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PERFORMANCE DATA FOR IMPROVING TITLE 24 COMPLIANCE SYSTEMS

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PREPARED BY:

Primary Authors:
Liping Wang
Tianzhen Hong
Philip Haves

Lawrence Berkeley National Laboratory
One Cyclotron Road
Berkeley, CA 94720
510-486-6512

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Prepared for:

California Energy Commission

Leah Mohney
Contract Manager

Virginia Lew
Office Manager
Energy Efficiency Research Office

Laurie ten Hope
Deputy Director
ENERGY RESEARCH AND DEVELOPMENT DIVISION

Robert P. Oglesby
Executive Director

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PREFACE

The California Energy Commission's Energy Research and Development Division supports public interest energy research and development that will help improve the quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace.

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- Transportation

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ABSTRACT

For the demonstration of performance-based compliance with the state's Building Energy Efficiency Standards (Title 24), California is transitioning from a method of demonstrating performance-based compliance with Title 24, based on DOE-2, to a generic method that enables different simulation programs to be assessed more objectively to determine whether they can be certified for use of Title 24 code compliance. Researchers created a new suite of standard tests that can be applied to any whole building energy simulation tool. The tests were developed using EnergyPlus, which is US Department of Energy's whole building energy simulation program. In this project, researchers identified 12 types of heating, ventilation, and air-conditioning (HVAC) systems in typical California climate zones to define a suite of HVAC test cases for use in Title 24 accreditation. The HVAC systems covered all Title 24 standard systems. Three test cases were created for each conventional system: the baseline system compliant with 2008 standards; low-efficiency systems; and high-efficiency alternate systems with a selected set of design and operation parameters adjusted from the code baseline system. The nonconventional systems included typical low energy systems used in California: variable refrigerant flow (VRF), natural ventilation, hydronic radiant slabs, and underfloor air distribution systems. VRF systems circulate refrigerant between a central compressor and heating and cooling units in the rooms, as opposed to circulating air or water. Natural ventilation systems typically use operable windows to ventilate the rooms when conditions are favorable. Hydronic radiant slabs use hot water circulating through slabs to heat floors. Two test cases were created for each nonconventional system: the typical design of the nonconventional system and the code baseline system. Baseline models and test cases were simulated using EnergyPlus version 7.0 for the selected climate zones. The reference data sets were generated from the simulation results. Test criteria were recommended to provide impartial accreditation based on the capability of the candidate program to model a subset of the full range of systems. The reference data sets were included in a spreadsheet that was set up to receive output data from a candidate program and perform predefined comparisons to determine if the program should be certified for use in building energy efficiency code compliance.

Keywords: Building simulation, code compliance, EnergyPlus, test cases, Title 24

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EXECUTIVE SUMMARY

Introduction

Air conditioning is the primary driver of peak energy demand in California and the number of central air conditioning systems is increasing. California is moving away from the use of a single building energy computer simulation program to demonstrate performance-based compliance with the state's *Building Energy Efficiency Standards* (Title 24). The new approach is to allow different simulation programs to be used for Title 24 code compliance once they have been assessed and determined to be sufficiently accurate. Starting with the 2013 update to Title 24, the simulation engine that will be used to set the accuracy standard is switching from US Department of Energy's earlier DOE-2.1E program to its current program, EnergyPlus. As a result, new sets of reference data must be developed using EnergyPlus.

Project Purpose

This project developed and tested a set of EnergyPlus reference models for heating, ventilation and air conditioning (HVAC) systems covering Title 24 baseline HVAC systems and typical low energy HVAC systems used in California. It also used corresponding sets of documents for use in creating input files for the candidate simulation programs.

Project Results

This project used EnergyPlus to create a new suite of reference tests for use in accreditting other simulation programs for use in Title 24 code compliance, including accreditation for a subset of the HVAC systems addressed by Title 24.

Researchers identified 12 types of conventional and non-conventional HVAC systems and typical California climate zones to define a suite of HVAC test cases as part of the entire set of reference tests for use in the code compliance. The conventional HVAC systems covered all 2008 Title 24 standards for HVAC systems. Three test cases were created for each conventional HVAC system: the baseline HVAC system compliant with 2008 standards; a lower-efficiency system; and a higher-efficiency system formed by adjusting a selected set of design and operation parameters from the code baseline system. The simulated energy results of the two alternate designs were compared to those of the baseline design to calculate the expected difference in energy performance in order to be able to test the ability of candidate programs to estimate the effect of design changes. A number of non-conventional HVAC systems were included in the tests, such as variable refrigerant flow (VRF), natural ventilation, hydronic radiant slabs, and an underfloor air distribution (UFAD) system. Two simulation cases were developed and compared for each non-conventional HVAC system: a typical design of the non-conventional HVAC system and the code baseline HVAC system that just complies with Title 24. The percentage of energy savings of the non-conventional HVAC system over the code baseline HVAC system was then calculated.

The energy models and results of these tests from EnergyPlus can be used for other simulation programs can create such models and demonstrate test results within a certain range from the reference results to be certified to use Title 24 code compliance. The energy saving percentage calculated from EnergyPlus results was set as the reference for each HVAC system and the

percentage calculated from other simulation programs have to be within a predefined range from the reference to be approved for Title 24 compliance use.

Project Benefits

This project created a new suite of reference tests using EnergyPlus that allowed other simulation programs to be accredited for use in Title 24 code compliance. Increased compliance with Title 24 will help improve energy efficiency, which will in turn help conserve electricity and natural gas and prevent the state from having to build more power plants.

CHAPTER 1: Introduction

The peak energy demand in California is largely driven by air conditioning use. The number of air conditioners routinely installed as standard equipment increases annually. Heating, ventilation, and air conditioning (HVAC) systems need to become more energy efficient in order to prevent the need for additional power plants to be built. California is transitioning from a method of demonstrating performance-based compliance with Title 24, based on DOE-2, to a generic method that enables different simulation programs to be assessed more objectively to determine whether they can be certified for use of Title 24 code compliance. To support this, one of the important tasks is to create a new suite of Alternate Calculation Method (ACM) reference tests using EnergyPlus. These tests aim to verify capabilities of ACM software to analyze input and output data and produce acceptable results. These tests cover various design aspects including envelope, internal gains, HVAC, lighting and daylighting. The Energy Commission requires reference data sets of simulation results, against which to compare the results from programs that are candidates for accreditation. These reference data sets for HVAC systems were generated using EnergyPlus by LBNL in this project. The reference data sets for envelope, internal gains, lighting and daylighting were generated using EnergyPlus by AEC (Architectural Energy Corporation) as a separate project. In this project, three technical subtasks were executed:

- Identify a set of building and HVAC system designs and climate zones that define the test cases for use in accreditation. Develop a set of design documents that can be used to generate the input files for a candidate program.
- Develop a set of EnergyPlus reference building models for the identified HVAC systems in subtask 1.
- Generate reference data sets based on the simulation results of the reference building models for the selected climate zones. The reference data set are included in a spreadsheet that is set up to receive output data from candidate programs and perform predefined comparisons. Test criteria are also recommended to provide partial accreditation based on the capability of the candidate program to model a subset of the full range of HVAC systems.

EnergyPlus was chosen to be the reference engine replacing DOE-2 mainly due to its continuous development and support from US Department of Energy (USDOE), and its more powerful calculation capabilities, including: 1) zone heat balance method, 2) small time step, 3) configurable HVAC systems, and 4) modeling innovative low energy designs.

CHAPTER 2:
Methodology on Identifying and Developing Reference HVAC Systems

There are many varieties of HVAC system designs with different configurations, it is not feasible to develop a complete set of HVAC models for all designs. Too many test cases would increase the burden on software vendors to get their programs certified for use in Title 24 code compliance. On the other hand, it is crucial to have a good representation of Title 24 code baseline and typical low energy HVAC systems in California.

2.1 HVAC System Types

Twelve types of conventional and non-conventional HVAC systems were selected for a suite of test cases. The conventional HVAC systems cover all Title 24 standard HVAC systems. The identified non-conventional HVAC systems cover popular low energy HVAC systems in California design practice.

The HVAC systems that were addressed in the project include:

- Packaged Terminal Air Conditioner (PTAC)
- Packaged Terminal Heat Pump (PTHP)
- Packaged Single Zone System (PSZ)
- Packaged Variable-Air-Volume (PVAV) system
- Single duct built-up Variable-Air-Volume (VAV) system
- Fan coil unit
- Water loop heat pump (WLHP)
- Evaporative cooling system
- Natural ventilation
- Hydronic radiant system
- Under-floor air distribution system
- Variable Refrigerant Flow (VRF) system

2.2 Climate Zones

The HVAC test cases cover four typical California climate zones. Most tests are performed on three climate zones to capture the sensitivity of the input characteristics to extremes in weather conditions. The test cases are performed on climate zones 6, 15 and 16 which represent mild, hot and cold climates respectively. Natural ventilation tests are performed on climate zone 3, a mild climate suitable for such an application.

Table 1: Climate Zones Tested

Climate Zone	Example City
3	Oakland
6	Long Beach
15	Palm Springs
16	Blue Canyon

Source: 2008 Non-residential ACM Manual of the California Building Energy Efficiency Standards

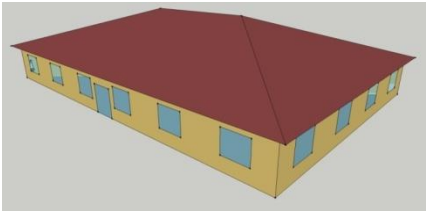
2.3 Building Prototype Models

The HVAC tests are performed on four building prototype models which are a subset of the USDOE Prototype Building Models developed by Pacific Northwest National Laboratory (PNNL) for analysis of American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) Standard 90.1. The building prototype models are available as EnergyPlus input files, modified to comply with the requirements of Title 24-2008 by Architectural Energy Corporation (AEC). The prototype models will be the reference baseline runs for the test cases. Key inputs for the developed building prototype models are summarized in Appendix A. Reference Models used for the test cases are:

- Small Office Building

This is a single story building of area 5,500 square feet with punched windows distributed evenly across all facades. There are five thermal zones in this building served by packaged single-zone air conditioning units.

Figure 1: Small Office Building Prototype

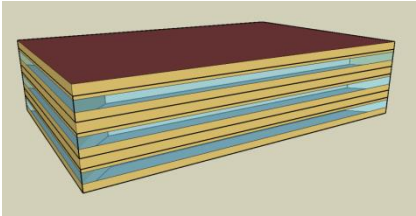


Source: USDOE Commercial Reference Buildings

- Medium Office Building

This is a three story rectangular building with an overall area of 53,600 square feet. It has a window to wall ratio of 33 percent with fenestration distributed evenly across all four facades. The zones are served by packaged VAV systems with gas furnace heating and electric reheat.

Figure 2: Medium Office Building Prototype

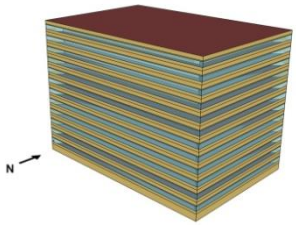


Source: USDOE Commercial Reference Buildings

- Large Office Building

The large office building has twelve floors and a basement floor with a window to wall ratio of 40 percent on the above-grade walls. The total area of the building is 498,600 square feet. The HVAC system type used is a built-up VAV system with centrifugal chillers and a gas boiler.

Figure 3: Large Office Building Prototype

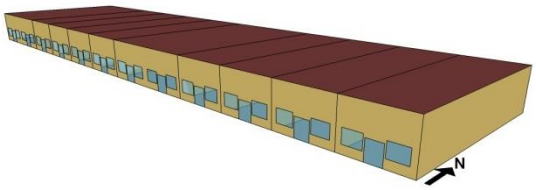


Source: USDOE Commercial Reference Buildings

- Strip Mall Building

The strip mall building has a total area of 22,500 square feet. It has ten zones each with rooftop units. The building has windows in the street facing façade and has an overall window to wall ratio of 10.5 percent.

Figure 4: Strip Mall Building Prototype



Source: USDOE Commercial Reference Buildings

2.4 Test Cases

Test cases assess the impact of one or more key inputs of HVAC systems on energy consumption in comparison with baseline models. Test cases were grouped based on the HVAC system type. For each conventional HVAC system, three test cases were created: the baseline HVAC system compliant with Title 24, a low-efficiency and a high-efficiency alternate HVAC

system with a selected set of design and operation parameters adjusted from the code baseline HVAC system. The non-conventional HVAC systems include a VRF system, natural ventilation, a hydronic radiant slab, and an underfloor air distribution system. For each non-conventional HVAC system, two simulation cases were compared: the typical design of the non-conventional HVAC system and the code baseline HVAC system. The test cases were simulated using multiple California climates to evaluate the sensitivity of HVAC system inputs on energy performance due to the change in weather conditions.

CHAPTER 3:
Description of Test Cases

The test cases and corresponding baselines are provided in Table 2 – Baseline Runs for Test Cases. Each test case described in this section is compared against a baseline run. The key inputs representing the low-efficiency and the high efficiency for conventional HVAC systems are listed in Tables 3-9. Key inputs for the developed test cases of each HVAC system type are also summarized in Appendix A. Detailed EnergyPlus input files of the Reference baseline and test case models are available from the California Energy Commission's Building Energy Efficiency Software Consortium webpage.

There are a total of 54 tests for HVAC systems. Brief descriptions of HVAC test cases are listed as follows. The label of HVAC system test cases starts from 79 for the continuation of the previous test cases for envelope, lighting, and equipment developed by AEC.

79. HVAC Test /PTAC, Stripmall-CZ-6, Low Efficiency- This case tests the impact of modifying a set of parameters including PTAC Coefficient of Performance (COP), fan operation modes, fan efficiency, and ventilation rates with requirements lower than the 2008 Title 24 baseline.
80. HVAC Test /PTAC, Stripmall-CZ-6, High Efficiency- This case tests the impact of modifying a set of parameters including PTAC COP, fan operation modes, and ventilation rates with requirements higher than the 2008 Title 24 baseline.
81. HVAC Test /PTAC, Stripmall-CZ-15, Low Efficiency- This case tests the impact of modifying a set of parameters including PTAC COP, fan operation modes, fan efficiency, and ventilation rates with requirements lower than the 2008 Title 24 baseline.
82. HVAC Test /PTAC, Stripmall-CZ-15, High Efficiency- This case tests the impact of modifying a set of parameters including PTAC COP, fan operation modes, fan efficiency, and ventilation rates with requirements lower than the 2008 Title 24 baseline.
83. HVAC Test /PTAC, Stripmall-CZ-16, Low Efficiency- This case tests the impact of modifying a set of parameters including PTAC COP, fan operation modes, fan efficiency, and ventilation rates with requirements lower than the 2008 Title 24 baseline.
84. HVAC Test /PTAC, Stripmall-CZ-16, High Efficiency- This case tests the impact of modifying a set of parameters including PTAC COP, fan operation modes, fan efficiency, and ventilation rates with requirements lower than the 2008 Title 24 baseline.
85. HVAC Test /PTHP, Stripmall-CZ-6, Low Efficiency- This case tests the impact of modifying a set of parameters including PTHP COP, fan operation modes, fan efficiency, and ventilation rates with requirements lower than the 2008 Title 24 baseline.
86. HVAC Test /PTHP, Stripmall-CZ-6, High Efficiency- This case tests the impact of modifying a set of parameters including PTHP COP, fan operation modes, fan efficiency, and ventilation rates with requirements higher than the 2008 Title 24 baseline.

87. HVAC Test /PTHP, Stripmall-CZ-15, Low Efficiency- This case tests the impact of modifying a set of parameters including PTHP COP, fan operation modes, fan efficiency, and ventilation rates with requirements lower than the 2008 Title 24 baseline.
88. HVAC Test /PTHP, Stripmall-CZ-15, High Efficiency- This case tests the impact of modifying a set of parameters including PTHP COP, fan operation modes, fan efficiency, and ventilation rates with requirements higher than the 2008 Title 24 baseline.
89. HVAC Test /PTHP, Stripmall-CZ-16, Low Efficiency- This case tests the impact of modifying a set of parameters including PTHP COP, fan operation modes, fan efficiency, and ventilation rates with requirement lower than the 2008 Title 24 baseline.
90. HVAC Test /PTHP, Stripmall-CZ-16, High Efficiency- This case tests the impact of modifying a set of parameters including PTHP COP, fan operation modes, fan efficiency, and ventilation rates with requirements higher than the 2008 Title 24 baseline.
91. HVAC Test / PSZ, Stripmall-CZ-6, Low Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas burner efficiency, fan operation modes, and fan efficiency with requirements lower than the 2008 Title 24 baseline.
92. HVAC Test / PSZ, Stripmall-CZ-6, High Efficiency- This case tests the impact of modifying a set of parameters including Direct Expansion (DX) cooling COP, gas burner efficiency, fan operation modes, and fan efficiency with requirements higher than the 2008 Title 24 baseline.
93. HVAC Test / PSZ, Stripmall-CZ-15, Low Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas burner efficiency, fan operation modes, and fan efficiency with requirements lower than the 2008 Title 24 baseline.
94. HVAC Test / PSZ, Stripmall-CZ-15, High Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas burner efficiency, fan operation modes, and fan efficiency with requirements higher than the 2008 Title 24 baseline.
95. HVAC Test / PSZ, Stripmall-CZ-16, Low Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas burner efficiency, fan operation modes, and fan efficiency with requirements lower than the 2008 Title 24 baseline.
96. HVAC Test / PSZ, Stripmall-CZ-16, High Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas burner efficiency, fan operation modes, and fan efficiency with requirements higher than the 2008 Title 24 baseline.
97. HVAC Test /PVAV, Medium Office-CZ-6, Low Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas furnace efficiency,

ventilation rate, supply air temperature, fan static pressure, and fan efficiency with requirement lower than the 2008 Title 24 baseline.

98. HVAC Test /PVAV, Medium Office-CZ-6, High Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas furnace efficiency, ventilation rate, fan static pressure, and fan efficiency with requirements higher than the 2008 Title 24 baseline.

99. HVAC Test /PVAV, Medium Office-CZ-15, Low Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas furnace efficiency, ventilation rate, supply air temperature, fan static pressure, and fan efficiency with requirement lower than the 2008 Title 24 baseline.

100. HVAC Test /PVAV, Medium Office-CZ-15, High Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas furnace efficiency, ventilation rate, fan static pressure, and fan efficiency with requirements higher than the 2008 Title 24 baseline.

101. HVAC Test /PVAV, Medium Office-CZ-16, Low Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas furnace efficiency, ventilation rate, supply air temperature, fan static pressure, and fan efficiency with requirement lower than the 2008 Title 24 baseline.

102. HVAC Test /PVAV, Medium Office-CZ-16, High Efficiency- This case tests the impact of modifying a set of parameters including DX cooling COP, gas furnace efficiency, ventilation rate, fan static pressure, and fan efficiency with requirements higher than the 2008 Title 24 baseline.

103. HVAC Test /VAV, Large Office-CZ-6, Low Efficiency- This case tests the impact of modifying a set of parameters including fan static pressure, fan efficiency, chiller efficiency and boiler efficiency with requirements lower than the 2008 Title 24 baseline.

104. HVAC Test /VAV, Large Office-CZ-6, High Efficiency- This case tests the impact of modifying a set of parameters including fan static pressure, fan efficiency, chiller efficiency and boiler efficiency with requirements higher than the 2008 Title 24 baseline.

105. HVAC Test /VAV, Large Office-CZ-15, Low Efficiency- This case tests the impact of modifying a set of parameters including fan static pressure, fan efficiency, chiller efficiency and boiler efficiency with requirements lower than the 2008 Title 24 baseline.

106. HVAC Test /VAV, Large Office-CZ-15, High Efficiency- This case tests the impact of modifying a set of parameters including fan static pressure, fan efficiency, chiller efficiency and boiler efficiency with requirements higher than the 2008 Title 24 baseline.

107. HVAC Test /VAV, Large Office-CZ-16, Low Efficiency- This case tests the impact of modifying a set of parameters including fan static pressure, fan efficiency, chiller efficiency and boiler efficiency with requirements lower than the 2008 Title 24 baseline.

108. HVAC Test /VAV, Large Office-CZ-16, High Efficiency- This case tests the impact of modifying a set of parameters including fan static pressure, fan efficiency, chiller efficiency and boiler efficiency with requirements higher than the 2008 Title 24 baseline.

109. HVAC Test /FanCoil, Stripmall-CZ-6, Low Efficiency- This case tests the impact of modifying a set of parameters including fan efficiency, and heating hot water/chiller water temperature with requirements lower than the 2008 Title 24 baseline.

110. HVAC Test /FanCoil, Stripmall-CZ-6, High Efficiency- This case tests the impact of modifying the fan efficiency higher than the 2008 Title 24 baseline.

111. HVAC Test /FanCoil, Stripmall-CZ-15, Low Efficiency- This case tests the impact of modifying a set of parameters including fan efficiency, and heating hot water/chiller water temperature with requirements lower than the 2008 Title 24 baseline.

112. HVAC Test /FanCoil, Stripmall-CZ-15, High Efficiency- This case tests the impact of modifying the fan efficiency higher than the 2008 Title 24 baseline.

113. HVAC Test /FanCoil, Stripmall-CZ-16, Low Efficiency- This case tests the impact of modifying a set of parameters including fan efficiency, and heating hot water/chiller water temperature with requirements lower than the 2008 Title 24 baseline.

114. HVAC Test /FanCoil, Stripmall-CZ-16, High Efficiency- This case tests the impact of modifying the fan efficiency higher than the 2008 Title 24 baseline.

115. VAC Test /VRF, Stripmall-CZ-6, Low Efficiency- This case models basic VRF system using low-efficient DX heating and DX cooling coils for each thermal zone. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

116. HVAC Test /VRF, Stripmall-CZ-6, High Efficiency- This case models basic VRF system using high-efficient DX heating and DX cooling coils for each thermal zone. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

117. HVAC Test /VRF, Stripmall-CZ-15, Low Efficiency- This case models basic VRF system using low-efficient DX heating and DX cooling coils for each thermal zone. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

118. HVAC Test /VRF, Stripmall-CZ-15, High Efficiency- This case models basic VRF system using high-efficient DX heating and DX cooling coils for each thermal zone. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

119. HVAC Test /VRF, Stripmall-CZ-16, Low Efficiency- This case models basic VRF system using low-efficient DX heating and DX cooling coils for each thermal zone. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

120. HVAC Test /VRF, Stripmall-CZ-16, High Efficiency- This case models basic VRF system using high-efficient DX heating and DX cooling coils for each thermal zone. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

121. Water Loop Heat Pump / WLHP, Strip Mall, CZ-6, Low Efficiency System-This case models water to air heat pump and a plant loop with a boiler and cooling tower to provide heating or cooling for thermal zones. In this case, the pump type in the plant loop is constant speed. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

122. Water Loop Heat Pump, Strip Mall, CZ-6, High Efficiency System-This case models water to air heat pump and a plant loop with a boiler and cooling tower to provide heating or cooling for thermal zones. In this case, the pump type in the plant loop is variable speed. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

123. Water Loop Heat Pump, Strip Mall, CZ-15, Low Efficiency System-This case models water to air heat pump and a plant loop with a boiler and cooling tower to provide heating or cooling for thermal zones. In this case, the pump type in the plant loop is constant speed. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

124. Water Loop Heat Pump, Strip Mall, CZ-15, High Efficiency System-This case models water to air heat pump and a plant loop with a boiler and cooling tower to provide heating or cooling for thermal zones. In this case, the pump type in the plant loop is variable speed. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

125. Water Loop Heat Pump, Strip Mall, CZ-16, Low Efficiency System-This case models water to air heat pump and a plant loop with a boiler and cooling tower to provide heating or cooling for thermal zones. In this case, the pump type in the plant loop is constant speed. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

126. Water Loop Heat Pump, Strip Mall, CZ-16, High Efficiency System-This case models a water to air heat pump and a plant loop with a boiler and a cooling tower to provide heating or cooling for thermal zones. In this case, the pump type in the plant loop is variable speed. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PSZ system.

