



PAROC PRO WIRED MATS LE

SUMMARY OF FIELD TESTS



PAROC[®]

INTRODUCTION

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NEW PRODUCTS FOR HIGH TEMPERATURE APPLICATIONS IN THE PROCESS INDUSTRY

Our new assortment PAROC PRO WIRED MATS LE is designed for use in high temperature applications in the process industry.

The assortment consists of the following products:

- **PAROC PRO WIRED MAT LE 80**
- **PAROC PRO WIRED MAT LE 80 COMFORT**
- **PAROC PRO WIRED MAT LE 100**
- **PAROC PRO WIRED MAT LE 100 COMFORT**

The LE mat is a non-combustible, heavy-duty stone wool mat for industrial applications produced with a **new, innovative binder** that is part of Owens Corning's global binder platform – a binder based on renewable, bio-based ingredients. Additionally, excellent durability, moisture, fire and sound properties are always part of Paroc insulation performance.

Thanks to the unique properties of the binder, PAROC PRO WIRED MATS can be used for thermal insulation of high temperature applications and **contributes to an improved indoor climate** during the start up of a plant and/or maintenance of equipment.

The overlapping, wired net secures an easy and quick installation.

PAROC PRO WIRED MAT LE 80/100 fully complies with the requirements as set by internationally recognized standards like EN 14303



LABORATORY TESTS

CONCLUSION

In laboratory scale Paroc PRO Wired Mat LE 100 has shown equal or lower high temperature emissions than the competitor benchmark, regardless of the test method the product has been exposed to.



HOT PIPE TEST*

The hot pipe is totally insulated with wool that needs to be tested and put into the small chamber before heating the pipe (300°C → 400°C → 600°C) and emissions starts to form. The wool will slowly heat from the inside towards the outside. Air (5 L/min) was continuously flowing through the chamber, outside of the insulation. Emissions collected onto different cartridges and analyzed according to the best method for each component.

Inside of the emission chamber without sample (left). Outside of the emission chamber (right).



TUBE FURNACE TEST*

A small wool sample is pushed into the Tube Furnace, which has been preheated to 300°C. The binder starts to decompose and all binder will be decomposed after 70-90 min. The airflow through the tube was set to 2 L/min. Emissions collected onto different cartridges and analyzed according to the best method for each component

Tube Furnace. Picture from the feeding side, where the sample is pushed into the furnace through a quartz pipe. The plastic hose in the left side of the picture provides the primary flow for the furnace.



CHAMBER TEST**

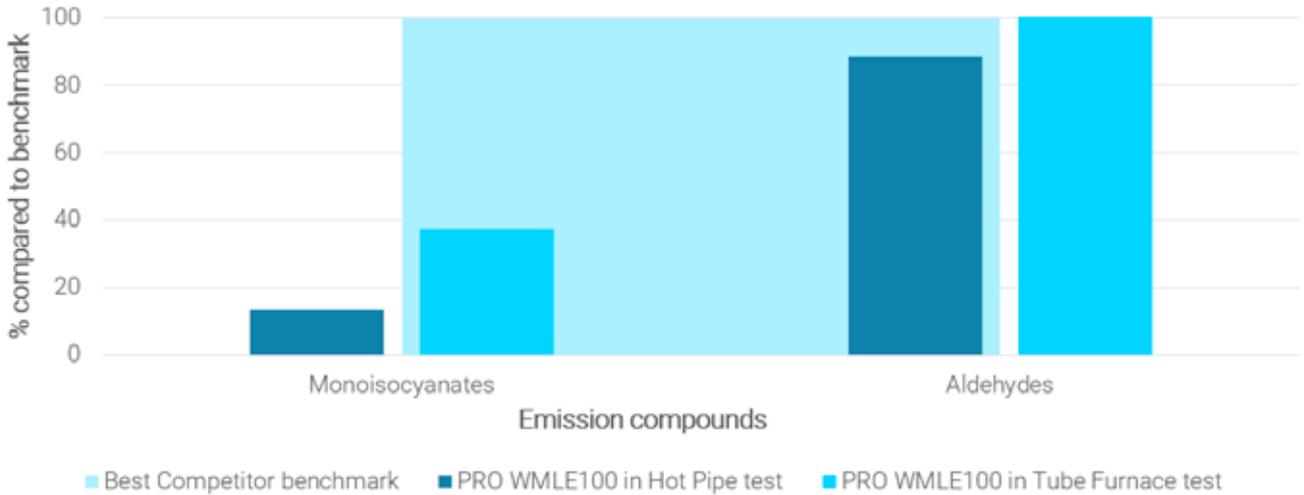
Wool sample is heated on a laboratory hot plate preheated to 380-400°C in ~4.75 m³ chamber, where the air is circulated with a fan. The air was changed by 1 m³/min and was totally changed during 5 min. Emissions in the chamber were collected inside the chamber onto different cartridges and analyzed according to the best method for each component

