Baghouse Filter Basics

July 26, 2019

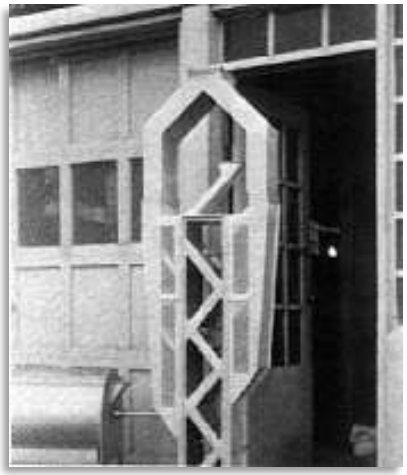
Presented by: Ben Kice,

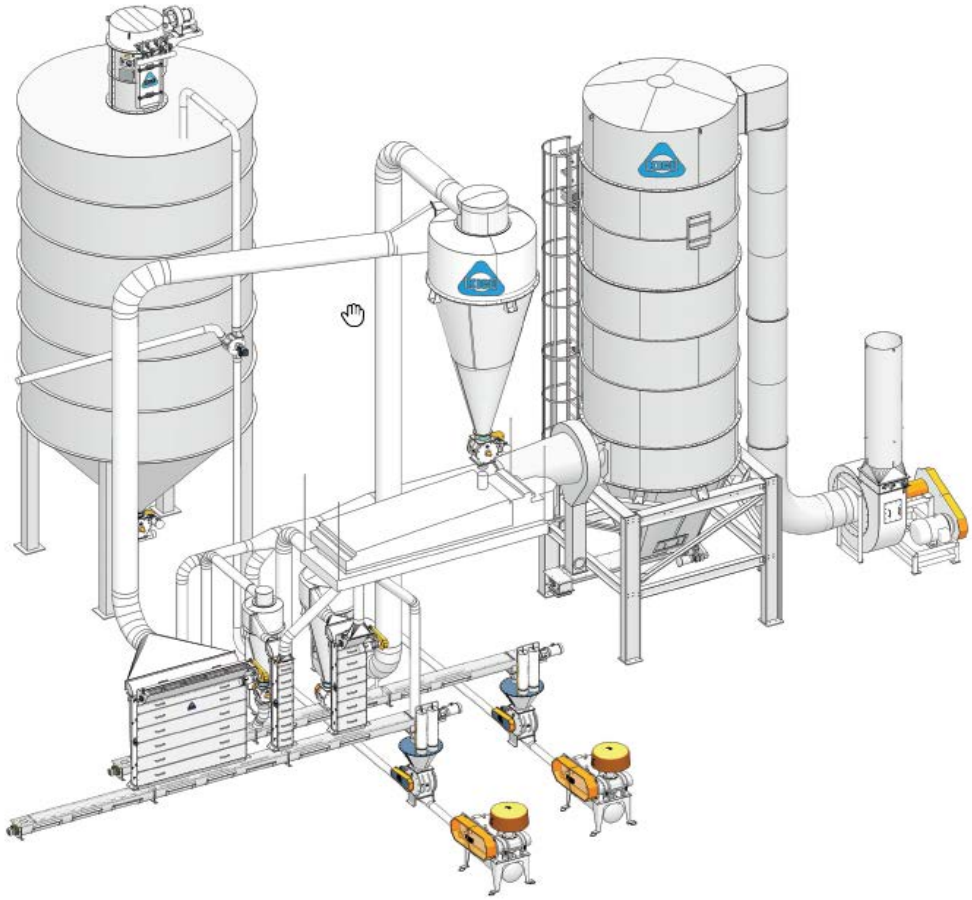
kice.com

Company History

- Started in 1946
- J.W. “Bill” Kice and three sons
  - *Russell*
  - *Jim*
  - *Jack*

- Started with Kice Multi-Aspirators
- Steadily added product lines
- Started Kice Foundry in 1976
- 100% Family owned and managed



