

Z23 Hull Survey for New Construction

(July
2006)
(Rev.1
Mar
2007)
(Corr.1
Oct
2007)
(Rev.2
Apr
2009)

1. Scope

The scope of this UR includes the following main activities:

1.1 Examination of the parts of the ship covered by classification rules and by applicable statutory regulations for hull construction, to obtain appropriate evidence that they have been built in compliance with the rules and regulations, taking account of the relevant approved drawings.

1.2 Appraisal of the manufacturing, construction, control and qualification procedures, including welding consumables, weld procedures, weld connections and assemblies, with indication of relevant approval tests.

1.3 Witnessing inspections and tests as required in the classification rules used for ship construction including materials, welding and assembling, specifying the items to be examined and/or tested and how (e.g. by hydrostatic, hose or leak testing, non destructive examination, verification of geometry) and by whom.

1.4 Appraisal of material and equipment used for ship construction and their inspection at works is not included in this UR. Details of requirements for hull and machinery steel forgings and castings and for normal and higher strength hull structural steel are given in W7, W8 and W11 respectively. Acceptance of these items is verified through the survey process carried out at the manufacturer's works and the issuing of the appropriate certificates.

*Note:

1. This UR is to be uniformly implemented by IACS Societies on ships contracted for construction on ~~and~~ or after 1 January 2008.
2. The "contracted for construction" date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of "contract for construction", refer to IACS Procedural Requirement (PR) No. 29.
3. The changes introduced in Revision 2 of the UR are to be uniformly implemented by IACS Societies on ships contracted for construction (as defined in IACS PR 29) from 1 July 2010.

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2. Definitions*

2.1 The hull structure is defined as follows:

- a) hull envelope including all internal and external structures;
- b) superstructures, deckhouses and casings;
- c) welded foundations, e.g. main engine seatings;
- d) hatch coamings, bulwarks;
- e) all penetrations fitted and welded into bulkheads, decks and shell;
- f) the fittings of all connections to decks, bulkheads and shell, such as air pipes and ship side valves – all ILLC 1966, as amended, items;
- g) welded attachments to shell, decks and primary members, e.g. crane pedestals, bitts and bollards, but only as regards their interaction on the hull structure.

2.2 Reference to documents also includes electronic transmission or storage.

2.3 Definition of survey methods which the surveyor is directly involved in: Patrol, Review, Witness.

2.3.1 Patrol, the act of checking on an independent and unscheduled basis that the applicable processes, activities and associated documentation of the shipbuilding functions identified in Table 1 continue to conform ~~with~~ to classification and statutory requirements.

2.3.2 Review, the act of examining documents in order to determine traceability, identification and to confirm that processes continue to conform ~~with~~ to classification and statutory requirements.

2.3.3 ~~Witness, attendance of scheduled survey items as defined within the shipbuilding functions.~~ Witness is the attendance at scheduled inspections in accordance with the agreed Inspection and Test Plans or equivalent to the extent necessary to check compliance with the survey requirements.

3. Applications

3.1 This UR covers the survey of all new construction of steel ships intended for classification and for international voyages except for:

- a) those defined in SOLAS I/3;
- b) high speed craft as defined in I/1.3.1 of the 2000 High Speed Craft Code;
- c) Mobile Offshore Drilling Units as defined in I/1.2.1 of the MODU Code.

3.2 This UR covers all statutory items, relevant to the hull structure and coating, i.e. Load Line and SOLAS Safety Construction.

*Footnote: Terminology for hull terms and hull survey terms can be found in Recommendation 82.

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3.3 This UR does not cover the manufacture of equipment, fittings and appendages regardless whether they are made inside or outside of the shipyard, examples being as follows. Evidence of acceptance shall be provided by accompanying documentation from class surveyor at manufacturer and verified at the shipyard:

- a) hatch covers;
- b) doors and ramps integral with the shell and bulkheads;
- c) rudders and rudder stock;
- d) all forgings and castings integral to the hull.

3.4 This UR applies to the installation into the ship, welding and testing of:

3.4.1 the items listed in 3.3 above;

3.4.2 equipment forming part of the watertight and weather tight integrity of the ship.

3.5 This UR applies to the hull structures and coating constructed at any of the following:

3.5.1 shipbuilder's facilities;

3.5.2 sub-contractors at the shipbuilder's facilities;

3.5.3 sub-contractors at their own facilities or at other remote locations.

4. Qualification and monitoring of personnel

4.1 Exclusive surveyors of the classification society, as defined in PR5, are to ~~verify~~ confirm through patrol, review and witness as defined in para. 2.3, that the ships are built using approved plans in accordance with the relevant rules and statutory requirements. The surveyors are to be qualified to be able to carry out the tasks and procedures are to be in place to ensure that their activities are monitored. Details are specified in PR6 and PR7.

