Filter Media Selection for Utility Baghouse Applications

Prepared for McIlvaine Hot Topic Hour

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August 11, 2011

Agenda

- US EPA Policies
- Required Flue Gas Design Conditions
- Typical Flue Gas Design Conditions
- Fabric Filter (FF) Bag Concerns
- FF Bag Materials for Utility Baghouse Applications
- Typical PPS FF Bag Specifications
- Questions

USEPA Policies

- Recent USEPA Policies will require more baghouse installations on utility boilers in order to be in compliance with the following:
  - Utility MACT
    - » Emission limits on Hg, Acid Gases, Non-Hg Metals
  - Cross-State Air Pollution Rule
    - » Reduce NO_x, SO_2, $PM_{2.5}$
  - BART (Best Available Retrofit Technology) or Regional Haze Rule
    - » Protect visibility in Class I Areas

Required Flue Gas Design Conditions

- Design Flow (acfm)
- Inlet Gas Temperature
  - Normal
  - Excursion
- Solid loading to baghouse
- Acid Concentrations
- Alkali Concentrations
- Oxygen Concentration
- Moisture Level
- Bag Cleaning Preference (Reverse Air; Pulse Jet)
- Method for bag protection during temperature excursions

Typical Flue Gas Design Conditions @ Air Heater Outlet

Design Condition	Units	Powder River Basin Coal	Eastern Bituminous Coal
Inlet flue gas temperature	F	275 to 330	300 to 330
Inlet N_2 level	vol%	73	73
Inlet O_2 level	vol%	7	7
Inlet H_2O level	vol%	10	10
Inlet CO_2 level	vol%	10	10
Inlet SO_2 level	ppmv	350	1400
Inlet SO_3 level	ppmvd@3%O_2	10	25 to 55
Inlet NH_3 level	ppmvd@3%O_2	2	2
Inlet Mercury level	lb/TBtu	10	10
DSI feed	lb/hr	Site Specific	Site Specific
ACI feed	lb/hr	Site Specific	Site Specific

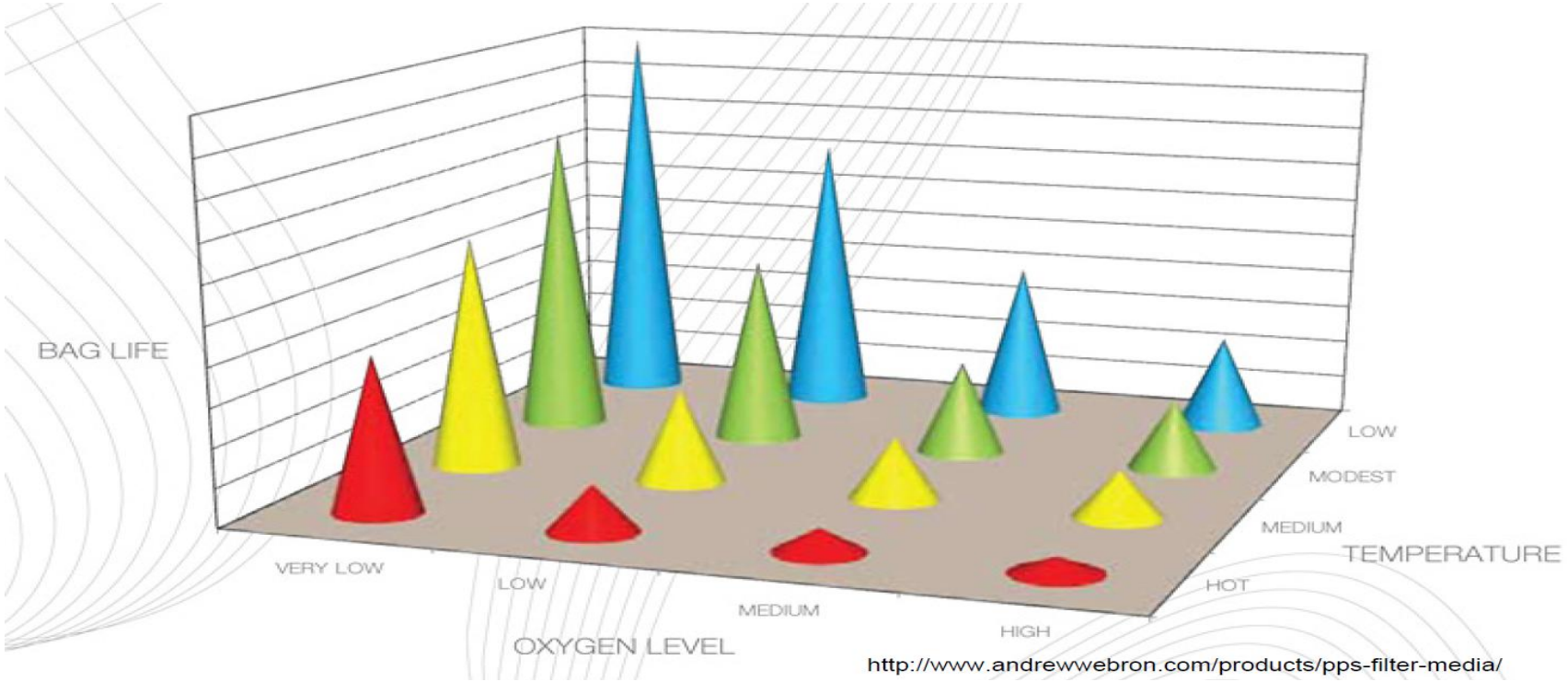
*Baghouse System Numbers are approximate concentrations dependent on the fuel selection

Fabric Filter Bag Concerns

- Chemical degradation due to acid attack
  - Molecular deterioration and weight change
- Thermal degradation due to elevated temperature and oxygen levels
  - Separation and reaction with one another to change the properties of the polymer
  - Reduction of ductility and embrittlement
  - Cracking, elongation, and porous openings

Fabric Filter Bag Concerns

- High temperature and Oxygen Concentration Level affects on Bag Life



http://www.andrewwebron.com/products/pps-filter-media/

Fabric Filter Bag Materials for Utility Baghouse Applications

Fiber	Type	Max. Cont. Oper. Temp F	Max. Surge Oper. Temp F	Tensile Strength	Abrasion Resistance	Chemical Resistance	Alkali Resistance
PPS	Felted	375	425	Very Good	Excellent	Excellent	Excellent
PTFE w/PTFE Membrane	Woven	450	500	Average	Fair	Excellent	Excellent
Fiberglass w/PTFE Membrane	Woven	450	550	Excellent	Fair	Good	Fair
P84®	Felted	500	550	Very Good	Excellent	Very Good	Fair

Typical PPS PJFF Bag Specifications

- Thermal Resistance
  - Max. Cont. Operating – 375°F
  - Max. Surge Operating – 425°F
- Tensile Strength
  - Warp Direction - The 0° direction to the edge of the cloth (Width)
    - » 145 lbs/inch minimum
  - Fill Direction - The 90° direction to the edge of the cloth (Length)
    - » 195 lbs/inch minimum
- Needle felt
- Bag Length
  - 8-10 Meters
- Weight
  - 16-18 oz/sq. yd.
- Thickness
  - .06 inch minimum
- Density
  - 0.3 g/cm^3 minimum
- Mullen Burst - Amount of pressure required to puncture a bag
  - 350 psi minimum

Questions?