Bellingham MARINE®

MATERIAL AND CONSTRUCTION SPECIFICATIONS

UNIFLOAT®

Precision engineered flotation systems

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1. CONCRETE

1.1 PLAIN AND REINFORCED CONCRETE

Concrete used in the construction of Unifloat® Pontoons shall comply with the following Australian Standard Specifications.

- AS3600-1988 - Concrete Structures
- AS1379-1991 - Ready-Mix Concrete
- AS1478-9-1973 - Chemical Admixtures for Concrete
- AS3610-1990 - Formwork for Concrete
- AS2758.1-1985 - Concrete Aggregates
- AS3600 Section 20 - Compressive Strength Compliance Testing
- Concrete from a Ready Mix Plant shall be high grade
- Cement shall be rapid hardening
- Maximum aggregate size shall be 10mm
- Concrete strength minimum 40 Mpa at 28 days
- Concrete shall be air entrained 5%
- Target slump shall be 130 mm + 20 mm
- Cement content shall be 335 kg/m3 minimum + 115Kg/m3 of Fly Ash
- Total water shall not exceed 165 kg/m3
- Superplasticizers may be added to the mix
- Top slab finish shall be skid proof produced by finishing screed or a broom
- Formed surface shall be Class F4

1.2 CONCRETE MIX DESIGN

Concrete supplier shall supply full details of the proposed concrete mix design and results of trial mixes to show the concrete complies with the specification. No concreting shall take place until the mix design has been approved by Bellingham Marine.

1.3 GLASS REINFORCED CONCRETE PANELS (GRC)

Glass fibre used in the manufacture of glass reinforced concrete shall be alkali resistant. Glass content shall be a minimum of 5 percent.
Glass reinforced panels shall be designed to carry a central point load of 2 kN or a uniformly distributed load of 3 kPa.

1.4 FIBRE REINFORCED CONCRETE PANELS

Compressed Sheet offers a flat, trafficable surface that is ideal for external decking applications. It is extremely durable and has precision trimmed edges for ease of installation. Used in decking applications it is immune to termite attack and water damage and will not rot.

Shall be manufactured to AS2908: Type A Category 4.

1.5 UNIMOULD PANELS (Plastic Material)

Unimould Panels offer a flat non-skid, weather-proof, no-rot, self-fire extinguishing, chemical resistant, flat sheet panel manufactured from recycled plastic waste using the patented Hettinga controlled density moulding process. Panels shall have a compressive strength of 25mPa, tensile strength of 30mpa and a modulus of rupture of 20mPa.

1.6 FIXING CONCRETE and UNIBOARD PANELS

Glass reinforced concrete (GRC) panels, Unimould Panels and Fibre Reinforced Panels shall be fixed in position with HD galvanised, or Grade 316 stainless steel, or bronze, c/s screws; minimum size 10 x 40 mm length. The GRC panels shall be drilled and fixed with a minimum of six screws, each evenly spaced on each side.

2. REINFORCEMENT

2.1 STEEL REINFORCING BARS FOR CONCRETE

Reinforcing bar shall comply with AS1302-1991. Reinforcing bar whether above or below float immersion level shall be hot dipped galvanised to AS1650-1989 Table 6.1 to a coating mass of 600gm/m2.

2.2 STEEL REINFORCING WIRE FOR CONCRETE

Reinforcing fabric shall comply with AS1303-1991.

2.3 WELDED WIRE REINFORCING FABRIC FOR CONCRETE

Welded wire fabric shall be manufactured from galvanised wire to AS1304-1991.

3. POLYSTYRENE

3.1 MATERIAL

The float units shall be manufactured from EPS (Expanded Polystyrene) Class S, or SL foam. The Class "S"" material may contain up to a 10% maximum level of reclaim material, metered accurately and mixed thoroughly with the expanded beads. SL Foam is not to contain any reclaim material. Materials shall comply with Australian Standard AS1366.3-1992 Rigid Cellular Polystyrene.

3.2 DENSITY

The EPS shall be manufactured to a design density of 16kg per cubic metre for Class S. SL grade shall have a density of 12.5kg per cubic metre. Allowable tolerance on design density shall be plus or minus 5%.

