

A Beginners Guide to Working with Silver.

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Silver is a fabulous material to work with. It is beautifully soft and malleable making it a breeze to shape and solder which is why so many jewellers gravitate towards it time after time.

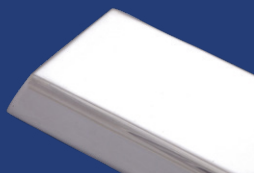
Our beginner's guide is aimed at those who are new to silver. In it we will look at the whole process of working with this wonderful material from start to finish including buying your metal and planning your designs, through to polishing and finishing tips.

We have also included some cost saving advice along the way to help save those pennies so if you are looking for an introduction into the world of silver, then look no further.

So relax, grab a cup of tea and read on...

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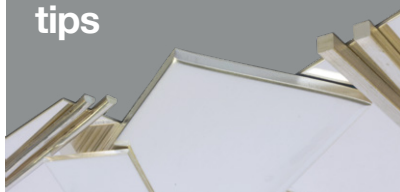
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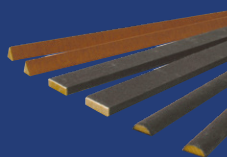
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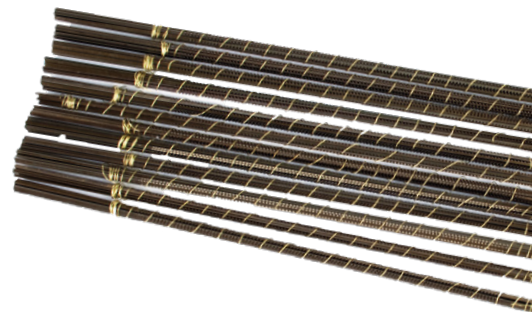
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Working with Silver...

Silver in its pure form is far too soft to be used for most practical purposes which is why silver alloys were created. Silver alloys are made by combining silver with other metals which bring with them additional qualities such as strength and tarnish resistance to create an improved version of the original material.

Specific metal recipes will vary from producer to producer but here is a list of some of the most readily available silver alloys.

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Types of Silver...

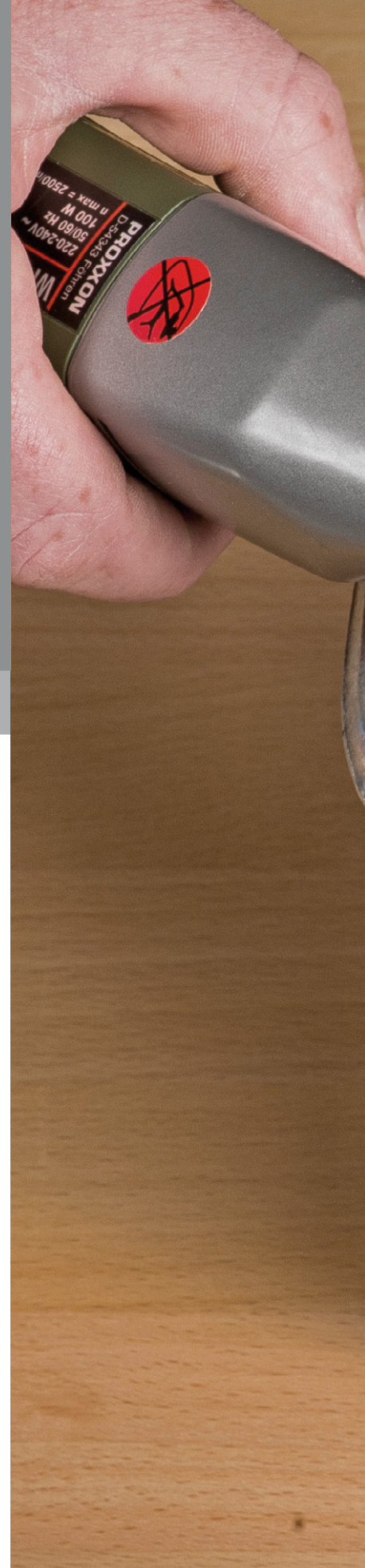
925 Sterling Silver: 925 Sterling Silver is a silver alloy created from silver and typically copper. It is by far the most popular form of silver used in the jewellery industry today and is available in a wide variety of gauges and profiles. Adding copper makes the silver harder and more durable which means it can be used for a much wider variety of applications. 925 is indicative that 92.5% of the material is pure silver with the remaining 7.5% made up of copper. Unfortunately the addition of copper whilst being advantageous brings with it its own problems but we will come to those later in the guide, (see **Fire Stain** on page 14).

