

HALLMARKS AND PURE METAL CONTENTS**GOLD CONTENTS**

Hallmark USA	Purity Hallmark International	Pure Gold %
8K	333	33.33%
9K	375	37.50%
10K	416	41.66%
14K	585	58.50%
18K	750	75.00%
22K	916	91.67%

PLATINUM CONTENTS

Hallmark	Purity Hallmark International	Pure Platinum %
PT \ Pt	950	95%
PT \ Pt	900	90%
PT \ Pt	850	85%
PT \ Pt	800	80%

SILVER CONTENTS

Hallmark U.K.	Purity by Hallmark International	Pure Silver %
Sterling	950	95%
Sterling	925	92%
	900	90%

ALLOYS USED FOR COLOR

Alloy Metal	Color
Copper	Pink
Copper \ Silver	Yellow
Cadmium \ Silver	Green
Silver	Green
Copper \ Zinc	Green
Iron	Blue
Copper \ Zinc \ Palladium	White
Aluminum \ Zinc	Purple



SPECIFIC GRAVITY OF METALS

Metal	S.G.	Metal	S.G.
10% Irid Plat	21.54	Iron	7.87
15% Irid Plat	21.59	Lead	11.34
5% Irid Plat	21.50	Magnesium	1.75
Aluminum	2.70	Manganese	7.43
Antimony	6.62	Molybdenum	10.20
Beryllium	1.82	Nickel	8.90
Bismuth	9.80	Osmium	22.50
Brass	8.50	Palladium	12.00
Cadmium	8.65	Pewter	9.50
Carbon	2.22	Phosphorus	1.82
Chromium	7.19	Platinum, Pure	21.45
Cobalt	8.90	Rhodium	12.44
Copper	8.94	Ruthenium	12.20
Gold 375	11.30	Silicon	2.33
Gold 585	13.40	Silver, Coin	10.31
Gold 750	15.58	Silver, Pure	10.49
Gold 916	17.70	Silver, Sterling	10.36
Gold 999	19.36	Tin	7.30
Iridium	22.41	Wax	1.00
Iron	7.87	Zinc	7.14

ELEMENT SYMBOLS FOR METALS

Metal	Symbol	Metal	Symbol
Aluminum	Al	Manganese	Mn
Antimony	Sb	Molybdenum	Mo
Beryllium	Be	Nickel	Ni
Bismuth	Bi	Osmium	Os
Cadmium	Cd	Palladium	Pd
Carbon	C	Phosphorus	P
Chromium	Cr	Platinum, Pure	Pt
Cobalt	Co	Rhodium	Rh
Copper	Cu	Ruthenium	Ru
Gold, 24K Pure	Au	Silicon	Si
Iridium	Ir	Silver, Pure	Ag
Iron	Fe	Tin	Sn
Lead	Pb	Zinc	Zn
Magnesium	Mg		



METAL & WAX WEIGHT CONVERSION - CROSS REFERENCE CHART (Pt. 1)

X	Y								
	Pt	Pt950	Pt900	F.G.	22kt	18kt(W)	18kt(Y)	14kt(W)	14kt(Y)
Pt	X	0.970	0.956	0.901	0.828	0.765	0.727	0.671	0.625
Pt 950	1.031	X	0.986	0.929	0.853	0.788	0.750	0.692	0.644
Pt 900	1.046	1.015	X	0.943	0.866	0.800	0.761	0.702	0.654
F.G	1.110	1.076	1.061	X	0.918	0.848	0.807	0.745	0.693
22kt	1.208	1.172	1.155	1.089	X	0.924	0.879	0.811	0.755
18kt (W)	1.308	1.268	1.250	1.179	1.082	X	0.951	0.878	0.817
18kt (Y)	1.375	1.333	1.314	1.239	1.138	1.051	X	0.923	0.859
14kt (W)	1.490	1.444	1.424	1.342	1.233	1.139	1.083	X	0.931
14kt (Y)	1.601	1.552	1.530	1.443	1.325	1.224	1.164	1.075	X
Rhodium	1.726	1.673	1.649	1.555	1.428	1.319	1.255	1.158	1.078
Palladium	1.785	1.730	1.705	1.608	1.477	1.364	1.298	1.198	1.115
10kt	1.873	1.817	1.790	1.688	1.550	1.432	1.362	1.258	1.170
9kt	1.890	1.833	1.806	1.703	1.564	1.445	1.374	1.269	1.181
F.S.	2.043	1.981	1.952	1.841	1.690	1.562	1.486	1.371	1.276
Stg. Silver	2.070	2.008	1.979	1.866	1.713	1.583	1.506	1.390	1.293
Pewter	2.258	2.189	2.158	2.035	1.868	1.726	1.642	1.516	1.411
Brass	2.494	2.419	2.384	2.248	2.064	1.907	1.814	1.674	1.558
Wax	21.450	20.800	20.500	19.330	17.750	16.400	15.600	14.400	13.400

