No. 90 SHIP STRUCTURE ACCESS MANUAL

(Oct 2005)
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Ship Structural Access Manual

Foreword

This access manual provides for safe conduct of overall and close-up inspections and thickness measurements on a regular basis throughout ship's operational life, and gives necessary information and instructions for that purpose, under the provisions of *SOLAS* regulation II-1/3-6 adopted by resolution *MSC*.134(76) as amended by resolution *MSC*.151(78) and the Technical provisions for means of access for inspections adopted by resolution *MSC*.133(76) as amended by resolution *MSC*.158(78).

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Preamble

It has long been recognized that the only way of ensuring that the condition of a ship's structure is maintained to conform to the applicable requirements is for all its components to be surveyed on a regular basis throughout their operational life. This will ensure that they are free from damage such as cracks, buckling or deformation due to corrosion, overloading, or contact damage and that thickness diminution is within established limits. The provision of suitable means of access to the hull structure for the purpose of carrying out overall and close-up surveys and inspections is essential and such means should be considered and provided for at the ship design stage.

Ships should be designed and built with due consideration as to how they will be surveyed by flag State inspectors and classification society surveyors during their in-service life and how the crew will be able to monitor the condition of the ship. Without adequate access, the structural condition of the ship can deteriorate undetected and major structural failure can arise. A comprehensive approach to design and maintenance is required to cover the whole projected life of the ship.

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Part I Manual for Safe Access

1 General Information

1.1 Ship Particular

[*Prepared for each ship appropriately*]

1.2 Tank Arrangement

[*Prepared for each ship appropriately*]

2 Scope of Access Manual

2.1 General

2.1.1 Permanent means of access provided for the ship do not give access to all areas required to be surveyed and measured. It is necessary that all areas outside of reach (i.e., normally beyond hand's reach) of the permanent means of access can be accessed by alternative means in combination with the permanent means of access, including those specified by the ESP Code, as amended. Critical structural areas, if necessary, also can be accessed by appropriate means of access.

2.1.2 Such means of access are described as shown in section 4. However other access arrangements including innovative means may be accepted in lieu of the arrangement described in the manual, based on case-by-case acceptance with the Classification Society prior to the survey.

2.1.3 Where movable means of access are supplied by a shore-based provider, it should be noted that the confirmation of suitability for the purpose and its safe and adequate use should be made by the Owner based on recorded maintenance and inspection regime by the provider of the equipment. It should be also noted that the surveyor has the right to reject movable means of access if not satisfied with the documentation or condition of the equipment.

2.1.4 Where the Ship Safety Management System specifies handling/operation of means of access, reference to these documents should be made in the access manual.

2.2 Critical Structural Areas

2.2.1 Critical structural areas are locations which have been identified from calculations to require monitoring or from the service history of similar or sister ships to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship, and, for this ship, are listed as follows:

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2.2.2 Where monitoring other locations are deemed as necessary from the service history of this ship, or similar or sister ships, such locations should be added to the above list.

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2.3 Relevant Rules and Regulations

Reference is to be made to the following publications:

(a) *SOLAS* regulation II-1/3-6 adopted by resolution *MSC*.134(76), as amended;
(b) Technical Provisions adopted by resolution *MSC*.133(76), as amended;
(c) The ESP Code, as amended;
(d) IACS Unified Requirements Z10.1, Z10.2, Z10.4 and Z10.5, as appropriate;
(e) IACS Unified Interpretation SC191, as amended;
(f) The relevant Class Rules for Vessels of the concerned Classification Society;
(g) IACS Recommendation No.39 “Safe use of rafts or boats for Survey”;
(h) IACS Recommendation No.78 “Safe use of Portable Ladders for Close-Up Surveys”; and
(i) IACS Recommendation No.91, “Guidelines for Approval/Acceptance of Alternative Means of Access”.

2.4 Approval / Re-approval

2.4.1 Any changes of the permanent, portable, movable or alternative means of access within the scope of this manual are subject to review and approval / re-approval by the Administration or by the organization recognized by the Administration. An updated copy of the approved manual is to be kept on board. For the approval / re-approval, it should be demonstrated that such means of access provides the required access.

