INSTALLATION GUIDE

COMPOSITE FIBER TECHNOLOGIES

WAGNERS

COOGEE BEACH STAIRS,
NSW, AU

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COOKTOWN FISHING PLATFORM,
NORTH QLD, AU

PART ONE

INTRODUCTION

Composite materials have proven to be a material of choice with an increased use by civil engineers in recent years. As the use of composite materials becomes more common, their performance advantages have been well received by the aerospace and nautical industries. Additional performance advantages such as high strength, low weight and a long service life are achieved as Wagners composite products do not corrode, rot or shrink. In certain applications, composite materials are superior to traditional construction materials such as steel and wood, ensuring a practical investment for the future of the asset.

Wagners has pioneered the use of composite materials both in Australia and internationally, exporting products from Toowoomba, Queensland to locations such as the United States, United Kingdom, New Zealand, Russia, Malaysia and Brazil. We are credited with the manufacture, design, and installation of the world's first composite road bridge on a public road network. Our continued research and development ensures we remain a leader in the design and implementation of this exciting building material.

Wagners use the 'pultrusion process' to fabricate the structural fiberglass sections. These sections are traditional in geometry and shape to that of rolled hollow section steel but are manufactured from fiberglass reinforcements and vinyl ester resins. The material combination has been chosen by Wagners to optimize the structural system as well as maximize cost efficiency.

In the past, our composites have been used in transportation, marine and electrical applications, amongst many others. However, it is not until recently that the ability to build large structures has been fully utilized by our experienced staff. Many years of research and development have resulted in the successful application of composite fiber technology to a number of products including wharves, road bridges, electrical crossarms and pedestrian structures.

1.1 SUPPLY OPTIONS

Wagners' composite structures can be supplied to site via the following options:

- Pre-assembled
- Partial pre-assembly
- Kit form
- Full on-site assembly

PRE-ASSEMBLED

This is the most efficient option of supply if there is accessibility for a loaded truck and crane. Products such as road bridges, pedestrian bridges, decks and beams will mostly arrive to site assembled and ready for a quick and easy installation assuring minimum community disruptions and reduced time on-site.

Transport of components to site can be arranged with Wagners utilizing our in-house transport fleet. By request, we can supply a site crew to take care of all facets of fitting of the composite structure.

PARTIAL PRE-ASSEMBLY

Larger composite structures may need to be transported in a partially pre-assembled state whereby portions of the structure are assembled by the Wagners production team but still require final assembly and installation on-site. Typically, long span bridges or large wharf projects will come in this form due to transportation restrictions.

KIT FORM

This option requires a higher level of construction expertise as there is potential for cutting, drilling, and inserting on-site. For this option, Wagners will aim to provide as many members as possible cut to size, pre-drilled, inserted, and glued, however due to possible site variables such as final pile layout, some of these processes may need to be completed in-situ. All members supplied as part of this option will be labeled with the corresponding member ID to match the construction drawings for ease of installation.

This option lends itself well to the installation of boardwalks where members are typically smaller and can be moved without the aid of large machinery.

Wagners complete most of the manual work in the factory which greatly reduces the time on-site and ensures all components are installed with ease

FULL ON-SITE ASSEMBLY

This option requires the highest level of on-site support and experience compared to the other options listed above. Composite members, inserts, bracketry and hardware are delivered to site and will require cutting, drilling, inserting, and assembly by the installer. The aim of this installation guide and the simple Wagners design ensures this process is easily completed by individuals with a good knowledge of building and construction.

PILING

2.1 PILE DRIVING

SAFETY

- Helmet
- Eye protection
- Hearing protection

TOOLS

- Vibratory pile driver, **OR**
- Impact/drop hammer pile driver
- Wagners piling frame (recommended)

PROCEDURE

- Wagners' fiber composite piles can either be vibratory or impact driven. The driving process is very similar to small steel or timber piles. The construction drawings will have details on the approximate impact hammer weight and drop height required as well as the required pile set to achieve effective resistance of design loads. Impact hammer weights and drop heights can be varied from the recommendation, however this should be discussed with Wagners for calculation of the relevant pile set verification details that correlate to the specific hammer chosen for the project.
- Establish the pile locations and level region in proximity to the piles in order for the driving jig to sit level on the ground.
- Place the pile driving jig in the correct position aligned with the survey mark and then pin the jig into the ground at the required location.
- Place the piles into the jig at correct distances apart in conjunction with the construction drawings.

