Regulatory Changes for Dedicated-Purpose Pool Pumps

All dedicated-purpose pool pumps (DPPP) (domestic and imported) manufactured on or after July 19, 2021, must meet the efficiency requirements adopted by the U.S. Department of Energy (DOE). The California Energy Commission has adopted the same DPPP regulations as U.S. DOE. California's Appliance Efficiency Regulations (Title 20) (Sections 1601-1609) will only apply to products manufactured *before* July 19, 2021. For products manufactured on or after that date, the former Title 20 DPPP definitions and regulations will no longer apply.

Why Were These Changes Made?

The DPPP standard adopted by the U.S. DOE in January 2017 has similar stringency to the standards previously adopted by California. According to the U.S. DOE, there are an estimated 8.5 million residential swimming pools in the U.S.[1] and the impact on the electrical grid and pool owners is significant. The new U.S. DOE standard will save U.S. consumers over $11 billion over the next 30 years.[2] For standard size self-priming pool pumps, compliant products save consumers over $2,000 in lifecycle costs (equipment price, installation and operating costs) over the life of the pump, compared to non-compliant single speed pool pumps. These products are ultimately quieter, have a longer lifetime and provide better filtration performance.

Relevant Code Sections

California Appliance Efficiency Regulations, Title 20

- Section 1601(g) – Scope
- Section 1602(g) – Definitions
- Section 1605.1(g) – Federal and State Standards for Federally Regulated Appliances
- Section 1606 – Filing by Manufacturers; Listings of Appliances in Database
- Section 1607(b) and (d)(2) – Marking of Appliances

Code of Federal Regulations (CFR): Title 10, Energy, Subpart Y (Pumps)

- 10 CFR 431.462 – Definitions
- 10 CFR 431.465 – Energy conservation standards and their compliance dates
- 10 CFR 431.466 – Labeling Requirements
- 10 CFR Appendix C to Subpart Y of Part 431 – Uniform Test Method for the Measurement of Energy Efficiency of Dedicated-Purpose Pool Pumps

DPPP are also referred to as residential and commercial, inground swimming pool filtration pump and motor combinations.

1 U.S. DOE LCC 2015: EERE-2015-BT-STD-0008-0106, Tab Overall Summary, Table Market Share.

2 U.S. DOE 2017-01-18 Energy Conservation Program: Energy Conservation Standards for Dedicated-Purpose Pool Pumps; Direct final rule, Tables V45 and V46.

New Scope

The scope of the new DPPP standard includes:

- Single-phase pool filtration pumps with a hydraulic horsepower (hhp) less than 2.5 hhp.
  - This applies to both residential and commercial DPPP products within the hhp range
  - Note that pool filtration pumps must include a basket strainer or require the connection of a basket strainer for operation, and if distributed with a sand or cartridge filter, this filter must be bypassable and the pump must continue to operate
- Self-priming (i.e., inground), non-self-priming (i.e., above-ground) and pressure cleaner booster pumps
- Integral filter pumps (typically storable/inflatable pool pumps)
  - A filter pump is integral if the filter cannot be bypassed
- Waterfall pumps ***do not have performance requirements***, however, they must comply with U.S. DOE freeze protection requirements if equipped with freeze protection and report performance data to the U.S. DOE's Compliance Certification Management System (CCMS)
- Storable spa pumps and rigid electric spa pumps ***are defined but not regulated*** by the U.S. DOE and the California Energy Commission

New Definitions

Weighted Energy Factor (WEF): This measures the performance of the pump in gallons pumped per watt hour. This weighted measurement is similar to having both city and highway miles per gallon (MPG) values for a car which are then weighted and used to calculate an overall MPG.

- For **variable**- and **multi- speed** pumps, WEF is calculated at 80% low-speed operation (filtration speed) and 20% high-speed operation (cleaning speed), to match how these products are meant to be used in the field
- For **two-speed** products, WEF is calculated at the same low- and high-speed weighting as for variable- and multi-speed pumps (80% low, 20% high), provided the low speed meets minimum U.S. DOE flow requirements
  - If the low speed does not meet flow requirements, it is not tested and the product is treated similarly to single-speed products
- For **single-speed** products, WEF is the performance at maximum speed
- For **pressure cleaner booster pumps**, WEF is measured at an operating flow of 10 gpm and head pressure greater than or equal to 60 feet head of water.
- For **waterfall pumps**, WEF is measured at 17 feet head of water and maximum speed.

