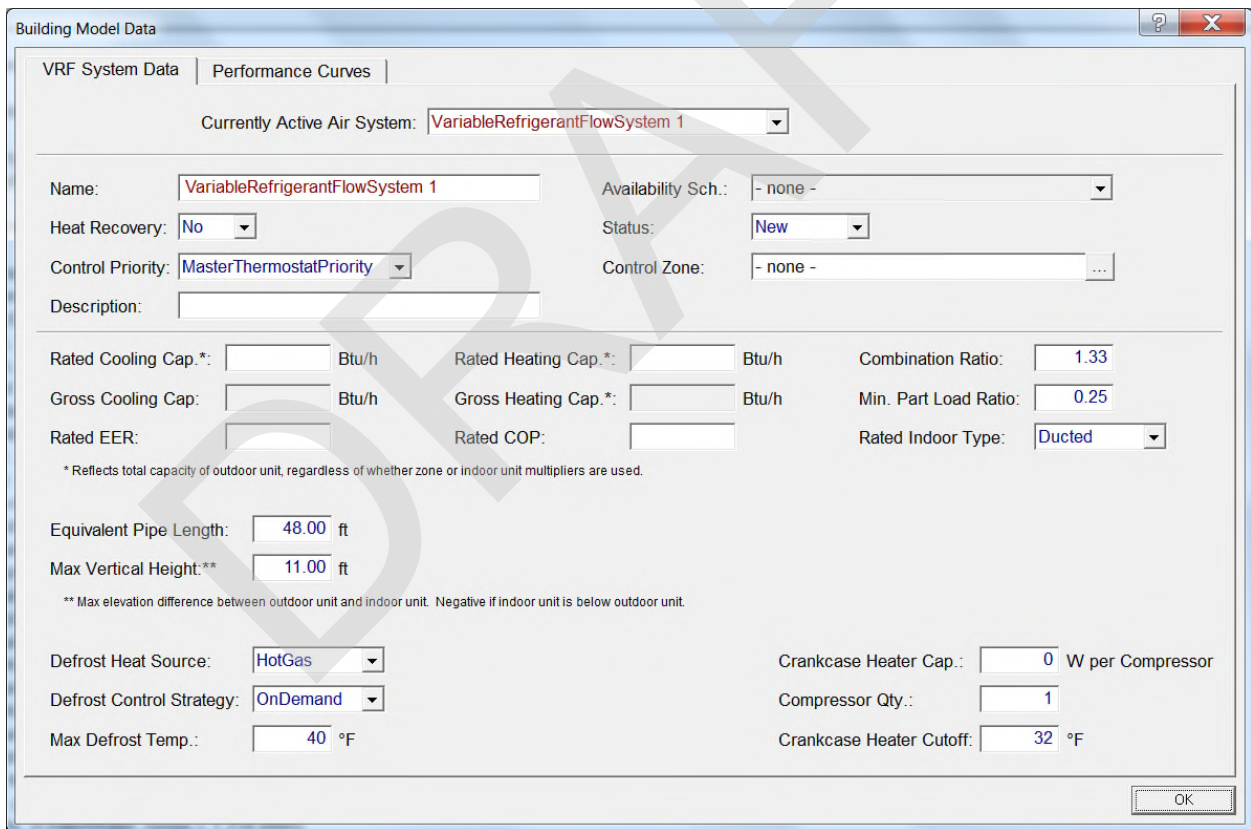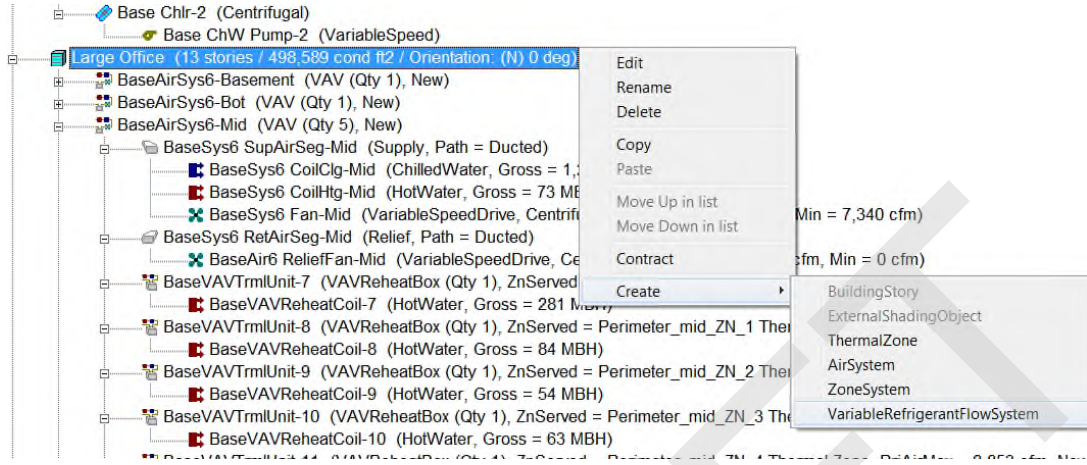## Variable Refrigerant Flow System Data Screen

