

# PORTABLE LAND CRANES ON BARGES

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Waterborne exposures for portable cranes and excavators can present additional risks and concerns other than those encountered when this type of contractors' equipment is used on land. Securing the crane so that it does not move while in operation is required. The crane's lifting capacities are generally always reduced, the stability of the barge with a shifting crane load comes into play and the condition and suitability of the barge is a critical factor.

## SECURING THE CRANE

All cranes used on barges, vessels or other means of flotation must be physically attached to the barge. Cranes should be placed on hardwood timber mats in order to protect the deck of the barge and to adequately spread the load. The wood mats need to be separately secured to the deck to prevent any movement.

There are four options for securing land cranes to barges as outlined in 29 CFR 1926.1437(n).

- Option 1:** Direct cross cabling, chains, welding, bolting or otherwise connecting directly to the barge.
- Option 2:** Corraling with barricade restraints that do not allow the equipment to shift by any amount in any direction.
- Option 3:** Directly mounted and secured to rail system will rail clamps and stops.
- Option 4:** A centerline wire rope system that is physically attached to the barge that can fully support the side load of the crane and that will secure the crane in one position while in operation.

Any of the systems used must be designed by a marine engineer, registered professional engineer familiar with floating vessels or qualified person familiar with cranes on floating vessels.

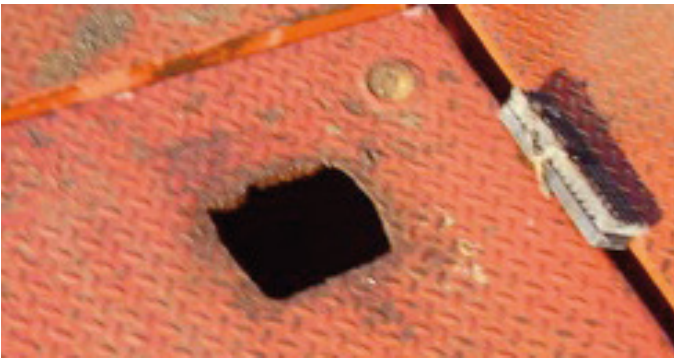
Exceptions to the above can only be allowed if a marine engineer or registered professional engineer develops and signs a written plan for the use of the mobile crane that demonstrates that the applicable requirements of the CFRs are met despite the position, travel, operation, and lack of physical attachment. Specific areas that the crane is allowed to travel have to be clearly marked and the environmental conditions outlined that must be present for the use of the plan.



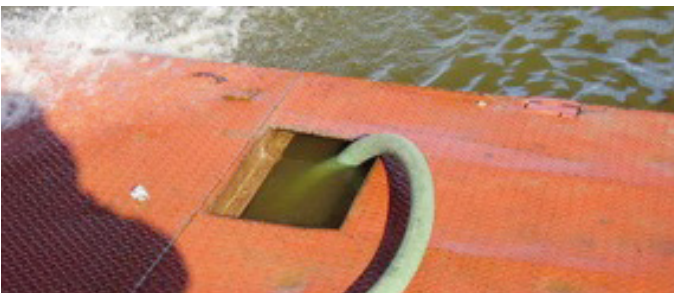
Typical portable land crane on raft of flexifloats

## BARGE STABILITY AND SUITABILITY

The condition of the barge directly relates to the suitability and stability of the barge. The barge should be in a watertight condition, even above the anticipated waterline. Hatches should be positively secured and any other holes or means of water ingress should be repaired or secured.



Opening in deck with no cover allowed water to fill compartment



Hole cut in deck to facilitate ballasting with no cover

Barges that are leased should require both an "On-Hire" and a "Suitability" survey. Just an "On-Hire" survey conducted by the barge owner to protect his interests resulting from any barge damage during the term of the lease is not sufficient to determine if the barge is of suitable size, construction and condition for the intended use. In fact, On Hire surveys will often state that the report is a record of condition for charter purposes, and no opinion is expressed as to the barge's condition or suitability for service.

The inspection should not be an external only inspection and must include an internal compartment inspection. The barge internally should be in good condition and free of any cement patches, shingles or other types of "patches" that could fail at any time and result in flooding of a compartment. "Maintenance Pumping" of tanks on a regular basis is a sure sign of new leaks or temporary repairs beginning to fail.