127. Evaporative Cooling, Medium Office, CZ-6, Evaporative Cooling-This case models a packaged VAV system with indirect evaporative coolers precooling before a DX cooling coil. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PVAV system.

128. Evaporative Cooling, Medium Office, CZ-15, Evaporative Cooling-This case models a packaged VAV system with indirect evaporative coolers precooling before a DX cooling

coil. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PVAV system.

129. Evaporative Cooling, Medium Office, CZ-16, Evaporative Cooling-This case models a packaged VAV system with indirect evaporative coolers precooling before DX cooling coil. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PVAV system.

130. Hydronic radiant system, Medium Office, CZ-6, Hydronic radiant system-This case models a hydronic low temperature radiant system for both heating and cooling and a dedicated outdoor air system. The central plant is single hot water boiler, electric compression chiller with a water-cooled condenser, and a cooling tower. An integrated water-side economizer is used to precool chilled water whenever possible. The dedicated outdoor air system supplies constant outdoor air to each thermal zone. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PVAV system.

131. Natural Ventilation, Medium Office, CZ-3, Natural ventilation-This case models natural ventilation to cool exterior zones using an airflow network, a packaged DX cooling system for interior zones, and a baseboard water heating system for all thermal zones. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PVAV system.

132. Underfloor air distribution, Medium Office, CZ-3,Underfloor air distribution-This case models an underfloor air distribution system with supply plenum, VAV reheat air terminal units serving interior thermal zones and a variable-speed fan powered VAV reheat terminal unit serving the exterior zones. The simulation results of this testing case are compared to those of the 2008 Title 24 baseline for PVAV system.

Table 2: Baseline Runs for HVAC Test Cases

No.	Test Case	Baseline
79	PTAC Test Strip Mall CZ-6 Low Eff	PTAC Strip Mall CZ-6 Baseline
80	PTAC Test Strip Mall CZ-6 High Eff	
81	PTAC Test Strip Mall CZ-15 Low Eff	PTAC Strip Mall CZ-15 Baseline
82	PTAC Test Strip Mall CZ-15 High Eff	
83	PTAC Test Strip Mall CZ-16 Low Eff	PTAC Strip Mall CZ-16 Baseline
84	PTAC Test Strip Mall CZ-16 High Eff	
85	PTHP Test Strip Mall CZ-6 Low Eff	PTHP Strip Mall CZ-6 Baseline
86	PTHP Test Strip Mall CZ-6 High Eff	
87	PTHP Test Strip Mall CZ-15 Low Eff	PTHP Strip Mall CZ-15 Baseline
88	PTHP Test Strip Mall CZ-15 High Eff	

89	PTHP Test Strip Mall CZ-16 Low Eff	PTHP Strip Mall CZ-16 Baseline
90	PTHP Test Strip Mall CZ-16 High Eff	
91	PSZ Test Strip Mall CZ-6 Low Eff	PSZ Strip Mall CZ-6 Baseline
92	PSZ Test Strip Mall CZ-6 High Eff	
93	PSZ Test Strip Mall CZ-15 Low Eff	PSZ Strip Mall CZ-15 Baseline
94	PSZ Test Strip Mall CZ-15 High Eff	
95	PSZ Test Strip Mall CZ-16 Low Eff	PSZ Strip Mall CZ-16 Baseline
96	PSZ Test Strip Mall CZ-16 High Eff	
97	PVAV Test Medium Office CZ-6 Low Eff	PVAV Medium Office CZ-6 Baseline
98	PVAV Test Medium Office CZ-6 High Eff	
99	PVAV Test Medium Office CZ-15 Low Eff	PVAV Medium Office CZ-15 Baseline
100	PVAV Test Medium Office CZ-15 High Eff	
101	PVAV Test Medium Office CZ-16 Low Eff	PVAV Medium Office CZ-16 Baseline
102	PVAV Test Medium Office CZ-16 High Eff	
103	VAV Test Large Office CZ-6 Low Eff	VAV Large Office CZ-6 Baseline
104	VAV Test Large Office CZ-6 High Eff	
105	VAV Test Large Office CZ-15 Low Eff	VAV Large Office CZ-15 Baseline
106	VAV Test LargeOffice CZ-15 High Eff	
107	VAV Test LargeOffice CZ-16 Low Eff	VAV Large Office CZ-16 Baseline
108	VAV Test LargeOffice CZ-16 High Eff	
109	FanCoil Test Strip Mall CZ-6 Low Eff	FanCoil Strip Mall CZ-6 Baseline
110	FanCoil Test Strip Mall CZ-6 High Eff	
111	FanCoil Test Strip Mall CZ-15 Low Eff	FanCoil Strip Mall CZ-15 Baseline
112	FanCoil Test Strip Mall CZ-15 High Eff	
113	FanCoil Test Strip Mall CZ-16 Low Eff	FanCoil Strip Mall CZ-16 Baseline
114	FanCoil Test Strip Mall CZ-16 High Eff	
115	VRF Test Strip Mall CZ-6 Low Eff	PSZ Strip Mall CZ-6 Baseline
116	VRF Test Strip Mall CZ-6 High Eff	
117	VRF Test Strip Mall CZ-15 Low Eff	PSZ Strip Mall CZ-15 Baseline
118	VRF Test Strip Mall CZ-15 High Eff	
119	VRF Test Strip Mall CZ-16 Low Eff	PSZ Strip Mall CZ-16 Baseline
120	VRF Test Strip Mall CZ-16 High Eff	

121	WLHP Test Strip Mall CZ-6 Low Eff	PSZ Strip Mall CZ-6 Baseline
122	WLHP Test Strip Mall CZ-6 High Eff	
123	WLHP Test Strip Mall CZ-15 Low Eff	PSZ Strip Mall CZ-15 Baseline
124	WLHP Test Strip Mall CZ-15 High Eff	
125	WLHP Test Strip Mall CZ-16 Low Eff	PSZ Strip Mall CZ-16 Baseline
126	WLHP Test Strip Mall CZ-16 High Eff	
127	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	PVAV Medium Office CZ-6 Baseline
128	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	PVAV Medium Office CZ-15 Baseline
129	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	PVAV Medium Office CZ-16 Baseline
130	HydronicRadiant System Test Medium Office CZ-6HydronicRadiantSystem	PVAV Medium Office CZ-6 Baseline
131	NaturalVentilation Test Medium Office CZ-3 NaturalVentilation	PVAV Medium Office CZ-3 Baseline
132	UFAD Test Medium Office CZ-3 UFAD	PVAV Medium Office CZ-3 Baseline

Source: LBNL

Table 3: Configurations of the Packaged Terminal Air Conditioners

Category ID	Parameter	Range		
		Low Efficiency	Title 24 Baseline	High Efficiency
DX Coil	COP	3.0	3.8	4.5
Ventilation	Ventilation rate($m^3/s/m^2$)	0.00099	0.00076	0.00053
Fan	Fan Status	On-Continuously	On-off	On-off
	Fan efficiency	0.1	0.3	0.5

Source: LBNL

Table 4: Configurations of the Packaged Terminal Heat Pumps

Category ID	Parameter	Range		
		Low Efficiency	Title 24 Baseline	High Efficiency
DX Cooling Coil	COP	3.0	3.8	4.5
DX Heating Coil	COP	2.88	3.2	3.52
Ventilation	Ventilation rate ($m^3/s/m^2$)	0.00099	0.00076	0.00053
Fan	Fan Status	On-Continuously	On-off	On-off
	Fan efficiency	0.1	0.3	0.5

Source: LBNL

Table 5: Configurations of the Packaged Single Zone Systems

Category ID	Parameter	Range		
		Low Efficiency	Title 24 Baseline	High Efficiency
Room temperature	Cooling temperature setpoint	23˚C	24˚C	25˚C
	Heating temperature setpoint	22˚C	21C	20˚C
Fan	Fan control	On continuously	On -off	On-off
	Fan efficiency	0.35	0.56	0.72
DX Cooling	DX efficiency	3.0	3.84	4.5
Gas Burner	Efficiency	0.65	0.8	0.92

Source: LBNL

Table 6: Configurations of the Packaged VAV Systems

Category ID	Parameter	Range		
		Low Efficiency	Title 24 Baseline	High Efficiency
Economizer	Economizer control	No economizer	Non-integrated economizer	Integrated economizer
Fan	Fan efficiency	0.35	0.60	0.72
	Fan static pressure reset	No reset	Fan 0.5 inch	Fan 0.3 inch
DX Cooling Coil	DX cooling rated COP	3.00	3.84	4.50
Gas Furnace	Gas furnace efficiency	0.65	0.80	0.92
Supply Air Temperature	Supply air temperature reset	No reset	Reset based on outdoor air temperature	Reset based on outdoor air temperature
Ventilation	Ventilation	0.00099	0.00076	0.00053
VAV box	VAVMin	50%	30%	15%

Source: LBNL

Table 7: Configurations of the Single Duct Built-Up VAV Systems

Category ID	Description	Range		
		Low Efficiency	Title 24 Baseline	High Efficiency
Air Economizer	Economizer control	No economizer	Non-integrated economizer	Integrated economizer
Fan	Fan efficiency	0.35	0.6	0.72
	Fan static pressure reset	No reset	Fan 0.5 inch	Fan 0.3 inch
VAV box	VAVMin, minimum box position	50%	30%	15%
Boiler	Efficiency	0.7	0.8	0.92
Chiller	Efficiency, COP	4.5	5.5	7.0

Source: LBNL

Table 8: Configurations of the Fan Coil Units

Category ID	Parameter	Range		
		Low Efficiency	Title 24 Baseline	High Efficiency
Chilled water loop	Cooling water temperature	6.7	Reset based on outdoor air temperature	
Hot water loop	Heating water temperature	82.2	Reset based on outdoor air temperature	
Fan	Efficiency	0.35	0.6	0.72

Source: LBNL

CHAPTER 4:
Simulation Results of the HVAC Test Cases

Baseline models and test cases were simulated using EnergyPlus v7.0 for the selected climate zones. The reference data sets based on the simulation results were generated. The reference data sets are included in a spreadsheet that is set up to receive output data from candidate programs and perform predefined comparisons. Compiled results include annual site energy consumption for each end-use, overall site energy consumption, total unmet load hours and the TDV energy and percent variation of the TDV and total end use site energy. Twenty items of simulation results listed below were summarized in the spreadsheet for comparison between reference software and applicant software. The spreadsheet is attached in Appendix B.

- Annual TDV Energy Use Intensity (EUI) (kBtu/ft^2)
- Annual TDV EUI- Electricity (kBtu/ft^2)
- Annual TDV EUI- Natural Gas (kBtu/ft^2)
- Annual Total End Use Site Energy EUI (kBtu/ft^2)
- Annual End Use Site Energy: Heating (kBtu/ft^2)
- Annual End Use Site Energy: Cooling (kBtu/ft^2)
- Annual End Use Site Energy: Interior Lighting (kBtu/ft^2)
- Annual End Use Site Energy: Interior Equipment (kBtu/ft^2)
- Annual End Use Site Energy: Exterior Lighting (kBtu/ft^2)
- Annual End Use Site Energy: Fans (kBtu/ft^2)
- Annual End Use Site Energy: Pumps (kBtu/ft^2)
- Annual End Use Site Energy: Refrigeration (kBtu/ft^2)
- Annual End Use Site Energy: Water Heating (kBtu/ft^2)
- Annual End Use Site Energy: Heat Rejection (kBtu/ft^2)
- Annual End Use Site Energy: Exterior Equipment (kBtu/ft^2)
- Variation from Baseline: TDV percent variation
- Variation from Baseline: Total End Use Site Energy percent variation
- The number of unmet load hours during occupied periods
- Area per cooling capacity (ft^2/Ton)
- Area per heating capacity (ft^2/kBtu/h)

The annual TDV percent variation shall be calculated using the formula:

TDV percent = $(TDV_b - TDV_n) / TDV_b$
Where, TDV percent is the TDV percent variation,
TDV_n is the annual TDV for test case number n, and
TDV_b is the annual TDV for the baseline case run.

A series of quantitative tests called the Compliance Margin Tests were performed and the results compared against predetermined Reference results to demonstrate that the applicant software is acceptable for use in code compliance. All the test cases were performed and the results summarized in the forms contained in Appendix B.

4.1 Test Criteria

Test criteria are recommended to provide impartial accreditation based on the capability of the candidate program to model a subset of the full range of HVAC systems. Applicant software vendors performed a series of computer runs. The applicant test case results were compared to the reference results to verify that applicant software meets the test criteria. Simulation results for each test case are compiled in forms provided in Appendix B.

In order to be accepted, the applicant software should fulfill the passing criteria as determined by the Commission:

For each test case,
When Reference Model TDV percent $r \leq 1$ percent, Allowed Maximum Applicant Model TDV $percent_a$ =1 percent
When Reference Model TDV percent $r > 1$ percent, Allowed Applicant Model TDV $percent_a$ shall be within ± 10 percent of Reference Model TDV percentr
Where, the subscript "a" represents the applicant results and the subscript "r" represents the reference results.

4.2 Testing Template

An HVAC test template is shown in Table 3. The variations of annual TDV and total end use site energy for HVAC test cases compared with baselines are listed in Table 3. The columns for "Reference Model" summarize the simulation results on variations in annual TDV and total end use site energy for HVAC test cases using results from EnergyPlus as the reference data set. Baseline and test cases were simulated using applicant software and the simulation results on variations in annual TDV and total end use site energy will be recorded in the highlighted area for "Applicant Model". The reference data set will be compared with the received output data from applicant software based on predefined test criteria. If the test results for a particular HVAC system type meet the test criteria, the applicant software will be accepted for compliance use for this HVAC system type. Otherwise, it will be not accepted for compliance use.

Table 9: Template of Results for HVAC Test Cases

Test Case		Variation from Baseline				Pass/Fail
		TDV % Variation		Total End Use Site Energy % Variation		
		Reference Model	Applicant Model	Reference Model	Applicant Model	
	PTAC Stripmall CZ-6 Baseline					
79	PTAC Test Stripmall CZ-6 Low Eff	46%		48%		
80	PTAC Test Stripmall CZ-6 High Eff	-6%		-4%		
	PTAC Stripmall CZ-15 Baseline					
81	PTAC Test Stripmall CZ-15 Low Eff	54%		55%		
82	PTAC Test Stripmall CZ-15 High Eff	-7%		-5%		
	PTAC Stripmall CZ-16 Baseline					
83	PTAC Test Stripmall CZ-16 Low Eff	52%		58%		
84	PTAC Test Stripmall CZ-16 High Eff	-4%		-3%		
	PTHP Stripmall CZ-6 Baseline					
85	PTHP Test Stripmall CZ-6 Low Eff	45%		47%		
86	PTHP Test Stripmall CZ-6 High Eff	-6%		-4%		
	PTHP Stripmall CZ-15 Baseline					
87	PTHP Test Stripmall CZ-15 Low Eff	54%		54%		
88	PTHP Test Stripmall CZ-15 High Eff	-7%		-6%		
	PTHP Stripmall CZ-16 Baseline					
89	PTHP Test Stripmall CZ-16 Low Eff	49%		54%		
90	PTHP Test Stripmall CZ-16 High Eff	-4%		-3%		
	PSZ Stripmall CZ-6 Baseline					
91	PSZ Test Stripmall CZ-6 Low Eff	42%		42%		

92	PSZ Test Stripmall CZ-6 High Eff	-18%		-18%		
	PSZ Stripmall CZ-15 Baseline					
93	PSZ Test Stripmall CZ-15 Low Eff	40%		40%		
94	PSZ Test Stripmall CZ-15 High Eff	-18%		-17%		
	PSZ Stripmall CZ-16 Baseline					
95	PSZ Test Stripmall CZ-16 Low Eff	40%		33%		
96	PSZ Test Stripmall CZ-16 High Eff	-18%		-18%		
	PVAV MediumOffice CZ-6 Baseline					
97	PVAV Test MediumOffice CZ-6 Low Eff	101%		95%		
98	PVAV Test MediumOffice CZ-6 High Eff	-20%		-20%		
	PVAV MediumOffice CZ-15 Baseline					
99	PVAV Test MediumOffice CZ-15 Low Eff	89%		83%		
100	PVAV Test MediumOffice CZ-15 High Eff	-15%		-14%		
	PVAV MediumOffice CZ-16 Baseline					
101	PVAV Test MediumOffice CZ-16 Low Eff	103%		99%		
102	PVAV Test MediumOffice CZ-16 High Eff	-14%		-14%		
	VAV LargeOffice CZ-6 Baseline					
103	VAV Test LargeOffice CZ-6 Low Eff	53%		84%		
104	VAV Test LargeOffice CZ-6 Low Eff	-9%		-16%		
	VAV LargeOffice CZ-15 Baseline					
105	VAV Test LargeOffice CZ-15 Low Eff	43%		66%		
106	VAV Test LargeOffice CZ-15 Low Eff	-6%		-9%		
	VAV LargeOffice CZ-16 Baseline					
107	VAV Test LargeOffice CZ-16 Low Eff	62%		87%		
108	VAV Test LargeOffice CZ-16 Low Eff	-7%		-9%		

	FanCoil Stripmall CZ-6 Baseline					
109	FanCoil Test Stripmall CZ-6 Low Eff	0%		-1%		
110	FanCoil Test Stripmall CZ-6 High Eff	0%		0%		
	FanCoil Stripmall CZ-15 Baseline					
111	FanCoil Test Stripmall CZ-15 Low Eff	0%		0%		
112	FanCoil Test Stripmall CZ-15 High Eff	0%		0%		
	FanCoil Stripmall CZ-16 Baseline					
113	FanCoil Test Stripmall CZ-16 Low Eff	0%		0%		
114	FanCoil Test Stripmall CZ-16 High Eff	0%		-1%		
	PSZ Stripmall CZ-6 Baseline					
115	VRF Test Stripmall CZ-6 Low Eff	-18%		-14%		
116	VRF Test Stripmall CZ-6 High Eff	-24%		-19%		
	PSZ Stripmall CZ-15 Baseline					
117	VRF Test Stripmall CZ-15 Low Eff	-25%		-20%		
118	VRF Test Stripmall CZ-15 High Eff	-32%		-26%		
	PSZ Stripmall CZ-16 Baseline					
119	VRF Test Stripmall CZ-16 Low Eff	-16%		-27%		
120	VRF Test Stripmall CZ-16 High Eff	-22%		-31%		
	PSZ Stripmall CZ-6 Baseline					
121	WLHP Test Strip Mall CZ-6 Low Eff	-21%		-15%		
122	WLHP Test Strip Mall CZ-6 High Eff	-21%		-15%		
	PSZ Stripmall CZ-15 Baseline					
123	WLHP Test Strip Mall CZ-15 Low Eff	-38%		-30%		
124	WLHP Test Strip Mall CZ-15 High Eff	-38%		-30%		

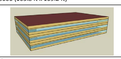
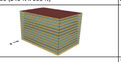
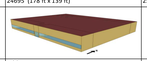
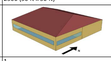
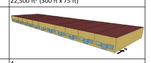
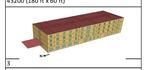
	PSZ Stripmall CZ-16 Baseline					
125	WLHP Test Strip Mall CZ-16 Low Eff	-17%		-24%		
126	WLHP Test Strip Mall CZ-16 High Eff	-17%		-25%		
	PVAV MediumOffice CZ-6 Baseline					
127	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	0%		0%		
	PVAV MediumOffice CZ-15 Baseline					
128	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	0%		0%		
	PVAV MediumOffice CZ-16 Baseline					
129	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	0%		0%		
	PVAV MediumOffice CZ-6 Baseline					
130	RadiantSlab Test Medium Office CZ-6 RadiantSlab	-10%		-9%		
	PVAV MediumOffice CZ-3 Baseline					
131	NaturalVentilation Test Medium Office CZ-3 NaturalVentilation	-27%		-22%		
	PVAV MediumOffice CZ-3 Baseline					
132	UFAD Test Medium Office CZ-3 UFAD	-17%		-18%		

Source: LBNL

GLOSSARY

Term	Definition
AEC	Architectural Energy Corporation
ASHRAE	American Society of Heating, Refrigeration, and Air-conditioning Engineers
CEC	California Energy Commission
COP	Coefficient of Performance
CZ	Climate Zone
DX	Direct Expansion
Eff	Efficiency
EUI	Energy Use Intensity
HVAC	Heating, Ventilation, and Air-Conditioning
LBNL	Lawrence Berkeley National Laboratory
PNNL	Pacific Northwest National Laboratory
PSZ	Packaged Single Zone
PTHP	Packaged Terminal Heat Pump
PVAV	Packaged Variable Air Volume
TDV	Time Dependent Valuation
UFAD	Underfloor Air Distribution
USDOE	U.S. Department of Energy
VAV	Variable Air Volume
VRF	Variable Refrigerant Flow
WLHP	Water Loop Heat Pump