WHEN DRIVING FIBER COMPOSITE PILES, IT IS IMPERATIVE TO CONSTANTLY MONITOR THE PROGRESS OF THE DRIVING TO ENSURE NO DAMAGE TO THE PILE (BOTH ABOVE AND BELOW GROUND) IS OCCURRING.

- Ensure that the end that is bolted is being driven into the ground first.
- Maneuver the pile driver into position, ensuring the driver is level with the pile.
- Begin driving of the pile using the chosen driving method. For impact hammering, drive the pile one blow at a time ensuring it is level and no twisting is occurring. When using a vibratory hammer, utilize a spotter to help monitor the driving progress of the pile and check progressively to ensure it's level and there is no twisting.

When using an impact driver, continue driving until the permanent set over five blows is reached. This requirement will be detailed in the construction drawings. If required by the certifying engineer, additional testing of the pile may be required and could include re-checking the permanent set after 24 hours or loading of the pile and checking for any height changes.

Vibratory driving is more difficult to determine when the permanent set has been reached. Testing of the piles will be necessary to ensure the piles are embedded enough to withstand the design loads. Consult with Wagners about possible testing methods specific to the project and site conditions. Possible testing options would include confirming the pile set progressively over the project using a drop hammer on pre-driven piles. Another option is for loading of the pile to simulate the expected design loads. Requirements for testing procedure, frequency and loading will be provided by Wagners or the certifying engineers.

It is highly recommended to use a steel cap when driving the piles to reduce damage from the impact or the vibrating hammers. Once the pile has been driven to the required depth, cut off any excess or any damage to the top of the pile caused by the driving process.

Refer to the following section if pile splicing is required.

2.2 PILE SPLICING

SAFETY

- Eye protection
- Hearing protection
- Respirator (recommended)

TOOLS

- Electric and/or battery powered drill (min. 1,800 RPM recommended)
- Hole saws (diamond tipped recommended)
- Wagners drill jig (recommended)
- Trestles (recommended)
- Clamps
- Screwdriver
- Nylon or rubber mallet
- Stop pins
- Impact wrench
- Spanners and/or shifters
- Anti-seize lubricant

PROCEDURE

If deep pile driving is required, pile splicing may be necessary. The splices will be supplied pre-manufactured by Wagners and will require installation into the piles on-site. For specific information regarding cutting, drilling and bolting of fiber composite members, refer to the relevant sections of this document.

- Drive base pile until there is at least 2.5 to 3.5 inches of 'clean' pile out of the ground. The pile is deemed to be clean if there is no damage to the pultrusion caused by the driving process.
- Cut off any damage to the top of the pile before marking of bolt holes.
- Once cut, mark the center of the ¾ inch hole for the splice bolt two inches down from the top of the pile and drill.
- Set up the second pile to be drilled on trestles when possible and drill the second bolt hole two inches up from base of secondary pile.
- Using a rubber or nylon mallet, tap the pre-made splice into the secondary pile and secure the bolt.
- Once secure, place the assembled top pile onto the bottom pile and secure a second bolt through the bottom pile and splice.
- Once all bolts have been secured continue driving as per the previously discussed methodology.

CUTTING

SAFETY

- Eye protection
- Hearing protection
- Respirator
- Gloves
- Long sleeves and/or white suit

TOOLS

- Circular saw (diamond tipped blade recommended), **OR**
- Drop saw, **OR**
- Angle grinder with cut-off wheel
- Trestles (recommended)

PROCEDURE

Cutting fiber composite is as straight forward as cutting steel or timber, however due to the abrasive nature of the material standard cutting blades will wear out very quickly. Diamond tipped blades are best suited for cutting the composite as they do not wear out as quickly. If generation of dust is an issue, wet sawing of the fiber composite is an option, however the member must be fully dry before any sealing of the cut is completed.

- Mark members to cut as per construction drawings, ensuring an allowance for blade thickness is made.
- If using a drop saw, hold member firmly against fence and ensure the blade is 90° to the member. A cutting guide is recommended when cutting bonded members using a circular saw to ensure straight and square cuts.
- Blunt blades will cause burning/scorching to the cut fibers similar to timber.
- Cleaning of the final cuts is generally not expected however 'dags' of fiber may become apparent if the member was not properly supported on either side of the cut or if the blade is starting to become blunt. A light sand or grind will remove this material and clean up the cut.