To create a new outdoor unit of a variable refrigerant flow system, right click the Building data, scroll down to **Create**, and select **VariableRefrigerantFlowSystem.** Then click on **Create.** A **VariableRefrigerantFlowSystem** dialog box appears. Enter data and click **OK**.
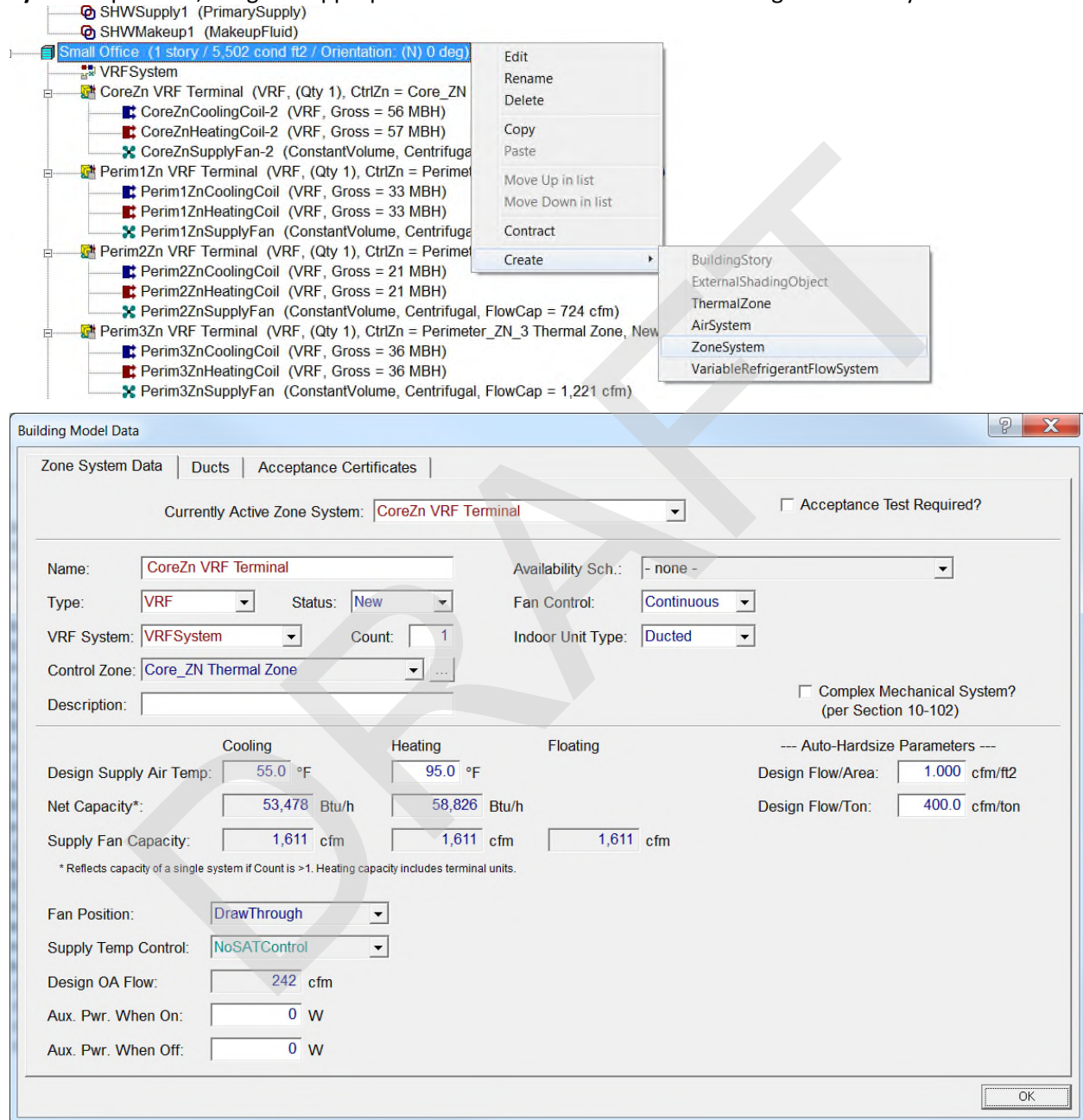

