

BLUEPRINT

August 2009 – Number 91

EFFICIENCY AND RENEWABLE ENERGY DIVISION

NEWS FLASH...

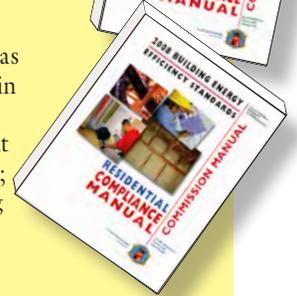
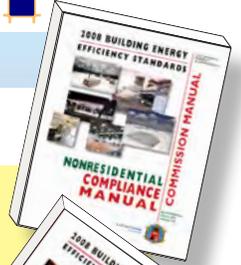
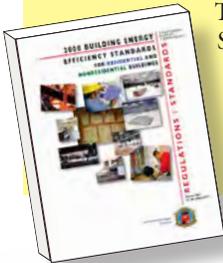
The effective date for the 2008 Building Energy Efficiency Standards (Title24, Parts 1 and 6) has been changed to January 1, 2010.

The 2008 Building Energy Efficiency Standards were adopted by the Energy Commission on April 23, 2008. The effective date was August

1, 2008; however, the Energy Commission has experienced delays in completing the public domain compliance software.

The Energy Commission had anticipated that these software programs would be available earlier; however the software required further programming attention before the programs could be released. The Energy Commission is resolving those problems and will provide the programs in the near future.

This delay provides the industry and building officials more time to prepare for the new Standards. The Energy Commission will use this additional time to provide more information for the Standards and work with the California utilities, building industry, and the California Building Officials to provide training on the new Standards.



In April the Energy Commission's Efficiency Committee determined that Shurtape Technologies' cloth back synthetic adhesive duct tape, PC 858CA, can be used to show compliance with the Standards to seal flex duct to fitting joints without being used in combination with mastic.

Shurtape PC 858CA duct tape has passed duct sealant longevity testing comparable to the testing conducted by the Lawrence Berkeley National Laboratory, in which cloth back rubber adhesive duct tapes failed. The testing of Shurtape PC 858CA followed the protocol specified in the American Society for Testing and Materials (ASTM) E2342-03, Standard Test Method for Longevity Testing of Duct Sealant Methods, with the exception that the pressure difference used in the testing was 84 pascals (Pa) to match the original testing conducted by Lawrence Berkeley National Laboratory of the cloth back rubber adhesive duct tapes. Shurtape PC 858CA

employs a combination of polymers in its synthetic adhesive to achieve enhanced performance compared with cloth back rubber adhesive tapes.

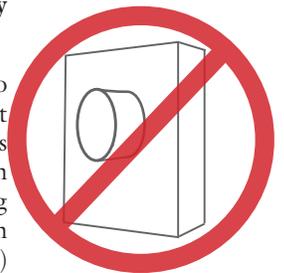
The Energy Commission has approved two cloth-backed duct tapes with special butyl or synthetic adhesives rather than rubber adhesive to seal flex duct to fittings. These tapes are:

- Polyken 558CA or Nashua 558CA, manufactured by Berry Plastics, Tapes and Coatings Division.
- Shurtape PC 858CA, manufactured by Shurtape Technologies, Inc.

These tapes can be used to seal flex duct to fittings without using mastic. These tapes cannot be used to seal other duct system joints, such as the attachment of fittings to plenums and junction boxes. These tapes have on their backing a drawing of a fitting to plenum joint in a red circle with a slash through it (the international symbol of prohibition) to illustrate where they are not allowed to be used.

Installation instructions in their packing boxes explain how to use them to attach duct core to fittings and a statement that the tapes cannot be used to seal fitting to plenum and junction box joints.

The Energy Commission wishes to thank Shurtape Technologies for recognizing the need to make improvements to the adhesive used on cloth back duct tape to meet California's requirements, for conducting the ASTM E2342-03 testing, and for developing the labels and installation instructions for Shurtape PC 858CA duct tape. These changes and labels will assist installers to make flex duct airtight to fitting attachments and building officials to verify that Shurtape PC 858CA has been properly used in compliance with the Standards.



