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OFFICE: ALARM SYSTEMS	OFF-130.1.US	1. Does the facility have an employee alarm system? Cite: 29 CFR 1910.39(c) 29 CFR 1910.135	As employer must have and maintain an employee alarm system that is able to be heard, seen, or otherwise perceived by everyone in the workplace. The employee alarm system must be distinctive and recognized by all employees as a signal to evacuate the work area or perform actions identified in the EPP/SAP.
OFFICE: ALARM SYSTEMS	OFF-130.2.US	2. Is the employee alarm system tested annually? Cite: 29 CFR 1910.135(d)(4)	Employee alarm systems must be tested at least annually for reliability and adequacy.

G. AUDIT QUESTIONS
Date: _____
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Question ID	Audit Questions	Auditor Guidance And Notes-Audit Questions	Y E S	N O	N A	Comments
ERGONOMICS						
OFF-140.1.US	1. Are workstations configured so that employees can achieve ergonomically correct working postures?	Workstations should be configured to prevent common ergonomic problems. The computer keyboard and mouse should be within easy reach and at a comfortable height (elbow high), the keyboard and monitor should be aligned, and the screen should be at or slightly below eye level. There have been no test.				
OFF-140.2.US	2. Are chairs used at workstations adjustable and in good condition?	Chairs so that employees can work in a comfortable seated position, with good body support. Chair height should allow feet to rest flat on the ground with thighs parallel to the				

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PG 4	Company Profile: SE International
PG 6	Clemson Provides Textbook Case of Performance-Based Fire Protection at New Football Practice Facility
PG 18	Company Profile: Regscan
PG 20	Company Profile: Hemco
PG 22	Company Profile: Calibration Technologies
PG 24	The Next Phase in Industrial Dust Explosion Protection
PG 32	Company Profile: Safety Rail Company
PG 34	Company Profile: Nixalite
PG 36	Ad Index

CEO
Christy Hobson

PRESIDENT
Glen Hobson
glen@tipsmag.net

GROUP PUBLISHER
Brandon Greenhill
205-733-4343
brandon@tipsmag.net

ASSOCIATE PUBLISHER
Anne Marie Miranda
205-624-2184
annm@handfmedia.net

EDITOR
Annie Galey
annie@handfmedia.net

CREATIVE/ WEB DIRECTOR
Jacklyn Greenhill
jacklyn@handfmedia.net

ADMINISTRATIVE DIRECTOR
Steven Hobson
steven@tipsmag.net



Executive and Advertising Offices

P.O. Box 1568

Pelham, AL 35124

Phone: 205-441-5591 Fax: 205-624-3354

www.safetyzonemagazine.com

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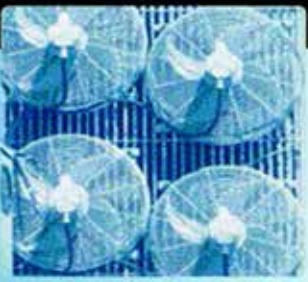


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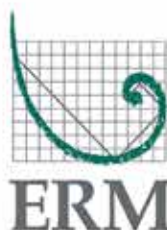
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Revised Ambient Air Monitoring Quality Assurance Requirements

ABSTRACT

The revised air monitoring quality assurance requirements are EPA's first comprehensive changes to the air monitoring rules since 2006. These changes formalize many changes that had been informally adopted by Agency memorandum and guidance documents. Many of the changes were driven by improved monitoring technology—such as continuous particulate matter analyzers—that were not commonly available at the time of the previous update.

The revised rules also revert to the pre-2006 structure whereby state and federal monitoring program requirements are set out in Appendix A, with industrial PSD monitoring requirements specified in Appendix B. EPA provides a summary of the changes at the following URL:

https://www3.epa.gov/ttnamti1/files/ambient/pm25/Summary_of_Appendix_A_Changes_10201_25_2016.pdf

ARTICLE

Key Changes

The revised regulation once again separates the quality assurance requirements applicable to state and federal monitoring programs from those for industrial PSD monitoring. This change recognizes the many differences in the objectives and implementation approach between the state and industrial monitoring programs. Other significant items include:

- Increased emphasis on the role and responsibilities of the Primary Quality Assurance Organization (PQAO)
- Requirement that EPA be provided a courtesy copy of an organization's Quality Assurance Project Plan (QAPP), even if that PQAO has been delegated QAPP review authority by EPA
- Clarification of the applicable system and performance audits and required frequency for each type of monitoring program
- Updated calibration and audit ranges for gaseous analyzers

Impacts On Existing Monitoring Monitoring Programs



Who We Are

Since 1979, S.E. International, Inc., has been a leading manufacturer of ionizing radiation detection instruments under the Radiation Alert® product line. We design, develop, and manufacture instruments for the environmental, laboratory, health physics, industrial hygiene, security, emergency response, and educational industries. SEI sells direct and has a strong network of domestic and international distributors. Together we are dedicated to our customers and promise to help you find the appropriate instrument for your needs.

