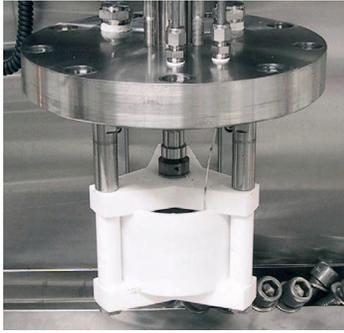


Instruments for controlled-flow laboratory tests

Controlled-flow instruments are used for flow-accelerated corrosion and inhibitor studies. The operation of rotating electrodes, jet impingement and certain high-speed loops is based on hydrodynamic parameters such as shear stress. Some large-scale high-speed loops have real-life pipeline components as specimens, and they can be operated with corresponding parameters, such as water-flow rate. Cormet builds all these instruments for high-temperature high-pressure applications.

Rotating electrodes

A rotating electrode is an inexpensive and simple way of studying the effect of flow rate on the electrochemical and corrosion behaviour of materials. The rotating disc electrode (RDE) and rotating ring disc electrode (RRDE) are conventional but powerful electrochemical tools for studying mass transfer effects and dissolved species. Rotating cylinder electrodes (RCE) and rotating cages (RC) are used to study corrosion inhibitors in oil and gas industry environments, as described in ASTM G170-06 and G184-06.



Cormet's product family includes high-temperature high-pressure versions of all the rotating electrodes mentioned above. Because the rotating specimens can be electrically connected to a poten-

tial monitoring system or to a potentiostat, it is possible to perform electrochemical tests as long as high-temperature high-pressure reference and counter electrodes are available.

Jet impingement

A jet-impingement specimen is a round plate onto the middle of which water is pumped through a 4 mm diameter nozzle. The shear stress is well defined in the region of 2-4 nozzle radiuses from the specimen centre.

Jet impingement is a versatile tool, because it can create higher shear stresses than a rotating cylinder electrode. It can be equipped with electrochemical tools too. The design has to be modelled carefully before specifying the components, because shear stress, temperature, liquid viscosity and pump parameters are interconnected in a complex way.

High-speed loop

As a concept, the high-speed loop is closer to the real-life application than rotating electrodes or jet impingement. When using RCE and JI, the operator has to play with hydrodynamic parameters such as turbulence and shear stress. If the operator has a similar specimen geometry

in the laboratory loop as in the real-life application, only temperature, pressure, water chemistry and volume flow rate need to be taken care of.

High-speed loops are always built according to the customer's needs. The possible variety for specimens is large. Real-life size elbows, bends and other components can be used. Shear stress can be defined by measuring the pressure loss over the specimen. The specimens can also be cylindrical, e.g. pieces of tubes that are electrically isolated from each other and the body. Electrochemical tests can be performed by using counter and reference electrodes in the test cells.



Cormet manufactures material- and corrosion-testing instruments for the laboratory and field environments. We specialise in high-temperature high-pressure applications. Cormet delivers instruments to university and industrial laboratories including the power-generation, chemical, transportation and oil & gas industries. Nearly all the products are tailored according to customers' needs.