VILPE®
Sense

CATCH LEAKS EARLY. EXTEND THE LIFE OF YOUR ROOF.

CATCH LEAKS EARLY. EXTEND THE LIFE OF YOUR ROOF.

Manage your biggest cost center with early moisture detection and demand-based ventilation

When your properties are subject to undetected leaks, they can sustain significant damage, exposing you to business disruption, increased insurance premiums, and the dangers of mold. Moisture damage is one of the most costly sources of damage to the building envelope, so early detection is critical to protect your investment value and keep repair costs low.

The cost of undetected leaks

Many leaks start small, but go undetected for months. Real-time data from VILPE Sense eliminates this problem by detecting these leaks before they become costly. VILPE Sense provides real-time monitoring of structural moisture levels, delivering alerts when elevated humidity or leaks are detected – so that you can react in time.

What you get with VILPE Sense

Catch leaks early and control costs: Quickly locate and address moisture problems before they become costly.

Clear data so you can make smart choices: Accurate, measurable insights eliminate guesswork about the condition of the structures.

Boost your property value: Building maintenance upgrades enhance resale value and reduce the burden of inspections.

A modular solution

VILPE Sense components can be deployed independently or combined for maximum protection, with leak-detection monitoring of roof, facade, or crawl space, while ventilation systems target moisture-prone areas. We offer a more convenient and cost-effective alternative to traditional leak detection technologies, enabling continuous monitoring without invasive inspections. Our system can be installed during construction or retroactively, and wireless technology guarantees at least 10 years of battery life.

Integrate VILPE Sense into your building maintenance strategy today and:

- Avoid costly renovations
- Extend the service life of roofing materials
- Maintain climate control performance
- Make data-driven maintenance decisions

Take control of your maintenance costs with the power of VILPE Sense.

VILPE®
Innovative and Easy

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Contact us

VILPE Sense

Table of Contents

MONETARY VALUE

LEAK DETECTOR

HUMIDITY CONTROL

DATA

ABOUT VILPE

Innovation rooted in building science

For over 50 years, VILPE has been shaping the future of stable, long-lasting buildings. We are a second-generation, family-owned company based in Korsholm, Finland – on the country's entrepreneurial west coast – where we design and manufacture high-performance roofing and ventilation solutions trusted by building professionals across the world.

Our story began in 1973 when our founder, Eero Saikkonen, then a student at Vaasa Technical Institute, set out to solve a common roofing challenge: bitumen-glued insulation layers were shifting, and traditional fasteners caused damage. His solution – a weight-responsive fastener – laid the foundation for VILPE. Since then, innovation has remained at the core of everything we do.

Today, our product portfolio includes fasteners, roof vents, fans, and accessories used in modern construction projects throughout Europe. Many of our solutions have set the standard in the industry. In recognition of our dedication to product development, quality, and manufacturing excellence, we received Finland's National Enterprise Award in 2022 – one of the country's highest honors for business achievement.

At VILPE, we believe that every building deserves a healthy envelope. That belief led to the creation of VILPE Sense – our most advanced innovation yet. Since 2017, we've been embedding smart technology into our systems to detect and prevent moisture damage before it becomes a costly problem. VILPE Sense empowers building owners and professionals to make data-driven decisions, protect their investments, and stay one step ahead of hidden threats.

THINK AHEAD WITH SMART TECHNOLOGY

VILPE Sense prevents damage that can be avoided, significantly reducing your expenses. Investing in our smart solutions is the smartest thing you can do for one of your greatest investments. In most cases, VILPE Sense pays for itself by preventing just one significant leak.

The data backs it up

According to recent surveys of US roofing professionals, early leak detection eliminates 90% of renovation costs per incident. Even a moderate leak affecting around 1,000 square feet: late detection could cost up to $18,600 in repairs, while early detection and immediate action reduce this expense to approximately $1,500 – a savings of $17,100 per leak*.

Savings like this across your whole portfolio could free up capital for growth using cash that otherwise would have been reserved for maintenance costs.

Calculation details:

- The standard industry average roof size used for calculations is 10,000 square feet per building.
- Assuming a portfolio of 100 roofs, this equates to 1,000,000 square feet.
- Leak detection system cost: $0.90 per square foot x 1,000,000 square feet = $900,000 upfront investment.
- Payback period calculation: $900,000 upfront / $171,000 annual savings = approximately 5.3 years.

By integrating our full system, including demand-based ventilation, your total investment only increases to $1.80 per square foot, maintaining a payback period within typical industry benchmarks (approximately 6 years).

These calculations represent direct cost savings. In reality, financial benefits extend further.

- Reduced emergency repair callouts
- Minimized disruption to operations and tenant use
- Improved preservation of insulation and energy efficiency
- Extended roof lifespan and lower capital expenditures

Adopting VILPE Sense is a strategic decision.

VILPE Sense shifts your time and resources from reactive repairs to proactive asset management – delivering a robust return in performance, reliability, and financial efficiency.

