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THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD SUBGROUP INSPECTION

MINUTES

Meeting of January 15th, 2019
San Antonio, TX

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The National Board of Boiler & Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, Ohio 43229-1183
Phone: (614)888-8320
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1. **Call to Order**

The meeting was called to order at 8:02 a.m. on January 15, 2019 by Chairman, Mr. Darrell Graf.

2. **Introduction of Members and Visitors**

The attendees are identified on the attendance sign in sheet (**Attachment Pages 1-2)**. With the attached attendance listing, a quorum was established.

3. **Announcements**

Announcements were made to the Subgroup by Secretary, Ms. Jodi Metzmaier and Main Committee Chairman, Bob Wielgoszinski.

After the announcements, Ms. Metzmaier handed out a 5 year Service Award pin to Mr. Ernest Brantley.

4. **Adoption of the Agenda**

- Add M. Byrum as a nominee for membership

The above item was added to the agenda and a motion was made to adopt the agenda as revised. The motion was seconded and unanimously approved.

5. **Approval of the Minutes of July 17th, 2018 Meeting**

A motion was made to approve the minutes from the July 2018 NBIC meeting. The motion was seconded and unanimously approved.

6. **Review of Rosters (Attachment Page 1)**

a. **Membership Nominations**

Mr. Marvin Byrum (Interest category: Jurisdictional Authority) has attended 2 previous meetings and would now like to become a member of the Subgroup on Inspection (see **attachment pages 3-5**).

Mr. Byrum addressed the Subgroup as to why he would like to become a member and how his experience and knowledge would benefit the group. The Subgroup discussed the nominee and a motion was made to recommend Mr. Byrum join the Subgroup on Inspection. The motion was seconded and unanimously approved.

b. **Membership Reappointments**

Mr. Welch, Mr. Mooney, and Mr. Newton all have memberships to the Subgroup that expire on 1/31/2019

Mr. Welch, Mr. Mooney and Mr. Newton have all stated they would like to continue being a member of the Subgroup Inspection. A motion was made to reappoint all 3 members. The motion was seconded and unanimously approved.

c. **Officer Appointments**

There were no officer appointments at this time.

7. Open PRD Items Related to Inspection

- NB14-0602B – Improve index in Part 2 relating to pressure relief devices – D. Marek (PM)
- NB15-0321 – Review testing requirements for inservice testing of pressure relief devices in Part 2, 2.5.7 a) – A. Renaldo (PM)
- NB15-0324 – guidelines for storage/shelf life in regard to inspection and testing frequencies – A. Renaldo (PM)
- 17-132 – Paragraph 3.2.6 in Part 4 can be put into tabular format (Part 2, 2.5.8) – B. Nutter (PM), M. Brodeur, D. Marek, D. DeMichael, A. Cox, P. Dhobi, R. McCaffrey, T. Beirne

The PRD items listed above were discussed by the Subgroup on Inspection. The group wanted further information on a few of the items. Mr. Newton spoke with the PRD Subgroup and reported back to the Subgroup on Inspection. The information provided was sufficient for the time being. The Subgroup Inspection will wait until the PRD Subgroup is further along with their proposals before expressing any possible concerns.

8. Interpretations

There were no Interpretations for the Subgroup Inspection.

9. Action Items

Item Number: 18-27	**NBIC Location: Part 2, S12.5**	**Attachment Page 6**
General Description: CO2 Detector Placement **Subgroup:** Inspection **Task Group:** V. Newton (PM), D. Graff, E. Brantley, M. Horbaczewski, T. Shernisky and D. Buechel **January 2019 Meeting Action:** The item is being combined with item number 18-26 from Subgroup Installation to come up with wording that can be agreed upon by both groups. Mr. Newton presented a proposal which was approved by the Subgroup Installation. Subgroup Inspection chose to make revisions to the proposal and will have the subcommittee on Installation review the proposal showing their changes. A motion was made to approve the revised proposal. The motion was seconded and unanimously approved.		

Item Number: 18-43	**NBIC Location: Part 2, S12.5**	**No Attachment**
General Description: Permanent nameplate removal from pressure vessel being removed from service **Subgroup:** Inspection **Task Group:** J. Roberts (PM), J. Burgess, J. Calvert, T. Shernisky, J. Clark, M. Sansone **January 2019 Meeting Action:** A progress report was given by Mr. Shernisky. Mr. Shernisky presented a new document and wording to be added to the NBIC to the Subgroup for "Discontinuance of Service". He explained the need for the new form and wording. The group had a lot of discussion to give their input into the form and wording. Mr. Shernisky is hoping to have a final proposal by next meeting.		

