

Ontario Fire Code

SECTION 5.10

COMBUSTIBLE DUST PRODUCING PROCESSES

Illustrated Commentary



***Office of the
Ontario
Fire Marshal***

5.10.1. Dust Collection

Mechanical Exhaust Systems

- 5.10.1.1. Machinery that produces, agitates or conveys **combustible dusts** shall have or be connected to a mechanical exhaust system to the outside atmosphere and dust-tight casings or enclosures.

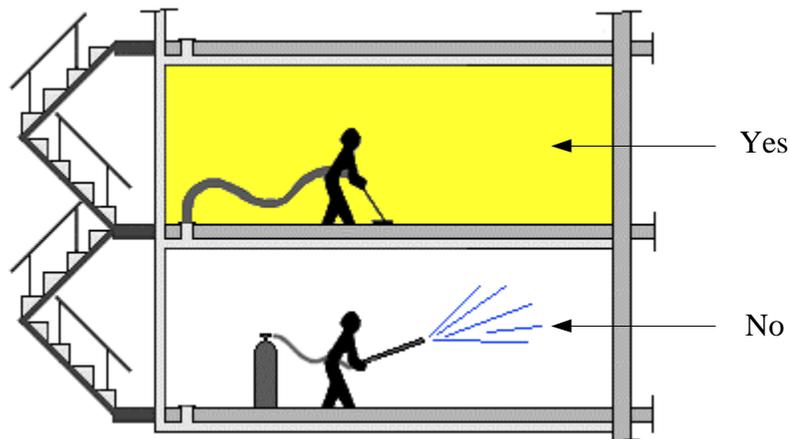
The intent of this Article is covered by Article 5.10.1.3.

5.10.1. Dust Collection

Mechanical Exhaust Systems

- 5.10.1.2.(1) **Building** and machinery surfaces shall be kept clean by a vacuum apparatus **listed** and labelled for use in atmospheres containing **combustible dusts**.
- (2) The vacuum cleaning machine required in Sentence (1) and ancillary piping, suction hose and tools shall be electrically conductive and grounded.
- (3) Compressed air or other **compressed gases** shall not be used to blow dust from surfaces inside **buildings**.

Surfaces in buildings and on machinery must be cleaned with a vacuum which is listed and labeled for use in atmospheres with combustible dusts. If you are unable to tell the colour of the surface, it needs to be cleaned often. If dust deposits are thicker than a paperclip (1/8 “), the surfaces need to be cleaned. Vacuums, ancillary piping, suction hose and tools must be electrically conductive and grounded. Inside buildings, the dust on surfaces must be cleared without the use of compressed air or other compressed gases. Under no circumstances should dust be blown off surfaces.



Do not use compressed air or other compressed gases

Building means any structure used or intended for supporting or sheltering any use or occupancy.

Combustible dust means dust and particles ignitable and liable to explode when mixed with air.

Compressed gas means any contained mixture or material with either an absolute pressure exceeding 275.8 kPa at 21°C or an absolute pressure exceeding 717 kPa at 54°C, or both, or any liquid having an absolute vapour pressure exceeding 275.8 kPa at 37.8°C .

