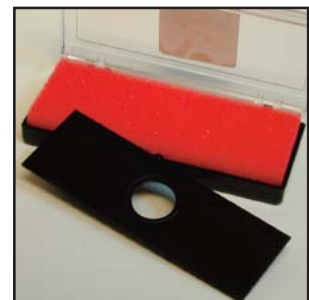


Stage Micrometers and Calibration Standards

For over 60 years Pyser-SGI have been manufacturing precision micropattern products at their UK facility. Their stage micrometers and calibration standards are used all round the world for calibrating microscopes, imaging systems and co-ordinate measuring equipment. Where customers need to have the traceability of their calibration, Pyser-SGI offer certificates of calibration, traceable to International standards.

S-Range Stage Micrometers

The scale or grid is chrome deposited centrally on a glass disc mounted in a black anodised aluminium slide mount 76mm x 25mm x 1mm thick. The metal mount gives these stage micrometers greater durability than those of all glass construction. These products are supplied in a plastic case with foam insert and are intended for general microscope calibration.



PS-Range Stage Calibration Standards

The scale is chrome deposited centrally on a glass disc mounted in a stainless steel slide mount, 76mm x 25mm x 1.5mm thick, with a unique serial number engraved in the top surface. These are the products of choice where you need certified scales to have unequivocal traceability for ISO, NIST, DIN or other standards. These products are supplied in a polished wooden case to indicate that they are superior calibration tools.



PS Multi-Image Calibration Slide

This unique artefact provides the most comprehensive solution to calibrating image analysis systems. An array of 16 different patterns and scales to a very high resolution, is chrome deposited on a glass slide, 76mm x 15mm x 1.6mm thick. A unique serial number is etched into the slide



PS-Range of Long Scales

Scales from 50mm to 1 metre in length, chrome deposited on glass substrate, and supplied in a polished wooden case (except 50mm version). Typically used for calibration of linear or two dimensional measuring systems.



PGR Two Dimensional Calibration Standards

Glass plates with 10mm grid squares occupying either 100mm x 100mm or 140mm x 240mm, central area of 20mm further subdivided into 1mm squares. Typically used for calibration of co-ordinate measuring systems.



High Precision Optical Dimension Standards

For customers requiring the ultimate in precision and calibration traceability, Pyser-SGI offer the NPL line scales, reference stage graticule, two dimensional position standard and photomask line width standard. These are all supplied with NPL's Internationally Traceable calibration certificate.



Custom Made Calibration Products

For some customers a standard calibration product may not fulfil their requirements. In this case Pyser-SGI are able to offer cost-effective production to custom designs. Please send drawing/specification or contact us to discuss.



Certificates of Calibration

Each day industrial companies carry out a vast range of physical measurements, the accuracy of which must satisfy their business requirements. It is well known that accurate measurements are needed, not only to achieve an acceptable level of quality and efficiency of manufacturing, but also to allow the testing of products to satisfy both the demands of direct customers and the broader requirements for international trade (such as ISO). To be consistent with measurements made elsewhere, such measurements should also be traceable¹ to International or National measurement standards.

The technical infrastructure in each country that underpins the measurement requirements of industry and ensures that measurements are consistent and traceable, is termed the National Measurement System. In the UK for example, this system comprises the hierarchy of calibration and testing laboratories, many of which are accredited by the United Kingdom Accreditation Service (UKAS). These laboratories carry out measurements and calibrations for industry traceable to National measurement standards held in the UK's National Metrology Institute, the National Physical Laboratory (NPL). In addition to providing measurement standards for use by other laboratories, the NPL also offers traceable measurements for industry when the highest accuracy is required.

To ensure world-wide consistency of measurements, all the National Metrology Institutes (NMI's) in the world work in harmony. This is carried out under the auspices of the International diplomatic treaty, the Treaty of the Metre, signed in 1875 whereby Nations agreed, amongst other things, to the setting up of the International Committee of Weights and Measures (CIPM). Besides establishing the worldwide definitions of physical units, the CIPM organises an ongoing series of key comparisons between NMI'S to support the mutual recognition of measurement standards and calibration certificates. These key comparisons also involve regional metrology organisations, such as EUROMET (EU +EFTA +European Commission), APMP (Asia Pacific Metrology Programme) and SIM (Canada, USA, Mexico plus most Latin, South American and Caribbean states), which act as regional focuses for the growing number of NMI's throughout the world. **This means that UKAS and NPL calibrations offered by Pyser-SGI will satisfy the requirements of NIST, DIN and all other NMI's across the world.**

¹ BS5233 : 1986 defines traceability as 'The property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons'.

Pyser-SGI Limited offers calibration of its scales and grids from the most appropriate laboratory to suit the customer requirements – the choice of laboratory is normally dependent on the nature of the calibration and the accuracy required.