APPENDIX A:
Input Summary

Prototype Description	Small Office Building	Medium Office Building	Large Office Building	Stand-alone Retail	Quick Service Restaurant	Strip Mall- Fan Coil System	Strip Mall-PSZ System	Strip Mall-PTAC System	Strip Mall-PTHP System	Strip Mall-VRF System	Strip Mall-WLHP System	MediumOffice-Evaporative Cooling System	Medium Office-Hydronic Radiant System	MediumOffice-Natural Ventilation System	MediumOffice-UFAD System	Small Hotel
Vintage	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction	New Construction
Location	CZ-6/15/16	CZ-3/6/15/16	CZ-1/7/6/15/16	CZ-1/7	CZ-6	CZ-6/15/16	CZ-6/15/16	CZ-6/15/16	CZ-6/15/16	CZ-6/15/16	CZ-6/15/16	CZ-6/15/16	CZ-6	CZ-3	CZ-3	CZ-6
Fuel Type	gas, electricity	gas, electricity	gas, electricity	gas, electricity	gas, electricity	gas, electricity										
Total Floor Area (sq feet)	5500 (90.8 ft x 60.5ft)	53600 (163.8 ft x 109.2 ft)	498,600 (240 ft x 160 ft)	24695 (178 ft x 139 ft)	2500 (50 ft x 50 ft)	22,500 ft² (300 ft x 75 ft)										43200 (180 ft x 60 ft)
Building shape																
Aspect Ratio	1.5	1.5	1.5	1.28	1	4										3
Number of Floors	1	3	12 (plus basement)	1	1	1										4
Window Fraction (Window-to-Wall Ratio)	24.4% for South and 19.8% for the other three orientations (Window Dimensions: 6.0 ft x 5.0 ft punch windows for all façades)	33% (Window Dimensions: 163.8 ft x 4.29 ft on the long side of facade 109.2 ft x 4.29 ft on the short side of the façade)	40% of above-grade gross walls 37.5% of gross walls (including the below-grade walls)	7.1% (Window Dimensions: 82.136 ft x 5 ft, 9.843 ft x 8.563 ft and 82.136 ft x 5 on the street facing facade)	South: 28% East: 14% North: 0% West: 14%	10.5% (Window Dimensions: 24 windows, 7 ft x 5 ft each and 12 doors, 6 ft x 7 ft each, on the street facing façade with south orientation)										South: 3.1%, East: 11.4%, North: 4.0%, West: 15.2% Average Total: 10.9%
Window Locations	evenly distributed along four façades	evenly distributed along four façades	evenly distributed along four façades	Windows only on the street facing façade (25.4% WWR)	East (23.3 ft x 3 ft), south (46.7 ft x 3 ft), and west (23.3 ft x 3 ft) sides of dining zone façade	Windows only on the street facing façade										One per guest room (4' x 5')
Shading Geometry	none	none	none	none	none	none										none
Azimuth	non-directional	non-directional	non-directional	non-directional	non-directional	non-directional										non-directional
Thermal Zoning	Perimeter zone depth: 16.4 ft. Four perimeter zones, one core zone and an attic zone. Percentages of floor area: Perimeter 70%, Core 30%	Perimeter zone depth: 15 ft. Each floor has four perimeter zones and one core zone. Percentages of floor area: Perimeter 40%, Core 60%	Perimeter zone depth: 15 ft. Each floor has four perimeter zones and one core zone. Percentages of floor area: Perimeter 33%, Core 67%	Five thermal zones	Kitchen, Dining, and Unconditioned Attic	10 thermal zones (from left to right): LGStore1 (Type 1), SMStore1 (Type 1), SMStore2 (Type 2), SMStore3 (Type 3), SMStore4 (Type 2), LGStore2 (Type 3), SMStore5 (Type 3), SMStore6 (Type 3), SMStore7 (Type 3), and SMStore8										Ground Floor: 19 zones including guest rooms, lobby, office space, meeting room, laundry room, employee lounge, restrooms, exercise room, mechanical room, corridor, stairs, storage; 2nd-4th Floor: 16 zones per floor, including
Floor to floor height (feet)	10	13	13	N/A	NA	17										Ground floor: 11 ft, Upper floors: 9 ft
Floor to ceiling height (feet)	10	9	9	20	10	17										same as above
Glazing sill height (feet)	3 (top of the window is 8 ft high with 5 ft high glass)	(4 ft above ceiling plenum) 3.35 ft (top of the window is 7.64 ft high with 4.29 ft high glass)	3 ft	5 ft (top of the window is 8.73 ft high with 3.74 ft high glass)	3.5 (top of the window is 6.5 ft high with 3 ft high glass)	3.0 ft (top of the window is 8 ft high)										3 ft in ground floor, 2 ft. in upper floors
Exterior walls																
Construction	Wood-Frame Walls	Metal Framed wall (Non Res)	Metal Framed wall (Non Res)	Metal Framed wall (Non Res)	Wood-Frame Walls	Metal Framed wall (Non Res)										Metal Framed wall (Guest room Bldgs)
Construction Assembly Layers	Refer T24NRWallWood	Refer T24NRWallMetalFrame	Refer T24NRWallMetalFrame	Refer T24NRWallMetalFrame	Refer T24NRWallWood											
U-factor (Btu / h * ft² * °F) and/or R-value (h * ft² * °F / Btu)	Refer T24NRWallWood for respective CZ U value	Refer T24NRWallMetalFrame for respective CZ U value	Refer T24NRWallMetalFrame for respective CZ U value	Refer T24NRWallMetalFrame for respective CZ U value	Refer T24NRWallWood for respective CZ U value	Based on T-24, 2013 requirements for Metal-framed (non-res) Wall										Based on T-24, 2013 requirements for Metal-framed (Guest room Bldgs)) Wall
Roof																
Construction	Attic Roof with wood joist	Metal Framed Attic Roof	Metal Framed Attic Roof	Metal Framed Attic Roof	Attic Roof with wood joist	Roof with insulation above deck										Built-up-Roof
Construction Assembly Layers	Refer T24NRAtticRWood	Refer T24NRRoofInsAboveDeck	Refer T24NRRoofInsAboveDeck	Refer T24NRRoofInsAboveDeck	Refer T24NRAtticRWood											
U-factor (Btu / h * ft² * °F) and/or R-value (h * ft² * °F / Btu)	Refer T24NRAtticRWood for respective CZ U value	Refer T24NRRoofInsAboveDeck for respective CZ U value	Refer T24NRRoofInsAboveDeck for respective CZ U value	Refer T24NRRoofInsAboveDeck for respective CZ U value	Refer T24NRAtticRWood for respective CZ U value	Based on T-24, 2013 requirements for Metal Framed Attic Roof.										Based on T-24, 2013 requirements for Roof.
Dimensions	Based on floor area and aspect ratio	Based on floor area and aspect ratio	Based on floor area and aspect ratio	Based on floor area and aspect ratio	Based on floor area and aspect ratio	Based on floor area and aspect ratio										Based on floor area and aspect ratio
Tilts and orientations	Hipped roof: 10.76 ft attic ridge height, 2 ft overhang soffit	Horizontal	Horizontal	Horizontal	Insulated Ceiling - horizontal, Attic Roof East & West - 45 deg. North & South - 18.44 deg.	horizontal										horizontal
Window																
Dimensions	based on window fraction, location, glazing sill height, floor area and aspect ratio	based on window fraction, location, glazing sill height, floor area and aspect ratio	based on window fraction, location, glazing sill height, floor area and aspect ratio	based on window fraction, location, glazing sill height, floor area and aspect ratio	based on window fraction, location, glazing sill height, floor area and aspect ratio	based on window fraction, location, glazing sill height, floor area and aspect ratio										based on window fraction, location, glazing sill height, floor area and aspect ratio
Glass-Type and frame	Fixed vertical window with U-value and SHGC as specified.	fixed vertical window with U-value and SHGC as specified.	Fixed vertical window with U-value and SHGC as specified.	Fixed vertical window with U-value and SHGC as specified.	Fixed vertical window with U-value and SHGC as specified.	Glazing Assembly with U-value and SHGC as specified.										Glazing Assembly with U-value and SHGC as specified.
U-factor (Btu / h * ft² * °F)	0.36	0.36	0.36	0.36	0.36	Based on T-24, 2013 Fixed, operable Window U-factor requirements										Based on T-24, 2013 Fixed Window U-factor requirements
SHGC (all)	0.25	0.25	0.25	0.25	0.25	Based on T-24, 2013 Fixed,operable Window RSHG requirements										Based on T-24, 2013 Fixed Window RSHG requirements
Visible transmittance	0.42	0.42	0.42	0.42	0.42	Based on T-24, 2013 Fixed, operable Window VT requirements.										Based on T-24, 2013 Fixed Window VT requirements.
Operable area	0	0	0	0	0	2%										0%
Skylight																
Dimensions				Core Retail, Refer Skylight Layout for details												
Glass-Type and frame	NA	NA	NA	Glass, curb mounted skylight with U-value and SHGC as specified.	NA	NA										NA
U-factor (Btu / h * ft² * °F)				0.58												
SHGC				0.25												
Visible transmittance				0.49												
Foundation																
Foundation Type	Slab on grade floor (unheated)	Slab on grade floor (unheated)	Slab on grade floor (unheated)	Slab on grade floor (unheated)	Slab on grade floor (unheated)	Slab on grade floor (unheated)										Slab on grade floor (unheated)
Construction	8" NW concrete floor	8" NW concrete floor	8" NW concrete floor	6" NW concrete floor	6" NW concrete floor											6" concrete slab
Construction Assembly Layers	T24NFloor_with_carpet	UnhtSoG	T24NFloor_with_carpet	ext_slab_6in_with_carpet	T24Floor											
Thermal properties for ground level floor U-factor (Btu / h * ft2 * °F) and/or R-value (h * ft2 * °F / Btu)	Refer T24Floor_with_carpet for respective CZ U value	F factor= 0.73	Refer T24Floor_with_carpet for further description	Refer ext_slab_6in_with_carpet for respective CZ U value	Refer T24Floor for respective CZ U value											Based on T-24, 2013 requirements for unheated slab on grade floor
Thermal properties for basement walls	NA	NA	Refer T24Basement_wall for further description	NA	NA	NA										NA
Dimensions	Based on floor area and aspect ratio.	Based on floor area and aspect ratio.	Based on floor area and aspect ratio.	Based on floor area and aspect ratio.	Based on floor area and aspect ratio.	Based on floor area and aspect ratio.										Based on floor area and aspect ratio.
Interior Partitions																
Construction	2x4 uninsulated Stud Wall	2x4 uninsulated Stud Wall	2x4 uninsulated Stud Wall	2x4 uninsulated Stud Wall	2x4 uninsulated Stud Wall	2x4 uninsulated Stud Wall										2x4 uninsulated Stud Wall
Construction Assembly Layers	Int_wall	Int_wall	Int_wall	Int_wall	Int_wall	Int_wall										
Dimensions	Based on floor area and floor to floor height	Based on floor area and floor to floor height	Based on floor area and floor to floor height	Based on floor area and floor to floor height	Based on floor area and floor to floor height	Based on floor area and floor to floor height										Based on floor plan and floor to floor height
Internal Mass	6 inches standard wood (16.6 lb/ft²)	6 inches standard wood (16.6 lb/ft²)	6 inches standard wood (16.6 lb/ft²)	6 inches standard wood (16.6 lb/ft²)	6 inches standard wood (16.6 lb/ft²)	6 inches standard wood (16.6 lb/ft²)										6 inches standard wood (16.6 lb/ft²)
Air Barrier System																
Infiltration	Peak: 0.2016 cfm/sf of above grade exterior wall surface area (when fans turn off) Off Peak: 25% of peak infiltration rate (when fans turn on)	Peak: 0.2016 cfm/sf of above grade exterior wall surface area (when fans turn off) Off Peak: 25% of peak infiltration rate (when fans turn on)	Peak: 0.2016 cfm/sf of above grade exterior wall surface area (when fans turn off) Off Peak: 25% of peak infiltration rate (when fans turn on)	Peak: 0.2016 cfm/sf of above grade exterior wall surface area (when fans turn off) Off Peak: 25% of peak infiltration rate (when fans turn on)	Peak: 0.2016 cfm/sf of above grade exterior wall surface area (when fans turn off) Off Peak: 25% of peak infiltration rate (when fans turn on)	Peak: 0.2016 cfm/sf of above grade exterior wall surface area (when fans turn off) Off Peak: 25% of peak infiltration rate (when fans turn on)										Peak: 0.2016 cfm/sf of above grade exterior wall surface area (when fans turn off) Off Peak: 25% of peak infiltration rate (when fans turn on)
HVAC System Type																
System Type	Packaged single zone air conditioning unit	Packaged VAV with hot-water reheat	VAV with hot-water reheat	Unit heater in Front_entry, Packaged single zone air conditioning unit for other zones.	Packaged single zone air conditioning unit	4 pipe fan coil system	Packaged single zone	Packaged Terminal Air Conditioner	Packaged Terminal Heat Pump	Variable Refrigerant Flow	Water to Air Heat Pump	Indirect evaporative cooling as pre-cooling for multizone VAV system	Hydronic radiant heating/cooling system + Dedicated outdoor air system	Natural ventilation (airflow network)+baseboard heating+a package DX cooling	Underfloor air distribution system	
Heating type	Gas furnace inside the packaged air conditioning unit	Gas furnace inside the packaged air conditioning unit	Gas boiler	Gas furnace inside the packaged air conditioning unit for back_space, core_retail, point_of_sale, and front_retail. Standalone gas furnace for front_entry	Gas furnace inside packaged air conditioning unit	Heating hot water	Gas furnace	Electric heating	Single speed DX heating with supplementary electric heating	DX heating variable refrigerant flow	Water to Air Heat Pump Heating Coil with supplementary gas heating	Pre-heating gas heating coil; Electric reheating coil	Heating hot water	Heating hot water	Pre-heating gas heating coil; Electric reheating coil	Guest rooms: PTAC with electric resistance heating Public spaces (office, laundry, lobby, and meeting room): gas furnace inside the packaged
Cooling type	Packaged air conditioning unit	Packaged air conditioning unit	Water cooled Centrifugal chillers (2)	Packaged air conditioning unit for back_space, core_retail, point_of_sale, and front_retail. No cooling for front_entry	Packaged air conditioning unit.	Chilled water system	Single speed DX cooling	Single speed DX cooling	Single speed DX cooling	DX cooling variable refrigerant flow	Water to Air Heat Pump Cooling Coil	Two speed DX cooling coil	Chilled water	Two speed DX cooling coil	Two speed DX cooling coil	Guest rooms and corridors: PTAC and make-up air unit for outdoor air ventilation
Distribution and terminal units	Single zone constant air volume distribution.	VAV terminal box with damper and hot-water reheating coil with Single maximum control logic. Zone control type: minimum supply air at 20% of the zone maximum air flow rate.	VAV terminal box with damper and hot-water reheating coil with Single maximum control logic. Zone control type: minimum supply air at 20% of the zone maximum air flow rate.	Constant air volume air distribution 3 single-zone roof top units serving four thermal zones back_space, point_of_sale, and front_retail. Variable Air Volume distribution with damper and reheat coil in core_retail zone with single maximum control logic. Zone minimum supply air at 0.67% of zone	Single zone constant air volume distribution	4 pipe fan coil unit	Air Terminal: SingleDuct: Uncontrolled	NA	NA	ZoneHVAC: TerminalUnit:VariableRefrigerantFlow	Air Terminal: SingleDuct: Uncontrolled	Air Terminal: SingleDuct:VAV:Reheat	ZoneHVAC: LowTemperatureRadiant:VariableFlow	Air Terminal: SingleDuct:VAV:NoReheat	Air Terminal: SingleDuct:VAV:Reheat:VariableSpeedFan (perimeter zones); Air Terminal: SingleDuct:VAV:Reheat (core zones)	Public space: Split system with DX cooling Constant air volume systems
HVAC Sizing																
Air Conditioning	Autosized with sizing factor of 1.15	Autosized with sizing factor of 1.15	Autosized with sizing factor of 1.15	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosizing	Autosized with sizing factor of 7	Autosizing	Autosizing	autosized to design day
Heating	Autosized with sizing factor of 1.25	Autosized with sizing factor of 1.25	Autosized with sizing factor of 1.25	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosized with sizing factor of 1.2	Autosizing	Autosized with sizing factor of 1.2	Autosizing	Autosizing	autosized to design day
HVAC Efficiency																
Air Conditioning	EER-11 (COP- 3.8445)	EER-11 (COP- 3.8445)	COP-6.1	EER-11 (COP-3.745 for back_space, point_of_sale, and front_retail. No cooling for front_entry EER-9.8 (COP-2.926 for core_retail)	EER-3.75 (COP-11)	COP-6.1	COP-3.84	COP-3.84	COP-3.84	COP-3.1	Compressor Efficiency: 1.35; Refrigerant Type: R22	COP-3.84	COP-8		COP-3.84	PTAC: EER = 10.58 Split system and packaged MAU system: varies by capacity and climate zone (see Appendix G)
Heating	80%	80%	80%	80%	80%	80%	80%	80%	COP-3.2	COP-2.9	Compressor Efficiency: 1.26; Refrigerant Type: R22	80%	100%		Gas Burner Efficiency: 80%	PTAC and electric cabinet heater: Et = 100% Gas furnace: varies by climate locations based
HVAC Control																
Thermostat Setpoint	75°F Cooling/70°F Heating	75°F Cooling/70°F Heating	75°F Cooling/70°F Heating	75°F Cooling/70°F Heating	Dining - 75°F Cooling/70°F Heating Kitchen - 79°F Cooling/66°F Heating	75.2°F Cooling/69.8°F Heating	75.2°F Cooling/69.8°F Heating	75.2°F Cooling/69.8°F Heating	75.2°F Cooling/69.8°F Heating	75.2°F Cooling/69.8°F Heating	75.2°F Cooling/69.8°F Heating	75°F Cooling/70°F Heating	66.2°F Cooling/78.8°F Heating	Cooling Setpoint based on ASHRAE 55 (C203_comfort.csv)Heating Setpoint 70°F	75°F Cooling/70°F Heating	70°F Cooling/Heating for rented guest rooms 74°F Cooling/66°F Heating for vacant guest
Thermostat Setback	85°F Cooling/60°F Heating	80°F Cooling/60°F Heating	80°F Cooling/60°F Heating	85°F Cooling/60°F Heating	Kitchen - 86°F Cooling/60°F Heating	85.0°F Cooling/60.0°F Heating	85.0°F Cooling/60.0°F Heating	85.0°F Cooling/60.0°F Heating	85.0°F Cooling/60.0°F Heating	85.0°F Cooling/60.0°F Heating	85.0°F Cooling/60.0°F Heating	80°F Cooling/60°F Heating	56.5°F Cooling/86°F Heating	Heating Setpoint 60°F	80°F Cooling/60°F Heating	
Design Supply air temperature	Maximum 104F, Minimum 55F	Maximum 104F, Minimum 55F	Maximum 104F, Minimum 55F	Maximum 104F, Minimum 55F	Maximum 104°F, Minimum 55°F	NA	Maximum 104°F, Minimum 55°F	NA	NA	NA	NA	Maximum 104F, Minimum 55F	72°F	Maximum 104F, Minimum 55F	Maximum 104F, Minimum 55F	
Supply air temperature reset	NA	Reheat coil max reheat temp 122F None	Reheat coil max reheat temp 122F When ODB is 50F or below, setpoint is 65F; when ODB is 70F or above, setpoint is 55F; setpoint varies linearly in between	Reheat coil max reheat temp 122F Warmest (104F) for core retail	NA	NA	NA	NA	NA	NA	NA	Reheat coil max reheat temp 122F Yes, reset based on outdoor air temperature	No reset	Reheat coil max reheat temp 122F Yes, reset based on outdoor air temperature	Reheat coil max reheat temp 122F No reset	No seasonal supply air temperature reset.
Chilled water supply temperatures	NA	NA	44°F	NA	NA	44°F	NA	NA	NA	NA	NA	NA	44°F	NA	NA	NA
Chilled water return temperatures	NA	NA	54°F	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chilled water supply temperature reset	NA	NA	None	NA	NA	Reset (44°F-54°F) based on outdoor air temper	NA	NA	NA	NA	NA	NA	No reset	NA	NA	
Condenser Type	NA	NA	Water-cooled	NA	NA	Water	NA	NA	NA	NA	NA	NA	Water	NA	NA	
Hot water supply temperatures	NA	NA	180°F	NA	NA	180°F	NA	NA	NA	NA	NA	NA	104°F	140°F	NA	NA
Hot water supply temperature reset	NA	NA	None	NA	NA	Reset (150°F-180°F) based on outdoor air temp	NA	NA	NA	NA	NA	NA	No reset	No reset	NA	
Economizers	No economizer	Fixed Dry Bulb at max limit 73F (CZ-15, 16) 70F (CZ-6)	Differential Dry bulb economizer	No economizer	No economizer	No economizer	No economizer; economizer with differential dry bulb control (LGstore1, LGstore2)									No Economizer
Ventilation	0.15 cfm/ft²	0.15 cfm/ft²	0.15 cfm/ft²	Point of Sale, Retail -0.25 cfm/ft² Backspace,	Dining- 0.15 cfm/ft², Kitchen-1.13 cfm/s	0.15 cfm/ft²	0.25 cfm/ft²	NA	NA	NA	0.15 cfm/ft²	Economizer with differential dry bulb control 0.15 cfm/ft²	No economizer 0.2 cfm/ft²	Economizer with differential dry bulb control 0.2 cfm/ft²	Economizer with differential dry bulb control 0.15 cfm/ft²	Varies
Demand Control Ventilation						NA	NA	NA	NA	NA	0.15 cfm/ft²	NA	NA	NA	NA	NA
Energy Recovery	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Supply Fan																
Fan type						OnOff	OnOff	OnOff	OnOff	OnOff	OnOff	Constatn volume (basement) and variable volume	Constant volume	Variable volume	Variable volume	
Fan schedules	Small Office Building Schedule	Medium Office Building Schedule	Large Office Building Schedule	Stand-alone Retail Schedule	Fast food Restaurant Schedule	Strip mall Schedule	Strip mall Schedule	Always available	Always available	Always available	Strip mall Schedule	Medium Office Building Schedule	Medium Office Building Schedule	Medium Office Building Schedule	Medium Office Building Schedule	Small Hotel Schedule
Supply Fan Total Efficiency (%)	53.56%	61%	61%	60.84% (VAV), 56.25% (CAV)	56.25%	60%	56%	30%	30%	30%	56%	60%	53%	70%	60% for main supply fans and 70% for underfloor fans	varies
Fan Motor Efficiency	85.50%	92%	94%	87%	86.50%	90%	86.50%	90%	90%	90%	87%	92.40%	85%	90%	92.40%	
Supply Fan Pressure Rise	2.49910709 ftinH2O	5.57800721 ftinH2O	5.57800703 ftinH2O	4.08853921 ftin H2O (VAV), 2.49910709 ftin H2O	2.49910709 ftin H2O	3.0 inH_2O	2.50 inH_2O	0.3 inH_2O	0.3 inH_2O	0.3 inH_2O	2.5 inH_2O	Variable volume: 5.58 inH_2O; Constant volume: 4.1 inH_2O	3.0 inH_2O	3.0 inH_2O	1 inH_2O for main supply fans and 0.5 inH_2O for underfloor fans	PTAC: 1.33 in. w.c. Cabinet Heater: 0.2 in w.c.
Pump																
Pump Type	NA	NA	SHW: Variable Speed,HW: Variable Speed, Cooling Tower:Constant Speed, CHW: Constant PrimaryVariable Secondary (constant flow to chillers with bypass, variable flow to coils)	NA	NA	Variable speed pumps for condensing water, chilled water and heating hot water systems	NA	NA	NA	NA	Constant Speed	NA	Variable speed pump	Variable speed pump	NA	Constant speed (recirculating pump for DHW)
Rated Pump Head	NA	NA	SHW:0.000000334549986 ft H_2O, HW: 60.0022091 ft H_2O, Cooling Tower:49.6996168 ft H2O, CHW Primary: 14.9748845 ft H_2O,CHW Secondary: 44.9246537 ft H_2O	NA	NA	60.0 ftH_2O	NA	NA	NA	NA	1.67 ft H_2O	NA	Heating hot/Chiller water circulation pump: 100 ftH_2O; Condensing water circulation pump: 10 ftH_2O	Heating hot water circulation pump: 100 ftH_2O	NA	
Pump Efficiency	NA	NA	Motor efficiency- SHW:1, HW: 0.9, Cooling Tower:0.87, CHW Primary, Secondary:0.9	NA	NA	Motor efficiency: 0.9	NA	NA	NA	NA	Motor efficiency: 0.87	NA	Motor efficiency: 0.87	Motor efficiency: 0.87	NA	20 ft
Cooling Tower																autosized
Cooling Tower Type	NA	NA	open cooling tower with two speed fan 10F (Design CW supply temp. 85F, CW return temp 95F)	NA	NA	Two speed tower	NA	NA	NA	NA	Single speed	NA	Single speed	NA	NA	NA
Tower range	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Tower Approach	NA	NA	7F (Tower leaving temp 85F and wet-bulb 78F)			Tower leaving temperature 85F	NA	NA	NA	NA	NA	NA	9°F	NA	NA	
Cooling Tower Efficiency	NA	NA	48.09 gpm/hp (high speed) 300. 59 gpm/hp (low speed)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Service Water Heating																
SWH type	Storage Tank	Storage Tank	Storage Tank	Storage Tank	Storage Tank	Storage Tank										Two Storage Tanks: one for laundry and the
Fuel type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas										Natural Gas
Thermal efficiency (%)	80%	80%	80%	78%	80%	80%										80%
Tank Volume (gal)	40 gal	264 gal	264 gal	40 gal	53 gal	6 gal										200 gal for guest rooms and 100 gal for laundry
Water temperature setpoint	120°F	120°F	120°F	135°F	120°F	120°F										120 F for guest rooms and 140 F for laundry
Water consumption	Small Office Building Schedule	Medium Office Building Schedule	Large Office Building Schedule	Stand-alone Retail Schedule	Fast food Restaurant Schedule	Strip mall Schedule										Small Hotel Schedule
Lighting Load																
Lighting power density (W/ft²)	0.8 W/ft²	0.8 W/ft²	0.8 W/ft²	Point of sale, Retail-1.2 W/ft², Lobby-1.5 W/ft², Backspace-0.6 W/ft²	Dining- 1.1 W/ft², Kitchen-1.6 W/ft²	1.2 W/ft²										As per T-24 Space-by Space Method Rqmts
Schedule	Small Office Building Schedule	Medium Office Building Schedule	Large Office Building Schedule	Stand-alone Retail Schedule	Fast food Restaurant Schedule	Strip mall Schedule										Small Hotel Schedule
Daylighting Controls	NA	NA	Stepped Dimming- 3 step control Illuminance setpoint = 100000 lux	Core retail-Stepped Dimming- 4 step control Illuminance setpoint = 100000 lux	Dining - Stepped Dimming- 3 step control Illuminance setpoint = 100000 lux											NA
Occupancy Sensors	NA	NA														NA
Plug load																
Electric power density (W/ft²)	1.34 W/ft2	1.34 W/ft2	1.34 W/ft2	Point of sale, Retail-1.0 W/ft2, Backspace-0.2 W/ft2	Electricity: Dining-0.5 W/ft², Kitchen- 25.17 W/ft². Gas: Kitchen,Dining- 1.51 W/ft²	0.4 W/ft²										
Schedule	Small Office Building Schedule	Medium Office Building Schedule	Large Office Building Schedule	Stand-alone Retail Schedule	Fast food Restaurant Schedule	Strip mall Schedule										Small Hotel Schedule
Occupancy																
Average people	100- ft²/person	100 ft²/person	100 ft²/person	Point of sale, Retail - 30 ft²/person, Back Space-	Dining- 14.3 ft²/person, Kitchen- 200 ft²/person	30 ft²/person										
Schedule	Small Office Building Schedule	Medium Office Building Schedule	Large Office Building Schedule	Stand-alone Retail Schedule	Fast food Restaurant Schedule	Strip mall Schedule										Small Hotel Schedule
Elevator																
Quantity																
Motor type																
Peak Motor Power (W/elevator)	NA	NA	NA	NA	NA	NA										NA
Heat Gain to Building																
Peak Fan/lights Power																
Motor and fan/lights Schedules																
Additional HAVC Parameters												Indirect evaporative cooling efficiency 85%	Counter-flow water-side economizer	Ventilation control: zone temperature Wind pressure coefficient type: surface average calculation		