Input Summary:

- **Currently Active Air System**: The name of the currently selected Variable Refrigerant Flow System.
- **Name**: The name of the variable refrigerant flow system assigned by the user.

- **Availability Schedule**: The schedule that defines when the variable refrigerant flow system can operate (this field is not user editable and will be removed in a final release).
- **Heat Recovery**: Identifies whether the VRF system has the heat recovery.
- **Status**: Defines system status as New, Existing, or Altered.
- **Control Priority**: The method to determine whether the outdoor unit is in heating or cooling. Options include MasterThermostatPriority and LoadPriority.
- **Control Zone**: The name of the thermal zone controlling the variable refrigerant flow system when the control priority is set to MasterThermostatPriority.
- **Description**: A brief description of the system for reference with the building plans.
- **Rated Cooling Cap** (Btu/h): The net total cooling capacity of the VRF system at AHRI rating conditions.
- **Rated Heating Cap** (Btu/h): The net total heating capacity of the VRF system at AHRI rating conditions.
- **Combination Ratio**: The ratio of indoor unit rated capacity to outdoor unit rated capacity. This value should be calculated by the software and this input will be removed in a final release.
- **Gross Cooling Cap** (Btu/h): The gross total cooling capacity of the VRF system at AHRI rating conditions.
- **Gross Heating Cap** (Btu/h): The gross total heating capacity of the VRF system at AHRI rating conditions.
- **Min. Part Load Ratio**: The minimum operating part-load ratio (PLR) of the heat pump. At part-load ratios below this value, the system will cycle to meet the load.
- **Rated EER**: The net cooling EER of the VRF system at AHRI rating conditions. This value includes the condenser fan and indoor fan energy.
- **Rated COP**: The net heating COP of the VRF system at AHRI conditions. This value includes the condenser fan and indoor fan energy.
- **Rated Indoor Type**: Whether the VRF system rated efficiency and capacity are calculated assuming 'Ducted' or 'Non-Ducted' indoor units.
- **Equivalent Pipe Length** (ft): The equivalent pipe length in feet between the farthest terminal unit and the heat pump condenser. This value includes the liquid refrigerant line length (for both horizontal and vertical distances), fitting losses, pipe bends, and other connections that contribute to piping losses.
- **Max Vertical Height** (ft): The vertical height difference between the highest or lowest terminal unit and the outdoor unit.
- **Defrost Heat Source**: The heat source used to defrost the condenser coil, Electric or HotGas.
- **Defrost Control Strategy**: The control strategy used to determine when defrost will be performed, TimedCycle or OnDemand.
- **Max Defrost Temp** (°F): **The m**aximum outdoor drybulb air temperature at which defrost operation will occur.
- **Crankcase Heater Cap** (W per Compressor): The capacity of the resistive defrost heating element.
- **Compressor Qty**: The number of compressors in the heat pump condenser. This value is used to determine the operating characteristics of the crankcase heater.
- **Crankcase Heater Cutoff** (°F): The outdoor drybulb air temperature below which the crankcase heater will operate.

