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safety - iaq - emergency response - instrumentation

Leak Detection Fluid

Sherlock® 5-sec leak detector is used on gas connections, air lines, tanks, cylinders, refrigeration condensers, evaporatosr ond other equipment that can be leak-tested for air or gas. The leak detection fluid pinpoints large and small leaks at temperatures as low as -65°F more effectively than soap solutions. Available in pint-size dispenser with brush, 8 oz unbreakable plastic container with dauber, plastic squeeze bottle, 1-gallon container, 5-gallon pail and 55-gallon drum.
— Winton Products Co. Inc., 704/399-5151, www.wintonproducts.com

Circle 1 on Card

Convenience Bag for Vomit & Urine

The original Convenience Bag (vomit and urine collection bag) now comes in a wall dispenser that may be attached to the wall for convenient dispensing. The Convenience Bag provides protection from vomit splatter. The extra wide rigid collar makes it easy for everyone to use, including children. The inner-valve helps to contain odor and ensures that the contents will not split even if the bag is dropped.
— GKR Industries Inc., 800/526-7879, www.gkrindustries.com

Circle 2 on Card

Infrared Gas Detector

The Determinator (Fixed Point Infrared) sensor is an infrared hydrocarbon gas detector that can recognize and identify multiple hydrocarbon gases. It has no moving parts and displays the correct LEL as well as the gas detected on its five digit LED display. All normal operations, including checking calibration and changing alarm levels can be done in the field without declassifying the area. **— Delphian Corporation, 201/767-7300, www.delphian.com**

Circle 3 on Card

4-Gas Detector Has Flashing Confidence Light

The GasAlertQuattro is a durable portable gas detector that monitors up to four gases continuously. GasAlertQuattro features IntelliFlash, a green light that flashes continuously to let the safety managers and workers know they are safe. No manual checks, no time spent inspecting or auditing equipment...just a quick visual scan of the area provides assurance that all is well in minutes. Ideal for smoky or low visibility environments. Simple one-button operation offers ease of use with gloves. Be sure you're safe from toxic and combustible gases and unsafe oxygen levels choose GasAlertQuattro with IntelliFlash. **— BW Technologies by Honeywell, 888/749-8878, www.gasalertquattro.com**

Circle 4 on Card

Model C16 Portable Gas Leak Detector

ATI's portable gas leak detector was designed to enable the user to pinpoint the location of a gas leak around gas storage areas, process equipment, piping runs, or in confined spaces prior to entry. This hand held unit contains an internal sample pump and an extension wand that draws the sample into any one of up to 33 different type smart gas sensors. Gas sensors are easily changed without the need of tools and can be stored in the included sensor keeper. Standard features include a large LCD display, data logger, 3-adjustible alarms, D-cell battery with NiCad backup and storage case.
— Analytical Technology Inc., 800/959-0299, www.analyticaltechnology.com

Circle 5 on Card

ISSUE FEATURES

Lab Safety/Clean Rooms
Gas Detection
Emergency Responders
Confined Space Entry
Fume Hoods
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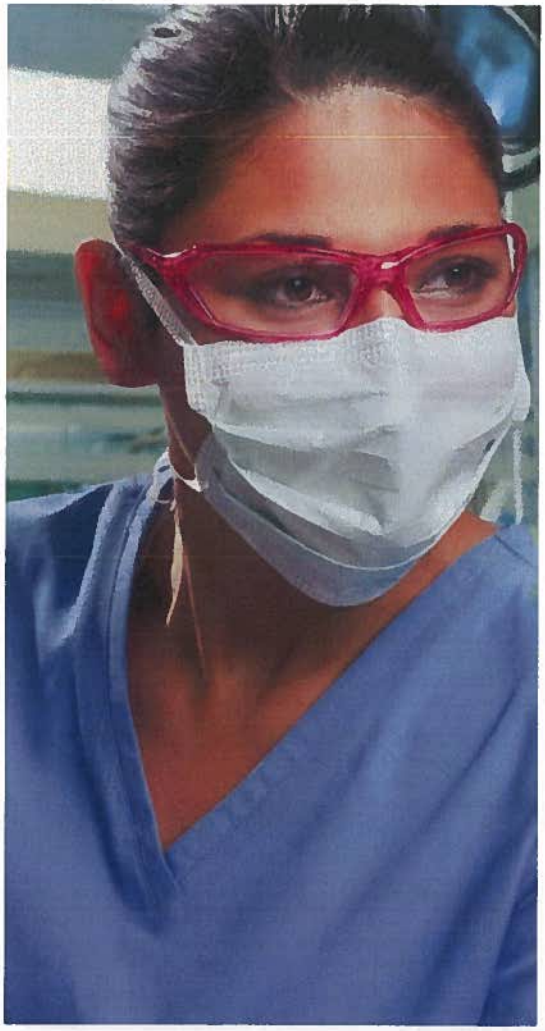