Britannia Silver: Britannia Silver is slightly purer than Sterling Silver having a pure silver content of 958 parts in every thousand or 95.8%. It is softer and slightly more malleable than Sterling Silver and is often favoured by silversmiths for its great workability. Its remaining 4.2% is usually made up of copper but is less susceptible to fire stain than Sterling Silver.

Argentium: Argentium is a relatively new silver alloy, discovered in 1991. It comes in two forms either Argentium 935 (93.5% silver) or Argentium 960 (96.0% silver) with both containing a reduced amount of copper and an increased percentage of germanium which has fantastic anti-tarnish qualities. It is whiter in colour and more durable than traditional Sterling Silver.

Fine Silver: Fine Silver is the purest form of silver you can buy commercially at 99.9% pure. It is very soft and is often used to make investment and decorative silver bars.

Hallmarking: Any silver item that weighs over 7.78g and is intended for sale within the UK must carry a hallmark by law. The standard sterling silver mark is 925, indicating that 925 parts in every thousand is pure silver. Additional hallmarks including the pictorial fineness mark (the lion) and the date letter which are optional and can be applied at the maker's discretion; however the makers mark, the standard mark and the Assay Office mark are all compulsory.



“

Silver in its pure form is far too soft to be used for most practical purposes which is why silver alloys were created”

What to do with silver when you first get it

Ideally metal sheet should be stored on its side to prevent surface marks and warping. Most pieces will be supplied with a protective plastic coating attached which is usually blue or green. Try to keep this on for as long as possible to maintain the surface and ensure your metal is stored away from any tools with sharp points.

6 Planning & Designing...

It is essential to plan your design before cutting into your precious piece of silver. There are a number of steps which can be taken during the planning stages to minimise cost and waste:

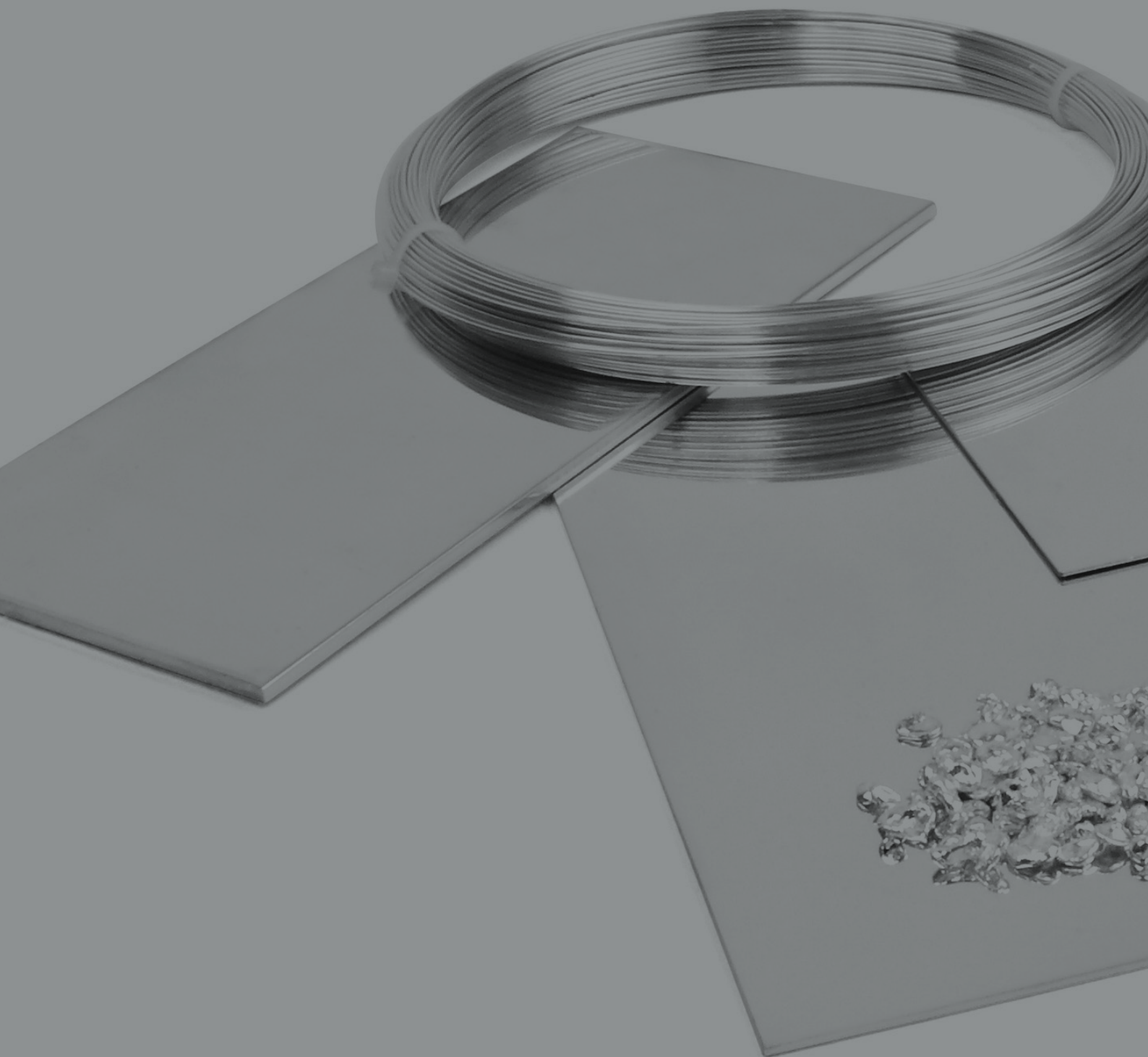
- Make a detailed, **scale** plan on paper.
- Have a practise run in a cheaper metal such as copper or gilding metal to highlight any potential problems.
- When choosing your metal gauge (thickness), consider the possibility of reducing the gauge by a mm or two to save money. For example you might have planned to use 1mm silver sheet for your design but may find that 0.9mm works just as well.
- Be careful with scale. Every gram of silver will cost you money so try to be cautious with the size of your designs until you are more confident with the whole process. Metal prices are notoriously volatile and change on a daily basis and you may well be surprised at the cost of a relatively small piece of silver.



Transferring a design onto silver:
It's all well and good drawing a fantastic design on paper, but how do you transfer that design onto your silver?

- **Metal ruler, scribe and dividers** are all used for marking out designs onto metal sheet and wire. A scribe has a sharp metal point and is used like a pencil and dividers look similar to a compass (with two metal points) and can be used for measuring and marking straight lines and curves.
- A combination of **tracing paper and carbon** paper can be used to transfer a more complicated design. First prepare the metal surface using emery paper to refine and degrease. You can then paint the surface with a light coloured poster paint and allow it to dry. Draw your design onto the tracing paper and then turn it over onto the metal surface placing the carbon paper in between and then trace over the design again with a hard pencil. Then go over the design with a scribe and remove the paint.
- If you have access to a **laser printer** you can print a black and white design onto photographic paper and transfer to a clean and degreased metal surface using either a hot iron (without steam) or acetone or cellulose thinners. If you use the iron method put a layer of newspaper over the top of the photographic paper and hold the iron in place for 3-4 minutes. If you use thinners, simply place the design face down onto the metal and wipe the back of the paper over with a cloth soaked with thinners. N.B Remember to mirror your image using computer software before printing it out.