3.3 PHYSICAL PROPERTIES

Mean strength of samples shall not be less than 90% of the strength required for material without regrind material as set out in AS1366.

Maximum water absorption level of the material shall not exceed 2.5% by volume when tested in accordance with ASTM-C272.

3.4 FABRICATION

The EPS float units shall be fabricated by cutting and gluing to produce the overall sizes required. Tolerance on overall dimensions shall be plus or minus 1.0mm. Glue shall be insoluble in water and cover the complete surface of the joint between EPS blocks. Chamfers, grooves and other cut-offs as detailed shall be cut to a tolerance of +2mm.

Each completed float unit may be further strengthened by two circumferential straps of plastic (BANDIT) tape or similar prior to leaving the factory.

The foam core shall be held in a true position during the casting operation with an allowance variation of 3mm from the dimensions shown on the shop drawings.

Foam core can be made up of laminated sections. The number of which should be kept to a minimum.

No horizontal lamination may occur in the upper 250mm of the foam core.

4. DUCTING

Longitudinal and Lateral Ducting to be incorporated in Unifloat® shall be manufactured from rigid 90-mm diameter UPVC material to comply with Australian Standard Specifications.

4.1 16MM DIAMETER THROUGH ROD DUCTS

Ducting for 16-diameter transverse through rods shall not exceed 19-mm internal diameter UPVC Class B Nova irrigation pipe or similar approved.

4.2 20MM DIAMETER THROUGH ROD DUCTS

Ducting for 20mm diameter transverse through rods shall not exceed 25mm internal diameter UPVC Class B Nova irrigation pipe or similar approved.

5. JUNCTION BOXES

Junction boxes may be fabricated in non-metallic materials such as, glass reinforced plastic or polyethylene, or glass reinforced concrete, subject to the approval of Bellingham Marine.

6. SPECIFICATION FOR METALWORK AND METAL FASTENERS

6.1 MATERIALS

Bolts, Nuts and Washers shall conform to AS1111-1980, Grade 4.6 (mild steel) Electrodes shall confirm to AS1553-1983 purchased in unopened packets and kept dry

6.2 FABRICATION

Shall be carried out under continuous competent supervision with as much work as possible executed in the workshop. The workmanship and finish shall conform to the best modern practices. Accuracy shall be such that all parts will fit properly together on erection without straining or forcing.

Gas cutting is permitted for all edges. Those to be butt-welded shall be ground to their correct bevel after gas cutting.

Burrs, rags and gas cutting slag to be removed before assembly; straighten all bars before fabrication and again afterwards if distortion has occurred.

Stamped metal tags shall be securely wired to each item of metalwork after fabrication and prior to dispatch to the galvanising works in a manner suitable for galvanising and subsequent removal. Alternatively, stamping or components with large letter or number punches in an approved location will be allowed prior to galvanising.

Nuts shall be tapped up to 0.4 mm oversize before galvanising to suit the galvanised bolt/bar threads.

Threaded length for bars shall not be less than 50 mm.
Punched slots shall have upset sharp edges removed and smoothed prior to galvanising.

6.3 WELDING

All welding plant to conform to AS1966. All operators shall have been engaged on welding work for 6 months prior to the start of the work and shall be qualified welders in terms of AS1796-1983 and amendments.

Welding terms shall be as defined in ASZ5-1968.

Welding current shall be within the range recommended by the electrode manufacturers.

Fillet welds to have an even surface, of throat thickness equal or greater than the size specified and free undercutting, porosity, slag inclusions and cratering. Carry fillet welds over tack welds.

Surfaces shall be cleaned or all scale, rust and paint; and shall be dry prior to commencement of welding. Work must be adequately held in position by tack welds or other means during welding to the correct position and gap.

The sequence of welds is to be arranged to minimise distortion and locked up stresses.

Fit of surface to be welded, to be within 1.5mm.

Repair of Welds: If any weld requires repair, this shall be done as directed at no extra costs, whether detected before or after galvanising, if after, the item shall be regalvanised.

