### **Critical Dimension (CD) Test Specimen**

This specimen is of particular interest to microscopists and test engineers using high performance SEMs for critical measurement of semi-conductor line width dimensions.

The  $4.8 \times 4.5$ mm silicon standard has a series of chess patterns around its edges with a side length of  $480 \mu$ m. These can be used for optimising imaging parameters and distortion checking.

The central area of the standard contains a series of four line patterns each clearly identified with its pitch size. Each pattern is made up form 5 bars and spaces of equal width. Pitches for the individual patterns range in size from  $1.0\mu$ m -  $10\mu$ m. Each standard is identified by a unique serial number. Three forms are available - non certified, certified with the manufacturers certificate or certified by the **G**erman **P**hysikalisch **T**echinische **B**undersanstalt. For certified standards each pitch is measured and a mean value calculated from a series of five measurements. Measured were made on a dedicated CD measuring system fitted to a FEG SEM at an accelerating voltage of 700eV. The specimen can be unmounted or mounted on any standard SEM stub - please specify.

S608CD calibration specimen non certifiedS608/MCCD calibration spec. (manufacturers cert.)S608/GPTBCD calibration specimen certified by GPTB

### **Standards for X-ray Microanalysis**

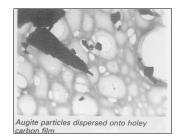
X-ray Reference Standards for T E M

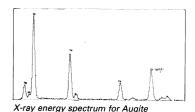
These standards are supplied as fine powders dispersed onto holey carbon films on 400 mesh 3mm  $\emptyset$  copper grids and are selected from a range of certified material and synthetic compounds. The universal set contains 25 compound standards and the rare earth set 14 compounds.

**S609** Universal TEM X-ray standard set

S610 Rare earth TEM X-ray standard set

10.0		100
5.0	- 11 -	5.0
2.0		2.0
1.0	]	1.0





### Boron Carbide Standard

A dispersion of small boron carbide particles on a 3mm carbon coated grid which provides a low atomic number analysis standard for determining the energy resolution of wavelength dispersive X-ray spectrometers

S611 Boron carbide on 3mm grid

each

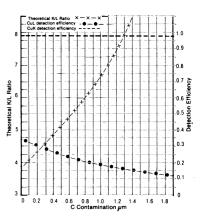
### **Copper Foil on Aluminium Grid**

A specimen used to determine detector efficiency.

This is a dual purpose specimen which generates two well separated K-lines to check the calibration of the X-ray detector. The aluminium generates a low energy line at 1.49keV and the copper K-alpha peak occurs at 8.04keV. The copper film has a very uniform thickness of about 60nm and carbon coated on both sides. The ratio of the Cu K/Cu L X-ray intensities is measured for assessing detector efficiency. Although detector efficiency is assumed to be constant any contaminant on the beryllium window can be detrimental to performance.

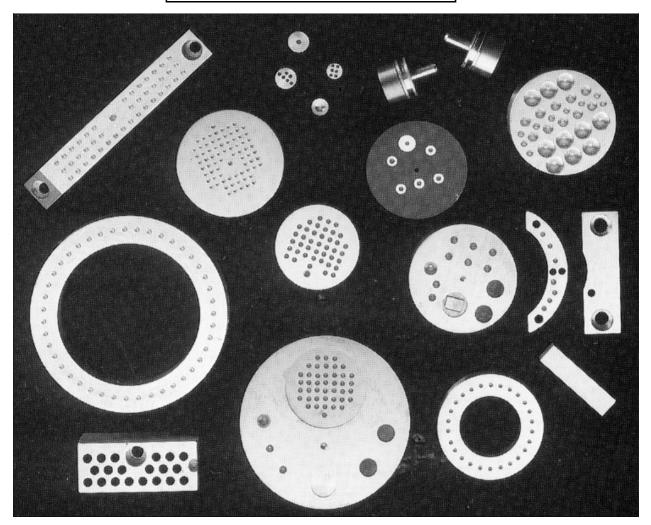
S612 Calibrating copper foil for X-ray detectors on 3mm grid

each



### X-ray Reference Standards for S E M

### Micro Analysis Consultants Range



#### Examples from the Range of Standard Holders Available

We can supply standards from **Micro Analysis Consultants** that are suitable for electron beam Energy Dispersive or Wavelength Dispersive X-ray microanalysis systems. Only high quality reference samples are used for fitting into the brass blanks (or aluminium, stainless steel or carbon resin to order) after diamond polishing to a 0.25µm finish. They are then carbon coated.

