PAS 5500/850D ACCEPTANCE TEST SPECIFICATIONS AND RESULTS

Model: PAS 5500/850D

Wafer size: 200 mm (8 in)
Software release: 8.8.6 and up
Actual software release: 8.9.0.C
Test completion date: TBD

Setting	NA	σ
1	0.80	σ_{in} = 0.55 σ_{out} = 0.85
2	0.70	σ_{in} = 0.55 σ_{out} = 0.85
3 High sigma DUV	0.80	σ_{in} = 0.72 σ_{out} = 0.92
4 Low sigma DUV	0.80	σ_{in} = N/A σ_{out} = 0.25
5 Dipole-DUV-35X	0.80	σ_{in} = 0.55 σ_{out} = 0.85
6 Dipole-DUV-35Y	0.80	σ_{in} = 0.55 σ_{out} = 0.85
7 QUASAR-DUV-quadrupole-30	0.80	σ_{in} = 0.55 σ_{out} = 0.85
8	0.80	σ = 0.40
9 DOE Multipole-4 DUV 30-45	0.80	σ_{in} = 0.55 σ_{out} = 0.85

Note: Shaded settings (Nos. 3 - 9) and specifications (Nos. 12 – 20) are for options.

Parameter		Specification (absolute values)	FAT Measured (date)	FAT Accept	SAT Measured (date)	SAT Accept
SYSTEM ACCEPTANCE TESTS						
1 Illumination and dose control						
1.1 Integrated slit uniformity, Setting 1	[%]	≤ 0.7	N/A ( )	Yes	0.69% (5/19/21)	Yes
1.2 Illumination intensity, Setting 1	[mW/cm²]	≥ 3300	( )	Yes	3970 (5/19/21)	Yes
1.3 Dose repeatability and accuracy at doses ≥ 10.0 mJ/ cm²						
Dose repeatability	[%]	≤ 0.3		Yes	0.11	Yes
Dose accuracy	[%]	≤ 1.0	( )	Yes	-0.74 (5/21/21)	Yes
1.4 Dose matching	[%]	≤ 2.0	SAT only		Cal ( )	Yes
1.5 Reticle masking half shadow size at wafer level			Max:		Max:	
in X direction	[µm]	≤ 300		Yes		Yes
in Y direction	[µm]	≤ 300	( )	Yes	( )	Yes
2 Imaging performance						
2.1 Intra-field CD control after reticle error correction (3σ): 0.11 µm H & V lines biased up to max ± 10% from nominal at best energy						
Dense lines: Setting 1						
CD variation, at best focus, + 0.2 µm and – 0.2 µm	[nm]	≤ 10	( )	Yes	( )	Yes
CD variation at best focus	[nm]	≤ 7	( )	Yes	( )	Yes
Isolated lines using OPC: Setting 2						
CD variation, at best focus, + 0.15 µm and – 0.15 µm	[nm]	≤ 14	( )	Yes	( )	Yes
CD variation at best focus	[nm]	≤ 7	( )	Yes	( )	Yes

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9 DOE Multipole-4 DUV 30-45	0.80	σ_{in} = 0.55 σ_{out} = 0.85

Parameter		Specification (absolute values)	FAT Measured (date)	FAT Accept	SAT Measured (date)	SAT Accept
2.2 Image plane deviation Setting 1	[nm]	≤ 90	( )	Yes	64 (5/19/21)	Yes
2.3 Astigmatism Setting 1	[nm]	≤ 60	( )	Yes	35 (5/19/21)	Yes
3 Dynamic performance						
3.1 Moving standard deviation X & Y (mean + 3σ)	[nm]	≤ 9	( )	Yes	7.7/8.3 (5/20/21)	Yes
3.2 Moving average X & Y (mean + 3σ)	[nm]	≤ 3.0	( )	Yes	1.7/1.2 (5/20/21)	Yes
4 Image distortion						
4.1 Non-correctable error Setting 1	[nm]	≤ 12	( )	Yes	6.9 (5/20/21)	Yes
5 Focus and levelling						
5.1 Total levelling repeatability (3σ)	[nm]	≤ 50	( )	Yes	22.8 (5/24/21)	Yes
6 Overlay performance						
6.1 Stage repeatability	[nm]	≤ 8	( )	Yes	6.8 (5/19/21)	Yes
6.2 Single machine overlay Using Athena	[nm]	≤ 15	( )	Yes	( )	Yes
6.3 Matched machine overlay to ASML holy reference wafer Using Athena	[nm]	≤ 25	( )	Yes	FAT only	
6.4 Matched machine overlay using Athena to reference machine of customers choice [nm] Machine type of reference machine Serial No. of reference machine		See Table 1 for matching specification	SAT only		( )	Yes

