Surveyor’s Glossary

Hull Terms & Hull Survey Terms
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1. Introduction

This Surveyor’s Glossary of Hull Terms is intended as a guide to improve the standardization of survey reporting. It is recommended that the listed terms for hull structural elements are used throughout report narratives.

The Glossary also includes definitions of common hull survey terms that are applicable for surveys of hull structures and reporting.

All parties involved in the review of classification survey reports should have this Glossary available to assist with correct interpretation of the report narratives.
2. Hull Terms

2.1 General

Accommodation Ladder is a portable set of steps on a ship’s side for people boarding from small boats or from a pier.

Aft Peak Bulkhead is a term applied to the first main transverse watertight bulkhead forward of the stern. The aft peak tank is the compartment in the narrow part of the stern aft of this last watertight bulkhead.

Bay is the area between adjacent transverse frames or transverse bulkheads.

Bilge Keel is a piece of plate set perpendicular to a ship’s shell along her bilges for about one third her length to reduce rolling.

Bilge Strake is the strake at the turn of bilge extending outward to a point where the side rises vertically.

Breast Hook is a triangular plate bracket joining port and starboard side structural members at the stem.

Bulkhead Deck is the uppermost continuous deck to which transverse watertight bulkheads and shell are carried.

Bulkhead Structure is the transverse or longitudinal bulkhead plating with stiffeners and girders.

Bulwark is the vertical plating immediately above the upper edge of the ship’s side surrounding the exposed deck(s).

Cargo Area or Cargo Length Area is that part of the ship that contains cargo holds and cargo / slop tanks and adjacent areas including ballast tanks, fuel tanks, cofferdams, void spaces and also including deck areas throughout the entire length and breadth of the part of the ship over the mentioned spaces.

Cargo Hold Bulkhead is a boundary bulkhead separating cargo holds.

Cargo Port is a door or port in a ship’s side for the loading or discharge of cargo or stores. Also called side port.

Carlings are supports usually of flat plate, welded in a fore and aft direction between transverse deck beams to prevent distortion of the plating.

Casing is the covering or bulkhead around or about any space for protection.
Ceilings is wood sheathing or planking fitted on various parts of the ship such as tank tops, ship’s sides and bulkheads to protect the ship’s structure from damage and also used to protect the cargo from damage.

Coaming is the vertical boundary structure of a hatch or skylight.

Cofferdams are spaces between two bulkheads or decks primarily designed as a safeguard against leakage of oil from one compartment to another.

Collision Bulkhead is the foremost main transverse watertight bulkhead.

Companion Way is a weathertight entrance leading from a ship's deck to spaces below.

Confined Space is a space identified by one of the following characteristics: limited openings for entry and exit, unfavorable natural ventilation or not designed for continuous worker occupancy.

Cross Deck is the area between cargo hatches.

Cross Ties are used to support the longitudinal bulkheads of oil tankers against hydrostatic and hydrodynamic loads.

Dead Covers are plates of bronze or steel working on a hinge serving to protect the glass port light in heavy weather. Also called dead light.

Deck House is a structure on the freeboard or superstructure deck not extending from side to side of the ship.

Deck Structure is the deck plating with stiffeners, girders and supporting pillars.

Deep Tank is a tank extending from the bottom or inner bottom up to or higher than the lowest deck.

Discharges are any piping leading through the ship's sides for conveying bilge water, circulating water, drains etc. Also called Overboard Discharge.

Double Bottom Structure is the shell plating with stiffeners below the top of the inner bottom and other elements below and including the inner bottom plating.

Duct Keel is a keel built of plates in box form extending the length of the cargo hold. It is used to house ballast and other piping leading forward which otherwise would have to run through the cargo holds.

Enclosed Superstructure is the superstructure with bulkheads forward and/or aft fitted with weather-tight doors and closing appliances.

Equipment Number is used by classification societies mainly to determine the size and number of anchors and chain cables for a new ship.
**Floor** is a bottom transverse member.

