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CABLE-BASED WATER LEAK DETECTION TECHNOLOGY

THE NEED

Water leaks can be considered as a serious problem from many sources such as water supply and return chains, air conditioning units, cold-water chillers, clogged drains, damaged skylights or windows, or even construction errors. According to the article “Innovations in Water Leak Detection Technologies” in AutomatedBuildings.com, Contingency Planning Research indicated that water damage causes 27% of the outages. Moreover, Ontrack International said that downtime is costly, ranging from about \$1M to \$2.8M per hour depending on the industry. We can notice that water is accounting for a higher portion of the costs. This damage out of water leaks is explained well by the insurance statistical data that insurers in California paid \$430M in water-related claims in 2001 versus \$206M in 1997 and water-related claims account for 24% of all homeowners' claims in 1997, but grew to 32% of all claims in 2001. Therefore, water leak detection technologies can be highly considered as critical points in the fields of construction and maintenance.

THE TECHNOLOGY

The efforts to find the new water leak detection technologies which can provide significant advantages in cost, reliability, and easy adoption have continued since the traditional technology mainly focusing on a spot detector revealed several limitations.



FIGURE 1 SPOT DETECTOR



Spot detectors sense water leaks at a single point. It typically uses a probe to sense the presence of water. They are ideal for drip pans, floor drains, and confined areas where water converges at a single location. Spot detectors are broadly used because they are the most economical and familiar; however, they have one major drawback. They are most effective in an area where the liquid is contained, such as small rooms, air conditioning drip pans or dams, and around floor drains.

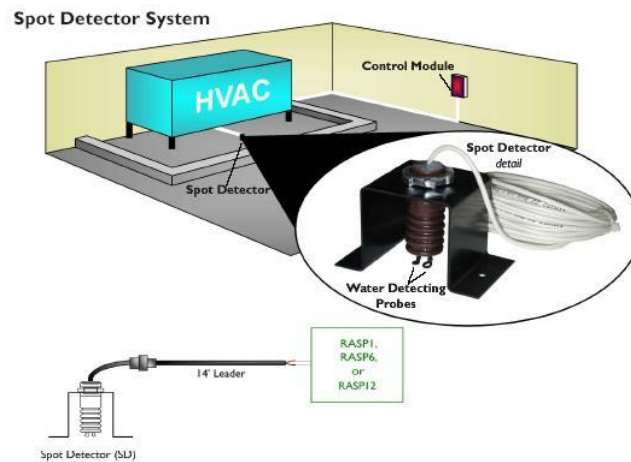


FIGURE 2 DIAGRAM OF SPOT DETECTOR

Each spot detector must connect to a control module. This control module is usually mounted on a wall in a high traffic area and provides visible and audible annunciation of a water leak. When used in an open floor area, the floor must be analyzed for low points to determine the best place(s) to put the spot detector(s). If the liquid flows one foot away and does not make contact with the probe, it won't be detected.

A new class of "continuous run" sensing systems has recently emerged, primarily using cable-based intelligent sensors. RLE Technologies and Tyco, uses an intelligent cable sensor, which can either use conductive and non-conductive sensing wires.



FIGURE 3 CABLE DETECTOR SYSTEM



Non-conductive cables are less prone to false alarms from the cable coming in contact with metallic surfaces such as metal rods or grounding planes, thus creating a short-circuit. In addition, this technology can detect any conductive fluid, not just water.



FIGURE 4 ZONE DETECTOR SYSTEM (COURTESY OF RLE TECHNOLOGIES)

With the intelligent cable sensor, businesses can easily detect single or multiple water leaks in a specific area or areas in conjunction with a zone control panel. Companies typically divide a visible area into several zones and monitor each zone using a multi-zone control panel.

