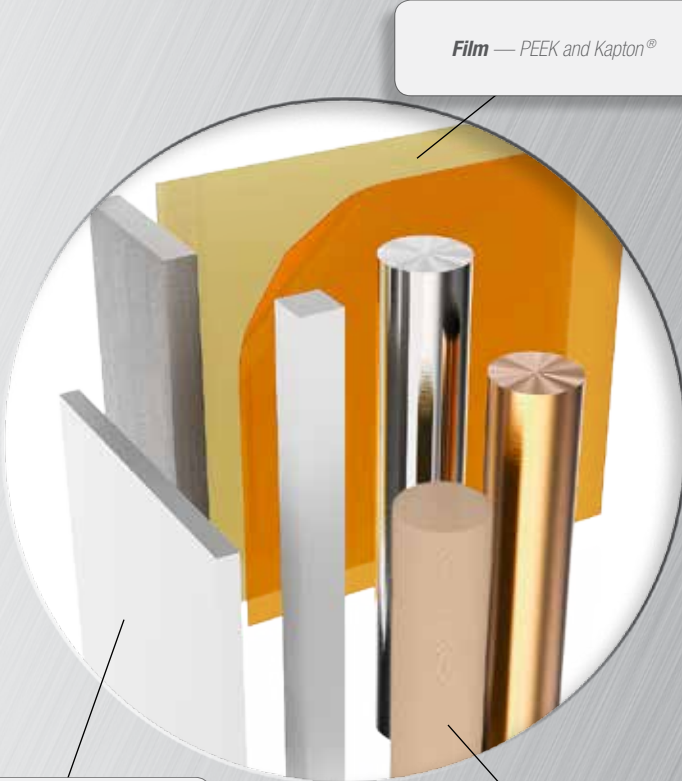




### UHV Materials



**Film** — PEEK and Kapton®

**Bar / Plate** — PEEK, OFE Copper, 304 Stainless Steel, Macor® Ceramic

**Rod / Tube** — PEEK, OFE Copper, and 304 Stainless Steel

### Features

- Ultrahigh vacuum compatible
- Cleaned for vacuum service
- Temperature specified for each material

### Specifications

#### Vacuum Range

UHV, Ultrahigh vacuum	1x10 <sup>-10</sup> Torr
HV, High vacuum	1x10 <sup>-8</sup> Torr

#### Temperature Range <sup>1</sup>

#### Material

Copper, OFE	875°C
Stainless Steel, 304	450°C
Kapton®	400°C
PEEK (Polyether Etherketone)	250°C
Polyimide	400°C
Macor® Machinable Ceramic	800°C

### Notes

1. Overall assembly ratings must be adjusted to that of its lowest rated component.
- § Unless specified otherwise, dimensional units in all sections of this catalog are expressed in inches.

### UHV Materials

Accu-Glass raw materials have been tested for ultrahigh vacuum applications. The most frequently used materials are offered to assist customers with their custom and special needs.

In addition to raw materials, Accu-Glass offers custom fabrication utilizing these materials. Call us with your specific application and requirements.

## Copper

Ultra-pure OFE copper contains virtually no oxygen and is easy to braze. Copper is ideally suited for high temperature, ultrahigh vacuum applications rated to  $1 \times 10^{-10}$  Torr and 875°C in temperature.

### Copper — OFE Grade / Flat Stock / 875°C / UHV to $1 \times 10^{-10}$ Torr

Material Thickness	Width	Length	Model Number	Part Number	Unit Price \$
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#### Bar — Rectangular / Copper Cu

0.064	1	12	CU-BAR-064-1x12	<b>111271</b>	14
0.064	2	12	CU-BAR-064-2x12	<b>111272</b>	26
0.125	1	12	CU-BAR-125-1x12	<b>111273</b>	23
0.125	2	12	CU-BAR-125-2x12	<b>111274</b>	41
0.250	1	12	CU-BAR-250-1x12	<b>111275</b>	42
0.250	2	12	CU-BAR-250-2x12	<b>111276</b>	76
0.375	1	12	CU-BAR-375-1x12	<b>111277</b>	58
0.375	2	12	CU-BAR-375-2x12	<b>111278</b>	124

