

TANK FABRICATION

TECHNICAL BULLETIN TB-F9

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This issue supersedes all previous issues

Tanks made from AQUAPLATE® steel are constructed in much the same way as tanks have been built for a long time. The only difference is that modern tanks made from AQUAPLATE® steel are sealed, not soldered as tanks were in the past.

Although there are two basic fabrication techniques, no two tankmakers appear to use identical processes. It is therefore recognised that no document could cover them all.

This bulletin assumes that certain tankmaking knowledge is already in place and will therefore not detail actual fabrication methods but rather concentrate on those techniques that differ from soldering.

1. Inspect the surface of the AQUAPLATE® steel to ensure that there has been no damage from transport or roll-forming.
2. Curve and prepare the various parts for assembly. AQUAPLATE® steel curves particularly well. See bulletin TB-6 Curving of Corrugated Sheeting if any problems are encountered.
3. Generously wipe those polymer surfaces to be sealed with methylated spirits, changing the wiping cloths frequently to ensure effectiveness.

IMPORTANT: Do not use stronger solvents as they may dissolve the polymer. Care should be taken when using methylated spirits due to its flammability.

Wiping is strongly recommended prior to assembly, as it becomes difficult to do so effectively later. This is particularly so if the fasteners have already been installed.

4. Assemble the shell without the lid and remove all drilling debris. The inside laps must nest neatly to simplify the sealant application.
5. While wearing suitable clean footwear to avoid soiling or damaging the polymer, seal the inside of the tank at all laps and fasteners.

It must be ensured that the interior film is completely free of any damage. Improperly made or damaged units can result in early failure of drinking-water tanks manufactured from AQUAPLATE® steel.

SEALING OF WATER TANKS

There are two basic methods of sealing tanks made from AQUAPLATE® steel.

1. Post Sealing
2. Sandwiching

A combination of both is also possible.

POST SEALING

Advantages

The use of sealants for sealing rainwater tanks made from AQUAPLATE® steel is now a well established practice. The principle, to date, has been to sandwich the sealant within the laps during fabrication. This method is proven but does have a couple of disadvantages. Any leak is difficult to pinpoint and, more importantly from a tankmaker's viewpoint, it can be messy. The alternative is to build the tank 'dry' and then seal it prior to fitting the lid. This has numerous advantages:

1. No interruption to fabrication for sealant application.
2. Tools and hands are not soiled during fabrication, thus avoiding tool slippage.
3. All 'involved' sealant is within the tank - not outside where it can cause later problems with paint adhesion.
4. Similar to soldering, the process is totally visible during application. 'Missed' areas can be seen and corrected as the job progresses or at later inspection.

IMPORTANT: The sealant chosen for this method must have approval from the State Health Authority with respect to its suitability for potable (drinking) water storage.

Alternatively, it is strongly recommended that assurance be provided by the sealant manufacturer with respect to its suitability for the purpose.

It is important that the tank be built in a manner that results in a fairly rigid shell. This will contribute to freedom from transport and leakage problems.

Techniques

IMPORTANT: All inside laps and fasteners must be sealed. Good light is essential. Ensure adequate ventilation if solvent based sealants are being used.

Those sealants that utilise water vapour cure, such as silicone or urethane rubber, do not require the same level of ventilation, as they are virtually fume free.

Tools: A spatula will be required for tooling the sealant in a professional manner, both around the wall-to-base joint and across the laps of both vertical and horizontal seams.

A modified kitchen spatula is suitable, or a simple tool can be made from a 4 litre square plastic ice cream container in the following manner:

1. At a corner, mark a centre line from the rim down to the bottom.
2. At the rim mark 35 mm each way from the centre.
3. At the bottom mark 19 mm each side of the centre line.
4. Join the two marks on the same side of the centre line.
5. Cut with tinsnips down one side of centre far enough to include the curve at the bottom and return up the other side.

The shape that results is a triangle with a curved narrow end which resembles a spoon. Four such tools can be cut from one container plus useful clean-up tools from the balance.

As the tools become messy, put them aside for a day or so to dry after which the sealant may be peeled off and the tools re-used.

Apply a sealant bead of sufficient volume to tool a raised mound at least 30 mm wide evenly placed so that the seam edges are about the centre of the sealant which should be about 2 to 3 mm thick at that point.

Ensure a feathered edge where the sealant meets the polymer by applying appropriate pressure on each side of the tool. Avoid air inclusions if possible.

The fasteners must also be sealed and this can easily be achieved by using a spare cartridge nozzle reversed onto the original. When sufficient sealant is extruded, the cartridge is removed while twisting the extra nozzle.

Closely inspect the total seal for continuity and repair any doubtful areas. Any damaged polymer can be repaired with sealant of the same type.

SANDWICH SEALING

Advantages

This method is well known and is used by most tankmakers. Sandwiching involves placement of

sealant within laps during fabrication. Actual choice of the sealant should always be dependent on discussion with the supplier regarding suitability.

Techniques

Both of the established techniques for tank assembly work well with this method, ie, the “rope” and the “slip” techniques.

The whole assembly depends on replacing supplied sealant to totally fill the laps. All fasteners must pass through the sealant “sandwich” and the fastener shanks within the tank must be totally encapsulated.

IMPORTANT: All lap edges and fasteners within the tank must also be sealed.

The base to wall seal can be simplified by taping over the base turn up loosely and then extruding the sealant into the remaining crevice prior to firm fixing.

Clean off any excess sealant on the outside of the tank. A useful clean up tool is an empty cartridge with a nick cut in the open end. The cartridge acts as a scoop when pushed along with the nick riding the edge of the lap.

TANK INSTALLATION

Tanks should **not** be placed directly onto the ground. Tank support must be flat and capable of safely supporting a tank when full (*tank weight plus 1 kg per litre of water*). Typically, concrete pads and fabricated tank stands are used.

