2017

Guidance for Shiplift and Transfer Systems

GC-22-E

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APPLICATION OF "GUIDANCE FOR SHIPLIFT AND TRANSFER SYSTEMS "

1. Unless expressly specified otherwise, the requirements in the Guidance apply to shiplift and transfer systems for which contracts for construction are signed on or after 1 July 2017.

CONTENTS

CHAPTER 1 GENERAL

Section 1 General

101. Application

1. The requirements of this Guidance are applicable to shiplift and transfer systems in which vessels are raised and lowered by means of winches or jacks when docked on a flexible or rigid platform structure.
2. The vessel may be docked on a system of blocks, cradles or an air/hydraulic cushion arrangement for subsequent transfer.
3. Docking systems which incorporate a combination of both shiplift and transfer systems and floating dock principles will be specially considered on the basis of these requirements and the other requirement of the Rules.
4. In those cases in which the installation is to be certified but not classed, the design criteria specified assume that Periodical Survey procedures, at least equivalent to the Society's, will be adhered to by the Owner. This is of particular importance with respect to ropes and chains used to raise the platform.
5. When specifically requested, end and side transfer arrangements will be examined and included in the class notation or certification issued. However, where the design concept of the platform involves an interaction or interdependence between the platform and transfer system, as in the case of a rigid platform with flexible ship support system, the transfer system will be considered as an essential and integral aspect of class or certification.
6. All foundations and civil engineering work are not included in scope of the Society.
7. These requirements are framed on the understanding that the Installation will be properly loaded and operated. They do not allow for concentrations of loading greater than Indicated by the specified maximum distributed load nor for loading situations or weather conditions which may result in the rated capacity of individual winches being exceeded.
8. Sufficient information is to be supplied to the operator, in the form of an operations manual, to ensure the safe operation of the installation.

102. Procedure

1. The following procedure is to be adopted for all installations where the Society's classification or certification is required:
   (1) Approval of plans covering structural, electrical, mechanical, hydraulic and control engineering aspects of the installation as indicated in below. Supporting calculations are to be submitted as may be required and these are to indicate clearly the proposed lifting capacity and the docking and transfer arrangement for which approval is required.
   (A) Structural aspects. The following plans are to be submitted for approval:
   (a) Structural plans of the platform.
   (b) Structural plans of the transfer system if it is required that this is to be included in the certification or class of the installation.
   (c) Upper and lower sheave housings.
   (d) Winch bedplate.
   (e) Rope or chain specification
   (f) The material specification for steels used in the construction.
   (g) Welding specifications.
   (B) In addition the following plans and information are to be submitted for reference purposes:
   (a) Finite element analysis data, calculations clearly indicating the basis of design, nominal lifting capacity, maximum distributed load weights and centres of gravity of the component parts and any other relevant design criteria.
   (b) Platform assembly.
   (c) Arrangement of decking.

(d) Rail arrangement and details.
(e) Hoist and rigging arrangements
(f) Cradle and block arrangements.

(C) Mechanical, electrical and control aspects. The following plans are to be submitted for approval:
(a) Diagrammatic plan of hydraulic or pneumatic systems (where fitted).
(b) Plans of winch gearing, shafts, clutches, brakes, coupling bolts, welded drums, and similar items and their materials and stresses.
(c) Plans of circuit diagram of electrical system, showing load currents and ratings of all electrical equipment, types and sizes of cables, rating type and make of all protecting devices.
(d) Arrangement plan and circuit diagram of switchboard.
(e) General arrangement of control centre.
(f) Schematic diagrams of control panels.
(g) Details of alarms and protection circuits.

(D) In addition, the following information is to be submitted for reference purposes:
(a) Calculations of short circuit currents and main busbars, sub switchboard busbars and the secondary side of transformers.

