

Title 20 Requirements

State-regulated compressors manufactured on or after January 1, 2022, must comply with the performance, testing, marking and certification requirements in Sections 1601-1609 of [California Appliance Efficiency Regulations \(Title 20\)](#). These regulations set minimum efficiency requirements for large, lubricated, rotary air compressors. Compliant products will be listed on the California Energy Commission’s (CEC) [Modernized Appliance Efficiency Database System \(MAEDbS\)](#), a publicly-available database that contains all regulated products that may legally be sold or offered for sale in California.

Background and Benefits

In 2017, the United States Department of Energy (DOE) pre-published the energy conservation standards for large rotary air compressors. However, they were not formally published until 2020.

As a result of the delay in publishing the federal standards, the CEC adopted the same federal standards early to avoid the loss of energy and cost savings for consumers. According to the CEC, over the lifecycle of one product, these Title 20 standards will save an estimated 2,100 to 7,000 kWh resulting in \$2,700 - \$9,200 in savings, depending on the compressor type. Statewide, this standard will save 217 gigawatt-hours of electricity and \$22 million per year after full stock turnover. This is equivalent to average yearly electricity consumption of over 20,000 homes in the U.S.

The Title 20 standards become effective on January 1, 2022, and the federal standards become effective on January 10, 2025.

State-regulated Compressor Criteria

Title 20 standards only regulate lubricated, rotary air compressors that:

- Operate at pressures greater or equal to 75 pounds per square inch gauge (psig) but less than or equal to 200 psig
- Are driven with a brushless electric motor
- Have a full-load actual volume flow rate greater than or equal to 35 cubic feet per minute (cfm) or are sold with a compressor motor nominal horsepower greater than or equal to 10 horsepower (hp)
- Have a full-load actual volume flow rate less than or equal to 1,250 cfm or sold with a compressor motor nominal horsepower less than or equal to 200 hp
- Are not a liquid-ring compressor
- Are not designed and tested to the requirements of the American Petroleum Institute Standard 619, “Rotary-Type Positive-Displacement Compressors for Petroleum, Petrochemical, and Natural Gas Industries”
- Are manufactured alone or as a component of another piece of equipment;
- Are driven by a 3-phase electric motor AND
- Are one of the equipment classes in Table S-5, below.

Title 20 Performance Requirements

State-regulated compressors manufactured on or after January 1, 2022, must meet the applicable performance values in [Table S-5](#):

Equipment Class	Minimum Package Isentropic Efficiency ¹	η_{Regr} (package isentropic efficiency reference curve)	d (Percentage Loss Reduction)
Rotary, lubricated, air-cooled, fixed-speed compressor	$\eta_{\text{Regr}} + (1 - \eta_{\text{Regr}}) * (d/100)$	$-0.00928 * \ln^2(.4719 * V_1) + 0.13911 * \ln(.4719 * V_1) + 0.27110$	-15
Rotary, lubricated, air-cooled, variable-speed compressor	$\eta_{\text{Regr}} + (1 - \eta_{\text{Regr}}) * (d/100)$	$-0.01549 * \ln^2(.4719 * V_1) + 0.21573 * \ln(.4719 * V_1) + 0.00905$	-10
Rotary, lubricated, liquid-cooled, fixed-speed compressor	$.02349\eta_{\text{Regr}} + (1 - \eta_{\text{Regr}}) * (d/100)$	$-0.00928 * \ln^2(.4719 * V_1) + 0.13911 * \ln(.4719 * V_1) + 0.27110$	-15
Rotary, lubricated, liquid-cooled, variable-speed compressor	$.02349\eta_{\text{Regr}} + (1 - \eta_{\text{Regr}}) * (d/100)$	$-0.01549 * \ln^2(.4719 * V_1) + 0.21573 * \ln(.4719 * V_1) + 0.00905$	-15

Where V_1 is the full-load actual volume flow rate of the compressor, in cubic feet per minute, as determined in accordance with the test procedure in [section 1604\(s\)](#)

¹For “fixed-speed compressor” equipment classes, the relevant Package Isentropic Efficiency is Full-load Package Isentropic Efficiency. For “Variable-speed compressor” equipment classes, the relevant Package Isentropic Efficiency is Part-load Package Isentropic Efficiency. Both Full- and Part- Load Package Isentropic Efficiency are determined in accordance with the test procedure in [section 1604\(s\)](#) of this Article.

Table S-5. Standards for State-regulated Compressors



Testing Requirements

State-regulated compressors must be listed in the MAEDbS prior to being sold or offered for sale in California. To be listed in MAEDbS, manufacturers must test their compressors using the federal test procedure and provide test results documenting compliance with the CEC standards. Manufacturers have two primary methods to test their products:

1. The DOE test [procedure](#) for lubricated, large rotary air compressors that is aligned with industry test procedure ISO 1217:2009: If historical test data is consistent with values that are generated when testing with the DOE test procedure, manufacturers may submit historical test data for the purposes of demonstrating compliance.
2. The “alternative efficiency determination method” (AEDM): This is a mathematical model of the compressor package that allows calculation of the package isentropic efficiency, package specific power, pressure ratio at full-load operating pressure, full-load actual volume flow rate or full-load operating pressure without actually assembling the compressor package and testing it.

