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
`Reference`	A reference to an ID of a data group.	string	AHU-01
`Null`	Indicator that no value is provided. Only used in combination with other data types, e.g., 'Number/Null'.	null	null

String Types

String Type	Description	JSON Schema Pattern	Examples
`Timestamp`	Date with UTC time formatted per ISO 8601 (ISO 2004)	[0-9]{4}-[0-9]{2}-[0-9]{2}T[0-9]{2}:[0-9]{2}Z	2016-06-29T14:35Z

AirEconomizerOptions

Enumerator	Description	Notes
`FIXED_FRACTION`	Fixed Fraction	
`TEMPERATURE`	Dry-bulb temperature	
`ENTHALPY`	Enthalpy	

Enumerator	Description	Notes
DIFFERENTIAL_TEMPERATURE	Differential dry-bulb temperature	
DIFFERENTIAL_ENTHALPY	Differential enthalpy	
OTHER	Other	

ApplicationTemperatureOptions

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)
VERY_LOW	Very low	-26.1 C +/- 1.1 C (-15 F +/- 2 F). This corresponds to the ice cream category in AHRI 1200
OTHER	Other	

BoilerCombustionOptions

Enumerator	Description	Notes
NATURAL	Natural	
FORCED	Forced	

BoilerEfficiencyMetricOptions

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

ChillerCompressorOptions

Enumerator	Description	Notes
SCREW	Screw	
CENTRIFUGAL	Centrifugal	

Enumerator	Description	Notes
`RECIPROCATING`	Reciprocating	
`SCROLL`	Scroll	
`POSITIVE_DISPLACEMENT`	Positive displacement	
`HEAT_PUMP`	Heat pump	
`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	

ChillerEfficiencyMetricOptions

Enumerator	Description	Notes
`FULL_LOAD_EFFICIENCY`	Full Load Efficiency expressed as a coefficient of performance (COP)	At minimum, the full load efficiency should be one of the metrics and values specified.
`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	

CommonConstructionClassificationOptions

Enumerator	Description	Notes
`METAL_BUILDING`	Metal building	
`WOOD_FRAMED`	Wood-framed	
`INSULATION_ENTIRELY_ABOVE_DECK`	Insulation entirely above deck	
`ATTIC`	Attic	
`BELOW_GRADE_WALL`	Below-grade wall	
`STEEL_JOIST`	Steel joist	
`SLAB_ON_GRADE`	Slab-on-grade	
`OTHER`	Other	

CommonOutputSchemaOptions

Enumerator	Description	Notes
`OTHER`	other	

CommonRulesetModelOptions

Enumerator	Description	Notes
`USER`	The building model as described without consideration of the ruleset	
`PROPOSED`	The proposed building model	The proposed building model typically transformed from the USER model following specific changes for the ruleset

ComponentLocationOptions

Enumerator	Description	Notes
IN_ZONE	In a zone	The component is located in a zone modeled in the simulation e.g., heat transfer through the surfaces surrounding the zone may impact the space temperature. This should be used instead of the other enumeration options when the zone is being modeled in the simulation.
CONDITIONED	Conditioned	The component is not in a zone modeled in the simulation, and its location has thermal properties similar to those of a conditioned location.
SEMICONDITIONED	Semiconditioned	The component is not in a zone modeled in the simulation, and its location has thermal properties similar to those of a semi-conditioned location. It is usually kept warm enough to prevent freezing and often only cooled by passive ventilators.
OUTSIDE	Outside	The component is not in a zone modeled in the simulation, and its location has thermal properties similar to the outdoors.
GARAGE	Garage	The component is not in a zone modeled in the simulation, and its location has thermal properties similar to those of a garage. It may or may not have passive ventilators and share an insulated wall with a conditioned zone.
ATTIC	Attic	The component is not in a zone modeled in the simulation, and its location has thermal properties similar to those of an attic. It may have passive ventilators or not, is often warmer during summer, especially on sunny days, and may share an insulated ceiling with a conditioned zone.
CRAWL_SPACE	Crawl space	The component is not in a zone modeled in the simulation, and its location has thermal properties similar to those of a crawl space beneath a building. It may or may not have passive ventilators and share an insulated floor with a conditioned zone.
UNDERGROUND	Underground	The component is not in a zone modeled in the simulation, and its location has thermal properties similar to those of an underground area.

Enumerator	Description	Notes
`UNCONDITIONED`	Unconditioned	The component is not in a zone modeled in the simulation, and its location has thermal properties similar to those of an unconditioned area other than one of the other enumerations in this list.
`OTHER`	Other	The component is not in a zone modeled in the simulation, and its location has thermal properties similar to those of an area not otherwise described by a different enumeration.

ConditioningOptions

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

CoolingDesignDayOptions

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	

CoolingMetricOptions

Enumerator	Description	Notes
`FULL_LOAD_COEFFICIENT_OF_PERFORMANCE`	Full load efficiency expressed as a coefficient of performance at 35C/95F rated conditions	

Enumerator	Description	Notes
`FULL_LOAD_COEFFICIENT_OF_PERFORMANCE_NO_FAN`	Full load efficiency expressed as a coefficient of performance at 35C/95F rated conditions not including indoor fan power	Descibes the efficiency not including the indoor supply fan. The outdoor evaporator fan power is generally included.
`ENERGY_EFFICIENCY_RATIO`	EER - Energy efficiency ratio	
`SEASONAL_ENERGY_EFFICIENCY_RATIO`	SEER - Seasonal energy efficiency ratio	
`SEASONAL_ENERGY_EFFICIENCY_RATIO_2`	SEER2 - Seasonal energy efficiency ratio 2	
`INTEGRATED_ENERGY_EFFICIENCY_RATIO`	IEER - Integrated energy efficiency ratio	
`INTEGRATED_PART_LOAD_VALUE`	IPLV - Integrated part load value	
`COMBINED_ENERGY_EFFICIENCY_RATIO`	CEER - Combined energy efficiency ratio	
`COEFFICIENT_OF_PERFORMANCE_WATER_TO_AIR_WATER_LOOP`	Coefficient of performance at entering temperature of 30C/86F rated conditions for water loops per ISO 13256-1	
`COEFFICIENT_OF_PERFORMANCE_WATER_TO_AIR_GROUND_WATER`	Coefficient of performance at entering temperature of 15C/59F rated conditions for ground water per ISO 13256-1	

Enumerator	Description	Notes
COEFFICIENT_OF_PERFORMANCE_BRINE_TO_AIR_GROUND_LOOP	Coefficient of performance at entering temperature of 25C/77F rated conditions for ground water per ISO 13256-1	
COEFFICIENT_OF_PERFORMANCE_WATER_TO_WATER_WATER_LOOP	Coefficient of performance at entering temperature of 30C/86F rated conditions for water loops per ISO 13256-2	
COEFFICIENT_OF_PERFORMANCE_WATER_TO_WATER_GROUND_WATER	Coefficient of performance at entering temperature of 15C/59F rated conditions for ground water per ISO 13256-2	
COEFFICIENT_OF_PERFORMANCE_BRINE_TO_WATER_GROUND_LOOP	Coefficient of performance at entering temperature of 25C/77F rated conditions for ground water per ISO 13256-2	
NONE	None	
OTHER	Other	

CoolingSourceOptions

Enumerator	Description	Notes
CHILLED_WATER	Chilled water	
NONE	None	
OTHER	Other	

CoolingSystemOptions

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

DayOfWeekOptions

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

DehumidificationOptions

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

DemandControlVentilationControlOptions

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

DrawPatternOptions

Enumerator	Description	Notes
VERY_SMALL	Very small	
LOW	Low	
MEDIUM	Medium	
HIGH	High	
OTHER	Other	

ElectricalPhaseOptions

Enumerator	Description	Notes
SINGLE_PHASE	Single Phase	
THREE_PHASE	Three Phase	

ElevatorOptions

Enumerator	Description	Notes
HYDRAULIC	Hydraulic	
TRACTION	Traction	
OTHER	Other	

EnergyRecoveryOperationOptions

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

EnergyRecoveryOptions

Enumerator	Description	Notes
SENSIBLE_HEAT_EXCHANGE	Sensible heat exchange	
ENTHALPY_HEAT_EXCHANGE	Enthalpy heat exchange	
SENSIBLE_HEAT_WHEEL	Sensible heat wheel	
ENTHALPY_HEAT_WHEEL	Enthalpy heat wheel	
HEAT_PIPE	Heat pipe	
OTHER	Other	
NONE	None	

EnergyRecoverySupplyAirTemperatureControlOptions

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

EnergySourceOptions

Enumerator	Description	Notes
ELECTRICITY	Electricity	
NATURAL_GAS	Natural gas	
PROPANE	Propane	
FUEL_OIL	Fuel oil	
NONE	None	No energy consumption by a utility supplied source occurs
OTHER	Other	

ExternalFluidSourceOptions

Enumerator	Description	Notes
CHILLED_WATER	Chilled water	
HOT_WATER	Hot water	
STEAM	Steam	

FanSpecificationMethodOptions

Enumerator	Description	Notes
SIMPLE	Simple	Specify the electric power input of fan
DETAILED	Detailed	Specify the brake horse power, design pressure rise through, total efficiency, motor efficiency

FanSystemOperationOptions

Enumerator	Description	Notes
CYCLING	Cycling	
CONTINUOUS	Continuous	
KEEP_OFF	Off	
OTHER	Other	

FanSystemSupplyFanControlOptions

Enumerator	Description	Notes
CONSTANT	Constant	
VARIABLE_SPEED_DRIVE	Variable speed drive	
MULTISPEED	Multispeed	
INLET_VANE	Inlet vane	
DISCHARGE_DAMPER	Discharge damper	
OTHER	Other	

FanSystemSupplyFanVolumeResetOptions

Enumerator	Description	Notes
CONSTANT	Constant	
DESIGN_LOAD_RESET	Design Load Reset	
OPERATING_CAPACITY_RESET	Operating Capacity Reset	
OTHER	Other	

FanSystemTemperatureControlOptions

Enumerator	Description	Notes
CONSTANT	Constant	
OUTDOOR_AIR_RESET	Outdoor air reset	
ZONE_RESET	Zone reset	
LOAD_RESET_TO_SPACE_TEMPERATURE	Load Reset To Space Temperature	
LOAD_RESET_DIFFERENTIAL_TEMPERATURE	Load Reset Differential Temperature	
SCHEDULED	Scheduled	
OTHER	Other	

FluidLoopFlowControlOptions

Enumerator	Description	Notes
FIXED_FLOW	Fixed flow	
VARIABLE_FLOW	Variable flow	

FluidLoopOperationOptions

Enumerator	Description	Notes
CONTINUOUS	Continuous	
INTERMITTENT	Intermittent/on-demand	
SCHEDULED	Scheduled	

FluidLoopOptions

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

HeatRejectionFanOptions

Enumerator	Description	Notes
AXIAL	Axial or Propellor	
CENTRIFUGAL	Centrifugal	
OTHER	Other	

HeatRejectionFanSpeedControlOptions

Enumerator	Description	Notes
CONSTANT	Constant	

Enumerator	Description	Notes
TWO_SPEED	Two Speed	
VARIABLE_SPEED	Variable Speed	
OTHER	Other	

HeatRejectionFluidOptions

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

HeatRejectionOptions

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	

HeatingDesignDayOptions

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	

HeatingMetricOptions

Enumerator	Description	Notes
`HEAT_PUMP_COEFFICIENT_OF_PERFORMANCE_HIGH_TEMPERATURE`	Efficiency at 8.3C/47F dry bulb and 6.1C/43F wet bulb	
`HEAT_PUMP_COEFFICIENT_OF_PERFORMANCE_LOW_TEMPERATURE`	Efficiency at -8.3C/17F dry bulb and -9.4C/15F wet bulb	
`HEAT_PUMP_COEFFICIENT_OF_PERFORMANCE_HIGH_TEMPERATURE_NO_FAN`	Efficiency at 8.3C/47F dry bulb and 6.1C/43F wet bulb not including fan	Used for heat pump and descibes the efficiency not including the indoor supply fan. The outdoor evaporator fan power is generally included.
`HEAT_PUMP_COEFFICIENT_OF_PERFORMANCE_LOW_TEMPERATURE_NO_FAN`	Efficiency at -8.3C/17F dry bulb and -9.4C/15F wet bulb not including fan	Used for heat pump and descibes the efficiency not including the indoor supply fan. The outdoor evaporator fan power is generally included.
`THERMAL_EFFICIENCY`	Et - thermal efficiency	
`COMBUSTION_EFFICIENCY`	Ec - combustion` efficiency	
`ANNUAL_FUEL_UTILIZATION_EFFICIENCY`	AFUE - annual fuel utilization efficiency	
`HEATING_SEASONAL_PERFORMANCE_FACTOR`	HSPF - heating seasonal perfomrance factor	
`HEATING_SEASONAL_PERFORMANCE_FACTOR_2`	HSPF2 - heating seasonal perfomrance factor 2	

Enumerator	Description	Notes
COEFFICIENT_OF_PERFORMANCE_WATER_TO_AIR_WATER_LOOP	Coefficient of performance at entering temperature of 20C/68F rated conditions for water loops per ISO 13256-1	
COEFFICIENT_OF_PERFORMANCE_WATER_TO_AIR_GROUND_WATER	Coefficient of performance at entering temperature of 10C/50F rated conditions for ground water per ISO 13256-1	
COEFFICIENT_OF_PERFORMANCE_BRINE_TO_AIR_GROUND_LOOP	Coefficient of performance at entering temperature of 0C/32F rated conditions for ground water per ISO 13256-1	
COEFFICIENT_OF_PERFORMANCE_WATER_TO_WATER_WATER_LOOP	Coefficient of performance at entering temperature of 20C/68F rated conditions for water loops per ISO 13256-2	
COEFFICIENT_OF_PERFORMANCE_WATER_TO_WATER_GROUND_WATER	Coefficient of performance at entering temperature of 10C/50F rated conditions for ground water per ISO 13256-2	
COEFFICIENT_OF_PERFORMANCE_BRINE_TO_WATER_GROUND_LOOP	Coefficient of performance at entering temperature of 0C/32F rated conditions for ground water per ISO 13256-2	
NONE	None	

Enumerator	Description	Notes
OTHER	Other	

HeatingSourceOptions

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

HeatingSystemOptions

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

HeatpumpAuxiliaryHeatOptions

Enumerator	Description	Notes
ELECTRIC_RESISTANCE	Electric resistance	
FURNACE	Furnace	
NONE	None	
OTHER	Other	

HumidificationOptions

Enumerator	Description	Notes
ADIABATIC	Adiabatic	
NONE	None	
OTHER	Other	

InfiltrationMethodOptions

Enumerator	Description	Notes
WEATHER_DRIVEN	Weather Driven. The amount of air leakage is determined by using the infiltration_flow_rate with a correlation usually involving windspeed, height, and the difference between indoor and outdoor temperature and is then multiplied by the schedule.	
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 schedule is ignored.	
CONSTANT_SCHEDULED	Constant multiplied by the schedule.	
OTHER	Other infiltration methods.	