TANK LIDS

A tank lid made from ZINCFORM® G300S Z450 AQUAPLATE® steel or prepainted ZINCFORM® G300S Z275 AQUAPLATE® steel, in the case of prepainted ZINCFORM® AQUAPLATE® steel tank walling, must be fitted to shield the inside of the tank from light which could encourage the growth of algae. A further reason for light protection is that the food grade polymer lining is not resistant to ultraviolet light.

PAINTING OF EXTERIOR TANK WALLS

To allow the tank to blend in with the architectural features of your home AQUAPLATE® steel is also available with a prepainted steel substrate.

In some cases the AQUAPLATE® steel tank may need to be painted after installation. This may be for enhanced corrosion resistance in aggressive conditions such as coastal or industrial sites, or alternatively the appearance where a colour is required for aesthetic or environmental reasons.

Procedure for Painting

1. Surface Contamination

Ensure that any surface contamination is removed prior to painting, by washing the surface with a mild solution of pure soap or non-abrasive/mild kitchen detergent in warm water followed by rinsing with clean water and drying with a clean, dry cloth.

2. Priming Coat

The use of a priming coat is recommended for all weathered galvanized steel. For new installations a water based, solvent-resistant primer should be applied over the clear water-based lacquer, which is factory applied to the AQUAPLATE® steel external surface.

3. Top Coat

Any exterior paint type, compatible with the chosen brand of primer may be applied. The paint manufacturer's recommendations should be strictly adhered to. Typically a water based acrylic system is suitable for non-aggressive locations whereas more corrosion resistant systems are recommended for aggressive locations.

ACCESSORIES

Modern accessories for water tanks must be designed to give a long life to match that of the tank itself. Do not use copper or copper containing fittings for any part of the tank made from AQUAPLATE® steel.

Inlet Strainers

Anodised aluminium mesh is recommended, for inlet strainers. Copper or copper alloys, must not be used. ZINCALUME® steel or plastic are suitable materials, but must not be used for the strainer surround. ZINCALUME® steel must not be continually immersed. The strainer must be located above the water level.

A PVC overflow with appropriately contoured flanges or a stormwater pipe adaptor should be fitted and a gauze filter should also be fitted to exclude mosquitos.

Outlet Fittings and Pipes

Copper and its alloys **MUST NOT** be used for fittings connected to tanks made from AQUAPLATE® steel. If a copper outlet pipe is connected to the outlet fitting, at least two metres of food grade plastic tubing must be installed between the copper pipe and the tank.

During the past few years there have been several reports that water from copper water services has caused green or blue stains in plumbing fixtures where dripping from taps has occurred. In many cases, water analysis has indicated a copper content in excess of safety levels for human consumption.

It is important that tankmakers are aware of this phenomenon and do not associate the effect with their tanks.

The pH value of water stored in an AQUAPLATE® steel tank remains virtually unchanged because of the inert nature of the polymer laminate, eg, if the rainwater is slightly acidic in nature it will remain so in the AQUAPLATE® tank. Such water can cause trace amounts of copper (from copper piping) to be taken into solution. This problem known as 'cupro-solvency' is occurring at many locations, quite independent from tank involvement, and is often related to town reticulated water.

Water in this condition must not be used for drinking until its suitability is established. In this case the local health authority should be consulted to determine if the water meets the appropriate drinking water standards.

IMPORTANT POINTS

Soldering

Soldering is not practical due to the polymer film and removal of the polymer will void any warranty claim.

Effect of Sunlight

AQUAPLATE® steel is not designed to have longterm resistance to sunlight. Therefore a lid should always be fitted to the tank in order to exclude sunlight.

Open Seams on Outside of Tank

It is recommended that the open seams on the outside of the tank be sealed against water ingress as this could cause corrosion.

It is recommended that the sealant chosen should be of a paintable variety in case the tank is to receive such treatment later.

Wash Tanks Before Use (*Most Important*)

All tanks must be washed out after fabrication and before being put into use. The purpose of this action is to remove contaminants which may have developed during the many processes involved in producing the AQUAPLATE® steel and its subsequent rollforming, transport and fabrication into a tank.

This advice should be communicated to the customer, who should release the first 50mm of the initial fill to ensure that the water contained is free of pollutants from the roof.

Cure Times

Quite apart from open or tooling time, which means the period after extrusion during which the sealant can be worked or tooled, the elapsed time before filling with water is important. To determine this lapse time refer to the sealant manufacturer.

This time lapse is important as leaks will obviously occur if the sealant has not cured sufficiently to withstand the load of water.

Fabrication Tips

- Good light is essential
- Clean the surfaces to be sealed
- Apply and tool the sealant at ALL laps and fasteners
- Good ventilation is essential
- Use only those sealants endorsed by the manufacturer for use with potable water.

The information and advice contained in this Bulletin is of a general nature only, and has not been prepared with your specific needs in mind. You should always obtain specialist advice to ensure that the materials, approach and techniques referred to in this Bulletin meet your specific requirements.

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BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625



AUSTRALIA	SYDNEY	Telephone: (02) 9795 6700
	MELBOURNE	Telephone: (03) 9586 2222
	BRISBANE	Telephone: (07) 3845 9300
	ADELAIDE	Telephone: (08) 8243 7333
	PERTH	Telephone: (08) 9330 0666

OVERSEAS	BlueScope Steel (Malaysia) Sdn Bhd	Telephone: (603) 3250 8333
	BlueScope Steel (Thailand) Limited	Telephone: (66 38) 685 710
	PT BlueScope Steel Indonesia	Telephone: (62 21) 570 7564
	BlueScope Steel Southern Africa (Pty) Limited	Telephone: (27 21) 555 4265