**Actual savings will vary based on building specifics, climate, and system configuration. Contact us for a customized savings and ROI estimate tailored to your project.*

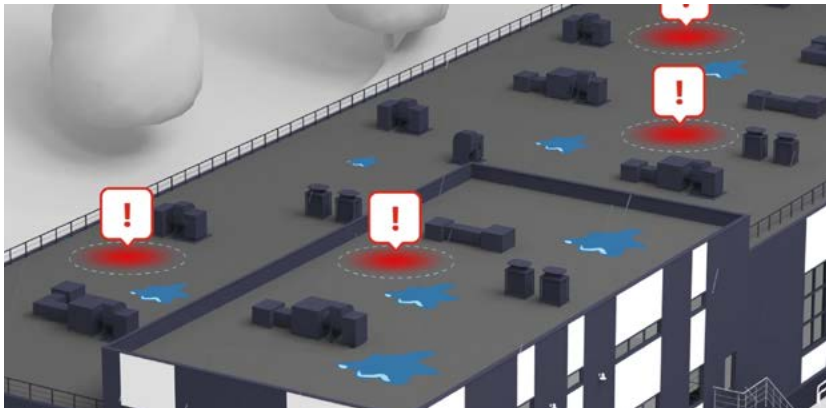
VILPE SENSE OUTPERFORMS TRADITIONAL LEAK DETECTION TECHNOLOGY

Electronic leak detection (ELD) has long been used to detect moisture breaches on roofs, often relying on electrical conductivity or resistance-based methods to identify the presence of water. While these systems can detect leaks once water has entered the structure, they often fall short in speed and real-time usability.

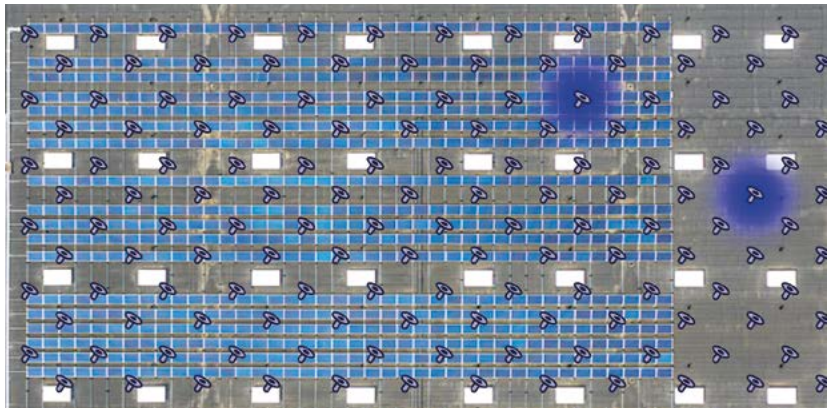
VILPE Sense takes leak detection to the next level as it combines advanced humidity sensors, remote cloud-based visualization, and optional demand-based ventilation – creating an intelligent system that not only detects hidden moisture but also prevents escalation. Here's how VILPE Sense compares.

VILPE Sense outperforms other leak detection products

Feature	VILPE Sense	Traditional LDS
Detection	Pinpoints moist areas on a humidity map	Membrane punctures only
Monitoring	Real-time monitoring with automatic alerts	Manual inspection required
Response	Optional smart ventilation to dry structures	No ventilation or active response
Cost efficiency	Long lifespan with easily maintained parts	Costly and difficult to maintain
Options	Adaptable cost options, including retrofit	Limited choice for new construction only



The VILPE Sense system locates possible leakages quickly.



A humidity map in the VILPE Sense.

EARLY DETECTION MATTERS

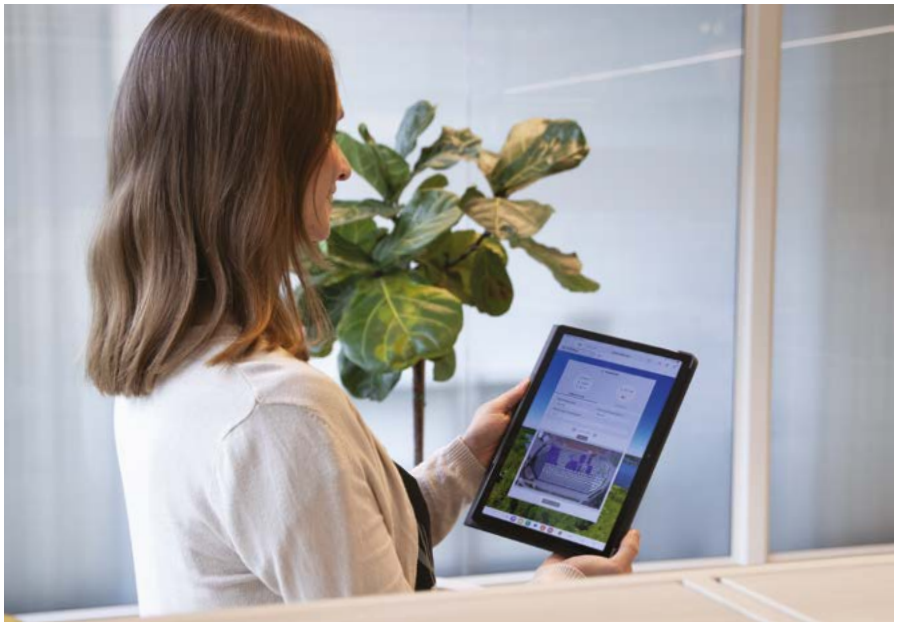
Roof breaches can occur for multiple reasons, but according to studies, the most common cause is human error. These include mistakes during construction, inadequate maintenance, or incidental damage during rooftop activities such as inspections or equipment servicing. Minor breaches are common on flat and complex roofs, and while they may initially cost just a few thousand dollars to repair, undetected leaks often grow into much larger and more expensive problems over time.

