



This Program is made possible through the Code of Regulations, Education & Training Revenue for the Fund from Assessments and Permits.

Please turn down cell phones and put pagers on vibrate.

Thank you



### Hazardous Exhausts



- Massachusetts: February 1999  
( 3 Killed, 9 Injured )
- North Carolina : January 2003  
( 6 Killed, 38 Injured )
- Kentucky: February 2003  
( 7 Killed, 37 Injured )
- Indiana: October 2003  
( 1 Killed, 1 Injured )



Grain Handling Industry Explosions: 1979

( 59 Dead & 49 Injured )



### Hazardous Exhaust Systems

- Section 510.1 General
  - Where are they required
    - For capture and control of emissions
  - What do they convey
    - Combustible, flammable
      - Vapors, gases, residue & particulate
  - Intent
    - Reduction of associated hazards
      - With conveyance of Hazardous Emissions

### Hazardous Emissions

- Include The Following
  - Vapors
  - Gases
  - Fumes
  - Mists/ Dusts
  - Volatile –Airborne Materials
    - Presenting or posing a health hazard

### Wood Dust Control



### Abrasives Dust Collection



### Sanding/Grinding Dust Collection



### Food Powder Collection



### Also Included

- Volatile / Airborne Materials
  - Which when present pose a health hazard
- Health Hazard Ratings
  - As per NFPA 704
    - Based upon physical properties and characteristics of the material

### Creation Of Possible Potential

1. Flammable vapor, gas or mist
  - Exceeds 25% LFL
2. Vapor, gas or mist with Health Hazard
  - Above 4
3. Vapor, gas or mist with Health Hazard
  - 1, 2 or 3
    - Concentration of which exceeds 1%

## Flammability Rating

4 <b>Danger</b>	Flammable gas or extremely flammable liquid
3 <b>Warning</b> degrees F.	Flammable liquid flash point below 100
2 <b>Caution</b> degrees F.	Combustible liquid flash point of 100 to 200
1	Combustible if heated
0	Not combustible

(Red) = Detailed Description Of Flammable Rating

## Reactivity Rating

4 <b>Danger</b>	Explosive material at room temperature
3 <b>Danger</b> confinement or	May be explosive if shocked, heated under mixed with water
2 <b>Warning</b>	Unstable or may react violently if mixed with water
1 <b>Caution</b> violently	May react if heated or mixed with water but not violently
0 <b>Stable</b>	Not reactive when mixed with water

(Yellow) = Detailed Description Of Reactivity Rating

## HEALTH RATING

4 <b>Danger</b> protective	May be fatal on short exposure. Specialized equipment required.
3 <b>Warning</b> inhalation	Corrosive or toxic. Avoid skin contact or
2 <b>Warning</b>	May be harmful if inhaled or absorbed
1 <b>Caution</b>	May be irritation
0	No unusual hazard

(Blue) = Detailed Description Of Health Rating

## Definitions Per IBC

- **Flammable Vapors Or Fumes**
  - The concentration of flammable constituents in air that exceed 10 percent of their lower flammable limit
- **Lower Flammable Limit (LFL)**
  - The minimum concentration of vapor in air at which propagation of flame will occur in the presence of an ignition source.
    - The LFL is sometimes referred to as "LEL" or Lower Explosive Limit"

## Where Required - 510.2

- **Required When**
  - Handling or processing of hazardous material
    - Where lack of exhaust under normal conditions
      - Creates the potential for a hazardous condition

## What Types Of Exhausts

- **Perchloric Acid Hoods**
  - Encountered in teaching laboratories
    - May generate a precipitate that is a contact explosive
- **Biological, Radioactive & Acid Contaminated**
  - Encountered in health care
    - Exhaust may require filtration, may be radioactively contaminated

