| | |
|---|---|
| CERTIFICATE OF COMPLIANCE | NRCC-CXR-02-E |
| Commissioning - Construction Documents | (Page 1 of 9) |
| Project Name: | Date Prepared: |

| A. General Information | | |
|---|---|---|
| Climate Zone: | Building Type: | Conditioned Floor Area (sf): |
| Reviewer's Name: | Reviewer's Agency: | |
| *Note: Design Review for each system/subsystem must be submitted* | | |
| Enforcement Agency: | Permit Number: | |
| Enforcement Agency Use: Checked by | Enforcement Agency Use: Date | |

**B. Design Review Checklist**

| Code Section | Measure | Design Reviewer | | | Designer Response | | |
|---|---|---|---|---|---|---|---|
| | | Yes. Complies | Does Not Comply | Consider Better Practice | Complies | Will Include in Next Draft | Not Included - State Reason |
| **ENVELOPE** | | | | | | | |
| **JOINTS AND OTHER OPENINGS** | | | | | | | |
| 110.7 | Plans indicate that joints, penetrations and other openings in the building envelope shall be sealed to limit infiltration and exfiltration. | | | N/A | | | |
| 120.7 | Roof/ceiling, wall and floor and soffit insulation must meet requirements identified in this section. | | | N/A | | | |
| **INSULATION AND ROOFING PRODUCTS** | | | | | | | |
| 140.3(a)1.A | Roofing products for low-sloped roofs meet minimum solar reflectance of 0.63 and minimum thermal emittance of 0.75 OR minimum Solar Reflectance Index of 75. Steep-sloped roofs meet requirements of 0.20 and 0.75 OR 16, respectively. | | | N/A | | | |
| 140.3(a)1.A-B | Exterior roofs, ceilings, and exterior walls, floors and soffits must have an overall assembly U-factor no greater than the applicable value in TABLE 140.3-B, C or D. | | | N/A | | | |

