SAFETY, STANDARDS, AND HOUSEKEEPING:

A COMPLIANCE GUIDE FOR FOOD MANUFACTURERS

PRESENTED BY: Nilfisk®

Safety, Standards, and Housekeeping: A Compliance Guide for Food Manufacturers

Food manufacturers have endless safety regulations, OSHA standards, and recommendations to consider on a daily basis.

It can get overwhelming for even the most experienced food industry professional. This guide will help you know which regulations apply to you, keep your daily operations safe, and how to choose the right equipment.

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SAFETY

Common Safety Mistakes in Food Plants

Safety. Ask any food manufacturer what's top of mind these days, and that's what they'll say. While much of the emphasis is on the safety of food products (especially with the Food Safety Modernization Act coming into play), the safety of the workers who make those products has seen more attention the past several years.

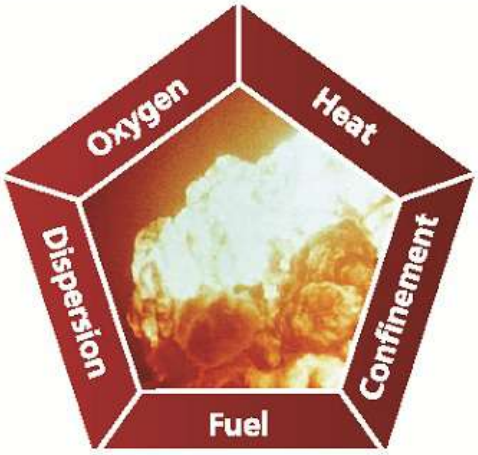
Last spring, Ken Wengert, then Director of Safety and Environmental at Kraft and current Director at Large of the American Society of Safety Engineers, told *Business Insurance* magazine: "We have had improved safety performance year over year for the past 20 years, but our rate of improvement has improved dramatically over the past five," largely due to process improvements and better technology.

But the food industry still has a ways to go. In 2014, according to the U.S. Bureau of Labor Statistics, the incidence rate of nonfatal occupational injuries and illnesses in food manufacturing was 5.1 per 100 full-time workers, which was higher than for manufacturing as a whole (4.0) and for all industries combined (3.4). With roughly 1.5 million people employed in food manufacturing, that works out to about 76,500 injuries.

Fortunately, as Wengert pointed out, process improvements and better technologies can help food manufacturers improve their safety records.

Here are seven common safety mistakes in food plants — and how to avoid them.

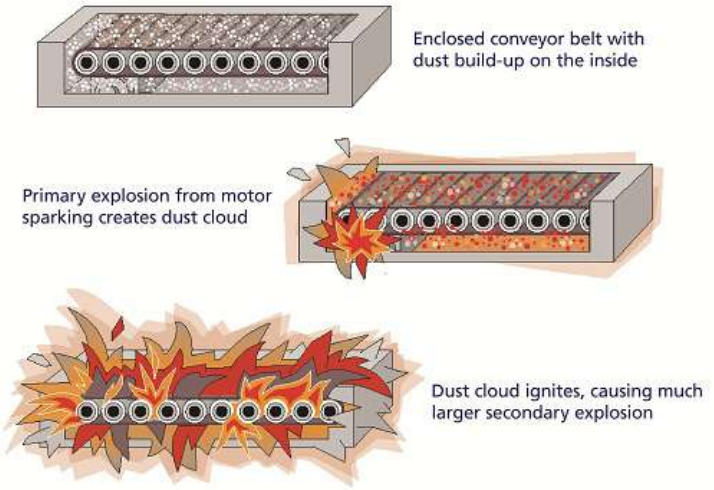
Dust Explosion Pentagon



The 5 basic elements needed to start an explosion:

1. A fuel is needed to burn (combustible dust)
2. Oxygen is needed to sustain the fire (air)
3. Heat from an ignition source is needed (spark)
4. A high concentration of dust is dispersed into the air (deflagration)
5. The dust must be confined within an enclosure or structure (explosion)

Secondary Explosion



The best way to mitigate this risk in your facility is to use proper housekeeping procedures, equipment, and controls.

Underestimating the risk of combustible dust

On February 7, 2008, 14 people were killed and 38 injured in an explosion and fire at an Imperial Sugar refinery. This event prompted regulatory agencies to revisit their policies and procedures surrounding combustible dust.

A typical combustible dust explosion has two phases: an initial explosion within the processing equipment, followed by a secondary explosion caused by additional dust igniting and dispersing into the air. It's this secondary explosion that causes most of the damage

The food industry is particularly susceptible to these types of explosions. Virtually every ingredient used in food has the potential to become combustible dust, especially sugars, flours, starches, and spices.

Both the National Fire Prevention Association (NFPA) and OSHA take a hard line on combustible dust. NFPA 652 is a new standard that provides general requirements for managing combustible dust fires and explosions across all industries, processes, and dust types. It applies to all facilities and operations that manufacture, process, blend, convey, repackage, generate, or handle combustible dusts or combustible particulate solids. This includes food plants.

Specifically, NFPA 652 requires facilities to:

- Test their dust to determine its combustibility or explosibility;
- Conduct a dust hazard analysis; and
- Develop a plan to manage the hazard(s). That plan must include proper housekeeping.

OSHA recommends several dust control strategies, including

- Implement a hazardous dust inspection, testing, housekeeping, and control program;
- Use proper dust collection systems and filters;
- If ignition sources are present, use cleaning methods that do not generate dust clouds; and
- Use only vacuum cleaners approved for dust collection.

Learn more in the OSHA Fact Sheet: Hazard Alert: Combustible Dust Explosions.

Ignoring ergonomics

According to a report by the California Department of Industrial Relations, musculoskeletal disorders are one of the most common types of injuries in the food processing industry. These disorders, which include everything from muscle strains to tendonitis and sciatica, are the result of awkward body positions and repetitive tasks.

Over time, these conditions can not only cause debilitating injuries for workers, but they can also cost companies significantly in medical expenses, workers' compensation insurance premiums, and low employee morale.

In 2013, musculoskeletal disorders accounted for a full third of all worker injury and illness cases.

Fortunately, they can be prevented through ergonomics. According to OSHA, ergonomics essentially means "designing the job to fit the worker, rather than physically forcing the worker's body to fit the job."

The OSHA website provides guidelines for preventing musculoskeletal injuries in several areas of food processing, including poultry processing and meatpacking. They also outline the major components of an ergonomics program, from problem identification to training and evaluation.

For a few simple things you can do right now, check out these five tips from Certified Professional Ergonomist Laura Dietrich. As she notes, small changes can lead to big improvements, like raising pallets off of the ground so that workers don't have to bend more than 90 degrees to pick things up. Even performing preventive maintenance on cart wheels so they're easier to maneuver can make a world of difference.

Being lax about personal protective equipment

Personal protective equipment (PPE), such as gloves, goggles, and aprons, can greatly reduce workers' exposure to harmful substances and environments. But only if workers actually wear them.

Last year, sanitation expert Chris Calusta told *Food Safety* magazine that "although facilities will conduct annual training on PPE, at some point during the year, trainees neglect to use gloves or goggles when working with sanitation products. When you are lax about PPE, you put employees' safety at risk and you take the chance of seriously affecting workers' compensation costs."

This problem is not limited to the use of sanitation products. PPE should be worn while working with many types of equipment as well. The solution is to be vigilant about the use of PPE in your facility, not just during training and inspection time, but all of the time.

Not implementing a lockout/tagout program

Last year, OSHA's Lockout/Tagout Standard (1910.147) was the fifth most frequently cited violation across industries as a whole. For food manufacturing, as has been the case for a couple of years, it was #1, costing companies an average of $3,670 per violation.
In 2014, the National Institute for Occupational Safety and Health (NIOSH) challenged the food manufacturing industry to prioritize worker safety by implementing a lockout/tagout, or LO/TO, program.

In a Q&A for Food Manufacturing, safety expert Heather Marenda identified four components of a successful LO/TO program:

- Procedures should be machine specific and graphical in nature, providing step-by-step instructions
- Procedures and signage should be multi-lingual.
- Procedures should be available locally and posted where employees can see them.
- Companies should provide training, including yearly refreshers.

