

International Standards for Electric Motor Driven Systems

Electric Motor Driven Systems (EMDS) are responsible for 53% of electric energy use worldwide. They drive pumps, fans, compressors and also transport, process and infrastructure systems.

In order to make mass produced rotating machines in a global market easily available and their performance comparable, standardization is the key. Not only geometrical and electrical properties but also energy performance is standardized. Standards provide the reference for a global nomenclature of how energy efficient an EMDS is, made up for example of a motor made in Germany, shipped to the USA, linked to a fan made in China and have it fed by a converter made in Canada.

The International Electrotechnical Commission (IEC) is the responsible global standard maker for all kinds of products operated with electric power. In parallel, the International Organization for Standardization (ISO) is responsible for all kinds of mechanical machinery. Together, IEC and ISO form the backbone for the standardization of the energy performance of EMDS. These standards also serve as a reference for national minimum performance requirements.

The key standardized elements for the energy performance of rotating electrical machines with motors and variable frequency drives (VFD) are included in the table. They explain:

- **Scope:** which types of rotating machinery, motors and generators, AC and DC, asynchronous or synchronous are included in the definitions, what are the testing and operating conditions, the allowable tolerances, and what needs to be printed on the rating plate.
- **Testing:** how the motor, as well as the losses of a VFD, their output and input is measured, the efficiency and the losses determined in full and partial load with the preferred testing method.

■ **Efficiency classification:** how the energy performance of a motor (with a different number of poles and operated at 50 Hz or 60 Hz) and of a VFD is classified.

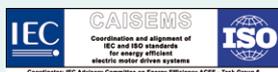
Scope	Testing	Efficiency classification
Motor 	IEC 60034-2-1 (2014)	IEC 60034-30-1 (2014)
Motor fed by a VFD 	IEC 60034-2-3 (2020)	IEC TS 60034-30-2 (2016)
VFD 		IEC 61800-9-2 VFD Losses (2017)
Motor + VFD 		IEC 61800-9-1 Extended Product Approach (2017)
Motor + VFD + Application 		 Coordinator: IEC Advisory Committee on Energy Efficiency ACEE - Task Group 4

Table 1: Key standardized elements for the energy performance of rotating electrical machines

The key standardized elements for the energy performance of major mechanical machines are:

- **Pumps:** the pump system energy assessment is defined in ISO 14414.
- **Fans:** the performance testing using standardized airways is defined in ISO 5801.
- **Air-compressors:** the efficiency for displacement compressors with an acceptance tests is defined in ISO 1217.
- **Cooling compressors:** the testing of refrigerating systems is defined in ISO 916.

All IEC and ISO standards are published in English and French, many are also available through DIN in German. Standards are regularly revised and adapted to new technologies. Check the latest available editions on www.iec.ch and www.iso.org.