Heavy wastage and deterioration of internal structural members

It is also important that the barges' watertight bulkheads are intact and in good condition. If for some reason the barge is holed below the waterline, such as from a grounding or contact/collision from another vessel landing alongside, the flooding needs to be contained within one compartment and water not allowed to communicate between compartments that can lead to progressive flooding, which can sink a barge. Also the barge with the crane on deck (but not under load) should have compartmentation such that it can withstand the flooding of one of the largest compartments and still remain upright & stable.



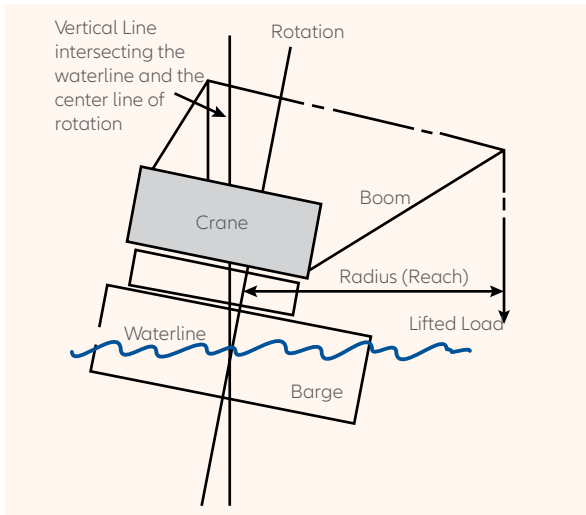
This photo shows the results of a swamped barge due to:

1. Wind, waves and multiple openings in the deck allowing water ingress and causing the raft to list
2. Crane mats and crane not secured separately or properly to the deck

A list and trim indicating device must be placed in the cab or operator's station.

While the crane is in operation the maximum list or trim cannot exceed 5 degrees.

Additional construction equipment temporarily or permanently stored on the barge must be taken into consideration for the stability and trim of the barge.



## CRANE LIFTING CAPACITY AND WORKING RADIUS

Crane lift capacity charts must be modified (reduced) by either the manufacturer or a qualified person who has expertise with respect to both land crane/derrick capacity and the stability of the barge. The size of the barge or pontoon raft will directly affect the reduction in lifting capacity.

Reduced lifting capacity chart is required to be placed in the operator's cab or at the operator's station.



Insufficient securing. Only one (1)  $\frac{3}{4}$ " wire looped over treads at each end. Crane mats are not secured to the deck.



Manhole covered with wooden hatch.

## INSPECTIONS

In addition to otherwise required inspections for cranes and derricks, the crane and barge should be inspected at the following intervals:

### SHIFT

1. Inspection of crane tie downs

### WEEKLY

1. Full, empty or partially filled barge compartments should all be inspected or sounded for leakage

### MONTHLY

1. Inspection of crane tie downs
2. Watertight integrity of barge including, hatches, decks and internal inspection of compartments for leaks and/or water accumulation. It is important that any compartments filled for ballast to offset a crane lift be pressed full and not left partially flooded, as the resulting free surface effect will have a very negative effect on stability and can lead to an unstable lift and/or capsizing of the barge.
3. Deck loads are properly secured
4. Firefighting and lifesaving equipment in good operable condition



Note hole cut in deck and the portable pump & hose on deck. Barge must be regularly pumped to keep the compartment from flooding.

### ANNUALLY

(In addition to of the shift, weekly and monthly inspections)

1. External condition of the barge by a qualified person for corrosion, wear, deterioration or deformation.

## EVERY FOUR (4) YEARS

1. Full barge internal and external inspection by a marine engineer, marine architect, qualified surveyor, or other qualified person.

Monthly, Annual and four year inspections are to be documented and retained a minimum of four (4) years.

All new or reinstalled floating cranes should be inspected and load tested by, or under the direction of, a qualified person to not less than 100% or more than 110% of the modified rated load.

Though not a requirement for most inland deck barges, hull plate should be audio gauged at least every 5 years and any hull plate wasted over 25% should be replaced.



Plywood sheets cover holes in the deck. Also, the crawler crane is not secured.

### ARC Marine Risk

Consultants are able to assist clients in addressing these complex issues and help them make the best decisions for their cargo. Listed below are some resources for additional reading on this subject.

### Publications cited

29 CFR, Floating cranes/derricks and land cranes/derricks on barges, standard no. 1926.1437

ASME B30.8-1999 Floating Cranes and Floating Derricks (2010 edition is available)

IMUA: Cranes, An Underwriting Guide, 2008