Copper load of that: These days we are spoilt for choice with plumbing options, and there are some innovative fittings which can make any repair job take minimal time and effort.

Plumbing made PEX-easy

By **Josh Giumelli** with photos by **Ben White**

One of the job prerequisites of being a farmer is a jack-of-all-trades qualification.

Turning your hand to a wide variety of trades saves considerable time and money, especially when you live in remote rural areas where tradesmen are hard to find, or charge large call-out fees.

Most farmers wouldn't think twice about doing their own plumbing work, even around the house, so it pays to stay abreast of some of the products which can make our lives a little bit easier.

From installing a sink in the workshop, to plumbing in a crib room or ablution block, there are several approaches to pipework other than using PVC or poly pipe.

Much of this domestic-style plumbing has traditionally used copper pipe, but PEX pipe has become increasingly popular due to its lower cost and ease of installation.

PEX pipe is made from cross-linked polyethylene plastic, and is sometimes called XLPE. PEX is high density, and features cross-linked polymer bonds, which changes the thermoplastic to a thermoset.

What this means in reality is the plastic is far more resistant to heat, and has higher impact and tensile strength than normal poly, making it ideal for a range of both hot and cold water applications.

It is far more flexible to use than copper, and about a quarter of the price.

But copper tube still needs to be used in close proximity to hot water systems, and anywhere the pipe is exposed to direct sunlight. It generally makes a neater job, especially where long straight stretches of pipe are used.

This workshop looks at a range of methods used to join both copper and PEX pipe.

PEX PIPE AND SHARKBITE FITTINGS

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PEX pipe is available in a range of colours such as black, red, blue, grey and green. The colours do not signify any special properties; rather they help differentiate services in a household installation (eg black or blue for cold, red for hot etc). It is readily available in both 16mm and 20mm diameters, and costs about $1.50 per metre for 16mm and $2/m for 20mm.

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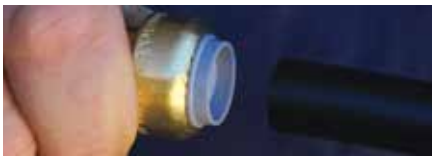
PEX pipe can be buried underground or in a concrete pad, but must not be exposed to sunlight. The pipe is not rated for continuous UV exposure and will become brittle over time. Remember to store unused pipe inside, away from direct sunlight.

The easiest way to attach fittings or join PEX pipes is using a Sharkbite fitting, which requires no special tool for installation. Note the central nylon sleeve, and the stainless steel teeth which grip the outside of the pipe. Behind the teeth the yellow sealing O-ring is just visible. The pipe must be pushed past this point in order to seal properly.

There is a huge range of Sharkbite fittings, commonly available from plumbing outlets and hardware stores such as Bunnings. While they are not cheap, they are comparable to brass compression fittings, but infinitely quicker to use. The 16mm fittings above cost (from left) ¾" BSP brass fitting ($8), tee ($6.20) and ball valve ($15.20). A 16mm joiner costs $4.20. You actually save on the number of fittings used with PEX pipe as you rarely need bends compared to copper tube, as the flexible pipe is easily routed to where it is needed.

To use a Sharkbite fitting, it is essential the tube is cut square and without a burr. This tube cutting tool is ideal (about $15).



Installation is as simple as pushing the pipe into the fitting. Make sure the inner plastic sleeve goes inside the pipe. Push the pipe into the fitting, making sure you go to full depth. There will be a point about half way in where restriction is felt. This is the end of the pipe sliding past the O-ring.

Removal of the fitting is relatively straightforward, especially if you have a set of removal tools. While the fittings can be reused, they will become less reliable the more times they have been removed from a pipe.

Place the appropriate size removal tool over the pipe and check it comes up squarely against the protruding plastic collar.