2.4.2 Notwithstanding the provisions of 2.4.1, replacing portable means of access with similar portable means which would give an equivalent safety and accessibility, might not require the approval / re-approval, subject to being recorded in the access manual and review by the Administration or by the organization recognized by the Administration at a periodical survey after such change.

3 Definitions

3.1 Portable means of access are means that generally may be hand carried by the crew *e.g.* ladders, small platforms and staging. Portable means specified as part of the Ship Structure Access Manual should be carried onboard the ship throughout the duration of the validity of the relevant access manual.

3.2 Movable means of access may include devices like a cherry picker, wire lift platforms, rafts or other means. Unless otherwise specified in the Technical Provisions (TP) or UI SC191, as amended, such means need not necessarily be kept on board or capable of being operated by the ship’s crew. However arrangements for the provision of such means should be addressed during survey planning. Movable means of access should be included in the Ship Structure Access Manual to designate the extent of access to the structural members to be surveyed and measured.

3.3 Alternative means of access is a term within SOLAS II-1/3-6 and TP for portable or movable means of access provided for the survey and thickness measurements of hull structure in areas otherwise not accessible by permanent means of access. For the purpose of this manual, alternative means of access include supplementary or additional means to provide necessary access for surveys and thickness measurements in accordance with SOLAS II-1/3-6.

3.4 *Approved* means that the construction and materials of the means of access and any

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attachment to the ship's structure should be to the satisfaction of the Administration. Compliance with the procedures in IACS Recommendation No.91 should be used in the absence of any specific instructions from a specific administration

3.5 *Acceptance:* it should be demonstrated to the satisfaction of the Owner that the equipment provided has been maintained and is, where applicable, provided with operators who are trained to use such equipment. This should be demonstrated to the surveyors by the production of documents, prior to the equipment being used, which demonstrate that the equipment has been maintained and which indicate any limitations of the equipment.

3.6 *Authorized person* is a specified Company person using the means of access that should assume the role of inspector and check for obvious damage prior to using the access arrangements. Whilst using the means of access the inspector should verify the condition of the sections used by close up examination of those sections and note any deterioration in the provisions. Should any damage or deterioration be found, the effect of such deterioration should be assessed as to whether the damage or deterioration affects the safety for continued use of the means of access. Deterioration found that is considered to affect safe use should be determined and measures should be put in place to ensure that the affected section(s) should not be further used prior effective repair.

3.7 Rung means the step of a vertical ladder or step on the vertical surface.

3.8 Tread means the step of an inclined ladder or step for the vertical access opening.

3.9 Spaces are separate compartments including holds and tanks.

3.10 Ballast tank is a tank which is used for water ballast and includes side ballast tanks, ballast double bottom spaces, topside tanks, hopper side tanks and peak tanks.

3.11 An overall survey is a survey intended to report on the overall condition of the hull structure and determine the extent of close-up surveys.

3.12 A close-up survey is a survey where the details of structural components are within the close visual inspection range of the surveyor, *i.e.*, normally within reach of hand.

3.13 Transverse section includes all longitudinal members such as plating, longitudinals and girders at the deck, side and bottom, inner bottom and hopper side plating, longitudinal bulkheads, and bottom plating in top wing tanks.

3.14 Representative spaces are those, which are expected to reflect the condition of other spaces of similar type and service and with similar corrosion prevention systems. When selecting representative spaces account should be taken of the service and repair history on board and identifiable critical and/or suspect areas.

3.15 Suspect areas are locations showing substantial corrosion and/or are considered by the surveyor to be prone to rapid wastage.

3.16 Substantial corrosion is an extent of corrosion such that assessment of corrosion pattern indicates wastage in excess of 75% of allowable margins, but within acceptable limits.