**NOTES**

| LIGHTING | | | | | | | |
|---|---|---|---|---|---|---|---|
| **LIGHTING CONTROLS** | | | | | | | |
| 130.1(a) | Accessible, independent switching or a control device is included for all areas enclosed by ceiling height partitions. | | | N/A | | | |
| 130.1(a)4 | General lighting is controlled separately from all other lighting systems. | | | N/A | | | |
| 130.1(b) | General lighting of enclosed spaces 100 sf or larger with a lighting load that exceeds 0.5 W/sf, have multi level lighting controls from at least one of the following methods: manual dimming, lumen maintenance, tuning, automatic daylighting controls, demand responsive lighting controls. Control steps are in accordance with Table 130.1-A. | | | N/A | | | |
| 130.1(c)1 | Shut off controls are controlled with occupant sensing controls, automatic time-switch control, signal from another building system or other control and are shown for all indoor lighting systems. | | | N/A | | | |
| 130.1(c)5 | Offices 250 square feet or smaller; multipurpose rooms of less than 1000 square feet, and classrooms and conference rooms of any size, shall be equipped with occupant sensor(s) to shut off the lighting. | | | N/A | | | |
| 130.1(c)6 | Lighting in corridors and stairwells shall be controlled by occupant sensing controls that separately reduce lighting power in each space by at least 50% when the area is unoccupied. | | | N/A | | | |
| 130.1(e) | For buildings greater than 10,000 sf, demand response controls should be included to reduce total building lighting power by a minimum of 15%. | | | N/A | | | |
| **DAYLIGHT AREA** | | | | | | | |
| 140.3(c) | In Climate Zones 2 though 15: Daylight areas required for conditioned or unconditioned spaces greater than 5,000 ft2 of roof area and with ceiling height greater than 15 feet are shown on building plans and meet requirements of this section. | | | N/A | | | |
| **DAYLIGHT CONTROLS** | | | | | | | |
| 130.1(d)2 | All skylit daylit zones, primary sidelit daylit zones and secondary sidelit daylit zone are shown on plans. Controls of skylit and sidelit zones are independent and provide multi-level lighting in accordance with Table 130.1-A. Plans should indicate that general lighting power is reduced by a minimum of 65% when daylit illuminance is 150% of design illuminance. | | | N/A | | | |
| *Best Practice* | *The locations of all photo sensors are shown on the plans. Height and position criteria are also shown. Photo sensors are not installed in direct sunlight nor in direct light of lighting fixtures.* | | | | | | |
| *Best Practice* | *Specification defines the amount of light to be gathered by the photo sensor in relation to its location for the lighted surface and this matches the application. For example: if 5 FC on the horizontal floor is the maintained lighting level and the sensor is mounted 15 feet off the ground, the sensor must be capable of detecting 5 FC from floor at that distance.* | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Best Practice* | *Daylight dimming zones have consistent window/glazing types and orientation (e.g., a single zone should not include east and south facing glass or have a section of tall window-wall and another wall section of smaller windows).* | | | | | | |
| *Best Practice* | *Specifications state that sensor and dimming settings are set up and calibrated after furniture and final finishes and all lighting equipment are installed and operational.* | | | | | | |
| *Best Practice* | *A complete step by step sequence of operation is included defining the lighting levels (max and min), zones, interaction with occupants, interaction with occupancy and time-clock controls, and interaction with lighting on-off or dimming switches.* | | | | | | |
| *Best Practice* | *Interface with BAS or other lighting control systems is defined and is fully compatible for all features of the sequence required. Interface shown on lighting and controls drawings.* | | | | | | |
| *Best Practice* | *Daylight dimming controls are properly integrated with emergency fixtures, using separate ballasts for dimming and emergency backup.* | | | | | | |
| *Best Practice* | *Daylight zones that penetrate more than one row of fixtures from the windows have the fixtures closer to the windows receiving a lower light command to create a more even lighting and save energy.* | | | | | | |
| *Best Practice* | *The ballast specified is able to turn down as low as the specified daylight dimming system.* | | | | | | |
| *Best Practice* | *To save energy, dimming specifications require that the illumination during night time shall be adjusted to be 20% or more lower than the daytime target, since the apparent illumination at night will appear higher.* | | | | | | |
| **OUTDOOR LIGHTING CONTROLS AND EQUIPMENT** | | | | | | | |
| 130.2(a) | Outdoor incandescent lighting rated over 100 watts is controlled by a motion sensor. | | | N/A | | | |
| 130.2(c)1 | All outdoor lighting is controlled by photocontrol or outdoor astronomical time-switch control. | | | N/A | | | |
| 130.2(c)3 | Outdoor lighting where bottom of luminaire is mounted 24 feet or less above the ground is controlled by motion sensors or other controls that are capable of reducing the lighting power of each luminaire by 40 to 80% in response to the area being vacated. | | | N/A | | | |
| 130.2(c)55 | Automatic lighting controls shown on plans for building façade, ornamental hardscape or outdoor dining lighting includes part-night lighting control, motion sensor control, or time-based control. | | | N/A | | | |

