



Flotation Docking Systems, Inc.

GENERAL SPECIFICATIONS

The following data outlines the design calculations and specifications around which Flotation Docking Systems, Inc. products are constructed. The use of such information for contract purposes shall be valid only by specific reference as explained in the contract documents. Specific application of the following specifications and/or drafted details/schematics should follow the expressed consent and approval of Flotation Docking Systems, Inc. (patent protection).

WARRANTY

Flotation Docking Systems, Inc. warrants to the original purchaser of a facility designed and installed by Flotation Docking Systems that the product shall be free from defects in materials, workmanship, and/or design under normal use for a period of 5 years. Anchorage systems and any related damage to the anchorage system, which is specified by others and/or not engineered and stamped by a Flotation Docking Systems appointed independent engineer may not be covered as a part of this warranty. At any time within the warranty period Flotation Docking Systems will replace and/or repair any part, assembly or portion thereof, which our examination shall disclose to our satisfaction to be defective. Misuse, alteration, or damage resulting from transportation after initial installation as well as from flood, windstorm, moving ice (thermal expansion, current or wind driven), fire, or an act of God exceeding the design criteria set forth in these specifications shall not be covered by this warranty.

Flotation Docking Systems does not extend the above warranty to products manufactured by others and used as part of this work (i.e. utility pedestals, sewage pumpouts, fuel dispensers, etc.). We will however, endeavor to pursue to a reasonable extent - warranty coverage as provided by the affected product's manufacturer.

DESIGN / PERFORMANCE CRITERIA

- A. **General** - Floating piers, anchorages and connections shall be designed in accordance with ASCE Report No. 50, "Small Craft Harbors", dated 2000 or current edition.
- B. **Loads** - Piers, bridges, connections and anchorages shall be designed for the following loads and conditions:
 1. *Vertical:*
 - i. Dead loads shall be the entire weight of the floating piers including access bridges.
 - ii. Live loads shall not be less than 30 pounds per square foot for the floating piers and bridges.
 - iii. Additional flotation shall be installed at end sections where bridges meet piers to compensate for the inconsistent loading requirement.

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2. Horizontal:

- i. Uniform wind load from any direction, 15 pounds per square foot. on all projected surfaces, assuming 100% boat occupancy or maximum slip dimensions, whichever is greater. 100% increase over profile heights of boats to be in accordance with Fig. 4-9, page 106, ASCE Report No. 50, dated 2000 or current edition. Such system is to be designed for storm conditions not in excess of 1'-6" waves. A 10% wind stress, as defined in ASCE Report No. 50 for all shielded boats, shall be included in determining total wind loads on each independent pier or individual pier system (main pier with fingers).
- ii. Local currents on all submerged surfaces of moored craft, assuming 100% boat occupancy or maximum slip dimensions, whichever is greater. For purposes of calculation, draft shall be considered to be 3 foot for craft up to 30 foot in length, 3.5 foot for craft from 31 to 45 foot in length and 4 foot for craft longer than 46 foot. Current pressure shall be calculated on the basis of pressure per square foot of Submerged Boat Surface = $0.75V^2$ where V is the velocity of the current in feet per second.
- iii. Impact of the largest boat normally using that slip, striking the end of the finger dock to a maximum angle of 10 degrees to the center line of that finger dock at a velocity of 2 knots (3 FPS.) or less. For the purpose of calculations on impact loadings, boat weights shall be as follows: 30 foot craft weight = 17,000 lbs., 45 foot craft weight = 45,000 lbs, and 80,000 lbs for 60' slips.
- iv. Each dock module must be designed so as to positively prevent torsional racking and twisting such that the free end of all dock units remains reasonably sound, stable, and rigid under any possible combination of normal loadings. The methodology analysis proposed is based on utilization of the moment of inertia method of the finger pier acting as a composite member about the y-y axis. The minimum recommended moment of inertia I_{y-y} of a 4'-0" wide pier based on wood assemblage excluding the flotation material, of the composite finger pier would be = 76,000 in 4 or its transformed equivalent based on modulus of elasticity ratios. The corresponding pipe connection bracing required should have a minimum moment of inertia for a steel member of = 1.53 in 4.

3. General:

- i. Freeboard - Unless otherwise specified, the deck height off water will be no more than 26" at dead load and no less than 22" under the full 30 pounds per square foot live loading.
- ii. Bridge slopes - Unless otherwise specified the maximum slope of the bridge to float shall not exceed a 4 horizontal on 1 vertical slope under normal anticipated water levels during the boating season.



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- iii. Handrails - Handrails (where included) shall be installed on both sides of the bridge. Posts, top railing, and intermediate railings shall be of comparable materials to the general construction of the dock and shall be designed to withstand a concentrated 200-pound load from any direction at any point on the handrail. The top rail is to be at 42" with three remaining rails equally spaced above deck surface.
- iv. Rubstrakes - Vertical rubstrakes are of 4" x 4" or 6" x 6" stock and to be the specified height above deck. Rubstrakes will be routed to a ½" radius on all four vertical edges as well as crowned on the top for appearance and drainage. Each rubstrake will be bolted to the dock frame by a minimum of four ½" diameter bolts.
- v. Handling Docks - As a safety measure, all dock sections are to be handled via the use of lifting straps applicable to the piece of equipment being used for the job. The specified lifting points are to be at the one-third points along the dock's length.
- vi. Side Skirts - All dock units shall be equipped with nominal 2" thick wood sides providing enclosure to dock frame and boat mooring protection. The use of rubstrakes on finger docks does not eliminate this requirement. The wood skirts shall be positively fastened to the frame on minimum 3'-0" centers.
- vii. Decking - All decks, unless otherwise specified, shall run transverse and be fastened with 3¼" galvanized screw shanked and epoxy coated nails. All four exposed edges of each deck board shall be routed to a ½" radius, done so in an effort to eliminate trip points as well as round off any sharp edges.
- viii. Deck Joists - Docks of 8'-0" width shall have two interior joists and units of 6'-0", 4'-0" and 3'-0" widths shall have a single interior joist.