Name	Layers	Overall U Value-CZ1		Overall U Value-CZ3		Overall U Value-CZ6		Overall U Value-CZ7		Overall U Value-CZ15		Overall U Value-CZ16	
		with film	without film	with film	without film	with film	without film	with film	without film	with film	without film	with film	without film
T24NRWallWood		NA	NA	NA	NA	0.110	0.121	NA	NA	0.042	0.043		
Outside Layer	T24 F11 Wood siding												
Layer 2	Insulation												
Layer 3	T24 G01 13mm gypsum board												
T24NRWallMetalFrame		0.098	0.107			0.098	0.107	0.098	0.107	0.062	0.066	0.062	0.066
Outside Layer	T24 F07 25mm stucco												
Layer 2	T24 G01 13mm gypsum board												
Layer 3	Insulation												
Layer 4	T24 G01 13mm gypsum board												
T24Basement_wall		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outside Layer	BwallInsulation												
Layer 2	T24 200mm concrete block basement wall												
T24NRAtticRfWood (Roof)		NA	NA	NA	NA	0.340	0.5347	NA	NA				
Outside Layer	T24 NR F15 Wood shingles												
Layer 2	T24 G05 25mm wood												
T24NRAttic_Floor (Attic Floor)													
Outside Layer	T24 G01 13mm gypsum board												
Layer 2	Insulation												
T24NR_Roof (Ceiling)													
Outside Layer	Insulation												
Layer 2	T24 G01 13mm gypsum board												
T24NRRoofInsAboveDeck		0.048	0.051			0.073	0.080	0.066	0.071	0.039	0.040	0.039	0.040
Outside Layer	T24 NR Built-up roofing												
Layer 2	Insulation												
Layer 3	T24 F08 Metal surface												
Int_wall		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outside Layer	G01 13mm gypsum board												
Layer 2	G01 13mm gypsum board												
T24Floor_with_carpet		NA	NA	NA	NA	0.287	0.474	NA	NA	0.287	0.474	0.287	0.474
Outside Layer	T24 200mm concrete floor												
Layer 2	CP02 CARPET PAD												
T24Floor		NA	NA	NA	NA	0.490	1.514	NA	NA	NA	NA	NA	NA
Outside Layer	T24 150mm concrete floor												
T24BFloor_with_carpet		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outside Layer	BfloorInsulation												
Layer 2	T24 200mm concrete floor												
Layer 3	CP02 CARPET PAD												
ext_slab_6in_with_carpet		0.335	0.623	NA	NA	NA	NA	0.335	0.623	NA	NA	NA	NA
Outside Layer	150mm Normalweight concrete floor												
Layer 2	CP02 CARPET PAD												
UnhtSoG													

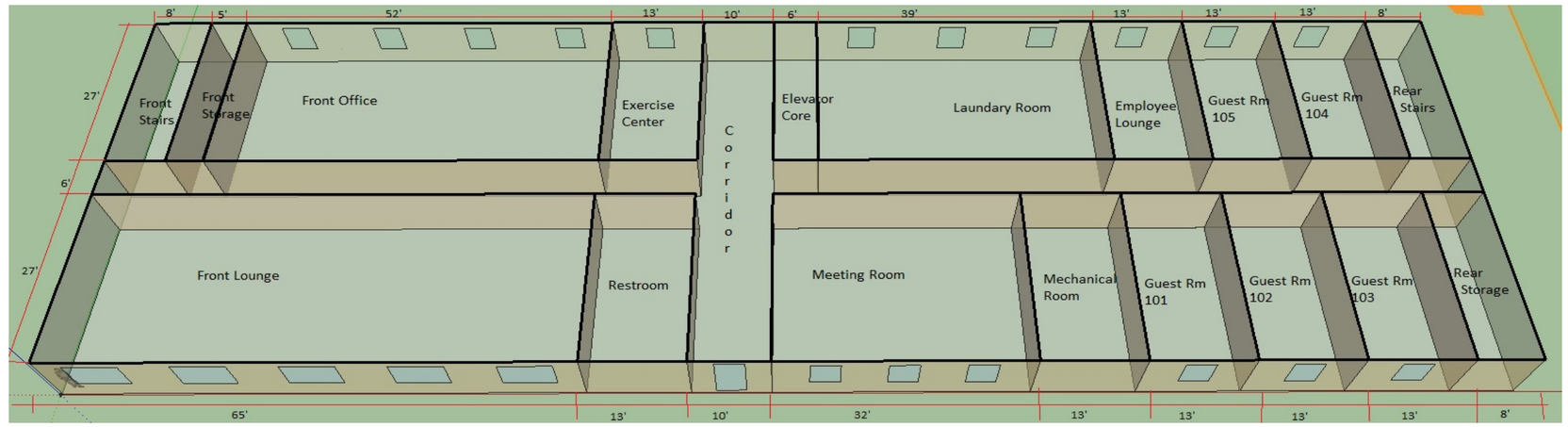
Material Name	Thickness(in)	Conductivity (Btu.in/hf	Density(lb/ft³)	Specific Heat (Btu/lb.F)
T24 F11 Wood siding	0.50	0.624	36.957	0.280
T24 G01 13mm gypsum board	0.50	1.110	49.942	0.261
T24 NR F15 Wood shingles	0.25	0.277	36.957	0.311
T24 G05 25mm wood	1.00	1.040	37.956	0.390
T24 200mm concrete floor	8.00	9.085	140.026	0.200
CP02 CARPET PAD	8.52			
T24 NR Built-up roofing	0.37	1.110	69.919	0.349
T24 F08 Metal surface	0.03	314.008	488.437	0.120
T24 F07 25mm stucco	1.00	4.993	115.866	0.201
T24 200mm concrete block basem	8.00	9.085	140.026	0.200
T24 150mm concrete floor	6.00	9.085	2243	0.200

Material Name	R value (ft^2.F-hr/Btu)
BwallInsulation	0.0057
BfloorInsulation	0.0057

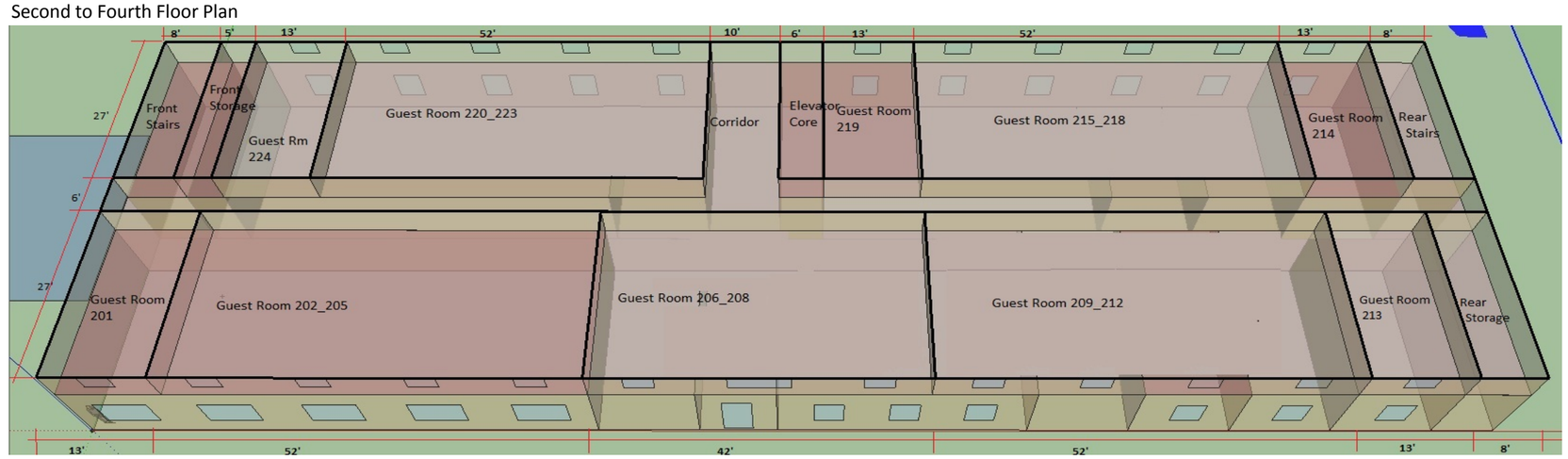
SMALL HOTEL

	Area [ft2]	Conditioned (Y/N)	
REARSTAIRSFLR1	216.053	Yes	8'x27'
CORRIDORFLR1	1620.234	Yes	
REARSTORAGEFLR1	216.053	No	8'x27'
FRONTLOUNGEFLR1	1755.335	Yes	65'x27'
RESTROOMFLR1	351.045	Yes	13'x27'
MEETINGROOMFLR1	864.103	Yes	32'x27'
MECHANICALROOMFLR1	351.045	Yes	13'x27'
GUESTROOM101	351.045	Yes	13'x27'
GUESTROOM102	351.045	Yes	13'x27'
GUESTROOM103	351.045	Yes	13'x27'
GUESTROOM104	351.045	Yes	13'x27'
GUESTROOM105	351.045	Yes	13'x27'
EMPLOYEELOUNGEFLR1	351.045	Yes	13'x27'
LAUNDRYROOMFLR1	1053.136	No	52'x27'
ELEVATORCOREFLR1	162.013	No	6'x27'
EXERCISECENTERFLR1	351.045	Yes	13'x27'
FRONTOFFICEFLR1	1404.182	Yes	52'x27'
FRONTSTAIRSFLR1	216.053	Yes	5'x27'
FRONTSTORAGEFLR1	134.993	No	8'x27'
REARSTAIRSFLR2	216.053	Yes	8'x27'
CORRIDORFLR2	1350.141	Yes	
REARSTORAGEFLR2	216.053	No	8'x27'
GUESTROOM201	351.045	Yes	13'x27'
GUESTROOM202_205	1404.289	Yes	52'x27'
GUESTROOM206_208	1134.196	Yes	42'x27'
GUESTROOM209_212	1404.289	Yes	52'x27'
GUESTROOM213	351.045	Yes	13'x27'
GUESTROOM214	351.045	Yes	13'x27'
GUESTROOM215_218	1404.182	Yes	52'x27'
ELEVATORCOREFLR2	162.013	No	6'x27'
GUESTROOM219	351.045	Yes	13'x27'
GUESTROOM220_223	1404.182	Yes	52'x27'
GUESTROOM224	351.045	Yes	13'x27'
FRONTSTORAGEFLR2	134.993	No	5'x27'
FRONTSTAIRSFLR2	216.053	Yes	8'x27'
REARSTAIRSFLR3	216.053	Yes	8'x27'
CORRIDORFLR3	1350.141	Yes	
REARSTORAGEFLR3	216.053	No	8'x27'
GUESTROOM301	351.045	Yes	13'x27'
GUESTROOM302_305	1404.289	Yes	52'x27'
GUESTROOM306_308	1134.196	Yes	42'x27'
GUESTROOM309_312	1404.289	Yes	52'x27'
GUESTROOM313	351.045	Yes	13'x27'
GUESTROOM314	351.045	Yes	13'x27'
GUESTROOM315_318	1404.182	Yes	52'x27'
ELEVATORCOREFLR3	162.013	No	6'x27'
GUESTROOM319	351.045	Yes	13'x27'
GUESTROOM320_323	1404.182	Yes	52'x27'
GUESTROOM324	351.045	Yes	13'x27'
FRONTSTORAGEFLR3	134.993	No	5'x27'
FRONTSTAIRSFLR3	216.053	Yes	8'x27'
REARSTAIRSFLR4	216.053	Yes	8'x27'
CORRIDORFLR4	1350.141	Yes	
REARSTORAGEFLR4	216.053	No	8'x27'
GUESTROOM401	351.045	Yes	13'x27'
GUESTROOM402_405	1404.289	Yes	52'x27'
GUESTROOM406_408	1134.196	Yes	42'x27'
GUESTROOM409_412	1404.289	Yes	52'x27'
GUESTROOM413	351.045	Yes	13'x27'
GUESTROOM414	351.045	Yes	13'x27'
GUESTROOM415_418	1404.182	Yes	52'x27'
ELEVATORCOREFLR4	162.013	No	6'x27'
GUESTROOM419	351.045	Yes	13'x27'
GUESTROOM420_423	1404.182	Yes	52'x27'
GUESTROOM424	351.045	Yes	13'x27'

First Floor Plan



Second to Fourth Floor Plan



FRONTSTORAGEFLR4	134.993	No	5'x27'
FRONTSTAIRSFLR4	216.053	Yes	8'x27'
Total	43206.032		8'x27'
Conditioned Total	40100.449		
Unconditioned Total	3105.584		

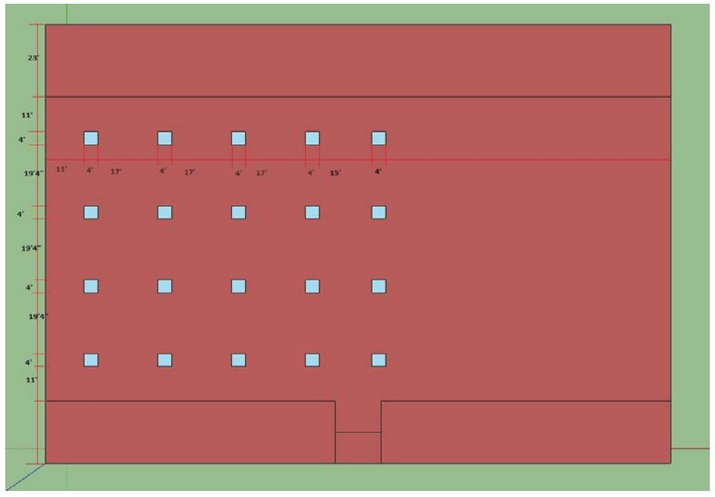
STRIP MALL

	Area [ft2]	Conditioned (Y/N)
LGSTORE1	3750.405	Yes
SMSTORE1	1875.149	Yes
SMSTORE2	1875.149	Yes
SMSTORE3	1875.149	Yes
SMSTORE4	1875.149	Yes
LGSTORE2	3750.405	Yes
SMSTORE5	1875.149	Yes
SMSTORE6	1875.149	Yes
SMSTORE7	1875.149	Yes
SMSTORE8	1875.149	Yes
Total	22502.213	
Conditioned Total	22502.213	
Unconditioned Total	0.000	

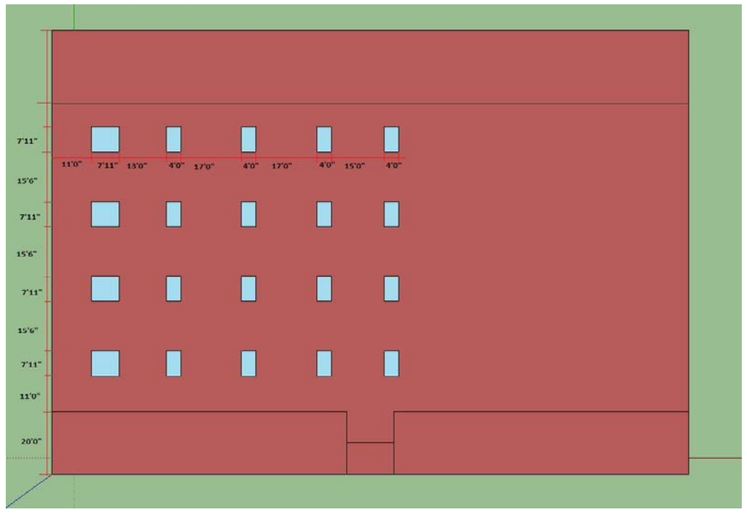
STAND ALONE RETAIL

	Area [ft2]	Conditioned (Y/N)
BACK_SPACE	4089	Yes
CORE_RETAIL	17227	Yes
POINT_OF_SALE	1623	Yes
FRONT_RETAIL	1623	Yes
FRONT_ENTRY	129	Yes
Conditioned Total	24692	
Unconditioned Total	0	

Baseline Skylight lauout



TestCase Skylight Layout



Small Office Hourly Operation Schedules

Input	Schedule	Day of Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Interior Light	T24BLDG_LIGHT_SCH	WD	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.35	0.30	0.30	0.20	0.20	0.10	0.05
		Saturday	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		Sunday, Holiday, Other	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		SummerDesign	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		WinterDesign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	T-24 BLDG_EQUIP_SCH_AD'	WD	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.35	0.30	0.30	0.20	0.20	0.10	0.05
		Saturday	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		Sunday, Holiday, Other	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		SummerDesign	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		WinterDesign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Occupancy	T24 BLDG_OCC_SCH	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.20	0.95	0.95	0.95	0.95	0.50	0.95	0.95	0.95	0.95	0.30	0.10	0.10	0.10	0.10	0.50	0.50
		Saturday	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.30	0.30	0.30	0.30	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.00	0.00	0.00	0.00	0.00
		Sunday, Holiday, Other	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
		SummerDesign	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.05	0.05
		WinterDesign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service Hot Water	T24 BLDG_SWH_SCH	WD, SummerDesignDay	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.19	0.35	0.38	0.39	0.47	0.57	0.54	0.34	0.33	0.44	0.26	0.21	0.15	0.17	0.08	0.05	0.05
		Saturday, WinterDesignDay	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.11	0.15	0.21	0.19	0.23	0.20	0.19	0.15	0.12	0.14	0.07	0.07	0.07	0.07	0.09	0.05	0.05
		Sunday, Holiday, Other	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.09	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04
Envelope Infiltratio	T24 INFIL_SCH	WD, SummerDesignDay	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00
		Saturday, WinterDesignDay	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sunday, Holiday, Other	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Door Infiltration	INFIL_Door_Opening_SCH	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.14	1.00	0.14	0.14	0.14	0.14	1.00	0.14	0.14	0.14	0.14	1.00	0.14	0.00	0.00	0.00	0.00	0.00
		Saturday, Sun,Hol, Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HVAC Fan operatio	T24 HVACOperationSchd	WD, SummerDesignDay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
	(Fan Schedule)	Saturday,WinterDesignDay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sunday, Holiday, Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heating Setpoint	T24 HTGSETP_SCH	WD	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56	15.56
		Saturday	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56	15.56	15.56	15.56	15.56	15.56
		Sunday, Holiday, Other	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56
		SummerDesignDay	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56
		WinterDesignDay	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11
Cooling Setpoint	T24 CLGSETP_SCH	WD	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44	29.44
		Saturday	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44	29.44	29.44	29.44	29.44	29.44
		Sunday, Holiday, Other	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44
		SummerDesignDay	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89
		WinterDesignDay	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44

Heating	WD	60	60	60	60	60	60	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	60	60
	Sat	60	60	60	60	60	60	70	70	70	70	70	70	70	70	70	70	70	70	60	60	60	60	60
	Sun	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Cooling	WD	85	85	85	85	85	85	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	85	85
	Sat	85	85	85	85	85	85	75	75	75	75	75	75	75	75	75	75	75	75	85	85	85	85	85
	Sun	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85

Medium Office Hourly Operation Schedules

Input	Schedule	Day of Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Interior Light	T24BLDG_LIGHT_SCH	WD	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.35	0.30	0.30	0.20	0.20	0.10	0.05
		Saturday	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		Sunday, Holiday, Other	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		SummerDesign	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		WinterDesign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	T-24 BLDG_EQUIP_SCH_AD'	WD	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.35	0.30	0.30	0.20	0.20	0.10	0.05
		Saturday	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		Sunday, Holiday, Other	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		SummerDesign	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		WinterDesign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Occupancy	T24 BLDG_OCC_SCH	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.20	0.95	0.95	0.95	0.95	0.50	0.95	0.95	0.95	0.95	0.30	0.10	0.10	0.10	0.10	0.50	0.50
		Saturday	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.30	0.30	0.30	0.30	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.00	0.00	0.00	0.00	0.00
		Sunday, Holiday, Other	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
		SummerDesign	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.05	0.05
		WinterDesign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elevator	T24 BLDG_ELEVATORS	WD	0	0	0	0	0	0	0	0.35	0.69	0.43	0.37	0.43	0.58	0.48	0.37	0.37	0.46	0.62	0.2	0.12	0.04	0.04	0	0
		Saturday	0	0	0	0	0	0	0	0.16	0.14	0.21	0.18	0.25	0.21	0.13	0.08	0.04	0.05	0.06	0	0	0	0	0	0
		Sunday, Holiday, Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SummerDesignDay	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		WinterDesignDay	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Service Hot Water	T24 BLDG_SWH_SCH	WD, SummerDesignDay	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.19	0.35	0.38	0.39	0.47	0.57	0.54	0.34	0.33	0.44	0.26	0.21	0.15	0.17	0.08	0.05	0.05
		Saturday, WinterDesignDay	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.11	0.15	0.21	0.19	0.23	0.20	0.19	0.15	0.12	0.14	0.07	0.07	0.07	0.07	0.09	0.05	0.05
		Sunday, Holiday, Other	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.09	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04
Envelope Infiltratio	T24 INFIL_SCH	WD, SummerDesignDay	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00
		Saturday, WinterDesignDay	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sunday, Holiday, Other	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Door Infiltration	INFIL_Door_Opening_SCH	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.14	1.00	0.14	0.14	0.14	0.14	1.00	0.14	0.14	0.14	0.14	1.00	0.14	0.00	0.00	0.00	0.00	0.00
		Saturday, Sun,Hol, Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

HVAC Fan operatio	T24 HVACOperationSchd	WD, SummerDesignDay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
	(Fan Schedule)	Saturday,WinterDesignDay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sunday, Holiday, Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heating Setpoint	T24 HTGSETP_SCH	WD	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56	15.56
		Saturday	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56	15.56	15.56	15.56	15.56	15.56
		Sunday, Holiday, Other	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56
		SummerDesignDay	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56
		WinterDesignDay	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11
Cooling Setpoint	T24 CLGSETP_SCH	WD	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44	29.44
		Saturday	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44	29.44	29.44	29.44	29.44	29.44
		Sunday, Holiday, Other	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44
		SummerDesignDay	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89
		WinterDesignDay	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44