InsulationLocationOptions

Enumerator	Description	Notes
ABOVE_GROUND_WALL_EXTERIOR_CONTINUOUS	Continous insulation on exterior of an above ground wall	
ABOVE_GROUND_WALL_INTERIOR_CONTINUOUS	Continous insulation on interior of an above ground wall	
ABOVE_GROUND_WALL_FULL_CAVITY	Insulation within the cavity of an above ground wall that fills the entire cavity	
ABOVE_GROUND_WALL_PARTIAL_CAVITY	Insulation within the cavity of an above ground wall that fills only part of the cavity	

Enumerator	Description	Notes
`SLAB_HORIZONTAL_PERIMETER`	Insulation on underside of the slab covering the perimeter	
`SLAB_HORIZONTAL_FULL`	Insulation fully covering the underside of the slab	
`SLAB_VERTICAL`	Insulation applied vertically next to edge of slab	
`NONE`	None	
`OTHER`	Other	

LightingDaylightingControlOptions

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

LightingOccupancyControlOptions

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.

MiscellaneousEquipmentOptions

Enumerator	Description	Notes
`PLUG`	Plug	
`PROCESS`	Process	

Enumerator	Description	Notes
`INFORMATION_TECHNOLOGY_EQUIPMENT`	Information technology equipment	
`OTHER`	Other	

PumpSpecificationMethodOptions

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

PumpSpeedControlOptions

Enumerator	Description	Notes
`FIXED_SPEED`	Fixed speed	
`TWO_SPEED`	Two Speed	
`VARIABLE_SPEED`	Variable speed	
`OTHER`	Other	

RefrigeratedCaseEquipmentCategoryOptions

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	

Enumerator	Description	Notes
`OTHER`	Other	

RefrigeratedCaseOptions

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	

ScheduleOptions

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

ScheduleSequenceOptions

Enumerator	Description	Notes
`HOURLY`	Hourly	
`EVENT`	Event	

ServiceWaterHeaterTankOptions

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	

ServiceWaterHeatingConfigurationOptions

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	

Enumerator	Description	Notes
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	

ServiceWaterHeatingEfficiencyMetricOptions

Enumerator	Description	Notes
ENERGY_FACTOR	Energy factor	
UNIFORM_ENERGY_FACTOR	Uniform energy factor	See 10 CFR 430 Appendix E Uniform Test Method for Measuring the Energy Consumption of Water Heaters for more information.
THERMAL_EFFICIENCY	Thermal efficiency	
STANDBY_LOSS_FRACTION	Standby loss fraction	
STANDBY_LOSS_ENERGY	Standby loss fraction	Units are watts and can be converted from STANDBY_LOSS_FRACTION based forumulat found in CBECC-Res User Manual
OTHER	Other	

ServiceWaterHeatingFixtureOptions

Enumerator	Description	Notes
SHOWER	Shower	

Enumerator	Description	Notes
BATH	Bath	
RESTROOM_SINK	Restroom Sink	
DISHWASHER	Dishwasher	
KITCHEN_SINK	Kitchen sink	
WASH_SINK	Wash sink	
CLOTHES_WASHER	Clothes washing machine	
OTHER	Other	

ServiceWaterHeatingHeatRecoveryOptions

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

ServiceWaterHeatingUseUnitOptions

Enumerator	Description	Notes
POWER_PER_PERSON	Power per person	The units for the use that correspond to this are watts/person
POWER_PER_AREA	Power per area	The units for the use that correspond to this are watts/m2
POWER	Power	The units for the use that correspond to this are watts
VOLUME_PER_PERSON	Volume per person	The units for the use of hot water that correspond to this are liters/(minute-person)
VOLUME_PER_AREA	Volume per area	The units for the use of hot water that correspond to this are liters/(minute-m2)

Enumerator	Description	Notes
VOLUME	Volume	The units for the use of hot water that correspond to this are liters/minute
OTHER	Other	

SpaceFunctionOptions

Enumerator	Description	Notes
LABORATORY	Laboratory	
KITCHEN	Kitchen	
PLENUM	Plenum	A compartment or chamber, to which one or more ducts are connected, that forms a part of the air-distribution system and that is not used for occupancy or storage. The area of a plenum is not counted toward the floor area of a building.
CRAWL_SPACE	Crawl space	An unoccupied, unfinished, narrow space within a building, between the ground and the first (or ground) floor. The crawl space is so named because there is typically only enough room to crawl rather than stand; anything larger than about 1 to 1.5 metres (3 ft 3 in to 4 ft 11 in) and beneath the ground floor would tend to be considered a basement. The area of a crawl space is not counted toward the floor area of a building.
INTERSTITIAL_SPACE	Interstitial space	The area of load bearing surfaces located above or below occupied building floors that is not available for general occupancy often due to inadequate clear headroom or lack of provisions for egress, and containing building structure or services predominantly serving adjacent floors or to provide access to such systems. They are not part of the air distribution systen, conditioned, used for occupancy, or used for storage. Interstitial spaces often contain ducts, piping, conduit, and other components that serve the building systems. The area of a interstitial space is not counted toward the floor area of a building.
OTHER	Other	

StatusOptions

Enumerator	Description	Notes
`NEW`	New	
`EXISTING`	Existing	
`EXISTING_PLUS_NEW`	Existing plus new	
`FUTURE`	Future	
`ALTERED`	Altered	
`ALTERED_ROOF_SURFACE`	Altered roof surface	
`OTHER`	Other	

SubsurfaceClassificationOptions

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

SubsurfaceDynamicGlazingOptions

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

SurfaceAdjacencyOptions

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.	

Enumerator	Description	Notes
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.	

SurfaceClassificationOptions

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

SurfaceConstructionInputOptions

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

TemperatureResetOptions

Enumerator	Description	Notes
NO_RESET	No Reset	
OUTSIDE_AIR_RESET	Outside air reset	
LOAD_RESET	Load Reset	
OTHER	Other	

TerminalFanConfigurationOptions

Enumerator	Description	Notes
PARALLEL	Parallel	

Enumerator	Description	Notes
SERIES	Series	
OTHER	Other	

TerminalOptions

Enumerator	Description	Notes
VARIABLE_AIR_VOLUME	Variable air volume	
CONSTANT_AIR_VOLUME	Constant air volume	
RADIANT	Radiant	
BASEBOARD	Baseboard	
VARIABLE_REFRIGERANT_FLOW	Variable refrigerant flow indoor unit	
OTHER	Other	

TerminalTemperatureControlOptions

Enumerator	Description	Notes
CONSTANT	Constant	
LOAD_RESET_DIFFERENTIAL_TEMPERATURE	Load Reset Differential Temperature	
SCHEDULED	Scheduled	
OTHER	Other	

TransformerOptions

Enumerator	Description	Notes
DRY_TYPE	Dry Type	
FLUID_FILLED	Fluid Filled	
OTHER	Other	

WeatherFileDataSourceOptions

Enumerator	Description	Notes
HISTORIC_AGGREGATION	Historic data aggregated to represent typical weather	
HISTORIC_ACTUAL	Specific weather data for time period based on monitoring	
FUTURE	Weather data projected to represent future conditions	
OTHER	Other	

RulesetProjectDescription

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group.	ID			✓	All id data elements are shown as required so that that every data group can be explicitly identified. Almost no other data elements are shown as required but they may be required by specific rulesets.	unknown	True	True	True
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
schema_version	Version of the schema used for generating the file	String				Common versions may include 0.0.36 from the first public review period. This is the value of the version field in the top of the ASRAE229.schema.json file or the version in the ASHRAE229.schema.yaml Schema data group.				
data_timestamp	Date and time of data publication	Timestamp			✓	Date and time of publication of the data				
data_version	Integer version identifier for the data	Integer		≥1		Used by data publisher to track revisions of the data and shall be incremented for each data revision				
ruleset_model_descriptions	A list of the ruleset model descriptions within the project each with a unique ruleset_model_type.	[{RulesetModelDescription}]			✓	For submissions with ruleset model descriptions (i.e., user, proposed, baseline,...) generated as separate files, only one model description would be defined for each ASHRAE229 ruleset project description json file. For submissions where the software always produces all ruleset model descriptions together, multiple model descriptions would appear in the same ASHRAE229 ruleset project description json file. Some rulesets may restrict the submission process including the number of files and number of model descriptions per file. Multiple model descriptions may be required by rulesets that require models at various tiers or levels of performance. Model descriptions may also be used by References between data groups and are restricted to be within the same ruleset model description. For 90.1-2019 appendix G model descriptions would be created for the following models: user, proposed, baseline at 0 degrees, baseline at 90 degrees, baseline at 180 degrees, and baseline at 270 degrees. All IDs within a ruleset model description should be unique for each type of data group. Between ruleset model descriptions, IDs should be the same for the same component. For example, a Surface with an ID of LobbyFrontSurface is very likely to have the same geometry for all ruleset model descriptions except perhaps the azimuth so that surface should have the ID LobbyFrontSurface for all ruleset model descriptions.		unknown	unknown	unknown
calendar	Information on the calendar used with the simulation.	{Calendar}					False	True	True	True

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
weather	Information on the local weather conditions used with the simulation.	{weather}					secondary	True	True	True
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	<CompliancePathOptions2019ASHRAE901>					unknown	unknown	unknown	unknown
output_format_type	Indicates the chosen format for output	(<CommonOutputSchemaOptions>, <OutputSchemaOptions2019ASHRAE901>, <OutputSchemaOptions2019T24>, OutputSchemaOptionsRESNET)					unknown	unknown	unknown	unknown

RulesetModelDescription

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		unknown	unknown	unknown	unknown
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					unknown	unknown	unknown	unknown
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
type	Describes the current ruleset model description for rulesets with multiple simulation models	(<CommonRulesetModelOptions>, <RulesetModelOptions2019ASHRAE901>, <RulesetModelOptionsRESNET>, <RulesetModelOptions2019T24Com>, <RulesetModelOptions2019T24Res>)			✓	Will usually designate which simulation this RulesetModelDescription refers to such as: PROPOSED, BASELINE_0, USER, RATED, REFERENCE	unknown	unknown	unknown	unknown
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.	False	True	True	True
buildings	Buildings on the site	[{Building}]				Contains a list of buildings on the site (often just one).	secondary	True	True	True
schedules	Schedules for internal loads, thermostats, equipment operation and control, and any other need.	[{Schedule}]				Contains a list of schedules used in model.	False	True	False	False
measured_infiltration_pressure_difference	Differential pressure difference used during measurement for infiltration values.	Numeric	Pa	≥0		Used as rating conditions for air leakage for a building. The most common values used are 50 Pa or 75 Pa since they correspond to common rating conditions. For the model of actual building value this value would be measured but for created baseline or reference model this could be an assumed value.	unknown	unknown	unknown	unknown
is_measured_infiltration_based_on_test	Indicates whether the differential pressure difference used during measurement for infiltration values is based on pressure testing of the building.	Boolean					False	unknown	unknown	unknown
altitude	Altitude of the building at ground level.	Numeric	m	>-1000, <10000		Altitude of the building site above sea level and used for adjusting airflows. If the altitude is not provided, it is assumed to be zero and airflows are already normalized to sea level.	unknown	unknown	True	True
fluid_loops	Fluid loops on the site	[{FluidLoop}]				Contains a list of fluid loops on the site that are not child loops. In primary/secondary piping systems or more complicated piping systems, this data element should include a list of the the primary loops. Child loops should appear in FluidLoop.child_loops.	Secondary	True	True	False
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.	False	False	unknown	unknown
service_water_heating_equipment	Service water heating equipment on the site	[{ServiceWaterHeatingEquipment}]				Contains a list of service water heating equipment at the site.	unknown	unknown	unknown	unknown
pumps	Pumps used on the site	[{Pump}]					Secondary	True	True	False
boilers	Boilers used on the site	[{Boiler}]					Secondary	True	True	False
chillers	Chillers used on the site	[{Chiller}]					Secondary	True	True	False
heat_rejections	HeatRejections used on the site	[{HeatRejection}]					unknown	True	True	False
external_fluid_sources	ExternalFluidSources used on the site	[{ExternalFluidSource}]				The sources of energy, such as district chilled water, district hot water, and district steam.	False	True	True	True
site_zone_type	Site zone type for Sec 9.4.2	<ExteriorLightingZoneOptions2019ASHRAE901>				The site designation type for exterior lighting classification.	False	True	True	True
output	Output	({Output2019ASHRAE901})					unknown	unknown	unknown	unknown