MATERIALS

- A. **Lumber** - Lumber shall be of Southern Pine graded #1 **or** "C & better," and shall conform to the rules of the West Coast Lumber Inspection Bureau or the Southern Pine Inspection Bureau as applicable. It shall be dried to the moisture content as per Association rules. Timber shall be pressure treated in accordance with AWPB Standard LP-22, and grade stamped in accordance with the current grading rules for the species. Timber cut or drilled after treatment shall receive two heavy coats of the preservative on the exposed surfaces.
- B. **Structural Steel** - Structural steel shall conform to the requirements of the Standard Specifications for Structural Steel, ASTM Designation: A36. All steel shall be zinc coated (hot-dip) in accordance with the requirements of ASTM Designation: A123. Minimum acceptable steel thickness for structural members shall be ¼".



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- C. **Hardware** - Bolts, lag bolts, screws, nails, flat washers and lock washers shall be of the type and size best suited for the intended use. Low carbon bolts shall conform to the requirements for Grade "A" bolts, ASTM Designation: A 307. High strength bolts shall conform to the requirements of ASTM designation: A 325. All fasteners and miscellaneous hardware shall be zinc or cadmium coated in accordance with the requirements of ASTM Designations: A 153, A 163, or A 164.
- D. **Cleats** - Cleats shall be 10" or 15" cast aluminum units as manufactured by Flotation Docking Systems or an approved equal.
- E. **Arc Welding Electrodes** - Arc welding electrodes shall conform to American Welding Society "Iron and Steel Arc Welding Electrodes".
- F. **Flotation Material** - The flotation material shall be rigid-foamed billets of polystyrene not less than 1.0 pounds per cubic foot and meeting ASTM standard C-578. Flotation shall be securely fastened to the dock structure and of a method that allows reasonably easy replacement.

FLOTATION ENCASEMENT

- A. The flotation will be encased on the top and bottom with 20 gauge galvanized steel sheet metal. The steel base metal, its formability and zinc coating shall be in accordance with ASTM Designation: A527 and A525 of a two ounce G235 (ordering weight) minimum thickness.
- B. The flotation device shall be rectangular in shape and completely fill the available "square" footage area provided by the dock frame. Thickness (not width or length) of the flotation shall be the only governing factor as to providing the specified live load. The solid lumber sidewalls provide flotation encasement for the vertical faces.

STRUCTURAL FRAMES

- A. The framework shall be a hybrid composite of southern yellow pine, galvanized structural steel fabricated components, and galvanized sheet steel. The assembly format shall be of monocoque design utilizing 2" thick exterior framing lumber, 2" thick interior bulkheading on maximum 4'-0" transverse span and 5'-0" longitudinal span, and 20 gauge sheet steel upper and lower skin on body work. Structural steel fabricated corner and finger connectors shall have a minimum 6" legs and a sectional depth equal to that of the dock frame.
- B. All structural welds must be hot-dipped galvanized after fabrication with exception only to certain welds, which must be field performed due to custom connection requirements. Every effort must be taken to avoid all such field welds, which may not be required for any reason other than quality control.



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- C. Welding shall conform to the requirements of the latest edition of the American Welding Society Specifications. Welds must be performed by certified welders. All field welds over galvanized material must be thoroughly cleaned and coated with two coats of cold galvanizing compound.

CONNECTORS AND FASTENERS

- A. The minimum acceptable plate thickness used for receiving and dissipating connector ear loads is $\frac{1}{4}$ ". The minimum acceptable bolt size and quantity for attachment of the connector plates and corner brackets is $\frac{1}{2}$ " diameter and 10 per unit. Interior back up plates (washers) shall be a minimum of $\frac{1}{4}$ " thick and serve two or more bolts per piece, preferably on the horizontal plane for corner brackets and on the vertical plane for straight connector plates. Nylon insert locknuts shall be used extensively and shall be welded to its back up plate to assist in future maintenance tightening of the bolts in critical connection areas.
- B. Articulating hinge ears must carry a minimum stock size of $\frac{3}{4}$ " x 3" for the single shear ear and $\frac{3}{8}$ " x 4" for the double shear stock. All articulating connection joint pins are to be $\frac{3}{4}$ " diameter ASTM A-325 bolts with nylon insert locknuts.
- C. Rigid connection ears must extend the full sectional height of the dock frame, must be constructed of minimum $\frac{3}{8}$ " x 4" stock, and must incorporate a minimum of four $\frac{5}{8}$ " diameter ASTM A-325 bolted connections.

Additional specification detail will be provided upon request