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THE NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS

NATIONAL BOARD SUBCOMMITTEE INSTALLATION

MINUTES

Meeting of July 19th, 2017
Columbus, Ohio

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The National Board of Boiler & Pressure Vessel Inspectors
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1. **Call to Order**

Chair, M. Richards, called the meeting to order at 8:00 a.m.

2. **Introduction of Members and Visitors (Attachment Page 1)**

- Introductions took place amongst all members and visitors and an attendance sheet was circulated for review and check off.

With the attached roster a quorum was established. There was a motion to approve the roster as published. The motion was unanimously approved.

3. **Announcements**

- The National Board invites all committee members and visitors to a reception at the National Board Pavilion on Wednesday, July 19, 2017. The event begins at 5:00 p.m.
- Breakfast and lunch will be provided to NBIC committee members on Thursday, July 20, 2017.
- The 2017 Edition of the NBIC is available for distribution to committee members.
- Coffee Mugs are available for distribution to all attendees.
- A reminder of how to name files should be in the format of the Item Number Person Upload Date.
- It was announced that the Action Item numbers will no longer contain the prefix of NB (NB-14-0403) or IN (IN16-0701). Instead the numbering will be in the format of the Year-a sequential number (17-133)
- Mr. Scribner announced changes with regard to CSD-1 and the NBIC.

4. **Adoption of the Agenda**

There was a motion to adopt the Agenda as published. The motion was unanimously approved.

5. **Approval of the Minutes of January 11th, 2017 Meeting**

There was a motion to approve the Minutes of January 11, 2017 as published. The motion was unanimously approved.

6. **Review of Rosters**

   a. **Membership Nominations**

   Joseph Brockman – SC Installation

b. Membership Reappointments

- Joseph Millette – SG Installation
- Milton Washington – SG Installation

A majority vote was taken on the above and unanimously approved.

7. NBIC Business

a. Interpretations

Item Number: IN16-0701	**NBIC Location: Part 1**	**Attachment Pages 2-4**

General Description: Result of NB16-0801; Is it standard operating procedure (per NBIC) to do hydrostatic pressure tests on installed ASME Section IV boilers at 150% of the rated pressure as part of the installation inspection?

Subgroup: SG Installation

Task Group: None assigned

Meeting Action: In the SG meeting a TG of D. Patten, R. Austin, E. Wiggins, and S. Konopacki met to complete a revised proposal. The revised proposal was then presented to the SG and was unanimously approved to the SC. M. Wadkinson presented this proposal to the SC. Discussions took place. The SC made a motion to approve the revised proposal to the MC. The motion was unanimously approved.

b. Action Items – Old Business

Item Number: NB11-1901	**NBIC Location: Part 1**	**Attachment Pages 5-8**

General Description: Add guidance for the safe installation of high pressure composite pressure vessels operating in close proximity to the public

Subgroup: FRP

Task Group: M. Richards (PM), S. Konopacki and D. Patten

Meeting Action: R. Smith has been added to the TG as PM along with E. Wiggins. The TG met to review the proposal that was approved by FRP on 6/27/2017.

Item Number: NB12-0302	**NBIC Location: Part 1**	**No Attachment**

General Description: Add installation requirements for pressure vessels for human occupancy (PVHOs)

Subgroup: Installation

Task Group: B. Moore (PM), T. Creacy, T. Millette, M. Richards

Meeting Action: A breakout session was held in the SG meeting to further discuss the topic and its importance at hand. The task group continues to research PVHOs. Additional imput from Parts 2 and 3 will be requested.

Item Number: NB14-0403	**NBIC Location: Part 1**	**Attachment Pages 9-11**

General Description: Identify terms from Part 1 that need to be added to the index

Subgroup: Installation

Task Group: B. Moore (PM), M. Richards, T. Creacy, M. Washington

Meeting Action: Mr. Moore presented a proposal/summary to the SG. Within this proposal/summary it was clarified that there will be no deletions if there are references in the text, but rather if so Mr. Moore may provide requests for additional action items to address these accordingly based on his research.