Building

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		Secondary	True	True	True
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					False	False	False	False
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
`building_segments`	Large portions of a building that share a building area type	`[{BuildingSegment}]`				Contains a list of building segments in the building.	False	True	True	True
`elevators`	Elevators	`[{Elevator}]`				Contains a list of elevators in the building.	False	True	True	True
`exterior_lighting`	Exterior lighting systems	`[{ExteriorLighting}]`				Contains a list of exterior lighting systems for the building.	False	True	True	unknown
`refrigerated_cases`	Refrigerated cases	`[{RefrigeratedCase}]`				Contains a list of refrigerated cases in the building.	False	True	True	True
`building_open_schedule`	Reference to the schedule indicating when the building is open	`Reference`				One represent when the building is open and zero when closed. If the schedule is not present, 24 hour operation is assumed. Constraint to use when implemented :Schedule:	False	True	True	True
`has_site_shading`	Indicates whether the site has features that cast shadows on the building	`Boolean`					Primary	True	True	True
`number_of_floors_above_grade`	Number of floors above grade	`Numeric`		≥0		For the entire building including all building segments. Includes only floors that are not devoted solely to parking or unconditioned space.	Secondary	True	True	True
`number_of_floors_below_grade`	Number of floors below grade	`Numeric`		≥0		For the entire building including all building segments. Includes only floors that are not devoted solely to parking or unconditioned space.	Secondary	✓	✓	✓

BuildingSegment

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	True	True
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
number_of_floors_above_grade	Number of floors above grade	Numeric		≥0		For the portion of the building represented by the BuildingSegment.	Secondary	True	True	True
number_of_floors_below_grade	Number of floors below grade	Numeric		≥0		For the portion of the building represented by the BuildingSegment.	Secondary	True	True	True
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.	False	True	True	True
zones	Zones in the building segment	[{Zone}]				Contains a list of zones in the building.	Secondary	True	True	True
heating_ventilating_air_conditioning_systems	HVAC systems in the building segment	[{HeatingVentilatingAirConditioningSystem}]				Contains a list of HVAC systems in the building.	Secondary	True	True	False
area_type_vertical_fenestration	Building area classification used for vertical fenestration	<VerticalFenestrationBuildingAreaOptions2019ASHRAE901>				The enumeration is based on the standard used.	False	True	unknown	True
lighting_building_area_type	Building area lighting area type	<LightingBuildingAreaOptions2019ASHRAE901T9S1TG38>				The lighting building area type for the building segment. If used, options are provided in the ruleset specific enumerations. This data element may also be used for determining the building area type for other purposes such as target setting targets (like 90.1 building performanc factors) so it should be completed even when the lighting building area method is not used.	False	True	unknown	True
area_type_heating_ventilating_air_conditioning_system	Classification used for HVAC	<HeatingVentilatingAirConditioningBuildingAreaOptions2019ASHRAE901>				The enumeration is based on the standard used.	False	unknown	unknown	unknown
service_water_heating_area_type	Service water heating area type classification	<ServicewaterHeatingSpaceOptions2019ASHRAE901>				The enumeration is based on the standard used.		unknown	unknown	unknown

Zone

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓	No multipliers or floor multipliers are used with the Zone data group so each zone should be individually identified.	Secondary	True	True	True
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
spaces	Spaces in the zone	[{Space}]				Contains a list of spaces in the building.	Secondary	True	True	True
floor_name	Floor name	String				Used to group zones on a floor. Zones with the same floor name are on the same floor. Numbers may be used as part of the floor name such as Level 1. If a number is used it should increase for increasing heights and use negative values for stories generally below ground. The floor name should generally correspond to numbering of floors on the plans.	unknown	True	True	True
volume	Volume of the space	Numeric	m3	≥0			Secondary	True	True	True
surfaces	Surfaces surrounding the zone	[{Surface}]				Contains a list of surfaces that define the zone.	Secondary	True	True	True
conditioning_type	Space conditioning category	<ConditioningOptions>					False	False	False	False
infiltration	Airleakage into the zone.	{Infiltration}				References a single infiltration data group. If a zone includes multiple spaces and infiltration is specified at the space level the rates and schedules should be aggregated to the zone.	Primary	True	True	False
design_thermostat_cooling_setpoint	Setpoint temperature for cooling during occupied hours	Numeric	C			The cooling setpoint temperature for the zone at design conditions.	unknown	True	True	True

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
thermostat_cooling_setpoint_schedule	Reference to the schedule containing the cooling setpoint temperatures	Reference				If the schedule is not present, the design thermostat cooling setpoint is assumed to be constant. Constraint to use when implemented :Schedule:	unknown	True	True	False
design_thermostat_heating_setpoint	Setpoint temperature for heating during occupied hours	Numeric	C			The heating setpoint temperature for the zone at design conditions.	unknown	unknown	True	False
thermostat_heating_setpoint_schedule	Reference to the schedule containing the heating setpoint temperatures	Reference				If the schedule is not present, the design thermostat heating setpoint is assumed to be constant. Constraint to use when implemented :Schedule:	unknown	True	True	True
minimum_humidity_setpoint_schedule	Reference to the schedule containing the minimum relative humidity setpoint	Reference		≥0, ≤1		For schedule values use relative humidity expressed on a 0 to 1 scale. Constraint to use when implemented :Schedule:	unknown	unknown	unknown	unknown
maximum_humidity_setpoint_schedule	Reference to the schedule containing the maximum relative humidity setpoint	Reference		≥0, ≤1		For schedule values use relative humidity expressed on a 0 to 1 scale. Constraint to use when implemented :Schedule:	unknown	unknown	unknown	unknown
terminals	List of terminals	[{Terminal}]				Multiple terminals may be used such as from a VAV system, a DOAS, and a baseboard.	Primary	True	True	False
served_by_service_water_heating_system	A service water heating system distribution serving the zone	Reference				Contains the ID of the service water heating distribution system serving the zone. The ID is a unique identification for a specific ServiceWaterHeatingSystem data group. Constraint to use when implemented :ServiceWaterHeatingDistributionSystem:	unknown	unknown	unknown	unknown
transfer_airflow_rate	Airflow rate for transfer air	Numeric	L/s			Net transfer air. Positive values indicate transfer air in to the zone and negative values show transfer out of the zone.	unknown	unknown	unknown	unknown
transfer_airflow_source_zone	ID of the source zone for transfer air.	Reference				Constraint to use when implemented :Zone:	unknown	unknown	unknown	unknown
zonal_exhaust_fan	Zonal exhaust fan	{Fan}				References a fan that is used to exhaust air from the zone. The fan should be configured to not be connected from any other HVAC data group.	unknown	unknown	unknown	unknown
exhaust_airflow_rate_multiplier_schedule	Reference to the schedule containing the multiplier for the exhaust airflow rate	Reference				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	unknown	unknown	unknown	unknown
makeup_airflow_rate	Airflow rate for makeup air	Numeric	L/s	≥0			unknown	unknown	unknown	unknown
non_mechanical_cooling_fan_power	Non-mechanical cooling fan power	Numeric	W	≥0		The power consumed by a fan used in a non-mechanical cooling device such as a ceiling fan.	unknown	unknown	unknown	unknown
non_mechanical_cooling_fan_airflow	Non-mechanical cooling fan airflow	Numeric	L/s	≥0		The airflow of a fan used in a non-mechancial cooling device such as a ceiling fan.	unknown	unknown	unknown	unknown
air_distribution_effectiveness	Air distribution effectiveness	Numeric		≥0		The zone air distribution effectiveness as defined in ASHRAE Standard 62.1 and shown as Ez.	unknown	unknown	unknown	unknown
aggregation_factor	Aggregation factor	Numeric		≥1		A factor that has already been applied when modeling a zone that represents an aggregation of several individual zones shown on design documents. For example, if five dwelling units facing the same orientation are modeled as a single zone, the total volume of the zone and the total surface area of the zone should be five times the values of a single dwelling unit shown on the design documents and aggregation_factor should be set to 5. Another example, when three identical floors are modeled, the zones modeled for these floors should represent the volume of the zone on three floors, and the aggregation_factor should be set to 3. A final example would be a big box retail store with eight units serving the core zone, the total floor area of the spaces in the core zone should already account for the total area, and the aggregation_factor should be set to 8. The factor is chiefly used to determine the size range for heating and cooling equipment serving that zone. Used only to confirm the individual size of heating or cooling units serving the zone so that the efficiency for that size range can be looked up in tables of equipment efficiency by size range. By dividing the heating and cooling capacity of the zone by the aggregation_factor, the result would indicate the capacity of the individual units represented by equipment. For zones not representing any type of aggregation, this value should be one. The aggregation_factor is typically an integer but occasionally may include a fractional value. The total area of the spaces and the volume of the zone should already be multiplied by the factor.	unknown	unknown	unknown	unknown

Space

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	True	True
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
interior_lighting	Internal lighting that produce internal gains for a space.	[{InteriorLighting}]				References one or more InteriorLighting data groups that collectively define all interior lighting within the space.	unknown	True	True	False
miscellaneous_equipment	Miscellaneous equipment loads that produce internal gains for a space.	[{MiscellaneousEquipment}]				References one or more MiscellaneousEquipment that collectively describe all of the miscellaneous equipment in the space.	unknown	True	True	unknown
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.	Secondary	True	True	True
number_of_occupants	Number of occupants in the space	Numeric		≥0			False	True	True	True
occupant_multiplier_schedule	Reference to the schedule containing the multiplier for the number of occupants	Reference				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	False	True	True	True
occupant_sensible_heat_gain	Sensible heat gain of each occupant.	Numeric	W	≥0			False	True	True	True
occupant_latent_heat_gain	Latent heat gain of each occupant.	Numeric	W	≥0			unknown	unknown	unknown	unknown
status_type	Choice of new, existing, addition, alteration, etc.	<StatusOptions>					False	unknown	unknown	unknown
function	Generic function for the space.	<SpaceFunctionOptions>				The enumeration is based on the standard used.	False	False	unknown	unknown
envelope_space_type	Envelope space type classification	<EnvelopeSpaceOptions2019ASHRAE901>				The enumeration is based on the standard used. Often refered to as occupancy type.	unknown	unknown	unknown	True
lighting_space_type	Lighting space type classification	<LightingSpaceOptions2019ASHRAE901TG37>				The enumeration is based on the standard used.	False	True	unknown	True
ventilation_space_type	Ventilation space type classification	<VentilationSpaceOptions2019ASHRAE901>				The enumeration is based on the standard used.	False	unknown	unknown	unknown
service_water_heating_area_type	Service water heating area type classification	<ServiceWaterHeatingAreaOptions2019ASHRAE901>				The enumeration is based on the standard used.	False	unknown	unknown	unknown
service_water_heating_uses	List of service water heating uses	[{ServiceWaterHeatingUse}]							unknown	unknown

Infiltration

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	True	True

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	unknown	unknown
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	unknown	unknown
modeling_method	The software methodology chosen for modeling infiltration	<InfiltrationMethodOptions>					Primary	True	unknown	True
algorithm_name	Name of the algorithm used for modeling infiltration in the specific simulation engine.	String					Secondary	True	False	True
measured_air_leakage_rate	Meaured air leakage rate from infiltration of outside air	Numeric	L/s	≥0		Based on the pressure described in ASHRAE229.measured_infiltration_pressure_difference. If a zone includes multiple spaces and infiltration is specified at the space level the rates should be aggregated to the zone.	unknown	False	unknown	unknown
flow_rate	Design infiltration flow rate	Numeric	L/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. If a zone includes multiple spaces and infiltration is specified at the space level the rates should be aggregated to the zone.	Primary	True	True	False
multiplier_schedule	Referenced to the schedule containing the multiplier for the infiltration	Reference				If the schedule is not present, the multiplier is always one. If a zone includes multiple spaces and infiltration is specified at the space level the rates and schedules should be aggregated to the zone. Constraint to use when implemented :Schedule:	Secondary	✓	✓	✓

Surface

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	True	True
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
subsurfaces	Subsurfaces that are on the surface	[{Subsurface}]				Contains a list of surfaces that define the space.	Secondary	True	True	False
classification	Classification for the surface.	<SurfaceClassificationOptions>				Options for surface being interior or exterior wall, floor, or ceiling.	False	False	False	False
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.	Secondary	True	True	True
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)	Secondary	True	True	True
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. For rulesets with baseline rotations, the angle of the azimuth should be different for each baseline rotation.	Secondary	True	True	True

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
adjacent_to	Used to classify the conditions on the surface.	`(<SurfaceAdjacencyOptions>, <AdditionalSurfaceAdjacencyOptionsRESNET>, <AdditionalSurfaceAdjacencyOptions2019ASHRAE901>)`				Determines whether the other side of the surface is modeled and if not what assumptions should be used. Commonly, plenums do not need to be explicitly described for many rulesets and instead when a plenum is present in the simulation model, this field should be set to the what is adjacent to the other side of the plenum. For example, on the top floor with a plenum, EXTERIOR would be entered.	Secondary	True	True	True
adjacent_zone	ID of the adjacent zone for interior surface. Only required when adjacent zone is explicitly modeled when adjacent_to is set to INTERIOR.	`Reference`				Constraint to use when implemented :Zone:	False	True	True	True
does_cast_shade	Determines whether the surface is modeled as casting shade on other exterior surfaces	`Boolean`					False	True	True	False
construction	Construction description of surface.	`{Construction}`					Secondary	True	True	False
optical_properties	Optical properties of the surface.	`{SurfaceOpticalProperties}`					unknown	True	True	False
status_type	Choice of new, existing, addition, alteration, etc. for each ruleset.	`<StatusOptions>`						unknown	unknown	unknown