5. Survey of the hull structure

5.1 Table 1 provides a list of surveyable items for the hull structure and coating covered by this UR, including:

5.1.1 description of the shipbuilding functions;

5.1.2 classification and statutory survey requirements;

5.1.3 survey method required for classification;

5.1.4 relevant IACS and statutory requirement references;

5.1.5 documentation to be available for the classification surveyor during construction.

5.1.5.1 The shipbuilder is to provide the classification surveyors access to documentation required by classification, this includes documentation retained by the shipbuilder or other third parties.

5.1.5.2 The list of documents approved or reviewed by the classification society for the

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specific new construction are as follows:

- a) plans and supporting documents
- b) examination and testing plans
- c) NDE plans
- d) welding consumable details
- e) welding procedure specifications
- f) welding plan or details
- g) welder's qualification records
- h) NDE operator's qualification records

5.1.6 Documents to be inserted into the ship construction file. Refer to paragraph 104 for details.

5.1.7 A list of specific activities which are relevant to the shipbuilding functions. This list is not exhaustive and can be modified to reflect the construction facilities or specific ship type.

5.2 Evidence is also to be made available, as required, by the shipbuilder, to the surveyor whilst the construction process proceeds to prove that the material and equipment supplied to the ship has been built or manufactured under survey relevant to the classification rules and statutory requirements.

6. Review of the construction facility*

6.1 The society is to ~~review the construction facilities~~ familiarize themselves with the yard's production facilities, management processes, and Safety for consideration in complying with the requirements of Table 1 prior to any steelwork or construction taking place in the following circumstances:

6.1.1 where the society has none or no recent experience of the construction facilities – typically after a one year lapse - or when significant new infrastructure has been added;

6.1.2 where there has been a significant management or personnel re-structuring having an impact on the ship construction process;

6.1.3 or where the shipbuilder contracts to construct a vessel of a different type or substantially different in design.

*Footnote: Reference is made to Appendix 1 "Shipyard review record", as an example.

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(cont)**7. Newbuilding survey planning**

7.1 Prior to ~~commencing commencement of surveys for~~ any newbuilding project, the society is to discuss with the shipbuilder at a kick off meeting the items listed in Table 1. The purpose of the meeting is to agree how the list of specific activities shown in Table 1 is to be addressed. The meeting is to take into account the shipbuilder's construction facilities and ship type including the list of proposed subcontractors. ~~and deal with subcontractors if it is known that the builder proposes to use them. The shipyard is to be informed of likely intervals for sampling and patrol activities.~~ A record of the meeting is to be made, based upon the contents of the Table – the Table can be used as the record with comments made into the appropriate column. If the society has nominated a surveyor for a specific newbuilding project then the surveyor is to attend the kick off meeting.

The builder is to be asked to agree to undertake ad hoc investigations during construction where areas of concern arise and for the builder to agree to keep the classification society advised of the progress of any investigation. Whenever an investigation is undertaken, the builder is to be requested, in principle, to agree to suspend relevant construction activities if warranted by the severity of the problem.

7.2 The records are to take note of specific published Administration requirements and interpretations of statutory requirements.

7.3 The shipyard shall be requested to advise of The any changes to the activities agreed at the kick off meeting and these are to be documented. ~~record of the meeting is to be updated as the construction process progresses in the light of changing circumstances, E.g.~~ if the shipbuilder chooses to use or change sub-contractors, or to incorporate any modifications necessitated by changes in production or inspection methods, rules and regulations, structural modifications, or in the event where increased inspection requirements are deemed necessary as a result of a substantial non-conformance or otherwise.

7.4 Shipbuilding quality standards for the hull structure during new construction are to be reviewed and agreed during the kick-off meeting. Structural fabrication is to be carried out in accordance with IACS Recommendation 47, "Shipbuilding and Repair Quality Standard for ~~New Construction~~", or a recognized fabrication standard which has been accepted by the Classification Society prior to the commencement of fabrication/construction. The work is to be carried out in accordance with the Rules and under survey of the classification society.

7.5 The kick-off meeting may be attended by other parties as defined in PR3 (owner, administrations, etc.) subject to agreement by the shipbuilder.

