



MATERIALS THICKNESS MEASUREMENT

- Sensor Crystals for Quartz Microbalance..... N 06

- Density and Acoustic Impedance Values..... N 15

Sensor Crystals for Quartz Microbalance

The quality and longevity of a crystal affect not only the accuracy of rate and thickness measurements, but also the successful completion of the process being controlled. Our quartz crystals offer proven quality and reliability-proven by millions of successful process runs with a wide range of materials, applications and industries.

Our 6 MHz crystals are used with INFICON controllers and monitors. The 5 MHz crystals can be used with 5 MHz instruments only; and are not compatible with INFICON instruments.

The 6 MHz and the 5 MHz crystals are available in gold, silver or alloy electrodes.

We recommend gold crystals for most applications. However, silver crystals will provide superior performance in processes with high heat loads, such as sputtering. They may also improve the deposition of oxides. And alloy crystals



are recommended for optical coating with dielectric materials and for semiconductor processes with high-stress materials.

P/N	NOMINAL FREQ.	FREQUENCY	MATERIAL	DIAMETER (mm)	TYPE	PACKING
AUSA497	5 MHz	4966	Au	13.97	AT-cut	20 pcs
AGSA497	5 MHz	4966	Ag	13.97	AT-cut	20 pcs
AUSA5	5 MHz	5000	Au	13.97	AT-cut	20 pcs
AGSA5	5 MHz	5000	Ag	13.97	AT-cut	20 pcs
AUDA5979	6 MHz	5970	Au	13.97	AT-cut	20 pcs
AGDA598	6 MHz	5982	Ag	13.97	AT-cut	20 pcs
AUDA6	6 MHz	5998	Au	13.97	AT-cut	20 pcs

Others frequencies and packings (5 pcs and 10 pcs) are available on request.

Density and Acoustic Impedance Values

We have compiled a list of some popular materials used in the vacuum industry and provided their material density and acoustic impedance values. The Z ratio is the ratio between quartz acoustic impedance and a given material.

This table has been compiled in combination with the PHYSICS HANDBOOK and actual customer experience. Although we have made every effort to test them, Neyco does not guarantee the accuracy of these values.

MATERIAL NAME	SYMBOL	DENSITY gm/cm ³	ACOUSTIC IMPEDANCE x10 ⁵ gm/cm ² sec
Aluminum	Al	2.700	8.170
Aluminum Antimonide	AlSb	4.360	11.884
Aluminum Oxide	Al ₂ O ₃	3.970	26.280
Antimony	Sb	6.620	11.490
Arsenic	As	5.730	9.140
Barium	Ba	3.500	4.200
Barium Fluoride	BaF ₂	4.886	11.135
Barium Nitrate	BaN ₂ O ₆	3.244	7.002
Barium Titanate (Cubic)	BaTiO ₃	6.035	21.432
Barium Titanate (Tetr)	BaTiO ₃	5.999	19.030
Beryllium	Be	1.850	16.260
Bismuth	Bi	9.800	11.180
Boron	B	2.540	22.700
Cadmium	Cd	8.640	12.950
Cadmium Sulfide	CdS	4.830	8.660
Cadmium Telluride	CdTe	5.850	9.010
Calcium	Ca	1.550	3.370
Calcium Fluoride	CaF ₂	3.180	11.390
Calcium Sulfate	CaSO ₄	2.962	9.246
Carbon (Diamond)	C	3.520	40.140
Carbon (Graphite)	C	2.250	2.710
Cesium Bromide	CsBr	4.456	6.262
Cesium Chloride	CsCl	3.988	6.312
Cesium Iodide	CsI	4.516	5.726

