Commercial Wafer Specifications

Here are the specification for Si wafers from one of the worlds top companies, Wacker Siltronic, as they appear in the Internet in Nov. 2000.

- Notice: Concentrations here are in cm³. The conversion to parts per .. is simple: The atomic density of Si is 4.96 · 10²² cm⁻³ or about 5 · 10²² cm⁻³.
 1 ppm thus corresponds to 5 · 10¹⁶ cm⁻³.
- The lowest concentration given in the table (look for it) is 5 · 10¹⁰ cm⁻³; it corresponds to 1 ppt or 10⁻¹².

Surface concentrations [S] (given in cm^{-2}) are converted to volume concentrations [V] by [S] = [V] /a with a = lattice constant (= 0,5431 nm) or, more precise for single crystals, distance between the crystallographic planes. With a \approx 0,5 nm = 5 \cdot 10⁻⁸ cm, we have [V] = 5 \cdot 10¹⁶ cm⁻³ = 1 ppm corresponds to S = 10⁸ cm⁻².

Many specifications relate to the "flatness" of the wafers and the perfection of the surface; the abbreviations used are

LLS (sometimes also abbreviated LPDs): *Localized Light Scattering Defect*; this relates to a detection method of **sub-µm** size surface imperfections (resulting from bulk microdefects)

SFQR: Site flatness quality requirements (??): Definitely a measure of flatness in a region comparable to the size of a single chip

(The rest: Who knows?)

Here is a link with precise defininitioons of geometrical parameters: http://www.freiberger.com/english/products/geom_parameters.php