Construction

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	`ID`			✓		Secondary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
classification	Classification for the subsurface being window, skylight, door.	`(<CommonConstructionClassificationOptions>, <ConstructionClassificationOptions2019ASHRAE901>, <ConstructionClassificationOptions2019T24>)`					False	unknown	unknown	unknown
surface_construction_input_option	Identifies whether construction is entered layer-by-layer or simplified (R-value)	`<SurfaceConstructionInputOptions>`					Primary	True	True	True
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.	False	False	unknown	unknown
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.	Primary	False	unknown	unknown
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.	False	False	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
insulation_locations	List of locations for the insulation related to the surface that correspoond to the values in the r_values list	[<InsulationLocationOptions>]					unknown	unknown	unknown	unknown
u_factor	suface U-factor	Numeric	W/m2-K	≥0		Includes interior and exterior air films as specified by the referenced standard.	Primary	True	True	False
c_factor	surface C-factor	Numeric	W/m2-K	≥0		Typically used to describe the thermal perfromance of constructions used in below grade walls. It is the time rate of steady-state heat flow through unit area of a material or construction, induced by a unit temperature difference between the body surfaces. Note that the C-factor does not include soil or air films.	Primary	True	True	False
f_factor	surface F-factor	Numeric	W/m-K	≥0		Typically used to describe the thermal perfromance of constructions used in slab-on-grade floors. It is the heat transfer through the floor, induced by a unit temperature difference between the outside and inside air temperature, on the per linear length of the exposed perimeter of the floor.	Primary	True	True	False
r_values	List of r-value of the insulation for the surface that correspond to values in the insulation_locations list	[Numeric]	K-m2/W	≥0			False	False	unknown	unknown
has_radiant_heating	Includes embedded radiant heating elements	Boolean					False	unknown	unknown	unknown
has_radiant_cooling	Includes embedded radiant cooling elements	Boolean						unknown	unknown	unknown

Material

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	unknown	unknown	unknown
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					unknown	unknown	unknown	unknown
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
thickness	The thickness of the material layer	Numeric	m	>0			Secondary	unknown	unknown	unknown
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.	Secondary	unknown	unknown	unknown
density	The density of the material layer	Numeric	kg/m3	≥0			False	unknown	unknown	unknown
specific_heat	The specific heat of the material layer	Numeric	J/kg-K	≥0			False	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`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.		unknown	unknown	unknown

SurfaceOpticalProperties

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		False	True	True	True
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					False	False	False	False
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	False	False	False
`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	False	True	False	False
`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	False	True	False	False
`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	False	False	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`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	False	False	unknown	unknown
`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	False	False	unknown	unknown
`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			unknown	unknown

Subsurface

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		Secondary	True	True	False
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					False	False	unknown	unknown
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	unknown	unknown
`classification`	Classification for the subsurface being window, skylight, door.	`<SubsurfaceClassificationOptions>`					False	True	True	True
`subclassification`	Standard specific subclassification for subsurfaces	`<SubsurfaceSubclassificationOptions2019ASHRAE901>`					False	unknown	unknown	unknown
`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.	False	False	unknown	unknown
`has_open_sensor`	Has sensor and reports to building control system when the window or door is open.	`Boolean`					False	False	unknown	unknown
`framing_type`	The material of the framing.	`<SubsurfaceFrameOptions2019ASHRAE901>`				This applies to windows and skylights but not to doors.	False	False	unknown	unknown
`glazed_area`	Area of subsurface including glass and transparent surfaces	`Numeric`	m2	≥0			Secondary	True	True	False
`opaque_area`	Area of subsurface framing for a window or skylight or opaque portion for a door.	`Numeric`	m2	≥0			Secondary	True	True	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
u_factor	Overall Subsurface U-factor	Numeric	W/m2-K	≥0		Includes interior and exterior air films as specified by the referenced standard.	Primary	True	True	False
dynamic_glazing_type	Type of dynamic glazing for the window subsurface	<SubsurfaceDynamicGlazingOptions>				Indicates if the glazed subsurface can change it's performance properties and if it is automatic or not.	False	True	True	False
solar_heat_gain_coefficient	Subsurface SHGC	Numeric		≥0		For dynamic glazing represents the minimum SHGC	Secondary	True	True	False
maximum_solar_heat_gain_coefficient	Maximum Subsurface SHGC for Dynamic Glazing	Numeric		≥0		Only used for dynamic glazing	False	unknown	unknown	unknown
visible_transmittance	Subsurface VT	Numeric		≥0		For dynamic glazing represents the maximum visible transmittance	False	True	True	False
minimum_visible_transmittance	Minimum Subsurface VT for Dynamic Glazing	Numeric		≥0		Only used for dynamic glazing	False	unknown	unknown	unknown
depth_of_overhang	Distance from the edge of the overhang to the subsurface.	Numeric	m	≥0			False	unknown	unknown	unknown
has_shading_overhang	Identifies whether subsurface has overhangs	Boolean					unknown	unknown	unknown	unknown
has_shading_sidefins	Identifies whether subsurface has sidefins	Boolean					unknown	unknown	unknown	unknown
has_manual_interior_shades	Are there manually-operated interior shading such as blinds, curtains or shades	Boolean					False	True	False	True
solar_transmittance_multiplier_summer	Solar transmittance multiplier for summer	Numeric		≥0		Often used to account for interior shading such as drapes.	False	False	unknown	unknown
solar_transmittance_multiplier_winter	Solar transmittance multiplier for summer	Numeric		≥0		Often used to account for interior shading such as drapes.	False	False	unknown	unknown
has_automatic_shades	Are there automatic interior shading such as blinds, curtains or shades	Boolean					False	True	True	unknown
status_type	Choice of new, existing, addition, alteration, etc. for each ruleset.	<StatusOptions>						unknown	unknown	unknown

InteriorLighting

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		unknown	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
purpose_type	Lighting purpose type classification	<LightingPurposeOptions2019ASHRAE901>				The enumeration is based on the standard used.	False	False	False	False
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.	False	True	True	False
lighting_multiplier_schedule	Reference to the schedule containing the multiplier for lighting	Reference				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	False	True	True	False
occupancy_control_type	Indicates the type of occupancy controls	<LightingOccupancyControlOptions>					False	True	True	False
daylighting_control_type	Indicates the type of daylighting controls	<LightingDaylightingControlOptions>					False	True	True	False
are_schedules_used_for_modeling_occupancy_control	Indicates that schedule values are used for modeling the impacts of occupancy controls on lighting.	Boolean					False	True	True	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
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	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
energy_type	Source of energy for the miscellaneous equipment in the space	<EnergySourceOptions>				To indicate that the energy is not accounted for by any utility supplied source, choose NONE. To indicate equipment with a energy source from a Loop choose OTHER	False	True	True	True
power	Power for miscellaneous equipment in space	Numeric	W			The value of power for the miscellaneous equipment in the space that when multiplied by the schedule is the consumption of power (for electricity or other energy_type's) for each period in the schedule.	Secondary	True	True	False
multiplier_schedule	Reference to the schedule containing the multiplier for miscellaneous equipment power in the space.	Reference				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	Secondary	True	True	False
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.	Secondary	unknown	True	True
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.	Secondary	unknown	True	True
remaining_fraction_to_loop	Referenced to the water fluid loop for the remaining fraction	Reference				If sensible_fraction and latent_fraction add up to less than 1.0 and this field is specified then the chilled water or condenser water loop specified gets the remaining fraction of the miscellenous load. Constraint to use when implemented :FluidLoop:	unknown	unknown	unknown	unknown
energy_from_loop	Referenced to the loop serving as the source of energy	Reference				References the loop that is the source of energy for the miscellenous equipment. Example would be hot water that is used for laundry in the zone. When this is used the energy_type should be set to OTHER. Constraint to use when implemented :FluidLoop:	unknown	unknown	unknown	unknown
type	Type of miscellaneous equipment	<MiscellaneousEquipmentOptions>					False	unknown	unknown	unknown
automatic_controlled_percentage	Fraction of receptacles that have automatic controls.	Numeric		≥0, ≤1			unknown	unknown	unknown	unknown

Transformer

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		False	True	True	True
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
type	The type of transformer	<TransformerOptions>					False	True	True	True
phase	The number of electrical phases	<ElectricalPhaseOptions>					False	True	True	True
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.	False	True	True	False
capacity	Rated Capacity of the Transformer	Numeric	V-A	≥0			False	True	True	False
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	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
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 RMDs. Examples include thermostat, multiplier for lighting, availability for equipment.	False	False	False	False
sequence_type	Schedule sequence type	<ScheduleSequenceOptions>					Seconary	True	True	True

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
hourly_values	Hourly Values of Schedule	[Numeric][0..8784]				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.	True	True	True	False
hourly_heating_design_day	Hourly values for heating design day	[Numeric][0..24]				Used when schedule_sequence_type is HOURLY.	unknown	unknown	unknown	unknown
hourly_heating_design_year	Hourly values for heating design year	[Numeric][0..8784]				Used when schedule_sequence_type is HOURLY. Use when more than a 24 hour period was used for sizing. Values with the value -999 will be ignored.	unknown	unknown	unknown	unknown
hourly_cooling_design_day	Hourly values for cooling design day	[Numeric][0..24]				Used when schedule_sequence_type is HOURLY.	unknown	unknown	unknown	unknown
hourly_cooling_design_year	Hourly values for cooling design year	[Numeric][0..8784]				Used when schedule_sequence_type is HOURLY. Use when more than a 24 hour period was used for sizing. Values with the value -999 will be ignored.	unknown	unknown	unknown	unknown
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.	unknown	unknown	unknown	unknown
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.	unknown	unknown	unknown	unknown
event_times_heating_design_day	Event times when the schedule changes for heating design day	[Numeric]	s			Used when schedule_sequence_type is EVENT.	unknown	unknown	unknown	unknown
event_values_heating_design_day	Event value at corresponding event time for heating design day	[Numeric]				Used when schedule_sequence_type is EVENT. New values starting at corresponding to the event time until following event time minus one second.	unknown	unknown	unknown	unknown
event_times_cooling_design_day	Event times when the schedule changes for cooling design day	[Numeric]	s			Used when schedule_sequence_type is EVENT.	unknown	unknown	unknown	unknown
event_values_cooling_design_day	Event value at corresponding event time for cooling design day	[Numeric]				Used when schedule_sequence_type is EVENT. New values starting at corresponding to the event time until following event time minus one second.	unknown	unknown	unknown	unknown
type	The type of schedule	<ScheduleOptions>				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.	Secondary	True	True	False
prescribed_type	Options when any schedule values have changed from what appears in the schedule library	<PrescribedScheduleOptions2019ASHRAE901>				Some rule sets prescribe which schedules to use for modeling purposes. This option indicates if the schedule is as prescribed or has been modified.	False	False	False	False
is_modified_for_workaround	True if any schedule has been modified for a workaround	Boolean				Not all technologies can be modeled directly in the simulation program. Modifiying schedules is a common workaround for modeling some technologies. This flag is used to indicate when a schedule has been modified for this purpose.		unknown	unknown	unknown

Calendar

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
day_of_week_for_january_1	Day of the week for January 1	<DayOfWeekOptions>					unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`is_leap_year`	The schedules assume it is a leap year	`Boolean`				This value is true if the calendar and schedules include February 29.	unknown	unknown	unknown	unknown
`has_daylight_saving_time`	The schedules adjust for Daylight Saving Time	`Boolean`				This value should be true if the modeled calendar includes daylight saving time.	unknown	unknown	unknown	unknown

Weather

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
`ground_temperature_schedule`	Ground temperature schedule name	`Reference`				Constraint to use when implemented :Schedule:	unknown	True	True	True
`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.	unknown	unknown	unknown	unknown
`data_source_type`	Data source use for the weather file.	`<weatherFileDataSourceOptions>`					unknown	unknown	unknown	unknown
`climate_zone`	The designation of the climate zone where the building is located	`<ClimateZoneOptions2019ASHRAE901>`				The enumeration is based on the standard used.	False	True	True	True
`cooling_design_day_type`	The frequency of occurance type for cooling design day	`<CoolingDesignDayOptions>`					False	True	False	False
`heating_design_day_type`	The frequency of occurance type for heating design day	`<HeatingDesignDayOptions>`					unknown	unknown	unknown	unknown

Elevator

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		False	False	True	True
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					False	False	False	False
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`type`	The type of elevator	`<ElevatorOptions>`					unknown	unknown	unknown	unknown
`number_of_floors_served`	Number of floors served by the elevator. This includes all unique full height building levels adjacent to the elevator shaft that are between the top and bottom floors where the elevator opens. Exclude levels serving only parking garages or other levels explicity not part of the building.	`Numeric`		≥1			unknown	unknown	True	True
`motor_location_zone`	Zone where the heat from the motor goes	`Reference`				When specified, it is the zone the heat from the elevator motor get added to. Constraint to use when implemented :Zone:	unknown	unknown	unknown	unknown
`motor_heat_fraction`	Fraction of heat from the motor that is added as a sensible load zone.	`Numeric`		≥0, ≤1			unknown	unknown	unknown	unknown
`cab_location_zone`	Zone where the heat from the cab goes	`Reference`				When specified, it is the zone the heat from the cab get added to to the zone including lighting heat, fan heat, and accessory heat. Constraint to use when implemented :Zone:	unknown	unknown	unknown	unknown
`cab_heat_fraction`	Fraction of heat from the cab that is added as a sensible load zone.	`Numeric`		≥0, ≤1		When specified, it is the fraction of the heat from the cab that gets added to the zone including lighting heat, fan heat, and accessory heat	unknown	unknown	unknown	unknown
`is_variable_speed_motor`	If the elevator uses a variable speed motor drive	`Boolean`					unknown	unknown	unknown	unknown
`motor_power`	Elevator average hourly peak motor power	`Numeric`	W			The motor power can be provided either together with or, instead of, the detailed elements used to calculate it.	False	True	True	False
`cab_counterweight`	Elevator car counterweight	`Numeric`	kg				False	True	True	True
`cab_weight`	Weight of elevator car	`Numeric`	kg				False	True	True	True

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
design_load	Elevator load at which to operate	Numeric	kg				False	True	True	True
speed	Design speed of the elevator	Numeric	m/s				False	True	True	True
cab_area	Floor area of elevator cab	Numeric	m2				False	True	True	True
cab_lighting_power	Lighitng power of cab	Numeric	W				False	True	True	False
cab_ventilation_fan_power	Ventilation fan power of cab	Numeric	W				False	True	True	False
cab_ventilation_fan_flow	Airflow of cab ventfan	Numeric	L/s				False	True	True	False
cab_motor_multiplier_schedule	Elevator motor operation multiplier schedule name	Reference				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	False	True	True	True
cab_ventilation_fan_multiplier_schedule	Elevator ventilation fan operation mulitplier schedule name	Reference				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	False	True	True	False
cab_lighting_multiplier_schedule	Elevator lighting multiplier schedule name	Reference				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:		✓	✓	