Building On Successful Relationships

Energy Commission staff receives input from many outside groups and individuals and try to learn from your comments. We have restructured ourselves, based on many suggestions to better serve you. We welcome your ideas for improving our training, outreach and compliance assistance. We will continue to collaborate with public and private groups and individuals to increase understanding and compliance with the new 2008 Building Energy Efficiency Standards.



Outreach and Education Unit

This unit supports the development of comprehensive and audience-specific education and outreach information on the 2008 Building Energy Efficiency Standards (Standards).

Building department staff has reported having difficulty enforcing the Standards due to a lack of adequate staff training and the complicated nature of the Standards. The unit manages the Energy Commission's Hotline and is responsible for the development of information (training curriculum, training videos, handouts, flyers, the Blueprint newsletter, trade journal articles, workshops, etc.) to educate and improve local enforcement of the Standards by building department personnel and the building industry.

Staff provides clear, concise answers on energy efficiency, Standards compliance, and the Commission's roles and responsibilities.

Stay on Course with the 2008 Standards

Coming soon, the Energy Commission will launch its California Building Standards Online Learning Center. The new resource tool will help building department personnel understand and comply with the Standards. The website will provide detailed information about the Standards as well as

interactive videos, in-field video presentations, study guides, quizzes, exams, an evaluation, and a certificate of completion for those who complete the on-line courses. Courses will highlight such topics as the planchecking process, HVAC change-outs, cool roofs, lighting, Home Energy Rating System (HERS) measures, and more.

The Compliance and Enforcement Unit

The Compliance and Enforcement Unit investigates complaints and provides assistance to enforcement agencies, the public, and other energy professionals to increase compliance with the Title 24, Building Energy Efficiency Standards.

Staff members work to resolve complaints at the lowest level possible, and some investigations are done in conjunction with the Contractors State License Board (CSLB) and/or individual building departments, or outside parties.

Helping Local Building Departments Enforce the 2008 Energy Standards

The Compliance and Enforcement Unit released a clarification letter, addressed to all the building departments in the state, explaining the Third Party Quality Control Program. The letter was developed in response to an inquiry from a building official seeking information about the program. The clarification letter has been well received and has prompted additional questions on related areas to which staff is responding.

Compliance and Enforcement staff also met with the personnel from the city of Winters to provide plan review assistance for their staff on the city's new Police and Fire complex.

Staff and building departments have forged good working relationships to increase local building department understanding and compliance with the Standards.

Also, staff is presenting overviews of the 2008 Standards to the International Code Council Chapters (building department personnel) to educate and increase compliance with the Standards.

The Energy Commission, Building Officials and the Contractors State License Board Continue Their Work Together

The California Energy Commission, the Contractors State License Board (CSLB), and building departments statewide are working to educate the public, contractors, and each other about the Standards and the Home Energy Rating System (HERS) and the Appliance regulations.

These partnering efforts will encourage the enforcement of laws and regulations intended to protect consumers and reduce energy use in houses and buildings.

Energy Commission staff is learning about CSLB's enforcement program and disciplinary process. Staff has attended CSLB's mandatory settlement conferences, an arbitration hearing and observed a CSLB sting operation targeting non-licensed contractors.

Energy Commission staff conducted a presentation for some of CSLB's consumer services representatives and enforcement representatives to educate them about the role of HERS Providers and Raters; to familiarize them with compliance documentation required for newly constructed and renovated structures; to inform them of the requirements for HVAC change outs; and more.

Staff from the Energy Commission is providing training to explain the changes coming with the Standards and providing



Photos courtesy of NREI

information on how building departments, and CSLB help enforce the Standards. Staff has been well received by the building departments, and we are learning about their policies and procedures while they learn more about the Standards.

Energy Commission staff has supplied information and handouts for consumers and contractors, which CSLB distributed through their district offices. Information about the new 2008 Building Energy Efficiency Standards, the requirements for HVAC installations and change outs and the new requirements for cool roofs will be published in CSLB's quarterly newsletter.

CSLB is working to protect consumers from "energy scams" and recently issued a Consumer Alert to warn unsuspecting property owners of scams in the popular "green" contracting trades.

