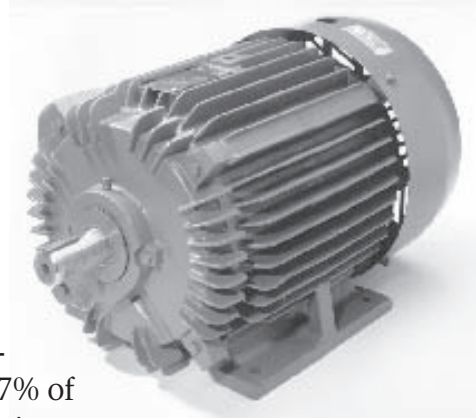


# Energy Efficiency FACTSHEET

## Premium Efficiency Motors

**Description:** A large fraction of electrical energy consumed in many facilities is used to run electric motors. Nationally, motor-driven systems account for about 57% of all electrical energy use. Energy-efficient motors now available are typically 2%-8% more efficient than standard motors.



This efficiency improvement can translate into substantial energy and dollar savings. Over a typical ten-year operating life, a motor operating most of the time can easily consume electricity valued at more than 50 times the motor's initial purchase price. This means that when you spend \$1,600 to purchase a motor that operates continually, you may be obligating yourself to spend more than \$80,000 on electricity. Therefore, it may be wise to invest in motors with higher efficiencies than what is required, even if they are a bit more expensive.

Premium efficiency motors reduce the amount of lost energy going into heat rather than power by using steel with better magnetic qualities, bigger diameter wire, and better bearings. Since less heat is generated, less energy is needed to cool the motor with a fan—further improving energy efficiency.

The term “premium efficiency” has been used by many people to mean anything better than what the government defines as “high efficiency.” Recently, the Consortium for Energy Efficiency (CEE) developed minimum efficiencies that motors have to exceed in order to be considered “premium efficiency.” This isn't law yet, but is getting to be fairly widely accepted among motor manufacturers. As is clarified in the table below, premium-efficiency motors are more efficient than energy-efficient motors.

**Applications:** The CEE Premium Efficiency standards apply to NEMA Design A and B, three-phase induction motors rated from 1- to 200-horsepower, with synchronous speeds of 1200, 1800, and 3600 RPM, and with either Open Drip Proof (ODP) or Totally Enclosed Fan-Cooled (TEFC) enclosures. These motors are used extensively to drive pumps, fans, compressors, and machine tools.

CEE Premium Efficiency motors should be considered in all new motor procurements and when specifying motor-driven equipment. Premium Efficiency motors should also be considered as an alternative to repairing or rewinding a failed motor. Premium Efficiency motors may also be cost-effective replacements for older, operable motors—particularly when the operable motor has been rewound, or is oversized and underloaded.

Premium Efficiency motors are particularly cost-effective when annual operating hours exceed 2,000, where utility rates exceed \$0.06/kWh, when motor repair costs exceed 60% of the price of a replacement Premium Efficiency motor, or where electrical utility motor rebates or other conservation incentives are available.

Annual Savings from Selecting Premium over Energy Efficient Motors			
Horsepower	Motor Efficiency Standard		Annual Savings of using Premium Efficiency over Energy Efficient Motors, \$
	EPACT EE full-load efficiency, %	CEE PE full-load efficiency, %	
10	89.5	91.7	60
25	91.7	93.6	124
50	93.0	94.5	191
100	94.1	95.4	324
200	95.0	95.8	393

Note: Based on 1800 RPM ODP motor, operated 8,000 hours per year, 75% load, and an electrical rate of \$0.05/kWh.

**Performance/Costs:** Premium Efficiency motors typically cost 10% to 15% more than their energy efficient counterparts. Annual energy savings are dependent upon operating profile, duty-cycle, and efficiency gain.

Depending on power costs, it is sometimes cost-effective to retrofit existing working motors. For example, at \$0.07/kWh, replacing the average 10 hp motor with the best premium efficiency motor will pay back in about three years, assuming continuous operation at \_ load.

Efficiency standards and annual savings for using Premium Efficiency motors rather than energy-efficient motors are summarized in the following table.

**Availability:** For each motor size, speed, and enclosure combination, at least three major motor manufacturers offer products that meet CEE Premium Efficiency standards. Since vendors typically stock or have access to multiple motor brands, most distributors have little difficulty providing Premium Efficiency motors.

**For Additional Information:**

**MotorMaster+ software**

The U.S. Department of Energy sponsors MotorMaster+ 3.0 software. MotorMaster+ features a manufacturers’ database containing price and performance information for over 27,000 motors. You can download the software from the website, or call the OIT Clearinghouse at (800) 862-2086 for your free copy.

[“http://mm3.energy.wsu.edu/mmplus/”](http://mm3.energy.wsu.edu/mmplus/) <http://mm3.energy.wsu.edu/mmplus/>

**Motors—U.S. Department of Energy Industries of the Future BestPractices**

This website contains tip sheets, case studies, and technical reports on motors and drives efficiency practices.

[http://www.oit.doe.gov/bestpractices/just\\_need/motors.shtml](http://www.oit.doe.gov/bestpractices/just_need/motors.shtml)

**Premium-Efficiency Motors Initiative**

From the Consortium for Energy Efficiency (CEE)

[.org/ceetoday/ceefacts/motors.html](http://ceetoday/ceefacts/motors.html) <http://ceeforamt.org/ceetoday/ceefacts/motors.html>

**National Electrical Manufacturers Association (NEMA)**

NEMA develops standards for the electrical manufacturing industry. They sell these standards, and have some other useful information.

<http://www.nema.org/>

**Ensuring Efficiency: Motor Specification and Performance**

An article from the January 1998 issue of Maintenance Solutions.

[3m8ac.html](http://www.facilitiesnet.com/fn/NS/NS3m8ac.html) <http://www.facilitiesnet.com/fn/NS/NS3m8ac.html>

**Motor Efficiency Recommendations**

From the FEMP Procurement website

<http://www.eren.doe.gov/femp/procurement/motor.html>

**Energy Star Purchasing Initiative**

Contains purchasing and efficiency information for electric motors

[http://www.epa.gov/appdstar/purchasing/non\\_res\\_equipment/electric\\_motors.htm](http://www.epa.gov/appdstar/purchasing/non_res_equipment/electric_motors.htm)

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