Round Filters in Dust Collection

Baghouses and Cartridge Collectors

Todd Hensley, CAFS

MENARDI

Trenton, SC

Overview

- Pollution Control
- Collectors
- Filters
- Baghouse Conversions

Purpose of Pollution Control

Comply - Collect - Protect

- COMPLY with Regulations
  - EPA and OSHA
- COLLECT Product
- PROTECT Resources
  - Equipment and Occupants

Pollution Control Components

- Pickup Points
  - Emission Source
- Ductwork
- Dust Collector
- Removal System
- Air Mover / Fan
- Exhaust / Stack

Pollution Control Components

- Pickup Points
  - Emission Source
- Ductwork
- **Dust Collector**
- Removal System
- Air Mover / Fan
- Exhaust / Stack

Pollution Control Components

- Dust Collector Types
  - Electrostatic Precipitators (ESP)
  - Wet Collectors
  - Dry Centrifugal
  - Fabric Collectors
- Dust Collectors
  - 0.1 to 100 gr/cfm
- Air Filters
  - 0.001 gr/cfm
- Source
  - Industrial Ventilation
    - www.ACGIH.org
    - 25th Edition, 2004
    - $100

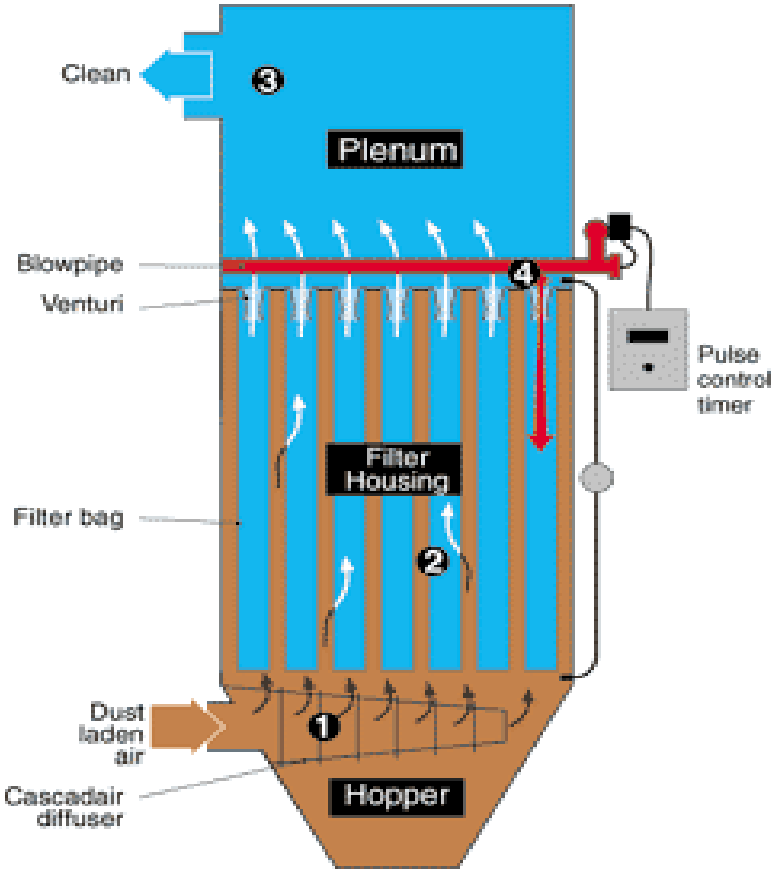
Fabric Collectors

- Baghouse
  - Shaker - Cleans Off Line
  - Reverse Air - Cleans On Line
  - Pulse Jet - Cleans On Line

