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Header 3



List View

General Information

Contact

Default Values

Discount

Document Information

Procurement Folder: 567547

Procurement Type: Central Purchase Order

Vendor ID: 000000186102



Legal Name: MALVERN PANALYTICAL INC

Alias/DBA:

Total Bid: \$34,590.00

Response Date: 05/20/2019



Response Time: 8:39

SO Doc Code: CRFQ

SO Dept: 0803

SO Doc ID: DOT1900000112

Published Date: 5/3/19

Close Date: 5/21/19

Close Time: 13:30

Status: Closed

Solicitation Description: 7719001 DYNAMIC SHEAR
RHEOMETERS


Total of Header Attachments: 3

Total of All Attachments: 3

**State of West Virginia
Solicitation Response**

Proc Type : Central Purchase Order

Date issued	Solicitation Closes	Solicitation Response	Version
	2019-05-21 13:30:00	SR 0803 ESR05171900000005297	1

VENDOR

MALVERN PANALYTICAL INC

Response Time: 08:39:42

Comments:

FOR INFORMATION CONTACT THE BUYER

crystal.g.hustead@wv.gov

DATE _____

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	DYNAMIC SHEAR RHEOMETERS	1.00000	EA	\$34,590.000000	\$34,590.00

Comm Code	Manufacturer	Specification	Model #
41112502			

Extended Description :	DYNAMIC SHEAR RHEOMETERS



Ref.: Q-13285-1
Date: 5/16/2019

Malvern Panalytical Inc.
117 Flanders Road
Westborough, MA 01581

West Virginia DOH
John Crane

190 Dry Branch Road
Charleston, West Virginia 25306
United States

Malvern Panalytical Inc.
117 Flanders Road
Westborough
Massachusetts
United States
01581

Quotation contact:

Ernie Fox
Account Manager
Sales
@: ernie.fox@malvernpanalytical.com
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Ref.: Q-13285-1
Date: 5/16/2019

Malvern Panalytical Inc.
117 Flanders Road
Westborough, MA 01581

Quotation Summary

Description	Amount (\$)
List Price	45,060.00
Discount	11,265.00
Subtotal	33,795.00
Freight	795.00
Tax	0.00
Grand total	34,590.00

Ref.: Q-13285-1
Date: 5/16/2019

Included items

Pos.	Quant.	Product code	Description	List price (\$)	Total list price (\$)
1	1.00	KNX5014	<p>Kinexus DSR-III 20N</p> <p>Kinexus DSRIII Rheometer Platform 20N NF</p> <p>Kinexus plate environmental controller with active hood for temperature control Designed for optimized thermal control and minimal sample thermal gradients. Inlet for inert gas feed into sample environment. For use with plate, and cone and plate measurement geometries over the temperature range -40 to 150°C. Note that for operation at temperatures below -10°C, a refrigerated circulator is required. Includes 'Interchangeable plate lower pedestal 65mm diameter'. Plug and play functionality - designed around a quick-connect cartridge; all mechanical, power, communication and fluid connections made instantly; auto-recognition and configuration. Kinexus active hood plate cartridge incorporates interchangeable lower plates to optimize measurement set-up for different sample types using a quick-connect engagement and release mechanism.</p> <p>Kinexus Passive Heat Exchanger</p> <p>Plate upper geometry 25mm diameter Stainless steel (316 Grade) upper geometry designed as part of the Kinex us rheometer system for optimized compliance, inertia and thermal properties. Quick-connect engagement mechanism and auto-recognition and configuration.</p> <p>Interchangeable plate lower pedestal 25mm diameter Lower stainless steel (316 Grade) measurement geometry for Kinexus plate cartridges. Designed for optimized thermal properties and mechanical alignment. Quick-connect engagement and release mechanism.</p> <p>High temperature standard Canon oil 50ml Standard material for verification of rheometer measurements.</p> <p>DSR SILICONE RUBBER MOLD SET</p>	40,510.00	40,510.00

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Pos.	Quant.	Product code	Description	List price (\$)	Total list price (\$)
2	1.00	KNX2025	Plate upper geometry 8mm diameter Stainless steel (316 Grade) upper geometry designed as part of the Kinexus rheometer system for optimized compliance, inertia and thermal properties. Quick-connect engagement mechanism and auto-recognition and configuration.	1,260.00	1,260.00
3	1.00	KNX0016	Interchangeable plate lower pedestal 8mm diameter Lower stainless steel (316 Grade) measurement geometry for Kinexus plate cartridges. Designed for optimized thermal properties and mechanical alignment. Quick-connect engagement and release mechanism.	1,310.00	1,310.00
4	1.00	KNX4033	Temperature Calibration Kit - Multimeter Temperature Range: -40 – 100°C	1,980.00	1,980.00

TOTAL: USD 33,795.00

Optional items, not included in the total price

Pos.	Quant.	Product Code	Description	List price (\$)	Total list price (\$)
1	1.00	KNX0057	Plate upper geometry 4mm diameter	1,440.00	1,440.00
2	1.00	KNX0058	Plate lower pedestal 4mm diameter	1,720.00	1,720.00

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Pos.	Quant.	Product Code	Description	List price (\$)	Total list price (\$)
3	1.00	KNX2002	Kinexus cylinder environmental controller for temperature control For use with concentric cylinder (cup and bob, double gap) and vane tool measurement geometries over the temperature range -30 to 200°C. Note that for operation at temperatures below -5°C, a refrigerated circulator is required. Includes 'Sample cover'. Plug and play functionality - designed around a quick-connect cartridge; all mechanical, power, communication and fluid connections made instantly; auto-recognition and configuration. Kinexus cylinder cartridge incorporates interchangeable lower cups to optimize measurement set-up for different sample types using a quick-connect engagement and release mechanism.	8,360.00	8,360.00
4	1.00	KNX2230	Comprises shallow C25 cup (35mm deep) - two piece, removable base design (cup in hard anodized Aluminum; removable base in Stainless Steel 316) for use with Kinexus cylinder cartridge. Insulated upper thermal covers and lower cup insulation pieces.	2,910.00	2,910.00
5	1.00	KNX2042	Bob upper geometry C14 cylinder DIN standard Stainless steel (316 Grade) geometry designed as part of the Kinexus rhe ometer system for optimized compliance, inertia and thermal properties. Quick-connect engagement mechanism and auto-recognition and configuration.	2,220.00	2,220.00
6	1.00	KNX2281	Kinexus Tribology Cell - Version 1 Tribology cell for use with Kinexus peltier plate and HTC cartridges. This tribology accessory is designed to investigate the lubricating properties of a sample by measuring the friction (torque) under a constant applied force. It can also be used to determine the wear of different materials. Stainless steel (316 grade) upper and lower geometry design. Removable and replaceable wearing components. Alternative materials (such as aluminium, PP, HDPE and hydroxyapatite (bone)) may be available on request.	3,280.00	3,280.00

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Commercial conditions

Delivery time

Shipment from factory will be approximately (status at the moment of generating the quotation): 4-6 weeks after receipt of a valid order.

Payment terms

30 Days From Invoice Date.

INCOTERMS

CPT - Carriage paid to
Destination

Quotation currency

Prices on the quotation are in U.S. Dollar, unless stated otherwise.

Quotation validity

The validity of this quotation expires on 8/14/2019.

Tax

Unless stated otherwise, taxes are not included

Additional terms and conditions

Intellectual property

Regardless of any provisions stating the contrary, the performance of a contract or any delivery of any products or performance of any services shall in no event imply any transfer of intellectual property. All intellectual property related to and vested in the delivered products, accompanying items and documents as well in the provided services (whether or not created, produced or developed under or in the course of the execution of a contract) will be and remain the property of Supplier (or its suppliers, as the case may be).

Export control

Delivery is subject to strict compliance with export control laws and regulations. Supplier shall be relieved from its obligations to deliver any items or perform any services, to the extent that applications for permits or licenses related thereto are refused by a relevant governmental authority.

Credit check

All our quotations are subject to approval based on the outcome of a risk assessment which includes a credit check

Terms and conditions

The General Terms and Conditions of Supplier apply to and are part of all our offers, agreements, sales, services, deliveries and all other dealings. The applicability of any other terms and conditions is explicitly rejected and superseded by our General Terms and Conditions.

Ref.: Q-13285-1

Date: 5/16/2019

TERMS AND CONDITIONS FOR SALE AND SUPPLY OF GOODS AND SERVICE ("CONDITIONS")

1. INTERPRETATION

For the purposes of these Terms and Conditions of Sale and Supply ("Conditions"):

"Buyer" - the person, firm or company which places an order for purchase of Products and/or Services as identified in any such order or Quotation as the case may be.

"Conditions" - these terms and conditions of sale and supply as from time to time varied by Supplier.

