

HVAC Energy Efficiency Regulations

*What You Need to Know to Prepare
December 2021*

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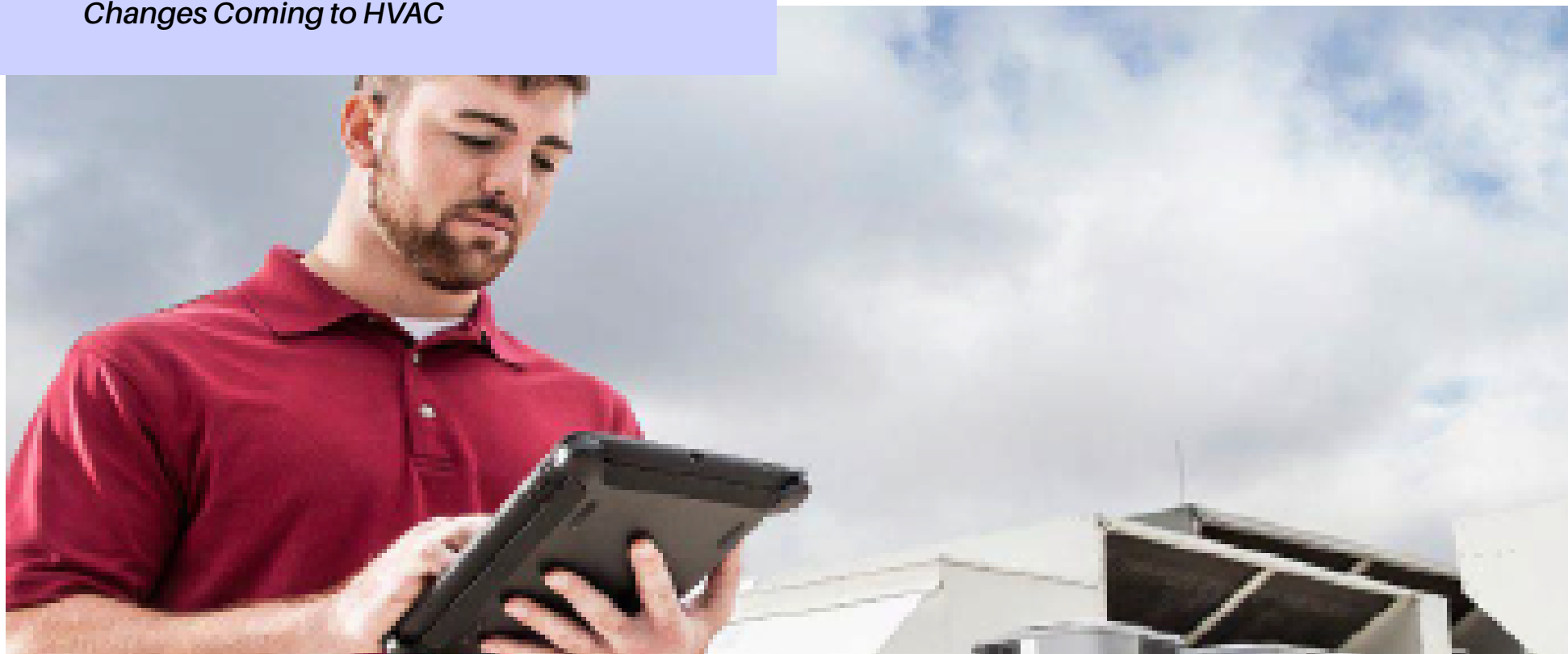
Copeland Helping Prepare the
HVAC Industry





Chapter 1

Changes Coming to HVAC





The HVAC regulatory landscape has historically challenged industry professionals to be nimble and adjust quickly to the next round of mandates. Those who have been in the industry for a number of years know that regulatory changes and updates to efficiency standards are a frequent occurrence.

Changes to government regulations and standards are not without their complexities, difficulties and challenges.

In many ways, these updates have become a catalyst for positive change, helping to evolve the HVAC industry. They provide a rallying cry for OEMs, system providers and industry associations to work together to accelerate the next generation of innovation and develop new technologies. However, changes to government regulations and standards are not without their complexities, difficulties and challenges.

Being prepared for the changes and understanding the impact they will have will allow contractors to identify and take advantage of the opportunities as they present themselves.

This eBook is designed to help drive clarity and preparation around the upcoming regulatory changes. It gives industry professionals, including contractors and OEMs, the helpful information they need to understand the changes, identify opportunities, and have conversations with customers and partners about what this means for their HVAC systems and equipment. It contains the most current information available up to the date of its release. To stay informed on current developments, visit our regulations website.