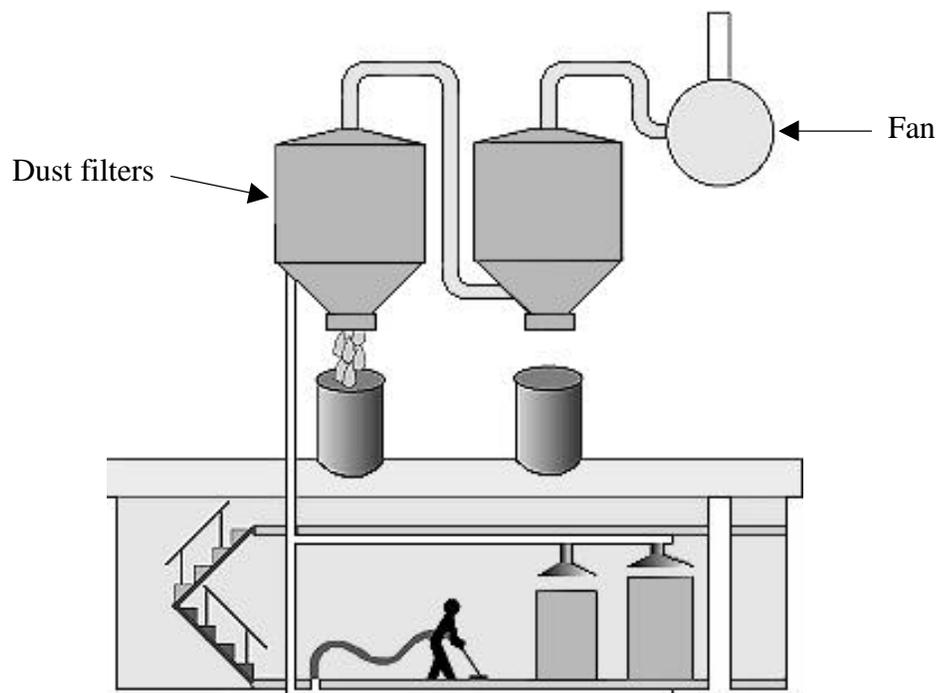
Listed means equipment or materials included in a list published by a certification organization accredited by the Standards Council of Canada.

5.10.1. Dust Collection

Dust-Collecting Equipment

- 5.10.1.3. Dust-collecting equipment shall be installed where necessary to keep the accumulation of dust at a safe concentration in the interior of the **building**.

In order to reduce the fire and explosion hazards associated with combustible dust, dust collecting equipment consisting of suction ducts and inlets, air moving equipment, feeders, discharge ducts and outlets, collecting equipment, vaults, and other receptacles designed to collect powdered, ground, and finely divided combustible material shall be provided.



Building means any structure used or intended for supporting or sheltering any use or occupancy.

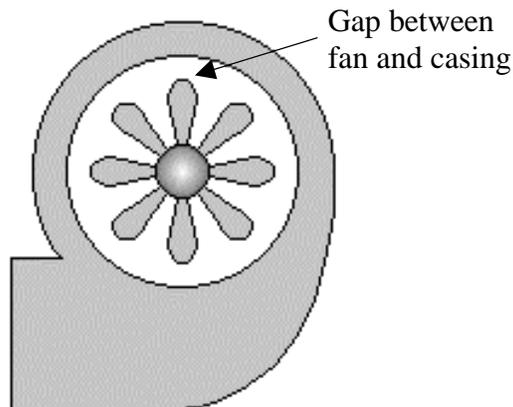
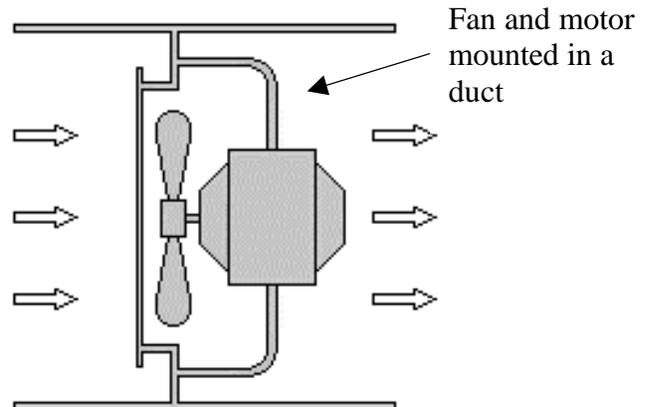
5.10.1. Dust Collection

Dust-Collecting Equipment

- 5.10.1.4.(1) Dust-collecting systems shall be made of noncombustible material.
- (2) Dust-collecting systems shall be of a design that will prevent sparks due to physical contact in the fan assembly.

Dust-collecting systems must be made of noncombustible material and be designed to prevent sparks when foreign materials come in contact with the fan. Systems that convey combustible dust should be positioned so that the fan is situated on the clean air side of the collector. This allows the system to operate under suction and dust is collected before the air stream reaches the fan. This arrangement prevents combustible dust from passing through the fan where it could be ignited by a spark.