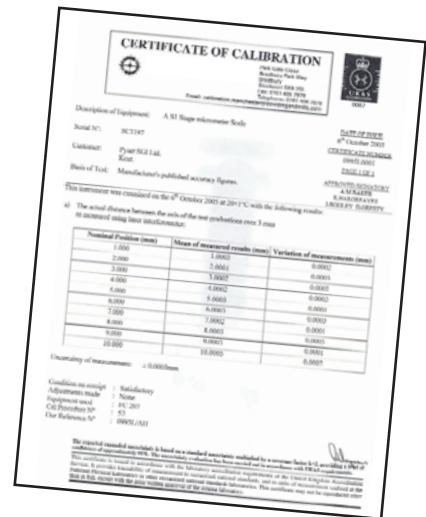
a) Calibration by NPL

The National Physical Laboratory carries out measurements at selected points on the scales and grids and issues a certificate of calibration.



b) Calibration by UKAS accredited laboratory

A UKAS accredited laboratory carries out measurements at selected points on the scales and grids and issues a calibration certificate.



c) Measurement by Graticules

For applications that do not require the accuracy provided by calibration carried out by NPL or a UKAS accredited laboratory, Graticules can provide a Certificate of Comparison. The scale or grid is compared with NPL calibrated in-house standards and a statement is provided on the accuracy of the item with respect to these standards. This certification is not traceable.



When ordering any of the stage micrometers, grids or scales with a calibration certificate please add a suffix to the order code:

- i.e.:- 05A01040/NPL for PS1 with NPL certificate
- 05A01040/NAM for PS1 with UKAS (NAMAS) certificate
- 05A01040/GRA for PS1 with Graticules certificate.

S-Range Stage Micrometers

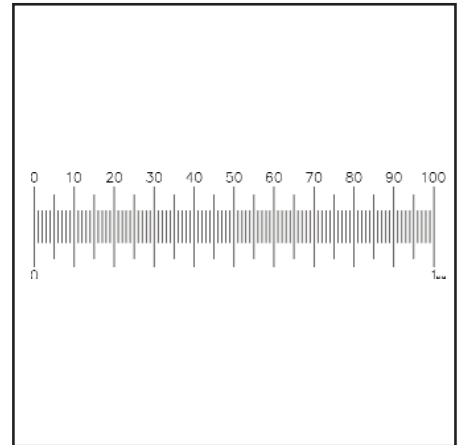
These stage graticules are intended for the routine calibration of eyepiece reticles particularly when alternating between objectives on one microscope or when using the same reticle in different microscopes.

Their robust construction, with metal slide mount, makes them ideal for student use and for instructional purposes. The scale or grid is centred on a glass disc mounted in a black anodised aluminium slide 76mm x 25mm x 1mm thick. The image is created using vacuum deposited chrome which is resistant to normal wear and tear.

Versions are available for transmitted light and reflected (incident) light

Accuracy and Line Widths of Stage Micrometers

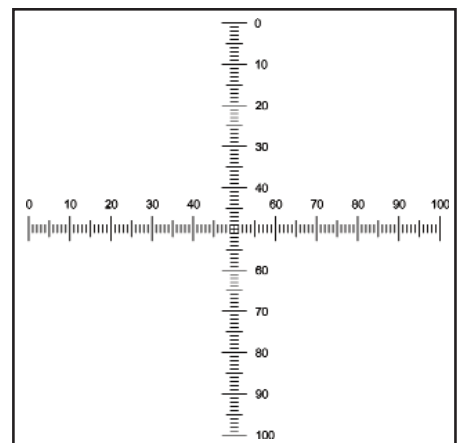
Pattern	Line Width	Accuracy (overall)
S1	0.005mm	Within 0.002mm
S2	0.005mm	Within 0.015mm
S4	0.002mm	Within 0.0001 inch
S8	0.002mm	Within 0.0015mm
S11	0.001mm	Within 0.00005 inch
S12	0.001mm	Within 0.001mm
S16	0.0015mm	Within 0.0015mm
S22	0.0025mm	Within 0.0015mm
S48	0.0027mm	Within 0.0015mm
S78	0.003mm	Within 0.01mm
S20	0.0025mm	Within 0.0015mm
S21	0.0025mm	Within 0.0015mm
S9	0.005mm	Within 0.0015mm
S10	0.004mm	Within 0.0015mm
S28	0.004mm	Within 0.0015mm
S29	0.0025mm	Within 0.0015mm
S1R	0.005mm	Within 0.002mm



For Transmitted Light

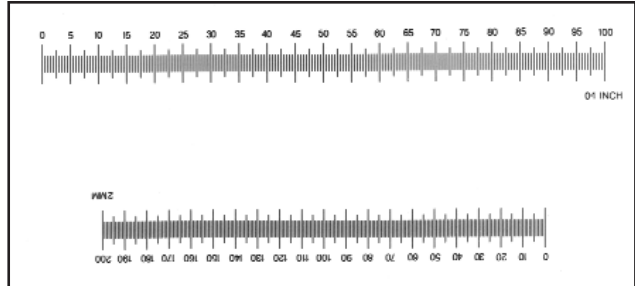
Horizontal micrometer scales and crossed micrometer scales.

