution_system	Referenced to the service water heating distribution system	$ID			✓	Constraint to use when implemented :ServiceWaterHeatingSystem:
energy_factor	Energy factor	Numeric		≥0		From CBECC-Com.
thermal_efficiency	Service water heating heater thermal efficiency	Numeric		≥0		
standby_loss_fraction	Standby loss fraction	Numeric				From CBECC-Com.
uniform_energy_factor	Uniform energy factor	Numeric		≥0		From CBECC-Com.
first_hour_rating	First hour rating volume	Numeric	L	≥0		From CBECC-Com.
flow_rate	Flow rate	Numeric	L/s	≥0		From CBECC-Com.
input_power	Input power	Numeric	W	≥0		From CBECC-Com.
rated_capacity	Rated capacity	Numeric	W			From CBECC-Com.
minimum_capacity	Minimum capacity	Numeric	W	≥0		From CBECC-Com.
recovery_efficiency	Recovery efficiency	Numeric				From CBECC-Com.
setpoint_temperature	Set point temperature	Numeric	C			
compressor_location	Description of where the heat pump for the water heater is located	String				Used when compressor is not located in a specific zone. From CBECC-Com.
compressor_zone	Zone reference of where the heat pump for the water heater is located	$ID				From CBECC-Com. Constraint to use when implemented :Zone:
compressor_heat_rejection_source	Heat pump heat rejection source	<ServiceWaterHeatingLocation>				From CBECC-Res.
compressor_heat_rejection_zone	Heat pump heat rejection zone	$ID				From CBECC-Res. Constraint to use when implemented :Zone:
draft_fan_power	Power for the draft fan	Numeric	W	≥0		From CBECC-Com.
has_electrical_ignition	Indicates whether the water heater has electrical ignition	Boolean				From CBECC-Com.
storage_capacity	Storage capacity	Numeric	L	≥0		From CBECC-Com.
storage_zone	Zone reference of where the water heater storage is located	$ID				From CBECC-Com. Constraint to use when implemented :Zone:
tank_height	Tank height	Numeric	m	≥0		From CBECC-Com.
heater_type	Service water heater type	<ServiceWaterHeaterType>				
tank_type	Service water heater tank type	<ServiceWaterHeaterTankType>				
tank_interior_insulation	Tank interior insulation R-value	Numeric	K-m2/W	≥0		From CBECC-Res.
tank_exterior_insulation	Tank interior insulation R-value	Numeric	K-m2/W	≥0		From CBECC-Res.
tank_location	Location	<ServiceWaterHeatingLocation>				From CBECC-Res.

Name	Description	Data Type	Units	Range	Req	Notes
`tank_location_zone`	Heat pump heat rejection zone	`$ID`				Only used when tank_location indicates the tank is located in a zone. From CBECC-Res. Constraint to use when implemented :Zone:

ServiceWaterHeatingUse

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`area_type`	Service Water Heating Loop Area Type	`<ServiceWaterHeatingSpaceType2019ASHRAE901>`				The enumeration is based on the standard used.
`water_serves_type`	The use of the water serves the type	`<ServiceWaterHeatingServesType>`				
`use`	Usage of service hot water	`Numeric`				
`use_units`	Type of units for use of service hot water	`<ServiceWaterHeatingUseUnits>`				
`use_multiplier_schedule`	Reference to the schedule containing the multiplier for the use of service hot water	`$ID`			✓	Constraint to use when implemented :Schedule:
`temperature_at_fixture`	Reference to the schedule containing the multiplier for the use of service hot water	`Numeric`	C			From RESNET
`is_heat_recovered_by_drain`	Indicates if heat is being recovered from the drain	`Boolean`				From CBECC-Res.
`is_recovered_heat_used_by_cold_side_feed`	Indicates if heat is being recovered from the drain is used on the cold side feed	`Boolean`				From CBECC-Res.

ExteriorLighting

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`type`	The type of exterior lighting fixture none	`<ExteriorLightingAreas2019ASHRAE901TableG36>`				
`area`	Area of the exterior functional space.	`Numeric`	m2	`>0`		
`length`	Linear length measure for exterior functional space	`Numeric`	m	`≥0`		For example, used when expressing street frontage or door width
`power`	Nominal power of exterior lighting fixtures	`Numeric`	W	`>0`		
`fixture_height`	Installation height of exterior fixture	`Numeric`	m	`>0`		

Refrigeration

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`type`	Refrigeration equipment type	`<RefrigerationType>`				
`equipment_category`	Equipment Class from referenced standard	`<RefrigerationCategory>`				
`is_self_contained`	Indicates whether unit is self-contained	`Boolean`				If not self-contained, show as false, and indicates that it has remote condenser
`application_temperature`	Equipment application temperature	`<ApplicationTemperatureType>`				Based on AHRI 1200
`energy_per_day`	Rated electrical energy use per day	`Numeric`	kWh			
`case_volume`	volume of a refrigerated case in cubic meters	`Numeric`	m3			
`total_display_area`	display area of a refrigerated case in square meters	`Numeric`	m2			

OverallSimulationOutputs

Name	Description	Data Type	Units	Range	Req	Notes
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓	
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`				
`notes`	Supplementary information to provide context to the model reviewer	`String`				
`refrigeration_energy_enduse`	Annual refrigeration energy end use from simulation output	`Numeric`	kWh			
`service_water_heating_annual_enduse_electricity`	Annual electricity energy end_use for SWH loops	`Numeric`	kWh	`≥0`		
`service_water_heating_annual_enduse_fossilfuel`	Annual fossil fuel energy end_use for SWH loops	`Numeric`	J	`≥0`		
`unmet_heating_load_hours`	total hours any HVAC Zone heating temperature setpoint not met	`Numeric`	J	`≥0`		JG to verify if used in test case description.
`unmet_cooling_load_hours`	total hours any HVAC Zone cooling temperature setpoint not met	`Numeric`	J	`≥0`		JG to verify if used in test case description.