All samples are supplied with a certificate of analysis and many standards are traceable to a national institution. Each block of standards has its own unique number and comes with a map for standard identification. A Faraday cage for accurate specimen current measurements is standard on some blocks and available as an option on others. Carousels, 13mm Ø blocks to fit pin stubs and singles of 5mm, 3mm and 2mm are also available.

3

### SEM Calibration Block

This block of standards is used to calibrate, set up and check most of the functions of an SEM with optional Energy-Dispersive X-ray analysis, Specimen Current and Backscattered Electron Detector.

4 styles available in 32mm x 8mm brass block 1 version available in 50mm x 8mm brass block

S613 SEM calibration block

each

### **Backscattered Electron Detector Calibration Standard**

30mm x 5mm Carbon Block. Checks Detector and SEM performance with certified standards for system calibration.

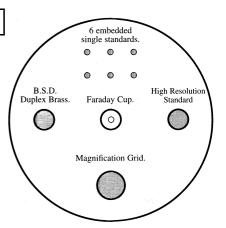
Contains:

Standards to check 1 Atomic number resolution Faraday cage to to set probe current Duplex brass to check 0.1 Atomic number resolution

S614	Backscattered ED calibration standard	each	
Also available 5mm x 5mm single standards containing 2 elements:			
S615/1	Platinum/Gold (Atomic numbers 78/79)	each	
S615/2	Palladium/Silver (Atomic numbers 46/47)	each	
S615/3	Nickel/Silver (Atomic numbers 28/29)	each	
S615/4	Aluminium/Silicon (Atomic numbers 13/14)	each	
S615/6	Copper/Nickel	each	

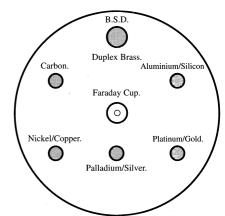
5mm x 5mm single standard containing:

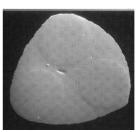
S615/5 Duplex brass (0.1Z Mean atomic number between phases)



3

#### **Other block combinations** available - please ask



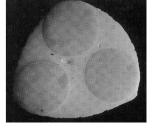


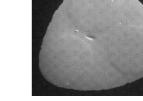
InSb

HgTe

PbTe

Bi<sub>2</sub>Se<sub>3</sub>





## **Standard Sets**

**Semiconductor Block** 

GaAs

#### **Biological Block**

BN	Al	CaCO₃	FeS <sub>2</sub>	BaSO₄
C	SiO₂	CaCO₄	Se	B1
NaCl	KCI <sup>2</sup>	Ti	InP	Faraday
MgO	KBr	V	BaF <sub>2</sub>	Cup

S244 25mm Ø Biological block with Faraday Cage S245 32mm Ø Biological block with Faraday Cage

B C Mg <sub>2</sub> Sn	Si	CuS <sub>2</sub>	
С	CaF <sub>2</sub>	ZnS	
Mg <sub>2</sub> Sn	FeSi <sub>2</sub>	GaP	
1. 6.0	- o <sup>2</sup>	<u> </u>	

Fe<sub>2</sub>S<sub>2</sub>

Al<sub>2</sub>ŠiO<sub>3</sub>

Bi<sub>2</sub>Te<sub>3</sub> S248 25mm Ø Semiconductor standards set S249 32mm Ø Semiconductor standards set

Ge  $Ag_2S$ 

CdS

InP

#### **42 Standard Universal Block**

Jade MgO Al2O3 Ortho Wollas Ti V Cr Mn	Fe FeS <sub>2</sub> Co Ni Cu Zn GaP Ge Se	SrF <sub>2</sub> Y Zr Nb Mo Rh Pd Ag Cd	InAs Sn Baf <sub>2</sub> LaB <sub>6</sub> CeAl <sub>2</sub> Hf Ta W	lr Pt Au HgTe PbTe Bi
S242 S243		al block 25 al block 32		