3.17 A corrosion prevention system is normally considered a full hard coating.
Hard protective coating should be epoxy coating or equivalent. Other coating systems may be considered acceptable as alternatives provided that they are applied and maintained in compliance with the manufacturer's specifications.

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3.18 Coating condition is defined as follows:

GOOD condition with only minor spot rusting;

FAIR condition with local breakdown of coating at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition;

POOR condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.

3.19 Critical structural areas are locations, which have been identified from calculations to require monitoring or from the service history of the subject ship or from similar or sister ships to be sensitive to cracking, buckling or corrosion, which would impair the structural integrity of the ship.

4 Access Plans

[*Prepared appropriately*]

4.1 Plans showing the means of access to the space (including openings for introducing portable means), with appropriate technical specifications and dimensions are as shown in appendixes X.

4.2 Plans showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions are as shown in appendixes X.

4.3 Plans showing the means of access within the space to enable close-up inspections to be carried out and necessary alternative means to be deployed. For any alternative means carried on board, appropriate technical specifications and dimensions are as shown in appendixes X.

5 Instructions

5.1 Instructions for Use of Means of Access

5.1.1 All persons using the means of access arrangements should study the instructions for safety in the access manual so as to gain adequate knowledge of the arrangements for the space(s) to be inspected prior to the use. Appropriate personal protective equipment must be available, if required.

5.1.2 Any recorded deficiencies to the means of access for the space(s) to be inspected should be considered. Any section with significant damage is not to be used.

5.1.3 It is recognized that climbing may be used by surveyors during surveys but is not accepted as an alternative means of access. When climbing the structures within tanks is necessary during surveys, the surface of the structures should be free of oil, sludge and mud and relatively dry to the satisfaction of the surveyor so that a good firm, non-slip footing maybe obtained.

5.2 Instructions for Inspection and Maintenance of Means of Access

5.2.1 Verification of means of access including portable equipment and their attachment is

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part of periodical surveys for continued effectiveness of the means of access in that space which is subject to the survey. After a space has been ventilated, cleaned and illuminated for the survey, an inspection of means of access should be carried out by the crew and/or an authorized person.

5.2.2 Periodical inspections of means of access should be carried out by the crew and/or an authorized person as a part of regular inspection and maintenance, at intervals, which are determined taking into account any corrosive atmosphere that may be within the space.

5.2.3 Any authorized person using the means of access should assume the role of inspector and check for obvious damage prior to using the access arrangements. Whilst using the means of access the inspector should verify the condition of the sections used by close up examination of those sections and note any deterioration in the provisions. Should any damage or deterioration be found, the effect of such deterioration should be assessed as to whether the damage or deterioration affects the safety for continued use of the access. Deterioration found that is considered to affect safe use should be determined as “substantial damage” and measures should be put in place to ensure that the affected section(s) are not to be further used prior to completing effective repair.

5.2.4 Periodical surveys of any space that contains means of access should include verification of the continued effectiveness of the means of access in that space. Usually, survey of the means of access is not expected to exceed the scope and extent of the survey being undertaken. If the means of access is found deficient the scope of survey should be extended if this is considered appropriate.

5.2.5 Records of all inspections should be established based on the requirements detailed in the ships Safety Management System. The records should be readily available to persons using the means of access and a copy attached to the access manual. The latest record for the portion of the means of access inspected should include as a minimum the date of the inspection, the name and title of the inspector, a confirmation signature, the sections of means of access inspected, verification of continued serviceable condition or details of any deterioration or substantial damage found. A file of permits issued should be maintained for verification.

5.2.6 Where movable means of access are supplied by a shore-based provider, the confirmation of its safe and adequate use should be made based on recorded maintenance and inspection regime by the provider of the equipment. Cognizance should be taken of the complexity of the equipment when making the judgment on the periodicity of inspections and thoroughness of maintenance by the provider of equipment.

