



SCiMax Tubes and Fittings

Specifications and Submittal Documentation





Tubes and Fittings Specifications and Submittal Documentation

Products: Tubing and fittings for use in the semiconductor industry

Material: Stainless steel 316L

Sizes: ¼" O.D. up to 6" O.D

Surface finish: Electropolished / Mechanical Polished / Bright Annealed

Reference Standards

ASTM Specifications

- ASTM A269, A270-S2: Standard specification for seamless or welded austenitic stainless-steel tubing for general uses
- ASTM A632, Standard specification for seamless or welded austenitic stainless-steel tubing (Small diameters) for general uses
- ASTM A262: E, recommended practices for detecting susceptibility to intergranular attack in austenitic stainless steel
- ASTM E112: Standard Test Methods for Determining Average Grain Size
- ASTM A967 Passivation process
- ASTM A912 EP Process (when applicable)
- ASME B46.1, ASTM A213, SA 213, ASTM 312

CGA G-4.1

- Cleaning Equipment

SEMI F17

- Specification for Ultra High Purity Electropolished and High Purity Mechanical Polished (MP) / Bright Annealed 316L Stainless steel tubing and tubular fittings

Material characteristics

Manufacturing

- ¼" - 1" (include): Seamless
- 1" - 6": Welded

Sulfur content*

- ¼" - 1": 0.005 - 0.010%
- 1" - 6": 0.005 - 0.017%

Tube Annealing Process

- Bright Annealed in dry hydrogen atmosphere

* Seamless material - 0.005 to 0.010 %

Welded and bar stock material - 0.005 to 0.017 %

Coax sleeves are fillet welded and the sulfur content may be up to 0.03%



Mechanical Properties

Yield strength offset (0.2%)	Tensile strength	Elongation (in 2" (50mm))	Reduction	Hardness
170 (N/mm ²) min	485 (N/mm ²) min	40%	N/A	Max. 95 HRB

Surface roughness - SEMI F17 & ASME B46.1

Tube and fitting Code	Description	Roughness - Ra measurements [μ -inch/ μ -meter]	
		Inner Diameter	Outer Diameter
EP	Electropolished	*Ra avg \leq 8/0.2	Ra max \leq 32/0.8
MP/BA	Mechanical Polished (MP) / Bright Annealed (BA)	**Ra avg \leq 16/0.4	Ra max \leq 32/0.8

* Ra max \leq 10/0.25 μ -inch/ μ -meter
For products $>1"$: Ra ave. 10/0.25 μ -inch/ μ -meter

** Ra max \leq 20/0.50 μ -inch/ μ -meter

Tube and Fittings Tolerances

Tubing specifications, ASTM A269 / A270 / A632

Tubing Diameter	Wall Thickness	OD Dimensional Specifications	Length*	Wall Thickness Tolerance
		ASTM Spec.	ASTM Spec.	ASTM Spec.
1/4"	.035"	+0.004"/-.000"	-0+1/8"	+/-10%
3/8"	.035"	+0.004"/-.000"	-0+1/8"	+/-10%
1/2"	.049"	+0.005"/-.005"	-0+1/8"	+/-10%
3/4"	.065"	+0.005"/-.005"	-0+1/8"	+/-10%
1"	.065"	+0.005"/-.005"	-0+1/8"	+/-10%
1 1/2"	.065"	+0.010"/-.010"	-0+1/8"	+/-10%
2"	.065"	+0.010"/-.010"	-0+1/8"	+/-10%
2 1/2"	.065"	+0.010"/-.010"	-0+1/8"	+/-10%
3"	.065"	+0.010"/-.010"	-0+1/8"	+/-10%
4"	.083"	+0.015"/-.015"	-0+1/8"	+/-10%
6"	.109"	+0.030"/-.030"	-0+1/8"	+/-10%

