INTENSITY
AT WORK

HWI HarbisonWalker International™

REFCOMM® BUDAPEST 2-5 Oct 2017

FCCU REFRACTORY SELECTION

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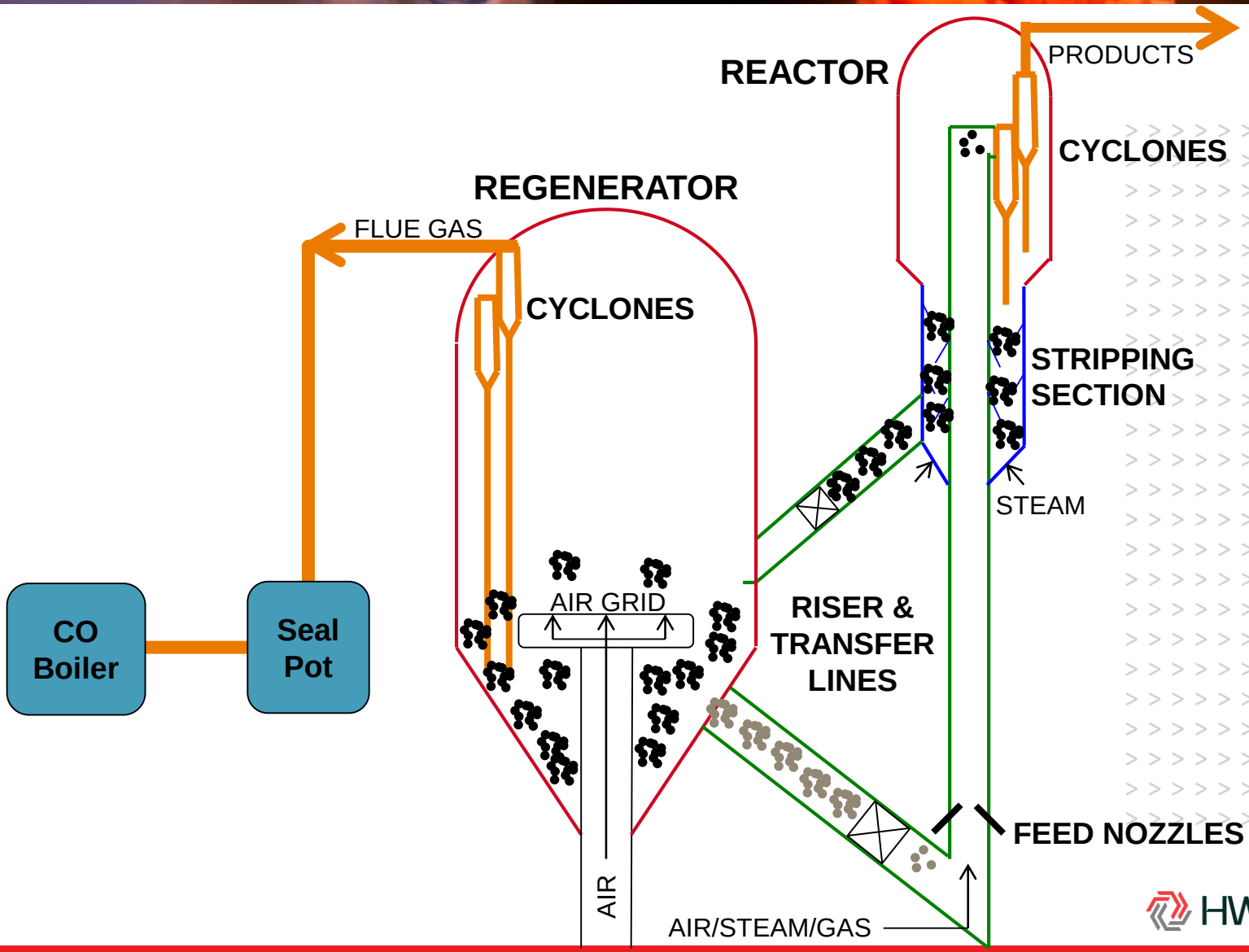
Agenda

