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Ships and marine technology — Large yachts — Deck crane and access gangways strength requirements

Navires et technologie maritime — Grands yachts — Exigences de résistance des grues de pont et des passerelles d'accès

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Foreword

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Ships and marine technology — Large yachts — Deck crane and access gangways strength requirements

1 Scope

This International Standard specifies requirements for the minimum structural scantling of lifting appliances for large yachts.

It is applicable to the following lifting appliances:

— cranes;

— access gangways (including side ladders);

— access gangways when used as a lifting appliance.

This International Standard is not applicable to lifting means for life saving appliances, which are covered by recognized rules and/or international regulations.

This International Standard covers mainly the following aspects:

— service class;

— applied loads;

— design criteria;

— allowable stresses;

— strength check;

— elastic stability check;

— connections.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
large yacht
ship with a hull length, L_H, equal to or higher than 24 m, used for sport or pleasure and commercial operations

NOTE For a definition of L_H, see ISO 8666.

2.2
lifting appliance
means of loading/unloading weights on board, excluding people loads

2.3
access gangway
means of embarking/disembarking people

2.4
life saving appliance
survival craft

EXAMPLE Life boat, rescue boat, inflatable life raft, rigid life raft.

2.5
favourable weather condition
steady wind up to Beaufort Force 4

2.6
calm water
sea state with waves up to 0,3 m significant height

2.7
wave significant height
mean height of the highest one third of the waves

NOTE Wave significant height approximately corresponds to the wave height estimated by an experienced observer.

2.8
jib type crane
crane (either rotating or not) with arm (either hoistable or not)

2.9
gantry crane
beam or carriage, with lifting device, running on guides

2.10
light service class
class used to refer to lifting of general equipment and supplies

3 General requirements

3.1 Service class

For the purposes of this International Standard, a light service class shall be considered, and the following load amplification factor M (service factor) shall be applied:

$M = 1{,}05$

3.2 Applied loads

3.2.1 General

The following load evaluation takes into account that the lifting appliances are to be operated in favourable weather conditions and in calm waters.

The following loads shall be considered:

— main loads acting statically on the lifting appliance structure;

— inertia forces due to lifted load vertical movement;

— inertia forces due to lifting appliance movements;

— static loads due to yacht trim and list.

3.2.2 Main loads

The following loads are defined as main loads (see Figure 1):

— P_S: weight (N) of lifting appliance structure;

— P_F: weight (N) of fittings and mechanical parts permanently connected to the lifting appliance;

— P_L: service load (N) (maximum weight to be lifted);

— P_M: weight (N) of mobile fittings lifted together with service load.