Chapter 2

Energy Efficiency Standards



Energy Efficiency Standards

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Under the Energy Policy and Conservation Act (EPCA), the Department Of Energy (DOE) is required to review energy conservation standards at least once every six years, or in the event the ASHRAE 90.1 standard updates efficiency requirements for covered products. Any new or amended energy conservation standard must be designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified.

The next round of DOE regulations enters into effect January 1, 2023, for both residential and commercial air conditioning and heat pump systems.

DOE explains that efficiency standards are intended to ensure a minimum level of performance, which means reduced energy consumption along with significant consumer energy bill savings over the operational life of their appliances.

In 2023, the second phase of the regulation will require an additional 14-15 percent increase in efficiency for new commercial units. This is once again driving OEMs to redesign air conditioning equipment to meet the minimum standard.





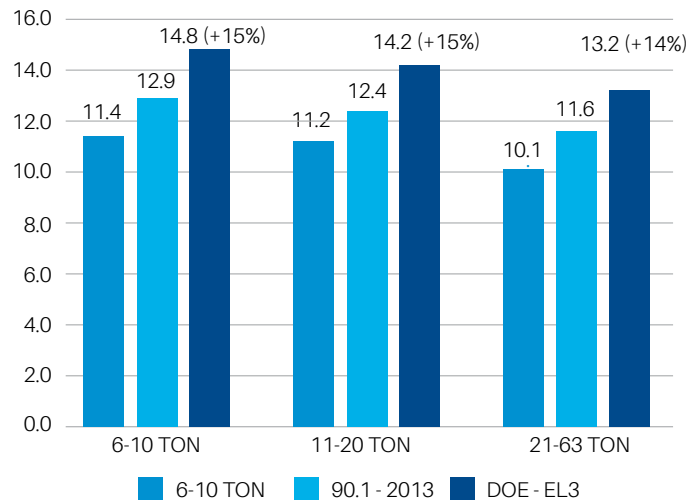
U.S. DOE Rooftop Unit Regulation

Announced in 2015, the new U.S. DOE rooftop unit regulations introduced what the department billed as “the largest energy savings standards in history” to cut energy costs and reduce waste. The regulation set new standards for commercial air conditioning and furnace rooftop units and was to be rolled out in two phases.

The first phase of the regulation was implemented in 2018 and was designed to deliver a 13 percent efficiency improvement in units. To meet this deadline, OEMs quickly worked to modify rooftop technology to meet or exceed the new standards. Advanced technology made attaining this increase relatively easy within the time frame given.

2023 DOE rooftop minimums

National IEER minimums, by tonnage



Notes: ASHRAE 90.1 also has an EER component not shown here.
Electric resistance values, subtract 0.2 EER/IEER for all other equipment.

U.S. DOE Residential Regulations

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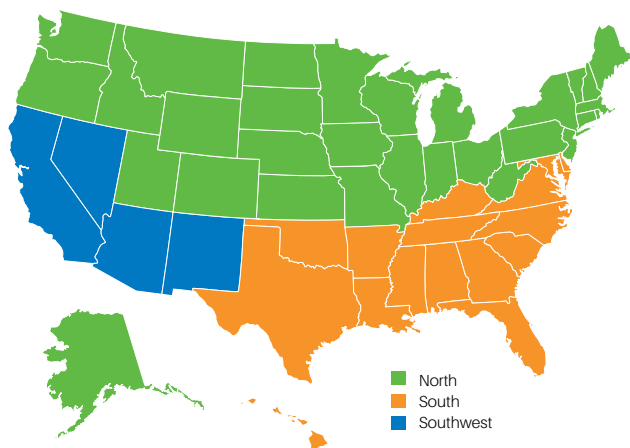
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All regions (North, South and Southwest) will increase by the equivalent of one Seasonal Energy Efficiency Rating (SEER) in 2023, which will result in a lower amount of electricity used for the same amount of cooling. The North will see an increase from 13 to 14 SEER, and the South and Southwest will increase from 14 to 15 SEER. Heat pumps will have a national increase from 14 to 15 SEER. This represents a seven to eight percent increase for SEER across all fronts.

The requirement for higher efficiency in the South is based primarily on the fact that units are typically run longer during the hotter summer months of the Southern regions.

As part of this transition, DOE is also implementing a new test procedure for calculating efficiency which is leading to new metrics to represent seasonal efficiency, full load efficiency and seasonal heating performance.



The updated regulation is to better reflect changing field conditions, such as new HVAC technologies and longer duct runs used in home building. The result is that efficiency ratings will appear to be lower, when in fact the efficiency isn't changing. For instance, a 13.4 SEER2 on paper is equivalent in efficiency to a 14 SEER and a 14.3 SEER2 is equivalent to a 15 SEER unit using today's test procedure. HSPF and EER minimums were also updated in the latest federal minimums and will be listed as HSPF2 and EER2.