5.2.7 The maintenance of all means of access should be in accordance with the Ships Safety Management System.

5.3 Instructions for the Rigging and Use of Portable Means of Access

5.3.1 Portable ladders should rest on a stable, strong, suitably sized, immobile footing so that the rungs remain horizontal. Suspended ladders should be attached in a manner so that they cannot be displaced and so that swinging is prevented. Step ladders, hanging ladders and ladders more than 5 *m* long may only been utilized if fitted with a mechanical device to secure the upper end of the ladder. Portable ladders should be maintained free of oil, grease and other slipping hazards.

5.3.2 The feet of portable ladders should be prevented from slipping during use by securing

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the stiles at or near their upper and lower ends, by any anti-slip device or by other arrangements of equivalent effectiveness. Unless otherwise stated in its specification or unless provided with appropriate securing means, the ladder should be raised at an angle of approximately 70 *degrees*.

5.3.3 When portable ladders are used on top of inner bottom or on deep stringers, the falling height should generally not exceed 6 *m*. Suitable attachment points for securing safety harnesses should be provided. If it is necessary to exceed this height:

- there should be at least 3 *m* of water above the highest structural element in the bottom to provide a “cushion”;
- a suitable safety harnesses or safety rafting should be considered; and
- and personal floating devices (*PFD*) should be used.

The free falling height above the water surface should not exceed 6 *m*.

5.3.4 Portable ladders should be arranged and rigged to support at least four *times* the maximum intended load.

5.3.5 When climbing ladders in tanks containing water, personnel should wear flotation aids. A floatation aid is a simple form of lifejacket, which does not impede climbing, or a self-inflatable lifejacket.

5.3.6 Aluminum ladders may be used in cargo tanks, but should not be stored in the cargo area or other gas dangerous spaces.

5.3.7 The securing of the equipment, its operation and training in use should be in accordance with the Ships Safety Management System.

5.4 Instructions for Safety Rafting (if, applicable)

5.4.1 Surveys of tanks or spaces by means of rafts or boats may only be undertaken with the agreement of the attending surveyor(s), who is to take into account the safety arrangements provided, including weather forecasting and ship response in reasonable sea conditions. Appropriate safety measures, including the following, should be taken by the authorized person prior to survey to the satisfaction of the attending surveyor(s).

5.4.2 When rafts or boats will be used for close-up survey the following conditions should be observed:

(1) Only rough duty, inflatable rafts or boats, having satisfactory residual buoyancy and stability even if one chamber is ruptured, should be used;
(2) The boat or raft should be tethered to the access ladder and an additional person should be stationed down the access ladder with a clear view of the boat or raft;
(3) Appropriate lifejackets should be available for all participants;
(4) The surface of water in the tank should be calm (under all foreseeable conditions the expected rise of water within the tank should not exceed 0.25 *m*) and the water level either stationary or falling. On no account should the level of the water be rising while the boat or raft is in use;
(5) The tank or space must contain clean ballast water only. When a thin sheen of oil on the water is observed, further testing of the atmosphere should be done to ensure that the tank or space is safe for entering;
(6) For rafting of cargo tanks, at no time should the upside of the boat or raft be allowed to be within 1 *m* of the deepest under deck web face flat so that the survey team is not isolated from a direct escape route to the tank hatch. Filling to levels above the deck transverses should only be contemplated if a permanent means of access, as per paragraph 5.4.3.2, below, is provided. For bulk cargo holds

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designed for filling of water (e.g. ballast holds) and where filling up to a height not less than 2 *m* below top of side frames is permitted (e.g. air draft holds), rafting may be utilized in lieu of permanent means of access to side frames (ref. TP Table 2 - 1.8) provided the structural capacity of the hold is sufficient to withstand static loads at all levels of water needed to survey the side shell frames; and

(7) If the tanks (or spaces) are connected by a common venting system, or inert gas system, the tank in which the boat or raft is to be used should be isolated to prevent a transfer of gas from other tanks (or spaces).