#### Sheet — Rectangular / Copper Cu

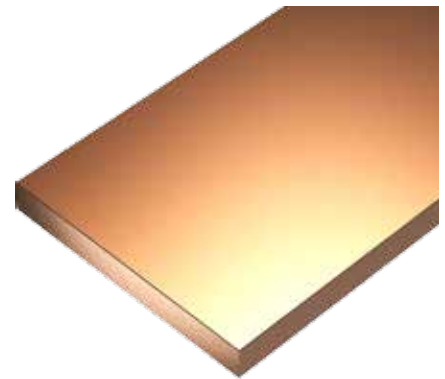
0.032	6	6	CU-SHT-032-6x6	<b>111279</b>	29
0.064	6	6	CU-SHT-064-6x6	<b>111281</b>	49
0.093	6	6	CU-SHT-093-6x6	<b>111283</b>	59
0.125	6	6	CU-SHT-125-6x6	<b>111285</b>	80
0.250	6	6	CU-SHT-250-6x6	<b>111287</b>	144
0.375	6	6	CU-SHT-375-6x6	<b>111289</b>	188

### Copper — OFE Grade / Round Stock / 875°C / UHV to $1 \times 10^{-10}$ Torr

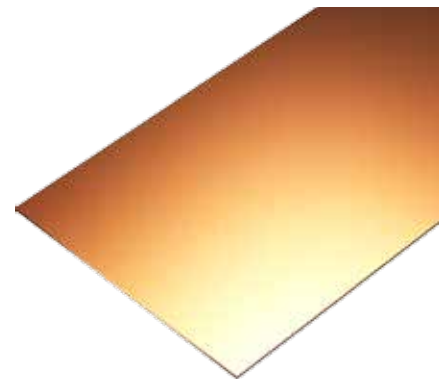
Rod Diameter	Length	Model Number	Part Number	Unit Price \$
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#### Rod — Round / Copper Cu

0.125	12	CU-ROD-125-12	<b>111291</b>	8
0.250	12	CU-ROD-250-12	<b>111292</b>	14
0.375	12	CU-ROD-375-12	<b>111293</b>	24
0.500	12	CU-ROD-500-12	<b>111294</b>	30
0.750	6	CU-ROD-750-6	<b>111295</b>	33
1.000	6	CU-ROD-1000-6	<b>111296</b>	42



**111275** / Copper Rectangular Bar



**111285** / Copper Sheet



**111294** / Copper Rod



### 304 Stainless Steel

The most widely used form of stainless steel, this basic 18-8 (18% chromium and 8% nickel) has a low carbon content for superior weldability. It also has good formability and corrosion resistance. Yield strength is 30–45 ksi. Excellent for ultrahigh vacuum use.

#### 304 Stainless Steel — Flat Stock / 450°C / UHV to 1x10<sup>-10</sup> Torr

Material Thickness	Width	Length	Model Number	Part Number	Unit Price \$
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#### Bar — Rectangular / Stainless Steel 304

0.125	1	12	SS-BAR-125-1x12	<b>111297</b>	11
0.125	2	12	SS-BAR-125-2x12	<b>111298</b>	19
0.250	1	12	SS-BAR-250-1x12	<b>111299</b>	19
0.250	2	12	SS-BAR-250-2x12	<b>111300</b>	30
0.375	1	12	SS-BAR-375-1x12	<b>111301</b>	24
0.375	2	12	SS-BAR-375-2x12	<b>111302</b>	40

#### Sheet — Rectangular / Stainless Steel 304

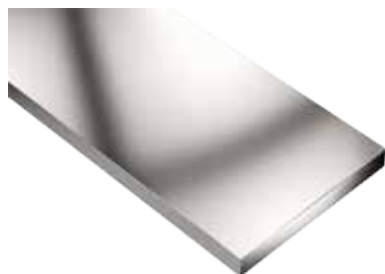
0.036	6	6	SS-SHT-036-6x6	<b>111303</b>	22
0.048	6	6	SS-SHT-048-6x6	<b>111304</b>	28
0.060	6	6	SS-SHT-060-6x6	<b>111305</b>	33
0.105	6	6	SS-SHT-105-6x6	<b>111306</b>	40
0.120	6	6	SS-SHT-120-6x6	<b>111307</b>	51