MATERIAL NAME	SYMBOL	DENSITY gm/cm ³	ACOUSTIC IMPEDANCE x10 ⁵ gm/cm ² sec
Cesium Sulfate	Cs ₂ SO ₄	4.243	7.285
Chromium	Cr	7.200	28.950
Cobalt	Co	8.710	25.740
Cobalt Oxide	CoO	6.440	21.432
Copper	Cu	8.930	20.210
Copper (I) Sulfide (alpha)	Cu ₂ S	5.600	12.800
Copper (I) Sulfide (beta)	Cu ₂ S	5.800	13.180
Copper (II) Sulfide	CuS	4.600	10.770
Dysprosium	Dy	8.540	14.720
Erbium	Er	9.050	11.930
Gadolinium	Gd	7.890	13.180
Gallium	Ga	5.930	14.890
Gallium Arsenide	GaAs	5.310	5.550
Germanium	Ge	5.350	17.110
Gold	Au	19.300	23.180
Hafnium	Hf	13.090	24.530
Holmium	Ho	8.800	15.200
Indium	In	7.300	10.500
Indium Antimonide	InSb	5.760	11.480
Iridium	Ir	22.400	68.450
Iron	Fe	7.860	25.300
Lanthanum	La	6.170	9.590
Lead	Pb	11.300	7.810
Lead Fluoride	PbF ₂	8.240	13.359
Lead Sulfide	PbS	7.500	15.600
Lead Telluride	PbTe	8.160	13.564
Lithium	Li	0.530	1.500
Lithium Bromide	LiBr	3.470	7.179
Lithium Fluoride	LiF	2.640	11.410
Lithium Niobate	LiNbO ₃	4.700	19.071
Magnesium	Mg	1.740	5.480
Magnesium Fluoride	MgF ₂	3.000	13.860
Magnesium Oxide	MgO	3.580	21.480
Manganese	Mn	7.200	23.420
Manganese (II) Sulfide	MnS	3.990	9.390
Manganese Oxide	MnO	5.390	18.908
Mercury	Hg	13.460	11.930
Molybdenum	Mo	10.200	34.360
Nickel	Ni	8.910	26.680
Niobium	Nb	8.570	17.910
Palladium	Pd	12.000	24.730
Platinum	Pt	21.400	36.040
Potassium	K	0.860	0.867
Potassium Bromide	KBr	2.750	4.665
Potassium Chloride	KCl	1.980	4.310
Potassium Iodide	KI	3.128	4.251

MATERIAL NAME	SYMBOL	DENSITY gm/cm ³	ACOUSTIC IMPEDANCE x10 ⁵ gm/cm ² sec
Rhenium	Re	21.040	58.870
Rhodium	Rh	12.410	42.050
Rubidium	Rb	1.530	3.476
Ruthenium	Ru	12.362	48.516
Samarium	Sm	7.540	9.920
Scandium	Sc	3.000	9.700
Selenium	Se	4.820	10.220
Silicon	Si	2.320	12.400
Silicon (II) Oxide	SiO	2.130	10.150
Silicon Dioxide (fused quartz)	SiO ₂	2.200	8.250
Silver	Ag	10.500	16.690
Silver Bromide	AgBr	6.470	7.480
Silver Chloride	AgCl	5.560	6.690
Sodium	Na	0.970	1.840
Sodium Chlorate	NaClO ₃	2.164	5.642
Sodium Chloride	NaCl	2.170	5.620
Sodium Fluoride	NaF	2.558	9.305
Sodium Nitrate	NaNO ₃	2.270	7.395
Strontium Fluoride	SrF ₂	4.277	12.146
Strontium Oxide	SrO	4.990	17.079
Sulphur	S	2.070	3.860
Tantalum	Ta	16.600	33.700
Tantalum (IV) Oxide	Ta ₂ O ₅	8.200	29.430
Tellurium	Te	6.250	9.810
Tellurium Oxide	TeO ₂	5.990	10.244
Terbium	Tb	8.270	13.380
Thallium	Tl	11.850	5.700
Thorium	Th	11.694	18.244
Thorium Dioxide	ThO ₂	9.860	31.092
Tin	Sn	7.300	12.200
Titanium	Ti	4.500	14.060
Titanium (IV) Oxide	TiO ₂	4.260	22.070
Tungsten	W	19.300	54.170
Tungsten Carbide	WC	15.600	58.480
Uranium	U	18.700	37.100
Uranium Dioxide	UO ₂	10.970	30.874
Uranium Oxide	U ₄ O ₉	10.969	25.374
Vanadium	V	5.960	16.660
Ytterbium	Yb	6.980	7.810
Yttrium	Y	4.340	10.570
Zinc	Zn	7.040	17.180
Zinc Oxide	ZnO	5.610	15.880
Zinc Selenide	ZnSe	5.260	12.230
Zinc Sulfide	ZnS	4.090	11.390
Zinc Telluride	ZnTe	6.340	11.468
Zirconium	Zr	6.510	14.720
Zirconium Carbide	ZrC	6.730	33.447



neyco

30 avenue de la Paix
92170 VANVES - France
Tel: +33(0)1 41 90 50 50
Fax: +33(0)1 41 90 50 51

www.neyco.fr



Materials N 2013-2

neyco