Large Office Operation Schedules

	Schedule	**Day of Week**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Interior Light	T24BLDG_LIGHT_SCH	WD	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.35	0.30	0.30	0.20	0.20	0.10	0.05
		Saturday	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		Sunday, Holiday, Other	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		SummerDesign	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		WinterDesign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	T-24 BLDG_EQUIP_SCH_AD	WD	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.35	0.30	0.30	0.20	0.20	0.10	0.05
		Saturday	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.30	0.30	0.30	0.30	0.15	0.15	0.15	0.15	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		Sunday, Holiday, Other	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		SummerDesign	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		WinterDesign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Occupancy	T24 BLDG_OCC_SCH	WD	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.20	0.95	0.95	0.95	0.95	0.50	0.95	0.95	0.95	0.95	0.30	0.10	0.10	0.10	0.10	0.50	0.50
		Saturday	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.30	0.30	0.30	0.30	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.00	0.00	0.00	0.00	0.00
		Sunday, Holiday, Other	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
		SummerDesign	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.05	0.05
		WinterDesign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elevator	T24 BLDG_ELEVATORS	WD	0	0	0	0	0	0	0	0.35	0.69	0.43	0.37	0.43	0.58	0.48	0.37	0.37	0.46	0.62	0.2	0.12	0.04	0.04	0	0
		Saturday	0	0	0	0	0	0	0	0.16	0.14	0.21	0.18	0.25	0.21	0.13	0.08	0.04	0.05	0.06	0	0	0	0	0	0
		Sunday, Holiday, Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SummerDesignDay	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		WinterDesignDay	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	ELEV_LIGHT_FAN_SCH_ AD	WD	0.05	0.05	0.05	0.05	0.1	0.2	0.4	0.5	0.5	0.35	0.15	0.15	0.15	0.15	0.15	0.15	0.35	0.5	0.5	0.4	0.4	0.2	0.2	0.1
		Sat	0.05	0.05	0.05	0.05	0.1	0.2	0.4	0.5	0.5	0.35	0.15	0.15	0.15	0.15	0.15	0.15	0.35	0.5	0.5	0.4	0.4	0.2	0.2	0.1
		Sun, Hol, Other	0.05	0.05	0.05	0.05	0.1	0.2	0.4	0.5	0.5	0.35	0.15	0.15	0.15	0.15	0.15	0.15	0.35	0.5	0.5	0.4	0.4	0.2	0.2	0.1
		SummerDesign	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
		WinterDesign	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Service Hot Water	T24 BLDG_SWH_SCH	WD, SummerDesignDay	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.19	0.35	0.38	0.39	0.47	0.57	0.54	0.34	0.33	0.44	0.26	0.21	0.15	0.17	0.08	0.05	0.05
		Saturday, WinterDesignDay	0.05	0.05	0.05	0.05	0.05	0.08	0.07	0.11	0.15	0.21	0.19	0.23	0.20	0.19	0.15	0.12	0.14	0.07	0.07	0.07	0.07	0.09	0.05	0.05
		Sunday, Holiday, Other	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.09	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.07	0.04	0.04
Envelope Infiltratio	T24 INFIL_SCH	WD, SummerDesignDay	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	1.00
		Saturday, WinterDesignDay	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	0.25	0.25	0.25	0.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		Sunday, Holiday, Other	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
HVAC Fan operatio	T24 HVACOperationSchd	WD, SummerDesignDay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
	(Fan Schedule)	Saturday,WinterDesignDay	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Sunday, Holiday, Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heating Setpoint	T24 HTGSETP_SCH	WD	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56	15.56
		Saturday	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56	15.56	15.56	15.56	15.56	15.56
		Sunday, Holiday, Other	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56
		SummerDesignDay	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56
		WinterDesignDay	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11
Cooling Setpoint	T24 CLGSETP_SCH	WD	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44	29.44
		Saturday	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44	29.44	29.44	29.44	29.44	29.44
		Sunday, Holiday, Other	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44
		SummerDesignDay	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89
		WinterDesignDay	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44
	CW-Loop-Temp-Schedule	AllDays	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70	6.70
	HW-Loop-Temp-Schedule	AllDays	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00	82.00

Stand Alone Retail Hourly Operation Schedules

	Schedule	**Day of Week**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Interior Lighting	T24AssemblyLightSch	WD	5	5	5	5	5	5	35	35	35	65	65	65	65	65	65	65	65	65	65	65	65	65	25	5
		SummerDesign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		WinterDesign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Sat.	5	5	5	5	5	5	5	30	30	40	40	40	40	40	40	40	40	40	40	40	40	40	40	5
		Sun, Hol, Other	5	5	5	5	5	5	5	30	30	30	30	30	55	55	55	55	55	55	55	55	55	55	5	5
	T24RetailLightSch	WD	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.5	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.55	0.55	0.5	0.2	0.05	0.05
		Sat.	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.3	0.55	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.5	0.3	0.3	0.1	0.05	0.05
		Sun, Hol, Other	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.4	0.4	0.55	0.55	0.55	0.55	0.55	0.4	0.2	0.05	0.05	0.05	0.05	0.05
		SummerDesign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		WinterDesign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inerior Equipment	T24RetailReceptacleSch	WD	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.6	0.5	0.2	0.05	0.05
		SummerDesign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		WinterDesign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		Sat.	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.3	0.6	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.5	0.3	0.3	0.1	0.05	0.05
		Sun, Hol, Other	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.4	0.4	0.6	0.6	0.6	0.6	0.6	0.4	0.2	0.05	0.05	0.05	0.05	0.05
	T24AssemblyReceptacleSch	WD	0.05	0.05	0.05	0.05	0.05	0.05	0.4	0.4	0.4	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.25	0.05
		Sat.	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.05
		Sun, Hol, Other	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.3	0.3	0.3	0.3	0.3	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.05	0.05
		SummerDesign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		WinterDesign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Occupancy	T24RetailOccupancySch	WD	0	0	0	0	0	0	0	0.1	0.2	0.5	0.5	0.7	0.7	0.7	0.7	0.8	0.7	0.5	0.5	0.3	0.3	0	0	0
		SummerDesign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		WinterDesign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Sat.	0	0	0	0	0	0	0	0.1	0.2	0.5	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.6	0.2	0.2	0.2	0.1	0	0
		Sun, Hol, Other	0	0	0	0	0	0	0	0	0	0.1	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.2	0.1	0	0	0	0	0
	T24AssemblyOccupancySch	WD	0	0	0	0	0	0	0	0	0.2	0.2	0.2	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.2	0.2	0.2	0.2	0.1	0
		Sat.	0	0	0	0	0	0	0	0	0.2	0.2	0.2	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.1	0
		Sun, Hol, Other	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.2	0
		SummerDesign																								
		WinterDesign																								
Service Hot Water	BLDG_SWH_SCH	WD, SummerDesign	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.15	0.23	0.32	0.41	0.57	0.62	0.61	0.5	0.45	0.46	0.47	0.42	0.34	0.33	0.04	0.04	0.04
		Sat, WinterDesign	0.11	0.1	0.08	0.06	0.06	0.06	0.06	0.2	0.24	0.27	0.42	0.54	0.59	0.6	0.49	0.48	0.47	0.46	0.44	0.36	0.29	0.22	0.06	0.06
		Sun, Hol, Other	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.14	0.29	0.31	0.36	0.36	0.34	0.35	0.37	0.34	0.25	0.06	0.06	0.06	0.06	0.06
Infiltration	T24RetailInfiltrationSch	WD, SummerDesign	0.25	0.25	0.25	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sat, WinterDesign	0.25	0.25	0.25	1	1	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sun, Hol, Other	0.25	0.25	0.25	1	1	1	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	T24AssemblyInfiltrationSch	WD, SummerDesign	1	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1
		Sat, WinterDesign	1	1	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1
		Sun, Hol, Other	1	1	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1
HVACOperation	T24RetailHVACAvailSch	WD, SummerDesign	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
	(FAN_SCH)	Sat, WinterDesign	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
		Sun, Hol, Other	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
	T24AssemblyHVACAvailSch	WD, SummerDesign	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
		Sat, WinterDesign	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
		Sun, Hol, Other	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Heating Setpoint	T24RetailHtgSetPtSch	WD, WinterDesign	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56	15.56	15.56
		SummerDesign	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56
		Sat	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56	15.56	15.56
		Sun, Hol, Other	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56	15.56	15.56	15.56	15.56	15.56	15.56
	T24AssemblyHtgSetPtSch	WD, WinterDesign	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56
		SummerDesign	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56
		Sat	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56
		Sun, Hol, Other	15.56	15.56	15.56	15.56	15.56	15.56	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	15.56
Cooling Setpoint	T24RetailClgSetPtSch	WD, SummerDesign	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44	29.44	29.44
		WinterDesign	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44
		Sat	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44	29.44	29.44
		Sun, Hol, Other	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44	29.44	29.44	29.44	29.44	29.44	29.44
	T24AssemblyClgSetPtSch	WD, SummerDesign	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44
		WinterDesign	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44	29.44
		Sat	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44
		Sun, Hol, Other	29.44	29.44	29.44	29.44	29.44	29.44	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	29.44

Quick Service Restaurant Hourly Operation Schedules

	Schedule	**Day of Week**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Interior Light	T24RestaurantLightSch	WD	0.15	0.15	0.15	0.15	0.15	0.2	0.35	0.35	0.55	0.55	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.45	0.3
		Sat	0.2	0.15	0.15	0.15	0.15	0.15	0.3	0.3	0.55	0.55	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.85	0.85	0.85	0.85	0.85	0.45	0.3
		Sun, Hol, Other	0.2	0.15	0.15	0.15	0.15	0.15	0.3	0.3	0.45	0.45	0.65	0.65	0.65	0.65	0.65	0.65	0.55	0.55	0.55	0.55	0.55	0.55	0.45	0.3
		SummerDesign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		WinterDesign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interior Equipment	T24RestaurantReceptacleS	WD	0.15	0.15	0.15	0.15	0.15	0.2	0.4	0.4	0.6	0.6	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.5	0.3
		Sat	0.2	0.15	0.15	0.15	0.15	0.15	0.3	0.3	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.5	0.3
		Sun, Hol, Other	0.2	0.15	0.15	0.15	0.15	0.15	0.3	0.3	0.5	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.3
		SummerDesign	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
		WinterDesign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gas Equipment	T24RestaurantGasSch	WD	0.5	0	0	0	0	0	0	0.5	0.5	0.5	0.9	0.9	0.9	0.9	0.75	0.75	0.75	0.9	0.9	0.9	0.9	0.75	0.5	0.5
		Sat	0.5	0	0	0	0	0	0	0	0.5	0.5	0.9	0.9	0.9	0.9	0.75	0.75	0.75	0.9	0.9	0.9	0.9	0.75	0.75	0.5
		Sun, Hol, Other	0.5	0	0	0	0	0	0	0	0	0.5	0.9	0.9	0.9	0.9	0.75	0.75	0.75	0.9	0.9	0.9	0.9	0.75	0.5	0.5
		SummerDesign	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
		WinterDesign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Occupancy	T24RestaurantOccupancyS	WD	0.15	0.15	0.05	0	0	0	0	0.05	0.05	0.05	0.2	0.5	0.8	0.7	0.4	0.2	0.25	0.5	0.8	0.8	0.8	0.5	0.35	0.2
		Sat	0.3	0.25	0.05	0	0	0	0	0	0	0.05	0.2	0.45	0.5	0.5	0.35	0.3	0.3	0.3	0.7	0.9	0.7	0.65	0.55	0.35
		Sun, Hol, Other	0.2	0.2	0.05	0	0	0	0	0	0	0	0.1	0.2	0.25	0.25	0.15	0.2	0.25	0.35	0.55	0.65	0.7	0.35	0.2	0.2
		SummerDesign	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		WinterDesign	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exterior Lighting	Exterior_lighting_schedule_	All Days	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Exterior_lighting_schedule_	All Days	0.3	0.3	0.3	0.3	0.3	0.3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Service Hot Water	BLDG_SWH_SCH	WD, SummerDesign	0.2	0	0	0	0	0	0.15	0.6	0.55	0.45	0.4	0.45	0.4	0.35	0.3	0.3	0.3	0.4	0.55	0.6	0.5	0.55	0.45	0.25
		Sat, WinterDesign	0.2	0	0	0	0	0	0.15	0.15	0.15	0.5	0.45	0.5	0.5	0.45	0.4	0.4	0.35	0.4	0.55	0.55	0.5	0.55	0.4	0.3
		Sun, Hol, Other	0.25	0	0	0	0	0	0.15	0.15	0.15	0.15	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.4	0.5	0.5	0.4	0.5	0.4	0.2
Envelope Infiltratio	T24RestaurantInfiltrationS	WD, SummerDesign	0.25	0.25	0.25	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

		Sat, WinterDesign	0.25	0.25	0.25	1	1	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		Sun, Hol, Other	0.25	0.25	0.25	1	1	1	1	1	1	1	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
HVAC Availability	T24RestaurantHVACAvailSc	WD, SummerDesign	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	(FAN_SCH)	Sat, WinterDesign	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Sun, Hol, Other	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Heating Setpoint	T24RestaurantHtgSetPt	WD, WinterDesign	15.56	15.56	15.56	15.56	15.56	18.33	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11
		SummerDesign	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56	15.56
		Sat	15.56	15.56	15.56	15.56	15.56	18.33	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11
		Sun, Hol, Other	15.56	15.56	15.56	15.56	15.56	18.33	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11	21.11
Cooling Setpoint	T24RestaurantClgSetPt	WD, SummerDesign	30	30	30	30	30	26.67	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89
		Sat	30	30	30	30	30	26.67	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89
		WinterDesign	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
		Sun, Hol, Other	30	30	30	30	30	26.67	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89	23.89
Exhaust Fan	T24RestExhtSch	All Days	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0

Test Criteria	No.	Test Description	Prototype Model Type	Test Characteristics							
				Test Case Run	Envelope	Glazing	Occupancy Schedule	LPD	EPD	HVAC System	Climate Zone
Envelope Test	1	Envelope Test Medium Office CZ-15 Roof Insulation	Medium Office CZ-15	Roof Insulation	Roof Assembly U value 20% higher than T-24 2013 Metal Framed Attic roof	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-15
	2	Medium Office CZ-15 Wall Insulation	Medium Office CZ-15	Wall Insulation	Wall Assemblu U value 20% higher than T-24 2013 Metal Framed Wall	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-15
	3	Medium Office CZ-15 Floor Slab Insulation	Medium Office CZ-15	Floor Slab Insulation	Unheated slab on grade Floor with 24 in vertical R-5 perimeter insulation	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-15
	4	Medium Office CZ-15 Infiltration	Medium Office CZ-15	Infiltration	Infiltration 5% higher than base case	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-15
	5	Medium Office CZ-15 Roof Insulation	Medium Office CZ-16	Roof Insulation	Roof Assembly U value 20% higher than T-24 2013 Metal Framed Attic roof	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-16
	6	Medium Office CZ-15 Wall Insulation	Medium Office CZ-16	Wall Insulation	Wall Assemblu U value 20% higher than T-24 2013 Metal Framed Wall	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-16
	7	Medium Office CZ-15 Floor Slab Insulation	Medium Office CZ-16	Floor Slab Insulation	Unheated slab on grade Floor with 24 in vertical R-5 perimeter insulation	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-16
	8	Medium Office CZ-15 Infiltration	Medium Office CZ-16	Infiltration	Infiltration 5% higher than base case	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-16
	9	Medium Office CZ-15 Roof Insulation	Medium Office CZ-6	Roof Insulation	Roof Assembly U value 20% higher than T-24 2013 Metal Framed Attic roof	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-6
	10	Medium Office CZ-15 Wall Insulation	Medium Office CZ-6	Wall Insulation	Wall Assemblu U value 20% higher than T-24 2013 Metal Framed Wall	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-6
	11	Medium Office CZ-15 Floor Slab Insulation	Medium Office CZ-6	Floor Slab Insulation	Unheated slab on grade Floor with 24 in vertical R-5 perimeter insulation	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-6
	12	Medium Office CZ-15 Infiltration	Medium Office CZ-6	Infiltration	Infiltration 5% higher than base case	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-6
	13	Envelope Test Small OfficeCZ-15 SolarReflectance-Low Slope	Small Office	SolarReflectance-Low Slope	Aged Solar Reflectance 20% higher than T-24 2013 low-sloped roofing product	I-Small Office	I-Small Office	I-Small Office	I-Small Office	I-Small Office	CZ-15
	14	Envelope Test Small OfficeCZ-16 SolarReflectance-Low Slope	Small Office	SolarReflectance-Low Slope	Aged Solar Reflectance 20% higher than T-24 2013 low-sloped roofing product	I-Small Office	I-Small Office	I-Small Office	I-Small Office	I-Small Office	CZ-16
	15	Envelope Test Small OfficeCZ-6 SolarReflectance-Low Slope	Small Office	SolarReflectance-Low Slope	Aged Solar Reflectance 20% higher than T-24 2013 low-sloped roofing product	I-Small Office	I-Small Office	I-Small Office	I-Small Office	I-Small Office	CZ-6
	16	Envelope Test Small OfficeCZ-15 SolarReflectance-Steep Slope	Small Office	SolarReflectance-Steep Slope	Aged Solar Reflectance 20% higher than T-24 2013 steep-sloped roofing product	I-Small Office	I-Small Office	I-Small Office	I-Small Office	I-Small Office	CZ-15
	17	Envelope Test Small OfficeCZ-16 SolarReflectance-Steep Slope	Small Office	SolarReflectance-Steep Slope	Aged Solar Reflectance 20% higher than T-24 2013 steep-sloped roofing product	I-Small Office	I-Small Office	I-Small Office	I-Small Office	I-Small Office	CZ-16
	18	Envelope Test Small OfficeCZ-6 SolarReflectance-Steep Slope	Small Office	SolarReflectance-Steep Slope	Aged SolarReflectance 20% higher than T-24 2013 steep-sloped roofing product	I-Small Office	I-Small Office	I-Small Office	I-Small Office	I-Small Office	CZ-6
	19	Envelope Test Small OfficeCZ-15 Heavy	Small Office	Heavy	Solid Concrete Wall with overall assembly U value equal to T-24 2013 Metal Framed Wall for CZ-15	I-Small Office	I-Small Office	I-Small Office	I-Small Office	I-Small Office	CZ-15
	20	Envelope Test Small OfficeCZ-16 Heavy	Small Office	Heavy	Solid Concrete Wall with overall assembly U value equal to T-24 2013 Metal Framed Wall for CZ-16	I-Small Office	I-Small Office	I-Small Office	I-Small Office	I-Small Office	CZ-16
	21	Envelope Test Small OfficeCZ-6 Heavy	Small Office	Heavy	Solid Concrete Wall with overall assembly U value equal to T-24 2013 Metal Framed Wall for CZ-6	I-Small Office	I-Small Office	I-Small Office	I-Small Office	I-Small Office	CZ-6
Envelope Glazing Test	22	Envelope Glazing Test Medium OfficeCZ-15 Window U	Medium Office	Window U	II-Medium Office	Window U value 20% lower than T-24 2013 window U factor	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-15
	23	Envelope Glazing Test Medium OfficeCZ-15 Window SHGC	Medium Office	Window SHGC	II-Medium Office	Window RSHG 20% lower than T-24 2013 RSHG	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-15
	24	Envelope Glazing Test Medium OfficeCZ-15 Window U&SHGC	Medium Office	Window U&SHGC	II-Medium Office	Window U and SHGC value 20% lower than T-24 2013 window Uand RSHG	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-15
	25	Envelope Glazing Test Medium OfficeCZ-16 Window U	Medium Office	Window U	II-Medium Office	Window U value 20% lower than T-24 2013 window U factor	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-16
	26	Envelope Glazing Test Medium OfficeCZ-16 Window SHGC	Medium Office	Window SHGC	II-Medium Office	Window RSHG 20% lower than T-24 2013 RSHG	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-16
	27	Envelope Glazing Test Medium OfficeCZ-16 Window U&SHGC	Medium Office	Window U&SHGC	II-Medium Office	Window U and SHGC value 20% lower than T-24 2013 window Uand RSHG	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-16
	28	Envelope Glazing Test Medium OfficeCZ-6 Window U	Medium Office	Window U	II-Medium Office	Window U value 20% lower than T-24 2013 window U factor	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-6
	29	Envelope Glazing Test Medium OfficeCZ-6 Window SHGC	Medium Office	Window SHGC	II-Medium Office	Window RSHG 20% lower than T-24 2013 RSHG	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-6
	30	Envelope Glazing Test Medium OfficeCZ-6 Window U&SHGC	Medium Office	Window U&SHGC	II-Medium Office	Window U and SHGC value 20% lower than T-24 2013 window Uand RSHG	II-Medium Office	II-Medium Office	II-Medium Office	II-Medium Office	CZ-6
	31	Envelope Glazing Test Large OfficeCZ-7 WWR 20%	Large Office	WWR 20%	III-Large Office	WWR-20%	III-Large Office	III-Large Office	III-Large Office	III-Large Office	CZ-7
	32	Envelope Glazing Test Large OfficeCZ-7 WWR 60%	Large Office	WWR 60%	III-Large Office	WWR-60%	III-Large Office	III-Large Office	III-Large Office	III-Large Office	CZ-7
	33	Envelope Glazing Test Large OfficeCZ-7 WWR 60% with South overhang	Large Office	WWR 60% with South overhang	III-Large Office	WWR-60% w/2 feet deep hor. Overhang in South	III-Large Office	III-Large Office	III-Large Office	III-Large Office	CZ-7
	34	Envelope Glazing Test Large OfficeCZ-1 WWR 20%	Large Office	WWR 20%	III-Large Office	WWR-20%	III-Large Office	III-Large Office	III-Large Office	III-Large Office	CZ-1
	35	Envelope Glazing Test Large OfficeCZ-1 WWR 60%	Large Office	WWR 60%	III-Large Office	WWR-60%	III-Large Office	III-Large Office	III-Large Office	III-Large Office	CZ-1

Lighting Tests	36	Lighting Tests Medium OfficeCZ-15 low LPD	Medium Office	low LPD	Medium Office	Medium Office	Medium Office	LPD 20% lower than T-24 2013 LPD	Medium Office	Medium Office	CZ-15
	37	Lighting Tests Medium OfficeCZ-15 high LPD	Medium Office	high LPD	Medium Office	Medium Office	Medium Office	LPD 20% higherthan T-24 2013 LPD	Medium Office	Medium Office	CZ-15
	38	Lighting Tests Medium OfficeCZ-16 low LPD	Medium Office	low LPD	Medium Office	Medium Office	Medium Office	LPD 20% lower than T-24 2013 LPD	Medium Office	Medium Office	CZ-16
	39	Lighting Tests Medium OfficeCZ-16 high LPD	Medium Office	high LPD	Medium Office	Medium Office	Medium Office	LPD 20% higherthan T-24 2013 LPD	Medium Office	Medium Office	CZ-16
	40	Lighting Tests Medium OfficeCZ-6 low LPD	Medium Office	low LPD	Medium Office	Medium Office	Medium Office	LPD 20% lower than T-24 2013 LPD	Medium Office	Medium Office	CZ-6
	41	Lighting Tests Medium OfficeCZ-6 high LPD	Medium Office	high LPD	Medium Office	Medium Office	Medium Office	LPD 20% higherthan T-24 2013 LPD	Medium Office	Medium Office	CZ-6

