CHANDLER ENGINEERING®

CUSTOM ENGINEERED PRODUCTS

PERFORMANCE • QUALITY • SAFETY

AMETEK®

FRICTION FLOW LOOP SYSTEMS

MODEL 6500 FRICTION FLOW LOOP systems are fully automated and accurately determine the effectiveness of friction reducers. They are a highly effective tool for optimizing slick water fluid designs. Fluid is circulated through two test sections and provides data including the Reynolds number and Percentage of Friction Reduction. The system is provided with full Data Acquisition and Control Software.

- *Open or closed loop architecture*
- *Flush-and-fill automation for easy system cleanup*
- *½" and ¾" OD, 10' test sections*
- *Coriolis Mass Flow Meter for flow rate feedback*

MODEL 6500

MODEL 6500-M MINI-LOOP™ is a benchtop instrument (patent pending) that allows for rapid test turn-around for the repeat testing of stimulation fluids. The Mini Flow Loop circulates fluid through a single test section and uses custom Chandler Engineering software to record and analyze the test data. This enables reliable testing in a simple to operate, compact system. The unit is ideal for Quality Control Testing of Slick Water Fracturing Fluids.

- *Easy to set-up, operate, clean, and maintain*
- *Benchtop model*
- *Progressive cavity pump for minimal shearing of fluids*

MODEL 6500-M

FOAM RHEOMETERS

MODEL 8500 FOAM RHEOMETER measures the rheological properties of foamed fluids under high pressure and temperature conditions. They are designed to simulate the foam fracturing and acidizing process under well bore pressure and temperature conditions. The automated system allows the operator to control foam quality, shear rate, shear stress, test time and operating temperature. High pressure viewing cell and imaging software can provide a visual analysis of the foam.

- *Max working pressure: 0 to 5800 psi (400 bar)*
- *Max temperature: ambient to 350°F (177°C)*
- *System performance:*
  - *Shear rate range: 50 – 1300 1/sec*
  - *Shear stress range: 0 – 1300 dyne/cm²*
- *Custom engineered design specifications are available*

MODEL 8500

MINIMUM MISCIBILITY PRESSURE APPARATUS (MMPA)

MINIMUM MISCIBILITY PRESSURE APPARATUS determines when gas is miscible in the reservoir which is key to gas injection. The gas injection pressure has a significant cost implication to the operation of the well. Included are Quizix precision syringe pumps as well as an innovative gasometer with infinite volume. Chandler's MMPA provides extremely accurate data along with significant savings and value over conventional instrumentation.

- *Precision pumps offer exceptional pressure and volume control*
- *Visual record of phase transitions*
- *Innovative gasometer with infinite volume*

MINIMUM MISCIBILITY PRESSURE APPARATUS

CURING CHAMBER FOR CO_2

LONG-TERM CURING CHAMBERS evaluate cement exposed to water and CO_2 for long term testing under elevated temperature and pressures.

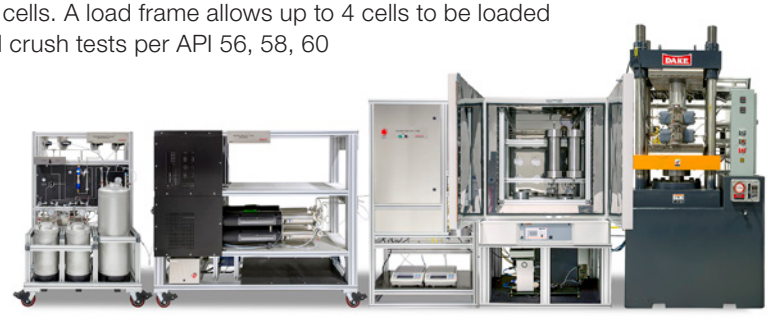
- *Gas accumulator pressurized via gas booster for pressure control*
- *Pressure: 5000 psi (345 bar) / temperature: 400°F (204°C)*
- *Max heating rate: 3°C/min (37°F)*

CURING CHAMBER

FRACTURE CONDUCTIVITY APPARATUS

THE FRACTURE CONDUCTIVITY APPARATUS is designed to perform testing per API and ISO procedures. The tester can create closure stress on proppant between cells. A load frame allows up to 4 cells to be loaded vertically. The frame is used to perform proppant and sand crush tests per API 56, 58, 60 and ISO 13503.

- *Load frame capable of creating 15,000 psi of closure stress*
- *Maximum temperature: 450°F (232°C) including heated rams*



CUSTOM CORE FLOW

FORMATION DAMAGE

MODEL 6100 FORMATION RESPONSE TESTER (FRT) is an automated system used to study the effect of chemical and fluid treatments on the permeability of core samples. The system offers forward, reverse and across-the-face core flow paths for up to five separate fluids. It is capable of simulating multiple stimulation treatments and can be operated as a Dynamic Fluid Loss Tester measuring filter cake buildup.