Item Number: 18-61	NBIC Location: Part 2, 2.3.6.8	Attachment Pages 7-9

General Description: Additional changes to PVHO

Subgroup: Inspection
Task Group: J. Byrum (PM), R. Smith, S. Reimers, J. Burgess

January 2019 Meeting Action:
Mr. Byrum and Mr. Smith presented their proposed changed to Part 2, 2.3.6.8. There were a few minor changes and they proposed adding the word "medical" to show that this section is only applicable to medical PVHOs. The Subgroup revised the proposal to remove some of the proposed changes. The changes that were removed will be addressed by opening a new action item (19-6). This item will address other types of PVHOs outside of medical. The motion was made to accept the revised proposal. The motion was seconded and unanimously approved.

New Item 19-6: Part 2, 2.3.6.8
Task Group: J. Byrum (PM), R. Smith, S. Reimers, J. Burgess, M. Mooney & D. Buechel.
Description: Add other types of PVHOs

Item Number: 18-62	NBIC Location: Part 2, S12.5	No Attachment

General Description: Remote Visual Inspection Requirements

Subgroup: Inspection
Task Group: V. Newton (PM), M. Horbaczewski, B. Wilson, J. Calvert, J. Castle, D. Graf, T. Shernisky

January 2019 Meeting Action:
A progress report was given by Mr. Horbaczewski. He has stated that the task group has more work to do to figure out if this should be a guideline or a new supplement.

Item Number: 18-63	NBIC Location: Part 2	No Attachment

General Description: Review inspection requirements for pressure vessels designed for high pressures

Subgroup: Inspection
Task Group: T. Shernisky (PM)

January 2019 Meeting Action:
A progress report of no progress was given by Mr. Shernisky.

The following people were added to the task group: J. Mangas, J. Peterson, and J. Castle.

Item Number: 18-79	NBIC Location: Part 2, S12	Attachment Page 10

General Description: Part 2 S12 changes to address shoulds/shalls

Subgroup: Inspection
Task Group: None Assigned

January 2019 Meeting Action:
Secretary, Ms. Metzmaier presented this item and a proposal to the Subgroup. The proposal approved by the Subcommittee on Inspection in January 2017 had two pages of attachments, but only one page ended up on the Main Committee letter ballot. The proposal is the page that was omitted from the Main Committee letter Ballot. A motion was made to accept the proposal as presented. The motion was seconded and unanimously approved.

Item Number: 18-101	NBIC Location: Part 2, 2.3.6.8	Attachment Pages 11-13
General Description: Inspection Requirements for PVHOs **Subgroup:** Inspection **Task Group:** None Assigned **January 2019 Meeting Action:** Secretary, Ms. Metzmaier presented a proposal to the Subgroup and explained that the changes shown on the proposal were initially passed by the subcommittee in July 2018, but the wrong document went to the Main Committee letter ballot. This document shows the changes that were omitted from the document approved by Main Committee. The proposal was reviewed and further changes were made. A motion was made to accept the revised proposal. The motion was seconded and unanimously approved.		

10. Future Meetings

Chairman, Mr. Graf, reviewed the future NBIC meetings with the Subgroup.

- July 15th-18th – Kansas City, MO
- January 2020 – Location TBD

11. Adjournment

A motion was made to adjourn the meeting at 12:08 p.m. The motion was seconded and unanimously approved.

Respectfully submitted,

Jodi Metzmaier
Subgroup Inspection Secretary

SG Inspection Attendance Sheet - 1/15/2019

Name	Company	Phone Number	Email	Signature
Darrell Graf	Air Products & Chemicals	(601) 799-2889	grafdr@airproducts.com	
Jim Getter	Worthington Industries	(614) 840-3087	jim.getter@worthingtonindustries.com	
Jodi Metzmaier	National Board	~~(614) 888-8320~~ 360 801 3790	jmetzmaier@nationalboard.org	
Timothy Barker	Factory Mutual	(781) 255-4784	timothy.barker@fmglobal.com	
Ernest Brantley	AXA XL Insurance	(337) 842-7044	ernest.brantley@bpcllcga.com	
David Buechel	HSB	(412) 310-7740	david_buechel@hsb.com	
James Calvert	Eli Lilly and Company	(317) 679-4900	jlcalvert@lilly.com	
Mark Horbaczewski	Diamond Technical Services	(630) 799-8162	mhorbaczewski@diamondtechnicalservices.com	
Donnie LeSage	State of Louisiana	(225) 925-4572	donnie.lesage@la.gov	
John Mangas	Air Products and Chemicals Inc.	(925) 997-5633	mangasjc@airproducts.com	
Mark Mooney	Liberty Mutual	~~(781) 891-8900~~ 774 644 8597	mark.mooney@libertymutual.com MMooney@PACKAGING TECH.com	
Venus Newton	Boiler & Property Insurance	(770) 614-3111	venus.newton@boilerproperty.com	
James Roberts	Trinity Containers, LLC	(214) 589-8344	james.roberts@trin.net	
Jason Safarz	CEC Combustion Safety	(216) 749-2992	jsafarz@combustionsafety.com	
Matthew Sansone	NYS Dept. of Labor Chief Boiler Inspector	(518)457-2722	Matthew.sansone@labor.ny.gov	
Matthew Sansone	NYS Dept. of Labor Chief Boiler Inspector	(518)457-2722	Matthew.sansone@labor.ny.gov	
Thomas Vandini	Quality Steel Corporation	(419) 334-2664	tvandini@propanetank.com	
Paul Welch	Arise	(678) 446-5290	paul.welch@ariseinc.com	
TOM SHERNISKY	ONECIS	304-374-5165	thomas.SHERNISKY@onecis.com	
JIM CLARK	WORTHINGTON INDUSTRIES	614-840-3661	james.clark@worthingtonindustries.com	
DAVID ROSE	T+T INSPECTION & ENGINEERING	780 217 8175	dr3747@Telus.net	

