Acceptance Testing and the 2013 Energy Standards

Christopher Olvera
California Energy Commission
Outreach and Education Unit

ICC Orange Empire Chapter Meeting
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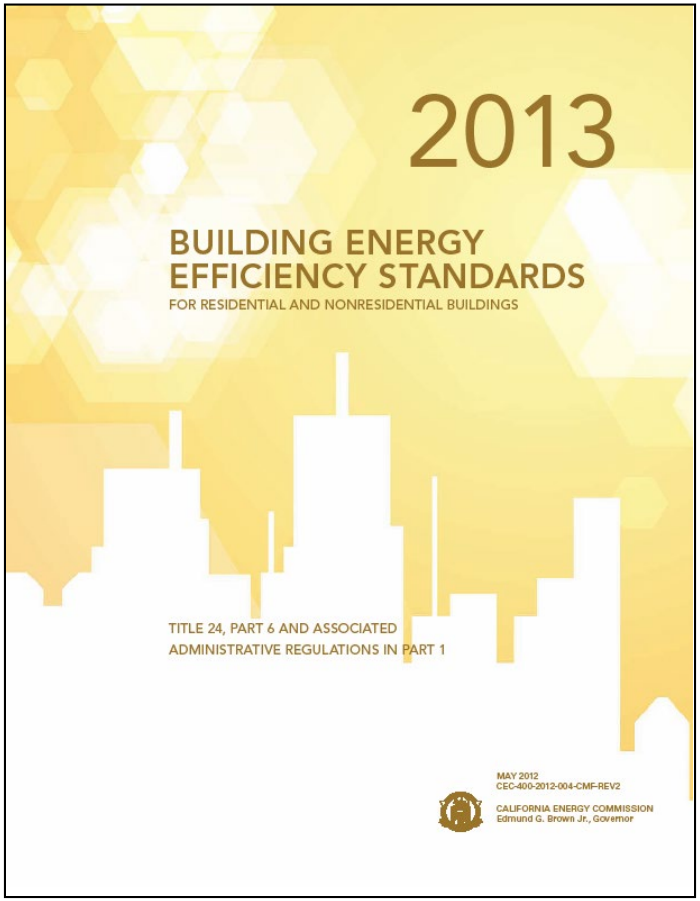
A Little CEC History

- Section 25402 of the Public Resources Code (known as the **Warren Alquist Act**)
- The act created the Energy Commission in 1974 and gave it authority to develop and maintain Building Energy Efficiency Standards
- Requires the Standards and new requirements to be cost effective over the economic life of the structure
- Requires the Energy Commission to update the Standards periodically (about every 3 years)

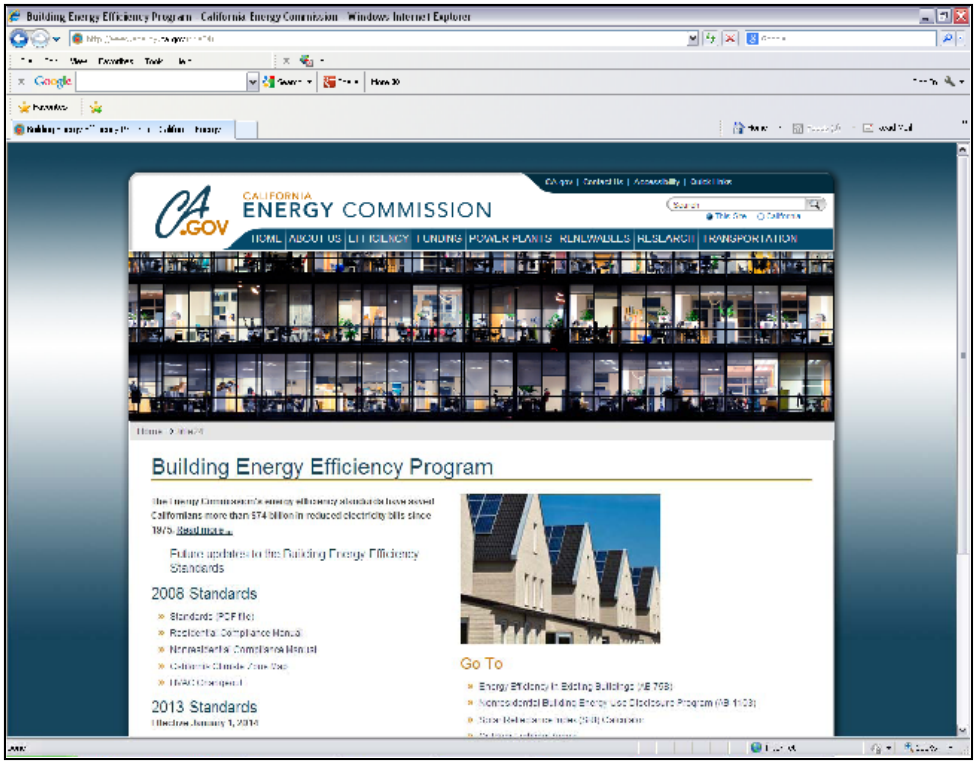
Let's discuss the 2013 Building Energy Efficiency Standards