7.6 In the event of series ship production consideration may be given to waiving the requirement for a kick off meeting for the second and subsequent ships provided any changes are documented as required in paragraph 7.1. ~~and where the classification society has a continual presence in the shipyard, consideration may be given to modification of the kick off meeting. The agenda would include essential variables from previous ships, e.g. flag requirements, modifications from previous ships, effects of key dates etc. subject to mutual agreement with the builder. In any instance the classification society must maintain records to demonstrate compliance with Table 1. The classification society will still need to demonstrate that changes described in this section (paragraph 7) have been addressed.~~

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8. Examination and test plan for newbuilding activities

8.1 The shipbuilder is to provide plans of the items which are intended to be examined and tested. These plans need not be submitted for approval and examination at the time of the kick off meeting. They are to include:

8.1.1 proposals for the examination of completed steelwork - generally referred to as the block plan and are to include details of joining blocks together at the pre-erection and erection stages or at other relevant stages;

8.1.2 proposals for fit up examinations where necessary;

8.1.3 proposals for testing of the structure (leak and hydrostatic) as well as for all watertight and weathertight closing appliances;

8.1.4 proposals for non-destructive examination;

8.1.5 any other proposals specific to the ship type or to the statutory requirements.

8.2 The plans and any modifications to them are to be submitted to the surveyors in sufficient time to allow ~~approval review~~ before the relevant ~~survey construction phase activity~~ commences. ~~The classification society is to require sample rates of NDE, proposals for steelwork survey, Tank testing requirements, etc. if the actual construction process warrants it. The classification society is to demonstrate proof to justify the request.~~

9. Proof of the consistency of surveys

9.1 The classification society is to be able to provide evidence, e.g. through records, check lists, inspection and test records, etc. that its surveyors have complied with the requirements of the newbuilding survey planning and duly participated in the relevant activities shown in the shipbuilder's examination and test plans.

~~9.2 For audit purposes, the information specified in 9.1 is to be made available.~~

10. Ship Construction File

10.1 The shipbuilder is to deliver documents for the Ship Construction File. In the event that items have been provided by another party such as the shipowner and where separate arrangements have been made for document delivery which excludes the shipbuilder, that party has the responsibility.

The Ship Construction File shall be reviewed for content in accordance with the requirements of para 10.2.

10.2 It is recognised that the purpose of documents held in the Ship Construction File on board the ship, is to facilitate inspection (survey) and repair and maintenance, and, therefore, is to include in addition to documents listed in Table 1, but not be limited to:

10.2.1 as-built structural drawings including scantling details, material details, and, as applicable, wastage allowances, location of butts and seams, cross section details and locations of all partial and full penetration welds, areas identified for close attention and rudders (Z7.1, Z7.2, Z10.1, Z10.2, Z10.3, Z10.4, Z10.5 ~~for COT, holds and ballast tanks of oil tankers, bulk carriers and chemical carriers~~);

10.2.2 manuals required for classification and statutory requirements, e.g. loading and

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stability, bow doors and inner doors and side shell doors and stern doors – operations and maintenance manuals (S8 and S9);

10.2.3 ship structure access manual, as applicable;

10.2.4 copies of certificates of forgings and castings welded into the hull (W7 and W8);

10.2.5 details of equipment forming part of the watertight and weather tight integrity of the ship;

10.2.6 tank testing plan including details of the test requirements (S14);

10.2.7 corrosion protection specifications (Z8 and Z9);

10.2.8 details for the in-water survey, if applicable, information for divers, clearances measurements instructions etc., tank and compartment boundaries;

10.2.9 docking plan and details of all penetrations normally examined at drydocking;

10.2.10 Coating Technical File, for ships subject to compliance with the IMO ~~Coating~~ Performance Standard for Protective Coatings (PSPC) as a class requirement under the IACS Common Structural Rules.

Enclosures: 1. Appendix 1
2. Table 1

Appendix 1

Shipyard review record

Name of Shipyard	Date

1. Details of any management systems

Obtained Approval	Certified by	Expiry Date	Remarks (scope, etc.)
ISO-9001 ISO-9002			
ISO 14000 <u>1</u>			
ISO 18000 <u>1</u>			
Other:			

2. Construction facilities: (Documents such as a brochure of shipyard can be attached in lieu of completing this section.)

2.1 Building Berth (B) or Dock (D)

* In case of berth, Depth is not applicable.

B / D	Name	Length (m)	Width (m)	Depth* (m)	Building Capacity (G/T <u>Gross</u> <u>Tonnage</u>)	Crane (Ton x No.)

2.2 Outfitting Quays

Name	Length (m)	Width (m)	Depth (m)	Berthing Capacity (G/T <u>Gross Tonnage</u>)	Crane (Ton x No.)