**Perchloric Acid Fume Hood Enclosure**



**Laboratory Fume Hood**



**Modification To 510.2**

- Present Modifications Have Been Granted
  - For laboratory scenarios
    - Modification being extended through an exception within the 2006 IMC
  - Exception
    - Laboratories, as defined in 510.1 except where the concentrations listed in Item 1 are exceeded ... health hazard rating of 1,2,3 or 4 present in concentrations exceeding 1% ... for acute inhalation toxicity.
- **NOTE: Modifications are for one time only and must be individually granted by OSBI**

**What Other Types Of Exhaust**

- Ethylene Oxide
  - For sterilization of equipment
    - Used in health care facilities
- Training Shops
  - Encountered in educational facilities
    - Requiring special exhaust systems
      - Metal work
      - Wood working
      - Automobile body work

**Vocational Training Welding Shop**



**Lumber Yards & Woodworking Facilities**

- Section 510.2.1
  - Dust collection & exhaust system to be provided
    - For equipment and machinery that generates or emits combustible dust
  - Collection and conveyance systems
    - To have approved explosion control system



**Sanding Dust Collection**



**Other Code Sections**  
**Relating to These Facilities**

- Section 510.2.1 refers over to the IFC
  - IFC Section 911 Explosion Control System
    - CFSC Section 911
      - 911.1 General
        - » Explosion control shall be provided in the following locations
          - » Rooms occupied and identified as per Table 911.1
          - » Quantities above that of Table 2703.1.1(1)
          - » Need venting and prevention systems as per this section and NFPA 69 or NFPA 495

TABLE #11.1  
EXPLOSION CONTROL REQUIREMENTS

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
Hazard Category			
Combustible dusts <sup>a</sup>	—	Not required	Required
Organic dusts	Flammable	Not required	Required
Explosives	Division 1.1	Required	Not required
	Division 1.2	Required	Not required
	Division 1.3	Not required	Required
	Division 1.4	Not required	Required
	Division 1.5	Required	Not required
	Division 1.6	Required	Not required
Flammable gas	Gaseous	Not required	Required
	Liquefied	Not required	Required
Flammable liquids	IA <sup>b</sup>	Not required	Required
	IB <sup>b</sup>	Not required	Required
Organic peroxides	U <sup>c</sup>	Required	Not permitted
	I <sup>c</sup>	Required	Not permitted
Inorganic liquids and solids	4	Required	Not permitted
	Pyrophoric	None	Required

See Next Handout Page For Full Table!!!

**Other Code Sections**  
**Relating to These Facilities**

- CSFSC Section 911
  - 911.2 Required Deflagration Venting
    - Areas required to have deflagration venting to comply with seven areas
  - 911.3 Explosion Prevention Systems
    - Install as per NFPA 69 & this section
  - 911.4 Barricades
    - Design and install as per NFPA 495

**Explosion**

- Explosion Control
  - Section 414.5.1 Of the IBC
    - Shall be provided as per IFC / CSFSC
    - Table 414.5.1
  - When hazardous material quantities
    - Exceed Table 307.7
    - Or structural space is occupied
      - » For purposes involving explosion hazards

TABLE #11.1  
EXPLOSION CONTROL REQUIREMENTS<sup>a</sup>

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems <sup>b</sup>
HAZARD CATEGORY			
Combustible dusts <sup>a</sup>	—	Not Required	Required
Organic flammables	—	Not Required	Required
Explosives	Division 1.1	Required	Not Required
	Division 1.2	Required	Not Required
	Division 1.3	Not Required	Required
	Division 1.4	Not Required	Required
	Division 1.5	Required	Not Required
	Division 1.6	Required	Not Required
Flammable gas	Gaseous	Not Required	Required
	Liquefied	Not Required	Required
Flammable liquid	IA <sup>b</sup>	Not Required	Required
	IB <sup>b</sup>	Not Required	Required
Organic peroxide	U <sup>c</sup>	Required	Not Permitted
	I <sup>c</sup>	Required	Not Permitted
Inorganic liquids and solids	4	Required	Not Permitted
Pyrophoric gas	—	Not Required	Required