Name	Company	Phone Number	Email	Signature
William Hackworth	ARIIC ARISE	732-221-3461	William.HAckworth@ARISEINC.com	
Rick Musser	Strasburg Rail Road Co	717 687-7589	rick@strasburgrailroad.com	
Jeff Petersen	IDAHO NATIONAL LAB	208 526-1568	PeteJL@INL.GOV	
Jim Byrum	ADOL	334 328-7122	MARVIN.BYRUM@LABOR.ALABAMA.GOV	
Rob. Smith	Navy ASME PVHO	202 433-8772	robert.c.smith@navy.mil	
JEFF CASTLE	ZURICH	716-753-0928	jeffrey.castle@zurichna.com	
DON COOK	CALIFORNIA	510 622-3050	dccook@dir.ca.gov	

Marvin J Byrum

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Tallassee, AL 36078
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marvin.byrum@labor.alabama.gov

OBJECTIVE

Work with a dynamic team of professionals to provide quality service in an efficient and cost-effective manner. Manage a group or team using the leadership skills obtained from 26 years of naval service and an additional 12 years with the Alabama Department of Labor Inspections Division.

HIGHLIGHTS OF QUALIFICATIONS

- Certified Navy Steam Generating Plant Inspector
- 38 years personnel and power plant management experience.
- Air Conditioning and Refrigeration Technician. (E.P.A. Certified Universal Technician)
- Commissioned National Board Inspector #10243
- Licensed Alabama Boiler and Pressure Vessel Inspector #AL13423BL
- Licensed Alabama Elevator Inspector #AL1144EL

EMPLOYMENT HISTORY

ALABAMA DEPARTMENT OF LABOR; Director

April 1, 2016 - Present, Director/Chief Inspector

- Chief Inspector- Responsible for 3 Elevator Inspectors, 4 Boiler and Pressure Vessel Inspectors and 5 Office Staff.
- Prepares budget, sets standards and Administers the Elevator and Boiler programs in accordance with Alabama Statutes and Regulations set forth by the Elevator and Boiler Safety Review Boards.

January 16 - March 31, 2016, Supervising Inspector

- Inspector Supervisor- Responsible for 2 Elevator Inspectors, 3 Boiler and Pressure Vessel Inspectors and 3 Office Staff.
- Insure all Inspectors meet standards, maintain training CEU's and territorial inspections.
- Write annual and pre-appraisals for all inspectors and 3 office staff.
- Insure office staff maintains standards set forth by the Chief Inspector.

May 2007- January 15, 2016, Deputy Inspector

- Jurisdictional Inspector- Responsible for scheduling and inspections on Jurisdictional Objects for 24 Counties in the State of Alabama.
- Elevator Inspector- Responsible for scheduling and inspections on Overdue Elevators for 24 Counties in the State of Alabama
- Accident Investigation- Conducted Investigations into Boiler, Pressure Vessel and Elevator incidents and provided reports to the State.

MID-ATLANTIC REGIONAL MAINTENANCE CENTER, NORFOLK VA; Steam Generating Plant Inspector, Naval Air Atlantic Representative for Steam Catapults and Re-Boilers:

November 2002-May 2007,

- Main Propulsion, Auxiliary, Waste Heat Boiler (WHB), Nuclear Re-Boilers and Steam Catapult Accumulator Inspector. Responsible for the coordination and execution of routine inspections for over 70 Steam Generators and Pressure Vessels in accordance with current Navy instructions and directives.
- Supervised Four Steam Generating Plant Inspectors conducting all aspects of Inspections and Engineering support.
- Provided technical direction for repairs to Steam Catapult Accumulators, Controls Systems and Boilers, to include, all pressure parts, refractory, air casings, uptakes, auxiliary support equipment, pneumatic and electronic control systems.
- Conducted shipboard training and calibration for pneumatic and electronic automatic controls that support auxiliary and main propulsion boilers, steam catapults and nuclear re-boilers.
- Provided Engineering Support to auxiliary steam machinery and piping systems using ASME codes and Military standard and specifications.

