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Best Practice	OPTIMISATION OF TEMPERATURE DIFFUSION (DELTA T-SYNDROME)	HYDR-03
Application	Heat distribution	
SME sector	All	
SME Sub-sector	All	
Technical description	The difference between inlet and return temperature is called delta T. Basically, the transported heat energy is proportional to delta T, according to the following formula for calculating the heat flow: $\dot{Q} = \dot{V} \times \Delta T \times c \times \rho$ c specific heat capacity[J/(kg*K)] ρ density [kg/m³] $\dot{V}$ volume flow [m³/s] ΔT delta T [K] If delta T is low, the emitted heat to the user is low and the warm water is circulated, thus indicating bad efficiency of the system. Main indicators: • Low delta T • High return temperatures	
Recommendation for optimisation	There are several ways to optimize temperature separation: Reduction of the return temperature • Return temperature reduction by installation of buffer tanks with fresh water module in residential buildings • Return temperature reduction with efficient hydraulic separators • High-efficient frequency-controlled pumps • Renovation of the control components • Use of new regulation valves Raising return temperature It is not always neither possible nor feasible to lower the return temperature. Some heat sources (e.g., condensing boilers) don't operate optimally, if delta T exceeds 20°C.	

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	If this happens, the return temperature has to be raised by using a special mixing valve, which mixes part of the inlet flow to the return flow. The rise in temperature is controlled by a shunt pump.	
Economics	Depending on the system, some components, such as pumps, need to be replaced, resulting in higher investment costs (400-1,000 EUR).	
Energy savings	Reducing the temperature of the return flow can reduce the energy consumption of the system by 0.6% for each °C. A lot of energy is also directed to the pumps, which are needed to circulate the fluid. Lowering the temperature of the return flow results in a decrease in the necessary volumetric flow rate and this reduces the energy consumption of the pumps. An increased difference of 10°C can save up to 40% of the electricity used by the pumps.	
Economic savings	Up to 40%	
Average Payback Time	Less than 3 years or 3-6 years (depending on the system, some components, such as pumps need to be replaced, resulting in higher investment costs).	
Emissions	Reducing CO_2 emissions	
Environmental benefits	Reducing CO_2 emissions	
Main NEBs (Multiple benefits)	☒ Environmental benefits ☐ Increased productivity ☐ Work environment/ Health/Safety ☐ Increased competitiveness ☐ Maintenance	Environmental benefits come from reduced CO_2 emissions.
Replicability	High	
Related measures	• HYDR-01: Insulation • HYDR-02: Hydraulic balancing	
References	Bauer M.: Leitfaden zur Optimierung von Wärmeverteilung, Wien 2018 Kulterer K.: Leitfaden technische Wärmeisolierung, Wien 2017 Novak K.: Energy recovery, The technical potential of large and industrial heat pumps, 2017	

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