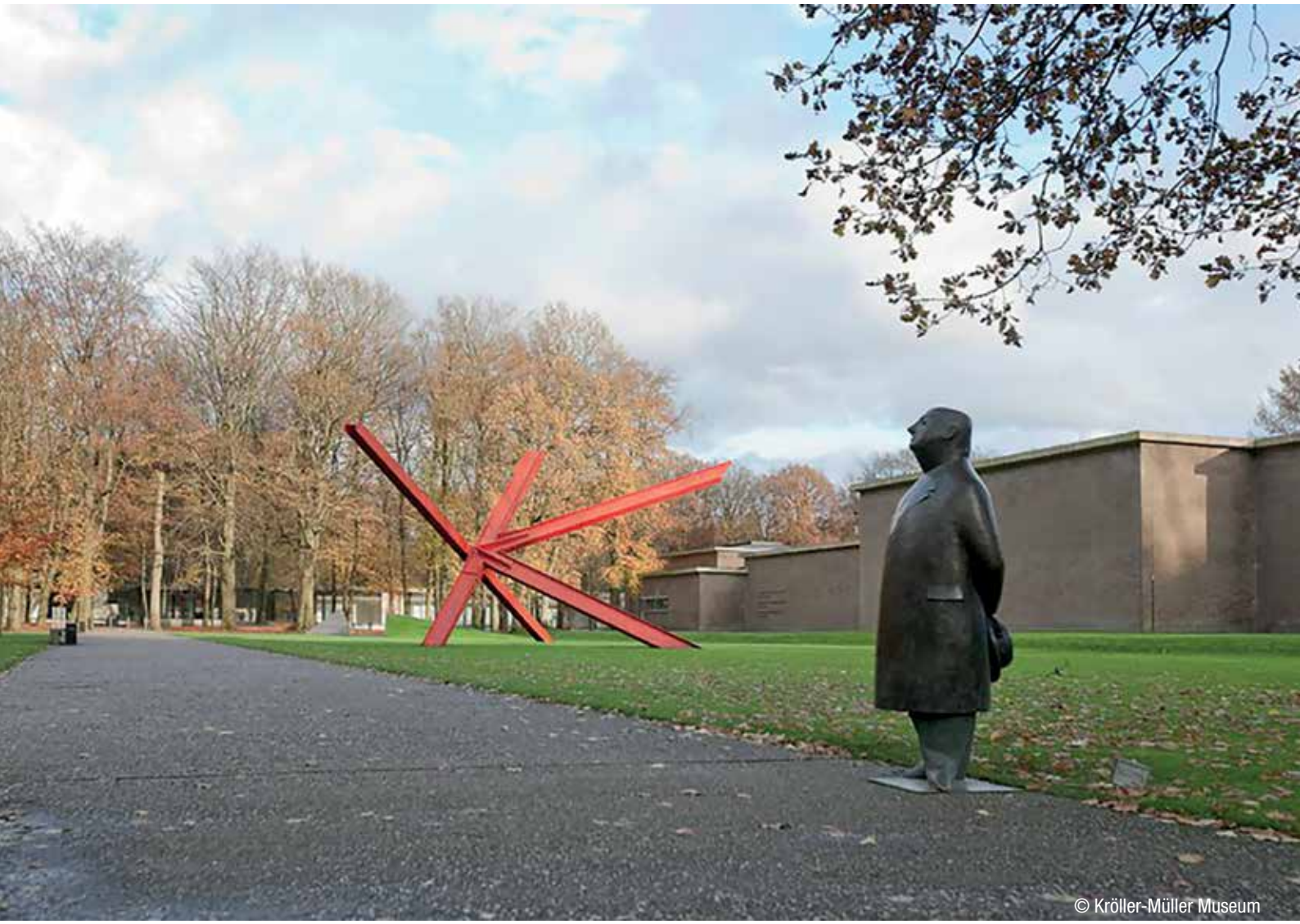


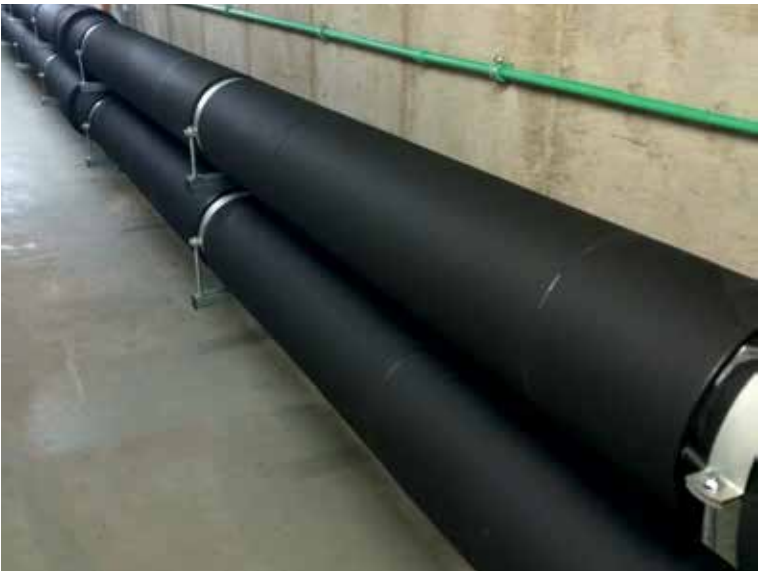

# THE ART OF ENERGY EFFICIENCY

**The Kröller-Müller Museum in Otterlo (the Netherlands) houses valuable paintings by old and modern masters – and a comprehensively renovated HVAC system, which thanks to highly efficient insulation conserves energy by 20 percent.**

