

Test Protocols for Long Term Thermal and Load Cycling of Short Stacks at DLR

For the stacks there were 2 different tests: thermal cycling and load cycling. Since the stacks arrive already with reduced anode, we can start immediately with the tests.

Thermal cycling:

Fuel gas flow: 1.15 l H₂ + 0.77 l N₂

Air flow: 21.3 l air

Heat up to 750°C @ 2 K/min

Wait for 2h to stabilize

Perform a polarization curve to U_{min}= 2.8 V

Cool down to 100°C @ 2 K/min

Repeat

Load cycling:

Fuel gas flow: 1.15 l H₂ + 0.77 l N₂

Air flow: 21.3 l air

Operating temperature: 750°C

Perform polarization curve to U_{min}=2.8 V

Load cycling is:

Load stack to current of 32 A @ ramp rate of 0.5 A/min

Wait for 30 min

Set stack current to 10 A @ ramp rate of 0.5 A/min

Wait for 30 min

Repeat

Perform polarization curve after 100 such load cycles.