VILPE® Sense

SMART PRODUCTS FOR MOISTURE CONTROL IN STRUCTURES

MONETARY VALUE

VILPE SENSE HELPS SAVING ON MOISTURE DAMAGE REPAIR

Moisture damage is a common problem in buildings of all types and ages, and timing is critical in limiting the extent of a moisture issue. Developed for early intervention, VILPE Sense monitors the condition of structures in real-time and alerts to increased moisture levels. It enables early intervention, thus preventing minor moisture damage from developing into a large and costly problem.

Causes of moisture damage include both leaks and structural issues. Structural concerns encompass vapor barrier air leaks, construction-phase moisture in building materials like wet insulation, and inadequate ventilation. The VILPE Sense leak detector monitors moisture levels in the structures, alerts to excessive moisture, and locates leaks also on larger roofs, allowing for quicker and cheaper repairs. The VILPE Sense humidity control system is designed to prevent moisture damage that arise due to structural causes and solves the problem by enhancing ventilation as needed. It is suitable for roofs and crawl spaces in all types of buildings.

The VILPE Sense leak detectors and humidity control system can be used separately or in combination. For example, the humidity control system can be used to ventilate critical areas on the roof while leak detectors monitor the rest of the roof area.

Early detection of breaches and other problems to save money and hassle

Continuous monitoring of the moisture level in building structures

Alerts to excessive moisture levels

Innovative and Easy

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Contact us

VILPE Sense

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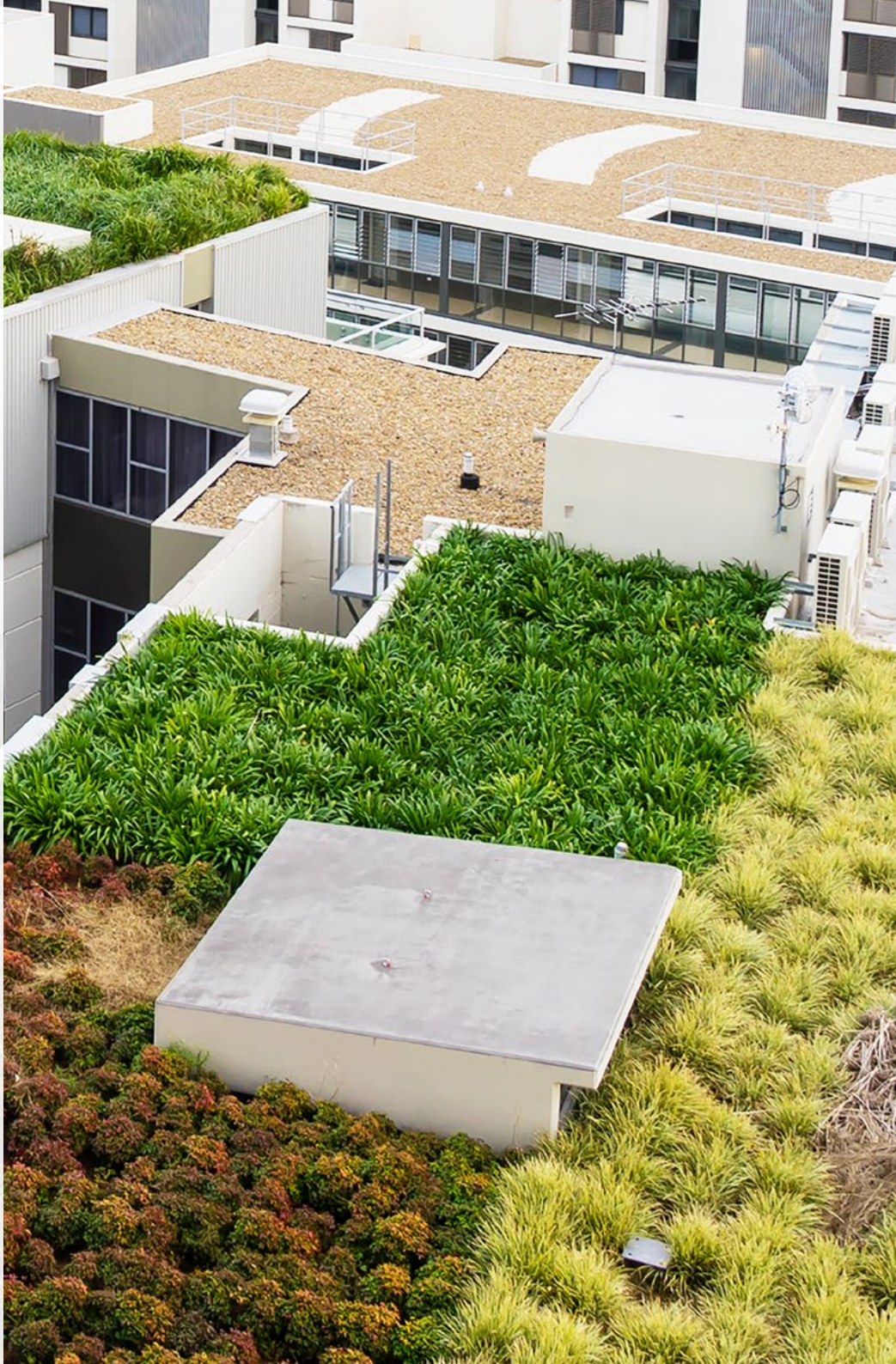
THE VILPE SENSE LEAK DETECTOR HELPS TO LOCATE LEAKS

Breaches arise on roofs for many reasons, but the most common cause is human error. These can include mistakes and damages that occur during construction, insufficient maintenance, and any kind of activity on the roof, such as unnoticed damage during maintenance work. Smaller breaches are normal on roofs, and their repair costs are usually in the range of a few thousand euros. Because most leaks are not easily visible, they can over time develop into larger and more expensive damages.

The VILPE Sense leak detection system has been developed to find even the smallest leaks as they arise and prevent them from becoming a bigger problem. The system continuously monitors the structures and alerts when it detects excessive moisture and indicate the problem area on the system's humidity map, enabling quick repair, and avoiding expensive renovations. The batteries of the sensors are designed to last 15 years (RHT-2).



Applications

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 a moisture damage on a roof.