HeatingVentilatingAirConditioningSystem

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		unknown	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
fan_system	Fan system	{FanSystem}				One FanSystem for each HeatingVentilatingAirConditioningSystem so if a direct outdoor air system is used a second Zone Terminal should be specified with a separate HeatingVentilatingAirConditioningSystem.	unknown	True	True	False
heating_system	Heating system	{HeatingSystem}				References the HeatingSystem data group that acts as the main heating system or coil for this HVAC System. If the HVAC system does not have a heating system, this entry can be left blank, or the HeatingSystem HeatingSystemOptions can be set to equal NONE.	Secondary	True	False	False
cooling_system	Cooling system	{CoolingSystem}				References the CoolingSystem data group associated with this HVAC System. If the HVAC system does not have a cooling system, this entry can be left blank, or the CoolingSystem CoolingSystemOptions can be set to equal NONE.	Secondary	True	False	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
preheat_system	Pre-heating system	{HeatingSystem}				References a HeatingSystem data group that provides preheat to this HVAC System. Preheat is typically a coil used to temper cold air entering an HVAC systm often when high quantities of outdoor air is expected. If the HVAC system does not have a preheat system, this entry can be left blank, or the HeatingSystem HeatingSystemOptions can be set to equal NONE in the referenced data group.	Secondary	True	False	False
humidification_type	Humidification type	<HumidificationOptions>					False	True	True	False
status_type	Choice of new, existing, addition, alteration, etc. for each ruleset.	<StatusOptions>							✓	✓

HeatingSystem

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	string					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	string				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
type	Heating system type	<HeatingSystemOptions>				System configurations that typically are at the zone and include a compressor (such as packaged terminal air conditioning, packaged terminal heat pumps, window air conditioning units, and water loop heat pumps) should be reported in the schema using HeatingSystem and CoolingSystem. Systems that include gas or electric furnaces should be reported in the schema using HeatingSystem. Distributed systems where each zone is individually served by dedicated fans and/or coils (such as four-pipe fan coil, two-pipe fan coil, radiant systems, baseboards, chilled beams, and variable refrigerant flow indoor units) should be reported in the schema using Terminal with the cooling and heating described in the cooling_source and heating_source data elements (and any other relevant Terminal Data elements). Evaporative cooling systems should be described in CoolingSystem. Passive diffusers with no coil or fan should be described in Terminal.	Primary	True	True	False
energy_source_type	Source of energy for the heating system	<EnergySourceOptions>					Primary	True	True	False
hot_water_loop	Referenced to the hot water fluid loop	Reference				Constraint to use when implemented :FluidLoop:	Primary	True	True	False
water_source_heat_pump_loop	Referenced to the water fluid loop to support water source heat pumps	Reference				Constraint to use when implemented :FluidLoop:	unknown	unknown	unknown	unknown
design_capacity	Design heating capacity	Numeric	W	≥0		Design capacity may be determined by sizing performed by the software. This value should be provided if sized by the simulation software as an output or explicitly provided as a simulation input.	Primary	True	True	False
rated_capacity	Rated heating capacity	Numeric	W	≥0		At rating conditions. The rated capacity is generally used to determine efficiency level when efficiency level is based on size. It is net heating capacity taking into account the heat from the indoor fan.	unknown	unknown	unknown	unknown
oversizing_factor	The oversizing factor applied to the peak load that results in the heat capacity. Zero indicates no oversizing.	Numeric		≥0		Used for furnace or heat pump.	Primary	True	True	False
is_calculated_size	True if the component is sized by software	Boolean				Determined in accordance with generally accepted engineering standards. For capacities determinied by software, including the simulation software, this should be true. For capacities that are autosized values should be true. Typically when true, the sizing is based on one or more design days, or other time periods, and should be consistent with the weather.heating_design_day_type. For capacities reflecting the an actual piece of equipment this should be false.	Primary	True	True	False
heating_coil_setpoint	Setpoint of the air leaving the heating coil	Numeric	C			The setpoint of the air leaving the heating coil at design conditions.	Primary	True	True	False
efficiency_metric_values	List of efficiency metric values that correspond to the descriptors in efficiency_metric_types list	[Numeric]	W/W			Used for furnace or heat pump.	unknown	unknown	unknown	unknown
efficiency_metric_types	List of efficiency metrics that correspond to the values in efficiency_metric_values list	[<HeatingMetricOptions>]				Used for furnace or heat pump.	unknown	unknown	unknown	unknown
heatpump_auxiliary_heat_type	Heatpump auxiliary heat type used for backup	<HeatpumpAuxiliaryHeatOptions>					Primary	True	True	False
heatpump_auxiliary_heat_high_shutoff_temperature	Heatpump auxiliary heat high temperature shutoff	Numeric	C			The auxiliary heat is available at or below this outside temperature to satisfy the load. If this temperature is higher than heatpump_low_shutoff_temperature then between the two temperatures, the heat pump is energized first and if any load remains, then the auxiliary heat is energized.	Primary	True	True	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
heatpump_low_shutoff_temperature	Heatpump low temperature shutoff	Numeric	C			The heat pump is available at above this outdoor temperature to satsify the load. The heat pump is always energized first to meet any heating load prior to the use of auxiliary heat. For heat pumps with no lower temperature limit, this value should not be provided or else set to -999.	Primary	✓	✓	

CoolingSystem

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	False	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
type	Cooling system type	<CoolingSystemOptions>				System configurations that typically are at the zone and include a compressor (such as packaged terminal air conditioning, packaged terminal heat pumps, window air conditioning units, and water loop heat pumps) should be reported in the schema using HeatingSystem and CoolingSystem. Systems that include gas or electric furnaces should be reported in the schema using HeatingSystem. Distributed systems where each zone is individually served by dedicated fans and/or coils (such as four-pipe fan coil, two-pipe fan coil, radiant systems, baseboards, chilled beams, and variable refrigerant flow indoor units) should be reported in the schema using Terminal with the cooling and heating described in the cooling_source and heating_source data elements (and any other relevant Terminal Data elements). Evaporative cooling systems should be described in CoolingSystem. Passive diffusers with no coil or fan should be described in Terminal.	Primary	True	True	False
design_total_cool_capacity	Design total cooling capacity	Numeric	W	≥0		Designed total cooling capacity. Design capacity may be determined by sizing performed by the software. This value should be provided if sized by the simulation software as an output or explicitly provided as a simulation input.	Primary	True	True	False
design_sensible_cool_capacity	Design sensible cooling capacity	Numeric	W	≥0		Designed sensible cooling capacity. Design sensible capacity may be determined by sizing performed by the software. This value should be provided if sized by the simulation as an output or explicitly provided as a simulation input.	Primary	True	True	False
rated_total_cool_capacity	Rated total cooling capacity	Numeric	W	≥0		At rating conditions. The rated capacity is generally used to determine efficiency level when efficiency level is based on size. It is net cooling capacity taking into account the heat from the indoor fan.	unknown	unknown	unknown	unknown
rated_sensible_cool_capacity	Rated sensible cooling capacity	Numeric	W	≥0		At rating conditions. The rated capacity is generally used to determine efficiency level when efficiency level is based on size. It is net sensible cooling capacity taking into account the heat from the indoor fan.	unknown	unknown	unknown	unknown
oversizing_factor	The oversizing factor applied to the peak load that results in the cool capacity. Zero indicates no oversizing.	Numeric		≥0			Primary	True	True	False
is_calculated_size	True if the component is sized by software	Boolean				Determined in accordance with generally accepted engineering standards. For capacities determinined by software, including the simulation software, this should be true. For capacities that are autosized values should be true. Typically when true, the sizing is based on one or more design days, or other time periods, and should be consistent with the weather.cooling_design_day_type. For capacities reflecting the an actual piece of equipment this should be false.	Primary	True	True	False
chilled_water_loop	Referenced to the Chilled water fluid loop	Reference				Constraint to use when implemented :FluidLoop:	Primary	True	True	False
condenser_water_loop	Referenced to the Condenser water fluid loop	Reference				Constraint to use when implemented :FluidLoop:	Primary	True	True	False
efficiency_metric_values	List of efficiency metric values that correspond to the descriptors in efficiency_metric_types list	[Numeric]	W/W			Used for direct expansion.	unknown	unknown	unknown	unknown
efficiency_metric_types	List of efficiency metrics that correspond to the values in efficiency_metric_values list	[<CoolingMetricOptions>]				Used for direct expansion.	unknown	unknown	unknown	unknown
dehumidification_type	Dehumidification type	<DehumidificationOptions>					False	unknown	True	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
cooling_turndown_ratio	Cooling turndown ratio	Numeric				Cooling capacity turndown before simultaneous heating and cooling occurs.	unknown	unknown	✓	

FanSystem

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Primary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
supply_fans	List of supply fans	[{Fan}]				List of fans that supply air by the HVAC system and are located in the building.	Primary	True	True	False
return_fans	List of return fans	[{Fan}]				List of fans that return air to the HVAC system and are located in the building.	Primary	True	True	False
exhaust_fans	List of exhaust fans	[{Fan}]				List of fans that exhaust air from the building either at the air handler or located in various spaces. The fans are located in the building.	Primary	True	True	False
relief_fans	List of relief fans	[{Fan}]				List of fans that exhaust air from the building at the air handler to maintain proper pressurization. The fans are located in the building.	Unknown	True	True	False
air_economizer	Air side economizer related to the fan system	{AirEconomizer}					Primary	True	True	False
air_energy_recovery	Air side energy recovery related to the fan system	{AirEnergyRecovery}					Primary	True	True	False
temperature_control	Supply air temperature control type	<FanSystemTemperatureControlOptions>					Primary	True	True	False
operation_during_occupied	Operation during occupied times type	<FanSystemOperationOptions>					Primary	True	True	False
operation_during_unoccupied	Operation during unoccupied times type	<FanSystemOperationOptions>					Primary	True	True"unknown"	False
has_lock_out_central_heat_during_unoccupied	Locks out the use of central heating during unoccupied hours	Boolean				Typically used when zone has heating coil available that can serve unoccupied heating load.	unknown	unknown	unknown	unknown
fan_control	Supply fan control type	<FanSystemSupplyFanControlOptions>					Primary	True	True	False
reset_differential_temperature	Supply air temperature reset differential temperature at minimum cooling load	Numeric	K			When temperature_control is LOAD_RESET_TO_SPACE_TEMPERATURE this temperate is added to the supply air temperature at minimum cooling load conditions. When temperature_control is LOAD_RESET_DIFFERENTIAL_TEMPERATURE this temperate is the temperate below space temapture when no cooling load. The supply air temperature is specified in Terminal.	Primary	True	True	False
supply_air_temperature_reset_load_fraction	Supply air temperature reset load fraction	Numeric				When temperature_control is LOAD_RESET_TO_SPACE_TEMPERATURE, this is the threshold fraction below which supply air temperature reset begins. Between the stated load fraction and 0% load the supply air temperature is ramped linearly until the supply air temperature reaches the zone. The supply air temperature is specified in Terminal.	Primary	True	True	False
supply_air_temperature_reset_schedule	Supply air temperature reset schedule	Reference				The supply air temperature is specified in Terminal. Constraint to use when implemented :Schedule:	Primary	True	True	False
fan_volume_reset_type	Fan volume reset control type	<FanSystemSupplyFanVolumeResetOptions>					Primary	True	True	False
fan_volume_reset_fraction	Fan volume reset load fraction	Numeric				When fan_volume_reset_type is DESIGN_LOAD_RESET this is the fraction of the design load that corresponds to minimum air flow. When fan_volume_reset_type is OPERATING_CAPACITY_RESET this is the fraction of the instanteous operating capacity that corresponds to minimum air flow.	Primary	True	True	False
operating_schedule	Operating schedule name	Reference				If the schedule is not present, the fansystem is always operating. Schedule values of zero when fan is scheduled to be off and one when the fan is scheduled to be on. While a zero indicates the fan is off, it may still be activated during that hour by other controls such as providing fan cycling at night to maintain the unoccupied set point. No values beside 0 and 1 are allowed. Constraint to use when implemented :Schedule:	Primary	True	True	False
minimum_airflow	Minimum volume airflow	Numeric	L/s			The minimum airflow may be determined by sizing performed by the softare. This value should be provided if sized by the simulation software as an output or explicitly provided as a simulation input.	Primary	True	True	False
minimum_outdoor_airflow	Minimum outdoor air volume airflow	Numeric	L/s			If the minimum_outdoor_airflow is equal to the maximum_outdoor_airflow and equal to the total supply fan volume that indicates a constant volume dedicated outdoor air system. If only the maximum_outdoor_airflow and equal to the total supply fan volume but the minimum_outdoor_airflow is lower that indicates an air side economizer.	Primary	True	True	False
maximum_outdoor_airflow	Maximum outdoor air volume airflow	Numeric	L/s			If the minimum_outdoor_airflow is equal to the maximum_outdoor_airflow and equal to the total supply fan volume that indicates a constant volume dedicated outdoor air system. If only the maximum_outdoor_airflow and equal to the total supply fan volume but the minimum_outdoor_airflow is lower that indicates an air side economizer.	Primary	True	True	False
air_filter_merv_rating	The MERV rating of the air filter	Numeric		≥1, ≤20			False	True	True	False
has_fully_ducted_return	If the fan system has fully ducted return.	Boolean					False	True	True	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
demand_control_ventilation_control	Demand control ventilation control type	<DemandControlVentilationControlOptions>					Primary	✓	✓	