#### 304 Stainless Steel — Round Stock / 450°C / UHV to 1x10<sup>-10</sup> Torr

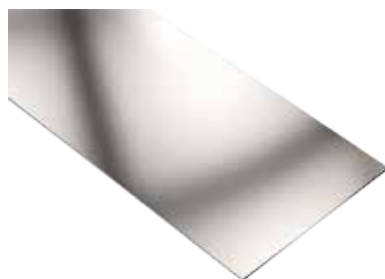
Rod Diameter	Length	Model Number	Part Number	Unit Price \$
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#### Rod — Round / Stainless Steel 304

0.125	12	SS-ROD-125-12	<b>111308</b>	4
0.250	12	SS-ROD-250-12	<b>111309</b>	7
0.375	12	SS-ROD-375-12	<b>111310</b>	15
0.500	12	SS-ROD-500-12	<b>111311</b>	18
0.750	6	SS-ROD-750-6	<b>111312</b>	25
1.000	6	SS-ROD-1000-6	<b>111313</b>	42



111299 / Stainless Steel Rectangular Bar



111307 / Stainless Steel Sheet



111311 / Stainless Steel Rod

**Kapton® Film**

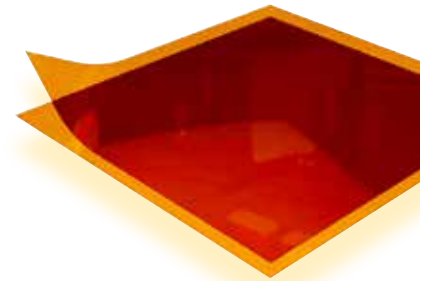
Accu-Glass Products' Kapton® Film provides a clean, flexible electrical insulation with low outgassing characteristics. It is suitable to vacuum levels of  $1 \times 10^{-10}$  Torr and temperatures up to 400°C. No adhesive is applied to these individual sheets of Kapton® film.

**Kapton® — Film Stock / 400°C / UHV to  $1 \times 10^{-10}$  Torr**

Film Thickness	Width	Length	Model Number	Part Number	Unit Price \$
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**Film — Rectangular / Kapton®**

0.001	12	12	KAP-001FM-12x12	<b>111208</b>	23
0.002	12	12	KAP-002FM-12x12	<b>111210</b>	31
0.005	12	12	KAP-005FM-12x12	<b>111212</b>	62



**111212** / Kapton® Film

**Polyimide Tubing**

Polyimide tubing provides a clean, flexible electrical insulation with low outgassing characteristics equivalent to Kapton®. It is suitable to vacuum levels of  $1 \times 10^{-10}$  Torr and temperatures up to 400°C.

**Polyimide — Tube Stock / 400°C / UHV to  $1 \times 10^{-10}$  Torr**

Tube Diameter	ID	Wall Thickness	Length	Model Number	Part Number	Unit Price \$
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**Tube — Round / Polyimide**

0.042	0.040	0.001	12	POLY-TUB-040-12	<b>111217</b>	18
0.053	0.051	0.001	12	POLY-TUB-051-12	<b>111218</b>	18
0.060	0.057	0.001	12	POLY-TUB-057-12	<b>111219</b>	18
0.075	0.072	0.001	12	POLY-TUB-072-12	<b>111220</b>	18
0.083	0.081	0.001	12	POLY-TUB-081-12	<b>111221</b>	18
0.093	0.088	0.002	12	POLY-TUB-088-12	<b>111222</b>	22
0.110	0.105	0.003	12	POLY-TUB-105-12	<b>111223</b>	22
0.166	0.160	0.003	12	POLY-TUB-160-12	<b>111225</b>	38



**111217** / Polyimide Tubing



**111225** / Polyimide Tubing



### PEEK (polyether etherketone)

Accu-Glass Products' PEEK provides a clean, flexible electrical insulation with low outgassing characteristics. It is suitable to vacuum levels of  $1 \times 10^{-10}$  Torr. No adhesive is applied to these sheets.

PEEK is a high performance thermoplastic that is super-tough, super abrasion and wear resistant, chemical and oil resistant, with very low liquid and moisture absorption. It has a temperature range of  $-72^{\circ}$  to  $250^{\circ}\text{C}$ . Meets Underwriters Laboratories (UL) Specification: UL 94VTM1. Color is natural / tan.