2.3 Main Fabrication and erection facilities

<p>(1) Marking and cutting of steel plates (including internal members)</p> <ul style="list-style-type: none"> - Marking method (Manual, Photo x ____, EPM x ____, NC x ____ others _____) - NC cutting machine (Gas x ____, Plasma x ____, Laser x ____) Control procedure of NC (On-line, other) - Cutting equipment (Edge planer x ____, Roll-shear x ____)
<p>(2) Marking and cutting of section bar</p> <ul style="list-style-type: none"> - Marking method (Manual, NC) - Marking of reference curved line (Manual, NC) - Cutting method (Manual, NC) - In case of NC (Gas x ____, Plasma x ____)
<p>(3) One-side automatic welding machine (Yes, No)</p> <ul style="list-style-type: none"> - Type of welding machine (Flux Backing x ____, Flux and Copper Backing x ____ other _____) - Existence of special surface plate for plate welding (Yes, No)
<p>(4) Fillet welding machine (Gravity, Automatic) Percentage of automatization except gravity: about __%</p> <ul style="list-style-type: none"> - Line welder (No, Yes: submerged arc x ____ heads, CO2 x ____ heads) - Small automatic fillet welding machine (No, Yes: Name: _____ x ____) - Welding robot (No, Yes: Portal x ____, Rectangular x ____, Articulated x ____)
<p>(5) Painting equipment</p> <ul style="list-style-type: none"> - Plate shot blasting/primer coating machine (No, Yes: Max. Width ____ m, Length ____ m) - Section bar shot blasting/primer coating machine (No, Yes: Max. Length ____ m) - Special coating factory (No, Yes: ____ m x ____ m x ____ sections)
<p>(6) Vertical automatic welding machine (No, Yes: EG x ____, SEG x ____, ES x ____)</p> <p>EG: Electro gas SEG: Simplified Electro gas ES: Electro slag</p>
<p>(7) Other main fabrication facilities</p>

3. Shipyard control of Qualified Welders

(1) Normal steel

		certification	traceability	supervision	maintenance of qualification
Shipyard workers	confirm system in place	<u>Yes / no</u>	<u>Yes / no</u>	<u>Yes / no</u>	<u>Yes / no</u>
Subcontracted workers	confirm system in place	<u>Yes / no</u>	<u>Yes / no</u>	<u>Yes / no</u>	<u>Yes / no</u>

4. Feature of Construction Procedure

<p>(1) Subcontract of hull blocks (weight)</p> <ul style="list-style-type: none"> - Sub members (No, Yes: Ratio of subcontracted works ___ %, No., of subcontractors ___) - Blocks (No, Yes: Ratio of subcontracted works ___ %, No., of subcontractors ___)
<p>(2) Method of plate block assembly</p> <ul style="list-style-type: none"> - Method fitting and welding longitudinals and transverse webs on jointed panels - Method welding longitudinals on jointed panels prior to fitting and welding transverse webs - Method fitting and welding a frame consists of longitudinals and transverse webs on jointed panels - Method jointing panels with pre-assembled longitudinals by welding prior to fitting and welding transverse webs - Other (please specify in (5) below)
<p>(3)- pre-erection outfitting carried out grand block/mega block adopted Method of erection at building berth/dock</p> <ul style="list-style-type: none"> - Max. weight of loading block: ton - Construction method in building dock/berth/land construction etc. (1 ship, 1.5 ships: Semi-tandem, dual entrance) - Block loading process (single starting block, multi starting blocks, inserting block : No, Yes)
<p>(4) Final dock (No, Yes: In-house, Other place of the same company, Use other company)</p>
<p>(5) Other feature of construction procedure</p>

5. Quality Control System: (Refer to Quality Manual, if available.)

Item and description	Result	Remarks
(1) Existence of the organization chart including the departments of design, purchasing, manufacturing and quality assurance - Are the function, responsibility and competence of the organization clear?		
(2) Quality control organization - Existence of quality control organization - Number of employees in this organization - Existence of procedures or plans related to tests and inspections	___ persons including the chief	
(3) Pre-inspection system of shipyard - Is pre-inspection carried out prior to shipyard Class inspection? - Are pre-inspectors assigned? (Check the list.) - Number of pre-inspectors (related to hull only) - Are inspection results marked on the object and/or recorded in the checklist?	____ persons	
(4) Records of inspections and tests - Are records made and kept properly? - Does the responsible person verify the records? - Can the adoption of necessary corrective actions against non-conformity happened be checked?		
(5) Condition at the time of the surveys in the presence of class surveyors - Is the schedule of the surveys changed often? - Are pre-inspection, shipyard inspection and repairs completed beforehand? - Are the sufficient preparations for surveys such as scaffoldings, lighting, cleaning made?		
Note: Above-mentioned (3) and (4) include the acceptance inspection of subcontracted items.		

