

Heat Loss of Insulated Pipe

Sample document with complete example values. It shows the report the purchased export produces for YOUR input - it is not itself a report for any part.

Project: Sample project

Part/Position: no real part

Prepared by: Sample, not released

Touch protection: pass - the surface temperature (25.7 °C) is safely below the limit of 60 °C.

System

Medium temperature θ_m	120 °C
Ambient temperature θ_a	20 °C
Temperature difference ΔT	100 K
Outer heat-transfer coefficient α_o	10 W/(m ² ·K)
Pipe length L	10 m
Touch-protection limit	60 °C

Layer structure (inside to outside)

Layer	r_i [mm]	r_o [mm]	λ [W/(m·K)]
Pipe wall	53.7	60.3	50
Insulation	60.3	110.3	0.04

Thermal resistances per unit length

Component	R' [m·K/W]	Share [%]
Pipe wall	0.0004	0
Insulation	2.4027	94.3
External convection	0.1443	5.7
Total	2.5474	100

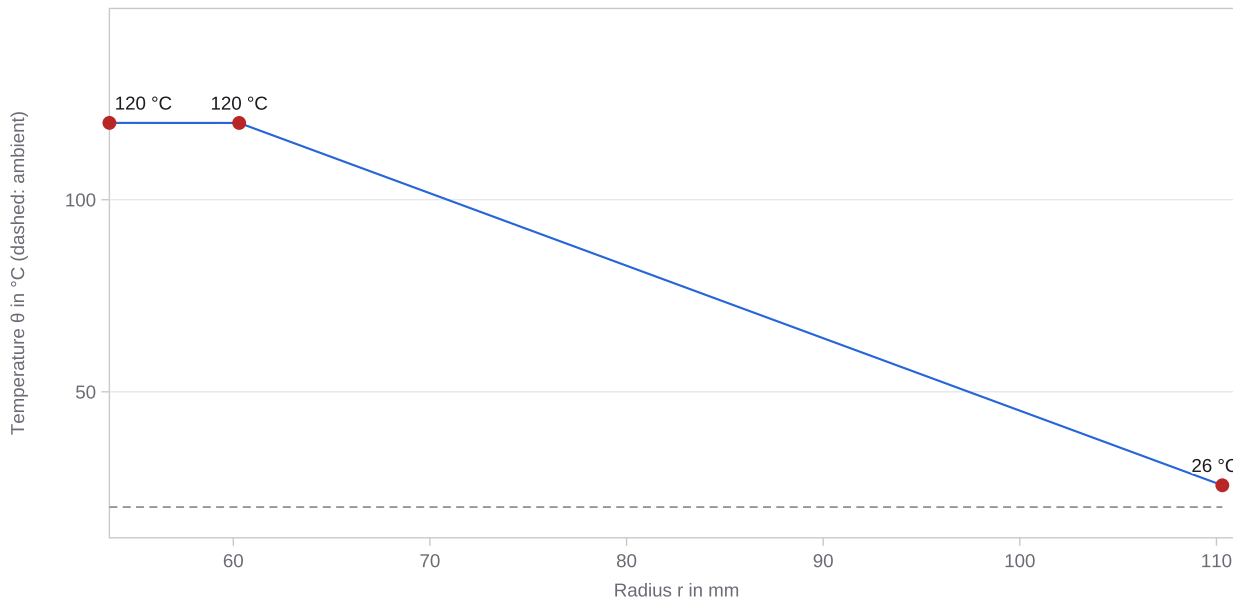
Results

Heat flow rate per length Q'	39.26 W/m
Total heat loss Q	392.6 W
Surface temperature θ_s	25.7 °C

Touch protection assessment

Criterion	Value	Limit	Status
Surface temperature θ_s	25.7 °C	≤ 60 °C	● OK

Radial temperature profile



Calculation basis

The heat loss results from the series connection of cylindrical thermal resistances per metre of pipe length: (optional internal convection) + pipe wall + insulation + external convection. For each layer $R' = \ln(r_o/r_i)/(2 \cdot \pi \cdot \lambda)$ applies, and for convection $R' = 1/(\alpha \cdot 2 \cdot \pi \cdot r)$. The heat flow rate per unit length is $Q' = \Delta T/R'_{\text{total}}$, the total loss $Q = Q' \cdot L$, and the surface temperature $\theta_s = \theta_a + Q' \cdot R'_{\text{outer}}$.

Model: steady-state, radial heat conduction through the full hollow cylinder with constant material properties. Thermal bridges (supports, flanges, fittings), surface radiation and moisture are not accounted for; λ and α values are reference figures with real-world scatter. Not a normative proof - manufacturer data and applicable codes take precedence.

About this sample

All values on these pages come from a freely chosen example calculation and belong to no real part. The purchased export contains the same sections with your input, your header data (project, part, prepared by) and as searchable text. Pricing and scope: maschinenbaurechner.de/en/pricing

Note: The results are design and orientation aids. They do not replace independent verification, calculation and approval by a qualified person. The terms of use at maschinenbaurechner.de apply.