"Contract" - the agreement between Supplier and Buyer arising as a result of Buyer's submission of an order for Supplier's Products and Supplier's written acceptance and/or, in the case of Services, an agreement between such parties for the provision of Services by Supplier, as initiated by a Quotation. Such Contract shall be deemed to incorporate and be governed by these Conditions.

"Products" - goods as agreed to be supplied by Supplier to Buyer under any Contract including, Software if any.

"Quotation" - a document provided by Supplier describing Products and/or Services offered to Buyer, subject to these Conditions.

"Services" - means any services which Supplier has agreed to provide using reasonable care and skill under any Quotation or Contract, as applicable.

"Supplier" - Malvern Panalytical Inc. or any of its Affiliates as named in any Quotation. In this context, an "Affiliate" means any other entity directly or indirectly controlled by Spectris Plc.

2. BASIS OF SALE

THESE CONDITIONS SHALL TAKE PRECEDENCE OVER ANY TERMS AND CONDITIONS WHICH APPEAR IN BUYER'S ORDER OR IN ANY DOCUMENTS INCORPORATED BY REFERENCE IN BUYER'S

ORDER. No term or condition of Buyer's order additional to or different from these Conditions shall become part of any Contract unless explicitly agreed to in writing by Supplier. Retention by Buyer of any Products delivered by Supplier, receipt by Buyer of any Services performed by Supplier or payment by Buyer of any invoice rendered hereunder, shall be conclusively deemed acceptance of these Conditions. Supplier's failure to object to any provision contained in any communication from Buyer shall not be construed as a waiver of these Conditions nor as an acceptance of any such provision.

3. QUOTATIONS

Prices, specifications and delivery date referenced in Supplier's Quotations are for information only and shall not be binding on Supplier until all technical requirements have been agreed and Supplier has accepted Buyer's order. Quotations terminate if Buyer does not place an order with Supplier within any express period indicated by Supplier or after 60 days, whichever comes first.

4. ORDERS

By submitting an order to Supplier, Buyer agrees to be subject to these Conditions in their entirety. No order, whether or not submitted in response to a quotation by Supplier, shall be binding upon Supplier until accepted in writing by Supplier.

5. PRICES AND TAXES

The prices for Products and Services will be as set out in the Quotation or as otherwise agreed between the parties in writing. As and when applicable to the Products sold and/or Services supplied under any Contract, prices do not include taxes, transport charges, insurance and export and/or import charges or duties, including without limitation sales, value added tax, use or excise taxes, which taxes and other charges may, in Supplier's discretion, be added by Supplier to the price or billed separately and which taxes and other charges shall be paid by Buyer unless Buyer provides Supplier with any necessary tax exemption certificate. Buyer shall pay for taxes, transport charges, insurance, export/import charges and duties unless agreed otherwise in writing.

6. SHIPMENT AND DELIVERY

6.1 Unless otherwise agreed by both parties in writing, Supplier shall arrange for delivery of Products Free Carrier (FCA Incoterms 2010) to Supplier's manufacturing facility (or an (international) airport close to Supplier's manufacturing facility) as agreed between the parties. Any dates quoted or agreed for delivery of Products or provision of Services are approximate only and Supplier shall not be liable for any delay howsoever caused and time is not of the essence.

6.2 Supplier reserves the right to make delivery of Products and provision of Services by instalments and to issue a separate invoice in respect of each instalment. When delivery is to be by instalments or Supplier exercises its right to deliver by instalments or if there is delay in the delivery of any one or more instalments for whatever reason Buyer shall not be entitled to treat the Contract as a whole as repudiated.

7. RISK AND PASSING OF TITLE

Title to, and risk of loss and damage to the Products shall pass to Buyer on delivery in accordance with Section 6 unless agreed otherwise by the parties in writing. Any claims for loss, damage or misdelivery shall be filed with the carrier and notified to Supplier within 5 days of the date of delivery. If installation is a requirement of the Contract and such installation is delayed by more than 28 days from the agreed delivery date for reasons not attributable to Supplier, then, to the extent allowed by applicable law, the Products shall be deemed accepted and Supplier shall be entitled to invoice the remaining balance of the Contract in full. Invoicing the remaining balance does not relieve Supplier from its installation obligations in accordance with the applicable term in the Contract.

8. SERVICES

8.1 Supplier shall provide Services in accordance with these Conditions and the terms of the relevant Contract.

8.2 Buyer shall, upon Supplier's reasonable request and otherwise as required, provide Supplier with all necessary information and materials to enable Supplier to provide Services in accordance with the terms of any relevant contract. Buyer will be responsible for the completeness and accuracy of all such information and materials provided, and will ensure that it is and remains entitled to provide the same to Supplier for use in connection with provision of the Services.

9. TERMS OF PAYMENT

9.1 Each shipment of Products shall be a separate transaction and Buyer will be invoiced on delivery. Notwithstanding the foregoing, if the Products are to be installed by Supplier or a third party acting on its behalf, Buyer may (at Supplier's discretion) be invoiced in accordance with the following payment scheme:

- 60% of the price upon Buyer's receipt of Supplier's order confirmation;
- 30% of the price upon delivery of the Products in accordance with Section 6;
- 10% of the price after acceptance of the Products in accordance with Section 11.

9.2 In the event of a delay in the delivery or acceptance that is not attributable to Supplier, the payment scheme shall not be affected and Buyer shall pay the installments based upon the initially agreed upon delivery or acceptance date.

9.3 Supplier shall be entitled to invoice Buyer, in respect of Services, yearly or monthly in advance. Terms of payment shall be net thirty (30) days from date of invoice for Products and Services unless agreed otherwise.

9.4 All amounts due under a Contract shall be paid in full by Buyer without deduction, withholding, set-off or counterclaim for any reason whatsoever, whether arising in contract, tort (including negligence), breach of statutory duty or otherwise, save as may be required by law.

9.5 Supplier may, in its sole discretion, determine at any time that Buyer's financial condition requires full or partial payment in advance or the provision of security for payment by Buyer in a form satisfactory to Supplier.

9.6 If Buyer fails to make any payment when due then, without prejudice to any other rights and remedies available to Supplier, Supplier shall (at its option) be entitled: (i) to treat the Contract as repudiated by Buyer, to suspend or cancel further delivery of Products and/or the provision of Services or any part thereof under that Contract or any other Contract between them and claim damages and/or receive reasonable cancellation fees; (ii) to affirm the Contract and claim damages from Buyer; and (iii) to recover, in addition to the payment, interest on the unpaid amount (both before and after judgement) at the rate of 6% per annum above the Royal Bank of Scotland's prevailing base lending rate from time to time, until payment in full is made. Such interest shall be calculated daily.

10. PRODUCTS

10.1 Supplier may modify specifications provided the modifications do not adversely affect the performance of the Products. In addition, Supplier may furnish suitable substitutes for materials used.

10.2 All descriptions, illustrations and any other information relating to the Products contained in Supplier's catalogues, brochures, price lists, advertising material and any sales or other particulars or literature are made by way of general description, are approximate only and for the general guidance and information of Buyer. They shall not constitute warranties or representations by Supplier nor shall they form part of any Contract.

11. INSTALLATION AND MAINTENANCE OF THE PRODUCTS

11.1 In the event of installation of the Products or the provision of maintenance, the following conditions shall apply and Supplier's price and provision of installation or maintenance are subject to the fulfilment of the following conditions at the expense and responsibility of Buyer:

- i. safe and secure climate controlled on-site storage so that Products and Supplier's tools (as applicable) are protected against theft and any damage or deterioration; any item lost or damaged during the storage period shall be repaired or replaced at Buyer's sole expense;
- ii. the timely and sufficient execution and completion of the preparatory works in accordance with all applicable safety, electrical and building codes as well as with Supplier's requirements;
- iii. the availability of Buyer's site to Supplier without obstacles in due time to enable Supplier to start installation or maintenance at the scheduled date;
- iv. the availability of the manpower and equipment necessary to place the Products in their final location or to provide the scheduled maintenance;
- v. the acquisition of all permits, licenses, rights of way, etc. of the pertinent authorities required for or in connection with installation or maintenance to be performed; and
- vi. the availability of all visas or any other permits necessary for Supplier's personnel and for the import and export of tools, equipment, and materials necessary for installation or maintenance to be performed.

11.2 In case any or all of the above conditions are not, not properly or not timely complied with, or Supplier has to interrupt its installation or maintenance works, subsequent testing for reasons not attributable to Supplier, the period of completion shall be extended accordingly and any and all additional costs resulting therefrom shall be for Buyer's account.

11.3 Supplier neither assumes liability nor offers any warranty for the fitness or adequacy of the premises or the utilities available at the premises in which the Products are to be installed, used or stored.