Process Refresher

Refractory Requirements for:

- Riser & Transfer Lines
- Cyclones
- Reactor & Regenerator
- Flue Gas Lines

FCCU



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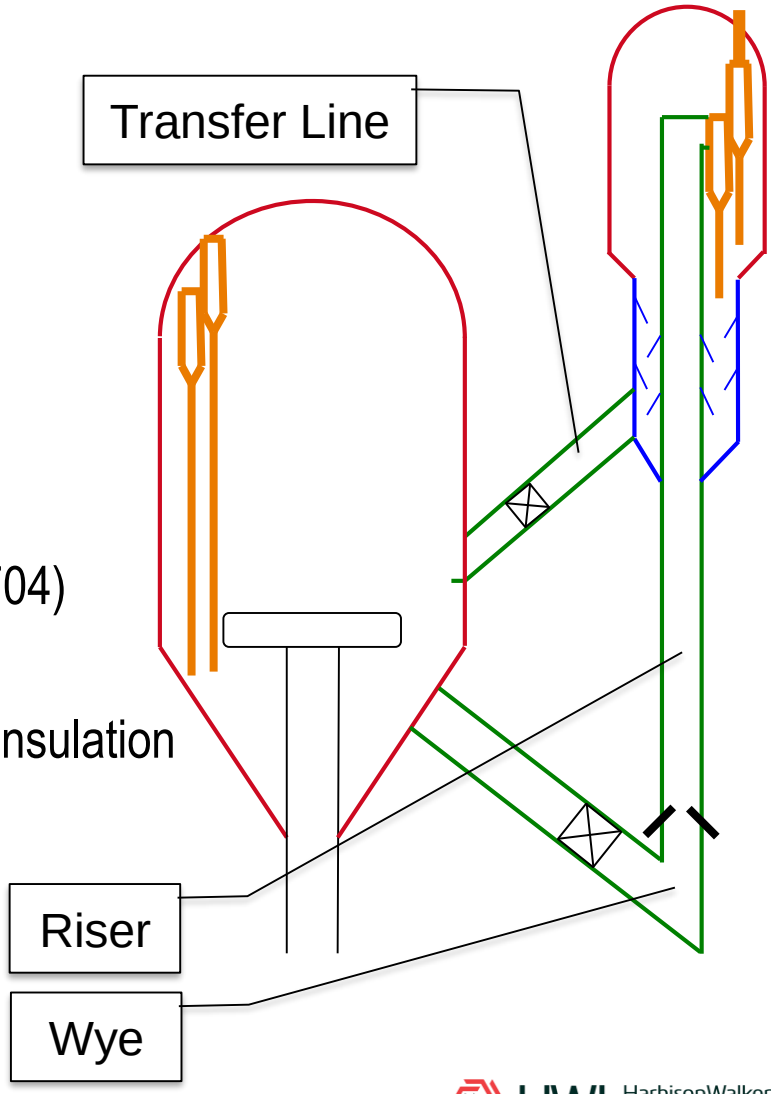
Riser and Transfer Lines

Conditions

- High speeds in riser
- Very abrasive in all lines
- Need to retain heat balance

Refractory Considerations

- Typically 75-150mm thick
- Abrasion resistance 5-12cc loss (ASTM C704)
- Density 2000-2600 kg/m³
- Must find a balance between strength and insulation
- Calcium Aluminate Cement bonded