2013 Building Energy Efficiency Standards

- **Effective on July 1, 2014**
  - Building permit applications submitted on or after this date
- **Larger projects in plan review may be affected:**
  - Need to resubmit if permits pulled on/after effective date



2013 Documents



- Building Energy Efficiency Standards
- Nonresidential Compliance Manual
- Reference Appendices
- All docs. available online at:

  www.energy.ca.gov/title24

What the future holds

- AB 32 – Reduce carbon footprint
- CPUC/CEC Strategic Plan:
  - Net-zero energy use for residential buildings by 2020
  - Net-zero energy use for nonresidential buildings by 2030
- Energy Standards will "evolve/expand" and become more stringent to reach these goals

Let's talk about Acceptance Testing

What is acceptance testing?

- Introduced in the 2005 Energy Standards
- Tests performed to ensure that equipment, systems and controls operate as required by the Standards
  - Visual inspection
  - Certification requirements
  - Functional testing

When is acceptance testing required?

- **All tests are mandatory requirements**
- **Specified on NRCC at permit, results reported on NRCA at Final Inspection**
- **Apply to newly installed and retrofit:**
  - HVAC systems and controls
  - Indoor/Outdoor lighting systems and controls
  - Site-built fenestration
  - Covered Processes

Who can perform acceptance testing?

- **Conducted by field technician:**
  - Builder/contractor
  - Engineer
  - Commissioning agent
  - NOTE: License not required
- **For 2013 Standards, certification by ATTCP required for:**
  - HVAC systems and controls
  - Indoor/Outdoor lighting systems and controls

Who/What is an ATTCP?

- **Acceptance Test Technician Certification Provider (ATTCP) §10-103-A and §10-103-B**
- **Responsible for training, certifying, and overseeing**:
  - Field technicians (acceptance test technician)
  - Employers (contractor)
  - HVAC and indoor/outdoor lighting only
- **Certification required when industry thresholds are satisfied**

Have any ATTCPs been approved?

- **Mechanical ATTCPs**
  - NEMIC (replaced TABB)
  - NEBB (interim approved)
- **Lighting ATTCPs**
  - CALCTP
  - NLCAA
- **More information at:**
  - http://www.energy.ca.gov/title24/attcp/

Have the industry thresholds been met?

- **No for Mechanical ATTCPs**
  - This means the builder, contractor, commissioning agent, etc. can perform testing at this time
  - No certification required
  - NEMIC and NEBB in the process of statisfying thresholds
- **YES for Lighting ATTCPs**
  - Field technician and employers performing acceptance testing must be certified by CALCTP or NLCAA now