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12. ACCEPTANCE OF INSTALLATION

12.1 In case of installation of the Products, Supplier shall notify Buyer when the Products installed will be ready for testing and acceptance, inviting Buyer to attend Supplier's standard tests or such tests as may have been agreed upon in the Contract to demonstrate compliance with the agreed specifications and/or to inspect the installation work.

12.2 If Buyer fails to attend the testing on the date notified, Supplier will commence with the tests according to Supplier's standard test procedures and these tests shall be considered performed in the presence of Buyer and acceptance shall in such case take place on the basis of the results stated in the test certificate signed by Supplier.

12.3 In case Buyer rejects the Products installed it should submit to Supplier the reasons for such rejection in detail and in writing within 10 days after completion of the acceptance tests concerned. If, within Supplier's reasonable opinion, the rejection is justified, Supplier shall as a sole remedy correct the shortcomings as soon as possible and the relevant parts of the acceptance test shall be repeated within a reasonable period of time in conformity with the procedures outlined above.

12.4 Upon acceptance of the Products, Buyer will sign the acceptance certificate. If within 10 days after completion of the acceptance test Supplier shall not have received the acceptance certificate signed by Buyer or a report with a justified rejection, the Products installed shall then be considered as having been accepted by Buyer.

12.5 Minor defects or deviations not affecting the operational use of the Products installed shall be stated in the acceptance certificate, but shall not obstruct or suspend acceptance. Supplier undertakes to remedy such defects as soon as reasonably possible.

13. WARRANTIES

13.1 Supplier warrants that all Products shall be free from defects in material and workmanship under normal use for a period of (twelve) 12 months from delivery. In the event of installation this warranty period shall be for (twelve) 12 months from installation or eighteen (18) months from dispatch, whichever comes first, save that Supplier does not warrant that operation of the Software (defined in Section 15) will be uninterrupted or error free or that all program errors will be corrected. This warranty does not include any consumables such as filaments, lamps, fuses or other parts, which fail as a result of normal usage. Buyer shall be responsible for determining that the Product is suitable for Buyer's use and that such use complies with any applicable law. Provided that Buyer notifies Supplier in writing of any claimed defect in the Product immediately upon discovery and any such Product is returned at Buyer's risk to Supplier, transportation charges prepaid, within the warranty period in accordance with Section 13.1 and upon examination Supplier determines to its satisfaction, after a reasonable period to inspect such Products, that such Product is defective in material or workmanship, Supplier shall, at its option, repair or replace the Products, shipment to Buyer prepaid.

13.2 Supplier shall have a reasonable time to make such repairs or to replace such Product. Any repair or replacement of Products shall not extend the period of warranty. The warranty is limited to a period in accordance with Section 13.1, without regard to whether any claimed defects were discoverable or latent on delivery.

13.3 Supplier shall not be liable for any breach of the warranty or payment of damages in respect of Products supplied if: (i) Buyer makes further use of such Products after giving the notice required in Section 13.1; (ii) the defect or failure arises from Buyer's own fault; (iii) the defect arises from any drawing, design or specification supplied by Buyer or from other materials or other property supplied by Buyer or from any parts or items that have not been completely manufactured by Supplier; (iv) the defect arises other than out of manufacture, including without limitation improper installation, misuse by Buyer or a third party, neglect or accident; (v) the defect arises out of the use of the Products in conjunction with products or materials not reasonably contemplated by Supplier; (vi) the failure or defect results from Buyer's unauthorised addition to or modification of, or failure to comply with Supplier's written instructions relating to, the Products or Services; and (vii) the failure or defect arises out of any breach by Buyer of its obligations to provide information to Supplier under these Conditions or Contract.

13.4 If Buyer fails to pay when due any portion of any payment due from Buyer to Supplier under a Contract or otherwise, all warranties and remedies granted under this Section may, at Supplier's option, be terminated.

13.5 The foregoing warranties are exclusive and exclude all other warranties, terms and conditions, express or implied by statute or otherwise, to the extent permitted by law, including without limitation warranties of quality or fitness for a particular purpose. Supplier's sole and exclusive liability, and Buyer's sole and exclusive remedy for breach of the warranties in this Section 13 shall be as set forth in Section 13.1.

14. LIABILITY

14.1 Nothing in these Conditions or Contract shall exclude or limit Supplier's liability for fraud or death or personal injury caused by its negligence or any other liability to the extent that the same may not be excluded or limited as a matter of law.

14.2 Subject to Section 14.1, in relation to Products, Supplier's maximum aggregate liability under or arising out of any Contract, whether arising in contract, tort (including negligence) or otherwise, shall in no event exceed 100% of the total amount payable by Buyer in respect of Products under that Contract.

14.3 Subject to Section 14.1 in relation to Services, Supplier's maximum aggregate liability under or in connection with the supply, non-supply or purported supply of Services under any Contract, whether arising in contract, tort (including negligence) or otherwise, shall in no event exceed 100% of the total amount payable by Buyer in respect of Services under that Contract and in respect of Services continuing beyond one year, shall in no event exceed in any year 100% of the total amount payable by Buyer in respect of Services in that year.

14.4 Subject to Section 14.1, Supplier shall be under no liability to Buyer for any loss of profit, loss of income, loss of use, loss of business, loss of revenue, loss of goodwill, or for any indirect or consequential loss or damage of any kind, in each case, howsoever arising, whether such loss or damage was foreseeable or in the contemplation of the parties and whether arising in tort (including negligence), contract or otherwise.

14.5 Any claim arising out of or in connection with a Contract must be commenced against Supplier within one year from the date upon which Buyer became aware of or should have become aware of Supplier's infringement of Buyer's rights, unless otherwise specified under applicable law.

15. SOFTWARE

Supplier or its suppliers (as the case may be) shall at all times have and retain title and full ownership of all software, firmware, programming routines, and documentation relating to such software supplied by Supplier for use with the Products, and of all copies made by Buyer or the end user of the Products (collectively "Software"). A non-exclusive, non-transferable and non-sublicensable licence to use such Software will be granted to the end user solely for use with the Products.

16. INTELLECTUAL PROPERTY RIGHTS

16.1 Notwithstanding delivery of and the passing of title in any Products and subject to section 15 and 16.3, nothing in these Conditions or any Contract shall have the effect of granting or transferring to, or vesting in, Buyer any intellectual property rights in or to any Products and/or Services.

16.2 Buyer acknowledges and agrees that all property, copyright and other intellectual property rights in any work or tangible deliverable item arising from or created, produced or developed by Supplier under or in the course of provision of any Services (the "Works"), wherever in the world enforceable, including without limitations all right title and interest in and to the Services and all documents, data, drawings, specifications, articles, sketches, drawings, reports, inventions, improvements, modifications, discoveries, tools, scripts and other items relating thereto shall immediately upon creation or performance vest in and shall be and remain the sole and exclusive property of Supplier and Buyer shall acquire no right, title or interest in or to the same except as expressly stated in these Conditions.

16.3 The Supplier grants to the Buyer a non-exclusive, non-transferable and non-sublicensable licence to use such of the Works as are necessary, and to the extent necessary, for the end user to obtain and utilise the intended benefit of the Services.

16.4 If any claim is made against Buyer that the Products or Services infringe the patent, copyright or other intellectual property rights of any third party, Supplier shall indemnify Buyer against all losses, damages, costs and expenses awarded against, or incurred by, Buyer in connection with the claim or paid, or agreed to be paid, by Buyer in settlement of the claim provided that: (i) Supplier is given full control of any proceedings or negotiations in connection with any such claim; (ii) Buyer shall not make any admission of liability and shall give Supplier all reasonable assistance for the purposes of any such proceedings or negotiations; (iii) except pursuant to a final award, Buyer shall not pay or accept any such claim, or compromise any such proceedings without the consent of Supplier; (iv) Buyer shall do nothing which would or might vitiate any insurance policy or cover which Buyer may have in relation to such infringement and shall use its best endeavours to recover any sums due thereunder and this indemnity shall not apply to the extent that Buyer recovers any sums under any such policy or cover; (v) Supplier shall be entitled to the benefit of, and Buyer shall accordingly account to Supplier for, all damages and costs (if any) awarded in favour of Buyer which are payable by, or agreed with the consent of Buyer (which consent shall not be unreasonably withheld) to be paid by, any other party in respect of any such claim; and (vi) without prejudice to any duty of Buyer, Supplier shall be entitled to require Buyer to take such steps as Supplier may reasonably require to mitigate or reduce any such loss, damages, costs or expenses for which Supplier is liable to indemnify Buyer under this section 16.4, which steps may include (at Supplier's option) terminating use of the Product or Service, accepting from Supplier non-infringing, modified or replacement Products or Services.

