



Best Practice	LEAKAGE REDUCTION OF PIPES	HVAC-07																
Application	Optimisation of HVAC systems																	
SME sector	All																	
SME Sub-sector	All																	
Technical description	<p>Maintenance and servicing of filters, air ducts and fittings has a significant impact on the efficiency of a ventilation system. Maintenance and servicing of these components is all too often neglected when considering the ventilation system, although they can have a high proportion of the required energy input. The effects of poorly maintained or leaking equipment are manifested in increased flow or pressure drop.</p> <p>The power requirement of the fan, and the energy requirements of the air conditioning depend on the delivered air flow and the pressure loss to be overcome. For this reason, when the system is optimized for energy efficiency, the tightness and pressure loss of the system must also be considered.</p>																	
Recommendation for optimisation	<p>Dirty or leaky air ducts increase the pressure loss and the flow rate and thus the energy consumption of fans and conditioning. the tightness of the piping system can be of crucial importance.</p> <p>But not only the leaks and contamination in air ducts cause an increased energy demand, but also not completely closing shut-offs or throttle bodies. If these do not close properly or not tightly the areas are unnecessarily supplied with air. This leads to an increased air volume flow with all its increased energy costs.</p>																	
Relevant technical considerations	<p>Air-tightness classification of ducts: tightness classes have been designed for round and rectangular ducts. There are 7 classes according to EN DIN 13798-3, ATC 7 to ATC 1 – where ATC 7 is the worst and ATC 1 is the best. In all systems where no tightness class has been defined (especially older air ducts), it can be assumed that the tightness class is equal to class ATC 6 and has a volume flow loss of about 15%.</p> <div> <div>Leakage classes (EN 16798)</div> <table> <tr> <th>Loss classes</th> <th>Air leak (fmax) $m^3s^{-1} \times m^{-2}$</th> </tr> <tr> <td>ATC 7</td> <td>Not classified</td> </tr> <tr> <td>ATC 6</td> <td>$0,0675 \times p_t^{0,65} \times 10^{-3}$</td> </tr> <tr> <td>ATC 5</td> <td>$0,027 \times p_t^{0,65} \times 10^{-3}$</td> </tr> <tr> <td>ATC 4</td> <td>$0,009 \times p_t^{0,65} \times 10^{-3}$</td> </tr> <tr> <td>ATC 3</td> <td>$0,003 \times p_t^{0,65} \times 10^{-3}$</td> </tr> <tr> <td>ATC 2</td> <td>$0,001 \times p_t^{0,65} \times 10^{-3}$</td> </tr> <tr> <td>ATC 1</td> <td>$0,00033 \times p_t^{0,65} \times 10^{-3}$</td> </tr> </table> </div>		Loss classes	Air leak (fmax) $m^3s^{-1} \times m^{-2}$	ATC 7	Not classified	ATC 6	$0,0675 \times p_t^{0,65} \times 10^{-3}$	ATC 5	$0,027 \times p_t^{0,65} \times 10^{-3}$	ATC 4	$0,009 \times p_t^{0,65} \times 10^{-3}$	ATC 3	$0,003 \times p_t^{0,65} \times 10^{-3}$	ATC 2	$0,001 \times p_t^{0,65} \times 10^{-3}$	ATC 1	$0,00033 \times p_t^{0,65} \times 10^{-3}$
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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	Less than 3 to 6 years (typically 1-6 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 checked="" type="checkbox"/> Work environment/ Health/Safety <input type="checkbox"/> Increased competitiveness <input checked="" type="checkbox"/> Maintenance
Replicability	High
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-06: Reduction of pressure loss • HVAC-07: Leakage reduction of pipes • HVAC-08: Replacement of motor
References	Gerstbauer, Ch., Kulterer, K., Gorbach, Ch., Brunner, W.,.: Leitfaden für Energieaudits von Lüftungsanlagen, klimaaktiv energieeffiziente betriebe, Wien 2013

This Best Practice was developed by the Impawatt Project (GA No. 785041) and adapted for the GEAR@SME Project (GA No. 894356)