PAROC® PRO LOCK (WR) PIPE SECTIONS

ALL THE BENEFITS OF A DOUBLE LAYER INSULATION SYSTEM
IN A SINGLE LAYER APPLICATION

PRO LOCK

HEAT LOSS UNDER
LOCK AND KEY

OWENS CORNING® PAROC®

SAVING TIME AND MONEY

*PAROC® Pro Lock (WR) gives same advantages of double layer insulation in one single-layer solution. According to our calculations, the innovative z-lock design can reduce heat losses and installation times - saving time and money**

**based on internal calculations (e. g PAROC® Calculus 2023)*

Steam and other high temperature media are regularly processed in most industrial plants. Hence requiring a high performing thermal insulation system, in order to maintain optimal process temperatures and prevent heat and energy losses.

Pipe insulation systems are often being installed during maintenance downtime. As a result, the temperature of the process pipes are similar to the ambient temperature during this installation phase.

When the systems are being heated to operating temperature, a thermal expansion of the pipes will take place. This can lead to serious heat and energy losses, if not considered from an insulation perspective.

Industrial insulation specifications are often duplicated from project to project. Opportunities for reducing heat losses, reducing CO_2 emissions, minimizing downtime and saving money are missed. Updating insulation specifications to include innovative solutions like PAROC® Pro Lock pipe sections (WR) would offer great benefits to the process owner.

BENEFITS COMPARED TO WIRED MATS:

- **Outstanding solution minimizing thermal leaks**
- **Thin insulation solution**
  - Less surface area and cladding material
  - Takes less space in processes
  - Lower installation costs, less installation time (compared to 2 layer solution)
- **No supporting structure for cladding needed**
- **Thermal expansion of metal pipe does not open the z-lock joints**
- **Reduction in down-time on the plant during maintenance**
- **Higher compressive strength and excellent resistance against mechanical impacts**

**compared to standard pipe insulation (internal testing)*

PAROC® PRO LOCK (WR) – AN EXCELLENT SOLUTION FOR PIPES!

PAROC® Pro Lock (WR) simulates overlapping double layers in one application – saving time and money (compared to a 2-layer solution).

Optimising energy consumption is a priority in all industrial plants as it supports optimal functionality, efficiency, and profits.

