FILTER MEDIA PROCESSING
FOR
WATER & WASTEWATER TREATMENT

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Definitions of Filter Media and Filtration
Filtration Spectrum
Pressure and Gravity Filtration
Filter Media Selection
Delmon Co Ltd Process Flow Diagram
Laboratory testing of filter media
Pilot plant testing of filter media
Conclusions
DEFINITION OF FILTER MEDIA

Filter media are the granular filtering materials which are installed in the filters. Their function is to retain the suspended solids during the filtration process.
Filtration is defined as the passage of a fluid through a porous medium (or media) in order to remove matter held in suspension.
SIZE COMPARISON OF WATERBORNE PARTICLES AND FILTER PORES (FILTRATION SPECTRUM)

PARTICLE DIAMETER (in microns)
Pressure and Gravity Filtration
VERTICAL TYPE PRESSURE FILTER
(DUAL MEDIA)

Gravel Packing layers
- 150 mm Gravel 6-12 mm
- 100 mm Gravel 3-6 mm
- 100 mm Gravel 2-3 mm

Free Board 1.5 m

Feed water

Manhole

Backwash water to waste

Gravel Packing layers
- 100 mm Gravel 2-3 mm
- 100 mm Gravel 3-6 mm
- 150 mm Gravel 6-12 mm

Anthracite

Sand

Backwash line

Filtrate
GRAVITY TYPE FILTER

FILTER CROSS SECTION
Normal Working Level

FREE BOARD
ANTHRACITE
SAND
UNDERDRAINAGE & NOZZLES
SUPPORT LAYERS

Operating Floor
Inlet
Backwash
Outlet
Bottom Connection
Selection
of
Filter Media
SELECTION OF FILTER MEDIA

- Particle size distribution
- Uniformity coefficient
- Size range
- Effective size
- Specific gravity
**SELECTION OF FILTER MEDIA**

Particle size distribution

- Use filter media of narrow size distribution for good porosity, long filter runs and no loss of filter media during backwash.

- Good porosity

- Bad porosity
SELECTION OF FILTER MEDIA

Uniformity Coefficient

Particle Size Distribution

Uniformity Coefficient - $d_{60}/d_{10} = 2.44$
SELECTION OF FILTER MEDIA

♦ Size range (i.e. 0.425-0.85 mm)

♦ Effective size = d10

♦ Specific gravity
Analyses performed by lab for QA/QC

- Sieve analysis
- Average fine size
- Average grain size
- Moisture content
- Silica content
- Clay content
- Bulk density
- Specific gravity
- Acid solubility
- ADV (Acid demand value)
- LOI (Loss on ignition)
- pH-Test
LABORATORY FOR QA/QC
PILOT PLANT TESTING OF FILTER MEDIA
DETERMINATION OF OPTIMUM BACKWASH VELOCITIES

- Head loss
- Backwash rate
- Minimum backwash velocity
- Recommended backwash velocity

1, 2
DETERMINATION OF BED EXPANSIONS

1 Anthracite expansion curve
2 Anthracite + sand expansion curve
3 Sand expansion curve

Expanded height

Backwash rate
CONCLUSIONS

◆ Use narrow size distribution filter media (sand U.C.<1.3, anthracite U.C.<1.5)

◆ Use compatible filter media configuration by considering the size range and specific gravity

◆ Take all necessary precautions and care in all the stages involved in the processing of the filter media (washing drying screening and packing) and most importantly QA/QC

◆ Determine optimum backwash velocities and bed expansions for best filter media cleaning and to avoid loss of filter media during backwash
END OF PRESENTATION

GENTLEMEN

YOUR QUESTIONS ARE WELCOME

Delmon Co Ltd
WASHING THE RAW MATERIAL
DRYING THE WASHED MATERIAL
SCREENING THE DRIED MATERIAL
SCREENING THE DRIED MATERIAL
STORING THE SCREEN MATERIAL