- *316 SST or Hastelloy wetted components*
- *Flow rates from 0.001 to 50 ml/min*
- *Variable Pressures available to 10,000 psi (690 bar) and temperatures to 400°F (205°C)*
- *Optional: Dynamic Slurry Cart available*

MODEL 6100

ENHANCED OIL RECOVERY (EOR)

Single and multi-phase core flood systems are available for EOR applications for Water Alternating Gas (WAG), Steam Alternating Gas (SAG) and chemical and polymer injection. Systems are customized based on user-application and uses Quizix precision pumps to displace fluids in open or closed loop recirculated flows. Many options are available for core holders, accumulators, dP transducers and types of oven enclosures.

- *Pressure options to 10,000 psi (690 bar) / temperature up to 350°F (177°C)*
- *CO_2 / liquid separation and measurement*
- *Sequential flow of multiple fluids as well as 2- and 3-phase flow options*
- *Flow rates to 200 ml/min*

CORE FLOOD SYSTEM

STEADY-STATE AND UNSTEADY STATE RELATIVE PERMEABILITY SYSTEMS

The fully automated, closed loop recirculating core flow systems measures 2 or 3-phase flows for long term testing of core samples at reservoir conditions. Fluids and gases are injected using Quizix precision pump products. These highly specialized systems are designed around specific application requirements and experiments.

- *Pressure to 20,000 psi (1379 bar) / temperature to 400°F (204°C)*
- *Flow rates to 200 ml/min*
- *Multiple options for oven enclosures, core holders, phase separators*
- *Ready for connection to CT / X-Ray / NMR instruments*

CLOSED LOOP RECIRCULATION SYSTEM

QUIZIX PRECISION PUMP SYSTEMS

Quizix Precision Pumps are the industry standard for core flow studies by operators, service companies and research laboratories. These positive displacement pumps provide pulse-free continuous flow at extremely accurate flow rates and pressures.

Operating from the proprietary PumpWorks software, there are 14 standard modes of operation and a sequencer function for automated response to internal or external system functions. PumpWorks easily interfaces to other Data Acquisition and Control programs via an embedded Open Platform Communications (OPC) server. Also included are ramping procedures by time, pressure, flow and volume.

Q5000 SERIES

Ultimate precision for special core analysis, EOR, and other core flood applications.

- *Flow rates from sub-nanoliter to 60 ml/min*
- *Pressures to 20,000 psi (1379 bar)*
- *Multiple configurations for temperature ratings and wetted components*

Q5000 SERIES

Q6000 SERIES

For high flow, large volumes and gas flows.

- *Flow rates from sub-microliter to 400 ml/min*
- *Pressures to 30,000 psi (2068 bar)*

Q6000 SERIES

QX SERIES

Compact dual cylinders for general and routine core analysis applications

- *Flow rates from sub-microliter to 500 ml/min*
- *Pressures to 20,000 psi (1379 bar)*

QX SERIES

LOST CIRCULATION TESTER

LOST CIRCULATION TESTER dynamically evaluates the performance of lost circulation materials under high pressure and temperature conditions. Variable slot widths are used to determine bridging characteristics under pre-defined differential pressures. The slurry is stirred and conditioned at 150 rpm during heating and pressurization. At steady-state conditions, differential pressure is created across the slot and a piston accumulator is used to measure the liquid volume passing through the slot.

- *Pressure up to 400ºF (204ºC) / pressure to 2000 psi (138 bar)*
- *Variable width slots for determining bridging characteristics at predefined differential pressures*
- *Data acquisition is provided via an Ethernet interface to Model 5270 software*

MODEL 7170

The Oil & Gas Industry is truly a global endeavor with operations on every populated continent. As a global industry needs global support, AMETEK strives to continuously grow and develop its sales and support network. In addition to a global network of factory trained personnel, AMETEK maintains factory-direct customer support capabilities at its manufacturing sites and a growing number of regional offices.

CHANDLER ENGINEERING®

Headquarters
2001 North Indianwood Avenue
Broken Arrow, OK 74012-1163 U.S.A.
Phone: +1 918 250 7200
Fax: +1 918 459 0165
chandler.sales@ametek.com
chandler.service@ametek.com
www.chandlereng.com

AMETEK Houston Sales and Services
4903 W. Sam Houston Parkway N.,
Suite A-400
Houston, TX 77041
Phone: +1 713 466 4900

AMETEK Singapore Pte. Ltd. (Asia Sales)
Phone: +65 6484 2388
Email: chandler.asia@ametek.com

AMETEK Oil & Gas Russia and CIS
Phone: +7 903 549 33 25
Email: chandler.russia@ametek.com

AMETEK Chandler Engineering - U.K. (EU, ME, Africa)
Phone: +971 52 645 3606
Email: chandler.uk@ametek.com

Chandler Australia
Phone: +65 6484 2388
Email: chandler.australia@ametek.com

Chengdu Industrial Trading & Supply Co. (China)
Phone: +86 28 8616 2896
or +86 28 8616 2897
Email: chandler.china@ametek.com

AMETEK Brazil
Phone: +55 19 3825 8904
Email: chandler.brazil@ametek.com

AMETEK UAE
Phone: +971 52 645 3606
Email: chandler.uae@ametek.com

Our global support network of AMETEK offices and factory-trained distributors and representatives continues to grow. Contact us at chandler.sales@ametek.com today.

Continuous product development may make it necessary to change product details without notice.

AMETEK®

1M321M (360018)

Printed in the U.S.A.