As an alternative, where the fan is situated between the dust-producing equipment and the collector, the blades and spider of the fan and fan housing should be made of non-sparking material (Illustration A). Fan bearings and motor should be outside of casings unless the fan and motor are designed for use in dust type atmospheres (Illustration B).

Illustration AIllustration B

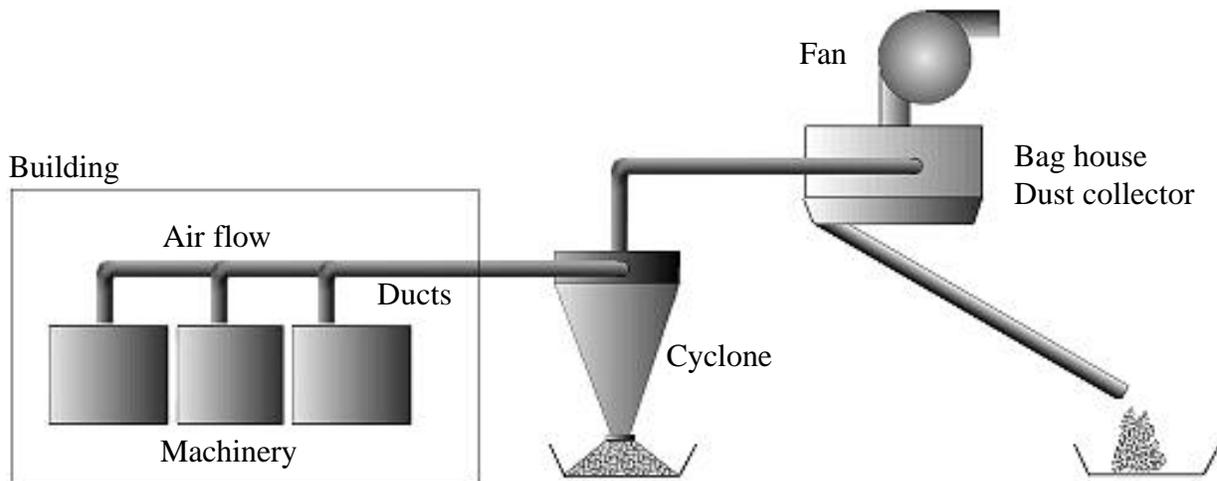
The entire fan unit has been designed for use in dust type atmospheres

5.10.1. Dust Collection

Dust-Collecting Equipment

- 5.10.1.5.(1) Except where specially designed and manufactured for internal use, dust-collectors shall
- (a) be located outside **buildings**, or
 - (b) be equipped with exhaust stacks or ducts leading to the outside.

This Article recognizes that the preferred location for dust collectors is outside. However it does permit dust collectors to be located within a building provided the dust collector has been designed for installation indoors.



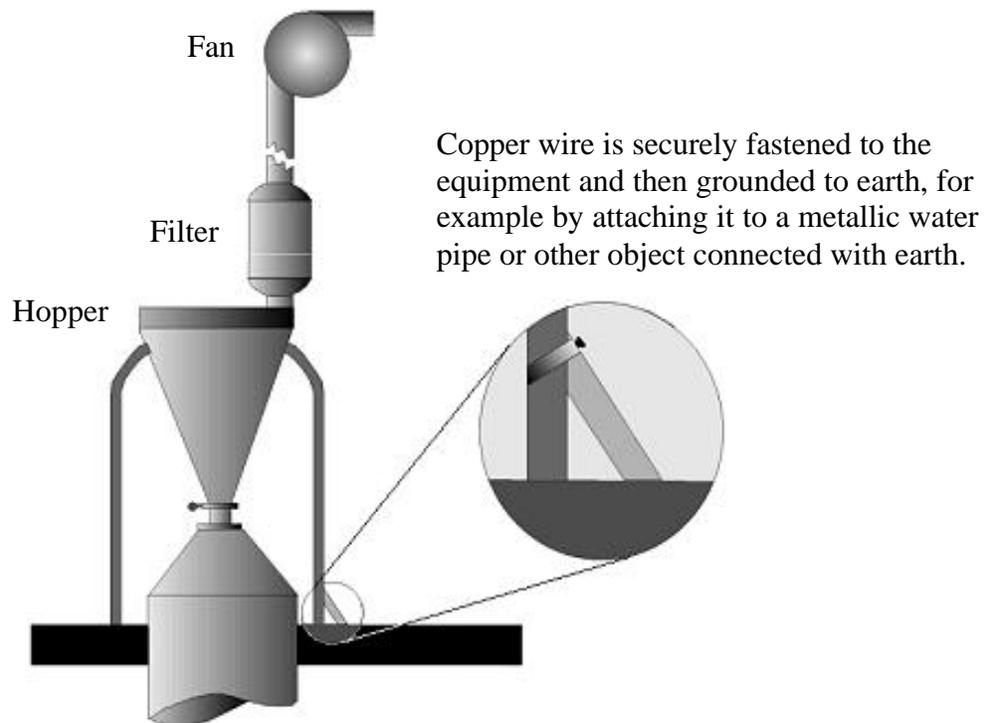
Building means any structure used or intended for supporting or sheltering any use or occupancy.

