



SURFACE VEHICLE RECOMMENDED PRACTICE

J1238™

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Rating Lift Cranes on Fixed Platforms Operating in the Ocean Environment

RATIONALE

Standard is not in active use in the industry. Information is still valid and other standards were based off of this one.

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1. Scope—The scope of this SAE Recommended Practice is limited to cranes mounted on a fixed platform lifting loads from a vessel alongside. The size of the vessel is assumed not to exceed that of a work boat as defined in 3.14.

1.1 Purpose—The purpose of this document is to establish the design dynamic loads, the calculation procedures, and a load rating chart format for lift cranes operating in a variety of sea conditions.

2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein.

1. J. J. Meyers, C. H. Holm, and R. F. McAllister, "Handbook of Ocean and Underwater Engineering." McGraw-Hill Book Co., 1969.
2. Carley C. Ward, "Dynamic Vertical Forces on a Crane Loading (Unloading) a Floating Platform." Civil Engineering Laboratory Technical Memorandum TM 51-76-11 (September 1976).
3. Kenneth V. Johnson, "Theoretical Overload Factor Effect of Sea State on Marine Cranes." Offshore Technology Conference, Paper No. OTC 2584 (1976).
4. D. A. Davis and H. S. Zwibel, "The Motion of Floating Advanced Base Components in Shoal Water—A Comparison Between Theory and Field Test Data." Civil Engineering Laboratory Technical Note NH-1371.

3. Definitions

3.1 Significant wave height is the average of the highest one-third of the wave height population. Wave height is measured trough to crest.

3.2 Sea state is an indicator relating the height of the waves to sea conditions in relative terms.

3.3 Wave instrument reading as used on the load rating chart, indicates the value obtained from a wave buoy or a wave staff that relates to the sea conditions. The wave instrument reading can be analyzed to form the ratio of the average wave height to the average period ($\bar{H}/\bar{T}$).

- 3.4 Surge is the fore and aft ship motion along the longitudinal axis through the center of gravity.
- 3.5 Sway is the athwart ship motion along the transverse axis through the center of gravity.
- 3.6 Heave is the vertical ship motion along the vertical axis through the center of gravity.
- 3.7 Roll is the angular ship motion about the longitudinal axis through the center of gravity.
- 3.8 Pitch is the angular ship motion about the transverse axis through the center of gravity.
- 3.9 Yaw is the angular ship motion about the vertical axis through the center of gravity.
- 3.10 Offlead is the percent slope from the vertical in the vertical plane of the boom, that locates the position of the load with respect to the tip of the boom.
- 3.11 Sidelead is the percent slope from the vertical normal to the vertical plane of the boom, that locates the position of the load with respect to the tip of the boom.
- 3.12 Dynamic rated load is the maximum load that can be lifted under specified dynamic conditions, without exceeding allowable strength limits.
- 3.13 Static rated load is the maximum load that can be lifted under normal land conditions, without exceeding allowable strength limits.
- 3.14 A typical work boat is a vessel of 180-ft length, 40-ft beam, and 1500-long-ton displacement.
- 4. **Dynamic Load**—The dynamic load being addressed is imposed on the crane at the time of the load lift off from the moving deck of the vessel alongside. Additionally, consideration is directed to the effects of the horizontal displacement in the plane of the boom and normal to the plane of the boom caused by surge and sway of the vessel.

After studying the motions of a workboat, it is assumed that the vertical motion follows the wave amplitude and that horizontal motions include sway, surge, and yaw, but exclude drift.

The vertical dynamic load, P (lb), that occurs when the lifted load W (lb) is directly under the boom tip is given by the equation:

$$P = W \left\{ 1 + \left[\frac{1k}{gW} (V_D + V_H)^2 + \left(\frac{A_D}{g} \right)^2 \right]^{1/2} \right\} \quad (\text{Eq. 1})$$

where:

g = Acceleration due to gravity (ft/s²)

k = Vertical structural stiffness component with the load force at appropriate offlead (lb/ft)

V_D = Absolute value of velocity of the deck at the pick point (ft/s)

V_H = Absolute value of velocity of the load hook (ft/s)

A_D = Acceleration of the deck at pick point (ft/s²). Refer to Reference 2.1.(2) for appropriate sign convention.