16.5 Supplier shall have no obligation or liability under Section 16.4 insofar as the infringement arises from: (i) any additions or modifications made to the Products and/or Services in question, otherwise than by Supplier or with its prior written consent; (ii) any information provided by Buyer to Supplier including without limitation any specification; (iii) performance by Supplier of any work required to any Products, or performance of any Services, in compliance with Buyer's requirements or specification; (iv) a combination with or an addition to equipment not manufactured or developed by Supplier; or (v) the use of Products beyond that scope established by Supplier or approved in writing by Supplier.

16.6 Without prejudice to Section 14.1, this Section 16 states the entire liability of Supplier and the exclusive remedy of Buyer with respect to any alleged infringement of intellectual property rights belonging to a third party arising out of or in connection with the performance of any Contract. This Section 16 shall be subject to the limits of liability in Sections 14.2.

17. FORCE MAJEURE

Notwithstanding anything to the contrary in these Conditions, Supplier shall not be liable to Buyer for any loss or damage which may be suffered by Buyer as a direct or indirect result of the supply of Products or Services being prevented, delayed or rendered uneconomic by reason of circumstances or events beyond Supplier's reasonable control. If due to such circumstances or events Supplier has insufficient stocks to meet all its commitments Supplier may apportion available stocks between its customers at its sole discretion.

18. CONFIDENTIAL INFORMATION

Each party undertakes to keep confidential, not use for its own purposes outside the agreed scope and not without the prior written consent of the other party disclose to any third party, any information of a confidential nature belonging or relating to the other party which may become known to it unless such information is or becomes public knowledge (other than by breach of this Section) or is required to be disclosed by order of a competent authority.

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19. CANCELLATION, RESCHEDULING AND TERMINATION

19.1 Orders for Products accepted by Supplier may be cancelled or rescheduled by Buyer only with the written consent of Supplier (which consent Supplier may withhold for any reason) and Buyer shall indemnify Supplier against the cost of all labour and materials used in connection with the order so cancelled or varied and against all loss, damage cost, charges and expenses suffered or incurred by Supplier as a result of that cancellation or variation. Contracts for Services shall commence on the commencement date identified in the relevant Contract and, subject to earlier termination in accordance with Section 19.2, shall continue in force for the initial term as prescribed in such Contract and thereafter for any renewal period (if any) set out in the Contract and thereafter without limit of period unless or until terminated by either party in accordance with 19.2.

19.2 Either party may terminate a Contract for Services immediately at any time by written notice to the other party if the other party commits a material breach of the Contract for Services which is incapable of remedy or which fails to be remedied. Notwithstanding the foregoing, either party may terminate a Contract for Services by giving ninety (90) days written notice to the other party.

19.3 Upon termination or expiry of any Contract, for Services, each party shall except to the extent permitted or required to exercise or perform its continuing rights, or obligations hereunder, return to the other party all property of the other party then in its possession, custody or control and shall not retain any copies of the same.

19.4 Termination of any Contract in accordance with these Conditions shall not affect the accrued rights or liabilities of the parties at the date of termination.

20. INSOLVENCY OF BUYER

If: (i) Buyer becomes insolvent, has a receiver, administrative receiver, administrator or manager appointed of the whole or any part of its assets or business, makes any composition or arrangement with its creditors, takes or suffers any similar action in consequence of debt or an order or resolution is made for its dissolution or liquidation (other than for the purpose of solvent amalgamation or reconstruction) or carries out or undergoes any analogous act or proceedings under an applicable foreign law; or (ii) Buyer ceases, or threatens to cease to carry on business then, without prejudice to any other right or remedy available to Supplier, Supplier may treat any Contract as repudiated and/or withhold any further supply of Products and/or Services without any liability to Buyer and, if any Products and/or Services have been supplied but not paid for, the price or fees shall become immediately due and payable notwithstanding any previous agreement or arrangement to the contrary.

21. EXPORT CONTROL

21.1 Buyer understands that where Supplier's obligations under the Contract to supply any Products or Services are subject to governmental export control laws and regulations, the performance of this Contract and Buyer's use or export of any Products delivered by Supplier shall be conditional upon the grant of all necessary permits or licences. Buyer shall provide all information and documentation, including where necessary end user certification, not in Supplier's possession and required by the relevant application procedure to enable Supplier to make the necessary applications for permits or licences required for deliveries to Buyer. Supplier shall be relieved from its obligations to Buyer to supply any Products or Services to the extent that applications for permits or licences for the same are refused by a relevant governmental authority. To the fullest extent permitted by law, Buyer shall have no right to claim compensation for damages, loss of business or otherwise arising from such a refusal or Contract termination.

21.2 Buyer shall not, directly or indirectly, sell, provide access to, export, re-export, transfer, divert, loan, lease, consign, tranship (including stop in port), transport, or otherwise dispose of any Supplier's Product, material, Software (including source code) or technology to, via, or for: (i) any entity known to be headquartered in, or owned or controlled by a national of, any country or region subject to comprehensive sanctions at any time; (ii) any other individual or entity identified on a denied or restricted party list; or (iii) any activity or end-use restricted by applicable laws without first obtaining all required government authorisations.

21.3 Supplier shall have the right, at its option, to suspend performance under or terminate any Contract if: (i) applicable comprehensive sanctions are imposed; (ii) the Buyer is designated as or determined to be a denied or restricted party under applicable law; or (iii) where the Supplier's obligations under these Conditions or any Contract to supply items or Services are subject to governmental export control laws and regulations, the performance of any Contract and Buyer's use or export of any item delivered by Supplier shall be conditional upon the grant of all necessary permits or licences.

22. GENERAL

22.1 These Conditions and any Contract shall be governed by the laws of the commonwealth of Massachusetts, USA. The parties agree that the United Nations Convention on Contracts for the International Sale of Goods is specifically excluded from application to these Conditions. The parties shall agree to settle any claims or disputes arising out of or in connection with these Conditions or any Contract by amicable negotiations. If no settlement can be reached through negotiations within sixty (60) days after either party has served written notice to the other requesting such negotiations, then the dispute shall be submitted to the exclusive jurisdiction of state or federal courts in Massachusetts.

22.2 Failure by Supplier to exercise or enforce any rights hereunder shall not be deemed to be a waiver of any such right.

22.3 If any Conditions are found to be invalid, this shall not affect the rest of the Contract, which shall remain in full force and effect.

22.4 Buyer may not assign, transfer, novate or otherwise dispose of all or any of its rights or obligations, in whole or in part without the written consent of Supplier.

22.5 These Conditions constitutes the entire agreement and supersedes any prior agreement, understanding, representations or arrangements between the parties with respect to its subject matter.

22.6 Variation to any Contract must be in writing and signed by the parties.

22.7 All notices given under these Conditions shall be sent to the address of the other party set forth in the Quotation or in Contract. Notice shall be regarded as properly given if sent in writing and shall be deemed to have been served on the next working day from delivery if sent by email or fax, and on the day of receipt if sent by express courier or by registered mail.

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Malvern Panalytical Inc.
117 Flanders Road
Westborough, MA 01581



RHEOLOGICAL PROPERTIES

KINEXUS DSR SERIES

REDEFINING RHEOMETER CAPABILITIES FOR
ASPHALT BINDER AND BITUMEN TESTING

ASPHALT BINDER AND BITUMEN

Characterization and classification to asphalt industry standards



Asphalt, or bitumen, is a petroleum product used in the road (pavement), roofing and construction industries. A mixture of aromatic hydrocarbons (varying with geographical source), this black viscoelastic material is considered to be a complex colloidal system.

Asphalt is used as a binder with aggregates in road (pavement) construction and as such determines performance and lifetime. Additives such as polymers, crumb rubber, oils, waxes, phosphates and pH adjusters are used to enhance mechanical properties in modified asphalt binders. Asphalt emulsions are also used as water-proofing and re-surfacing materials.

Rheological characterization by Dynamic Shear Rheometers (DSR) is the standard method of classifying asphalt binders for behavior over time and loading conditions, and in different climates.



While some still use viscosity (vis) and penetration (pen) methods for grading, the use of DSR grading methods provides a much broader range of information about the asphalt performance properties and its suitability for desired applications. This is especially the case with engineered binders; binders designed with elastomeric properties to reduce rutting, aging, thermal and fatigue cracking.



