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STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

EXECUTIVE DIRECTOR RECOMMENDATION TO APPROVE THE REFRIGERATION SERVICE ENGINEERS SOCIETY PROPOSED UPDATE REPORT FOR THE ACCEPTANCE TEST TECHNICIAN CERTIFICATION PROVIDER AMENDMENT APPLICATION FOR THE 2022 BUILDING ENERGY EFFICIENCY STANDARDS

Executive Summary

The acceptance test technician certification providers (ATTCP) program addresses training, certification, and oversight of acceptance test technicians (ATT), as well as the acceptance test employers (ATE). The technicians perform the tests required by the Building Energy Efficiency Standards (Energy Code), and the employers are responsible for the technician's work. ATTCPs are professional organizations that are approved to provide training curricula for ATTs and ATEs, certification procedures, complaint resolution (including disciplinary procedures), quality assurance, and accountability measures.

Acceptance testing ensures that installed equipment, controls, and systems in nonresidential buildings operate as required by the Energy Code. ATTCPs must submit an update report if the California Energy Commission (CEC) approves an updated Energy Code. The 2022 Energy Code was approved by the CEC on August 11, 2021, approved by the California Building Standards Commission in December of 2021, and will go into effect on January 1, 2023. Update reports are subject to the application review and determination process specified in section 10-103.2(e).

The Refrigeration Service Engineers Society (RSES) submitted an update report to the CEC amending its application on June 29, 2022, as required by section 10-103.2(d)2 of the Energy Code. As specified in section 10-103.2(e) of the 2022 Energy Code, staff reviewed and validated all information received in the update report and determined that RSES meets most of the criteria and procedures in section 10-103.2(c) for providing acceptance testing certification services. Pursuant to section 10-103.2(e), the executive director posted the staff evaluation to docket number 13-ATTCP-01 (https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=13-ATTCP-01), provided an opportunity for public comment, and considered all comments received as of November 15, 2022.

The RSES has not completed the database system for tracking completed acceptance tests as required by sections 10-103.2(c)3H and 10-103.2(c)3I. Staff has confidence that the RSES will complete this task by December 1, 2022. Staff proposes a Condition of Approval to allow the CEC to approve the RSES 2022 Update Report. The RSES will be required to demonstrate that the database is in full operation to the CEC by December 1, 2022. Failure to demonstrate that the database is in full operation to the

executive director's satisfaction by December 1, 2022, shall result in automatic termination of the ATTCP's approval of the RSES Update Report. The executive director shall issue a formal letter of determination regarding compliance with this condition by December 14, 2022. Failure to comply with any other requirement of CAO-2022-1 may result in the CEC rescinding the ATTCP approval of the RSES 2022 Update Report.

Staff's evaluation is included in Exhibit A.

Recommendation of the Executive Director

Based upon staff's review and validation of the RSES application amendments, I recommend that the CEC confirm these findings and approve the RSES 2022 Update Report.

October 24, 2022

Drew Bohan
Executive Director
California Energy Commission

Date

EXHIBIT A

Staff Evaluation – Refrigeration Service Engineers Society
2022 Update Report

Summary:
Staff has verified and reviewed the Refrigeration Service Engineers Society (RSES) 2022 Update Report to confirm that it is complete and complies with most of the requirements in section 10-103.2(c) of the 2022 Building Energy Efficiency Standards (Energy Code) in regard to its acceptance test technician certification provider (ATTCP) application. Staff reviewed the confidential and non-confidential information and verified that all changes needed to meet the requirements of the 2022 Energy Code are represented in the RSES 2022 Update Report.

Exception:
Sections 10-103.2(c)3H and 10-103.2(c)3I require the implementation of a database system to track and record acceptance test activities and results of certified acceptance test technicians (ATTs). The RSES was not able to fully implement the required database system. However, based on the progress made and the experience of the RSES, staff is confident that the RSES can complete the database system and satisfy the requirements in sections 10-103.2(c)3H and 10-103.2(c)3I by December 1, 2022. Staff recommends the following condition of approval (COA-2022-1) for the California Energy Commission (CEC) to consider and allow RSES to proceed with the required training as soon as possible. This will ensure that the ATTs responsible for compliance with the Energy Code are fully trained and their customers are able to realize the energy savings from the 2022 Energy Code requirements.

COA-2022-1: By December 1, 2022, RSES (or its representatives) shall perform all of the following:

- Develop and implement an online database web service in compliance with sections 10-103.2(c)3H and 10-103.2(c)3I.
- Submit all necessary evidence to the CEC to substantiate its claim of compliance with COA-2022-1.

Compliance:
The RSES will demonstrate that the database is in full operation to the executive director. Once the executive director is satisfied with the performance of the database, they will provide the RSES with a written acknowledgement of compliance by December 14, 2022. Failure to comply with any other requirement of COA-2022-1 may result in the CEC rescinding the ATTCP approval of the RSES.