According to CSLB's website, several Sonoma County victims have apparently lost tens of thousands of dollars to a business called American Sun Solar Corporation, operated by Peter Davidson. CSLB's Statewide Investigative Fraud Team (SWIFT) investigators are searching for additional victims or witnesses who have done business with Davidson or American Sun Solar Corporation.

Anyone who has information about American Sun Solar Corporation or Davidson is urged to contact CSLB's Santa Rosa Office at (707) 576-2196. Visit the CSLB website at www.cslb.ca.gov for additional information.

If you have suggestions or ideas on how the Energy Commission can help improve our efforts to enforce laws and protect consumers and legitimate contractors, please contact us at:

Building Standards Hotline

1-800-772-3300 (toll free in Calif.)

1-916-654-5106

or e-mail us at:

title24@energy.state.ca.us



New Energy Standards for HVAC Clarified¹

The new (2008) California Building Energy Efficiency Standards will become effective on January 1, 2010.²

The new Standards make a distinction between two types of changeout situations:

1) New or Replacement Space Conditioning Systems

include a completely new or replacement duct system, and a new or replacement air handler unit.

2) Altered Space Conditioning Systems

utilize the preexisting duct system when installing or replacing some or all of the system components such as: air handler unit, outdoor condensing unit, cooling or heating coil, or furnace heat exchanger.

The new Standards require that changeouts must be tested to ensure they meet the Home Energy Rating System (HERS) requirements in some climate zones as shown in the table below.

Duct Sealing and Testing

In Climate Zones 2 and 9-16 the duct sealing and testing rules that began in 2005 remain in effect. There are no changes to the allowable leakage rates or to which of the climate zones must meet the requirements.

However, there is a change that eliminates the Table 8-3 "Alternatives to Duct Sealing"

options from the Residential Compliance Manual. The result is that installation of higher efficiency equipment is no longer an available alternative to meeting the HERS Duct Seal Test requirements.

Refrigerant Charge (RC) Verification

In climate Zones 2 and 8-15, for *Altered space conditioning systems* and also for *New or Replacement space conditioning systems*, Refrigerant Charge Verification by a third-party HERS rater is required either for each unit or by sampling as is done in the current Standard.

The installing contractor must measure the refrigerant charge, make any necessary corrections, then complete an Installation Certificate form that must be posted at the job site for use at final inspection. A third party HERS rater must also verify the RC. In order to achieve a valid RC verification, the system must meet or exceed a minimum Cooling Coil Airflow (CCA) rate of 300 cfm per nominal ton of capacity by direct measurement or by the temperature split method. This airflow requirement is less stringent than airflow rate required for Cooling Coil Airflow and Fan Watt Draw testing described below.

If the system fails to meet the minimum airflow requirement, the HVAC contractor must modify the duct system or air handler equipment in order to increase the system airflow.

Installers of *New or Replacement space conditioning systems* should consider reevaluating the duct system design prior to installation of the ducts (using an industry recognized duct design method such as ACCA Manual D) rather than simply replacing an old poorly designed duct system with "like for like" to end up with a brand new poorly designed duct system. Installers of *Altered space conditioning systems* need to consider modifications to the existing ducts to improve the airflow. Modifications such as enlarging the return duct and return grille, or installing a second return duct and return grille may be sufficient.

Installers of *New or Replacement space conditioning systems* (with new duct systems) must install Saturation Temperature Measurement Sensors (STMS). STMS make

Continued on next page

¹ This article was authored by California Energy Commission staff and was first published in the March 2009 edition of "Indoor Comfort News." The article is reprinted here in slightly altered form courtesy of "Indoor Comfort News" and its Editor, Peter Landau.

² Editors note: This article has been updated with the new effective date of January 1, 2010.

it possible for HERS raters to verify RC without attaching gages to the refrigerant lines. Installers of *Altered space conditioning systems* do not have to install the STMS.

Both Altered and New or Replacement space conditioning systems require Temperature Measurement Access Holes (TMAH). A non-intrusive alternative to RC that is introduced by the new Energy Standards is the Charge Indicator Display (CID). If a CID is installed at the factory or in the field by the HVAC contractor, STMS and TMAH are not required.