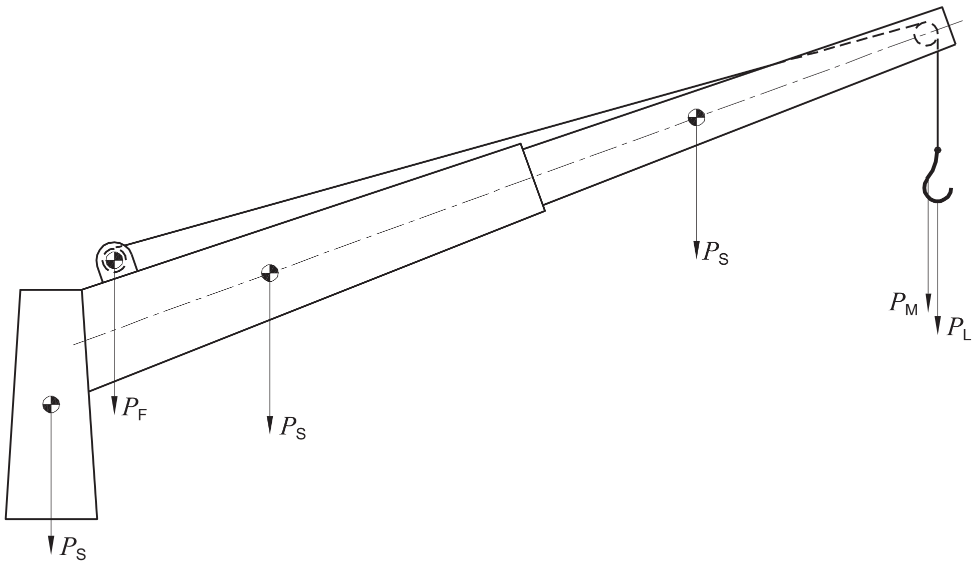


Figure 1 — Main loads

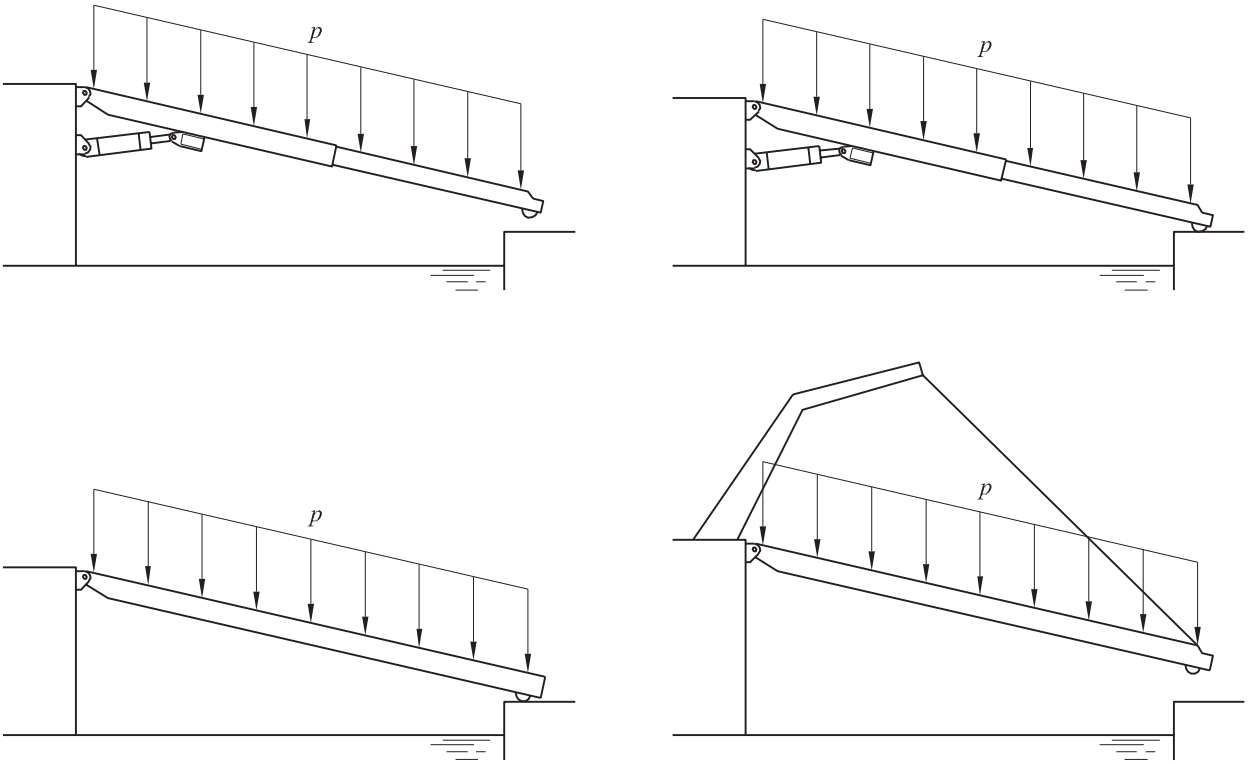
The service load (P_L) shall be declared by the manufacturer, marked on the lifting appliance and listed in the user's manual.

For access gangways, the service load (type and value) for which the appliance is designed shall be clearly declared and marked on the gangway, and shall be listed in the user's manual. For example the access gangway load can be defined as a uniformly distributed load (p in Figure 2) or as a number of concentrated loads P (people accessing the yacht) for which the following data shall be defined (Figure 3):

— number of loads;

— amount of each load;