The VILPE Sense Leak Detection System is designed to help identify leaks early. It continuously monitors moisture levels within the insulation layer and issues alerts when abnormal readings are detected. The system also displays the affected area on a humidity map in the cloud service, enabling fast, more targeted repairs and helping to avoid unnecessary demolition or large-scale renovations.

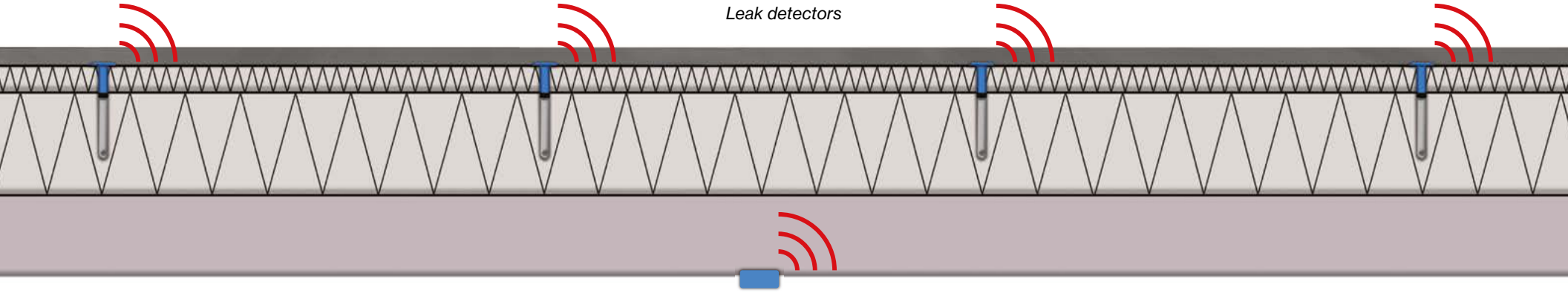
Each sensor is powered by a long-life battery engineered to last up to 15 years, ensuring dependable performance with minimal maintenance. The VILPE Sense leak detection system is designed to be used for roofs, but it can also be utilized for monitoring of other structures, such as, walls. VILPE Sense is particularly useful in new construction and renovation projects, but it is also suitable for retrofitting, for example, to map out the extent of moisture damage on a roof.

This means:

- **Only the affected roof section needs to be opened** – minimizing labor, material waste, and exposure risks.
- **Repairs can happen faster**, with far less guesswork.
- **Costs stay under control**, and a healthy roof remains untouched.



Check the condition of your roof in your phone or on your computer.



HOW VILPE SENSE WORKS

Installing VILPE Sense leak detection system on a low-slope roof

On low-slope roofs, leak detectors are installed inside the insulation layer to continuously measure moisture levels.

To plan installation, a visual layout of the monitored area, such as a roof plan drawing or scaled image, is required. This layout is used to generate a digital humidity map in the cloud service, enabling sensor positioning and later serving as the primary tool for locating potential leak zones.

System components

- **VILPE Sense leak detectors:** Measure internal moisture levels and provide early warnings of potential leaks.
- **Croco fasteners:** Ensure consistent installation depth for all sensors. Uniform sensor positioning improves data comparability on the humidity map by standardizing the vertical measurement point. Use of Croco fasteners is optional but recommended for consistent sensor placement.
- **VILPE Sense mobile base station:** Installed indoors, the base station receives data from the leak detectors and transmits it to the cloud service. A single unit can support up to 200 sensors and 50 VILPE Sense control units (MCU-2).