AirEconomizer

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Primary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
type	Type	<AirEconomizerOptions>					Primary	True	True	False
high_limit_shutoff_temperature	High limit temperature shutoff	Numeric	C				Primary	True	True	False
is_integrated	True if the economizer and mechanical cooling system can work together	Boolean				When the economizer is integrated with the mechanical cooling system it is capable of providing partial cooling even when additional mechanical cooling is required to meet the remainder of the cooling load.	unknown	unknown	unknown	unknown

AirEnergyRecovery

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Primary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
type	Energy recovery type	<EnergyRecoveryOptions>					Primary	True	True	False

Name	Description	Data Type		Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
enthalpy_recovery_ratio	Enthalpy recovery ratio	Numeric					The change in the enthalpy of the outdoor air supply divided by the difference between the outdoor air and entering exhaust air enthalpy, expressed as a percentage.	Primary	unknown	unknown	unknown
energy_recovery_operation	Energy recovery operation	<EnergyRecoveryOperationOptions>						Primary	True	True	False
energy_recovery_supply_air_temperature_control	Energy recovery supply air temperature control	<EnergyRecoverySupplyAirTemperatureControlOptions>						unknown	unknown	unknown	unknown
design_sensible_effectiveness	Design sensible effectiveness	Numeric						unknown	unknown	unknown	unknown
design_latent_effectiveness	Design latent effectiveness	Numeric						unknown	unknown	unknown	unknown
outdoor_airflow	Outdoor airflow	Numeric		L/s				unknown	unknown	unknown	unknown
exhaust_airflow	Exhaust airflow	Numeric		L/s				unknown	unknown	unknown	unknown

Fan

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Primary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
design_airflow	Design airflow	Numeric	L/s			The design airlow may be determined by sizing performed by the software. This value should be provided if sized by the simulation software as an output or explicitly provided as a simulation input.	Primary	True	True	False
is_airflow_calculated	True if the airflow is sized by software	Boolean				Determined in accordance with generally accepted engineering standards. For air flows determinined by software, including the simulation software, this should be true. For air flows that are autosized values should be true. Typically when true, the sizing is based on one or more design days, or other time periods, and should be consistent with the weather.heating_design_day_type and weather.cooling_design_day_type. For air flows reflecting the an actual piece of equipment this should be false. If the air flow is a calculated sum of hardcoded zone air flow values this should be false.	unknown	unknown	unknown	unknown
specification_method	Options for how the fan is specified	<FanSpecificationMethodOptions>				Indicates if the fan is specified using the SIMPLE method of just the design electric power or using the DETAILED method of using pressure rise, nameplate power, shaft power, total efficiency, and motor efficiency.	Primary	True	True	False
design_electric_power	Design electric fan power	Numeric	W			Only used when specification_method is set to Simple.	Primary	True	True	False
design_pressure_rise	Pressure rise through fan at design flow conditions	Numeric	Pa			Only used when specification_method is set to Detailed	Primary	True	True	False
motor_nameplate_power	nameplate power of fan motor	Numeric	W			Only used when specification_method is set to Detailed.	unknown	unknown	unknown	unknown
shaft_power	fan shaft power	Numeric	W			Power delivered to the fans shaft and does not include the mechanical drive losses. Equivalent to fan brake horsepower for inch-pound units. Only used when specification_method is set to Detailed.	unknown	unknown	unknown	unknown
total_efficiency	Total fan efficiency	Numeric		≥0, ≤1		Only used when specification_method is set to Detailed. It includes the overall efficiency of the combination of the fan, drive, and motor.	unknown	unknown	unknown	unknown
motor_efficiency	Fan motor efficiency	Numeric		≥0, ≤1		Only used when specification_method is set to Detailed.	unknown	unknown	unknown	unknown
motor_heat_to_airflow_fraction	Fraction of motor heat added to the airflow.	Numeric		≥0, ≤1		Fraction to airflow plus fraction to zone do not necessarily add up to 1.0.	unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
motor_heat_to_zone_fraction	Fraction of motor heat added to the zone.	Numeric		≥0, ≤1		Fraction to airflow plus fraction to zone do not necessarily add up to 1.0.	unknown	unknown	unknown	unknown
motor_location_zone	Zone where the heat from the motor goes	Reference				When specified, it is the zone the heat from the fan motor get added to. Constraint to use when implemented :Zone:	unknown	unknown	unknown	unknown
status_type	Choice of new, existing, addition, alteration, etc. for each ruleset.	<StatusOptions>					False	False	False	False
output_validation_points	Energy validation points	[{FanOutputValidationPoint}]				Airflow is input to each validation point and energy output is the result. A minimum number of four points is recommended. Certain rulesets may have a different minimum number of points. For example, 90.1 Appendix G expects 11 data points.	Primary	✓	✓	

FanOutputValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
airflow	Load	Numeric	L/s			No name and id is needed since typically used as one of a series.	Primary	True	True	False
result	Result	Numeric	W			The rate of energy used by the fan at the given airflow.	Primary	✓	✓	

Terminal

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Primary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	string					Primary	False	False	False
notes	Supplementary information to provide context to the model reviewer	string				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
type	Type of terminal	<TerminalOptions>				System configurations that typically are at the zone and include a compressor (such as packaged terminal air conditioning, packaged terminal heat pumps, window air conditioning units, and water loop heat pumps) should be reported in the schema using HeatingSystem and CoolingSystem. Systems that include gas or electric furnaces should be reported in the schema using HeatingSystem. Distributed systems where each zone is individually served by dedicated fans and/or coils (such as four-pipe fan coil, two-pipe fan coil, radiant systems, baseboards, chilled beams, and variable refrigerant flow indoor units) should be reported in the schema using Terminal with the cooling and heating described in the cooling_source and heating_source data elements (and any other relevant Terminal Data elements). Evaporative cooling systems should be described in CoolingSystem. Passive diffusers with no coil or fan should be described in Terminal.	Primary	True	True	False
served_by_heating_ventilating_air_conditioning_system	HVAC system serving the terminal	Reference				Contains ID of the HVAC system serving the terminal - from Unique Identification Number in HeatingVentilatingAirConditioningSystem. Constraint to use when implemented :HeatingVentilatingAirConditioningSystem:	Primary	True	True	False
heating_source	Source of heating	<HeatingSourceOptions>				Used for terminal heating including reheat.	Primary	True	True	False
heating_from_loop	References the fluid loop used to provide heating	Reference				Only used when heating_source is hot water. Used for terminal heating including reheat. Constraint to use when implemented :FluidLoop:	Primary	True	True	False
cooling_source	Source of cooling	<CoolingSourceOptions>				Used for terminal cooling.	unknown	unknown	unknown	unknown
cooling_from_loop	Referenced the fluid loop used to provide cooling	Reference				Only used when cooling_source is chilled water. Used for terminal cooling including radiant and fan coils. Constraint to use when implemented :FluidLoop:	unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
fan	Terminal fan	{Fan}				The fan data group associated with the terminal. If no fan is modeled for this terminal, this field should be left blank.	False	True	False	False
fan_configuration	Fan configuration	<TerminalFanConfigurationOptions>					False	True	False	False
primary_airflow	Zone terminal primary airflow	Numeric	L/s			Zone terminal primary airflow at design conditions.	True	True	True	False
secondary_airflow	Zone terminal secondary_airflow	Numeric	L/s				False	unknown	True	False
maximum_heating_airflow	Zone terminal maximum heating airflow	Numeric	L/s			Entry only needed if maximum heating airflow is different than the pimary airflow such as when describing a dual maximum VAV box control.	unknown	unknown	unknown	unknown
supply_design_heating_setpoint_temperature	Zone terminal supply design heating temperature setpoint	Numeric	C				unknown	unknown	unknown	unknown
supply_design_cooling_setpoint_temperature	Zone terminal supply design cooling temperature setpoint	Numeric	C				unknown	unknown	unknown	unknown
temperature_control	Temperature control type	<TerminalTemperatureControlOptions>					Primary	True	True	False
minimum_airflow	Zone terminal minimum volume airflow	Numeric	L/s				Primary	True	True	False
minimum_outdoor_airflow	Zone terminal minimum outdoor air volume airflow	Numeric	L/s			This value should be provided if fan airflow determined by sizing performed by the software or explicitly provided. This should be the design flow of outdoor air based on an occupied space using the appropriate ventilation standard such as ASHRAE Standard 62.1. Adjustments to lower the value for demand controlled ventilation should be made using the minimum_outdoor_airflow_multiplier_schedule.	unknown	True	True	False
minimum_outdoor_airflow_multiplier_schedule	Zone terminal minimum outdoor air volume airflow multiplier schedule name	Reference				If the schedule is not present, the multiplier is always one. Often used to indicate the reduced flow needed when the space has reduced occupancy when a demand controlled ventilation control is used. Constraint to use when implemented :Schedule:	unknown	True	True	True
heating_capacity	Heating capacity for baseboard or radiant system or reheat	Numeric	W			Only includes the heating capacity of the terminal for hot water or electric coil. This value should be provided if determined by sizing performed by the software or explicitly provided.	unknown	unknown	unknown	unknown
cooling_capacity	Cooling capacity for the radiant system or cooling coil	Numeric	W			Only includes the cooling capacity of the terminal for chilled water coil for radiant or fan coil. This value should be provided if determined by sizing performed by the software or explicitly provided.	Primary	True	True	False
is_supply_ducted	True if the the supply is ducted.	Boolean				Packaged terminal air conditioners (PTAC), packaged terminal heat pumps (PTHP), and window or through the wall air conditioners should be False and other DX systems including rooftop units should be True	Primary	True	True	False
has_demand_control_ventilation	True if the zone has demand control ventilation	Boolean				The zone is either served by an air handler that responds to demand control ventilation signals from that zone or is served by a DOAS that specifically provides air to that zone on demand.	unknown	unknown	unknown	unknown
is_fan_first_stage_heat	True if the the only source of first stage heating is the heat from the fan itself	Boolean				Only appropriate with variable volume boxes that are fan powered	unknown	unknown	unknown	unknown

FluidLoop

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Primary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
type	Type of loop	<FluidLoopOptions>					Primary	True	True	False
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.	True	True	True	False
child_loops	Other fluid loops connected to this one as children.	[{FluidLoop}]				Secondary loops should be described as child loops.	Primary	True	True	False
cooling_or_condensing_design_and_control	Fluid loop design and control used for cooling or condensing loops	{FluidLoopDesignAndControl}				References a FluidLoopDesignAndControl data group which describes how this FluidLoop is sized and controlled in cooling or condensing mode.	Primary	True	True	False
heating_design_and_control	Fluid loop design and control used for heaing loops	{FluidLoopDesignAndControl}				References a FluidLoopDesignAndControl data group which describes how this FluidLoop is sized and controlled in heating mode.	Primary	✓	✓	

FluidLoopDesignAndControl

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		Secondary	True	True	False
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					False	False	False	False
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
`design_supply_temperature`	Design Supply Temperature	`Numeric`	C				Primary	True	True	False
`design_return_temperature`	Design Return Temperature	`Numeric`	C				Primary	True	True	False
`is_sized_using_coincident_load`	True if the loop is sized based on coincident load	`Boolean`					Primary	True	False	False
`minimum_flow_fraction`	Minimum fraction of full flow allowed	`Numeric`				The minimum flow rate expressed as a fraction of the loop design flow rate.	Primary	True	True	False
`operation`	Type of operation used by loop	`<FluidLoopOperationOptions>`					Primary	True	True	False
`operation_schedule`	Operation schedule	`Reference`				One represents when the fluid loop is availble to be operating and zero when not available to be operating. Only used when operation equals SCHEDULED. Constraint to use when implemented :Schedule:	Primary	True	True	False
`flow_control`	Flow control options	`<FluidLoopFlowControlOptions>`					Primary	True	True	False
`temperature_reset_type`	Type of temperature reset used by loop	`<TemperatureResetOptions>`					Primary	True	True	False
`outdoor_high_for_loop_supply_reset_temperature`	Outdoor high for loop supply temp reset	`Numeric`	C			Used when temperature_reset_type = OUTSIDE_AIR_RESET	Primary	True	True	False
`outdoor_low_for_loop_supply_reset_temperature`	Outdoor low for loop supply temp reset	`Numeric`	C			Used when temperature_reset_type = OUTSIDE_AIR_RESET	Primary	True	True	False
`loop_supply_temperature_at_outdoor_high`	Loop supply temperature at outdoor high temperature	`Numeric`	C			Used when temperature_reset_type = OUTSIDE_AIR_RESET	Primary	True	True	False
`loop_supply_temperature_at_outdoor_low`	Loop supply temperature at outdoor low temperature	`Numeric`	C			Used when temperature_reset_type = OUTSIDE_AIR_RESET	Primary	True	True	False
`loop_supply_temperature_at_low_load`	Loop supply temperature at low load	`Numeric`	C			Used when temperature_reset_type = LOAD_RESET	Primary	True	True	False
`has_integrated_waterside_economizer`	True if chilled water loop described has an integrated waterside economizer	`Boolean`					unknown	unknown	unknown	unknown