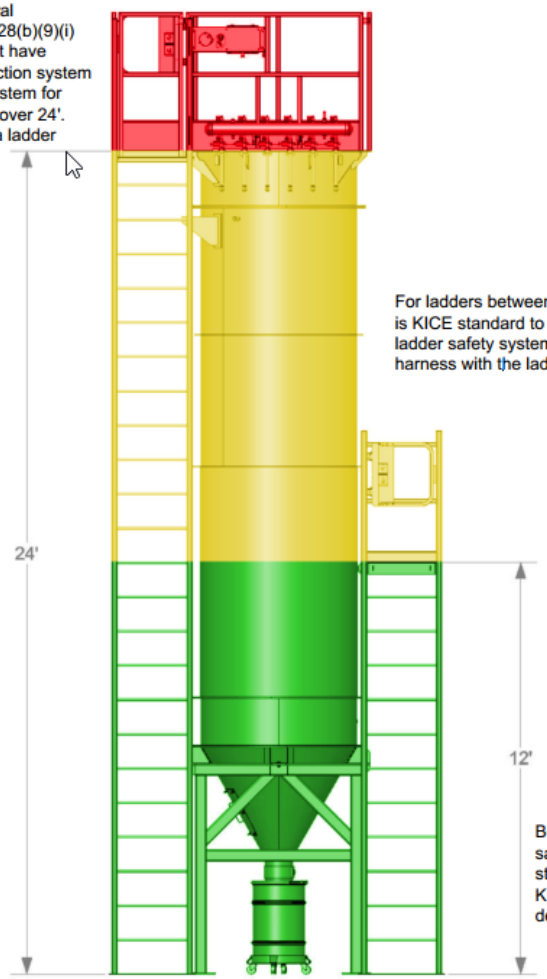


Systems Capabilities

New Safety Features

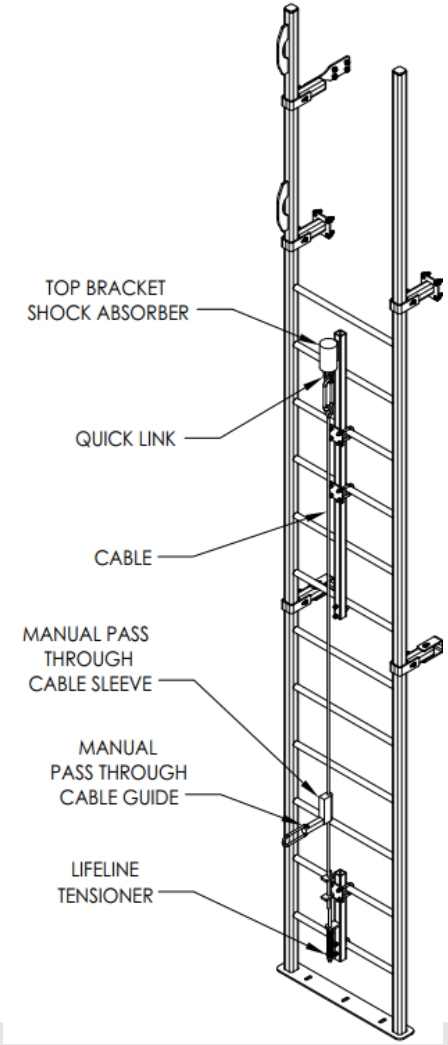
Kice Industries Ladder Application and Recommendation Guide

Per Code of Federal Regulations 1910.28(b)(9)(i)(B), employer must have personal fall protection system or ladder safety system for ladders extending over 24'. KICE will provide a ladder safety system less body harness.



For ladders between 12' and 24' it is KICE standard to provide a ladder safety system less body harness with the ladder.

Below 12', a ladder safety system is not standard. Contact KICE Engineering if desired.