See Next Page Of Handout For Complete Table

(TABLE 510.2)  
MINIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD<sup>(1)</sup>

MATERIAL	CLASS	GROUP HAZARDOUS MATERIAL QUANTITY EXCEEDED		STORAGE <sup>(2)</sup>		USE CLASSIFICATION <sup>(3)</sup>			USE PREVENTION <sup>(4)</sup>		
		Substance (lb)	Substance (kg)	Substance (lb)	Substance (kg)	Substance (lb)	Substance (kg)	Substance (lb)	Substance (kg)	Substance (lb)	Substance (kg)
Combustible liquid <sup>(5)</sup>	I	50	22.7	100	45.4	100	45.4	100	45.4	100	45.4
	II	100	45.4	200	90.8	200	90.8	200	90.8	200	90.8
	III	200	90.8	400	181.6	400	181.6	400	181.6	400	181.6
Combustible dust	Low	100	45.4	100	45.4	100	45.4	100	45.4	100	45.4
	High	100	45.4	100	45.4	100	45.4	100	45.4	100	45.4
Corrosive liquids (Class C Corrosive)	I, II, III	100	45.4	100	45.4	100	45.4	100	45.4	100	45.4
	IV	200	90.8	200	90.8	200	90.8	200	90.8	200	90.8
Corrosive materials	I, II	100	45.4	100	45.4	100	45.4	100	45.4	100	45.4
	III	200	90.8	200	90.8	200	90.8	200	90.8	200	90.8
Explosives	Division 1.1	1	0.45	1	0.45	1	0.45	1	0.45	1	0.45
	Division 1.2	10	4.5	10	4.5	10	4.5	10	4.5	10	4.5
	Division 1.3	100	45.4	100	45.4	100	45.4	100	45.4	100	45.4
	Division 1.4	100	45.4	100	45.4	100	45.4	100	45.4	100	45.4
	Division 1.5	100	45.4	100	45.4	100	45.4	100	45.4	100	45.4
	Division 1.6	100	45.4	100	45.4	100	45.4	100	45.4	100	45.4
Flammable gas	Group A	100	45.4	100	45.4	100	45.4	100	45.4	100	45.4
	Group B	200	90.8	200	90.8	200	90.8	200	90.8	200	90.8

See Next Two Pages In Handout For Complete Table

## Combustible Fibers

- Section 510.2.2
  - Equipment and machinery within building
  - Approved dust-collection and exhaust to be provided
  - When machinery emits combustible fibers



## Coffee Break



## Concentration vs Design & Operation

- Section 510.2
  - Establishes a concentration trigger
  - Setting up requirement for a system
- Section 510.3 Design and Operation
  - Establishes the dilution of concentrations within exhaust flow
  - To below 25% of the LEL

## Independent Systems

- Section 510.4
  - Hazardous systems are to be independent of other types of systems
  - Incompatible materials are not to be exhausted through the same system
  - Not to share common shafts
    - With exception of orientation and same area
  - No recirculation allowed to occupied areas
  - Recirculation not allowed for
    - Explosive, Flammable or Radioactive Materials

## Are There Additional Code Areas To Consider?

- The International Building Code
  - Section 414.3 Ventilation
    - Refers to Group H spaces with
      - Explosive, corrosive, combustible, flammable or highly toxic
      - » Dusts, Mists, Fumes, Vapors
    - Ducts conveying these items
      - To extend directly to the building exterior without entering other spaces
      - » See Exception

### Section 414.3 Ventilation

- **No Extension To Outside**
  - Through or by entering into other spaces
- **Exception**
  - **When Duct With**
    - Vapors or fumes with flammable constituents
    - Is less than 25% of its LFL
    - » The duct may extend / pass through other spaces

### Continuation of 414.3

- **Emissions At Work Stations**
  - To be confined to area
- **Supply Exhaust Openings**
  - If exhaust air is contaminated
    - Treat as per the IFC / CSFSC
- **Ventilation Equipment Manual Shutoffs**
  - Provide outside room
    - Break glass type with label
      - "VENTILATION SYSTEM EMERGENCY SHUTOFF"



