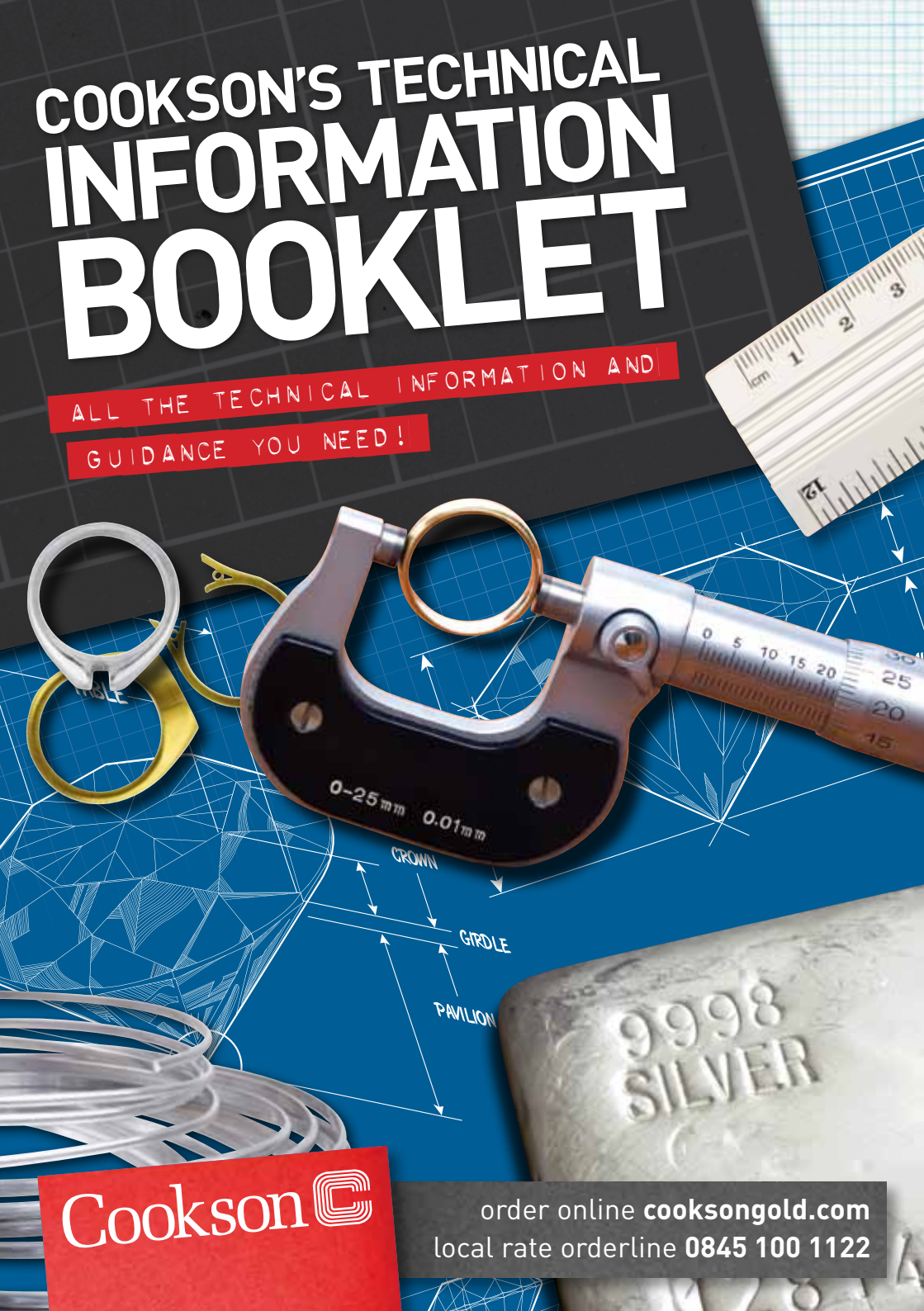
COOKSON'S TECHNICAL INFORMATION BOOKLET

ALL THE TECHNICAL INFORMATION AND GUIDANCE YOU NEED!



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GOLD? SILVER? SOLDERING? FINISHING?

If you've got questions, GET THE ANSWER, online at www.cooksongold.com/technical/

Jargon Explained

Here at Cooksons, we've been in the jewellery business for a long time, so it won't come as any surprise if we tell you that we've got a lot of experience and knowledge in the field. What might surprise you though, is how easy it is for you to benefit from that experience.