Detailed Evaluation

The following tables identify all of the changes that may have affected the RSES update report. Staff considered all of these changes in its validation and review of the RSES 2022 Update Report.

Table 1: Changes within Title 24, Part 1

Section	Description of Change
10-103.2	Adds references to section 160.5(e) alongside existing references to section 130.4 consistent with the separation of multifamily building requirements, including acceptance testing requirements, into separate chapters in sections 160, 170, and 180 (inclusive).
10-103.2(c)3H	This change adds express criteria for electronic storage, within a database system, of compliance forms prepared and collected by ATTs.
10-103.2(c)3I	The purpose of the addition of this section is to add specifications for recording, maintaining, and providing certificate of compliance, certificate of installation, and certificate of acceptance documents collected by ATTCPs to the CEC.
10-102, Definition "Nonresidential Data Registry"	This change excludes certificates of acceptance recorded by an ATTCP from requiring additional submittal to separate data registries.
10-103(a)4B	This change excludes certificates of acceptance recorded by an ATTCP from requiring additional submittal to separate data registries.
10-103(a)4C	The change removes reference to registration or the use of data registries as it relates to certificates of acceptance.
10-103(b)4	The purpose of the changes to this section is to broaden its application to include central building systems serving multiple separate dwellings, in part by distinguishing between whole-dwelling ventilation systems and local exhaust systems or equipment.
10-103(d)	The change removes reference to registration or the use of data registries as it relates to certificates of acceptance.
10-109(i)1B	This change exempts nonresidential certificate of acceptance (NRCA) forms recorded by an ATTCP from nonresidential data registry registration requirements.

Table 2: 2022 Energy Code Changes

Section	Description of Change
100.0	The changes to these sections, their subsections and associated Table are to relocate provisions describing the application of the Energy Code and, in doing so, to reflect changes occurring later in the document that relocate provisions applicable to multifamily buildings (inclusive of low-rise and high-rise multifamily buildings) into their own subsections. These edits include removing references to “high-rise residential” where no longer applicable, replacing low-rise residential” with “single-family,” and updating references to include the new sections of the Energy Code relating to multifamily buildings (sections 160, 170, and 180 inclusive) consistent with the relocation.
100.0, Table 100.0-A	The changes to this table are to separate multifamily from the nonresidential and single-family building categories, and to add the new electric-ready sections to this table. Additionally, existing section references were updated to account for any change in section numbering resulting from additional changes to the Energy Code.
Updates, additions and deletions for various ANSI, AHRI, AMCA, ASSP, ASME, ASHRAE, ASTM, CIT-ATC, HVI, and other References	These changes are generally either updated to the most recent version of test references, additions of new references, or deletions of outdated references replaced with new testing standards.
100.1(b), New Definition Central Fan Ventilation Cooling System, or CFVCS	Ducting arrangement including outside air ducts, motorized dampers, and an automatic control system that allows a residential space conditioning system central fan and ducts to distribute outside air throughout a residential dwelling unit, intending to reduce or eliminate the need for mechanical cooling.
100.1(b), New Definition Dedicated Outdoor Air System (DOAS)	A ventilation system which delivers 100 percent outdoor air and delivers ventilation supply air to each space, either directly or in conjunction with local or central space-conditioning systems serving those same spaces such as a DX-DOAS, heat recovery ventilation (HRV), energy recovery ventilation (ERV), or custom ventilation only units.
100.1(b), New Definition Duct Wall Penetrations	Openings to the duct wall made by pipes, holes, conduit, tie rods, or wires.
100.1(b), New Definition Dwelling Unit, Attached	This is a dwelling unit that shares a common wall or common floor/ceiling with another dwelling unit.

Section	Description of Change
100.1(b), New Definition Dx-Dedicated Outdoor Air System Units (DX-DOAS)	A type of air-cooled, water-cooled, or water-source dedicated outdoor air system (DOAS) unit that dehumidifies 100 percent outdoor air and includes reheat that is capable of controlling the supply dry-bulb temperature of the dehumidified air to the designed supply air temperature. This conditioned outdoor air is then delivered directly or indirectly to the conditioned spaces. It may precondition outdoor air by containing an enthalpy wheel, sensible wheel, desiccant wheel, plate heat exchanger, heat pipes, or other heat or mass transfer apparatus.
100.1(b), New Definition Economizer, Pumped Refrigerant	A system by which the supply air of a cooling system is cooled directly by refrigerant pumped between indoor and outdoor units during cooler ambient temperatures in order to reduce or eliminate the need for mechanical cooling.
100.1(b), New Definition Enthalpy Recovery Ratio (ERR)	A ratio of the change in enthalpy of the outdoor air supply to the difference in enthalpy between the entering supply airflow and the entering exhaust airflow, with no adjustment to account for that portion of the psychometric change in the leaving supply airflow that is the result of leakage of entering exhaust airflow rather than exchange of heat or moisture between the airstreams.
100.1(b), New Definition Terms regarding fan installations	Including all of the following: Fan Arrays, Embedded Fans, Fan Energy Index (FEI), Fan Electrical Input Power (Fan kW-design), Fan Nameplate Electrical Input Power (kW), Fan System, Complex Fan System, Fan System, Exhaust / Relief, Fan System, Multi-Zone Variable Air Volume (VAV), Fan System, Return, Supply Only Fan System, Fan System, Single-Cabinet, Fan System, Transfer, Fan System Airflow, Fan System Design Conditions, and Fan System Electrical Input Power (Fan kW-design, System).
100.1(b), New Definition Heating Seasonal Performance Factor 2 (HSPF2)	The heating seasonal performance factor (HSPF) metric for residential central heat pumps effective January 1, 2023, as created by the U.S. Department of Energy “ISSUANCE 2016-11-30 Energy Conservation Program: Test Procedures for Central Air Conditioners and Heat Pumps, Final Rule.”
100.1(b), Updated Hotel/Motel	Hotel/motel will also include the following: Occupancy Group R-1, Vacation timeshare properties and hotel or motel buildings of Occupancy Group R-2, and the following types of Occupancy Group R-3: Congregate residences for transient use, Boarding houses of more than 6 guests, and Alcohol or drug abuse recovery homes of more than 6 guests.

