

TWI Trevor Gooch Corrosion Laboratory kit

| Testing Method  | Equipment name        | Brief description (supplier/in-house)  | Range/capability   | Number of items   | Additional notes  |
|---|-----------------------|--|--|---|---|
| SENT (single edge notch tension)  | Blue dolphin          |  | Tension<br>Non-compressive fatigue                             | 1   |   |
| Four-point bend full pipe   | Full-size pipe bend   | Solution inside pipe (designed and built in-house)   | Pipe up to 12"OD   | 1   |   |
| Immersion<br>Electrochemical  | Autoclave             | Immersion tests;<br>Tensile tests<br>Electrochemical tests   | 5l volume.<br>Up to 170 bar; up to 200°C                       | 4 total including<br>1 tensile testing<br>autoclave &<br>1 electrochemical<br>testing   |   |
| SSRT (slow strain rate testing)   | SSRT<br>Autoclave     | SSRT tests   | 2.5l volume<br>Up to 170bar;<br>Up to 200°C<br>2kN max. load   | 1   |   |
|   | SSRT                  | SSRT tests   | Ambient pressure.<br>Various volume vessels,<br>15kN max. load | 1   |   |
| Axial load corrosion fatigue  | Blue whales           | Computer controlled servo-hydraulic axial loading testing machines with environmental chambers (designed and built in-house) | In solutions at elevated temperature and/or pressure.          | 6   | Electrochemical testing capability;<br>Hot finger for Fe ion removal. |
| Fatigue crack growth rate   | FCGR vessel/Autoclave | Computer controlled servo-hydraulic testing machines with environmental chambers (designed and built in-house)               | 20l volume vessel, up to 60°C, ambient pressure                | 3 including<br>1 autoclave for up to 100°C and up to 20 bar   | Electrochemical testing capability;<br>Hot finger for Fe ion removal. |
| Constant or ripple load (dead-weight) bend or tension;<br>SENB (single edge notch beam) | Nodding donkeys       | (designed and built in-house)  | Ambient and elevated pressure testing<br>15kN max. load        | 12 total comprising:<br>7-off configured for bend in H <sub>2</sub> S solutions at ambient T<br>1-off configured for bend in H <sub>2</sub> S solutions at 60°C (Hastelloy tooling)<br>4-off configured for open vessel tensile |   |

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|---|----------------------|--|--|-----------------|--|
| SLC (Sustained load cracking)<br>3-point bend |                      | Sustained load cracking (designed and built in-house)  | Flowing water: 0°C -ambient temperature. Heating possible. Load-arm ratio 6:1. Typical specimen load = 6kN   | 12              | CP (cathodic protection) can be applied to specimens |
| Tensile loading                               | Tall boy tensile rig | Tensile loading (designed and built in-house)  | Flowing water: 0°C -ambient temperature. Heating possible. Load-arm ratio 10:1. Typical specimen load = 12kN   | 4               | CP (cathodic protection) can be applied to specimens |
| Immersion/electrochemical                     |                      |  | Ambient pressure and temperature<br>Vessel volume 15-25l.  | Various         |  |
| Immersion/electrochemical                     |                      |  | Ambient pressure<br>Up to 80°C<br>Vessel volume 1-10l.   | Various         | Can be used for hydrogen charging CTOD specimens     |
| Rotating cylinder electrode                   | RCE                  | Corrosion tests in simulated flowing conditions (supplied by PINE Instrument Company)  | Speed range: 50 to 10000rpm<br>Temperature: 10 to 50°C   | 1               | Electrochemical testing capabilities.                |
| Environmental chamber                         |                      | CTS  | -40 to +180°C, +10 to 98%RH, approx. 30x30x50cm volume.  | 1               | Port for monitoring access.                          |
| Salt spray                                    |                      | Salt spray tests to BS EN ISO 9227:2006 "Corrosion tests in artificial atmospheres — Salt spray tests"<br>Capacity >0.4m <sup>3</sup> (W= 0.715 x D= 0.49 x H= 0.49m; the shape is more like a triangular prism) | Standard operating conditions: 'neutral salt spray' (NSS); but can also work in 'acetic acid salt spray' (AASS) and 'Copper-accelerated acetic acid salt spray' (CASS)<br>Typical temperature (in standard conditions): 35C.<br>- Operational Modes: wet humidity / dry air. The cabinet has also the facility to run in cyclic mode (if requested) but this does not follow the related BS. | 1               |  |

- **Simulated service environments**

- Sour service
- Sweet service testing
- Brines
- Seawater (natural or artificial)
- Hydrogen atmosphere at pressure
- Applied cathodic protection in seawater
- Controlled pH, H<sub>2</sub>S/CO<sub>2</sub> content and low dissolved oxygen (<10ppb).
- Standard solutions eg NACE TM0177.