Minimums for residential air conditioning and heat pumps

| Today - Appendix M | All | North | South | Southwest angle | |
|--------------------|------|-------|-------|-----------------|------------|
| Type | HSPF | SEER | SEER | SEER | EER |
| AC | | 13 | 14 | 14 | 12.2/11.7* |
| Heat Pump | 8.2 | 14 | 14 | 14 | |
| Packaged Units | 8.0 | 14 | 14 | 14 | 11 |

*11.7 EER limit for equipment $\geq 45K$ BTU/Hr

| 2023 - Appendix M1 | All | North | South | Southwest angle | |
|------------------------|--------------|--------------|--------------|-----------------|---------------------------|
| Type | HSPF2 (HSPF) | SEER2 (SEER) | SEER2 (SEER) | SEER2 (SEER) | EER2 (EER) |
| AC < 45K BTU/Hr | | 13.4 (14) | 14.3 (15) | 14.3 (15) | 11.7 (12.2) 9.8 (10.2) |
| AC > 45K BTU/Hr (NEW*) | | 13.4 (14) | 13.8 (14.5) | 13.8 (14.5) | 11.7 (12.2) 9.8 (10.2) |
| Heat Pump | 7.5 (8.8) | 14.3 (15) | 14.3 (15) | 14.3 (15) | |
| Packaged Units | 6.7 (8.0) | 13.4 (14) | 13.4 (14) | 13.4 (14) | 10.6 (11.0) |

*9.8 EER2 limit for equipment ≥ 15.2 SEER2

Achieving Higher Efficiency

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While DOE mandates minimum efficiency levels, there is an opportunity to incentivize more efficient and more expensive units and systems through tax credits and rebates.

ENERGY STAR and residential energy efficiency rebates

ENERGY STAR is the government-backed symbol for energy efficiency, providing simple, credible and unbiased information that consumers and businesses rely on to make well-informed decisions. The program is designed to help consumers make informed decisions that save energy, resulting in consumer cost savings. The Environmental Protection Agency (EPA) program also enables utilities to leverage ENERGY STAR efficiency levels as a common national platform when establishing rebate criteria. In response to increased federal minimum energy efficiency requirements in 2023, EPA has also finalized updates to their ENERGY STAR specifications requiring higher efficiency levels to qualify.

Tax credits

Tax credits and deductions are currently available on both residential and commercial purchases, if the equipment meets certain criteria. These credits and deductions change frequently, and more information can be found at www.energystar.gov/about/federal-tax-credits



From the website: Equipment Tax Credits for Primary Residences – 10% of cost up to \$500 or a specific amount from \$50-\$300. The Non-Business Energy Property Tax Credits are in place through 12/31/2021. Must be an existing home & your principal residence. New construction and rentals do not apply.

Tax Deductions for Commercial Buildings – Section 179D of the Internal Revenue Code allows deductions for energy-efficient commercial buildings. These tax deductions were made permanent under the Consolidated Appropriations Act of 2021. A tax deduction of up to \$1.80 per square foot is available to owners or designers of commercial buildings or systems that demonstrate a 50% reduction in energy usage accomplished solely through improvements to the heating, cooling, ventilation, hot water, and interior lighting systems. Partial deductions of up to \$.60 per square foot can be taken for qualifying measures. The deduction is available for buildings or systems placed in service after December 31, 2017.



Implications of the efficiency requirements

For OEMs, it means redesigning units to meet the standard changes without significantly impacting the weight, size and cost of the equipment. One way this is being accomplished is through the use of modulating compressor technology that can adjust capacity and reduce compressor cycling to achieve higher part-load efficiency.

Many OEMs are going even further than adjusting base tiers by adjusting mid and premium tiers as well, although the overall look and feel of the equipment is expected to remain very similar. OEMs are also sharing information to help educate the industry on the coming changes. Updated product materials, websites and marketing communication are likely to roll out ahead of the transition capturing the new metrics and higher efficiencies.

Beyond minimum efficiency, enhanced comfort benefits, such as tighter temperature and humidity control and improved air quality, are available through systems featuring modulating compressor technologies, including two-stage scroll compressors.

How prepared are contractors and wholesalers?