Let's discuss the Mechanical Acceptance Testing requirements

MECH Acceptance Testing

2008 – §125

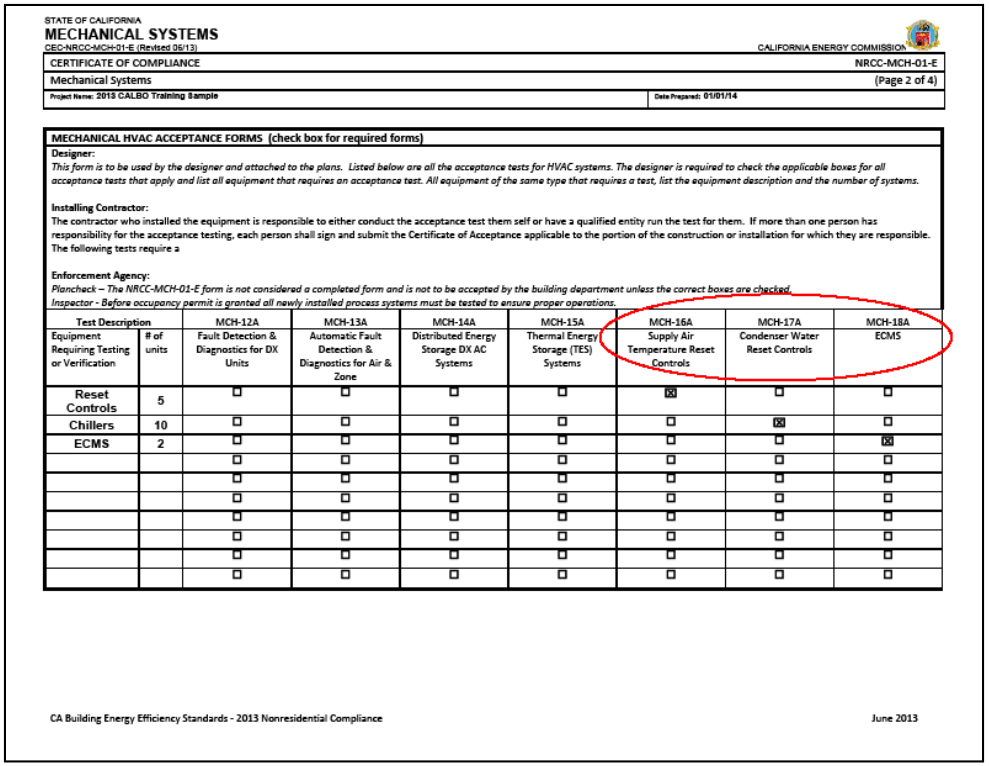
- Testing mandatory if equip. installed for:
  - Outdoor air ventilation
  - Air economizers
  - Demand controls vent.
  - Supply fan variable flow cont.
  - Thermal energy storage
- Indentified as "MECH-A"

2013 – *§120.5*

- New tests added for:
  - Supply air temp. reset cont.
  - Water cooled chillers w/condenser reset controls
  - EMCS
- Identified as "NRCA-MCH"
- Must be performed by Certified Mechanical Acceptance Test Technician (CMATT)

§120.5 and the Plans Examiner

- **Verify required Acceptance Tests on NRCC-MCH-01**
  - NRCA-MCH-16A (supply air reset)
  - NRCA-MCH-17A (chiller condenser reset)
  - NRCA-MCH-18A (ECMS)
- **Form must be incorporated onto plans**



STATE OF CALIFORNIA
MECHANICAL SYSTEMS
CEC-NRCC-MCH-01-E (Revised 06/13)
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE — NRCC-MCH-01-E
Mechanical Systems — (Page 2 of 4)
Project Name: 2013 CALBO Training Sample — Date Prepared: 01/01/14

MECHANICAL HVAC ACCEPTANCE FORMS (check box for required forms)

Designer:
This form is to be used by the designer and attached to the plans. Listed below are all the acceptance tests for HVAC systems. The designer is required to check the applicable boxes for all acceptance tests that apply and list all equipment that requires an acceptance test. All equipment of the same type that requires a test, list the equipment description and the number of systems.

Installing Contractor:
The contractor who installed the equipment is responsible to either conduct the acceptance test them self or have a qualified entity run the test for them. If more than one person has responsibility for the acceptance testing, each person shall sign and submit the Certificate of Acceptance applicable to the portion of the construction or installation for which they are responsible. The following tests require a

Enforcement Agency:
Plancheck – The NRCC-MCH-01-E form is not considered a completed form and is not to be accepted by the building department unless the correct boxes are checked.
Inspector - Before occupancy permit is granted all newly installed process systems must be tested to ensure proper operations.

