07-410

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

Part D Machinery Installations

Rules for the Survey and Construction of Steel Ships
Part D 2007 AMENDMENT NO.2
Guidance for the Survey and Construction of Steel Ships
Part D 2007 AMENDMENT NO.2

Rule No.48 / Notice No.51 27th September 2007
Resolved by Technical Committee on 2nd July 2007
Approved by Board of Directors on 24th July 2007

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RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part D Machinery Installations

2007 AMENDMENT NO.2

Rule No.48 27th September 2007

Resolved by Technical Committee on 2nd July 2007

Approved by Board of Directors on 24th July 2007

Rule No.48 27th September 2007
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Rules for the Survey and Construction of Steel Ships" has been partly amended as follows:

Amendment 2-1

Part D Machinery Installations

Chapter 6 SHAFTINGS

6.2 Materials, Construction and Strength

6.2.12 Shaft Couplings and Coupling Bolts

Sub-paragraph -1. has been amended as follows.

1 The diameter of coupling bolts at the joining face of the couplings is not to be less than the value given by the following formula:

$$d_b = 0.65\underline{\alpha}\sqrt{\frac{{d_0}^3(T_s + 160)}{nDT_b}}$$

Where ;

d_b : Bolt diameter (*mm*)

d_0 : Diameter (*mm*) of intermediate shaft calculated with k_1 = 1.0 and K = 1.0 in **6.2.2**

n : Number of bolts

D : Pitch circle diameter (*mm*)

T_S : Specified tensile strength of intermediate shaft material taken for the calculation in **6.2.2**

T_b : Specified tensile strength of bolt material (N/mm^2), while in general $T_S \le T_b \le 1.7T_S$, and the upper limit of the value of T_b used for the calculation is to be 1,000 N/mm^2

$\underline{\alpha}$: Coefficient concerning vibratory torque, given by the following formula or to be taken as 1.0, whichever is greater

However, $\underline{\alpha}$=1.0 may be accepted for coupling bolts used for shafting systems which transmit power from prime movers to drive generators and auxiliaries.

$$\underline{\alpha = 0.95\sqrt[3]{\frac{Q_a}{Q_m}}}$$

$\underline{Q_a}$: Torsional vibratory torque acting on the joining face of the couplings rotating at resonant critical speed in all conditions (*Nm*)

$\underline{Q_m}$: Nominal rated torque given by the following formula (*Nm*)

$$\underline{Q_m = 9549\frac{H}{N_0}}$$

H : Maximum continuous output of engine (*kW*)

N_0 : Rate of revolutions of intermediate shaft at the maximum continuous output (*rpm*)

EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 1 January 2008.

2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships other than ships for which the application for Classification Survey during Construction is submitted to the Society on and after the effective date.

Amendment 2-2

Chapter 18 AUTOMATIC AND REMOTE CONTROL

18.1 General

18.1.3 Drawings and Data

Paragraph 18.1.3 has been amended as follows.

18.1.3 Drawings and Data

Drawings and data to be submitted are generally, as follows:

(1) Drawings and data concerning automation
  (a) List of measuring points
  (b) List of alarm points
  (c) Control devices and safety devices
    i) List of controlled objects and controlled variables
    ii) Kinds of sources of control energy (self-actuated, pneumatic, electric, etc.)
    iii) List of conditions for emergency stopping, speed reduction (automatic or demand for reduction), etc.

(2) Following drawings and data for the automatic control devices and remote control devices for main propulsion machinery or controllable pitch propellers.
  (a) Operating instructions of main propulsion machinery such as starting and stopping, change-over of direction of revolution, increase and decreased of output, etc.
  (b) Arrangements of safety devices (including those attached to the engines) and pilot lamps
  (c) Controlling diagrams

(3) Following drawings and data for the automatic control devices and remote control devices for boilers:
  (a) Operating instructions of sequential control, feed water control, pressure control, combustion control and safety devices.
  (b) Diagrams for automatic combustion control devices and automatic feed water control devices

(4) Diagrams and operating instructions for automatic control devices for electric generating sets (automatic load sharing devices, preference tripping devices, automatic starting devices, automatic synchronous making devices, sequential starting devices, etc.)

(5) Panel arrangements of monitoring panels, alarming panels and control stands at respective control stations

(6) Drawings and data for the computers and computerized systems specified in **18.2.7**.

18.2 System Design

Paragraph 18.2.7 has been amended as follows.