**Flush Deck Ship** is a ship that has no superstructure on the freeboard deck.

**Forecastle** is a short superstructure situated at the bow.

**Forepeak** is the area of the ship forward of the collision bulkhead.

**Freeboard Deck** is normally the uppermost complete deck exposed to weather and sea, which has permanent means of closing all exposed openings.

**Freeing Port** is an opening in the bulwarks to allow water shipped on deck to run freely overboard.

**Gangway** is the raised walkway between superstructure such as between forecastle and bridge or between bridge and poop.

**Girder** is a collective term for primary supporting structural members.

**Gunwale** is the upper edge of the ship's sides.

**Gusset** is a triangular plate, usually fitted to distribute forces at a strength connection between two structural members.

**Hatch Coaming** is the vertical plating built around the hatchways to prevent water from entering the hold; and to serve as a framework for the hatch covers.

**Hatch Covers** are wooden or steel covers fitted over a hatchway to prevent the ingress of water into the ship's hold and may also be the supporting structure for deck cargo.

**Hatch Ways** are openings, generally rectangular, in a ship's deck affording access into the compartment below. Also called hatches.

**Hopper Side Tanks** are tanks used for ballast or for stability when carrying certain cargoes in bulk carriers. Also referred to as topside wing ballast tanks and bottom hopper tanks.

**Independent Tank** is a self-supporting tank.

**Keel** is the main structural member or backbone of a ship running longitudinal along centerline of bottom. Usually a flat plate stiffened by a vertical plate on its centerline inside the shell.

**Margin Plate** is the outboard strake of the inner bottom and when turned down at the bilge the margin plate (or girder) forms the outer boundary of the double bottom.
**Midship Section** is the cross section through the ship, midway between the forward and after perpendiculars.

**Pipe Tunnel** is the void space running in the midships fore and aft lines between the inner bottom and shell plating forming a protective space for bilge, ballast and other lines extending from the engine room to the holds.

**Poop** is the space below an enclosed superstructure at the extreme aft end of a ship.

**Poop Deck** is the first deck above the shelter deck at aft end of a ship.

**Port Light** is another term for side light or side scuttle.

**Reduced Scantlings** are scantlings that are allowed to be reduced because approved corrosion control arrangements have been applied.

**Representative Spaces** is those which are expected to reflect the condition of other spaces of similar type and service and with similar corrosion prevention systems.

**Scupper** is any opening for carrying off water from a deck, either directly or through piping.

**Scuttle** is a small opening in a deck or elsewhere, usually fitted with a cover or lid or a door for access to a compartment.

**Shedder Plates** are slanted plates fitted in dry cargo holds to prevent undesired pockets of cargo. The term is also commonly applied to slanted plates that are fitted to improve the structural stability of corrugated bulkheads and framing members.

**Sheer Strake** is the top strake of a ship's side shell plating.

**Single Bottom Structure** is the shell plating with stiffeners and girders below the upper turn of bilge.

**Skylight.** A deck opening fitted with or without glass port light and serving as a ventilator for engine room, quarters, etc.

**Spaces** are separate compartments including holds and tanks.

**Stay** is a term for bulwarks and hatch coaming brackets.

**Stem** is the piece of bar or plating at which a ship’s outside plating terminates at her forward end.

**Stern Frame** is the heavy strength member in single or triple screw ships, combining the rudder post.
**Stiffener** is a collective term for secondary supporting structural members.

**Stool** is a structure supporting cargo hold and tank bulkheads.

**Strake** is a course, or row, of shell, deck, bulkhead, or other plating.

**Strength Deck** is normally the uppermost continuous deck. After special consideration of its effectiveness, another deck may be defined as strength deck.

**Stringer Plate** is the outside strake of deck plating.

**Superstructure** is a decked structure on the freeboard deck extending for at least 92% of the breadth of the ship.

**Suspect Areas** are locations showing substantial corrosion and/or which are considered by the Surveyor to be prone to rapid wastage.