Section	Description of Change
100.1(b), New Definition Integrated Seasonal Coefficient of Performance (ISCOP)	This is a seasonal efficiency number that is a combined value based on the formula listed in AHRI Standard 920 of the two coefficient of performance (COP) values for the heating season of a DX-DOAS unit water or air source heat pump, expressed in terms of the power input (Watts) over the power output (Watts).
100.1(b), New Definition Integrated Seasonal Moisture Removal Efficiency (ISMRE)	This is a seasonal efficiency number that is a combined value based on the formula listed in AHRI Standard 920 of the four dehumidification moisture removal efficiency (MRE) ratings required for DX-DOAS units, expressed in lb. of moisture/kWh.
100.1(b), New Definition Integrated heating, ventilation and air conditioning (HVAC)System	This is an heating, ventilation, and air conditioning (HVAC) system designed to handle both sensible and latent heat removal. Integrated HVAC systems may include, but are not limited to HVAC systems with a sensible heat ratio of 0.65 or less and the capability of providing cooling, dedicated outdoor air systems, single package air conditioners with at least one refrigerant circuit providing hot gas reheat, and stand-alone dehumidifiers modified to allow external heat rejection.
100.1(b), Modified Definitions Mechanical Cooling and Mechanical Heating	Modified to exclude systems that are solely ERV, HRV, or only use solar energy.
100.1(b), New Definition Multi-Family Buildings	Multifamily Building is any of the following: • A building of Occupancy Group R-2, other than a hotel/motel building or timeshare property, • A building of Occupancy Group R-3 that is a non-transient congregate residence, other than boarding houses of more than 6 guests and alcohol or drug abuse recovery homes of more than 6 guests, or • A building of Occupancy Group R-4.
100.1(b), New Definition Net Sensible Coefficient of Performance (COP)	This is defined by AHRI 1360 and includes all indoor unit power and air-cooled condenser/condensing unit power for air-cooled units and includes all indoor unit power and the power allowance for pump and heat rejection as described in the Heat Rejection/Cooling Fluid Standard Rating Conditions table of AHRI 1360 for water, glycol, and chilled water units.

Section	Description of Change
100.1(b), definition of “Occupant Sensing Controls” (was Occupant Sensor)	This change updates the definitions (including Motion Sensor; Occupant Sensor; Partial-ON Occupant or Motion Sensor; Partial-OFF Occupant or Motion Sensor; Vacancy Sensor) with a change of phrase from “sensor” to “sensing control” to the terms of definition. These changes are to align with the use of the term in section 130.1(c) of Automatic Shutoff Controls, and the revised terms more accurately reflects of their characters as lighting controls.
100.1(b), definition of “One-to-One Alteration” (new)	This change adds the definition to provide clear and specific definitions for technical terms used within other updates to Part 6, aligned with the use of the term where it is proposed to occur later in the Energy Code.
100.1(b), definition of “Radiant Power”	This change revises the definition to provide clear and specific definitions for technical terms used within other updates to Part 6, aligned with the use of the term where it is proposed to occur later in the Energy Code.
100.1(b), definition of “Multifamily Building” (new)	This change adds the definition to provide clear and specific definitions for technical terms used within other updates to Part 6, aligned with the use of the term where it is proposed to occur later in the Energy Code.
100.1(b), definition of “Museum Building” (Nonresidential Building Occupancy Types) (new)	This change adds the definition to provide clear and specific definitions for technical terms used within other updates to Part 6, aligned with the use of the term where it is proposed to occur later in the Energy Code.
100.1(b), definition of “Barber, Beauty Salon, Spa Area” (was Beauty Salon Area)	This change updates the name of the nonresidential function areas to include barber and spa areas for the nonresidential function area definition.
100.1(b), definition of “Lobby, Main Entry” (was Main Entry Lobby)	This change reorders the name of the nonresidential function areas with “Lobby” as the preceding term for the nonresidential function area definition.
100.1(b), definition of “Laboratory, Scientific Area” (was Scientific Laboratory Area)	This change reorders the name of the nonresidential function areas with “Laboratory” as the preceding term for the nonresidential function area definition.