6. Measures for Safety and Health

Item and description	Result	Remarks
(1) Are conditions of scaffolding, nets, safety belt, lighting and ventilation good?		
(2) Does sufficient attention paid for radiographic examination and operation of cherry picker?		
Note:		

7. Control System of Non-Destructive Examination(NDE)

Item and description	Result	Remarks
(1) Number of NDE supervisors in shipyard (including persons responsible for judging results)	_____ persons	
(2) Dependence on subcontracted NDE work - Number of shipyard employees - Number of sub-contractors	<u>about</u> ____ (-%) <u>persons</u> <u>about</u> ____ (-%) <u>persons</u>	
(3) NDE sub-contractor company's name and official technical qualifications	Name _____ (approved by) _____ Name _____ (approved by) _____	
(4) Grade and number of NDE employees with official technical qualifications in shipyard Specialized in radiography Specialized in ultrasonic Specialised in surface detection	___ Grade ___ persons ___ Grade ___ persons ___ Grade ___ persons	
(5) If non-destructive examinations are subcontracted, the grade and number of officially qualified persons Specialized in radiography Specialized in ultrasonic Specialised in surface detection	___ Grade ___ persons ___ Grade ___ persons ___ Grade ___ persons	
(6) Non-destructive examination equipment (in-house) - Number of radiographic equipment - Number of ultrasonic equipment	_____ _____	
Note: Even if all works are subcontracted, it is recommendable to attach the qualified person(s) who can verify the works.		

8. Quality Control on Production Line

Item and description	Result	Remarks
8.1 Preventive measures for misuse of materials		
(1) Job title of supervisor and person in charge of collating ordered steel and received steel, and checking of mill sheet	Title of supervisor: _____ Title of person in charge: _____	
(2) Are means for checking the material grade in hand prescribed for high-grade steels		
(3) Are regulations prescribed for checking the material grade for high-tensile steel and steel for low-temperature applications? Are there regulations for inscribing high tensile steel on the surface of the high tensile steel and special indication for steel for low temperature applications?		
(4) Are procedures for re-using of remaining cut-off mild steel?		
(5) Are there procedures for re-using of remaining cut-off high-tensile steel?		
(6) In the case of (4) and (5) above, can a collation be made with the mill sheet?		
(7) Section of controlling the lists of remaining cut-off steel	Name of section: _____	
<p>Note:</p> <ul style="list-style-type: none"> - In case of high tensile steel, are means identifying different grades - In the case of (3) and (4) above, are the materials approved by other classes controlled similarly? 		
8.2 Shot blasting/Primer coating		
(1) Existence of surface preparation standards		
(2) Existence of coating thickness control standards - Existence of thickness measurement records		
<p>Note:</p> <ul style="list-style-type: none"> - The standard is to include the description related traceability after shot blasting and primer coating. 		

8.3 Marking and cutting (Assembly work)		
(1) Existence of standards for accuracy and periodical inspection of tape measures, tapes, stencils, etc.		
(2) Existence of standards for accuracy of cut dimensions and edge preparation		
(3) Existence of standards for finish of cutting face		
(4) What is the frequency and extent of maintenance and inspection carried out for ensuring accuracy of NC cutter and/or flame planer?		
(5) In case of NC, are the disks, tapes etc. maintained in good condition?		
(6) What are the measures adopted and guidance given to make the worker fully conversant with cutting work standards for maintaining accuracy?		
<p>Note:</p> <ul style="list-style-type: none"> - In case of (2) and (3) above, check items are to include confirmation of edge preparations free from piercing hole. - NC for section bars is also to be in accordance with the above. 		
8.4 Bending and strain free		
(1) Existence of standards for maximum heating temperatures during water cooling and at the time of bending and distortion removal of steel by quick heating and cooling		
(2) Existence of regulations for plate thickness and bending radius for flange processing		
(3) What are the measures adopted and guidance given to make the worker fully conversant with maintaining quality and accuracy during the bending process?		
<p>Note:</p>		

8.5 Control of Welding Procedure		
(1) Are all welding procedures applied to the ships approved by the Society or other IACS members?		
Note:		
8.6 Treatment of serious non-conformities		
(1) Are repair plans submitted to the Society when serious non-conformities happened?		
(2) Were the NDE(RT/UT) plans submitted at appropriate timing?		
(3) Was the extent of tests extended considering the results of the test?		
Note:		
8.7 Hydrostatic and Watertight Tests		
(1) Is the test plan submitted to the Society?		
(2) Are vacuum tests applied to?		
(3) Are local air injection tests during sub-assembly works applied to?		
(4) If (2) or (3) above is applied to, are the test procedures approved by the Society?		
Note:		