VILPE Sense leak detector locates breaches in the structures

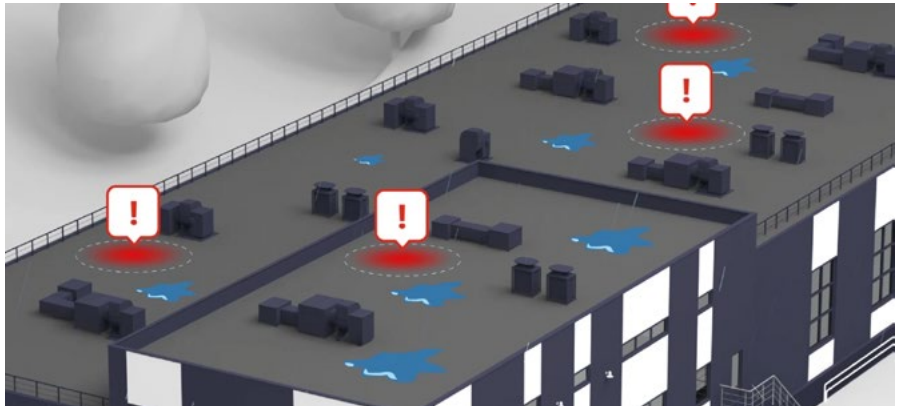
- Continuously monitors structures for excessive moisture
- Alerts about a potential leak and the leak can be patched as soon as it arises
- Indicates the leak area on the system's humidity map
- Helps in targeting repair only to damaged areas
- The condition of structures can be conveniently monitored from the cloud service via a computer or phone

Products

VILPE SENSE LEAK DETECTOR, 10 pcs Sensor RHT-2, (735045)

VILPE SENSE MOBILE BASE STATION, 1 pc, (735044)

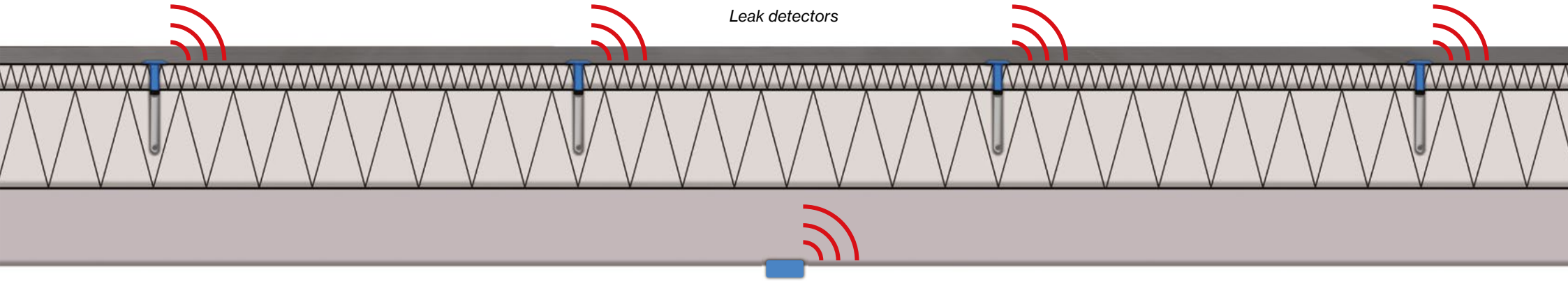
VILPE Croco fasteners are sold separately.



The VILPE Sense system locates possible leakages quickly.

The mobile base station requires a SIM card. The local operator and subscription must support the following: LTE-M (LTE Cat. M1), NB-IoT (LTE Cat. NB1), or 2G (EDGE/EGPRS). A data service subscription alone is sufficient. The subscription must allow for at least 100 MB/month of data transfer. The SIM card must be set up so that it does not require a PIN code.

VILPE Sense leak detector can be also retrofitted, for example, to map out the extent of a moisture damage on a roof.



DESIGNING AND INSTALLING THE VILPE SENSE LEAK DETECTOR SYSTEM ON A LOW-SLOPE BITUMEN MEMBRANE ROOF

The system consists of moisture sensors that are installed into the roof insulation layer. A visual representation of the area to be monitored, such as a roof plan drawing or another type of image, is required to plan the installation spots for the leak detectors. From this image, a humidity map is created, which is used to locate potential leak areas.

Products

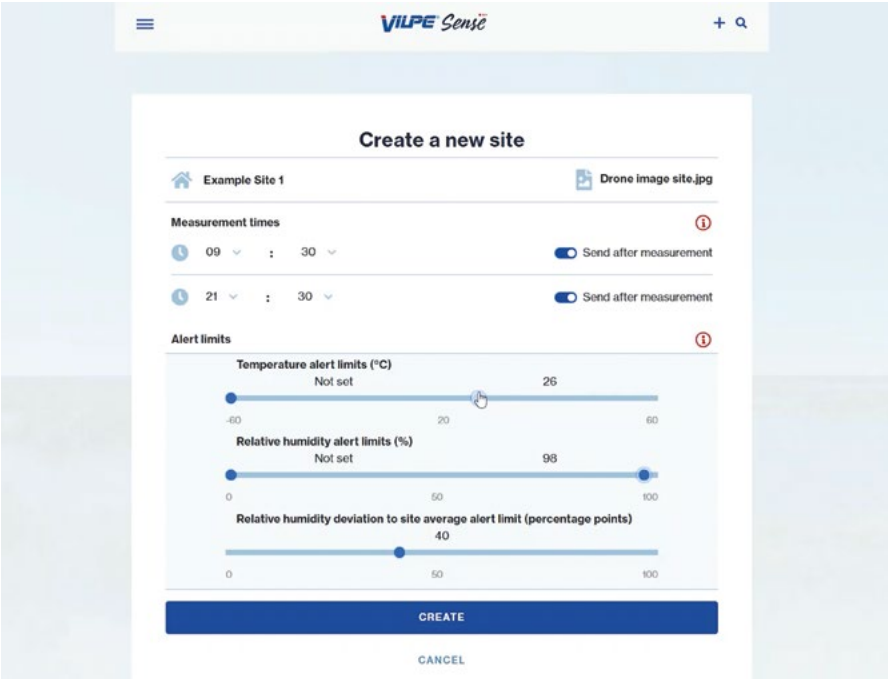
- **VILPE Sense leak detectors:** Measure moisture levels within the monitored structures. Their primary function is to detect the presence of moisture that could indicate a leak, providing early warning to prevent further damage.
- **Croco fasteners:** To ensure that the leak detectors' sensors are installed at a consistent depth, it's recommended to use Croco fasteners. This uniformity in installation depth helps in making the data comparison on the humidity map more accurate, as it ensures that all sensors are measuring moisture levels from the same relative position within the structure.
- **VILPE Sense mobile base station:** The system requires a VILPE Sense mobile base station, which can be installed indoors. The base station receives data from the sensors, transmitting it to the cloud service. A single mobile base station can connect to up to 200 leak monitoring sensors and a maximum of 50 VILPE Sense control units (MCU-2).