Design and installation steps

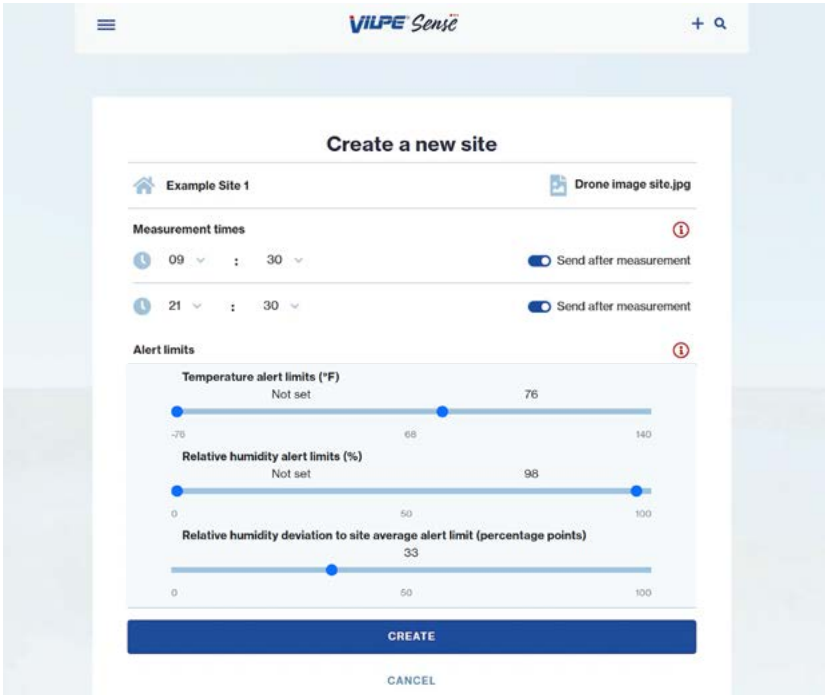
- **Sensor density planning.** Determine the appropriate spacing based on the building's needs. A general guideline is one sensor per 200 ft². Higher-risk or critical areas should include additional sensors for closer monitoring. Recommended spacing: 13–16 feet between units.
- **Humidity map planning.** Use a scaled roof image or plan to map sensor placement. The system requires accurate positioning for effective data interpretation. A device report can be generated to confirm required components and layout.
- **Product registration.** Register each device to the cloud platform before or

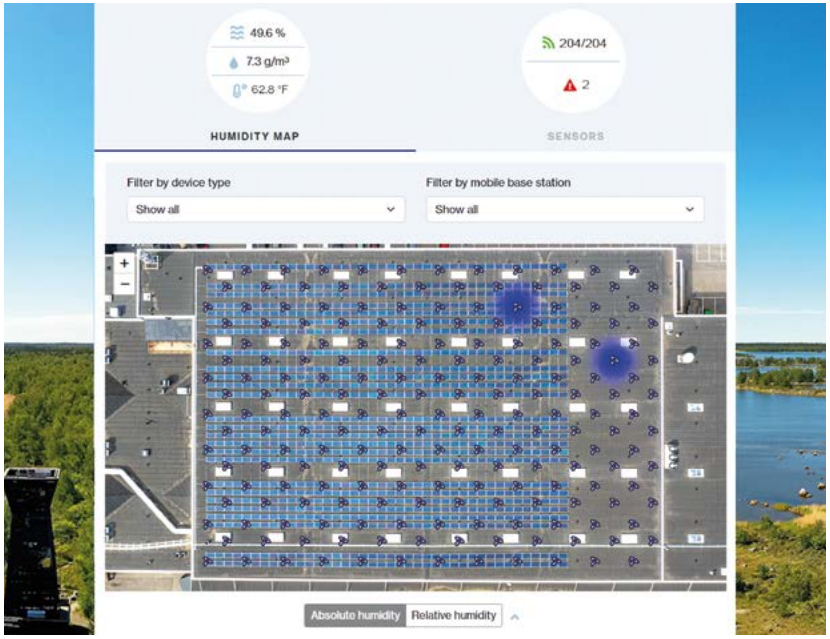
during installation. Ensure each sensor is placed exactly according to its assigned location on the roof image plan.

- **Installation.** Follow the official VILPE installation instructions to place all devices according to plan.
- **System settings.** Set alert thresholds in the cloud interface. The system sends data twice daily, so alarm delays should account for this reporting cycle. Additional guidance is available in the installation manual.
- **Integration with building automation.** VILPE Sense data can be integrated with building management systems via REST API. Contact your automation provider or VILPE's technical support for interface documentation and implementation guidance.

Leak detection and response

If moisture levels rise above set thresholds, the system sends an email alert to your assigned e-mail address, which may be your building owner or manager. The humidity map, accessed via the VILPE Sense cloud platform, visually displays moisture concentration. Blue areas indicate elevated moisture levels, though readings can temporarily spike due to weather (e.g., rain). Persistent elevation over several days suggests a probable leak.





COMBATING ROOF LEAKS AT SCALE WITH SMART TECHNOLOGY

"We take a realistic approach—no matter how advanced a roof is, breaches will happen over time."

Finland's largest indoor arena turns to VILPE Sense

The Botniahall indoor arena, located in the Vaasa region of Finland, has long battled persistent and expensive roof leaks. With a roof area of 183,000 square feet, even small breaches have posed major challenges. The roof's curved profile, steep slope, and limited accessibility mean that each repair requires heavy equipment and specialized crews – making even minor leaks costly and time-consuming to fix.