All pultrusion that has been cut on-site must be sealed. Refer to section 9.2 for the sealing procedure.

TOWNSVILLE STADIUM BOARDWALK,
TOWNSVILLE, QLD, AU

RIVETED CONNECTIONS

4.1 STANDARD RIVETED CONNECTIONS

SAFETY

- Eye protection (recommended)
- Hearing protection

TOOLS

- Electric and/or battery powered drill
- 13⁄64 inch drill bit (carbide recommended)
- Pneumatic rivet gun, **OR**
- Battery powered rivet gun

PROCEDURE

- Locate the two members to be connected and place the appropriate bracket on the joint as per the construction drawings.
- Drill one hole in the first composite member and then install the rivet using either a pneumatic or battery powered rivet gun. Hand rivet guns are not recommended as the stainless rivets work-harden and are very difficult to 'pop-off' by hand.
- Check that the bracket is correctly aligned and then drill and install a second rivet into the second composite member.
- Follow the same process for the other rivets.
- Typically, Wagners standard riveted connections use 6-6 rivets (approximately 3⁄16 inches diameter).

The composite joists can be drilled using standard drill bits, however as the fiberglass material is abrasive, they will become blunt quickly. It is recommended to use carbide or diamond tipped drill bits which will last much longer and save time.

4.2 STAIR TREAD BRACKETS

SAFETY

- Eye protection (recommended)
- Hearing protection

TOOLS

- Electric and/or battery powered drill
- 13⁄64 inches drill bit (carbide recommended)
- Pneumatic rivet gun, **OR**
- Battery powered rivet gun

PROCEDURE

The installation of the riveted stair tread brackets is the same as the standard brackets. If a template/guide is not being used, it is critical to position the stair tread brackets correctly as the treads will need to be level and square between all stringers.

4.3 RIVETED TRUSS BRACKETS

SAFETY

- Eye protection (recommended)
- Hearing protection

TOOLS

- Electric and/or battery powered drill
- ¼ inch drill bit (carbide recommended)
- Pneumatic rivet gun
- Clamps

PROCEDURE

Installation of riveted truss brackets is very similar to standard connections. Larger structural rivets are generally required for these brackets to increase the connection capacity.

- Ensure brackets are aligned square and straight on the members and are positioned in accordance with the construction drawings.
- Clamp the bracket and members in place using quick clamps while riveting. It is not advised to use clamps that require screwing to tighten, such as G clamps or F clamps, as this can damage the surface coating.
- Drill one hole in the first composite member and then install the rivet using a pneumatic rivet gun. Hand or battery rivet guns are not recommended as the larger stainless rivets are too difficult to 'pop-off'.
- Check that the bracket is correctly aligned and then drill and install a second rivet into the second composite member. Follow the same process for the other rivets on the bracket.

BOLTED CONNECTIONS

5.1 DRILLING

SAFETY

- Eye protection
- Hearing protection
- Respirator (recommended)

TOOLS

- Electric and/or battery powered drill (min. 1,800 RPM recommended)
- Hole saws (diamond tipped recommended)
- Wagners drill jig (recommended)
- Trestles (recommended)
- Clamps
- Screwdriver

PROCEDURE

Set up the members to be drilled on trestles when possible, ensuring trestles will not clash with holes to be drilled as this will destroy the hole saw.

- Mark the position of the drill hole on the members as per the construction drawings.
- Mark two points of two inches on either side of the hole position for the edge location of the drill jig.
- Adjust drill jig to suit the size of the member being drilled to allow the jig to locate the center of the member.
- Place drill jig on previously marked locations and clamp in place making sure it is clamped tight and flat against the member.

It is not advised to use clamps that require screwing to tighten, such as G clamps or F clamps, as this can damage the surface coating.

- With the appropriate hole saw attached to the shaft start drilling through the composite member.
- Ensure to keep the drill as straight as possible and held firmly.
- Check and clear the hole saw after each hole to prevent slugs getting jammed.
- Use a screwdriver to push the slugs out of the diamond coated hole saw.

All pultrusion drilled on-site must be sealed. Refer to section 9.2 for the sealing procedure.

5.2 INSERTING

SAFETY

- Eye protection
- Hearing protection

TOOLS

- Nylon or rubber mallet
- Pushing bar
- Stop pins
- Clamps
- Trestles (recommended)

PROCEDURE

Unless otherwise noted, all bolted connections require Wagners inserts to resist crushing when tightening bolts and to increase the bearing strength of the connection. Most bolted connections will come from the factory pre-drilled, inserted and glued where possible. Generally, inserts installed will not need gluing into place but may require a small pop rivet to ensure no movement occurs. Bushes can also sometimes be used in lieu of Wagners inserts, however prior approval from Wagners will need to be given.