Universal block 32mm Ø

#### **Rare Earth (REE-glass)**

Y,Pr,Dy,Er	La
Ce,Eu,Ho,TM	No
All 15	GI

,Sm,Gd,Yb d,Tb,Lu lass Blank

S353 Rare earth (REE-glass) block 25mm Ø

Ra	are Ear	th Blo	ck
$\begin{array}{c} LaB_6\\ LaF_3\\ CeAl_2\\ PrF_3 \end{array}$	$\begin{array}{c} NdF_3\\SmF_3\\EuF_3\\GdF_3\\LuF_3 \end{array}$	$\begin{array}{c} TbF_3\\TbSi_2\\DyF_3\\HoF_3\\LuSi_2 \end{array}$	${\rm ErF_3}$ Tm TmSi <sub>2</sub> YbF <sub>3</sub>
S246 S247		rth block 2 rth block 3	••••••

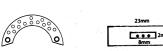
45 S	tanda	rd + F( Block	C Unive	ersal
В	V	GaP	Pd	Hf
BN	Cr	Ge	Ag	Та
С	Mn	Se	Cd	W
Jade	Fe	$SrF_2$	InAs	lr
MgO	FeS <sub>2</sub>	Y	Sn	Pt
$Al_2O_3$	Co	Zr	Sb	Au
Ortho	Ni	Nb	BaF <sub>2</sub>	HgTe
Wollas	Cu	Мо	LaB <sub>6</sub>	PbTe
Ti	Zn	Rh	CeAl <sub>3</sub>	Bi

S354 45 Standard + FC universal block 25mm Ø

S355 45 Standard + FC universal block 32mm Ø

### **Special Holders for EMs**

S250 for JSM 35



holder is	the same price as the holder with 21 standards.
S250	JSM 35 standard block containing 21 standards
S251	JEM 100CX STEM block containing 7 standards
S252	JXA 733 standard holder containing 12 standards
S253	JEOL Temscan bulk holder containing 3 standards

### Transmission Standards

### **Thin Foil**

A comprehensive range of high purity metal foils 3mm x 0.1mm Ø to fit into TEM grid holders for use in STEM mode. They are polished to a 3 µm finish.

Al	Hf	Ni	Ag	V
Cd	In	Nb	Ta	Y
Co	Fe	Pd	Sn	Zn
Cu	Mg	Pt	Ti	Zr
Au	Mo	Rh	W	316

S254 Thin foil standard set

A range of thin film microanalysis standards for calibrating energy-dispersive detectors for thin film microanalysis. These come on 3mm Ø copper (or user choice) grids or holey carbon films for TEMs.

Thin Film

These holders are specials and are hand polished. Pricing is per holder and not the number of specimens in the holder. A holder containing 10 standards in a 21 standard

#### **Universal Thin Film Sets**

Ag₂Te₃	CaWO <sub>4</sub>	GaAs	KAlSi₃O <sub>8</sub>	K453
BaSO₄	CdTe	Gd₃Ga₅O₁₂	LaB₅	SrTiO₃
Be <sub>3</sub> Al <sub>2</sub> Si <sub>6</sub> O <sub>18</sub>	CeAl <sub>2</sub>	HgŤe	Li <sub>2</sub> Ta <sub>2</sub> O <sub>6</sub>	TIBr
Bi₂Se₃	Cu <sub>2</sub> S	InP	(Mg.Fe)₂SiO₄	ZnS
CaMoO₄	FeCr <sub>2</sub> O <sub>3</sub>	InSb	Na₃AlF <sub>6</sub>	ZrSiO₄

S255 Universal thin film set on 3mm grid

CeAl2

LuF3

**Rare Earth Thin Film Set** 

HoF3 SmF3 DvF3 LaF3 TbF3 ErF3 TmF3 EuF3 NdF3 YbF3 GdF3 PrF3

S256 Rare earth thin film set on 3mm grid

### **Compound and Pure Standards**

available Compound standards from Augite are (Ca,Mg,Fe)<sub>2</sub>(SiAl)<sub>2</sub>O<sub>6</sub> to Zircon ZrSiO<sub>4</sub>.

Pure standards are available from Ag (silver) to Zr (Zirconium) Please ask for quotation.

### MBH/NIST/NBS/BAS Material

A range of materials to the above standards is available including stainless steels, brass, gold/copper wires, phosphor bronze etc., etc.

Please ask for list

O 000000000 0

S252 for JXA 733



S251 for JEM 100CX

Others available to special order