UNDERWATER VEHICLES, SYSTEMS AND HYPERBARIC FACILITIES 2002

NOTICE NO. 6 – October 2008

The following Rule Changes were approved by the ABS Rules Committee on 3 June 2008 and become **EFFECTIVE AS OF 1 JANUARY 2009.**

(See http://www.eagle.org/absdownloads/index.cfm for the consolidated version of the Rules for Building and Classing Underwater Vehicles, Systems and Hyperbaric Facilities, 2002, with all Notices and Corrigenda incorporated.)

Notes - The date in the parentheses means the date that the Rule becomes effective for new construction based on the contract date for construction, unless otherwise noted. (See 1-1-4/3.3 of the ABS Rules for Conditions of Classification (Part 1).)

SECTION 3 GENERAL REQUIREMENTS AND SAFEGUARDS

(Revise Subsection 3/7, as follows.)

7 Emergency Locating Devices *(2009)*

A surface locating device such as a strobe light or VHF radio and a subsurface locating device such as an acoustic pinger, sonar reflector or buoy are to be provided. Surface detectors or other equipment as required for the detection of subsurface locating devices is to be available.

Diving bells and other similar tethered units are to have an emergency locating device designed to operate in accordance with paragraph 2.12.5 of IMO Resolution A.831 (19) "Code of Safety for Diving Systems" (see Appendix 6).

Electric locating devices not designed and equipped to operate using a self-contained power source are to be arranged to be powered by both the normal and the emergency power supplies. Non-electric locating devices are to be deployable without electric power.

(Add new Subsection 3/33, as follows.)

33 Hyperbaric Evacuation Systems *(2009)*

Hyperbaric Evacuation Systems are to be designed, constructed and tested in accordance with the applicable requirements of these Rules and IMO Resolution A.692(17) "Guidelines and Specifications for Hyperbaric Evacuation Systems".

SECTION 7 WINDOWS AND VIEWPORTS

3 Definitions *(2002)*

(Revise Paragraph 7/3.3, as follows.)

3.3 Service Life *(2009)*

The *Service Life* of an acrylic window is the maximum length of time and/or number of cycles that an acrylic window may be used in a pressure vessel for human occupancy.

(Revise first paragraph of Subsection 7/7, as follows.)

7 Design Parameters and Operating Conditions *(2009)*

The windows of underwater vehicles and hyperbaric installations are subject to the design parameters contained in the latest edition of ASME PVHO-1. The design parameters below are based on ASME PVHO-1-2007. It is the responsibility of the designer to determine that these requirements are consistent with the latest edition of the ASME PVHO-1 safety standard.

(Remainder of text is unchanged.)

(Revise Subsection 7/9, as follows.)

9 Certification *(2009)*

Copies of the following certifications are to be submitted for each window:

9.1 Design Certification

A design certification is to be provided for each window and viewport assembly design. This document is to certify that the design complies with ASME PVHO-1. The certificate is to include the information required by Form VP-2 in Section 2 of ASME PVHO-1.

9.3 Material Manufacturer's Certification

The manufacturer of the acrylic material is to provide a document certifying that the material complies with ASME PVHO-1. The Acrylic material is to be marked so as to be traceable to this certificate. The certificate is to include the information required by Form VP-3 in Section 2 of ASME PVHO-1.

9.5 Material Testing Certification

After annealing, material acceptance tests are to be performed by the material manufacturer or by an independent testing laboratory. The material acceptance tests are to be documented by a certificate that includes the information required by Form VP-4 in Section 2 of ASME PVHO-1.

9.7 Pressure Testing Certification

Window pressure testing in accordance with Subsection 7/19 is to be documented by a certificate. The certificate is to include the information required by Form VP-5 in Section 2 of ASME PVHO-1.

9.9 Fabrication Certification

The window fabricator is to provide an overall window certification confirming that the window was fabricated in compliance with these Rules and ASME PVHO-1. The certificate is to provide traceability of the window through all stages of manufacture and fabrication and is to include the information required by Form VP-1 in Section 2 of ASME PVHO-1.

19 Pressure Testing *(2009)*

(Revise Paragraph 7/19.13, as follows.)