5.4.3 In addition to the above, rafts or boats alone may be allowed for close-up survey of the under deck areas for tanks or spaces if the depth of the webs are 1.5 *m* or less. If the depth of the webs is more than 1.5 *m*, rafts or boats alone may be allowed only:

(1) when the coating of the under deck structure, as evaluated from a safe distance (see 5.4.2(6), is in GOOD condition and there is no evidence of wastage; or

(2) if a permanent means of access is provided in each bay to allow safe entry and exit. This means:

(a) access direct from the deck via a vertical ladder and a small platform about 2 *m* below the deck; or

(b) access to deck from a longitudinal permanent platform having ladders to deck in each end of the tank. The platform should, for the full length of the tank, be arranged in level with, or above, the maximum water level needed for rafting of under deck structure. For this purpose, the ullage corresponding to the maximum water level should be assumed to be not more than 3 *m* from the deck plate measured at the midspan of deck transverses and in the middle length of the tank.

5.4.4 Safety Meetings should be held prior to entering the tank or space and regularly during the survey on board for ensuring the following:

(1) the establishment of proper preparation and the close co-operation between the attending surveyor(s) and the company's representatives onboard prior to and during the survey are an essential part in the safe and efficient conduct of the survey; and

(2) applicable safety procedures and responsibilities should be discussed and agreed to ensure that the survey is carried out under controlled conditions.

5.4.5 Adequate communication arrangements and equipment should be prepared for ensuring the following:

(1) the attending surveyor(s) is always accompanied by at least one responsible person assigned by the company experienced in tank and enclosed spaces inspection. In addition a backup team of at least two experienced persons should be stationed at the hatch opening of the tank or space that is being surveyed. The back-up team should continuously observe the work in the tank or space and should keep lifesaving and evacuation equipment ready for use;

(2) a communication system should be arranged between the survey party in the tank or space being examined and the responsible officer on deck, the navigation bridge and the personnel in charge of handling the ballast pump(s) in the pump control room. These communication arrangements should be maintained throughout the survey;

(3) adequate and safe lighting should be provided for the safe and efficient conduct of the survey; and

(4) adequate protective clothing should be made available and used (*e.g.* safety helmet, gloves, safety shoes, etc) during the survey.

5.4.6 The organization for the surveys by the means of rafting, its operation and training in use should be in accordance with the Ships Safety Management System.

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5.5 Instructions for Use of Portable Platforms (if, applicable)

5.5.1 Portable platforms should not be more than 3 *m* in length.

5.5.2 Safety measures, including ensuring that portable platforms are safely secured and supported prior to use, should be taken by the authorized person prior to survey to the satisfaction of the attending surveyor(s).

5.5.3 The rigging of the equipment, its operation and training in use should be in accordance with the Ships Safety Management System.

5.6 Instructions for Use of Staging (if, applicable)

5.6.1 Appropriate safety measures should be taken by the authorized person prior to survey to the satisfaction of the attending surveyor(s).

5.6.2 Before working on or near any staging it should be ensured:

(1) A minimum of 6 evenly spaced suspension points – steel wire ropes or chains evenly spaced and as near vertical as possible;
(2) Scaffold tubes are linked by rigid-angle couplers;
(3) An adequate working platform, fully boarded with toe boards and guardrails. Platform transforms (at 1.2 *m* intervals) resting on ledgers (at 2.5 *m* interval) and double transforms at platform board overlaps;
(4) The staging is level and provided with safe access (such as ladders);
(5) The staging is adequately decked (for example have a work surface and platform), and provided with guardrails; and
(6) The staging is adequate for the work performed taking into account that falls are a significant hazard in site.

5.6.3 Where specifically designed staging is carried on board as a part of the means of access listed in Ship Structure Access Manual, the rigging of the equipment, its operation and training in use should be in accordance with the Ships Safety Management System.

5.7 Instructions for Use of Wire Lift Platform (if, applicable)

5.7.1 Safety measures, including the following, should be taken by an authorized person prior to survey to the satisfaction of the attending surveyor(s):

(1) Rigging of wires should be in accordance with manufacturer's recommendations and conducted by suitably qualified riggers;
(2) Fix points to which the wires will be connected should be examined before each use and verified as in good condition (free of wastage, fractures, etc.); and
(3) Means should be provided for using fall protection with a lifeline that can be tended from above the platform.