18.2.7 Computers and Computerized Systems

1 Computerized control systems, alarm systems and safety systems are divided into three categories as shown in **Table D18.1** based upon the impact a single failure has on human and vessel safety, and the environment. These systems are to comply with the requirements in this chapter and the following **-2** through **-4**.

Table D18.1 Computerized System Categories

Category	Effects in case of failure	System functionality
I	Those systems which will not lead to dangerous situations for human safety, safety of the vessel and threat to the environment.	- Systems related with informational or administrative tasks
II	Those systems which could eventually lead to dangerous situations for human safety, safety of the vessel and threat to the environment.	- Alarm systems - Control systems which are necessary to maintain the ship in normal operational and habitable conditions
III	Those systems which could immediately lead to dangerous situations for human safety, safety of the vessel and threat to the environment.	- Control systems for maintaining the vessel's propulsion and steering - Safety systems

2 Computers used for the control systems, alarm systems and safety systems for the machinery and equipment, considered necessary by the Society, are to comply with the following.

(1) Reliability and maintainability
The reliability and maintainability of computerised systems are not to be inferior to those of the systems not relying upon computers.

(2) Requirements for Computers
- (a) The composition of computers is to be so planned that the extent of effect due to a failure of part of circuits or components is limited to a minimum as far as possible.
- (b) Each component is to be protected against over voltage (electric noise) which may intrude from an input or output terminal.
- (c) Central processing units and important associating apparatus are to have self-monitoring function.
- (d) Important programs and data are to be made not to come to extinction where electrical supply from outside may temporarily stop.
- (e) Computers are to be so composed as to re-start in a short time in accordance with the planned order when electrical power is restored after a power failure.
- (f) Spare parts for important composing elements which require special technique for repair work, are to be supplied by easily replaceable units.
- (g) Change-over to the back-up means is to be easily and surely possible.

(3) Back-up means
- (a) ~~In case where fuel control (governor control, electronic injection control, etc.) and remote control of main propulsion machinery of diesel ships or turbine ships, and rotational speed control or load control and remote control of main propulsion machinery in electric propulsion ships are carried out by one computer, a stand-by computer which can be changed over and put into operation in a short time in the event of failure of the computer in service is to be provided.~~ Where one computer simultaneously performs fuel control (governor control, electronic injection control,

etc.) and remote control of main propulsion machinery in diesel or turbine ships, or output control (rotational speed control, load control, etc.) and remote control of main propulsion machinery in electric propulsion ships, one of the following systems is to be provided in case of a computer failure. However, where this requirement is impracticable, the systems are to comply with the requirements deemed appropriate by the Society.

i) Stand-by computer

ii) Governor controlled back-up systems operated at the main control station

(b) Important safety systems utilizing computers are to be provided with a means of back-up which can be used in a short time in the event of failure of the computer in service.

(c) Where visual display units (VDU) are adopted as the indicators for the alarm systems stipulated in this chapter, at least two VDUs are to be installed or other arrangements deemed appropriate by the Society are to be considered.

(4) ~~Composition~~ Components of computerized systems ~~utilizing computers~~

~~The separation of control systems and safety systems utilizing computers is, as a rule, to comply with the requirements in **18.2.4-1** and **18.2.6-1**, but where this is impracticable special consideration will be given each case.~~

The separation of computerized control systems and safety systems are to comply with the requirements in **18.2.4-1** and **18.2.6-1** respectively. However, where these requirements are impracticable, the systems are to comply with the requirements deemed appropriate by the Society.

3 The communication links for transferring data between separated terminals of the systems categorized in Categories II and III in **Table D18.1** are to comply with the following.

(1) Where the failure of a single component of the data communication link results in loss of data communication, means are to be provided for the automatic restoration of the link.

(2) Where the data communication link covers two or more systems from among control systems, alarms systems and safety systems specified in this chapter, the link including cables is to be installed in duplicate; unless there are alternate means of performing the same functions without the use of the link.

(3) The data communication link is to be self-checking and visual and audible alarms are to be activated when failures in the link are detected.

4 Where system specifications are modified, the following items are to be complied with.

(1) The systems categorized in Categories II and III in **Table D18.1** are to be protected against program modification by end users.

(2) For the systems categorized in Category III in **Table D18.1**, modifications of parameters by manufacturers are to be approved by the Society.

(3) Any modifications made after shipment are to be documented and traceable.

18.5 Automatic and Remote Control of Electric Generating Sets

18.5.2 Emergency Source of Electric Power

In sub-paragraph (1), "**Table D18.1**" has been amended to "**Table D18.2**".