Rheological testing with the Kinexus DSR Series

- Grade testing to industry standards such as AASHTO , ASTM and EN specifications (see www.malvern.com/kinexus for a full list)
- Full characterization of rheological behavior with Master Curves
- Formulation development and quality control metrics
- Determination of Mixing and Compaction Temperatures
- Blend testing of Warm Mix, Crumb Rubber and Recycled Asphalt Paving (RAP)
- Solids testing for Fatigue or Accumulated Strain
- Emulsion stability and viscosity profiling
- Benchmarking and comparison of competitive products
- Penetration, pull off and tack testing
- Tribology-friction testing
- Additive optimization and product interactions



KINEXUS DSR SERIES

Redefining rheometer capabilities for Asphalt binder and bitumen testing

The Kinexus DSR Series is the next generation rotational rheometer platform for Asphalt testing that's been developed from extensive market knowledge and feedback, integrating innovative instrument design with a revolutionary software interface, to deliver an intelligent solution that will exceed your rheological expectations.

A modular rheometer with true 'plug and play' functionality for all measuring systems and environmental control units. The Kinexus DSR Series enables pioneering Standard Operating Procedure (SOP) based testing with a built-in comprehensive library of standard test protocols for the Asphalt industry.

TruGrade_0001 Auto-grade T315 Original Binder.rseq
TruGrade_0002 Auto-grade T315 Rolling Thin Film Oven Binder
TruGrade_0003 Auto-grade T315 Pressure Aging Vessel Binder
Texas SPG TruGrade_0001 Auto-grade T315 Original Binder
AASHTO_0001-1 T-315 Original Binder
AASHTO_0001-2 T-315 Original Binder auto report print
AASHTO_0001-3 T-315 Nevada Original Binder
AASHTO_0001-4 T-315 Texas SPG Original Binder
AASHTO_0002-1 T-315 Rolling Thin Film Oven
AASHTO_0002-2 T-315 RTFO Binder auto report print
AASHTO_0003-1 T-315 Pressure Aging Vessel
AASHTO_0004 T-315 Cannon Oil Verification DSR test
AASHTO_0005 T-315 Linearity Test
AASHTO_0006 T-315 Cannon Oil Statistical Quality Control Documentation and
AASHTO_0007-1 TP-70 Multiple Stress Creep Recovery
AASHTO_0007-2 T350 Multiple Stress Creep Recovery
AASHTO_0007-3 Combined T315 and T350
AASHTO_0008-1 TP-70 Multiple Stress Creep Recovery Using Bohlin Data
AASHTO_0008-2 T-350 Multiple Stress Creep Recovery Using Bohlin Data
AASHTO_0008-3 Manual Entry MSCR Elastic Response Analysis
AASHTO_0009 TP-101-12-UL LAS Test for asphalt fatigue
ASTM D4402 Brookfield Viscosity
Mix and Compaction Temperature Shear Flow - Renike Method
Mix and Compaction Temperature Phase Angle - Casola Method
Mix and Compaction Temperature Equi-Viscosity - Brookfield Method.rseq
Master Curve Generation with Cross Over Analysis
Softening Point Determination
BYET Binder Yield Energy Test Method A

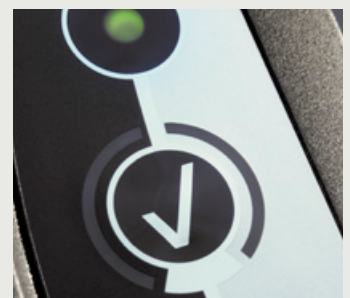


Key benefits of the Kinexus rheometer

- All modes of operation – stress, shear rate and direct strain controlled oscillation
- Exceptional vertical travel and gapping capabilities with ultra-responsive and highly sensitive Normal Force for dedicated pull-off, tack and penetration testing
- Unique rSpace software interface that offers total flexibility of test set-up, from sequence-driven Standard Operating Procedure (SOP)-type functionality to fully customizable test design
- Fully integrated Materials Database enables user friendly data management that can be tailored to any organization. Easily tie results by products, projects, customers, vendors, tanks, or locations. Maintain testing logs and specification limits for acceptance
- Wide variety of measurement geometries optimized for rheological characterization of liquid binders to solid asphalt cores
- Complete sample history recorded from loading to unloading, ensuring reliable and reproducible measurements
- Unique 'plug and play' cartridge system for all environmental controllers – all mechanical, power, communication and fluid connections made in one simple action. Capable of fully automated calibration
- Geometry Database in conjunction with RFID plate recognition ensures only the correct, in tolerance, plates are used for testing
- Fully automated statistical quality control (SQC) charting with pass/fail analysis tied to any sample



Environmental cartridges are easily changed or removed for service



Large, interactive, operator inputs are glove friendly and solvent safe

UNPRECEDENTED DUAL-ACTION CAPABILITIES

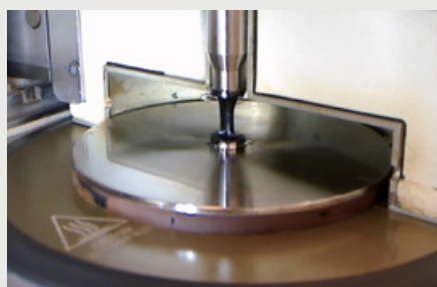
A revolution in shear and vertical (axial) test control

The unique combination of Kinexus DSR hardware technology and rSpace software gives the user the ability to configure three critical rheometer functions independently:

- Rotational (shear) control - torque, speed and position
- Vertical (axial) control – gap and Normal Force
- Temperature control

Offering the ultimate in rheological test flexibility for both industry and academia, Kinexus DSR enables:

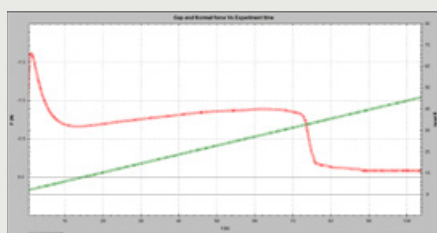
- All rotational shear-based testing
- Advanced vertical (axial) testing including pull-off, squeeze flow and tack testing
- A combination of shear and vertical actions for revolutionary process-relevant measurements



Significant design effort has been directed at the vertical, or axial capabilities of the Kinexus DSR platform – an area that typically sees compromises on most rheometer systems.

Kinexus DSR combines high speed and ultra-fine resolution gap control with high sensitivity and ultra-responsive Normal Force control for truly innovative sample loading and measurement capabilities – from sensitive structures to rapid curing systems.

Allied to 'cradle to grave' data collection providing a complete sample history from loading to unloading, every aspect of rheological testing can be optimized and verified for total consistency.



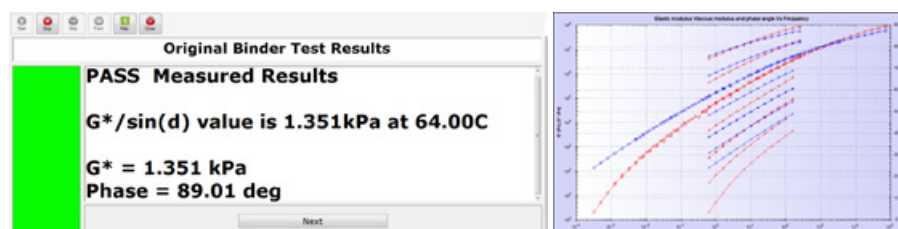
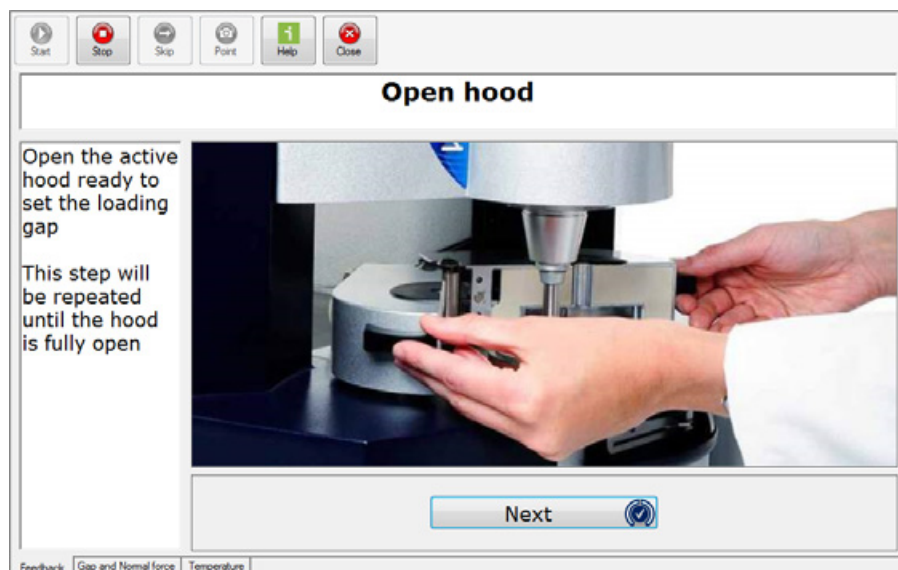
rSPACE SOFTWARE

Standard Operating Procedure (SOP) driven tests for robust rheological measurements