Pattern	Description	Order Code
S1	Micrometer scale 10mm in 0.1mm divisions	02A00400
S2	Micrometer scale 5mm in 0.05mm divisions	02A00401
S4	Micrometer scale 0.1inch in 0.001inch divisions	02A00402
S8	Micrometer scale 1mm in 0.01mm divisions	02A00404
S11	Micrometer scale 0.005inch in 0.0001inch divisions	02A00407
S12	Micrometer scale 0.1mm in 0.002mm divisions	02A00408
S16	Crossed micrometer scales 1mm in 0.01mm divisions	02A00429
S22	Micrometer scale vertical 2mm in 0.01mm divisions	02A00411
S48	Micrometer scale 1mm in 0.01mm divisions, no coverglass	02A00414



Combined Metric/Imperial Scales

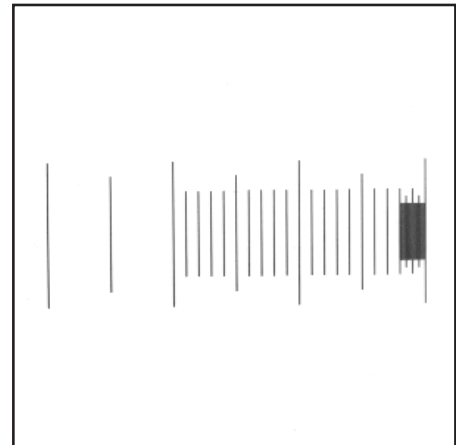
Pattern	Description	Order Code
S20	Double micrometer scale 2mm in 0.01mm divisions and 0.1inch in 0.0005inch divisions	02A00409



Grouped Graduation Scale

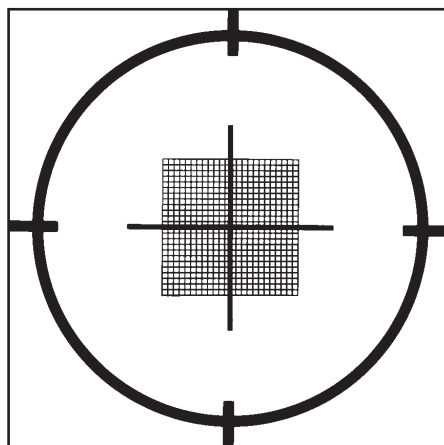
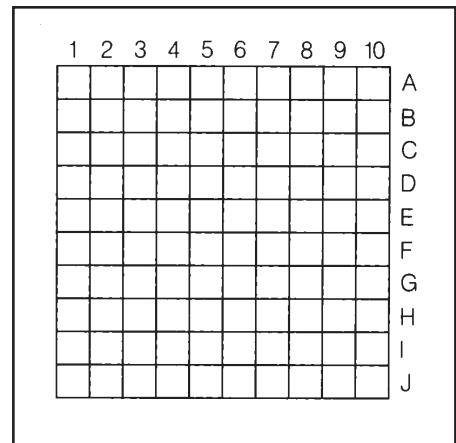
For speedy determination of a range of feature sizes within a given specimen.

Pattern	Description	Order Code
S21	Micrometer scale 5mm in 0.5mm divisions, 2mm in 0.1mm divisions, and 0.2mm in 0.01mm divisions	02A00410



Grids

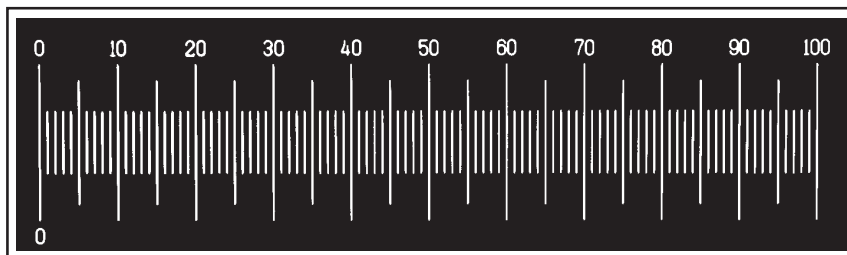
Pattern	Description	Order Code
S9	Counting slide 0.1mm squares.	02A00405
S10	Counting slide 0.05mm squares.	02A00406
S28	0.01mm grid / 0.2 x 0.2mm overall.	02B00428
S29	0.01mm grid / 1.5 x 1.5mm overall.	02B00429



For Reflected Light

These scales are etched through highly reflective vacuum coated metal. When viewed under vertical illumination, as with a metallurgical microscope, the scale appears black against a bright background.