Section	Description of Change
100.1(b), definition of “Manufacturing, Commercial and Industrial Area” (was Commercial and Industrial Manufacturing Area)	This change reorders the name of the nonresidential function areas with “Manufacturing” as the preceding term for the nonresidential function area definition.
100.1(b), definition of “Storage, Commercial and Industrial Area” (was Commercial and Industrial Storage Area)	This change reorders the name of the nonresidential function areas with “Storage” as the preceding term for the nonresidential function area definition.
100.1(b), definition of “Parking Zone and Ramps” (was Parking Zone and Dedicated Ramps)	This change revises the definitions to combine both definitions for parking zone and dedicated ramps as one definition for “Parking Zone and Ramps.”
100.1(b), definition of “Dedicated Ramps” (removed)	This change removes the definition to provide clear and specific definitions for technical terms used within other updates to Part 6, aligned with the use of the term where it is proposed to occur later in the Energy Code, and to remove obsolete terms, removing unnecessary complexity.
100.1(b), definition of “Overhang Projection” (removed)	This change removes the definition to provide clear and specific definitions for technical terms used within other updates to Part 6, aligned with the use of the term where it is proposed to occur later in the Energy Code, and to remove obsolete terms, removing unnecessary complexity.
100.1(b), definition of “Overhang Rise” (removed)	This change removes the definition to provide clear and specific definitions for technical terms used within other updates to Part 6, aligned with the use of the term where it is proposed to occur later in the Energy Code, and to remove obsolete terms, removing unnecessary complexity.
100.1(b), New Definition Sensible Energy Recovery Ratio	This is a ratio of the change in the dry-bulb temperature of the outdoor air supply to the difference in dry-bulb temperature between the outdoor air and entering exhaust airflow, with no adjustment to account for that portion of the dry-bulb temperature change in the leaving supply airflow that is the result of leakage of entering exhaust airflow rather than heat exchange between the airstreams.

Section	Description of Change
110.2(e)	Remove the word “circuit” were used in reference to cooling towers as unneeded, and to state “open and closed cooling towers” in the Exception to section 110.2(e) for consistency. Existing language defines the terms “open cooling tower” and “closed-circuit cooling tower;” the purpose in changing these terms is to standardize around one method of phrasing for consistency across terms (i.e., either including the word “circuit” for both open and closed systems, or discarding it for both). The proposed change opts to discard the word “circuit” for simplicity.
Tables 110.2-A through N	Update minimum standards to accurately reflect updated federal appliance standards applicable to associated equipment, and to identify the test standard applicable to closed-circuit cooling towers consistent with the other entries in these tables.
110.12, 110.12 (a)	More clearly states the scope of application of the overall section and to state the communication requirements applicable more clearly to demand responsive controls. The term “hard-wiring” in particular was observed to be a common source of confusion and is adequately covered by “other bi-directional communication pathway.” These changes are understood to be non-substantive.
120.1(b)	Removes reference to high-rise residential (now labeled multifamily buildings), such that the requirements of this section and its subsections now only apply to nonresidential, hotel/motel buildings. This is a non-substantive change: multifamily requirements are being relocated into new sections 160, 170, and 180. (Any substantive changes made to multifamily requirements are described in the statements for those new sections.)
120.1(c)	More completely references its subsections and to clarify their interaction. This change is not a substantive change, though substantive changes have been made to subsections (c)1 and (c)3 (described below).
120.1(c)1	Clarifies the requirements for air filters by use of language consistent with language previously in section 120.1(b)1A instead of referencing said language, to clarify the expected locations of air filters within space conditioning systems, and to require sealing around filters.
120.1(c)1D	Clarify and reword the language for sealing of air filter racks and grills to prevent air from bypassing the filter.
120.1(c)3	Better align this section’s provisions with section 1004 of the California Building Code and remove potential conflict between code requirements.