Test Description: Equipment Requiring Testing or Verification	# of units	MCH-12A Fault Detection & Diagnostics for DX Units	MCH-13A Automatic Fault Detection & Diagnostics for Air & Zone	MCH-14A Distributed Energy Storage DX AC Systems	MCH-15A Thermal Energy Storage (TES) Systems	MCH-16A Supply Air Temperature Reset Controls	MCH-17A Condenser Water Reset Controls	MCH-18A ECMS
Reset Controls	5	☐	☐	☐	☐	☒	☐	☐
Chillers	10	☐	☐	☐	☐	☐	☒	☐
ECMS	2	☐	☐	☐	☐	☐	☐	☒
		☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐
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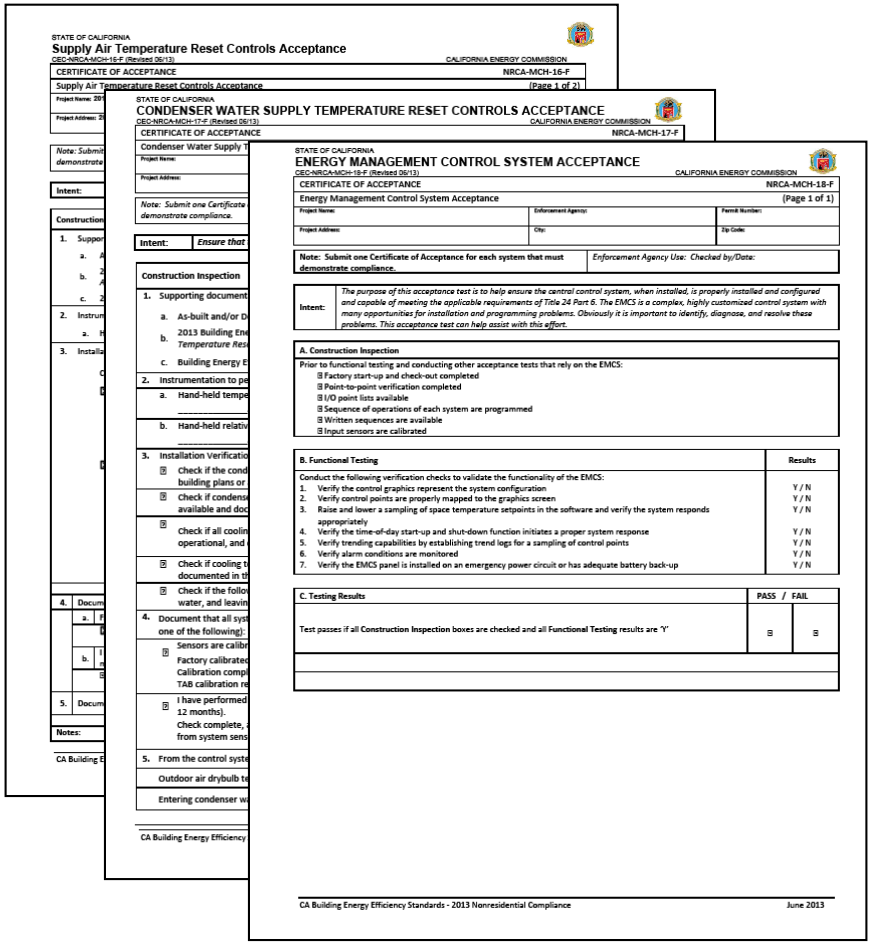
		☐	☐	☐	☐	☐	☐	☐

CA Building Energy Efficiency Standards - 2013 Nonresidential Compliance — June 2013

§120.5 and the Plans Examiner *cont.*

- **All HVAC units/controls and req. acceptance test must be verified on the NRCC-MCH-01 form**
- **Frequently req. test include:**
  - Outdoor air ventilation (NRCA-MCH-02)
  - Single zone unitary A/C and HP controls (NRCA-MCH-03)
  - Duct leakage (NRCA-MCH-04)
  - Economizer controls (NRCA-MCH-05)
  - DCV (NRCA-MCH-06)

§120.5 and the Field Inspector



STATE OF CALIFORNIA
Supply Air Temperature Reset Controls Acceptance
CEC-NRCA-MCH-16-F (Revised 06/13) CALIFORNIA ENERGY COMMISSION
CERTIFICATE OF ACCEPTANCE NRCA-MCH-16-F
Supply Air Temperature Reset Controls Acceptance (Page 1 of 2)