(2) Survey of steelwork and winches at the place of manufacture and verification of materials.
(3) Certification, on the appropriate forms, of wire ropes and chains which are to be manufactured at a works approved by the Society.
(4) Survey of structure, winches, electrical and hydraulic systems during installation and on site assembly.
(5) Periodical Surveys and tests are to be carried out as specified in Section 2.

103. Lifting capacity

1. For the purpose of classification or certification, each shiplift and transfer systems will be designated a lifting capacity on the following basis:

(1) Maximum distributed load (MDL)
This is the maximum load, in tonnes/metre, which can be uniformly distributed along the centreline of the platform, and which has been used to establish the scantlings of the installation. It is to be taken as:
(Capacity of one pair of hoists minus deadweight of the length of platform associated with these hoists) divided by the hoist spacing.

(2) Nominal lifting capacity (NLC)
This is the maximum displacement, in tonnes, of a ship of normal form which can be lifted without exceeding the maximum distributed load for which the platform is designed, and is to be taken as:

NLC = MDL x effective platform length x a distribution factor.

These values will appear on the appropriate certificates issued by the Society.

2. The maximum distributed load on the platform includes the weight of cradles or blocks used for supporting the ship.

3. The effective platform length is the total length between hoists plus the lengths of the end cantilevers, but each of these is to be taken as not greater than one half of the hoist spacing.

4. The distribution factor is to ensure that the maximum distributed load is not exceeded anywhere along the effective length of the platform and to allow for dynamic factors. The following values are generally to be adopted:

(1) Platforms of articulated design (that is with no longitudinal stiffness or bending rigidity) and incorporating conventional block or cradle arrangements: 0.67.
(2) Platforms of articulated design incorporating flexible cradles, or platforms of rigid design incorporating flexible or rigid cradles: calculations to be submitted but in no case to exceed 0.83.

5. The total net lifting capacity of the installation is defined as the 'MDL x effective platform length'. Where requested, this value may be included in the certification for information purposes only.

6. The lifting capacities will be specially considered in cases where:

(1) The block or cradle arrangement is such that the loads are not applied along the centreline of the platform.
(2) The block or cradle arrangement is such that the loads are not applied along the centreline of the platform.

7. The block or cradle arrangement is, in general, to be such as to ensure that the pressure on the hull of a docked ship is not greater than that for which its structure is suitable. In general, this pressure is in the range 200 to 230 t/m^2. Particular circumstances may, however, result in a greater or lesser pressure being appropriate.

104. Machinery, control and operational features

1. The arrangements in respect of electrical, mechanical, hydraulic and control engineering aspects of the installation are to comply with the requirements of **Pt 9, Ch 2** of the Rules.

Section 2 Classification Regulations

201. General

1. Shiplift and transfer systems built in accordance with the Society's Rules in respect of structural and machinery requirements will also be eligible to be assigned a class in the Register Book and will continue to be classed so long as they are found upon examination at the prescribed surveys to be maintained in accordance with the Society's requirements.

2. The Regulations for classification and Periodical Surveys are given in **Pt 1** of the Rules. These Regulations will be applied to the shiplift and transfer systems insofar as they are applicable and are to be read in conjunction with the specific requirements given in this Chapter.

3. Where the proposed installation is novel in design, or involves the use of unusual materials, or where experience, in the opinion of the Committee, has not sufficiently justified the principle or mode of application involved, special tests or examinations before and during service may be required. In such cases, a suitable notation will be inserted in the Register Book.

202. Character of classification

1. The class will be distinguished by the class notations and the class notations assigned to the systems classed with the Society are to be in accordance with the requirements specified in **Pt 1, Ch 1, 201.** of the Rules. However, "Shiplift and Transfer System" is to be assigned and the following special feature notations is to be assigned.

(1) Shiplift and Transfer System for service at ..... (port to be specified)
(2) MDL x effective platform length

2. Special features or design principles may require variations from these typical class notations, and appropriate additional or amended notations may be assigned.

