The Physics of Vacuum Systems & Proper Waste Disposal
Speakers

• Skip Edwards
• David Stroud
Vacuum Recommendations

1. Use vacuum that has the power and size for your grinder
2. Make sure condition of gaskets and hoses are good
Vacuum/Dust Extractor Systems

- Cyclonic Separation
- Pre-filter
- HEPA filter
Cyclonic Separation

Inlet location, chamber design and velocity of air work together to move heavier particles toward the inside walls and bottom of the tank.
Pre-Filters

SOCK STYLE
Polyester tube/sock pre-filters

CARTRIDGE STYLE
Radial paper/polyester cartridge filter
Types of Pre-Filters

- Both capture visible dust, allowing for repetitive daily cleaning and long service life
- Some manufacturers offer pre-filter cleaning without opening the vacuum
What is HEPA?

- High Efficiency Particulate Air
- 99.97% efficient at .3 microns
  - Referenced in numerous government standards for hazardous material recovery
Particle Size

PARTICLE DIAMETER (μm)

0.0001  0.001  0.01  0.1  1  10  100  1000  10000

<—— VISIBLE TO HUMAN EYE ————

FILTER TYPE

ACTIVE CARBON FILTER  FINE FILTER  HEPA FILTER

POLLUTIONS

GAS MOLECULES  VIRUSES

PETROL FUMES  TOBACCO SMOKE  AIRBORNE MOULD  ASHES

METALLURGIC MOULD  CEMENT MOULD

BACTERIA  POLLEN  HAIR

COARSE FILTER

<—— VISIBLE TO HUMAN EYE ————
HEPA Filter Testing & Certification

- Filter is placed on “air flow bench”
  - Duplicate operating air flow of machine
- .3 micron particle is introduced to upstream side of filter
- Laser scanner counts number of particles
- Passes test = 99.97% or higher in efficiency
HEPA Filter Testing & Certification

• Be certain that your HEPA filter is individually tested and certified
• Only a few manufactures sell individually tested and certified HEPA filters
• If not, you may have leaks
HEPA Filter Testing & Certification

**BOTTOM LINE**
The vacuum, dust extractor or air scrubber must be designed as a complete operating unit.
The airflow must correspond with filter size.
Causes for HEPA Filter Leaks

- Not enough filter media
  - Total filter surface area must be correct for amount of airflow (CFM)
- Manufacturing defects (hole, tear, glue joints)
- Bad media
Care for HEPA Filter

• Never attempt to clean a HEPA Filter
• Make sure pre-filters do not have major holes, leaks, tears etc.
• Inspect HEPA Filter daily
• Replace HEPA filter annually or if there are signs of leakage
Proper Waste Disposal

- Why is it important?
- Dry Concrete Dust
- Wet Concrete Slurry
- Circle of Life
Why Is It Important?

- Protecting the environment
- Cleaner & more efficient worksite
- Productivity
- Health and safety
  - Is concrete slurry hazardous waste?
Why Is It Important?

- EPA prohibits slurry from being disposed of in the drain
- Slurry in storm drains lead to the lakes, rivers, and oceans
- Slurry runoff from the rain
Highway 99 tunnel contractors fined for concrete spill

Posted by Mike Lindblom

Seattle Tunnel Partners has been fined $2,000 because a concrete slurry spilled into city storm drains in Sodo last November.

The state Department of Ecology issued the penalty notice, dated June 27, and contractors have 30 days to pay it or to appeal. From the notice:

Violation description:

In November 2012 Seattle Tunnel Partners discharged controlled density fill (CDF) into the City of Seattle’s storm water sewer system through four catch basins located on the SR 99 bored tunnel construction project.

Ecology spokesman Larry Altose said the drains flow directly into Elliott Bay. In this case, the ...
Dry Concrete Dust Disposal
Collecting Concrete Dust

- Sweep up with broom
- Concrete Dust Vacuum
- Make sure to wear fitted dusk mask
Concrete Dust Disposal

70 ft plastic tube can be divided in single bags of any size

Tie the plastic tube twice

Cut between ties, dispose the filled, sealed bag
Wet Concrete Slurry Disposal
Collecting Wet Slurry

Autoscrubber

Slurry Vacuum
Reclaiming Water

Slurry bins/pits

• Allow water to separate naturally
• Use filter press/water reclaimer
Reclaiming Water

• Use slurry separator
• Reuse water back into jobsite machinery
• Neutralize pH to dispose
Water Recycling - Small Jobs

Water back to machinery

Container Primed w/ Separator

Wet Vacuum w/ Pump

Slurry Collection
Water Recycling - Large Jobs

Clean water is recycled back into the grinder

1. Separator

2. Clean Water

3. Solids drop to the bottom

Slurry is collected and contained in a drum
Circle of Life
Proper Slurry Disposal

Slurry drums/pits
• Allow it dry out naturally
• Haul slurry off to proper slurry disposal center
• Use slurry absorbent
Slurry Absorbents

• EPA compliant
• Fast cleanup
• Easy to handle
• Cost effective
TCLP Test

Determines whether liquids will excrete from the solids after solidification.
Slurry Absorbents

- Increase Diamonds Life
- Water Recycling
- Grinding Steps
- Collecting Slurry
- Slurry Treatment
- Cut Water Costs
- EPA Compliant
- Efficiency
- Productivity
- Dust Free
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