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C704 Abrasion Testing

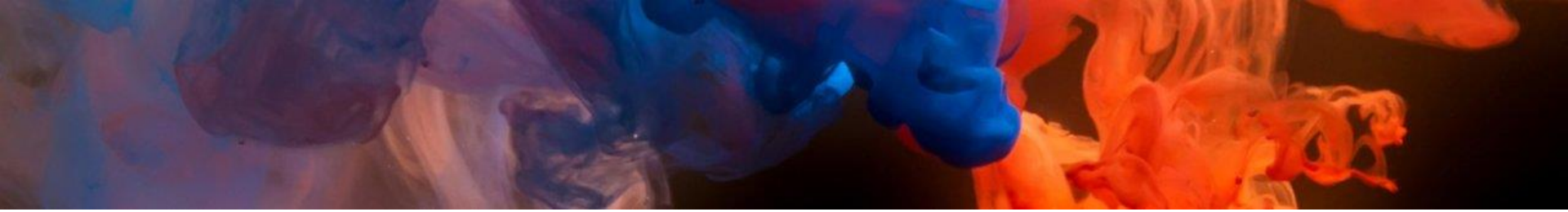
115 x 115 x 50mm sample

Weight and density are determined before test and after being fired to 815°C

SiC grit is sprayed onto sample

Pressure through gun and inside chamber is regulated

Sample is weighed after test and results are recorded as “cc loss”

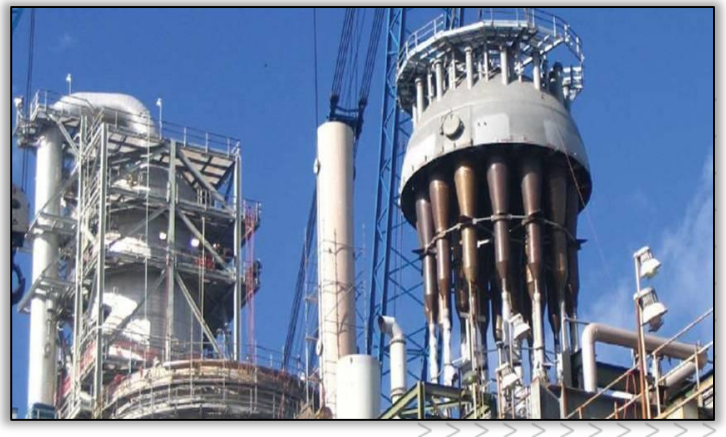


Before

After

11.5 cc Loss of Refractory

Cyclones

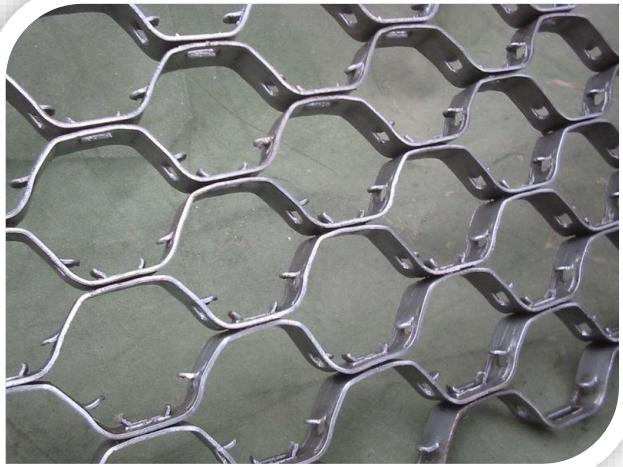


Conditions

- Extremely abrasive environment
- No concern for insulating value

Refractory Considerations

- Typically 25-50mm thick
- Rammed installation into hexmesh or S-bar anchoring
- Inlet and cyclone area
  - Abrasion Resistance of 2-5cc loss
  - Exotherm Reaction Bonded
- Cone and Dipleg
  - Abrasion resistance of 2-7cc loss
  - Can be CAC bonded