* Made at Research Institutes of Sweden (RISE) in Borås, Sweden (Hot Pipe a joint Paroc /RISE developed method)

** Made at Occupational and Environmental Medicine, Linköping University Hospital, Sweden

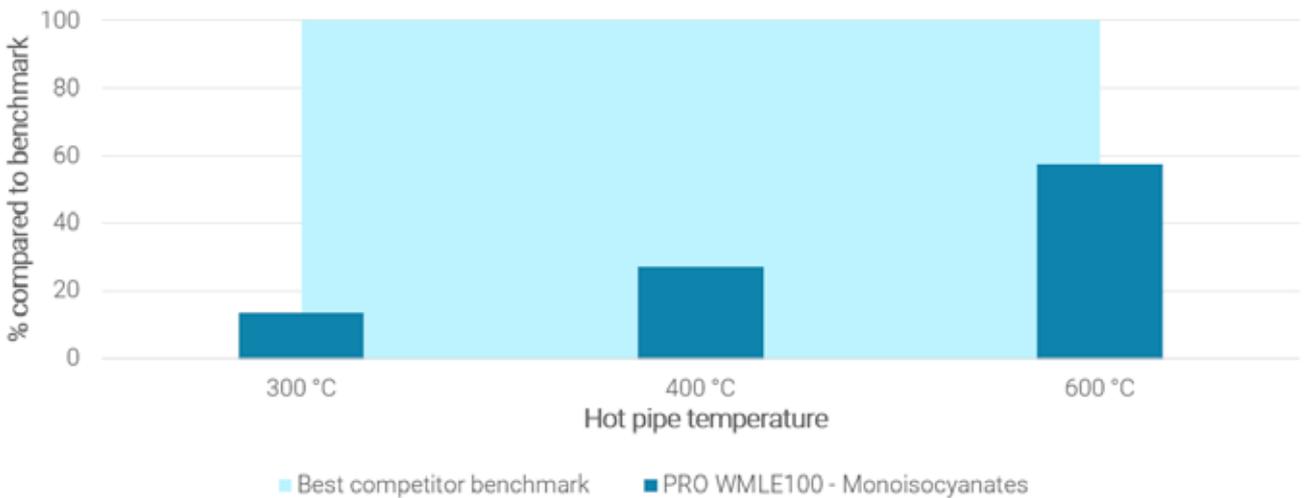
LABORATORY TEST RESULTS

HOT PIPE AND TUBE FURNACE TESTS AT 300 °C



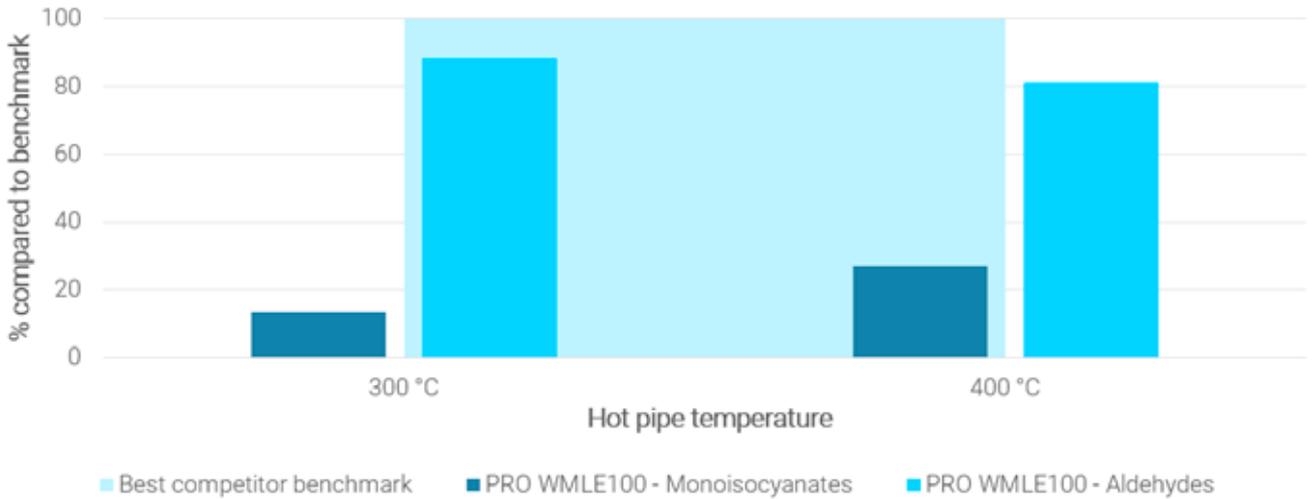
Paroc PRO WMLE100 shows equal or lower emissions at 300 °C both in the Hot Pipe and Tube Furnace test