USS BATAAN (LHD-5), NORFOLK VA; Engineering Repair Officer:

March 1999-October 2002

- Engineering Repair Officer. Responsible for coordination and tracking of all outside facility repairs to engineering department equipment and working with the Port Engineer to correct contractor deficiencies.
- Aft Main Machinery Leading Chief Petty Officer. Responsible for supervising 47 personnel maintaining the aft propulsion and electric plant, auxiliary machinery room, valve shop, engineering tech library and all propulsion automatic controls.

FLEET TRAINING CENTER, NORFOLK VA; Branch Head, Automatic Boiler Controls School: February 1996-March 1999

- Branch Head, supervised 6 Instructors conducting the Automatic Boiler Control Operators and Maintenance courses with a through put of over 200 Naval Personnel per year.
- Course Curriculum Model Manager, Developed and maintained curriculum for all Automatic Boiler Control Console Operators and Maintenance Courses.
- Developed and piloted the Hagan Nuclear Main Feed Pump Controls Training Course for Nimitz Class Aircraft Carriers.
- Constructed from spare parts and maintained the Navy's only functional Hagan Nuclear Main Feed Pump Controls Simulator. Saving the Navy approximately 1.5 million dollars.
- Developed the first Training Project Plan for the Electronic Automatic Boilers Controls (EABC) System.

Prior Years:

USS Shreveport LPD-12 August 1993 to February 1996
USS Thomas C Hart FF-1092 September 1991 to August 1993
SIMA Norfolk Shop 41-A Boiler Repair July 1988 to September 1991
USS Donald B Beary FF-1085 May 1986 to July 1988
USS Harry E Yarnell CG-17 March 1982 to May 1986
RTC/NTC Great Lakes May 1981 to March 1982

EDUCATION AND TRAINING

Steam Generating Plant Inspector (Boiler Inspector)

Automatic Boiler Control Maintenance

Automatic Boiler Control Console Operator

Quality Assurance Inspector

Advanced Boiler Technician/Machinist Mate 1200/600 p.s.i. Steam Plant Maintenance

Air Conditioning and Refrigeration Technician

Boiler Water Test and Treatment

Senior Enlisted Propulsion Engineer

Navy Instructor/ Master Training Specialist

18-26 CO2 Supplement (passed by SG Installation – January 15, 2019)

S3.4 GAS DETECTION SYSTEMS

A continuous gas detection system shall be provided in the room or area where container systems are filled and used, and in areas where the heavier than air gas can ~~congregate~~ accumulate ~~(where leaks of carbon dioxide can accumulate),~~ and in below grade, enclosed, or confined space outdoor locations. . Small outdoor, at-grade enclosures which are not large enough for a person to enter are not required to have gas detection. Carbon dioxide (CO2) sensors shall be provided within 12 inches (305mm) of the floor in the area where the gas is most likely to accumulate or leaks are most likely to occur, or as specified by the gas detection manufacturer. The system shall be designed to detect and notify at a low level alarm and high level alarm.

a) The threshold for activation of the low level alarm shall not exceed a carbon dioxide concentration of 5,000 ppm (9,000 mg/m3) Time Weighted Average (TWA) over 8 hours. When carbon dioxide is detected at the low level alarm, the system shall activate a signal at a normally attended location within the building.

b) The threshold for activation of the high level alarm shall not exceed a carbon dioxide concentration 30,000 ppm (54,000 mg/m3). When carbon dioxide is detected at the high level alarm, the system shall activate an audible and visual alarm at a location approved by the jurisdiction having authority.

18-27 Novak 1-8-18

S12.5 GAS DETECTION SYSTEMS

A continuous gas detection system shall be provided in the room or area where container systems are filled~~/ and~~ used, and in areas where the ~~heavier than air~~heavier-than-air gas can ~~congregate~~ accumulate, ~~and~~ including ~~in~~ below grade, enclosed, or confined space outdoor locations. Small outdoor, at-grade enclosures which are not large enough for a person to enter are not required to have gas detection. Carbon dioxide (CO2) sensors shall be provided within 12 inches (305mm) of the floor in the area where the gas is most likely to accumulate or leaks are most likely to occur, or as specified by the gas detection manufacturer. The system shall be designed to detect and ~~notify~~ alert at a low ~~level alarm and~~and high level alarm.

NOTE: A SIMILAR ACTION IS BEING PROPOSED IN PART 1; PLEASE COORDINATE WITH PART 1 TO DEVELOP WORDING

Item Number 18-61

2.3.6.8 INSPECTION OF PRESSURE VESSELS FOR HUMAN OCCUPANCY (PVHO's)

A pressure vessel for human occupancy (PVHO), as defined by ASME PVHO-1 is a pressure vessel that encloses a human being or animal within its pressure boundary while it is subject to internal or external pressure that exceeds a 2 psi (14 kPa) differential pressure. PVHOs include, but are not limited to submersibles, diving bells, personal transfer capsules, decompression chambers, recompression chambers, hyperbaric chambers, high altitude chambers and medical hyperbaric oxygenation facilities.