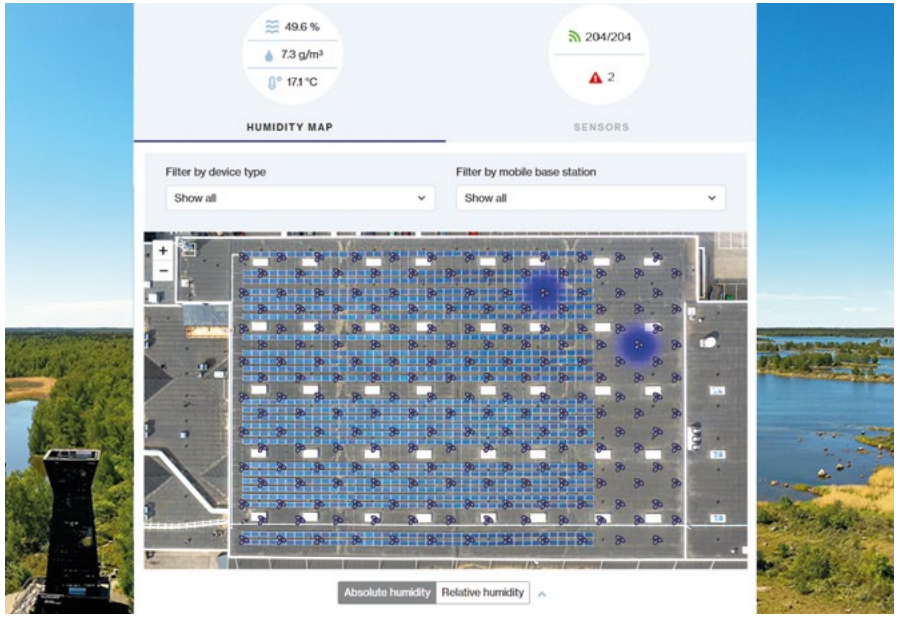
Design and installation

- **User accounts.** If you do not already have a user account, please request one by sending an e-mail to VILPE sales (*sales@vilpe.com*)
- **Planning the density of the sensors.** Plan the density of sensors to suit the site. The distance between two sensors can be, for example, 4–5 meters. The shorter the distance between sensors, the more accurate the data obtained. If an area needs to be monitored more closely or is prone to leaks, it is recommended to install more sensors on this spot. For an area of 200 m², it is recommended to install 10 sensors.
- **Plan the products on the humidity map.** The layout of the devices should be planned on the humidity map before installation. Any image of the roof that accurately reflects the roof's actual dimensions can be used for creating the humidity map. At the end of the planning phase, a device report can be created for the site, indicating the number of products needed.
- **Product registration:** Products can be registered to the cloud service either before installation or during the installation process. It is important that each registered device is installed exactly at its designated location according to the plan.
- **Installation:** Install the products into the structures according to the plan and the installation instructions.
- **Settings:** Set alert limits in the cloud service. Detailed instructions and recommendations can be found in the installation manual. The system sends new measurement values twice a day. This should be considered when setting the alarm delay.
- **Data transfer to building automation system:** Utilization of the data in building automation systems can be achieved through a REST API. Contact the supplier or designer of the building automation system for integration with VILPE Sense. A description of the interface is available from VILPE's technical support.

Leak detection

The owner receives an alert about elevated moisture levels via email. Leaks are located using the humidity map in the VILPE Sense cloud service. On the humidity map, the blue areas indicate that the moisture level in these areas is higher. However, the moisture level can vary over short periods, for example, during rain. If the moisture level remains high for at least a couple of days, it suggests there is a problem. The humidity map helps in locating the damaged areas.





Finland's largest indoor arena has long suffered from expensive and difficult-to-repair roof breaches

COMBATING LEAKS ON THE BOTNIAHALL ROOF WITH VILPE SENSE SMART PRODUCTS

Finland's largest indoor arena, the Botniahall in the Vaasa region in Finland, has long struggled with difficult-to-locate and repair roof leaks. As part of the ongoing roof renovation, smart VILPE Sense products are being installed on the roof. VILPE Sense leak detectors alert to excessive moisture and facilitate the location of leaks on the large roof. Additionally, a VILPE Sense moisture management system is being installed to ventilate the roof as needed, keeping the insulation layer dry. The Vaasa Region Arena's municipal consortium, which manages the Botniahall, expects to save significant amounts on roof maintenance and major repairs.

"The VILPE Sense products are the most effective solution on the market for detecting leaks"

Finland's largest indoor arena, the Botniahall, is located in the Vaasa region in Finland. A roof renovation was inevitable as the old PVC roofing had reached the end of its lifespan and there were numerous leaks. The large roof covers a total of 17,000 m². Initially, the roof had several difficult-to-repair leaks, the insulation wool was partially wet, and water was leaking inside the hall. Michael Lyyski, director of the Vaasa Region Arena's municipal consortium, says that the Botniahall roof has suffered from roof leaks for a long time and the repair costs have been high.

"All in all, we're talking about a six-figure cost," says Lyyski.

The repairs are particularly challenging due to the roof's curved shape, as access requires a crane, and the steepness makes it impossible to walk on the roof. Additionally, locating leaks on the large roof has been very difficult. Jyrki Tyynelä, regional manager of TEP Roof Oy, has often repaired the Botniahall roof.

"It's rare to see so many leaks. In repair situations, we have been able to find and fix only the worst and clearly visible leaks. Repairing a leak usually required at least a day's work," says Tyynelä.

Savings from leak detection and demand-based ventilation

Since locating leaks on the large roof has been challenging, the decision was made to install the VILPE Sense leak detection system on the roof. The leak detector continuously monitors the roof's moisture values, alerts to excessive moisture, and locates leaks on the roof. By limiting the leak to a small area, repair work is accelerated. Lyyski

"We are realistic and acknowledge that regardless of how new and sophisticated a roof is, breaches are bound to occur over the years"

who was tired of leaks and their repair costs, was immediately excited about the VILPE Sense leak detectors.

"We are realistic and acknowledge that no matter how new and sophisticated roof, breaches are bound to occur over the years. It is clear to us that investing in smart products will bring us savings in roof maintenance. When the roof stays in good condition, its lifespan increases," says Lyyski.

In addition to the leak detection system, a decision was made to also invest in a VILPE Sense humidity control system, which analyzes data from structures, detects elevated moisture levels, ventilating the structures as needed and drying the insulation layer. A dry insulation layer is important for maintaining the insulation capacity and the condition of the structures.