STATE OF CALIFORNIA
CONDENSER WATER SUPPLY TEMPERATURE RESET CONTROLS ACCEPTANCE
CEC-NRCA-MCH-17-F (Revised 06/13) CALIFORNIA ENERGY COMMISSION
CERTIFICATE OF ACCEPTANCE NRCA-MCH-17-F

STATE OF CALIFORNIA
ENERGY MANAGEMENT CONTROL SYSTEM ACCEPTANCE
CEC-NRCA-MCH-18-F (Revised 06/13) CALIFORNIA ENERGY COMMISSION
CERTIFICATE OF ACCEPTANCE NRCA-MCH-18-F
Energy Management Control System Acceptance (Page 1 of 1)

Project Name: | Enforcement Agency: | Permit Number:
Project Address: | City: | Zip Code:

Note: Submit one Certificate of Acceptance for each system that must demonstrate compliance. | Enforcement Agency Use: Checked by/Date:

Intent: *The purpose of this acceptance test is to help ensure the central control system, when installed, is properly installed and configured and capable of meeting the applicable requirements of Title 24 Part 6. The EMCS is a complex, highly customized control system with many opportunities for installation and programming problems. Obviously it is important to identify, diagnose, and resolve these problems. This acceptance test can help assist with this effort.*

A. Construction Inspection

Prior to functional testing and conducting other acceptance tests that rely on the EMCS:
- ☐ Factory start-up and check-out completed
- ☐ Point-to-point verification completed
- ☐ I/O point lists available
- ☐ Sequence of operations of each system are programmed
- ☐ Written sequences are available
- ☐ Input sensors are calibrated

B. Functional Testing	Results
Conduct the following verification checks to validate the functionality of the EMCS:	
1. Verify the control graphics represent the system configuration	Y / N
2. Verify control points are properly mapped to the graphics screen	Y / N
3. Raise and lower a sampling of space temperature setpoints in the software and verify the system responds appropriately	Y / N
4. Verify the time-of-day start-up and shut-down function initiates a proper system response	Y / N
5. Verify trending capabilities by establishing trend logs for a sampling of control points	Y / N
6. Verify alarm conditions are monitored	Y / N
7. Verify the EMCS panel is installed on an emergency power circuit or has adequate battery back-up	Y / N

C. Testing Results	PASS	FAIL
Test passes if all Construction Inspection boxes are checked and all Functional Testing results are 'Y'	☐	☐

CA Building Energy Efficiency Standards - 2013 Nonresidential Compliance June 2013

- **At Final, verify required Acceptance forms**
  - ➢ Refer to NRCC-MCH-01 form
- **Verify Acceptance testing is performed by CMATT when required**
  - ➢ Identify signature in Declaration Statement

Let's talk about the Indoor Lighting Acceptance Testing requirements

Lighting – Multi-Level

2008 – *§131(b)*

- Multi-level lighting controls req. for:
  - Enclosed spaces ≥ 100 ft^2; and
  - Have a lighting load > 0.8 W/ft^2
- One control step between 30% and 70%
- Uniform illuminance with dimmers, A/B switching, etc.

2013 – *§130.1(b)*

- Multi-level lighting controls req. for
  - Enclosed space ≥ 100 ft^2; and
  - Have a lighting load > 0.5 W/ft^2
- Control steps and uniform illuminance dependent on luminaire type
  - In accordance with TABLE 130.1-A

Lighting – Shut-OFF

2008 – *§131(d)*

- Shut-off controls req. for every floor
- Can be achieved with:
  - Occupancy sensors
  - Automatic time-switch
  - Countdown timer switch
  - Etc.

2013 – *§130.1(c)*

- Countdown time switches prohibited (some exceptions)
- Occupant sensors that shut off all lighting req. in specific areas
- Occupant sensors with partial ON/OFF controls req. in specific areas
- Captive key cards req. in hotel/motel guest rooms

Lighting – Acceptance/Installation Cert.

