

Wax Deposition under Shear Conditions

with the

Coaxial-Shear Cold Finger cCF6

Characteristics

- Constant shear at finger surface due to rotating finger
- Convincing improved handling
- 6 measuring places for simultaneous tests
- Highly precise measurements with weight-calibrated cold finger caps
- Software for documentation

Cold Finger with Shear

Measure wax deposits under shear conditions in oils and other fluids with PSL Systemtechnik's automated Coaxial-Shear Cold Finger cCF6.

Wax deposition in production and transportation of crudes is one of the most common challenges in flow assurance. While traditionally solvent based, thermal or mechanical methods are used to remediate wax deposition, chemical treatment with wax inhibitors is increasingly deployed to mitigate deposition.

To qualify the effectivity of the wax inhibitors different methods are used. One of the most common is the Cold Finger test.





Measurement Principle

A crude oil sample is stirred and kept above Wax Appearance Temperature (WAT). A cooled cylinder element - so called 'cold finger' - is immersed in the sample, providing a cold surface, where the waxes of the crude oil shall deposit. An integrated magnetic stirrer is providing a gentle circulation to ensure that all of the sample gets in touch with the cold finger surface. The amount of wax that deposits at this surface at given temperature in ratio to the total amount of sample is an indication of potential amount of wax deposition as well as, related to a blank test, for the efficiency of a wax inhibitor (WI).

Different then with a 'classical' Cold Finger, a constant shear can be applied to the finger surface by rotation of the finger. By use of different rotation speeds the shear condition that applies during production on the pipeline wall can be simulated.

Test Procedure

The cCF6 is designed as a very compact instrument combining 6 fingers integrated in one drive block in the head section of the cCF6. The sample bottles are screwed in the block and immersed with a pneumatic lift into

a temperature controlled water bath. At the end of the experiment the head section is lifted again and the bottles are removed. To measure the amount of wax deposition the well-fitting measurement sleeves are removed from the fingers and then weighed on a balance.

Great advantage

The sleeves are adjusted with a deviation of <0.01 g. Therefore fingers can be exchanged between different measurement places. Furthermore, the low weight of the finger sleeves provides best precision for measurement on the balance up to 0.01 g. Finally, the sleeves can be reinstalled to determine deposition rate or - in case of lack of sample - to use the same sample for further tests runs.

Software

If you have connected the Cold Finger to a PC, you can control temperature via WinCFS software and save the readings of the balance directly, which are also documented immediately. In this way, the experiment data is automatically documented in your files.

The Coaxial-Shear Cold Finger can be adapted to your requirements.

Specifications:

Temperature range:	
Cold Finger	-5 ... +65 °C (23 ... +149 °F)
Sample temperature	+30 ... +90 °C (+86 ... +194 °F)
Number of measuring places:	6 fingers
Sample volume:	max. 250 ml
Finger rotation speed:	0 ... 400 rpm
Power consumption:	3,000 W
Voltage input:	230 V~ or 115 V~
Weight:	100 kg
Dimensions (WxDxH):	55 x 59 x 118 cm + PC, thermostats