



NFPA 69
[4.3.1]
[4.3.3]
[6.1.2]
[9.1]
[9.1.1]

NFPA 664
[9.3.5.4.1]
[9.3.5.4.2]

NFPA 664
[9.7.1.2]
[9.7.2.1.3]

NFPA 652
[9.7.4]

NFPA 69
[12.2.3]

NFPA 664
[9.7.1.2]

NFPA 69
[12.2.4]



1 Spark detector:
Detect sparks, flames, and incandescent material that passes in front of the detector.
Test lamp:
Ensures the spark detector performance is not compromised by dust.



4 Thermal Probe:
Detects thermal event in vessel and sends alarm signal for system shutdown.



5 Dust Probe:
It signals the Control Unit when there is an increase in the concentration of dust levels which could potentially indicate the rupture of dust filters/bags.



6 High Speed Abort Gate:
Designed as a safety component when filtered air is returned to a building.



2 Water Extinguishing Assembly:
Provides Extinguishing after receipt of signal from detector assembly.



3 Fire Break Shutter:
Provides additional security for Spark Detection and Extinguishing Systems.

Dirty air flow
 Clean air flow



NFPA Standards

NFPA 61 2020

Explosion Protection

- 9.3.5.2 Dust collector Filtered Air
- 9.3.5.2.1: Recycling of air from collectors to buildings shall be permitted if the systems is designed in accordance with methods found in NFPA 69, Chapter 11 and 12, to prevent a return of dust, combustion products, flammable vapors, heat, and flames into the building.
- 9.7.3.1.1: Equipment requiring explosion prevention shall be protected by one of the following:
 1. Oxidant concentration reduction
 2. Deflagration venting in accordance with NFPA 68
 3. Deflagration pressure containment
 4. Deflagration suppression systems in accordance with NFPA 69
 5. Dilution in accordance with NFPA 69
 6. Dilution with a non combustibile dust
 7. Deflagration venting through a listed dust retention and flame-arresting device (flameless)
- 9.7.4.1.1: Where a DHA has determined that isolation is necessary, isolation shall be provided to prevent deflagration propagation between connected equipment in accordance with NFPA 69
- 9.7.4.2.1: Where a DHA has determined that isolation is required, isolation shall be provided to prevent deflagration propagation from equipment through upstream ductwork to the work areas in accordance with NFPA 69
- 9.7.4.3: Explosion venting shall be directed to a safe, outside location away from platforms, means of egress, or other potentially occupied areas or directed through a listed flame arresting and particulate retention device.

Fire Protection

- 9.8.6: Spark/Ember detection and extinguishing systems: where provided, spark/ember detection and extinguishing systems shall be designed, installed, and maintained in accordance with NFPA 15, 69, and 72.

NFPA 664 2020

Explosion Protection 9.7

- 9.7.1.2 Dust Collectors with Deflagration Hazards: Dust collectors with a deflagration hazard having a dirty side volume greater than 0.23m^3 (8ft^3) shall be designed and constructed in accordance with one of the following options:
 1. Constructed of suitable strength to withstand maximum unvented deflagration pressure
 2. Protected by listed deflagration suppression system in accordance with NFPA 69 with a design strength exceeding the maximum reduced deflagration pressure of the material being collected

3. Equipped with deflagration relief vents in accordance with NFPA 68 with a design strength exceeding the maximum reduced deflagration pressure of the material being collected.
 4. Located outdoors with minimal exposure to personnel and public at large with weaker construction, subject to risk analysis acceptable to the AHJ.
 5. Enclosureless dust collectors of any strength suitable for the intended use shall be permitted without any additional explosion protection requirements.
- 9.7.2.1 Conveying system isolation
 1. 9.7.2.1.1: Conveying systems with deflagration hazards shall be isolated to prevent propagation of fire and deflagration both upstream and downstream into occupied areas of other critical process equipment
 2. 9.7.2.1.2: Conveying systems with fire hazards shall be protected in accordance with chapter 9 to prevent fire extension through the facility
 3. 9.7.2.1.3: Isolation devices shall be listed or approved for the use intended
 4. 9.7.2.1.4: Ducts shall be isolated to prevent propagation of deflagration to other vessels.
 5. 9.7.2.1.5: Where provided, explosion isolation devices shall be installed, inspected, and maintained in accordance with chapter 15 or NFPA 69