Table 1, IACS Unified Requirement Z 23 Rev.2

Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
	shipbuilding quality control function								
1	welding								
1.1	welding consumables	Classification approved separately at the manufacturer	review approval status and patrol, verify storage, handling and treatment in accordance with manufacturer's requirements	UR W17		consumable specification and approval status	not required	Identify consumables against approved list	
								verify temporary and permanent storage facilities	e.g. kept dry, covered, where applicable heated
								verify traceability	e.g. random batch number checking
1.2	welder qualification	Qualified welders	review of welder certification and patrol	Recommendation 47		shipyards records with individual's identification	not required	verify welder qualification standard, e.g. class or recognised standard approval	
								verify welder approved for weld position	
								verify validity of qualification certificate	

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1.3	Welding - mechanical properties (welding procedures)	All weld joint configurations, positions and materials to be covered by weld procedures approved by the classification society or by another IACS member available	review and patrol	UR W28		Approved weld procedure specification and welding plan relevant to the ship project or process	not required	verify weld procedures records have been approved and cover all weld processes and positions in accordance with classification or recognised standards. <u>verify procedures are available at relevant workstations</u>	
		the classification society witnesses all new weld procedure qualification tests carried out in the shipyard whenever the classification society is surveying in the shipyard	<u>witness</u>					verify procedures are available at relevant workstations <u>verify weld procedures records have been approved and cover all weld processes and positions in accordance with classification or recognised standards and are available for the surveyors reference</u>	
1.3a	welding equipment	correctly calibrated and maintained	patrol and review			shipbuilders maintenance and calibration records	not required	verify condition of machinery and equipment.	
								verify machines are calibrated by appropriate staff	
								verify calibration carried out in accordance with manufacturer's recommendations	
								verify calibration in accordance with maintenance schedule	

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1.3b	welding environment	satisfactory environment	patrol	Recommendation 47			not required	Verify welding areas clean, dry, well lit.	
								Confirm relevant measures taken for any pre or post heat treatment, drying of surfaces prior to welding	
								Confirm shielding gases, fluxes protected	
1.3c	welding supervision	sufficient number of skilled supervisors	patrol	Recommendation 20 and 47				verify supervision is effective	
1.4	welding- surface discontinuities	Substantially free from significant indications, satisfactory profile and size	visual examination, surface detection techniques, review of documents and patrol of operator	Recommendation 20 and 47		Shipbuilders and recognised standards and Rules as applicable, welding and NDE plans, NDE reports, operator qualifications	not required	Identify workstations where NDE is carried out, e.g. panel line butt welds, castings into hull structure	
								Verify NDE carried out in accordance with approved plans where applicable	
								Verify suitability of NDE methods	
								Verify operators suitably qualified particularly where sub-contractors have been employed	
								Verify NDE is carried out according to the acceptable process	
								Review NDE records	

Table 1, IACS Unified Requirement Z 23 Rev.2

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1.5	Welding - embedded discontinuities	NDE is to be carried out by qualified operators capable of ensuring that welds are substantially free from significant indications	Radiography and ultrasonic testing, review of documents and patrol of operator, examination of films	Recommendation 20 and 47		Shipbuilders and recognised standards and Rules as applicable, welding and NDE plans, NDE reports, operator qualifications	not required	Identify workstations where NDE is carried out, e.g. panel line butt welds, castings into hull structure	
								Verify NDE carried out in accordance with approved plans where applicable	
								Verify suitability of NDE methods	
								Verify operators suitably qualified particularly where sub-contractors have been employed	
								Verify that records have been completed and in accordance with recognised standards, e.g. IQI and sensitivity recorded	
								Verify that reports and radiographs have been evaluated correctly by the shipbuilder. Systematic review of radiographs carried out by the surveyor	
								Verify equipment calibration satisfactory and in accordance with manufacturers and recognised standards requirements	
								Verify NDE is carried out according to the acceptable process	

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2	Steel preparation and fit up:								
2.1	surface preparation, marking and cutting	traceability and acceptability of material, check of steel plates & profiles materials type, scantling identification, testing marks	patrol	Recommendation 47		material certificates, shipbuilder's marking/cutting production documents at the workstage - documents retained at the facility	not required	Verify stockyard storage satisfactory	
								Verify material traceability, e.g. stamping identification against material certification, archiving of records	
								Verify transfer marking after treatment line	
								Verify standard of shotblasting and priming	
								Verify suitability of primer	
								Verify that steel grades can be identified	
								Verify machinery adjusted to maintain within IACS or manufacturers recommendations.	
								Verify accuracy of marking and cutting	
Verify storage of piece parts.									
2.2	straightening	Approval of straightening methods/ procedures against deformation	patrol and review	Recommendation 47		recognised standards, approved procedures	not required	Verify that straightening processes are approved for the grade and type of steel, e.g. tmcp, z plate.	
								Verify that plates and sections are within recognised tolerances	