### Sanding Dust Collection



### Sanding Dust Collection



### H-5 IBC Application

- **Ventilation Section 415.9.2.6**
  - Mechanical ventilation shall be provided
    - Throughout fabrication area
  - No interconnection of area exhausts
  - System shall be provided for capturing
    - Fumes & exhaust at workstations
  - Multiple station operations are not to use
    - The same system if combined substances
      - Could constitute a hazardous reaction

### H-5 IBC Application

- **Storage Of Hazardous Production Materials**
  - **Explosion Control Section 415.9.5.4**
    - Provide as per requirements of 414.5.1
  - **Ventilation Section 415.9.5.7**
    - Liquid Storage, HPM & Gas Rooms
      - Mechanical exhaust shall be provided
- **Exhaust Ventilation Systems Section 415.9.10.2**
  - Design may operate at ½ normal fan speed
    - On emergency power
      - If a safe exhaust atmosphere is maintained

## Design

- **Section 510.5**
  - **Sets up methods of design**
    - **Constant Velocity Method**
      - Duct is sized for constant velocity per unit length
    - **Equal Friction Method**
      - Duct is sized for constant pressure loss per unit length
  - **For conveyance of particulate matter**
    - **Constant velocity method is to be used**

## Balancing

- **Section 510.5.1**
  - **Explosive or radioactive materials**
    - **To be Pre Balanced by the duct size**
      - **This self balancing method is critical**
    - **Manual balancing is subject to**
      - **Human error & tampering**



## Balancing

- **Other systems**
  - **Duct sizing may be accomplished with balancing devices**
    - **Dampers**
      - **Dampers are to be securely fixed in the minimum position**
      - **No blockage / restriction of airflow may occur**



## Emissions

- **Section 510.5.2 Emission Control**
  - **Emissions to be confined to**
    - **Area where they are generated**
  - **Confinement method**
    - **Air Currents**
    - **Hoods or enclosures**
  - **Exhaust by duct system**
    - **To a safe location**



## Hood Capture

- **Section 510.5.3 Hoods Required**
  - **Contaminants originating within a limited space**
    - **Air current capture, with transport to exhaust system**
- **Section 510.5.4 Contaminate Capture & Dilution**
  - **Capture by air stream**
    - **Where generated**
    - **Dilution to be**
      - **Below thresholds of section 510.2**



**510.2 Where required.** A hazardous exhaust system shall be required wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:

1. A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature.
2. A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration.
3. A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.



**IBC**  
**Emergency / Standby Power**

- Section 414.5.4 Standby or Emergency Power
  - Mechanical ventilation, treatment systems, temperature control, alarm detection & electrically operated systems
    - Emergency or standby power shall be provided



**Emergency Power Under**  
**IFC & CSFSC**

- Emergency & Standby Power Systems Section 604

– Where Required / Section 604.2

- Semiconductor Fabrication Facilities
- Hazardous Materials Facilities
  - Emergency and Standby Power systems shall be provided



**Floor & Ceiling**  
**Penetrations**

- All Penetrations Are To Conform With

– Section 510.6 Penetrations

- Are to follow these sections for penetration of structural elements
  - 510.6.1 Floors
  - 510.6.2 Wall Assemblies
  - 510.6.3 Fire Walls
- Exception
  - H5 application is to follow the IBC
    - » Sections 415.9.2.4 & 415.9.2.5

**Group H-5 Application**

- IBC Group H-5 Section 415.9

– Shafts & Openings Through Floors Section 415.9.2.5

- Shall be enclosed as per section 707
- Within fabrication areas
  - Mechanical, duct and pipe penetrations
    - » Not to extend more than two floors
- All annular space shall be sealed
  - At floor level