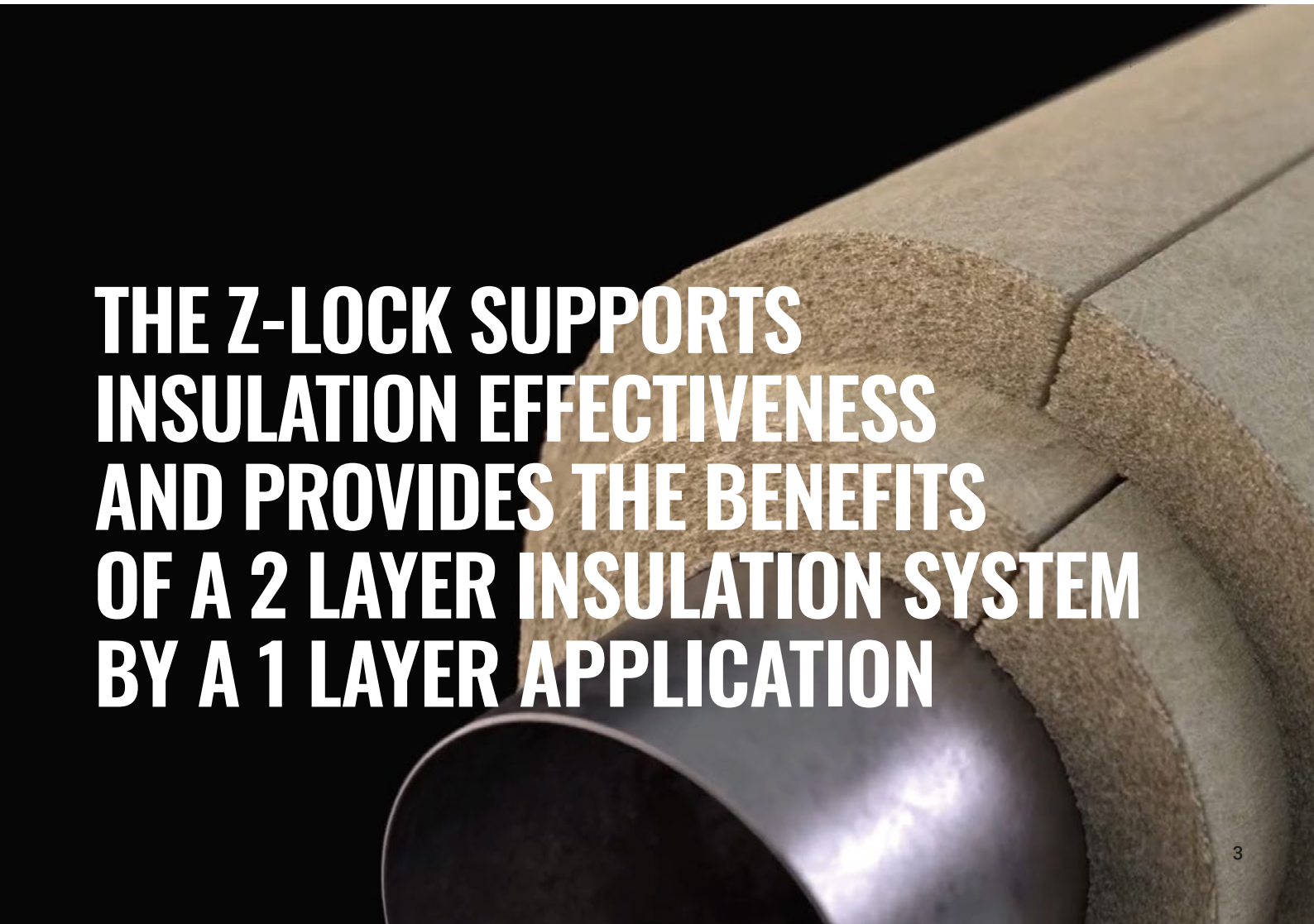
When operating temperatures exceed 250 °C, or required thickness exceeds 160 mm, overlapping double layer insulation is often required. Paroc offers double layer solutions, but through innovation also offers its Pro Lock (WR) option, which simulates overlapping double layers in one application.

Expansions of the pipeline at high temperatures can be offset by the z-lock cut into the ends and down the length of the section, and heat losses are reduced. Compatible double layer segments may be used for pipe bends, which offers optimal insulation for the entire pipeline.

For most applications, PAROC® Pro Lock (WR) 100 is suitable. However, when temperatures exceed 350 °C, PAROC® Pro Lock (WR) 140 is recommended.