Table 1, IACS Unified Requirement Z 23 Rev.2

Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
2.3	forming	Maintain material properties. Acceptance of forming method against improper deformations	patrol	Recommendation 47		Shipbuilders procedure for hot forming	not required	Verify that temperature control is exercised by the operator.	
								Verify that suitable methods of temperature control are available when forming special steels and materials	
								Verify that forming processes are acceptable	
2.4	conformity with alignment/fit up/gap criteria	Check alignment/fit up/gap against reference standards	patrol	Recommendation 47		Shipbuilders and recognised standards and Rules as applicable,	not required	Verify the processes to ensure satisfactory fit up and alignment at all workstations	
								Verify that edge preparations are re-instated where lost during fitting operations	
								Verify remedial procedures are in place to compensate for wide gaps and alignment deviations	

Table 1, IACS Unified Requirement Z 23 Rev.2

Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
2.5	conformity for critical areas with alignment/fit up or weld configuration	Check alignment/fit up/gap against approved drawings	patrol and review	Recommendation 47		Shipbuilders and recognised standards and Rules as applicable, approved plan or standard, builder's records	Approved plans of critical areas if applicable	Verify that the information relevant to the latest approved drawings is available at the workstations	
								Verify the processes to ensure satisfactory fit up and alignment at all workstations	
								Verify that edge preparations are re-instated where lost during fitting operations	
								Verify remedial procedures are in place to compensate for wide gaps and alignment deviations	

Table 1, IACS Unified Requirement Z 23 Rev.2

Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
3	Steelwork process, e.g. sub assembly, block, grand and mega block assembly, pre-erection and erection, closing plates	compliance with approved drawings, visual examination of welding and material, check alignment and deformations	patrol of the process and witness of the completed item	Recommendation 47		approved plans, shipbuilders inspection records, Shipbuilders and recognised standards and Rules as applicable, construction plan (steelwork sub-division)		Verify that the information relevant to the latest approved drawings is available at the workstations	
								Verify that correct weld sizes have been adopted	
								Verify operation of the welding processes at the different work stages is satisfactory	
								Verify that the information relevant to the latest approved drawings is available at the workstations	
								Verify that piece parts are identifiable	
								Verify that fit ups are within recognised tolerances	
								Verify that correct welding requirements specified in reference 1 of this table have been adopted	
								Verify processes for closing plates etc. are acceptable	
								Confirm that steelwork is in accordance with the approved plan	

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Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
4	Remedial work and alteration	welding, check against deformation, alignment	review records and witness	Recommendation 47		permanent record of shipyard surveyable item		Verify that records have been maintained of significant deviations from the approved plans, for situations such as mis cut openings, re-routing outfit items	
								Verify that all deviations brought to the attention of the classification society by the shipbuilder are acceptable	
5	Tightness testing, including leak and hose testing, hydropneumatic testing	Absence of leaks	patrol of the process and witness of the test	UR S14	Reg. II-1/14 of SOLAS as amended;	approved tank testing plan, shipbuilders inspection records	approved tank testing plan	Confirm that tank testing is carried out in accordance with the approved plan	
								Confirm the methods used to carry out leak testing	
								Confirm that correct test pressures maintained for leak, hose and hydro and hydropneumatic testing is satisfactory	
								Verify that adequate records of the tank testing have been maintained	
6	Structural testing	structural adequacy of the design	witness testing	UR S14	Reg. II-1/14 of SOLAS as amended;	approved tank testing plan, shipbuilders inspection records	approved tank testing plan	Confirm that tank testing is carried out in accordance with the approved plan	
								Confirm that correct test pressures maintained for testing is satisfactory	
								Verify that adequate records of the tank testing have been maintained	