Zone System Data Screen (Variable Refrigerant Flow System)

To create a new indoor unit of a variable refrigerant flow system, right click the Building data, scroll down to **Create**, and select **ZoneSystem**. The **Create ZoneSystem** dialog box appears. Enter data and click **OK**. The ZoneSystem Primary Data dialog box then appears. Select VRF and click **OK**. In the **VRF System** input field, assign an appropriate outdoor unit of the variable refrigerant flow system.

Input Summary:

- **Currently Active Zone System:** The name of the currently selected Zone System.
- **Acceptance Test Required:** a checkbox that indicates on the compliance forms whether or not an acceptance test is required on this zone system.
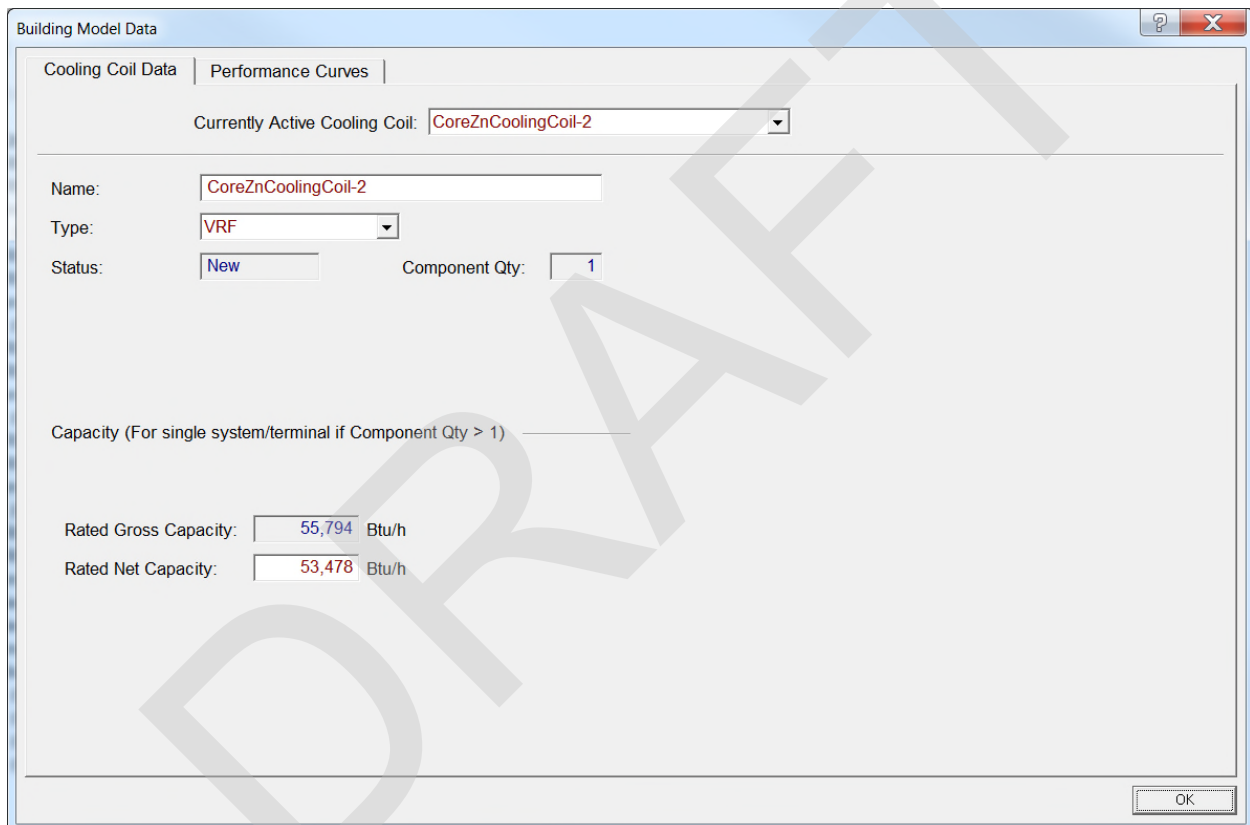- **Name**: The name of the zone system.