How We Started

In the early years of the company, we were known as Solar Electronics because the first products were solar powered two-way radios that could be used in remote locations. We then developed a team of people to work with TVA on demonstration projects all over the southeastern US designing and installing photovoltaic arrays and wind energy. During that period, we also produced a small fetal heart monitor and from that instrument the idea of a small radiation detector was born.

In the mid-1980's, SEI decided to focus on radiation detection instruments. We have worked hard to establish a company and products that are known for quality and reliability. We have a reputation for being honest, innovative, and good to work with. We've partnered with numerous companies over the years and received recognition in the state of Tennessee for our international sales efforts.

Much of our success started with one product, the Monitor 4, a simple but reliable general-purpose survey meter. At the height of the Chernobyl disaster, we sold thousands of the Monitor 4 meters establishing us as one of the leading radiation detection instrument manufacturers. We now offer many products including our two most recent developments; the Radiation Alert® Ranger and the Radiation Alert® Monitor 200. Our product line features both analog and digital instruments with detection ranges from 1 microR to 1R.

Our Improvements

The Ranger offers maximum performance for surveying at the facility or out in the field. It is designed for industrial environments, but still has all of the features you've come to love in the lab. This small, handheld, smart instrument offers excellent sensitivity to low levels of alpha, beta, gamma, and x-rays and has built in efficiencies for common isotopes to calculate activity in Bq and DPM. Each instrument includes a backlit digital display, internal memory, selectable alert levels,

adjustable timer, a red count light and a beeper that sounds with each count detected. With the free Observer USB Software, you can set alarms and download your collected data from the internal memory for easy reporting! An optional wipe test plate is available for detecting small amounts of contamination. We also offer the Ranger EXP with all of the same features of the Ranger but with the added flexibility of an external probe.

The Monitor 200 also measures alpha, beta, gamma, and x-rays. Its digital display shows readings in your choice of CPM, CPS, $\mu\text{Sv/hr}$, mR/hr, or in accumulated counts. Includes a red count light, and a beeper that sounds with each count detected, adjustable timer, and selectable alert and free Observer USB Software.

The Ranger, Ranger EXP, and the Monitor 200 also come with a case, protective rubber boot, stand, lanyard, and batteries.

Our diverse product line includes handheld instruments for surface and air contamination, including general purpose survey meters, friskers, and dosimeters. We offer area monitors, multi-channel analyzers, and a portable laboratory, for the detection and identification of radiation in a variety of sources, i.e. soil, food, liquid, etc. All of our software along with all updates is included for free with the purchase of a Radiation Alert® instrument.