- Set up and clamp the members to be inserted on trestles when possible. It is not advised to use clamps that require screwing to tighten, such as G clamps or F clamps, as this can damage the surface coating.
- Wedge appropriate Wagners insert (correct size and hole diameter) into member.
- Place the stop pin into the pre-drilled hole and use it as an indicator of when the insert is close to the hole location.
- Use a nylon or rubber mallet to hammer the insert into the member as far as possible. Do not allow the handle of the mallet to hit the end of the composite member as this may cause structural damage.
- Push the insert the remaining distance into the member using manual pusher bars. Use short bars and work up in size where appropriate to reduce personal strain.
- Once the insert touches the stop pin, remove the pin and continue pushing the insert in small increments.
- The stop pin can then be used to move the insert into its final location concentric with the pre-drilled hole.

5.3 BOLTING

SAFETY

- Eye protection (recommended)
- Hearing protection

TOOLS

- Impact wrench
- Spanners and/or shifters
- Anti-seize lubricant

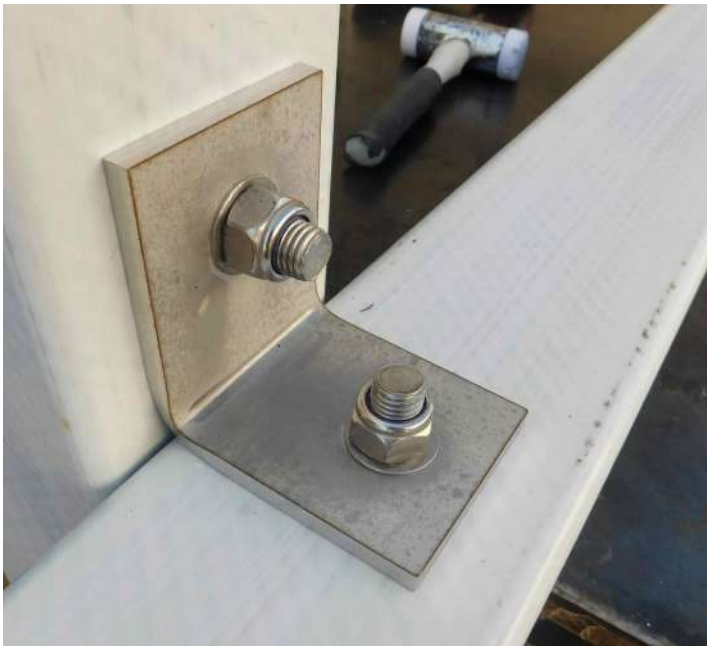
PROCEDURE

Unless otherwise noted, Wagners structures utilize 316 stainless steel connections. All bolts are to be installed with two washers and one nyloc nut. All threaded rods are to be installed with two washers, a nyloc nut on one end and the other end with two standard nuts. Refer to construction drawings to confirm if any variance to this is required, such as dome nuts. All stainless steel assemblies require anti-seize lubricant to prevent galling of the thread.

- For threaded rod installation, thread on two hex nuts from one end, leaving three threads past the outer nut.
- Tighten the outer hex nut against the inner nut using spanners.
- Once tightened and placed through the composite members and/or brackets, tighten the nyloc nut onto the opposite end of the rod using the impact wrench while keeping the spanner on the outer hex nut.
- Cut any excess threaded rod off so that three threads are protruding past the end of the nyloc nut.
- For flush faced truss bolts, clamp the inner face using multigrips with rubber pads to prevent damage to the mirror polished face.
- Use a nyloc nut on the back face of the bolt and secure.

All bolts are to be 'snug tight' but shall not exceed the maximum torques as per below:

Bolt Size	Max. Torque (Nm)
5/8 inches	119
3/4 inches	140
15/16 inches	221



ENDCAP AND TEE-PIECES

6.1 ENDCAPS

Endcaps are used to prevent water and debris from entering the hollow sections as well as improving the final presentation of the finished product. There are four types of endcaps available; normal endcaps, trimmed flush endcaps, riveted metal endcaps and web caps.