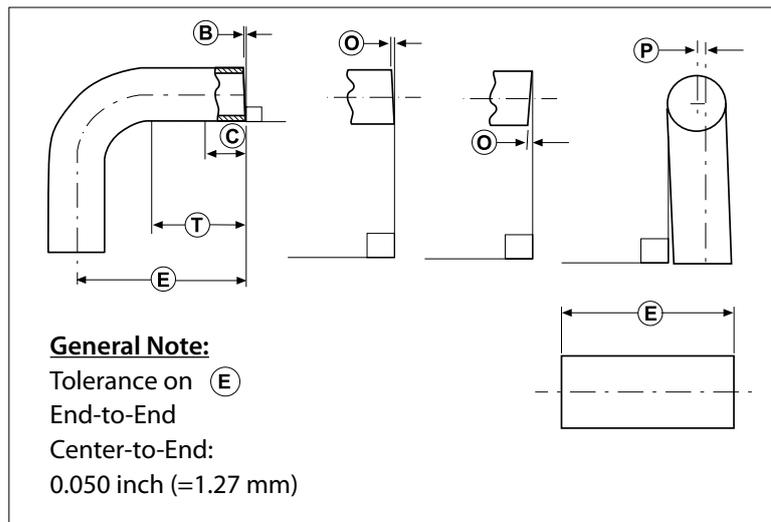
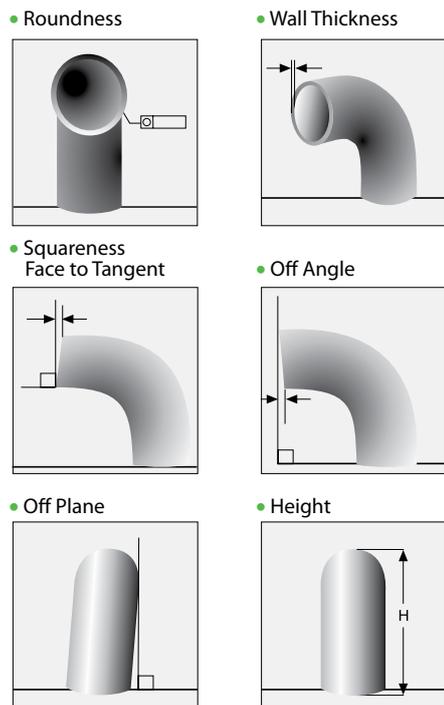
Tube Face End-Square Tolerance

OD Size [Inch]	1/4" - 3/4"	1" - 2"	2 1/2"	3" - 4"	6"
	0.005	0.008	0.01	0.016	0.03

Fitting Tolerances

Nominal OD Size	¼"	⅜"	½"	¾"	1"	1½"	2"	2½"	3"	4"	6"
O.D. Tolerance	±.005	±.005	±.005	±.005	±.005	±.008	±.008	±.010	±.010	±.015	±.030
Nominal Wall Thickness	.035	.035	.049	.065	.065	.065	.065	.065	.065	.083	.109
Wall Thickness Tolerance before EP	+0.003/-0.004	+0.003/-0.004	+0.005/-0.008	+0.005/-0.008	+0.005/-0.008	+0.005/-0.008	+0.005/-0.008	+0.005/-0.008	+0.005/-0.008	+0.008/-0.010	+0.015/-0.015
Wall Thickness Tolerance after EP	+0.005/-0.010	+0.005/-0.010	+0.005/-0.010	+0.005/-0.010	+0.005/-0.010	+0.005/-0.010	+0.005/-0.010	+0.005/-0.010	+0.005/-0.010	+0.008/-0.012	+0.015/-0.017
Control Length (C)	.750	.750	.750	.750	.750	.750	.750	.750	.750	.750	.750
Tangent Length (T)	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.750	2.000	2.500
Squareness Face to Tangent (B)	.005	.005	.005	.005	.008	.008	.008	.010	.016	.016	.030
Off Angle (O)	.009	.012	.014	.018	.025	.034	.043	.054	.068	.086	.135
Off Plane (P)	±.030	±.030	±.030	±.030	±.030	±.050	±.050	±.050	±.050	±.060	±.060

* All dimensions are in Inches
 Tubing specifications, ASTM A269 / A270 / A632



- All other tolerances per ASTM A270 / A269.
- The measured wall Thickness of each tubing batch should be reported as part of the certificate of test results.
- Each separate package should contain tubing with the same wall thickness, produced from the same ingot (i.e., a "BATCH") and the same nominal size (i.e., same O.D.).

Marking

- Marking method - permanent**
- Tubes - Engraving / Pin marking / Laser Mark
 - Fittings - Laser Mark
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- Each product will be marked with the following details**
- Brand Name: SciMax
 - Job Number
 - Size x Wall Thickness (in inch units)
 - Material Grade
 - Heat Number
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Labeling

- Each product is identified with a SciMax label with the following:**
- Brand Name: SciMax
 - Job Number
 - Size x Wall Thickness (in inch units)
 - Material Grade
 - Heat Number
 - QR Code - to scan and download the MTR (Material Test Reports) from the web
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Packing

- EP Products**
- EP products are cleaned with UPW 18M Ω , packed in a Class10 (ISO4) clean room and UHP N2 is used to purge.
 - EP products are capped with mylar and red PE caps.
 - EP products are packed with two layers nylon sleeves.
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- MP/BA Products**
- MP/BA products are cleaned with DI-WATER, packed in a Class1,000 (ISO6) clean room and HP N2 is used to purge.
 - MP/BA products are capped with mylar and yellow PE caps.
 - MP/BA products are packed with one layer nylon sleeve.
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- Tubes Length: 6.1 meters (20Ft) long
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- Conventional Cargo - wooden crates
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Documentation / Certification