Tip: Keep your scraps and spares in a box, then when you're designing and making you can check what is in there to see what bits you can use, rather than starting on a fresh piece.



Tips on buying Silver...

Precision is key when buying precious metal so you will need to be prepared with a list of exactly what you require. (The planning stage of the process, detailed in the previous section will help generate your shopping list). If purchasing sheet, you will need the gauge (thickness in mm) as well as the size required, for example, '100mm x 100mm x 0.9mm'. Silver sheet can generally be purchased in 0.1mm increments ranging from 0.3mm - 4mm.

10 Precision is Key...

You will need similar information when buying silver wire along with the profile you require which can be round, oval, square, rectangular or D-shape.

For example, '200mm x 2mm of round' or if you prefer, '20cm of 2mm round wire'. Most wire will be supplied fully annealed (soft), so it is ready to use, but check the details as it is not always the case. Sizes vary from supplier to supplier with round wire having the biggest range from 0.4mm – 6mm.

Tip: As you write your silver shopping list ensure you include **everything** you might need for the entire design including any catches, jump rings and earring fittings as well as any consumable items such as solder.



Tip: Bullion dealers are similar to banks due to the valuable products they are supplying. Security will be tight and you will often find that most premises operate a time delayed, buzzer door system controlled by the shop staff. Products will be behind glass if on display at all and any prices shown generally exclude VAT which will be added at the point of sale.

Saw blades and Filing...

A saw is probably going to be one of the first tools you use with your silver and the size of blade you need will be dictated by the gauge of metal you have. The information below and tables to the right is a good guide to help you select the correct saw blade.

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What do I use?

Files are used to shape, smooth rough edges and remove surface scratches from your metal.

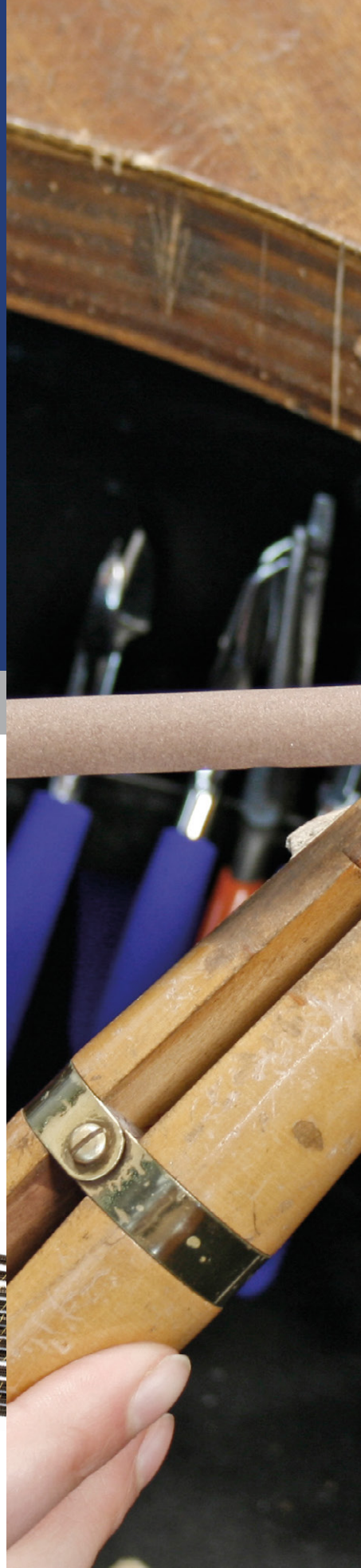
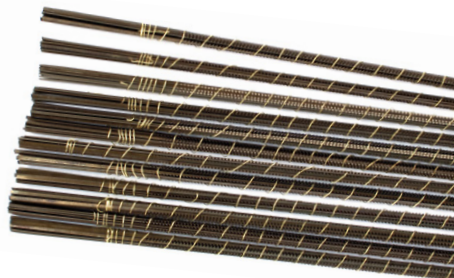
A coarse file will remove material quickly and is more effective for shaping where as medium grade and smoother files are used to refine surfaces and remove scratches.