Table 1, IACS Unified Requirement Z 23 Rev.2

Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
7	corrosion protection systems, e.g. coatings, cathodic protection, impressed current <u>except for coating system subject to PSPC</u>	Salt water ballast tanks with boundaries formed by the hull envelope, and also bulk carrier hold internal surfaces, coamings and hatch covers shall have an efficient protective coating. Safety aspects of cathodic systems to be dealt with separately.	Review and report on builder's & manufacturer's documentation	UR Z 8 and Z 9, UI SC122, UR F1	Reg. II-1/3-2 of SOLAS as amended;	manufacturer's and builder's specification	corrosion protection specifications	Verify that applied coatings are approved and review records of application	
								Verify that adequate records have been maintained and copied to the ship <u>construction</u> file	
								Verify that adequate records have been maintained and copied to the <u>ship construction</u> file	
	<u>Application Antifouling Systems</u>		Review		AFS Convention	<u>Painting Specification</u>	<u>Paint Specification and Mfg Declaration</u>	Verify that adequate records have been maintained and copied to the <u>ship construction</u> file	
7.1	<u>Application of Protective Coatings for Dedicated Seawater Ballast Tanks in all Types of Ships and Double-Side Skin Spaces of Bulk Carriers subject to PSPC</u>	<u>monitor implementation of the coating inspection requirements</u>	<u>Patrolling and Review</u>	UI SC223, PR34	Reg. II-1/3-2 of SOLAS as amended;	<u>Coating Standard</u>	<u>Coating Technical File</u>	Verify that applied coatings are approved and review records of application in accordance with <u>Chapter 7 of Annex to MSC.215(82).</u>	
8	Installation, welding and testing of the following:								
8.1	hatch covers	tightness and securing	witness	UR S14 & Rec 14	Reg. 13-14-15 and 16 of ILLC '66	approved tank testing plan, shipbuilders inspection records	details required, structural drawings	Confirm leak test of hatch covers	
								Confirm operation and securing test	

Table 1, IACS Unified Requirement Z 23 Rev.2

Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
8.2	doors and ramps integral with the shell and bulkheads	tightness and securing	witness	UR S14	Reg. II-1/18 of SOLAS as amended; Reg. 12 and 21 of ILLC '66	approved tank testing plan, shipbuilders inspection records	details required	Confirm leak test	
								Confirm operation and securing test	
								Confirm safety device operation	
								Ensure correct maintenance logs/manuals supplied with the ship construction file	
8.3	rudders	fitting	witness	UR S14		approved plan, shipbuilders inspection records	details required, structural drawings	Confirm alignment and mounting and fitting up to the connection to the tiller	
								Confirm function test	
								Verify fitting of pintles and all securing bolts	
								Verify all fit up records including all clearances maintained and placed into ship construction file	

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Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
8.4	forgings and castings	compliance with approved drawings, visual examination of welding and material, check alignment and deformations	patrol of the process and witness of the completed item	UR W7 & W8		approved plans, shipbuilders inspection records, Shipbuilders and recognised standards and Rules as applicable, construction plan (steelwork sub-division)	copies of certificates of forgings and castings	Verify casting and forgings against material certificate	
								Verify that correct welding and fit up requirements specified in reference 1, 2.4 and 2.5 of this table have been adopted	
								Verify that material certificates are included in the ship construction file	
	appendages							Verify that correct welding and fit up requirements specified in reference 1, 2.4 and 2.5 of this table have been adopted	

Table 1, IACS Unified Requirement Z 23 Rev.2

Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project	
8.5	equipment forming the watertight and weathertight integrity of the ship, e.g. overboard discharges, air pipes, ventilators	tightness and securing	witness		Reg. II-1/19 of SOLAS as amended; Reg. 17-18-19-20-22-23 of ILLC '66	approved tank testing plan, shipbuilders inspection records	details required	Verify that correct welding and fit up requirements specified in reference 1, 2.4 and 2.5 of this table have been adopted		
								Verify Compliance with Load line Convention 1966 as amended - i.e. all fittings in accordance with the record of freeboard assignment		
				UR P3					Verify air pipes, vents etc closing device are approved type	
								Verify material certificates for overboard discharges where applicable		
								Verify record of freeboard assignment and all material certificates included in the ship construction file		
	Freeboard marks and draft marks	within allowable tolerances and in accordance with the freeboard assignment	witness	UI LL4	Reg. 4- 5- 6- 7 and 8 of ILLC '66		details required	Verify freeboard marks in accordance with load line assignment		
								Verify draft marks in accordance with the agreed tolerances specified by the builder unless more onerous flag state requirements		

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Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference*	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
	Principal dimensions	within allowable tolerances	review and witness	Recommendation 47			details required	Verify principal dimensions in accordance with recognised standard	
								Verify dimensions included in ship construction file	
	Safety Construction certification	no outstanding imperfections or defects	witness		Reg. 10 of SOLAS as amended			Verify that Administration requirements have been incorporated into the hull structure	

Shipbuilder's name	
project	
project duration	
kick off meeting date	
representing builder	
representing class society	

* IACS Recommendations are not mandatory requirements.