A smart renovation strategy

As part of a major roof renovation project, the Botniahall facility managers chose to install VILPE Sense leak detectors and humidity control systems. These smart technologies are designed not only to detect leaks early but also to help locate them on a digital humidity map – allowing targeted repairs without unnecessarily opening large roof sections.

“All in all, we’re talking about a six-figure cost in repairs,” says Michael Lyyski, Director of the Vaasa Region Arena’s municipal consortium, about the costs of roof leaks over the years. “That’s why we were excited about the VILPE Sense system. It allows us to act early – and only where needed.”

In addition to the leak detection system, VILPE Sense’s humidity control solution was installed to proactively manage moisture. By monitoring structural humidity and activating ventilation when needed, the system helps keep the insulation layer dry, preserving its thermal performance and preventing hidden deterioration.

More targeted repairs and long-term savings

According to Jyrki Tyynelä, Regional Manager at TEP Roof Oy, which oversees the Botniahall roof renovations, the traditional approach to leak detection was time-consuming and inefficient.

“It’s rare to see this many leaks on one roof. In the past, we’d repair only the worst, most obvious ones. Each repair could take an entire day – and that’s without even locating the leak properly,” says Tyynelä.

With VILPE Sense, crews can now visualize moisture zones remotely and focus only on affected areas – reducing labor, costs, and unnecessary exposure of sensitive areas of the building.

“VILPE Sense is the most effective solution on the market for leak detection.”

“Before, we were searching for leaks across thousands of square feet. With VILPE Sense, locating them is so much easier,” says Tyynelä. “In my view, VILPE Sense is the most effective solution on the market for leak detection.”

Tyynelä particularly recommends the system for hard-to-access roofs and solar panel installations, where physical inspection is limited, and guesswork often leads to over-repair or missed problems.

“When you can’t see the leak, you end up fixing what’s not broken. That gets expensive fast.”

Building performance benefits

By integrating smart sensors and demand-based ventilation, the Botniahall renovation team expects to:

- Extend the lifespan of the new roof
- Reduce annual maintenance costs
- Improve the overall energy efficiency of the facility

Products

VILPE SENSE LEAK DETECTOR, 10 pcs Sensor RHT, (735073)

VILPE SENSE MOBILE BASE STATION +MODBUS +ETH, 1 pc, (735072)

VILPE SENSE HUMIDITY CONTROL

Ventilation when your roof needs it

Structurally sound building structures require proper ventilation to prevent moisture accumulation. Over time, damp insulation can lead to mold, fungal growth, and decay – all of which compromise long-term structural integrity. Wet insulation also loses its thermal performance, which can drive up energy costs, especially in extreme climates.

Moisture stress in roofs is heavily influenced by weather conditions, including rain, humidity, and temperature fluctuations. Infiltration through air leaks can further increase the moisture load. That's why ventilation must be adaptive.

Demand-based ventilation responds to the insulation layer's condition and outdoor circumstances

The VILPE Sense humidity control system automatically adjusts roof ventilation based on the real-time condition of the roof structure – ventilating when the insulation layer needs it. Using smart algorithms, the system regulates roof fan operation to remove excess moisture at the optimal time, reducing the risk of insulation degradation and energy loss. Sensors are powered by long-life batteries designed to last 15 years and are compatible with both new construction and retrofit applications.

The system uses embedded sensors to measure absolute humidity levels both inside the roof structure and outdoors. These values, calculated from temperature and relative humidity, provide a much clearer picture of when ventilation is truly beneficial – especially because warm air holds more moisture than cold air.

The fan's operation is dynamically optimized according to the conditions within the structure and outdoor air:

- **Reduced ventilation during rainfall**, when outdoor air is humid
- **Limited circulation in freezing conditions**, to avoid cooling the structure unnecessarily
- **Increased airflow when dry weather follows rain**, to quickly dry the insulation layer

Save on cooling costs during heat waves

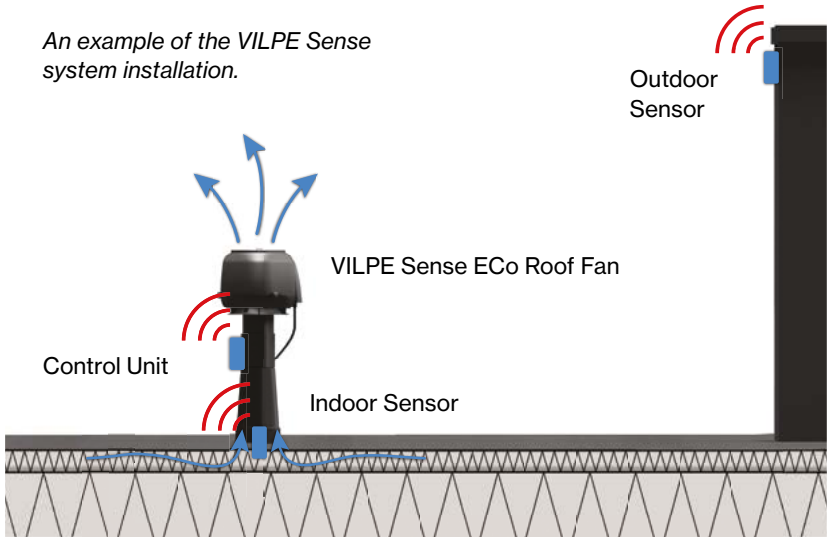
According to a study conducted by Ramboll Finland Oy, the VILPE Sense system helps reduce the need for building cooling during warm weather, offering clear energy savings. Ramboll Finland Oy is an independent engineering, design, and consultancy company that conducted the study evaluating the system's impact on cooling needs.