PRO LOCK

HEAT LOSS UNDER LOCK AND KEY



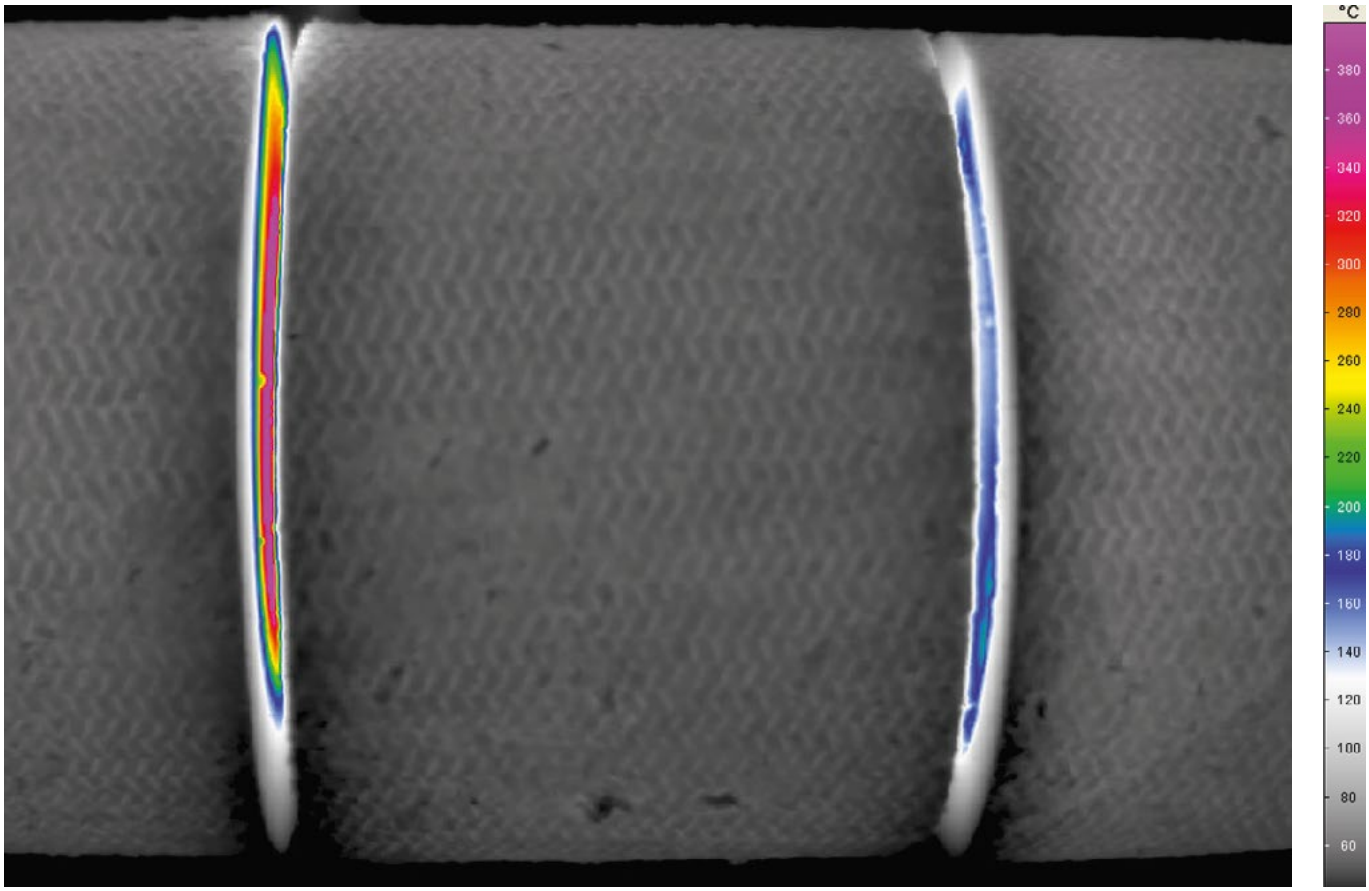
THE Z-LOCK SUPPORTS INSULATION EFFECTIVENESS AND PROVIDES THE BENEFITS OF A 2 LAYER INSULATION SYSTEM BY A 1 LAYER APPLICATION

PAROC® PRO LOCK - A COMPARISON

Image by high-resolution infrared camera (Infratec VarioCam high resolution)
Test setup according to EN 14707
Medium temperature 600 °C gap simulation about 10 mm
Insulation thickness 100 mm / D=219 mm

- left gap PAROC® Pro Section 100 (without z-lock)
- right gap PAROC® Pro Lock 100

FIW München
Forschungsinstitut für Wärmeschutz e.V. München



PAROC® PRO LOCK IN PRACTICAL APPLICATION

Also available with outstanding water-repellency features

OUTSTANDING WATER REPELLENCY

CALCULATION OF ENERGY EFFICIENCY

Utilisation of PAROC® Pro Lock (WR) in comparison to open joints of Wired Mat single layer insulation

Presumed situation on site:
Stainless steel pipe D = 219.1 x 3.0 mm
Overall length 100 m, medium temperature 400 °C, ambient temperature 10 °C
Preferred insulation PAROC® Pro Lock (WR) 140 – insulation thickness 120 mm
Comparison insulation PAROC® Pro Wired Mat (WR) 700 TH1 – insulation thickness 120 mm

Required design lambda (thermal conductivity) & thermal bridge corrections in Wired Mat insulation per ISO 12241:2022 & ISO 23993:
Joint factor multiplies lambda x 1.1. Steel cladding spacers add 0.01 W/mK.

Required design lambda & thermal bridge corrections in conventional Pipe Section insulation per ISO 12241:2022 & ISO 23993:
None.

Suggested design lambda correction in Pro Lock insulation per ISO 23993 Annex A.6:
5% reduction in lambda.