Item Number: NB15-0108A	**NBIC Location: Part 1**	**Attachment Page 12**

General Description: Add a supplement to address high temperature hot water boilers

Subgroup: Installation

Task Group: M. Wadkinson (PM) B. Moore, T. Creacy, D. Patten

Meeting Action: A breakout session was held in the SG meeting amongst the TG to discuss the proposal that M. Wadkinson had put together. This proposal was presented to the SG. A motion was made to send this out as a review and comment ballot to the SG, SC, and Part 4. The motion was unanimously approved.

Item Number: NB15-2202	**NBIC Location: Part 1**	**Attachment Pages 13-15**

General Description: Add guidance for the safe installation of high pressure composite pressure vessels operating in close proximity to the public

Subgroup: FRP

Task Group: R. Smith (PM), M. Washington, R. Austin

Meeting Action: The TG met to review the proposal that was approved by FRP on 6/27/2017.

Item Number: NB15-2209	**NBIC Location: Part 1**	**Attachment Pages 16-20**

General Description: Develop guidance and requirements for installation of graphite pressure Equipment

Subgroup: Graphite

Task Group: A. Stupica (PM)

Meeting Action: A TG of M. Richards and E. Wiggins have been assigned. They met with the PM of Graphite to discuss the proposal that was recently approved by them.

Item Number: NB16-0101	NBIC Location: Part 1	No Attachment

General Description: Result of NB13-1101, address carbon monoxide sensors in equipment rooms

Subgroup: Installation

Task Group: E. Wiggins (PM), G. Halley, S. Konopacki, T. Creacy, T. Millette, B. Moore, P. Schuelke, R. Smith, M. Washington

Meeting Action: Progress Report - A breakout session was held in the SG meeting amongst the TG to further discuss the topic at hand. R. Troutt was invited to that breakout session so as to contribute feedback to the TG. The task group hopes to have something to present at the meeting in January 2018.

Item Number: NB16-0104	NBIC Location: Part 1, 3.8.1.5	Attachment Page 21

General Description: Address low water fuel cutoff requirements on vapor-system boilers

Subgroup: Installation

Task Group: M. Wadkinson (PM), B. Moore, M. Washington

Meeting Action: M. Wadkinson presented a proposal to the SG of removing the term "vapor-system" to limit confusion. It has been confirmed that ASME Section IV and CSD-1 have approved to also remove the term "vapor-system". The SG made a motion and unanimously approved this proposal. The SC makes a motion to approve the proposal to the MC. The motion is unanimously approved.

Item Number: NB16-0811	NBIC Location: Part 1	Attachment Page 22

General Description: Remove references back to general requirements section in Sections 2, 3, 4, 5, S5

Subgroup: Installation

Task Group: M. Wadkinson (PM), D. Patten

Meeting Action: In the SG meeting M. Wadkinson reported that the TG reviewed this item and has come to the conclusion that having the references back to the general section adds value and therefore motions to close this item with no action. The motion was unanimously approved.

Item Number: NB16-2801	NBIC Location: Part 1, Section 1	No Attachment

General Description: Result of PR16-0401, 0403, 0407, 0409 - scope creep requiring the use of manufacturer's recommendations/other industry standards

Subgroup: Installation

Task Group: B. Moore (PM), R. Smith

Meeting Action: The TG reported no progress to report at this time.

Item Number: NB16-2802	NBIC Location: Part 1, Section 1	Attachment Pages 23-25

General Description: Result of PR16-0406, 0409, 0416; possible contradiction in requirements for compliance with "environmental requirements"

Subgroup: Installation

Task Group: D. Patten (PM), S. Konopacki, M. Wadkinson, E. Wiggins

Meeting Action: D. Patten presented a summary to the SG which resulted in extensive discussions. A motion was made to close this item with no action, as it is felt that this is addressed through out. The motion was approved with 1 disapprove.