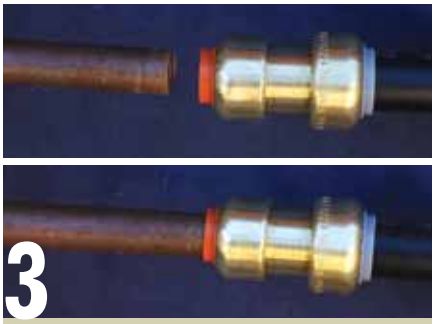
Grasp the fitting and the removal sleeve in one hand, pulling the sleeve toward the fitting. The pipe should pull away easily with the other hand.

While Sharkbite fittings are the most convenient, there are several types of fittings used to join PEX pipe, including crimp and compression-style fittings. Auspex iCrimp fittings have a small copper sleeve around the outside of the pipe. The pipe is pushed into the sleeve until it can be seen through the small sight hole on the inner edge of the sleeve. The sleeve is then crimped on using the proprietary crimping tool.

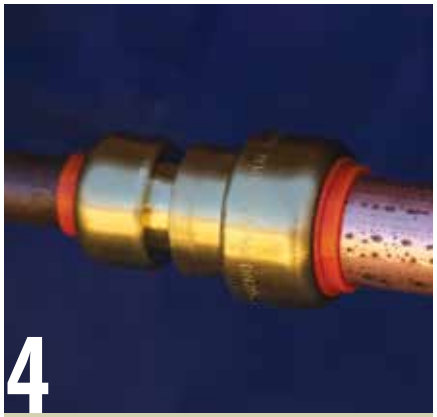
SHARKBITE FITTINGS FOR COPPER

Incredibly, there are also Sharkbite fittings for joining copper pipe, which work in much the same way as the PEX pipe fittings. The most notable difference, other than the orange colour plastic sleeve, is the absence of the internal sleeve as used with the PEX fittings. The ½" copper joiner costs about $4.40 and the ¾" joiner costs about $7.15.

Once again, it is crucial to cut tubing squarely and without a burr. The small tube cutter (about $20) is perfect for the task.



As with the PEX pipe, installation is about as simple as it gets. Simply push the tube into the fitting, making sure it goes in full depth past the restriction of the O-ring. Note the fitting above is a combination joiner for attaching PEX pipe (grey sleeve) to copper pipe (orange sleeve). It costs about $4.40.



As with the PEX fittings, there are Sharkbite copper fittings for just about every task. The ½" to ¾" reducer costs about $6.

Removing a fitting is the same as for PEX pipe, provided you have the correct sized orange removal tool for copper pipe.

A shifter spanner makes a great improvised removal tool for both PEX and copper Sharkbite fittings.

This slip coupling is great for repairing a leak in copper tubing, or joining two tubes where the ends are not quite close enough. If a pipe has developed a split, the damaged section can be cut out with a tube cutter. The slip end (opposite to the end with the ring) can be pushed down over a tube, then pulled backwards onto the other end with the use of a removal tool.

COMPRESSION FITTINGS FOR COPPER

Most people would be familiar with brass compression fittings, which are a reliable way for joining copper pipe without heat or the use of Sharkbite fittings. Some fittings now come with a nylon olive in addition to the copper olive (centre). Nylon olives should not be used if the pipework is close to a hot water system.

Slide the nut over the pipe, then the olive, then slide the pipe into the body of the fitting full depth.

Hand tighten the nut until it has pulled the olive up snug against the fitting. You now only need to tighten the nut a further ¾ of a turn with a spanner. Note that olives cannot be reused once installed, and must be replaced if the fitting is to be reused.

CRIMP FITTINGS FOR COPPER

Copper pipes can also be joined using specialised crimp fittings. Note the sealing O-ring inside the fitting. An advantage of this joining method is the speed and mechanical strength of the join.

The finished join is neat and incredibly strong,. Obviously the fittings are not removable or reusable. Crimping tools vary, but all are expensive, although it may be possible to hire one from a plumbing outlet.