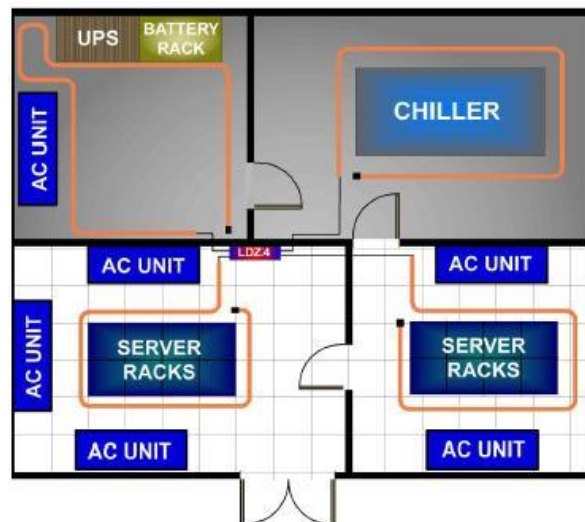


FIGURE 5 DIAGRAM OF ZONE DETECTOR SYSTEM (COURTESY OF RLE TECHNOLOGIES)

Then, the sensing cable is placed on the floor or the sub-floor around the potential leak sources, with each cable monitoring one zone. This allows each zone's sensitivity to be adjusted. If water or other conductive



liquids contact the cable anywhere along its length, the control panel annunciates the water and in which zone the leak is located. Also, for larger areas, businesses can pinpoint the exact location of the water leak using one continuous length of the sensing cable in conjunction with a "distance read" control panel. Typically, a single cable sensor can be used for up to several thousand feet and is installed throughout the floor or sub-floor around possible water sources. When a leak occurs, the control head annunciates this information and provides a distance measurement within a few feet. This information is cross-referenced with the cable route map that indicates the corresponding location of the leak. The "distance read" system is ideal for larger areas where it is not possible to view the cable, or any water that may come in contact with it, such as large raised-floor areas.

THE BENEFITS

These solutions allow for more comprehensive protection by supporting detection of multiple leaks, covering larger areas, and better pinpointing the exact location of a leak which spot detectors showed several limitations to be adopted.

- **Breadth of Application:** This system supports detection of multiple fluid leaks.
- **Adjustable Sensitivity:** This system can be adjusted to alarming with various ranges of amounts of water. Adjustable sensitivity is ideal and recommended to help eliminate false alarms that may occur from high humidity or slight condensation drips.
- **Quick Reset:** It is often required to reset the cable back to normal after an alarm condition has occurred. This system provides a solution to dry quickly.
- **Easy to Install:** The cable is easy to install, resist kinks, and lie flat after installation without "recoiling".
- **Highly Scalable:** This system supports multiple sensors and 9,000 feet of cable lengths.
- **Integration Friendly:** It is easy to integrate the water leak detection system into a building management system (BMS) and/or a network management system (NMS). This system provides easy integration with other monitoring and control systems that is offered by a company with expertise in integrating water leak detection as well as other monitoring devices into such systems.

STATUS

Common usage of a cable based intelligent sensor for water leak are areas where mission-critical equipment is being maintained, including data rooms, data centers, clean rooms, utility corridors, laboratories, telecommunication facilities, storage areas, elevator shafts, drip pans under water-cooled equipment, and many more. With water-related claims rising and water a significant cause of business outages, data centers have become one of the first to adopt leak detection technology in protecting their mission-critical equipment.



Companies are also starting to look at water leak detection to address two other problems: (A) toxic mold (B) high insurance costs. First, new regulations concerning toxic mold increases the liability for building owners. It takes only a few hours for mold to start to develop. Thus, as the concern for toxic mold increases, the need to detect the primary cause of the mold -- i.e. water --will also increase. Leak detection solutions can be useful in monitoring any area where condensation can build up and cause mold. Second, anecdotal evidence suggests that insurance companies are starting to realize the benefits of having water detection systems in place and have begun to offer incentives to those businesses that install such systems. Given the large amount of water-based claims, water leak detection systems can help insurance companies lower their risk and exposure to business interruptions and outages caused by water damage.

This system has been used in the Pentagon, Citibank, DOD Electronics, Security Industry Automation Corporation (SIAC), NASA, AT&T, and the University of Pennsylvania, and so on. The more information of customers who have installed this system can be checked on [HTTP://WWW.RLETECH.COM/CUSTOMERS.HTML](http://www.rletech.com/customers.html).

BARRIERS

- Initial cost for installation and maintenance cost can be higher than that of spot detector system
- It might be difficult to find the right location preventing any conflict with other electrical and mechanical outfits under the raised floor.

POINT OF CONTACT

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REVIEWERS

Peer reviewed as an emerging construction technology

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