Temperature Measurement Access Holes (TMAH)

are 5/16” holes that the installing contractor must drill – one in the supply plenum and one in the return plenum. The exact locations are specified in the Energy Commission document Reference Residential Appendices in section RA3.2. Watch for classes and training on installation of the TMAH.

Saturation Temperature Measurement Sensors (STMS)

are type K thermocouples that are attached permanently – one to the evaporator coil and one to the condenser coil. The mini plug at the end of the thermocouple wire is plugged into a handheld digital thermometer to read the coil saturation temperature. This direct measurement of the temperature of the saturated region of the coil is an alternative to use of gages for determining the coil saturation temperature readings needed for the refrigerant charge verification. The STMS may be installed at the factory, or in the field by the HVAC contractor. Watch for classes and training on installation of the STMS.

Charge Indicator Display (CID)

is a new technology that is not yet commercially available, but when these devices become available, this will be a non-intrusive alternative to performing RC verification for the HERS rater. However the HVAC contractor will still need to perform RC verification at the time of the installation of the system. Watch for more information about the CID when it becomes available.

Thermostatic Expansion Valves (TXV)

no longer qualify for an automatic “pass” for HERS refrigerant charge verification. Systems with TXVs need to be tested for correct subcooling to verify refrigerant charge, and

tested for superheat to ensure the TXVs are mounted and operating as designed.

Cooling Coil Airflow (CCA) and Fan Watt Draw (FWD) Testing

In Climate Zones 10-15, *New or Replacement space conditioning systems* (with new duct systems) must meet the CCA and FWD requirements. The airflow and Watt draw measurements must be made simultaneously, and the results from the measurements are used to calculate a Watt per cfm value for the test result.

The air handler must deliver an airflow of at least 350 cfm per nominal ton of capacity in order to pass, and the calculated result must be less than or equal to 0.58 Watts per cfm of measured airflow in order to pass the test. The installing contractor must measure the CCA and FWD, make any necessary corrections, then complete an Installation Certificate form that must be posted at the job site for use at final inspection. A third party HERS rater must also verify the CCA and FWD.

If the system fails to meet the minimum airflow, the HVAC contractor must modify the system ducts and/or air handler equipment in order to increase the system airflow. Duct system improvements such as those mentioned above for meeting the minimum airflow for refrigerant charge verification are applicable to CCA and FWD. Additionally, installation of a more efficient air handler unit may be a solution to meeting the required Watt per CFM.

In some situations (but not all) an air handler with a brushless permanent magnet motor might provide reduced fan Watt draw. If the problem is low air flow due to high static pressure, a higher efficiency motor by itself will probably not solve the problem. A good duct design, carefully installed, is highly recommended, and may be the lowest cost solution. Watch for classes and training on recommendations for meeting CCA and FWD.

Airflow measurement

procedures are described in the Energy Commission document Reference Residential Appendices in section RA3.3. There are three acceptable methods:

Flow Capture Hood at the return grille(s)

Flow Grid Device at the return grille(s) or other point where all the fan airflow shall flow through the flow grid.

Plenum Pressure Matching Procedure uses the same duct pressurization and flow measurement device (fan flowmeter) as is used to measure duct leakage. This procedure has been simplified for the new Standards to allow connection of the fan flowmeter at the return grille in the same way as for the duct leakage test. This change makes it possible to test both the duct leakage and the airflow with the same setup, which may be a time saver. Watch for classes and training on this method.

Fan Watt Draw

measurement must be done with a true power meter device that measures voltage and amperage simultaneously and reports the true power value. True power meters are available in both plug-in and clamp-on configurations. Voltage and amperage can be taken separately, but their product is VoltAmps or “Apparent Watt Draw.” True watt draw is the product of the voltage, amperage, AND power factor.

Conclusion

This article clarifies the airflow requirements and diagnostic measurement procedures for CCA and FWD, and for RC Verification, and clarifies the distinction between two types of “changeout” situations: installation of new or replacement space conditioning systems (with a new duct system) and installations that involve altered space conditioning systems.

Both situations must meet the refrigerant charge verification requirements. But systems that do not have a completely new duct system are not required to meet the CCA and FWD requirements. Additional information has been given to clarify some suggested ways to meet these HVAC performance requirements.