Crystal / Bulk			300mm		200mm			150mm		125mm	100mm
Growth Technique *}			C	Z		CZ		CZ		CZ	CZ
Orientation			1-0-0		1-0-0		1-0-0 / 1-1-1		1	1-0-0 / 1-1-1	1-0-0 / 1-1-1
Orientation Tolerance	degree		± 0.2		± 0.2		± 0.5			± 0.5	± 0.5
Off Orientation	degree		0		0 - 4		0 - 4			0 - 4	0 - 4
Dopant			Boron / Ph	nosphorus	Boron	n / Phosphorus	Bore	on / Phosph	orus	Boron / Phosphorus	Boron / Phosphorus
Resistivity Target Range	pol prime - Boron	Ohmcm	0.5 - 50		0.5 - 50		0.5 - 50			0.5 - 50	0.5 - 50
	pol prime - Phosphorous	Ohmcm	1.0 - 50		1.0 - 50		1.0 - 50			1.0 - 50	1.0 - 50
	epi substrate - Boron	Ohmcm	0.006 - 50		0.006 - 50		0.006 - 50			0.006 - 50	0.006 - 50
Radial Resistivity Variation	Boron typical 1-0-0 / 1-1-	1-0-0/1-1-1 %		< 10		< 5		< 5 / < 6		< 6 / < 10	< 8 / < 9
	Phosph. typical 1-0-0 / 1-1-	I %	< .	< 15		< 15		< 12 / < 25		< 12 / < 25	< 15 / < 25
Oxygen Target Range ± Tol.	pol prime - Boron 1-0-)	4.8 - 7.8 x 10" ± 0.5		5 - 7.8 x 10 ¹³ ± 0.5		5.8 - 8.9 x 10 ¹³ (± 0.6 - 0.8)		.6 - 0.8)	5.8 - 8.9 x 1012 (± 0.5 - 1.0)	5.8 - 8.9 x 1017 (± 0.8 - 1.2
	1-1-	at cm ³	NA		NA		5.8 - 8.9 x 101 (± 0.7 - 1.0)		.7 - 1.0)	6.2 - 8.9 x 10" (± 0.5 - 1.0)	5.9 - 8.9 x 1017 (± 0.8 - 1.5
	pol prime - Phosph. 1-0-) ASTM F121-83	4.8 - 7.8 x 10 ¹⁷ ± 0.5		6 - 7.5 x 10 ¹³ ± 0.5		5.8 - 8.9 x 1013 (± 0.6 - 0.8)		.6 - 0.8)	5.8 - 8.9 x 1017 (± 0.5 - 1.0)	5.8 - 8.9 x 1012 (± 0.8 - 1.2
	1-1-	1	NA		NA		5.8 - 8.9 x 101 (± 0.7 - 1.0)		.7 - 1.0}	6.2 - 8.9 x 10 ¹⁷ (± 0.5 - 1.0)	5.9 - 8.9 x 1012 (± 0.8 - 1.5
Radial Oxygen Variation	typical	%	< 10		< 5		< 6			< 6	< 5 - 10
Bulk Metal Concentration	Fe	at cm ³	≤ 5.0 x 10 [∞]		≤ 5.0 x 10 ¹⁰		≤ 1.0 x 10"			≤ 1.0 × 10 ¹¹	≤ 1.0 x 10 ¹¹
Bulk Carbon Concentration	measured on wafer	at cm ³	≤ 2.0 x 10 [%]		≤ 2.0 x 10 ¹⁶		≤ 2.0 x 10 [™]			≤ 2.5 x 10 ¹⁶	≤ 2.5 x 10 ¹⁶
Polished Wafers / Substrates			300	nm		200mm		150mm		125mm	100mm
	Cu / Cr / Fe / Ni	at cm ²									
Polished Wafers / Substrates	Cu / Cr / Fe / Ni Al / Zn / K / Na / Ca	at cm ²	300r ≤ 1.0 : ≤ 5.0 :	x 10 ¹⁰	s	200mm 2.5 × 10 ¹⁰		150mm ≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹		125mm	100mm ≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹
			≤ 1.0 :	x 10 ¹⁰ x 10 ¹⁰	≥ ≥	2.5 x 10"	> 0.3	≤ 5.0 × 10 ¹⁰	> 0.12	125mm ≤ 5.0 × 10 [∞]	≤ 5.0 x 10 ¹⁰
Surface Metals	Al / Zn / K / Na / Ca	at cm ²	≤ 1.0 ±	x 10 ¹⁰ x 10 ¹⁰ .16 > 0.12	≤ ≤ > 0.2	2.5 x 10" 1.0 x 10"		≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹		125mm ≤ 5.0 x 10 ¹⁶ ≤ 2.0 x 10 ¹¹	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹
	Al / Zn / K / Na / Ca size	at cm ² µm	≤ 1.0 ± ≤ 5.0 ± > 0.2 > 0.	x 10 ³⁹ x 10 ⁵⁹ .16 > 0.12 .300 < 200-10 ⁵	≤ ≤ > 0.2	2.5 x 10" 1.0 x 10" > 0.16 > 0.12	> 0.3	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.2	> 0.12	125mm ≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.3	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.3
Surface Metals	Al / Zn / K / Na / Ca size pol prime	at cm² µm # per wafer	≤ 1.0 : ≤ 5.0 : > 0.2 > 0. < 30 < 40	x 10 ¹⁰ x 10 ¹⁰ .16 > 0.12 .300 < 200-10 ² A NA	≤ > 0.2 < 15-35 NA	2.5 x 10" 1.0 x 10" > 0.16 > 0.12 < 20-120 < 70-600	> 0.3 < 15 < 5	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.2 < 30	> 0.12 NA	125mm ≤ 5.0 × 10 th ≤ 2.0 × 10 th > 0.3 < 15	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹ > 0.3 < 15
Surface Metals	Al / Zn / K / Na / Ca size pol prime UltraFlat (150 mm)	at cm² µm # per wafer # per wafer	≤ 1.0 : ≤ 5.0 : > 0.2 > 0. < 30 < 40- NA NA	x 10 ¹⁰ x 10 ¹⁰ .16 > 0.12 .300 < 200-10 ¹⁰ A NA 50 < 100	≤ > 0.2 < 15-35 NA	2.5 × 10" 1.0 × 10" > 0.16 > 0.12 < 20-120 < 70-600 NA NA	> 0.3 < 15 < 5	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹ > 0.2 < 30 < 10	> 0.12 NA < 150	125mm ≤ 5.0 × 10 th ≤ 2.0 × 10 th > 0.3 < 15 NA	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.3 < 15 NA
Surface Metals LLSs (Frontside) *) Diameter Tolerance	Al / Zn / K / Na / Ca size pol prime UltraFlat (150 mm)	at cm² µm # per wafer # per wafer # per wafer	≤ 1.0 : ≤ 5.0 : > 0.2 > 0. < 30 < 40 NA NA < 30 < 6	x 10 ¹⁰ x 10 ¹⁰ .16 > 0.12 .300 < 200-10 ¹⁰ A NA .300 < 100 0.2	≤ > 0.2 < 15-35 NA	2.5 × 10" 1.0 × 10" > 0.16 > 0.12 < 20-120	> 0.3 < 15 < 5	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹ > 0.2 < 30 < 10 NA	> 0.12 NA < 150	125mm ≤ 5.0 × 10 ^m ≤ 2.0 × 10 ^m > 0.3 < 15 NA NA	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.3 < 15 NA NA
Surface Metals LLSs (Frontside) *) Diameter Tolerance Warp	A / / Zn / K / Na / Ca size pol prime UltraFlat (150 mm) monitor	at cm ² µm # per wafer # per wafer # per wafer mm	≤ 1.0 : ≤ 5.0 : > 0.2 > 0. < 30 < 40 NA NA < 30 < € ± 0	x 10 ¹⁰ x 10 ¹⁰ x 10 ¹⁰ x 10 ¹⁰ x 0.12 x 0.10 x 0.12 x 0.12	≤ > 0.2 < 15-35 NA	2.5 x 10" 3.0 x 10" 3.0.6 > 0.12 3.0-120 < 70-600 NA NA 3.20-65 < 130-700 ± 0.2	> 0.3 < 15 < 5 NA	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.2 < 30 < 10 NA ± 0.2	> 0.12 NA < 150 NA	125mm ≤ 5.0 × 10° ≤ 2.0 × 10° > 0.3 < 15 NA NA ± 0.2	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.3 < 15 NA NA ± 0.2
