

INTRODUCTION TO DOE 2023 REGULATORY REQUIREMENTS

Day &
Night.

Heating & Cooling Products





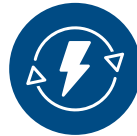
XeVane™ Fan Technology



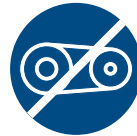
75% fewer moving parts



Intuitive fan speed adjustment controls



Up to 40% more energy efficient



No belts or pulleys



No shaft or shaft bearings



CONTENTS:

Introduction	3
Day & Night Readiness	4
Commercial Rooftop Unit Rating Comparisons	5
Commercial Split System Rating Comparisons	6
New Technologies	7
New Refrigerant for Rooftop Units	8
Where to Go for More Information	9



A Carrier Company

Dear Day & Night Customer:

We are getting ready for the 2023 regulatory requirements and we want you to be ready too!

On January 1, 2023, the Department of Energy's (DOE) new minimum efficiency standards for commercial packaged air conditioners (ACs) and heat pumps (HPs) went into effect. These new regulations are part of the DOE's ongoing initiative to reduce overall energy consumption in the United States. These changes will present new complexities, but Day & Night is prepared, and we are here to support you through this transition.

HVAC manufacturers are required to comply with a new testing procedure for developing efficiency ratings. Day & Night is committed to leading our industry in compliance and we have developed this 2023 Regulatory Requirement booklet to help you fully understand and be prepared for these changes.

The 2023 Regulatory Requirement booklet provides information to help you get up to speed with the new requirements, including:

- Minimum efficiency changes
- Regulatory-ready product updates
- New technologies

As your trusted manufacturer, we will continue to make resources available to you. Be sure to visit HVACpartners for the most current marketing resources.

Thank you for your support!

DAY & NIGHT READINESS

TIME FOR A NEW CHANGE

WHY THE CHANGE

Every six years the Department of Energy (DOE) reanalyzes the effects of energy usage, sets minimum efficiency requirements and manages the testing standards by which those efficiencies are measured. In 2018 the DOE started the first phase of their six-year plan requiring a 13% increase in energy efficiency for commercial packaged air conditioners, heat pumps and split systems. The second phase of this plan is in effect now.



2023 MINIMUM EFFICIENCY CHANGE

On January 1, 2023 all commercial air conditioning and heat pump equipment from 65,000 btu/h to 760,000 btu/h required an additional 15% efficiency increase from the existing ratings set in 2018. Combined with the efficiency requirements implemented in 2018 this will result in a 30% increase over the six-year period.

Additionally, all gas fired commercial air conditioners are now required to meet an 81% gas efficiency rating.

In 2023, there will not be any changes to the testing procedures mandated for commercial air conditioners and heat pumps greater than 65,000 btu/h.

2023 SINGLE PHASE COMMERCIAL – SEER2, EER2 AND HSPF2

The DOE has also reanalyzed and adjusted the minimum efficiencies of single-phase air conditioners and heat pumps, 5 tons or less. Single phase and residential products will also be required to comply with a new testing procedure for developing efficiency ratings. Compared to today's test procedure, the external static pressure used when testing will be increased by up to 5X to better reflect field conditions.

Since the new testing requirements are more stringent and reduce the resulting efficiency rating, there will be new metrics and nomenclature – SEER2, EER2 and HSPF2. On the same system, compared to SEER ratings, the new SEER2 ratings will be lower and the minimum efficiencies will be reduced to account for the more difficult test procedure required for 2023 products.

DOE ENFORCEMENT FOR THE MANUFACTURE

After January 1, 2023, Day & Night will no longer manufacture any rooftop units that are not compliant with the new DOE energy efficiency mandates. According to 10CFR part 431.97, compliance is only on the date of manufacture – this means any three-phase product produced on 12/31/2022 or earlier is still able to be sold and installed after the compliance date.

Please refer to the residential DOE 2023 regulatory brochure for more details on single phase requirements and enforcement.