(1) Alarm devices to be activated in the event of the abnormal conditions given in ~~**Table D18.1**~~ **Table D18.2** are to be provided.

Table D18.1 has been renumbered to Table D18.2.

~~Table D18.1~~ Table D18.2 Alarms for Diesel Engines to Drive Emergency Generators

18.7 Tests

18.7.1 Shop Tests

Sub-paragraph (2) has been amended as follows.

(2) Completion tests of automatic equipment
The automatic devices which have passed through the environmental tests specified in **(1)** are to be subjected to the following tests after completion of assembly as automatic equipment. The procedures of the tests are to ~~be~~ comply with the requirements deemed appropriate by the Society.
(a) External examination
(b) Operation tests and performance tests
(c) Insulation resistance tests and high voltage tests (to be applied to ~~electric devices, electronic devices and so on~~ electric/electronic devices etc.)
(d) Pressure tests (to be applied to ~~hydraulic devices, pneumatic devices and so on~~ hydraulic/pneumatic devices etc.)
(e) Confirmation of the effective implementation of quality control of software and documentation of software modification history
~~(e)~~ (f) Other tests deemed necessary by the Society

EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 1 January 2008.
2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships for which the date of contract for construction* is before the effective date.
*"contract for construction" is defined in IACS Procedural Requirement(PR) No.29 (Rev.4).

IACS PR No.29 (Rev.4)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.
For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:
(1) such alterations do not affect matters related to classification, or
(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Notes:

1. This Procedural Requirement applies to all IACS Members and Associates.
2. This Procedural Requirement is effective for ships "contracted for construction" on or after 1 January 2005.
3. Revision 2 of this Procedural Requirement is effective for ships "contracted for construction" on or after 1 April 2006.
4. Revision 3 of this Procedural Requirement was approved on 5 January 2007 with immediate effect.
5. Revision 4 of this Procedural Requirement was adopted on 21 June 2007 with immediate effect.

Amendment 2-3

Chapter 18 AUTOMATIC AND REMOTE CONTROL

18.7 Tests

18.7.1 Shop Tests

Sub-paragraph (1) has been amended as follows.

(1) Environmental tests
Devices, units and sensors (hereinafter referred to as "automatic devices" in this Part) and automatic equipment composed of automatic devices are to be subject to the following tests at the manufacture's works. The procedures of the tests are to comply with the requirements deemed appropriate by the Society.
(a) External examination
(b) Operation test and performance test
(c) Electrical power supply failure test (to be applied to ~~electrical devices, electronic devices and so on~~ electrical/electronic devices, etc.)
(d) Electrical power supply fluctuation test (to be applied to ~~electrical devices, electronic devices and so on~~ electrical/electronic devices, etc.)
(e) Power supply fluctuation test (to be applied to ~~hydraulic devices, pneumatic devices and so on~~ hydraulic/pneumatic devices, etc.)
(f) Insulation resistance test (to be applied to ~~electrical devices, electronic devices and so on~~ electrical/electronic devices, etc.)
(g) High voltage test (to be applied to ~~electrical devices, electronic devices and so on~~ electrical/electronic devices, etc.)
(h) Pressure test (to be applied to ~~hydraulic devices, pneumatic devices and so on~~ hydraulic/pneumatic devices, etc.)
(i) Dry heat test
(j) Damp heat test
(k) Vibration test
(l) Inclination test（to be applied to equipment with moving parts）
(m) Cold test
(n) Salt mist test（to be applied to devices installed in unenclosed spaces such as open decks）
(o) Electrostatic discharge immunity test (to be applied to electronic devices)
(p) Radiated radio frequency immunity test (to be applied to electronic devices)
(q) Conducted low frequency immunity test (to be applied to electronic devices)
(r) Conducted high frequency immunity test (to be applied to electronic devices)
(s) Burst/Fast transient immunity test (to be applied to electronic devices)
(t) Surge immunity test (to be applied to electronic devices)
(u) Radiated emission test（to be applied to electronic devices that emit the electromagnetic wave）
(v) Conducted emission test（to be applied to electronic devices that emit the electromagnetic wave）

(w) Flame retardant test (to be applied to flammable enclosures of equipment)
~~(w)~~ (x) Other tests considered necessary by the Society

EFFECTIVE DATE AND APPLICATION (Amendment 2-3)

1. The effective date of the amendments is 1 January 2008.

2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships other than ships for which the application for Classification Survey during Construction is submitted to the Society on and after the effective date.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part D Machinery Installations