Not providing enough training

Employee training is key to avoiding every one of the safety mistakes on this list, as well as the many that didn't make the list. Training is also associated with higher product quality, better food safety, and many other positive results.

However, responses to the most recent *Food Manufacturing* survey suggest that many companies don't provide enough training.

- Only 53% of companies providing ongoing training. The remaining 47% provide only a few days to a few weeks.
- While 90% provide equipment-specific training, only 83% provide industrial safety training.
- The biggest obstacle to training, cited by 51% of respondents, is lack of time.

Your food manufacturing environment is only as safe as the people working in it. Providing regular, ongoing training for everyone in your facility will improve your operations across the board.

Not creating a safety culture

Like training, plant safety isn't something you do just once. It needs to be a part of your workplace culture. And that culture needs to start at the highest level of your organization.

In an article entitled "Cultivating a Culture of Safety in Food and Beverage Plants," *Food Processing Managing* Editor Kevin T. Higgins writes:

> *"As with food safety, worker safety begins with a commitment from the top. The absence of a top-down approach will doom improvement programs, which will flounder from a lack of direction and resources. With management's support, employee safety committees and internal audit recommendations will flourish."*

In a safety culture, companies constantly strive for continuous improvement and employees know that their safety is more important than keeping lines running at all costs.

Failing to learn from past mistakes

Dame Judith Hackitt, chair of the U.K. Health and Safety Executive famously said, "There are no new accidents, only old accidents repeated by new people."

In 2014, David W.K. Acheson, the former Chief Medical Officer at FDA's Center for Food Safety and Applied Nutrition, called for the food industry to learn from past mistakes when it comes to recalls and food safety. The same wisdom applies to plant safety — companies can look to their mistakes and the mistakes of others to guide their actions into the future. By doing this, food processors can take a proactive approach to prevent safety problems from happening in the first place.

Compliance: The High Cost of Doing Nothing

Do you feel like there are so many new compliance regulations that you don't even know where to start? The compliance landscape for the food industry is already complex. And between FSMA (rolling out now), NFPA 652 (finalized September 2015, compliance dates starting in 2018), and OSHA's combustible dust standard (tentatively planned for 2018), that complexity is only increasing.

This understandably puts many food companies in a bind. They want to do what's right for their customers and employees, but they also need to keep their doors open. The food industry has low margins to begin with. So investing in things that help with compliance but don't directly affect the bottom line — like sanitation equipment — can feel like a risk.

However, as much as compliance may cost, the cost of doing nothing is much, much higher.

Here, we take a look at the high cost of doing nothing.

FSMA non-compliance

FSMA amended Section 415 of the Federal Food, Drug, and Cosmetic Act to give the FDA the authority to suspend a food facility's registration if there is a "reasonable probability of [the food it produces] causing serious adverse health consequences or death to humans or animals." A suspended license means the food produced in that facility can no longer be sold.

But even in much less drastic cases, FSMA non-compliance can be expensive.

The new law is funded in part by non-compliance fees. Two types of tasks will incur these fees:

- Tasks related to reinspecting facilities found to be non-compliant
- Tasks related to non-compliance with a recall order

Every year, the FDA puts out a fee schedule. Here's the schedule for FY2017, which is in effect now (as of October 1, 2016) through September 30, 2017.

The current hourly fees are:

- $221 if domestic travel is required
- $285 if foreign travel is required

What this means is that if you don't comply with FSMA, and the FDA has to reinspect your facility, you'll receive a bill. Billable time consists of "direct hours spent on such reinspections, including time spent conducting the physical surveillance and/or compliance reinspection at the facility, or whatever components of such inspection are deemed necessary."

It's the second part of the definition that can really add up. "Whatever components of such inspection are deemed necessary" includes all activities outside of the actual inspection, like travel and preparing the report.

For non-compliance with recalls, billable time again consists of all direct hours. This includes time spent conducting and analyzing audit checks, reviewing reports, and traveling.

> For example, if you have a domestic facility and a reinspection takes 20 hours, you can expect a bill of $4,420, payable within 90 days. If the facility isn't located in the United States, those same 20 hours will cost you $5,700.

OSHA non-compliance

As you're probably well aware, OSHA fines went up 78% on August 2, 2017w. Going forward, they will be adjusted for inflation every year.

Here are the maximum penalties per violation for the current year:

- $12,471 for Serious, Other-Than-Serious, and Posting Requirements violations
- $12,471 for Failure to Abate violations
- $124,709 for Willful or Repeated violations

The trick with OSHA citations is that they don't always come in one at a time. Any given inspection could result in penalties related to multiple violations.

Between October 2015 and September 2016, OSHA performed 460 inspections of food manufacturing facilities and issued 1,666 citations to the tune of $5,780,988. That's an average of almost four citations, resulting in penalties of more than $12,500, *per inspection*. Note that most of these citations occurred before the fines went up. At the current rates, those same penalties would be more than $20,000 per inspection.

> In addition to inspection-based fines, OSHA now has the power to issue citations without first performing an inspection.

For example, imagine you have four baking facilities that all produce the same type of bread using the same process. If OSHA finds a violation at one of them, you can automatically receive a fine for the same violation at the other three facilities. In this case, your per-inspection penalty just quadrupled.

Recalls

The direct costs of regulatory non-compliance are high and growing. But, they're nothing next to recalls.

Both the number and the cost of food recalls are rising. This 2015 report from Swiss Re shows that 52% of recalls cost food producers more than $10 million each.

Importantly, this number is *direct costs only*. It doesn't include damage to the brand, which can be significant. In some cases, recalls have led food companies to declare bankruptcy or even face criminal charges.

Compared to these potential consequences, we hope you agree that the cost of compliance is miniscule…and worth every penny.

How an Industrial Vacuum Cleaner Improves Food Safety

Conversations about food safety and cleaning tend to focus on sanitation — sanitary equipment, chemical sanitizers, and so on. Industrial vacuum cleaners are more often discussed in the context of plant and worker safety, for example, combustible dust fire prevention.

But an industrial vacuum cleaner can also play a critical role in your food safety plan. Here are five ways an industrial vacuum improves food safety.

Preventing bacterial contamination

An estimated 48 million Americans get sick from foodborne pathogens every year. Three thousand of them die.

For the food industry, the costs associated with contamination are not small. Half of all recalls cost the companies more than $10 million (some cost more than $100 million), and that doesn't count the damage to their reputation.

Brooms, mops, and compressed air are commonly used to clean food processing facilities. But these systems have some major drawbacks:

- Sweeping and compressed air don't eliminate dust. They just move it around.
- Mopping introduces water. This gives bacteria a place to thrive.

Only by using a food-grade industrial vacuum cleaner with advanced filtering technology can you be confident that you're getting rid of the bacteria and other pests that cause contamination problems.

Learn more about contamination control in the food industry.

Industrial vacuum cleaners fitted with appropriate filters, such as HEPA and ULPA (ultra-low particulate air) filters, help you avoid cross-contamination with allergens in two ways:

- First, they remove the allergens from the production environment.
- Then, they decontaminate the exhaust stream to prevent the allergens from recirculating back into the environment.

Avoiding cross-contamination of foods with allergens

Food allergy reactions cause more than 200,000 people each year to require emergency medical care. To maintain an allergen-free environment, you must remove 100% of allergens from your plant and equipment.

Cleaning in hard-to-reach places

Brooms and mops can only reach so far. And they can't always reach all of the places dirt and bugs like to hang out. An industrial vacuum system enables you to access those hard-to-reach places, like air vents and the tops of equipment, so that you know that every inch of your facility is clean.

Making your cleaning equipment easy to clean

The idea of sanitary design in food processing doesn't just apply to the equipment used to make the food. To ensure food safety, all equipment used in a food facility needs to be easy to clean.

Brooms and mops can harbor dust and bacteria. Food-grade industrial vacuums are designed modularly and using stainless steel, so they are easy to clean and sanitize. This means you won't accidentally introduce further food safety problems during your cleaning process.

Keeping you in compliance

Finally, for all of the reasons above, an industrial vacuum can help keep you in compliance with current regulations.