Item Number: NB16-2803	NBIC Location: Part 1, 2.5.3.2	Attachment Page 26

General Description: Result of PR16-0410, add requirements that remote emergency shutdown switches should not be retroactively installed

Subgroup: Installation

Task Group: R. Smith (PM), B. Moore, P. Schuelke, M. Washington

Meeting Action: A breakout session was held in the SG meeting to discuss/complete a proposal. R. Smith presented the proposal to the SG and SC. Discussions were held. There was a motion to approve the proposal to the MC. The motion was unanimously approved.

Item Number: NB16-2804	NBIC Location: Part 1, 2.7.5 p)	Attachment Page 27

General Description: Result of PR16-0411, remove mandatory reference of NB-27, Guide for Blowoff Vessels

Subgroup: Installation

Task Group: E. Wiggins (PM), B. Moore, D. Patten, M. Washington

Meeting Action: A breakout session was held in the SG meeting to discuss/complete a proposal. Mr. Wiggins presented the proposal to the SG and SC. Discussions were held. There was a motion to approve the proposal to the MC. The motion was unanimously approved.

Item Number: NB16-2805	NBIC Location: Part 1, 3.8.1.5	No Attachment

General Description: Result of PR16-0412, clarify requirements for vapor system boilers

Subgroup: Installation

Task Group: M. Wadkinson (PM), B. Moore, M. Washington

Meeting Action: M. Wadkinson explained that there is no need to clarify requirements because of the action taken on item NB16-0104. A motion was made to close this item with no action. The motion was unanimously approved.

Item Number: NB16-2806	NBIC Location: Part 1, S6.1 b)	Attachment Page 28

General Description: Result of PR16-0415, delete references to building codes because this is beyond the knowledge of an inservice inspector

Subgroup: Installation

Task Group: E. Wiggins (PM), S. Konopacki

Meeting Action: A breakout session was held in the SG meeting to discuss/complete a proposal. Mr. Wiggins presented the proposal to the SG and SC. Discussions were held. There was a motion to approve the proposal to the MC. The motion was unanimously approved.

Item Number: NB16-2807	NBIC Location: Part 1, S6.4	Attachment Page 29

General Description: Result of PR16-0417, rewrite section to clarify that it is guidance for owners or users, not requirements for inspectors

Subgroup: Installation

Task Group: D. Patten (PM), M. Washington

Meeting Action: A breakout session was held in the SG meeting to discuss a proposal. D. Patten presented the proposal to the SG and SC. Discussions were held. A motion was made to close this item with no action. The motion was unanimously approved.

c. Action Items – New Business

Item Number: 17-133	NBIC Location: Part 1, 3.5.3.2	No Attachment

General Description: Change "shall be located inside" to "should" in accordance with CSD-1

Subgroup: SG Installation

Task Group: None Assigned.

Meeting Action: A TG was assigned of R. Smith (PM), T. Creacy, B. Moore, P. Schuelke. A break out session was held to discuss this item. This item will also address sections 3.5.3.1 and S5 5.5.7. A summary was presented to the SG and SC.

Item Number: 17-147	NBIC Location: Part 1, Section 9	Attachment Page 30-31

General Description: Define “Hot Water Storage Tank” in glossary

Subgroup: SG Installation

Task Group: None Assigned.

Meeting Action: A TG was assigned of R. Austin (PM), J. Brockman, P. Schuelke. A break out session was held to discuss this item. A proposal was presented to the SG and SC. There was a motion to approve the proposal to the MC. The motion was unanimously approved. An additional Action Item was opened to address how “potable water storage tank” is used in the entire Part 1. **(Item # 17-159)**

8. Future Meetings

- January 8th-11th, 2018 – New Orleans, Louisiana
- July 16th-19th, 2018 – Columbus, Ohio

9. Adjournment

A motion was made and unanimously approved to adjourn the meeting at 11:16 a.m.