As a general guide, files are graded from 00-4 with 00 being the coarsest and 4 the finest. Start with a coarse file, moving gradually towards a smoother one once the desired finish is achieved.

Files come in a range of sizes and profiles and include round, half round, square, flat and triangular as well as many others. Needle files have the widest range of profiles and are smaller in size ranging from 10-20cm. Needle files can be used on small scale work and to access detailed areas on larger pieces and many brands offer an assorted selection pack which is a good place to start as a beginner.

Full size files measure between 6" – 8" and are sold minus the wooden handle which will need to be purchased separately, and attached. A coarse, flat file and a medium cut half round are suitable for most general purpose tasks and will provide a good basis for more additions as the need arises.

Emery paper and wet and dry papers are sheets of abrasive paper which are used after filing as the final stage of surface preparation before polishing. They are graded from coarse to smooth and should be used in sequence to obtain the best result. Emery paper is used dry but wet and dry paper can be used with water to speed up the results.



Saw Blade Specification

	Suitable Metal Gauge mm	Corresponding Drill Size mm
Saw blade Grade 4	1.0 – 1.3	0.8
Saw blade Grade 3	0.9 – 1.2	0.8
Saw Blade Grade 2	0.9 – 1.1	0.7
Saw Blade Grade 1	0.8 – 1.0	0.7
Saw Blade Grade 0 (1/0)	0.6 – 0.95	0.6
Saw Blades Grade 2/0	0.6 – 0.8	0.55
Saw Blades Grade 3/0	0.6 – 0.7	0.5
Saw Blades Grade 4/0	0.5 – 0.6	0.5
Saw Blades Grade 5/0	0.4 – 0.55	0.4
Saw Blades Grade 6/0	0.35 – 0.5	0.4
Saw Blades Grade 8/0	Up to 0.4	0.3

Emery Paper Types

	Grade	Size	Usage
Emery Paper 150	Coarsest grit	280x230mm	Use directly after filing to remove surface marks
Emery Paper 180	Coarse grit	280x230mm	Use after 150 grade to refine surface imperfections
Emery Paper 240	Medium/coarse grit	280x230mm	Use after 180 grade to continue with the removal of surface imperfections
Emery Paper 500	Medium grit	280x230mm	Use after 240 grade to begin the final surface finish
Emery Paper 1200	Fine grit	280x230mm	Use after 500 grade to refine the surface finish
Emery Paper 2000	Finest grit	280x230mm	Use after 1200 as a final satin finish or directly before polishing

Wet & Dry Paper Types

	Grade	Size	Usage
Wet & Dry Paper 240	Coarsest grit	280x230mm	Use directly after filing to remove surface marks
Wet & Dry Paper 320	Coarse grit	280x230mm	Use after 240 grade to refine surface imperfections
Wet & Dry Paper 400	Medium/coarse grit	280x230mm	Use after 320 grade to continue with the removal of surface imperfections
Wet & Dry Paper 600	Medium grit	280x230mm	Use after 400 grade to begin the final surface finish
Wet & Dry Paper 800	Medium/fine grit	280x230mm	Use after 600 grade to refine the surface finish
Wet & Dry Paper 1000	Fine grit	280x230mm	Use after 800 grade to continue to refine the surface finish
Wet & Dry Paper 1200	Finest grit	280x230mm	Use to achieve a final satin finish or immediately before polishing. Always use last after working through the coarser grits in sequence

N.B. Wet and Dry Paper can be used with water for greater efficiency and to prevent the paper becoming clogged.