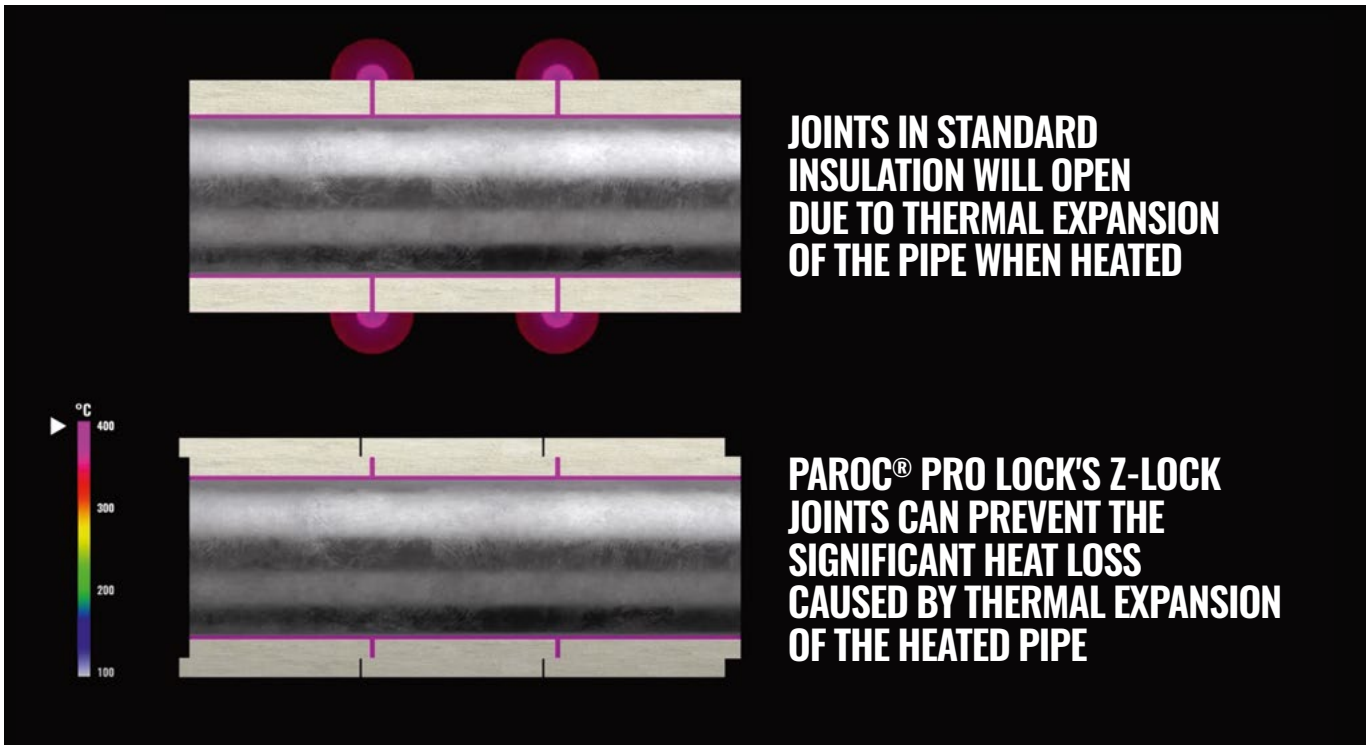
Estimation of heat losses in each scenario

Medium 400 °C, ambient temperature 10 °C, wind speed 5 m/s, cladding galvanized steel sheet.
Annual operating hours 8760, energy source dry natural gas at 10 cents per kWh and 202g/kWh CO_2*.

	Annual energy losses, cost, CO_2 - thickness 120 mm, 100 m	Reduction in heat flux, lost energy cost, CO_2	10 year saving
1 layer Wired Mat insulation with open joints	260 W/m, €22776, 46 tonnes CO_2		
1 layer PAROC® Pro Section (WR)	221 W/m, €19360, 39 tonnes CO_2	**15%**	€34,160, 70t CO_2
1 layer PAROC® Pro Lock (WR) with z-locked joints (or PAROC® Pro Section (WR) DL)	210 W/m, €18396, 37 tonnes CO_2	**19-20%**	€43,800, 90t CO_2

In the joint area PAROC® Pro Lock 219 x 120, included in the calculation, in comparison to standard insulation, features a z-lock that replicates the effect of having overlapping double layers of insulation, keeping the insulation system intact in the event of linear expansion of the pipe and minimises heat loss according to the table.