**Tank Bulkhead** is a boundary bulkhead in a tank for liquid cargo, ballast or bunkers.

**Topside Wing Ballast** tanks are ballast tanks in bulk carriers that normally stretch along the length of the ship’s side and occupy the upper corners of the cargo hold.

**Tween Decks** is an abbreviation of between decks, placed between the upper deck and the tank top in the cargo holds.

**Void** is an enclosed empty space in a ship.

**Wash Bulkhead** is a perforated or partial bulkhead in a tank.

**Watertight Bulkhead** is a collective term for transverse bulkheads required for subdivision of the hull into watertight compartments.

**Wind and Water Strakes** are the strakes of a ship’s side shell plating between the ballast and deepest load waterline.
2.2 Nomenclature for typical hull structures

![Diagram of single hull tanker with typical transverse section]

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<thead>
<tr>
<th>Number</th>
<th>Description</th>
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<tbody>
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<td>1</td>
<td>Strength deck plating</td>
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<td>2</td>
<td>Stringer plate</td>
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<td>3</td>
<td>Sheer strake</td>
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<td>4</td>
<td>Side shell plating</td>
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<td>Bilge plating</td>
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<td>Bottom shell plating</td>
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<td>Keel plate</td>
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Figure 1: Single Hull Tanker — Typical Transverse Section
Figure 2: Single Hull Oil / Ore Carrier — Typical Transverse Section
Figure 3: Double Hull Tanker — Typical Transverse Section
Figure 4: Double Hull Tanker — Typical Transverse Bulkhead
Figure 5: Single Skin Bulk Carrier — Typical Cargo Hold Structural Configuration
Figure 6: Single Skin Bulk Carrier — Typical Transverse Section
Figure 7: Bulk Carrier — Typical Transverse Watertight Bulkhead
Figure 8: General Dry Cargo Ship — Typical Transverse Section
3. Hull Survey Terms

**Abrasion** is the removal of material by mechanical, i.e. rubbing or frictional, means.

**Active Corrosion** means gradual chemical or electrochemical attack on a metal producing loose scale, by atmosphere, moisture or other agents.

**Allowable Corrosion** or **Wastage Limit** is the acceptable thickness diminution of structural elements.

**Anode** is the positively charged metal surface and the corroding part of an electrochemical corrosion cell at which the oxidation or loss of electrons occurs. Sacrificial anode or impressed current anode.

**Antifouling** is paint for use on underwater areas on hulls. Antifouling contains agents who prevent the adhesion and growth of organisms on the hull.

**Bacterial Corrosion** or **Microbially Influenced Corrosion (MIC)** is corrosion which is induced or accelerated by the presence of micro organisms.

**Blasting** or **Shot-Blasting** is the cleaning of a metal surface by a stream of abrasive particles.

**Blister** - a raised area, often dome shaped, resulting from loss of adhesion between a coating or deposit and the substrate.

**Brittle Fracture** is the separation of a solid accompanied by little or no macroscopic plastic deformation. Typically, brittle fracture occurs by rapid crack propagation with less expenditure of energy than for ductile fracture. Brittle tensile fractures have a bright, granular appearance and exhibit little or no necking.

**Buckling**: a bulge bend or other wavy condition of the structure caused by in plane compressive stresses and /or shear stresses.

**Butt Joint** is a joint between two structural members lying in the same plane. Typically a butt joint is used to describe the welded connection between two plates in the transverse direction.

**Cathode** is the negatively charged metal surface and the non-corroding or protected part of an electrochemical corrosion cell.

**Cathodic Protection** is the partial or complete protection of a metal from corrosion by making it a cathode, using either a galvanic or an impressed current to bring a metal to a potential where it is thermodynamically stable.

**Cavitation Damage** is degradation of metal surfaces, characterized by pitting, in which the pit profile is irregular, occurring when very turbulent fluids are in contact with the metal surface, and associated with the formation and collapse of
cavities in the liquid at the solid — liquid interface.