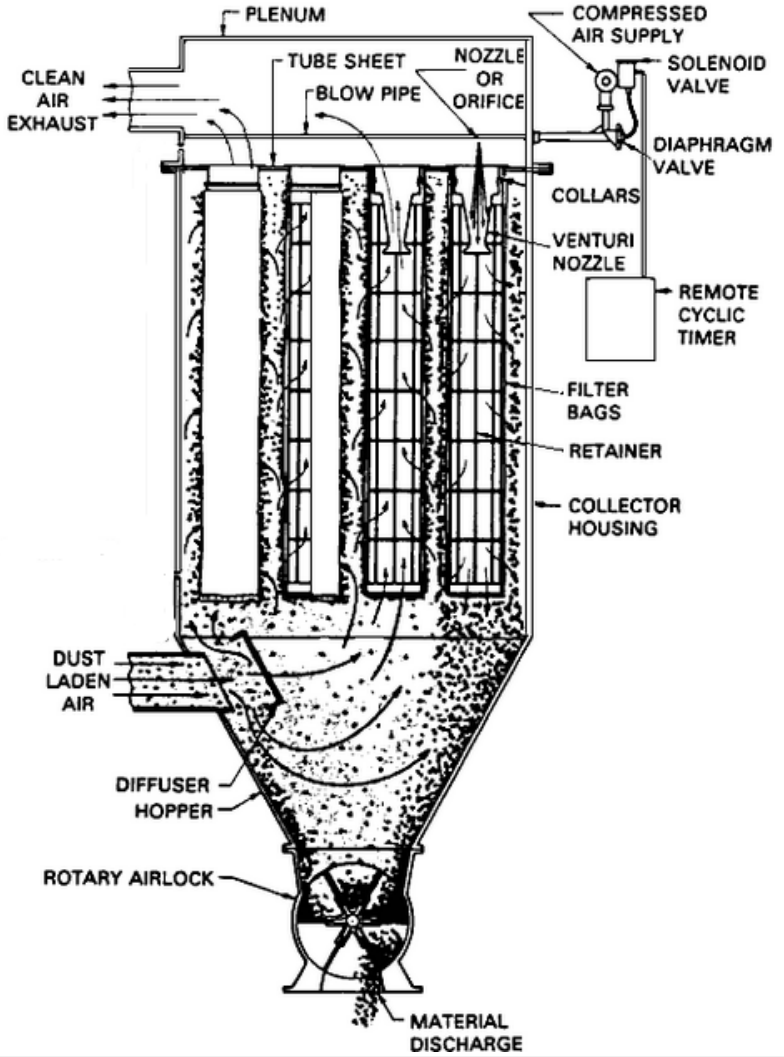
Dry-Type Dust Collectors
Air Material Separators (AMS)

Baghouse filter vs Cyclone

	Baghouse	Cyclone
Efficiency	High (typically >99.5%)	Highly dependent on application
Maintenance	Moderate (if correctly sized/designed)	Minimal
Cost	$$$	$

Baghouse Filter Operation

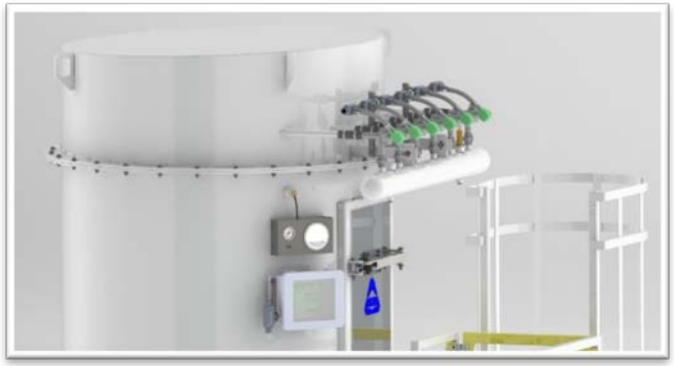
- Various styles/designs available
- Utilizes fabric socks/media
- Efficiencies could exceed 99.9% depending on type of filter media and dust characteristics Dust characteristics must be carefully considered during filter selection and system design
- Filter bags and “dust cake” on surface of media act to separate particles from incoming dirty airstream, resulting in clean air exiting baghouse to atmosphere



Bag Cleaning Systems

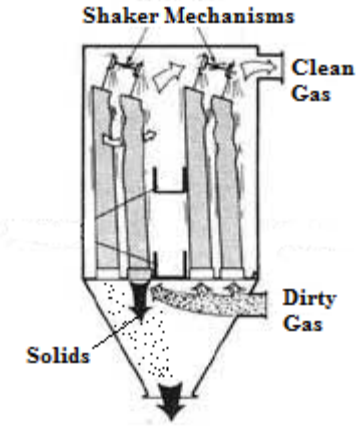
Reverse air cleaning

- High Pressure, Low Volume
- Medium Pressure
- Low Pressure



Bag shaker systems

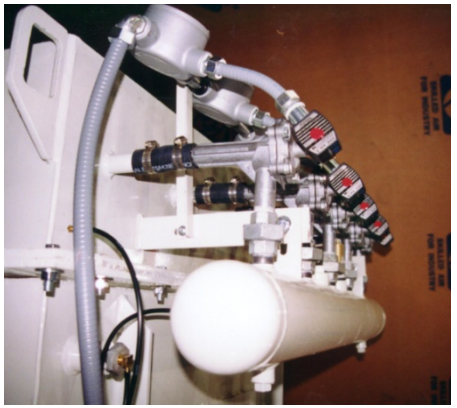
- Generally not as effective as reverse air