Seal Welds: In every position where two members are in close proximity, a seal weld shall be made (to prevent ingress of moisture) whether or not detailed in the drawings, and whether or not exposed to the weather.

Ends of RHS and tubes shall be sealed unless expressly detailed otherwise.

6.4 TOLERANCE

Length of through rods and insert studs must be accurate to plus or minus 1.0 mm.

Tolerances on overall lengths and sizes of metalwork items shall be +0 mm. Tolerances on position of drilled holes for bolts shall be +1.0 mm.

7. GALVANISING

Hot dip galvanising shall be carried out in accordance with the provisions of AS1650-1989 and the provisions of the "Standard Specification for Hot Dip Galvanised Coatings" as prepared by the Galvanisers Association of Australia. The following particular points should be noted.

7.1 FASTENERS

Nuts, Bolts and Washers shall be treated by the centrifugal process and have a coating thickness in accordance with Table 5.2AS1650-1989.

7.2 STRUCTURAL SECTIONS

All items not treated by the centrifugal process shall be treated in accordance with Table 6.1 AS1650 to a coating mass of 600 gm/m2.

7.3 STRUCTURAL HOLLOW SECTIONS

Hollow sections shall be galvanised internally and externally and suitable holes shall be provided by the fabricator in accordance with the galvaniser's requirements. Holes shall be oriented such that they face downwards then in their final position.

7.4 REJECTION

Repairs to galvanising using various paint products will not be acceptable. Any item exhibiting faulty galvanising shall be regalvanised. Welding, grading, cutting etc. shall be complete before galvanising but removal of excess material by careful hand dressing shall be permitted.

7.5 IDENTIFICATION

Identification tags fitted by the fabricator shall be left in place and protected from damage/removal by the galvaniser.

7.6 PACKING AND DELIVERY

Each item shall be delivered, tagged as previously described and small items - bolts, nuts etc., shall be bagged or suitably bundled. Adequate care shall be taken to prevent damage to threads, galvanising etc.

8. TIMBER

8.1 STANDARD

Timber shall comply with AS1720-1990 and AS2082-1979.

8.2 SPECIES

Timber is to be Jarrah, Karri, Turpentine or other approved species.

Treated Pinus Radiata may also be used.

8.3 GRADE

Structural Hardwood timber shall not be less than Structural Grade No. 2 and Stress Grade F17. Finish shall be sawn, unless detailed otherwise on the drawings.

Softwood to be Structural Grade 2 Stress grade F8

8.4 TOLERANCES

Timber must be cut to exact dimensions as detailed by the drawing and code designation with a tolerance of +2.0 mm for length, L and depth, D and +1.0 mm for thickness T.

Holes must be drilled to the spacing and patterns detailed with a maximum tolerance centre to centre between adjacent holes and overall the holes in each piece of timber of +1.0mm.

Pinus to be No 2 Grade Rougher Headed F8 or better treated to H4 after cutting to size and all drilling or working.

8.5 PROTECTION UP TO INSTALLATION

Timber supplied in the dry condition shall be fully protected against rain and moisture pick-up from the ground or site concrete between delivery and installation.

9. FLOATS

9.1 FORMS

Floats shall be cast in steel forms, with a smooth, true surface.

Forms shall be designed in such a way to prevent unsightly finished surfaces or definite lines that could result in crack planes. Any rough edges, form marks, or defects shall be cleaned, ground smooth, or patched.

Float forms shall have a tolerance of not more than 0, +3 mm from the dimensions shown on the drawings.

Concrete shall be vibrated internally and/or externally to assure a smooth dense finish. The placement will be such that the concrete float is monolithic with no cold joints in any part of the finished float.

9.2 FLOAT MANUFACTURE

Floats shall be manufactured in accordance with the Unifloat© Worldwide Method Statement in the sizes and dimensions as detailed on the construction drawings.

Materials used in manufacture shall comply with the particular material specification.

Bellingham Marine shall furnish all tools, equipment, materials, and supplies and shall perform all labour, supervision, fabrication, assembly, and installation of a complete concrete float system.

The manufacturing facility shall be designed to provide the proper environment and physical conditions necessary for float casting. The facility shall provide adequate work space, equipment, level heated casting floors, and protection from direct sunlight, wind, moisture and freezing.