Our Involvement

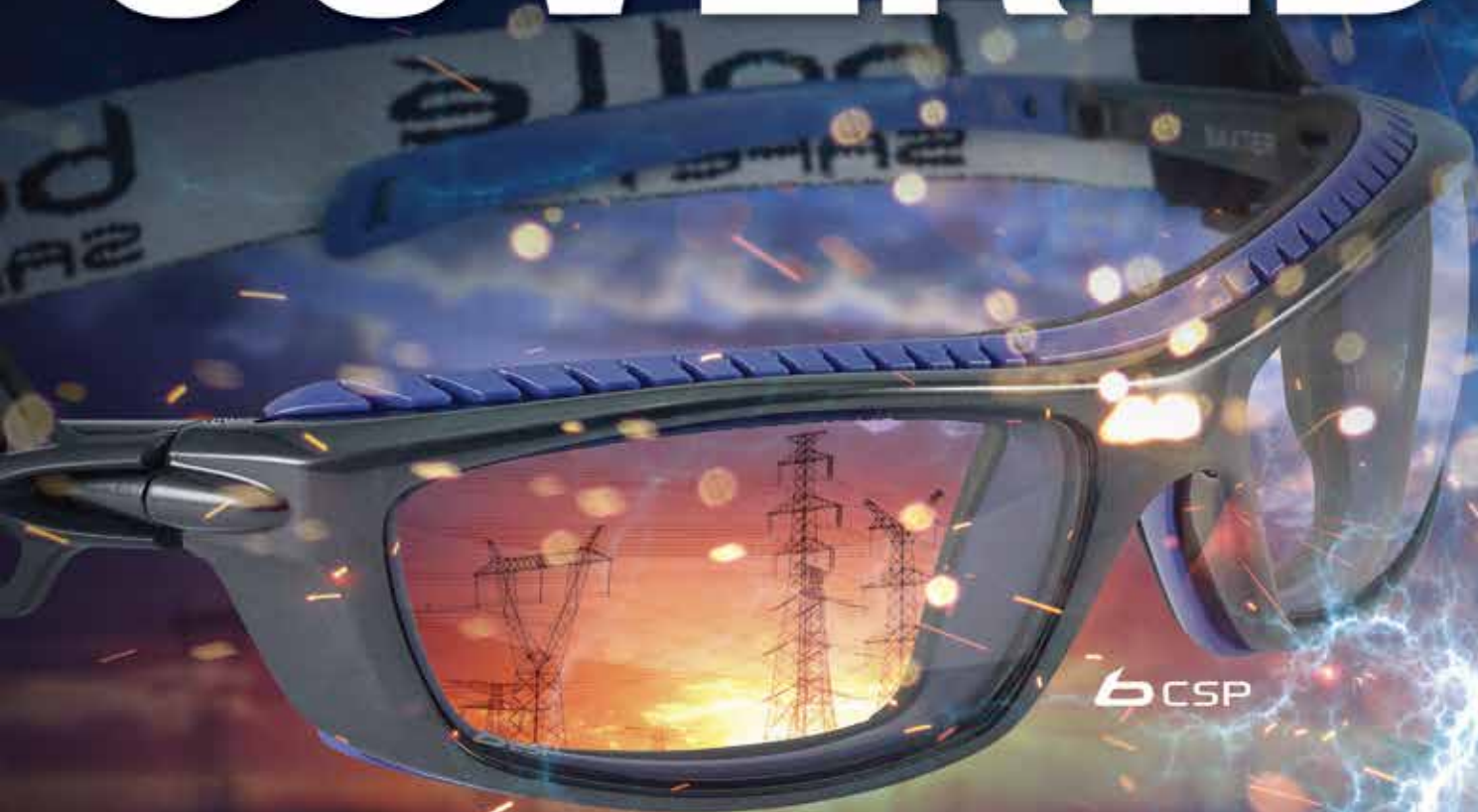
S.E. International, Inc. has a strong sense of community and has provided development grants, as well as donations to local groups and non-profits to help strengthen community-based initiatives. By supporting all of these projects, S.E. International, Inc. hopes to inspire other companies to look for creative ways to improve, support, and cooperate with their local communities.



How to Find Us

SEI can be found in a wide variety of industry magazines, trade shows, and web based buyers' guides. We strive to provide great instrumentation at a cost that will fit most budgets. To find out more about S.E. International, Inc. and the Radiation Alert® product line, please visit our website at www.seintl.com or call 800-293-5759. •