Strict compliance is particularly important as the Food Safety Modernization Act (FSMA) comes into play. FSMA requires almost all food processing companies to establish and implement a Hazard Analysis Risk-Based Preventative Controls (HARPC) plan, which focuses on food safety risk prevention.

> In the new FSMA environment, brooms and mops won't be sufficient to demonstrate to auditors your commitment to improving food safety through cleaning and sanitation.

STANDARDS

Basic OSHA Standards

In the food industry, having a clean facility is a major step toward ensuring both food safety and worker safety. It's also required for avoiding citations and fines due to lack of compliance.

To help you get a better handle on the rules you're required to follow, here is a brief guide to OSHA standards applicable to the food industry.

General Industry Requirements

OSHA 1910 is a general standard under which most industries fall. In the broader food industry, the only sector that has its own separate standard is agriculture, which is covered by OSHA 1928.

OSHA 1910 is a comprehensive and complex standard. Here is a short list of the subsections that address housekeeping, food facilities, and combustible dust.

1910.22: Housekeeping

OSHA 1910.22 is a general housekeeping standard applicable to almost all permanent places of employment.

Section (a) specifies three housekeeping requirements:

- All places where people work must be clean, orderly, and sanitary.
- Workroom floors must be clean and, if possible, dry.
- To facilitate cleaning, floors and workspaces must be kept free of hazards.

1910.263: Bakery equipment

This standard specifies requirements for the design, installation, operation, and maintenance of bakery equipment.

The bakery sector is especially susceptible to risk because of the combustible dusts that are present. OSHA's list of combustible agricultural dusts includes several types of flour:

- Oat flour
- Potato flour
- Rice flour
- Rye flour
- Wheat flour

Other common bakery ingredients, like sugar, spices, and cornstarch, are also on the list.

OSHA 1910.263 provides several strategies for reducing the risk associated with flour dusts and other potentially hazardous ingredients. For example, flour storage bins must be dust-tight and measures must be taken to eliminate static electricity.

1910.272: Grain handling facilities

Grain handling is considered a "high hazard industry." From a housekeeping perspective, the primary cause for concern in grain handling facilities is fugitive grain dust, which is highly combustible. OSHA notes that "grain dust explosions are often severe, involving loss of life and substantial property damage."

To prevent these explosions, OSHA requires grain dust to be carefully controlled. Specifically, this standard requires the following:

Employers must have a documented housekeeping program that includes the frequency and methods of cleaning. Priority housekeeping areas — i.e., those at the greatest risk — must be identified. Within these areas, dust accumulation may not exceed ⅛ inch. The housekeeping program must include procedures for cleaning up grain and product spills.

Additional requirements include implementing a preventative maintenance program for equipment, minimizing ignition sources, and properly locating dust collection systems.

1910.307: Hazardous (classified) locations

Any area where there is a fire or explosion risk because of the presence of combustible dusts or other flammable substances is considered a hazardous, or classified, location.

Most food facilities are **Class II, Division 1 locations**, which means combustible dusts are in the air during normal operating conditions in concentrations high enough to produce explosive or ignitable mixtures.

OSHA 1910.307 specifies the types of equipment that are approved for use in various hazardous locations.

Explore Nilfisk's complete line of explosion-proof/ hazardous location vacuum cleaners.

Additional food industry-specific resources

In addition to these standards, OSHA publishes several industry-specific pages. Below are the pages that target different sectors of the food industry.

Meat packing

Meat packing is one of the most hazardous industries in the United States. Injury and illness rates in meat packing are two and a half times greater than the national average. And serious injuries that require work restrictions or time off occur three times more often in meat packing than in other industries. This section provides resources on how to implement an effective safety program in meat packing facilities.

Poultry processing

This section provides resources for combating the most common hazards in poultry processing plants, including high noise levels, dangerous equipment, slippery floors, activities that lead to musculoskeletal disorders, and hazardous chemicals such as ammonia.

Food processing: Flavorings-related lung disease

In 2000, lung problems began to appear in workers at plants that produce certain flavorings, like butter for popcorn. This page outlines the research that has been done to date about this health risk.

Fire Prevention Through Housekeeping: NFPA Codes & Standards You Need to Know

The 2008 explosion and fire at the Imperial Sugar Company in Port Wentworth, Georgia, is the best-known example of a combustible dust incident at a food manufacturing plant. And for good reason: the fire was devastating. It killed 14 people and injured 38 others.

By U.S. Chemical Safety and Hazard Investigation Board

Adding to the tragedy is the fact that the fire was "entirely preventable," according to the result of an investigation by the U.S. Chemical Safety Board. CSB Chairman John Bresland concluded: "The accident was caused by poor equipment design, poor maintenance, and poor housekeeping. If the dust was not allowed to build up, this terrible accident would not have happened and we would not have had the terrible injuries that we saw."

It was in response to this fire that the food industry started to take combustible dust more seriously But perhaps not seriously enough. The National Fire Protection Association (NFPA) estimates that in 2011, the total cost of fire in the United States was $329 billion, equal to 2.1% of the GDP. And research through the OSHA National Emphasis Program has revealed that food is a prime culprit for combustible dust fires and explosions.

Here are the results of their research:

- Food dusts were found in 23% of combustible dust incidents. For causing problems, food is second only to wood dusts, which were found in 24% of incidents
- The food products industry has the most combustible dust incidents, being responsible for 24% of all incidents across all industries. This time, the race isn't even close — wood products comes in second place at 15%.

Part of the reason the food industry is so susceptible to combustible dust incidents is the vast number of ingredients that can cause problems.

It isn't just the more obvious products, like flour and sugar. Processing ingredients such as alfalfa, hops, lemon pulp, potatoes, and even tomatoes can put a plant at risk of a combustible dust explosion. (For the full list of agricultural products and dusts that can become combustible, view OSHA's combustible dust poster.)

To help food companies mitigate their risks of combustible dust fires and explosions, the NFPA has issued several codes and standards covering all fire hazards found in food plants and processes. This section reviews the main NFPA codes and standards relevant for fire prevention in the food industry, focusing on guidance related to housekeeping.

NFPA 61: Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities

Current edition: 2017
Next edition: 2020

NFPA 61 is the main food industry-specific standard for combustible dusts. It applies to three types of food manufacturing facilities:

- All facilities that handle or process dry agricultural bulk materials, their by-products, or dusts including grains, oilseeds, agricultural seeds, legumes, sugar, flour, spices, feeds dry dairy/food powders, and other related materials.
- All facilities that manufacture and handle starch.
- Seed preparation and meal-handling systems of oilseed processing plants that are not already covered by NFPA 36: Standard for Solvent Extraction Plants.

Examples of facilities covered by NFPA 61:

- Bakeries
- Flour mills
- Wet and dry corn milling
- Dry milk products
- Cereal processing
- Snack food processing
- Chocolate processing
- Sugar refining and processing

This standard is comprehensive, providing guidance for everything from construction and ventilation to heat transfer operations and pneumatic conveying.

NFPA 61 housekeeping guidance

The sections of NFPA that apply specifically to housekeeping are in Chapter 8: Hazard Management: Mitigation and Prevention.

NFPA 61 requires food manufacturers to control airborne combustible dusts generated from all processes, equipment, and material transfer points. The dust must be removed concurrently with operations. The following list summarizes the main requirements.

- **Documentation:** Food manufacturers are required to have a documented housekeeping program that specifies both the method and the frequency of cleaning.
- **Compressed Air:** Since compressed air causes dust to become airborne, it can be used only after shutting down all machinery and ensuring all ignition sources are under control.
- **Portable electric vacuums:** If portable electric vacuums are used, they should be listed for use in Class II, Group G, Division I atmospheres as listed in NFPA 70.
- **Vacuum systems:** Vacuum systems must be grounded and bonded. Hoses and couplings have to be static dissipative or conductive and grounded.
- **Dust collection:** Dust collection systems and all of their components must be made of noncombustible materials. If a dust collection system shuts down, its related machinery must shut down as well.
- **Centralized vacuum systems:** Centralized vacuum systems require static-conductive cleaning tools and static-dissipative hoses. The air-material separator must provide filtration and be fitted with a system for explosion prevention.