203. Initial Survey

1. Where it is intended to build the installation for classification with the Society, constructional plans and all necessary particulars are to be submitted for the approval of the Committee before the work is commenced. Any subsequent modifications or additions to the scantlings or arrangements shown in the approved plans are also to be submitted for approval.

2. New installations are, from the commencement of the work until completion and Installation, to be examined by the Surveyors with respect to materials, workmanship and arrangements. Any items not in accordance with the Society's requirements or the approved plans, or any material, workmanship or arrangement found to be unsatisfactory are to be rectified.

3. The requirements for weld procedure tests and weld inspection are to be agreed with the Surveyors. In general, however, it is recommended that non-destructive testing of welding to primary members should be as follows:

(1) All fillet and butt welds in the area of support for sheave housings, transverse butt welds in main girders and similar critical areas.

(2) 10 percent of all other fillet and butt welds in primary structural members.

204. Periodical Surveys

1. Periodical Surveys are to be carried out on a 5-yearly Continuous Survey on the basis of the requirements of **2** to **13**. The Shipowner is to submit the survey programme for Continuous Survey and reviewed.

2. 20 percent of main and secondary transverse and longitudinal girders are to be examined. This may require the removal of limit switch operating rods to enable submerged areas of the platform to be raised clear of the water). The examination is to include:

(1) The connection or seating arrangements at the junction of longitudinal and transverse girders for signs of work hardening and cracking and other defects.
(2) A general examination of protective coatings.
(3) Examination of the rails for alignment and sign of wear giving particular attention to connecting arrangements and the connecting rail between the platform and shore.

Timber decking is to be removed as necessary to allow these examinations.

3. The Surveyor is to satisfy himself as to the maintenance condition and lubrication of the hoist ropes. Concurrent with periodic surveys he is to carry out a complete in situ visual examination for signs of corrosion, wear or broken wires:

(1) In general, wire ropes are to be renewed where there are 5 percent or more of broken, worn or corroded wires in any length of ten rope diameters. However, reference may be made to a recognised national standard in determining discard criteria.
(2) Each year a minimum number of ropes are to be removed from installations as follows:

Up to 6 hoist units : 1 rope
6 to 20 hoist units : 2 ropes
More than 20 hoist units : 4 ropes

A test to destruction is to be carried out on a sample length selected by the Surveyor from each of the ropes being replaced. Should the test piece fail at breaking loads more than 10 per cent below the minimum required values, consideration will be given to the need to select for test and replacement some or all of the remaining ropes.

(3) It is the intention that all ropes are replaced in sequence at a rate determined by wear, chemical attack, corrosion or other forms of deterioration associated with the particular installation. For small installations this will result in a replacement cycle of about 5 years. Proposals for the replacement cycle for large installations to exceed 10 years will be specially considered in the light of the test results obtained.

4. Where the Annual Survey incorporates the use of non-destructive examination equipment to inspect hoist ropes, the following procedure is to be adopted:

(1) The accuracy and reliability of the NDE equipment is to be demonstrated to the satisfaction of the Surveyors.
(2) Field tests are to be carried out to the Surveyor's satisfaction to verify the suitability of the equipment for the particular hoist and rope arrangement and rope speed.
(3) The annual rope survey is to be as follows:
  (A) Complete visual inspection of all ropes for signs of broken wires. Particular attention is to be given to the condition of the ropes in way of the rope terminations as these areas are unlikely to be accessible to NDE equipment. See (4) Test A.
  (B) NDE of a selected number of ropes using approved equipment operated by skilled personnel. The number of ropes selected for inspection is to be in accordance with **3** (2) but not less than 10 percent of the total number of ropes in the installation. Ropes are to be tested over their full length and are to be selected in accordance with a planned programme of inspection to ensure an even distribution of ropes, selected on an annual rotation basis. See (4) Test B.
  (C) Two years after installation of the ship lift, one rope that has been subjected to NDE is to be selected for a test to destruction to verify the NDE results.
  Thereafter, one rope is to be selected for a break test each year. See (4) Test C.
(4) The results of the tests in (3) will be used to determine, to the satisfaction of the Surveyor, whether rope replacement or further testing is necessary for the particular installation. In general, the following criteria are to be used in determining the adequacy of the ropes to be retained in service:

Test A: The number of broken wires is not to exceed 5 percent in any length of 10 rope diameters.