19.13 *(2009)*

A hydrostatic or pneumatic test in excess of design pressure may be substituted for the tests specified in 7/19.3 and 7/19.5 for windows with a design temperature of 52°C (125°F) or less. During the hydrostatic or pneumatic test, the pressure shall be maintained for a minimum of 1, but not more than 4, hours. The test pressure shall not exceed 1.5 times the design pressure or 138 MPa (20,000 psi), whichever is the lesser value. To prevent permanent deformation of windows tested above design pressure, the temperature of the pressurizing medium during the test shall be at least 14°C (25°F) lower than the design temperature. For windows with a 10°C (50°F) design temperature, the temperature of the pressurizing medium during the test shall be 0°C to 4°C (32°F to 40°F). All the other requirements of the mandatory pressure test specified in Paragraphs 7/19.7, 7/19.9 and 7/19.11 remain applicable.

(Delete Paragraph 7/19.15.)

SECTION 8 LIFE SUPPORT AND ENVIRONMENTAL CONTROL SYSTEMS

5 Design Principles

(Revise Paragraph 8/5.1, as follows.)

5.1 General *(2009)*

All units are to be provided with equipment to generate, monitor and maintain suitable life support conditions inside the living compartment.

One atmosphere chambers/systems are to be designed so that the concentration of O_2 (oxygen) will be kept within the limits of 18.0 to 23.0 percent by volume and the concentration of CO_2 (carbon dioxide) will never exceed 0.5 percent by volume.

Hyperbaric chambers/systems are to be designed so that the partial pressure of O_2 is kept within the appropriate limits for the particular application (mixed gas diving, saturation diving, etc.) as specified in the US Navy Diving Manual or an equivalent recognized national or international standard. The partial pressure of CO_2 is not to exceed 0.005 atmosphere absolute (ata) for all applications.

Systems are to be such that adequate quantities of gases for operation at the maximum pressure for normal and emergency conditions are provided. For hyperbaric chambers/systems, a sufficient supply of gases essential for the desaturation (or decompression) period in accordance with the applicable decompression table is to be kept available for the expected maximum number of personnel.

(Revise table in Paragraph 8/5.3, as follows.)

5.3 Standard Person *(2009)*

The following table is provided as a reference for performing life support calculations.

Item		*Quantity*	*Units (per person)*
Oxygen (O_2) Consumption		0.038 (0.083)	kg (lbs.) per hour at 1 atm
Drinking Water		2.72 (6)	kg (lbs.) per day
Food, Dry		0.64 (1.4)	kg (lbs.) per day
Carbon Dioxide (CO_2) Produced		0.0523 (0.115)	kg (lbs.) per hour at 1 atm
Water Vapor Produced		1.81 (4)	kg (lbs.) per day
Urine		1.81 (4)	kg (lbs.) per day
Feces		0.18 (0.4)	kg (lbs.) per day
Flatus		0.1	cu. ft. per day
Heat Output	Sensible	250	BTU per hour
	Latent	220	BTU per hour

7 Breathing Gas

(Revise Paragraph 8/7.1, as follows.)

7.1 Oxygen Supply *(2009)*

Oxygen supply systems are to be capable of supplying oxygen at the rate of 0.038 kg (0.083 lbs) per hour per person at 1 atmosphere.

9 Carbon Dioxide (CO_2) Removal Systems

(Revise Paragraph 8/9.1, as follows.)

9.1 Capacity *(2009)*

CO_2 removal systems are to be provided and are to be capable of maintaining the CO_2 concentration at or below 0.5 percent by volume referenced to standard temperature and pressure [a CO_2 mass of 0.00989 kg/m^3 at 1 atmosphere and 0°C (0.000572 lbm/ft^3 at 1 atmosphere and 70°F)] or 0.005 ata. Systems are to be designed based upon an assumed CO_2 production rate of 0.0523 kg (0.115 lbs.) per hour per person at 1 atmosphere. Design calculations are to take into account temperature, humidity, CO_2 density at rated depth, absorption efficiency, and flow rate. See also Subsection 11/5.

13 Emergency Life Support System

(Revise Paragraph 8/13.3, as follows.)

13.3 CO_2 *(2009)*

The system is to be designed such that CO_2 levels in the gas being breathed do not exceed 1.5 percent by volume referenced to standard temperature and pressure [a CO_2 mass of 0.0297 kg/m^3 at 1 atmosphere and 0°C (0.00185 lbm/ft^3 at 1 atmosphere and 70°F)] or 0.015 ata.

15 Distribution Piping

15.7 Supply Piping *(2009)*

(Delete Subparagraph 8/15.7.4 and renumber subsequent Subparagraphs accordingly.)