FAQs

If products were tested prior to the standards taking effect but according to the DOE test procedure, do they need to be re-tested?

No. Manufacturers can use results from previously conducted tests as long as they were performed according to the appropriate procedure. This is the same process for all appliances not just state-regulated compressors.

Where I can I find the appropriate test procedure?

[Title 20, Section 1604\(s\)](#) incorporates the DOE test procedure by reference. The DOE procedure can be found in 10 Code of Federal Regulations (CFR) [Appendix A](#) to subpart T of Part 431.

Do I need to test each new model made?

No. The CEC allows the test results of basic models to be extended to additional models with the same performance characteristics. AEDMs can be used for units with differing performance characteristics based on the test performance of similar models.

Also, as noted above, a product’s historical test data is acceptable if the required test method was performed.

Will the test procedure used to certify products in California be acceptable to sell products nationally once the federal requirement becomes effective?

Yes. The CEC uses the same test procedure. Once the federal standard becomes effective, the California standard will become preempted, so the product data will need to be recertified to the MAEDbS as a federally regulated product.

How to Comply with Title 20

Compliance entails the following:

- Meeting the applicable design or performance standards (efficiency standards)
- Testing regulated products by using the required test method by a test lab
- Marking the regulated product in accordance with Title 20, [Section 1607](#) AND
- Certifying the product to the CEC’s MAEDbS

Even if a state-regulated compressor meets all performance, testing and marking requirements outlined in Title 20, it is illegal to sell or offer for sale a regulated product in California if the model is not certified to the CEC and listed in the MAEDbS.

Everyone in the sales chain – including manufacturers, distributors, retailers, contractors and importers – is responsible for ensuring regulated products are listed in the MAEDbS. To learn more about the MAEDbS and how to use it, view the Energy Code Ace Title 20 On-Demand Video [Training](#).

The screenshot shows the California Energy Commission (CEC) MAEDbS search page. At the top, there is a header with the CEC logo and navigation links for 'Help' and 'Back To Login'. Below the header is a search bar with a 'SEARCH' button. The main content area is titled 'Quick Search' and contains instructions: 'To begin your search enter model criteria and click search. Use the additional fields if necessary. The quick search also allows search results to be narrowed to currently approved models or to search historical models. To search historical models, please set the status to archived which can be found on the appliance status tab. Questions can be directed to Appliances@energy.ca.gov or to the Appliances Hotline, toll free at (888) 838-1467 or outside California (916) 651-7100. Search instructions are also available.' Below the instructions are several input fields: 'Model Number', 'Appliance Type', 'Company', 'Brand', and '@Appliance Status'. There are also two dropdown menus: 'Select Category' (with 'Motor Products' selected) and 'Select Appliance Type' (with 'Electric Motors' selected). At the bottom right of the form are 'Search' and 'Clear' buttons.



For More Information

CALIFORNIA ENERGY COMMISSION

www.energy.ca.gov

Appliances Call Center

(888) 838-1467 or outside California (916) 651-7100

Questions may also be emailed to

Appliances@energy.ca.gov

California Appliance Efficiency Standards Site

bit.ly/Title-20-Regulations

Modernized Appliance Efficiency Database (MAEDbS)

bit.ly/MAEDbS

Commercial and Industrial Air Compressors: Frequently Asked Questions

bit.ly/Air-Compressor-FAQ



EnergyCodeAce.com

Online “one-stop-shop” with no-cost tools, training and resources on compliance requirements of Title 24, Part 6 and Title 20

Email: title20@energycodeace.com



Interactive tools to help you understand the compliance process, required forms, installation techniques and energy efficiency regulations applicable to building projects and appliances in California

Reference Ace

energycodeace.com/content/reference-ace-t20-tool

Tool to help navigate the Title 20 Standards documents

- [Section 1602\(s\)](#) – Definitions
- [Section 1604\(s\)](#) – Test Methods for Electric Motors and Compressors
- [Section 1605.3\(s\)](#) – State Standards for Electric Motors and Compressors
- [Section 1606](#) – Filing by Manufacturers; Listing of Appliances in Database
- [Section 1607](#) – Marking of Appliances
- [Section 1608](#) – Compliance, Enforcement, and General Administrative Matters



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Title 20 Training Courses

energycodeace.com/content/title-20-training/



Downloadable materials with guidance on how and when to comply with California’s building and appliance energy efficiency standards

Fact Sheets

energycodeace.com/Title20FactSheets

- Title 20 Basics – Manufacturers
- Title 20 Basics – Retailers, Distributors & Installers
- Title 20 Certification Overview, Process and FAQs

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