- **Availability Schedule:** The schedule that defines when the zone system can operate.
- **Type**: Select VRF type of zone system. Options are SZAC, SZHP, SPVAC, SPVHP, FPFC, WSHP, PTAC, PTHP, Furnace, Exhaust, Baseboard, PassiveBeam, VRF, MiniSplitAC and MiniSplitHP.
- **Status**: Defines system status as New, Existing, or Altered.
- **Fan Control:** The fan control method used to determine how the fan will operate.
- **VRF System:** The name of the variable refrigerant flow system outdoor unit to which the indoor VRF zone system is connected.
- **Count**: The number of duplicate systems represented by the current system.
  The number of duplicate systems can only be >1 when all attributes of the systems are the same. If Count is specified to be >1, all parameters (capacity, power, etc.) are specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Indoor Unit Type:** Specification of whether the variable refrigerant flow system indoor unit is 'Ducted' or 'Non-Ducted.'
- **Control Zone:** The name of the thermal zone served by the zone system.
- **Description:** A brief description of the zone system that ties the zone system to the building plans.
- **Complex Mechanical System? (per Section 10-102):** Checkbox to indicate whether the HVAC system is Simple or Complex, used for reporting. Complex systems serve multiple zones or use hydronic heating or cooling. Simple systems are all other systems. PTAC, PTHP and exhaust zone systems are simple – VRF, FPFC, WSHP and Baseboard zone systems are complex.
- **Design Supply Air Temp (Cooling):** The design cooling supply air temperature for sizing zone/system airflows in cooling mode.
- **Design Supply Air Temp (Heating):** The design heating supply air temperature for sizing zone/system airflows in heating mode.
- **Net Capacity (Cooling)** (Btu/h)**:** The net cooling capacity of the zone system. Reflects capacity of a single system if Count is > 1.
- **Net Capacity (Heating)** (Btu/h)**:** The net heating capacity of the zone system. Reflects capacity of a single system if Count is > 1.
- **Supply Fan Capacity (Cooling)** (cfm): The supply fan air flow rate when the indoor unit is in cooling mode.
- **Supply Fan Capacity (Heating)** (cfm): The supply fan air flow rate when the indoor unit is in heating mode.
- **Supply Fan Capacity (Floating)** (cfm)**:** The supply fan air flow rate when the indoor unit is not in cooling or heating mode.
- **Design Flow/Area** (cfm/ft²)**:** Used for AutoHardSizing only, a system level specification of supply air flow capacity based on system conditioned floor area. This value is referenced for AutoHardSizing of system capacities.
- **Design Flow/Ton** (cfm/ton)**:** Used for AutoHardSizing only, a system level specification of air side cooling capacity based on supply air flow. This value is referenced for AutoHardSizing of system capacities.
- **Fan Position**: The position of the supply fan relative to the cooling coil (DrawThrough or BlowThrough).
- **Supply Temp Control:** The method of controlling the supply air temperature of the zone system.
- **Design OA Flow:** The rate of outside air that needs to be delivered by the system at design conditions.

- **Aux. Pwr. When On**: The parasitic electrical energy use of the zone terminal unit when either terminal unit coil is operating.
- **Aux. Pwr. When Off**: The parasitic electrical energy use of the zone terminal unit when the terminal unit coils are not operating.

Cooling Coil Data Screen (VRF)

To create a new Cooling Coil, in the Mechanical tab right click on a Terminal Unit, scroll down to **Create**, and select **CoilCooling**. Make selections and click **OK**. The CoilCooling Primary Data dialog box then appears. Select **VRF** and click **OK**.

To access an existing Cooling Coil, double click a cooling coil option (Cooling Coil icon). In the **Type** field, select **VRF**.

Input Summary:

- **Currently Active Cooling Coil:** The name of the currently selected cooling coil.
- **Name**: Name of the cooling coil.
- **Type:** Select the cooling coil of type **VRF**.
- **Status:** Defines cooling coil as New or Existing.
- **Component Qty**: The number of duplicate cooling coils represented by the current cooling coil object.