NORMAL AND FLUSH ENDCAPS

SAFETY

- Eye protection (recommended)
- Hearing protection
- Gloves
- Electric and/or battery powered drill

TOOLS

- Caulking gun
- Wagners endcap groover
- Rubber mallet
- Butane burner

PROCEDURE

- Connect the endcap groover to the powered drill.
- Place the groover tool firmly against the end of the fiber composite profile, ensuring it is sitting flush and square.
- Run the groover around the internal perimeter of the composite member.
- Check that the tool has made a sufficient groove (approx. ⅛ inches deep) into all four internal faces of the member to help secure the endcap.
- To ensure a good bond of adhesive to the cap, run the butane burner around the edge of the endcaps approximately 1½ inches from the surface following the groove where the composite will sit inside the endcap. The flame will only need to touch the surface once. A flame treated surface has a matte-looking finish.
- Take care not to place the flame too close to avoid burning or scorching the plastic surface.
- Once the endcap has been flame treated, the surface must not be touched and it needs to be used within 24 hours of treatment. If outside of the 24 hours or contaminated, re-do the flame treatment process.
- Apply a small bead of Sikaflex (or similar) in the groove on the endcap.
- Once the endcap has been placed on the end of the composite member, gently tap it on with a rubber mallet until the clips engage.
- Clean up any Sikaflex that has squeezed out with a clean rag. Ensure the Wagners logo is facing the correct way on the member.

RIVETED METAL ENDCAPS

SAFETY

- Eye protection (recommended)
- Hearing protection

TOOLS

- Electric and/or battery powered drill
- 13⁄64 inch drill bit (carbide recommended)
- Pneumatic rivet gun, **OR**
- Battery powered rivet gun, **OR**
- Manual rivet gun (aluminum or zinc rivets only)
- Caulking gun

PROCEDURE

- Place endcaps into the composite member and centralize.
- Using a 13⁄64 inch drill bit, drill a single rivet hole through the composite member and then into metal endcap. The rivet hole is to be placed centrally on the member and approximately ¾ inch from the end.
- A second rivet on the opposing face may be necessary should there be a concern of endcap movement. It is not foreseen that sealing of the endcap would be necessary in most cases.
- If the composite member requires a water tight seal, Sikaflex or a similar rubberized sealant can be used around the outside of the endcap before placement.
- Excess sealant can then be wiped off using a clean rag.

WEB CAPS

SAFETY

- Eye protection (recommended)
- Hearing protection

TOOLS

- Electric and/or battery powered drill
- 5 mm drill bit (carbide recommended)
- Rubber mallet
- Pneumatic rivet gun, **OR**
- Battery powered rivet gun

PROCEDURE

Web caps are predominantly used on truss bridges where members are cut on an angle and the standard endcaps will not fit.

- These web caps can be placed over the fiber composite member and lightly tapped on using a rubber mallet if necessary.
- Once the cap is level, and utilising the pre-drilled holes in the cap, drill through the composite member using a 5 mm drill bit.
- Install rivets through all available holes to secure the cap to the composite fiber member.

6.2 TEE-PIECES

SAFETY

- Eye protection (recommended)

TOOLS

- Rubber mallet

PROCEDURE

- Place tee-pieces on the ends of the pre-cut handrail member ensuring the notch is facing the same way that the bracket will be installed.
- Gently tap the handrail using a rubber mallet (if necessary) in between handrail posts and secure the rail using standard riveted bracket connections. Standard rail bracket notches will be pre-made on the 100 x 75 mm tee-pieces however cutting of the notches may be required if special brackets are required or 100 x 100 mm rails are used.

MERCY FOOTBRIDGE,
DALBY, QLD, AU

BALUSTRADE AND HANDRAILING

7.1 BALUSTRADE

SAFETY

- Eye protection (recommended)

TOOLS

- Electric and/or battery powered drill, **OR**
- Impact driver
- Clamps

PROCEDURE

- Once the composite top rail has been installed, clamp and centralize the balustrade on the rail keeping the panel just on the inside of the rail brackets. The gap between the handrail post and the first balustrade upright must be no greater than five inches.
- Place the plastic endcaps into the balustrade rails. These will automatically grip and should not need adhesive, however adhesive may be necessary if vandalism is a concern or if full sealing is required.
- Using a ⅝ inch sized hex bit on an impact driver or powered drill, drive the balustrade screws through the pre-drilled holes through the balustrade and into the composite rail. Stop driving the screw once it firmly secures the balustrade to the rail. Do not over-drive the screw as this can damage the balustrade and strip the composite rail.
- Once the balustrade has been secured to the top rail, install the bottom rail firmly against the balustrade panel using tee-pieces and riveted brackets.