Fabric Collectors

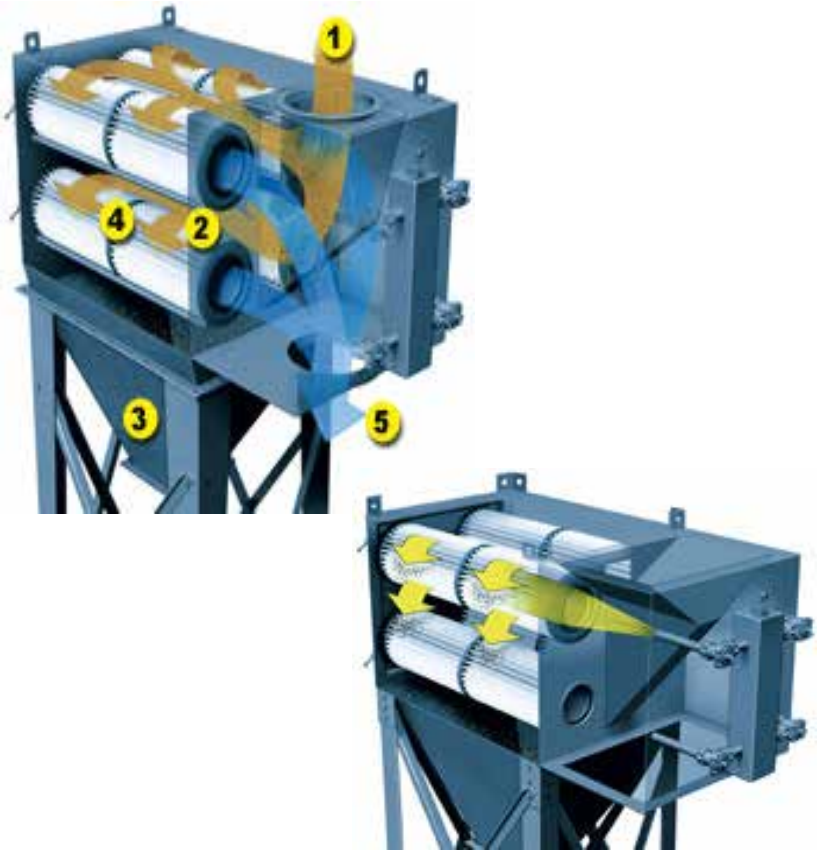
- Baghouse
  - Shaker - Cleans Off Line
  - Reverse Air - Cleans On Line
  - Pulse Jet - Cleans On Line
- Cartridge Collector
  - Up flow
  - Cross flow / Up flow
  - Down flow / Parallel flow

Pulse Jet Components



- Inlet Distribution
- Hopper
- Housing
- Tubesheet
- Plenum
- Cleaning System
  - Blow Pipe / Others
  - Venturi

Cartridge Collector Components



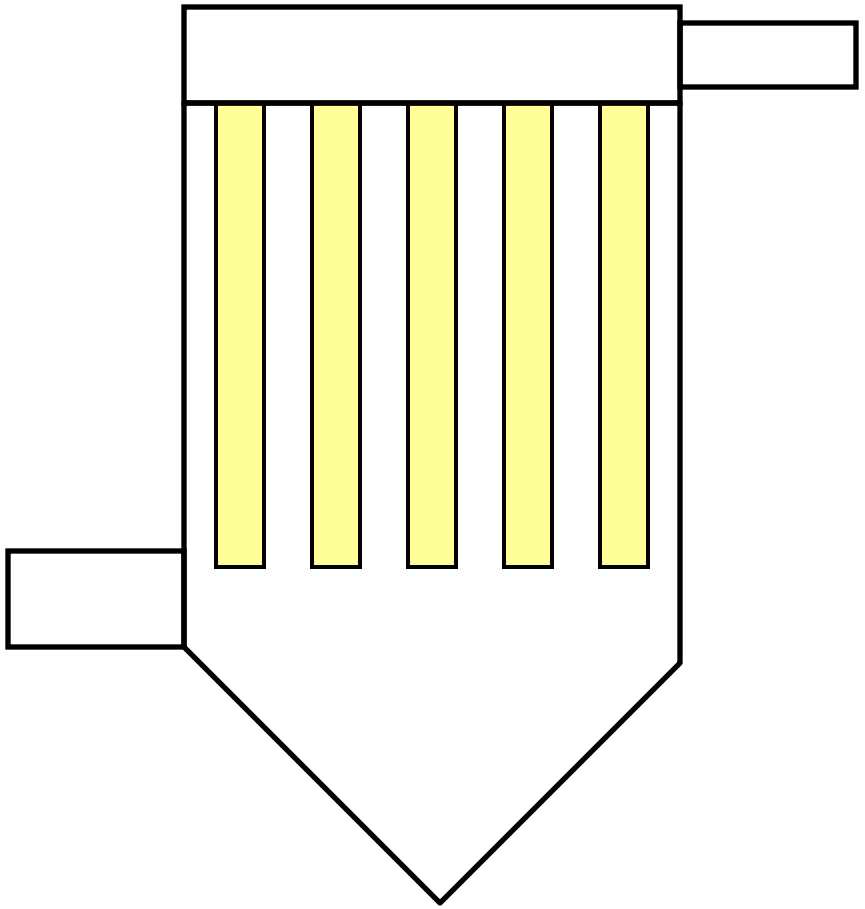
- Inlet Distribution
- Hopper
- Housing
- Tubesheet
- Plenum
- Cleaning System