Key:

Pt.	Platinum	Pt. 950	95% Platinum
F.G.	Fine Gold	Pt. 900	90% Platinum
22kt	22 karat	(W)	White
18kt	18 karat	(Y)	Yellow
14kt	14 karat	Rho.	Rhodium
10kt	10 karat	Pal.	Palladium
9kt	9 karat	Pew.	Pewter
F.S.	Fine Silver	Br.	Brass
Stg.	Sterling Silver	Wax	Casting Wax

Example: 2 gm of 18kt (Y) = 1.468 gm 10kt

 $X \times Y = Y \quad 2 \times .734 = 1.468$ 

METAL & WAX WEIGHT CONVERSION - CROSS REFERENCE CHART (Pt. 2)

X	Y								
	Rho.	Pal.	10kt	9kt	F.S	Stg.	Pew.	Br.	Wax
Pt	0.579	0.560	0.534	0.529	0.490	0.483	0.443	0.401	0.047
Pt 950	0.598	0.578	0.550	0.546	0.505	0.498	0.457	0.413	0.048
Pt 900	0.606	0.586	0.559	0.554	0.512	0.505	0.463	0.420	0.049
F.G.	0.643	0.622	0.592	0.587	0.543	0.536	0.491	0.445	0.052
22kt	0.700	0.677	0.645	0.639	0.592	0.584	0.535	0.485	0.056
18kt (W)	0.758	0.733	0.698	0.692	0.640	0.632	0.579	0.524	0.061
18kt (Y)	0.797	0.771	0.734	0.728	0.673	0.664	0.609	0.551	0.064
14kt (W)	0.863	0.835	0.795	0.788	0.729	0.719	0.660	0.597	0.069
14kt (Y)	0.928	0.897	0.854	0.847	0.784	0.773	0.709	0.642	0.075
Rhodium	X	0.967	0.921	0.913	0.845	0.833	0.764	0.692	0.080
Palladium	1.034	X	0.953	0.944	0.874	0.862	0.790	0.715	0.083
10kt	1.086	1.050	X	0.991	0.917	0.905	0.830	0.751	0.087
9kt	1.095	1.059	1.009	X	0.925	0.913	0.837	0.758	0.088
F.S.	1.184	1.145	1.090	1.081	X	0.987	0.905	0.819	0.095
Stg. Silver	1.200	1.160	1.105	1.096	1.014	X	0.917	0.830	0.097
Pewter	1.308	1.265	1.205	1.195	1.105	1.091	X	0.905	0.105
Brass	1.445	1.398	1.331	1.320	1.221	1.205	1.105	X	0.116
Wax	12.430	12.020	11.450	11.350	10.500	10.360	9.500	8.600	X

***** Note:** There are many variations of alloys that can be used to reach these purity indicators. These cross references may vary depending on the alloy. In the case of the lower purities of the precious metals the variance may be considerable. This reference is for guidance only.

Example: Weight of the metal in the vertical column (X) multiplied by the corresponding value on the same horizontal line referencing the desired metal at the top (Y), will provide a rough indicator of the weight of the same volume as the referenced material.

Example: 2 gm of 18kt (Y) = 1.468 gm 10kt

$$X \times Y = Y \quad 2 \times .734 = 1.468$$



Standard Weight Abbreviations

Weight Measure	Abbreviations	Note:
Pound Troy	lb.t.	British system specifically for precious metals and jewels.
Ounce Troy	oz.t.	British system specifically for precious metals and jewels.
Ounce Avoirdupois	oz.av.	International default ounce.
Pound Avoirdupois	lb.av.	International default pound.
Tonne	t	Metric system of weights.
Kilogram	kg	Metric system of weights.
Gram	gm	Metric system of weights.
Milligram	mg	Metric system of weights.
Carat	c. or ct	Standard used by dealers worldwide for gemstones.
Point	pt	Term describing one hundredth of a carat applied to gemstones.
Pearl Grain	gi	Standard used dealers worldwide for pearls.
Momme	mme	Standard used dealers worldwide for pearls.
Kan	kan	Standard used dealers worldwide for pearls.
Tael	tl	Weight for metals common in Hong Kong and Singapore.
Baht	bt	Weight for metals common in Thailand.
Tola	tola	Weight for metals common in India.
Pennyweight	dwt \ pwt	Weight for metals common in USA.
Grain	gr	Weight for metals common in USA. (Troy)