5.10.1. Dust Collection

Grounding

- 5.10.1.6. Electrically conducting paths of duct systems, dust-collectors and the machines they serve shall be grounded.

To prevent a build-up of static electricity, equipment is grounded by running one or more wires between each component of the dust-collecting system and then grounding the wire to the earth.

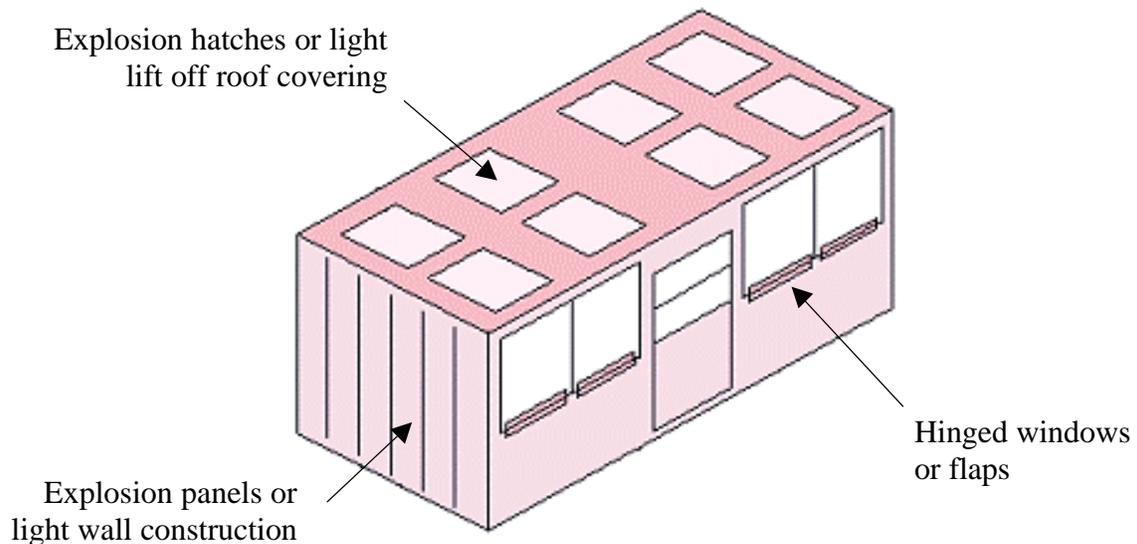


5.10.1. Dust Collection

Explosion Venting

- 5.10.1.7. Except as provided in Article 5.10.1.11., manufacturing activities that produce, agitate, or convey **combustible dusts** shall be located only in **buildings** which have explosion venting to the outdoors.

Except as provided in Article 5.10.1.11., buildings where combustible dusts are located must have explosion venting to the outdoors. There are a variety of explosion venting techniques.