"The most effective solution on the market"

Jyrki Tyynelä of TEP Roof Oy is responsible for the Botniahall roof renovation. As a roofing professional, Tyynelä has followed with interest the launch of new smart products on the market.

"In my view, the VILPE Sense products are the most effective solution on the market for detecting leaks. The leak repairs at the Botniahall will undoubtedly become easier. Before, we searched for leaks among thousands of square meters of roofing, but with the new system, locating will be a hundred times easier," says Tyynelä.

Tyynelä recommends VILPE Sense products especially for roofs that are difficult to access.

"Searching for leaks under solar panels is also difficult because the leaks are hard to detect. Random repair tends to become expensive in the long run," says Tyynelä.

THE VILPE SENSE HUMIDITY CONTROL SYSTEM VENTILATES THE ROOF WHEN NEEDED

Building structures need to be sufficiently ventilated to remove excessive moisture and keep the building healthy. Over time, moist insulation can lead to mold and fungal growth. Additionally, wet insulation loses its insulating capacity, which in turn lead to higher energy costs. The moisture load on structures is reflected by weather conditions; for example, moisture tends to accumulate more in structures during rain. Air leaks can also lead to higher moisture accumulation.

Demand-based ventilation

The VILPE Sense humidity control improves the air circulation on the roof by controlling the roof fan(s) to ventilate the structures when needed and at the most optimal time. Using the VILPE Sense humidity control, it is important to make sure that the structure is ventilated and that air can move within the structure, for instance with underpressure vents. VILPE Sense enhances the ventilation solution by integrating it with smart technology. This ensures that ventilation efficiency is not solely dependent on wind conditions. When the roof fan operates at its lowest speed, the air circulation resembles that of underpressure vents. VILPE Sense adjusts the roof fan based on the absolute humidity of the indoor and outdoor air. Absolute humidity values are calculated from temperature and relative humidity measurements. The algorithm then uses these values for controlling the roof fan because warm air can contain much more water than the same volume of cold air, and relative humidity alone does not provide a complete picture of the condition of the structure. The roof fan is optimized for adaptive operation based on the indoor- and outdoor conditions. For example, air circulation is limited during freezing conditions to avoid cooling the structures and during rain, when the outdoor humidity level is high, the fan circulation is at its minimum. When the rain stops and the air is drier, the roof fan's rotation speed increases.

The sensor batteries are designed to last 10 years (RHT-1). A sensor operates until its battery is depleted. After that, the sensor is replaced. Changing the sensors is easy if they have been installed, for example, inside an underpressure vent. The VILPE Sense humidity control can be installed in both new and older buildings.

Save on cooling costs during summer heat waves

According to a study conducted by Ramboll Finland Oy, the VILPE Sense system reduces the need to cool a building during warm weather, thereby providing energy savings. The results indicate that underpressure ventilation decreases the cooling needs by 4 % (on a poorly insulated roof) and 12 % (on a better-insulated roof) compared to an unventilated roof structure. With the VILPE Sense system, the reduction in cooling needs is 12 % (on a poorly insulated roof) and 21 % (on a better-insulated roof). If the air volume of the VILPE Sense system is tripled, the reduction in cooling needs is -27 % (on a poorly ventilated roof). To reach higher air volumes, a more powerful roof fan can be linked to the VILPE Sense humidity control system, such as the EC 200 FLOW. In conclusion, the results show that the VILPE Sense humidity control reduces the need for cooling both on better and less well-insulated roofs, but a greater net benefit can be achieved on a poorer insulated roof. More information about the study is available on VILPE's website or via *sales@vilpe.com.*

Detects and removes excessive moisture in structures

No mold or fungal growth, dry structures prevent decay

Functional insulation layer, moisture significantly reduces insulating capacity

Removes excessive heat and reduces the need for cooling

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

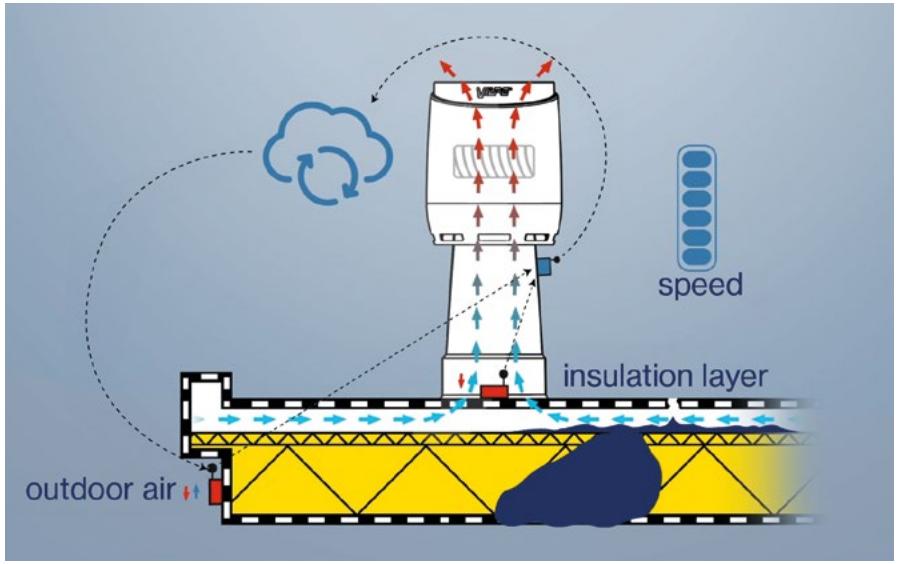
Products

VILPE EC Sense roof fan: The roof fan can easily be installed retroactively, for example, into an underpressure vent, eliminating the need to open the roof structures. A single roof fan can cover an area of 200 m² on a wool-insulated low pitched roof with ventilation grooves.

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 underpressure 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.

Underpressure vents: Underpressure vents are important for the system's functionality, ensuring air movement in the ventilated space with adequate make-up air. On flat roofs, make-up air can for instance be obtained using underpressure vents. The better the air circulation in the ventilated space, the more effectively the system operates.