COMMERCIAL ROOFTOP UNIT RATING COMPARISONS

COMMERCIAL PACKAGED AIR CONDITIONER AND HEAT PUMP RATINGS

The new 2023 minimum efficiency standards for packaged air conditioners and heat pumps will increase the minimum efficiency by 15% over the January 1, 2018 efficiency standards. This second phase of regulatory increases will bring the total efficiency of these air conditioning system up by 30% from 2015.

Packaged Air Conditioning Units – Air Cooled Direct Expansion			
Equipment Type		Existing January 1, 2018	New January 1, 2023
Small Commercial Packaged AC's (≥ 65,000 Btu/h < 135,000 Btu/h)	Electric Resistance or No Heating	12.9 IEER	14.8 IEER
	All Other Types of Heating	12.7 IEER	14.6 IEER
Large Commercial Packaged AC's (≥ 135,000 Btu/h < 240,000 Btu/h)	Electric Resistance or No Heating	12.4 IEER	14.2 IEER
	All Other Types of Heating	12.2 IEER	14.0 IEER
Very Large Commercial Packaged AC's (≥ 240,000 Btu/h < 760,000 Btu/h)	Electric Resistance or No Heating	11.6 IEER	13.2 IEER
	All Other Types of Heating	11.4 IEER	13.0 IEER

Packaged Air Conditioning Units – Air Cooled Heat Pumps			
Equipment Type		Existing January 1, 2018	New January 1, 2023
Small Commercial Packaged AC's (≥ 65,000 Btu/h < 135,000 Btu/h)	Electric Resistance or No Heating	12.2 IEER, 3.3 COP	14.1 IEER, 3.4 COP
	All Other Types of Heating	12.0 IEER, 3.3 COP	13.9 IEER, 3.4 COP
Large Commercial Packaged AC's (≥ 135,000 Btu/h < 240,000 Btu/h)	Electric Resistance or No Heating	11.6 IEER, 3.2 COP	13.5 IEER, 3.3 COP
	All Other Types of Heating	11.4 IEER, 3.2 COP	13.3 IEER, 3.3 COP
Very Large Commercial Packaged AC's (≥ 240,000 Btu/h < 760,000 Btu/h)	Electric Resistance or No Heating	10.6 IEER	N/A

3 to 5 Tons Packaged Air Conditioning Units – Air Cooled DX and Heat Pumps			
Equipment Type		Three Phase*	Single Phase
Small Commercial Packaged AC's (< 65,000 Btu/h)	All Heat Types	14 SEER, 8.0 HSPF	13.4 SEER2, 6.7 HSPF2

*Three phase 3-5 ton models have the same efficiency as existing models today. There is no change for SEER or HSPF for three phase models, only single phase is moving to SEER2 and HSPF2. Please refer to the residential DOE 2023 regulatory brochure for more details on SEER2 and HSPF2.

COMMERCIAL SPLIT SYSTEM RATING COMPARISONS

COMMERCIAL SPLIT SYSTEM AIR CONDITIONER AND HEAT PUMP RATINGS

The new 2023 minimum efficiency standards for split system air conditioners and heat pumps will increase the minimum efficiency by 15% over the January 1, 2018 efficiency standards. This second phase of regulatory increases will bring the total efficiency of these air conditioning system up by 30% from 2015.

Commercial Split Air Conditioning Units – Air Cooled Direct Expansion			
Equipment Type		Existing January 1, 2018	New January 1, 2023
Small Commercial Split AC's (≥ 65,000 Btu/h < 135,000 Btu/h)	Electric Resistance or No Heating	12.9 IEER	14.8 IEER
	All Other Types of Heating	12.7 IEER	14.6 IEER
Large Commercial Split AC's (≥ 135,000 Btu/h < 240,000 Btu/h)	Electric Resistance or No Heating	12.4 IEER	14.2 IEER
	All Other Types of Heating	12.2 IEER	14.0 IEER
Very Large Commercial Split AC's (≥ 240,000 Btu/h < 760,000 Btu/h)	Electric Resistance or No Heating	11.6 IEER	13.2 IEER
	All Other Types of Heating	11.4 IEER	13.0 IEER