SIMPLY LOG ONTO WWW.COOKSONGOLD.COM/TECHNICAL/ TO USE THIS FREE QUICK AND EASY TO USE 24/7 RESOURCE.

Jargon Explained

Our A-Z Glossary makes sense of all the complex terms or abbreviations used within the trade.

Frequently Asked Questions?

Check through our Frequently Asked Questions covering, products, process and techniques, to see if yours has already been answered.

Can't find the answer?

If you can't find the answer you're looking for, use our 'ask a question' feature for quick personal responses.

Hundreds of useful datasheets

Get the latest facts & figures on alloys, products plus key health and safety information.

Instant Conversion calculations

Click for instant conversion of length, weight, carat and now stone sizing charts.

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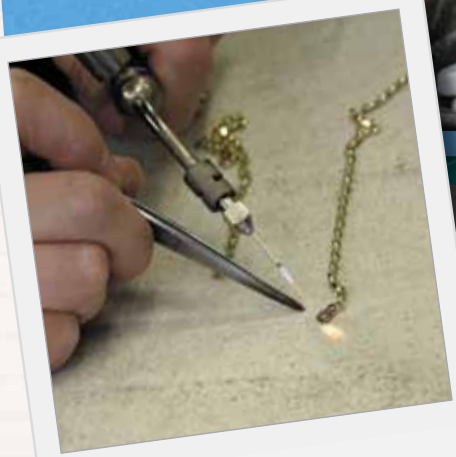
Soldering

- Soldering - technical hints
- Joint preparation
- Polishing Platinum
- Choosing the right Solder



Gold

- Wedding Rings
- Furnace annealing Gold Alloys
- Stress relief annealing Gold Alloys
- Stress and intergranular corrosion
- Minimising the 'orange peel' effect when annealing
- Tarnishing in Gold Alloys
- Pickling to remove Gold Oxide

Silver

- The difference between hard and soft wire
- Avoiding firestain
- Prevention or removal of surface oxides
- Causes of tarnishing in Silver Alloys

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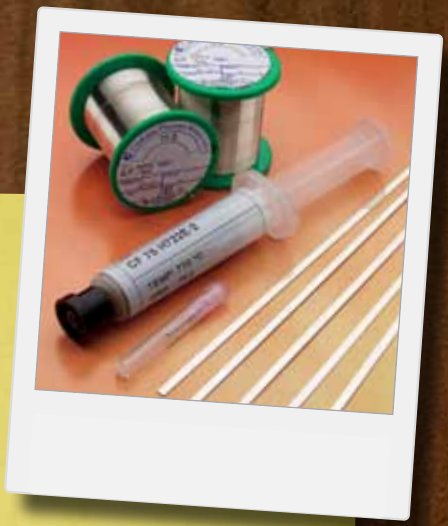
FAQ'S
technical information



Q. What is the difference between hard & soft wire?

A. The key differences between hard & soft wire are:

Soft wire is fully annealed and therefore is more malleable, ideal when you want to manipulate or form a design, use soft wire as it can be used to create more detailed or delicate jewellery pieces.
Hard wire ensures that the piece the wire is formed into keeps its shape – ideal for making springs and ear wires. Silver hard wire will become soft once heated.

Q. What thickness wire do I need to make jump rings, and should it be hard or soft?

A. The most popular wire diameter for jump rings is approximately 0.8mm. Half hard or hard is the ideal temper to use.

Q. Why use solder paste?

A. Rather than buy separate solder and flux, solder paste comes conveniently mixed together in a syringe. To solder an item of jewellery, simply apply the paste to the item that needs soldering, remove excess paste and apply heat to solder as normal. Using solder paste ensures that you do not have to apply flux and solder separately. The syringe aids easy application and helps remove the often tricky problem of getting the solder to balance on the item before it is soldered. Plus, the solder paste mix ensures that solder will not 'jump' off the item when heat is applied.

Q. I'm making a pendant/brooch, what thickness sheet do I need?

A. 1.0mm sheet is a good place to start because it is easy to manipulate and provides a manageable thickness to work with.

HINTS & TIPS

Preparation of Silver For Enamelling

Before starting an enamelling project there are some basic techniques that should be followed to prepare silver.

Preparation of Silver

Before enamelling silver, it needs to be de-greased and de-oxidized.