**IBC Section 707 Shaft**  
**Enclosures**

- Shaft Enclosure Required Section 707.2

– Shaft enclosures are required for openings

- Through floors and ceiling assemblies
- Exceptions: # 3 & 4
- Pipe, tube, conduit, wire, cable & vents
  - Protected as per section 712.4
- Duct penetration
  - Protected as per section 712.4

- Fire Resistance Rating Section 707.4

– Not less than 2 hours when connecting

- 4 or more stories

– Not less than 1 hour when connections

- Less than 4 stories

**Floor & Wall Penetrations**

- Section 510.6.1 Floors

– When a floor / ceiling is penetrated by a hazardous exhaust system

- It is to be enclosed in a fire resistance rated shaft, as per the IBC

- Section 510.6.2 Wall Assemblies

– Fire rated construction enclosure

- Point of penetration to outlet terminal unless

– Duct interior is equipped with an approved automatic fire suppression system

## Can I Penetrate A Fire Wall???

- Section 510.6.3 Fire Walls

– No penetration allowed!!!!



## Duct Suppression

- Section 510.7 Suppression Required

– Duct protection to be by

- Approved Automatic fire Suppression System

– Exceptions

- Not required for nonflammable & noncombustible
- Not required when duct diameter
  - Largest less than 10 inches



## HPM Duct Fire Sprinkler System Protection

- General Section 415.9.11.1

– AFSS shall be provided in exhaust ducts

- That convey vapor, fumes, mists or dusts
  - HPM Generated

- Metallic & Noncombustible, Nonmetallic Exhaust Duct Section 415.9.11.2

– AFSS shall be provided in ducts where

- Largest cross sectional diameter is = to or greater
  - Than 10 inches
- Duct is within the building
- Duct conveys flammable vapor or fumes

## Fire Sprinkler Protection

- Combustible Nonmetallic Exhaust Ducts Section 415.9.11.3

– AFSS shall be provided where

- Largest cross sectional diameter is
  - = to or greater than 10 inches

• Note Exceptions

- Automatic Sprinkler Locations Section 415.9.11.4

– Install at 12 ft. intervals

- In horizontal ducts & at changes of direction

– At top & alternate floor levels for vertical duct

## Duct

- Section 510.8 Duct Construction

– Metal duct

- Approved G90 galvanized sheet metal
- As per Table 510.8

TABLE 510.8  
MINIMUM DUCT THICKNESS

DIAMETER OF DUCT OR MAXIMUM SIDE DIMENSION	MINIMUM NOMINAL THICKNESS		
	Nonabrasive materials	Nonabrasive materials	Abrasive materials
0-8 inches	0.038 inch (No. 24 Gauge)	0.034 inch (No. 22 Gauge)	0.040 inch (No. 20 Gauge)
9-18 inches	0.034 inch (No. 22 Gauge)	0.040 inch (No. 20 Gauge)	0.052 inch (No. 18 Gauge)
19-30 inches	0.040 inch (No. 20 Gauge)	0.052 inch (No. 18 Gauge)	0.064 inch (No. 16 Gauge)

## Duct Construction

- Nonmetallic Ducts

– To be used for nonflammable application

– Use

- Corrosive fumes or vapors
- Flame spread index of 25 or less
- Smoke developed index of 50 or less
- Testing per ASTM E 84



## Duct Joints & Clearance

- **Section 510.8.1 Duct Joints**
  - To be made *tight with lap joints*
    - *Minimum of 1 inch lap*
- **Section 510.8.2 Clearances To Combustibles**
  - For proper *minimum clearance see*
    - *Table 510.8.2*

TABLE 510.8.2  
CLEARANCE TO COMBUSTIBLES

TYPE OF EXHAUST OR TEMPERATURE OF EXHAUST (°F)	CLEARANCE TO COMBUSTIBLES (inches)
Less than 100	1
100-600	12
Flammable vapors	6

For SI: 1 inch = 25.4 mm. EC = [(EF) - 32] 1.8.

Food Powder Collection System is equipped with explosion vents to the atmosphere.