Test B: The cross-sectional area is not to be reduced by more than 10 percent of the original area. Where the loss in area is found to be between 5 and 10 percent, consideration is to be given to including these ropes in subsequent examinations in addition to ropes selected for normal annual NDE.

Test C: The reduction in breaking strength when the combined effect of metal loss, corrosion pitting and broken wires has been taken into account, is not to exceed 10 percent of the minimum specified rope breaking strength.

5. The Surveyor is to satisfy himself as to maintenance, condition and lubrication of hoist chains. In general, any length of chain so worn that its mean diameter at its most worn part is reduced by 4 percent or more from its nominal diameter is to be renewed.

6. 25 percent of the upper and lower sheaves, bearings, axles and housings are to be examined, with at least two complete sets of sheaves opened up for examination. All sheaves are to be opened up at least once in the 4-yearly survey cycle. Attention is to be paid to lower blocks in way of drain holes and the attachment of sheave housings to upper and lower supports is to be examined.

7. Covers on 20 percent of the hoists are to be removed to allow for the following inspections:

(1) The tooth alignment of open gears is to be checked.
(2) Main shaft pillow block bearings are to be opened up.
(3) Cap screws securing final spur wheels to the drum are to be check tightened with a torque spanner.
(4) Primary gears and all open gear shafts and bearings are to be examined.
(5) The hoist frame and bolting arrangements are to be examined.

8. Where the transfer system is included in the class notation 20 percent of the transfer bogies are to be examined.

(1) Wheels are to be examined for wear and the condition of linkages between bogies is to be checked.
(2) A random selection of 10 percent of the axle pins to the bogie wheels is to be withdrawn for inspection for signs of excessive wear and other defects.
(3) The rails are to be examined for alignment and signs of wear and to verify the adequacy of the locating and locking arrangements.

9. A complete megger test of all electrical systems is to be carried out and electrical cables are to be examined.

(1) Breakers, relays and all other mechanical electrical gear are to be examined.
(2) 25 percent of electric motors including bearings and magnetic brakes are to be examined.
(3) All circuit breakers to be tested for overload tripping.
(4) Air compressors for hoist ratchet and arrangement are to be generally examined together with the air tank.
(5) The efficiency of all safety devices is to be demonstrated.

10. At a convenient time close to the Periodical Survey, the Surveyor should attend during a hoist and transfer operation.

11. It should be noted that timber decking is not a class matter. However, the general condition of timber should be reported.

12. Any other matter which may have a bearing on the class of the installation is also to be reported.

13. The requirements for Periodical Surveys for small installations will be considered.

205. Classification of installations not built under survey

1. Where classification is desired for a shiplift and transfer systems not built under survey, plans and information showing the materials of construction, arrangements and principal scantlings equivalent to survey during construction are to be submitted for approval.

2. In case that the plans and documents considered equivalent to those specified in **Par 1** are submitted, they may be accepted at the discretion of the Society

3. A thorough survey of the installation is to be carried out and is to include the following:

(1) A thorough examination of the steel structure. The scantlings of material present and the extent of any deterioration is to be recorded. Non-destructive testing is to be carried out in accordance with **204. 3.**

(2) A thorough examination of all the hoist ropes or chains, together with sheaves and winch sets. Ropes or chains are to be renewed as may be required by **204. 3**. The requirements of **204. 4** are to be applied and the initial extent of renewal is to be agreed with the Surveyor.