Malvern's Standard Operating Procedure (SOP) approach to material testing has been a cornerstone to all our technologies, and is now available for the first time on a rheometer system.

rSpace can be used for simple QC operation or for advanced rheological testing

- Locked down tests including geometry and parameter set-up using standard user access control
- Continuous feedback and user guidance at all times
- Ensure best rheological practice
- Add specific test controls relevant to your samples
- Produce standard test methods for your samples
- Available for use company-wide
- Consistent operator independent testing as standard
- Time-Temperature Superposition for master curve generation
- Automatically reports Pass or Fail based on the appropriate test and test criteria
- Report designer with auto print/PDF generation



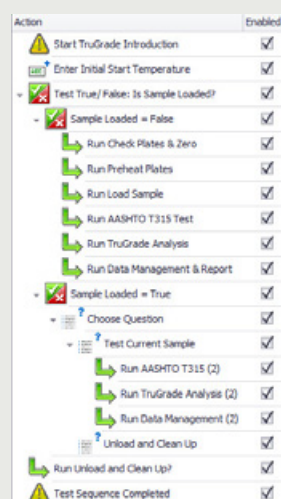
Clear operator feedback of relevant information and visual properties

Automated advanced analysis available

rSpace - Powerful, user friendly, flexible and easily tailored

rSpace software is driven by 'sequences' – which consist of fundamental rheological actions (or test building blocks) that can be linked together with other test actions, such as user feedback and choices, calculate values, loops and triggers, in order to build 'intelligent' tests.

- Set a sequence to 'run' only, and a user operates under SOP-type conditions with defined test instructions and feedback
- Set user access to 'edit' sequence functionality, and researchers have the full design capabilities at their fingertips



'What rheological test progression would you like to run?'

- You think it - Kinexus can run it
- Dedicated and advanced tests exactly to your needs

Program sequence in Kinexus

- 'Drag and drop' actions and 'Import subsequence' functionality
- Include user choices, calculate values, loops, triggers
- Include specific user inputs and instructions as required
- Include specific analysis, acceptance criteria and 'what next' decision making

TECHNOLOGY AT THE **HEART** OF KINEXUS DSR

10 Features of the Kinexus DSR series

1. Inductive motor technology

Precision control of instrument torque

- Ultra low inertia, electronically commutated (EC), drag cup motor allows rapid change of torque and speed, as well as, access to higher oscillation frequencies without the need of excessive corrections.
- Wide continuous torque range facilitates measurement of low viscosity liquids through to stiff solids without changing test conditions or measuring geometries.
- Intelligent motor cooling regulates internal operating temperature according to torque and power demands.

2. Precision air bearing

Provides frictionless support between moving parts

- Machined from sintered, porous carbon to provide uniform air distribution with negligible directional bias enabling operational and measurable torques below 1 nNm.
- High axial and radial stiffness for increased robustness and reduced compliance.

3. High Precision Rotational System

Accurate measurement of rotor position and speed

- Optical encoder with nanometer resolution for measuring minuscule radial displacements and speeds.
- Sample response optimized by locating the sensor as close to the measurement as possible.
- High speed Digital Signal Processor (DSP) provides rapid and accurate direct strain and speed control.

4. Precision chuck mechanism

Connects and aligns the measuring system with the motor and bearing assembly

- Quick connect push-fit mechanism for easy insertion and removal of measuring systems while maintaining micrometer alignment.
- Auto recognition - Radio frequency identification (RFID) reader automatically identifies the measuring systems, calibration constants and operational settings, and ensures zero gapping prior to measurement.

5. Upper measuring system

Interfaces with the sample to transfer torque or motion from the motor assembly

- Wide range of measuring systems available, including plates, cones, cylinders and vanes with different sizes, materials and surface finishes.
- Precision engineered for accurate calculation of rheological parameters and designed with high shaft stiffness and low mass to minimize compliance and inertia.
- Quick connect push-fit design and integrated RFID tag (auto-detection) allows for reduced time to measurement while ensuring the correct measuring system and calibration constants are always used.

6. Axial Force Sensors

Provides the measurement and control of normal force

- Novel strain gauge with fast transient response which is independent of air bearing rotor position and rotor speed.
- Operational in all modes of instrument operation for both measurements and control. Capable of measuring between 0.001 and 50N for consistent sample loading and precision control of axial testing.

7. Stage Drive Control

Controlled vertical profiles for sample loading and axial testing

- Enables full range of vertical profiles including linear, exponential and normal force over a working range of 230 mm (0.1 μm resolution) and speed range of 0.1 $\mu\text{m/s}$ to 35 mm/s for controlled sample loading or dedicated axial testing.

8. Integrated electronics

Houses all electronics for controlling rheometer functionality

- All micro electronics are located as close to the measurement as possible, improving measurement quality and reliability.
- Incorporates all control and measurement functions including high speed Digital Signal Processor (DSP), which provides the intelligence to the instrument.

9. Environmental control cartridge / Lower measuring system

Provides fast lower geometry interchange, plus temperature and environmental control

- Unique 'plug and play' cartridge system with auto-recognition. All mechanical, power, communication and fluid connections made in one simple action.
- Cartridge options include:
 - Asphalt Peltier Plate, active hood design
 - Universal Cylinder; for cub-bob & torsion
 - High Temperature; for polymer melts & curing.
- Geometries available in a wide range of sizes, materials and surface finishes.
- Lower measuring system can be secured and removed easily using a simple slide lock mechanism, while maintaining micrometer alignment.
- Employs Peltier elements for heating/cooling of upper and lower plates working in conjunction with an intelligent heat exchanger to improve efficiency.
- Optimally positioned temperature sensors (PT100s) ensure fast & accurate sample temperature reporting.

10. Control Panel

Allows rheometer functions to be controlled direct from the instrument

- Control panel functionality directly linked to all user instructions in test sequences so 'Yes' and 'No' responses to software prompts can be made without keyboard interaction.
- Warning lights flag-up any rheometer faults, software communication errors or low pressure in the air bearing.
- Robust design for glove operation and solvent safe for easy clean up.

TAKE A CLOSER LOOK



MEASURING SYSTEMS AND ACCESSORIES

Characterization and classification to asphalt industry standards

Active Hood Cartridge [-40 °C to +200 °C] **Environmental controller with minimized thermal gradients for plate measuring systems**

- Applicable to the measurement of highly thermally-sensitive samples, and for temperature-critical testing
- Proprietary design incorporates state-of-the-art heating technology with Peltier elements to dynamically control radial and vertical thermal gradients within the sample quickly and accurately
- Conforms to AASHTO, ASTM & EN standards
- Temperature resolution to better than 0.0005 °C
- PT100 sensor located within 1 mm of asphalt sample for accurate reporting
- Low thermal mass components for rapid response
- Inlet for inert gas feed into sample chamber enables live monitoring of aging
- Easy and accurate integrated temperature calibration



Peltier Cylinder Cartridge [-30 °C to +200 °C]

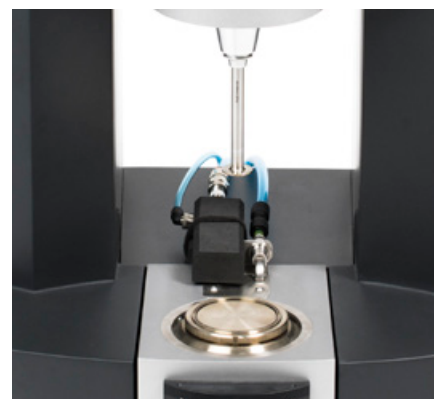
Environmental controller for concentric cylinder-type measuring systems

- Twin Peltier design for rapid temperature changes, sample equilibration and minimal thermal gradients
- Various cup and bob sizes available - C14 (DIN), C25 (DIN) and wide diameter C34
- Interchangeable lower cups with removable base for ease of cleaning
- Plate insert provides a 'universal Peltier option'
- Accommodates Solid (Torsion) Fixtures for Dynamic Mechanical Analysis (DMA) testing of solid asphalt cores
- Crumb rubber testing system available
- Easy and accurate integrated temperature calibration



High Temperature Cartridge (HTC) [0 °C to +300 °C] **High temperature environmental controller for cone-plate and parallel plate measuring systems**

- Extremely stable temperature control using a high accuracy PT100 sensor in close proximity to sample
- Rapid temperature changes of up to 20 °C per minute.
- Temperature resolution to better than 0.0005 °C
- Air cooling and adiabatic cooling for rapidly attaining ambient and sub-ambient temperatures
- Easy and accurate integrated temperature calibration
- All plate and cone diameters are available
- Optional disposable plate inserts available for curing applications