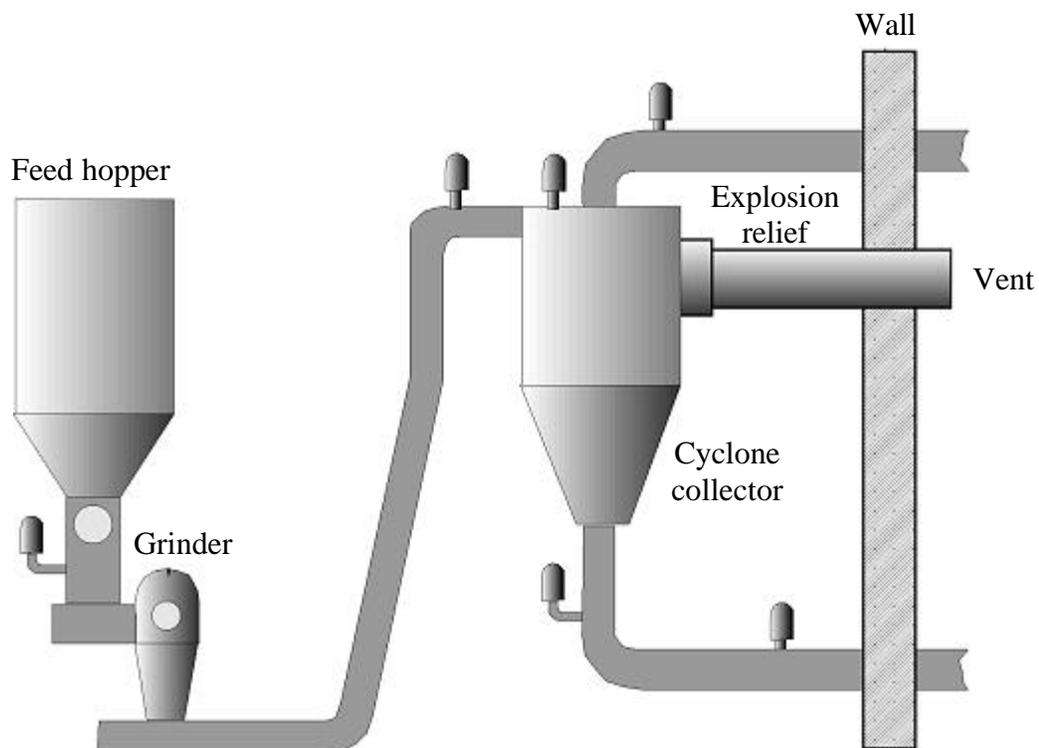


Combustible dust means dust and particles ignitable and liable to explode when mixed with air.
Building means any structure used or intended for supporting or sheltering any use or occupancy.

5.10.1. Dust Collection
Explosion Venting

5.10.1.8. Dust-collectors within **buildings** shall be designed with explosion venting to the exterior.

Dust collectors within buildings must have explosion venting to the outdoors. Explosion vents should be located close to an outside wall and be vented through a short, straight duct directly outside.



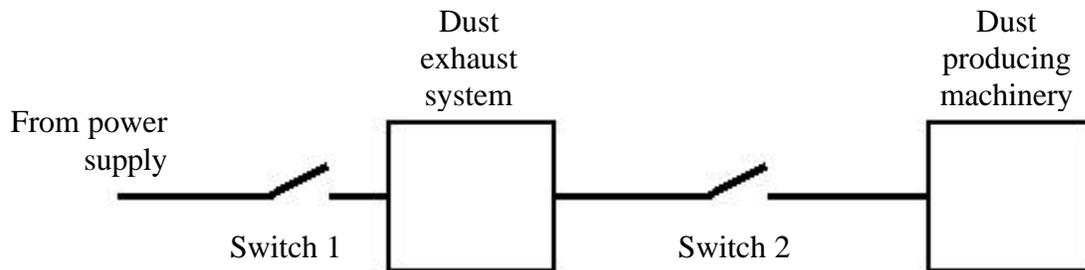
Building means any structure used or intended for supporting or sheltering any use or occupancy.

5.10.1. Dust Collection

Interlocks

5.10.1.9. Equipment required to have a dust exhaust system shall not be capable of operating until the dust exhaust system is in operation.

A system of interlocks should be provided to ensure that equipment requiring a dust-exhaust system will not start up until the exhaust system starts. For example, if the exhaust fan is not in operation, the dust producing equipment will not start.