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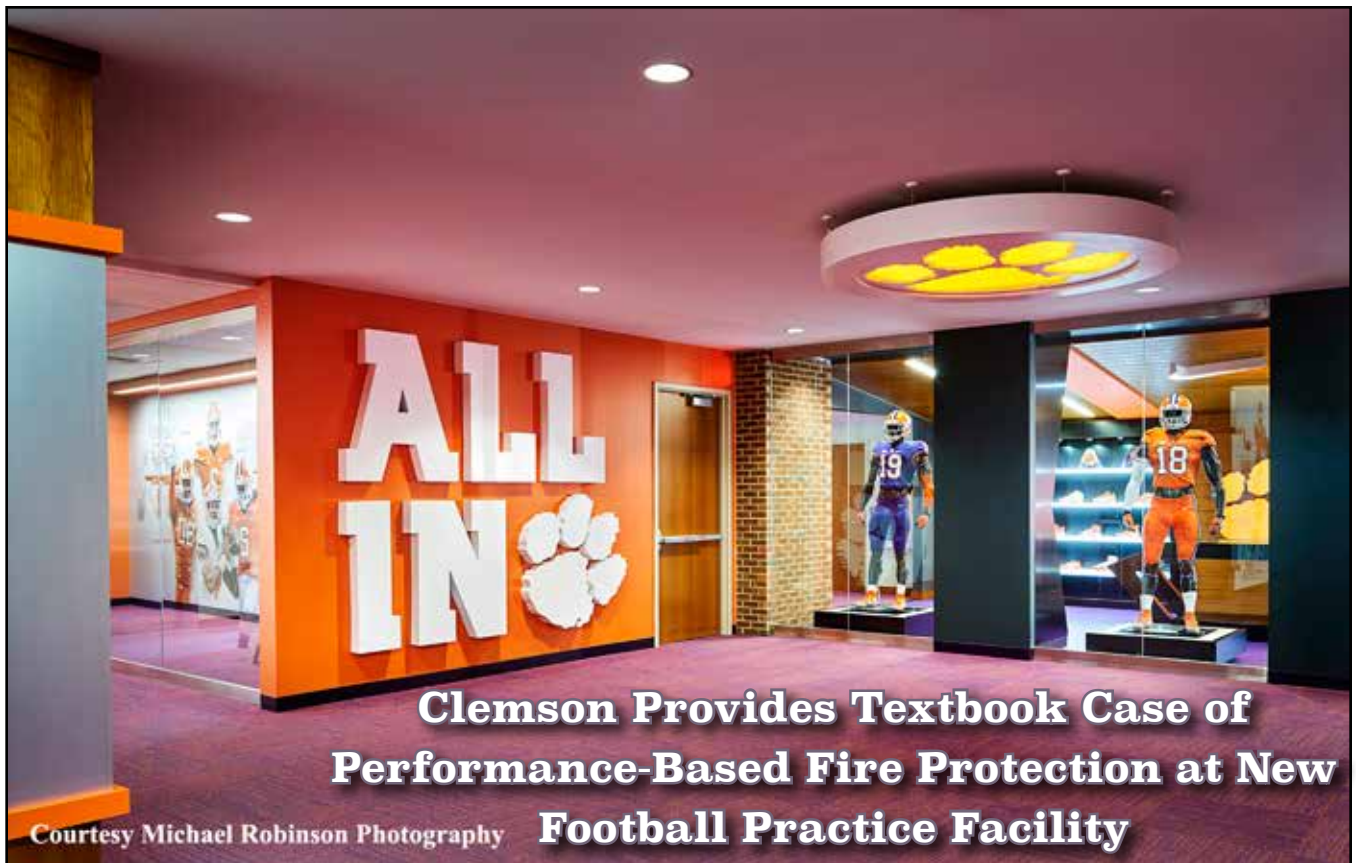
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Clemson Provides Textbook Case of Performance-Based Fire Protection at New Football Practice Facility

Courtesy Michael Robinson Photography

Unique approach to smoke detection at NCAA national champion's practice facility improves safety while dramatically lowering cost

Too often when educational facilities look to add unique or architecturally impactful buildings on campus, restrictive fire codes put a damper on designs or threaten to significantly increase costs and compromise functionality.

However, Clemson University, which recently constructed a new state-of-the-art home for its 2016 NCAA championship football team, was able to rethink conventional wisdom with a radical, more flexible approach to fire code interpretations.

The Allen N. Reeves Football Complex is the first in South Carolina history to utilize a performance-based design code analysis approach (tested to meet specific goals) to fire code safety, instead of a traditional prescriptive approach (adhering strictly to written codes), according to Paul Borick, one of Clemson University's Capital Projects, project managers for renovations and new construction.

"Universities have so many uniquely shaped or large volume spaces – like sports centers, pools, weight rooms, aerobic rooms, as well as classrooms and labs pushed up against multi-story structures and assembly areas – that don't quite fit the prescriptive fire code," says Borick.

Performance Based Design

In traditional prescriptive based designs, building codes usually require specific, measurable design criteria that are meant to govern typical building situations, based on past loss history and standard construction methods. While

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this works well in routine cases, the approach can lack flexibility when buildings have unusual design parameters.

As an International Code Council (ICC) accepted alternative, however, performance based design allows “alternate materials and methods” that offer equivalent or superior fire safety performance. In terms of enhancing fire safety, this often involves utilizing scientific calculations and engineering as well as computer fire modeling to determine how a building would respond to fire. With this approach, a design is considered acceptable if the fire engineering calculations demonstrate that it meets the measurable performance criteria set at the start of the process.

In Clemson’s case, to consolidate operations the university sought to construct the 142,500 sq. ft. Allen N. Reeves Football Complex adjacent to its existing indoor football practice facility and outdoor practice fields.

The state-of-the-art building, designed by architecture

firms Goodwyn Mills and Cawood, Inc. (GMC) and HOK, adjoins the indoor practice facility and outdoor practice fields, consolidating football operations into one complex. The complex features include 1.5 acres of outdoor leisure and entertainment space, hydrotherapy, training, weight room, steam room, recovery room and a Gatorade fuel bar.

“We wanted to put a new two-story football complex building next to our indoor practice facility, which has a full football field, but the prescriptive code made this difficult,” says Borick, who sought to avoid separating the two buildings in order to keep the team on a tight, regimented schedule.

According to Borick, this design was important to allow players to go from one area to the next (such as from the weightlifting room to the practice field) without having to walk outside in adverse weather conditions.