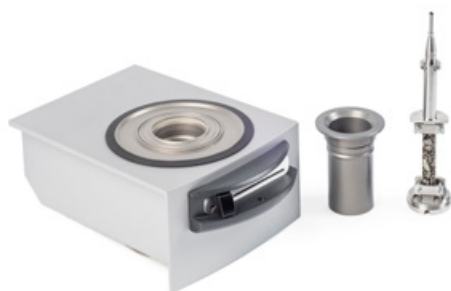
KINEXUS DSR ACCESSORY SPECIFICATIONS

Characterization and classification to asphalt industry standards



Measuring systems

- Quick-connect geometries with intelligent RFID auto-recognition linked to database
- Lock-down tests to specific geometry to minimize operator error
- Standard upper plates of 4 mm, 8 mm, and 25 mm to conform to AASHTO, ASTM & EN standards, with disposable options also available
- Coaxial cylinders (cup and bob) to DIN standard with Double gap and vane tool options also available
- Geometry adapter allows use of custom geometries (e.g. Penetration probes)
- Automatic temperature calibration device available
- Tribology kit for friction testing, lubricity and warm mix analysis
- Torsion kit for solids testing



Solid Fixtures (-20 °C to +200 °C dry and fluid immersed (wet))

Torsion/DMA System including Sample Mounting & Alignment kit

- Utilizes the multifunctional design of the Cylinder Cartridge to allow Torsional testing of a self-supporting rectangular or cylindrical solid sample (e.g. final product)
- Understand how a sample changes by temperature or time in a dry vs. wet environment
- Includes a torsional alignment jig and disposable cylindrical sample end caps
- Mounted samples can be investigated as a function of Frequency, Strain, Stress, Time and Temperature to investigate solid properties
- Easy temperature calibration with sensor mounting provided



Crumb Rubber Kit

- Hard anodized aluminium shallow cup insert for Kinexus cylinder cartridge, designed to measure crumb rubber asphalt mixtures
- Low volume, wide gap concentric cylinder enables samples with larger particles to be measured for more accurate testing
- Optimized thermal properties and mechanical alignment
- Two piece, removable base design, and includes thermal cover and insulation kit

KINEXUS DSR SPECIFICATIONS

A range of asphalt DSR rheometer designed to meet and exceed your application requirements. If you are unsure as to specifying an appropriate rheometer model for your application or region, contact us for advice and/or a demonstration.

	DSR+	DSR	DSR-E	DSR-III
Rheometer specification	Each system designed to meet the demanding needs of research, product development, comparative benchmarking, quality control and assurance required by the global Asphalt / Bitumen Industry			
Motor control	Electronically commutated (EC), drag cup motor control providing absolute direct: shear strain, shear rate, shear stress for operation in steady, dynamic, and transient loading modes			
Torque range – Viscometry (rate and stress control)	5 nNm – 225 mNm	10 nNm – 200 mNm	20 nNm – 200 mNm	100 nNm – 150 mNm
Torque range – Oscillation (strain and stress control)	1 nNm – 225 mNm	5 nNm – 200 mNm	10 nNm – 200 mNm	100 nNm – 150 mNm
Torque resolution	0.1 nNm	0.1 nNm	0.1 nNm	0.1 nNm
Position resolution	<10 nrad	<10 nrad	<10 nrad	<10 nrad
Angular velocity range	1 nrad s ⁻¹ to 500 rad s ⁻¹	10 nrad s ⁻¹ to 325 rad s ⁻¹	10 nrad s ⁻¹ to 325 rad s ⁻¹	10 nrad s ⁻¹ to 200 rad s ⁻¹
Step change in strain	<10 ms	<10 ms	<10 ms	<10 ms
Frequency range	6.28 μ rad s ⁻¹ to 942 rad s ⁻¹ (1 μ Hz to 150 Hz)	6.28 μ rad s ⁻¹ to 628 rad s ⁻¹ (1 μ Hz to 100 Hz)	6.28 μ rad s ⁻¹ to 628 rad s ⁻¹ (1 μ Hz to 100 Hz)	6.28 μ rad s ⁻¹ to 628 rad s ⁻¹ (1 μ Hz to 100 Hz)
Motor inertia	12 μ N.m.s ²	12 μ N.m.s ²	13 μ N.m.s ²	13 μ N.m.s ²
Normal Force range	0.001 N - 50 N	0.001 N - 50 N	0.01 N - 50 N	0.01 N - 20 N
Normal Force resolution	0.5 mN	0.5 mN	0.5 mN	0.5 mN
Normal Force response time	<10 ms	<10 ms	<10 ms	<10 ms
Vertical lift speed	0.1 μ ms ⁻¹ to 35 mms ⁻¹	0.1 μ ms ⁻¹ to 35 mms ⁻¹	0.1 μ ms ⁻¹ to 35 mms ⁻¹	0.1 μ ms ⁻¹ to 20 mms ⁻¹
Vertical lift range (measurable)	230 mm	230 mm	230 mm	230 mm
Gap resolution (over full vertical lift range)	0.1 μ m	0.1 μ m	0.1 μ m	0.1 μ m
Fully configurable vertical profiles	By speed and by Normal Force			
Raw instrument variables	5 kHz constant streaming data			
Complete sample history	Data available from loading to unloading as standard			
Instrument interface	USB2 – plug and play			
Dimensions D x W x H (Weight)	485 mm x 490 mm x 680 mm (47 kg)			
rSpace software	Sequence-driven user interface enabling Standard Operating Procedure (SOP)-type test functionality and fully customizable test designs			
rSpace package	Comprehensive Rheology		Complete Asphalt	Standard Asphalt
User Access Control	✓	✓	✓	✓
General Rheology	✓	✓	✗	✗
rSolution applications database	✓	✓	✗	✗
Rheology Toolkit package	✓	✓	✓	✗
Asphalt Rheology	✓	✓	✓	✓
Rheology Analysis package	✓	✓	✓	✓
Sequence design functionality	✓	✓	✓	✓
Interactive materials database	✓	✓	✓	✓

NOTE: Specifications have been obtained under conditions as stated in the Installation and Site Requirements for Kinexus rheometers

KINEXUS DSR ACCESSORY SPECIFICATIONS

Environmental controllers**	DSR+	DSR	DSR-E	DSR-III
Quick-connect cartridge system	Plug & play; auto-recognition and auto-configuration in software with all alignments and utilities in hardware			
Asphalt Active Hood Oven <ul style="list-style-type: none"> Standard temperature range (optional) Heating rate (controlled) Resolution Stability Gradients 	-5 °C to +200 °C (-40 °C to +200 °C) 30 °C/minute <0.0005 °C +/-0.003 °C <0.1 °C	-5 °C to +200 °C (-40 °C to +200 °C) 30 °C/minute <0.0005 °C +/-0.003 °C <0.1 °C	-5 °C to +150 °C (-40 °C to +200 °C) 30 °C/minute <0.0005 °C +/-0.01 °C <0.1 °C	-5 °C to +150 °C (-40 °C to +200 °C) 30 °C/minute <0.0005 °C +/-0.01 °C <0.1 °C
Universal Cylinder Peltier <ul style="list-style-type: none"> Standard temperature range (optional) Heating rate (controlled) Resolution Stability 	-5 °C to +200 °C (-30 °C to +200 °C) 15 °C/minute <0.0005 °C +/-0.003 °C	-5 °C to +200 °C (-30 °C to +200 °C) 15 °C/minute <0.0005 °C +/-0.003 °C	-5 °C to +150 °C (-30 °C to +200 °C) 15 °C/minute <0.0005 °C +/-0.003 °C	-5 °C to +150 °C (-30 °C to +200 °C) 15 °C/minute <0.0005 °C +/-0.003 °C
High Temperature (HTC) <ul style="list-style-type: none"> Standard temperature range Heating rate (controlled) Resolution Stability 	0 °C to +300 °C 50 °C/minute <0.0005 °C +/-0.003 °C	0 °C to +300 °C 50 °C/minute <0.0005 °C +/-0.003 °C	0 °C to +300 °C 50 °C/minute <0.0005 °C +/-0.003 °C	0 °C to +300 °C 50 °C/minute <0.0005 °C +/-0.003 °C

* Temperature range dependent.