Capacity section

- **Rated Gross Capacity** (Btu/h): The gross total (both sensible and latent) cooling capacity of a cooling coil at Air Conditioning, Heating, & Refrigeration Institute (AHRI) rating conditions.

The gross capacity is the total cooling capacity without adjustments for fan heat.
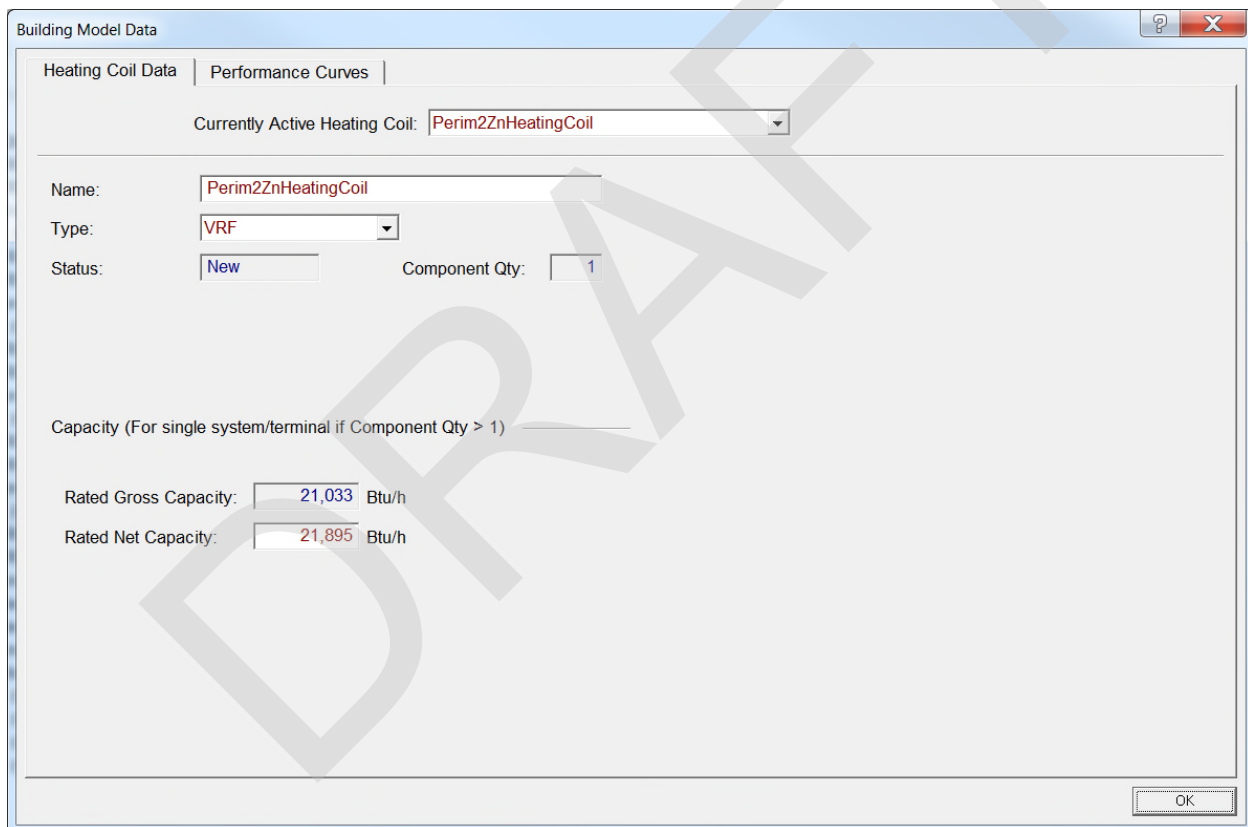- **Rated Net Capacity** (Btu/h): The net total (both sensible and latent) cooling capacity (both sensible and latent) of a cooling coil at AHRI conditions.
The net capacity is the total cooling capacity of the coil after adjusting for fan heat at rated conditions.

Heating Coil Data Screen (VRF)

To create a new Heating Coil, in the Mechanical tab right click on Terminal Unit, scroll down to **Create**, and select **CoilHeating.** In the CoilHeating Primary Data dialog box, select **VRF** in the **Type** field, and click **OK**.