1. To degrease the metal use emery paper, or pumice powder and a brush.
2. To remove oxidation, cover the metal with nitric acid, until metal appears white in colour. Alternatively heat until it turns cherry red, quench in cold water then place in a 10% sulphuric acid solution until it turns white. Rinse and repeat until desired finish is achieved.
3. Finally brighten up your metal with a wire brush and liquid soap, dry with a cotton cloth without touching the surface that is to be enamelled - it's a good idea to use latex gloves.

Flux

Flux is applied where an item needs to be soldered. The flux helps the solder to flow into the area to be soldered. If solder is applied without flux, the solder will not flow, forming into a ball or simply not melting and sitting on the surface of the metal.

MAKE YOUR SOLDER RUN EASILY BY CHECKING THE JOINT IS CLEAN, AND THAT THERE IS FLUX ON THE SURFACE.

SOLDERING

Techniques

There are two general techniques used to apply solid solder:

- **Preplacement -** small pieces of solder are placed at the joint seam prior to heating. Heat is then applied until the solder flows into the joint.
- **Feeding -** the fluxed joint is heated to temperature and the tip of the solder wire is fed into the joint and should melt on contact.

Using both these techniques the part of the joint to which the molten solder is required should be heated more strongly than the remainder ensuring the solder will flow towards the hottest section. Continued flame impingement on the molten solder may result in the vaporisation of lower melting point constituents. Higher temperatures may then be required to complete the joint. The time and temperature required to complete a joint must be kept to a minimum.

FOR LARGE SCALE SOLDERING A SMALL FURNACE MAY BE USED TO PROVIDE SUFFICIENT UNIFORM HEAT TO THE WORKPIECE

Gold and silver flux residues may normally be removed by soaking in hot water. Any further residues that persist may then be removed by brushing. In difficult cases the workpiece should be impressed in 5 - 10% sulphuric acid solution for 2 - 5 minutes, rinsed in hot water and brushed again.

For mass production, batch or conveyer type furnaces may be used. However, the quantities of components to be soldered must be large enough to justify the relatively high capital expenditure and development of a method for each particular soldering operation. All workpieces can be successfully finished by the standard practices and processes currently available. It must be noted that powdered borax does not always meet the requirements for all applications where the extensive range of solders now available may be used.

Which Solder to use - Gold, Silver and (particularly) Platinum

Solders are typically classified according to their melting points - "easy", "medium" and "hard", referring to the ease of melting the solder. Hence an "easy" solder melts before a "hard" one and this can be used where a sequence of joints are to be made. Usually a solder must conform to the same hallmarking rules as the metal being joined - for example, a 9ct solder must contain at least 37.5% gold. However, there are some concessions, which are: Platinum solders must contain at least 95% precious metals by weight, chosen from silver, gold, platinum, palladium, iridium and osmium. There is no minimum platinum content specified. Solders for white golds may be Hallmarked on concession down to 50% gold content. 22ct solder must contain at least 80% gold.

SILVER

THESE PROPERTIES MAKE IT IDEAL FOR USE IN A NUMBER OF AREAS INCLUDING SPINNING ENAMELLING AND BEATING.

Britannia versus Standard Silver

Britannia silver is a less commonly known hallmarking standard than Sterling silver, however it carries with it a number of features that are of some use to the manufacturing jeweller. The greater proportion of silver means that Britannia is more easily worked and work hardens less quickly. It is also less susceptible to "firestain".

Avoiding Firestain

Firestain occurs when the copper contained in silver alloys is oxidised during annealing or soldering - it can be seen as a dark stain on the surface of the metal after polishing. Light firestaining can usually be polished out, or may respond to pickling in a bath of 10% sulphuric acid or another proprietary pickle, however silver plating may be the only answer to heavy firestain. If a protective atmosphere is not available to carry out annealing operations, the following steps can be taken: Avoid prolonged heating wherever possible. Ensure that a large enough flame is used to get soldering and annealing jobs completed in the minimum amount of time. The entire workpiece can be coated with a flux which will form a glassy coat on the metal, protecting it from the atmosphere. Use a large, bushy flame when annealing, which allows the job to be completed quickly and provides a slightly reducing atmosphere.