*** Note: kt is the standard abbreviation for metal purities.



Weight Conversion Chart (Pt. 1) X x Y = Y

X	Abr.	Y Stones		Y Pearls			
		ct	pt	kan	mme	gi	
Stones							
	ct	Carat (Metric)	X	100		0.0533	4
	pt	Point	0.01	X		0.0005	0.04
Pearls							
	kan	Kan	18,750		X	1,000	75,000
	mme	Momme	18.75	1,875	0.001	X	75
	gi	Grain (Pearl)	0.25	25		0.0133	X
Metals							
	mg	Milligram	0.005	0.5		0.0027	0.2
	gr	Grain (Troy)	0.324	32.40		0.0173	1.296
	dwt \ pwt	Pennyweight	7.776	777.587		0.4147	31.104
	gm	Gram	5	500	0.0003	0.2667	20
	bt	Baht (Thailand)	76.22	7,622	0.0041	4.065	304.88
	tola	Tola (India)	58.319	5,831.90	0.0031	3.110	233.28
	oz.av.	Ounce Av.	141.75	14,174.76	0.0076	7.560	566.99
	oz.t.	Ounce Troy	155.52	15,551.74	0.0083	8.294	622.07
	lb.t.	Pound Troy	1,866.21	186,620.9	0.0995	99.53	7,464.83
	lb.av.	Pound Av.	2,267.96	226,796.2	0.121	120.96	9,071.85
	kg	Kilogram	5,000	500,000	0.267	266.67	20,000

Note: Grain (Troy) is equal to Grain (Avoirdupois)



Weight Conversion Chart (Pt. 2) X x Y = Y

X	Y Metals											
		mg	gr	dwt \ pwt	gm	bt	tola	oz.av.	oz.t.	lb.t.	lb.av.	kg
Stones												
ct	Carat (Metric)	200	3.086	0.1286	0.2	0.1312	0.0171	0.0071	0.0064	0.0005	0.0004	0.0002
pt	Point	0.2	0.0309	0.0013	0.002	0.0001						
Pearls												
kan	Kan		57,871.30	2,411.30	3,750	246	321.51	132.28	120.57	10.471	8.267	3.75
mme	Momme	3,750	57.871	2.411	3.750	0.246	0.3215	0.1323	0.1206	0.01	0.0083	0.0038
gi	Grain (Pearl)	50	0.7716	0.0322	0.05	0.0033	0.0043	0.0018	0.0016			
Metals												
mg	Milligram	X	0.01543	0.0006	0.001							
gr	Grain (Troy)	64.80	X	0.0417	0.0648	0.0043	0.0056	0.0023	0.0021			
dwt \ pwt	Pennyweight	1,555.17	24	X	1.555	0.102	0.133	0.0549	0.05	0.0042	0.0034	
g	Gram	1,000	15.432	0.643	X	0.0656	0.0857	0.0353	0.0322	0.0027	0.0022	0.001
bt	Baht (Thailand)	15,244	235.25	9.802	15.244	X	1.307	0.5377	0.49	0.0408	0.0336	0.0152
tola	Tola (India)	11,663.80	180	7.5	11.664	0.7651	X	0.4125	0.376	0.0313	0.0258	0.1166
oz.av.	Ounce Av.	28,349.52	437.50	18.229	28.35	1.8597	2.431	X	0.9115	0.076	0.0625	0.0283
oz.t.	Ounce Troy	31,103.48	480	20.0	31.103	2.04	2.667	1.097	X	0.0833	0.0686	0.0311
lb.t.	Pound Troy	373,241.7	5,760	240.00	373.24	24.485	32	13.166	12	X	0.8229	0.3732
lb.av.	Pound Av.	453,592.4	7,000	291.67	453.59	29.755	38.89	16	14.583	1.215	X	0.4536
kg	Kilogram	1,000,000	15,432.36	643	1,000	65.6	85.74	35.274	32.151	2.67	2.205	X

Note: Grain (Troy) is equal to Grain (Avoirdupois)



WAX CONVERSION TO METAL

X	Y					
Wax Wt.	8kt	9kt\10kt	14kt	18kt	PT 900	PT 950
?	10.5	11	14	15	16	16.7

Wax Weight (X) multiplied by factor (Y)= Metal weight
Approximate

NICKEL SILVER PROTOTYPE CONVERSION TO METAL

X	Y					
Prototype Wt.	8kt	9kt\10kt	14kt	18kt	PT 900	PT 950
?	1.02	1.15	1.3	1.54	2.1	2.19

** Note: Also known as German Silver

Prototype Weight (X) multiplied by factor (Y)= Metal weight
Approximate

TEMPERATURE CONVERSION

$$\text{Centigrade} = 5 \div 9 (F - 32)$$

$$\text{Fahrenheit} = 9 \div 5 C + 32$$

$$\text{Example: } 500 C = ? F$$

$$9 \div 5 \times 500 + 32 = 932 F$$

$$\text{Example: } 500 F = ? C$$

$$500 - 32 \times 5 \div 9 = 260 C$$



Calculate Estimated Weights and Volumes

Plate or Square Wire:

Formula: Length x width x thickness x specific gravity (SG)

Example: 18ct Yellow Gold Plate 40 mm x 20 mm x 1 mm
 $= 4 \times 2 \times 1 \times 15.58 = 12,464 \text{ mg or } 12.464 \text{ gm}$

Round Wire:

Formula: Radius x Radius x 3.142 x length x specific gravity (SG)

Example: 18ct Yellow Gold Wire 1.5 mm diameter, 60 mm long
 $= 0.75 \times 0.75 \times 3.142 \times 60 \times 15.58 = 1,652.14 \text{ mg or } 1.652 \text{ gm}$

Finished Length of Worked Plate or Square Wire:

Formula: Present thickness divided by finished thickness
 then multiplied by present length = finished length

Example: Present plate 3.5 mm thickness, 50 mm long.

Length be when rolled to 1.5 mm?

$= 3.5 \text{ divided by } 1.5 \times 50 = 116.66 \text{ mm}$

Note: Gains in width reduce gains in length

Radius of a circle:

Center point to side or width\thickness\diameter divided by 2

Circumference of a circle:

Circumference = Diameter multiplied by 3.142

Area of a circle:

Radius multiplied by radius then multiplied by 3.142

Volume of a cylinder:

Radius multiplied by radius then multiplied by 3.142,
 then multiplied by the height

Convert Known Weight of an Alloy to the Weight of Another:

Specific gravity (SG) of alloy required

divided by SG of alloy in hand multiplied by weight in
 hand equals weight in required alloy.

Example: What will a 2 gm ring in 14k gold weigh in 18k gold?

$15.58 \text{ divided by } 13.4 \times 2 = 2.325 \text{ gm}$



Melting Point of Metals

Metal	Celsius	Fahrenheit	Metal	Celsius	Fahrenheit
10% Irid Plat	1,788.0	3,250.0	Iron	1,539.0	2,802.0
15% Irid Plat	1,821.0	3,310.0	Lead	327.0	621.0
5% Irid Plat	1,779.0	3,235.0	Magnesium	650.0	1,202.0
Aluminum	660.0	1,220.0	Manganese	1,245.0	2,273.0
Antimony	630.0	1,167.0	Molybdenum	2,625.0	4,760.0
Beryllium	1,280.0	2,340.0	Nickel	1,455.0	2,651.0
Bismuth	271.0	520.0	Osmium	2,700.0	4,892.0
Brass	940.0	1,724.0	Palladium	1,555.0	2,831.0
Cadmium	321.0	610.0	Phosphorus	44.0	111.0
Carbon	-	-	Platinum	1,773.0	3,223.4
Chromium	1,830.0	3,326.0	Rhodium	1,955.0	3,551.0
Cobalt	1,132.2	2,070.0	Ruthenium	2,450.0	4,442.0
Copper	1,083.0	1,981.4	Silicon	1,430.0	2,605.0
Gold 375	830.0	1,526.0	Silver 925	893.0	1,639.4
Gold 585	838.0	1,540.4	Silver 999	961.0	1,761.8
Gold 750	905.0	1,661.0	Silver, Coin	879.0	1,615.0
Gold 916	1,003.0	1,837.4	Tin	232.0	449.6
Gold 999	1,063.0	1,945.4	Zinc	419.0	786.2
Iridium	2,454.0	4,449.2			

* Melting points for alloyed metals may vary according to metal component contents and quantity thereof.



U.S. Wire Gauge Measurements

B&S Gauge	Inches	mm	B&S Gauge	Inches	mm
0000	0.46	11.684	19	0.036	0.912
000	0.41	10.400	20	0.032	0.812
00	0.365	9.270	21	0.028	0.723
0	0.325	8.255	22	0.025	0.644
1	0.289	7.348	23	0.023	0.573
2	0.258	6.543	24	0.02	0.511
3	0.229	5.827	25	0.018	0.455
4	0.204	5.189	26	0.016	0.405
5	0.182	4.621	27	0.014	0.360
6	0.162	4.115	28	0.013	0.321
7	0.144	3.665	29	0.011	0.286
8	0.125	3.264	30	0.01	0.255
9	0.114	2.906	31	0.009	0.226
10	0.102	2.588	32	0.008	0.202
11	0.091	2.305	33	0.007	0.180
12	0.081	2.052	34	0.006	0.160
13	0.072	1.828	35	0.006	0.142
14	0.064	1.628	36	0.005	0.127
15	0.057	1.449	37	0.004	0.113
16	0.051	1.291	38	0.004	0.100
17	0.045	1.149	39	0.004	0.090
18	0.04	1.024	40	0.003	0.080