Surface Metals LLSs (Frontside) ") Diameter Tolerance Warp Wafer / Substrate Thickness	A / Zn / K / Na / Ca size pol prime UltraFlat (150 mm) monitor polished - without layer	at cm ² µm # per wafer # per wafer # per wafer mm µm	≤ 1.0 : ≤ 5.0 : > 0.2 > 0. < 30 < 40- NA NU < 30 < € ± 0 < 5	x 10 ¹⁰ x 10 ¹⁰ .16 > 0.12 .300 < 200-10 ⁰ A NA 50 < 100 0.2 .55	≤ > 0.2 < 15-35 NA	2.5 x 10" 3.0 x 10" 3.0.12	> 0.3 < 15 < 5 NA	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹ > 0.2 < 30 < 10 NA ± 0.2 < 30	> 0.12 NA < 150 NA	125mm ≤ 5.0 × 10 ^m ≥ 2.0 × 10 ^m > 0.3 < 15 NA NA ± 0.2 < 30	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.3 < 15 NA NA ± 0.2 < 30
Surface Metals LLSs (Frontside) *) Diameter Tolerance Warp Wafer / Substrate Thickness Tolerance	A / Zn / K / Na / Ca size pol prime UltraFlat (150 mm) monitor polished - without layer	at cm ³ µm # per wafer # per wafer # per wafer mm µm µm	≤ 1.0 : ≤ 5.0 : > 0.2 > 0. < 30 < 40 NA NU < 30 < 6 ± 0 < 5 777	x 10 ³⁰ x 10 ³⁰ .16 > 0.12 .300 < 200-10 ³ A NA 50 < 100 0.2 .5 .5 .25	≤ > 0.2 < 15-35 NA	2.5 x 10" 3.0 x 10" 3.0 x 10" 3.0.16 > 0.12 4.0.20 3.0 x 100 3.0 x 100	> 0.3 < 15 < 5 NA	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹ > 0.2 < 30 < 10 NA ± 0.2 < 30 / 525 / 625 /	> 0.12 NA < 150 NA	125mm ≤ 5.0 × 10 ^a ≤ 2.0 × 10 ^a < 15 NA ×0.2 ≤ 0.2 < 30 375 / 525 / 625	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.3 < 15 NA NA ± 0.2 < 30 300 / 375 / 525
Surface Metals LLSs (Frontside) ") Diameter Tolerance Warp Wafer / Substrate Thickness Thickness Tolerance "GBIR = TTV (Sid <i>UltraFlag</i>) "	A / Zn / K / Na / Ca size pol prime UltraFlat (150 mm) monitor polished - without layer	at cm ³ µm # per wafer # per wafer # per wafer mm µm µm µm	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	x 10 ³⁵ x 10 ³⁵ 116 > 0.12 3000 < 200-10 ¹ A NA 800 < 100 0.2 55 25 25 4	≤ > 0.2 < 15-35 NA	2.5 × 10 ¹⁰ 1.0 × 10 ¹⁰ > 0.16 > 0.12 < 20-120 < 70-600 NA NA < 20-650 < 130-700 ± 0.2 < 20 725 ± 15	> 0.3 < 15 < 5 NA 375	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹ > 0.2 < 30 < 10 NA ± 0.2 < 30 / 525 / 625 /	> 0.12 NA < 150 NA / 675	125mm ≤ 5.0 × 10" ≥ 2.0 × 10" > 0.3 < 15 NA × 0.2 < 30 375 / 525 / 625 ± 15	≤ 5.0 × 10 [∞] ≤ 2.0 × 10 [∞] > 0.3 < 15 NA ± 0.2 < 30 300 / 375 / 525 ± 15
Surface Metals LLSs (Frontside) ') Diameter Tolerance Warp Warer / Substrate Thickness Thickness Tolerance GBIR = TIR (Sid <i>UltraFalq</i> ') GFIR = TIR (Sid <i>UltraFalq</i> ')	A / Zn / K / Na / Ca size pol prime UltraFlat (150 mm) monitor polished - without layer	at cm ² µm # per wafer # per wafer # per wafer mm µm µm µm µm µm	$ \leq 1.0 \\ \leq 5.0 \\ < 5.0 \\ < 3.0 \\ < 3.0 \\ < 40 \\ NA \\ NN \\ < 3.0 \\ < 6 \\ \hline \\ = 0 \\ < 5 \\ \hline \\ 7.7 \\ = 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < 2 \\ < $	x 10 ³⁰ x 10 ³⁰ x 10 ³⁰ < 200-10 ³ A NA A NA 500 < 100 0.2 55 55 55 4 4	≤ > 0.2 < 15-35 