Prevention or Removal of Surface Oxides

Sterling Silver is supplied fire free. Annealing under oxidising conditions, for example in air, will discolour the surface of the silver due to the oxidation of the base metal present, e.g. copper. Copper oxide particularly, is hard and brittle and, if it is not removed from the surface, can be forced into the silver by subsequent working to create hard spots. Cracking may occur in these oxide rich areas during spinning operations. Oxides are removed from the surface by pickling the annealed silver in hot dilute (10%) sulphuric acid. Their presence in the final workpiece produces unsightly fire stains that are extremely difficult and sometimes impossible to remove during finishing or polishing operations. The silver should be pickled after every anneal that is carried out in air. It is strongly recommended that protective atmospheres are used wherever possible to prevent the formation of surface oxides. Alternatively, Argo-tect may be used to minimise the formation of oxide on or near the surface of silver items being heated under oxidising conditions. The proper use of Argo-tect gives a continuous protective film over the piece. Very deep firestain may require mechanical action to remove it.

TABLE OF COMPARATIVE WEIGHTS

To use the table below, simply take the unit figure of the metal to which comparison is required and then follow the line to the right or left of this figure that is the relative weight unit for the chosen metal.

Typically, a silver model may be made for subsequent casting using the cuttlefish method producing a casting in 18ct Yellow Gold HB.

	PURE PLAT.	FINE GOLD	22ct DS	18ct MW	18ct HB	14ct AY	GW PD	9ct DF	STERLING	COPPER	BRASS	WAX
Pure Plat.	1.00	0.90	0.83	0.75	0.72	0.60	0.54	0.52	0.48	0.42	0.40	0.05
Fine Gold	1.11	1.00	0.92	0.84	0.80	0.67	0.60	0.58	0.53	0.47	0.45	0.05
22ct DS	1.21	1.08	1.00	0.91	0.87	0.73	0.66	0.63	0.58	0.51	0.49	0.06
18ct MW	1.33	1.19	1.10	1.00	0.96	0.80	0.72	0.69	0.64	0.56	0.54	0.06
18ct HB	1.39	1.25	1.15	1.05	1.00	0.84	0.75	0.72	0.66	0.58	0.56	0.06
14ct AY	1.65	1.48	1.37	1.25	1.19	1.00	0.90	0.86	0.79	0.69	0.67	0.08
GW Palladium	1.84	1.65	1.52	1.39	1.32	1.11	1.00	0.96	0.88	0.77	0.75	0.09
9ct DF	1.92	1.72	1.59	1.45	1.38	1.16	1.04	1.00	0.92	0.80	0.78	0.09
Sterling Silver	2.09	1.87	1.73	1.57	1.50	1.26	1.14	1.09	1.00	0.87	0.84	0.10
Copper	2.39	2.14	1.98	1.80	1.72	1.44	1.29	1.24	1.14	1.00	0.97	0.11
Brass (90/10)	2.47	2.22	2.05	1.86	1.78	1.49	1.35	1.29	1.18	1.03	1.00	0.11
Wax	21.50	19.30	17.80	16.20	15.50	13.00	11.70	11.20	10.30	9.00	8.70	1.00

The model of a man's signet ring has been made out of silver and weighs 7.9 grammes. Looking at the table along the sterling silver horizontal line and then matching this with the intersection of the 18ct Yellow Gold HB gives the number 1.50.

So, the approximate weight of a similar ring cast in 18ct HB would be: **7.90 grammes x 1.50 = 11.85 grammes in 18ct Yellow HB Gold.**

UNIT CONVERSION

Multiply the known unit by the figure to the right of the measurement you desire. For instance, how many grains are in 3 carats?

known	x	# from chart	=	answer
3	x	3.0865	=	9.2595

CARATS	to grains	x 3.0865
	to grams	x 0.2
	to milligrams	x 200
GRAINS	to carats	x 0.324
	to grams	x 0.0648
	to milligrams	x 64.799
	to oz, avoir	x 0.002286
	to oz, troy	x 0.00208
	to pennyweight	x 0.04167
GRAMS	to carat	x 5
	to grains	x 15.4324
	to oz, avoir	x 0.03527
	to oz, troy	x 0.03215
	to pennyweight	x 0.64301
KILOGRAMS	to oz, avoir.	x 35.274
	to oz, troy	x 32.1507
	to pennyweight	x 643.015
	to lb, avoir	x 2.2046
	to lb, troy	x 2.6792
OZ, AVOIRDUPOIS	to grains	x 437.5
	to grams	x 28.3495
	to oz, troy	x 0.91146
	to pennyweight	x 18.2291
	to lb, troy	x .07595
OZ, TROY	to grains	x 480
	to grams	x 31.1035
	to oz, avoir	x 1.0971
	to pennyweight	x 20
	to lb, avoir	x 0.06857
PENNYWEIGHTS (DWT)	to grains	x 24
	to grams	x 1.5551
	to oz, avoir	x 0.05486