HOT PIPE TESTS AT 300 °C → 400 °C → 600 °C



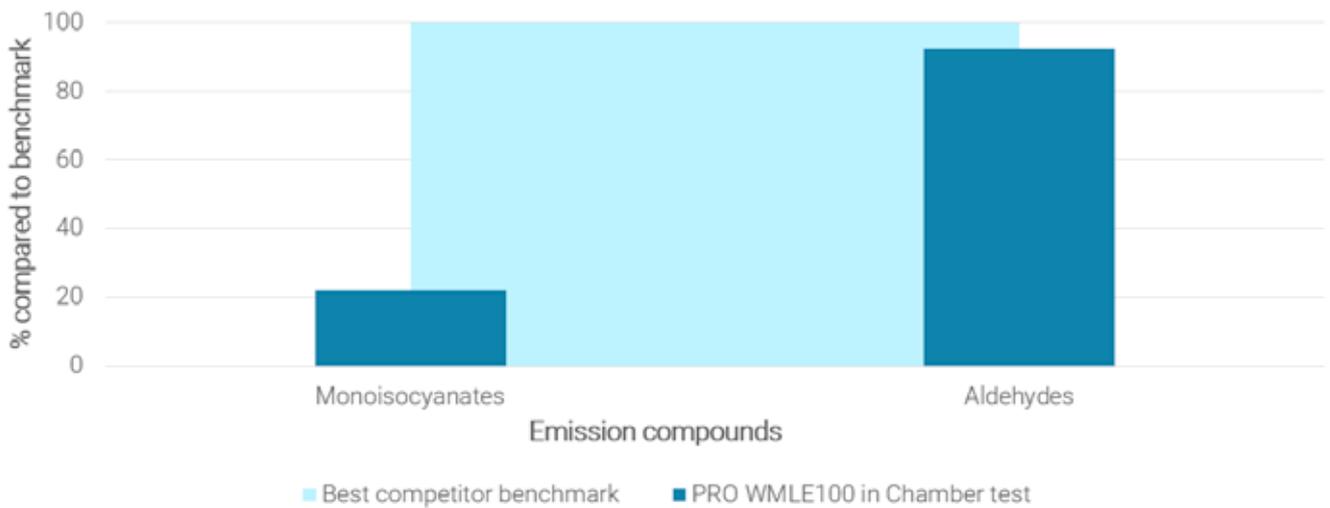
Paroc PRO WMLE100 shows lower monoisocyanate emissions at 300 °C → 400 °C → 600 °C in the Hot Pipe test

HOT PIPE TESTS AT 300 °C AND 400 °C



Paroc PRO WMLE100 shows equal or lower emissions at 300 °C and 400 °C in the Hot Pipe test

CHAMBER TEST AT 380-400 °C



Paroc PRO WMLE100 shows equal or lower emissions at 380-400 °C in the Chamber test

CUSTOMER INSTALLATION

CONCLUSION

In a customer installation Paroc PRO Wired Mat LE 80 and Paroc PRO Wired Mat LE 100 emitted Monoisocyanates **below Occupational Exposure Limit** values both during stationary and personal sampling tests.

CONDITIONS:

- PAROC PRO WIRED MAT LE products were installed on a boiler at a customer site
 - Two different density products were installed around two components:
 - 486 m² Paroc PRO Wired Mat LE 100 (100mm)
 - 135 m² Paroc PRO Wired Mat LE 80 (100mm)
- corresponding to a total of 62.1 m³ new insulation with a mass of 5.9 metric tons
- Measurements in the air at the start-up were conducted by Occupational and Environmental Medicine, Linköping University Hospital, Sweden
 - 9 different stationary stations were set up around the newly installed wool
 - Personal samplers were mounted near the breathing zone (<30 cm from the mouth/nose) of the operators and emissions were collected while work with the stationary stations were done
 - Collections of emissions were done 12 – 84 h after the heating of the boiler had started



