CEPI-145-21 (As Modified)

# IECC®: SECTION 202 (New), C405.13 (New), TABLE C405.13 (New), DoD (New)

**Proponents:**

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**2021 International Energy Conservation Code**

# Add new definition as follows:

C202 PEICL. The *pump* energy index for a constant load ~~(hp).~~

202 PEIVL. The *pump* energy index for a variable load.

C202 PERCL. The *pump* energy rating for a constant load (hp), determined in accordance with either testing for bare *pumps*, *pumps* sold with single-phase induction motors, and *pumps* sold with drivers other than electric motors, or testing for *pumps* sold with motors and rated using the testing-based approach, or testing for *pumps* sold with motors and rated using the calculation-based approach. (hp)

C202 PERSTD. The *PERCL* for a *pump* that is minimally compliant with USDOE energy conservation standards with the same flow and specific speed characteristics as the tested *pump* (hp).

C202 PERVL. The *pump* energy rating for a variable load (hp), determined in accordance with testing for *pumps* sold with motors and continuous or noncontinuous controls rated using the testing-based approach, or testing for *pumps* sold with motors and continuous controls rated using the calculation-based approach.

C202 PUMP. Equipment designed to move liquids that may include entrained gases, free solids, and totally dissolved solids by physical or mechanical action and that includes a bare pump and, if included by the manufacturer at the time of sale, mechanical equipment, driver, and controls.

C202 CLEAN-WATER PUMP. A device that is designed for use in pumping water with a maximum nonabsorbent free solid content of 0.016 lb/ft3 (0.256 kg/m3) and with a maximum dissolved solid content of 3.1 lb/ft3 (49.66 kg/m3), provided that the total gas content of the water does not exceed the saturation volume, and disregarding any additives necessary to prevent the water from freezing at a minimum of 14°F (-10°C).

C202 END-SUCTION CLOSE-COUPLED (ESCC) PUMP. A close-coupled, dry-rotor, end-suction device that has a shaft input power greater than or equal to 1.0 hp (0.74 kW) and less than or equal to 200 hp (149.1 kW) at its *best efficiency point (BEP)* and full impeller diameter and that is not a dedicated-purpose pool *pump*. It is also a single-stage, rotodynamic *pump* in which the liquid enters the bare *pump* in a direction parallel to the impeller shaft and on the side opposite the bare *pump's* driver end and is then discharged through a volute in a plane perpendicular to the shaft.

C202 END-SUCTION FRAME-MOUNTED/OWN-BEARINGS (ESFM) PUMP. A mechanically coupled, dry-rotor, end-suction device that has a shaft input power greater than or equal to 1.0 hp (0.75 kW) and less than or equal to 200 hp (149.1 kW) at its *best efficiency point (BEP)* and full impeller diameter and that is not a dedicated-purpose pool *pump*. It is also a single-stage, rotodynamic *pump* in which the liquid enters the bare *pump* in a direction parallel to the impeller shaft and on the side opposite the bare *pump’s* driver end and is then discharged through a volute in a plane perpendicular to the shaft.

C202 INLINE (IL) PUMP. A device that is either a twin-head *pump* or a single-stage, single axis flow, dry-rotor, rotodynamic *pump* that has a shaft input power greater than or equal to 1.0 hp (0.75 kW) and less than or equal to 200 hp (149.1 kW) at its *best efficiency point (BEP)* and full impeller diameter, in which liquid is discharged through a volute in a plane perpendicular to the shaft. Such pumps do not include pumps that are mechanically coupled or close-coupled, have a *pump* power output that is less than or equal to 5.0 hp (3.73 kW) at its BEP at full impeller diameter, and are distributed in commerce with a horizontal motor.

C202 RADIALLY SPLIT, MULTISTAGE, VERTICAL, INLINE DIFFUSER CASING (RSV) PUMP. A device that is a vertically suspended, multistage, single-axis-flow, dry-rotor, rotodynamic *pump* and:

1. Has a shaft input power greater than or equal to 1.0 hp (0.75 kW) and less than or equal to 200 hp (149.1 kW) at its *best efficiency point (BEP)* and full impeller diameter and at the number of stages required for testing;
2. In which liquid is discharged in a place perpendicular to the impeller shaft;
3. For which each stage (or bowl) consists of an impeller and diffuser; and d. for which no external part of such a *pump* is designed to be submerged in the pumped liquid.

C202 SUBMERSIBLE TURBINE (ST) PUMP. A device that is a single-stage or multistage, dry-rotor, rotodynamic *pump* that is designed to be operated with the motor and stage(s) fully submerged in the pumped liquid; that has a shaft input power greater than or equal to 1.0 hp (0.75 kW) and less than or equal to 200 hp (149.1 kW) at its *best efficiency point (BEP)* and full impeller diameter and at the number of stages required for testing; and in which each stage of this *pump* consists of an impeller and diffuser, and liquid enters and exits each stage of the bare *pump* in a direction parallel to the impeller shaft.

C202 PUMP SYSTEM POWER. The sum of the nominal power demand (nameplate horsepower) of motors of all pumps that are required to operate at design conditions to supply fluid from the heating or cooling source to all heat transfer devices (e.g., coils, heat exchanger) and return it to the source.

**Add new text as follows:**

C405.13 Pumps.