LB, AVOIRDUPOIS	to grains	x 7000
	to grams	x 453.59
	to kilogram	x 0.4536
	to oz, troy	x 14.5833
LB, TROY	to gram	x 373.242
	to kilogram	x 0.3732
	to oz, avoir	x 13.165
	to lb, avoir	x 0.82286
FEET	to centimetres	x 30.48
	to metres	x 0.3048
METRES	to feet	x 3.2808
	to inches	x 29.37
	to yards	x 1.0936
MILLIMETRES	to feet	x 0.00328
	to inches	x 0.03937
	to centimetres	x 2.54
	to metres	x 0.0254
	to millimetres	x 25.4
CUBIC CM	to cubic inches	x 0.061
	to US £1. oz.	x 0.0338
	to cu cm	x 16.387
	to litres	x 0.01639
	to US £1.oz.	x 0.554
US GALLONS	to litre	x 3.785
	to cubic inches	x 231
	to cubic feet	x 0.1337
LITRES	to US gallon	x 0.2642
	to US quart	x 1.0567

POLISHING

Do's & Don'ts for Polishing Success.
Polishing is often viewed as a less desirable task by the jeweller due to it being dirty, noisy and tedious. It is therefore often given to the trainee jeweller, this can pose a problem as now the least experienced employee is now responsible for the finished product - what the customer actually sees.

DO'S & DON'TS

1. Inhalation of the abrasives in polishing compounds causes long-term health problems. Always use a dust collection system with adequate ventilation, even for short periods of time.

2. Wear safety protection. Eye protection is essential. Finger protection is also important, allowing you to work more efficiently when pieces heat up.

3. Cutting compounds can be used with any type of buff but polishing compounds should be matched to the correct buff wherever possible. Rouges should be used with non-treated buffs, since the binder on the buff which is typically lacquer can cause scratching.

4. Buffs and compounds should not be stored together in the same container, the buffing compound will be contaminated and prevent it from producing a high lustre finish.

5. Sufficient polishing compound should be used on the wheel and recharged frequently. A properly charged wheel has a dull, waxy finish.

6. If insufficient compound is used, metal particles accumulate on the surface of the buff, leading to galling and scratching.

7. Tapering, where one edge of the buff wears more than the other is a common problem. To avoid this, attempt to use the entire face of the buff. If the buff does taper, use a file cleaner to grind it down and true again.

8. Large buffs mounted on a polishing motor can often grab and damage delicate findings. When polishing such findings, use small brushes, small silicone wheels, felt points or other small polishing tools.

9. If corners are polished directly against they will be quickly rounded off. To prevent this, start with the flat surface against the wheel and draw it out to the edge and off the wheel.

10. Endeavour to match the shape of the polishing tool to the part to be polished.

11. Don't polish down into a 'V', as the buff will conform to the shape and cut a groove into the surface. Instead, polish against the point of the 'V' and allow the buff to spread down over it.

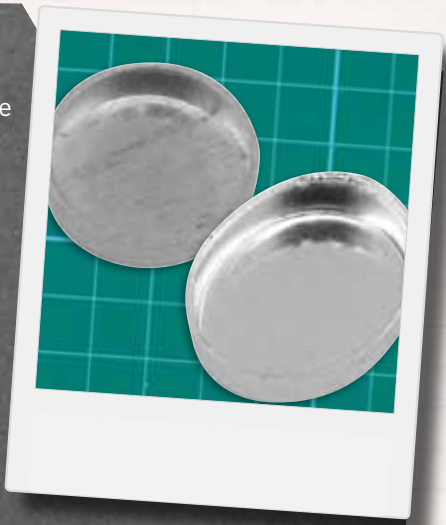
12. Brushes should be used to polish filigree, especially where abrasive compounds are used. Buffs are too aggressive and will destroy the detail.