Melting temperatures

It is important to be aware of the melting point of your chosen metal to enable you to choose the appropriate soldering torch and solder. Sterling silver has quite a low melting point in comparison to other precious metals, making it easier to use with some of the lower temperature blow torches.

925 Sterling silver > melting range 805C – 890C

Britannia silver > melting range 890C – 940C

999 Fine silver > melting range 961C – 961C

(The first temperature is when the surface will start to melt and the second is when the material will become molten)

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The Art of Melting...

Fire stain: Fire stain occurs when sterling silver is heated for prolonged periods which cause the copper content to oxidise in the air, forming dark shadows on the metal surface. Often these shadows will only become visible during the latter stages of production and the only way to remove them once they appear is through repeated buffing with emery paper and polishing, (for light staining) and in the most serious cases silver plating.

Preventing Fire stain: The best way to deal with fire stain is to prevent it from occurring in the first place and there are several ways to do this:

- Avoid heating silver for prolonged periods. Ensure your soldering and annealing operations are efficient and completed as quickly as possible with the correct size torch and flame for the job.
- Quench heated silver in a Picklean or pickling powder solution to avoid the build up of oxides.
- Paint the surface of your silver with flux before heating. This will form a protective, transparent coating which should prevent oxides from forming.

Avoiding Cracking: Oxidised copper (i.e. fire stain) is extremely hard. If this is forced into the body of the metal through continuous working without removal, these areas will eventually become brittle and crack. To avoid cracking either:

- Quench silver in picklean or pickling powder solution after every heating operation, both annealing and soldering.
- Coat silver with Argo-TECT to provide a protective layer thus preventing the formation of oxides.

Annealing: Annealing is the heating of metal to relax the internal structure making it easier to work and shape. As metal is worked, the structure becomes compacted making it harder and more difficult to move which is known as work-hardening. If this continues, the metal will eventually become brittle and may eventually crack so it is essential to anneal your silver at regular intervals throughout a job to keep it soft.

Tip: It is possible to buy both flux and solder combined in a soldering paste which essentially does two jobs in one. It comes in a syringe which means it can be applied with great precision, ideal for more delicate work.

“ Sterling silver melting point lower than other precious metals, making it easier to use ”

Tip: To anneal silver, gently heat with a bushy flame until metal glows a dull red. Keep the flame moving at all times and try to keep the heat even across the whole piece. Remove the flame as soon as the dull red colour is achieved and quench.

Quenching: Quenching is the process of cooling heated metal in water, pickle or in some cases oil. It is normally done following an annealing or soldering procedure to cool metal quickly.

Soldering: Soldering is the process of permanently joining two pieces of metal together using solder and heat supplied by a blowtorch. The solder melts at a lower temperature than the main body of metal and flows into the joint to form a strong and lasting bond.

Silver solder: To solder silver you always use specific silver solders which are available in strip form from your bullion supplier. There are four different types (Hard, medium, easy and extra easy), each with a different melting temperature, the idea being to use them in sequence with the highest melting temperature first.

	Melting temp.	When to use..	Tips
Hard Solder	745 – 780 C	Always use first and for as many subsequent joins as possible	You will use twice the amount of hard solder than any other, so buy extra
Medium Solder	720 – 765 C	Use when the main soldering is done and the last few joins are in sight	-
Easy Solder	705 – 725 C	Only use on the final joins	-
Extra Easy Solder	655 – 710 C	Only use as a last resort, to correct mistakes for example	Extra easy solder tends to be quite yellow in colour which can be unsightly

Flux: Flux is a cleaning agent which is painted onto the area to be soldered, allowing the solder to run freely. It prevents oxides from forming during the soldering process and is essential to ensure a good join. You can buy it as a liquid (Auroflux), or as a borax dish and cone which are ground together with water to form a paste. Flux is best applied with a small paintbrush.

Polishing

Polishing should only be attempted once you have successfully completed the filing and emery paper stages of finishing. Once all the surface marks and scratches have been removed it is time to start polishing. A fine, mirror polish can be achieved using soft cloth wheels (mops) and polish which are rotated at high speed via a motor to buff the silver to a fantastic shine.