Pump

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		Primary	True	unknown	unknown
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					False	False	False	False
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
loop_or_piping	Referenced to the fluid loop or service water heating piping	Reference			✓	Data elements linking data groups by reference that don't make sense without the reference are shown as required. Few other data elements than this type and id data elements are shown as required. Other data elements may be required by specific rulesets. Constraint to use when implemented :FluidLoop: or :ServiceWaterPiping:	Primary	True	True	False
specification_method	Options for how the pump is specified	<PumpSpecificationMethodOptions>					Primary	True	True	False
design_electric_power	Pump design electric power	Numeric	W			Pump electric power at design conditions. Only used when specification_method is set to Simple	Primary	True	True	False
motor_nameplate_power	Pump motor nameplate power	Numeric	W			Only used when specification_method is set to Detailed	unknown	unknown	unknown	False
design_head	Head of the pump at design flow conditions	Numeric	Pa			Only used when specification_method is set to Detailed	unknown	False	False	False
impeller_efficiency	Full load efficiency of the impeller	Numeric		≥0, ≤1		Only used when specification_method is set to Detailed	False	False	False	False
motor_efficiency	Full load efficiency of the pump motor	Numeric		≥0, ≤1		Only used when specification_method is set to Detailed	False	False	False	False
speed_control	Options for pump speed control	<PumpSpeedControlOptions>					Primary	True	True	False
design_flow	Design Pump Flowrate	Numeric	L/s			This value should be provided if determined by sizing performed by the software or explicitly provided.	unknown	unknown	unknown	unknown
is_flow_calculated	True if the design_flow is sized by software	Boolean				Determined in accordance with generally accepted engineering standards. For flows determinined by software, including the simulation software, this should be true. For flows that are autosized values should be true. Typically when true, the sizing is based on one or more design days, or other time periods, and should be consistent with the weather.heating_design_day_type and weather.cooling_design_day_type. For flows reflecting the an actual piece of equipment this should be false.	unknown	unknown	unknown	unknown
output_validation_points	Energy validation points	[{PumpOutputValidationPoint}]				Pump flow is input to each validation point and energy output is the result. A minimum number of four points is recommended.	unknown	unknown	unknown	unknown

PumpOutputValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
flow	Flow rate	Numeric	L/s			No name and id is needed since typically used as one of a series.	Primary	True	True	False
result	Result	Numeric	W			The rate of energy used by the pump at the given flow rate.	Primary	✓	✓	

Boiler

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
loop	Referenced to the fluid loop	Reference			✓	Data elements linking data groups by reference that don't make sense without the reference are shown as required. Few other data elements than this type and id data elements are shown as required. Other data elements may be required by specific rulesets. Constraint to use when implemented :FluidLoop:	Primary	True	True	False
design_capacity	Heating capacity	Numeric	W				unknown	unknown	unknown	unknown
rated_capacity	Heating capacity	Numeric	W			At rating conditions.	Primary	True	unknown	unknown
minimum_load_ratio	Minimum fraction of full load allowed	Numeric					False	False	False	False
draft_type	Combustion option	<BoilerCombustionOptions>					Primary	True	True	False
energy_source_type	Source of energy for the boiler	<EnergySourceOptions>					Primary	True	True	False
efficiency_metric_types	List of efficiency metrics that correspond to the values in efficiency_metric_values list	[<BoilerEfficiencyMetricOptions>]					Primary	True	True	False
efficiency_metric_values	List of efficiency metric values that correspond to the descriptors in efficiency_metric_types list	[Numeric]		≥0			Primary	True	True	False
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.	Primary	True	True	False
auxiliary_power	Auxiliary power	Numeric	W			Power for boiler pump, combustion fan, or other auxiliary that operates when boiler operates.	False	False	False	False
operation_lower_limit	Heating load range operation, lower limit	Numeric	W			The heating rate below which the boiler will not operate. This is often used in plants that have multiple boilers to specify how they should be sequenced.	False	False	False	False
operation_upper_limit	Heating load range operation, upper limit	Numeric	W			The heating rate above which the boiler will not operate. This is often used in plants that have multiple boilers to specify how they should be sequenced.				

BoilerOutputValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
load	Load	Numeric	W			No name and id is needed since typically used as one of a series.	Primary	True	True	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
entering_water_temperature	Entering water temperature	Numeric	C			Temperature of water entering the boiler which returned from the loop. This entry is optional since not all curves for boiler performance need this.	unknown	unknown	unknown	unknown
result	Result	Numeric	W				Primary	✓	✓	

Chiller

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		Secondary	True	True	True
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
cooling_loop	Referenced to the cooling fluid loop	Reference			✓	Data elements linking data groups by reference that don't make sense without the reference are shown as required. Few other data elements than this type and id data elements are shown as required. Other data elements may be required by specific rulesets. Constraint to use when implemented :FluidLoop:	Primary	True	True	False
condensing_loop	Referenced to the condensing fluid loop	Reference				No condensing loop name implies air-cooled chiller. Constraint to use when implemented :FluidLoop:	Primary	True	True	False
compressor_type	Compressor Type	<ChillerCompressorOptions>					False	False	False	False
energy_source_type	Source of energy for the chiller	<EnergySourceOptions>					Primary	True	True	False
design_capacity	Chiller Design Cooling Capacity	Numeric	W			The capacity of the chiller at design conditions.	unknown	unknown	unknown	unknown
rated_capacity	Chiller Rated Cooling Capacity	Numeric	W			At rating conditions.	unknown	unknown	unknown	unknown
rated_entering_condenser_temperature	Rated entering condenser temperature	Numeric	C			The rated outside air dry-bulb temperature for air cooled chillers or design entering condenser water temperature for water cooled chillers. For AHRI conditions for inch-pound ratings for air cooled chillers are 35C/95F and water cooled are 29.4C/85F. The AHRI conditions for SI ratings are 35C for air cooled chillers and 30C for water cooled.	unknown	unknown	unknown	unknown
rated_leaving_evaporator_temperature	Rated leaving evaporator temperature	Numeric	C			For AHRI conditions for inch-pound ratings are 6.7C/44F. For AHRI conditions for SI ratings are 7C.	unknown	unknown	unknown	unknown
minimum_unload_ratio	Minimum unload ratio of full load allowed	Numeric				The ratio of current load to available capacity at a given simulation time step. Used only when this value is higher than the minimum_load_ratio. Between the minimum_unload_ratio and the minimum_load_ratio, the chiller creates a false load in order to continue operating at the minimum_unload_ratio.	unknown	unknown	unknown	unknown
minimum_load_ratio	Minimum fraction of full load allowed	Numeric				The ratio of current load to available capacity at a given simulation time step. Below the minimum load ratio, the chiller cycles on and off.	unknown	unknown	unknown	unknown
design_flow_evaporator	Chiller evaporator design flow	Numeric	L/s				unknown	unknown	unknown	unknown
design_flow_condenser	Chiller condenser design flow	Numeric	L/s				unknown	unknown	unknown	unknown
design_entering_condenser_temperature	Design entering condenser temperature	Numeric	C			The temperature entering the condenser portion of the chiller at design conditions. The design outside air dry-bulb temperature for air cooled chillers or design entering condenser water temperature for water cooled chillers.	unknown	unknown	unknown	unknown
design_leaving_evaporator_temperature	Design leaving evaporator temperature	Numeric	C			The temperature leaving the evaporator portion of the chiller at design conditions.	unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
efficiency_metric_values	List of efficiency metric values that correspond to the descriptors in efficiency_metric_types list	[Numeric]	W/W	≥0		The useful cooling energy supplied by the chiller divided by the electric energy into the chiller both in the same units when the chiller is supplying a predefined load.	Primary	True	True	False
efficiency_metric_types	List of efficiency metrics that correspond to the values in efficiency_metric_values list	[<ChillerEfficiencyMetricOptions>]					Primary	True	True	False
capacity_validation_points	Capacity validation points	[{ChillerCapacityValidationPoint}]					False	False	False	False
power_validation_points	Energy validation points	[{ChillerPowerValidationPoint}]					Primary	True	True	False
is_chilled_water_pump_interlocked	Indicates if the operation of the chilled water pump is interlocked with the operation of the chiller	Boolean				Should be set to true when the chiller and the chiller water pump are controlled to turn on an off at the same time.	unknown	unknown	unknown	unknown
is_condenser_water_pump_interlocked	Indicates if the operation of the condenser water pump is interlocked with the operation of the chiller	Boolean				Should be set to true when the chiller and the condenser water pump are controlled to turn on an off at the same time.	unknown	unknown	unknown	unknown
heat_recovery_loop	Recovered heat to fluid loop	Reference				Constraint to use when implemented :FluidLoop:	unknown	unknown	unknown	unknown
heat_recovery_fraction	Heat recovery fraction	Numeric		≥0, ≤1		Fraction of total rejected heat that can be recovered at full load	unknown	unknown	unknown	unknown

ChillerCapacityValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
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.	False	False	False	False
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.	False	False	False	False
result	Result	Numeric	W							

ChillerPowerValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
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.	Primary	True	True	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
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.	Primary	True	True	False
load	Load	Numeric	W				Primary	True	True	False
is_at_full_capacity	True if chiller is at full capacity	Boolean	W			True if chiller is operating at full copacity for the given temperature conditions	unknown	unknown	unknown	unknown
result	Result	Numeric	W				Primary	✓	✓	

HeatRejection

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		unknown	True	True	False
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					False	False	False	False
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
loop	Referenced to the fluid loop	Reference			✓	Data elements linking data groups by reference that don't make sense without the reference are shown as required. Few other data elements than this type and id data elements are shown as required. Other data elements may be required by specific rulesets. Constraint to use when implemented :FluidLoop:	unknown	True	True	False
type	Heat Rejection Type	<HeatRejectionOptions>					unknown	True	True	False
fan_type	Heat Rejection Fan Type	<HeatRejectionFanOptions>					unknown	False	True	False
fluid	Fluid Cooled by Heat Rejection	<HeatRejectionFluidOptions>					unknown	True	True	False
number_of_cells	Number of cells	Numeric		≥1			unknown	unknown	True	False
range	Heat rejection Range	Numeric	K				unknown	True	True	False
approach	Heat rejection Approach	Numeric	K				unknown	True	True	False
fan_design_electric_power	Fan design electric power	Numeric	W			Only used when fan_shaft_power and fan_motor_efficiency and fan_motor_nameplate_power cannot be provided.	unknown	unknown	unknown	unknown
fan_shaft_power	Fan Shaft Power	Numeric	W			Power delivered to the fan's shaft and does not include the mechanical drive losses. Equivalent to fan brake horsepower for inch-pound units.	unknown	unknown	unknown	unknown
fan_motor_efficiency	Efficiency of the fan motor at rating conditions	Numeric	W			From CBECC-Com.	unknown	unknown	unknown	unknown
fan_motor_nameplate_power	Fan Motor Nameplate Power	Numeric	W			The nameplate power at rating conditions. In inch-pound units is the fan motor horsepower.From CBECC-Com.	unknown	unknown	unknown	unknown
fan_speed_control	Fan Speed Control Type	<HeatRejectionFanSpeedControlOptions>					unknown	True	True	False
design_wetbulb_temperature	Design wetbulb temperature	Numeric	C			0.4% ASHRAE MCWB	unknown	True	True	False

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`design_water_flowrate`	Design condenser water flow rate	`Numeric`	L/s				unknown	unknown	unknown	unknown
`rated_water_flowrate`	Rated condenser water flow rate	`Numeric`	L/s			At rating conditions.	unknown	unknown	unknown	unknown
`leaving_water_setpoint_temperature`	leaving water setpoint temperature	`Numeric`	C				unknown	unknown	unknown	unknown

ExternalFluidSource

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		Primary	True	True	True
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					False	False	False	False
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	False	False	False	False
`loop`	Referenced to the fluid loop	`Reference`			✓	Data elements linking data groups by reference that don't make sense without the reference are shown as required. Few other data elements than this type and id data elements are shown as required. Other data elements may be required by specific rulesets. Constraint to use when implemented :FluidLoop:	Primary	True	True	True
`type`	Type of external fluid source	`<ExternalFluidSourceOptions>`					Primary	True	True	True
`energy_source_type`	Source of energy for the external fluid source	`<EnergySourceOptions>`					Primary	✓	✓	✓

ServiceWaterHeatingDistributionSystem

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		unknown	unknown	unknown	unknown
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					unknown	unknown	unknown	unknown
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
`design_supply_temperature`	Design supply temperature setpoint of service water heating loop	`Numeric`	C			From CBECC-Com.	unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
design_supply_temperature_difference	Design supply temperature difference (deltaT) of service water heating loop	`Numeric`	C			From CBECC-Com.	unknown	unknown	unknown	unknown
tanks	Tanks within service water heating distribution system	`[{Tank}]`				Contains a list of storage tanks that are part of this service water heating distribution system but not part of individual service water heaters.	unknown	unknown	unknown	unknown
is_central_system	Indicates whether it is a central service water heater distribution system	`Boolean`				From CBECC-Com.	unknown	unknown	unknown	unknown
service_water_piping	Connected service water piping	`[{ServicewaterPiping}]`				Contains a list of service water piping that is associated with this service water heater distribution system.	unknown	unknown	unknown	unknown
distribution_compactness	Type of compact distribution system	`<ServicewaterHeatingDistributionCompactnessOptions2019T24Com>`				From CBECC-Com.	unknown	unknown	unknown	unknown
control_type	Type of distribution system	`<ServicewaterHeatingControlOptions2019T24Com>`				From CBECC-Com.	unknown	unknown	unknown	unknown
configuration_type	Type of configuration	`<ServicewaterHeatingConfigurationOptions>`				From CBECC-Com.	unknown	unknown	unknown	unknown
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.	unknown	unknown	unknown	unknown
drain_heat_recovery_efficiency	Shower heat drain recovery efficiency	`Numeric`		≥ 0, ≤ 1		From CBECC-Com. May use the Canadian Standards Association Rated Recovery Efficiency.	unknown	unknown	unknown	unknown
drain_heat_recovery_type	Drain heat recovery type	`<ServicewaterHeatingHeatRecoveryOptions>`				From CBECC-Res.	unknown	unknown	unknown	unknown
flow_multiplier_schedule	service water heating Loop flow muliplier schedule name	`Reference`				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	unknown	unknown	unknown	unknown
entering_water_mains_temperature_schedule	Temperature schedule for unheated entering water to the building site often referenced as mains temperature.	`Reference`				Constraint to use when implemented :Schedule:	unknown	unknown	unknown	unknown
is_ground_temperature_used_for_entering_water	Indicates whether ground temperature is the source of the entering water temperature	`Boolean`					unknown	unknown	unknown	unknown