5.7.2 The rigging of the equipment, its operation and training in use should be in accordance with the Ships Safety Management System.

5.8 Instructions for Use of Hydraulic Arm Vehicles (if, applicable)

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5.8.1 The vehicle should be operated by qualified personnel and evidence should be provided that the vehicle has been properly maintained by a shore-based provider. The standing platform should be fitted with anchor points for attaching fall arrest systems. For those vehicles provided with a self-leveling platform, care should be taken that the locking device is engaged after completion of maneuvering to ensure that the platform is fixed.

5.8.2 Safety measures, including the following, should be taken by an authorized person prior to survey to the satisfaction of the attending surveyor(s):

(1) Lift controls, including safety devices should be serviceable and should be operated throughout the range prior to use;
(2) Operators should be trained;
(3) The equipment range of use should be agreed with the operator before using the equipment;
(4) Operators should work within the basket;
(5) Body belts (such as harnesses) with lanyards should be used;
(6) Permissible load and reach limitations should not be exceeded;
(7) Brakes should be set; outriggers used, if so equipped; and wheels chocked; if on incline;
(8) Unless designed otherwise, aerial lift trucks should not be moved when the boom is elevated in a working position with workers in the basket;
(9) Upper and lower controls should be required and should be plainly marked. Lower controls should be capable of overriding the upper controls;
(10) Special precautions should be made to ensure the vessel and the lifting device are stable when aerial lifts are used on vessels (for example barges, floats);
(11) Personal flotation devices (*PFD*) should be used when working over water; and
(12) Caution should be taken for potential crushing hazards (for example booming into the overhead, pinch point).

5.8.3 The operation and training in the use of this type of equipment should be in accordance with the Ships Safety Management System.

6 Inventory of Portable Means of Access

All portable means of access are listed as shown in appendix zz.

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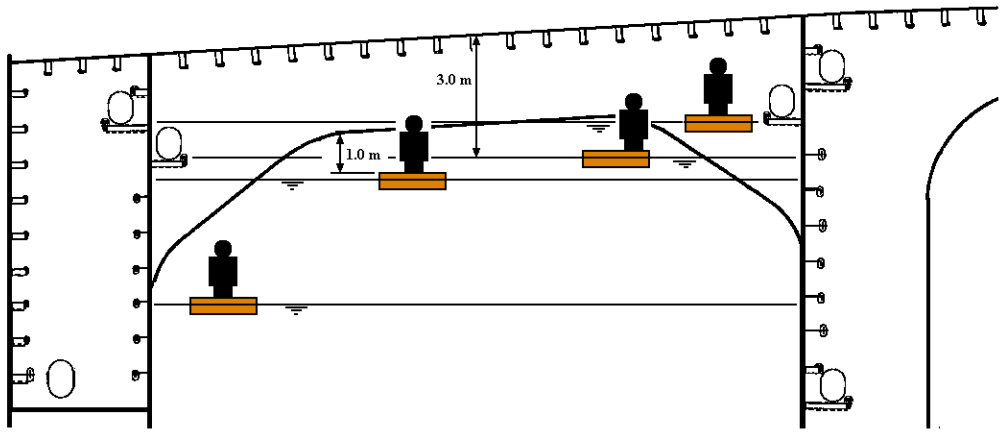
Appendix 1

Plans for Access to the under deck structures within No.x Cargo Tanks (P/S) (*example*)