Protecting the Plant from Catastrophic Combustible Dust Explosions

Industrial vacuums are the right tool for preventing secondary explosions

The issue of dust explosions has been a hot topic since the early 20th century. In a book published by the NFPA in 1922, titled Dust Explosions, the authors, David J. Price and Harold H. Brown, acknowledge the need for a vacuum that can withstand the rigors of an industrial environment stating that despite every precaution to capture dust at the source, small amounts of it "will get out into the atmosphere of the mill and gather on floors, walls and ledges."

The authors of the book knew then, as it still stands today, "if there is no accumulation of dust and the plant is perfectly clean, the explosion cannot propagate and the plant will not be destroyed."

Even without a sufficient vacuum cleaner for industrial environments at the 1922 publishing of the book, the authors still warned against using brooms and compressed air in housekeeping practices because those methods often cause dust to be suspended in the environment during cleaning and could itself ignite, or would settle back onto floors, equipment and beams, lending itself to potential secondary explosions later.

Primary dust explosions occur when combustible dust is present, forms a dust cloud (in sufficient amounts), in an enclosed environment, with an ignition source and oxygen.

Bill Stevenson, VP of Engineering at Cv Technology and NFPA 654 committee member, says, "the explosion is caused by the rapid pressure rise as a result of the rapid burning of the dust cloud. So it has to be in an enclosure. If it were outside you'd just have a big flash."

Cv Technology is a Florida-based corporation dedicated to the prevention, protection, and mitigation of industrial dust explosions and related fires.

Stevenson further explains that if there was a layer

of combustible dust sitting on a desk, "you could get it to burn by putting a flame to it, but it wouldn't explode. If you took the torch away it would smolder and most would self extinguish; but, if you take the same dust, throw it in the air and then light it on fire, it would literally blow up in your face," he says.

Catastrophic secondary explosions occur when the force from the primary explosion dislodges fugitive dust, producing more dust clouds, and creating a domino type effect that can cause further explosions. So if you took that same dust smoldering on the desk and waved a piece of paper to make the particles airborne, a dust cloud could form and explode.

According to an NFPA Fact Sheet titled, U.S. Industrial and Manufacturing Property Structure Fires, "U.S. fire departments responded to an estimated average of 10,500 structure fires in industrial and manufacturing properties per year in 2003-2006," averaging 29 fires per day in the industrial sector. Of those fires, 29 percent involved shop tools or industrial equipment, and the manufacturing area was the leading origin of the fires.

Controlling the Explosion Pentagon

The explosion pentagon includes the three elements of the fire triangle, fuel (combustible dust), ignition source (heat) and an oxidizer (air), but needs two additional elements, dispersion of dust particles (in sufficient quantity and concentration), and the confinement of the dust cloud (vessel, area or building).

If one of the elements is missing, a fire or explosion can not occur. While it is difficult to remove air and fuel from the triangle, the first rule of fire prevention, and therefore explosion prevention, is to eliminate the ignition source. Although most machinery manufacturers design equipment with safety in mind, mechanical equipment is capable of malfunctioning, heating up, and causing ignitions.