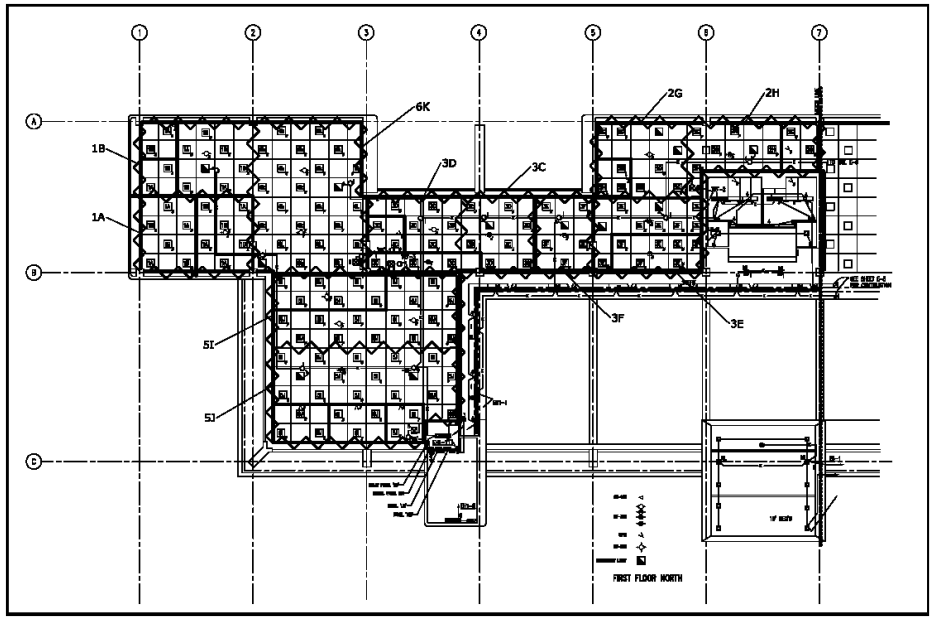
2008 – *§134*

- Testing mandatory if controls/systems installed for:
  - Multi-level controls
  - Shut-off controls
  - Daylighting controls
  - Automatic daylighting controls
- Identified as "LTG-A"

2013 – *§130.4*

- Identified as "NRCA-LTI"
  - Must be performed by Certified Lighting Controls Acceptance Test Technician (CLCATT)
- New Certificate(s) of Installation req.
  - Identified as "NRCI-LTI"
  - Completed by installing contractor

§130.1, §130.4 and the Plans Examiner



- **Verify multi-level and shut-OFF controls on electrical plans:**
  - More spaces may req. multi-level controls (> 0.5 W/ft^2)
  - Many spaces will req. occupant sensors
    - All lighting
    - Partial ON/OFF
- **Verify req. Acceptance Tests on NRCC-LTI-01**

§130.1, §130.4 and the Field Inspector

- **At Final visually verify:**
  - Multi-level lighting controls installed in accordance with TABLE 130.1-A
  - Shut-OFF controls installed to comply with completely OFF, or Partial ON/OFF requirements
- **Verify req. NRCI-LTI forms**
- **Verify req. NRCA-LTI forms**
  - Must be signed my CLCATT

Let's talk about the Covered Processes Acceptance Testing requirements

Covered Processes

2008 – *§126*

- Requirements for refrigerated warehouses ≥ 3,000 ft^2:
  - Insulation (walls, roof, etc.)
  - Evaporators
  - Condensers
  - Compressors

