**Introduction**

The performance of a parabolic trough receiver is best described by optical efficiency and heat loss power. Their constancy over the lifetime are tested with accelerated aging at DLR. Tests are performed on entire receivers and on small glass samples, where aging of the AR-coating is investigated. Before and after the aging the samples are tested for performance, compare Figure 1.

**Aging of Receivers**

For the overheatig test the absorber is heated above operating temperature in order to induce accelerated aging of the absorber coating. Standardized aging parameters of 478 °C for 1000 h for oil receivers are currently used. Heating is performed with resistance heaters inserted in the absorber. The test bench (Figure 4) is also used for thermal cycling of parabolic trough receivers, where the receiver is heated for 100 cycles from 200 °C to 478 °C.

**Performance Measurement of the AR-coating on Small Glass Samples**

Tests of the AR-coating of the parabolic trough receiver are performed on small glass samples. The transmittance is measured with a spectrophotometer at the entrance port of an integrating sphere with 15 cm diameter before and after testing.

**Performance Measurement of Receivers**

Performance measurement of parabolic trough receivers consists of optical efficiency testing in the linear focus solar simulator (Figure 2) and heat loss testing. Figure 3 shows a typical heat loss curve.

**Aging of the AR-coating on Small Glass Samples**

AR-coatings are tested for abrasion resistance and weather durability. Abrasion resistance is tested with the Taber Linear Abrasor and rubber MIL 12397 ¼”, compare Figure 6. Research regarding a realistic sand erosion test simulating the effect of sand and dust storms is ongoing.

**Parabolic trough receiver testing capability is available for industry and introduced in international standardization activities.**

**Figure 1: Measurement sequence**

**Figure 2: Linear focus solar simulator**

**Figure 3: Heat loss of typical parabolic trough receiver** [1]

**Figure 4: Test bench for overheating and thermal cycling of parabolic trough receivers**

**Figure 5: Scheme of bellow fatigue test bench**

**Figure 6: Taber Linear Abrasion Test for AR-coating testing**

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