NFPA 70: National Electrical Code

Current edition: 2017
Next edition: 2020

NFPA 70 is the National Electrical Code (NEC). The NEC covers everything related to the installation of electrical equipment across all industries and all types of buildings. This code is in force in all 50 states.

Food manufacturers need to be aware of two main sections of NFPA 70 because they apply to housekeeping.

Combustible dust definition

NFPA 70 defines combustible dust as “dust particles that are 500 microns or smaller and present a fire or explosion hazard when dispersed and ignited in air.”

500 microns is about 0.02 inches. This just goes to illustrate how even very tiny specks can lead to huge problems if they’re allowed to accumulate.

Hazardous locations

The NEC defines different classes of hazardous (classified) and non-hazardous locations. These classes determine not just the wiring of buildings, but also the equipment and housekeeping procedures that can be used in different areas of facilities.

For example, NFPA 61 specifies that portable vacuum cleaners should be used for dust removal in Class II, Group G, Division 1 locations. What does that mean?

Hazard classes are determined by the type of fire risk they present:

- **Class I locations** are hazardous because of flammable or combustible gases and vapors.
- **Class II locations** are hazardous because of combustible dust.
- **Class III locations** are hazardous because of easily ignitable fibers or combustible flyings.

Class II is divided into three groups based on the type of dust present:

- **Group E locations** contain metal dusts.
- **Group F locations** contain carbonaceous dusts.
- **Group G locations** contain all other combustible dusts, including those from flour, grain, wood, plastic, and chemicals.

The division definitions are a bit more complicated. But for simplicity's sake, we can summarize them like this:

- **Division 1** locations have enough combustible dust in the air under normal operating conditions to pose a risk of fire or explosion.
- **Division 2** locations don't normally have enough combustible dust to cause a problem (though abnormal conditions may increase the safety risk).

So, **Class II, Group G, Division 1** indicates a location that is hazardous because non-metal, non-carbonaceous combustible dust is present under normal conditions in a concentration high enough to pose a risk. In these areas, NFPA 61 requires a portable vacuum cleaner to be used for dust removal.

Obviously, there's a lot more to it (NFPA 70 is nearly 900 pages long). The important thing is to understand that these different classifications exist and that they determine the housekeeping procedures you need to use.

NFPA 652: Standard on the Fundamentals of Combustible Dust

Current edition: 2016
Next edition: 2019

NFPA 652 is a brand new standard that covers the requirements for managing combustible dust fires and explosions across industries, processes, and dust types. It was created to clear up confusion between the five industry-specific combustible dust standards:

- **NFPA 61**: Agricultural and food processing facilities (see above)
- **NFPA 484**: Combustible metals NFPA 664: Wood processing and woodworking facilities
- **NFPA 654**: General manufacturing/other industries (e.g., plastics, pharmaceuticals; see below)
- **NFPA 655**: Sulfur

This standard applies to all facilities and operations that deal with combustible dust, not just hazardous, or classified, locations.

In essence, NFPA 652 fills in the gaps, providing requirements for situations that were not adequately addressed in the individual industry-specific standards.

Relationship between NFPA 61 and NFPA 652

With more than one standard in place, it can be difficult to know which one to follow. The table below shows which standard food manufacturers should consider primary in cases conflicts may exist.

Conflict	Standard to Be Applied
Where a requirement in NFPA 61 differs from the requirement in NFPA 652…	NFPA 61
Where a requirement in NFPA 61 prohibits a requirement in NFPA 652…	NFPA 61
Where NFPA 61 neither prohibits or provides a requirement…	NFPA 652
Where a conflict exists between a general requirement and a specific requirement…	NFPA 652 – Specific

Rule of thumb: Follow the most specific requirement available. If there is no specific requirement, then apply the general one.

What's new for food manufacturers in NFPA 652?

The biggest change NFPA 652 brings to the table is that it requires a Dust Hazards Analysis, or DHA, which NFPA defines like this:

"A systematic review to identify and evaluate the potential fire, flash fire, or explosion hazards associated with the presence of one or more combustible particulate solids in a process or facility."

According to this new requirement, the owner or operator of any facility where combustible exists is responsible for conducting a DHA to identify the hazards, create a plan for managing the hazards, and providing training for anyone affected by the hazards.

Here are the key points you need to know about NFPA 652 and the DHA:

- **NFPA 652 is retroactive.** An insurance company, government inspector, state fire marshal, or other authority having jurisdiction (AHJ) can apply any portion of the standard if there's an unacceptable degree of risk.
- **A dust test is required.** Before you can perform a hazards analysis, you must first test your dust to determine whether it's combustible or explosible. The absence of a previous combustible dust incident is not sufficient to show that a particulate is not combustible or explosible.
- **There are no industry exceptions or automatic grandfathering.** DHAs must be completed for all processes and facilities by September, 2018, which is three years after the standard went into effect.
- **Documentation is required.** Test results as well as historical and published data must be kept on file at all times.

NFPA 652 housekeeping guidance

NFPA 652 provides specific guidance about housekeeping and vacuum cleaning.

- Similar to NFPA 61, this standard specifies that the cleaning method must match the potential risk. In particular, NFPA 652 requires cleaning methods to reduce the potential for creating a combustible dust cloud.
  - Vacuuming is the preferred method of cleaning.
  - Sweeping/water washdown is only permitted where vacuuming is not practical.
  - Blowdown is only permitted when the methods mentioned above have already been used.

NFPA 654: Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids

Current edition: 2017
Next edition: 2020

NFPA 654 is a general standard for dealing with combustible dust. It doesn't specifically address food manufacturing environments. In fact, NFPA 654 is primarily directed toward the chemical processing industry. However, as it is a general manufacturing standard, many in the food industry have historically turned to it for guidance, particularly before NFPA 652 went into effect.

This is likely to change. At least in terms of housekeeping, the guidelines in this standard are nearly identical to those in NFPA 652. So, for now, food manufacturers probably don't need to be too concerned with NFPA 654. Instead, concentrate on making sure your facilities and processes comply with NFPA 61 and NFPA 652.

NFPA 68: Standard on Explosion Protection by Deflagration Venting

Current edition: 2018
Next edition: 2023

These last few standards don't specifically discuss housekeeping, but they do apply to food manufacturing.

NFPA 68 provides requirements for deflagration venting, which includes the devices and systems that vent combustion gases and pressures. The goal is to protect buildings against explosions due to internal heat and pressure.

The following sections provide information related to combustible dusts:

- **Section 6.2.2** provides a formula for calculating vent size in an area where dust is a hazard.
- **Chapter 8** is devoted to deflagration venting for dusts and hybrid mixtures.
- **Chapter 11** details installation and maintenance requirements of vent enclosures.
- **Annex C** discusses a procedure for testing combustible dusts.
- **Annex F** provides characteristics of combustible dusts including several common agricultural dusts.

For more specific information on where deflagration venting is required in food manufacturing facilities, see NFPA 61.

NFPA 69: Standard on Explosion Prevention Systems

Current edition: 2014
Next edition: 2019

NFPA 69 covers explosion prevention where venting isn't possible. It focuses on the following methods:

- Control of oxidant concentration
- Control of combustible concentration
- Predeflagration detection and control of ignition sources
- Explosion suppression
- Active isolation
- Passive isolation
- Deflagration pressure containment
- Passive explosion suppression

Other standards on this list specify when NFPA 69 becomes applicable.

Performance-Based Codes

If you happened to open up any of the standards, you might have seen a "performance-based option." What does this mean?

In many cases, NFPA allows performance-based design options to substitute for its prescribed processes, materials, and equipment. What this means is that instead of using the exact solutions set down by NFPA, you can demonstrate compliance using an alternative solution that meets the same fire safety goals. The performance-based code system allows you more flexibility in designing solutions for the unique needs of your food facility and operations.

Not all parts of NFPA standards are eligible for performance-based alternatives. Visit the NFPA website to learn more.