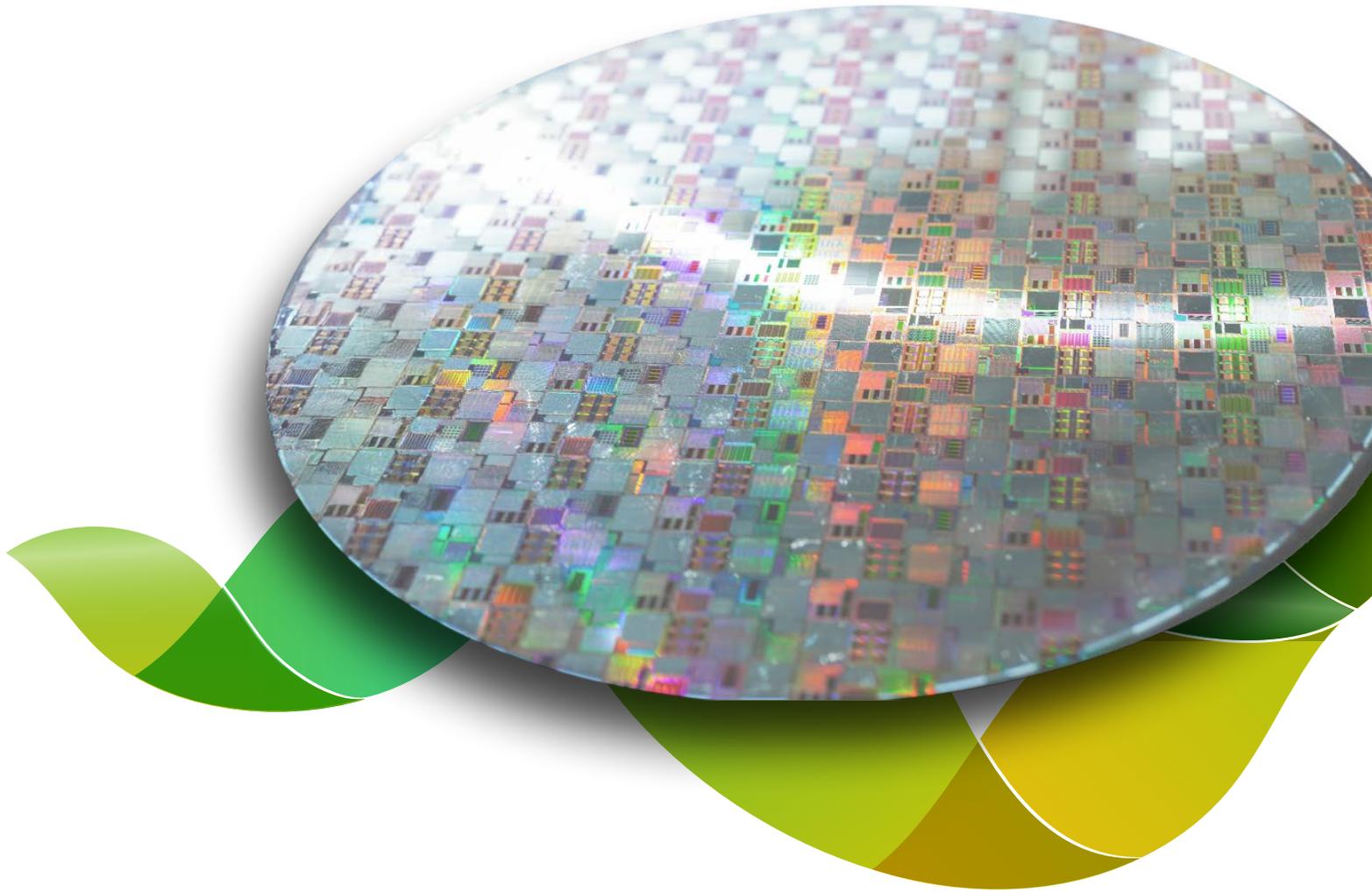
- The MTR (Material Test Reports) are supplied with the finished products.
 - Inspection documents certification to be according to standards in page 6.
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Inspection Tests and Documentation

Summary table of testing, inspection and certification that can be given per our process.