Section	Description of Change
120.1(d)5	• Remove reliance on reference to a later section by instead directly stating where these controls are required. • Clarify the expected interaction between ventilation devices and occupancy sensors installed to also provide lighting control functions. • Allow occupancy sensing controls to delay reporting "unoccupied" for up to 20 minutes to prevent false or temporary readings from overly affecting controlled equipment behavior. • To provide an additional five minutes from receipt of that signal for ventilation equipment to be staged up or down as appropriate. • Replace "occupancy" with "occupant sensor." • Revise the term "air conditioning" to "space conditioning." • Revise and add the reference to subsections of section 130.1(c)5, 6, and 7 which are specifically about and for occupant sensing controls in both the ventilation sections and the lighting sections.
120.1(d)5A	Revise the text "within 20 minutes" to "in 20 minutes or less."
120.1(d)5F and 120.1(d)5G	Revise the text "Within 5 minutes" to "In 5 minutes or less" and to add clarification about the system outside air rate required for the zone after entering occupied-standby mode - as provided by the ventilation system serving the zone.
120.1 and Table 120.1-A	Remove the reference to note G for office buildings breakrooms and note H for retail sales in Table 120.1-A as these footnotes are not defined for this table. Additionally, formatting edits were made to properly align information in Table 120.1-A.
Tables 120.1-A	Clarify that the outdoor air rate is the total outdoor airflow rate and that the demand control ventilation (DCV) ventilation rates are minimum values.
120.1(h)	Ventilation Only Mechanical Systems. HVAC Systems without mechanical cooling or mechanical heating shall meet the requirements of section 120.2(f).
120.2(e)3	Revise functionality requirements for the occupant sensor zone controls to align with the ventilation requirements of section 120.1 and the occupant sensor ventilation controls devices requirements of section 120.1(d)5, and to clarify and simplify language regarding occupancy sensing zone controls.
120.2(e)3	Replace the text "occupancy" with "occupant" in the term "occupant sensing zone controls."
120.2(i)	Expands Economizer and Economizer Fault Detection (FDD) and Diagnostic requirements to include mechanical cooling capacities greater than 33,000 Btu/hr.

Section	Description of Change
120.4	Removes reference to high-rise residential (now labeled multifamily buildings), such that the requirements of this section and its subsections now only apply to nonresidential, hotel/motel buildings and to include a reference to the newly added section 120.4(g). This is a non-substantive change: multifamily requirements are being relocated into new sections 160, 170, and 180. (Any substantive changes made to multifamily requirements are described in the statements for those new sections.)
120.4(b)	Specify Seal Class A construction for all ductwork and plenums with pressure class ratings for factory-fabricated and field-fabricated duct systems while allowing some flexibility for ducts in condition spaces that are in view.
120.4(b)1D and 120.4(b)2D	Add reference to the specific level of sealing required by the California Mechanical Code and the underlying ASHRAE 90.1 standard, as context for the prohibition on use of certain types of duct tapes.
120.4(g)	• Make the prescriptive section 140.4(l) a mandatory requirement by moving this language to section120.4(g), and updating references to section 140.4(l) present in section 120.5(a) to refer to this new location. • Include California Mechanical Code section 603.10.1 duct testing for systems that do not fall under section 120.4(g)1 which took effect January 1, 2020. • Simplify code language and follow existing formatting. NA7.5.3 references NA 1 and NA2 and referencing NA7.5.3 will simplify the language.
120.5	• Remove reference to high-rise residential (now labeled multifamily buildings), such that the requirements of this section and its subsections now only apply to nonresidential, hotel/motel buildings. This is a non-substantive change: multifamily requirements are being relocated into new sections 160, 170, and 180. (Any substantive changes made to multifamily requirements are described in the statements for those new sections.) • Changes to the Authority and Reference citations is to correct the statement for this section to match those of the preceding and following sections. This is not a substantive change in requirements.
120.5(a)	Duct sealing requirements in section 140.4(l) have been moved to section 120.4(g) as a mandatory requirement (see section 120.4(g)). This section now refers to sections 120.4(g) and 141.0(b)2D. The addition of sections 120.4(g)1 and 141.0(b)2D clarify the requirements for which NA7.5.3 is required. (See also sections 140.4(l), 141.0(b), 120.4(g), NA 1.1, NA 2.1, and NA7.)

Section	Description of Change
120.5(a)3	Further specify the requirements of which duct systems are subject to duct testing by pointing to the specific subsections.
120.10 and 141.0(b)1D	Add new mandatory requirements of FEI for fan and fan arrays for new construction and for additions and alterations when a new fan system is installed. FEI is an analysis of fan power draw that accounts for more aspects of overall fan system design (i.e., more of the context into which a fan is installed) than the watts-per-cubic feet per minute (CFM) of a given fan taken in isolation. (See https://www.amca.org/assets/resources/public/documents/Introducing-%20the%20Fan%20Energy%20Index%20Metric.pdf for a useful description of the metric provided at a layperson level.) The use of this approach is intended to both provide additional flexibility in achieving efficient performance on a holistic basis, as well as prevent designs that create avoidable inefficiencies that are invisible under an approach that looks exclusively at rated fan performance values.
140.4(a)2 New requirement	Single Zone Space Conditioning System Type. Sets requirements for single zone space conditioning systems with direct expansion cooling with rated cooling capacity 240,000 Btu/hr or less serving specific spaces.
140.4(c)	Change the requirements for fan systems and to expand the requirements to >= 1kW replacing the existing “Fan Power Limits” using look up tables, and to define the types of power allowances per fan system types and components. This will also apply to additions and alterations with additional power allowances. These changes include equations to determine compliance with the new Fan Power Budget, and tables that feed into those equations. (See also Table 140.4-A, Table 140.4B, Table 140.4-C, Table 140.4-D, Table 141.0-D, and section 141.0(b)2C.)
140.4(c)1A New requirement	Requirements for calculating the Fan Power Budget.
140.4(c)1B New requirement	Change the midlife filter pressure drop to two times the clean filter pressure drops for calculation of fan input power.
Equation 140.4-A	Change the requirements for fan systems using look up tables and Equation 140.4-A to define the types of power allowances per fan system types and components. This will also apply to additions and alterations with additional power allowances. (See also Table 140.4-A, Table 140.4B, Table 140.4-C, Table 140.4-D, Table 141.0-D, and section 141.0(b)2C.)