Watch for additional training videos and classes on these and other quality HVAC installation topics.

If you have questions about Title 24,
e-mail: title24@energy.state.ca.us

Or contact the Energy Standards Hotline:
916-654-5106 or

1-800-772-3300 (toll free in Calif.)
Additional information about the 2008 Building Energy Efficiency Standards can be found on the Internet at:

www.energy.ca.gov/title24/2008standards

Climate Zone	HERS Test*		
	Duct Seal & Test	Refrigerant Charge Verification	Cooling Coil Airflow and Fan Watt Draw and Saturation Temperature Sensors
1	Not Required	Not Required	Not Required
2	Required	Required	Not Required
3 - 7	Not Required	Not Required	Not Required
8	Not Required	Required	Not Required
9	Required	Required	Not Required
10 - 15	Required	Required	Not Required
16	Required	Not Required	Required For "New or Replacement Space-Conditioning Systems" (with new duct systems)

Photos courtesy of NREEL



*This chart has been modified from the chart originally published in the March 2009 edition of "Indoor Comfort News.."

New Roofing Requirements

Beginning January 1, 2010, the California Energy Commission's updated Title 24 Building Energy Efficiency Standards (Standards) for residential and nonresidential roofing will go into effect.

The new Standards affect new construction, significant repairs of existing roofs, re-roofing, plus additions and alterations of existing buildings and homes.

Currently, a residential cool roof is an optional energy efficiency measure, however on January 1, 2010, a cool roof will be required for residential buildings. Cool roof standards are designed to reduce air conditioner demand, save money, and reduce the urban heat island effect.

Cool roof requirements for residential and nonresidential now apply to low-slope and steep-slope roofs. The aged solar reflectance and thermal emittance requirements will vary, depending on the slope of the roof, climate zone, and density of the roofing product.



Photos courtesy of Eagle Roofing

All roofing products must be certified and labeled according to the Cool Roof Rating Council (CRRC) to comply with the Standards. There are exceptions to both residential and nonresidential requirements.

For more information contact the **Energy Standards Hotline:** (916) 654-5106, (800) 772-3300, or e-mail: title24@energy.state.ca.us.

For more information on the **2008 Building Energy Efficiency Standards**, visit the Energy Commission's website:

www.energy.ca.gov/2008publications/CEC-400-2008-01/CEC-400-2008-001-CMF.PDF

For a certified listing of cool roof products, visit: www.coolroofs.org.



Photo courtesy MCA Clay Roof Tile

Cool Roofs Come in Colors

Cool roofing materials now come in a wide variety of materials and colors. Nonwhite pigments with high near-infrared (NIR) reflectance historically have been used to camouflage military surfaces (by mimicking foliage) and to minimize solar heating of dark exterior architectural surfaces, such as colored vinyl siding and gray battleship hulls. In recent years roofing manufacturers have incorporated NIR-reflecting pigments in coatings applied to a variety of nonwhite roofing products, such as metal panels and clay tiles.

Replacing NIR-absorbing ("conventional") roofing with visually similar, NIR-reflecting ("cool") roofing can significantly reduce building heat gain. A roof with high solar reflectance (ability to reflect sunlight) and high thermal emittance (ability to radiate heat) stays cool in the sun, reduces demand for cooling power in conditioned buildings, and increases occupant comfort in unconditioned buildings.



Photos courtesy of Eagle Roofing

Photo courtesy MCA Clay Roof Tile

Aged Reflectance Calculation

Effective January 1, 2010, Section 118(i) of the 2008 Energy Standards will require that a Cool Roof material meet an aged solar reflectance value (3 year testing) provided by the Cool Roof Rating Council (CRRC): www.coolroofs.org

If the three year aged solar reflectance value is not available from the CRRC, then you can input the initial solar reflectance value from the CRRC into the calculation listed, which will assume an aged solar reflectance for the cool roof material.