Description	Standard / Value		
		SCiMax10	SCiMax20
Material Composition	ASTM A269, A270, A632, A-213, SA-213	✓	✓
Mechanical Tests	ASTM A269, A632	✓	✓
Visual Inspection 100%	Internal procedure	✓	✓
Dimensional Measurements	ANSI B31.3	✓	✓
Hydrocarbon Cleaning Inspection	CGA G-4.1	✓	✓
Helium Leak Test for Welded Fittings	1*10 ⁻⁹ scc/sec	✓	✓
Inspection Certification	EN 10204 3.1	✓	✓
Ra Measurements	ASME B46.1	✓	✓
Particles Test	<10 particles (greater than 0.1µ ft ³)	✓	
Moisture Test for Tube: Additional Moisture on UHP N2 Purged Gas	Δ0.5 ppm	✓	
Ultra Pure Water Resistivity	18 MΩ	✓	
SEM TEST - Scanning Electron Microscopy for Defects	SEMATECH 90120401B 50 defects (magnification*3600)	✓	
XPS TEST - X Ray Photoelectron Spectroscopy for Analysis of Cr / Fe	SEMATECH 90120403B > 1.5/1	✓	
XPS TEST - X Ray Photoelectron Spectroscopy for Analysis of Cr ox / Fe ox	SEMATECH 90120403B > 2/1	✓	
AES TEST - Auger Electron Spectroscopy for Measuring of Oxide Thickness	SEMATECH 91060573B > 20A	✓	





NEUMO EHRENBERG GROUP

GLOBAL LOCATIONS



NEUMO GmbH+Co. KG (D)
Tel: +49 (0) 7043 36 0
Fax: +49 (0) 7043 36 179
E-Mail: info@neumo.de
www.neumo.de
GERMANY



NEUMO-EGMO Spain S.L
Tel: +34 977 524 914
Fax: +34 977 524 898
E-Mail: neumo-es@neumo-es.com
www.neumo-es.com
SPAIN



Tel: +33 665 00 2201
E-Mail: france@neumo-es.com
FRANCE



NEUMO Italy S.r.l.
Tel: +39 0155821893
E-Mail: sales@neumo.it
ITALY



NEUMO Polska Sp. z.o.o
Tel: +48 (0) 46 833 4306
Fax: +48 (0) 46 832 5626
E-Mail: neumo@neumo.pl
POLAND



NEUMO LLC
Tel: +84 908475382
E-Mail: Minh.Vietnam@neumo.de
www.awh.eu
VIETNAM



AWH Armaturenwerke (D)
Hötensleben GmbH
Tel: +49 (0) 39405 92 0
Fax: +49 (0) 39405 92 111
E-Mail: info@awh.de
www.awh.de

Damstahl GmbH (D)
Tel: +49 (0) 2173 797 0
Fax: +49 (0) 2173 797 274
E-Mail: ds@damstahl.de
www.damstahl.de

Gebr. Rieger GmbH+Co. KG (D)
Tel: +49 (0) 7361 5702 0
Fax: +49 (0) 7361 5702 51
E-Mail: info@rr-rieger.de
www.rr-rieger.de
GERMANY



VNE Corporation
Tel: +1 800 356 1111
+1 608 756 4930
Fax: +1 608 756 3643
E-Mail: stainless@vnecorp.com
www.vnestainless.com
U.S.A



HPT Inc.
Tel: +845.452.1103
+800.284.4478
E-Mail: sales@hptinc.com
<http://www.hptinc.com/>
U.S.A



NEUMO Turkey
Tel: +90 (212) 875 01 41
Fax: +90 (212) 875 23 13
E-Mail: info@neumo.com.tr
www.neumo.com.tr
TURKEY



NEUMO - VARGUS (Shanghai)
Trading Co., Ltd
Tel: +86 (21) 51688300
Fax: +86 (21) 51688380
E - Mail: info@neumo.com.cn
CHINA



EGMO Ireland
Tel: +353 (0)21 4975540
Cel: +353 (0)87 2330469
E-Mail: dosullivan@flowsolutions.ie
www.egmo.co.il
IRELAND



Damstahl a/s Oslo (N)
Tel: +47 5615 1570
Fax: +47 5615 1571
E-Mail: dano@damstahl.com
www.damstahl.no
NORWAY



EGMO Ltd.
Tel: +972 (0) 4 9855 176
+972 (0) 4 9855 111
Fax: +972 (0) 4 9855 175
E-Mail: salese@egmo.co.il
www.egmo.co.il
ISRAEL



Herrli AG
Tel: +41 (0) 31 750 12 11
Fax: +41 (0) 31 750 12 00
E-Mail: info@herrli.net
www.herrli.net
SWITZERLAND



NEUMO Budapest Kft
Tel: +36 (1) 3174177
+36 (1) 3185982
Fax: +36 (1) 266 8765
E-Mail: neumo@neumo.hu
www.neumo.hu
HUNGARY



NEUMO UK Ltd.
Tel: +44 (0) 1952 583 999
Fax: +44 (0) 1952 583 958
E-Mail: stainless@neumo.co.uk
www.neumo.co.uk
UNITED KINGDOM



Damstahl a/s (Denmark)
Tel: +45 (0) 8794 4000
Fax: +45 (0) 8794 4150
E-Mail: ds@damstahl.com
www.damstahl.dk
DENMARK



Damstahl a/b (Sweden)
Tel: +46 87 61 71 00
Fax: +46 87 61 14 05
www.damstahl.se
SWEDEN