Daylighting Tests	42	Daylighting Tests Large OfficeCZ-7 Continuous Dimming	Large Office	Continuous Dimming	Large Office	Daylight sensors with continuous dimming	Large Office	Large Office	Large Office	Large Office	CZ-7
	43	Daylighting Tests Large OfficeCZ-7 Continuous Dimming and high VT	Large Office	Continuous Dimming and high VT	Large Office	Daylight sensors with continuous dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-7
	44	Daylighting Tests Large OfficeCZ-7 Stepped Dimming	Large Office	Stepped Dimming	Large Office	Daylight sensors with stepped dimming	Large Office	Large Office	Large Office	Large Office	CZ-7
	45	Daylighting Tests Large OfficeCZ-7 Stepped Dimming and high VT	Large Office	Stepped Dimming and high VT	Large Office	Daylight sensors with stepped dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-7
	46	Daylighting Tests Large OfficeCZ-7 WWR-20%,Continuous Dimming	Large Office	WWR-20%,Continuous Dimming	Large Office	WWR 20%,Daylight sensors with continuous dimming	Large Office	Large Office	Large Office	Large Office	CZ-7
	47	Daylighting Tests Large OfficeCZ-7 WWR-20%,Continuous Dimming and high VT	Large Office	WWR-20%,Continuous Dimming and high VT	Large Office	WWR-20%, Daylight sensors with continuous dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-7
	48	Daylighting Tests Large OfficeCZ-7 WWR-20%,Stepped Dimming	Large Office	WWR-20%,Stepped Dimming	Large Office	WWR-20%,Daylight sensors with stepped dimming	Large Office	Large Office	Large Office	Large Office	CZ-7
	49	Daylighting Tests Large OfficeCZ-7 WWR-20%,Stepped Dimming and high VT	Large Office	WWR-20%,Stepped Dimming and high VT	Large Office	WWR-20%, Daylight sensors with stepped dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-7
	50	Daylighting Tests Large OfficeCZ-7WWR-60%,Continuous Dimming	Large Office	WWR-60%,Continuous Dimming	Large Office	WWR 60%,Daylight sensors with continuous dimming	Large Office	Large Office	Large Office	Large Office	CZ-7
	51	Daylighting Tests Large OfficeCZ-7 WWR-60%,Continuous Dimming and high VT	Large Office	WWR-60%,Continuous Dimming and high VT	Large Office	WWR-60%, Daylight sensors with continuous dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-7
	52	Daylighting Tests Large OfficeCZ-7 WWR-60%,Stepped Dimming	Large Office	WWR-60%,Stepped Dimming	Large Office	WWR-60%,Daylight sensors with stepped dimming	Large Office	Large Office	Large Office	Large Office	CZ-7
	53	Daylighting Tests Large OfficeCZ-7 WWR-60%,Stepped Dimming and high VT	Large Office	WWR-60%,Stepped Dimming and high VT	Large Office	WWR-60%, Daylight sensors with stepped dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-7
	54	Daylighting Tests Large OfficeCZ-1 Continuous Dimming	Large Office	Continuous Dimming	Large Office	Daylight sensors with continuous dimming	Large Office	Large Office	Large Office	Large Office	CZ-1
	55	Daylighting Tests Large OfficeCZ-1 Continuous Dimming and high VT	Large Office	Continuous Dimming and high VT	Large Office	Daylight sensors with continuous dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-1
	56	Daylighting Tests Large OfficeCZ-1 Stepped Dimming	Large Office	Stepped Dimming	Large Office	Daylight sensors with stepped dimming	Large Office	Large Office	Large Office	Large Office	CZ-1
	57	Daylighting Tests Large OfficeCZ-1 Stepped Dimming and high VT	Large Office	Stepped Dimming and high VT	Large Office	Daylight sensors with stepped dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-1
	58	Daylighting Tests Large OfficeCZ-1 WWR-20%,Continuous Dimming	Large Office	WWR-20%,Continuous Dimming	Large Office	WWR 20%,Daylight sensors with continuous dimming	Large Office	Large Office	Large Office	Large Office	CZ-1
	59	Daylighting Tests Large OfficeCZ-1 WWR-20%,Continuous Dimming and high VT	Large Office	WWR-20%,Continuous Dimming and high VT	Large Office	WWR-20%, Daylight sensors with continuous dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-1
	60	Daylighting Tests Large OfficeCZ-1 WWR-20%,Stepped Dimming	Large Office	WWR-20%,Stepped Dimming	Large Office	WWR-20%,Daylight sensors with stepped dimming	Large Office	Large Office	Large Office	Large Office	CZ-1
	61	Daylighting Tests Large OfficeCZ-1 WWR-20%,Stepped Dimming and high VT	Large Office	WWR-20%,Stepped Dimming and high VT	Large Office	WWR-20%, Daylight sensors with stepped dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-1
	62	Daylighting Tests Large OfficeCZ-1WWR-60%,Continuous Dimming	Large Office	WWR-60%,Continuous Dimming	Large Office	WWR 60%,Daylight sensors with continuous dimming	Large Office	Large Office	Large Office	Large Office	CZ-1
	63	Daylighting Tests Large OfficeCZ-1 WWR-60%,Continuous Dimming and high VT	Large Office	WWR-60%,Continuous Dimming and high VT	Large Office	WWR-60%, Daylight sensors with continuous dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-1
	64	Daylighting Tests Large OfficeCZ-1 WWR-60%,Stepped Dimming	Large Office	WWR-60%,Stepped Dimming	Large Office	WWR-60%,Daylight sensors with stepped dimming	Large Office	Large Office	Large Office	Large Office	CZ-1
	65	Daylighting Tests Large OfficeCZ-1 WWR-60%,Stepped Dimming and high VT	Large Office	WWR-60%,Stepped Dimming and high VT	Large Office	WWR-60%, Daylight sensors with stepped dimming and high Window VT	Large Office	Large Office	Large Office	Large Office	CZ-1
	66	Daylighting Tests Stand Alone Retail CZ-7 Skylight VT	Stand Alone Retail	Skylight VT	Stand Alone Retail	Stepped Dimming w/Skylight VT 20% higher than baseline	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	CZ-7
	67	Daylighting Tests Stand Alone Retail CZ-7 SRR-5%	Stand Alone Retail	SRR-5%	Stand Alone Retail	Stepped Dimming w/Skylight to roof ratio -5%	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	CZ-7
	68	Daylighting Tests Stand Alone Retail CZ-7 SRR-5% and high VT	Stand Alone Retail	SRR-5% and high VT	Stand Alone Retail	Stepped Dimming w/Skylight to roof ratio -5% and skylight VT 20% higher than baseline	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	CZ-7
	69	Daylighting Tests Stand Alone Retail CZ-1 Skylight VT	Stand Alone Retail	Skylight VT	Stand Alone Retail	Stepped Dimming w/Skylight VT 20% higher than baseline	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	CZ-1
	70	Daylighting Tests Stand Alone Retail CZ-1 SRR-5%	Stand Alone Retail	SRR-5%	Stand Alone Retail	Stepped Dimming w/Skylight to roof ratio -5%	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	CZ-1
	71	Daylighting Tests Stand Alone Retail CZ-1 SRR-5% and high VT	Stand Alone Retail	SRR-5% and high VT	Stand Alone Retail	Stepped Dimming w/Skylight to roof ratio -5% and skylight VT 20% higher than baseline	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	Stand Alone Retail	CZ-1

Equipment test	72	Equipment test Medium OfficeCZ-15 low EPD	Medium Office	low EPD	Medium Office	Medium Office	Medium Office	Medium Office	EPD 20% lower than T-24 2013 LPD	Medium Office	CZ-15
	73	Equipment test Medium OfficeCZ-15 high EPD	Medium Office	high EPD	Medium Office	Medium Office	Medium Office	Medium Office	EPD 20% higher than T-24 2013 LPD	Medium Office	CZ-15
	74	Equipment test Medium OfficeCZ-16 low EPD	Medium Office	low EPD	Medium Office	Medium Office	Medium Office	Medium Office	EPD 20% lower than T-24 2013 LPD	Medium Office	CZ-16
	75	Equipment test Medium OfficeCZ-16 high EPD	Medium Office	high EPD	Medium Office	Medium Office	Medium Office	Medium Office	EPD 20% higher than T-24 2013 LPD	Medium Office	CZ-16
	76	Equipment test Medium OfficeCZ-6 low EPD	Medium Office	low EPD	Medium Office	Medium Office	Medium Office	Medium Office	EPD 20% lower than T-24 2013 LPD	Medium Office	CZ-6
	77	Equipment test Medium OfficeCZ-6 high EPD	Medium Office	high EPD	Medium Office	Medium Office	Medium Office	Medium Office	EPD 20% higher than T-24 2013 LPD	Medium Office	CZ-6
	78	Equipment test Fast food RestaurantCZ-6 high Process load	Fast food Restaurant	high Process load	Fast food Restaurant	Fast food Restaurant	Fast food Restaurant	Fast food Restaurant	Kitchen Equipment load 5% higher than baseline	Fast food Restaurant	CZ-6

I. HVAC sizing- html result mapping

1	System lvl	Heating Eqpt Capacity	Report:Equipment Summary
2	System lvl	Cooling Eqpt Capacity	Report:Equipment Summary
3	System lvl	Fan cfm	Report:Component Sizing Summary
4	System lvl	Fan efficiency	Report:Equipment Summary
5	System lvl	Fan Static pressure	Report:Equipment Summary
6	Zone lvl	Zone airflow cfm	Report:Component Sizing Summary
7	Zone lvl	Reheat coil size	Report:Equipment Summary
8	Plant lvl	Boiler capacity	Report:Component Sizing Summary
9	Plant lvl	Chiller capacity	Report:Component Sizing Summary/Equipment Summary
10	Plant lvl	Pump Power	Report:Component Sizing Summary
11	Plant lvl	Pump efficiency (total or motor+impeller)	Report:Equipment Summary
13	Plant lvl	Cooling Tower fan power	Report:Component Sizing Summary

APPENDIX B:
Results Summary (Compliance Margin Test)

TEST RESULTS

	Test Case	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15			16	
		Annual TDV EUI (kBtu/sqft)		Annual TDV EUI- Electricity (kwh/sqft)		Annual TDV EUI- Natural Gas (therm/sqft)		Annual Total End Use Site Energy EUI (kBtu/sqft)		Annual End Use Site Energy EUI Heating (kBtu/sqft)		Cooling (kBtu/sqft)		Interior Lighting (kBtu/sqft)		Interior Equipment (kBtu/sqft)		Exterior Lighting (kBtu/sqft)		Fans (kBtu/sqft)		Pumps (kBtu/sqft)		Refrigeration (kBtu/sqft)		Water Heating (kBtu/sqft)		Variation from Baseline TDV % variation		Total End Use Site Energy % Variation			Reference Model Occupied Unmet Load Hrs	Applicant Model Occupied Unmet Load Hrs
		Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Pass/Fail		
	Medium Office CZ-15 Baseline	**294.56**		**10.33**		**0.15**		**50.72**		**0.35**		**14.96**		**5.06**		**12.95**		**0.00**		**2.15**		**0.13**		**0.00**		**15.13**							677	
1	Envelope Test Medium OfficeCZ-15 Roof Insulation	293.74		10.30		0.15		50.62		0.34		14.87		5.06		12.95		0.00		2.14		0.13		0.00		15.13		0.28%		0.20%		PASS	675	
2	Envelope Test Medium OfficeCZ-15 Wall Insulation	293.46		10.30		0.15		50.59		0.33		14.86		5.06		12.95		0.00		2.14		0.13		0.00		15.13		0.38%		0.25%		PASS	677	
3	Envelope Test Medium OfficeCZ-15 Floor Slab Insulation	295.55		10.36		0.15		50.83		0.34		15.06		5.06		12.95		0.00		2.17		0.12		0.00		15.13		-0.33%		-0.21%		PASS	674	
4	Envelope Test Medium OfficeCZ-15 Infiltration	295.06		10.34		0.15		50.78		0.37		14.99		5.06		12.95		0.00		2.15		0.13		0.00		15.13		-0.17%		-0.11%		PASS	676	
	Medium Office CZ-16 Baseline	**207.59**		**6.85**		**0.24**		**47.03**		**8.52**		**3.31**		**5.06**		**12.95**		**0.00**		**1.48**		**0.59**		**0.00**		**15.13**							823	
5	Envelope Test Medium OfficeCZ-16 Roof Insulation	207.00		6.84		0.23		46.83		8.35		3.29		5.06		12.95		0.00		1.47		0.58		0.00		15.13		0.29%		0.42%		PASS	822	
6	Envelope Test Medium OfficeCZ-16 Wall Insulation	206.96		6.85		0.23		46.77		8.28		3.30		5.06		12.95		0.00		1.47		0.58		0.00		15.13		0.30%		0.54%		PASS	821	
7	Envelope Test Medium OfficeCZ-16 Floor Slab Insulation	207.75		6.86		0.24		46.98		8.44		3.33		5.06		12.95		0.00		1.49		0.58		0.00		15.13		-0.07%		0.10%		PASS	817	
8	Envelope Test Medium OfficeCZ-16 Infiltration	208.14		6.86		0.24		47.30		8.77		3.31		5.06		12.95		0.00		1.48		0.60		0.00		15.13		-0.26%		-0.58%		PASS	817	
	Medium Office CZ-6 Baseline	**209.32**		**7.51**		**0.16**		**41.41**		**0.67**		**6.15**		**5.06**		**12.95**		**0.00**		**1.25**		**0.19**		**0.00**		**15.13**							246	
9	Envelope Test Medium OfficeCZ-6 Roof Insulation	208.83		7.49		0.16		41.33		0.63		6.11		5.06		12.95		0.00		1.25		0.19		0.00		15.13		0.23%		0.19%		PASS	247	
10	Envelope Test Medium OfficeCZ-6 Wall Insulation	209.05		7.50		0.16		41.35		0.63		6.14		5.06		12.95		0.00		1.26		0.19		0.00		15.13		0.13%		0.14%		PASS	247	
11	Envelope Test Medium OfficeCZ-6 Floor Slab Insulation	209.69		7.52		0.16		41.44		0.66		6.19		5.06		12.95		0.00		1.26		0.18		0.00		15.13		-0.18%		-0.06%		PASS	231	
12	Envelope Test Medium OfficeCZ-6 Infiltration	209.32		7.50		0.16		41.43		0.70		6.14		5.06		12.95		0.00		1.25		0.20		0.00		15.13		0.00%		-0.04%		PASS	251	
	Small Office CZ-15 SolarReflectance-Low Slope Baseline	**224.97**		**8.78**		**0.04**		**33.74**		**0.83**		**8.90**		**6.14**		**12.95**		**0.00**		**1.95**		**0.00**		**0.00**		**2.97**							146	
13	Envelope Test Small OfficeCZ-15 SolarReflectance-Low Slope	223.41		8.72		0.04		33.56		0.84		8.75		6.14		12.95		0.00		1.91		0.00		0.00		2.97		0.69%		0.52%		PASS	147	
	Small Office CZ-16 SolarReflectance-Low Slope Baseline	**227.83**		**8.87**		**0.04**		**34.08**		**0.86**		**9.15**		**6.14**		**12.95**		**0.00**		**2.01**		**0.00**		**0.00**		**2.97**							153	
14	Envelope Test Small OfficeCZ-16 SolarReflectance-Low Slope	225.55		8.79		0.04		33.83		0.88		8.93		6.14		12.95		0.00		1.95		0.00		0.00		2.97		1.00%		0.75%		PASS	147	
	Small Office CZ-6 SolarReflectance-Low Slope Baseline	**185.13**		**7.34**		**0.05**		**30.17**		**2.17**		**4.53**		**6.15**		**12.95**		**0.00**		**1.39**		**0.00**		**0.00**		**2.97**							79	
15	Envelope Test Small OfficeCZ-6 SolarReflectance-Low Slope	183.22		7.27		0.05		30.00		2.22		4.36		6.15		12.95		0.00		1.34		0.00		0.00		2.97		1.03%		0.58%		FAIL	81	
	Small Office CZ-15 SolarReflectance-Steep Slope Baseline	**189.54**		**7.47**		**0.05**		**30.74**		**2.29**		**4.87**		**6.15**		**12.95**		**0.00**		**1.51**		**0.00**		**0.00**		**2.97**							82	
16	Envelope Test Small OfficeCZ-15 SolarReflectance-Steep Slope	186.68		7.37		0.05		30.47		2.36		4.61		6.15		12.95		0.00		1.43		0.00		0.00		2.97		1.51%		0.89%		FAIL	82	
	Small Office CZ-16 SolarReflectance-Steep Slope Baseline	**181.65**		**6.88**		**0.11**		**34.14**		**7.70**		**3.04**		**6.14**		**12.95**		**0.00**		**1.34**		**0.00**		**0.00**		**2.97**							163	
17	Envelope Test Small OfficeCZ-16 SolarReflectance-Steep Slope	180.81		6.84		0.11		34.13		7.81		2.95		6.14		12.95		0.00		1.31		0.00		0.00		2.97		0.46%		0.03%		PASS	161	
	Small Office CZ-6 SolarReflectance-Steep Slope Baseline	**183.86**		**6.94**		**0.11**		**34.44**		**7.78**		**3.20**		**6.14**		**12.95**		**0.00**		**1.41**		**0.00**		**0.00**		**2.97**							161	
18	Envelope Test Small OfficeCZ-6 SolarReflectance-Steep Slope	182.61		6.89		0.11		34.42		7.93		3.07		6.14		12.95		0.00		1.36		0.00		0.00		2.97		0.68%		0.08%		PASS	158	
	Envelope Test Primary SchoolCZ-15 Light	**223.68**		**8.72**		**0.04**		**33.60**		**0.86**		**8.76**		**6.14**		**12.95**		**0.00**		**1.91**		**0.00**		**0.00**		**2.97**							148	
19	Envelope Test Primary SchoolCZ-15 Heavy	223.27		8.72		0.04		33.55		0.84		8.73		6.14		12.95		0.00		1.92		0.00		0.00		2.97		0.18%		0.08%		PASS	151	
	Envelope Test Primary SchoolCZ-16 Light	**181.28**		**6.86**		**0.11**		**34.16**		**7.77**		**3.00**		**6.14**		**12.95**		**0.00**		**1.33**		**0.00**		**0.00**		**2.97**							160	
20	Envelope Test Primary SchoolCZ-16 Heavy	180.90		6.85		0.11		34.06		7.71		2.98		6.14		12.95		0.00		1.32		0.00		0.00		2.97		0.21%		0.13%		PASS	159	
	Envelope Test Primary SchoolCZ-6 Light	**184.41**		**7.31**		**0.05**		**30.16**		**2.24**		**4.47**		**6.15**		**12.95**		**0.00**		**1.38**		**0.00**		**0.00**		**2.97**							80	
21	Envelope Test Primary SchoolCZ-6 Heavy	183.89		7.30		0.05		30.03		2.16		4.44		6.15		12.95		0.00		1.37		0.00		0.00		2.97		0.28%		0.15%		PASS	79	
	Medium Office CZ-15 Baseline	**294.56**		**10.33**		**0.15**		**50.72**		**0.35**		**14.96**		**5.06**		**12.95**		**0.00**		**2.15**		**0.13**		**0.00**		**15.13**							677	
22	Envelope Glazing Test Medium OfficeCZ-15 Window U	292.57		10.28		0.15		50.49		0.28		14.81		5.06		12.95		0.00		2.15		0.11		0.00		15.13		0.68%		0.46%		PASS	685	
23	Envelope Glazing Test Medium OfficeCZ-15 Window SHGC	288.52		10.11		0.16		50.02		0.40		14.32		5.06		12.95		0.00		2.03		0.13		0.00		15.13		2.05%		1.39%		FAIL	636	
24	Envelope Glazing Test Medium OfficeCZ-15 Window U&SHGC	286.42		10.06		0.15		49.76		0.30		14.17		5.06		12.95		0.00		2.03		0.12		0.00		15.13		2.77%		1.89%		FAIL	633	
	Medium Office CZ-16 Baseline	**207.59**		**6.85**		**0.24**		**47.03**		**8.52**		**3.31**		**5.06**		**12.95**		**0.00**		**1.48**		**0.59**		**0.00**		**15.13**							823	
25	Envelope Glazing Test Medium OfficeCZ-16 Window U	206.31		6.86		0.23		46.18		7.64		3.35		5.06		12.95		0.00		1.50		0.55		0.00		15.13		0.62%		1.79%		PASS	813	
26	Envelope Glazing Test Medium OfficeCZ-16 Window SHGC	204.83		6.76		0.24		46.86		8.65		3.10		5.06		12.95		0.00		1.38		0.58		0.00		15.13		1.33%		0.36%		FAIL	843	
27	Envelope Glazing Test Medium OfficeCZ-16 Window U&SHGC	203.44		6.77		0.23		45.98		7.75		3.14		5.06		12.95		0.00		1.40		0.55		0.00		15.13		2.00%		2.21%		FAIL	816	
	Medium Office CZ-6 Baseline	**209.32**		**7.51**		**0.16**		**41.41**		**0.67**		**6.15**		**5.06**		**12.95**		**0.00**		**1.25**		**0.19**		**0.00**		**15.13**							246	
28	Envelope Glazing Test Medium OfficeCZ-6 Window U	209.79		7.53		0.16		41.39		0.55		6.24		5.06		12.95		0.00		1.28		0.17		0.00		15.13		-0.23%		0.06%		PASS	231	
29	Envelope Glazing Test Medium OfficeCZ-6 Window SHGC	205.87		7.39		0.16		41.05		0.72		5.82		5.06		12.95		0.00		1.18		0.20		0.00		15.13		1.65%		0.87%		FAIL	270	
30	Envelope Glazing Test Medium OfficeCZ-6 Window U&SHGC	206.27		7.42		0.16		41.01		0.58		5.90		5.06		12.95		0.00		1.21		0.18		0.00		15.13		1.46%		0.96%		FAIL	259	
	Large Office CZ-7 Baseline	**209.18**		**8.51**		**0.05**		**34.18**		**0.52**		**3.32**		**6.16**		**15.04**		**0.00**		**2.55**		**1.69**		**0.00**		**4.62**							326	
31	Envelope Glazing Test Large OfficeCZ-7 WWR 20%	206.23		8.43		0.05		33.85		0.47		3.17		6.16		15.04		0.00		2.52		1.60		0.00		4.62		1.41%		0.94%		FAIL	194	
32	Envelope Glazing Test Large OfficeCZ-7 WWR 60%	211.55		8.58		0.05		34.45		0.57		3.44		6.16		15.04		0.00		2.58		1.75		0.00		4.62		-1.13%		-0.81%		FAIL	477	
33	Envelope Glazing Test Large OfficeCZ-7 WWR 60% with South overhang	209.83		8.52		0.05		34.26		0.57		3.36		6.16		15.04		0.00		2.50		1.72		0.00		4.62		-0.31%		-0.24%		PASS	481	
	Large Office CZ-1 Baseline	**180.23**		**7.21**		**0.10**		**34.55**		**5.35**		**0.27**		**6.16**		**15.04**		**0.00**		**2.82**		**0.29**		**0.00**		**4.62**							347	
34	Envelope Glazing Test Large OfficeCZ-1 WWR 20%	179.35		7.21		0.10		34.18		4.96		0.26		6.16		15.04		0.00		2.86		0.28		0.00		4.62		0.49%		1.08%		PASS	281	
35	Envelope Glazing Test Large OfficeCZ-1 WWR 60%	181.04		7.22		0.10		34.82		5.57		0.28		6.16		15.04		0.00		2.85		0.30		0.00		4.62		-0.45%		-0.77%		PASS	391	
	Medium Office CZ-15 Baseline	**294.56**		**10.33**		**0.15**		**50.72**		**0.35**		**14.96**		**5.06**		**12.95**		**0.00**		**2.15**		**0.13**		**0.00**		**15.13**							677	
36	Lighting Tests Medium OfficeCZ-15 low LPD	285.80		9.95		0.15		49.44		0.37		14.68		4.05		12.95		0.00		2.14		0.13		0.00		15.13		2.97%		2.52%		FAIL	710	
37	Lighting Tests Medium OfficeCZ-15 high LPD	303.41		10.71		0.15		52.01		0.34		15.23		6.07		12.95		0.00		2.16		0.13		0.00		15.13		-3.00%		-2.54%		FAIL	647	
	Medium Office CZ-16 Baseline	**207.59**		**6.85**		**0.24**		**47.03**		**8.52**		**3.31**		**5.06**		**12.95**		**0.00**		**1.48**		**0.59**		**0.00**		**15.13**							823	
38	Lighting Tests Medium OfficeCZ-16 low LPD	199.93		6.52		0.24		45.96		8.60		3.21		4.05		12.95		0.00		1.44		0.58		0.00		15.13		3.69%		2.27%		FAIL	846	
39	Lighting Tests Medium OfficeCZ-16 high LPD	215.06		7.19		0.23		47.98		8.32		3.40		6.07		12.95		0.00		1.51		0.59		0.00		15.13		-3.60%		-2.03%		FAIL	806	
	Medium Office CZ-6 Baseline	**209.32**		**7.51**		**0.16**		**41.41**		**0.67**		**6.15**		**5.06**		**12.95**		**0.00**		**1.25**		**0.19**		**0.00**		**15.13**							246	
40	Lighting Tests Medium OfficeCZ-6 low LPD	201.14		7.14		0.16		40.21		0.71		5.97		4.05		12.95		0.00		1.22		0.19		0.00		15.13		3.91%		2.90%		FAIL	259	
41	Lighting Tests Medium OfficeCZ-6 high LPD	217.58		7.87		0.16		42.61		0.64		6.33		6.07		12.95		0.00		1.29		0.19		0.00		15.13		-3.95%		-2.90%		FAIL	235	
	Large Office CZ-7 Baseline	**209.18**		**8.51**		**0.05**		**34.18**		**0.52**		**3.32**		**6.16**		**15.04**		**0.00**		**2.55**		**1.69**		**0.00**		**4.62**							326	
42	Daylighting Tests Large OfficeCZ-7 Continuous Dimming	201.67		8.20		0.05		33.14		0.56		3.23		5.28		15.04		0.00		2.50		1.64		0.00		4.62		3.59%		3.03%		FAIL	367	
43	Daylighting Tests Large OfficeCZ-7 Continuous Dimming and high VT	201.71		8.19		0.05		33.14		0.56		3.24		5.27		15.04		0.00		2.49		1.64		0.00		4.62		3.57%		3.04%		FAIL	367	
44	Daylighting Tests Large OfficeCZ-7 Stepped Dimming	198.93		8.07		0.05		32.74		0.57		3.20		4.94		15.04		0.00		2.48		1.62		0.00		4.62		4.90%		4.19%		FAIL	384	
45	Daylighting Tests Large OfficeCZ-7 Stepped Dimming and high VT	198.77		8.07		0.05		32.72		0.57		3.19		4.92		15.04		0.00		2.48		1.62		0.00		4.62		4.97%		4.27%		FAIL	384	
	Large Office CZ-7 WWR 20% Baseline	**206.23**		**8.43**		**0.05**		**33.85**		**0.47**		**3.17**		**6.16**		**15.04**		**0.00**		**2.52**		**1.60**		**0.00**		**4.62**							194	
46	Daylighting Tests Large OfficeCZ-7 WWR-20%,Continuous Dimming	199.08		8.13		0.05		32.86		0.50		3.06		5.33		15.04		0.00		2.48		1.55		0.00		4.62		3.47%		2.95%		FAIL	216	
47	Daylighting Tests Large OfficeCZ-7 WWR-20%,Continuous Dimming and high VT	198.76		8.12		0.05		32.83		0.50		3.06		5.31		15.04		0.00		2.48		1.55		0.00		4.62		3.62%		3.01%		FAIL	215	
48	Daylighting Tests Large OfficeCZ-7 WWR-20%,Stepped Dimming	197.10		8.05		0.05		32.58		0.50		3.04		5.11		15.04		0.00		2.47		1.54		0.00		4.62		4.43%		3.75%		FAIL	225	
49	Daylighting Tests Large OfficeCZ-7 WWR-20%,Stepped Dimming and high VT	196.67		8.03		0.05		32.52		0.51		3.04		5.05		15.04		0.00		2.47		1.54		0.00		4.62		4.64%		3.94%		FAIL	225	
	Large Office CZ-7 WWR 60% Baseline	**211.55**		**8.58**		**0.05**		**34.45**		**0.57**		**3.44**		**6.16**		**15.04**		**0.00**		**2.58**		**1.75**		**0.00**		**4.62**							477	
50	Daylighting Tests Large OfficeCZ-7WWR-60%,Continuous Dimming	204.16		8.26		0.05		33.42		0.60		3.36		5.28		15.04		0.00		2.53		1.70		0.00		4.62		3.49%		3.01%		FAIL	523	
51	Daylighting Tests Large OfficeCZ-7 WWR-60%,Continuous Dimming and high VT	204.03		8.26		0.05		33.40		0.60		3.35		5.27		15.04		0.00		2.53		1.70		0.00		4.62		3.55%		3.06%		FAIL	522	
52	Daylighting Tests Large OfficeCZ-7 WWR-60%,Stepped Dimming	201.26		8.14		0.05		33.00		0.62		3.31		4.95		15.04		0.00		2.51		1.68		0.00		4.62		4.86%		4.20%		FAIL	536	
53	Daylighting Tests Large OfficeCZ-7 WWR-60%,Stepped Dimming and high VT	201.09		8.13		0.05		32.98		0.62		3.30		4.93		15.04		0.00		2.51		1.68		0.00		4.62		4.94%		4.28%		FAIL	536	
	Large Office CZ-1 Baseline	**180.23**		**7.21**		**0.10**		**34.55**		**5.35**		**0.27**		**6.16**		**15.04**		**0.00**		**2.82**		**0.29**		**0.00**		**4.62**							347	
54	Daylighting Tests Large OfficeCZ-1 Continuous Dimming	174.40		6.92		0.10		34.07		5.84		0.26		5.29		15.04		0.00		2.74		0.28		0.00		4.62		3.23%		1.40%		FAIL	355	
55	Daylighting Tests Large OfficeCZ-1 Continuous Dimming and high VT	174.34		6.92		0.10		34.07		5.84		0.26		5.28		15.04		0.00		2.74		0.28		0.00		4.62		3.27%		1.41%		FAIL	355	
56	Daylighting Tests Large OfficeCZ-1 Stepped Dimming	172.31		6.83		0.11		33.90		6.00		0.26		4.99		15.04		0.00		2.72		0.28		0.00		4.62		4.39%		1.89%		FAIL	359	
57	Daylighting Tests Large OfficeCZ-1 Stepped Dimming and high VT	172.13		6.81		0.11		33.89		6.03		0.26		4.96		15.04		0.00		2.71		0.28		0.00		4.62		4.49%		1.92%		FAIL	359	
	Large Office CZ-1 WWR-20% Baseline	**179.35**		**7.21**		**0.10**		**34.18**		**4.96**		**0.26**		**6.16**		**15.04**		**0.00**		**2.86**		**0.28**		**0.00**		**4.62**							281	
58	Daylighting Tests Large OfficeCZ-1 WWR-20%,Continuous Dimming	174.03		6.95		0.10		33.79		5.45		0.25		5.38		15.04		0.00		2.78		0.27		0.00		4.62		2.96%		1.16%		FAIL	295	
59	Daylighting Tests Large OfficeCZ-1 WWR-20%,Continuous Dimming and high VT	173.87		6.94		0.10		33.78		5.48		0.25		5.35		15.04		0.00		2.77		0.27		0.00		4.62		3.05%		1.17%		FAIL	296	
60	Daylighting Tests Large OfficeCZ-1 WWR-20%,Stepped Dimming	172.68		6.90		0.10		33.64		5.48		0.25		5.22		15.04		0.00		2.77		0.27		0.00		4.62		3.72%		1.60%		FAIL	302	
61	Daylighting Tests Large OfficeCZ-1 WWR-20%,Stepped Dimming and high VT	172.27		6.88		0.10		33.63		5.56		0.25		5.14		15.04		0.00		2.76		0.27		0.00		4.62		3.95%		1.61%		FAIL	302	
	Large Office CZ-1 WWR-60% Baseline	**181.04**		**7.22**		**0.10**		**34.82**		**5.57**		**0.28**		**6.16**		**15.04**		**0.00**		**2.85**		**0.30**		**0.00**		**4.62**							391	
62	Daylighting Tests Large OfficeCZ-1WWR-60%,Continuous Dimming	175.13		6.94		0.11		34.26		5.97		0.27		5.30		15.04		0.00		2.78		0.29		0.00		4.62		3.26%		1.61%		FAIL	405	
63	Daylighting Tests Large OfficeCZ-1 WWR-60%,Continuous Dimming and high VT	175.06		6.93		0.11		34.25		5.98		0.27		5.29		15.04		0.00		2.77		0.29		0.00		4.62		3.30%		1.62%		FAIL	405	
64	Daylighting Tests Large OfficeCZ-1 WWR-60%,Stepped Dimming	173.05		6.85		0.11		34.07		6.09		0.26		5.00		15.04		0.00		2.77		0.28		0.00		4.62		4.42%		2.16%		FAIL	410	
65	Daylighting Tests Large OfficeCZ-1 WWR-60%,Stepped Dimming and high VT	172.86		6.83		0.11		34.05		6.12		0.26		4.97		15.04		0.00		2.76		0.28		0.00		4.62		4.52%		2.20%		FAIL	408	
	Stand Alone Retail CZ-7 Baseline	**279.30**		**9.97**		**0.11**		**45.09**		**2.65**		**5.90**		**7.89**		**10.73**		**0.00**		**9.52**		**0.00**		**0.00**		**8.41**							0	
66	Daylighting Tests Stand Alone Retail CZ-7 Skylight VT	275.83		9.85		0.11		44.67		2.66		5.87		7.51		10.73		0.00		9.50		0.00		0.00		8.41		1.25%		0.94%		FAIL	0	
67	Daylighting Tests Stand Alone Retail CZ-7 SRR-5%	273.98		9.75		0.11		44.44		2.77		6.04		6.74		10.73		0.00		9.75		0.00		0.00		8.41		1.91%		1.44%		FAIL	0	
68	Daylighting Tests Stand Alone Retail CZ-7 SRR-5% and high VT	273.18		9.71		0.11		44.34		2.79		6.03		6.68		10.73		0.00		9.71		0.00		0.00		8.41		2.19%		1.67%		FAIL	0	