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

**Coating Evaluation Criteria** is normally an assessment of the extent of damage registered in terms of coating breakdown area and/or rust scales in % of area under consideration, normally the complete tank, with additional information on coating damage to edges and weld connection. Typical coating failures may be given as additional information.

**Coating**, often synonymous with **Painting**, i.e. a protective film of thickness usually about 0.2 - 0.5 mm, applied to prevent corrosion mainly via a three main mechanisms; the barrier effect, the cathodic effect or by inhibition / passivation.

**Collision Damage** is damage caused by physical impact between two or more ships used for navigation.

**Condition Assessment Programme (CAP)** is a voluntary system, which gives a detailed assessment of a tanker’s actual condition at the time of inspection and is available to both charter-parties and owners.

**Condition Survey** is a survey normally of limited scope and time and intended to identify any anticipated structural or corrosion related deficiencies and give an overall visual impression of the structural integrity.

**Contact Damage** is damage caused when the ship strikes something other than another ship. (see also ‘**Grounding**’).

**Corrosion Fatigue** is the process in which a metal fractures prematurely in a trans-crystalline manner under conditions of simultaneous corrosion and repeated cyclic loading of lower stress levels or fewer cycles than would be in the absence of a corrosive environment.

**Corrosion** is the chemical or electrochemical reaction between a material, usually a metal and its environment that produces a deterioration of material and its properties, usually an oxide is formed.

**Corrosion Prevention System** is considered a full hard coating; alternatively a full hard coating supplemented by cathodic protection.

**Crack** is a fracture type discontinuity without complete separation characterized by a sharp tip and high ratio of length and width to opening displacement.

**Crevice Corrosion** is localized corrosion of a metal surface at, or immediately adjacent to, an area that is shielded from full exposure to the environment because of close proximity between the metal and surface of another material. It is usually associated with small volumes of stagnant water; within lapped joints,
under heads of fastenings, under gaskets and packings, under marine organisms and porous deposits.

**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 ships to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

**Cumulative Damage** is an aggregation of damage due to various physical causes, specifically applied to fatigue under various stress ranges and frequencies.

**Damage Survey** is a survey requested as a result of hull damage or other defects.

**Deformation** is a change in the form of a structure due to stress, thermal change, change in moisture, or other causes.

**Delamination** is peeling from undercoat or substrate.

**Deposit Attack** is an attack under, or around, the edge of a local deposit formed on a metal surface in the presence of an electrolyte.

**Ductile Fracture** is the separation of a solid accompanied by gross plastic deformation.

**Edge Corrosion** is local corrosion at the free edges of stiffeners, brackets, flanges, manholes etc.

**Elasticity** means the structural member's capability of sustaining stress without permanent deformation, i.e. to recover its original size and shape after the stress has been removed.

**Electrochemical Corrosion** is corrosion associated with the passage of an electric current. If the current is produced by the system itself it is called Galvanic Corrosion and if it results from an impressed current it is called Electrolytic Corrosion.

**Erosion Corrosion** is a combined action involving corrosion and erosion in the presence of a moving corrosive fluid, leading to the accelerated loss of material. Erosion corrosion is characterized by grooves, gullies, waves, valleys etc., usually with directional pattern and with bright surfaces free from corrosion products.

**Erosion Damage** is the physical removal of material from a surface by mechanical means such as e.g. flowing liquid and it may be accelerated by corrosion.

**Excessive Corrosion** is an extent of corrosion that exceeds the Allowable Corrosion.
**Extensive Corrosion** is an extent of corrosion consisting of hard and/or loose scale, including pitting, over 70% or more of the area under consideration, accompanied by evidence of thickness diminution.

**FAIR** condition is a term used to describe the condition of a hard coating; with local breakdown 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.

**Fair** is to smooth or fair up a ship’s lines and eliminating irregularities.

**Fatigue** is the phenomenon leading to fracture under repeated or fluctuating stresses having a maximum value significantly less than the ultimate tensile strength of the material.