Collector Considerations

- Air Properties
  - Air Flow
  - Temperature
  - Moisture
  - Explosivity
  - Chemistry
- Dust Properties
  - Particle Size / Shape
  - Grain Load
- Space Constraints
  - Footprint
  - Height
- Capital Cost
- Operating Costs
  - Media
  - Compressed Air
  - Energy / DP
- AIR TO CLOTH

Collector Considerations

- Air Velocity
  - Inlet Velocity
  - Can Velocity
  - Interstitial Velocity
  - Media Velocity
    - Air to Cloth / A:C
    - Bags 4 to 8 fpm
    - Pleated 2 to 6 fpm



Collector Considerations

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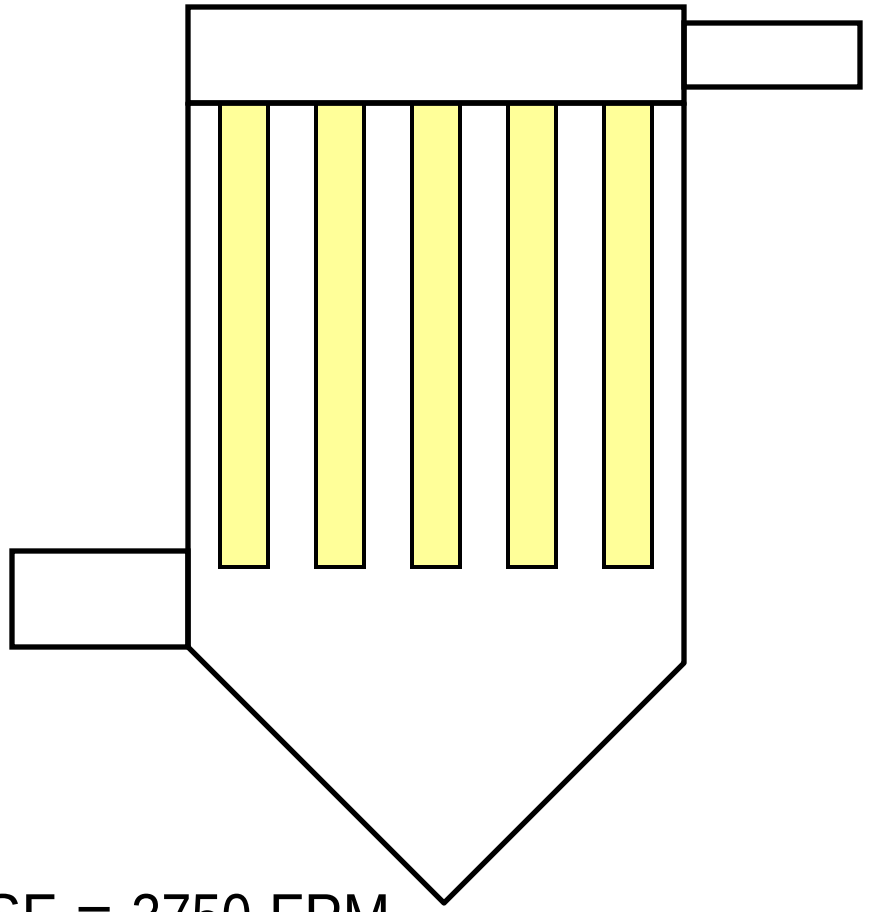
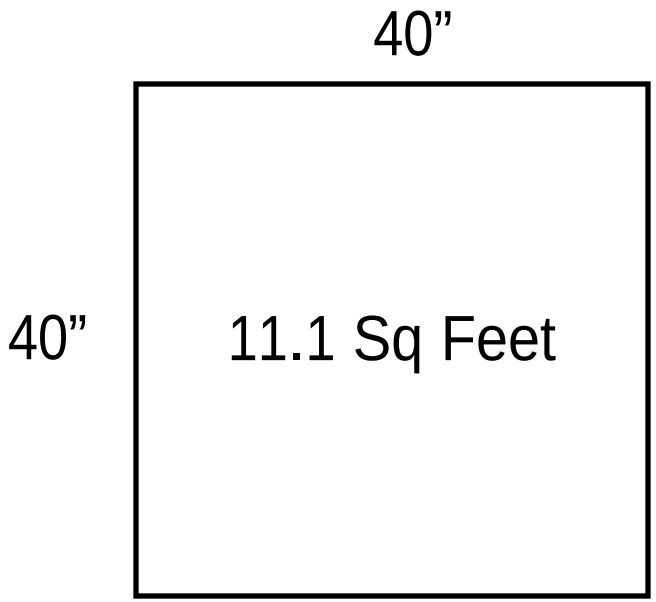