Commercial Split Air Conditioning Units – Air Cooled Heat Pumps			
Equipment Type		Existing January 1, 2018	New January 1, 2023
Small Commercial Split AC's (≥ 65,000 Btu/h < 135,000 Btu/h)	Electric Resistance or No Heating	12.2 IEER, 3.3 COP	14.1 IEER, 3.4 COP
	All Other Types of Heating	12.0 IEER, 3.3 COP	13.9 IEER, 3.4 COP
Large Commercial Split AC's (≥ 135,000 Btu/h < 240,000 Btu/h)	Electric Resistance or No Heating	11.6 IEER, 3.2 COP	13.5 IEER, 3.3 COP
	All Other Types of Heating	11.4 IEER, 3.2 COP	13.3 IEER, 3.3 COP
Very Large Commercial Split AC's (≥ 240,000 Btu/h < 760,000 Btu/h)	Electric Resistance or No Heating	10.6 IEER, 3.2 COP	12.5 IEER, 3.2 COP
	All Other Types of Heating	10.4 IEER, 3.2 COP	12.3 IEER, 3.2 COP

WHAT IT ALL MEANS

Breaking down the numbers, the 2023 efficiency standards represent a 15% energy efficiency increase from current standards, across the board. Many of our current products already meet or exceed the minimum efficiency standards set for 2023. We have been working for several years in anticipation of these changes and are ready to increase the efficiency of our remaining product lines before the new standards take effect on January 1, 2023.

NEW TECHNOLOGIES

X-VANE™ TECHNOLOGY

As we continue to look for measured improvements in the energy efficiency and performance of our heating and cooling systems leading up to 2023, we continue to expand our X-Vane technology across our product lines.

Currently the X-Vane direct drive vane axial fan systems with EC motors only exist on our 3–6 ton, small rooftop units. This technology will soon be available on all small and medium light commercial rooftop units up to 27.5 tons. X-Vane Technology has been designed to improve performance and efficiency while decreasing maintenance and installation costs.



Most notable of X-Vane Technology's many features is the exclusive beltless direct-drive vane axial fan system an industry first for rooftop units. This patent-pending technology replaces traditional belts and pulleys with a simpler, more compact design, all with 75 percent fewer moving parts. The outdoor fan system's high-density composite blade fan is also an exclusive design. Other technological advances that differentiate these units include: a new control board and coil technology, increased factory options and a tool-less filter access door.

- Units with X-Vane Technology are up to 60 percent more efficient than RTUs of 17 years ago, and 40% more efficient than traditional forward curve fans today. This ensures lower operating costs while increasing the opportunity for utility rebates.
- 75% fewer moving parts compared to traditional fans. No fan belts, pulleys, shafts and bearings.
- Maintaining our historical footprints while increasing energy efficiency, allows for faster, easier, and less costly replacement opportunities

SPLIT SYSTEM WITH X-VANE FANS

Day & Night is expanding the use of the highly efficient X-Vane direct drive fan system into the Commercial Split System market. All 6 to 10 ton split system air handlers are now available with direct drive vane axial fans. All of the same efficiencies and convenience of the X-Vane fan system apply to the FAX and FHX product lines.



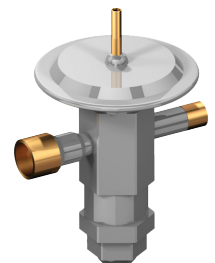
MULTISTAGE – SINGLE CIRCUIT DESIGN

Day & Night rooftop units continue to utilize a single circuit Multistage compression system across our product lines that is designed to increase energy efficiency and heat transfer rates across the condenser coil. Using the full surface of the condenser coil throughout full load or part load conditions allows our units to achieve greater cooling efficiencies without the need to increase the footprint of the unit.

THERMAL EXPANSION VALVES – TXVS

The use of Thermal Expansion Valves has replaced the older style fixed orifice metering devices in our light commercial 6 to 27.5 tons rooftop units. A TXV is capable of operating more efficiently at part load conditions compared to a fixed orifice system due to its ability to precisely control the rate of refrigerant flow based on the temperatures and load of the system.