This section provides guidelines for inspection of medical PVHOs. Due to the many different designs and applications of PVHOs, potential failures of components or safety concerns that are not specifically covered, such as rapid decompression or fire/sparking issues should be considered.

a) General/operational

1) PVHOs should be constructed in accordance with ASME PVHO-1. This code adopts Section VIII and therefore the vessels should bear a "U" or "U2" ASME designator. Inspections may be conducted using ASME PVHO-2 for reference. PVHO-1 also has several Code Cases that address PVHOs manufactured from non-traditional materials such as various fabrics. PVHOs built under such Code Cases shall have all the documentation required by the Code Case, but may not necessarily have any related Section VIII forms.
2) Cast and ductile iron fittings are not allowed.
3) Due to the human occupancy element, a person should be in attendance to monitor the PVHO when in operation, in the event there is an accident.
4) The installation should be such that there is adequate clearance to inspect it properly. ~~In some applications, such as underground tunneling, it may be impossible to perform a complete external inspection.~~

b) Internal Inspection

1) Where existing openings permit, perform a visual internal inspection of the vessel. Look for any obvious cracks and note areas that are subject to high stress such as welds, welded repairs, head-to-shell transitions, sharp interior corners, and interior surfaces opposite external attachments or supports.
2) The vessel should be free of corrosion, dents, gouges, or other damage. Special attention should be paid to areas under chamber floors and the interiors of chamber drain fittings.
3) All openings leading to external fittings or controls should be free from obstruction.
4) All exhaust inlets should be checked for the presence of fittings that prevent a chamber occupant from ~~inadvertently~~ blocking the opening.
5) The inlets to all chamber pressure gauge lines should be located where they are either protected from possible blockage, or are fitted with multiple openings.
6) Chamber doors:
    a. should operate freely and smoothly. However, doors should not move on their own when released;
    b. that close/seal with pressure, and which are fitted with "dogs" or other restraints to hold them in place until an initial seal is obtained, shall be fitted with features to prevent the door from maintaining a seal in the event the pressure differential on the door is reversed;
    c. should have seals that are supple, free from flat spots, cracking, etc.; and
    d. that close/seal against pressure shall have provisions as follows:
        1. Positive protection against pressurization of the vessel unless the restraint mechanism is fully engaged. This includes pressurization by back-up methods as well as primary methods; and
        2. Positive protection against release of the restraint mechanism unless pressure in the vessel is fully relieved.

c) External Inspection

1) The Inspector should closely examine the external condition of the pressure vessel for corrosion, damage, dents, gouges or other damage.
2) The lower half and the bottom portions of insulated vessels should receive special focus, as condensation or moisture may gravitate down the vessel shell and soak into the insulation, keeping it moist for long periods of time. Penetration locations in the insulation or fireproofing such as saddle supports, sphere support legs, nozzles, or fittings should be examined closely for potential moisture ingress paths. When moisture penetrates the insulation, the insulation may actually work in reverse, holding moisture in the insulation and/or near the vessel shell.
3) Insulated vessels that are run on an intermittent basis or that have been out of service require close scrutiny. In general, a visual inspection of the vessel's insulated surfaces should be conducted once per year.
4) The most common and superior method to inspect for suspected corrosion under insulation (CUI) damage is to completely or partially remove the insulation for visual inspection. The method most commonly utilized to inspect for CUI without insulation removal is by X-ray and isotope radiography (film or digital) or by real time radiography, utilizing imaging scopes and surface profilers. The real time imaging tools will work well if the vessel geometry and insulation thickness allows. Other less common methods to detect CUI include specialized electromagnetic methods (pulsed eddy current and electromagnetic waves) and long-range ultrasonic techniques (guided waves).
5) There are also several methods to detect moisture soaked insulation, which is often the beginning for potential CUI damage. Moisture probe detectors, neutron backscatter, and thermography are tools that can be used for CUI moisture screening. Proper surface treatment (coating) of the vessel external shell and maintaining weather-tight external insulation are the keys to prevention of CUI damage.
6) Couplers and doors that open with pressure:
    a. should operate freely and smoothly;
    b. should have seals that are supple, free from flat spots, cracking, etc.; and
    c. that close/seal against pressure shall have provisions as follows:
        1. Positive protection against pressurization of the vessel unless the restraint mechanism is fully engaged. This includes pressurization by back-up methods as well as primary methods; and
        2. Positive protection against release of the restraint mechanism unless pressure in the vessel is fully released.

d) Inspection of parts and appurtenances (e.g., piping systems, pressure gages, bottom drains, etc.)

