



Best Practice	INSULATION	HYDR-01
Application	Heat distribution	
SME sector	All	
SME Sub-sector	All	
Technical description	<p>Pipes and hydraulic components are often not insulated properly. Insulation is often missing, damaged or insufficient regarding thickness and/or material. Temperatures of heat distribution mediums can vary between -160°C to far above +600°C. Thus, insulation is not always for heat losses only, it can also save energy in cooling systems.</p> <p>An uninsulated pipe transporting water at 80°C, over 10 m for 3,200 hours per year consumes 12 times more energy than an insulated pipe.</p> <p>Indicators for missing or insufficient insulation:</p> <ul style="list-style-type: none"> • Visible damage at the surface of the insulation • High ambient temperature in the surrounding area • Condensation water on the pipes and hydraulic components <p>unusually high surface temperatures of the pipes.</p>	
Recommendation for optimisation	<p>Missing or insufficient isolation should be located and categorized.</p> <p>It is important to consider the insulation of all related components (pipes, valves, etc.).</p> <p>The heat loss of an uninsulated flange corresponds to the heat loss of a non-insulated pipe of the same size with a length of one and a half meters.</p> <p>The heat loss of a seal corresponds to the heat loss of a non-insulated pipe of the same size with a length of one meter.</p> <p>For cooling systems, the insulation of all components is essential for two reasons:</p> <ul style="list-style-type: none"> • Heat gain increases the heat load and energy demand of the cooling systems • Condensation of water on the surface of cold pipes can cause corrosion and destruction of the whole equipment <p>Therefore, the calculation of the thickness and sometimes the use of different insulation layers and materials are very important in these cases.</p>	
Relevant technical considerations	<p>Depending on the application, the right type of insulation should then be picked (regarding stability etc.). As a rule of thumb, insulation can be dimensioned economically as follows:</p> <ul style="list-style-type: none"> • Below 100°C: 1mm insulation for every °C of the medium 	



	<ul style="list-style-type: none"> Above 100°C: 0,5mm insulation for every °C of the medium 	
Economics	<p>7-20 EUR/m² (depending on the thickness)</p> <p>The lamellar carpet for pipe insulation is mainly used for pipes with a diameter of more than 250 DN and for temperatures below 300°C.</p> <p>In most cases they do not require additional construction for structural aid.</p>	
Energy savings	<p>A non-insulated pipe that carries water at 80°C for a distance of more than 10 meters for 3,200 hours per year consumes 12 times more energy than an isolated one. The energy savings are considerable.</p> <p>Energy losses in heat distribution systems range from 15% to 21% of total fuel consumption. Insulation can reduce losses by 30%, leading to an overall decrease in fuel consumption of 6%.</p>	
Economic savings	Up to 10%	
Average Payback Time	<p>3-6 years</p> <p>Pipe insulation in residential buildings has an average PBT less than 1 year</p> <p>The larger the system, the higher the payback time gets</p>	
Emissions	Decrease in fuel consumption and consequent reduction of CO ₂ emissions.	
Environmental benefits	Reduction of CO ₂ emissions.	
Main NEBs (Multiple benefits)	<input 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	<p>Uninsulated pipes can be safety hazards. Insulating components can reduce maintenance needed by avoiding condensation and therefore corrosion is some areas.</p>
Replicability	High	
Related measures	<ul style="list-style-type: none"> HYDR-02: Hydraulic balancing HYDR-03: Delta T Optimization 	
Case study	<p>Replacing damaged insulation of pipes, Vienna airport (Austria, 2016)</p> <ul style="list-style-type: none"> Initial Situation: the buildings at the Vienna airport are energetically connected via a collector, in which pipes for the central cold and heat supply are located. The pipes for the heat, running at an inlet temperature of 150°C, were not insulated properly. 	



	<p>Some pipes had damaged insulation while others were not insulated at all. Some hydraulic components (pumps, valves) were also not insulated either.</p> <ul style="list-style-type: none">• Description of the optimisation: damaged insulation on the pipes and components was replaced, while the missing one was added. Thus, energy losses were reduced by 532.100kWh/a.• Implementation costs: not available• Payback Time: not available
References	<p>Bauer M.: Leitfaden zur Optimierung von Wärmeverteilung, Wien 2018</p> <p>Kulterer K.: Leitfaden technische Wärmeisolierung, Wien 2017</p> <p>Nowak K.: Energy recovery, The technical potential of large and industrial heat pumps, 2017</p> <p>https://www.ee-ip.org/articles/detailed/87f4ab4b1d6c3c767a9dcae1e30b0808/the-technical-potential-of-large-and-industrial-heat-pumps/</p> <p>Wolff D.: Einsparpotenzial des hydraulischen Abgleichs ist hoch, 2009</p> <p>https://www.co2online.de/energie-sparen/heizenergie-sparen/hydraulischer-abgleich/kommentar-hydraulischer-abgleich-einsparpotential/</p> <p>ASUE, Arbeitsgemeinschaft für sparsamen und umweltfreundlichen Energieverbrauch: Optimierung von Wärmenetzen bei KWK-Anlagen</p> <p>https://www.klimaaktiv.at/dam/jcr:55bcd7f4-29a0-4e6f-89f0-cb51fa2c9117/PP_BestPracticeBeispiel_FlughafenWien_FREIGEG_1411_barrierefrei.pdf</p>

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