**Fracture** is the propagation of a crack through the thickness of a material. (see ‘Brittle’ and ‘Ductile’ Fractures)

**Galvanic Corrosion** is electrochemical accelerated corrosion of a metal because of an electrical contact with a more noble metal or nonmetallic conductor in a corrosive electrolyte.

**Galvanizing** is the deposition of zinc on to the surface of steel to provide corrosion protection by both protecting the steel from contact with the environment and giving sacrificial protection.

**General Corrosion** or **Overall Corrosion** appears as non-protective, friable rust of a uniform nature on uncoated surfaces. Rust scale continually breaks off, exposing fresh metal to corrosive attack. Visual judgment of thickness loss is difficult until serious wastage has occurred.

**GOOD** condition is a term used to describe condition of hard coating; with only minor spot rusting.

**Grooving Corrosion** is local corrosion normally adjacent to welding joints along abutting stiffeners and at stiffener or plate butts or seams.

**Grounding** is contact of the ship’s bottom with the sea floor.

**Hard Coating** is a coating which chemically converts during its curing process, normally used for new construction, or non-convertible air drying coating which may be used for maintenance purposes. Hard coating can be either organic or inorganic and covers typical marine coatings such as those based on epoxy, coal tar epoxy, polyurethane, chlorinated rubber, vinyl, zinc epoxy, zinc silicate.

**Hose Testing** is carried out to demonstrate the tightness of structures not subject to structural (hydrostatic) or leak testing and to other components that contribute to the watertight or weathertight integrity of the hull.
**Hydropneumatic Testing** is a combination of hydrostatic and air testing.

**Indent** is deformation of structural members caused by out-of-plane loads like bottom slamming and bow impact forces, contact with other objects etc.

**Inhibitors** are substances used to prevent or retard a chemical or electrochemical reaction, often used to render corrosion products less soluble and thereby tending to stifle electrochemical corrosion processes.

**Insignificant Corrosion** or **Minor Corrosion** is an extent of corrosion with minor spot rusting and such that an assessment of the corrosion pattern indicates wastage generally not exceeding of 30% of the allowable corrosion limits.

**Lamination** is an excessively large, laminar, non-metallic inclusion, producing a defect appearing in sheets or strips as segregation or in layers.

**Lap Joint** is a joint between two structural members that overlap each other.

**Leak Testing** is an air or other medium test carried out to demonstrate the tightness of the structure.

**Local Corrosion** is by name local in nature, often appearing at areas with local breakdown of coating or at areas with stress concentrations.

**Loose Scale** is sheets of rust falling off if the surveyor hits the structure with his test hammer. Loose scale can best be removed by hand or power tool cleaning or a combination of these.

**Mill Scale** is thick oxide film formed on wrought-metal products which have been hot-rolled or forged and allowed to cool in air, the term is principally applied to steel on which the oxide is essentially magnetic black oxide.

**Necking Effect** is a term describing local corrosion at junction of plating and stiffeners due to flexure effects caused by reverse, cyclic loading with loss of coating or shedding of scale exposing fresh steel to further corrosion. The corrosion rate may be rather high and accelerates with thinning of the material.

**On-hire/Off-hire Survey** is surveys carried out to state the ship’s condition prior to or after her chartering. The main purpose is to record deficiencies or damages.

**Overall Survey** is survey intended to report on the overall condition of the hull structure and determine the extent of additional close-up surveys.

**Paint** can be described as a liquid material capable of being applied or spread over a solid surface on which it subsequently dries or hardens to form a continuous adherent, obliterating film.

**Paint Cracking** is deep cracks in paint that expose substrate.
**Periodical Survey** is a collective term of classification surveys carried out after the delivery a ship and at prescribed time intervals, i.e. annual, intermediate and renewal/special surveys.