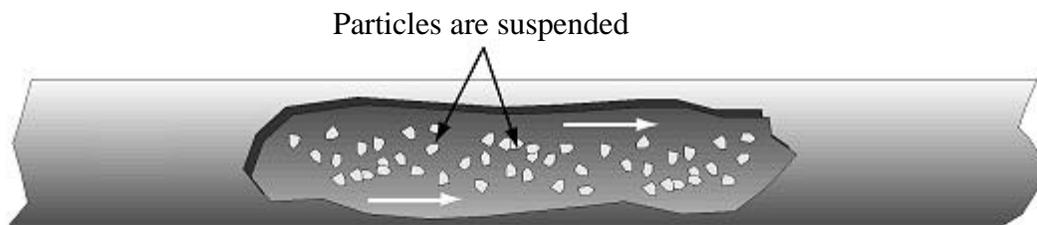
A simple illustration of an interlock where **switch 1** must be engaged to operate the dust exhaust system before **switch 2** can provide power to the dust producing machinery.

5.10.1. Dust Collection

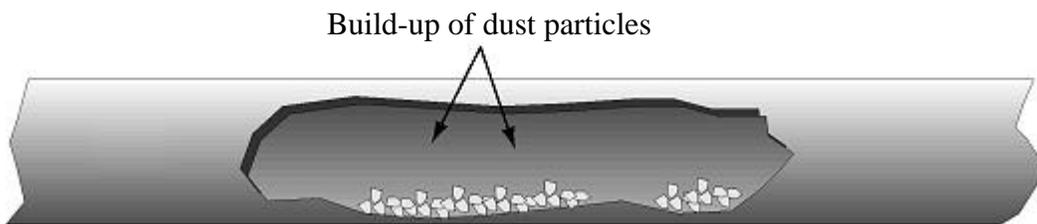
Air Velocity

5.10.1.10. Dust-collector systems shall be designed for an air velocity in the ducts of at least 1068 m/min.

Dust-collecting systems must have an air velocity of at least 1068 m/min. The air velocity keeps the particles in suspension and moving within the ducts.



