Stellenbosch University Packed Bed Thermal Storage Facility

STERG Facilities

An experimental packed bed thermal storage facility is installed at Stellenbosch University (Fig. 1). The facility is intended for research in thermal storage capabilities of various materials as well as comparing the effectiveness of different packing layouts.

Fig. 1 Packed bed thermal storage facility

The system was commissioned in November 2012 and has the following capabilities:

- Testing up to 3 ton material in a 1.5 m^3 insulated vessel
- Maximum heating power of diesel burner: 148 kW
- Cyclic heating and cooling (max. temp. up to 600 °C @ min. air flow rate 0.025 kg/s)

Normal heating/cooling operation:

Material in the insulated vessel is heated by forcing exhaust gases from the diesel burner through the test material (top to bottom). The gases are then exhausted to atmosphere through a chimney. The burner continues to heat the test material until the exhaust gases exiting the

bottom of the vessel reach 250 °C (fully charged state). The vessel is discharged by reversing the gas flow through it. Atmospheric air is forced into the base of the storage vessel and exits at the top. The hot air vents to atmosphere readying the test section for further heating and cooling cycles.

Instrumentation:

The system is fitted with temperature and pressure measurement controls. Fig. 2 shows the insulated vessel filled with test material and perforated tubing embedded for temperature measurement provisions.

Fig. 2 Insulated storage vessel packed with test material

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