(3) A thorough examination of all the winches and of the electrical and control system in accordance with **204. 7** and **204. 9** respectively.

4. The installation is to be tested in accordance with **Ch 3**.

5. Where the transfer system is to be included in the class notation, the requirements of **204. 8** are to be complied with, except that 25 percent of the axle pins to the bogie wheels are to be withdrawn for inspection.

Section 3 Certification requirements

301. General

1. Where the Society is requested to issue certification for a shiplift and transfer systems but the installation is not to be classed, the procedure given in this Section is to be adopted.

2. Constructional plans and all necessary particulars are to be submitted for approval before the work is commenced. Any subsequent modifications or additions to the scantlings or arrangements shown on the approved plans are also to be submitted for approval.

3. New installations are, from the commencement of the work until completion and installation, to be examined by the Surveyors with respect to materials, workmanship and arrangements. Any items not in accordance with the approved plans or other applicable requirements, or any material, workmanship or arrangements found to be unsatisfactory, are to be rectified.

4. he requirements for weld procedure tests and weld inspection are to be agreed with the Surveyors. In general, however, It is recommended that non-destructive testing of welding to primary members should be carried out as follows:

(1) All fillet and butt welds in the area of support for sheave housings, transverse butt welds in main girders and similar critical areas.

(2) 10 percent of all other fillet and butt welds in primary structural members.

5. The installation is to be tested in accordance with the requirements of **Ch 3**. ⚓

CHAPTER 2 Structural design

Section 1 Structural design criteria

101. Loading

1. The design is to be based on the maximum distributed load per metre applied as a keel block loading along the centreline of the platform, see also **Ch 1, 103. 6**.

2. The above loading is to be applied over the docking length of the platform and to the shore end of the platform where transfer takes place.

3. The access and decked-in areas of the platform are also to be designed for:

(1) a superimposed load of 5.0 kN/m^2, uniformly distributed; and
(2) a point load of 10 kN at any one point;

but higher values may be required to meet operational or equipment criteria. These loadings will not, normally, influence the lifting capacity specified in **Ch 1, 103. 1** nor the design loading given in **1** and **2**.

4. Consideration is to be given to the horizontal forces arising from wind loading and transfer operations. The horizontal strength of the platform is to be capable of resisting the following forces:

(1) During transfer operations: a total horizontal force of 250 N/m^2 on the projected area of the docked vessel, plus the effects of the forces required to overcome friction in the transfer system. The friction force is to be taken as 1.5 percent of the cradle wheel loads when roller bearings are fitted to the wheels, and 4 percent when plain or bushed bearings are fitted.
(2) Where a vessel is supported on the platform and transfer operations are not being carried out: a total horizontal force calculated from a wind loading of 2.5 kN/m^2 (corresponding to a wind speed of 64 m/s) on the projected area of the docked vessel.

5. Resistance to these forces may be provided by one or more of the following methods:

(1) A horizontal bracing system.
(2) A horizontal rigid platform.
(3) An adequate decking acting as a horizontal girder.

102. Load combinations

1. Shiplift platforms and transfer systems are to be considered for the design loadings resulting from the following load cases:

(1) Case 1(Operational): docking and transfer with no wind
The shiplift and transfer system are to be considered with respect to its self-weight plus the applied vertical load from the docked ship and transfer system, together with the horizontal loads resulting from the traction/friction loads during transfer operations.
(2) Case 2(Operational): docking and transfer with wind
The shiplift and transfer system are to be considered with respect to its self-weight plus the applied vertical load from the docked ship and transfer system, together with the horizontal loads resulting from the in-operation wind speed (actual data to be provided or 20 m/s will be used) applied to both the ship and the platform, and also to traction/friction loads during transfer operations.
(3) Case 3(Survival): ship on transfer system on land during extreme wind conditions
he transfer system is to be considered with respect to its self-weight plus the applied vertical load from the docked ship, together with the horizontal load resulting from the extreme wind condition (actual data to be provided or 63 m/s will be used) applied to both the ship and the platform.