1) As stated above, cast iron is not allowed on PVHOs and shall be replaced with parts fabricated with other suitable materials, in accordance with ASME Code Section II.
2) If valves or fittings are in place, check to ensure that these are complete and functional.
3) The Inspector shall note the pressure indicated by the gage and compare it with other gages on the same system. If the pressure gage is not mounted on the vessel itself, it should be ascertained that the gage is installed on the system in such a manner that it correctly indicates actual pressure in the vessel. Lines leading to chamber primary depth gauges should connect only to the depth gauge.
~~4) The Inspector shall verify that the vessel is provided with a drain opening.~~
~~5~~4) The system should have a pressure gage designed for at least the most severe condition of coincident pressure in normal operation. This gage should be clearly visible to the person adjusting the setting of the pressure control valve. The graduation on the pressure gage ~~shall~~ should be graduated to not less than 1.5 times the MAWP of the vessel.
~~6~~5) Provisions should be made to calibrate pressure gages or to have them checked against a standard test gage.
~~7~~6) Any vents and exhausts should be piped at least 10 ft. (3.0 m) from any air intake.

e) Inspection of view ports / windows

1) Each window should be individually identified and be marked in accordance with PVHO-1.

2) If there are any penetrations through windows, they must be circular and in accordance with PVHO-1 requirements.
3) ~~If~~ Windows must be free of crazing, cracks and scratches that exceed “superficial” defects as defined by PVHO-2.
4) Windows and viewports have a maximum interval for seat/seal inspection and refurbishment. Documentation should be checked to ensure compliance with PVHO-2, ~~Table 7.1.3~~ Section 2-4.4.

f) Inspection of pressure relief devices

1) Pressure relief devices for chambers only must have a quick opening manual shutoff valve installed between the chamber and the pressure relief device, with a frangible seal in place, within easy access to the operator.
2) The pressure relief device shall be constructed in accordance with ASME Code Section VIII.
3) The discharge from the chamber pressure relief device shall be piped outside to a safe point of discharge as determined by the Authority having Jurisdiction.
4) Rupture disks may be used only if they are in series with a pressure relief valve, or when there is less than 2 ft^3 (57 l) of water volume.
5) Verify that the safety valve is periodically tested either manually by raising the disk from the seat or by removing and testing the valve on a test stand.

g) Acceptance criteria

The following forms are required to be available for review:

1) ASME BPV Forms U-1, U-1A or U-2 as appropriate;
2) PVHO-1 Form GR-1 Manufacturer’s Data Report for Pressure Vessels for Human Occupancy;
3) PVHO-1 Form~~s~~ VP-1 ~~PVHO-2~~ Fabrication Certification for Acrylic Windows (one for each window),
4) PVHO-1 Form VP-2 Design Certification for Acrylic Windows (one for each window);
5) PVHO-2 Form ~~VP~~VM-1 Viewport Inspection (one for each window, current within PVHO-2 requirements);and
6) For any repaired windows, PVHO-2 Form ~~VP~~VM-2 Acrylic Window Repair Certificate for Windows. Repaired by the User (or his Authorized Agent) or PVHO-2 Form ~~VP~~VM-3 Acrylic Window Repair Certificate for Severely Damaged Windows.

h) All PVHOs under the jurisdiction of the U.S. Coast Guard must also comply with 46 CFR Part 197.

Item 18-79

History: Item NB16-2809 had two attachments, when it went to MC letter Ballot only one attachment was attached; therefore, MC never reviewed this part of the action item. A new action item has been opened for the below changes.

Part 2 Supplement 12
INSPECTION OF LIQUID CARBON DIOXIDE STORAGE VESSELS

Replace mandatory "shall" with non-mandatory "should" in all places listed below.

S12.3 b) Portable LCDSV installations with no permanent remote fill connection: Warning: LCDSVs shall not be filled indoors...

4) Are provided with a pathway that provides a smooth rolling surface to the outdoor, unenclosed fill area. There ~~shall~~ should not be any stairs or other than minimal inclines in the pathway.

S12.5 A continuous gas detection system shall be provided in the room or area where container systems are filled and used, in areas where the heavier ~~that~~ than air gas can congregate and in below grade outdoor locations. Carbon dioxide (CO2) sensors ~~shall~~ should be provided within 12 inches (305mm) of the floor in the area where the gas is most likely to accumulate or leaks are most likely to occur. The system shall be designed to detect and notify at a low level alarm and high level alarm.

a) The threshold for activation of ~~the~~ a low level alarm shall not exceed a carbon dioxide concentration of 5,000 ppm (9,000 mg/m3) Time Weighted Average (TWA) over 8 hours. When carbon dioxide is detected at the low level alarm, the system shall activate a signal at a normally attended location within the building.
b) The threshold for activation of the high level alarm shall not exceed a carbon dioxide concentration 30,000 ppm (54,000 mg/m3). When carbon dioxide is detected at the high level alarm, the system shall activate an audible ~~and visual~~ alarm at a location approved by the jurisdiction having authority.