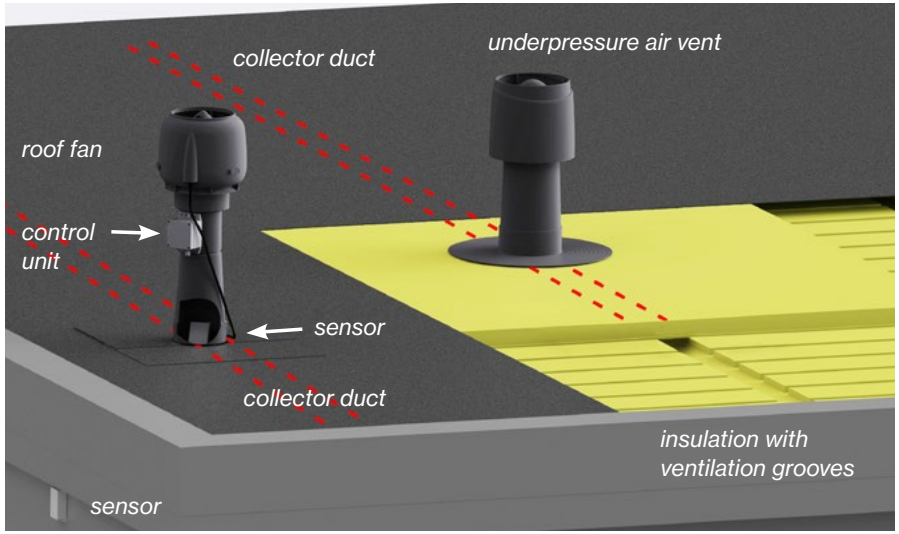
The VILPE Sense EC roof fan installed retroactively on an VILPE Alipai underpressure vent.



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.

Planning and installation

- **Planning:** In the planning phase, factors such as the size of the roof, roof structure and make-up air must be considered. Detailed design guidelines are available in the instructions.
- **Serial numbers:** Record the serial numbers of all basic kit control units and sensors before installation. It is also advisable to mark which sensors are for indoor and outdoor use.
- **Roof fan installation:** The roof fan is installed on the roof, either on an underpressure air 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 not exposed to direct sunlight or buried under snow in winter. Additional sensors may be installed as needed to extend the coverage of monitoring.
- **Product registration:** Products can be registered to the cloud service either before installation or during it. The serial number is needed for device registration.
- **Settings:** Set alarm thresholds in the cloud service and enable the mold index alarm. The system's measurement interval is two hours. It is also possible to set alarm delays to avoid unnecessary alerts.
- **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. Contact the supplier or designer of your building automation system for integration. A description of the interface is available from VILPE's technical support.



Ventilation grooves improves the function of VILPE Sense.

Ventilation grooves improves the function of VILPE Sense

The VILPE Sense system excels on roofs equipped with ventilation grooves. These grooves are channels beneath the top insulation layer, designed to facilitate free airflow within the insulation. At the construction site, the installation of collector ducts is advised to further enhance airflow (see image). For new constructions, it is recommended to utilize insulation that incorporates ventilation grooves in conjunction with the VILPE Sense system. In all other instances, ensuring adequate ventilation and the provision of make-up air is important.

Monitor the condition of the structure from the cloud service

The cloud service contains data collected by VILPE Sense about the building and the conditions of the structures, such as moisture levels and temperatures throughout the lifespan of the system. The cloud service also displays the structure's mold index. The mold index is based upon the Finnish mold growth model and it has been developed by Tampere University of Technology (TTY) and VTT Technical Research Centre of Finland. It calculates the risk of mold growth on a scale of 0–6. Users receive an alert via email about elevated moisture levels. Detailed instructions for interpreting the data can be found in the VILPE Sense instruction manual. Users also receive an alert if a sensor or control unit has stopped working.

VILPE SENSE AND DEMAND-BASED VENTILATION SOLVED MOISTURE PROBLEMS ON PUBLIC BUILDINGS

HUMIDITY CONTROL

Like numerous municipalities, Korsholm, in Finland, faces ongoing challenges with moisture issues in its buildings. In an initiative to mitigate these problems, Korsholm has equipped three of its buildings with problematic roofs with the VILPE Sense humidity control system. Thanks to the system's demand-controlled ventilation, moisture levels on these roofs have been successfully normalized.

Picture for illustrative purposes only.

"When spring arrives, the melting water starts to drip inside. Repairing leaks and preventing them is a central part of our daily routine," says project engineer Johan Klemets from Korsholm's property management.

According to Klemets, property maintenance is an ongoing development process aimed at reducing the number of unplanned renovations. As part of this work, the municipality decided to invest in the latest IoT technology to facilitate property maintenance. Therefore, in 2021, VILPE Sense humidity control was installed on three of the municipality's roofs that had been suffering from moisture problems.

"We've had problems with these three buildings. For some reason, ventilation has been poor on these roofs, and we also knew that the moisture levels were way too high. Now, the system practically manages itself, and we can see from the cloud service that the moisture levels have significantly improved," says Klemets.

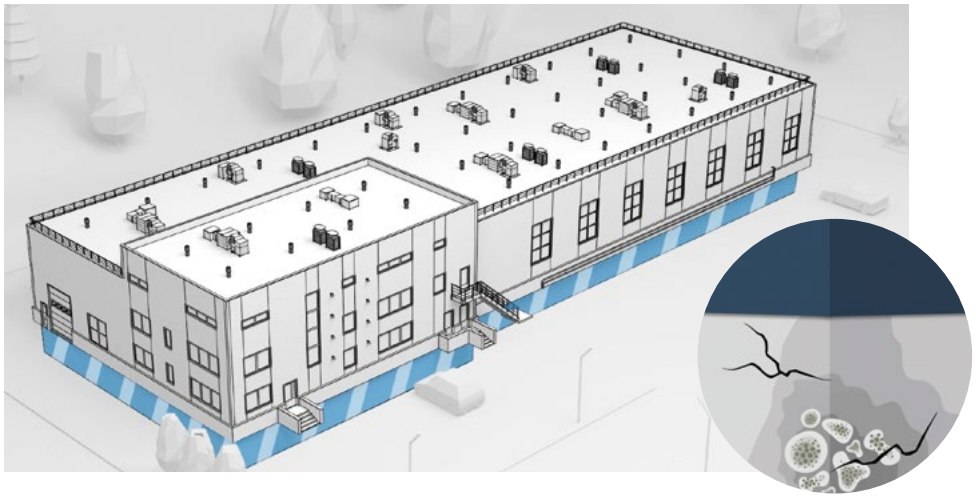
VILPE Sense's sensors monitor moisture levels in the roof structures. If elevated levels are detected, the roof fan is activated to dry the structures. The system ventilates as needed and not, for example, during rainy weather or severe frost. The system is connected to a cloud service, so users can also monitor roof moisture levels in real-time. An alarm is issued if excessive moisture is detected.

Klemets believes that smart solutions are the future for achieving healthier building stocks. The municipality is now considering installing VILPE Sense for monitoring and ventilating problematic crawl spaces.