Source: Regulations Readiness Survey, December 2019



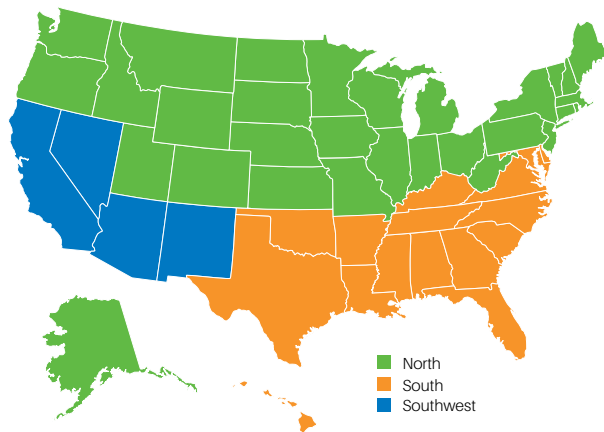
Energy Efficiency Standards

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Inventory transition planning will also be very important, especially on the residential side. In the Southeast and Southwest, the residential transition date of January 1, 2023, for air conditioning is based on installation date, so equipment must meet the new efficiency levels to be installed as of that date. For commercial equipment, residential heat pumps and residential air conditioning in the North, the transition date is based on manufacturing date, so existing inventory can continue to be sold and installed even if it doesn't meet the new efficiency levels as long as it was manufactured prior to January 1, 2023.



Equally important is the role contractors can play in educating residential and commercial end users of the changes. Contractors should share information on the new regulations while also discussing the benefits, such as additional energy savings, convenience and comfort the new equipment will provide. Educating consumers on the status of local utility rebates and tax incentives will also help them make a more informed decision. Copeland, system manufacturers and **Air Conditioning Contractors of America (ACCA)** can also be great sources for information to help educate customers.





Chapter 3

Copeland Helping Prepare the HVACR Industry





Copeland scroll compressor technology

Recognized for its energy efficiency and reliability, scroll compressor technology has helped shape the HVACR industry and drive greater comfort and efficiency. Since scroll technology's broad commercialization more than 30 years ago, the technology has driven many of the industry's efficiency gains and more than 190 million scroll compressors have been installed worldwide.

Copeland scroll compressor technology has been instrumental in helping the industry confront and overcome a number of challenges, including the previous moves to a 10 SEER standard and a 13 SEER minimum, as well as the phaseout of R-22 refrigerants. Scroll technology has evolved through the years as market dynamics and regulations have evolved. Modulation technologies such as **two-stage, tandem, variable speed** and **digital** have delivered comfort and efficiency beyond base tier products.

Copeland continues to innovate and invest in scroll technology to meet future regulatory dynamics. Copeland's commitment to supporting the industry includes not only the advancement of scroll technology, but also investments in our labs and extensive North American supply base that allow us to adjust production capacity and support business continuity.





The Helix Innovation Center

Copeland is committed to realizing and accelerating the next generation of innovation to help solve some of the world's biggest HVACR challenges. The centerpiece of this commitment is The Helix Innovation Center, which is fueling new kinds of research, collaboration and conversations that are playing a pivotal role in preparing the industry for the coming energy and refrigeration changes.

Within the 40,000-square-foot, \$35 million research and education facility is a working commercial kitchen, grocery store and a fully functional, two-story, 2,000-square-foot residential home that features Copeland's comprehensive suite of residential solutions.

The Helix offers research teams an opportunity to do rapid prototyping and use practical applications to develop and test their innovations for enhancing residential and commercial building controls, efficiency and comfort. This hub of technology and innovation also allows Copeland to demonstrate its differentiated approach to the advancement of sustainable solutions and help execute Copeland's sustainability framework aimed at decarbonizing energy sources, improving energy efficiency and reducing waste, managing and controlling emissions, and electrifying supply and end use.

Located on the campus of the University of Dayton, the center is an industry-first, \$35 million hub dedicated to advancing research and education for the global HVACR industry. Since opening in 2016, The Helix has become a place where Copeland collaborates with customers, HVACR industry partners and industry educators, as well as experts from other industries who can bring new perspectives to specific challenges.





Sidney Innovation Lab

The Helix is not the only place we are doing advanced research and development. As part of the recent \$100 million renovation of Copeland's Sidney, Ohio, campus, we created 110,000 square feet of innovative development lab space collectively known as the Sidney Innovation Lab.

\$100 million renovation

110,000 square feet of lab space

60 individual testing rooms

The cutting-edge lab is focused on product research, development and testing of the next generation of compressors, refrigerants, electronics, controls and other critical technologies for the global HVACR industry. It is designed to accelerate product development, collaborate with OEM partners and end-user customers, and help deliver simplified lower-GWP solutions.



Much of the research and work being done in the new facility, which features 76 compressor test rooms, is focused on testing designs and products that are capable of reaching the higher efficiencies required by government regulations and ensuring that these products perform effectively and safely with the more sustainable, alternative refrigerants becoming available.