## Dust Stock & Refuse

- **Section 511**
  - *Dust, Stock & Refuse Conveying Systems*
  - *Systems must qualify with both Sections 510 & 511*
    - *Specifically in the matter of*
      - *Fire Safety Requirements*
      - *Hazardous Exhaust*



## Explosion Relief

- **Section 510.8.3**
  - *Approved explosion relief or explosion prevention*
    - *To be used with a potentially explosive mixture*
  - *Design*
    - *As per NFPA 69*



EXPLOSION RELIEF PANEL



BLAST SHAFTS & DOORS

## Duct Support

- **Section 510.9 Supports**
  - *Interval not to exceed 10 feet*
  - *Construction of noncombustible material*
- **Design For Weight Of Duct & Content**



## Grinding Dust Collection

Granite / Stone Grinding Operation



**Titanium Grinding Dust Collection**



**Battery Plant Dust Collection**



**Collectors & Separators**

- Section 511.1.1 Collectors & Separators
  - Cyclone collectors, supports & separators
    - Non-combustible construction
    - Exterior of building
      - Minimum of 10 feet to combustible construction



Custom automatic dumpster cover used with conveying cyclone to move dust from larger dust collection system into 40 yard dumpster

**Discharge**

- Section 511.1.2 Discharge Pipe
  - To conform to duct requirements
  - Collector delivery pipe shall not convey directly into a firebox of:
    - Boiler
    - Furnace
    - Dutch Oven
    - Refuse Burner
    - Incinerator



**High Heat Appliances**

- High Heat Appliance:
  - Any appliance in which the products of combustion at the point of entrance to the flue under normal operating conditions have a temperature greater than 2000 degrees Fahrenheit
    - Clearances
      - As per Section 510.8.2
      - NFPA 91

- **Section 511.1.3 Conveying System Exhaust Discharge**

- *Directly by flue*
- *Or*
- *Indirectly through*
  - *Separator, bin or vault*



## Sparks & Explosions

- **Section 511.1.4 Spark Protection**

- *Open air exhaust terminal*
  - *To be protected by a noncombustible screen*



## Explosion Relief

- **Section 511.1.5 Explosion Relief Vents**

- *To be provided on all systems*
  - *Conveying combustible refuse or stock*



## Screens

- **Section 511.1.5.1 Screens**

- *When a screen is installed within a safety relief vent*
  - *Attachment shall permit ready release*
    - *Under explosion pressure*



## Hoods

- **Section 511.1.5.2 Hoods**

- *All relief vents to have*
  - *An approved non-combustible cowl or hood*
- *Relief valve to be counter balanced*
  - *Preventing the escape of materials, gases or liquids*



*Intake air fan driving air into room and an exhaust fan pulling air out. Fan hoods on roof contain noise silencers.*



Gasoline engine dynamometer test cell

with low level ventilation ducts and cooling air intake and exhaust stacks equipped with sound absorption capabilities.

### Fan And Drive Application

- Types
  - Some systems require special wheel designs
    - Capable of handling entrained material
      - Without damage to the fan
  - Systems may also require
    - Special coatings and finishes
      - Explosion proof construction, non-sparking construction

### Exhaust Outlets

- Fan Location
  - To minimize potential for hazardous effluent escape
    - Exhaust fans serving the hazardous exhaust need to be located
      - At the termination point of the system



### Exhaust Outlets

- Section 511.2 Exhaust Outlet
  - 600 degree F or higher
    - Design as a chimney
      - As per Table 511.2