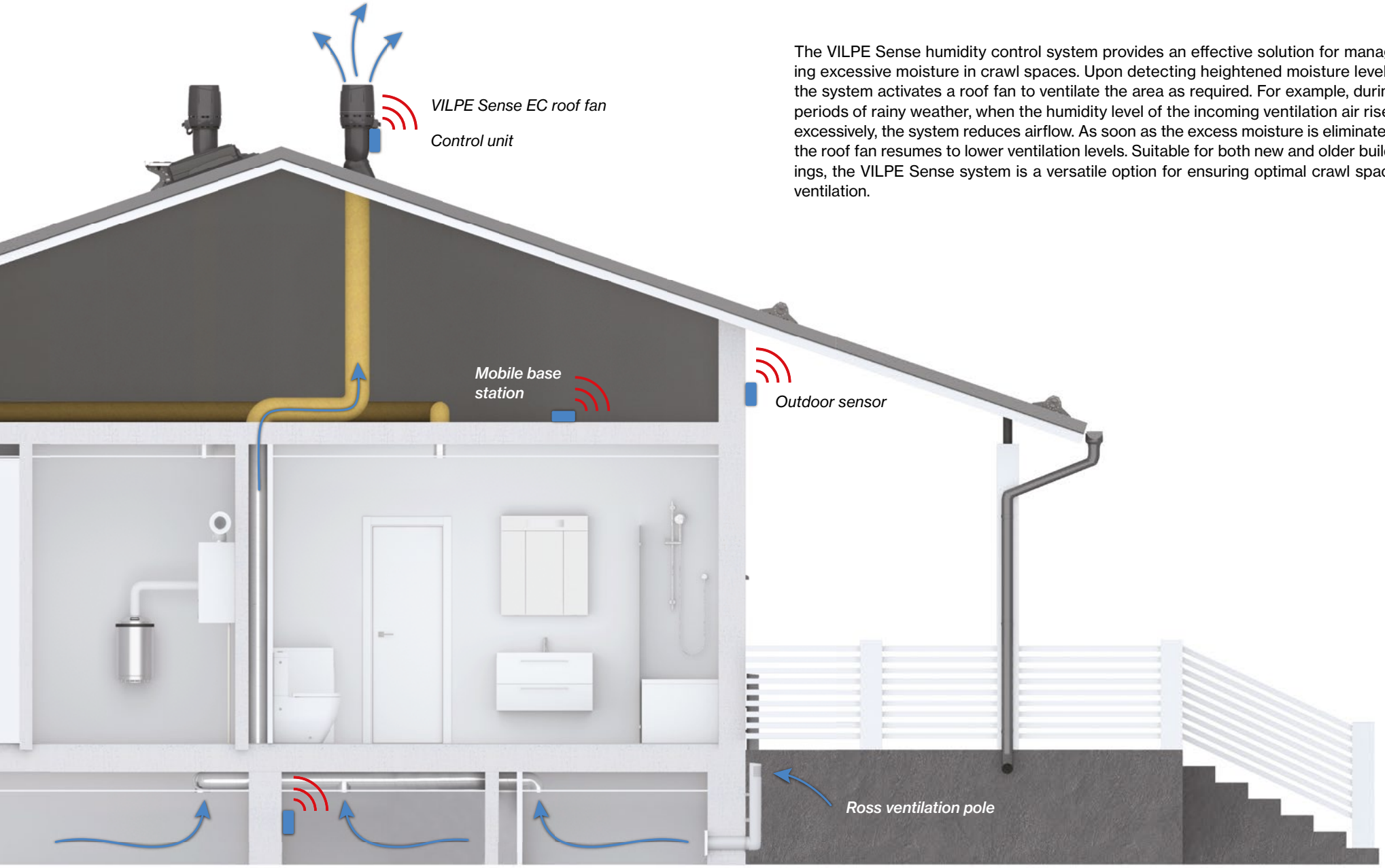
"For some reason, ventilation has been insufficient on these roofs, and we also knew that the moisture levels were way too high. Now, the system practically manages itself, and we can see from the cloud service that the situation has significantly improved."

SMART VENTILATION TACKLES EXCESSIVE MOISTURE IN CRAWL SPACES

Moisture issues in crawl spaces are a widespread concern. Moisture inherently ascends from the ground and, without adequate drying mechanisms in place, can infiltrate the crawl space structures. Over time, this can lead to detrimental effects such as mold and fungal proliferation. Additionally, the freezing and subsequent expansion of water within these structures during winter can cause cracks. These complications can ultimately compromise the integrity of the crawl space structures in the long run. Renovating a crawl space presents a particularly challenging task.



The VILPE Sense humidity control system provides an effective solution for managing excessive moisture in crawl spaces. Upon detecting heightened moisture levels, the system activates a roof fan to ventilate the area as required. For example, during periods of rainy weather, when the humidity level of the incoming ventilation air rises excessively, the system reduces airflow. As soon as the excess moisture is eliminated, the roof fan resumes to lower ventilation levels. Suitable for both new and older buildings, the VILPE Sense system is a versatile option for ensuring optimal crawl space ventilation.



PLANNING AND INSTALLATION OF THE VILPE SENSE HUMIDITY CONTROL FOR THE CRAWL SPACE

The solution consists of a VILPE EC roof fan that utilizes EC fan technology, combined with a control unit and two or more sensors. One sensor is installed outdoors to measure temperature and relative humidity, and another is installed within the crawl space structures. VILPE Sense adjusts the roof fan to ventilate at the optimal level based on the absolute humidity of the indoor and outdoor air. Absolute humidity values are calculated from temperature and relative humidity measures.

It is important to ensure that there is sufficient make-up air in the crawl space, for instance by using VILPE Ross ventilation poles. Exhaust ducts should be designed to fit the building, preferably leading to the roof.

Products, planning and installation

Roof fan and appropriate pass-through: The system requires a roof fan dimensioned for the crawl space based on the volume of air and the space's air volume. When the fan operates at half air flow rate, the ventilated air volume should be completely exchanged once every two hours. We recommend using a VILPE EC FLOW roof fan that matches the air volume requirements, paired with a pass-through compatible with both the roof and the roof fan. Typically, a single fan is sufficient to ventilate a crawl space.

VILPE Sense basic kit: The basic kit includes a control unit and two sensors, with one kit required per roof fan. Install the indoor sensor into the ventilated structure near the air extraction point, to monitor temperature and humidity levels of the exhaust air. For more detailed moisture monitoring, up to three additional sensors may be placed, ideally in corners lacking ventilation openings.