“The challenge was that if we attached the two buildings, the prescriptive code would have required us to separate



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the buildings by 60 feet or create a firewall between them, as well as fireproof all the existing structural steel in our big, open 100,000 square foot facility,” says Borick. “This would have cost well over \$1 million, so we had to find an alternative.”

Clemson University turned to Jensen Hughes Inc., one of world’s the largest fire protection and life safety engineering and consulting firms. In addition, as required by the South Carolina Office of State Engineer, the university employed Fisher Engineering Fire Protection Engineers to perform an independent 3rd party peer review of the Jensen Hughes performance based code analysis. Fisher also had extensive experience with performance based designs.

“The way the building was configured, it did not fit into the prescriptive requirement box,” says Mike Ernst, Senior Fire Protection Engineer at Jensen Hughes. “So we looked at the intent of the prescriptive code requirements and asked, ‘What’s the goal? What level of safety is the prescriptive code requirement trying to meet?’”

Due to the project’s unique design requirements, modification of the indoor practice facility was necessary to accommodate the construction of the adjacent two-story building.



“We went back and analyzed how they could configure it to meet the prescriptive code requirements, which meant making a two story building a big single story building,” says Ernst. “We then compared the level of safety of the single story configuration to the desired two-story building configuration.”

By adopting a performance-based design approach, computer egress modeling software, and an innovative smoke detection technology, the university was able to dramatically reduce the project cost while increasing safety.





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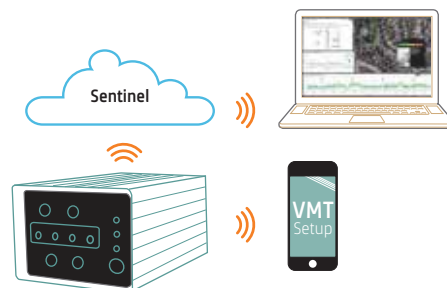
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In a performance based design approach, it turns out, one of the ways to meet safety code is to utilize egress modeling.

As such, Jensen Hughes employed Pathfinder egress modeling, which enables advanced evaluation of pedestrian movement, evacuation, and congestion studies through software-based simulation. This included going to the facility and observing how the football players moved throughout their existing building and interacted with each other in egress corridors and room exiting.

"Jensen Hughes staff filmed how our football players exited their main team room and moved together before entering their individual position meeting rooms," says Borick. "They analyzed the video to determine how their exit could be expedited and restrictions removed."

Along with this, Clemson University utilized advanced smoke detection technology in the form of four VESDA-E VEA fire alarm system units, manufactured by Xtralis, a global provider of early detection and remote visual verification of fire, gas and perimeter threats.

"For the VEA your detection time is essentially zero," says Ernst. "We had multiple scenarios with different levels of occupant loading in the building based on the way the university uses it. Overall, we gained 2-3 minutes of time to egress for each scenario due to early detection [compared to standard detection]."

Aspirating Technology

In smoke detection, advanced technologies such as the VEA provide earlier warning by aspirating – or drawing in air – from each room through small, flexible tubing. The air is then analyzed to identify the presence of minute smoke particles in a continuous process.

This is in stark contrast with the way traditional smoke detectors are designed. Conventional detectors are typically installed in each room or common space and connected to a central fire alarm panel by low voltage electrical wiring. When a significant amount of smoke accumulates in the chamber of the smoke detector, the alarm sounds.



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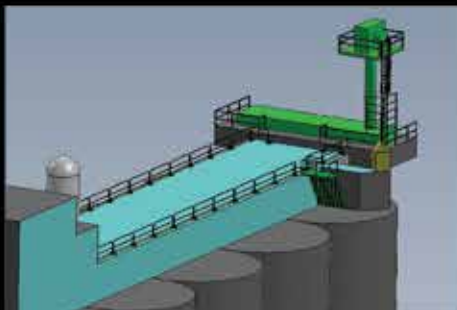
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"The VEA allowed us to get earlier warning to the occupants, which allowed them to move earlier and fully egress the building in less time than the prescriptive alarm initiation requirements," says Ernst.

"By going to a performance based design and [aspirating technology], egress is faster and the building safer than if we followed prescriptive code," agrees Borick.

The technology was first introduced in the early 1980s by Xtralis as the VESDA (Very Early Smoke Detection Apparatus) system. The company now offers a VEA model that consists of small, unobtrusive sample points in each room. The air is analyzed using sophisticated laser-based technology at the central unit located within 300 feet.

As a multi-channel, addressable system, the central unit can pinpoint the exact location of the alarm. A single system supports up to 40 sample points and can be extended to 120.