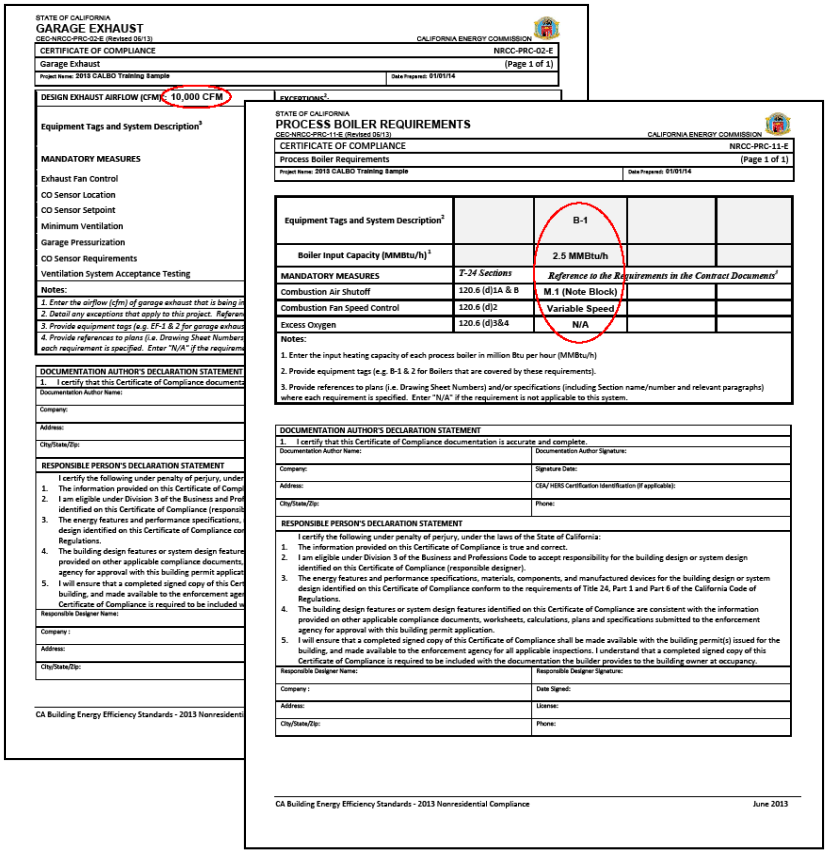
2013 – *§120.6*

- Refrigerated warehouse reqs. updated
  - Acceptance testing req.
- Covered processes added:
  - Commercial refrigeration
  - Enclosed parking garages
  - Process boilers
  - Compressed air systems

Covered Processes *cont.*

- **Commercial refrigeration reqs. in §120.6(b)**
  - Applicable to retail food stores with CFA ≥ 8,000 ft^2 that have refrigeration
- **Enclosed parking garages reqs. in §120.6(c)**
  - Applicable if total design exhaust rate ≥ 10,000 CFM
  - Acceptance testing req. for ventilation
- **Process boiler reqs. in §120.6(d)**
  - Applicability based on boiler capacity (Btu/h)
- **Compressed air system reqs. in §120.6(e)**
  - Applicable to compressors with HP ≥ 25
  - Acceptance testing req. for compressor and controls

§120.6 and the Plans Examiner



STATE OF CALIFORNIA
GARAGE EXHAUST
CEC-NRCC-PRC-02-E (Revised 06/13) CALIFORNIA ENERGY COMMISSION
CERTIFICATE OF COMPLIANCE NRCC-PRC-02-E
Garage Exhaust (Page 1 of 1)
Project Name: 2013 CALBO Training Sample Date Prepared: 01/01/14

DESIGN EXHAUST AIRFLOW (CFM): 10,000 CFM

Equipment Tags and System Description[3]

MANDATORY MEASURES
Exhaust Fan Control
CO Sensor Location
CO Sensor Setpoint
Minimum Ventilation
Garage Pressurization
CO Sensor Requirements
Ventilation System Acceptance Testing

Notes:
1. Enter the airflow (cfm) of garage exhaust that is being in
2. Detail any exceptions that apply to this project. Referen
3. Provide equipment tags (e.g. EF-1 & 2 for garage exhaus
4. Provide references to plans (i.e. Drawing Sheet Numbers
each requirement is specified. Enter "N/A" if the requirem

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT
1. I certify that this Certificate of Compliance document
Documentation Author Name:
Company:
Address:
City/State/Zip:

RESPONSIBLE PERSON'S DECLARATION STATEMENT
I certify the following under penalty of perjury, under
1. The information provided on this Certificate of Compl
2. I am eligible under Division 3 of the Business and Prof
identified on this Certificate of Compliance (responsib
3. The energy features and performance specifications,
design identified on this Certificate of Compliance cor
Regulations.
4. The building design features or system design feature
provided on other applicable compliance documents,
agency for approval with this building permit applicat
5. I will ensure that a completed signed copy of this Cert
building, and made available to the enforcement age
Certificate of Compliance is required to be included w
Responsible Designer Name:
Company :
Address:
City/State/Zip:

CA Building Energy Efficiency Standards - 2013 Nonresidenti

STATE OF CALIFORNIA
PROCESS BOILER REQUIREMENTS
CEC-NRCC-PRC-11-E (Revised 06/13) CALIFORNIA ENERGY COMMISSION
CERTIFICATE OF COMPLIANCE NRCC-PRC-11-E
Process Boiler Requirements (Page 1 of 1)
Project Name: 2013 CALBO Training Sample Date Prepared: 01/01/14

Equipment Tags and System Description[2]		B-1		
Boiler Input Capacity (MMBtu/h)[1]		2.5 MMBtu/h		
MANDATORY MEASURES	*T-24 Sections*	*Reference to the Requirements in the Contract Documents[3]*		
Combustion Air Shutoff	120.6 (d)1A & B	M.1 (Note Block)		
Combustion Fan Speed Control	120.6 (d)2	Variable Speed		
Excess Oxygen	120.6 (d)3&4	N/A		

Notes:
1. Enter the input heating capacity of each process boiler in million Btu per hour (MMBtu/h)
2. Provide equipment tags (e.g. B-1 & 2 for Boilers that are covered by these requirements).
3. Provide references to plans (i.e. Drawing Sheet Numbers) and/or specifications (including Section name/number and relevant paragraphs) where each requirement is specified. Enter "N/A" if the requirement is not applicable to this system.

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:

CA Building Energy Efficiency Standards - 2013 Nonresidential Compliance June 2013

- **Verify applicable Certificate of Compliance on plans**
  - NRCC-PRC-02 (Garages)
  - NRCC-PRC-05 (Comm. Refrig.)
  - NRCC-PRC-10 (Comp. Air Sys.)
  - NRCC-PRC-11 (Boilers)
- **Verify required Acceptance Tests on NRCC-PRC-01 and respective forms above**

§120.6 and the Field Inspector

- **Verify at Final applicable Certificate of Acceptance**
  - ➢ Refer to NRCC-PRC-01
    - NRCA-PRC-01 (Comp. Air Systems)
    - NRCA-PRC-03 (Garages)
    - NRCA-PRC-04 through -08 (Refrigerated Warehouses)

§120.6 and the Field Inspector *cont.*

- **NRCA forms req. for covered processes (refrigerated warehouses)**
  - NRCA-PRC-04 (evaporator fan motor controls)
  - NRCA-PRC-05 (evaporative condenser controls)
  - NRCA-PRC-06 (air-cooled condenser controls)
  - NRCA-PRC-07 (variable speed compressor)
  - NRCA-PRC-08 (electric resistance underslab heating)

** Acceptance testing for covered processes do not req. a CMATT*

In Summary

- Acceptance testing is required for HVAC, indoor/outdoor lighting, site-built fenestration, and covered processes
- When applicable, acceptance tests must be specified on respective NRCC form at permit
- Field technician must report results of acceptance testing on respective NRCA form at final inspection
- Field technicians performing testing for indoor/outdoor lighting must be a CLCATT
- Field technicians performing testing for HVAC will need to be CMATT when thresholds are satisfied

Nonresidential Data Registry status update

- **Effective January 1, 2015 – all nonresidential forms must be registered (§10-103)**
  - Contingent upon approval of a nonresidential data registry
- **To date, no such registry has been approved**
  - This means that registration is not required at this time
- **No application has been submitted as of yet to review**

For more information

- **2013 Standards Website at:**
  - http://www.energy.ca.gov/title24/2013standards/index.html
- **Training**
  - http://www.energy.ca.gov/title24/training/
- **List servers and Newsletter (*Blueprint*)**
  - http://www.energy.ca.gov/efficiency/listservers.html
- **Ace Web Toolkit**
  - http://www.energycodeace.com/content/home/

2016 Standards

- **Want to help forge the next set of Standards?**
  - http://www.energy.ca.gov/title24/2016standards/prerulemaking/documents/
- **Where do I submit comments?**
  - http://www.energy.ca.gov/dockets/docket_redesign.php?docketNo=14-BSTD-01.html