7.2 HANDRAIL

SAFETY

- Eye protection (recommended)
- Hearing protection
- Gloves (recommended)

TOOLS

- Electric and/or battery powered drill
- 6.5 mm drill bit (carbide recommended)
- 5 mm drill bit (carbide recommended)
- Pneumatic rivet gun
- Angle grinder, **OR**
- Drop saw

PROCEDURE

- Position the offset rail brackets as per heights shown on the construction drawings.
- Install one ¼ inch diameter rivet into the brackets using the same process as described in section 4.1 (Standard Riveted Connections) utilizing the pre-drilled holes in the offset bracket.
- It is recommended to install multiple brackets at once to ensure the rail remains level over the length of the walkway.
- Loosely place the offset rail onto the brackets and adjust each bracket until the rail is level.
- Once level, install all remaining rivets into the brackets.
- Care must be taken not to rub the drill or rivet gun against the rail bracket as this can contaminate the stainless steel and cause it to rust.
- Once all brackets have been riveted, install the rail using the pre-drilled holes in the saddle of the bracket.
- If cutting of the rail is necessary, it is recommended that a drop saw is used.
- When cutting the stainless steel rail, keep the blade constantly wet using water or a suitable cooling fluid as a hot blade can leave burn/scorch marks on the polished rail.
- Install joiners into rails with the split facing upwards using 3⁄16 inch diameter rivets through the bottom of the rail into the joiner. The second rail can then be positioned ⅛ inches from the first and secured to the joiner.
- Cooling fluid may also be necessary with this step to remove the risk of scorching the rail when drilling.
- The rail end returns can be installed the same way, ensuring they do not protrude any more than 1 foot from the last handrail post.

DECKING

8.1 CUTTING DECKING

SAFETY

- Eye protection
- Hearing protection
- Respirator
- Long sleeve and/or white suit
- Gloves (recommended)
- Face shield (recommended)

TOOLS

- Circular saw (diamond tipped blade recommended), **OR**
- Angle grinder
- Cutting guide
- Clamps
- Trestles

PROCEDURE

- Cutting of decking may be required on-site depending on the sheet size supplied, the walkway width, and if any changes of direction are incorporated into the design.
- For visual purposes, it is recommended to cut on the closest closed edge (also known as a rib) of the mesh decking.
- For accuracy of cutting against the ribs, it is suggested that the decking is laid upside down. This will also make it easier for sliding the circular saw and protect it from rubbing against the non-slip surface.

DUE TO THE ABRASIVE NATURE OF THE MATERIAL, STANDARD CUTTING BLADES WILL WEAR OUT VERY QUICKLY. DIAMOND TIPPED BLADES ARE BEST SUITED FOR CUTTING THE COMPOSITE AS THEY DO NOT WEAR OUT AS QUICKLY.

- Place the decking on trestles and mark a cut line along the closest closed edge.
- Set up the cutting guide along the marked line and clamp it to the decking.
- It may also be necessary to clamp the decking to the trestle if the sheet size is small and has a tendency to move.
- Ensure the decking is well-supported on both sides of the cut to reduce the risk of the panel tearing once it is cut.
- Where notching around the handrail posts, the use of an angle grinder with a cutting disc is best suited.

If generation of dust is an issue, wet sawing of the decking is an option, however the panel must be completely dry before any sealing of the cut is completed.

All decking cut on-site must be sealed. Refer to section 9.2 for the sealing procedure.

8.2 SECURING MESH DECKING

SAFETY

- Eye protection (recommended)
- Hearing protection (recommended)

TOOLS

- Electric and/or battery powered drill, **OR**
- Impact driver
- Hammer

PROCEDURE

- Place the deck panel onto a joist or substructure.
- Ensure to leave a ⅛ inch gap between all panels.
- Locate all M clips on the deck panel ensuring the clip is sitting flush on the grating ribs.

- Position the first set of clips on each deck panel approximately two inches from each edge of the panel in the longitudinal direction (such as with the direction of the walkway).
- Internal clips must not be positioned any greater than two feet apart.
- There shall be a minimum of five screws per square meter of decking, however it is recommended to secure into every joist.
- A minimum of four screws is required on any one panel irrespective of its size.
- Install the decking screw through the M clip and into the joist using an impact driver on a low torque setting.
- Stop driving the screw once it firmly secures the clip, and the decking and joist are in full contact.
- Do not over drive the screw as this can bend the clip and create a trip hazard.