Air velocity at least 1068 m/min

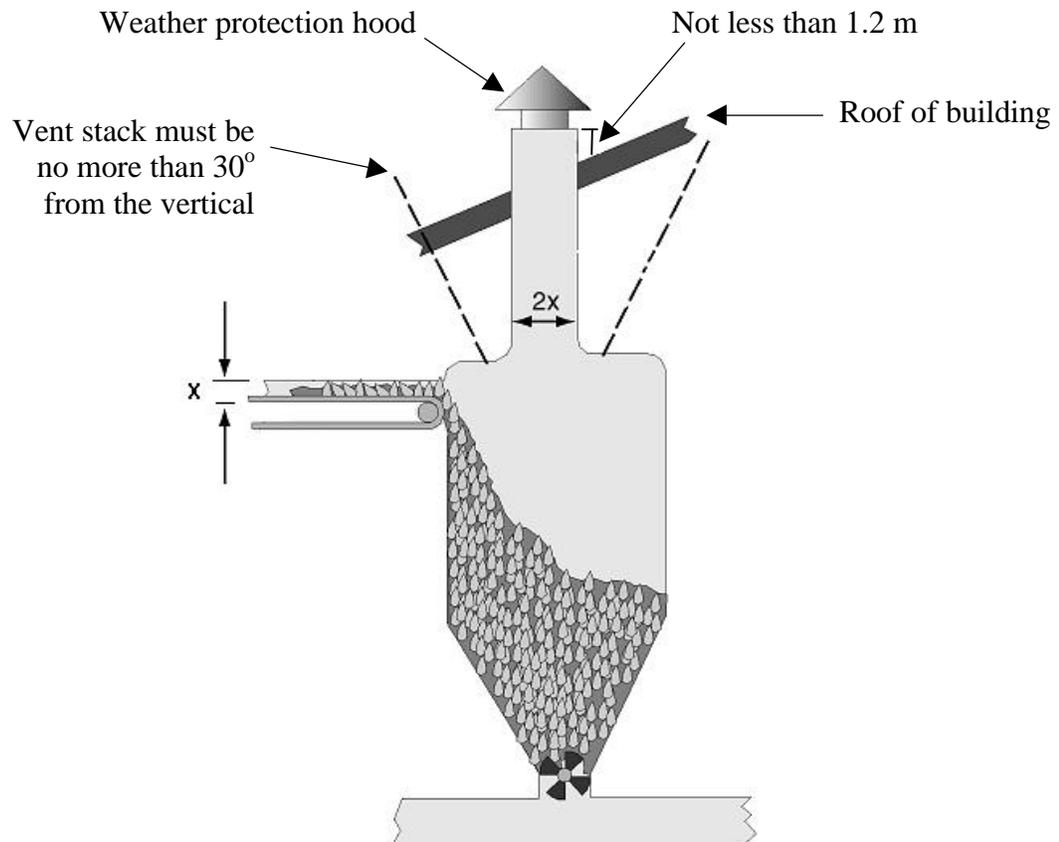


Air velocity < 1068 m/min

5.10.1. Dust Collection

Vent Stacks

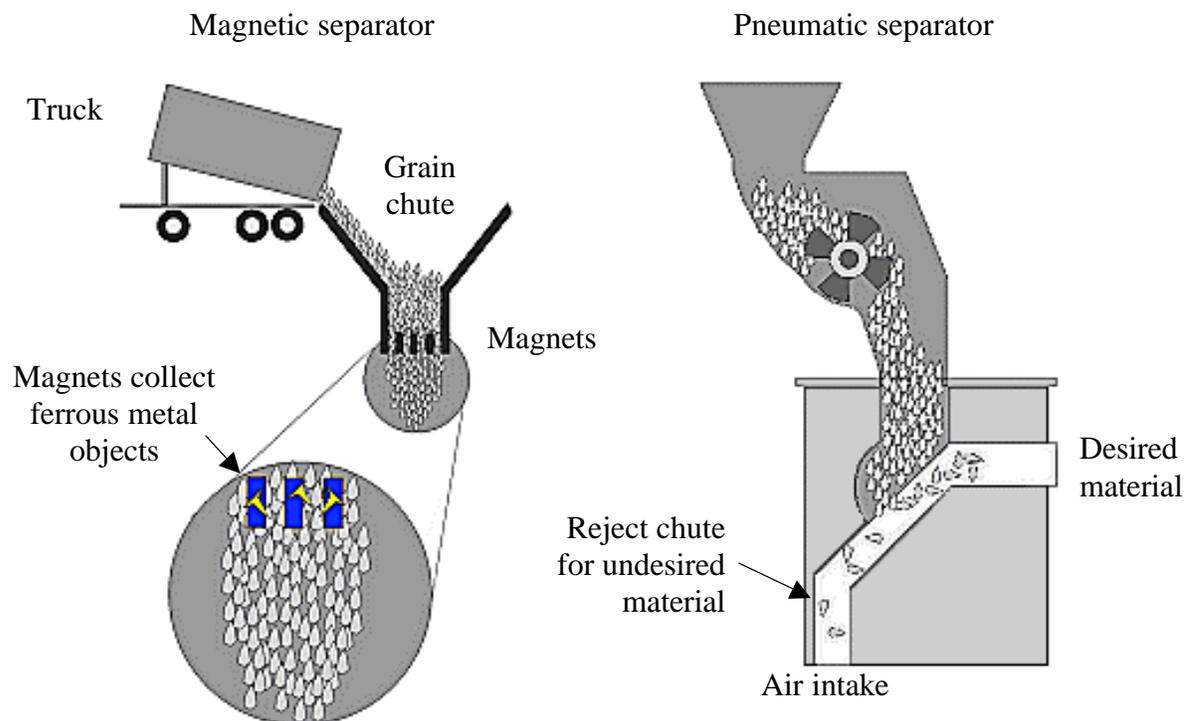
- 5.10.1.11.(1) Permanently open vent stacks may be used to ventilate storage containers where mechanical dust-collector systems are not practical, provided that the vent stacks
- (a) have a cross-sectional area not less than twice that of spouts discharging into the container,
 - (b) are installed not more that 30 degrees from the vertical,
 - (c) extend from the top of the container to a point not less than 1.2 m above the roof, and
 - (d) are designed to prevent the entry of snow and rain.



