

## STANDARD WEIGHTS, MEASURES, AND TEMPERATURES FOR JEWELERS

### ALLOYS

**PLATINUM ALLOY USAGE** This chart will tell you which alloy is best suited for your job.

PT Alloy	Casting	Fabrication	Die Striking	Machining
90/10 Pt/Ir	Satisfactory	Excellent	Excellent	Poor
95/5 Pt/Ir	Poor	Excellent	Excellent	Poor
Pt 950/Co	Excellent	Good	Good	Good
Pt 950/Ru	Good	Excellent	Good	Excellent
Pt 950/Heat treatable	Excellent	Good	Excellent	Excellent

Platinum Alloy	Hardness HV	Strength PSI
90/10 Iridium	110 HV	55,000 PSI
95/5 Iridium	80 HV	40,000 PSI
Platinum/Cobalt	135 HV	64,000 PSI
Platinum/Ruthenium	135 HV	66,000 PSI
Pt 950/Heat treatable	240-330 HV Variable	100,000 PSI +

### PLATINUM

- 90/10 Pt/Ir is an all round pt alloy. It can be used for all applications, but is best suited for fabrication.
- 95/5 Pt/Ir is a fabrication alloy. It has high malleability and work-hardens rapidly. It is great for die striking. Because of its low hardness, it is not well suited for casting.
- Pt 950/Cobalt has a very fine grain and is ideal for casting. It is slightly Ferro-magnetic and oxidizes at about 1000°C. The oxidation can be removed with hot Sparex.
- Pt 950/Ruthenium is the best choice for multi-purpose use. It is ideal for machining and fabrication. Casting will deliver good results. Because of its structure, fine detail castings are somewhat more difficult to achieve.
- Pt 950 heat treatable alloys are ideal when spring action is needed, or a harder product is desired. The hardening feature gives these alloys great flexibility. The properties vary with alloys from different vendors. Ask for data sheets from metal providers.

*Courtesy of: Platinum Guild International USA*

## STANDARD WEIGHTS, MEASURES, AND TEMPERATURES FOR JEWELERS

### WEIGHTS

#### RELATIVE WEIGHTS

**Formula to calculate metal weight and cost from wax models:**

- Wax weight (dwt.\*) x specific gravity of desired metal\*\* = weight of casting in dwt. x Cost/dwt. + Labor Charges = Cost of Casting.
- Allow some additional weight for the remaining gate.

The top line is the known material (in pennyweights). The first column is the desired material. For example, if you have a wax that weighs .7 dwt, and you want to know its corresponding weight in platinum, go down the wax column to platinum and multiply .7 dwt. (wax weight) by 21.45. 15.02 dwt's is the corresponding weight in platinum.

	Wax	Sterling	10Y	14Y	18Y	14W	18W	Platinum
Sterling	10.36	1.00	0.90	0.79	0.67	0.82	0.71	0.49
10Y	11.60	1.11	1.00	0.89	0.74	0.92	0.79	0.54
14Y	13.08	1.27	1.13	1.00	0.84	1.03	0.89	0.61
18Y	15.60	1.49	1.34	1.19	1.00	1.23	1.06	0.73
14W	12.65	1.22	1.09	0.97	0.81	1.00	0.86	0.59
18W	14.65	1.41	1.26	1.12	0.94	1.16	1.00	0.68
PT	21.45	2.04	1.85	1.64	1.38	1.70	1.46	1.00

\*The specific gravity of wax is 1. \*\*See Specific Gravity Chart or Relative Weights.

