

# DSR Bitumen Rheometer

measuring place RHEOTEST® RN 4.3

## Novelty

Quality problems during construction of roads in the whole world as well as qualitatively new bitumen mixtures require also new, rheological justified measuring methods. To this effect it is prescribed by the **DIN EN 14770, ASTM D7175-08, ASTM D7175-08, AASHTO T315-12, ASTM D7405-10a, AASHTO TP 70** to use „DSR-Rheometer“, among other things.

DSR Bitumen Rheometer RHEOTEST® RN 4.3 fulfils completely requirements to the DSR-Rheometer stated in the standard **DIN EN 14770, ASTM D7175-08, ASTM D7175-08, AASHTO T315-12, ASTM D7405-10a, AASHTO TP 70** as for quality control of bitumen mixtures for asphalt construction materials.



## Main Implementation Areas for Bitumen for Highway Engineering

1. Determination of complex shear modulus  $G^*$  and phase angle  $\delta$  of road bitumen at different temperatures (temperature sweep) according to DIN EN 14770
2. Determination of deformation properties of bitumen for road construction with Multiple Stress Creep Recovery Test (MSCR – Test). This test is related in Germany from 2012 to „Guide of MSCR Test“ of the German Research Society of Roads and Transport (FGSV), and is based on:

Regulations draft CEN/TC336 WG1 TG1 *and*  
„Standard Practice for Multiple Stress Creep Recovery Test of Asphalt Binder using a Dynamic Shear Rheometer (MSCR) of the AASHTO, the American Association of State Highway and Transportation Officials

## Main Implementation Areas for Liquefied Bitumen (e.g. Bitumen Emulsion, Foamed Bitumen, Liquefied with Oils Bitumen, Melted Bitumen)

## User Benefits of DSR Bitumen Rheometer RHEOTEST® RN 4.3 compared to Air-beared Rheometers

- robust construction is durable even under tough working conditions
- easy operation and user-friendly software, e.g. exchange of measuring plates for quick sample preparation
- product-related software for quality control for automatic test execution, analysis and presentation of measuring results
- lower in price than an air-beared rheometer and cleanroom conditions aren't required
- universally applicable due to modular construction and quickly exchangeable measuring systems
- **The modular construction also allows a longer-term investment strategy and a successful fitting to new measuring tasks in the future. Further measuring systems for fluid bitumen and construction materials as well cylinder measuring systems and cone-plate measuring systems according to the standard DIN**

## Software RHEOTEST® RN 4 Manager

In the software **RHEOTEST® RN 4 Manager** stored *jobs* allow automatic test execution and analysis of measurement data for selected types of bitumen. On demand, RHEOTEST offers assistance in development of additional *jobs* for other bituminous mixtures, too.