**111261** / PEEK Rectangular Bar



**111238** / PEEK Film / Sheet

### PEEK — Flat Stock / $250^{\circ}\text{C}$ / UHV to $1 \times 10^{-10}$ Torr

Material Thickness	Width	Length	Model Number	Part Number	Unit Price \$
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#### Bar — Rectangular / PEEK

0.250	1	12	PK-BAR-250-1x12	<b>111261</b>	71
0.250	2	12	PK-BAR-250-2x12	<b>111262</b>	142
0.375	1	12	PK-BAR-375-1x12	<b>111263</b>	96
0.375	2	12	PK-BAR-375-2x12	<b>111264</b>	192
0.500	1	12	PK-BAR-500-1x12	<b>111265</b>	123
0.500	2	12	PK-BAR-500-2x12	<b>111266</b>	246
0.750	1	12	PK-BAR-750-1x12	<b>111267</b>	158
0.750	2	12	PK-BAR-750-2x12	<b>111268</b>	316
1.000	1	12	PK-BAR-1000-1x12	<b>111269</b>	193
1.000	2	12	PK-BAR-1000-2x12	<b>111270</b>	386

#### Film / Sheet — Rectangular / PEEK

0.003	6	6	PK-003FM-6x6	<b>111232</b>	12
0.003	12	12	PK-003FM-12x12	<b>111233</b>	39
0.005	6	6	PK-005FM-6x6	<b>111235</b>	20
0.005	12	12	PK-005FM-12x12	<b>111236</b>	64
0.010	6	6	PK-010FM-6x6	<b>111238</b>	36
0.010	12	12	PK-010FM-12x12	<b>111239</b>	112
0.250	6	6	PK-250SHT-6x6	<b>111241</b>	160
0.375	6	6	PK-375SHT-6x6	<b>111242</b>	289
0.500	6	6	PK-500SHT-6x6	<b>111243</b>	371
0.750	6	6	PK-750SHT-6x6	<b>111244</b>	437
1.000	6	6	PK-1000SHT-6x6	<b>111245</b>	540

**PEEK Tubing**

PEEK Tubing maintains its shape and offers great tensile strength in wide temperature ranges. It is suitable to vacuum levels of  $1 \times 10^{-10}$  Torr and temperatures as high as 250°C.

**PEEK — Round Stock / 250°C / UHV to  $1 \times 10^{-10}$  Torr**

Tube / Rod Diameter	ID	Wall Thickness	Length	Quantity Pieces	Model Number	Part Number	Unit Price \$
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**Tube — Round / PEEK**

0.062	0.010	0.026	12	2	PK-TUB-010-12	<b>111254</b>	16
0.062	0.020	0.021	12	2	PK-TUB-020-12	<b>111255</b>	16
0.062	0.030	0.018	12	2	PK-TUB-030-12	<b>111256</b>	16
0.062	0.040	0.011	12	2	PK-TUB-040-12	<b>111257</b>	16
0.125	0.062	0.032	12	2	PK-TUB-062-12	<b>111259</b>	36
0.125	0.093	0.016	12	2	PK-TUB-093-12	<b>111260</b>	40

**Rod — Round / PEEK**

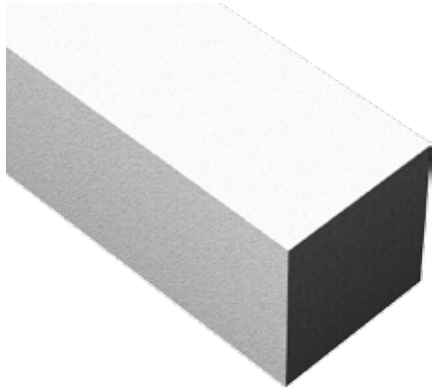
0.250	—	—	6		PK-ROD-250-6	<b>110940</b>	8
0.375	—	—	6		PK-ROD-375-6	<b>110941</b>	16
0.500	—	—	6		PK-ROD-500-6	<b>110942</b>	29
0.625	—	—	6		PK-ROD-625-6	<b>110939</b>	52
0.750	—	—	6		PK-ROD-750-6	<b>110943</b>	55
1.000	—	—	6		PK-ROD-1000-6	<b>110944</b>	92
1.500	—	—	6		PK-ROD-1500-6	<b>110945</b>	175
2.000	—	—	6		PK-ROD-2000-6	<b>110946</b>	285
2.500	—	—	6		PK-ROD-2500-6	<b>110947</b>	375
3.000	—	—	6		PK-ROD-3000-6	<b>110948</b>	498
4.000	—	—	6		PK-ROD-4000-6	<b>110949</b>	954