**NOTES**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **SERVICE HOT WATER HEATING** | | | | | | | |
| 110.3(c)2 | SHW systems with circulating pumps or with electrical heat trace have automatic controls that turn off the system during unoccupied periods. | | | N/A | | | |
| 120.3 | Pipe insulation for space conditioning and service water-heating with fluid temperatures listed in Table 120.3-A have insulation levels as specified in subsection (a) and (b). | | | N/A | | | |
| **NOTES** | | | | | | | |
| | | | | | | | |
| **HVAC DESIGN - ALL BUILDINGS** | | | | | | | |
| **HVAC EQUIPMENT** | | | | | | | |
| 110.2(a) | Equipment meets efficiency requirements of Tables 110.2-A through 110.2-K. | | | | | | |
| 120.2(i) | All air-cooled, unitary, DX units (packaged, split-system, heat pumps and VRF) with economizers are equipped with Fault Detection and Diagnostics systems. | | | | | | |
| 120.3 | Pipe insulation for space conditioning and service water-heating with fluid temperatures listed in Table 120.3-A have insulation levels as specified in subsection (a) and (b). | | | | | | |
| 140.4(a) | Mechanical heating and cooling equipment are the smallest size, within the available options of the desired equipment line, necessary to meet the design heating and cooling loads of the building, as calculated according to the requirements of Section 140.4(b). | | | | | | |
| 140.4(c)4 | HVAC motors for fans that are less than 1 hp and 1/12 hp or greater are ECM or have a minimum motor efficiency of 70%. Motors also have means to adjust motor speed for balancing or remote control. | | | | | | |
| 140.4(g) | Electric resistance heating systems are not provided for space heating for cases were exceptions are not allowed. | | | | | | |
| *Best Practice* | *In drier climates and when large outdoor air fractions are required, evaporative pre-cooling packages were evaluated to pre-cool outside air and cool the air flowing over the DX condensing unit.* | | | | | | |
| *Best Practice* | *In semi-arid climates, two-stage evaporative cooling has been evaluated in lieu of mechanical refrigeration.* | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **HVAC ZONING** | | | | | | | |
| *Best Practice* | *Zone each air handler to serve only areas with common loads to allow more aggressive control strategies and improve comfort. Have different AHU's serving core vs. perimeter areas.* | | | | | | |
| *Best Practice* | *The design accommodates partial occupancy energy savings when the owner's requirements or narrative describe any possibility of partial occupancy, by zoning air handlers by floor or by part of a floor, or by incorporating controlled floor dampers, or VAV air terminals going totally shut when not occupied, etc.* | | | | | | |
| **CONTROLS** | | | | | | | |
| 120.2(a) and (b) | Each zone is controlled by an individual thermostatic control. Controls are capable of setting temperatures to 55°F for comfort heating and 85°F for cooling and provide a temperature deadband of at least 5°F if controlling both heating and cooling. | | | | | | |
| 120.2(e) | Each space conditioning system is equipped with controls to shut the system off during periods of nonuse and will temporarily operate the system to maintain setback and setup temperatures while keeping ventilation dampers closed. | | | | | | |
| 120.2(e)3 | Systems serving multipurpose rooms less than 1000 sf and classrooms, conference, auditorium or meeting center rooms greater than 750 sf have occupancy sensors that interface with HVAC controls to automatically setup the cooling setpoint by 2°F or more and setback the heating setpoint by 2°F or more and automatically reset the minimum required ventilation rate. These occupant sensor ventilation control devices must meet the requirements of section 120.1(c)5. | | | | | | |
| 120.2(f) | Outdoor air supply and exhaust equipment shall be installed with dampers that automatically close upon fan shutdown. | | | | | | |
| 120.2(g) | Each space-conditioning system serving multiple zones with a combined conditioned floor area of more than 25,000 square feet shall be designed, installed, and controlled to serve isolation areas. | | | | | | |
| 120.2(h) | HVAC systems with DDC to the Zone level shall be programmed to allow centralized demand shed for non-critical zones. | | | | | | |
| 140.4(d) | Zone controls prevent reheating, recooling and simultaneous provisions of heating and cooling to the same zone. | | | | | | |
| *Best Practice* | *Each wall mounted thermostat is located away from potential sources that would adversely affect the reading (close to copiers, direct sunlight, below or above a supply air diffuser or convector, etc.).Any thermostats mounted on exterior walls are installed in sealed and insulated junction boxes.* | | | | | | |
| *Best Practice* | *Corner office should always have their own thermostats, air terminal boxes or fin-tube radiators.* | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Best Practice* | *Multiple air terminal boxes in a single large open space are served by a single thermostat, or multiple thermostat signals are polled and altered, to prevent fighting of terminals and simultaneous heating and cooling.* | | | | | | |
| *Best Practice* | *Control sequences are listed for equipment operated by stand-alone packaged controls. Unoccupied sequences should be included.* | | | | | | |
| *Best Practice* | *Control sequences exist for each piece of equipment listed in the equipment schedule that is monitored or controlled by the building automation system (BAS). Unoccupied sequences should be included.* | | | | | | |
| *Best Practice* | *Outside air temperature sensors should be in a commercially designed solar shield located on a north wall or some other location out of direct sunlight and away from building exhaust or heat rejection equipment.* | | | | | | |
