



Best Practice	REPLACEMENT OF MOTOR	HVAC-08
Application	Optimisation of HVAC systems	
SME sector	All	
SME Sub-sector	All	
Recommendation for optimisation	<p>To assess the efficiency of a motor, the ErP directive (VO (EU) 327/2011) from the European Commission have set minimum efficiency criteria which allow an evaluation of motors. This affects fans with an electrical output between 0.125 kW and 500 kW.</p> <p>The standard IEC 60034-30-1 defines the efficiency classes of asynchronous motors (<i>IE=International Efficiency</i>), the efficiencies and the efficiency classes at 50 and 60 Hz for single-phase and three-phase mains motors with 2÷8 poles in a power range from 0.12 to 1,000 kW. The following figure shows the efficiency values according to the motor standards.</p>	
Relevant technical considerations	<p>EU Regulation 640/2009 and Supplement 04/2014 (<i>ErP Directive</i>) deal with the energy consumption and energy efficiency of three-phase asynchronous motors for mains operation in an industrial environment. This regulation is valid in all countries of the European Union. The EU regulation is based on the standard IEC 60034-30: 2008.</p> <p>The required minimum efficiency criteria for motors from 0.75 kW to 375 kW are IE3 or IE2 motor with frequency converter. Since the ErP Directive introduces minimum efficiency standards it is recommended to purchase a motor with a higher overall efficiency for the replacement. The common efficiency class for motor systems today is IE4 (some manufacturers offer IE5).</p>	
Economics	Several factors affect investment costs, and a case-by-case assessment is necessary.	
Energy savings	A pressure drop of 15% means at the same time a 15% increase in energy requirements for heating and cooling and about 40% more energy required for motor performance.	
Economic savings	Between 15% and 30% of the costs for the energy consumed.	
Average Payback Time	3-6 years	
Emissions	This measure does not involve further emissions.	
Environmental benefits	Reduction of CO ₂ emissions due to lower energy needs.	



Main NEBs (Multiple benefits)	<input checked="" type="checkbox"/> Environmental benefits <input type="checkbox"/> Increased productivity <input type="checkbox"/> Work environment/ Health/Safety <input type="checkbox"/> Increased competitiveness <input checked="" type="checkbox"/> Maintenance
Replicability	<p>Medium</p> <p>In some cases, optimizing some parts of the system is not possible or not cheap.</p>
Related measures	<ul style="list-style-type: none"> • HVAC-01: Reduction of fan running time • HVAC-02: Flow rate reduction through variable speed variation (VSD) • HVAC-03: Replacement of fan • HVAC-04: Replacement of transmission system • HVAC-05: Heat and moisture recovery • HVAC-06: Reduction of pressure loss • HVAC-07: Leakage reduction of pipes • HVAC-08: Replacement of motor
References	<p>Gerstbauer, Ch., Kulterer, K., Gorbach, Ch., Brunner, W., Leitfaden für Energieaudits von Lüftungsanlagen, klimaaktiv energieeffiziente betriebe, Wien 2013</p>

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