Although every precaution is taken to eliminate ignition sources to prevent fires, and dust collection equipment is designed to safely contain most of the dust in the plant, manufacturers must make housekeeping for fugitive dust, that can be formed into a dust cloud, equally important to prevent dust explosions.

Industrial vacuum cleaners to control fugitive combustible dust should be suitable for use in Class II Div 2 areas. "Vacuum cleaners in particular are vulnerable to ignition and that is why there are only a few companies that know how to do that properly and VAC-U-MAX is one of them that does it right," says Stevenson. "They take extraordinary care to make sure there is no chance for the product to come into contact with anything ignitable."

VAC-U-MAX, the pioneer in industrial vacuum cleaning and pneumatic conveying since 1954, makes a line of combustible dust vacuums that are redundantly grounded and ideal for combustible dust.

Any time there is powder flowing in one direction through a plastic vacuum-cleaning hose it can create a significant static electric charge. In addition, there is the possibility that there may be static electricity build-up on individual dust particles. If a charged, ungrounded hose used to vacuum combustible dust powder were to contact an object that was grounded, the static electricity could then arc and trigger a violent explosion. This is why OSHA has issued numerous citations for using standard vacuum cleaners where Class II Div 2 equipment is required.

The Right Tool for Combustible Dust

Bill Bobbitt of Bobit Associates Environmental Systems, who's been working in the clean air industry for over 25 years, says, "I always tell my clients, it is not a matter of if, but when. Conditions have to be perfect and that 'when' can be 30 years from now, or it could be next week. But if you eliminate the fugitive dust, it cannot create a secondary dust explosion".

Bobbitt sees a lot of standard shop type vacuums in plants. "There are so many problems with them. They themselves are hazards in an industrial environment," he says. First and foremost, they are not grounded or classified for Class II Div 2 areas, they shock workers, they clog easily and the workers don't want to use them, and if workers don't use them, fugitive dust is accumulating in the plant.

Employing an industrial vacuum cleaner that is redundantly grounded in five different ways, "eliminates the possibility of any kind of explosion from the vacuum," says Bobbitt. Although VAC-U-MAX does make electric vacuums designed for Class II Div 2 environments, the most economical solution for cleaning combustible fugitive dust is its air-operated vacuums.

Beyond the fact that air operated vacuums use no electricity and have no moving parts, the first of the

five ways that VAC-U-MAX vacuums are grounded begins with the air line that supplies the compressed air to the units. Because most plants have compressed air lines made from iron that conducts electricity, the company's air operated vacuums use static conductive high pressure compressed air lines. In addition to the static conductive air lines, static conductive hoses, filters and casters are employed to further reduce risk. A grounding lug and strap that travels from the vacuum head down to the 55-gallon drum, eliminates the potential for arcing.

Air operated vacuums for combustible dust are safer in terms of grounding, they also work more efficiently in the industrial environment. Bobbitt says on a recent visit to a coal fired electric power plant he was shown five different electric vacuums sitting in a warehouse not being used because after 20 minutes, the filters would bind and workers just didn't want to use them because they would have to lift the head from the vacuum and tap the cake off before they would get any more suction.

The power plant and two sister facilities, Bobbitt says, "now use an air powered VAC-U-MAX model with a pulse cleaning system on the filters, that with the push of a button releases the dust from the filter and they can resume cleaning."

Compliance when Regulations aren't Clear

Fugitive dust "is a moving target that changes depending on the nature of the process and how well plants manage keeping the dust contained," says Stevenson. Most NFPA guidelines for combustible dust state that a layer of dust the thickness of a paperclip is enough dust to cause a significant secondary explosion. The problem he says, "is that it doesn't account for the different Kst values between different dusts. Some are more reactive than others. Some are more easily suspended into a cloud. Some tests found that depending on the type of dust, even half of the thickness of a paper clip would be too much."

Kst values classify dusts according to their explosivity—the rate of pressure-rise of a dust in the test vessel upon being ignited.

In situations where many different dusts are handled, testing all of them can be prohibitively expensive. For instance, in a high performance rubber plant where several different products are manufactured within the same plant, the dust in each area of the plant may have different Kst values in each area. For this circumstance it is recommended to work with an expert in the field to select samples for testing that represent the worst case.