#### WEIGHT CONVERSION

To convert:

Pennyweights to grams	Multiply by	1.55518
Grams to pennyweights	Multiply by	0.64301
Ounces troy to grams	Multiply by	31.1035
Grams to ounces troy	Multiply by	0.0321507
Ounces avoirdupois to grams	Multiply by	28.3495
Grams to ounces avoirdupois	Multiply by	0.0352740
Ounces troy to ounces avoirdupois	Multiply by	1.09714
Ounces avoirdupois to ounces troy	Multiply by	0.911458
Pounds avoirdupois to kilograms	Multiply by	0.4535924
Kilograms to pounds avoirdupois	Multiply by	2.20462
Kilograms to ounces avoirdupois	Multiply by	35.2740
Kilograms to ounces troy	Multiply by	32.1507

## STANDARD WEIGHTS, MEASURES, AND TEMPERATURES FOR JEWELERS

### WEIGHTS

#### CARAT WEIGHT

**Used in Weighing Precious and Semi-Precious Stones**

1 carat	=	0.20 grams
1 gram	=	5 carats
1 carat	=	3.086 grains troy
1 carat	=	0.007 ounce avoirdupois
1 carat	=	100 points

#### AVOIRDUPOIS WEIGHT

**Used in Weighing the Base Metals**

16 ounces	=	1 pound
16 ounces	=	7000 grains

**The avoirdupois pound is about 21.5% heavier than the troy pound**

28.35 grams	=	1 ounce avoirdupois
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#### TROY WEIGHT

**Used in Weighing the Precious Metals**

24 grains	=	1 pennyweight
20 pennyweights (dwt.)	=	1 ounce troy
12 ounces	=	1 pound troy
5760 grains	=	1 pound troy

**The troy ounce is about 10% heavier than the avoirdupois ounce.**

31.1035 grams	=	1 ounce troy
1 gram	=	15.432 grains troy
1.555 grams	=	1 pennyweight (dwt.)

# STANDARD WEIGHTS, MEASURES, AND TEMPERATURES FOR JEWELERS

## MEASUREMENTS

### FLUID MEASUREMENT

- 1 quart = 32 ounces (fluid) = 2 pints = 1/4 gallon = 57 cubic inches
- 1 gallon = 4 quarts = 128 ounces (fluid) = 3.78 litre and 231 cubic inches = 0.134 cubic feet
- 1 litre = 1,000 cc (slightly more than 1 quart U.S.) = 0.264 U.S. gallons
- 1 cubic foot = 7.481 U.S. gallons = 1,728 cubic inches
- 1 imperial gallon = 1.2 U.S. gallons = 4.59 litre = 277.27 cubic inches

### DOUZIEME GAUGE

The douzieme gauge used by watchmakers and sometimes by jewelers is also called a spring gauge and degree gauge. Douzieme in French means 1/12.

- 1 douzieme = 1/12 ligne (or line) = 0.0074" = 0.188mm
- 1 ligne = 12 douzieme = 0.0888" = 2.256mm

### LENGTH CONVERSION

To convert:

Millimetres to inches	Multiply by	0.0393701
Inches to millimetres	Multiply by	25.4
Metres to inches	Multiply by	39.3701
Inches to metres	Multiply by	0.0254

- 1 inch = 25.4 millimetres
- 1 millimetre = 0.0393 inch
- 1 metre = 1,000,000 microns
- 1 micron = 0.000039 inch

### AREA AND VOLUME CONVERSION

To convert:

Square inches to square millimetres	Multiply by	645.16
Square inches to square decimetres	Multiply by	0.064516
Square decimetres to square inches	Multiply by	15.50
Square millimetres to square inches	Multiply by	0.00155
Cubic inches to cubic centimetres	Multiply by	16.3871
Cubic centimetres to cubic inches	Multiply by	0.061024

### RULES RELATING TO CIRCLES

- The circumference of a circle is the diameter x 3.1416.
- The diameter of a circle is the circumference multiplied by .31831.
- The area of a circle is the diameter x itself x .7854.
- A circle is .7854 times as heavy as a square of the same size. The loss in cutting a circle from a square is .2146 of the weight of the square.