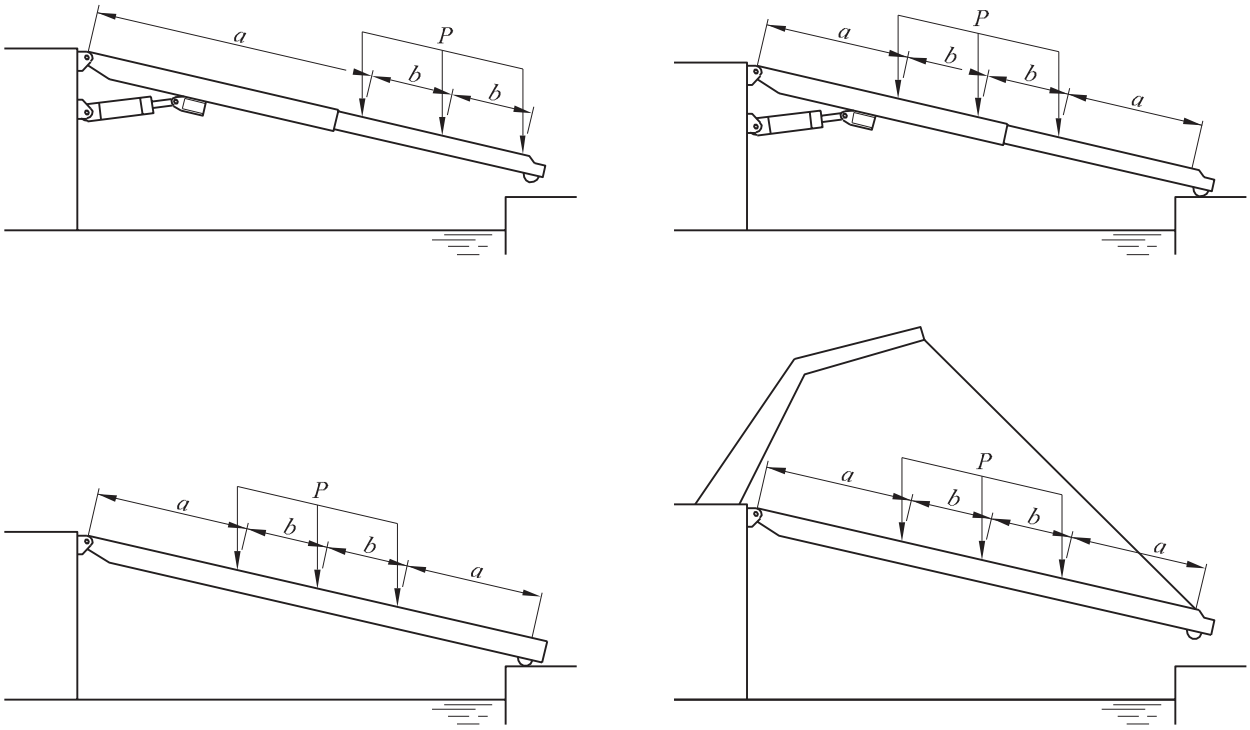
— position of loads along the access gangway.



Key

p distributed load

Figure 2 — Uniformly distributed load



Key

P concentrated loads

a distance from the load to the end of the gangway

b distance between the concentrated loads

Figure 3 — Concentrated loads

For gangways that can be used either hanging free above the quay or with the end supported by the quay, the maximum load to be marked is that resulting from the worst loading condition.

When the access gangway can also be used as a crane, the structural check shall be carried out for the two separate loading cases.

3.2.3 Inertia loads due to lifted load vertical movement

To take into account the inertia force due to lifted load vertical movement, the loads P_L and P_M shall be multiplied by the dynamic factor ψ given by:

$$\psi = 1 + K\, v_S \tag{1}$$

where:

K is the coefficient = 0,3 (jib type crane), 0,6 (gantry crane);

v_S is the load lifting velocity (m/s), to be taken as no more than 1.

Factor ψ, to be taken as not less than 1,15, is given in Figure 4.