CAPILLARY FITTINGS FOR COPPER

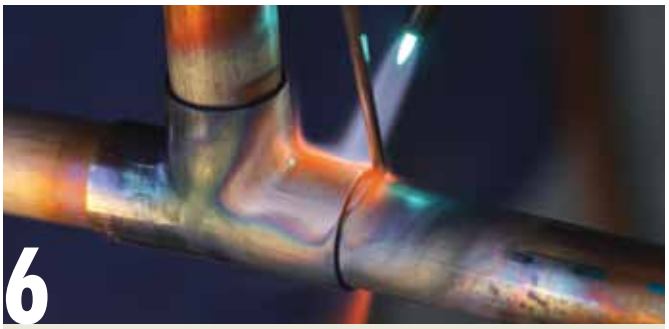
Silver soldering is the tried and tested method for joining copper pipes, but also potentially the most difficult. But a few simple steps to watch will help you get the hang of it very quickly. The fittings are very cheap, and rely on the capillary action of the close-fitting sockets to draw the molten solder into the join, creating a strong, sealed joint. If there is any residual water dribbling down the tube, it will be next to impossible to achieve the correct temperature.

Cut the pipe square with a tube cutter. If there is any tarnish or contamination of the pipe surface, polish lightly with a 400 grit wet-and-dry paper. Avoid touching the joint surfaces with your hands, as even finger grease will make the job trickier.

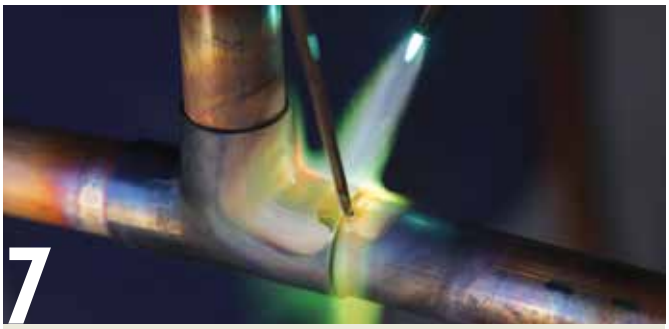
Fit the pipes into the socket, making sure they extend into the sockets to maximum depth. There is no need to apply any flux to the joint for copper-to-copper joins.

Silver solder is actually a brazing alloy, and is available in a range of different alloys, or compositions of metals. For standard silver soldering of copper fittings, a 2.5mm yellow-tip, 2% silver rod is adequate (about $3). The grey tip is 5% silver and the brown tip is 15% (and about $15 a rod).

A heat supply is the next thing needed, and most farmers will turn to the oxy-acetylene set, which is more than capable of providing enough heat for the job. Use a smallish tip and adjust the flame to neutral. Oxy-LPG or MAPP gas will also work, but LPG or propane by itself will not be hot enough.



Gently and evenly heat the fitting, as it will require more heat to reach brazing temperature than the pipe. Don't get the cone of the flame too close to the fitting. The colour of the copper should change to a pinky-red colour.



When you think the fitting is up to temperature, briefly touch the end of the silver solder rod against the surface. It should melt on contact with the copper, wetting the surface as shown.

It should now be possible to brush the tip of the rod around the joint as it melts. The liquid solder will wick into the fitting, creating a neat join. There should be an even amount of solder around the circumference of the joint. You should be able to use the application of heat to draw the solder around the fitting.

Once cool, the finished join should be inspected. Note there is no problem with quenching the fitting with water to cool it down; this only anneals the copper.

To join copper pipe to a brass fitting, coat the inside of the fitting with water-soluble flux paste. You may also apply flux to the tip of the pipe.

Insert the pipe into the fitting and give it a wiggle to distribute the flux.

Heat the join, concentrating the majority of the heat into the brass fitting. Once it reaches a dull red colour it should be ready for brazing. Note the flux, which has changed colour to dark red.

Soldering is much the same as with the copper fittings. Touch the tip of the rod to the fitting, and if it wets on contact, run solder into the joint until is travels the circumference of the fitting.