Fire Protection 9.3, 9.8

- 9.3.5 Recycling of AMS Clean Air Exhaust: Recycling of AMS exhaust to buildings shall be permitted if the provisions of 9.3.5.1-9.3.5.4 are met
- 9.3.5.4.: Air from AMSs or dust collectors deemed to have a fire hazard shall meet the provisions of 9.3.5.4.1 or .2 or .3 or .4
- 9.3.5.4.1: For dust collection systems of capacity less than or equal to 5000CFM one of the following shall apply:
 1. The system shall be equipped with listed spark detection, designed and installed in conformance with the relevant sections of NFPA 72 located on the duct upstream from the dust collector and downstream from the last material entry point, connected directly to a listed spark extinguishing system, designed and installed in conformance with NFPA 15

Or

 2. The system shall be protected in accordance with 9.3.5.4.2
- 9.3.5.4.2: For dust collection systems of capacity greater than 5000CFM, the following shall apply:
 1. Equipped with listed spark detection located on the duct upstream from the dust collector and downstream from the last material entry point, or on the exhaust side of the dust collector, to detect fire entering or occurring within the dust collector
 2. Exhaust air duct conveying recycled air back to the building shall be equipped with a high-speed abort gate activated by spark detector in 9.3.4.5.2 (1), and the abort gate shall be sufficiently fast to intercept and divert any burning material to atmosphere before it can enter the plant

3. The abort gate is provided with a manual reset so that after it has aborted, it can be reset to the normal position only by manual interaction at the damper, automatic or remote reset shall not be allowed. A powered reset is acceptable if it can be activated only by manual interaction at the damper location
- 9.8.5: Ducts with a Fire Hazard: Ducts conveying dry material released by equipment having a high frequency of generated sparks shall be designed and constructed in accordance with one of the following:
 1. Equipped with listed spark detection and extinguishing system installed downstream from the last material entry point and upstream of any collection equipment
 2. Equipped with a listed spark detection system actuating a high-speed abort gate, provided the abort gate can operate fast enough to intercept and divert burning embers to atmosphere before they can enter any collection or storage equipment
 3. If conveying material to locations representing minimal exposure to personnel and the public at large, equipped without spark detection and extinguishing systems but subject to a risk analysis acceptable to the AHJ.

NFPA 654 2020

Protection 9.3.13.1.2

- 9.3.13.1.2.1: Where both an explosion hazard and a fire hazard exist in an AMS, protection for each type of hazard shall be provided
- 9.3.13.1.2.2: Where an explosion hazard exists, AMSs with a dirty size volume of 8ft^3 (0.23m^3) or greater shall be protected in accordance with 9.7.1
- 9.3.13.1.2.3: Where a fire hazard exists see 9.8.3
- 9.3.13.1.6: Exhaust Air
- 9.3.13.1.6.3: Recycling of AMS exhaust to buildings or rooms shall be permitted when all of the following requirements are met:
 1. Combustible or flammable vapors or gases are not present
 2. Combustible particulate solids are not present in the recycled air in concentrations above applicable limits
 3. The oxygen concentration of the recycled air stream is between 19.5 and 23.5 percent by volume
 4. Deflagration isolation is incorporated to prevent transmission of flame and pressure effects from a deflagration in an AMS back to the facility in accordance with 9.7.2, unless a DHA indicates that those effects do not pose a threat to the facility or the occupants
 5. Provisions are incorporated to prevent transmission of smoke and flame from a fire in an AMS back to the facility unless a DHA indicates that those effects do not pose a threat to the facility or the occupants
 6. The system includes a method for detecting AMS malfunctions that would reduce efficiency

- 7. The building or room or room to which the recycled air is returned meets the fugitive dust control and housekeeping requirements of this standard (chapter 8)
- 8. Recycled air ducts are inspected and cleaned at least annually
- 9.3.13.1.6.4: A flame arresting and particulate retention device that is designed for use on explosion vent discharge shall not be used as an explosion isolation device in a return air line

Explosion Prevention and Protection 9.3.13.1.2, 9.7

- 9.3.13.1.4: isolation devices shall be provided for AMSs in accordance with 9.7.2
- 9.7.1.1: The design of explosion protection for equipment shall incorporate one or more of the following methods of protection:
 1. Oxidant concentration reduction
 2. Deflagration venting in accordance with NFPA 68
 3. Deflagration pressure containment in accordance with NFPA 69
 4. Deflagration suppression systems in accordance with NFPA 69
 5. Dilution with a noncombustible dust to render the mixture non combustible
 6. Deflagration venting through a listed dust retention and flame arresting device
- 9.7.2 Isolation of equipment and Work areas
- 9.7.2.1: Where an explosion hazard exists, isolation devices shall be provided to prevent deflagration propagation between connected equipment and/or work areas in accordance with NFPA 69