Hydraulic Horsepower (hhp): This is a measurement of the energy a pump supplies to water that it is pumping at the exit point of the pump (discharge).

- Defined at the maximum speed on PHTA-15 Curve C, at product full impeller size
  - At this load point, hhp is the: Flow (gpm) * Head (ft water) / 3960
- Hhp is used to calculate the WEF requirements
- Conventional pool pump motor rated hp includes various service factors (e.g., up-rating versus full rating) whereas hhp is a direct measurement of output power

Self-priming: A self-priming pump is capable of repriming with a water lift of five or more feet vertically in under 10 minutes and is not a waterfall pump (defined according to American National Standards Institute (ANSI) / National Sanitation Foundation (NSF) 50-2015).

- Pumps capable of this operation are determined to be self-priming pool pump products, suitable for inground applications, whereas pumps that cannot are non-self-priming and are typically suitable for above-ground pool pump applications
- Some pumps, formerly considered above-ground products, are capable of self-priming, so have been modified to either meet the regulatory requirements for self-priming pumps or no longer prime according to U.S. DOE definitions

Operating Points: High-speed & Low-speed

The **high-speed operating point** is the closest operating point a pump can use which is at least 80% of maximum flow of the pump on the test system curve. Per the Pool and Hot Tub Alliance (PHTA) Standard 15, Curve C: Head = 0.0082* Flow^2.

The **low-speed operating point** is the lowest speed the pump is capable of operating at which meets minimum U.S. DOE flow requirements. Per Appendix C to Subpart Y of Part 431, I.D.3 Table 1, the low speed flow at tested head 0.0082*(Low Speed Flow)^2 must be at or above 31.1 gpm for products with greater than 0.75 hhp, and at or above 24.7 gpm for products with less than or equal to 0.75 hhp. Variable- and multi-speed products are tested at the lowest speed that can reach this operating point. Two-speed products are tested at high speed only if this flow requirement is met.

New Requirements

WEF: These translate to pool pump technologies such as:

- Standard Size Self-Priming Pumps: Only variable-speed products are likely to meet the standard
- Small Self-Priming Pumps: High-efficiency motor single-speed products can meet the standard
- Non-Self-Priming Pumps: Medium-efficiency motor single-speed products can meet the standard
- Pressure Cleaner Booster Pumps: Medium-efficiency motor single-speed products can meet the standard

Pool Pump Type	Hydraulic Horsepower (hhp)	Phase	Minimum WEF in kgal/kWh
Self-Priming - Standard Size	0.711 ≤ hhp < 2.5	Single	WEF = -2.30 x ln(hhp) + 6.59
Self-Priming - Small	hhp < 0.711	Single	WEF = 5.55, for hhp ≤ 0.13 -1.30 x ln(hhp) + 2.90, for hhp > 0.13
Non-Self-Priming	hhp < 2.5	Any	WEF = 4.60, for hhp ≤ 0.13 -0.85 x ln(hhp) + 2.87, for hhp > 0.13
Pressure Cleaner Booster	Any	Any	WEF = 0.42

Table 1: Minimum WEF by Pool Pump Type (based on 10 CFR 431.465)
Note: ln() is the natural logarithm

Freeze Protection

- Eliminates defaults that run the pump too soon and accounts for the fact that not all Climate Zones need freeze protection
- Pumps equipped with freeze protection controls must either ship with freeze protection disabled or with the U.S. DOE defaults specified in 10 CFR 431.465(h)

Integral Cartridge Filter and Integral Sand Filter Pool Pumps

- Must be distributed in commerce with a pool pump ***timer*** that is either integral to the pump or a separate component that is shipped with the pump
- A ***timer*** as defined in 10 CFR 431.462 must turn off a DPPP after a runtime of no longer than 10 hours

Marking Requirements

- Manufacturers (or third-party test labs) are required to test and ensure that WEF and DPPP motor total horsepower are added to the product nameplate (i.e., product label)
  - U.S. DOE regulations now require that all service factors for DPPP total horsepower are 1.0, thus making rated and total horsepower equal for this value
- Manufacturers have the option to add hydraulic horsepower to the nameplate, but it is not required
- Standard marking requirements in Title 20, Section 1607(b): manufacturer's name or brand name or trademark, model number and date of manufacture (including year and month or smaller (e.g., week) increment)

Frequently Asked Questions

How do the regulations handle (formerly) 1 to 1.5 hp inground pool pumps?