The findings show that:

- Traditional intake ventilation reduces cooling needs by 4% on less-insulated roofs and by 12% on more-insulated roofs, compared to unventilated roof structures.
- The VILPE Sense system further improves performance, reducing cooling needs by 12% (less insulated) and 21% (more insulated).
- When the air volume in the VILPE Sense system is tripled, the cooling demand is reduced by up to 27% on less insulated roofs.

To achieve higher air volumes, a more powerful roof fan can be connected to the VILPE Sense humidity control system. VILPE Sense humidity control reduces the need for cooling in both more and less insulated roofs, with the greatest relative benefit observed in less insulated roof structures.

An example of the VILPE Sense system installation.



This is how it works:

DESIGN AND INSTALLATION OF THE VILPE SENSE HUMIDITY CONTROL ON A LOW-SLOPE ROOF

System parts

VILPE ECo Sense roof fan. On a low-pitched roof, a single fan can effectively ventilate an area of up to 2200 ft².

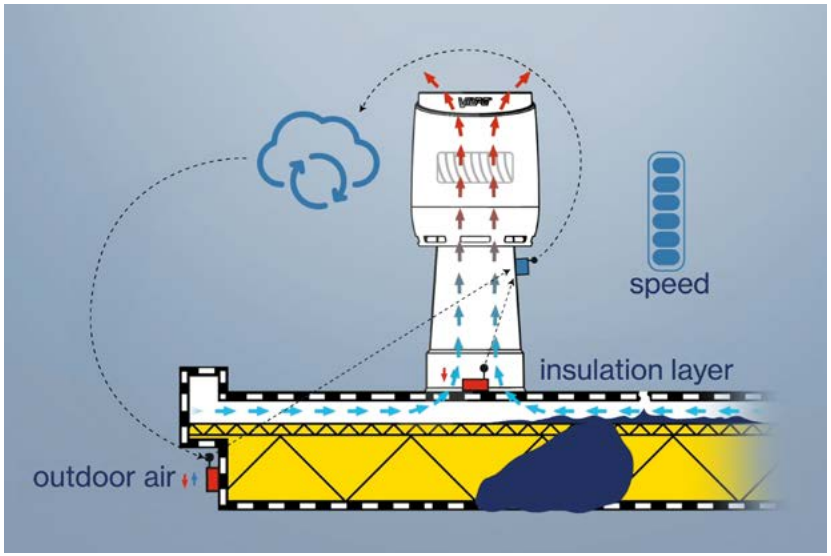
Intake vents. Intake vents ensure air movement in the ventilated space with adequate make-up air. On flat roofs, make-up air can be obtained using intake vents. The better the air circulation in the ventilated space, the more effectively the system operates.

The VILPE Sense basic kit and additional sensors. The VILPE Sense basic kit includes two sensors and a control unit. The outdoor sensor is installed on the roof in a location protected from direct sunlight, while the indoor sensor is placed inside an intake vent equipped with a roof fan. One basic kit is sufficient for monitoring the area covered by one roof fan. For monitoring larger areas, additional sensors are needed. A maximum of five sensors can be connected to one control unit.

Planning and installation

- **Roof fan installation:** The roof fan is installed on the roof, either on an intake vent or in an appropriate pass-through. The roof fan needs an electrical power supply. The control unit of the VILPE Sense basic kit is mounted on the side of the roof fan, and the roof fan's control cable is connected to the control unit according to instructions. The VILPE Sense control unit is powered by the roof fan.
- **Sensor installation**: The indoor sensor is installed to measure temperature and humidity within the ventilated structure, such as inside an exhaust duct under the roof fan. The outdoor sensor is installed in a location where it is

The VILPE Sense ECo roof fan installed retroactively on an VILPE Alipai underpressure vent.



Data is transmitted by wireless sensors to the control unit that adjusts the roof fan, then to the mobile base station for upload to the cloud. The roof fan automatically adjusts to the optimal level to remove excess moisture from the building's internal structures. When excess humidity has been removed, the roof fan returns its normal activity level. The owner also receives an alarm of potential leaks and problems.

not exposed to direct sunlight or buried under snow in winter. Additional sensors may be installed as needed to extend sensor coverage.