The system is also sophisticated enough to allow for three levels of sensitivity that can significantly reduce false alarms. For example, the system can differentiate a fire alarm triggered by someone smoking in a room from an alarm activated by a smoldering fire.

"The VEA system provides earlier, more intelligent alerts so the fire department can act quickly," says Borick. "Eliminating false alarms is also important so our football players and coaches do not have to vacate the building any more than is necessary."

Even with these benefits, one of the primary advantages of an aspirating smoke detector system is its ease of maintenance, inspection and servicing.

While spot smoke detectors are reliable and relatively easy to install, NFPA regulations also mandate annual inspection and testing of each unit for many facilities including colleges and universities. This tedious and time-consuming process requires a fire alarm contractor to enter each room, introduce smoke directly into the

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detector and verify that it functions properly. This is often covered under ongoing maintenance contracts where fire alarm contractors make a significant amount of their profit.

According to Ernst, the aspirating technology significantly simplifies such annual smoke detector maintenance.

"Maintenance wise, you have a few VEA detectors with about 160 sampling points in this building [that can

be tested from a central location each year], which is a lot simpler," says Ernst. Traditionally, that would have required about 160 spot smoke detectors to be tested every year at varying heights and locations, including some 20-30 feet off the ground, such as the weight room."

Since the NFPA requires annual inspection of detectors to ensure that they are functional, the ability to test them from one location also enhances security at the Allen N. Reeves Football Complex.

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"It is top secret stuff these days and we don't want contractors wandering around unescorted," says Borick. "It helps with security that the detectors can be checked from one spot."

For university administrators overseeing any type of building, addition, or renovation that does not quite fit the prescriptive code, Borick recommends considering the use of a performance-based code provision.

"The ultimate goal in any collegiate environment is safety, getting people out of the building quickly in case of a fire," concludes Borick. "In that regard, by following performance based design, I think we have created a much safer environment for our student athletes in this new facility than if we followed the prescriptive code. While our project may be the first to use this design method in South Carolina, I soon expect a slew of such projects may also consider this method on campuses nationwide."

For more information, contact: Xtralis at 175 Bodwell Street, Avon, MA 02322; call: +1 619-252-2015, email: sales@xtralis.com; or visit: www.xtralis.com/vea •



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Tutorials

RegScan also produces a number of helpful videos for our users. They answer most commonly asked questions on using the RegScan One interface. You may wish to visit our Informational & Tutorial Videos Page prior to submitting a ticket to see if your question can be answered with the assistance of one of these videos.

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The Next Phase in Industrial Dust Explosion Protection

Among its directives, NFPA 652 outlines deadlines for sampling and analysis to identify potential risk areas for dust explosions in industrial facilities. Spotlight now turns to mitigation equipment.

For a wide range of facilities that manufacture, process, blend, convey, repackage, generate or handle items that could be categorized as combustible dusts or particulate solids, new NFPA Standards and even the first deadline to conduct a dust hazard analysis are now on the books adding to the responsibilities of owners and operators of such facilities.

Explosions can result from an ignition of a combustible gas, mist or dust when mixed with air during processing, handling or storage operations. A rapid rise in pressure occurs in the containing structure, and if it is not of adequate strength to withstand the pressure, extensive damage and injury to personnel can occur.

After a string of incidents in the early 2000s, organizations such as OSHA stepped up the requirements, as with the Combustible Dust National Emphasis Pro-

gram of 2008, which is still in effect today.

The NFPA (National Fire Protection Association), which has been issuing Standards and guidelines for decades, is doing the same with publication of NFPA 652 – Standard on the Fundamentals of Combustible Dust, in 2016. This new Standard consolidates best engineering practice and provides reference to all of the existing combustible dust standards in a single, overarching document that applies to all facilities that handle potentially explosive dusts.

While the new Standard does an admirable job of unifying the various existing equipment and industry specific codes, NFPA 652 goes a step further by specifying – for the first time – a deadline for owners and operators of at-risk facilities to conduct a dust hazard analysis.

“Perhaps the most important aspect of the introduction of NFPA 652, is that it requires all owners and operators of a dusty industrial process to do a dust hazard analysis,” says Geof Brazier, president of BS&B Pressure Safety Management, a manufacturer of a broad range of dust explosion prevention and protection technologies.

According to Brazier, NFPA 652 specifies facilities must complete this dust hazard analysis within 3 years. However, recent revisions to NFPA 654 and 61 that additionally apply to many facilities have extended that deadline to 5 years.