S12.7 VALVES, PIPING, TUBING AND FITTINGS

b) Relief Valves – The inspection should verify that each LCDSV shall have at least one ASME/NB stamped & certified relief valve with a pressure setting at or below the MAWP of the tank. The relief valve shall be suitable for the temperatures and flows experienced during relief valve operation. The minimum relief valve capacity shall be designated by the manufacturer. Additional relief valves that do not require ASME stamps may be added per Compressed Gas Association pamphlet, CGA S-1.3 Pressure Relief Device Standards Part 3, Stationary Storage Containers for Compressed Gases, recommendations. Discharge lines from the relief valves shall should be sized in accordance with NBIC Part 2, Tables S12.7-a and S12.7-b. Note: Due to the design of the LCDSV the discharge line may be smaller in diameter than the relief valve outlet size.

Caution: ~~Company's~~ Companies and or individuals filling or refilling LCDSV's ~~shall be~~are responsible for utilizing fill equipment that is acceptable to the manufacturer to prevent over pressurization of the vessel.

c) Isolation Valves – The inspection should verify that each LCDSV ~~shall have~~has an isolation valve installed on the fill line and tank discharge, or gas supply line in accordance with the following requirements:

1) Isolation valves shall be located on the tank or at an accessible point as near to the storage tank a possible.
2) All valves shall be designed or marked to indicate clearly whether they are open or closed.
3) All valves ~~shall~~ should be capable of being locked or tagged in the closed position for servicing.
4) Gas supply and liquid CO2 fill valves shall be clearly marked for easy identification.

COMMENT: The above note is immediately after the metric Tables S12.7M-a and –b, but the references tables are the customary units S12.7-a and –b. This appears to be a mistake.

This document shows the changes that were added to the proposal by the SC Inspection on 1/10/18. After the SG approved a proposal the SC made further changes, and mistakenly, the document approved by SG Inspection was the one that went to MC Letter Ballot.

2.3.6.8 INSPECTION OF PRESSURE VESSELS FOR HUMAN OCCUPANCY (PVHO's)

A pressure vessel for human occupancy (PVHO), as defined by ASME PVHO-1 is a pressure vessel that encloses a human being or animal within its pressure boundary while it is subject to internal or external pressure that exceeds a 2 psi (14 kPa) differential pressure. PVHOs include, but are not limited to submersibles, diving bells, personal transfer capsules, decompression chambers, recompression chambers, hyperbaric chambers, high altitude chambers and medical hyperbaric oxygenation facilities.

This section provides guidelines for inspection of PVHOs. Due to the many different designs and applications of PVHOs, potential failures of components or safety concerns that are not specifically covered, such as rapid decompression or fire/sparking issues should be considered.

a) General/operational

1) PVHOs should be constructed in accordance with ASME PVHO-1. This code adopts Section VIII and therefore the vessels should bear a "U" or "U2" ASME designator. Inspections may be conducted using ASME PVHO-2 for reference. PVHO-1 also has several Code Cases that address PVHOs manufactured from non-traditional materials such as various fabrics. PVHOs built under such Code Cases shall have all the documentation required by the Code Case, but may not necessarily have any related Section VIII forms.
2) Cast and ductile iron fittings are not allowed.
3) Due to the human occupancy element, a person should be in attendance to monitor the PVHO when in operation, in the event there is an accident.
4) The installation should be such that there is adequate clearance to inspect it properly. In some applications, such as underground tunneling, it may be impossible to perform a complete external inspection.

b) Internal Inspection

1) Where existing openings permit, perform a visual internal inspection of the vessel. Look for any obvious cracks and note areas that are subject to high stress such as welds, welded repairs, head-to-shell transitions, sharp interior corners, and interior surfaces opposite external attachments or supports.
2) The vessel should be free of corrosion, dents, gouges, or other damage. Special attention should be paid to areas under chamber floors and the interiors of chamber drain fittings.
3) All openings leading to external fittings or controls should be free from obstruction.
4) All exhaust inlets should be checked for the presence of fittings that prevent a chamber occupant from ~~inadvertently~~ blocking the opening.
5) The inlets to all chamber pressure gauge lines should be located where they are either protected from possible blockage, or are fitted with multiple openings.
6) Chamber doors:
    a. should operate freely and smoothly. However, doors should not move on their own when released;
    b. that close/seal with pressure, and which are fitted with "dogs" or other restraints to hold them in place until an initial seal is obtained, shall be fitted with features to prevent the door from maintaining a seal in the event the pressure differential on the door is reversed;
    c. should have seals that are supple, free from flat spots, cracking, etc.; and
    d. that close/seal against pressure shall have provisions as follows:
        1. Positive protection against pressurization of the vessel unless the restraint mechanism is fully engaged. This includes pressurization by back-up methods as well as primary methods; and
        2. Positive protection against release of the restraint mechanism unless pressure in the vessel is fully relieved.