Section	Description of Change
Table 140.4-A, Table 140.4-B, Table 140.4-C, and Table 140.4-D	Include turndown credit for single zone variable air volume fan systems, change the midlife filter pressure drop to two times the clean filter pressure drops, revise sensible only cooling power allowance back to the 2019 version as “coil runaround loop,” move the Economizer Return Damper allowance from Table 140.4-B to Table 140.4-A, clarify “Return and/ or exhaust airflow control devices,” and to reorder the headings and subsequent values from least to greatest. Note that footnote 1 in the top row, furthermost right column (“All Other Fan Systems >10,000 cfm”) is deleted as not relating to that specific column or header. This corrects a typographical clerical error.
Table 140.4-A and Table 140.4-B	Change the requirements for fan systems and to expand the requirements to >= 1kW, replacing the existing “Fan Power Limits” by using these four new lookup tables, which replace the prior Table 140.4-A, and by defining the types of power allowances per fan system types and components. These new requirements will apply to new construction and to additions and alterations, with additional power allowances. These new tables provide input values for Equation 140.4-A to determine the Fan Power Limit. (See also section 140.4(c), Table 141.0-D, and section 141.0(b).)
140.4(c) Exception deleted	Systems serving healthcare facilities are no longer excepted from the requirements of 140.4(c).
140.4(d)	Simplify code language by removing the 20 percent of the peak primary airflow option.
140.4(e)	Expand Economizer requirements to include mechanical cooling capacities greater than 33,000 Btu/hr. The changes to exception 6 amend existing requirements of dedicated outdoor air systems to point towards new requirements in section 140.4(p). This exception excludes economizers requirements for specific dedicated outdoor air system types that are working in conjunction with cooling capacities less than 54,000 Btu/hr. (See also sections 120.2(i)), and JA 6.3.)
Exception 6 to section 140.4(e)1	Specify dedicated outdoor air systems that fulfill the new requirements of sections 140.4(p)1B and 140.4(p)2 through 140.4(p)6 that are working in conjunction with cooling capacities less than 54,000 Btu/hr.
Exception 7 to section 140.4(e)1	Reduce the threshold for system sizes where economizing is required, replace the exception for outdoor air systems with an exception for dedicated ventilation systems, to add an exception to account for controlled environment horticulture spaces where use of an economizer would compromise the ability to control the gas mix of indoor air, and to correct section numbering in subsection 2E.

Section	Description of Change
Table 140.4-F	Revise the text to align with ASHRAE 90.1.
140.4(k)8	Add new requirements for high-capacity space heating gas boiler systems for climate zone 1 through 6, 9 through 14, and 16.
140.4(l)	• Make the prescriptive section 140.4(l) a mandatory requirement by moving this language to subsection 120.4(g). • Update references to subsection 140.4(l) present in subsection 120.5(a) to refer to this new location.
140.4(p)	Clarify the requirements of DOAS for the different configurations and to simplify code language by moving requirements related to economizing to the economizer section in Exception 6 to 140.4(e).
140.4(q) and Tables 140.4-J and 140.4-K New requirement Exhaust Air Heat Recovery	Fan systems designed to operate to the criteria listed in either Table 140.4-GJ or Table 140.4-HK shall include an exhaust air heat recovery system meeting the requirements listed.
141.0	This change removes reference to high-rise residential (now labeled multifamily buildings), such that the requirements of this section and its subsections now only apply to nonresidential, hotel/motel buildings. Multifamily requirements are being relocated into new sections 160, 170, and 180. Additionally, a note has been added concerning the relocation or moving of a relocatable public school building stating that it is not, by itself, considered an alteration for the purposes of Title 24, Part 6.
141.0(a) Exception 7	Add an exception to the prescriptive space conditioning system type requirements of section 140.4(a)2.
141.0(b)	This change removes multifamily “high-rise residential” from the scope of this requirement.
141.0(b)1D	Incorporate reference to new mandatory fan energy requirements and apply them to alteration projects that add new fan systems.
Table 141.0-D	Change the requirements for fan systems and expand the requirements to >= 1kW replacing the existing “Fan Power Limits” using look up tables, and to define the types of power allowances per fan system types and components. This will also apply to additions and alterations with additional power allowances. (See also sections 140.4(c) and 141.0(b)2C, Table 140.4-A, Table 140.4-B, Table 140.4-C, Table 140.4-D, and Table 141.0-D.)