Here is an example of how to complete the calculation:

- 1. Three year aged solar reflectance not available from the CRRC.*
- 2. Initial solar reflectance value is available from the CRRC (let's assume an initial solar reflectance value of 0.77).*
- 3. Input initial solar reflectance value into the equation:*

$$[0.2 + 0.7(\text{initial solar reflectance} - 0.2)]$$

$$[0.2 + 0.7(0.77 - 0.2)]$$

$$[0.2 + 0.7(0.57)]$$

$$[0.2 + 0.40] = 0.60 \text{ aged solar reflectance}$$

Local Energy Ordinances

Cities or counties may choose to adopt local energy standards that are more stringent than the statewide energy Standards for a variety of reasons. Some of these reasons may include the need to address local building patterns or issues, addressing local air, water, land use, or resource constraints, or addressing state legislation such as Assembly Bill 32 (Núñez, Chapter 488, Statutes of 2006), which is the California Global Warming Solutions Act of 2006 (AB 32) or Executive Orders. Cities or counties can also adopt new statewide energy Standards before their effective date. These cities or counties are called “early adopters.”

Many cities and counties have been approved by the Energy Commission to enforce local energy standards that exceed the statewide energy Standards. These include large and small cities and counties, in high density urban areas as well as lower density suburban regions. Their climate zones vary from coastal to desert.

Each local energy standard is unique and addresses local growth issues or building practices, and most are designed to reduce demand for electricity, especially during high use (peak) periods such as hot summer afternoons. Recently local energy standards have been adopted as part of more comprehensive “green” ordinances, and include requirements related to land use, water use, recycling, indoor air quality, and reduction goals for greenhouse gas emissions as well as energy efficiency requirements.

The California Energy Commission commends the following local agencies that have adopted energy ordinances requiring more stringent energy requirements than those set by California’s 2005 Building Energy Efficiency Standards Title 24, Part 6.

The cities or counties are: *Culver City, La Quinta, Los Altos, Los Altos Hills, Marin County, Mill Valley, Palo Alto, Palm Desert,*

Robnert Park, City and County of San Francisco, San Mateo County, Santa Barbara, Santa Monica and Santa Rosa.

The Energy Commission’s website also includes a table of local standards that have been adopted by the Energy Commission, since the effective date of the 2005 Building Energy Efficiency Standards. The table includes the name of each city or county, the date the local standard was approved by the Energy Commission and a link to the application the city or county submitted to the Energy Commission. In most cases, the text of the local ordinance is a part of the application. **You can see the table at:** www.energy.ca.gov/title24/2005standards/ordinances_exceeding_2005_building_standards.html

Section 10-106 of the Building Energy Efficiency Standards describes the requirements and application process for adopting local energy standards. The local standards must be approved by the Energy Commission before a city or county can enforce the standards in their jurisdictions. The Energy Commission reviews all proposed local standards to assure that the requirements of the local standards are at least as stringent as the statewide energy Standards and are not in conflict with any federal or state requirements.

Those cities or counties that currently enforce local energy standards will need to resubmit applications to the Energy Commission and go through the approval process again to continue to enforce local energy standards after the 2008 Building Energy Efficiency Standards go into effect on January 1, 2010.

Energy Commission staff is happy to provide support to local governments requesting assistance. Local energy standards generally take from five weeks to three months to complete the Energy Commission review and approval process.

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EFFICIENCY AND RENEWABLE ENERGY DIVISION

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Need Help?
Energy Standards
Hotline
(800) 772-3300
or (916) 654-5106

Building Energy Efficiency Standards Training

Links for training on issues relating to California Building Energy Efficiency Standards for Low-Rise Residential and Nonresidential/High-Rise Residential Buildings (Title 24, Part 6) are available on the Energy Commission's website at: www.energy.ca.gov/title24/training

The Energy Commission's

Energy Code Online Training: www.energyvideos.com/

Other Energy Standards Training

For training offered by the utilities and other organizations please see the following websites:

PG&E

www.pge.com/stockton

SoCal Gas Company

<http://seminars.socalgas.com>

San Diego Gas and Electric

<http://seminars.sdge.com/int/default.asp>

SCE

www.sce.com/RebatesandSavings/EnergyCenters/workshops.htm

SMUD

www.smud.org/education/index.html

CALBO Training Institute

www.calbo.org

CABEC

www.cabec.org



Flex Your Power Newswire

www.fypower.org/news/enewswire.html

www.gosolarcalifornia.org/



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