2007 AMENDMENT NO.2

Notice No.51 27th September 2007

Resolved by Technical Committee on 2nd July 2007

Notice No.51 27th September 2007
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Guidance for the Survey and Construction of Steel Ships" has been partly amended as follows:

Amendment 2-1

Part D MACHINERY INSTALLATIONS

D12 PIPES, VALVES, PIPE FITTINGS AND AUXILIARIES

D12.3 Construction of Valves and Pipe Fittings

Paragraph D12.3.3 has been added as follows:

D12.3.3 Mechanical Joint
The "mechanical joints (that) are to be of approved type" stipulated in **12.3.3-1, Part D of the Rules** refer to mechanical joints approved in accordance with **Chapter 9, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.

EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 1 October 2007.

Amendment 2-2

D2 DIESEL ENGINES

D2.4 Safety Devices

Paragraph D2.4.5 has been added as follows:

D2.4.5 Crankcase Oil Mist Detection Arrangements

The "crankcase oil mist detection arrangements required to be fitted to engines (that) are to be approved type" stipulated in **2.4.5, Part D of the Rules** refer to crankcase oil mist detection arrangement approved in accordance with **Chapter 6, Part 7 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.

EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 1 January 2008.

Amendment 2-3

D18 AUTOMATIC AND REMOTE CONTROL

D18.1 General

Paragraph D18.1.3 has been amended as follows.

D18.1.3 Drawings and Data

~~In case where computers specified in **D18.2.7-1** and **-2** are used, the following drawings and data are to be submitted to the Society:~~

~~(1) Drawings, etc.~~

~~(a) System diagram of computer (block diagram showing principal system components, the flow of data and control signals)~~

~~(b) List of input and output signals of computer (showing application and kind of signals)~~

~~(c) List of spare parts~~

~~(2) Data~~

~~Brief service instructions on the following items:~~

~~(a) Function of principal system components~~

~~(b) Power supply system to each of system components (may be including in **(1)(a)** above)~~

~~(c) Self-monitoring function~~

~~(d) Protection against power failure and restarting procedure after recovery of power supply~~

~~(e) Changing procedure to back-up means~~

~~(f) Replacing procedures of spare parts~~

The drawings and data stipulated in **18.1.3(6), Part D of the Rules** refer to the following items that are standard for the systems categorized in Categories II and III in **Table D18.1**. With respect to automatic devices and equipment which are already approved by the Society, only the data on the parts that differ from ship to ship need to be submitted.

(1) Hardware description

(a) System block diagrams, showing the arrangement, input and output devices and interconnections

(b) Connection diagrams including data communication, electrical power circuit diagrams

(c) Back-up systems and back-up procedures

(d) Protections against power failure and procedures for restarting the system after recovery of power

(2) Software description

(a) Operating Systems and data communication software

(b) Intended functions

(c) Application software, control logic

(d) Detailed descriptions of control and monitoring equipment, and safety systems

(3) Quality control of software

(a) Quality standards

(b) A quality plan for software lifecycle
(c) Quality assurance procedures in production

(4) Documentation of software modification
Work procedures for modifying program contents and data including upgrades

(5) Failure analysis for systems
(a) Verification process and results (including counter measures) by failure analysis methods such as FTA, FMEA and FMECA
(b) Evidence that the failure of a system of Category I will not impact human safety, safety of the vessel, or the environment

(6) Test procedures for hardware
Procedures according to the requirements of **18.7.1, Part D of the Rules**

(7) Test procedures for software
Procedures to verify that systems interact correctly to perform the intended functions and do not perform unintended functions (the test is carried out in each module, subsystem and whole system, if necessary)

(8) Test procedures to verify the integration of systems at factory (including failure simulation)
(a) Operation test procedures for the completed system combining actual hardware and finalized software which were verified according to (6) and (7)
(b) Confirmation method for the adequacy of the results of failure analysis methods such as FTA, FMEA and FMECA

(9) On-board test procedures
Operation test procedures on board of the systems after installation of the software

(10) Detail descriptions of system modifications and their verification test procedures (where the modification influences the functionality or safety of the systems)

(11) Spare parts and replacement procedures

D18.2 System Design

Paragraph D18.2.7 has been amended as follows.

D18.2.7 Computers and Computerized Systems

1 Examples of computerized systems relevant to **Table D18.1, Part D of the Rules** are shown in the **Table D18.2.7-1**. Where independent effective backup or other means of averting danger is provided, a category III system may be downgraded to category II.