Ensuring sufficient amounts of make-up air, e.g., with Ross ventilation poles: The ventilated area must be equipped with VILPE Ross ventilation poles or alternative air intake solutions to guarantee sufficient make-up air. Position these ventilation openings to facilitate air movement throughout the entire crawl space. The air intake for the crawl space should be calibrated such that it maintains a slight underpressure (approximately 10 Pa) relative to the external atmosphere when the fan operates at half air flow rate.

Possible transfer air routes/ductwork: If air cannot freely move in the crawl space area, ductwork needs to be constructed to ensure air circulation.

Product registration: Products can be registered with the cloud service either before or during installation. Registration requires the device's serial number.

Settings: Set alert limits in the cloud service and enable the mold index. The system's measurement interval is two hours. It is also possible to set alarm delays to avoid unnecessary alerts.

Data transfer to the building automation system: Data collected by the VILPE Sense system can be read to a building automation system via a REST API. Contact the supplier or designer of your building automation system for integration. A description of the interface is available from VILPE's technical support.

Track the structural health of your building via the cloud service

The cloud service grants access to data collected by the VILPE Sense system on your building, including the condition of its structures like moisture levels and temperatures, throughout the system's entire lifecycle. It also features the mold index, which is based upon the Finnish mold growth model, a tool developed by Tampere University of Technology (TTY) and VTT Technical Research Centre of Finland, which assesses the risk of mold development on a scale from 0 to 6. Users are notified via email about elevated moisture levels.

Image for illustrative purposes only. The photo does not show the actual location.

CRAWL SPACE

VILPE SENSE ADDRESSED THE ROOT CAUSE OF MOISTURE DAMAGE IN ROW HOUSE CRAWL SPACE

The load-bearing structures in the crawl space of a row house in Ostrobothnia on the West Coast of Finland, suffered damage due to excessive moisture. The underlying issue was pinpointed as excessive moisture. During repairs, the VILPE Sense humidity control system was implemented to continuously monitor and regulate the crawl space's ventilation when needed. The data collected by VILPE Sense confirms that the moisture problem has been effectively addressed through demand-controlled ventilation.

"By examining the data from VILPE Sense, it's evident that conditions in the crawl space have significantly improved. The risk of damage to the reinforcement steel is much lower"

In Ostrobothnia, on the Finnish West Coast, the chairperson of a housing cooperative made a concerning discovery in the crawl space of a row house constructed in 2007: fragments had broken away from the crawl space's load-bearing structures. The fundamental issue plaguing the crawl space was traced back to excessive moisture. This crawl space was constructed using Siporex lightweight concrete slabs for its load-bearing elements. Produced through steam curing, Siporex is more porous and lighter than standard concrete, offering effective insulation for both heat and sound.

However, the porosity of the material used in the crawl space presented a drawback by reducing its resistance to moisture diffusion. Water vapor in the air easily infiltrates lightweight concrete, leading to a substantial amount of moisture being absorbed into the pores of the material due to the high humidity levels in the crawl space. This increased moisture content caused the reinforcement bars within the lightweight concrete slabs to corrode.

Fix not just the problem, but also the cause

In the process of formulating a repair strategy, project manager Mika Iso-Oja from the engineering firm Recon aimed to tackle not only the visible issues but also their underlying causes. A significant breakthrough occurred at the ”Functional Roofs” construction fair in Finland, where a colleague of Iso-Oja encountered a VILPE representative who introduced them to the VILPE Sense system. Concurrently, Iso-Oja was developing a repair plan for the project and became acquainted with the Sense system through his colleague. It turned out to be the precise solution he had been searching for. In October 2020, the VILPE Sense system was implemented in the crawl spaces of the row houses, with the existing roof fans being upgraded to VILPE EC Sense fans.

VILPE Ross ventilation poles bring replacement air into the crawl space.

During the repair, additional duct systems were also installed in the buildings to prevent the creation of ventilation dead zones. The crawl space was repaired, and VILPE Sense’s demand-controlled ventilation ensures that the problems do not recur. If the moisture level in the crawl space rises, the VILPE Sense system reacts by increasing ventilation, which reduces the moisture stress on the structures of the crawl space.

”Looking at the data from VILPE Sense, it’s clear that conditions in the crawl space are now significantly better. The risk of damage is much lower,” Iso-Oja states.

Helps in detecting problems early

Automation facilitates the monitoring of conditions in crawl spaces.

”The advantage of a smart system is that you know immediately if the system stops. If problems in this housing cooperative had been reacted to earlier, less damage would have occurred,” Iso-Oja says.

The system has already reported a couple of outages.

”An alarm indicating a stoppage is significant for any roof fan responsible for mechanical extraction from a crawl space,” says Iso-Oja.

He examined the system’s functionality in his thesis as a construction engineer. Measurements showed that VILPE Sense was working as intended. ”Based on my measurements, another advantage of Sense is that with the designed collector ductwork, air exchange is even, and typical dead zone problems in crawl spaces can be minimized”, says Iso-Oja.

To the left: The VILPE Sense outside sensors on the outside wall. The housing company has two VILPE Sense systems and, therefore, two outdoor air sensors. To the right: The VILPE Sense indoor sensor in the crawl space.

MAXIMIZING THE BENEFITS OF DATA GATHERED BY VILPE SENSE

VILPE Sense delivers insightful data on moisture levels and structural conditions. The sensor data, including temperature, relative humidity, absolute humidity, mold index, and fan motor speed, is securely stored in the cloud service, accessible for users to review. The system measures environmental data from both indoor and outdoor air, utilizing this information to optimize ventilation. Data ownership resides with the building owner, ensuring privacy, as it is not automatically accessible to third parties. However, the primary user of the cloud service has the option to share a link to the data, enabling stakeholders such as apartment residents or public building users to view the moisture conditions of the structures. This feature is particularly useful in scenarios like property sales, where potential buyers might find the data valuable. The data can be monitored across one or more locations, with the interface being compatible with PCs, smartphones, and tablets.

The VILPE Sense system's data can be transmitted to building automation systems via REST API.

Maintaining buildings: The premier environmental strategy

The construction and renovation of buildings typically require extensive environmental resources. Consequently, the care and upkeep of existing structures represent a significant environmental commitment. Opting for durable products and materials, along with maintenance of building infrastructures, can diminish the frequency of renovations. VILPE Sense revolutionizes building maintenance by facilitating proactive repairs and ensuring healthier buildings, thus elevating environmental stewardship to a smarter level.

Energy savings with the help of VILPE Sense

The VILPE Sense control unit is installed on the VILPE EC roof fan. The control unit adjusts the operation of the roof fan as needed, so the fan does not consume excess energy. Mostly, the fan operates modestly, with an average consumption of 20–30 W.