Pattern	Description	Order Code
S78	Micrometer scale 1mm in 0.01mm divisions,	02B00421
S1R	Micrometer scale 10mm in 0.1mm divisions,	02A00440



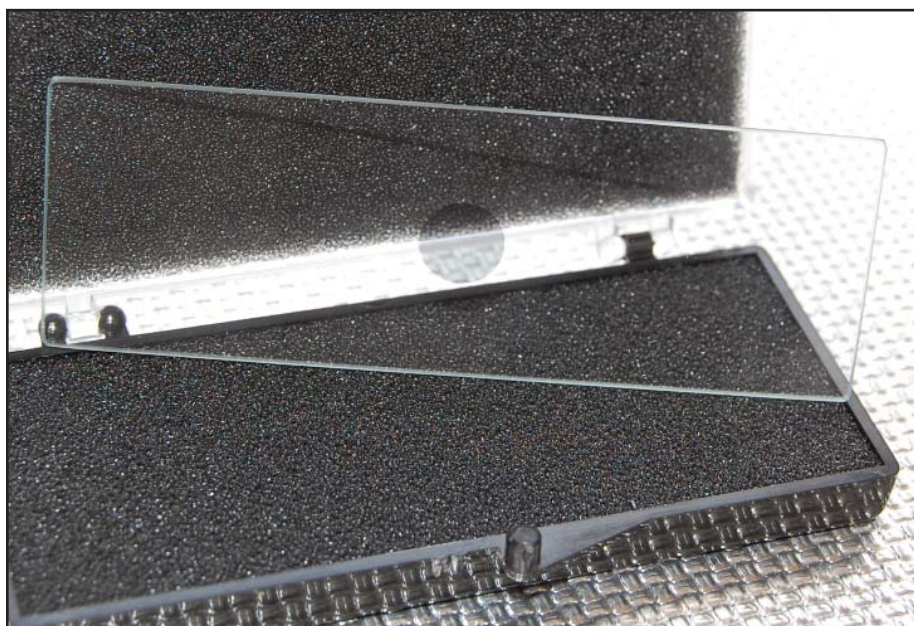
Diamond Ruled Stage Micrometer

Stage micrometers with very fine well defined lines are available from Pyser-SGI. These reference scales offer substantial improvements in definition over the standard types when used under the highest magnification. This is made possible by the use of diamond cutting tools and a special ruling engine

The S91 has clear lines ruled through a semi-opaque metal film which, with transmitted light, appear as bright lines on a dark background.

The micrometer is made on a glass substrate 76mm x 26mm x 1.2mm thick. The lines are 1 micron wide or less and 3.5mm long. The metric rulings provide a scale of 1mm divided into 0.1mm parts, with one part being sub-divided into 0.01mm parts.

Pattern	Description	Order Code
S91	Diamond ruled stage micrometer	02D00481



H.S.E./N.P.L. MKIII Test Slide for Phase Contrast Microscopy

This test slide is made in the UK under licence from the National Physical Laboratory.

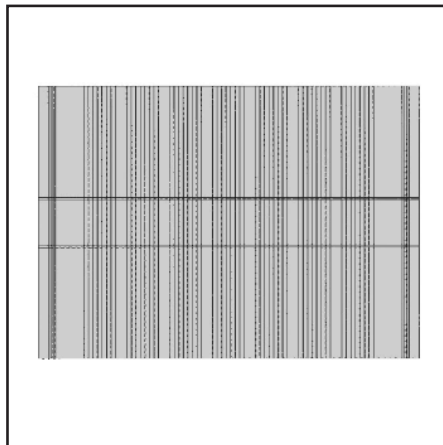
It is an epoxy replica of a master slide produced and certified by that laboratory. The replicas are mounted on microscope slides of 1.2 mm thickness with cover glass of 0.17 mm thickness.

The purpose of the slide is to provide a standard means to check the performance of phase microscopes prior to the analysis of asbestos. The pattern consists of seven bands of twenty lines with widths ranging from 0.25 μ to 1.1 μ m.

A satisfactory system will detect block 5. Full details are supplied with the slide.

