METAL WEIGHT REFERENCE CARD

The right metal for every flask.

Three ways to work out the metal for a casting. The CAD route is the most reliable: it does not depend on what your wax weighs.

1 From CAD volume

grams = volume (mm³) × alloy density ÷ 1000

Per piece. Multiply by the number of pieces. Measure the metal only, with stones and cutters hidden.

2 From pattern weight

grams = pattern weight × (alloy density ÷ pattern density)

Use your wax's own density, not the chart's 1.00. Weigh patterns before spruing.

3 Whole tree

patterns × (metal ÷ printed wax) + sprue wax × (metal ÷ sprue wax) + button

Button about 15 g, or about 10% of the metal weight on larger trees. Sprue wax = tree on base − empty base − patterns.

ALLOY DENSITIES (G/CM³)

ALLOY	USE	PUBLISHED FIGURES
Sterling silver 925	10.4	10.36 to 10.40 (S, C, HM)
Fine silver 999	10.5	10.49 to 10.53 (S, C, HM, CH)
9ct yellow gold	11.2	11.0 to 11.2 (C, CH)
9ct rose or red gold	11.2	11.1 to 11.3 (C, CH)
14ct yellow gold	13.1	12.84 to 13.3, most recipes (S, C, HM, CH)
14ct white gold, nickel	12.6	12.53 to 12.71 (S, HM)
14ct rose or red gold	13.2	12.9 to 13.26 (S, HM, CH)
18ct yellow gold	15.5	15.2 to 15.64 (S, C, HM, CH)
18ct white gold, nickel	14.8	14.62 to 15.0 (S, C, HM, CH)
18ct white gold, palladium	15.9	15.6 to 16.3 (S, C, CH)
18ct rose or red gold	15.1	14.9 to 15.4 (S, C, CH)
22ct yellow gold	17.8	17.6 to 17.86 (C, S, CH)
24ct fine gold	19.3	19.30 to 19.36 (HM, S, CH)
950 platinum, ruthenium	20.7	20.7 (PGI)
950 platinum, cobalt	20.2	20.1 to 20.2 (S, CH)
950 platinum, iridium	21.5	21.4 to 21.5 (JM, PGI, HM)
950 palladium	12.0	11.7 to 12.0 (CH, Klotz and Held)
Brass	8.4	8.40 (S). Varies with zinc
Bronze	8.6	8.62 (United PMR bronze 342)

Density varies with the exact alloy recipe. For precision, use your alloy supplier's data sheet. S: Stuller. C: Cooksongold. HM: Hauser & Miller. CH: C.Hafner. PGI: Platinum Guild International. JM: Johnson Matthey.

PATTERN MATERIALS (G/CM³)

MATERIAL	DENSITY
Chart assumption	1.00
Carving wax (Freeman File-A-Wax)	0.92
Injection wax, wax wire (Freeman)	0.9 ± 0.05
Jetted wax (3D Systems VisiJet Cast)	0.85 to 0.91
Flashforge red model wax, liquid at 90°C	0.79

The chart shortcut (wax weight × metal specific gravity) assumes 1.00. A wax of 0.90 needs 11% more metal than the chart says. Flashforge's 0.79 is for hot liquid wax, and a solid pattern is denser: measure yours.

MEASURE YOUR PRINTED WAX

1. Print a solid 20 mm cube (8000 mm³ in CAD).
2. Dissolve all support, let the IPA evaporate fully.
3. Weigh on a scale reading to 0.01 g.
4. Density = weight (g) × 1000 ÷ 8000.
5. Average two or three cubes. Write it down.

CONVERSIONS (FIRST FOUR EXACT)

1 dwt = 1.55517384 g

1 oz t = 31.1034768 g

1 oz t = 20 dwt

1 cm³ = 1000 mm³

1 g = 0.6430 dwt

1 g = 0.03215 oz t

Worked example: ten 18ct yellow rings

CAD volume of one ring	**250 mm³**
250 × 15.5 ÷ 1000	**3.875 g each**
× 10 rings	**38.75 g**

38.75 g = 24.92 dwt = 1.246 oz t

Rings only. Sprue metal and button come on top.

Worked example: one sterling tree

Patterns 6.00 g × 10.4 ÷ 0.85	**73.41 g**
Sprue wax 3.00 g × 10.4 ÷ 0.90	**34.67 g**
Button	**15.00 g**

123.08 g = 79.14 dwt = 3.957 oz t

0.85 is an example, not a WaxJet figure. The chart shortcut gives 108.60 g, 14.48 g short.

3D WERK

Local Flashforge WaxJet support in Sydney

Questions about your wax patterns?

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Online calculator: 3dwerk.com.au/metal-weight-calculator