

Examination of Scale Formation

with the

Differential Scale Loop

Characteristics

- Wide temperature and pressure range
- Small sample volumes
- Fully automated with software
- Exchangeable model pipeline
- Easy maintenance

The Differential Scale Loop (DSL) is a fully automated laboratory instrument to examine the precipitation and deposition of scale under simulated pipeline conditions.

The Differential Scale Loop was particularly developed to observe the process of barium sulphate and calcium carbonate (scale) forming under realistic conditions and to design counteractive measures. This is carried out in three steps:

1. Determine the risk of scale deposition
2. Selection or development of an inhibitor
3. Test the efficiency of the inhibitor and determine the minimal necessary inhibitor concentration.



Mode of operation

To execute this process three HPLC-pumps are used. Two solutions - anionic and cationic - are mixed with a third fluid which contains a known concentration of inhibitor.

The mixed solutions are pumped through a model pipeline. By increase of pressure - measuring of differential pressure - the start of scale deposition is indicated.

Exchangeable model pipeline

The model pipeline can be exchanged and is available with different length and inner diameters to simulate different test conditions.

Small sample volumes

A sample volume of just 500 ml is already sufficient for one measurement. To simulate different environment conditions, measurements can be executed at temperatures up to 250 °C (482 °F) and pressures up to 51.7 bar (739.7 psi).

Fully automated tests

The PSL software WinDSL permits scheduling and execution of complex test runs in steps with different inhibitor concentrations. The measuring data are visualised and stored in an ASCII-compatible format. An import of data to Excel for easy evaluation is possible. Beside measuring data further information is saved in a log-file.

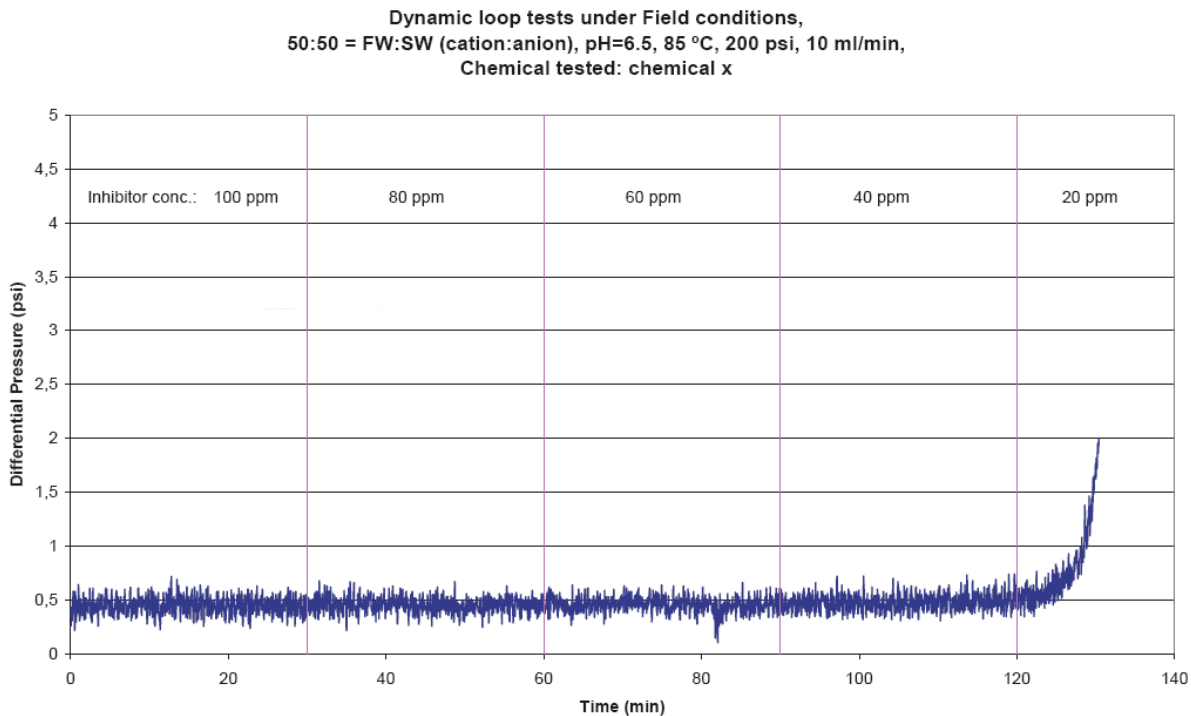
Also the configuration of a test schedule can be saved and reloaded separately.

Easy maintenance

With the software a fully automated cleaning after every test is preset, so in general you do not have to exchange the model pipeline.

A long lifespan and durability of the instrument is achieved by using monel for all parts exposed to heat except for the model pipeline. This is made of stainless steel simulating pipeline conditions.

The Differential Scale Loop can be adapted or extended to your requirements, e.g. for core flood testing.



Measurement example for test on critical inhibitor concentration

Specifications:

| | |
|---------------------|-----------------------------------------------------------------------------------|
| Temperature range*: | +30 °C ... +250 °C (+ 86 °F ... 482 °F) |
| Pressure range*: | 3.4 bar ... 51.7 bar (50 psi ... 750 psi) |
| Flow rate*: | single pump: 0.001 ml/min ... 9.99 ml/min overall: max. 29.97 ml/min |
| Model pipeline*: | length: 2 m, available in different designs diam. outer: 1/16", inner: 0.88 mm |
| Power consumption: | max. 2,500 W |
| Voltage input: | 230 V~ (115 V~ on request) |
| Weight: | 70 kg |
| Dimensions (WxDxH): | 120 cm x 45 cm x 60 cm (without PC) |

* Alternative designs possible



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