Materials delivered and stored at either the manufacturing facility, staging area, or job-site shall be properly stored on dunnage or by other appropriate means to prevent direct contact with the ground and unnecessary damage.

Floats during manufacture shall be protected from the effects of rain, wind and sun until the morning after casting.

The top concrete surface of floats shall be finished with a non-skid "broom finish" surface, except for a steel float finish, (picture frame) not exceeding 75mm wide to the float perimeter and the perimeter of cast in junction boxes. External concrete cover to mesh and bar reinforcement shall not be less than 20mm.

Polystyrene form cores shall be spaced from all side end forms to ensure accurate control of concrete wall thicknesses.

Floats shall be supported from the base slab at all times during handling, by the use of a fork or web slings, and shall be stored on 100mm wide timbers placed under the end walls only. Floats shall not be moved after casting until concrete strength reaches 10mPa.

Immediately after stripping from the forms the floats shall be cleared of all mortar fins, duct holes cleared, any minor defects patched and the floats sprayed with curing agent.

After floats have achieved a concrete strength of 20mPa and not less than 3 days after casting they can be rehandled to stack storage, not exceeding four floats in height.

Tests shall be carried out on each days casting to determine and record the workability (slump test) of the fresh concrete. Daily compression cylinder specimens shall be taken for testing early lift-out strengths or as required. At intervals as required, further concrete compression cylinder specimens shall be manufactured for testing at 7 and 28 days.

All completed floats shall be marked with water-resistant ink showing the float size and type, mould number and date of manufacture. Walking surface of concrete floats shall be level and flush with respect to the adjacent floats.

9.3 CRACKS

Most concrete will have cracks form; it is the nature of the material. Unifloats are designed to minimise this cracking.

Surface or Shrinkage cracks to the walkway surface can be sealed with Xypex or similar concrete waterproofer.

Cracks located below the structural deck that do not indicate migration to the deck surface may be repaired.

Cracks (non-shrinkage) which are open or which exceed 600-mm in length shall be V-cut out and patched with a non shrink-patching compound approved by Bellingham Marine.

Excessive cracking apart from hairline or shrinkage cracks in a single flotation unit shall be cause for rejection of that unit.

10. TRANSPORT AND HANDLING

10.1 ON SHORE

At all times during handling out of the water, each float must be supported at two places underneath the base. Fork tines if used, must pass right under the float and support both front and rear walls. Alternatively two soft webbing slings may be used.

Sub-assemblies of floats must be supported from a lifting beam designed for the purpose, with at least one soft webbing sling under and about the centre of each float.

During transport and storage, floats must be supported under the end walls on 100-mm wide timbers. Floats should not be stacked on trucks more than three high and on the ground more than four high.

10.2 IN WATER

Individual floats or a sub-assembly of floats must be lowered vertically into the water from a crane or similar device. Alternatively, floats may be assembled on a level platform between tides and allowed to float off as the tide rises. Float assemblies can not be launched longitudinally into the water e.g. from a boat ramp.

Floats or float sub-assemblies which are unstable in the water must have outrigger pontoons attached prior to towing. Sub-assemblies must be towed slowly from the launching area to the point of assembly. Floats or sub-assemblies must not be left overnight in the water unless securely moored to or clear of all other floating and fixed structures.

The pier shall be connected to the temporary piles if required with devices which permit it to be moved relative to them and then to be fixed in the new position. The position in which the pier is to be thus fixed shall comply with the following:

The gangway end of the walkway shall be within 25 mm transversely and 50 mm longitudinally of the design position, the bearing of the pier centre line shall lie within 0.05% of the design position.

Throughout the length of the pier the centre-line of the walkway shall not deviate from the straight line joining the centre of the walkway at its ends by more than 20 mm.

The configuration of the temporary piles and connecting devices shall be such that:

horizontal movement of the pier relative to the temporary piles is limited to the minimum clearance required between the piles and the keeper frame of the connecting device as is necessary to prevent the frame from jamming on the pile with rise and fall of the tide,

Horizontal movement of the pier does not exceed 10 mm during the pitching and driving of piles.