This is why, Bobbitt says, that when you are dealing with explosive dust, you may need a Class II Div 2 vacuum in a non Class II Div 2 area. "You might have explosive dust in small quantities, and it might take a very hot and prolonged source of ignition, but with the new combustible dust initiative, facilities need to be very careful that they comply because there is a lot of question as to what compliance means."

"Although the regulations for combustible dust aren't real clear," Bobbitt says, "I find that a lot of companies are simply just trying to get better at general housecleaning."

Cv Technology's Stevenson agrees. "The one thing you can do very simply and easily is to keep everything clean—it is as simple as that. If you clean the place up and protect your dust collectors, you've gone a long way toward minimizing the chance for an explosion even if you do nothing else and those are pretty straight forward easy things that everyone can do," he says.

For more info about combustible dust industrial vacuum cleaners or to learn about VAC-U-MAX pneumatic conveying systems, call 1-800-VAC-U-MAX (800) 822-8629 or (973) 759-4600; e-mail info@vac-u-max.com; or visit www.vac-u-max.com.

Circle 121 on Card

To Calibrate (or Not to Calibrate) your Portable Gas Detector

As a trainer on gas detector use, one question that I hear repeatedly is, Why do I have to "bump test" my gas monitor daily? Another is, when should I calibrate it?

To ensure that a gas monitor will perform as intended in the presence of gas, most manufacturers of portable gas monitors and regulatory agencies alike agree that a bump, or functional test, should be carried out on the instrument prior to each day's use. Manufacturers offer confined space entry kits that provide all the equipment necessary for this operation, and docking stations can bump test as well as record the events.

However, many workers remain puzzled about how often they should bump test or when to subject the instrument to a full calibration. Manufacturer's recommendations can vary, with language that cites the need for "periodic" or "frequent" testing, and intervals between calibrations up to 180 days. Questions abound. Is a monitor with a 180 day calibration interval better than one recommending 30 days? What does OSHA or other governing agencies require? These are simple questions that involve safety, reliability, ease of use, and maintenance costs for a company.

The fact is, there is no one size fits all answer to the question about testing an instrument. Sensor technology, applications and functions of the monitor must be considered.

Sensor technologies used in today's gas monitors have improved significantly over the last decade. Advances such as electrochemical over solid state, enhanced poison resistance, and less cross-interference have resulted in more reliable performance. This evolution is one reason why calibration intervals have lengthened. Still, gas monitors must operate in harsh conditions and are not impervious to damage. Along with physical shock to the instrument, sensors can be damaged by gas concentrations that exceed the detectable limit. Filters and sensor ports can become obstructed by liquid, dirt and dust producing no change in readings even though the atmospheric conditions may have fluctuated. Proper bump testing and verification of accuracy between calibrations can prevent a false sense of security.

The frequency of this testing may depend on the monitor itself. Most if not all confined space monitors used today are direct reading and detect for oxygen, LEL (lower explosive level), and H2S and CO at a minimum. Catalytic bead combustible sensors are particularly prone contamination that inhibits response to the target gas. Oxygen sensors are also prone to failure where it does not respond to atmospheric changes. Monitors that employ these sensors should be tested prior to each day's use.

In 2004 the Occupational Safety & Health Administration (OSHA) posted a statement on "Verification Of Calibration for Direct-Reading Portable Gas Monitors" their website as a "Safety and Health Information Bulletin" and can be viewed at www.osha.gov/dts/shib/shib050404.html. OSHA stipulates that this is not a regulation and creates no legal obligations but is advisory in nature and is to assist employers in providing a safe and healthful workplace.

Portable gas monitors are designed to protect workers against potentially life threatening occupational environments. Verifying the proper performance is an essential part of any gas monitoring safety program. Following this protocol will ensure confidence in the workers as well as everyone responsible for keeping them safe.

Andrew Saunders is a senior technical trainer for BW Technologies by Honeywell and Honeywell Analytics.

Circle 122 on Card