**Pinholing** is tiny, deep holes exposing substrate.

**Pinpoint Rusting** is local rusting at pinholes or holidays.

**Pitguard Anode** is a sacrificial anode placed just above tank bottom in order to mitigate the general and pitting corrosion process.

**Pitting Corrosion** is local, random scattered corrosion mainly on horizontal surfaces and at structural details where water is trapped, particularly at bottom of tanks. For coated areas the attack produces deep and small diameter pits which may lead to perforation. Pitting of uncoated areas in tanks, as it progresses, forms shallow but very wide scabby patches (e.g. 300 mm in diameter) and the appearance resembles condition of general corrosion.

**Plasticity** is the property of a material that allows it to be extensively repeatedly deformed without rupture when acted upon by a force sufficient to cause deformation and that allows it to retain its deformed shape after the applied force has been removed.

**POOR** condition is a term used to describe condition of hard coating; with general breakdown of coating over 20% or more or hard scale at 10% or more of areas under consideration.

**Prompt and Thorough Repair** is permanent repair completed at the time of the survey to the satisfaction of the surveyor, therein removing the need for imposition of any associated condition of class.

**Rust** is a visible corrosion product consisting of hydrated oxides of iron and is formed on steel surfaces exposed to moist atmospheric conditions.

**Sags** are excess flow of paint, also called runs or curtains.

**Scale** is surface oxidation, consisting of partially adherent layers of corrosion products, left on metals by heating or casting in air or in other oxidizing atmospheres and is the product of the corrosion process of steel with a porous surface layer or flakes, in volume greater than the metal from which it was formed.

**Scantlings** are the dimensions of a ship's structural members as girders, stiffeners and plates.

**Seam** is a joint between two structural members lying in the same plane. Typically a seam is used to describe the welded connection of two plates in the longitudinal direction.
**Semi-hard Coating** is a coating that dries or converts in such a way that it stays flexible although hard enough to touch and walk upon.

**Shop primer** is a rust preventing paint for temporary protection of steel immediately after blasting for protection of the material surface from corrosion during construction and until the final paint system is applied.

**Soft Coating** is a coating that remains soft so that it wears off at low mechanical impact or when touched; often based on oils (vegetable or petroleum) or lanolin (sheep wool grease). Application of soft coating does generally not allow relaxation of the extent of periodical hull survey requirements of ballast tanks.

**Statutory Survey** is a collective term of surveys required to meet International Convention requirements such as Load Line, SOLAS and MARPOL.

**Strain** is any forced change in the dimensions of a structural member.

**Stress Concentration** or **Stress Raiser** is a term used of any notch, crack, hole, corner, groove, attachment or other interruption to smooth flow of stress and strain in structures introduces a concentration of stress.

**Stress Corrosion** is the preferential attack of areas under tensile stress in a corrosive environment, where such an environment alone would not have caused corrosion. Tensile stresses may be residual stresses from welding or cold-working or applied working stresses.

**Stripe Coating** is used to produce a coating with sufficient film thickness on edges, corners, weld seams and other areas that are difficult to coat using airless spray.

**Structural Testing** or **Tank Testing** is a hydrostatic test carried out to demonstrate the structural adequacy of design and tightness of tank boundaries.

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

**Survey** is a collective term for examination, testing and evaluation of results and decision making.

**Suspect Areas** are locations showing substantial corrosion and/or are considered to be prone to rapid wastage.

**Transverse Section** includes, for thickness measurement purposes, all longitudinal members such as plating, longitudinals and girders at the deck, side, bottom, inner bottom and longitudinal bulkheads. For transversely framed ships, a transverse section includes adjacent frames and their end connections in way of transverse section. Also called **Girthbelt**.
**Watertight** means capable of preventing the passage of water through the structure under a head of water for which the surrounding structure is designed.

**Wear** is the deterioration of a surface due to relative motion between it and another.

**Weathertight** means that in any sea condition water will not penetrate into the ship.

**Weld Metal Corrosion** is a preferential corrosion of the weld deposit due to an electrolytic action between the weld metal and base metal.