Pattern	Description	Order Code
S84	HSE Test slide for calibration in asbestos analysis	02F00490

Block No.	Ridge Width (Micrometers)	Maximum Calculated Phase Change (in degrees) for light rays (wavelength = 530 nanometers) passing through test objects.
1	1.08	6.6
2	0.77	4.7
3	0.64	3.9
4	0.53	3.2
5	0.44	2.7
6	0.36	2.2
7	0.25	1.5

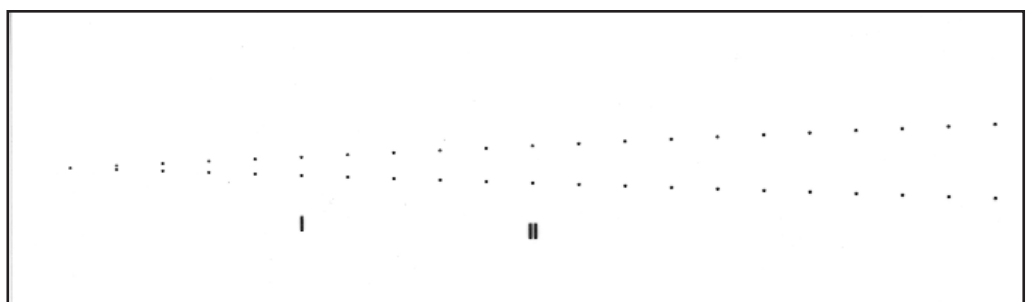


Vibration (FOE PPL Dot)

The amount of vibration of the slide in the appropriate axis is determined by the pair of dots which appear to merge into a single dot.

The pattern on the S25 is an array of 20 pairs of dots converging on a single dot. The distance between each dot pair increases by 0.001 inch to a maximum of 0.02 inches, pairs being equispaced 0.25 inch.

Pattern	Description	Order Code
S25	FOE PPL Dot vibration test pattern	02A00421



Finder Graticules

Finder graticules are used to swiftly and accurately give a position of reference to an area of interest on a specimen slide.

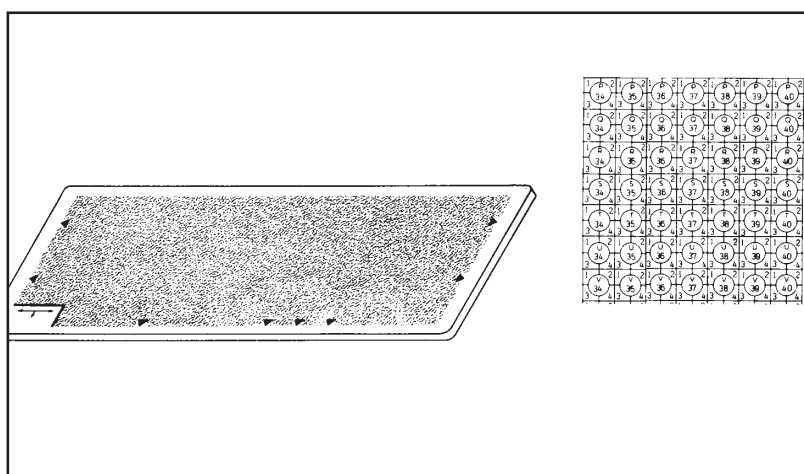
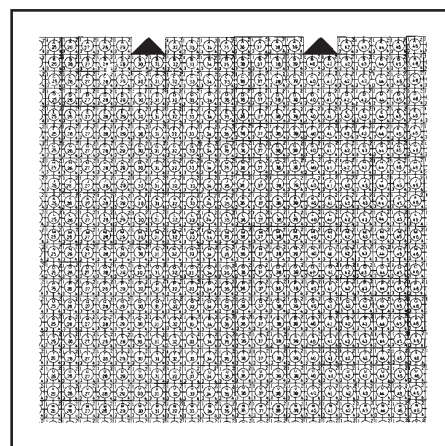
The England Finder - 9045 Findable Locations

The England Finder is a glass slide marked over the top surface in a way that a referenced position can be directly read relative to the locating edges.

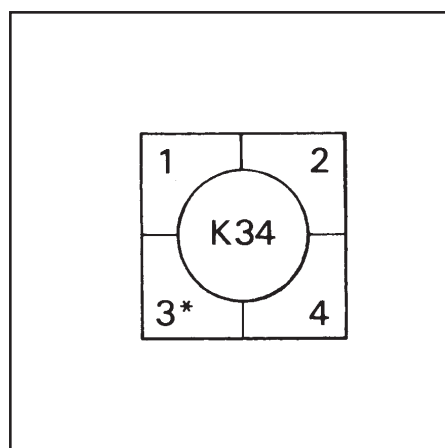
All England Finders produced by Graticules for over 40 years are identical. The purpose of the finder is to give the microscopist an easy method of recording the position of a particular field of interest, so that the same position can be re-located at a later date, or by another person in another laboratory, or when using any other England Finder on any other microscope.

The location of the arrows is identical for all England Finder slides. The method of use is as follows: Mark a label on the left hand side of the specimen slide, indicating the orientation to be repeated. By replacing the specimen slide with the England finder, taking care not to disturb the position, the feature of interest can be noted. The feature can also be re-located at another place or time by reversing the procedure. A total of 9045 positions on a 76mm x 26mm slide can be accurately located.

