

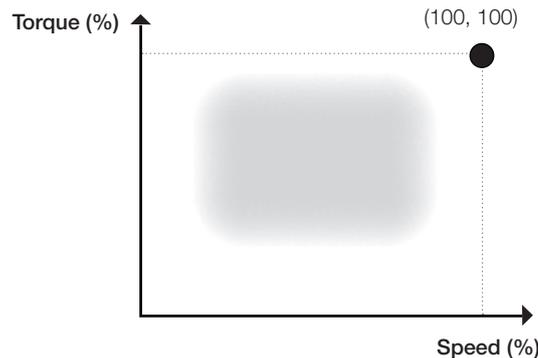
Understanding system efficiency

Efficiency classes (IE and IES) according to EN 50598

The European Committee for Electrotechnical Standardization (CENELEC) has released a new EN 50598 standard. The standard defines the IE classes for complete drive module (CDM) and the new IES classes for the power drive system (PDS). It applies to drives and motor and drive packages with a voltage range of 100 to 1000 V, and a power range up to 1000 kW.

Motor efficiency classes (IE)

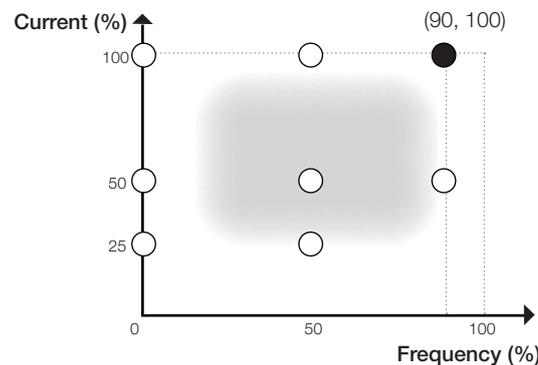
EN 60034-30-1 (DOL)



- Defines IE (efficiency classes for motors)
- Based on efficiency (%)
- Measured at 100 percent speed and 100 percent torque

Complete drive module (CDM) efficiency classes (IE)

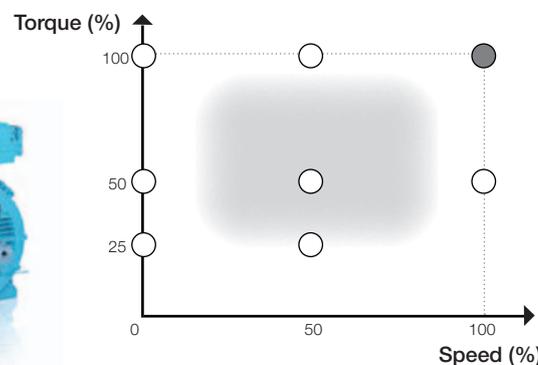
EN 50598-2



- New efficiency class (IE) for drives and integrated auxiliaries
- Based on drive losses (percent in watts)
- Measured or calculated at 90 percent frequency and 100 percent current

Power drive system (PDS) efficiency classes (IES)

EN 50598-2

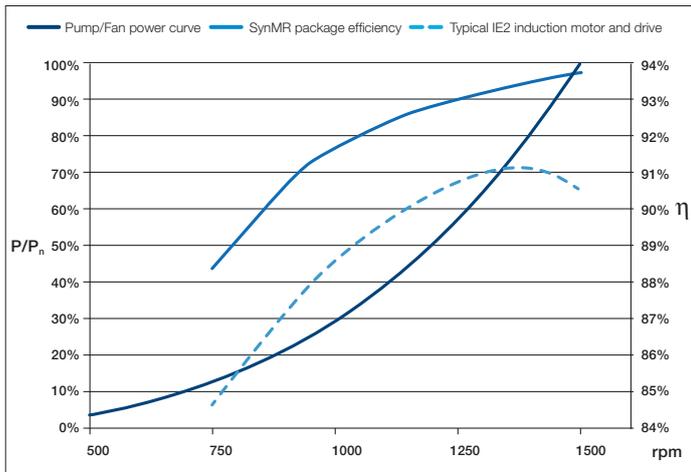


- New system efficiency classes (IES) for the drive, motor and auxiliaries
- Provides a standardized way to determine system losses via measurements or calculations at standardized operating points
- The PDS efficiency class is based on the determined system losses at one operating point

- Typical operating area
- Operating point where IE efficiency classes are defined
- Standardized operating points
- Operating point where PDS efficiency classes (IES) are determined

Power drive system efficiency

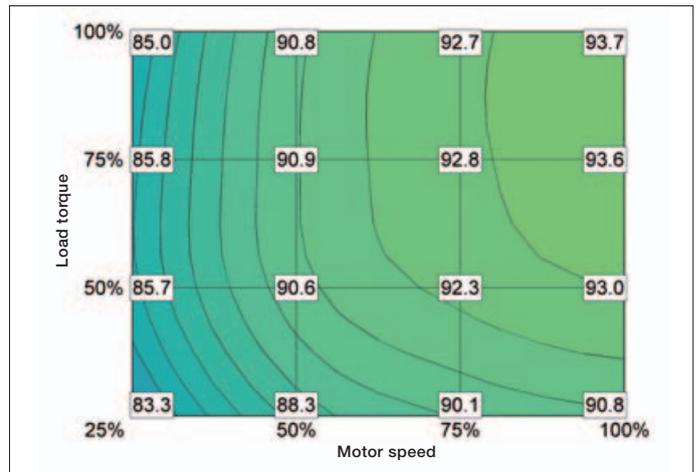
The efficiency classes in the standards are commonly defined at the maximum speed and load point (100, 100), but in reality, very rarely driven equipment runs at that speed.



Drive system efficiency (75 kW, 1500 rpm) in pump/fan duty

In addition to the operating points required by the standard, ABB has verified additional points across the full speed range to ensure you get the true system efficiency at the speeds that you will be running. These points have been verified according to the methods defined in the EN 50598.

ABB has created manufacturer's statements that provide verified system efficiency values for several drive and motor packages targeted at different applications. The graphs above come from one of these statements.



Drive system efficiency (%) (75 kW, 1500 rpm) at various operating points

The graph on the left shows an example of verified system efficiency numbers for an ABB drive and IE4 SynRM motor package for quadratic load (pump and fan) applications compared to a typical IE2 induction motor and drive package. The theoretical power curve for pump or fan applications is also presented in the same graph.

The graph on the right shows an example of verified system efficiency numbers in the typical operating area for the same ABB drive and IE4 SynRM motor package, but for other load types.



ABB is a complete drive module (CDM) and motor manufacturer. We strongly support the system approach in the EN 50598-2 in order to determine and verify the efficiency of the power drive system. We also support the approach in EN 50598-1 for power driven equipment efficiency standards.



EN 50598-2

EN 50598-1

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