Wet insulation is an energy drain. The VILPE Sense moisture management system dries the insulation and maintains the insulation layer's insulating capacity at the designed level. During heatwaves, VILPE Sense helps to remove heat load, thereby saving on cooling needs. Read more about this on VILPE's webpage or contact *sales@vilpe.com* if you are interested to know more about how VILPE Sense can be used for cooling.

Transferring data from VILPE Sense to a building automation system

A building automation system enables easy monitoring of building conditions and aids in decision-making. The VILPE Sense system's data can be transmitted to building automation systems via REST API. Due to the unique operation of each building automation system, a solution must be custom-designed for every property system. After developing a solution for a specific building automation system, data transmission for properties utilizing that system is simplified.

VILPE Sense data was integrated into Schneider's building management system

Schneider Electric offers several building management and automation solutions, one of the most well-known being EcoStruxure Building Operation. EcoStruxure Building Operation is an integrated platform that enables building energy management, automation, and optimization. It is designed to improve building performance, maximize energy efficiency, and enhance occupant comfort. The solution for this building management system was designed by maintenance engineer Roope Leppänen from Schneider Electric in collaboration with VILPE's product manager Kimmo Kujala.

"The goal was to develop a solution that would provide the customer with a familiar interface and all the information related to the property in one place," says Leppänen.

The solution works as follows: The sensors of VILPE Sense send data on the structural conditions to the VILPE Sense cloud service. The local automation subsystem (PLC) requests the desired data from VILPE Sense's cloud service through REST API, which then returns the requested data to the automation subsystem. Through the API, it is possible to read, among other things, system-related alerts, temperature and humidity measurements, mold index (the Finnish mold growth index), and roof fan speed. The automation subsystem is then connected to Schneider's building automation cloud service, and the data ends up there (please see image).

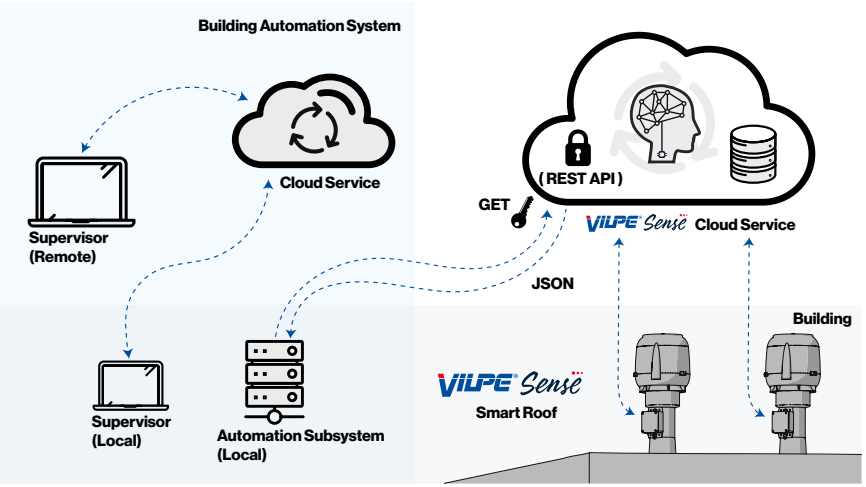
"This is not quite the traditional way to connect devices to a building management system, but the implementation went smoothly. Some adjustments had to be made regarding data processing since the solution was entirely new, but I do not feel that these were difficult issues," says Leppänen.

Products

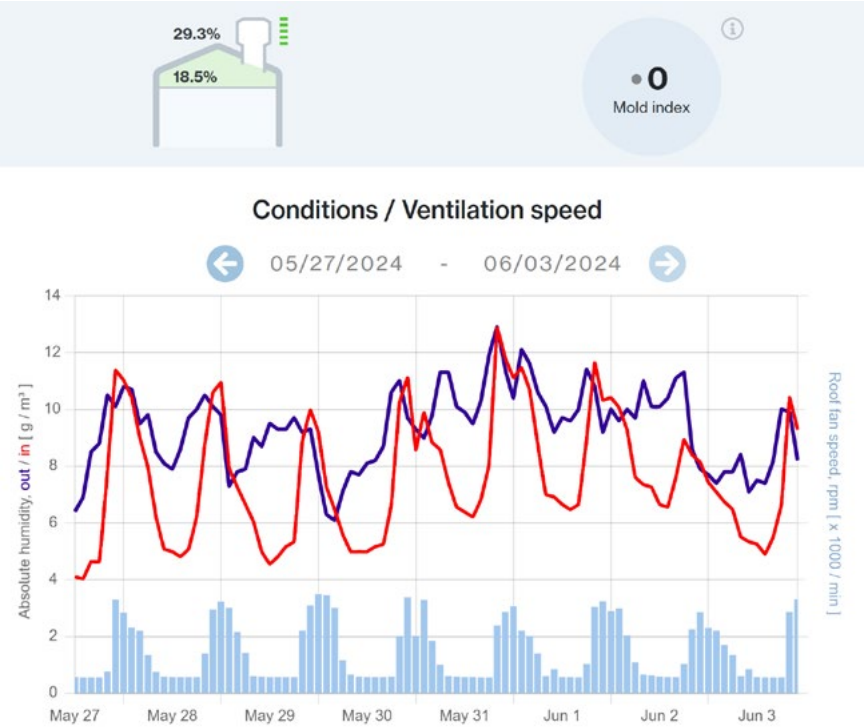
VILPE SENSE BASIC KIT, 1 pc control unit, 2 pcs sensors, (735042)

VILPE SENSE MOBILE BASE STATION, 1 pc, (735044)

VILPE EC SENSE ROOF FAN, 1 pc, (741982)



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.

DATA

OUR STORY

The story of our company started with a single innovation. During the summer of 1973, Eero Saikkonen – then a student at Vaasa Technical Institute – started looking for a solution to a practical building problem.

He had noticed that roofing felt and insulation, which at the time were glued together with bitumen, did not stay in place, and the heads of screws often penetrated and damaged the felt layer. To solve this problem, he developed a new type of fastener that would adjust to the weight which was applied to it. This innovation was the start of our company.

Since that day, we have been at the cutting edge of product development and have continued to challenge the building industry with new innovations. Many of these innovations, such as exhaust ventilation pipes, roof fans and ventilation poles have become a part of everyday building practice since we introduced them to the market. VILPE Oy's factory and headquarters are in Korsholm, Finland.

VILPE has always promoted healthy structures through innovations, and VILPE Sense is a natural continuation of this work. Since 2017, we have been developing products equipped with smart technology to combat moisture problems. Nowadays, VILPE Sense protects an increasing number of buildings from excessive moisture.

VILPE Sense

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