*Clean water pumps* meeting the following criteria shall comply with the requirements shown in Table C403.13~~5~~:

1. A flow rate of 25 gal/min (1.5 L/s) or greater at its *best efficiency point (BEP)* at full impeller diameter
2. Maximum head of 459 ft (140m) at its BEP at full impeller diameter and the number of stages required for testing
3. Design temperature range from 14°F (-10°C) to 24 °F (120°C)
4. Designed to operate with either:
   1. a 2- or 4-pole induction motor, or
   2. a non-induction motor with a speed of rotation operating range that includes speeds of rotation between 2880 and 4320 rpm and/or 1440 and 2160 rpm, and
   3. in either (1) or (2), the driver and impeller must rotate at the same speed.
5. For *submersible turbine pumps*, a 6 in. (152 mm) or smaller bowl diameter
6. For *end-suction close-coupled pumps* and *end-suction frame-mounted/own bearings pumps*, specific speed less than or equal to 5000 rpm when calculated using U.S. customary units

**Exceptions:** The following *pumps* are exempt from these requirements:

1. Fire *pumps*
2. Self-priming *pumps*
3. Prime-assisted *pumps*
4. Magnet-driven *pumps*
5. *Pumps* designed to be used in a nuclear facility subject to 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities."
6. *Pumps* meeting the design and construction requirements set forth in U.S. Military Specification MIL-P-17639F, "Pumps, Centrifugal, Miscellaneous Service, Naval Shipboard Use" (as amended); MIL-P-17 1D, "Pumps, Centrifugal, Boiler Feed, (Multi-Stage)" (as amended); MIL-P-17 40C, "Pumps, Centrifugal, Close-Coupled, Navy Standard (For Surface Ship Application)" (as amended); MIL- P-1 6 2D, "Pump, Centrifugal, Main Condenser Circulating, Naval Shipboard" (as amended); MIL-P-1 472G, "Pumps, Centrifugal, Condensate, Feed Booster, Waste Heat Boiler, And Distilling Plant" (as amended).

TABLE C405.13 MAXIMUM PUMP ENERGY INDEX (PEI)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Pump Type** | **Nominal Speed of Rotation (RPM)** | **Operating Mode** | **Maximum PEIa** | **C-Value b** | **Test Procedure** |
| *End suction, close coupled* | 1800 | Constant load | 1.00 | 128.47 | 10 CFR Part 431 |
| *End suction, close coupled* | 3600 | Constant load | 1.00 | 130.42 |
| *End suction, close coupled* | 1800 | Variable load | 1.00 | 128.47 |
| *End suction, close coupled* | 3600 | Variable load | 1.00 | 130.42 |
| *End suction, frame mounted* | 1800 | Constant load | 1.00 | 128.85 |
| *End suction, frame mounted* | 3600 | Constant load | 1.00 | 130.99 |
| *End Suction, frame mounted* | 1800 | Variable load | 1.00 | 128.85 |
| *End suction, frame mounted* | 3600 | Variable load | 1.00 | 130.99 |
| *In-line* | 1800 | Constant load | 1.00 | 129.30 |
| *In-line* | 3600 | Constant load | 1.00 | 133.84 |
| *In-line* | 1800 | Variable load | 1.00 | 129.30 |
| *In-line* | 3600 | Variable load | 1.00 | 133.84 |
| *Radially split, vertical* | 1800 | Constant load | 1.00 | 129.63 |
| *Radially split, vertical* | 3600 | Constant load | 1.00 | 133.20 |
| *Radially split, vertical* | 1800 | Variable load | 1.00 | 129.63 |
| *Radially split, vertical* | 3600 | Variable load | 1.00 | 133.20 |
| *Submersible turbine* | 1800 | Constant load | 1.00 | 138.78 |
| *Submersible turbine* | 3600 | Constant load | 1.00 | 134.85 |
| *Submersible turbine* | 1800 | Variable load | 1.00 | 138.78 |
| *Submersible turbine* | 3600 | Variable load | 1.00 | 134.85 |

1. For *pumps* with the constant load operating mode, the relevant PEI is *PEICL*. For *pumps* with the variable load operating mode, the relevant PEI is *PEIVL*.
2. The C-values shown in this table shall be used in the equation for *PER~~I~~STD* when calculating *PEICL* or *PEIVL*.

**Insert references as follows:**

|  |  |
| --- | --- |
| **U.S. Department of Defense** | **3010 Defense Pentagon**  **Washington, DC 20301** |
| MIL-P-17639F (1996) | Pumps, Centrifugal, Miscellaneous Service, Naval Shipboard Use |
| MIL-P-17840C (1986) | Pumps, Centrifugal, Close-Coupled, Navy Standard (For Surface Ship Application) |
| MIL-P-17881D (1972) | Pumps, Centrifugal, Boiler Feed (Multi-Stage) |
| MIL-P-18472 (1989) | Pumps, Centrifugal, Condensate, Feed Booster, Waste Heat Boiler, and Distilling Plant |
| MIL-P-18682D | Pump, Centrifugal, Main Condenser Circulating, Naval Shipboard |

# Reason Statement:

In 2016, the U.S. Department of Energy published a final rule for energy conservations standards for commercial and industrial clean water pumps that went into effect on January 27, 2020. This proposal provides a new table of information about the new efficiency requirements to users of of the IECC that will be consistent with Addendum AN to ASHRAE 90.1-2016, which was approved for publication in ASHRAE 90.1-2019.

It also provides new definitions and reference standards that are needed to accompany the table. This will have an energy savings impact in those buildings that use clean water pumps.

# Bibliography:

ASHRAE Standards Addendum AN to 90.1-2016, which can be downloaded from: https://[www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda](http://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda) **Cost Impact:**

The code change proposal will neither increase nor decrease the cost of construction.

The information in the proposed change show the minimum "baseline" products that are allowed to be used in the United States as of January 27, 2020. Pumps meeting these efficiency levels represent the current minimum efficiency and the now

minimum cost products available in the US. CEPI-145-21