2. In way of platform bilge blocks, the platform structure is to be designed for the maximum loads resulting from load case 2. This load is to be not less than 20 percent of the maximum distributed load per metre.

103. Allowable stresses

1. The allowable stress, σ_a, is to be taken as the failure stress of the component concerned, multiplied by a stress factor, F, which depends on the load case considered. The allowable stress is given by the general expression:

$$\sigma_a = F\sigma \text{ or } \tau_a = F\tau$$

σ_a = allowable direct stress (N/mm^2)
τ_a = allowable shear stress (N/mm^2)
F = stress factor
σ, τ = failure stress (N/mm^2)

2. The stress factors, F, for steels in which $\sigma_y/\sigma_u \leq 0.85$, are given in **Table 2.1.**

σ_y = yield stress of material (N/mm^2)
σ_u = ultimate tensile stress of the material (N/mm^2)

Table 2.1 Stress factor F

Load case	1	2	3
Stress factor, F	0.67	0.75	0.85

3. For steel with $\sigma_y/\sigma_u > 0.85$, the allowable stress is to be derived from the following expression:

$$\sigma_a = 0.459(\sigma_u + \sigma_y)$$
$$\tau_a = 0.266(\sigma_u + \sigma_y)$$

4. Steels with $\sigma_y/\sigma_u > 0.94$, are not generally acceptable and shall be specially considered.

5. The failure stresses for the elastic modes of failure are given in **Table 2.2** Failure stress.

Table 2.2 Failure stress

Mode of failure	Symbol	Symbol Failure stress
Tension	σ_t	1.0 σ_y
Compression	σ_c	1.0 σ_y
Shear	τ	0.58 σ_y
Bearing	σ_{br}	1.0 σ_y

6. For components subjected to combined stresses, the following allowable stress criteria are to be used:

(1) $\sigma_{xx} \leq \sigma_a$
(2) $\sigma_{yy} \leq \sigma_a$
(3) $\tau_o < \tau_a$
(4) $\sigma_e = \sqrt{\sigma_{xx}^2 - \sigma_{xx}\sigma_{yy} + \sigma_{yy}^2 + 3\tau_o^2} \leq 1.1\,\sigma_a$

σ_{xx} = applied stress in x direction (N/mm^2)

σ_{yy} = applied stress in y direction (N/mm^2)

τ_o = applied shear stress (N/mm^2)

7. The allowable stresses may be reduced in areas where openings in the structure may lead to the creation of stress concentrations.

8. The safety factor in sheaves, shackles and other loose items are to comply with the requirements of **Pt 9, Ch 2** of the Rules.

9. Items of structure which are subjected to wind forces only, irrespective of load combination, may be determined on the basis of a stress factor of $F = 0.85$.

104. Rope and chain factors of safety

1. The safety factor required for ropes used to raise and lower the platform is to be not less than 3 to 1 based upon the certified breaking strength of the rope and the maximum rope tension. The maximum rope tension is to be calculated from the rated capacity of the hoists with an allowance for the cumulative effect of sheave friction and wire rope stiffness of 1.5 percent for ball or roller bearings and 5 percent for plain or bushed bearings.

2. The safety factor required for chains used to raise and lower the platform is to be not less than 3.0 to 1.0 based upon the certified breaking strength of the chain and the maximum chain tension. The maximum chain tension is to be based upon the rated capacity of the hoist. In view of the possibility of stress corrosion cracking, grade 80 or similar type, alloy chain should not be used.

3. Increased safety factors may be required where:

(1) The hoisting speed of the platform exceeds 0.5 m/mm.
(2) The mode of operation of the hoist system may produce significant shock loading.
(3) A less onerous inspection replacement programme than the Society's is envisaged in the case of installations certified but not classed.