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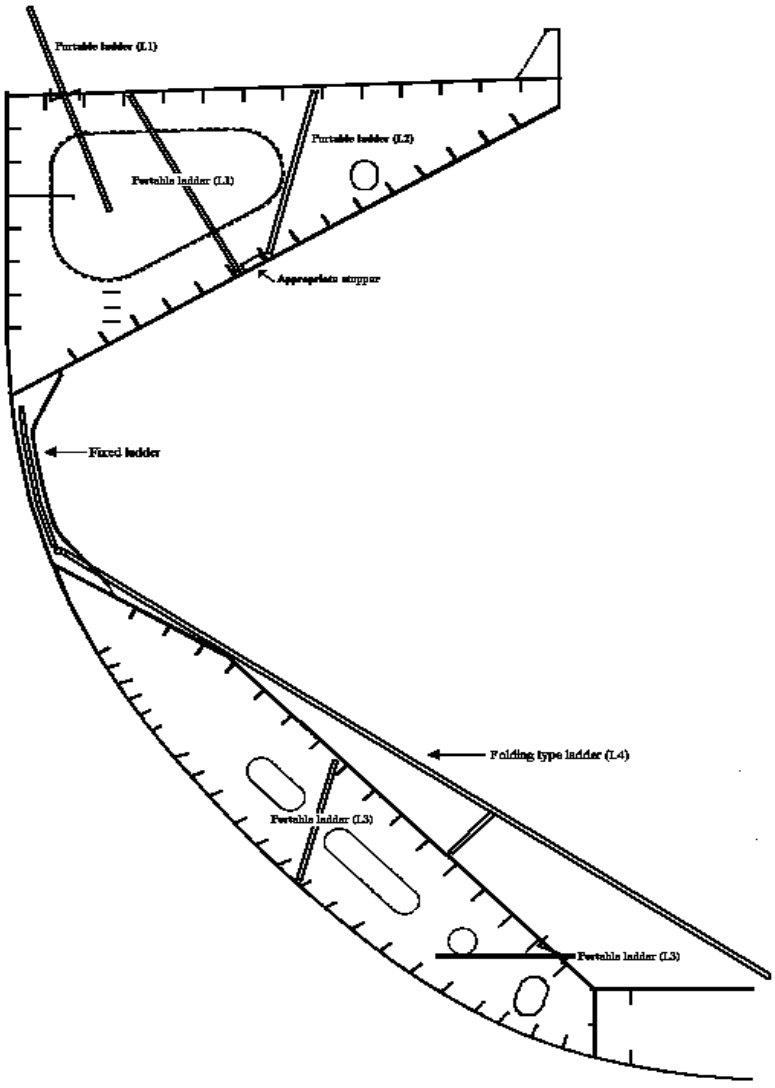
Appendix
Top Side Tank, Bilge Hopper Tank and Cargo Hold (Hold Frames)
(*example*)

Notes:

1. Before use, the top of the ladder located in the top wing tank should be secured to ensure sufficient support of the ladder towards the deck longitudinals.
2. Where ladders used at relatively small angle (*e.g.*, less than 45 *degrees*) such as those prepared for the use on the hopper tank sloping plate (see the folding type ladder in the following figure), steps of such ladders are assumed designed in such a way that a safe walkway is provided. For such ladders of more than 5 *m* in length, handrail should be provided.



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Appendix Inventory of Portable Means of Access

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ID	Type	Dimensions	Applicable spaces	Number/Storage	Note
L1	Portable ladder	5 *m*	All spaces	2 sets / No.1 Deck Store	See the attached maker's specification.
L2	Portable ladder	4 *m*	All spaces	1 set / No.1 Deck Store	SG mark by Consumer Product Safety Association, Japan See the attached maker's specification.
L3	Portable ladder	3 *m*	All spaces	1 set / No.1 Deck Store 1 set / Boatswain Store	SG mark by Consumer Product Safety Association, Japan See the attached maker's specification.
L4	Folding type ladder	18 *m*	Cargo holds	3 sets / No.2 Deck Store	See the attached maker's specification.

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Part 2 Records for Means of Access

(*This part is approved for its form only at new building.*)

7 Records of Inspections and Maintenance

[*Prepared appropriately*]

Note: The record for the portion of the means of access inspected should include as a minimum the date of the inspection, the name and title of the inspector, a confirmation signature, the sections of means of access inspected, verification of continued serviceable condition or details of any deterioration or substantial damage found.

8 Records of Change of Portable Means of Access

[*Prepared appropriately*]

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