Inlet Duct = 12” Round = 0.8 SF
Inlet Velocity = 3000 CFM / 0.8 SF = 3750 FPM

Collector Considerations

- Air Velocity
  - Inlet Velocity
  - Can Velocity
  - Interstitial Velocity
  - Media Velocity



Can Velocity = 3000 CFM / 11.1 SF = 270 FPM

Collector Considerations

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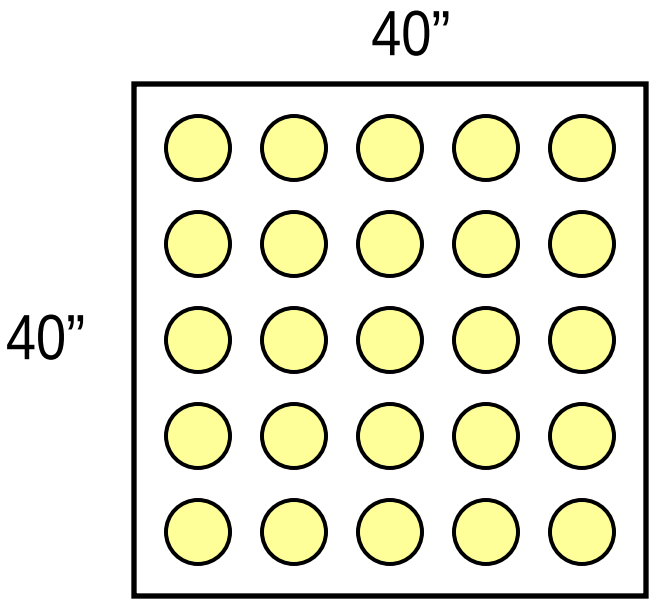
  - Inlet Velocity
  - Can Velocity
  - Interstitial Velocity
  - Media Velocity