- **Settings:** Set alarm thresholds in the cloud service and enable the mold index alarm. The system's measurement interval is two hours. The mold index estimates the risk of mold growth based on building material, temperature, and humidity levels over time.
- **Data transfer to building automation system:** Data collected by the VILPE Sense system can be read to a building automation system via a REST API. A description of the interface is available from VILPE's technical support.

Airflow within the structure is essential for VILPE Sense to function effectively

For the VILPE Sense system to operate optimally, air must circulate within the roof structure, enabling the system to regulate humidity and temperature. Equally important is ensuring a sufficient supply of make-up air – fresh air that replaces the air being extracted.

In some countries, this internal airflow is supported by using ventilation grooves – channels beneath the top insulation layer that promote free airflow. Where such grooves are available, combining them with the VILPE Sense system is recommended. In other cases, the same effect can be achieved by designing the structure to allow air movement and by installing appropriate collector ducts or equivalent air pathways.

HUMIDITY CONTROL

INVESTING IN PREVENTION

Smart moisture control at a coastal hotel & spa

"This is an investment in intelligent control and ventilation of flat roof structures. It supports maintaining buildings in the best possible condition through prevention, not repair."

— Krzysztof Kapela, Investor, Bursztynowe Resort & SPA

Bursztynowe Resort & SPA on the Gdańsk Bay, Poland

Located in Stegna, on Poland's scenic Gdańsk Bay, Bursztynowe Resort & SPA is a newly constructed, visually distinctive hotel complex made up of two flat-roofed buildings, covering a total area of nearly 40,000 ft².

Maintaining flat roofs is always a challenge, especially in hospitality settings. These roofs often host solar panels, ventilation systems, and HVAC equipment, all requiring regular servicing. Each maintenance visit introduces the risk of damaging the waterproofing layer – especially if technicians accidentally cause punctures or shift components. For buildings on the coast, the weather adds extra complexity: strong winds, high humidity, and intense sun exposure speed up wear and increase the risk of hidden moisture damage.

Smart ventilation for long-term protection

To ensure long-term performance and building fitness, the investor prioritized high-quality materials and technologies, including advanced waterproofing and ventilation systems. The site manager, Szymon Skóra, from roofing contractor Maxprojekt, based in Gniezno, proposed implementing the VILPE Sense system to continuously monitor humidity and temperature levels and automatically ventilate the roof structure as needed.

The system installed on the first building includes Eco Sense roof fans, Alipai 110 intake vents, and VILPE Sense leak detectors. The second building will be equipped with the same solution after completion of its solar panel and HVAC installation.

Building performance benefits

By integrating smart sensors and automated ventilation at Bursztynowe Resort & SPA, the owners expect to:

- Prevent hidden moisture damage in the flat roof structure
- Extend the lifespan of waterproofing and insulation layers
- Reduce the risk of undetected leaks from rooftop maintenance activities
- Maintain uninterrupted operations in the hotel
- Minimize long-term repair and maintenance costs
- Ensure optimal insulation layer performance for energy efficiency

MAXIMIZING THE BENEFITS OF DATA GATHERED BY VILPE SENSE

DATA

At the heart of VILPE Sense is a suite of sensors that monitor a range of environmental parameters, including indoor and outdoor temperature, relative and absolute humidity, mold index, and roof fan motor speed. These readings are automatically transmitted to a cloud service, where they are stored and made available for review at any time.

The data interface – accessible via PC, tablet, or smartphone – gives users full visibility into the condition of the roof structure. Whether overseeing a single property or managing a portfolio of buildings, owners can access all data through the cloud service.

Crucially, data ownership remains with the building owner, and it is not automatically shared with third parties. However, the primary user can easily generate links to share selected data with stakeholders – such as apartment residents, public building users, or prospective buyers in a property sale. This transparency fosters trust while adding tangible value, as buyers appreciate hard data confirming the building's condition. Public institutions can show that structural health is being actively managed. In every scenario, VILPE Sense transforms invisible conditions into actionable insight.

From the cloud to building automation systems

While VILPE Sense delivers standalone value, it also fits seamlessly into broader building automation strategies. Its data can be transmitted via a REST API to external systems, enabling easy integration with building management platforms (BMS).

Because every automation system operates differently, integrations are developed on a case-by-case basis. Once a solution is built for a specific platform, it can be replicated across properties that use the same system – streamlining future installations.

One such integration was carried out in collaboration with Schneider Electric. The VILPE Sense system was successfully connected to Schneider's EcoStruxure Building Operation, an advanced energy management and automation platform. In this project, the goal was to centralize all building data within one familiar interface for the customer.

In this setup, VILPE Sense sensors send data to the VILPE cloud. A programmable logic controller (PLC) on-site then queries the cloud via a REST API to retrieve specific data points, such as structural temperature and humidity, mold index, fan speed, and system alerts. This data is then passed to Schneider's system, where it becomes part of the building's unified automation framework.