Fire Protection 9.8.3

- 9.8.3.1: Fire protection systems required by this standard shall comply with 9.8.3.2.1-9.8.3.2.10.3
- 9.8.3.2.1: Fire extinguishing agents shall be compatible with the conveyed material
- 9.8.3.2.4.1: Where fire detection systems are incorporated into the pneumatic conveying, dust collection, or centralized vacuum cleaning system, the fire detection systems shall be interlocked to shut down any active device feeding materials to the pneumatic conveying, dust collection, or centralized vacuum cleaning system, on actuation of the detection system.
- 9.8.3.2.4.2: Where spark or infrared detection and extinguishing systems are provided, the process shall be permitted to continue operating on activation of the detection system
- 9.8.3.2.4.3: Where a spark or infrared detection system actuates a diverter valve that sends potentially burning material to a safe location, the process shall be permitted to continue operating on activation of the detection system.
- C.2.4:

NFPA 484 2019

Explosion Protection 11.2.4.4.11

- Where provided, explosion protection shall be directed to a safe location away from areas where personnel are normally present

- 11.2.4.4.11.2: Collectors shall be protected by a minimum of one of the following explosion protection methods:
 - Deflagration venting in accordance with NFPA 68, which includes the following requirements:
 - a. Where deflagration venting is used on indoor dust collectors, the vents shall be ducted to the outside and the flow resistance shall be included in the vent design
 - b. Vent ducts shall be designed to prevent accumulation of moisture
 - Oxidant concentration reduction in accordance with NFPA 69
 - Deflagration pressure containment in accordance with NFPA 69
 - Deflagration suppression in accordance with NFPA 69, where the suppressant has been shown to be chemically compatible and effective with the material collected
 - Dilution with a compatible non combustible material
 - Deflagration venting through a listed dust retention and flame arresting device that has been shown to be effective with the metal being collected through independent third party testing
- 11.2.4.4.11.4 (A): Explosion isolation shall be provided in accordance with NFPA 69 between the dust collector and upstream process
- 11.2.4.4.13 Requirements for the Clean Air Exhaust
 - (6) Provisions are incorporated to prevent transmission of flame and pressure effects from a deflagration in an MS back to the facility unless a DHA indicates that those effects do not pose a threat to the facility or the occupants
 - (7) Provisions are incorporated to prevent transmission of smoke and flame from a fire in an AMS back to the facility unless a DHA indicates that those effects do not pose a threat to the facility or the occupants
- 11.2.4.4.15 Indoor Dry-Type Air-Material Separator (AMS)
- 11.2.4.4.15.6: The collector exhaust duct located inside the building shall use one of the following deflagration protection methods:
 - (1) Deflagration pressure containment
 - (2) Deflagration isolation in accordance with NFPA 69

NFPA 69 2019

Explosion Protection

- 4.3.1 Options: Deflagration protection and control meeting the goals and objectives of sections 4.1 and 4.2 shall be provided in accordance with either of the following:
 1. The performance based provisions of 4.3.2
 2. The prescriptive-based provisions of 4.3.3
- 4.3.3 Prescriptive-Based Design: A prescriptive based design shall be in accordance with Chapters 6-15 of this standard.
- 6.1.2 Methods Based on the Prevention or Limitation of Damage: the following shall be considered methods based on preventing or limiting damage:
 1. Predeflagration detection and detection and ignition control systems
 2. Deflagration suppression

3. Isolation methods
 4. Deflagration pressure containment
- 9.1 Application: Systems used for the predeflagration detection and control of certain specific ignition sources shall be permitted to be used to reduce the probability of the occurrence of deflagrations in systems that handle combustible particulate solids.
 - 9.1.1: Systems used for the predeflagration detection and control of ignition sources shall be permitted to be used in conjunction with other explosion prevention or explosion protection measures, such as deflagration suppression or deflagration venting, for those systems posing a dust explosion hazard.

For any additional information, please contact:

Air Purifiers Inc.
1 Pine St.
Rockaway, NJ 07866
973-586-3988
info@airpurifiersinc.com
www.airpurifiersinc.com