Pattern	Description	Order Code
S7	The England Finder	02A00403



The ruled area is approximately 73mm x 24mm, each square is approximately 1mm and line width is nominally 25µ



The Halton Finder

Pattern as per S7 but covers only a 5mm x 5mm area in the form of a stage graticule.

Pattern	Description	Order Code
S30	The Halton Finder	02A00413

PS-Range Stage Calibration Standards

Stage calibration standards differ from the stage micrometers in that they have a unique serial number etched into the surface of the slide mount, so they are fully traceable when supplied with a certificate of calibration. This means that they satisfy the requirements of ISO traceability.

Pyser-SGI Limited Graticules Division can arrange for the calibration of its scales and grids to be carried out by the most appropriate laboratory to suit the customer requirements - the choice of laboratory is normally dependent on the nature of the calibration and the accuracy required.

a) Calibration by NPL

The National Physical Laboratory carries out measurements at selected points on the scales and grids and issues a certificate of calibration.

b) Calibration by UKAS Accredited Laboratory

A UKAS accredited laboratory carries out measurements at selected points on the scales and grids and issues a calibration certificate.

c) Measurement by Graticules

For applications which do not require the accuracy provided by calibrations carried out by NPL or a UKAS accredited laboratory, Graticules can provide a Certificate of comparison. The scale or grid is compared with NPL calibrated in-house standards and a statement is provided on the accuracy of the item with respect to these standards.

When ordering any of the following parts with calibration certificate please add a suffix to the order code

- ie:- 05A01040/**NPL** for PSI with NPL certificate
- 05A01040/**NAM** for PSI with UKAS (NAMAS) certificate
- 05A01040/**GRA** for PSI with Graticules certificate

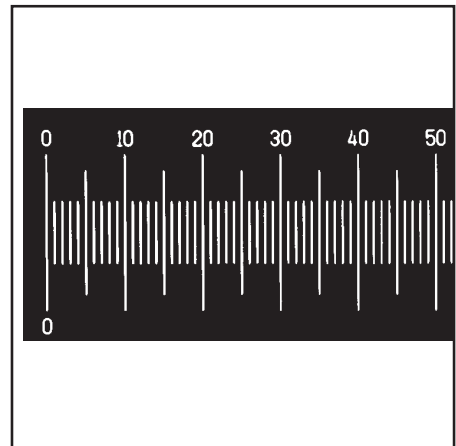
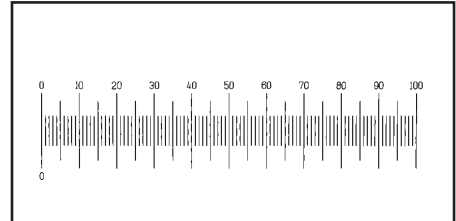


Microscope Standards for Calibration of Eyepiece Graticules

The scale is created as a vacuum deposited chrome image on a glass disc. The glass discs are then mounted in stainless steel slides with engraved serial numbers. Each slide is supplied in a polished wooden presentation and storage box to distinguish it as a traceable standard of high value.

For Transmitted Light

Pattern	Description	Order Code
PS1	Micrometer scale 10mm in 0.1mm divisions.	05A01040
PS4	Micrometer scale 0.1inch in 0.001inch divisions.	05A01041
PS5	Micrometer scale 20mm in 0.01mm divisions.	05B01048
PS8	Micrometer scale 1mm in 0.01mm divisions.	05A01042
PS12	Micrometer scale 0.1mm in 0.002mm divisions.	05A01043
PS16	Crossed micrometer scale 1mm in 0.01mm divisions.	05A01040



For Reflected (incident) Light

Pattern	Description	Order Code
PS78	Micrometer scale 1mm in 0.01mm divisions.	05B01050
PS1R	Micrometer scale 10mm in 0.1mm divisions.	05A01047

Accuracy and Line Widths of PS Calibration Standards

Pattern	Line Width	Accuracy (overall)
PS1	0.005mm	Within 0.002mm
PS4	0.002mm	Within 0.0001 inch
PS8	0.002mm	Within 0.001mm
PS12	0.001mm	Within 0.001mm
PS16	0.0015mm	Within 0.001mm
PS78	0.003mm	Within 0.01mm
PS1R	0.005mm	Within 0.002mm

Universal Calibration Slide

Calibration of microscopes and image analysis systems is becoming more sophisticated, with the requirement being for a variety of image patterns to satisfy the numerous parameters. Pyser-SGI has introduced a new multi-function calibration standard specifically for these applications.



Multiple images on a single slide provide the most cost-effective solution to calibration and resolution checking of microscopes and image analysis systems. The combination of scales, dots, circles, squares, rulings, grids and angles can be supplied with an internationally traceable certificate of calibration for those who require ISO conformity.