Bag Bottom Area
= Qty * p * Radius^2
= 25 * 3.14 * (3”)^2
= 4.9 Sq Feet

Interstitial Area
= 11.1 - 4.9 Sq Feet
= 6.2 Sq Feet

Interstitial Velocity = 3000 / 6.2 = 480 FPM
Interstitial = 1.8x Can Velocity

Collector Considerations

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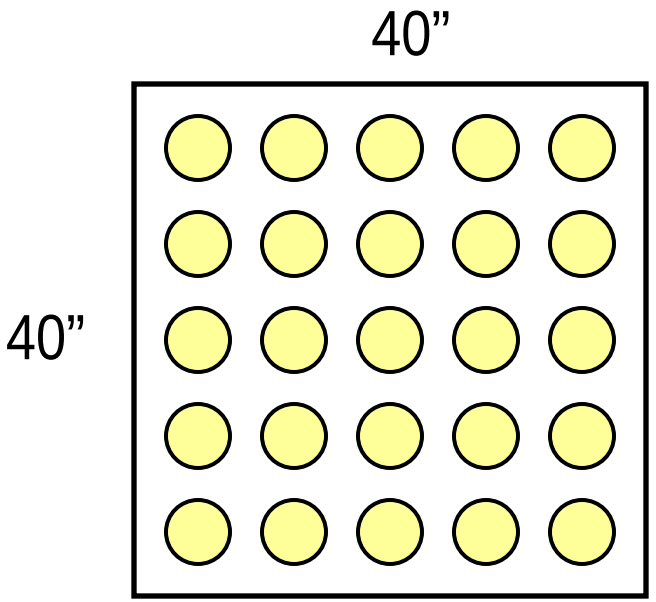
  - Media Velocity



Bag Area
= Qty * p * Diameter * Length
= 25 * 3.14 * 6” * 120”
= 393 Sq Feet

Media Velocity = 3000 / 393 = 7.6 FPM

Collector Considerations

- Air Velocity
  - Inlet Velocity 3750 FPM
  - Can Velocity 270 FPM
  - Interstitial Velocity 480 FPM
  - Media Velocity 7.6 FPM

Collector Considerations

- Baghouses
  - Can Change
    - Media Type
    - Media Area
    - Filter Type
    - Length
  - Cannot Change
    - Tubesheet Hole
- Cartridge Collectors
  - Can Change
    - Media Type
    - Media Area
    - Materials
  - Cannot Change
    - Envelope Size
    - Cap Design

Filter Considerations

Bag Fabric

- Felted Fiber
  - Polypropylene PP
  - Polyester PET
  - Aramid Nomex
  - Polyphenylene Sulfide PPS
  - Polyimide P84
  - Fiberglass
- Basis Weight oz / sq yd

- Finish
  - Singed / Glazed
  - Metallized
  - Epitropic
  - HydroOleophobic
  - Membrane
- Support
  - Fiber
  - Scrim

Filter Considerations

Fiber Properties

Fiber Properties							Max. Operating Temp. °F (°C)	
Fiber	Available In	Tensile Strength	Abrasion Resistance	Acid Resistance	Alkali Resistance	Supports Combustion	Continuous	Surges
Cotton	Woven	Good	Good	Poor	Good	Yes	180 (82)	200 (93)
Polypropylene	Woven, Felted	Excellent	Excellent	Excellent	Excellent	Yes	170 (77)	200 (93)
Nylon	Woven	Excellent	Excellent	Poor	Excellent	Yes	200 (93)	250 (121)
Wool	Woven, Felted	Poor	Fair	Good	Poor	No	200 (93)	230 (110)
Homopolymer Acrylic	Woven, Felted	Good	Good	Very Good	Fair	Yes	260 (127)	284 (140)
Copolymer Acrylic	Woven, Felted	Average	Fair	Good	Fair	Yes	230 (110)	248 (120)
Polyester	Woven, Felted, Knit, Spun Bonded	Excellent	Excellent	Fair	Fair	Yes	275 (135)	300 (149)
Aramid	Woven, Felted	Very Good	Excellent	Fair	Good	No	375 (191)	425 (218)
Teflon®	Woven, Felted	Average	Fair	Excellent	Excellent	No	450 (232)	500 (260)
Fiberglass	Woven, Felted	Excellent	Fair	Good	Fair	No	500 (260)	550 (288)
Ryton®	Woven, Felted	Very Good	Excellent	Excellent	Very Good	No	375 (191)	425 (218)
P84®	Felted	Very Good	Excellent	Very Good	Fair	No	500 (260)	550 (288)

Teflon is a trademark of E. I. DuPont Company
Ryton is a trademark of Amoco Fabrics
P-84 is a trademark of Lenzing Corporation