### for bitumen tests according to:

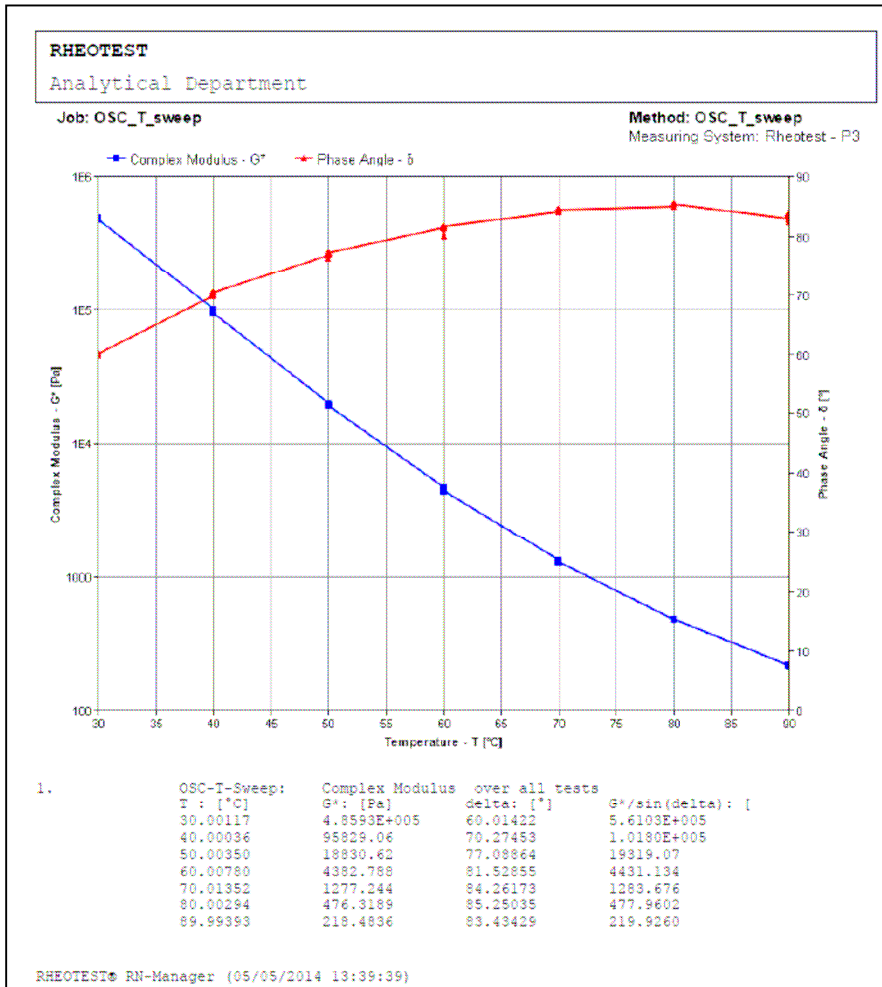
- DIN EN 14770
- ASTM D7175-08
- AASHTO T315-12
- ASTM D7405-10a
- AASHTO TP 70

### for test execution of:

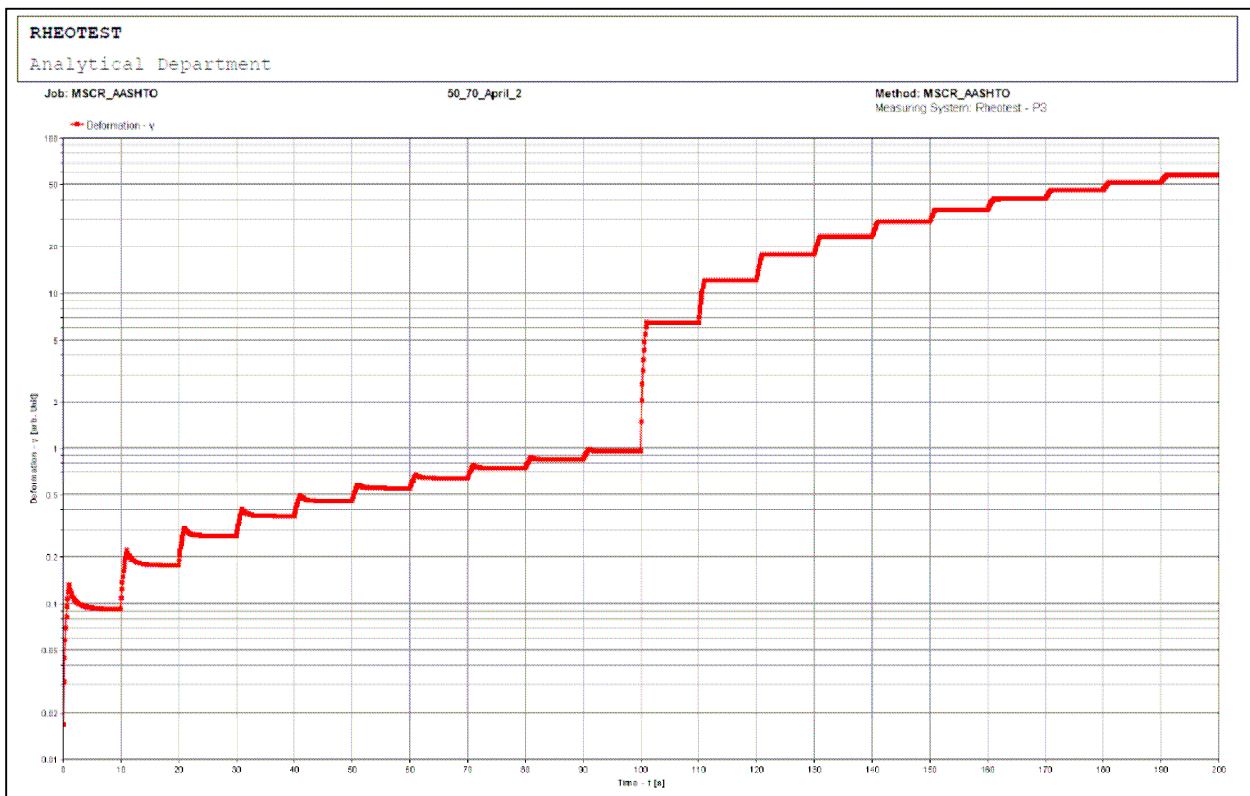
- **CR-Tests** (shear rate tests),
- **CS-Tests** (shear stress tests), e.g. to realise Creep Recovery tests, MSCR-Test acc. to ASTM D7405-10a and AASHTO TP70 and
- **Oscillation tests** (e.g. to determine complex shear modulus and phase angle acc. to ASTM D7175-08 und AASHTO T315-12 and DIN EN 14770)