In the regulation, the cut point between large and small pumps is 0.711 hhp, which is approximately 1.2 hp. Some pumps at 1-1.5 motor hp will be above or below the 0.711 threshold depending on the performance of the pump in the test method.

The WEF regulations are all based on the product's hhp and must be rounded to three significant figures.

Pumps which are greater than or equal to 0.711 hhp must meet the WEF requirements of standard-size inground pumps, which is generally met by variable- or multi- speed pumps. Whereas pumps falling below that 0.711 hhp limit may meet the WEF requirements of small inground pumps, which can be generally met by efficient single-speed pumps.

Matching a pump to a pool is still a factor of the unique conditions of the pool, such as medium vs high head installations, flow requirements, turnovers and pool size, plumbing system losses, downstream equipment and distance. Hhp is especially useful for sizing considerations, however, consulting manufacturer system curves is still recommended, especially when replacing a pump with unknown hhp.

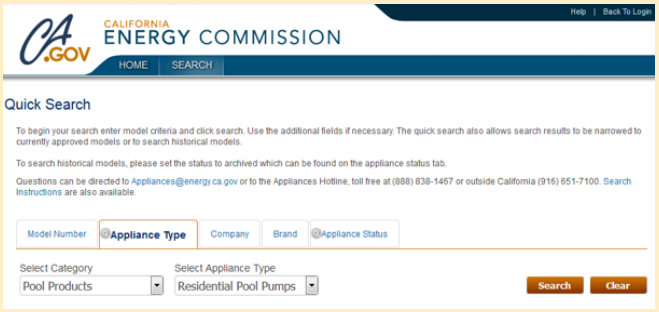
Are there any residential pool pumps still regulated by Title 20 but not the U.S. DOE DPPP regulations?

No, all former Title 20 definitions will be preempted for DPPP manufactured on or after July 19, 2021. The California Energy Commission has adopted regulations identical to U.S. DOE for DPPP. However, on July 19, 2021, a separate Title 20 replacement pool pump motor regulation becomes effective.

How to Comply with Title 20

In addition to being certified to the CCMS, Title 20 requires that both federally and state-regulated products be certified to the California Energy Commission's Modernized Appliance Efficiency Database System (MAEDbS). A product that was previously certified to the MAEDbS and is federally regulated after July 19, 2021 will need to be recertified to the MAEDbS as a federally regulated product.

Everyone in the sales chain – including manufacturers, distributors, retailers, contractors, importers and installers – is responsible for ensuring regulated products are listed in the MAEDbS.



For More Information

Primary Documents

- Title 20 Appliance Efficiency Regulations
  energycodeace.com/content/reference-ace-t20-tool
- Code of Federal Regulations (CFR): Title 10, Energy, Subpart Y (Pumps)
  ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=7672fe9b9023da11cc463a5260087d97&mc=true&n=pt10.3.431&r=PART&ty=HTML#sp10.3.431.y

California Energy Commission Information & Services

- Appliances Hotline: (888) 838-1467 or outside California (916) 651-7100
- Questions may also be emailed to Appliances@energy.ca.gov
- California Appliance Efficiency Standards Site
  energy.ca.gov/rules-and-regulations/appliance-efficiency-regulations-title-20
- Modernized Appliance Efficiency Database (MAEDbS)
  cacertappliances.energy.ca.gov/Login.aspx

U.S. DOE Information and Services

- Office of Energy Efficiency & Renewable Energy Appliance and Equipment Standards Program
  energy.gov/eere/buildings/appliance-and-equipment-standards-program
- Compliance Certification Management System (CCMS)
  www.regulations.doe.gov/ccms

Additional Resources

- Energy Code Ace:
  EnergyCodeAce.com
  - An online "one-stop-shop" providing no-cost tools, training and resources to help appliance and building industry professionals decode and comply with Title 24, Part 6 and Title 20. The site is administered by California's investor-owned utilities.
    Of special interest:
    - Fact Sheets
      energycodeace.com/content/resources-fact-sheets/
      - Title 20 Certification Overview, Process and FAQs
    - Title 20 On-Demand Video Training:
      energycodeace.com/content/title-20-training/
      - Residential Pool Pumps
        energycodeace.com/content/training-ace/courseId=44517

    Register with the site and select an industry role for your profile in order to receive messages about all our no-cost offerings and Title 20 news! You can also email us at Title20@energycodeace.com.

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