13. Pieces should not be tilted against the buff as this can taper the metal, especially inside the shank.

14. It is essential to clean a piece between cutting and buffing to avoid contamination.

USING BEZEL CUPS

- Bezel cups are an easy way to set stones.
- Prior to setting, pop a small drop of adhesive into the bezel cup. This not only secures the stone but also acts as a cushion.
- Flat side of the stone down, place it into the bezel setting and burnish the bezel over the edge of the stone using a bezel roller.
- Continue by applying even pressure all the way around the top edge of the bezel, until the stone is tight inside the cup and the bezel trim against the outside edges of the stone.



WHICH STONES CAN BE FIRED WITH PMC

We recommend that laboratory-grown gemstones such as CZ's (cubic zirconias), ceramic shards and some glass components can be fired with PMC.

To set these stones, we advise that you work as normal with the clay but when you are setting the stone, you push the stone deep enough into the clay so that there is a slight curl over the top. After it is fired, the clay shrinks and this ensures that there is a small lip over the stone.

Natural gemstones (pearls, corals,) can not be fired as they will burn on contact with the flame. Semi- precious gemstones (amethyst, turquoise,) are also not recommended to be fired. As they are made up of layers or crystals, they will pull apart with the heat.

We advise that you make your piece out of PMC as normal, and place a cast (made from plaster of paris) where the stone will be set and fire as normal. Once the PMC item has cooled, you can remove the plaster and set the stone using some strong glue, like the epoxy glue, product code 999 CJ2.

CROWN

RING SIZING

FINGER SIZE BRITISH	FINGER SIZE EURO	INTERNAL DIA. mm	INTERNAL DIA. ins	INTERNAL CIRCUM mm
A		12.1	0.48	37.5
	38	12.1	0.48	
A½		12.3	0.48	38.4
	39	12.4	0.49	
B		12.5	0.49	39.0
B½		12.7	0.50	39.6
	40	12.7	0.50	
C		12.9	0.51	40.2
C½	41	13.1	0.51	40.8
D		13.2	0.52	41.4
	42	13.4	0.53	
D½		13.4	0.53	42.0
E		13.6	0.54	42.6
	43	13.7	0.54	
E½		13.8	0.54	43.2
	44	14.0	0.55	
F		14.0	0.55	43.8
F½		14.2	0.56	44.4
	45	14.3	0.56	
G		14.4	0.57	45.0
G½		14.6	0.58	45.6
	46	14.6	0.58	
H		14.8	0.58	46.2
	47	15.0	0.59	
H½		15.0	0.59	46.8
I		15.2	0.60	47.4
	48	15.3	0.60	
I½		15.4	0.61	48.0
	49	15.6	0.61	
J		15.6	0.61	48.6
J½		15.8	0.62	49.2
	50	15.9	0.63	
K		16.0	0.63	49.8
K½		16.2	0.64	50.4
	51	16.2	0.64	
L		16.4	0.65	51.0
	52	16.6	0.65	
L½		16.6	0.65	51.6
M		16.8	0.66	52.2
	53	16.9	0.66	
M½		17.0	0.67	52.8
N		17.2	0.68	53.5
	54	17.2	0.68	
N½		17.4	0.68	54.1
	55	17.5		0.69
O		17.6	0.69	54.7
O½		17.8	0.70	55.4
	56	17.8	0.70	
P		18.0	0.71	56.0
	57	18.1	0.71	
P½		18.2	0.72	56.7
Q		18.4	0.72	57.3
	58	18.5	0.73	
Q½		18.6	0.73	57.9
R		18.8	0.74	5
	59	18.8	0.74	
R½		19.0	0.75	59.2
	60	19.1	0.75	
S		19.2	0.75	59.9
S½		19.4	0.76	60.5
	61	19.4	0.76	
T		19.5	0.77	61.1
	62	19.7		0.78
T½		19.7	0.78	61.8
U		19.9	0.79	62.4
	63	20.1	0.79	
U½		20.1	0.79	63.0
V		20.3	0.80	63.7
	64	20.4	0.80	
V½		20.5	0.81	64.3
	65	20.7	0.81	
W		20.7	0.82	64.9
W½		20.9	0.82	65.5
	66	21.0	0.83	
X		21.1	0.83	66.1
X½		21.3	0.84	66.7
		21.3	0.84	66.7
Y		21.5	0.85	67.3
	68	21.6	0.85	
Y½		21.7	0.85	67.9
Z		21.9	0.86	68.5
	69	22.0	0.86	
Z½		22.1	0.87	
Z+1		22.3	0.88	
Z+2		22.7	0.89	
Z+3		23.1	0.91	