Section	Description of Change
141.0, Table 141.0-F	The changes to Table 141.0-F clarify applicability by replacing “and” with “or” and update section references consistent with changes made elsewhere in the Energy Code (e.g., moving the demand response provisions to section 110.12). The added language also specifies that the new occupant sensing control requirement added to section 130.1(c)6D are not intended to apply to alterations meeting specified requirements.
141.0(b)2C	Replace additional fan power credits based on pressure drop with more general and direct fan power allowances, and to associate the allowances with fan and system types rather than filtration types. In addition, new exceptions are provided that prevent newly proposed standards in sections 140.4(a)2, 140.4(e), and 140.4(k)8 from applying to alterations.
141.0(b)2Di and 141.0(b)2Dii	Clarify and simplify language. Changing the reference to NA7.5.3 simplifies language because this section references NA 1 and NA 2.
141.0(b)2N	Prevent proposed standards applicable to large water heater systems in newly constructed buildings from applying to alterations.
Table 141.0-D	Replace additional fan power credits based on pressure drop with more general and direct fan power allowances, and to associate the allowances with fan and system types rather than filtration types.
141.0(b)2D Altered Duct Systems.	Primarily these are nonsubstantive changes to be more consistent with other sections within the Energy Code.

Section	Description of Change
160.0 through 180.4	Relocate requirements applicable to multifamily buildings to one area of the Energy Code, and merge requirements were cost effective and technically feasible. The mandatory requirements for multifamily buildings have been relocated to the newly created Subchapter 10, sections 160.0 through 160.9. The performance and prescriptive requirements for multifamily buildings have been relocated to the newly created Subchapter 11, sections 170.0 through 170.2. The requirements for additions and alterations to multifamily buildings have been relocated to the newly created Subchapter 12, sections 180.0 through 180.4. Most of this relocation is non-substantive, though note that substantive changes proposed for residential and/or nonresidential building standards in sections 120 through 150.2 are duplicated here where applicable, for consistency as well as for the reasons stated in the statements for changes made to those sections. Additional substantive changes have been made where feasible to create consistency across the former categories of low-rise and high-rise buildings, i.e., buildings with three or fewer habitable / residential stories and those with four or more (respectively). Specific changes requiring additional detail are described below.
160.2(b)1Bv	Clarify and reword the language for sealing of air filter racks and grills to prevent air from bypassing the filter.
160.2(b)2Aivb	Clarify that this section applies to whole-dwelling unit ventilation systems.
160.2(b)2Bi	Add a new requirement for balanced ventilation systems that serve multifamily dwelling units for fan efficacy. Unitary heat or energy recovery ventilators must have a fan efficacy of less than or equal to 1.0 W/cfm.
160.2(b)2D	Add a new requirement for multifamily central ventilation system duct sealing.
160.3(d)1 Common Area Required Mechanical Acceptance Testing	Sets the mandatory requirement for acceptance testing in all multifamily common areas consistent with section 120.5.
160.3(d)2 Dwelling Unit Required Mechanical Acceptance Testing	Sets the mandatory requirements for acceptance testing for dwelling units in all multifamily buildings with four or more habitable stories.

Section	Description of Change
170.2(c)	Add new prescriptive requirements for balanced ventilation systems requiring minimum sensible heat recovery efficiencies and fan efficacies for heat or energy recovery ventilators.
180.2(b)5	Mechanical ventilation and indoor air quality requirements for alterations to dwelling units in multifamily buildings.
NA1.1	Update the reference to the Energy Code where the duct leakage requirements are located, and update Table NA1-1 to include references to verifications for kitchen range hoods located in NA2.2.4.1.4, and HRV/ERV systems located in NA2.2.4.1.5.
NA1.9	ATT Alternative Procedure. This section expanded the alternative of using an ATT in place of a Home Energy Rating System (HERS) Rater (for duct leakage testing) to include all of the following HERS Tests for low-rise (and high-rise) multifamily buildings: duct sealing, dwelling unit mechanical ventilations airflow – continuous operations, dwelling unit mechanical ventilations airflow – intermittent operations, kitchen local mechanical exhaust verification, HRV/ERV rated performance verification and building envelop air leakage.
NA2.1	Update reference in NA2.1 to reference section120.4(g) instead of section140.4(l).
Table NA2.1-1	Update the summary table to reflect the titles and descriptions of the procedures.
NA2.1.4.1	Provide specific air handler airflow values for multi-split systems and small duct high velocity systems, instead of holding these systems to airflow rates applicable to packaged systems with a single indoor unit.
NA2.1.4.2, Table NA2.1-1	Remove a column that redundantly states a standards value applied by the Energy Code.
NA2.2.1, Table NA2.2-1	Improve consistency in phrasing, remove unneeded reference to ASHRAE 62.2, and add two rows to the table consistent with the addition of specified procedures to NA2.2.4 (described below).
NA2.2.4	Add Heat Recovery Efficiency as a new verification metric for HRV and ERV system types in section NA2.2.4.1.5, incorporate into the NA2.2.4.1.4 kitchen range hood verification the specification for use of capture efficiency as an alternative for compliance in addition to airflow rate, clarify the specification of existing HERS verification procedures for verification of indoor air quality (IAQ) ventilation systems, and clarify that compliance with the kitchen local mechanical exhaust vented range hood protocol may be determined by use of ratings published in CEC-approved directories and the Association of Home Appliance Manufacturers (AHAM) directory in addition to the Home Ventilating Institute (HVI) directory.

