DSR Asphalt Rheometer

Designed specifically for Asphalt Testing

- Optimised for high throughput
- Meets & exceeds AASHTO designation T315 and meets all ASTM requirements
- Simple to use, proven design
- Precise and stable temperature control (patented)
- Rapid sample equilibrium to set temperature
- Significant reduction in need for regular re-calibration of temperature
- Pre set gaps for AASHTO tests - no zeroing necessary
- Automatic Expansion Compensation keeps gap constant with temperature
- Compact, integrated unit with small footprint

- Dedicated AASHTO specification software package available (see BM522) including:
  - Pass/Fail medium temperature original binder test (T315-11)
  - Pass/Fail high temperature RTFO binder (T315-11)
  - Pass/Fail high temperature PAV binder (T315-11)
  - Linearity test (T315-12)
  - Grade determination test (R29-02)

This rheometer offers greater ease of use and better performance within a compact integrated unit. Because it is designed for asphalt and is only sold into the asphalt industry, the rheometer is optimised specifically for asphalt. This means that it out-performs general purpose or adapted rheometers in terms of accuracy, throughput and ease of use.

Sample Throughput

Every feature of the design has been implemented with the goal of minimising the time required to make each measurement. This includes loading the sample through to reaching thermal equilibrium, collecting the data and finally cleaning the unit. For example, the unit has been designed with measuring systems and gap setting which eliminate much of the operator time required when using conventional or modified general purpose rheometer units. Additionally, the temperature control system offers rapid thermal equilibrium as well as extremely stable control. In practice, for the overall test sequence, this unit acheives up to three times the throughput of a conventional rheometer.

Temperature Control

Bituminous materials are extremely temperature sensitive with large variations in their material properties over just a fraction of a degree centigrade. It is typical to see a 20% change in modulus for only a 1ºC change in temperature. Without accurate temperature control in a rheometer's design, this can lead to erroneous passing or failing of AASHTO PG graded materials with potentially disastrous commercial consequences.

For this reason, AASHTO specification T315-02 (6.1.2) states that temperature control may be by means of a liquid or a gas (as the heat transfer medium). By implication, this simply excludes systems which use heated enclosures to radiate heat onto the sample, where it is almost impossible to ensure the absence of temperature gradients. To fully optimise temperature control, this rheometer incorporates a clean and easy to use system which completely immerses the sample in a temperature controlled liquid (patented). For testing bituminous materials, this design out-performs all other types of temperature control including forced gas convection ovens and radiatively heated plates. This is because the relatively high thermal conductivity

of the liquid, which is in direct contact with the sample, allows f or a much better heat transfer into the test specimen - up to 25 times faster than other systems.

Temperature gradients within the sample are completely eliminated and in order to achieve the required 0.1ºC specified by AASHTO, the rhheometer controls the sample temperature to 0.03ºC or better. Because of the rapid heat transfer into the sample, thermal equilibrium (the time that the sample takes to react to the liquid temperature) is near instantaneous due to the intimate contact of the sample and the circulating

liquid. This is important in optimising throughput, as the long thermal equilibrium times of non-liquid based systems can mean that they take up to half an hour to properly equilibrate. This problem more than outweighs the often - and falsely - perceived benefit of the rapid set-point changes achievable with other types of control.

Gap Setting

The gap can easily be changed to any desired value. For simplicity, both of the specification testing positions are clearly marked and can be easily selected. With most rheometer systems, the gap must be constantly reset

during a day's testing and must be readjusted every time the temperature or the measuring systems are changed. This rheometer addresses both of these issues, eliminating continual resetting of the gap to help optimise sample throughput and operator error. The measuring systems are designed to be easily interchangeable. The unique coupling arrangement of the lower system together with quick fit upper systems ensure that the gap need not be reset whenever the upper or lower plates are removed or replaced. If necessary, samples can be loaded remotely onto the lower plate for convenience. On a general purpose rheometer, changes in temperature may affect the gap zero point due to thermal expansion of the measuring systems, which requires either re-zeroing or the pre-programming of a motorised mechanical adjustment. To remove the need for any gap adjustments, this rheometer features automatic expansion compensation (AEC) to keep the gap constant as the temperature changes.

Air Bearing Type

This unit incorporates an air bearing. It requires a supply of compressed air and is warranted to withstand even the most adverse industrial laboratory environments. It is ideally suited to specification testing, as well as having excellent research capabilities and longevity. The Air Bearing system used is impervious to dirt and other contaminants, as well as being extremely strong and robust.

Software

Easy to use, Windows driven software is standard for AASHTO specification and grade determination testing is supplied with the PC, BM522.