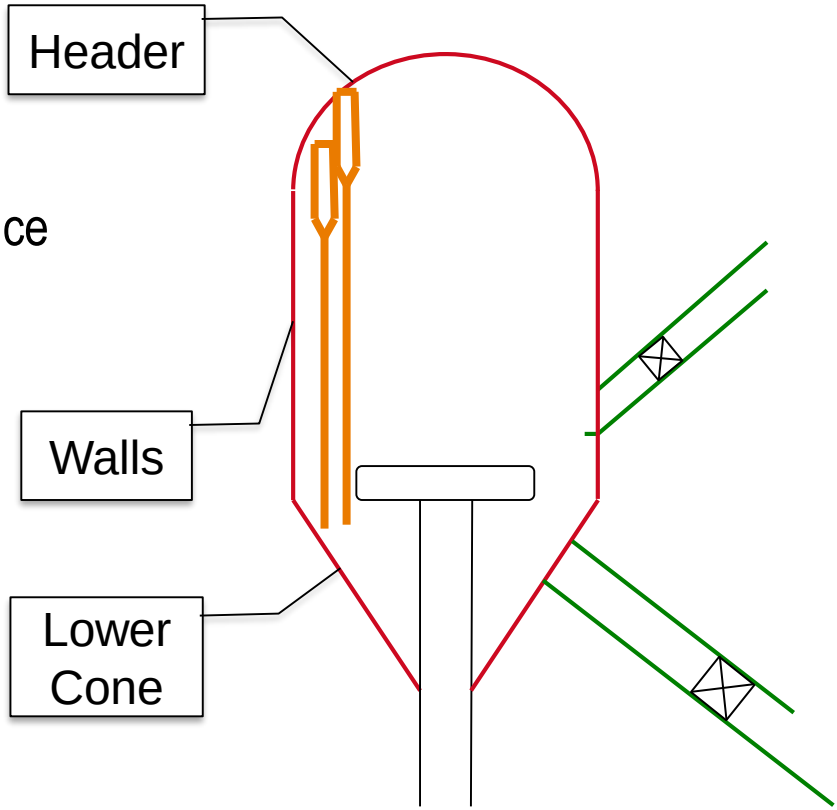
Reactor and Regenerator

Conditions

- Less abrasive, but still requires durability
- Must retain heat for the catalyst
- Lower areas need some abrasion resistance
- Insulation is important to retain energy

Refractory Considerations

- Typically 75-150mm thick
- Walls and Header
  - CCS 11-20 MPa
  - Density 1150-1250 kg/m³
- Lower Cone Areas
  - Abrasion Resistance 10-15cc loss
  - Density ~1750 kg/m³



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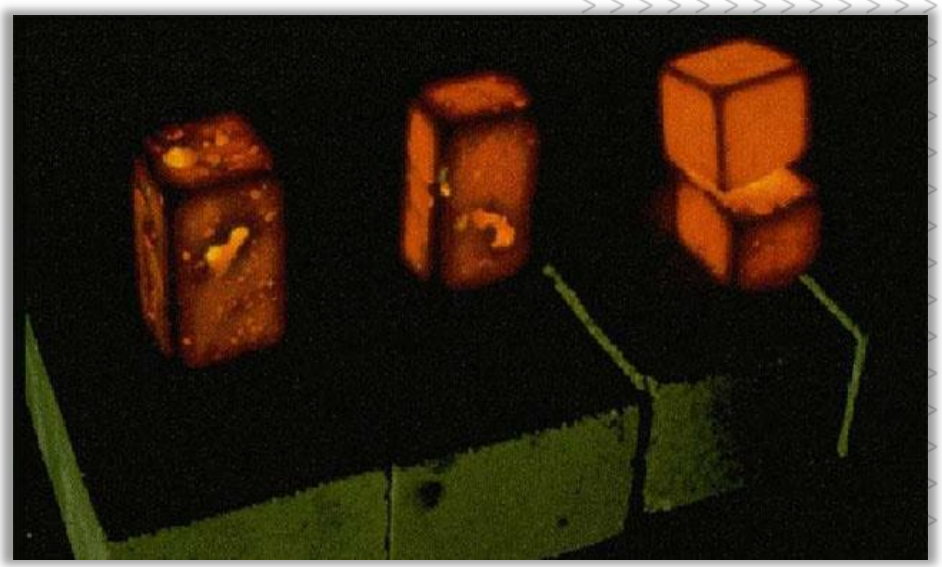
Flue Gas Line

Conditions

- Reducing gases
- Frequently contain fine catalyst debris
- Cyclic Temperatures

Refractory Considerations

- Low Iron, <1.5%
- Abrasion resistance 10-15cc loss
- Thermal shock resistant
- Density of 1750 to 2100kg/m³



Thermal Shock Testing

Cycles to failure

- Low: 1-10
- Average: 10-20
- Good: 20-30
- Excellent: 30-40+

Choose Wisely

THANK YOU

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