APPENDIX 4 CERTIFICATION OF HANDLING SYSTEMS

(Renumber existing Paragraphs A4/3.3 and A4/3.5 as A4/3.5 and A4/3.3 and revise. Revise Paragraph A4/3.7. Delete Paragraph A4/3.9)

3 Definitions *(2009)*

3.1 Handling System (Launch and Recovery System) *(2002)*

A system supporting launch, recovery and other handling operations of underwater units, hyperbaric facilities and their ancillary equipment and may include cranes, booms, masts, frames, davits, foundations, winches and associated hydraulic and electrical systems as necessary for the intended operations.

3.3 Rated Load or Safe Working Load *(2009)*

The rated load or safe working load is the maximum load that the assembled handling system is certified to lift at its rated speed when the outermost layer of rope or umbilical is being wound on the winch drum, under the parameters specified in the equipment specifications (e.g., hydraulic pressures, electrical current, electrical voltages, etc.).

3.5 Design Load *(2009)*

The design load is the maximum expected load on the handling system which consists of an appropriate combination of the rated load (see A4/3.3), dynamic effects associated with the rated load, weight of the rigging (hooks, blocks, deployed rope, etc.) and other applicable loads such as, wind load, drag, added mass effect and weight of entrained mud and water. See also Subsection A4/9.

3.7 Rigging *(2009)*

Rigging is a general term for all ropes and other gear (hooks, blocks, etc.) used in handling systems.

3.7.1 Running Rope

Running rope consists of moving or movable rope (wire rope, fiber or synthetic line) that passes over sheaves or through rollers and is used for hoisting, lowering or moving equipment.

3.7.2 Standing Rope

Standing rope consists of non-moving or non-movable rope that provides support to the structures of the handling system such as the A-frame, masts, etc.

3.7.3 Rotation-Resistant Rope

A rope designed to resist spin or rotation under load.

5 Submission of Plans, Calculations and Data

(Revise first and third bullets of Paragraph A4/5.1, as follows.)

5.1 Plans *(2009)*

The following plans are required for the Bureau's review and approval and are to be submitted as applicable to the particular design features:

- General arrangements showing the equipment locations and indicating the safe working load of the assembled handling system
- Details indicating sizes, sections, and locations of all structural members
- Winch drum and flange details
- Material specifications
- Dimensioned weld joint details
- Welding procedures and NDT methods
- Type and size of rivets, bolts, and foundations
- Foundation and support arrangements
- Hydraulic piping systems, materials, sizes, details of fittings, and valves and overpressure protective devices
- Electrical systems, cable, and wiring types and sizes, nominal characteristics and overcurrent protection settings of all electrical protections
- Rope sizes and data indicating material, construction, quality, and breaking strength
- Manufacturer's ratings, braking capabilities, and power drive requirements for electrical, hydraulic, and mechanical equipment
- Details of emergency source of power

9 Design

9.1 Factors of Safety

(Revise Subparagraphs A4/9.1.1 and A4/9.1.2, as follows.)

9.1.1 Wire Rope *(2009)*

The factor of safety is to be not less than 5 for both conventional and rotation-resistant running rope. The factor of safety for standing rope is to be not less than 4.0. These factors of safety are to be based on the design load of the system as compared to the minimum breaking strength of the rope.

9.1.2 Fiber and Synthetic Rope *(2009)*

Safety factors for fiber and synthetic rope except nylon are to be not less than 7.0 for running rope and 5.0 for standing rope based on the design load of the system as compared to the minimum breaking strength of the rope. Safety factors for nylon rope are to be not less than 9.0 for running rope and 7.0 for standing rope.

25 Surveys and Tests During Construction

(Revise Paragraph A4/25.3, as follows.)

25.3 Static Load Tests *(2009)*

A static test load of 100% of the design load is to be applied to the structural components of the completed handling system in the presence of the Surveyor.

APPENDIX 6 IMO – DIVING BELL EMERGENCY LOCATING DEVICE

(Revise first paragraph, as follows.)

(2009) Code of Safety for Diving Systems, Para. 2.12.5 of IMO Res. A.831 (19).

.2 Diver-held Interrogator/Receiver

(Revise table in .2.2, as follows.)

.2.2 (2009)

The interrogator/receiver should be designed to operate with the following characteristics:

Common emergency reply frequency	37.5 kHz
Individual interrogation frequencies:	
channel A	38.5 kHz
channel B	39.5 kHz
Minimum transmitter output power	85 db referred to 1 μbar at 1 m
Transmit pulse	4 ms
Directivity	±15°
Capability to zero range on transponder	
Maximum detectable range	more than 500 m