RESULTS - STATIONARY SAMPLING

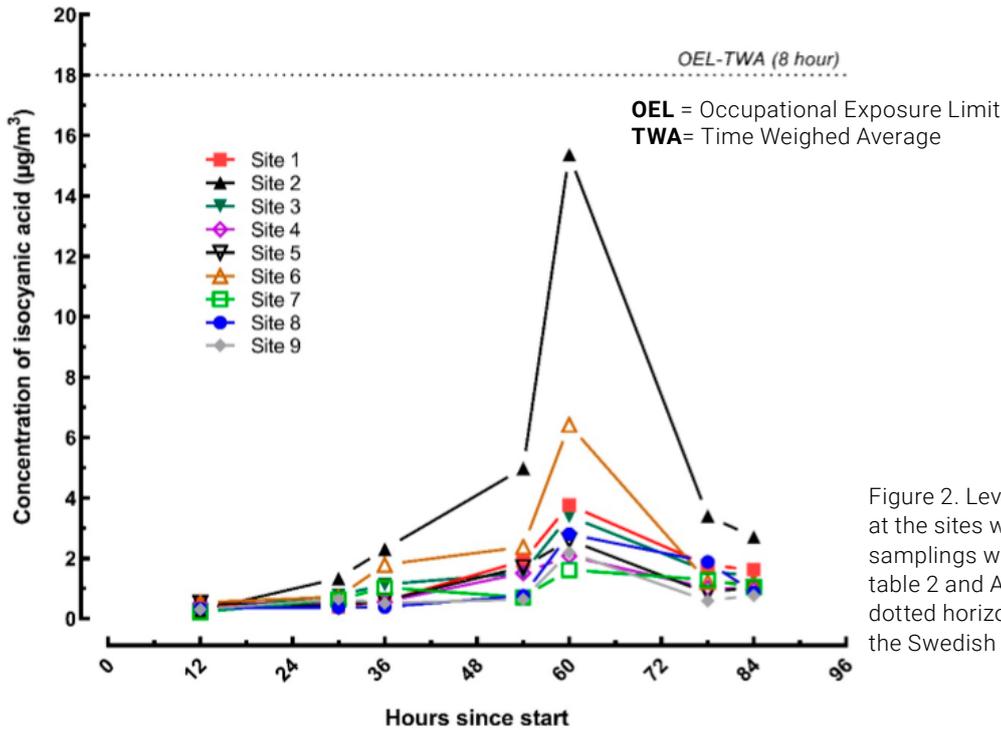


Figure 2. Levels of isocyanic acid at the sites where stationary samplings were performed (see table 2 and Appendix 1). The dotted horizontal line indicate the Swedish TWA-OEL (8h).

CONDITIONS:

- The air flow in the plant was from bottom to top of the building
- Site 1, 2, 3 and 4 were on the highest floor and site 2 was selected as being a suspected "hot spot"
- Site 5-9 were lower in the building
- At 60 h the furnace core had reached a temperature of 720 °C and the parts insulated 350-380 °C. Site 2 significantly higher.

ASSESSMENT by Occupational and Environmental Medicine:

"On day three, at the time point 60 hours, the temperature of the superheaters were well above 200 °C, a temperature where normally much ICA will emit from mineral wool products that use PUF as a binder (urea-modified phenol-formaldehyde resin). However, only a modest increase in ICA-levels could be seen after 60 hours in this full-scale test where hot surfaces on the pan had been insulated with 5.9 metric tons of mineral wool with the new binder, free from PUF."

RESULTS - PERSONAL SAMPLING

OEL-TWA = 18 µg/m³

| Day | Time since start of furnace (h) | Operator | Sanpling time* (minutes) | Concentration of ICA (µg/m³) |
|-----|---------------------------------|----------|--------------------------|------------------------------|
| 2 | 30-36 | 1 | 119 | 0,31 |
| 2 | 30-36 | 2 | 119 | 0,46 |
| 3 | 54-60 | 3 | 74 | 0,75 |
| 3 | 54-60 | 4 | 74 | 0,86 |
| 4 | 78-84 | 2 | 91 | 0,81 |

CONDITIONS:

* The total of two samplings, one in the morning and one in the afternoon.

ASSESSMENT by Occupational and Environmental Medicine:

"The personal samplings revealed that the concentration of ICA never exceeded 1 µg/m³. During these measurements, the operators circulated between different sampling sites and floors, mainly on floors 6 to 9. Thus, being in the building, even under the start-up phase and close to newly insulated parts, does not indicate that there is a risk of being exposed to high levels of ICA."

READ MORE ABOUT THE NEW PRODUCTS:

<https://www.paroc.se/produkter/teknisk-isolering/industri-natmattor>

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