## STANDARD WEIGHTS, MEASURES, AND TEMPERATURES FOR JEWELERS

### MEASUREMENTS

#### STONE CONVERSIONS

Carat Size	Round Shape MM	Carat Size	Round Shape MM	Carat Size	Round Shape MM
.005	1.0	.11	3.1	.40	4.8
.01	1.3	.12	3.2	.50	5.2
.015	1.5	.14	3.3	.60	5.4
.02	1.7	.15	3.4	.65	5.6
.025	1.8	.16	3.5	.75	5.8
.03	2.0	.17	3.6	.80	6.0
.035	2.1	.18	3.7	1.00	6.5
.04	2.2	.20	3.8	1.25	7.0
.05	2.4	.22	3.9	1.33	7.2
.06	2.5	.23	4.0	1.50	7.4
.07	2.7	.25	4.1	1.75	7.8
.08	2.8	.30	4.2	2.00	8.2
.09	2.9	.33	4.4	2.50	8.8
.10	3.0	.38	4.6	3.00	9.4

#### PERIPHERAL OR SURFACE SPEED (in Feet/Min)

RPM	1" Diameter	4" Diameter	6" Diameter
900	235	950	1400
1150	300	1200	1800
1200	315	1250	1900
1500	400	1550	2350
1750	450	1800	2750
2000	525	2100	3100
2400	625	2500	3800
2800	730	2900	4400
3000	785	3100	4700
3200	840	3350	5000
3450	900	3600	5400
3750	980	3900	5900
4000	1045	4200	6300
4500	1180	4700	7200

#### FINENESS OF GOLD (KARATS)

9K	.3750	17K	.7083
<b>10K</b>	<b>.4167</b>	<b>18K</b>	<b>.7500</b>
11K	.4583	19K	.7917
12K	.5000	20K	.8333
13K	.5417	21K	.8750
<b>14K</b>	<b>.5833</b>	<b>22K</b>	<b>.9167</b>
15K	.6250	23K	.9583
16K	.6667	24K	1.000

## STANDARD WEIGHTS, MEASURES, AND TEMPERATURES FOR JEWELERS

### MEASUREMENTS

#### WIRE AND DRILL SIZES

B&S	mm	Inches		Drill Size
		Thou.	Fractions	
0	8.5	.325	21/64	
1	7.35	.289	9/32	
2	6.54	.258	1/4	
3	5.83	.229	7/32	1
4	5.19	.204	13/64	6
5	4.62	.182	3/16	15
6	4.11	.162	5/32	20
7	3.67	.144	9/64	27
8	3.26	.129	1/8	30
10	2.59	.102		38
11	2.30	.090	3/32	43
12	2.05	.080	5/64	46
13	1.83	.072		50
14	1.63	.064	1/16	51
15	1.45	.057		52

B&S	mm	Inches		Drill Size
		Thou.	Fractions	
16	1.29	.050		54
17	1.15	.045	3/64	55
18	1.02	.040		56
19	.912	.036		60
20	.813	.032	1/32	65
21	.724	.029		67
22	.643	.025		70
23	.574	.023		71
24	.511	.020		74
25	.455	.018		75
26	.404	.016	1/64	77
27	.361	.014		78
28	.330	.013		79
29	.279	.011		80
30	.254	.010		

#### RING SIZE

Size	Inside Diameter		Size	Inside Diameter	
	Inch	mm		Inch	mm
1	.486	12.344	7½	.694	17.628
1½	.502	12.751	8	.710	18.034
2	.518	13.157	8½	.7265	18.453
2½	.534	13.564	9	.743	18.872
3	.550	13.970	9½	.759	19.279
3½	.566	14.376	10	.778	19.761
4	.582	14.783	10½	.794	20.168
4½	.598	15.189	11	.811	20.599
5	.6141	15.597	11½	.8271	21.008
5½	.6300	16.002	12	.843	21.412
6	.6455	16.396	12½	.859	21.819
6½	.662	16.815	13	.875	22.225
7	.678	17.221			