To access an existing Heating Coil, double click a heating coil option (Heating Coil icon). In the **Type** field, select **VRF**.

Input Summary:

- **Currently Active Heating Coil:** The name of the currently selected heating coil.
- **Name**: Name of the heating coil.
- **Type:** Select the heating coil of type **VRF**.
- **Status:** Defines heating coil as New or Existing.
- **Component Qty**: The number of duplicate heating coils represented by the current heating coil object.

Capacity section

- **Rated Gross Capacity** (Btu/h): The gross total (both sensible and latent) heating capacity of a heating coil at Air Conditioning, Heating, & Refrigeration Institute (AHRI) rating conditions. The gross capacity is the total heating capacity without adjustments for fan heat.
- **Rated Net Capacity** (Btu/h): The net total (both sensible and latent) heating capacity (both sensible and latent) of a heating coil at AHRI conditions.
  The net capacity is the total heating capacity of the coil after adjusting for fan heat at rated conditions.

Fan Data Screen

To create a new Fan, in the Mechanical tab right click on Terminal Unit, scroll down to **Create**, and select **Fan.**

To access existing Fan data, under air system double click a fan option (Fan icon).

Input Summary:

- **Currently Active Fan**: The name of the currently selected fan.
- **Name**: The name of the fan.
- **Control Method**: Select the method used to control fan flow. Options are ConstantVolume, VariableSpeedDrive, Dampers, InletVanes and TwoSpeed.
- **Status:** The status of the system or component used for additions and alterations. Options are new and existing.
- **Component Qty:** The number of duplicate systems represented by the current system. The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be

specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.

- **Classification:** Fan classification based on centrifugal or axial types.
- **Centrifugal Type**: The type of blade type used in a centrifugal fan. Options are AirFoil, BackwardInclined, ForwardCurved.

Capacity and Power (For single system/terminal if Component Qty > 1) section

- **Flow Capacity** (cfm): The design air flow rate of the fan at design conditions.
  This building descriptor sets the 100 percent point for the fan part-load curve. This input should be at least as great as the sum of the design air flow specified for each of the thermal zones that are served by the fan system. For multiple deck systems, a separate entry should be made for each deck.
- **Flow Minimum** (cfm): The lowest flow rate rated for a fan.
- **Position**: The position of the supply fan relative to the cooling coil.
- **Modeling Method:** The method used to describe the design power consumption of a fan. Software commonly models fans in three ways. The simple method is for the user to enter the electric power per unit of flow (W/cfm). This method is commonly used for unitary equipment and other small fan systems. A more detailed method is to model the fan as a system whereby the static pressure, fan efficiency, part-load curve, and motor efficiency are specified at design conditions. A third method is to specify brake horsepower at design conditions instead of fan efficiency and static pressure. This is a variation of the second method whereby brake horsepower is specified in lieu of static pressure and fan efficiency. The latter two methods are commonly used for VAV and other larger fan systems.
- **Total Static Pressure:** The total static pressure drop across the fan at design conditions. The total static pressure (TSP) drop includes the pressure drop across components both internal and external to an air handler. It is important for both fan electric energy usage and fan heat gain calculations.
- **Fan Efficiency**: The efficiency of the fan at design conditions.
  Overall fan efficiency includes belt/drive and fan efficiency, but does not include the efficiency of the fan motor.
- **Motor Brake HP**: The design motor shaft brake horsepower of the fan.
  The motor brake horse power is the power at the motor shaft, including fan and drive efficiencies.
- **Power Per Flow (Ref)** (W/cfm)**:** The supply fan power, in watts, per unit of flow, in CFM

Motor Information section

- **Position**: The position of the supply fan motor relative to the cooling air stream. Options are InAirStream and NotInAirStream.
- **Nameplate HP**: The nameplate HP of the fan motor.
- **Type:** Defines if the motor is open or closed.
- **Pole Count**: The number of pole electromagnetic windings in the motor's stator and used to assign MotorEfficiency. Poles are always paired, so PoleCount is always a multiple of 2.
  Motor Efficiency: The efficiency of the motor serving a fan.