8.3 SECURING COVERTOP DECKING

SAFETY

- Eye protection
- Hearing protection

TOOLS

- Electric and/or battery powered drill
- Impact driver
- Wagners countersinking tool
- Wire brush

PROCEDURE

- Place deck panel onto a joist or substructure.
- Ensure to leave a ⅛ inch gap between all panels.
- Mark all screw holes on the deck panel ensuring that the washer will bear on at least two of the mesh decking ribs.
- There shall be a minimum of one screw per square meter of decking, however it is recommended to secure into every joist.
- A minimum of four fixings is required on any one panel irrespective of its size.
- Using the supplied countersink tool, pre-drill a hole through the deck at the previously marked locations.
- Once the countersink tool reaches the deck surface, begin countersinking/boring into the top of the deck.
- The countersinking tool will continue to bore until the height adjustment touches the top face of the decking.
- If necessary, use a wire brush to clean the countersinking tool of excess dust to ensure the tool works effectively.

- Once bored, test the countersinking depth by using a washer and ensuring it does not protrude more than 1/32 - ⅛ inch above the deck level.
- Clean the bored area of any remaining dust and place the washer in bored hole.
- Screw through the deck and joist using an impact driver until fully secure.

All decking that has been countersunk on-site must be sealed. Refer to section 9.2 for the sealing procedure.

TOUCH-UPS AND FINISHING

9.1 TOUCH-UP PAINT

CAMERON ROCKS FISHING PLATFORM, HAMILTON, QLD, AU

SAFETY

- Eye protection
- Respirator (recommended)
- Gloves
- Long sleeves and/or white suit (recommended)

TOOLS

- Touch-up paint
- Brush, **OR**
- Roller (seamless foam recommended)
- Fine grit sandpaper
- Painters and/or masking tape
- Mixing container
- Measuring stick (recommended)

PROCEDURE

- Lightly sand the area requiring touch-up paint using the fine grit sandpaper. For best results use 320 grit paper.
- Once sanded, wipe the surface with acetone using the wipe on/wipe off method (use one cloth to wipe on acetone and another cloth to wipe it off).
- It is critical to ensure that all contaminants are removed from the surface to guarantee proper adhesion of paint.
- Some surfaces may require a light buffing to remove the visible join lines or surface irregularities.
- Once fully prepped, mask off any areas that will not be painted such as brackets or adjoining members.
- Unless noted otherwise, no primer coat is necessary on the Wagners product. Wagners use two types of paint; V700 for any elements subjected to constant UV light (such as handrails or other elements above deck level), and V620 for any below deck members such as joists and bearers.
- The Bill of Materials (BOM) supplied by Wagners will detail what paint is to be used on the members, this includes the specific paint color.
- Mix Part A of the paint thoroughly using a mixing stick to consistently blend the liquid.
- Decant the Part A paint into a mixing container, take care not to decant too much paint to reduce the risk of paint curing in the container before touch-ups are complete.
- The mixed paint will have an estimated maximum usable life of three hours, depending on weather conditions.
- Decant Part B into the previously decanted Part A at the ratio as recommended by the supplier.
- Mix Part A and Part B for a minimum of two minutes until the paint is fully blended.
- Using a paint brush or roller, apply the mixed paint to the composite member, blending/feathering into the existing paint as much as possible.
- Apply the paint so that the minimum wet film thickness is achieved (available on material data sheets or via Wagners upon request).
- The paint will be touch-dry after 30 minutes at 77 °F, dry to handle after 16 hours at 77 °F, and fully cured after seven days.
- Before using paint, carefully analyze the relevant Technical Data Sheets (TDS) and Material Safety Data Sheets (MSDS) from the supplier for specific application and safety requirements.

9.2 SEALING

SAFETY

- Eye protection
- Respirator (recommended)
- Gloves
- Long sleeves and/or white suit (recommended)

TOOLS

- Touch-up paint, **OR**
- Approved resin equivalent
- Paint brush
- Mixing container
- Measuring stick (recommended)

PROCEDURE

- All cuts and bolt holes made to the composite fiber members on-site must be sealed to ensure longevity of the product over its design life.
- Depending on available material and application, either the supplied touch-up paint or resin can be used to complete the sealing.
- Refer to the above procedure for sealing using touch-up paint.
- When using resin, follow all procedures and safety information received from the material supplier to ensure proper application.
- Contact Wagners for approval of proposed resin systems prior to application on the members.
- All sealing must be completed and allowed to cure before bolting or handling to ensure the sealing is retained on the exposed composite.