Temporary piles may be removed progressively as the installation of permanent piles proceeds subject to the following. The configuration of permanent and remaining temporary piles shall comply with the requirements given above for temporary piles at all times during the installation of further permanent piles.

Permanent piles which are part of this configuration shall be fitted with suitable devices to prevent movement of the pier as specified during the installation of further piles.

In the event of staged completing of a pier all of the specified piles within the designated construction stage shall be installed before that stage shall be made available for use.

11. ASSEMBLY OF FLOATING DOCKS

Assembly of the floating structures can be carried out in two stages.

11.1 SUB-ASSEMBLY ON SHORE

Sub-assembly of finger modules and parts of walkways may be carried out on shore either adjacent to the point of launching or at a place of manufacture, subject to suitable transport facilities being provided.

Sub-assembly of finger modules shall consist of Unifloats, timber, bolts and metalwork. Sub-assembly of walkways shall consist of a number of floats complete with timber walers and a minimum of four through rods per float.

During sub-assembly the floats must be placed on a level bed which will support each float at a minimum of two places across the base with a rear-guide which will ensure accurate alignment of the floats and walers. Sub-assemblies shall be lifted with purpose made lifting frames to ensure that the timbers and rods are not overstressed. Details of the assembly bed and lifting frame must be submitted to the Unifloat Design Engineer for approval prior to work commencing.

11.2 ASSEMBLY IN WATER

Each pier shall be assembled on the water commencing at one end and then by progressively adding sub-assemblies and units in accordance with the layout shown on the drawings. The addition of finger sub-assemblies shall be coordinated with the piling operation to facilitate the placing of temporary location piles and walkway piles if required.

The location and orientation of each pier shall be as shown on the drawings.

Initially the pier shall be held in position by temporary piles if required spaced not more than 40 metres apart. These piles shall not deviate from the vertical by more than 0.4% and shall not be driven within 2 metres of the specified positions of permanent piles.

11.3 TIGHTENING OF THROUGH RODS

All through rods shall be tightened during assembly such that the metal work items and flat washers are pulled hard against the timber members. This can be achieved by hand tightening using a strong-arm 350-mm long on a 12-mm (1/2 rive socket set.

The ends of rods in contact with timber and the thread length shall be treated with Lanocote or similar during assembly.

12. MARINE ACCESSORIES

12.1 PVC FENDERING

Fendering material shall be extruded PVC to the following specification:

- Specific gravity 1.25 to 1.35
- Shore hardness (10 sec. delay) A75 to A90
- Tensile strength 15 to 16 MN/m2
- Elongation at break 300 to 350%
- Modulus at 100% elongation 7 to 12 MN/m2
- Comply with BS2571-1963, class 2 type G2
- Colour white, semi or high gloss
- Tear Strength 60 to 70 N/mm.

The fender profile shall be as shown and dimensioned on the drawings and may be supplied to site in convenient lengths for handling and transport.

Fixing to the timber walers shall be by means of Silica- Bronze large head nails, at least 40 mm long at 200 mm centres on both the top and lower face. Top and face fastenings shall be staggered.

Alternatively, stainless steel staples suitable for Marine use; at least 25 mm deep may be used. The driving gun shall be adjusted to ensure that visible portion of staple does not cut into the upper surface of the fender material. Staples shall be aligned longitudinally.

"D" fender shall be fixed with stainless steel large head tec screws minimum length 35mm.

12.2 PILES GUIDES

Where shown on the drawings, fabricated pile guides shall be either galvanised steel or aluminium as per shop drawings. Contact with piles shall be through either rollers or HMW Polyethylene slider blocks. All Pile Guides must be directly attached to Pontoons via through bolts.

12.3 PILE TOP CAPS

All piles shall be fitted with a fibre glass cone to protect the top surface and or edges of the piles.

Marine Technologies
AUSTRALIA

INTRODUCING THE NEW PLATINUM PEDESTAL FROM MARINE TECHNOLOGIES.

Features include:

The new Platinum Pedestal will revolutionise full service marina pedestals for large vessels.

Our new Pedestal meets the increasing demands for power and communications to large vessels.