**Calculations done in Calculus using ISO 12241:2022 & ISO 23993:2010.Energy source data: https://www.forestresearch.gov.uk/tools-and-resources/fthr/biomass-energy-resources/reference-biomass/facts-figures/carbon-emissions-of-different-fuels/*



PAROC® WR PIPE SECTIONS:

- **Significantly less water absorption than the requirements of the toughest standard (EN13472/24h)**
- **Elevated temperature range - water absorption levels measured after preheating the products to 300 °C***
- **Safe to use during painting operations and tested according to the requirements of the coating compatibility standard VDMA 24364**
- **More than 20 years' experience with WR mineral wool products for industrial applications**
- **Broad WR offering range including pipe sections, wired mats, mats and slabs**
- **Average water absorption <0,1 kg/m²* according to EN13472/24h**

**based on external 3rd party testing 2019 and internal testing 2023 and 2024.*

PAROC® PRO LOCK WR 100

Water repellent stonewool pipe section with a z-joint on the longitudinal and circumferential seams

Application

- Insulation of industrial pipework at high temperatures

Technical Data

- Melting point > 1000 °C according to DIN 4102-17
- Non-combustible EN 13501-1: $A1_L$
- Upper application temperature limit according to EN 14707 and AGI Q 132 max. 640 °C
- Non-wicking according to EN 13472
- AS-quality according to EN 13468 and AGI Q 132
- Safe to use in combination with painting operations
- AGI designation code: 10.04.03.50.10
- Quality monitored according to VDI 2055
- CE-designation code: MW-EN 14303-T8/T9-ST(+)640-WS1-CL10

OUTSTANDING WATER REPELLENCY

Datasheet
www.paroc.com/products/technical-insulations/ti-pipe-sections/paroc-pro-lock-wr-100

Nominal value of thermal conductivity λ according to EN ISO 8497

t	°C	50	100	150	200	250	300
$\lambda_{N,P}$	W/mK	0.039	0.045	0.054	0.064	0.077	0.092

PAROC® PRO LOCK 100

Stonewool pipe section with a z-joint on the longitudinal and circumferential seams

Application

- Pipework for Industry and power plants, district heating and exhaust lines

Technical Data

- Melting point > 1000 °C according to DIN 4102-17
- Non-combustible EN 13501-1: $A1_L$
- Upper application temperature limit according to EN 14707 and AGI Q 132 max. 640 °C
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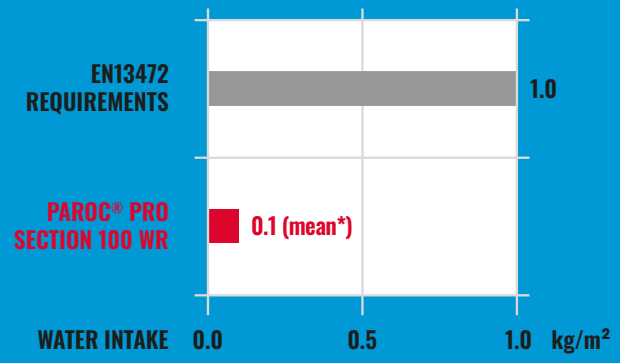


OUTSTANDING WATER ABSORPTION PROPERTIES FOR STONE WOOL INSULATION

10 TIMES BETTER THAT THE REQUIREMENTS OF THE TOUGHEST KNOWN STANDARD AVAILABLE (EN13472), EVEN AFTER BEING EXPOSED TO TEMPERATURES UP TO 300 °C*

** average water absorption level <0,1 kg/m² after 300 °C/24h prebake; based on 3rd party testing in 2019 and internal testing in 2023 and 2024*

PAROC® PRO LOCK WR 140

Water repellent stonewool pipe section with a z-joint on the longitudinal and circumferential seams

Application
- Thermal insulation of industrial pipework at high temperatures

Technical Data
- Melting point > 1000 °C according to DIN 4102-17
- Non-combustible EN 13501-1: $A1_L$
- Upper application temperature limit according to EN 14707 and AGI Q 132 max. 680 °C
- Non-wicking according to EN 13472
- AS-quality according to EN 13468 and AGI Q 132
- Safe to use in combination with painting operations
- AGI designation code: 10.04.04.80.14
- Quality monitored according to VDI 2055
- CE-designation code: MW-EN 14303-T8/T9-ST(+)680-WS1-CL10