**as well display and analysis of measuring data**

## Exemplary display and analysis of measuring datas:



graph 1:  
job "OSC\_T\_sweep" for determination of complex shear modulus and phase angle with DSR RHEOTEST® RN 4.3 acc. to DIN EN 14770, ASTM D7175-08, AASHTO T315-12



graph 2:  
job "MSCR" for execution MSCR-Test according to ASTM D7405-10a and AASHTO TP70

## Main Technical Data

• Viscosity Measuring Range:	ca. 1 ... 3 x 10 <sup>9</sup> mPas
• Speed of Rotation Range:	ca. 0 ... 1 000 r.p.m.
• Speed of Rotation Resolution:	ca. 0.015 r.p.m.
• Torque Range:	ca. 0.1 ... 150 mNm
• Torque Resolution:	ca. 0.002 mNm
• Rotation Angle Range:	ca. -50 ... 300°
• Rotation Angle Resolution:	ca. 0.001°
• Frequency Range:	ca. 0.001 ... 10 Hz
• Complex Modulus:	ca. 100 ... 6 x 10 <sup>9</sup> Pa
• Phase Angle:	ca. 0 ... 90°
• Temperature Range, general:	ca. -60 ... +375°C
• Temperature Range, Peltier Temperature Control:	ca. -10 ... +150°C
• Power Supply Voltage:	230 V AC ±10 %; 49 ... 61 Hz 110 V AC ±10 %; 49 ... 61 Hz

## Product Overview of DSR Bitumen Rheometer RHEOTEST® RN 4.3:

<u>description</u>	<u>order-no.</u>
<b>DSR measuring place for Bitumen RHEOTEST® RN 4.3</b>	3022.0.20000

### configuration:

#### 1) **basic instrument Rheometer RHEOTEST® RN 4.1** including:

measuring head, stand, control unit

#### 2) **plate-plate-measuring system, peltier tempered** consists of:

peltier control unit RHEOTEST® PP 4.1, peltier tempered basic plate, basic plate support, adapter, exchange grip, exchangeable plate (ø 25mm), measuring plate P3 (ø 25mm), measuring plate P4 (ø 8mm)

#### 3) **software RHEOTEST® RN 4 Manager for Bitumen tests acc. to DIN EN 14770, ASTM D7175-08, AASHTO T315-12, ASTM D7405-10a, AASHTO TP 70**

**for test execution** of CR-tests (shear rate tests), CS-tests (shear stress tests, e.g. to realise Creep Recovery tests, MSCR-Test acc. to ASTM D7405-10a and AASHTO TP70) and Oscillation tests (e.g. to determine complex shear modulus and phase angle acc. to ASTM D7175-08 and AASHTO T315-12 und DIN EN 14770),  
**as well display and analysis of measuring data**

### special accessories

**exchangeable plate** (ø 25mm)

**set of rubber molds** for sample preparation, consists of 1 mold ø 25mm, 1 mold ø 8mm

**set of trimming tools**

**calibration kit standard**



**Medingen** traditional location for viscometers and rheometers for more than 80 years

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