The Platinum Pedestal features

- Extruded anodised aluminium side panels offering unparalleled strength and durability.
- Able to accommodate power outlets from 15 Amp to 250 Amp and 400 Amp direct connection.
- Light diffuser specifically designed to direct light downward toward the marina docking whilst radiating a soft filtered light for ambience.

Marine Technologies Platinum Pedestal is a most economical solution whilst still maintaining Marine Technologies' high standard of quality.

What a Platinum idea!

MP1100PL

MP800PL

Marine Technologies AUSTRALIA

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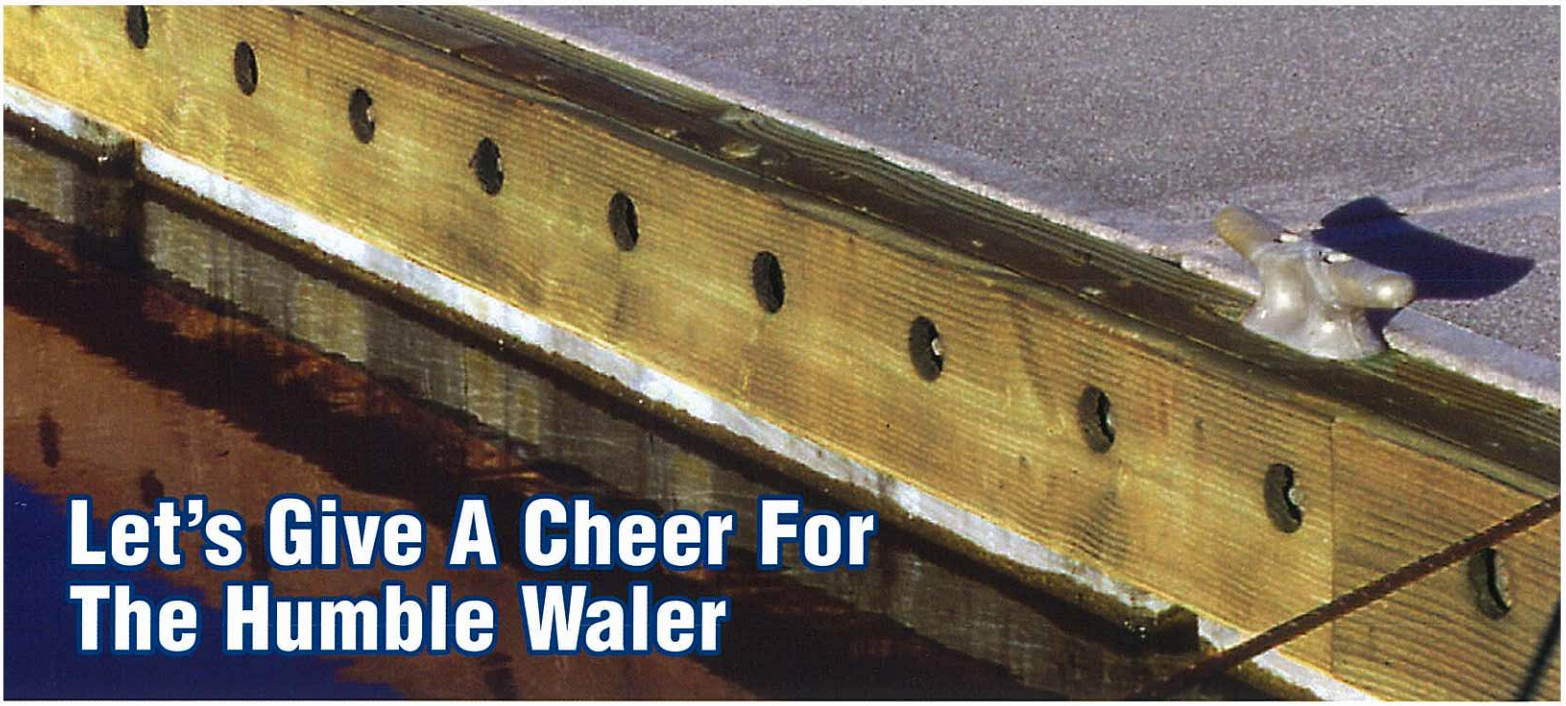
New Service Pedestal