PREFABRICATED BRIDGES INSTALLATION

10.1 LIFTING

SAFETY

- Hard hat
- Gloves (recommended)

TOOLS

- Soft sling
- Spreader bar (recommended)

PROCEDURE

- Given the lightweight nature of the Wagners composite fiber product, lifting bridge structures is typically straight forward and will usually require smaller machinery than traditional construction materials such as timber, steel and concrete.
- Recommended lifting points on the bridge can be provided by Wagners if required.
- The specific project lifting procedure and safety recommendations must be developed and/or approved by the suitably qualified lifting sub-contractor in conjunction with advice from Wagners engineers to ensure the safest and most efficient process is used.
- Decking, balustrade, or elements of the bridge structure may need to be removed for safe and/or efficient lifting.
- No structural element is to be removed without written approval by Wagners.
- Soft slings must be used when contact with the Wagners bridge structure is possible.
- If soft slings are not an option, appropriate protection is required to prevent any damage to the members.

10.2 LANDING

SAFETY

- Eye protection
- Hearing protection
- Hard hat (recommended)
- Respirator (recommended)

TOOLS

- Impact wrench
- Spanners and/or shifters
- Chemical anchor gun (relevant to anchor supplier)
- Hammer drill
- Caulking gun

PROCEDURE

- When landing a Wagners bridge onto new abutments, it is recommended not to pour the backwall until the bridge is in place.
- This will ensure a neat connection between the bridge and the abutment and will remove any negative effects of on-site 'as built' variances.
- Place rubber bearing pads onto the abutments as per construction drawing locations.
- While referencing the the construction drawings and confirming measurements from the prefabricated bridge, drill through the rubber pads and concrete abutments using the appropriate hammer drill.
- Use of a hole saw may be easiest for drilling rubber bearing pads.
- If required, Wagners can fabricate a template for the bolt hole locations which can help to have the abutments pre-drilled prior to the arrival of the bridge. This can help reduce lane closures or on-site downtime.
- Before installation of the bridge, it is recommended to remove the first decking panel from either end of the bridge to be able to access the hold down brackets.
- In conjunction with the lifting procedure developed as per above, land the bridge onto the abutments as per locations shown on the construction drawings.
- Special attention is needed when abutment heights are not equal as the aluminum balustrade attached to the bridge may have an angled rake to keep the posts vertical and would therefore determine which end of the bridge needs to be placed on which abutment.
- The majority of larger Wagners' bridges will be supplied with a fix end and a sliding end.
- The chemically anchored hold down bolts should be positioned central of the slotted hole.
- Once the bridge is fully landed and in place, install hold down bolts through the supplied brackets using the appropriate chemical anchor. Please review the TDS and MSDS for the chemical anchor to ensure the correct procedure and safety information is followed.
- Once bolts are set into the abutments, fully secure all washers and nuts.
- Replace end decking panels and secure.
- Pour the concrete abutment backwall and wingwalls when required.
- For connection between the concrete abutments and the fiber composite bridge, install backing rod or similar foam joint filler and seal using Sikaflex or approved equivalent.

WAGNERS COMPONENTRY

STAIR TREAD BRACKET

RIVETED ‘L’ BRACKET

BOLTED ‘L’ BRACKET

WAGNERS DRILL JIG

WAGNERS ENDCAP GROOVER

WAGNERS PILING JIG

WAGNERS COUNTERSINKING TOOL

ANTI-CRUSH INSERT

NORMAL ENDCAP

FLUSH ENDCAP

RIVETED METAL ENDCAP

TEE-PIECE

BALUSTRADE

RAIL BRACKET

HANDRAIL JOINER

HANDRAIL RETURN

FLUSH FACED TRUSS BOLT

COVERTOP COUNTERSUNK WASHER

MESH M CLIP

MINIMESH

COVERTOP

MICROMESH

TREDDECK

BALLIN DRIVE PEDESTRIAN BRIDGE,
TOOWOOMBA, QLD, AU

INSTALLATION GUIDE

Published by Wagners CFT LLC.

EIN 36-4902068

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