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Parameter	Specification (absolute values)	FAT Measured (date)	FAT Accept	SAT Measured (date)	SAT Accept
7 Wafer throughput					
7.1 200 mm wafers, 46 exposures, 16 x 32 mm, 50 mJ/cm² [wafers/hour]	≥ 145	( )	Yes	142.59 (5/24/21)	Yes
7.2 200 mm wafers, 46 exposures, 16 x 32 mm, 50 mJ/cm² With PEP 850D option [wafers/hour]	≥ 157	( )	Yes	( )	Yes
8 Reticle exchange time					
8.1 Flash-to-flash reticle exchange time [s]	≤ 25	( )	Yes	( )	Yes
9 Wafer contamination					
9.1 200 mm wafer contamination Particles (≥ 0.2 µm) added per wafer pass [number]	≤ 5	SAT only		( )	Yes
10 Image quality control					
10.1 3σ Image sensor measurements					
Focus repeatability [nm]	≤ 25		Yes		Yes
(Rx) slit axis tilt repeatability [µrad]	≤ 4.0		Yes		Yes
(Ry) scan axis tilt repeatability [µrad]	≤ 1.5		Yes		Yes
Translation repeatability [nm]	≤ 4.0		Yes		Yes
Magnification repeatability [ppm]	≤ 0.4		Yes		Yes
Die rotation repeatability [µrad]	≤ 0.4	( )	Yes	( )	Yes
11 Batch streaming					
11.1 Batch overhead [s]	≤ 20	( )	Yes	( )	Yes

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Table 1 Matching specification

Matching machine overlay using BA for a /850D to:		Specification
/200B and /250C	[nm]	≤ 85
/300B and /300C	[nm]	≤ 75
/400 and /500	[nm]	≤ 65
/400C and /400 IOSc	[nm]	≤ 55
/500B and /550D, /900	[nm]	≤ 60
/700B, /700C, /700D and /950	[nm]	≤ 55
/5X0 IOSc, /700B IOSC, /700C IOSc and /900 IOSc	[nm]	≤ 50
/750E , /700D IOSc and /950 IOSc	[nm]	≤ 45
/750F	[nm]	≤ 40
/800, /850B and /1100	[nm]	≤ 30
/850C and /1100B /8X0 IOSc-3 and /11x0 IOSc-3	[nm]	≤ 25
Note: If the /850D is matched to a machine without Reticle Blue Align the machine to be matched should be operated using TTL.		

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Parameter		Specification (absolute values)	FAT Measured (date)	FAT Accept	SAT Measured (date)	SAT Accept
OPTIONS ACCEPTANCE TESTS						
12 Reticle inspections, systems with IRIS option						
12.1 Size and position reproducibility						
Position (range)	[mm]	≤ 1.0		Yes		Yes
Size (standard deviation σ)	[µm]	≤ 3.0	( )	Yes	( )	Yes
12.2 Inspection time						
< 200 particles found	[s]	≤ 150	( )	Yes	( )	Yes
12.3 Size accuracy						
10 µm latex spheres	[µm]	± 3.0		Yes		Yes
30 µm latex spheres	[µm]	± 3.0		Yes		Yes
50 µm latex spheres	[µm]	± 5.0	( )	Yes	( )	Yes

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9 DOE Multipole-4 DUV 30-45	0.80	σ_{in} = 0.55 σ_{out} = 0.85

Parameter		Specification (absolute values)	FAT Measured (date)	FAT Accept	SAT Measured (date)	SAT Accept
13 UNICOM uniformity improvement option						
13.1 Integrated slit uniformity						
Setting 1	[%]	≤ 0.5		Yes		Yes
Setting 8	[%]	≤ 0.6	( )	Yes	( )	Yes

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8	0.80	σ = 0.40
9 DOE Multipole-4 DUV 30-45	0.80	σ_{in} = 0.55 σ_{out} = 0.85

Parameter		Specification (absolute values)	FAT		SAT	
			Measured (date)	Accept	Measured (date)	Accept
14 IOSc-4 overlay improvement option						
14.1 Stage repeatability	[nm]	≤ 6	( )	Yes	( )	Yes
14.2 Single machine overlay Using Athena	[nm]	≤ 10	( )	Yes	( )	Yes
14.3 Matched machine overlay to ASML holy reference wafer Using Athena	[nm]	≤ 17	( )	Yes	FAT only	
14.4 Matched machine overlay using to a reference machine of the customers choice Using Athena	[nm]	See Table 1 for matching specification	SAT only		( )	Yes
Machine type of reference machine						
Serial No. of reference machine						