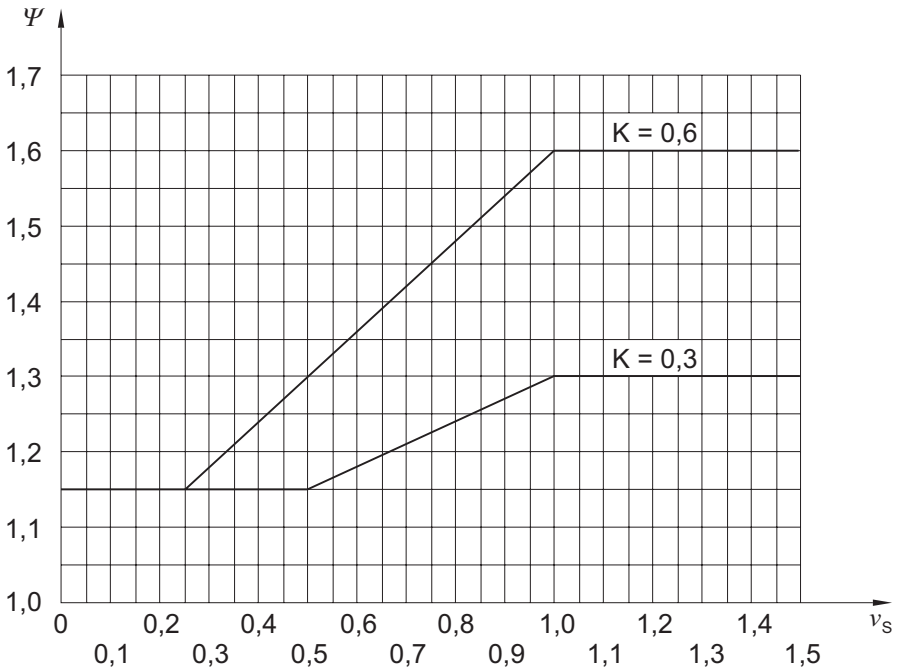


Figure 4 — Dynamic factor

3.2.4 Inertia loads due to lifting appliance horizontal translation

The force due to horizontal translation, P_t, is as follows:

$$P_t = M\,(P_L + P_M)\,a_t/g \qquad (2)$$

where:

a_t is the translating acceleration (m/s^2);

g is gravity acceleration (9,81 m/s^2).

If acceleration a_t is not specified, it can be obtained from Figure 5 as a function of translating speed v_t.

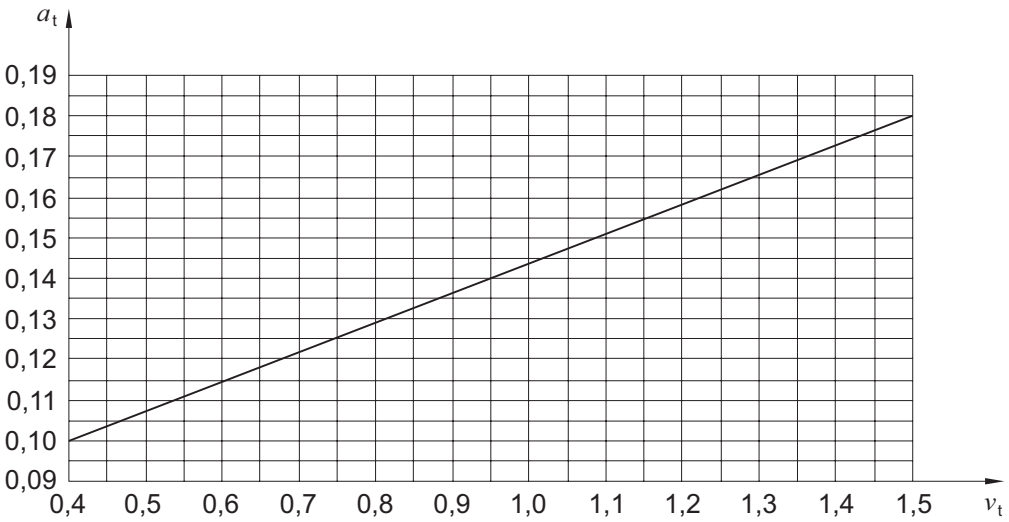


Figure 5 — Translating acceleration

3.2.5 Inertia loads due to lifting appliance slewing

The force due to slewing, P_r, is as follows:

$$P_r = M\,(P_L + P_M)\,a_r/g \tag{3}$$

where a_r is the slewing acceleration (m/s^2).

If acceleration a_r is not specified, it can be assumed to be 0,6 (m/s^2) at the jib head at maximum outreach.

3.2.6 Loads due to yacht trim and list

Unless higher values are specified, all the combinations of the following angles shall be considered, according to the location on board and the degree of freedom of the lifting appliance:

List		- 5°	0°	+ 5°
Longitudinal trim	- 2°	0°	+ 2°	

as in the following examples, where (see Figure 6):

θ is the transversal angle of the lifting appliance arm;

β is the longitudinal angle of the lifting appliance arm.

Figure 6 — Lifting appliance angles