~~**1**~~**2** The computers "considered necessary by the Society" specified in **18.2.7, Part D of the Rules** means those used for the following systems in general. In this case, programmable controllers such as sequencers are included.

(1) Control systems for the machinery and equipment specified in **18.1.1-1(1)** through **(5), Part D of the Rules**
(2) Alarm systems specified in **18.2.5, Part D of the Rules**
(3) The safety systems for the machinery and equipment specified in **18.1.1-1, Part D of the Rules**~~. However, the systems provided individually for each machinery or equipment may be excluded.~~
(4) Control systems, alarm systems and safety systems relevant to **Table D18.1, Part D of the Rules**

~~**2** In case where the control systems and alarm systems specified in **-1** above are formed by an aggregate of computers charged with individual function (hereinafter referred to as the "one loop controller"), the requirements of **18.2.7, Part D of the Rules** may not apply. However, the master computers provided to form each system specified in **-1(1)** and **(2)** above by regulating a number of one loop controller are to be in accordance with the requirements of **18.2.7, Part D of the Rules**.~~

3 "The extent of effect due to a failure of part of circuits or components is limited to a minimum" specified in **18.2.7-2(2)(a), Part D of the Rules** means, for example, that in a system always controlled by two or more computers, the system can be made to cope with the failure of one computer without hindering performance.

4 The requirements "deemed appropriate by the Society" specified in **18.2.7-2(3)(a), Part D of the Rules** mean that the results of a failure analysis such as FMEA on the system are satisfactory and approved by the Society.

~~**3**~~**5** ~~The wording "back-up means"~~ "Means of back-up" specified in ~~**18.2.7(3)(b)**~~ **18.2.7-2(3)(b), Part D of the Rules** ~~means~~ refer to either of the following~~s~~ pieces of equipment or systems.

(1) Safety systems ~~without relying~~ that do no rely on computers

(2) ~~Back-up~~ Stand-by computers

6 "Other arrangements deemed appropriate by the Society" specified in **18.2.7-2(3)(c), Part D of the Rules** mean, for example, the combination of a VDU and an alarm printer.

~~**4**~~**7** ~~The wording "special consideration" specified in **18.2.7(4), Part D of the Rules** means as follows.~~ "Requirements deemed appropriate by the Society" specified in **18.2.7(4) 18.2.7-2(4), Part D of the Rules** mean the following.

(1) Where secondary control systems or ~~back-up~~ stand-by computers are installed for the control systems specified in ~~**-1(1)**~~ **-2(1)** above, the independence of the control systems may not be required for an individual machinery or equipment. In this case, the local control equipment fitted to the main propulsion machinery in accordance with the requirements of **18.3.2-3(2), Part D of the Rules** may not be regarded as the secondary control systems.

(2) Where the safety systems are conformed to the requirement in ~~**-3**~~ **-5** above, the independence for individual machinery and equipment in the systems, and the independence from the other systems may not be required.

(3) Where the secondary systems or ~~back-up~~ stand-by computers are installed in both of the control systems and the safety systems, the independence for individual machinery and equipment in their systems including alarm systems, and the independence from the other systems may not be required.

8 "Parameters" specified in **18.2.7-4(2), Part D of the Rules** mean the settings specified in relevant chapters of the equipment specified in **18.1.1-1, Part D of the Rules**.

Table D18.2.7-1 Examples of Computerized Systems

Category	Examples
I	- Maintenance support systems - Information and diagnostic systems
II	- Alarm and monitoring systems - Main propulsion remote control systems - Governor control systems - Control systems for auxiliary machinery - Bilge systems - Other systems considered necessary by the Society
III	- Control systems for propulsion with steering - Electronic fuel injection systems for main diesel engines - Burner control systems (for main boiler and essential auxiliary boiler defined in **9.1.2(2), Part D of the Rules**) - Power supply control systems - Other systems considered necessary by the Society

D18.3 Automatic and Remote Control of Main Propulsion Machinery or Controllable Pitch Propellers

D18.3.2 Remote Control Devices for Main Propulsion Machinery or Controllable Pitch Propellers

Sub-paragraph -4 has been amended as follows.

4 ~~The wording~~ "~~f~~Failure of remote control systems of main propulsion machinery or controllable pitch propellers" specified in **18.3.2-3, Part D of the Rules** means ~~a loss of power supply sources (electric, pneumatic or hydraulic power) of the remote control systems.~~the following.