Conclusion

When it comes to fire safety, there is simply a lot to know. Especially with the introduction of NFPA 652, the requirements are stricter than ever before. This means food manufacturers need to double-down on making sure they are aware of — and actively managing — the risks in their facilities.

Another fire like the Imperial Sugar Company disaster is simply not an option.

If you haven't performed your Dust Hazards Analysis yet, or you aren't sure what type of vacuum you need to be in compliance, contact us. We're here to help you keep your facility, your personnel, and your equipment safe.

What Combustible Dust Standards Do You Have to Follow?

If you're up on the latest workplace health and safety news, you know that in July 2017 OSHA removed the combustible dust standard from its regulatory agenda. What does this mean for you as a manufacturer or an industrial processor with a facility that contains combustible dust? What standards do you need to follow to ensure compliance with all of the regulations in your jurisdiction?

Here we'll look at the path from standard to law and identifies three types of combustible dust regulations you should be aware of.

How a combustible dust standard becomes a law

In August 2017, fire protection engineer Russell Bainbridge authored an excellent article on MyDustExplosionResearch.com about how standards become laws. We recommend you read the whole article to gain a full understanding of the issue.

Here are the CliffsNotes:

The National Fire Protection Association (NFPA) develops combustible dust standards. On their own, these standards provide recommendations and best practices, but they aren't legally binding.

There are several industry- and commodity-specific standards related to combustible dust:

- NFPA 61: Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
- NFPA 484: Combustible Metals
- NFPA 654: Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
- NFPA 664: Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities

As well as a unifying standard that was released just last year:

- NFPA 652: Standard on the Fundamentals of Combustible Dust

Other standards also contain guidance on combustible dust:

- NFPA 68: Standard on Explosion Protection by Deflagration Venting
- NFPA 69: Standard on Explosion Prevention Systems
- NFPA 70: National Electrical Code

These standards become law when they are adopted by a local, state, or federal jurisdiction.

3 ways NFPA standards can be adopted into law

Manufacturers and industrial processors need to be aware of three main ways NFPA standards can become laws.

OSHA

OSHA relies heavily on the NFPA for its fire-related standards, and OSHA standards are mandatory.

Even though a combustible dust final rule is off the table for now, several current OSHA standards include provisions about combustible dust. In addition, the General Duty Clause is a catch-all for recognized hazards not addressed in a specific standard. OSHA also has a Combustible Dust National Emphasis Program that it uses to inspect, and cite, facilities for dust-related hazards.

Keep in mind that only about half of states operate under federal OSHA. The rest have an OSHA-approved state plan, and these state plans are often even more stringent.

Building codes

Every jurisdiction has building codes, which may be established and enforced at the state, county, or local level. Currently, the International Building Code (IBC) is in use in all 50 states, New York City, Washington DC, and the U.S. territories. However, they don't all use the same version, and many modify the codes to match their unique circumstances.

As Bainbridge notes in his article, the IBC considers combustible dust areas as part of Group H-2, which includes occupancies containing materials that have a deflagration potential or that create a hazard from accelerated burning. As such, several NFPA standards apply, depending on the type of occupancy (food processing, metalworking, etc.).

Fire codes

Finally, every jurisdiction also has fire codes. Again, these may be established and enforced at various levels, and there are about as many versions of the codes out there as there are jurisdictions.

There are three main standards used as the foundation of fire codes in the United States:

- The International Fire Code (IFC) — This is the most common, currently in use in 42 states, New York City, Washington DC, Guam, and Puerto Rico.
- NFPA 1: Fire Code
- NFPA 101: Life Safety Code

If you're starting to feel like this is all pretty complicated, you're right! Few jurisdictions are exactly alike. But they do all have one thing in common: they'll all hand out citations, fines, or worse to facilities that don't comply.

The best way you can protect your company and your people is to be informed. Talk to your local OSHA, building, and fire inspectors. Make sure you understand all of the combustible dust regulations in your area and hazards in your facility.

Is Your Dust Combustible? Dust Testing Under NFPA 652

Have you tested your dust? If not, it's time to get on that. Under the recently released NFPA 652: Standard on the Fundamentals of Combustible Dust, material explosivity testing is now a requirement for all facilities that generate, handle, or store dust.

This means if you have dust in your facility, it's your responsibility to have the dust tested for combustibility, even if there's no history of your type of dust causing a combustible dust incident.

What does dust testing entail?

A dust test is a comprehensive evaluation that should be done by a qualified laboratory with the expertise to not only test the dust, but also analyze and explain the results as well as provide the required compliance documentation.

There are five main factors that a dust test should evaluate:

Dust cloud explosibility parameters (Kst, Pmax)

These parameters quantify the severity of a dust explosion. Together, they tell you how much pressure an explosion will generate and how fast it will travel.

- Kst indicates the pressure of a dust cloud.
- Pmax indicates the rate of pressure rise.

Dust cloud ignition limits (LOC, MEC)

These two parameters tell you the likelihood that a dust cloud will explode based on the concentration of oxygen and dust.

- Limiting oxidant concentration (LOC). The LOC is the minimum oxygen concentration that can support a dust cloud explosion.
- Minimum explosible concentration (MEC). The MEC is the minimum concentration of dust in the air that will explode if ignited.

Auto-ignition temperature (MAIT)

This test assesses a dust's sensitivity to heat. The minimum auto-ignition temperature (MAIT) is the lowest temperature at which a dust cloud will auto-ignite when exposed to hot air.

Minimum ignition energy (MIE)

This test determines the smallest amount of ignition energy required to ignite a dust cloud.

Dust layer ignition temperature (MIT)

This test finds the minimum temperature required to ignite a dust layer on a hot surface. For example, the MIT for a 5-mm layer of a combustible food dust will be different from the MIT for a 5-mm layer of a combustible wood dust.

The results of these dust tests determine your further responsibility under NFPA 652. If the dust is found to be combustible, you must then perform a dust hazard analysis (DHA) and take steps to mitigate those hazards.

How Nilfisk can help

For many companies, the dust testing step is new. Our goal at Nilfisk is to help you through the entire process, from facilitating your dust testing to helping you select NFPA-compliant products so you can mitigate your risks.

Here's how we can help:

- Facilitating your dust testing (we don't provide the testing ourselves, but we can help you obtain it through our collaboration with the fire and explosion experts at Fike)
- Performing site assessments Demonstrating cleaning equipment on-site
- Helping you select NRTL-certified and NFPA-compliant products
- Setting up your new equipment and providing training for you and your employees

How to Prevent Combustible Dust Explosions in Food Manufacturing Plants

How often do you think about the combustible dust at your food processing plant? Likely not often enough.

Combustible dust is often underestimated as a hazard. This oversight can be disastrous. The destructive power of combustible dust makes ongoing, consistent attention and immediate corrective measures absolute musts.

This section outlines a strategy you can use to prevent combustible dust explosions in your food plant based on National Fire Protection Association (NFPA) standards.

What is combustible dust?

OSHA defines combustible dust as any solid material that is composed of distinct particles and can present a fire hazard. In a food processing plant, that includes wheat flour, sugar, cornstarch, and other powders. You can find it in the air, in vents, or on any flat or hidden surface that isn't cleaned regularly.

NFPA standards for food processing facilities

The NFPA issues several standards relating to combustible dust. For the food processing industry, there are two main standards you should be aware of:

- NFPA 61: Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities. This standard provides guidance specific for the food industry.
- NFPA 652: Standards on the Fundamentals of Combustible Dust. This is a new standard that provides general requirements for managing combustible dust fires and explosions across all industries, processes, and dust types.

On their own, NFPA standards are not law. However, **violating NFPA standards is a cite-able and fine-able offense under OSHA.**

What you can do to prevent combustible dust incidents at your food plant

Preventing combustible dust problems isn't hard, but it does require awareness of the problem, facility-specific analysis of risks, and consistency in implementing housekeeping and other prevention procedures.

Based on these NFPA standards, here are four measures you can take to prevent dust-related fires and explosions at your food processing plant.

> A combustible dust hazard analysis isn't just a best practice. Under NFPA 652, it's mandatory.

Perform a dust hazard analysis

The first step in preventing a problem is understanding your risk.