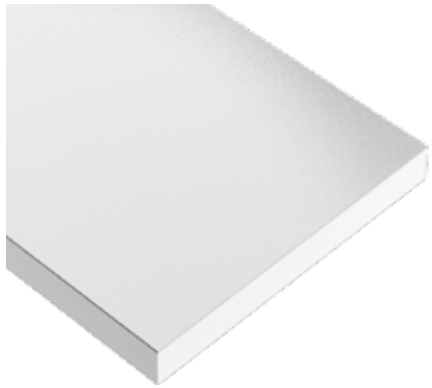
**111255** / PEEK Tubing



**110942** / PEEK Rod



**112518** / Macor® Square Bar



**112522** / Macor® Sheet

### Macor® Ceramic

An easy to machine, ultrahigh temperature glass-mica ceramic. Macor® is machinable using standard machining tools. It is moisture resistant with zero porosity and no outgassing. Use where good electrical and thermal resistance is required. Color is white.

### Macor® Ceramic — Flat Stock / 800°C / UHV to 1x10<sup>-10</sup> Torr

Material Thickness	Width	Length	Model Number	Part Number	Unit Price \$
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### Bar — Rectangular / Macor® Machinable Ceramic

0.50	0.50	2	MC-BAR-1/2x1/2x2	<b>112518</b>	40
0.50	0.50	3	MC-BAR-1/2x1/2x3	<b>112519</b>	61
0.50	0.50	6	MC-BAR-1/2x1/2x6	<b>112520</b>	122
0.50	0.50	12	MC-BAR-1/2x1/2x12	<b>112521</b>	243

### Sheet — Rectangular / Macor® Machinable Ceramic

0.250	2	2	MC-250SHT-2x2	<b>112522</b>	117
0.250	4	4	MC-250SHT-4x4	<b>112523</b>	319



## Material Properties

Below is an abridged materials properties table referencing the raw materials offered on the preceding pages. Please note that this information is only provided for general reference use, and that its accuracy for use in mission critical calculations can not be guaranteed.

### Properties Table<sup>1</sup> — Metals / Polymers / Ceramics

Specification	Units	Copper OFE Grade	Stainless Steel 304 Grade	Kapton <sup>®</sup> Polymer	PEEK Polymer	Macor <sup>®</sup> Machinable Ceramic
<b>Properties — Vacuum</b>						
Vacuum Rating	Torr	10 <sup>-10</sup>	10 <sup>-10</sup>	10 <sup>-10</sup>	10 <sup>-10</sup>	10 <sup>-10</sup>
Temperature, Maximum Operating	°C	875	450	400	250	800
Temperature, Minimum Operating	°C	-200	-200	-200	-72	-200
<b>Properties — Physical / Mechanical / Electrical / Thermal</b>						
Melting Point	°C	1083	1400~1450	—	340~374	—
Density	g/cm <sup>3</sup>	8.94	9	1.42	1.3~1.93	2.52
Coefficient of Thermal Expansion	µm/m-°C	17.0~17.7	13.2~15.3	20	13~55	7.40
Thermal Conductivity	W/m-°C	391	16.3	0.120	0.290~0.918	1.46
Specific Heat	J/kg-°C	385	502	1090	1280~1730	790
Electrical Resistivity	ohm-cm	1.71 <sup>-6</sup>	72.1 <sup>-6</sup>	1 <sup>10</sup> ~1.5 <sup>10</sup>	10 <sup>17</sup> ~3.80 <sup>17</sup>	1 <sup>16</sup>
Electrical Conductivity	% IACS @20°C	101	—	—	—	—
Tensile Strength, Ultimate	psi	36,300	89,900	20,000	74,00~34,800	—
Tensile Strength, Yield	psi	28,300	47,900	10,000	14,200~31,900	—
Coefficient of Friction (film-to-film)	None	—	—	0.48	0.24~0.45	—
Compressive Strength	psi	—	—	—	600~36,300	50,000
Modulus of Rupture	psi	—	—	—	—	13,600
Water Absorption	%	—	—	< 0.32	< 0.05	< 0.01
Dielectric Strength	kV/mm	—	—	339	15~175	30.9

1. Please note that these material properties are only provided for general reference. Actual values may vary from those listed here, and should be carefully researched for use in mission critical calculations.