Filter Considerations

Pleated Bag

- Fabric
  - Spunbond Polyester
    - Epitropic / Metallized
    - HydroOleophobic
    - Membrane
  - Pleatable Felts
    - Membrane
  - Area
    - Pleat Count / Height
    - Limited Length
    - Felt Thickness
- Construction
  - Installation
    - Top Load
    - Bottom Load
    - Tubesheet Seal
  - Materials
    - Potting Compounds
    - Core
  - Retainer
    - Bands

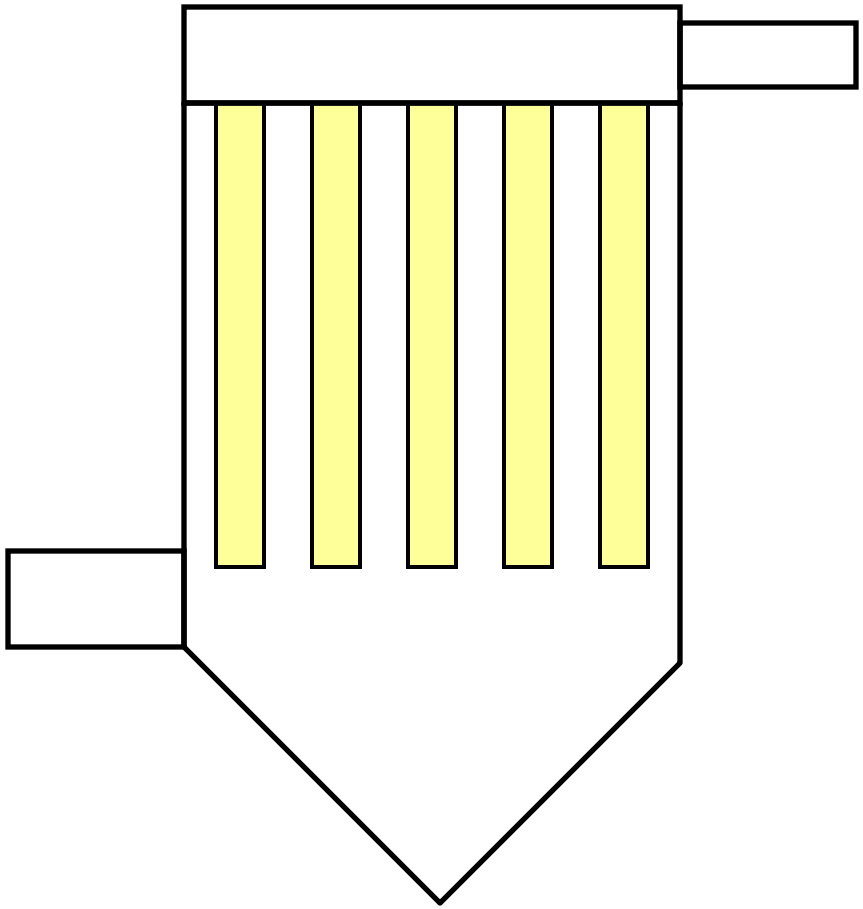
Filter Considerations

Cartridge

- Fabric
  - Spunbond Polyester
    - Epitropic / Metallized
    - HydroOleophobic
    - Membrane
  - Pleatable Felts
    - Membrane
  - Area
    - Pleat Count / Height
    - Limited Length
    - Felt Thickness
- Construction
  - Installation
    - Open / Open
    - Open / Closed
    - Flanged Cap
  - Materials
    - Potting Compounds
    - Core
  - Retainer
    - Bands
    - Cage