Different dusts present different risks and can cause different levels of damage to your facility. NFPA 652 requires all facilities to test their dust so they're fully aware of their risks. Your analysis will help you identify which materials and processing stages have the highest potential for a problem.

Once you've identified and measured your risks, you can take appropriate methods to control them.

Keep ignition sources away from combustible material

The combination of combustible dust and an ignition source can be catastrophic. Most of the guidelines in both NFPA 61 and NFPA 652 focus on how to keep dust and sparks away from each other. You can achieve this through facility design and construction, dust collection, venting systems, and so on.

Here are just a few examples of ways to avoid a catastrophe:

- **Bond and ground your equipment to reduce static electricity.** Certain food additive powders, like maltodextrin, are very sensitive to static. Make sure to ground your machinery and use antistatic equipment in areas where dust may be present.
- **Implement a hot work program and obtain hot work permits when such work is required.** In general, try to make sure hot work is performed in a designated area that is free of combustible dust. When this isn't possible, ensure the area is properly cleaned before commencing work.
- **Pay special attention to your heat transfer systems.** High heat equals high risk. NFPA 61 requires heat transfer devices to be fitted with pressure relief valves, heaters and pumps for combustible heat transfer fluids to be located in separate dust-free rooms, and heat exchanges to be arranged in such a way that combustible dust can't accumulate.

Implement and document proper housekeeping procedures

The more combustible dust that is in your plant, the greater your risk. NFPA 652 requires you to implement cleaning methods based on the type of dust present in your facility, with the goal of reducing the potential to create a combustible dust cloud.

Here are the top three weapons in your combustible dust cleaning arsenal, in order of preference:

- **Vacuuming**. NFPA standards have different requirements for vacuums in areas classified as hazardous and non-hazardous. Make sure your vacuum system is approved for dust collection in food processing facilities.
- **Sweeping/water washdown**. These methods are permitted in areas where vacuuming is impractical.
- **Blowdown**. Blowdown is only permitted when vacuuming and sweeping/water washdown have already been used.

NFPA 652 also requires you to document all housekeeping procedures, specifically addressing these seven areas:

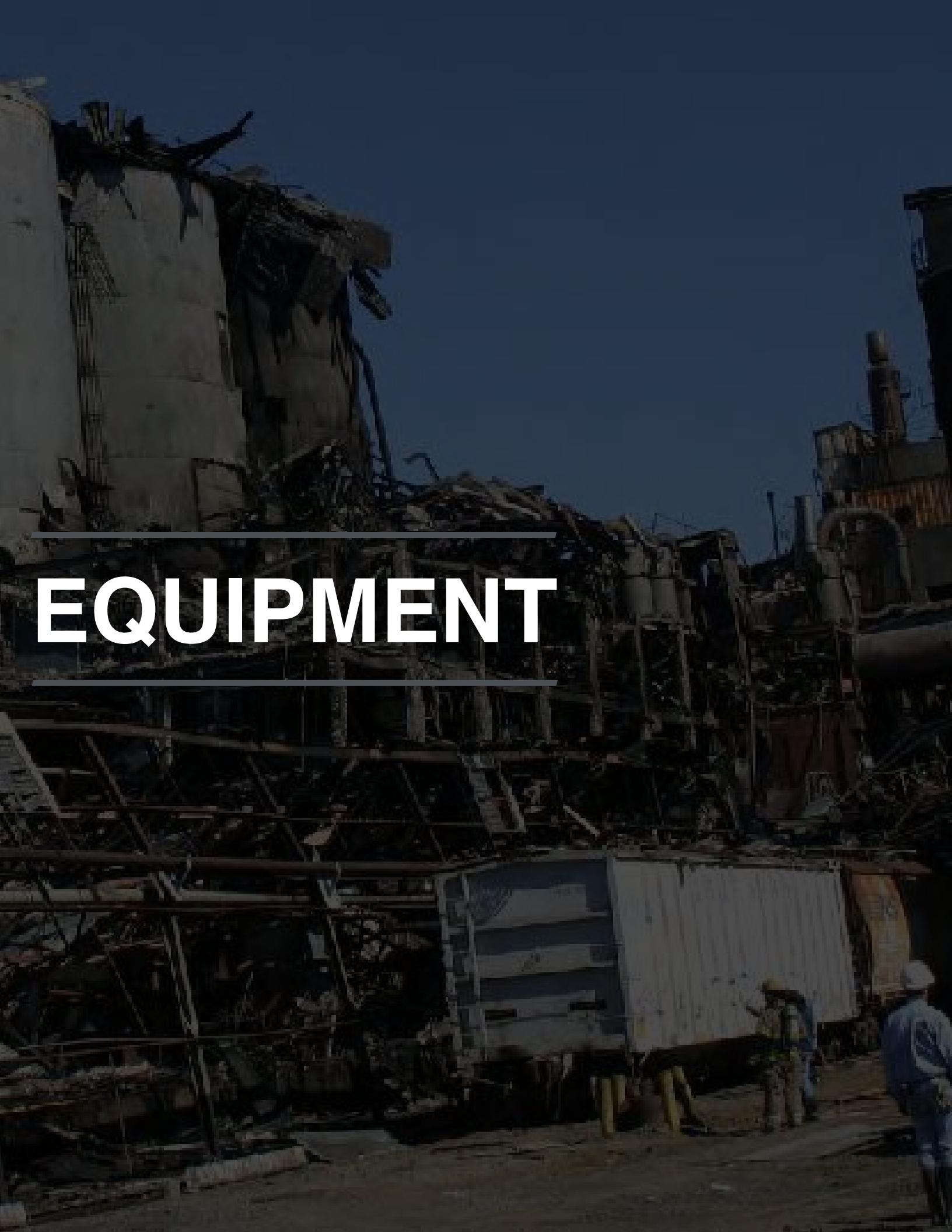
- Risk assessment with the specific characteristics of the dust
- Personal safety procedures
- Personal protective equipment
- Cleaning sequence
- Cleaning methods to be used
- Equipment including lifts, vacuum systems and attachments
- Cleaning frequency

Train your staff

Finally, NFPA 652 requires ongoing employee training on the potential exposure to combustible dust in your plant and the associated risks. This training takes several forms:

- General safety and hazard awareness training for all affected employees
- Job-specific training about combustible dusts in staff work environments
- Ongoing refresher training

Once again, this training must be documented. If you fail to comply with NFPA standards, you aren't just risking being fined. You're risking an explosion that could put your plant and your personnel in jeopardy. Hopefully that's not a risk you're willing to take.



EQUIPMENT

Vacuum Filtration Helps Prevent Food Contamination

Every year, foodborne illnesses cost the economy more than $15.6 billion and send more than 53,000 Americans to the hospital. A large portion of these costs and illnesses are due to a group of usual suspects — 15 pathogens including *E. coli, Salmonella,* and *Listeria monocytogenes*.

Preventing food from becoming contaminated with these and other harmful microorganisms requires a comprehensive plan that includes employee personal hygiene, equipment sanitation, and, of course, proper housekeeping. Here are three ways vacuum filtration contributes to this effort.

Keeping pathogens at bay

Listeria is probably the most well-known pathogen of the "Big 15." This nasty bacteria accounts for about $3 billion of the economic burden due to contamination. Just this month, a *Listeria* outbreak prompted a huge recall of frozen foods sold under 42 different brand names.
It goes without saying that mops and brooms can't come anywhere close to this level of efficiency.
If you're still using this type of cleaning equipment, you're not effectively keeping pathogens out of your facility.

Listeria is a rod-shaped bacteria that typically measures 0.4 to 0.5 microns long by 0.5 to 2 microns wide. To capture particles this small requires serious filtration:

- HEPA filters are 99.97% efficient at trapping and retaining particles down to and including 0.3 microns.
- ULPA filters are 99.999% efficient at trapping and retaining particles down to and including 0.12 microns.

Controlling the spread of allergens

As many as 15 million Americans have food allergies, and these are potentially deadly.

Wet cleaning is a common way to remove allergens. But not all areas of a plant can be washed down, and even a very small concentration of allergens is often enough to create a big problem.