105. Materials

1. Materials are to comply with the requirements of **Pt 2, Ch 1** and **Pt 9, Ch 2, 103.** of the Rules. Steel for the primary strength members is to comply with **Table 2.3**.

Table 2.3 Steel grade

Design temperature T (°C)	Thickness t (mm)	Steel grade
$10 < T$	t ≤ 40	A/AH
	40 < t ≤ 80	D/DH
	t > 80	E/EH
$0 < T \leq 10$	t ≤ 20	A/AH
	20 < t ≤ 25	B/AH
	25 < t ≤ 40	D/DH
	t > 40	E/EH
$-10 < T \leq 0$	t ≤ 12.5	B/AH
	12.5 < t ≤ 25.5	D/DH
	t > 25.5	E/EH
$-25 < T \leq -10$	t ≤ 40	D/DH

2. Consideration may, however, be given to steel complying with an appropriate national standard, but tests to the satisfaction of the Society will be required to demonstrate the suitability of the steel.

3. Alternative proposals in respect of the notch tough characteristics of the material will be considered when the service location of the particular installation is such that low temperatures are not climatically probable. ⚓

CHAPTER 3 Testing

Section 1 Test criteria

101. General

1. The test criteria specified in this Section are applicable to all installations where the control system has an acceptable method of measuring the actual load on each individual hoist and where over-hoist and overload cut outs and levelling devices are fitted in accordance with **Pt 9, Ch 2, 103.** of the Rules.

2. The test criteria will be specially considered where an inherent feature of the design requires a departure from these safety control requirements.

3. In all cases, a detailed test procedure based upon the requirements of this Section is to be submitted for approval.

4. Loose gear, ropes and chains are to be in accordance with the requirements of **Pt 9, Ch 2, 103.** of the Rules.

5. National Authorities may have more onerous test requirements than the Society's and it is the Owner's responsibility to ensure that these are complied with.

102. Load tests

1. Light running tests on each winch unit are to be carried out at the manufacturer's works. It is strongly recommended that all winch units are also proof tested at the manufacturer's works to the loads given in **Table 3.1**.

Table 3.1 Proof loads for winches and cradles

SWL (t)	Proof load (t)
$SWL < 20$	$1.25 \times SWL$
$20 \leq SWL < 50$	$SWL + 5$
$50 \leq SWL$	$1.1 \times SWL$

2. The winch rated capacity (SWL) is normally based upon the line pull multiplied by the number of parts supporting the platform.

3. The platform is to be load tested following installation on site:

(1) In an unloaded or partially loaded condition; and
(2) To 100 percent of the total lifting capacity.

4. The unloaded or partially loaded test is to be carried out to demonstrate the efficient operation of the platform systems.

5. The 100 percent load test is to be based upon the rated capacity of each winch derived from the maximum distributed load per metre of the platform. This test may be carried out in stages by testing opposite pairs or sets of winches together if the size of the installation prohibits the provision of adequate test loads.

6. Where staged testing is adopted for rigid platform designs, it is to be ensured that each winch is subjected to its rated capacity.

7. Where desired, the winches may be proof tested on site by increasing the 100 percent load test referred to in **5.** to the appropriate value obtained from **Table 3.1**.

8. Cradles are to be individually tested with a proof load in accordance with **Table 3.1** based upon the rated capacity of the cradles.

103. Operational test

1. In addition to the load tests in **102.**, a complete operational test is to be carried out at approximately the nominal lifting capacity of the installation. This is to be performed over the full cycle of operations, that is, hoisting, transfer ashore, transfer to platform and lowering.

2. Where, for practical considerations, it is not possible to test to the full nominal lifting capacity, this test may be carried out with a reduced test load but not less than 60 percent of the nominal lifting capacity.

3. Transfer operations will be restricted to the tested displacement until such times as a ship of suitable displacement is available to test the installation to the full nominal lifting capacity. This full operational test is generally to be carried out within one year of the completion of the installation. ⚓

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