| **VENTILATION RATES** | | | | | | | |
| 120.1(a)2 | The outdoor air-ventilation rate and air-distribution assumptions made in the design of the ventilating system are clearly identified on the plans. | | | | | | |
| 120.1(b) | Each space is designed to have natural ventilation OR mechanical ventilation that is no less than the larger of conditioned floor area times the requirements in Table 120.1-A or 15 cfm times the expected number of occupants. | | | | | | |
| *Best Practice* | *The minimum and maximum outdoor air rates for each air handler are listed on the equipment schedules.* | | | | | | |
| *Best Practice* | *The outdoor air-ventilation rates are based on planned owner occupancy as defined in owner's design intent and are not based on maximum egress occupancy rates.* | | | | | | |
| *Best Practice* | *Heat recovery is specified on fan systems where the design outside air flow rate is greater than 70% and design supply air flow rate is greater than 5,000 cfm.* | | | | | | |
| **DEMAND CONTROL VENTILATION (DCV)** | | | | | | | |
| 120.1(c)3-4 | HVAC systems that have an economizer, serve a space with a design occupant density greater than or equal to 25 people per 1000 sf, and are either a single zone system with any controls or multiple zone system with DDC controls to the zone level must have demand control ventilation controls. The following must be met:<br>A. $CO_2$ sensors installed in each room served by systems with DCV controls<br>B. $CO_2$ sensors are located between 3 ft and 6 ft above the floor<br>C. $CO_2$ concentrations maintained at less than or equal to 600 ppm plus outdoor ppm<br>D. During hours of expected occupancy, controls maintain the system ventilation rate. | | | N/A | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **ALL HVAC SYSTEMS - ECONOMIZERS** | | | | | | | |
| 140.4(e)1 and 3 | Each cooling fan system that has a design mechanical cooling capacity over 54,000 Btu/h has an air economizer or a water economizer. Air economizers must comply with the high limit shutoff controls shown in Table 140.4-B. | | | | | | |
| 140.4(e)2.B | Plans indicate integrated economizer controls are set up such that partial cooling is provided by the economizer even when additional mechanical cooling is required. | | | | | | |
| *Best Practice* | *Economizer dampers are specified to be driven by direct drive actuators rather than rod linkages, which can be a major cause of economizer malfunction.* | | | | | | |
| *Best Practice* | *Barometric relief is used, if possible. If not, relief fans(rather than return fans) are used in most cases.* | | | | | | |
| *Best Practice* | *Outdoor and return air sensors are properly selected, properly located to provide accurate and repeatable measurements for controlling economizer operation. Averaging sensors cover the entire duct or coil face areas.* | | | | | | |
| **DUCT DESIGN** | | | | | | | |
| 120.4(a) | All air distribution system ducts and plenums must be installed, sealed and insulated as required by 120.4(a). | | | | | | |
| 140.4(l) | Plans indicate duct sealing leakage rates. | | | | | | |
| *Best Practice* | *Ducts utilize low static pressure design. Identify the most restrictive branch from the fan to the last air terminal unit. Identify possible means of significantly reducing the pressure drop. Branch duct systems are designed for equal pressure drop, when possible.* | | | | | | |
| *Best Practice* | *Duct branches with significantly differing static pressure requirements have volume control strategically placed to aid in TAB work.* | | | | | | |
| *Best Practice* | *Fans discharge into duct sections that remain straight for as long as possible (ideally 10 duct diameters) to reduce fan inefficiencies from system effects.* | | | | | | |
| *Best Practice* | *Duct velocities are generally below 2,000 fpm for ducts in ceiling plenums, 1500 fpm for exposed ducts and 3500 fpm in mechanical rooms and non-noise sensitive shafts.* | | | | | | |
| *Best Practice* | *Duct friction rates are generally less than 0.25" WC per 100 lineal feet nearer the fan, 0.15 to 0.20" in the main ducts and 0.08 to 0.12" WC /100' nearer the end of the system. Designs over these rates should be questioned. Very energy efficient design can lower these values by up to 40%.* | | | | | | |
| *Best Practice* | *Ensure that drawings are sufficiently detailed to ensure that distribution system design intent is adequately conveyed. If sufficient detail is not included in drawings, installations may result in significantly higher pressure drops and hence higher energy consumption and other operating issues.* | | | | | | |

| ACCEPTANCE AND COMMISSIONING | | | | | | | |
|---|---|---|---|---|---|---|---|
| 120.5(a) | Acceptance requirements clearly identified in construction documents. | | | N/A | | | |
| 120.8(e) | Commissioning measures or requirements are reflected in the construction documents. | | | N/A | | | |
| 120.8(g) | Requirements for functional performance tests are reflected in the construction documents. | | | N/A | | | |
| **NOTES** | | | | | | | |

| DOCUMENTATION AUTHOR'S DECLARATION STATEMENT | |
|---|---|
| 1. I certify that this Certificate of Compliance documentation is accurate and complete. | |
| Documentation Author Name: | Documentation Author Signature: |
| Company: | Signature Date: |
| Address: | CEA/ HERS Certification Identification (if applicable): |
| City/State/Zip: | Phone: |

**RESPONSIBLE PERSON'S DECLARATION STATEMENT**

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

| Responsible Designer Name: | Responsible Designer Signature: |
|---|---|
| Company : | Date Signed: |
| Address: | License: |
| City/State/Zip: | Phone: |