This problem can be exacerbated by traditional dry cleaning methods like blowing compressed air. Mike Pehanich described the problem well in this *Food Processing* article:

"*A peanut chunk can be propelled half way across a plant by an air-hose blast. A vacuum, on the other hand, removes it.*"

By using a vacuum with HEPA or ULPA filtration, you can ensure that even the smallest allergen particles are removed during cleaning.

Ensuring contaminant-free exhaust

Vacuuming a food processing facility with a regular shop-style vacuum cleaner is equivalent to collecting contaminants and then releasing them back into the air. That's because the contaminants are not properly filtered, so they end up exhausted back into the air from the vacuum.

You can keep contaminants from escaping in this fashion by using a vacuum with multi-stage filtration that includes a downstream exhaust filter. This guarantees that once you've trapped the contaminants in, they won't get out again.

Preventing food contamination requires a multi-faceted approach that takes into consideration equipment, processes, and personnel. On the cleaning side, an industrial vacuum with adequate filtration is one of the most important tools you can have in your toolbox.

Is Your Shop-Style Vacuum Creating an Explosion Hazard in Your Facility?

One of the most common questions we get about combustible dust is whether an industrial vacuum is really necessary. Won't a shop-style vacuum do the trick?

While shop-style vacuums (i.e., the kind you'll find at The Home Depot or Lowe's) are great for cleaning your garage, your home woodworking shop, and even some commercial applications, they aren't recommended for industrial applications. This is because they frequently create sparks. If combustible dust is present, using these vacuums can create a significant explosion hazard.

What NFPA 652 says about vacuum cleaners

Combustible dust is a major problem in manufacturing and industrial processing facilities. It causes fires and explosions every single day. Fortunately, most of them are contained before they become big enough to make the news. But every wayward spark in a processing plant has the potential to cause an explosion if it comes into contact with the right dust cloud.

To help processors understand this hazard and prevent incidents, the National Fire Protection Association (NFPA) issued NFPA 652: Standard on the Fundamentals of Combustible Dust. This standard identifies specific design requirements for portable vacuums used in all facilities that manufacture, process, blend, convey, repackage, generate, or handle combustible dusts, even if those facilities aren't classified as hazardous locations.

These requirements include:

- Vacuums must be constructed from conductive materials.
- Hoses must be conductive or static dissipative.
- All conductive components must be bonded and grounded.
- Dust-laden air must not pass through the fan or blower.
- And more — view the full list here.

Most shop-style vacuums don't meet all of these requirements. And because they don't meet these requirements, they can pose an explosion risk.

Let's look at the properties of many shop-style vacuums that make them not just insufficient, but dangerous, for combustible dust applications.

Insulative, rather than conductive, materials

The first few design requirements in NFPA 652 specify that vacuums and their hoses must be constructed using *conductive* or *dissipative* materials. These terms refer to how easily an electric charge flows across the surface of the materials. Both conductive and dissipative materials allow electricity to flow easily to ground.

Insulative materials, on the other hand, do not allow an electric charge to flow to ground. Instead, the charge builds up over time, and when it discharges, sparks can fly.

True industrial vacuum cleaners are built using stainless steel or other conductive materials that are electrostatic discharge safe. Most shop-style vacuums are not. They often have bodies made of plastic and hoses made of rubber — both of these materials are insulative. In addition, most shop-style vacuums have a small cartridge filter that is not antistatic. All of these components contribute to an explosion risk.

Ungrounded components

NFPA 652 also requires that all conductive components be bonded and grounded. This is because if a charged, ungrounded object comes into contact with a grounded object, it can cause a spark or an electric arc. If that spark or arc reaches a combustible dust cloud, it can put an entire facility at risk.

All conductive components on industrial vacuum cleaners are bonded and grounded. With a shop-style vacuum cleaner, this may not be the case.

A cautionary tale

From a discussion on ProBrewer.com

"Using a shop vac to minimize dust may sound like a good idea, but I'll stick with an explosion-proof dust collection system–like those used for woodworking. We used to use a shop vac to clean the milling room, until one of our employees got (quite literally) knocked on her butt by a static electric discharge from the grain passing through the plastic hose. Now every bit of plastic the grain passes through (drop tubes, dust collection hoses) in our mill house has a grounding wire inside, even if the run is only a foot or less."

Motor sparking

Another problem some shop-style vacuum users report is the motor sparking. This can happen even with brand new machines, and typically will get worse over time as the motor brushes wear out.

As we mentioned before, where combustible dust is present, any spark could be the one that sets off a catastrophic event. A vacuum cleaner whose motor sparks every time you use it presents too many opportunities for such an event to occur.

Shocking the operator

Finally, if you read the online forums for communities where shop-style vacuums are used, like woodworking and homebuilding, you'll quickly encounter another problem commonly reported for shop-style vacuums: they shock the operator.

This leads to risk in a couple of ways. First, the shock itself is a spark, which can cause an explosion. But also, getting shocked is annoying and painful, and it can disincentivize people to use the vacuum to perform thorough housekeeping. If you decide not to clean your backyard workshop for a couple of days, you'll end up with a messy workshop. If you decide not to clean your processing facility, you could end up with a hazardous level of dust accumulation.

Shop-style vacuums simply weren't made for the demands of collecting combustible dust in a manufacturing or industrial processing facility. Using them can be dangerous to your plant and your workers.

It can also result in penalties. For example, in 2010, OSHA fined a pellet mill $30,000 for violations including "the use of an unapproved spark-producing shop vacuum in a Class II, Division 2 location, and not training employees on specific work procedures to protect themselves from the explosive properties of wood dust."

What is ATEX Certification? Is It Applicable in North America?

Lately, we've seen more vacuum cleaners being marketed in the United States as "ATEX certified" or "ATEX approved." We even offer some combustible dust safe pneumatic vacuums that meet ATEX requirements.

However, the introduction of yet another acronym to the already crowded arena of OSHA, NFPA, NEC, and so on has understandably brought with it some confusion. In this section, we'll answer two of the most common questions we get regarding this designation.

For the skimmers out there, here are the short answers:

- ATEX is a uniquely European Union directive for protection against explosive atmospheres.
- No. It's not harmonized with NFPA combustible dust standards not considered by OSHA an acceptable certification for electrical equipment used in hazardous locations.

Read on for more details about ATEX certification and its relevance in the United States.

What is ATEX certification?

ATEX stands for *atmosphères explosibles*. It's a European Union directive from the European Committee for Standardization that covers "equipment and protective systems intended for use in potentially explosive atmospheres." An atmosphere can be explosive for several reasons, including flammable gases, mists or vapors, or combustible dust.

All equipment and protective systems intended for this type of use in the EU must meet ATEX health and safety requirements. In this way, the directive is similar to an OSHA or NEC standard in the United States.

Equipment manufacturers whose products are intended to be used in Europe are responsible for making sure their equipment complies with ATEX standards. This process involves conformity assessment procedures and certification by a third party called a "Notified Body." Certified equipment is marked with the symbol shown below.

For equipment intended for use in certain less hazardous explosive locations, manufacturers can **self-certify** their equipment.

Is ATEX certification compliant with NFPA combustible dust standards and acceptable to OSHA?

This is where things get sticky. While many of the requirements for ATEX certification overlap with NFPA vacuum design requirements often relied upon during an OSHA inspection, the ATEX directive isn't relevant in the United States.

Instead, OSHA requires equipment to be certified by a Nationally Recognized Testing Laboratory (NRTL). On its NRTL FAQ page, OSHA states:

"ATEX Certification is a certification of equipment intended for use in potentially explosive atmospheres in the European Union. **Equipment intended for use in potentially explosive atmospheres in the United States must have the specific mark of one of the NRTLs recognized to test and certify this type of equipment.**"

It must be noted that NRTL certifications and marks are issued based upon testing done to electrical codes and standards. There are presently no standards and no NRTL certifications specific to pneumatic vacuum equipment.

A pneumatically operated vacuum that bears an ATEX certification will have been purposely designed, tested, and certified – albeit by an EU notified body– as meeting specific guidelines for reducing the risk of causing an explosion in a hazardous environment. If the buyer's pneumatic vacuum options include ATEX pneumatic vacuums and those with no certification, a decision should be made, keeping OSHA's General Duty Clause in mind.