(1) A loss of power supply sources (electric, pneumatic or hydraulic power) of the remote control systems

(2) A failure of computers where computerized systems are adopted

Sub-paragraph -6 has been added.

6 In application of the requirements of **18.3.2-3(5), Part D of the Rules**, where an emergency stop device is set into the electrical system and operated by electrical power, loss of power and discontinuity are to be monitored.

EFFECTIVE DATE AND APPLICATION (Amendment 2-3)

1. The effective date of the amendments is 1 January 2008.

2. Notwithstanding the amendments to the Guidance, the current requirements may apply to ships for which the date of contract for construction* is before the effective date.
*"contract for construction" is defined in IACS Procedural Requirement(PR) No.29 (Rev.4).

IACS PR No.29 (Rev.4)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.
For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:
(1) such alterations do not affect matters related to classification, or
(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.
The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Notes:

1. This Procedural Requirement applies to all IACS Members and Associates.
2. This Procedural Requirement is effective for ships "contracted for construction" on or after 1 January 2005.
3. Revision 2 of this Procedural Requirement is effective for ships "contracted for construction" on or after 1 April 2006.
4. Revision 3 of this Procedural Requirement was approved on 5 January 2007 with immediate effect.
5. Revision 4 of this Procedural Requirement was adopted on 21 June 2007 with immediate effect.

Amendment 2-4

Annex D1.1.3-3 GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF AZIMUTH THRUSTERS

1.4 Construction and Strength

Paragraph 1.4.6 has been amended as follows.

1.4.6 Strengthening for Navigation in Ice

Thrusters in ships intended to be registered with the ice-strengthened class notation are to comply with the requirements specified in ~~Chapter 28, Part C~~**Chapter 5, Part I of the Rules**.

Annex D5.3.5 GUIDANCE FOR CALCULATION OF STRENGTH OF GEARS

1.5 Loading Factors

Paragraph 1.5.1 has been amended as follows.

1.5.1 Application Factor, K_A

1 The application factor, K_A, accounts for dynamic overloads from source external to the gearing. K_A for gears designed for infinite life is defined as the ratio between the maximum repetitive cyclic torque applied to the gear set and the nominal rated torque. The nominal rated torque is defined by the rated power and speed and is the torque used in the rating calculations. The factor mainly depends on:

(1) characteristics of driving and driven machines;
(2) ratio of masses;
(3) type of couplings;
(4) operating conditions (over speed, changes in propeller load conditions, etc.)

2 When operating near a critical speed of the drive system, a careful analysis of conditions is to be made. The application factor K_A is to be determined by measurements or by system analysis acceptable to the Society. Where a value determined in such a way cannot be supplied, the following values may be used;

(1) Main propulsion

K_A = 1.00 (diesel engine with hydraulic or electromagnetic slip coupling)
= 1.30 (diesel engine with high elasticity coupling)
= 1.50 (diesel with other couplings)

Where the vessel, on which the reduction gear is being used, is receiving Ice Class Notation, the following value is to be substituted for above K_A.

$$K_A + \frac{1.10}{1 + J_1 / J_h} \cdot \frac{M}{M_0}$$

Where J_1, J_h, M and M_0 are the same as those specified in ~~28.2.10, Part C~~**5.4.5, Part I of the Rules**.

(2) Auxiliary gears

K_A = 1.00 (electric motor, diesel engine with hydraulic or electromagnetic slip coupling)

= 1.20 (diesel engine with high elasticity coupling)

= 1.40 (diesel with other couplings)

EFFECTIVE DATE AND APPLICATION (Amendment 2-4)

1. The effective date of the amendments is 1 March 2008.

2. Notwithstanding the amendments to the Guidance, the current requirements may apply to ships for which the date of contract for construction* is before the effective date.

*"contract for construction" is defined in IACS Procedural Requirement(PR) No.29 (Rev.4).

IACS PR No.29 (Rev.4)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.

For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:

(1) such alterations do not affect matters related to classification, or

(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Notes:

1. This Procedural Requirement applies to all IACS Members and Associates.
2. This Procedural Requirement is effective for ships "contracted for construction" on or after 1 January 2005.
3. Revision 2 of this Procedural Requirement is effective for ships "contracted for construction" on or after 1 April 2006.
4. Revision 3 of this Procedural Requirement was approved on 5 January 2007 with immediate effect.
5. Revision 4 of this Procedural Requirement was adopted on 21 June 2007 with immediate effect.