Mechanical-Shaker Baghouse

Bag Cleaning Systems:

Reverse-pulse (pulse-wave or pulse-jet)



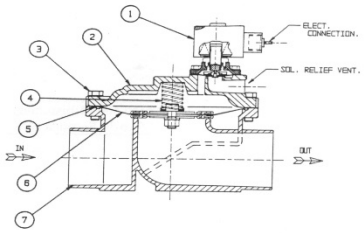
- High Pressure Low Volume:
  - *80 to 100 psig air at low volume*
  - *Cleaning air supplied by “house” compressed air system*
  - *Oil and moisture contamination from “house” compressed air system are common.*
  - *Uses venturi system to induce air and whip material from the bags*

Bag Cleaning Systems:

Reverse-pulse (pulse-wave or pulse-jet)

- Medium Pressure
  - *10-15 psig at moderate to high air volume*
  - *Use of positive displacement blower to supply air.*
  - *Air supply is local to inlet of PD blower; oil and moisture contamination not typically a problem.*

May 1993 to the Present
PN HV-264-000-1, & EFHV-264-000-1
Ref Dwg # 1-4210 M



• Electric Solenoid Valve NEMA 4 (Green) Kit #224-845-120
• Electric Solenoid Valve NEMA 7&9 (Black) Kit #224-845-119
♦ PneuJet Body Repair Kit #K 234-169

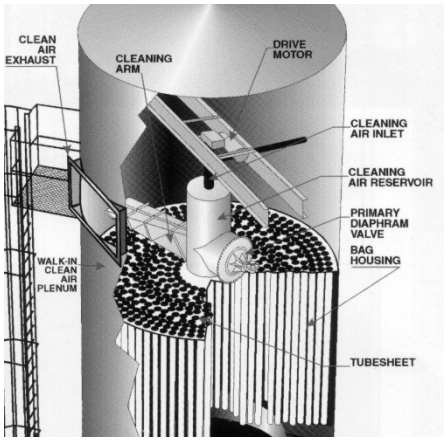
ITEM	NAME	QTY.	ITEM	NAME	QTY
•1.	Electric Operator Assembly	1	♦4.	Spring	1
	(Nema -4 Green)		♦5.	Gasket, Body	1
	(Nema - 7 & (Black)		♦6.	Diaphragm Assembly	1
2.	Bonnet	1	7.	Body	1
3.	Screws (SEMA)	8			

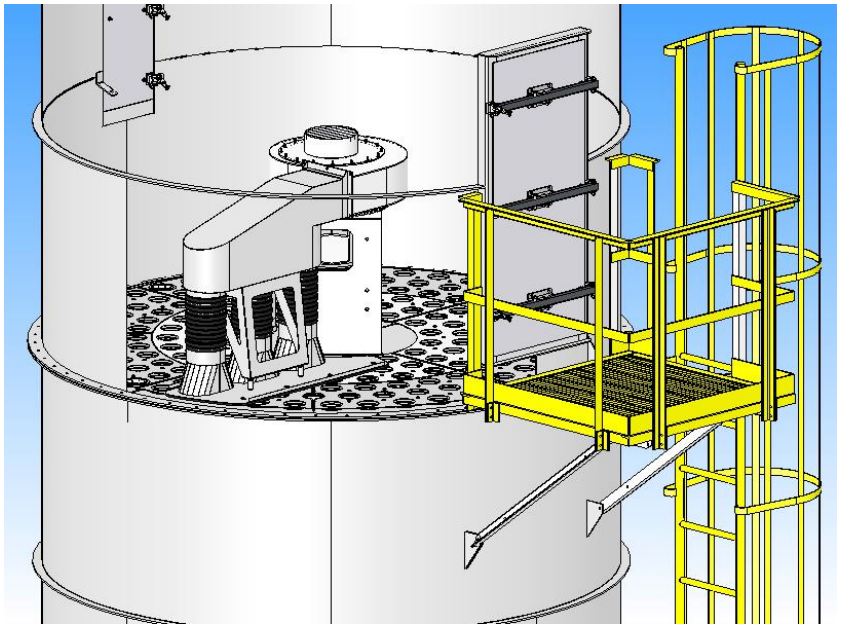
13. (MAT00200.DOC-7-12-94)