While a fixed orifice metering device will always deliver a fixed amount of refrigerant regardless of system load, a smart system using a TXV can avoid operating with improper refrigerant levels and reduce the amount of resulting temperature swings. TXV's will not only greatly impact energy efficiency of the system but also increase the durability of the refrigeration system as well as occupant comfort.



NEW REFRIGERANT FOR ROOFTOP UNITS

R-454B – A NEW REFRIGERANT FOR A NEW STANDARD

In a worldwide effort to address climate change concerns, global leaders have proposed a phase down of high Global Warming Potential (GWP) refrigerants as a part of the Kigali Amendment to the United Nations' Montreal Protocol. Although the United States as a whole has not yet ratified this agreement, states involved in the U.S. Climate Alliance* are embracing the reductions. Based on proposed California regulations, it is anticipated that many U.S. states will be limiting the GWP for refrigerants used in HVAC applications at a maximum of 750, possibly as early as 2025.

Our current R-410A refrigerant, while excellent at providing a non-ozone-depleting alternative to R-22, has a GWP of 2088, well above the anticipated future limit. That is why we are in the process of developing new products that will use R-454B refrigerant. The new R-454B is a blend of R-32 and R-1234yf. It has a much lower GWP – 465 – which easily surpasses the proposed 2025 requirement. And, it will continue to meet the anticipated future Kigali phase down requirements well into the 2030s.

WHAT'S THE BIG DIFFERENCE?

R-454B falls into a new classification on the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 34 flammability and toxicity matrix – A2L. A2L refrigerants are classified by ASHRAE as having lower toxicity and lower flammability. Our current refrigerant, R-410A, falls into the A1 category for refrigerants with no ignition at or below 60° C. And while that makes A2Ls more flammable than A1s, such as R-410A, they are still much less flammable than natural gas or propane. According to AHRI research studies, the risk of fire remains low. Here's why:

- A2Ls, like R-454B, are hard to ignite (they require significant ignition energy) so they will not be ignited by static electricity
- A significant leak of an A2L, such as R-454B, would be required to reach a flammable concentration of 11.8% lower flame limit (LFL)
- Concentrations of A2Ls, like R-454B, below the LFL will only burn while passing through a flame and will not ignite and sustain a flame
- If an unlikely ignition does occur, the resulting energy is very low with a burning velocity of about 2.0 inches per second

As an added precaution, Day & Night will add safety features in all systems containing R-454B which could include leak detection sensors and mitigation procedures.

The change to R545B is just that – a change. But since it will meet regulatory requirements far into the future, it should be a change that lasts quite a while. As we move forward with implementing R454B, Day & Night will support you all along the way making the transition as smooth as possible.

ASHRAE Standard 34 Safety Classes

Higher Flammability	A3 Propane, Butane	B3
Flammable	A2 Methylene Fluoride	B2 Methyl Chloride
Lower Flammability	A2L R-454B	B2L Ammonia
No Flame Propagation at 60° C	A1 R-410A	B1 Sulfur Dioxide
	Lower Toxicity (OEL of 400 ppm or greater)	Higher Toxicity (OEL of less than 400 ppm)
	Increasing Toxicity	

WHERE TO GO FOR MORE INFORMATION

MAKE THE COMMITMENT

Remember, we ALL have a stake in this. As your trusted supplier, we will invest the time and resources to make compliance as easy as possible. That includes training, updated product labeling, and continued communications about this topic.

In the end, we encourage you to make the commitment as well. Start preparing now by getting up to speed on the upcoming 2023 regulations and taking advantage of your resources. If you have any questions regarding the new 2023 regulations, reach out to your local distributor.



HVAC PARTNERS

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Visit HVACpartners.com for access to the 2023 Regulatory Launch Kit page. Visit often, as we will be adding new product information and regulatory details to the site as they become available.

Go to: *HVACpartners > Marketing Tools > Sales Tools > Marketing Launch Kits > 2023 Regulatory Requirements*



OTHER RESOURCES

- U.S. Department of Energy – www.energy.gov
- U.S. Environmental Protection Agency – www.epa.gov
- EPA and DOE Energy Efficiency – www.energystar.gov
- U.S. Government's national archives – www.federalregister.gov



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