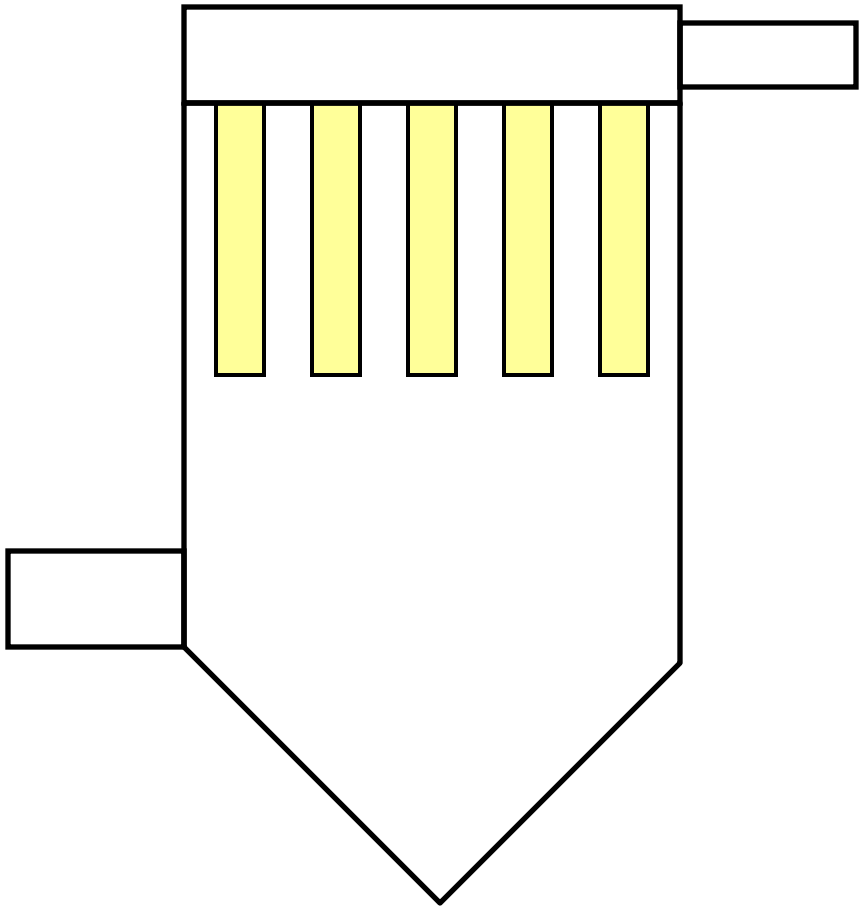
Baghouse Conversion

- Original with 3000 CFM
  - 25 PET Felt Bags
  - 6” OD x 120” OAL
  - Fabric 393 SF
  - Inlet 3750 CFM
  - Interstitial 480 FPM
  - Media 7.6 FPM
  - Problems
    - High Pressure Drop
    - Bag Wear



Baghouse Conversion

- Original
  - 25 Bags
  - 6” OD x 120” OAL
  - 393 Sq Feet
- Pleated Bags
  - 6” OD x 72” OAL
    - 45 Pleats at 1”
  - 1,078 Sq Feet
    - 175% more fabric



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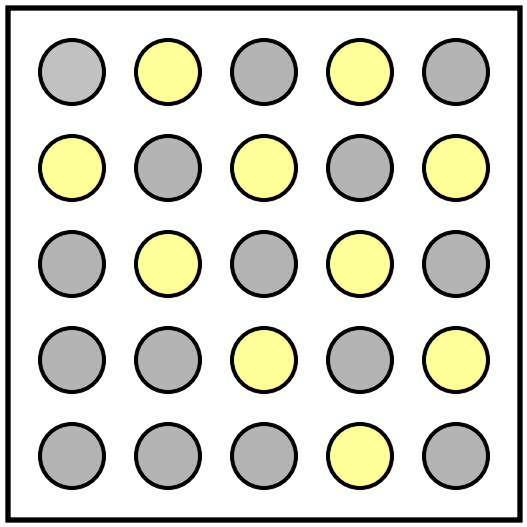
- Replace all of the bags
  - Lower Air to Cloth
    - From 7.6 to 2.8 FPM
  - Gain Efficiency
    - Better Media
    - Lower A:C
  - Lower Pressure Drop
    - Better Pulse Cleaning
  - Drop Out Zone Adds 4’

Baghouse Conversion



- Replace 10 and Plug 15
  - Lower Air to Cloth
    - From 7.6 to 7.0 FPM
  - Gain Efficiency
    - Better Media
    - Lower A:C
  - Cut Interstitial Velocity
    - From 480 to 330 FPM
  - Drop Out Zone adds 4’

Questions