There are buildings in which constant humidity, internal temperature and ventilation play a critical role. The Kröller-Müller Museum in the Dutch province of Gelderland is one of them. The museum, founded in 1928 by married couple, the Kröller-Müllers, and covering 14,213 $m^2$, has the second-largest collection of Van Gogh works in the world. Nowadays, the museum houses around 90 paintings and over 180 drawings which are displayed in the Van Gogh Gallery in various curated compilations. In addition, the museum exhibits well-known works by modern masters, such as Claude Monet, Georges Seurat, Pablo Picasso and Piet Mondriaan and organises special far-reaching exhibitions. One thing is important for all exhibits, no matter what era they are from: the humidity, internal temperature and ventilation of the rooms must be kept constant. These are requirements that incurred significant energy costs in the past, day after day. It was decided to convert the building management system to a sustainable and modern climate system in order to become 'state of the art' in terms of energy efficiency for the future. The stated goal: The artwork and visitors should experience a consistent, pleasant climate and energy costs should be reduced by 20 percent.

## Renovation during normal museum service

The owner's need to keep visitor access unchanged during the general overhaul of the complete HVAC system posed a special challenge for all those involved in the renovation. Together with the consulting architectural office of Witteveen & Bos from Deventer and the insulation installation specialist company ERIB from Rosmalen, the renovation was planned so that the museum visitors did not even notice the renovation work. Large jobs such as the renewal of the air-conditioning systems were carried out only on Mondays, when the museum is traditionally not open. The renovation period lasted 1.5 years in total. When the comprehensive renovations to the air-conditioning, heating and ventilation systems were completed in January 2017, the public continued to pay attention to art as usual – having hardly noticed what had been going on behind the scenes.

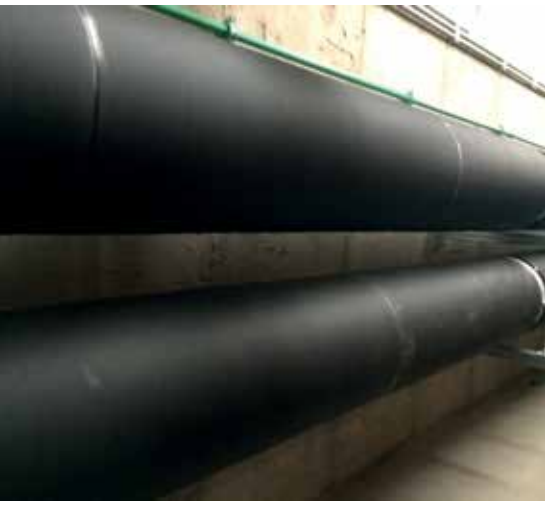


## New technology and smart insulation provide a consistent picture

To sustainably reduce energy costs, the Kröller-Müller Museum focused first on new technology in terms of HVAC systems and secondly on ideally insulating the HVAC system. The issue of safety also played a part: since this involved a building used by the public, a focus was also placed on fire safety.

Insulation materials from Kaimann were therefore the ideal choice. In the event of a fire, the material ensures limited smoke development, providing increased safety: the emergency exits are substantially more visible to visitors and the artworks are not destroyed by dripping insulation material.

A total of 2,000 $m^2$ of Kaiflex products were used in this ambitious project. The key here was Kaiflex KKplus with an insulation thick-



ness of 32 mm. Thanks to a water vapour permeability of μ ≥10,000, the formation of condensation and thus corrosion and rust is reliably prevented – which is ideal for insulating the pipes of the cooling system. As a closed-cell insulation material, Kaiflex KKplus already provides an integrated 'water vapour barrier'. With its flexible, fine-cell elastomeric foam, it is just as thick as the insulation itself. A secure water vapour barrier is already integrated into the insulation layer, and the pipework is protected for the long term. Kaiflex KKplus is also impressive with its high thermal efficiency of λ ≤0.033 W/(m·K) at 0 °C – thus fulfilling one of the requirements for keeping the room temperature constant.

Like all Kaimann insulation materials, Kaiflex KKplus also stands for reliable long-term performance – and is thus sure to endure in the Kröller-Müller Museum, from one artistic epoch to the next.

*Text source:* *Project report 'Energiezuinig Kröller-Müller Museum klaar voor de toekomst' published in Installatietotaal (April 2017 edition)*

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**Property**
Kröller-Müller Museum in Otterlo, the Netherlands

**Area**
14,213 m²

**Renovation time**
Spring 2015 to Summer 2017

**Products**
2,000 m² Kaiflex KKplus, predominantly with an insulation thickness of 32 mm