	Stand Alone Retail CZ-1 Baseline	**247.43**		**8.95**		**0.19**		**49.99**		**11.02**		**0.78**		**8.17**		**10.73**		**0.00**		**10.87**		**0.00**		**0.00**		**8.42**					0	
69	Daylighting Tests Stand Alone Retail CZ-1 Skylight VT	244.25		8.82		0.20		49.60		11.08		0.77		7.76		10.73		0.00		10.84		0.00		0.00		8.42		1.28%		0.78%		FAIL	0	
70	Daylighting Tests Stand Alone Retail CZ-1 SRR-5%	237.96		8.49		0.20		49.02		11.63		0.81		6.76		10.73		0.00		10.68		0.00		0.00		8.42		3.82%		1.93%		FAIL	0	
71	Daylighting Tests Stand Alone Retail CZ-1 SRR-5% and high VT	237.11		8.45		0.20		48.91		11.67		0.81		6.65		10.73		0.00		10.63		0.00		0.00		8.42		4.17%		2.14%		FAIL	0	
	Medium Office CZ-15 Baseline	**294.56**		**10.33**		**0.15**		**50.72**		**0.35**		**14.96**		**5.06**		**12.95**		**0.00**		**2.15**		**0.13**		**0.00**		**15.13**					677	
72	Equipment test Medium OfficeCZ-15 low EPD	270.61		9.30		0.16		47.26		0.39		14.18		5.06		10.36		0.00		2.02		0.13		0.00		15.13		8.13%		6.83%		FAIL	740	
73	Equipment test Medium OfficeCZ-15 high EPD	318.55		11.36		0.15		54.20		0.32		15.74		5.06		15.54		0.00		2.28		0.13		0.00		15.13		-8.14%		-6.85%		FAIL	623	
	Medium Office CZ-16 Baseline	**207.59**		**6.85**		**0.24**		**47.03**		**8.52**		**3.31**		**5.06**		**12.95**		**0.00**		**1.48**		**0.59**		**0.00**		**15.13**					823	
74	Equipment test Medium OfficeCZ-16 low EPD	187.56		5.97		0.24		44.39		8.89		3.04		5.06		10.36		0.00		1.34		0.57		0.00		15.13		9.65%		5.60%		FAIL	874	
75	Equipment test Medium OfficeCZ-16 high EPD	227.28		7.74		0.23		49.46		7.94		3.58		5.06		15.54		0.00		1.62		0.60		0.00		15.13		-9.48%		-5.18%		FAIL	787	
	Medium Office CZ-6 Baseline	**209.32**		**7.51**		**0.16**		**41.41**		**0.67**		**6.15**		**5.06**		**12.95**		**0.00**		**1.25**		**0.19**		**0.00**		**15.13**					246	
76	Equipment test Medium OfficeCZ-6 low EPD	187.36		6.55		0.16		38.22		0.74		5.60		5.06		10.36		0.00		1.12		0.20		0.00		15.13		10.49%		7.71%		FAIL	277	
77	Equipment test Medium OfficeCZ-6 high EPD	231.43		8.46		0.16		44.62		0.62		6.69		5.06		15.54		0.00		1.39		0.19		0.00		15.13		-10.56%		-7.76%		FAIL	217	
	Fast food Restaurant CZ-6 Baseline	**2590.09**		**104.31**		**0.81**		**436.60**		**20.28**		**48.34**		**20.71**		**245.69**		**0.00**		**40.53**		**0.00**		**25.04**		**36.02**					98	
78	Equipment test Fast food RestaurantCZ-6 high Process load	2678.04		108.17		0.80		449.37		19.88		50.10		20.71		256.54		0.00		41.09		0.00		25.05		36.02		-3.40%		-2.93%		FAIL	94	