NA	2.5 × 10 ¹⁰ 1.0 × 10 ¹⁰ > 0.16 > 0.12 < 20-120 < 70-600 NA NA < 20-650 < 130-700 ± 0.2 < 20 < 20 × 20 × 20 < 3.5	> 0.3 < 15 < 5 NA 375 < 5.0	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹ > 0.2 < 30 < 10 NA ± 0.2 < 30 / 525 / 625 /	> 0.12 NA < 150 NA / 675 < 2.5	125mm ≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.3 < 15 NA ± 0.2 < 30 375 / 525 / 625 ± 15 < 5.0	≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹¹ > 0.3 < 15 NA ± 0.2 < 30 300/375/525 ± 15 < 5.0
Surface Metals LLSs (Frontside) ') Diameter Tolerance Warp Warer / Substrate Thickness Thickness Tolerance GBIR = TIR (Sid <i>UltraFalq</i> ') GFIR = TIR (Sid <i>UltraFalq</i> ')	A / Zn / K / Na / Ca size pol prime UitaFlat (150 mm) monitor polished - without layer Standards	at cm ³ µm # per wafer # per wafer mm µm µm µm µm µm	≤ 1.0 : ≤ 5.0 : > 0.2 > 0. < 30 < 40 NA N. < 30 < 60 ± 0 < 5 777 ± 2 < <	x 10 ³⁰ x 10 ³⁰ x 10 ³⁰ x 10 ³⁰ x 200-10 ³⁰ A NA XA x 100 x 10	≤ > 0.2 < 15-35 NA	2.5 × 10 ¹⁰ 1.0 × 10 ¹⁰ > 0.16 > 0.12 < 20-120 < 70-600 NA NA < 20-65 < 130-700 ± 0.2 < 20 725 ± 15 < 3.5 < 2.0	> 0.3 < 15 < 5) NA 375 < 5.0 < 2.0	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹ > 0.2 < 30 < 10 NA ± 0.2 < 30 / 525 / 625 /	> 0.12 NA < 150 NA / 675 < 2.5 < 1.2	$\begin{array}{c} 125mm \\ \leq 5.0 \times 10^m \\ \leq 2.0 \times 10^m \\ > 0.3 \\ < 15 \\ NA \\ \pm 0.2 \\ < 30 \\ 375 / 525 / 625 \\ \pm 15 \\ < 5.0 \\ < 2.0 \end{array}$	≤ 5.0 × 10" ≤ 2.0 × 10" > 0.3 < 15 NA ± 0.2 < 30 300 / 375 / 525 ± 15 < 5.0 < 2.0
Surface Metals LLSs (Frontside) ") Diameter Tolerance Warp Wafer / Substrate Thickness Thickness Tourance GBIR = TTN (Std <i>UltraFlad</i> ") GFLR = TTN (Std <i>UltraFlad</i> ") Coral Flatness ")	A/ Zn / K / Na / Ca size pol prime UttraFlat (150 mm) UttraFlat (150 mm) polished - without layer Standards SFOR / STIRmax, s.b.f.	at cm ² µm # per wafer # per wafer mm µm µm µm µm µm µm µm	≤ 1.0 : ≤ 5.0 : > 0.2 > 0 < 30 < 40 NA NL < 30 < 6 ± 0 < 5 < 777 ± 2 < < 2 < 0 < 40 < 8 < 0 < 40 < 8 < 0 < 2 < 0 < 40 < 8 < 0 < 8 < 0 < 8 < 0 < 40 < 8 < 8 < 8 < 8 < 8 < 8 < 8 < 8	x 10 ³⁰ x 10 ³⁰ 300 < 200-10 ¹⁰ A NA 300 < 100 .2 55 55 55 4 4 A 25 18	≤ > 0.2 < 15-35 NA	2.5 × 10 ¹⁰ 1.0 × 10 ¹⁰ > 0.16 > 0.12 < 20-120 < 70-600 NA NA 2.0-65 < 130-700 ± 0.2 < 20 5 ± 15 < 3.5 < 2.0 < 0.25	> 0.3 < 15 < 5 NA 375 < 5.0 < 5.0 < 2.0 < 0.5	≤ 5.0 x 10 ¹⁰ ≤ 2.0 x 10 ¹¹ > 0.2 < 30 < 10 NA ± 0.2 < 30 / 525 / 625 /	> 0.12 NA < 150 NA / 675 < 2.5 < 1.2 < 0.3	125mm ≤ 5.0 × 10 ¹⁰ ≤ 2.0 × 10 ¹⁰ > 0.3 < 15 NA ± 0.2 < 30 375 / 525 / 625 ± 15 < 5.0 < 2.0 NA	≤ 5.0 × 10° ≤ 2.0 × 10° > 0.3 < 15 NA 4 0.2 < 30 300/375/525 ± 15 < 5.0 < 2.0 NA