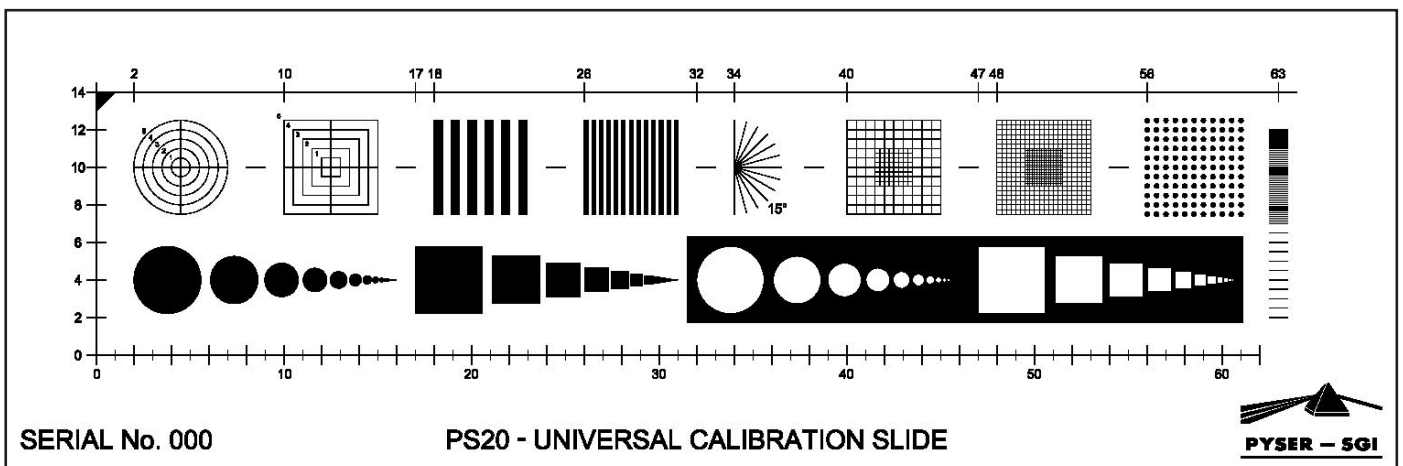
Each glass slide has a unique permanent serial number and can be supplied with full or partial UKAS certificate of accuracy.

Starting from a fixed 'Datum point' mark, each individual pattern or array can be located using X, Y coordinates. See table (over).

Pattern	Description	Order Code
PS20	Universal calibration slide	05B01095

General Specification

General tolerance (microns)	Feature size	Tolerance
	≤ 10	0.5
	10-50	1.0
	50-127	1.3
	127-250	1.9
	> 250	2.54
Coating	Enduring evaporated chrome image	
Optical density	>2.5	
Substrate	Soda lime glass	
Size	76mm x 25mm x 1.5mm	
Package	Polished wooden case	



PS20 Universal Calibration Slide Image Details

ID	Pattern Name	Location	Description
A	Concentric Circles	X=2 Y=10	1, 2, 3, 4, 5mm Circles with Cross Line and circle identifier. Line width 20 μ m
B	Concentric Squares	X=10 Y=10	1, 2, 3, 4, 5mm Squares with Cross Line and circle identifier. Line width 20 μ m
C	Line Grating 25 lines /mm	X=18 Y=10	12.5 Line Pairs per mm (40 μ line 40 μ space)
D	Line Grating 100 lines /mm	X=26 Y=10	50 line pairs per mm (10 μ line 10 μ space)
E	Half Protractor	X=34 Y=10	15° Spacing Line width 20 μ
F	Grid Array Coarse	X=40 Y=10	5mm square array with 0.5mm divisions and central 2mm square with 0.25mm divisions. Line width 20 μ
G	Grid Array Fine	X=48 Y=10	5mm square array with 0.1mm divisions and central 2mm square with 0.05mm divisions. Line width 8 μ
H	Dot Array	X=56 Y=10	Dot diameter 0.25mm, dot centre to centre spacing 0.50mm — 11x11 grid=121 dots
I	Geometric progression of Opaque Dots	X=2 Y=4	<p>Line array of dot or square shapes, of either clear or opaque. Reducing in size in a Root 2 progression for the purposes of edge threshold detection to enable an image analyser to measure the size correctly, or general shape size comparison.</p> <p>Root 2 progression of 21 dots or square shapes, from 3.5μm to 3.5mm</p> <p>Nominal size in mm Dot/square size — Large to small in mm 3.5833; 2.5338; 1.7917; 1.2669; 0.8959; 0.6335; 0.4479; 0.3167; 0.2240 0.1584; 0.1120; 0.0792; 0.0560; 0.0396; 0.0280; 0.0198; 0.0140; 0.0099; 0.0070; 0.0049; 0.0035</p>
J	Geometric progression of Opaque Squares	X=17 Y=4	
K	Geometric progression of Clear Dots	X=32 Y=4	
L	Geometric progression of Clear Squares	X=47 Y=4	
M	Vertical Scale Fine Variable	X=63 Y=2	Overall Scale length 10mm. 5mm in 0.5mm divisions. Line width 20 μ 4mm in 0.1mm divisions. Line width 10 μ 1mm in 0.01mm divisions. Line width 3 μ
N	Horizontal Scale Coarse	X=0 Y=0	Scale length 62mm long in 2mm divisions, subdivided in 1mm divisions with a 20 μ line width

Long Linear Glass Scales

Parallax free readings

High levels of accuracy. Hard wearing scales in vacuum deposited chrome on substantial glass substrates. For measurement and calibration of instruments and standards.