TEST RESULTS

	Test Case	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17			18		19	20
		Annual TDV EUI (kBtu/sqft)		Annual TDV EUI- Electricity (kwh/sqft)		Annual TDV EUI- Natural Gas (therm/sqft)		Annual Total End Use Site Energy EUI (kBtu/sqft)		Annual End Use Site Energy EUI																				Variation from Baseline				Pass/Fail	Reference Model Occupied Unmet Load Hrs	Applicant Model Occupied Unmet Load Hrs	Area/ CoolingCapcity (ft2/Ton)	Area/ HeatingCapacity (ft2/kBtu/hr)
										Heating (kBtu/sqft)		Cooling (kBtu/sqft)		Interior Lighting (kBtu/sqft)		Interior Equipment (kBtu/sqft)		Exterior Lighting (kBtu/sqft)		Fans (kBtu/sqft)		Pumps (kBtu/sqft)		Refrigeration (kBtu/sqft)		Water Heating (kBtu/sqft)		Heat Rejection (kBtu/sqft)		Exterior Equipment (kBtu/sqft)		TDV % variation		Total End Use Site Energy % Variation						
		Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model	Reference Model	Applicant Model						
	PTAC Stripmall CZ-6 Baseline	**235.87**		**232.83**		**3.05**		**32.84**		**0.07**		**8.02**		**14.63**		**2.31**		**5.42**		**0.54**		**0.00**		**0.00**		**1.85**		**0.00**		**0.00**							2		329.258	56.923
79	PTAC Test Stripmall CZ-6 Low Eff	343.29		340.21		3.10		48.67		0.64		9.53		14.63		2.31		5.42		14.24		0.00		0.00		1.88		0.00		0.00		46%		48%		FAIL	37		327.018	52.692
80	PTAC Test Stripmall CZ-6 High Eff	222.84		219.78		3.05		31.47		0.07		6.85		14.63		2.31		5.42		0.32		0.00		0.00		1.85		0.00		0.00		-6%		-4%		FAIL	2		331.173	61.892
	PTAC Stripmall CZ-15 Baseline	**270.89**		**267.89**		**3.00**		**36.98**		**0.01**		**10.96**		**15.85**		**2.32**		**5.42**		**0.59**		**0.00**		**0.00**		**1.81**		**0.00**		**0.00**							12		296.351	72.949
81	PTAC Test Stripmall CZ-15 Low Eff	417.11		414.14		3.00		57.20		0.31		17.43		15.85		2.32		5.42		14.06		0.00		0.00		1.81		0.00		0.00		54%		55%		FAIL	59		290.120	59.607
82	PTAC Test Stripmall CZ-15 High Eff	251.69		248.69		3.00		34.98		0.01		9.18		15.85		2.32		5.42		0.36		0.00		0.00		1.81		0.00		0.00		-7%		-5%		FAIL	12		302.953	80.822
	PTAC Stripmall CZ-16 Baseline	**227.11**		**224.03**		**3.06**		**32.00**		**0.30**		**6.37**		**15.29**		**2.32**		**5.42**		**0.46**		**0.00**		**0.00**		**1.85**		**0.00**		**0.00**							23		299.814	50.805
83	PTAC Test Stripmall CZ-16 Low Eff	346.18		343.02		3.15		50.71		3.93		5.95		15.29		2.32		5.42		15.88		0.00		0.00		1.91		0.00		0.00		52%		58%		FAIL	70		299.814	46.149
84	PTAC Test Stripmall CZ-16 High Eff	217.20		214.14		3.06		30.98		0.28		5.55		15.29		2.32		5.42		0.28		0.00		0.00		1.85		0.00		0.00		-4%		-3%		FAIL	24		299.814	56.505
	PTHP Stripmall CZ-6 Baseline	**235.64**		**232.60**		**3.05**		**32.80**		**0.03**		**8.02**		**14.63**		**2.31**		**5.42**		**0.54**		**0.00**		**0.00**		**1.85**		**0.00**		**0.00**							**0**		329.258	18.513
85	PTHP Test Stripmall CZ-6 Low Eff	341.51		338.41		3.10		48.31		0.31		9.53		14.63		2.31		5.42		14.24		0.00		0.00		1.88		0.00		0.00		45%		47%		FAIL	1		327.018	17.961
86	PTHP Test Stripmall CZ-6 High Eff	222.58		219.54		3.05		31.42		0.03		6.85		14.63		2.31		5.42		0.32		0.00		0.00		1.85		0.00		0.00		-6%		-4%		FAIL	0		331.173	19.086
	PTHP Stripmall CZ-15 Baseline	**270.84**		**267.86**		**3.00**		**36.98**		**0.00**		**10.96**		**15.85**		**2.32**		**5.42**		**0.59**		**0.00**		**0.00**		**1.81**		**0.00**		**0.00**							**12**		296.351	18.489
87	PTHP Test Stripmall CZ-15 Low Eff	416.22		413.24		3.00		57.02		0.14		17.43		15.85		2.32		5.42		14.06		0.00		0.00		1.81		0.00		0.00		54%		54%		FAIL	40		290.120	17.200
88	PTHP Test Stripmall CZ-15 High Eff	251.64		248.66		3.00		34.93		0.00		9.18		15.85		2.32		5.42		0.35		0.00		0.00		1.81		0.00		0.00		-7%		-6%		FAIL	12		302.953	19.236
	PTHP Stripmall CZ-16 Baseline	**226.44**		**223.40**		**3.06**		**31.87**		**0.18**		**6.37**		**15.29**		**2.32**		**5.42**		**0.46**		**0.00**		**0.00**		**1.85**		**0.00**		**0.00**							**1**		299.814	16.748
89	PTHP Test Stripmall CZ-16 Low Eff	337.42		334.28		3.15		49.02		2.25		5.95		15.29		2.32		5.42		15.88		0.00		0.00		1.91		0.00		0.00		49%		54%		FAIL	20		299.814	16.209
90	PTHP Test Stripmall CZ-16 High Eff	216.58		213.50		3.06		30.89		0.16		5.56		15.29		2.32		5.42		0.28		0.00		0.00		1.85		0.00		0.00		-4%		-3%		FAIL	1		299.814	17.324
	PSZ Stripmall CZ-6 Baseline	**324.27**		**319.47**		**4.79**		**44.62**		**0.91**		**7.85**		**14.63**		**5.42**		**2.31**		**11.61**		**0.00**		**0.00**		**1.87**		**0.00**		**0.00**							**36**		**301.405**	**45.302**
91	PSZ Test Stripmall CZ-6 Low Eff	461.51		456.09		5.44		63.20		1.24		15.68		14.63		5.42		2.31		22.01		0.00		0.00		1.89		0.00		0.00		42%		42%		FAIL	48		281.537	36.220
92	PSZ Test Stripmall CZ-6 High Eff	264.98		261.00		3.97		36.67		0.47		4.43		14.63		5.42		2.31		7.51		0.00		0.00		1.86		0.00		0.00		-18%		-18%		FAIL	18		332.101	51.936
	PSZ Stripmall CZ-15 Baseline	**422.53**		**418.55**		**3.97**		**55.78**		**0.50**		**17.69**		**15.85**		**5.42**		**2.32**		**12.18**		**0.00**		**0.00**		**1.82**		**0.00**		**0.00**							**55**		**239.176**	**53.566**
93	PSZ Test Stripmall CZ-15 Low Eff	590.49		586.20		4.28		78.00		0.64		28.68		15.85		5.42		2.32		23.22		0.00		0.00		1.85		0.00		0.00		40%		40%		FAIL	73		226.286	42.953
94	PSZ Test Stripmall CZ-15 High Eff	347.47		344.04		3.44		46.04		0.24		12.45		15.85		5.42		2.32		7.98		0.00		0.00		1.80		0.00		0.00		-18%		-17%		FAIL	14		262.040	60.483
	PSZ Stripmall CZ-16 Baseline	**321.69**		**296.72**		**24.95**		**53.38**		**11.98**		**4.56**		**15.29**		**5.42**		**2.32**		**11.88**		**0.00**		**0.00**		**1.92**		**0.00**		**0.00**							**66**		**335.674**	**33.609**
95	PSZ Test Stripmall CZ-16 Low Eff	451.38		425.04		26.33		70.84		12.75		9.20		15.29		5.42		2.32		23.94		0.00		0.00		1.92		0.00		0.00		40%		33%		FAIL	87		265.625	31.189
96	PSZ Test Stripmall CZ-16 High Eff	285.20		245.89		19.29		43.87		8.85		2.68		15.29		5.42		2.32		7.38		0.00		0.00		1.92		0.00		0.00		-18%		-18%		FAIL	30		422.216	36.444
	PVAV MediumOffice CZ-6 Baseline	**280.9**		**274.8**		**6.1**		**45.8**		**6.3**		**6.0**		**8.8**		**16.6**		**1.4**		**3.0**		**0.0**		**0.0**		**3.7**		**0.00**		**0.00**							**26**		**277.54**	**7.84**
97	PVAV Test MediumOffice CZ-6 Low Eff	565.7		559.6		6.1		89.1		30.4		14.5		8.8		16.6		1.4		13.7		0.0		0.0		3.7		0.00		0.00		101%		95%		FAIL	2		275.91	7.84
98	PVAV Test MediumOffice CZ-6 High Eff	224.3		218.2		6.1		36.5		0.8		3.7		8.8		16.6		1.4		1.5		0.0		0.0		3.7		0.00		0.00		-20%		-20%		FAIL	223		278.21	7.84
	PVAV MediumOffice CZ-15 Baseline	**298.5**		**292.4**		**6.1**		**47.1**		**3.4**		**10.2**		**8.8**		**16.6**		**1.4**		**3.0**		**0.0**		**0.0**		**3.7**		**0.00**		**0.00**							**54**		**261.20**	**8.31**
99	PVAV Test MediumOffice CZ-15 Low Eff	565.0		558.9		6.1		86.2		22.0		20.2		8.8		16.6		1.4		13.4		0.0		0.0		3.7		0.00		0.00		89%		83%		FAIL	7		254.72	8.31
100	PVAV Test MediumOffice CZ-15 High Eff	253.7		247.7		6.1		40.6		0.2		8.2		8.8		16.6		1.4		1.7		0.0		0.0		3.7		0.00		0.00		-15%		-14%		FAIL	239		268.12	8.31
	PVAV MediumOffice CZ-16 Baseline	**261.5**		**255.5**		**6.1**		**43.4**		**6.4**		**3.1**		**8.8**		**16.6**		**1.4**		**3.5**		**0.0**		**0.0**		**3.7**		**0.00**		**0.00**							**330**		**252.15**	**8.60**
101	PVAV Test MediumOffice CZ-16 Low Eff	531.6		525.6		6.1		86.5		30.2		10.1		8.8		16.6		1.4		15.8		0.0		0.0		3.7		0.00		0.00		103%		99%		FAIL	164		252.15	8.60
102	PVAV Test MediumOffice CZ-16 High Eff	223.7		217.6		6.1		37.2		2.7		2.2		8.8		16.6		1.4		1.8		0.0		0.0		3.7		0.00		0.00		-14%		-14%		FAIL	638		252.15	8.60
	VAV LargeOffice CZ-6 Baseline	**252.70**		**242.69**		**10.01**		**41.47**		**5.09**		**6.42**		**8.57**		**10.24**		**1.04**		**2.31**		**3.10**		**0.00**		**0.67**		**0.39**		**3.62**							**70**		**365.615**	**17.084**
103	VAV Test LargeOffice CZ-6 Low Eff	386.86		345.08		41.77		76.18		24.17		12.74		8.57		10.24		1.04		10.65		3.76		0.00		0.67		0.72		3.62		53%		84%		FAIL	6		365.615	17.084
104	VAV Test LargeOffice CZ-6 Low Eff	229.02		226.33		2.69		34.74		0.85		4.90		8.57		10.24		1.04		1.41		3.12		0.00		0.67		0.32		3.62		-9%		-16%		FAIL	222		365.615	17.084
	VAV LargeOffice CZ-15 Baseline	**280.82**		**275.33**		**5.48**		**43.59**		**2.36**		**9.63**		**8.57**		**10.24**		**1.04**		**2.36**		**3.83**		**0.00**		**0.67**		**1.25**		**3.62**							**122**		**340.899**	**17.749**
105	VAV Test LargeOffice CZ-15 Low Eff	400.22		369.96		30.26		72.40		16.91		15.18		8.57		10.24		1.04		10.42		4.34		0.00		0.67		1.40		3.62		43%		66%		FAIL	28		340.899	17.749
106	VAV Test LargeOffice CZ-15 Low Eff	264.68		263.05		1.63		39.70		0.27		8.38		8.57		10.24		1.04		1.59		4.05		0.00		0.67		1.26		3.62		-6%		-9%		FAIL	291		340.899	17.749
	VAV LargeOffice CZ-16 Baseline	**225.00**		**208.46**		**16.54**		**40.25**		**8.58**		**2.98**		**8.57**		**10.24**		**1.04**		**2.75**		**1.75**		**0.00**		**0.67**		**0.04**		**3.62**							**156**		**324.480**	**17.762**
107	VAV Test LargeOffice CZ-16 Low Eff	365.26		319.27		45.99		75.18		26.11		9.11		8.57		10.24		1.04		12.44		3.27		0.00		0.67		0.11		3.62		62%		87%		FAIL	75		324.480	17.762
108	VAV Test LargeOffice CZ-16 Low Eff	208.42		194.37		14.05		36.74		7.09		2.16		8.57		10.24		1.04		1.71		1.61		0.00		0.67		0.03		3.62		-7%		-9%		FAIL	326		324.480	17.762
	FanCoil Stripmall CZ-6 Baseline	**364.71**		**361.46**		**3.23**		**51.91**		**0.10**		**23.73**		**14.63**		**2.31**		**5.42**		**0.25**		**3.51**		**0.00**		**1.85**		**0.11**		**0.00**							**2**		**262.040**	**49.001**
109	FanCoil Test Stripmall CZ-6 Low Eff	364.53		361.33		3.22		51.64		0.09		23.46		14.63		2.31		5.42		0.36		3.44		0.00		1.85		0.10		0.00		0%		-1%		PASS	3		262.040	49.001
110	FanCoil Test Stripmall CZ-6 High Eff	364.27		361.03		3.23		51.87		0.10		23.72		14.63		2.31		5.42		0.21		3.51		0.00		1.85		0.11		0.00		0%		0%		PASS	2		262.040	49.001
	FanCoil Stripmall CZ-15 Baseline	**385.38**		**382.37**		**3.02**		**55.16**		**0.01**		**25.57**		**15.85**		**2.32**		**5.42**		**0.24**		**3.75**		**0.00**		**1.81**		**0.16**		**0.00**							**10**		**263.407**	**61.737**
111	FanCoil Test Stripmall CZ-15 Low Eff	385.11		382.10		3.02		54.98		0.01		25.29		15.85		2.32		5.42		0.39		3.73		0.00		1.81		0.15		0.00		0%		0%		PASS	10		263.407	61.737
112	FanCoil Test Stripmall CZ-15 High Eff	384.98		381.97		3.02		55.07		0.01		25.56		15.85		2.32		5.42		0.20		3.75		0.00		1.81		0.16		0.00		0%		0%		PASS	10		263.407	61.737
	FanCoil Stripmall CZ-16 Baseline	**332.80**		**329.03**		**3.75**		**47.82**		**0.38**		**19.42**		**15.29**		**2.32**		**5.42**		**0.25**		**2.85**		**0.00**		**1.85**		**0.05**		**0.00**							**24**		**259.589**	**44.095**
113	FanCoil Test Stripmall CZ-16 Low Eff	332.40		328.68		3.73		47.60		0.37		19.17		15.29		2.32		5.42		0.34		2.78		0.00		1.85		0.05		0.00		0%		0%		PASS	19		259.589	44.095
114	FanCoil Test Stripmall CZ-16 High Eff	332.36		328.62		3.76		47.78		0.38		19.42		15.29		2.32		5.42		0.21		2.85		0.00		1.85		0.05		0.00		0%		-1%		PASS	24		259.589	44.095
	PSZ Stripmall CZ-6 Baseline	**324.27**		**319.47**		**4.79**		**44.62**		**0.91**		**7.85**		**14.63**		**2.31**		**5.42**		**11.61**		**0.00**		**0.00**		**1.87**		**0.00**		**0.00**							**36**		**301.405**	**45.302**
115	VRF Test Stripmall CZ-6 Low Eff	267.11		263.99		3.11		38.18		0.38		8.82		14.63		2.31		5.42		4.75		0.00		0.00		1.88		0.00		0.00		-18%		-14%		FAIL	30		334.305	27.858
116	VRF Test Stripmall CZ-6 High Eff	248.04		244.94		3.11		36.04		0.30		6.74		14.63		2.31		5.42		4.75		0.00		0.00		1.88		0.00		0.00		-24%		-19%		FAIL	30		334.305	27.858
	PSZ Stripmall CZ-15 Baseline	**422.53**		**418.55**		**3.97**		**55.78**		**0.50**		**17.69**		**15.85**		**2.32**		**5.42**		**12.18**		**0.00**		**0.00**		**1.82**		**0.00**		**0.00**							**55**		**239.176**	**53.566**
117	VRF Test Stripmall CZ-15 Low Eff	316.13		313.13		3.01		44.89		0.19		14.61		15.85		2.32		5.42		4.69		0.00		0.00		1.82		0.00		0.00		-25%		-20%		FAIL	125		338.543	28.211
118	VRF Test Stripmall CZ-15 High Eff	287.07		284.05		3.01		41.38		0.15		11.12		15.85		2.32		5.42		4.69		0.00		0.00		1.82		0.00		0.00		-32%		-26%		FAIL	125		338.543	28.211
	PSZ Stripmall CZ-16 Baseline	**321.69**		**296.72**		**24.95**		**53.38**		**11.98**		**4.56**		**15.29**		**2.32**		**5.42**		**11.88**		**0.00**		**0.00**		**1.92**		**0.00**		**0.00**							**66**		**335.674**	**33.609**
119	VRF Test Stripmall CZ-16 Low Eff	269.82		266.64		3.16		39.07		2.17		6.65		15.29		2.32		5.42		5.29		0.00		0.00		1.91		0.00		0.00		-16%		-27%		FAIL	43		299.814	24.983
120	VRF Test Stripmall CZ-16 High Eff	251.82		248.67		3.16		36.98		1.68		5.08		15.29		2.32		5.42		5.29		0.00		0.00		1.91		0.00		0.00		-22%		-31%		FAIL	43		299.814	24.983
	PSZ Stripmall CZ-6 Baseline	**324.27**		**319.47**		**4.79**		**44.62**		**0.91**		**7.85**		**14.63**		**5.42**		**2.31**		**11.61**		**0.00**		**0.00**		**1.87**		**0.00**		**0.00**							**36**		**301.405**	**45.302**
121	WLHP Test Strip Mall CZ-6 Low Eff	255.96		252.89		3.05		38.04		0.01		0.77		14.63		5.42		2.31		10.49		0.15		0.00		1.84		2.44		0.00		-21%		-15%		FAIL	8		396.615	33.050
122	WLHP Test Strip Mall CZ-6 High Eff	255.91		252.89		3.04		38.04		0.00		0.77		14.63		5.42		2.31		10.49		0.07		0.00		1.84		2.51		0.00		-21%		-15%		FAIL	8		396.615	33.050
	PSZ Stripmall CZ-15 Baseline	**422.53**		**418.55**		**3.97**		**55.78**		**0.50**		**17.69**		**15.85**		**5.42**		**2.32**		**12.18**		**0.00**		**0.00**		**1.82**		**0.00**		**0.00**							**55**		**239.176**	**53.566**
123	WLHP Test Strip Mall CZ-15 Low Eff	263.24		260.23		2.99		39.24		0.00		0.81		15.85		5.42		2.32		10.30		0.15		0.00		1.81		2.58		0.00		-38%		-30%		FAIL	6		387.344	32.277
124	WLHP Test Strip Mall CZ-15 High Eff	262.98		260.01		2.99		39.20		0.00		0.80		15.85		5.42		2.32		10.30		0.07		0.00		1.81		2.62		0.00		-38%		-30%		FAIL	6		387.344	32.277
	PSZ Stripmall CZ-16 Baseline	**321.69**		**296.72**		**24.95**		**53.38**		**11.98**		**4.56**		**15.29**		**5.42**		**2.32**		**11.88**		**0.00**		**0.00**		**1.92**		**0.00**		**0.00**							**66**		**335.674**	**33.609**
125	WLHP Test Strip Mall CZ-16 Low Eff	266.98		262.28		4.71		40.53		0.89		0.66		15.29		5.42		2.32		11.63		0.15		0.00		1.84		2.31		0.00		-17%		-24%		FAIL	16		320.366	26.696
126	WLHP Test Strip Mall CZ-16 High Eff	266.09		262.13		3.95		40.04		0.48		0.66		15.29		5.42		2.32		11.63		0.07		0.00		1.84		2.35		0.00		-17%		-25%		FAIL	16		320.366	26.696
	PVAV MediumOffice CZ-6 Baseline	**280.88**		**274.81**		**6.06**		**45.76**		**6.35**		**5.98**		**8.79**		**16.58**		**1.44**		**2.96**		**0.00**		**0.00**		**3.67**		**0.00**		**0.00**							**26**		**277.545**	**7.838**
127	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	280.13		274.07		6.06		45.63		6.32		5.88		8.79		16.58		1.44		2.96		0.00		0.00		3.67		0.00		0.00		0%		0%		PASS	26		277.545	7.838
	PVAV MediumOffice CZ-15 Baseline	**298.46**		**292.41**		**6.06**		**47.12**		**3.42**		**10.23**		**8.79**		**16.58**		**1.44**		**3.00**		**0.00**		**0.00**		**3.67**		**0.00**		**0.00**							**54**		**261.200**	**8.307**
128	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	297.81		291.75		6.06		47.01		3.39		10.14		8.79		16.58		1.44		3.00		0.00		0.00		3.67		0.00		0.00		0%		0%		PASS	54		261.200	8.307
	PVAV MediumOffice CZ-16 Baseline	**261.54**		**255.49**		**6.06**		**43.45**		**6.40**		**3.11**		**8.79**		**16.58**		**1.44**		**3.46**		**0.00**		**0.00**		**3.67**		**0.00**		**0.00**							**330**		**252.153**	**8.599**
129	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	260.89		254.84		6.06		43.32		6.38		3.01		8.79		16.58		1.44		3.47		0.00		0.00		3.67		0.00		0.00		0%		0%		PASS	330		252.153	8.599
	PVAV MediumOffice CZ-6 Baseline	**280.88**		**274.81**		**6.06**		**45.76**		**6.35**		**5.98**		**8.79**		**16.58**		**1.44**		**2.96**		**0.00**		**0.00**		**3.67**		**0.00**		**0.00**							**26**		**277.54**	**7.84**
130	RadiantSlab Test Medium Office CZ-6 RadiantSlab	254.01		247.79		6.22		41.62		0.09		8.14		8.79		16.58		1.44		0.01		1.41		0.00		3.67		1.50		0.00		-10%		-9%		FAIL	511		313.73	16.25
	PVAV MediumOffice CZ-3 Baseline	**257.31**		**251.30**		**6.02**		**42.78**		**6.06**		**3.41**		**8.79**		**16.58**		**1.44**		**2.83**		**0.00**		**0.00**		**3.67**		**0.00**		**0.00**							**58**		**290.21**	**8.15**
131	NaturalVentilation Test Medium Office CZ-3 NaturalVentilation	188.28		179.75		8.52		33.34		1.33		1.00		8.79		16.58		1.44		0.54		0.01		0.00		3.67		0.00		0.00		-27%		-22%		FAIL	274		579.51	73.70
	PVAV MediumOffice CZ-3 Baseline	**257.31**		**251.30**		**6.02**		**42.78**		**6.06**		**3.41**		**8.79**		**16.58**		**1.44**		**2.83**		**0.00**		**0.00**		**3.67**		**0.00**		**0.00**							**58**		**290.21**	**8.15**
132	UFAD Test Medium Office CZ-3 UFAD	213.32		207.31		6.02		35.06		1.47		1.64		8.79		16.58		1.44		1.49		0.00		0.00		3.67		0.00		0.00		-17%		-18%		FAIL	330		223.41	3.56

TEST RESULTS

	Test Case	16 Variation from Baseline: TDV % variation, Reference Model	16 Variation from Baseline: TDV % variation, Applicant Model	17 Variation from Baseline: Total End Use Site Energy % Variation, Reference Model	17 Variation from Baseline: Total End Use Site Energy % Variation, Applicant Model	Pass/Fail	18 Reference Model Occupied Unmet Load Hrs	18 Applicant Model Occupied Unmet Load Hrs	19 Area/ CoolingCapcity (ft2/Ton)	20 Area/ HeatingCapacity (ft2/kBtu/hr)
	PTAC Stripmall CZ-6 Baseline						2		329.258	56.923
79	PTAC Test Stripmall CZ-6 Low Eff	46%		48%		FAIL	37		327.018	52.692
80	PTAC Test Stripmall CZ-6 High Eff	-6%		-4%		FAIL	2		331.173	61.892
	PTAC Stripmall CZ-15 Baseline						12		296.351	72.949
81	PTAC Test Stripmall CZ-15 Low Eff	54%		55%		FAIL	59		290.120	59.607
82	PTAC Test Stripmall CZ-15 High Eff	-7%		-5%		FAIL	12		302.953	80.822
	PTAC Stripmall CZ-16 Baseline						23		299.814	50.805
83	PTAC Test Stripmall CZ-16 Low Eff	52%		58%		FAIL	70		299.814	46.149
84	PTAC Test Stripmall CZ-16 High Eff	-4%		-3%		FAIL	24		299.814	56.505
	PTHP Stripmall CZ-6 Baseline						**0**		329.258	18.513
85	PTHP Test Stripmall CZ-6 Low Eff	45%		47%		FAIL	1		327.018	17.961
86	PTHP Test Stripmall CZ-6 High Eff	-6%		-4%		FAIL	0		331.173	19.086
	PTHP Stripmall CZ-15 Baseline						**12**		296.351	18.449
87	PTHP Test Stripmall CZ-15 Low Eff	54%		54%		FAIL	40		290.120	17.200
88	PTHP Test Stripmall CZ-15 High Eff	-7%		-6%		FAIL	12		302.953	19.236
	PTHP Stripmall CZ-16 Baseline						**1**		299.814	16.748
89	PTHP Test Stripmall CZ-16 Low Eff	49%		54%		FAIL	20		299.814	16.209
90	PTHP Test Stripmall CZ-16 High Eff	-4%		-3%		FAIL	1		299.814	17.324
	PSZ Stripmall CZ-6 Baseline						**36**		**301.405**	**45.302**
91	PSZ Test Stripmall CZ-6 Low Eff	42%		42%		FAIL	48		281.537	36.220
92	PSZ Test Stripmall CZ-6 High Eff	-18%		-18%		FAIL	18		332.101	51.936
	PSZ Stripmall CZ-15 Baseline						**55**		**239.176**	**53.566**
93	PSZ Test Stripmall CZ-15 Low Eff	40%		40%		FAIL	73		226.286	42.953
94	PSZ Test Stripmall CZ-15 High Eff	-18%		-17%		FAIL	14		262.040	60.483
	PSZ Stripmall CZ-16 Baseline						**66**		**335.674**	**33.609**
95	PSZ Test Stripmall CZ-16 Low Eff	40%		33%		FAIL	87		265.625	31.189
96	PSZ Test Stripmall CZ-16 High Eff	-18%		-18%		FAIL	30		422.216	36.444
	PVAV MediumOffice CZ-6 Baseline						**26**		**277.54**	**7.84**
97	PVAV Test MediumOffice CZ-6 Low Eff	101%		95%		FAIL	2		275.91	7.84

98	PVAV Test MediumOffice CZ-6 High Eff	-20%		-20%		FAIL	223		278.21	7.84
	PVAV MediumOffice CZ-15 Baseline						**54**		**261.20**	**8.31**
99	PVAV Test MediumOffice CZ-15 Low Eff	89%		83%		FAIL	7		254.72	8.31
100	PVAV Test MediumOffice CZ-15 High Eff	-15%		-14%		FAIL	239		268.12	8.31
	PVAV MediumOffice CZ-16 Baseline						**330**		**252.15**	**8.60**
101	PVAV Test MediumOffice CZ-16 Low Eff	103%		99%		FAIL	164		252.15	8.60
102	PVAV Test MediumOffice CZ-16 High Eff	-14%		-14%		FAIL	638		252.15	8.60
	VAV LargeOffice CZ-6 Baseline						**70**		**365.615**	**17.084**
103	VAV Test LargeOffice CZ-6 Low Eff	53%		84%		FAIL	6		365.615	17.084
104	VAV Test LargeOffice CZ-6 Low Eff	-9%		-16%		FAIL	222		365.615	17.084
	VAV LargeOffice CZ-15 Baseline						**122**		**340.899**	**17.749**
105	VAV Test LargeOffice CZ-15 Low Eff	43%		66%		FAIL	28		340.899	17.749
106	VAV Test LargeOffice CZ-15 Low Eff	-6%		-9%		FAIL	291		340.899	17.749
	VAV LargeOffice CZ-16 Baseline						**156**		**324.480**	**17.762**
107	VAV Test LargeOffice CZ-16 Low Eff	62%		87%		FAIL	75		324.480	17.762
108	VAV Test LargeOffice CZ-16 Low Eff	-7%		-9%		FAIL	326		324.480	17.762
	FanCoil Stripmall CZ-6 Baseline						**2**		**262.040**	**49.001**
109	FanCoil Test Stripmall CZ-6 Low Eff	0%		-1%		PASS	3		262.040	49.001
110	FanCoil Test Stripmall CZ-6 High Eff	0%		0%		PASS	2		262.040	49.001
	FanCoil Stripmall CZ-15 Baseline						**10**		**263.407**	**61.737**
111	FanCoil Test Stripmall CZ-15 Low Eff	0%		0%		PASS	10		263.407	61.737
112	FanCoil Test Stripmall CZ-15 High Eff	0%		0%		PASS	10		263.407	61.737
	FanCoil Stripmall CZ-16 Baseline						**24**		**259.589**	**44.095**
113	FanCoil Test Stripmall CZ-16 Low Eff	0%		0%		PASS	19		259.589	44.095
114	FanCoil Test Stripmall CZ-16 High Eff	0%		-1%		PASS	24		259.589	44.095
	PSZ Stripmall CZ-6 Baseline						**36**		**301.405**	**45.302**
115	VRF Test Stripmall CZ-6 Low Eff	-18%		-14%		FAIL	30		334.305	27.858
116	VRF Test Stripmall CZ-6 High Eff	-24%		-19%		FAIL	30		334.305	27.858
	PSZ Stripmall CZ-15 Baseline						**55**		**239.176**	**53.566**
117	VRF Test Stripmall CZ-15 Low Eff	-25%		-20%		FAIL	125		338.543	28.211
118	VRF Test Stripmall CZ-15 High Eff	-32%		-26%		FAIL	125		338.543	28.211
	PSZ Stripmall CZ-16 Baseline						**66**		**335.674**	**33.609**
119	VRF Test Stripmall CZ-16 Low Eff	-16%		-27%		FAIL	43		299.814	24.983
120	VRF Test Stripmall CZ-16 High Eff	-22%		-31%		FAIL	43		299.814	24.983
	PSZ Stripmall CZ-6 Baseline						**36**		**301.405**	**45.302**

121	WLHP Test Strip Mall CZ-6 Low Eff	-21%		-15%		FAIL	8		396.615	33.050
122	WLHP Test Strip Mall CZ-6 High Eff	-21%		-15%		FAIL	8		396.615	33.050
	PSZ Stripmall CZ-15 Baseline						**55**		**239.176**	**53.566**
123	WLHP Test Strip Mall CZ-15 Low Eff	-38%		-30%		FAIL	6		387.344	32.277
124	WLHP Test Strip Mall CZ-15 High Eff	-38%		-30%		FAIL	6		387.344	32.277
	PSZ Stripmall CZ-16 Baseline						**66**		**335.674**	**33.609**
125	WLHP Test Strip Mall CZ-16 Low Eff	-17%		-24%		FAIL	16		320.366	26.696
126	WLHP Test Strip Mall CZ-16 High Eff	-17%		-25%		FAIL	16		320.366	26.696
	PVAV MediumOffice CZ-6 Baseline						**26**		**277.545**	**7.838**
127	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	0%		0%		PASS	26		277.545	7.838
	PVAV MediumOffice CZ-15 Baseline						**54**		**261.200**	**8.307**
128	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	0%		0%		PASS	54		261.200	8.307
	PVAV MediumOffice CZ-16 Baseline						**330**		**252.153**	**8.599**
129	EvaporativeCooling Test Medium Office CZ-6 EvaporativeCooling	0%		0%		PASS	330		252.153	8.599
	PVAV MediumOffice CZ-6 Baseline						**26**		**277.54**	**7.84**
130	RadiantSlab Test Medium Office CZ-6 RadiantSlab	-10%		-9%		FAIL	511		313.73	16.25
	PVAV MediumOffice CZ-3 Baseline						**58**		**290.21**	**8.15**
131	NaturalVentilation Test Medium Office CZ-3 NaturalVentilation	-27%		-22%		PASS	274		579.51	73.70
	PVAV MediumOffice CZ-3 Baseline						**58**		**290.21**	**8.15**
132	UFAD Test Medium Office CZ-3 UFAD	-17%		-18%		FAIL	330		223.41	3.56