#### FILE TEETH COUNT

Teeth Count by Size Number on Files Used by Jewelers  
00 = coarsest; 6 = finest

	Size No.	Teeth per inch upcut
<i>Needle and Escapement Files 4-7¾"</i>	00	51
	0	64
	1	79
	2	97
	3	117
	4	142
	6	213

## STANDARD WEIGHTS, MEASURES, AND TEMPERATURES FOR JEWELERS

### TEMPERATURES

#### TORCH FUEL CHARACTERISTICS AND TEMPERATURES

Chemical Fuel	Formula	Special Characteristics	Flame Temp. w/Oxygen	Flame Temp. w/Air	BTU per lb.
Acetylene	C2H2	Burns hottest; popular fuel gas; not recommended for use with platinum	6300°F	4217°F	21,499
Natural Gas	**	Burns clean; economical to use	4600°F	3420°F	—
Propane	C3H8	burns clean; economical to use	4780°F	3497°F	21,260
Butane	C4H10	Low heat; available in portable containers	4995°F	3443°F	21,298
Hydrogen	H2	High heat; cleaner than acetylene	4850°F	3713°F	61,085
MAPP®	C3H4	Somewhat concentrated high-temperature flame	5300°F	3600°F	2300

\*\*Typical analysis: methane 83.4%, ethane 15.8%, nitrogen 0.8%.

#### HIGH TEMPERATURE JUDGED BY COLOR

°F	°C	Color
752	400	Red heat, visible in dark
885	474	Red heat, visible in twilight
975	525	Red heat, visible in daylight
1077	581	Red heat, visible in sunlight
1292	700	Dark red
1472	800	Dull cherry red
1652	900	Cherry red
1832	1000	Bright cherry red
2012	1100	Orange-red
2192	1200	Orange-yellow
2372	1300	Yellow-white
2552	1400	White welding heat
2732	1500	Brilliant white
2912	1600	Dazzling white, blue-white

#### ANNEALING TEMPERATURE GUIDE

Time at the full annealing temperature will depend on the thickness of the section, but 1 minute per mm of section should be sufficient for thickness up to about 5 mm. Too frequent annealing or annealing for too long can cause *grain growth* which may make subsequent working or polishing to a smooth surface more difficult.

## STANDARD WEIGHTS, MEASURES, AND TEMPERATURES FOR JEWELERS

### TEMPERATURES

#### SPECIFIC GRAVITY AND METAL MELTING POINTS

Metal	Melting Point		Specific Gravity	Metal	Melting Point		Specific Gravity
	°C	°F			°C	°F	
Aluminum	660	1220	2.7	Iridium	2454	4450	22.5
Bronze	1060	1945	8.8	Iron	1535	2793	7.9
Copper	1083	1981	8.9	Lead	327	621	11.3
Gold (fine)	1063	1945	19.3	Nickel	1455	2651	8.8
22K Yellow	977	1790	17.3	Nickel Silver	1110	2030	8.8
22K Coin	940	1724	17.2	Palladium	1549	2820	12.2
18K Yellow	1030	1885	15.5	Platinum (Pure)	1774	3225	21.4
18K Green	966	1770	15.6	5% Cobalt	1765	3209	20.8
18K Rose	932	1710	15.5	5% Iridium	1790	3254	21.4
18K White	940	1725	15.7	10% Iridium	1800	3272	21.5
14K Yellow	960	1760	13.4	5% Ruthenium	1795	3263	20.7
14K Green	835	1535	13.6	Silver (Fine)	961	1762	10.6
14K Rose	827	1520	13.4	Sterling	920	1640	10.4
14K White	975	1785	13.7	Stainless Steel	1371	2500	7.8
10K Yellow	980	1796	11.6	Titanium	1800	3272	4.5

### TEMPERATURE CONVERSION

**To convert:**

**°Fahrenheit to °Centigrade (Celsius)** = Subtract 32 from degrees Fahrenheit, multiply remainder by 5, divide the product by 9.

**°Centigrade to °Fahrenheit** = Multiply degrees Centigrade by 9, divide product by 5, and add 32.