What does this mean for you?

If you're purchasing a vacuum cleaner, or any other piece of electrical equipment, that you plan to use in hazardous locations or to collect combustible dust even in non-hazardous locations **in the United States**, an "EX" symbol probably won't cut it during an OSHA inspection. That equipment must be certified and marked by an OSHA-recognized NRTL. Even if your equipment meets OSHA requirements, if it doesn't have an NRTL mark, you may find yourself subject to penalties.

If you have any additional questions about ATEX certification, please contact us. Our vacuum experts will be happy to help.

Is Your Vacuum Cleaner NFPA 652-Compliant?

One of the biggest misconceptions we hear today is the idea that if your facility isn't a hazardous or classified environment, you don't need an NFPA-compliant vacuum cleaner. In fact, we hear this so often, we made a Myth Busters video about it!

The truth is that if you collect dust in your facility using a vacuum cleaner, that vacuum **must** meet certain safety standards.

If you have combustible dust in your facility (and if you're in food, pharma, or most other industries, you do), your vacuum cleaner must comply with NFPA 652, which was released just last year.

What does it mean for a vacuum cleaner to be NFPA-652 compliant?

The standard identifies 7 specific requirements:

- The materials of construction must be conductive, except in a few specific circumstances.
- Hoses must be conductive or static dissipative.
- All conductive components, including wands and attachments, must be bonded and grounded.
- Dust-laden air must not pass through the fan or blower.
- Electrical motors must not be in the dust-laden air stream unless listed for Class II, Division I, locations.
- Paper filter elements aren't allowed for picking up liquids or wet materials.
- Vacuum cleaners used for metal dusts must meet the requirements of NFPA 484, which is the standard for combustible metals.

Why should you focus on compliance now?

Many manufacturing facilities, particularly in industries like pharma, were built 15 to 20 years ago. That was before we knew as much as we do today about combustible dust and many other workplace hazards. Companies are just now starting to adapt to the new standards to ensure they're capable of handling and processing materials that create combustible dust particulates.

This leads us to a couple of other major misconceptions.

For example, some companies take the perspective, "Well, we haven't had an incident thus far, so we're not at risk."

The lack of a past incident doesn't mean you aren't at risk.

> Combustible dust is such a rampant problem that, under NFPA 652, you're required to test your dust for combustibility *even if there's no prior history of your type of dust causing combustible dust incidents.*

And a fire or explosion isn't the only possible consequence. The final misconception we'll address in is the idea that you can't be fined for combustible dust violations because OSHA doesn't have a combustible dust standard.

It is true that compliance with NFPA standards is voluntary. However, OSHA relies heavily on the NFPA when developing its own standards. And both courts of appeals and the Occupational Safety and Health Review Commission have ruled that OSHA's main housekeeping standard, 1910.22, applies to combustible dust hazards. In addition, OSHA is expected to have its own combustible dust standard by 2018, so now's the time to start preparing!

Vacuum Solutions for the Food Processing Industry

You already know the value of an industrial vacuum cleaner for keeping your facility clean, compliant, and contaminant-free. The question is, which vacuum cleaner will best help you achieve these goals?

To help you answer that question, here are ten vacuum solutions for the food processing industry.

VHT EXP Series

The VHT EXP Series includes two continuous duty explosion-proof (EXP) vacuums:

- VHT437 EXP
- VHT456 EXP

These VHT EXP Series works well as a multi-operator central vacuum system and for the bulk collection of materials like coffee beans, flour, and sugar.

Both vacuums are designed to safely collect explosive dust in general cleaning and process-integrated applications. They are also both CSA-certified for use in Class I, Group D and Class II, Groups F and G environments, appropriate for all collection of combustible dusts and in classified (hazardous) locations.

There are two main differences:

- **Power**. The 456 has greater horsepower: 7.5 HP vs 5 HP for the 437.
- **Filtration**. The 437 can be outfitted with an optional downstream ULPA filter for the collection of ultrafine dust and particles.

118 EXP

The 118 EXP is an electric explosion-proof / dust ignition-proof vacuum. This model, which is CSA-approved for use in Class I, Group D and Class II, Groups E, F, and G locations, is a smaller (6.6 gallon capacity) vacuum designed for dry material collection.

A15 EXP

The A15 EXP is an explosion-proof vacuum cleaner powered by compressed air. This makes it ideal for use in areas where electricity is unavailable or undesirable. The vacuum is CSA-approved for use in Class I, Group D and Class II, Groups E, F, and G locations, as well as ATEX-approved for zones 1, 2, 21, and 22.

Similar to the 118 EXP, this model has a 6.6 gallon capacity and is designed for dry material collection. Other models are available for larger capacity and wet/dry material collection.

VHC200 EXP

Like the A15 EXP, the VHC200 EXP is an explosion-proof air-operated vacuum for use in hazardous locations. It's CSA-approved for use in Class I, Group D and Class II, Groups E, F, and G locations, and ATEX-approved for zones 1, 2, 21, and 22. The VHC200 EXP can also be used in continuous duty applications.

Compared to the A15 EXP, this vacuum provides more heavy-duty cleaning power, so it's better suited for applications that produce denser types of debris, for example, pick-up of starch around production lines.

VHS110 C2D2

The VHS110 Certified C2D2 is a single-phase NRTL-certified vacuum cleaner for collection of combustible dust in non-classified (per NFPA 652) and in Class II, Division 2 classified locations. This vacuum is ideally suited for floor and overhead cleaning around production areas.

T Series: NFPA-Kitted

The T Series is a collection of lightweight, easily maneuverable vacuums for cleaning challenging environments. They are perfect for collecting powders, liquids, dust, and debris.

These machines can be fitted with an optional NFPA transformation kit, which ensures the vacuums are compliant with NFPA guidelines for collecting combustible dust in non-hazardous environments.

Modifications to design are required for NFPA-kitted vacuums.

3700-3900 Series

With oversized filters and large collection capacities, our 3700 and 3900 Series vacuums are designed for continuous and heavy-duty applications, such as vacuuming up large volumes of grain.

These vacuum cleaners are maintenance-free and come with optional upstream and downstream HEPA filters for the collection of ultrafine particles.

The main differences are the power and the maximum waterlift and airflow. Learn more about this family of vacuum cleaners.

Trim Vacs

For packaging applications, check out our R Series Trim Vacuums. These high-capacity, high-pressure vacuum cleaners are designed for continuous duty removing excess lateral trim and scraps during packaging processes.

Trim vacuums improve packaging efficiency by continuously collecting waste, which reduces your production time. Learn more about the features and benefits of trim vacuums.

Pneumatic Conveyors

Pneumatic conveyors allow coffee roasters to safely and efficiently move coffee beans and roasted grounds from large containers to other locations.

These systems decrease the risk of product contamination, while also reducing staffing requirements and load times.

Nomex Filters for Hot Oven Cleaning

If you operate a bakery, you know the importance of a powerful vacuum cleaner, especially when it comes to cleaning the oven.

In the past, you might have used hand tools to scrape flour, crumbs, and other food particles out of the oven and then vacuumed them up. Now, there's an easier solution. Using an industrial vacuum with a high-temperature resistant filter, you can clean your oven much faster because you don't have to wait for it to cool down. This boosts your productivity and profitability by reducing your downtime.

Several of our food processing vacuums can be fitted with a Nomex star filter, which can collect materials up to 464°F and an efficiency of 99.7% at 1.5 microns.

About Nilfisk Industrial Vacuums

Nilfisk Industrial Vacuums (Morgantown, PA), a division of Nilfisk, Inc., is one of the largest providers of cleaning equipment in North America. Equipped with exceptionally efficient filtration systems and user-friendly features, the company's vacuums play a critical role in thousands of manufacturing facilities and industrial processes across North America. Supported by a direct sales force and an extensive dealer network, Nilfisk Industrial Vacuums helps customers solve a variety of cleaning challenges, including combustible dust, general maintenance, overhead cleaning, abatement, process integration, laboratory/cleanroom control, and more.

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