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PAS 5500/850D ACCEPTANCE TEST SPECIFICATIONS AND RESULTS

Model: PAS 5500/850D

Test completion date: TBD

Setting	NA	σ
1	0.80	σ_{in} = 0.55 σ_{out} = 0.85
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9 DOE Multipole-4 DUV 30-45	0.80	σ_{in} = 0.55 σ_{out} = 0.85

Parameter		Specification (absolute values)	FAT Measured (date)	FAT Accept	SAT Measured (date)	SAT Accept
15 High-sigma-DUV option						
15.1 Integrated slit uniformity Setting 3	[%]	≤ 1.2	( )	Yes	( )	Yes
15.2 Illumination intensity, Setting 3	[mW/cm^2]	≥ 2300	( )	Yes	( )	Yes
15.3 Image plane deviation Setting 3	[nm]	≤ 120	( )	Yes	( )	Yes
15.4 Astigmatism Setting 3	[nm]	≤ 75	( )	Yes	( )	Yes
15.5 Intra-field CD control after reticle error correction (3σ): 0.10 µm H & V lines biased up to max ± 10% from nominal at best energy						
Dense lines: Setting 3						
CD variation, at best focus, + 0.2 µm and - 0.2 µm	[nm]	≤ 9	( )	Yes	N/A	
CD variation at best focus	[nm]	≤ 7	( )	Yes	N/A	

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4 Low sigma DUV	0.80	σ_{in} = N/A σ_{out} = 0.25
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6 Dipole-DUV-35Y	0.80	σ_{in} = 0.55 σ_{out} = 0.85
7 QUASAR-DUV-quadrupole-30	0.80	σ_{in} = 0.55 σ_{out} = 0.85
8	0.80	σ = 0.40
9 DOE Multipole-4 DUV 30-45	0.80	σ_{in} = 0.55 σ_{out} = 0.85

Parameter		Specification (absolute values)	FAT		SAT	
			Measured (date)	Accept	Measured (date)	Accept
16 Low-sigma-DUV option						
16.1 Integrated slit uniformity Setting 4	[%]	≤ 1.2	( )	Yes	( )	Yes
16.2 Illumination intensity, Setting 4	[mW/cm^2]	≥ 3000	( )	Yes	( )	Yes
16.3 Image plane deviation Setting 4	[nm]	≤ 120	( )	Yes	( )	Yes
16.4 Astigmatism Setting 4	[nm]	≤ 75	( )	Yes	( )	Yes

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Test completion date: TBD

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Parameter		Specification (absolute values)	FAT		SAT	
			Measured (date)	Accept	Measured (date)	Accept
17 Dipole-DUV-35X option						
17.1 Integrated slit uniformity Setting 5	[%]	≤ 1.2	( )	Yes	( )	Yes
17.2 Illumination intensity, Setting 5	[mW/cm^2]	≥ 3000	( )	Yes	( )	Yes

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Parameter		Specification (absolute values)	FAT Measured (date)	FAT Accept	SAT Measured (date)	SAT Accept
18 Dipole-DUV-35Y option						
18.1 Integrated slit uniformity Setting 6	[%]	≤ 1.2	( )	Yes	( )	Yes
18.2 Illumination intensity, Setting 6	[mW/cm^2]	≥ 3000	( )	Yes	( )	Yes

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8	0.80	σ = 0.40
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Parameter		Specification (absolute values)	FAT Measured (date)	FAT Accept	SAT Measured (date)	SAT Accept
19 QUASAR-DUV-quadrupole-30 option						
19.1 Integrated slit uniformity Setting 7	[%]	≤ 1.2	( )	Yes	( )	Yes
19.2 Illumination intensity, Setting 7	[mW/cm^2]	≥ 3300	( )	Yes	( )	Yes
19.3 Image plane deviation Setting 7	[nm]	≤ 120	( )	Yes	( )	Yes
19.4 Astigmatism Setting 7	[nm]	≤ 75	( )	Yes	( )	Yes

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Parameter		Specification (absolute values)	FAT		SAT	
			Measured (date)	Accept	Measured (date)	Accept
20 DOE Multipole-4 DUV 30-45 option						
20.1 Integrated slit uniformity Setting 9	[%]	≤ 1.2	( )	Yes	( )	Yes
20.2 Illumination intensity, Setting 9	[mW/cm^2]	≥ 3000	( )	Yes	( )	Yes
20.3 Image plane deviation Setting 9	[nm]	≤ 120	( )	Yes	( )	Yes
20.4 Astigmatism Setting 9	[nm]	≤ 75	( )	Yes	( )	Yes