Supporting sustainability through smarter maintenance

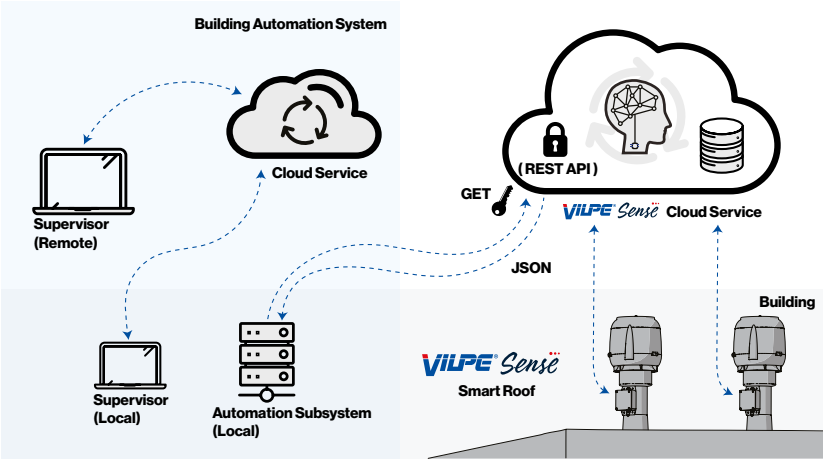
The environmental footprint of new construction and renovation is significant. That's why maintaining and extending the life of existing structures is one of the most effective sustainability strategies in the built environment. VILPE Sense enables this by promoting proactive, condition-based maintenance and reducing the frequency of costly, resource-intensive renovations.

The system detects moisture issues early, preventing deterioration of structural materials. This not only avoids unnecessary repairs but also contributes to longer-lasting buildings – a major benefit in both residential and commercial markets.

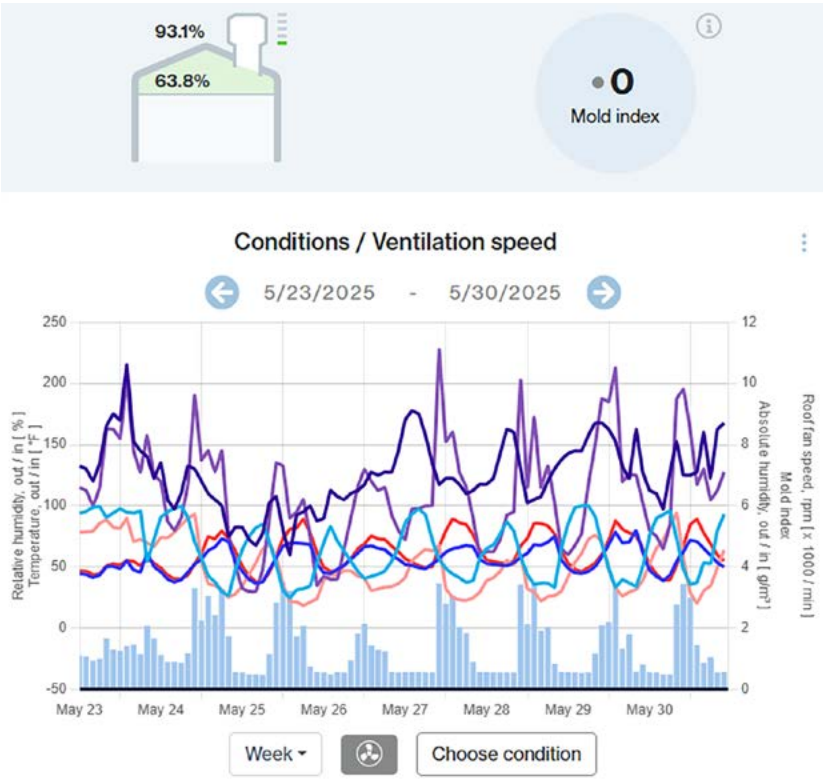
Energy efficiency by design

VILPE Sense also delivers energy savings through its intelligent fan control. The system's control unit is installed on a high-efficiency VILPE EC roof fan, which adjusts its operation based on real-time moisture conditions. On average, the fan consumes just 20–30 watts, which translates to less than $2 per month in electricity costs under typical U.S. utility rates. When higher ventilation is needed – such as after a rain event – the fan ramps up to ensure optimal moisture removal.

Wet insulation is an often-overlooked source of energy loss. Moisture in the insulation layer dramatically reduces its thermal resistance, forcing HVAC systems to work harder. VILPE Sense addresses this by actively drying out insulation, preserving its performance, and reducing heating and cooling demand. During hot weather, the system also helps remove excess heat from the roof, easing the load on air conditioning systems.



The path of the VILPE Sense data in Schneider's building management system



The VILPE Sense data is easily accessible in the VILPE cloud service.

VILPE® Sense

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