16 Two Steps to Shine...

You can either utilise a bench mounted motor which uses large mops and normally has a capability of 1/4 horsepower and above. Or you can use a hobby drill or pendant motor which is essentially a mini-drill like hand piece which will hold a variety of small scale polishing accessories mounted on small steel shafts. The principle is the same for both methods and this is achieved via a two part process.

Step 1 is called the pre-polish and uses a white polish called ‘tripoli’ which is buffed onto your item using a slightly harder polishing mop made of either calico or felt.

Step 2 is the final polish and is done with compound known as ‘rouge’ which is a red / brown colour. This is used in conjunction with a softer mop made of linen or down.

The table right gives a more detailed breakdown of which item to use at what stage and also gives options for hand polishing if mechanised methods are not accessible.

Pre-Polish		Final Polish	
Mops for a Bench Motor	Polishing Compound	Mops for a Bench Motor	Polishing Compound
hard suede mop	-	reflex mop	-
cotton mop	-	swansdown mop	-
hard calico mop	-	lamb's wool mop	-
felt mop – for large areas	Tripoli/lustre	soft suede mop	Rouge
felt cone – for rings	-	felt cone for rings	-
Mops for Pendant Motor	Polishing Compound	Mops for a Pendant Motor	Polishing Compound
small felt mop	Tripoli	small wool mop	Rouge
small calico mop	-	small suede mop	-
Hand Polishing Equipment	Polishing Compound	Hand Polishing Equipment	Polishing Compound
suede stick	Tripoli	chamois leather	Rouge + lighter fluid
felt polishing stick	Tripoli + lighter fluid	polishing thread	Rouge + lighter fluid
polishing thread	Tripoli + lighter fluid	burnisher	-
Polishing Papers	-	Polishing Papers	-

Barrel Polishing: The biggest advantage of barrel polishing is that once the machine is set up, you can leave it alone to get the job done whilst you get on with something else which is always useful!

It is suitable for more detailed and textured pieces and also wire work, but not ideal for anything with large, plain areas of silver on show e.g. cuff bangle.

Barrel polishers basically consist of a sealed cylindrical container with a removable lid which is filled with steel shot, (cones, powder or chips) soap and water solution and the items to be polished. The sealed barrel is placed onto a small motorised unit which turns the container continuously, bringing the silver to a high shine in a couple of hours.

N.B. Cones, powder or chips can be used in a barrel polisher to obtain a matt finish. The coarser the media the rougher the finish will be, but chips and cones are most effective when used in conjunction with cutting powder.

Steel shot: Steel shot is available to buy as round ball bearings in mixed sizes or as mixed shapes which contain some needle shaped pieces as well as ball bearings. A mixed range of shapes and sizes will give a finer result as it will reach the finer detail of pieces as well as the broader areas.

The quantity you need depends on the capacity of the barrelling unit you have, but as a general rule, you should aim to have the container no more than $\frac{1}{4}$ full of steel shot. This can then be topped up to $\frac{1}{2}$ with water and a teaspoon of a barrelling compound (for a small barrel) such as Barrelbrite.

If you are thinking that these instructions sound a bit vague, you would be correct as barrel polishing is not an exact technique. As long as you don't overfill the barrel, you can't go far wrong and experience will enable you to adjust the process to suit your specific requirements.

In terms of time, it is very much trial and error, but once set up and running, allow your machine to work for a good 2 hours before checking on the progress of your pieces. If the finish isn't to your liking, simply re-seal the barrel and leave for longer. Once you are happy with the polish achieved, tip the contents of your barrel into a plastic sieve over a sink to retrieve your pieces.

Tip: Although most shot is made of steel or stainless steel, it will rust if left damp. Either dry it out completely after each use in a plastic sieve with a hairdryer or store fully immersed in water with a spoonful of your barrelling compound which will act as a rust inhibitor.

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