Bag Cleaning Systems:

Reverse-pulse (pulse-wave or pulse-jet)

- Low Pressure High Volume
  - *20-100” w.c.*
  - *Use of fan to deliver high volume of air at low pressure.*
  - *Physically forces air from the bags.*





Filter Design Considerations

Air-to-Cloth Ratio

- Establishes design capacity of a baghouse
- Term refers to ratio of air quantity (cubic feet per minute or CFM) to the amount of media surface area within filter (square ft.)
- Air Volume (CFM) ÷ Cloth Area (SQ.FT.) = Air to Cloth Ratio

Example: 15,000 CFM ÷ 1,555 sq ft = 9.65:1

(Varies by application and manufacturer but typically in the range of 7:1 to 10:1)

Interstitial-Velocity (Can Velocity)

- Interstitial Velocity is measured in feet per minute (FPM).
- Determined by dividing the total air flow entering the baghouse chamber by the cross sectional area of the filter housing (less bag area)

Example:

15,000 CFM ÷ (77.2 sq ft - 20.63 sq ft) = 265 FPM

(Increases with bulk density of material but typically below 300FPM)

Air to Cloth Ratio

Rule of Thumb for design A/C Ratio

- 9-10:1 Ratio: Elevator, Cleaning House, General Suction
- 7:1 Ratio: Secondary Collector, High Humidity Air Systems,
- 5:1 Ratio: Filter / Receiver

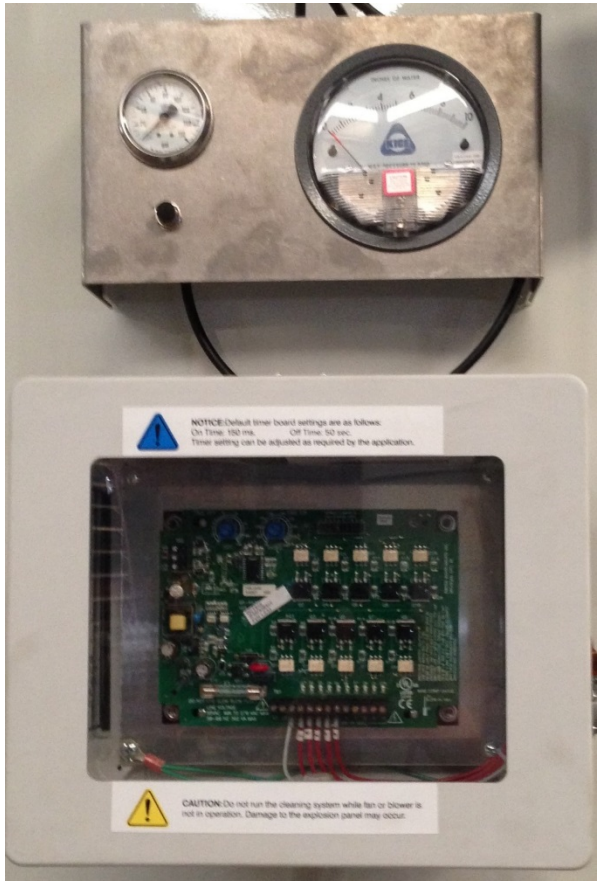
Interstitial Velocity of a baghouse

- “Rule of Thumb” for Can-velocity
- Varies with application, but can generally assume a can-velocity at 300 fpm or below to be acceptable.

Bulk Density (lbs/cu ft)	Filter Can Velocity (fpm)
30-50	300-360
<30	300
<20	180-240
<10	120-180
<5	60-120
<1	<60

Baghouse Cleaning Systems

- Pressure gauge
  - *Reads air tank pressure*
  - *Push Palm button to read tank pressure*
- Magnehelic Gauge
  - *Measures Pressure Differential across filter bags*
  - *The difference in static pressure upstream (dirty air side) and downstream (clean air side) of the bags = pressure drop.*
  - *Magnehelic gauge mounted to filter, visible to operator.*
- Timer Board in Enclosure
  - *Sends signal to electronic solenoid valves to pulse air*
  - *Allows for adjustment for the application or fine-tuning*



Thank you