5.10.1. Dust Collection
Separators

5.10.1.12. Magnetic and pneumatic separators shall be installed to prevent the entrance of foreign materials that may cause sparks in equipment such as shellers, crackers, crushers, grinding machines, pulverizers or similar machines that produce **combustible dusts**.

Magnetic and pneumatic separators are required to be installed to collect ferrous metals that can cause sparks in equipment that produce combustible dust. In a magnetic separator, magnets attract and separate the metallic foreign objects from the desired materials. In a pneumatic separator the air current intake is adjusted to convey the desired material and reject heavier unwanted material.



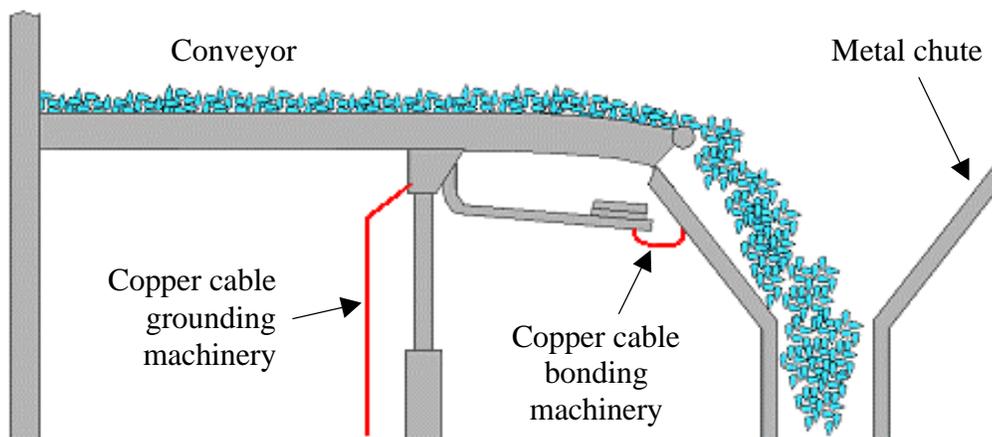
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5.10.1. Dust Collection

Grounding

5.10.1.13. Machinery and metal parts of the equipment in Article 5.10.1.12. and related conveying systems shall be electrically grounded.

Similar to the requirements for grounding under Article 5.10.1.6., machines that produce combustible dust, conveying systems and their metal parts must be electrically grounded to prevent sparks from occurring due to static electricity.



The machinery and metal parts can be grounded individually or bonded together and electrically grounded.

5.10.1. Dust Collection

Ignition Sources Prohibited

5.10.1.14. Smoking, open flame and spark-producing equipment shall not be allowed in areas containing **combustible dust** producing operations.

The purpose of this requirement is to ensure that sources of ignition are not in an area containing combustible dusts. Smoking, open flame and spark-producing equipment is not allowed in areas where combustible dust is produced. “No-smoking” signs should be posted in all operational areas. For welding and cutting operations, a hot work permit system should be in place. Electrical equipment and machinery must be of a type designed for use in areas containing combustible dust.



No smoking signs



Ignition sources

Combustible dust means dust and particles ignitable and liable to explode when mixed with air.

- Q1 What is meant by combustible dust?
A1 Combustible dust means dust and particles ignitable and liable to explode when mixed with air.
- Q2 Where should dust-collecting equipment be installed?
A2 Refer to Ontario Fire Code 5.10.1.3.
- Q3 What features must dust-collecting systems have?
A3 Refer to Ontario Fire Code 5.10.1.4.(1) and (2).
- Q4 What minimum air velocity is required for dust-collecting systems?
A4 Refer to Ontario Fire Code 5.10.1.10.
- Q5 What is the purpose of magnetic and pneumatic separators?
A5 Refer to Ontario Fire Code 5.10.1.12.
- Q6 What preventative measures must be taken with respect to ignition sources in areas containing combustible dust?
A6 Refer to Ontario Fire Code 5.10.1.14.
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