ServiceWaterPiping

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	`ID`			✓		unknown	unknown	unknown	unknown
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					unknown	unknown	unknown	unknown
notes	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
is_recirculation_loop	Indicates if service water heating piping is a loop and recirculates	`Boolean`					unknown	unknown	unknown	unknown
are_thermal_losses_modeled	Indicates if thermal losses from the service water heating piping are modeled	`Boolean`					unknown	unknown	unknown	unknown
insulation_thickness	Pipe insulation thickness	`Numeric`	m	≥ 0		From CBECC-Com.	unknown	unknown	unknown	unknown
loop_pipe_location	Loop pipe location	`<ComponentLocationOptions>`				From CBECC-Com.	unknown	unknown	unknown	unknown
location_zone	Zone reference of where the component is located when IN_ZONE is selected from ComponentLocationOptions	`Reference`				From CBECC-Com. Constraint to use when implemented :Zone:	unknown	unknown	unknown	unknown
length	Pipe length	`Numeric`	m	≥ 0		From RESNET	unknown	unknown	unknown	unknown
diameter	Pipe section diameter	`Numeric`	m	≥ 0		From CBECC-Res.	unknown	unknown	unknown	unknown
child	Other service water piping connected to this one as children.	`[{ServicewaterPiping}]`					unknown	unknown	unknown	unknown
service_water_heating_design_and_control	Design and control used for service heating piping	`{FluidLoopDesignAndControl}`				References a FluidLoopDesignAndControl data group which describes how the service water piping is sized and controlled	unknown	unknown	unknown	unknown

SolarThermal

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		unknown	unknown	unknown	unknown
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					unknown	unknown	unknown	unknown
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
`angle_from_true_north`	Solar heater angle from true north, clockwise	`Numeric`				From CBECC-Com.	unknown	unknown	unknown	unknown
`solar_savings_fraction`	Solar savings fraction	`Numeric`				Based on ICC-SRCC rating. From CBECC-Com.	unknown	unknown	unknown	unknown
`collector_area`	Solar collector area	`Numeric`				From CBECC-Com.	unknown	unknown	unknown	unknown
`collector_type_description`	Description of solar collector type	`String`				From CBECC-Com.	unknown	unknown	unknown	unknown
`collector_slope`	Solar slope from horizontal	`Numeric`				From CBECC-Com.	unknown	unknown	unknown	unknown
`tank`	Tank that is part of the solar thermal system	`{Tank}`				Contains a storage tank that is part of the solar thermal system.	unknown	unknown	unknown	unknown

ServiceWaterHeatingEquipment

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		unknown	unknown	unknown	unknown
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					unknown	unknown	unknown	unknown
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
`heater_fuel_type`	Service water heating heater fuel type	`<EnergySourceOptions>`					unknown	unknown	unknown	unknown
`distribution_system`	Referenced to the service water heating distribution system	`Reference`			✓	Data elements linking data groups by reference that don't make sense without the reference are shown as required. Few other data elements than this type and id data elements are shown as required. Other data elements may be required by specific rulesets. Constraint to use when implemented :ServiceWaterHeatingDistributionSystem:	unknown	unknown	unknown	unknown
`efficiency_metric_types`	List of efficiency metrics that correspond to the values in efficiency_metric_values list	`[<ServiceWaterHeatingEfficiencyMetricOptions>]`					unknown	unknown	unknown	unknown
`efficiency_metric_values`	List of efficiency metric values that correspond to the descriptors in efficiency_metric_types list	`[Numeric]`					unknown	unknown	unknown	unknown
`draw_pattern`	Draw pattern	`<DrawPatternOptions>`				Draw pattern refers to the water draw profile in the uniform energy factor test. See 10 CFR 430 Appendix E Uniform Test Method for Measuring the Energy Consumption of Water Heaters for more information.	unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
first_hour_rating	First hour rating volume	Numeric	L	≥0		From CBECC-Com.	unknown	unknown	unknown	unknown
output_validation_points	Capacity validation points	[{ServiceWaterHeaterValidationPoint}]					unknown	unknown	unknown	unknown
input_power	Input power	Numeric	W	≥0		From CBECC-Com.	unknown	unknown	unknown	unknown
rated_capacity	Rated capacity	Numeric	W			From CBECC-Com.	unknown	unknown	unknown	unknown
minimum_capacity	Minimum capacity	Numeric	W	≥0		From CBECC-Com.	unknown	unknown	unknown	unknown
recovery_efficiency	Recovery efficiency	Numeric				From CBECC-Com.	unknown	unknown	unknown	unknown
setpoint_temperature	Set point temperature	Numeric	C				unknown	unknown	unknown	unknown
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.	unknown	unknown	unknown	unknown
compressor_zone	Zone reference of where the heat pump for the water heater is located	Reference				From CBECC-Com. Constraint to use when implemented :Zone:	unknown	unknown	unknown	unknown
compressor_heat_rejection_source	Heat pump heat rejection source	<ComponentLocationOptions>				From CBECC-Res.	unknown	unknown	unknown	unknown
compressor_heat_rejection_zone	Heat pump heat rejection zone	Reference				From CBECC-Res. Constraint to use when implemented :Zone:	unknown	unknown	unknown	unknown
compressor_capacity_validation_points	Capacity validation points	[{HeatPumpWaterHeaterCapacityValidationPoint}]					unknown	unknown	unknown	unknown
compressor_power_validation_points	Coefficient of performance validation points	[{HeatPumpWaterHeaterPowerValidationPoint}]					unknown	unknown	unknown	unknown
draft_fan_power	Power for the draft fan	Numeric	W	≥0		From CBECC-Com.	unknown	unknown	unknown	unknown
has_electrical_ignition	Indicates whether the water heater has electrical ignition	Boolean				From CBECC-Com.	unknown	unknown	unknown	unknown
tank	Tank that is part of the service water heating equipment	{Tank}				Contains a storage tank that is part of the service water heating equipment.	unknown	unknown	unknown	unknown
status_type	Choice of new, existing, addition, alteration, etc. for each ruleset.	<StatusOptions>					unknown	unknown	unknown	unknown
solar_thermal_systems	Solar thermal systems used for heating service water	[{SolarThermal}]				Contains a list of Solar thermal systems that are part of this service water heating distribution system.	unknown	unknown	unknown	unknown
hot_water_loop	Referenced to the hot water fluid loop	Reference				Can be used when heat is supplied to service water heater from a hot water loop or when combination service water and space heating is used. Constraint to use when implemented :FluidLoop:	unknown	unknown	unknown	unknown

ServiceWaterHeaterValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
load	Load	Numeric	W			No name and id is needed since typically used as one of a series.	unknown	unknown	unknown	unknown
result	Result	Numeric	W				unknown	unknown	unknown	unknown

HeatPumpWaterHeaterCapacityValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
evaporator_air_temperature	Outside dry bulb temperatures of air	Numeric	C			No name and id is needed since used as one of a series.	unknown	unknown	unknown	unknown
condenser_water_temperature	Entering condenser temperature of water	Numeric	C				unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
evaporator_air_flow	Air flow across evaporator	Numeric	L/s				unknown	unknown	unknown	unknown
condenser_water_flow	Water flow across condenser	Numeric	L/s				unknown	unknown	unknown	unknown
result	Result	Numeric	W				unknown	unknown	unknown	unknown

HeatPumpWaterHeaterPowerValidationPoint

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
evaporator_air_temperature	Outside dry bulb temperatures of air	Numeric	C			No name and id is needed since used as one of a series.	unknown	unknown	unknown	unknown
condenser_water_temperature	Entering condenser temperature of water	Numeric	C				unknown	unknown	unknown	unknown
evaporator_air_flow	Air flow across evaporator	Numeric	L/s				unknown	unknown	unknown	unknown
condenser_water_flow	Water flow across condenser	Numeric	L/s				unknown	unknown	unknown	unknown
load	Load	Numeric	W				unknown	unknown	unknown	unknown
result	Result	Numeric	W				unknown	unknown	unknown	unknown

Tank

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		unknown	unknown	unknown	unknown
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					unknown	unknown	unknown	unknown
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
storage_capacity	Storage capacity of tank in distribution system	Numeric	L	≥0		From CBECC-Com.	unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`type`	Service water heater tank type	`<ServiceWaterHeaterTankOptions>`					unknown	unknown	unknown	unknown
`height`	Tank height	`Numeric`	m	≥0		From CBECC-Com.	unknown	unknown	unknown	unknown
`interior_insulation`	Tank interior insulation R-value	`Numeric`	K-m2/W	≥0		Insulation that is part of the tank and is inside of the housing. From CBECC-Res.	unknown	unknown	unknown	unknown
`exterior_insulation`	Tank exterior insulation R-value	`Numeric`	K-m2/W	≥0		A blanket of insulation that surrounds the exterior of the tank. From CBECC-Res.	unknown	unknown	unknown	unknown
`location`	Location	`<ComponentLocationOptions>`				From CBECC-Res.	unknown	unknown	unknown	unknown
`location_zone`	Tank zone location	`Reference`				Only used when tank_location indicates the tank is located in a zone. From CBECC-Res. Constraint to use when implemented :Zone:	unknown	unknown	unknown	unknown

ServiceWaterHeatingUse

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		unknown	unknown	unknown	unknown
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					unknown	unknown	unknown	unknown
`notes`	Supplementary information to provide context to the model reviewer	`String`				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
`area_type`	Service Water Heating Loop Area Type	`<ServiceWaterHeatingSpaceOptions2019ASHRAE901>`				The enumeration is based on the standard used.	unknown	unknown	unknown	unknown
`water_serves_type`	The use of the water serves the type	`<ServiceWaterHeatingFixtureOptions>`					unknown	unknown	unknown	unknown
`served_by_distribution_system`	ID fo the ServiceWaterHeatingDistributionSystem that serves this end use	`Reference`			✓	From CBECC-Res. Constraint to use when implemented :ServiceWaterHeatingDistributionSystem:	unknown	unknown	unknown	unknown
`use`	Usage of service hot water	`Numeric`				This field together with the use_units and use_multiplier_schedule fields allow detailed description of the ServiceWaterHeating use in the units selected in the use_units field. When describing a flow rate, it indicates the use of hot water from the water heater unmixed with cold tap water.	unknown	unknown	unknown	unknown
`use_units`	Type of units for use of service hot water	`<ServicewaterHeatingUseUnitOptions>`					unknown	unknown	unknown	unknown
`use_multiplier_schedule`	Reference to the schedule containing the multiplier for the use of service hot water	`Reference`				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	unknown	unknown	unknown	unknown
`temperature_at_fixture`	Temperature leaving the fixture that is result of mixing hot water from the water heater and cold water from the tap.	`Numeric`	C			From RESNET	unknown	unknown	unknown	unknown
`is_heat_recovered_by_drain`	Indicates if heat is being recovered from the drain	`Boolean`				From CBECC-Res.	unknown	unknown	unknown	unknown
`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.	unknown	unknown	unknown	unknown

ExteriorLighting

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
`id`	Scope-unique reference identifier for instances of this data group	`ID`			✓		unknown	unknown	unknown	unknown
`reporting_name`	Descriptive name used in RCT reports if id is not already a descriptive name	`String`					unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
type	The type of exterior lighting fixture	<ExteriorLightingAreaOptions2019ASHRAE901TableG36>					unknown	unknown	unknown	unknown
area	Area of the exterior functional space.	Numeric	m2	>0		The lit area, when the lighting allowance specified by the type is based on area.	unknown	unknown	unknown	unknown
length	Linear length measure for exterior functional space	Numeric	m	≥0		For example, used when expressing street frontage or door width	unknown	unknown	unknown	unknown
power	Nominal power of exterior lighting fixtures	Numeric	W	>0			unknown	unknown	unknown	unknown
fixture_height	Installation height of exterior fixture	Numeric	m	>0			unknown	unknown	unknown	unknown
is_exempt	Indicates whether the exterior lighting is exempted from requirements	Boolean					unknown	unknown	unknown	unknown
multiplier_schedule	Reference to the schedule containing the multiplier for exterior lighting	Reference				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	unknown	unknown	unknown	unknown

RefrigeratedCase

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
id	Scope-unique reference identifier for instances of this data group	ID			✓		unknown	unknown	unknown	unknown
reporting_name	Descriptive name used in RCT reports if id is not already a descriptive name	String					unknown	unknown	unknown	unknown
notes	Supplementary information to provide context to the model reviewer	String				Notes are not used by the RCT, but may be included in RCT reports to give the reviewer additional information or context	unknown	unknown	unknown	unknown
type	Refrigerated case type	<RefrigeratedCaseOptions>					unknown	unknown	unknown	unknown
equipment_category	Equipment Class from referenced standard	<RefrigeratedCaseEquipmentCategoryOptions>					unknown	unknown	unknown	unknown
is_self_contained	Indicates whether unit is self-contained	Boolean				If not self-contained, show as false, and indicates that it has remote condenser	unknown	unknown	unknown	unknown
application_temperature	Equipment application temperature	<ApplicationTemperatureOptions>				Based on AHRI 1200	unknown	unknown	unknown	unknown
power	Nominal power of refrigerated case	Numeric	W	>0			unknown	unknown	unknown	unknown
power_multiplier_schedule	Refrigerated case power multiplier schedule name	Reference				If the schedule is not present, the multiplier is always one. Constraint to use when implemented :Schedule:	unknown	unknown	unknown	unknown
sensible_fraction	Fraction of energy that is a sensible load on the space.	Numeric		≥-1, ≤1			unknown	unknown	unknown	unknown
heat_gain_fraction	Fraction of energy that is a heat gain to the space.	Numeric		≥-1, ≤1			unknown	unknown	unknown	unknown
volume	volume of a refrigerated case in cubic meters	Numeric	m3				unknown	unknown	unknown	unknown

Name	Description	Data Type	Units	Range	Req	Notes	RMD Test	AppG Used By TCDs	AppG P_RMD Equals U_RMD	AppG B_RMD Equals P_RMD
total_display_area	display area of a refrigerated case in square meters	Numeric	m2				unknown	unknown	unknown	unknown
zone	Zone where case is located	Reference				Constraint to use when implemented :Zone:	unknown	unknown	unknown	unknown