c) External Inspection

1) The Inspector should closely examine the external condition of the pressure vessel for corrosion, damage, dents, gouges or other damage.
2) The lower half and the bottom portions of insulated vessels should receive special focus, as condensation or moisture may gravitate down the vessel shell and soak into the insulation, keeping it moist for long periods of time. Penetration locations in the insulation or fireproofing such as saddle supports, sphere support legs, nozzles, or fittings should be examined closely for potential moisture ingress paths. When moisture penetrates the insulation, the insulation may actually work in reverse, holding moisture in the insulation and/or near the vessel shell.
3) Insulated vessels that are run on an intermittent basis or that have been out of service require close scrutiny. In general, a visual inspection of the vessel's insulated surfaces should be conducted once per year.
4) The most common and superior method to inspect for suspected corrosion under insulation (CUI) damage is to completely or partially remove the insulation for visual inspection. The method most commonly utilized to inspect for CUI without insulation removal is by X-ray and isotope radiography (film or digital) or by real time radiography, utilizing imaging scopes and surface profilers. The real time imaging tools will work well if the vessel geometry and insulation thickness allows. Other less common methods to detect CUI include specialized electromagnetic methods (pulsed eddy current and electromagnetic waves) and long-range ultrasonic techniques (guided waves).
5) There are also several methods to detect moisture soaked insulation, which is often the beginning for potential CUI damage. Moisture probe detectors, neutron backscatter, and thermography are tools that can be used for CUI moisture screening. Proper surface treatment (coating) of the vessel external shell and maintaining weather-tight external insulation are the keys to prevention of CUI damage.
6) Couplers and doors that open with pressure:
    a. should operate freely and smoothly;
    b. should have seals that are supple, free from flat spots, cracking, etc.; and
    c. that close/seal against pressure shall have provisions as follows:
        1. Positive protection against pressurization of the vessel unless the restraint mechanism is fully engaged. This includes pressurization by back-up methods as well as primary methods; and
        2. Positive protection against release of the restraint mechanism unless pressure in the vessel is fully released.

d) Inspection of parts and appurtenances (e.g., piping systems, pressure gages, bottom drains, etc.)

1) As stated above, cast iron is not allowed on PVHOs and shall be replaced with parts fabricated with other suitable materials, in accordance with ASME Code Section II.
2) If valves or fittings are in place, check to ensure that these are complete and functional.
3) The Inspector shall note the pressure indicated by the gage and compare it with other gages on the same system. If the pressure gage is not mounted on the vessel itself, it should be ascertained that the gage is installed on the system in such a manner that it correctly indicates actual pressure in the vessel. Lines leading to chamber primary depth gauges should connect only to the depth gauge.
~~4) The Inspector shall verify that the vessel is provided with a drain opening.~~
~~5~~4) The system should have a pressure gage designed for at least the most severe condition of coincident pressure in normal operation. This gage should be clearly visible to the person adjusting the setting of the pressure control valve. The graduation on the pressure gage shall be graduated to not less than 1.5 times the MAWP of the vessel.
~~6~~5) Provisions should be made to calibrate pressure gages or to have them checked against a standard test gage.
~~7~~6) Any vents and exhausts should be piped at least 10 ft. (3.0 m) from any air intake.

e) Inspection of view ports / windows

1) Each window should be individually identified and be marked in accordance with PVHO-1.

2) If there are any penetrations through windows, they must be circular and in accordance with PVHO-1 requirements.
3) ~~If~~ Windows must be free of crazing, cracks and scratches that exceed “superficial” defects as defined by PVHO-2.
4) Windows and viewports have a maximum interval for seat/seal inspection and refurbishment. Documentation should be checked to ensure compliance with PVHO-2, ~~Table 7.1.3~~ Section 2-4.4.

f) Inspection of pressure relief devices

1) Pressure relief devices for chambers only must have a quick opening manual shutoff valve installed between the chamber and the pressure relief device, with a frangible seal in place, within easy access to the operator.
2) The pressure relief device shall be constructed in accordance with ASME Code Section VIII.
3) The discharge from the chamber pressure relief device shall be piped outside to a safe point of discharge as determined by the Authority having Jurisdiction.
4) Rupture disks may be used only if they are in series with a pressure relief valve, or when there is less than 2 ft_3 (57 l) of water volume.
5) Verify that the safety valve is periodically tested either manually by raising the disk from the seat or by removing and testing the valve on a test stand.

g) Acceptance criteria

The following forms are required to be available for review:

1) ASME BPV Forms U-1, U-1A or U-2 as appropriate;
2) PVHO-1 Form GR-1 Manufacturer’s Data Report for Pressure Vessels for Human Occupancy;
3) PVHO-1 Forms VP-1 PVHO-2 Fabrication Certification for Acrylic Windows (one for each window),
4) PVHO-1 Form VP-2 Design Certification for Acrylic Windows (one for each window);
5) PVHO-2 Form VP-1 Viewport Inspection (one for each window, current within PVHO-2 requirements);and
6) For any repaired windows, PVHO-2 Form VP-2 Acrylic Window Repair Certificate for Windows. Repaired by the User (or his Authorized Agent) or PVHO-2 Form VP-3 Acrylic Window Repair Certificate for Severely Damaged Windows.

h) All PVHOs under the jurisdiction of the U.S. Coast Guard must also comply with 46 CFR Part 197.