While a significant step in the right direction, NFPA 652 is essentially requiring owners and operators of at-risk facilities to confront and address an issue that many may not fully understand in terms of both the potential for such an event and what steps must be taken to mitigate those risks.

The NFPA Standards, for example, outline requirements that can range from improved housekeeping to installing dust-collection equipment and offering protective equipment for personnel.

In addition, protection or hazard mitigation devices may also be required. Because these typically represent some capital expenditure, many owners and operators are seeking out information on the available technologies on the market.

Explosion Protection Devices

To protect process equipment and personnel, a hybrid of technical measures is often required. Among the options are passive devices like vents or containment systems along with active devices such as explosion suppression or spark detection and extinguishing systems.

In addition, chemical or mechanical isolation devices are required to protect connected equipment and

pipework from propagating to a secondary event, which can often be more dangerous and destructive than the initial event.

Explosion Vents

During the early stages of a dust or gas explosion, explosion vents open rapidly at a predetermined burst pressure, allowing the combustion process to escape to the atmosphere and limiting the pressure generated inside the process equipment to calculated safe limits.

Venting is the most popular and widely adopted protection mechanism, in part because it is economical and requires little attention or maintenance once installed.

“In the US, there are well over 20,000 vents applied every year on equipment,” says Brazier, adding that a single piece of equipment might require multiple vents according to the NFPA 68 design calculations that assess both dust reactivity and the volume as well as shape of the equipment to be protected.

For decades, explosion vents have traditionally been designed using a “composite” approach that sandwiches plastic film between more resistant stainless steel sheets with holes, or slots, cut into it. These vents are designed to “open” at typically 1 to 1.5 PSI set pressure, a result of the slot and hole pattern placed into the sheet metal.

Over time, however, this type of vent is prone to tears in the plastic film, which is the seal between the process conditions and the atmosphere.

With this type of technology, the holes and slots in the stainless steel sheets can admit particulates and debris over time. In addition to being unsanitary, particularly for food processors, the build-up can eventually affect the functionality of the vent.

“A vent that becomes heavier in weight due to build-up

will open slowly and less efficiently, and ultimately the pressure in the equipment will be higher than expected which is a safety concern,” explains Brazier.

In 1990, BS&B Systems patented the first single-section explosion vent, comprised of a solitary sheet of stainless steel in a domed configuration. Perforations around the perimeter to aid opening at the desired low set pressure are protected with gasket materials.

The single-section domed design produces a vent that is more robust, lighter in weight and also largely eliminates the potential for build-up or contamination.

In 2010, the company improved on the design by altering the shape of the dome to a unique compound geometry that delivers even greater rigidity for high vacuum or vibration applications.

Despite its popularity, explosion vents will not work for every application. With venting, the combustion process will release a large ball of flame into the atmosphere that might be 10 times the size of the protected equipment for a few milliseconds.

While this might be an acceptable consequence for equipment that is outdoors at a remote location, for applications within a plant compound or inside a building it could endanger personnel or equipment, and even lead to a secondary explosion external to the protected equipment.

In cases where a flameball must be avoided, flame arrestors can be deployed. These devices are designed to absorb the pressure wave, flame and at least some of the dust that would normally be ejected by a vented explosion.

The 3 dimensional flame arrestors applied downstream of explosion vents are heavy and when installed directly on top of a vent damage can result.

To address this concern, companies like BS&B Pres-

sure Safety Management provide a flameless system designed with the vent installed inside the flame arrestor. In doing so, the heavier flame arrestor is mechanically mounted directly to the equipment, reducing the weight load transmitted through the more sensitive vent and eliminating the risk of damaging the vent.

It also serves the dual purpose of allowing for easy inspection of the vent and arrestor while installed. NFPA Standards require periodic inspection of explosion safety equipment.

Suppression Equipment

For processes where an explosion would ideally be prevented altogether, suppression systems are the best alternative.

Explosion suppression equipment detects a dust explosion in the first milliseconds of the event and then signals extinguishing modules to release a flame quenching medium into the process equipment. This effectively stops the explosion in its infancy and only low pressure is produced that is safe for the protected equipment.

“Suppression can be preferable for indoor equipment, simply because the explosion doesn’t really propagate; it starts, but it never evolves into a full blown event,” says Brazier.

For a 24/7 process, a suppression system can be very desirable, because the speed of clean up and refit allows for a quick return to production.

“If you use venting or flameless venting, you are allowing the explosion to fully develop in process equipment, so you have cleanup to deal with, you may have fire-related damages and other consequences that take time to get the process back into operation,” adds Brazier.



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A typical suppression system consists of sensors and several explosion suppression “cannons,” which propel an extinguishing agent, such as sodium bicarbonate, into the process equipment. Nitrogen is often used to provide the motive power.