Section	Description of Change
NA2.2.4.1.3	Add language that includes ventilation airflow of systems with multiple operating modes.
NA2.2.4.1.5	Add language on how to determine compliance with fan efficacy and sensible recovery efficiency requirements. Note that there is also a nonsubstantive change to replace the second instance of "Power Consumed" with "Fan Efficacy (W/cfm)." This is a typographical clerical error that renders the sentence and section nonsensical and therefore could lead to confusion if not corrected.
NA2.3.5	Delete the field verification and diagnostic testing of whole building air leakage from NA2. This language was moved to NA5.
NA2.4	Describe a field verification and diagnostic test procedure for testing whole building air leakage. The Energy Code does not require performance of this test.
NA7	Include new functional testing for duct leakage in NA7 Include California Mechanical Code language for duct leakage testing in NA7f. Include eligible criteria of whom can perform testing NA7.
NA7.5.3.2	Minor correction to Energy Code reference.
NA7.5.4	Include appropriate acceptance testing of heat recovery bypassing HRV/ERV or DOAS systems (see also sections 140.4(e), and 140.4(p)).
NA7.5.17	Minor changes to construction inspection and functional testing procedures for clarity.
NA7.18.1	Delete the language that specifies a "fixed minimum" outside airflow must be verified and documented prior to performing the test, which is incorrect, and could lead to confusion. References were changed from section 120 to section 160. Additionally, the Energy Code now requires that ATTs perform the dwelling unit ventilation acceptance.
NA7.18.2	References were changed from section 120 to section 160. Additionally, the Energy Code now requires that ATTs perform the dwelling unit envelope enclosure leakage acceptance.
NA7.18.3	This is a new acceptance test for central ventilation system duct leakage that ATTs are required to perform.
NA7.18.4	This is a new acceptance test for rated central ventilation system heat recovery or energy recovery that ATTs are required to perform.

All of the certificate of acceptance for mechanical installations (NRCA-MCH compliance documents) were updated to Americans with Disabilities Act requirements for accessibility. This includes removing all merged cells and standardizing table formatting and numbering. In addition to those changes the following forms have been modified to demonstrate compliance with the 2022 Energy Code requirements.

Table 3: 2022 Acceptance Test Compliance Document Changes

Mechanical Acceptance Compliance Document	Summary of Modifications
NRCA-MCH-02-A	No other significant changes.
NRCA-MCH-03-A	Substantive changes consistent with 2022 Energy Code requirements.
NRCA-MCH-04-A	Substantive changes consistent with 2022 Energy Code requirements.
NRCA-MCH-05-A	Substantive changes consistent with 2022 Energy Code requirements.
NRCA-MCH-06-A	Substantive changes consistent with 2022 Energy Code requirements.
NRCA-MCH-07-A	No other significant changes.
NRCA-MCH-08-A	No other significant changes.
NRCA-MCH-09-A	No other significant changes.
NRCA-MCH-10-A	No other significant changes.
NRCA-MCH-11-A	No other significant changes.
NRCA-MCH-12-A	No other significant changes.
NRCA-MCH-13-A	No other significant changes.
NRCA-MCH-14-A	No other significant changes.
NRCA-MCH-15-A	No other significant changes.
NRCA-MCH-16-A	No other significant changes.
NRCA-MCH-17-A	No other significant changes.
NRCA-MCH-18-A	No other significant changes.
NRCA-MCH-19-A	Substantive changes consistent with 2022 Energy Code requirements.
NRCA-MCH-20a-A	Substantive changes consistent with 2022 Energy Code requirements.
NRCA-MCH-20b-A	Substantive changes consistent with 2022 Energy Code requirements.
NRCA-MCH-20c-A	Substantive changes consistent with 2022 Energy Code requirements.
NRCA-MCH-20d-A	Substantive changes consistent with 2022 Energy Code requirements.
NRCA-MCH-21-A	No other significant changes.
NRCA-MCH-22-A	New acceptance test consistent with 2022 Energy Code Requirements.
NRCA-MCH-23-A	No other significant changes.