OUTSTANDING WATER REPELLENCY

Datasheet
www.paroc.com/products/technical-insulations/ti-pipe-sections/paroc-pro-lock-wr-140

Nominal value of thermal conductivity λ according to EN ISO 8497

t	°C	50	100	200	300	400
$\lambda_{N,P}$	W/mK	0.041	0.047	0.063	0.085	0.110

PAROC® PRO LOCK 140

Stonewool pipe section with a z-joint on the longitudinal and circumferential seams

Application
- Thermal insulation of industrial pipework at high temperatures

Technical Data
- Melting point > 1000 °C according to DIN 4102-17
- Non-combustible EN 13501-1: $A1_L$
- Upper application temperature limit according to EN 14707 and AGI Q 132 max. 680 °C
- Non-wicking according to EN 13472
- AS-quality according to EN 13468 and AGI Q 132
- AGI designation code: 10.04.04.80.14
- Quality monitored according to VDI 2055
- CE-designation code: MW-EN 14303-T8/T9-ST(+)680-WS1-CL10

Datasheet
www.paroc.com/products/technical-insulations/ti-pipe-sections/paroc-pro-lock-140

Nominal value of thermal conductivity λ according to EN ISO 8497

t	°C	50	100	200	300	400
$\lambda_{N,P}$	W/mK	0.041	0.047	0.063	0.085	0.110

RECOMMENDED PRODUCTS FOR INDUSTRIAL PIPEWORK INSULATION

PAROC® CALCULUS:
DESIGN ENERGY-EFFICIENT INSULATION TAILORED TO YOUR PROJECT

PAROC® Calculus is a technical insulation calculation program for dimensioning thermal insulation for different HVAC and Process Industry applications e.g. pipes, ventilation ducts and process industry tanks. With PAROC® Calculus it is also possible to calculate the heat loss for insulated and uninsulated valves and flanges, which usually increases the risk of heat loss. Additionally, the heat loss caused by thermal bridges in pipe and duct suspensions can be taken into account.

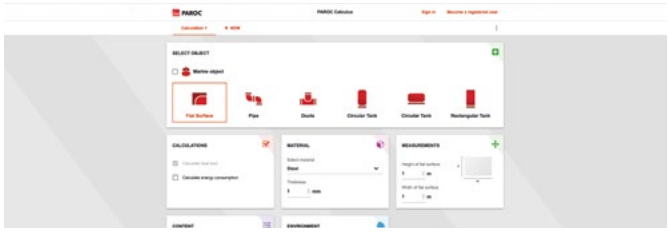
With PAROC® Calculus you can design energy efficient and economical insulation solutions for different HVAC and process industry applications with PAROC products.

PAROC® Calculus features:

Updated according to ISO 12241:2022

- Easy to use interface
- Works on pc, tablets and mobile phones
- Calculations for heat loss, surface temperature and temperature drop in pipes, ventilation ducts, process industry tanks, valves and flanges.
- Easy input of pipe diameters and duct dimensions (predefined)
- Thermal bridges of pipe and duct suspensions
- Print out your calculations to pdf
- All calculations are based on equations described in the EN ISO 12241 standard.

Select application



Calculate with surface temperature display - cladding systems, suspensions and substructures can optionally be used for the calculation

This software (the Service) calculates properties of insulation solutions made by PAROC Technical Insulation products. Calculations are based on standard ISO 12241. The latest version is always on Paroc web pages. The information contained in the online insulation, energy and CO_2 calculations (the Service) is provided in good faith and for general information purpose only. Owens Corning as well as any of its direct or indirect affiliates, including Paroc Group OY (individually and jointly "Owens Corning") assumes no responsibility for errors or omissions in the contents of the Service, including technical or product data, product recommendations, research information, data and/or content contained in the Service. In providing the Service, Owens Corning does not make any warranties about its completeness, its reliability and its accuracy. Any action you take upon the information you find in using the Service, is strictly at your own risk. In no event shall Owens Corning be liable for any special, direct, indirect, consequential, or incidental damages or any other damages whatsoever, whether in an action of contract, negligence or other tort, arising out of or in connection with the use of the Service or the contents of the Service. Owens Corning reserves the right to make additions, deletions, or modification to the contents on the Service at any time without prior notice. By using the Service, you hereby consent to the present disclaimer and agree to its terms.

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