TABLE 511.2  
CONSTRUCTION, CLEARANCE AND TERMINATION REQUIREMENTS FOR  
SINGLE-WALL METAL CHIMNEYS

CHIMNEY SPACING	MINIMUM THICKNESS		TERMINATION						CLEARANCE	
	Walls	Lining	Above roof opening (ft)	Above any part of building within (ft)			Combustible construction (ft)		Noncombustible construction	
				10	25	50	Interior	Exterior	Interior	Exterior
Low heat appliances (1,000 BTU/hr or less)	0.125" (No. 10 MSG)	None	3	2	--	--	10	6	Up to 10' diameter, 2"	Over 10' diameter, 4"
Medium heat appliances (2,000 BTU/hr or less)	0.125" (No. 10 MSG)	Up to 10' dia - 2 1/2" dia 18" dia - 4 1/2" dia 6" dia	10	--	10	--	16	14	Over 10' diameter, 4"	
High heat appliances (Over 2,000 BTU/hr)	0.125" (No. 10 MSG)	4 1/2" dia or 4 1/2" dia	20	--	--	20			See Note c	

See the next page of your handout for complete Table 511.2

### Exhaust Outlets

- Continuation of 511.2
  - Exhaust ducts discharging to the atmosphere
    - Shall meet the requirements for
      - Conveyance of explosive or flammable vapors, fumes or dusts
      - Other product being conveyed
      - Environmental air duct

### Exhaust Outlets

- 1. Ducts conveying explosive or flammable vapors, fumes or dusts
  - **Minimum termination requirements**
    - 30' from property line
    - 10' from building openings
    - 6' from exterior walls or roof
    - 30' from combustible walls
    - 10' above adjoining grade

### Exhaust Outlets

- 2. Other product conveying outlets:
  - **Minimum termination requirements**
    - 10 feet from property line
    - 3 feet from exterior wall or roof
    - 10 feet from openings into the building
    - 10 feet above adjoining grade

### Exhaust Outlets

- 3. Environmental air duct exhaust
  - **Minimum termination requirements**
    - 3 feet from property line
    - 3 feet from openings into the building



### Discussion Of Item #3

- Item #3 is generally superseded by
  - **Section 401.5 Opening Location**
    - Exhaust and intake openings to be located
      - Minimum of 10 ft from lot lines or buildings on the same lot
  - **Section 501.3 Pressure equalization**
    - Exhaust to be sized to remove quantity of air required
    - Such space shall be maintained in a neutral or negative pressure

### Group H2 Application

- IBC Section 415.7.1 Combustible Dusts, Grain Processing & Storage
  - Handling and storage to be in compliance
    - Compliance with IFC / CSFSC
      - NFPA
        - » 62, 120, 651, 655
        - » 664 & 85

### Food Powder Collection



### H-2 IBC Application

- **Grinding Rooms Section 415.7.1.2**
  - Grinding or other operation producing dusts
    - Shall be enclosed with fire barriers
- **Conveyers Section 415.7.1.3**
  - When equipment passes through enclosure
    - Shall be constructed dirt and vapor tight
- **Explosion Control Section 415.7.1.4**
  - Provide as per
    - IFC / CSFSC or IMC

### Sanding Dust Collection

A downdraft bench removes fiberglass dust for sanding operation for a custom orthopedic brace manufacture. This particular unit has been in operation for more than 10 years.



### H-2 IBC Application

- **Room Ventilation Section 415.7.2.8**
  - Storage areas of Class I, II, IIIA liquids
    - Shall be provided with Mechanical Ventilation
- **Explosion Venting Section 415.7.2.9**
  - Class I liquid storage
    - Shall have explosion venting provided
- **Tank Openings Other Than Vents Section 415.7.2.10**
  - Tank Openings inside buildings to be designed
    - So liquid & vapor concentrations are not released within the building



### Hazardous Exhaust Summation

- **By products of manufacturing produce**
  - Hazardous Exhaust
  - Areas of consideration
    - Ignitability
    - Corrosivity
    - Reactivity
    - Toxicity
- **Hazardous exhaust may not be recirculated into the structural area**

### Summation Continued

- **When exhaust is used**
  - Makeup air must be supplied
    - Resulting in a neutral to negative pressure
    - Outdoor air ventilation rates must be maintained
  - Products of hazardous exhaust must be contained and properly disposed of
  - Building and Fire Officials must be aware of
    - Coordination between
      - IMC / IBC / IFC / CSFSC / NEC / NFPA

## QUESTIONS???