Options Available**		DSR+	DSR	DSR-E	DSR-III
Quick-connect upper geometries	Plug and play; auto-recognition and configuration in software	✓	✓	✓	✓
Disposable plates option	Upper and lower disposable plate options for curing materials	✓	✓	✓	✓
Crumb rubber kit	C14/25 - CRM C25 cup & C14 bob for use with cylinder cartridge. Other cups, bobs and vanes available	✓	✓	✓	✓
Solids Fixtures kit	Solid fixtures for use with cylinder cartridge for testing rectangular or cylindrical solids (Asphalt cores)	✓	✓	✓	✗
Plates and Cones diameter & angle	Standard diameters range from 4 mm to 60 mm Standard angles are 0.5°, 1°, 2° and 4° – others on request	✓	✓	✓	✓
Asphalt Plate diameter	Asphalt 4 mm, 8 mm and 25 mm plates	✓	✓	✓	✓
Tribology - friction	Ball Tribology kit based on ISO7148 design	✓	✓	✓	✗
Temperature Calibration Kit	Fully automated and integrated NIST traceable device for easy verification and calibration of system temperature	✓	✓	✓	✓

NOTE: Specifications have been obtained under conditions as stated in the Installation and Site Requirements for Kinexus rheometers

**Additional Environmental controllers, accessories and geometries available upon request



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Kinexus rheometer and system components protected by: US6714879B2 and related filings EP1219948A2; US8225644B2; US20120240665A1 and related filings EP2307873A2, CN102112861A, JP2011530063A; EP2538198A1 and related filings CN102112860A, JP2011530062A.

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Malvern Solutions: Advanced technology made simple - distributor details



State of West Virginia Response to RFQ 7719001 Dynamic Shear Rheometers from Malvern Panalytical Specification – Kinexus DSR-III

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Kinexus DSR-III

Executive Summary

Malvern Panalytical is pleased to submit a tender response to State of West Virginia for a Kinexus DSR-III that meets the performance levels set out in the specification.

This document addresses all the points in the procurement specification, along with detailed supporting evidence.

Complex scientific instruments require skilled professionals to install commission and train users. Malvern Panalytical has a worldwide network of scientists, engineers and technicians to help our users get the most out of their instruments, complemented by a dedicated helpdesk.

Malvern Panalytical is world renowned for the quality of its measurement instruments.

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About Malvern Panalytical

Malvern Panalytical is a leading provider of scientific instrumentation for the measurement of elemental concentrations, crystallographic structure, molecular structure, remote sensing, rheology, particle size, particle shape, particle concentration and more. Highly reliable and robust characterization of these properties is fundamental to predicting how a product will behave during use, to optimizing its performance and achieving manufacturing excellence.

Malvern Panalytical technologies are used by scientists and engineers in a wide range of industries and organizations to solve the challenges associated with maximizing productivity, developing better quality products and getting them to market faster. Our focus is on creating innovative, customer-focused solutions and services to enhance efficiency and deliver tangible economic impact through chemical, physical and structural analysis of materials.

Underpinned by extensive industry knowledge and technical and applications expertise, Malvern Panalytical instruments are designed to help users better understand a wide variety of materials, ranging from proteins and polymers, particle and nanoparticle suspensions and emulsions, through to sprays and aerosols, industrial bulk powders, minerals and high concentration slurries, and solids such as metals and building materials plastics and polymers.

Malvern Panalytical was formed by the merger of the businesses Malvern Instruments and PANalytical, including the companies ASD and Claisse, on 1st January 2017, and employs over 2,000 people worldwide. The combined entity is a strong player and innovator in the materials characterization market and will leverage the strengths of the individual companies in their end markets, ranging from building materials to pharmaceuticals and from metals and mining to nanomaterials. Applications laboratories around the world and a global sales and service presence supported by a strong distributor network ensure unrivalled levels of customer support.

Meeting the State of West Virginia's Specification for Dynamic Shear Rheometers

In this section of our response, we will outline how we meet the detailed specifications you have provided for a one-time purchase of a Dynamic Shear Rheometer and Appurtenances.

To meet your specification, we are proposing our Kinexus DSR-III dynamic shear rheometer package for the global Asphalt / Bitumen Industry.

The Kinexus DSR-III forms part of a standard dynamic shear rheometer package to meet the demanding needs of research, product development, comparative benchmarking, quality control and assurance required by the global Asphalt / Bitumen Industry with true 'plug and play' functionality for all measuring systems and environmental control units. The Kinexus DSR-III enables pioneering Standard Operating Procedure (SOP) based testing while offering access to a full range of standard rheological tests with total flexibility of test design and set up.

Dynamic Shear Rheometer

The Kinexus DSR-III provides grade testing to industry standards such as AASHTO, ASTM and EN specifications.

Malvern Panalytical is a leading manufacturer of instrumentation for the purpose of rheological material characterization for the asphalt industry. In this regard, we have supplied many hundreds of instruments for the specific purposes of testing asphalt binders in accordance with AASHTO M320 and M332. Specifically, our Kinexus DSR-III includes Standard Operating Procedures (SOPs) reviewed by AASHTO for T315 and T350 for Superpave Performance Grade binder product grading and acceptance. In addition to providing these standard SOPs, Malvern Panalytical provides a complete suite of asphalt specific SOPs for all areas of specification and research. As such, meeting the specific requirements of this solicitation is a regular part of our company's charter and our instrument is designed with the ability to fully comply with the State of West Virginia's specification. In addition, there are hundreds of these instruments currently participating and accredited in compliance with the AASHTO proficiency program.

Malvern Panalytical is extremely active in all areas of asphalt binder and asphalt mix testing as participants and/or members of the TRB Binder Expert Task Group, Emulsions Task Force, ASTM D4, AMAP, AAPT and all the regional user/producer groups. Our staff have consulted in SHRP, NCHRP 9-10, NCHRP 9-39 and instructed at the South Central Superpave Center and the North East Superpave Center. As a result, we have always been the first to implement new technology to meet the changing testing requirements of the binder testing industry.

DSR Measuring System

Supplied with Components

The Kinexus DSR-III is supplied with all components necessary for operations including air filters, flow indicators, communication cables, hoses, connectors, etc.

Test Plates

One set of each precision 8-mm and 25-mm diameter upper and lower test plates are provided within this bid proposal.

By design, the supplied plates and environmental chamber are unaffected by normal room temperature variations. The Active Hood Cartridge was specifically designed for the rigorous requirements needed to accurately test asphalt binders to AASHTO T315 and T350. The proposed system meets this requirement and supporting data provided demonstrates the systems performance.

Automatic Recognition & Software

All are standard features for the Kinexus rSpace operational software. There is a Geometry Database easily accessed where all this information can be found. The proposed system meets this requirement.

Precision, Quick Connect Coupling System

The Kinexus DSR meets this requirement and utilizes a precision quick connect coupling systems which provides one handed quick connect coupling of the upper test plate to the instrument. The quick connect coupling system is of high precision taper design such that re-zeroing of the gap is not necessary after upper test plate removal for cleaning.

Setting the Measuring Gap

The proposed system meets this requirement and is capable of automatically setting the gap via the operational software and correcting the gap automatically for any temperature changes during the test procedure.

Temperature Control

The Kinexus DSR Environmental Chamber controls temperature using a lower plate chamber with integrated Peltier elements and an upper hood with integrated Peltier elements.

The system is capable of maintaining specimen temperatures within $\pm 0.1^{\circ}$ Celsius for test temperatures ranging from 4°C to 88°C .

Temperature Calibration

The Kinexus DSR will include a temperature calibration kit which meets the requirement to perform automatic temperature calibrations via the DSR software.

The proposed system meets this requirement and offers 22 individual calibrations points

The proposed system will include traceable calibrations documentation to meet the requirements of AASHTO 350 and with Calibration in 6°C increments from 4°C to 88°C .

The DSR will include a temperature calibration kit which meets this requirement and does not require use of a multi-meter and that is capable of being sent to a certified calibration laboratory for traceable calibration.

The Kinexus DSR provides for AASHTO compliant temperature calibration reports upon completion of the calibration routine and the software provides archiving and retrieval of past temperature calibration reports.

General Accessory Requirements

To meet the State of West Virginia's requirements for low temperature testing of asphalt in studies designed to correlate with the Bending Beam Rheometer 4mm plates which meet this requirement will be listed as an option to this proposal

There is a Peltier controlled concentric cylinder chamber available for the Kinexus which meets this requirement. This information is contained within the Kinexus brochure. If additional information on performance is required, we will be happy to provide it.

A Tribology kit for evaluation of asphalt lubricity has been listed as an option to this proposal.

Training, Support and Delivery

The DSR shall be delivered within 45 working days of award. Installation of the DSR and training shall occur within one week of delivery.

Preventative Maintenance

The DSR shall include one preventative maintenance visit to occur at the purchaser's location within the first year of instrument's installation.

Onsight Verification of Conformance to Bid Specification

The Vendor shall verify conformance to each bid specification at the time of installation. Any non-conformance to the bid specifications discovered at the installation or within the first thirty days of ownership will result in the order being cancelled and the DSR being returned to the vendor at the vendors expense.

1 Reference Documents Attached

- [1] Attachment 1 - Quotation Q-13285-1
- [2] Attachment 2 – Kinexus DSR Series Brochure