1. Light
2. MCB Cover
3. Door (Click On)
4. PVC Panel (Slides In)
5. Aluminium Extrusion
6. Aluminium Base

TECH

ADV4665

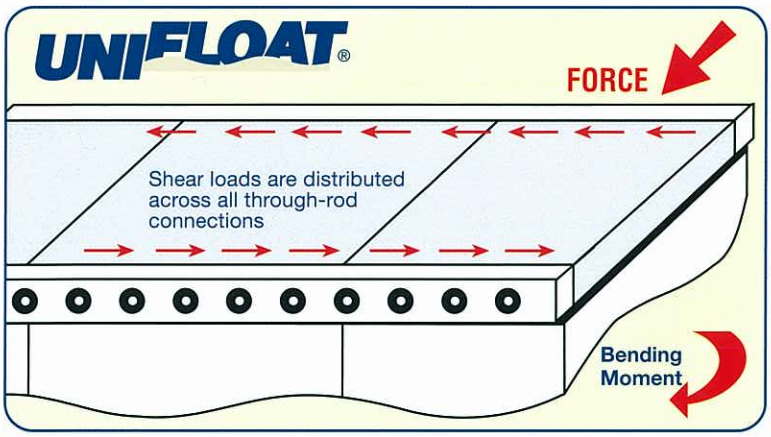


Let's Give A Cheer For The Humble Waler

The Waler Is An Unappreciated But Critical Part Of Our Unifloat® Dock System.

While your guests might think walers just provide a welcoming surface to tie against, they do much more to make Unifloat® the most durable, low maintenance system on the market.

Unifloat® walers are an integral part of the structure, providing a reliable, resilient interconnect between float segments. They also provide the foundation for our world renowned through-rod system–effectively distributing the forces of nature all along the length of the multi-segment structure. Distributing the shear forces throughout the many through-rod connections protects the concrete building blocks of the Unifloat® system and contributes to its amazing durability and longevity.



Why Is This System Better Than Other Connection Systems?

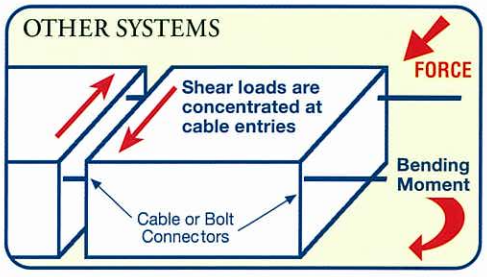
Because with other connectors all of the forces are highly concentrated at the point where the cables or bolts enter the float. These concentrated loads place undue demands on the concrete, and don't use the natural strength of concrete to its greatest advantage.

The Waler Is Just One Part of a System.

Viewed from above the water, one might get the impression that the waler is subject to high localized stresses from wind and wave forces. Not true. Most of the loads are transferred to the earth through piles or anchor systems. The remaining stresses are evenly transferred throughout the structure by the waler/through-rod system. In fact, the Unifloat® design so efficiently distributes loads that it has built a reputation over more than four decades of service as the most durable, low-maintenance floating dock system anywhere.

The Right Waler For The Job.

Rather than an off-the-shelf solution, our engineers optimize the design to exactly suit the conditions at your marina. Likewise, the correct waler is specified for each part of each marina we build. From pressure treated timber walers, to high-strength steel beams, the humble waler stands ready to shoulder the load.



The exterior waler system makes Unifloat® a joy to own. It is simple, robust and easy to maintain. Ordinary hand tools are all that are required to maintain or re-configure the Unifloat® system. Exterior walers also allow easy inspection, as there are no hidden structural areas subject to corrosion.

Convinced? You can believe it. Unifloat® is one tough system. Since 1958, Unifloat® systems have seen storms beyond their engineered design limits – and continue to serve their owners well. So if someone tries to tell you other float connection systems are better, don't buy it.

Instead, ask us about a Unifloat® System for your marina.

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Bellingham MARINE®

Unifloat®. Durable. Affordable.
The best marina is also the best buy.