For installation purposes, this provides tremendous flexibility for placing cannons in the ideal location.

Although some available systems combine nitrogen and extinguishing agent in a single canister, this means the cannon must be oriented vertically downward to discharge properly. If not, the extinguishing powder could be left behind.

In the BS&B suppression system the nitrogen and extinguishing chemical are kept separate until the instant of activation. For this reason, discharge cannons can be installed facing vertically down, horizontal, or even upwards.

Separating the extinguishing agent and providing it in an easily replaced canister also means that on-site personnel can refit the system in case of an

event. This can be a significant advantage given that some systems require a service technician to travel to the facility to re-set the system.

Containment Systems

To “contain” an explosion, process equipment is built strong enough to resist the pressures generated by the combustion occurring inside a sealed container.

With this type of system, there is a high cost of con-

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struction since the design pressure has to be typically over 100 psig, and sometimes over 150 psig, which is far above the normal, required operating pressure conditions of the equipment.

As a consequence, containment is only economically viable for processes that are small volumes and / or high added value, such as some pharmaceutical manufacturing and for industries handling toxic materials that cannot be released to the environment.

In this type of system, the isolation devices play a critical role in preventing damage to connected equipment and piping. For this, fast activating knife gate or pinch valve device can be used, as well as chemical isolation systems.

With containment systems, however, isolation equipment must also be able to withstand greater pressures, up to 150 psig, unlike similar equipment required with vents or suppression devices that must survive only 3-10 psig.

Regardless of the type and combination of equipment installed, the appropriate solution for each application is a hands-on, collaborative endeavor.

“There is always more than one way to achieve combustible dust safety,” says Brazier. “The expertise is in reviewing each option for a particular industrial process and arriving at a combination of technologies that is technically effective, as well as cost effective in meeting the owner / operator’s responsibilities under NFPA Standards.”

For more information, contact BS&B Safety Systems at 7455 East 46th Street, Tulsa, OK 74145-6379, (918) 622-5950, e-mail: sales@bsbsystems.com or visit www.bsbsystems.com •



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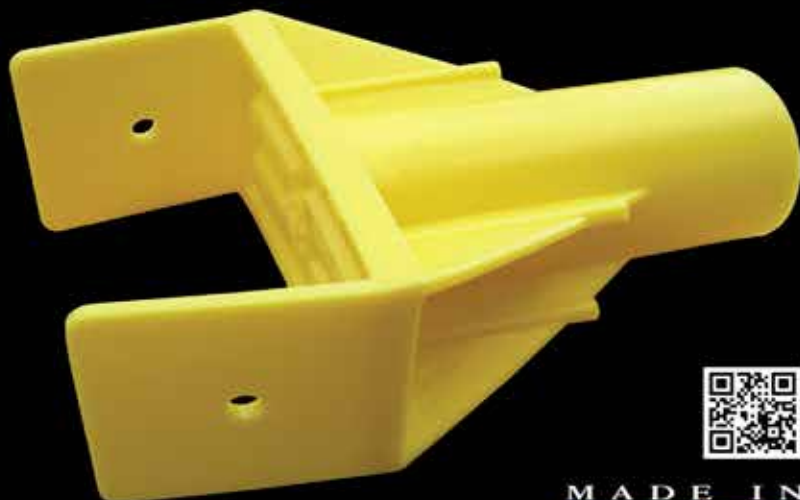
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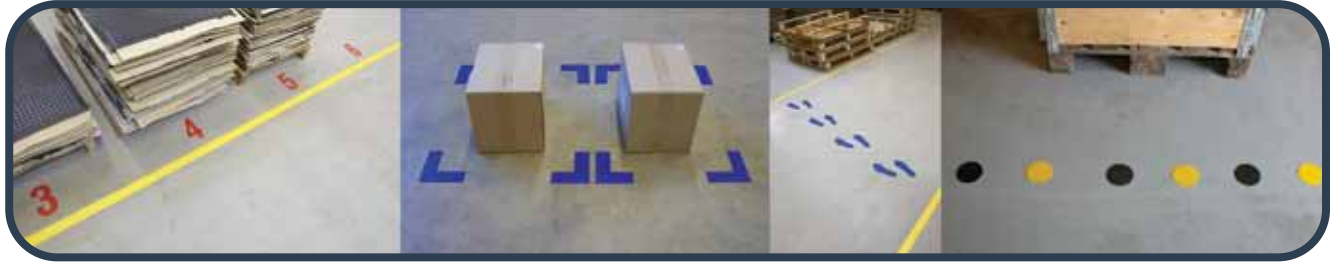
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