Pattern	Description	Order Code
PS50	Micrometer scale 50mm in 0.1mm divisions.	05B01051
PS150	Long scale 150mm in 0.1mm divisions.	05B01055
PS150HS	Long scale 150mm in 1mm divisions.	05B01060
PS300	Long scale 300mm in 0.1mm divisions.	05B01056
PS300HS	Long scale 300mm in 1mm divisions.	05B01061
PS500	Long scale 500mm in 1mm divisions.	05B01057
PS1000	Long scale 1000mm in 1mm divisions.	05B01058

Pattern	Specification	Line Width	Accuracy (overall)	Size (overall)
PS50	50mm in 0.1mm	0.012mm	Within 0.002mm	75mm x 75mm x 3mm
PS150	150mm in 0.1mm	0.03mm	Within 0.015mm	180mm x 30mm x 6mm
PS150HS	150mm in 0.1mm	0.07mm	Within 0.01mm	180mm x 30mm x 6mm
PS300	300mm in 0.1mm	0.03mm	Within 0.025mm	330mm x 30mm x 6mm
PS300HS	300mm in 1mm	0.07mm	Within 0.01mm	330mm x 30mm x 6mm
PS500	500mm in 1mm	0.07mm	Within 0.01mm	530mm x 30mm x 6mm
PS1000	1000mm in 1mm	0.07mm	Within 0.01mm	1066mm x 30mm x 6mm



Measuring Scales

These are standard glass scales for in-contact measurements. Ideal for direct vision, for pocket magnifiers and for use in measuring profiles on projector screens.

Pattern	Description	Order Code
P6	Contact nonparallax scale 100mm in 0.1mm divisions. Overall size 125mm x 25mm x 2.5mm Line width 0.020mm	22B01300
P16	Contact nonparallax scale 300mm in 0.5mm divisions. Overall size 325mm x 25mm x 2.5mm Line width 0.020mm	22B01303



Calibration Grids

For checking two-dimensional instruments for straightness and accuracy. The patterns are produced in vacuum deposited chrome on glass.

- Lines every 10mm
- Central 20mm subdivided in 1mm rulings.
- Line width 0.008mm
- Linear straightness 0.002mm.
- Angular accuracy within 5 seconds



	PGR 100	PGR 200
Overall divided area	100 x 100mm	140 x 220mm
Glass size	120 x 120mm	160 x 240mm
Glass thickness	6mm	6mm

Pattern	Description	Order Code
PGR100	Calibration grid	05B01030
PGR200	Calibration grid	05B01031

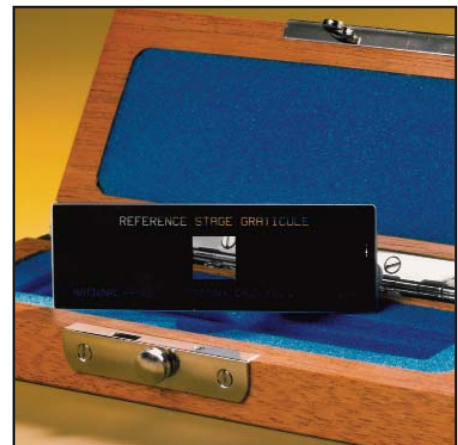
NPL High Precision Optical Dimensional Standards

This range of high precision optical dimensional standards are supplied complete with internationally traceable certificates of calibration from NPL. For full technical information please contact Pyser-SGI Limited, Graticules Division.

Image Analysis Standard (Reference Stage graticule)

This calibration stage contains four test areas comprising; a 400 x 400 micron square grid, a 20 x 17 monosize array of 15 micron diameter spots, a Root-2 array of spots from 3 to 48 micron diameter, and a log normally distributed array of 100 spots ranging from 4.5 to 27 micron diameter. It is ideally suited for calibrating image analyser systems and can also be used as a high precision micrometer.

Pattern	Description	Order Code
RSG	Reference stage graticule 75mm x 25mm slide	05B01085



For all other NPL High Precision Dimensional Standards including:

- Two dimensional grid plate standards
- Line scale standards
- Line width standards
- Optical dimensional standards

Please contact Pyser-SGI Limited



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