Respectfully submitted,

Jeanne Bock
NBIC Part 1 Secretary

SC Installation Attendance Sheet - 7/19/17

Name	Company	Phone Number	Email	Signature	Attend Rec.?	Bringing Guest?
Mike Richards	Southern Company	(205) 992-7111	hmichaelrichards.pe@gmail.com		✓	
Don Patten	Bay City Boiler	(510) 786-3711	dpatten@baycityboiler.com		✓	
Jeanne Bock	National Board	(614) 431-3233	jbock@nationalboard.org			
Randy Austin	State of Arizona	(602) 542-1648	randy.austin@azdosh.gov		✓	
Geoffrey Halley	ABMA	(636) 394-3483	ghalleysii@aol.com		✓	
Stanley Konopacki	NRG Energy	(630) 771-7956	stanley.konopacki@nrgenergy.com nrg.com		✓	
Brian Moore	Hartford Steam Boiler	(860) 722-5657	brian_moore@hsb.com		✓	
Paul Schuelke	Weil-McLain	(219) 879-6561	pschuelke@weil-mclain.com		✓	
Rex Smith	Authorized Inspection Associates	(281) 751-1150	rsmith@aiallc.org		✓	
Melissa Wadkinson	Fulton Thermal	(315) 298-7112	melissa.wadkinson@fulton.com		✓	
Edward Wiggins	Liberty Mutual	(256) 357-2825	edward.wiggins@libertymutual.com		✓	
Joe Brockman	State of Missouri	573-751-8709	Joe.Brockman@dps.mo.gov		✓	
Richard Dalton	FM Global	801 540 0861	richard.dalton@fmglobal.com		✓	

Item Number: NB16-0801	NBIC Location: Part 1	No Attachment

General Description: Is it standard operating procedure (per NBIC) to do hydrostatic pressure tests on installed ASME Section IV boilers at 150% of the rated pressure as part of the installation inspection?

Question:
If a pressure test has been performed and documented on the applicable Manufacturer's Data Report for a boiler, pressure vessel or piping, is an additional pressure test required prior to initial operation?

Reply:
NO

Interpretation IN16-0701

Proposed Interpretation

Inquiry:	IN16-0701
Source:	NB16-0801
Subject:	Pressure Testing - Part 1
Edition:	2015 NBIC
Question 1:	Is it standard operating procedure (per NBIC) to do hydrostatic pressure tests on installed ASME Section IV boilers at 150% of the rated pressure as part of the installation inspection?
Reply 1:	
Committee's Question:	If a pressure test has been performed and documented on the applicable Manufacturer's Data Report for a boiler, pressure vessel or piping and the Jurisdiction does not require additional pressure tests, is an additional pressure test required prior to initial operation?
Committee's Reply:	No
Rationale:	2.10.2 Power Boilers, 3.10.1 Heating Boilers, 4.6 Pressure Vessels, 5.4 Piping It is not the intent of the code to mandate post construction testing at 150% of the rated pressure.
SC Vote	Passed – Unanimous
NBIC Vote	

2.10.2 PRESSURE TEST

Prior to initial operation, the completed boiler, including pressure piping, water columns, superheaters, economizers, stop valves, etc., shall be pressure tested in accordance with the original code of construction. Any pressure piping and fittings such as water columns, blowoff valves, feedwater regulators, superheaters, economizers, stop valves, etc., which are shipped connected to the boiler as a unit, shall be hydrostatically tested with the boiler and witnessed by an Inspector.

3.10.1 PRESSURE TEST

Prior to initial operation, the completed boiler, individual module, or assembled module, shall be subjected to a pressure test in accordance with the requirements of the original code of construction.

4.6 TESTING AND ACCEPTANCE

a) The installer shall exercise care during installation to prevent loose weld material, welding rods, small tools, and miscellaneous scrap metal from getting into the vessel. The installer shall inspect the interior of the vessel and its appurtenances where possible prior to making the final closures for the presence of foreign debris.

b) The completed pressure vessel shall be pressure tested in the shop or in the field in accordance with the original code of construction. When required by the Jurisdiction, owner or user, the Inspector shall witness the pressure test of the completed installation, including piping to the pressure gage, pressure relief device, and, if present, level control devices.

5.4 EXAMINATION, INSPECTION, AND TESTING

The owner shall ensure that all examinations, inspections, and tests required by the code of construction have been performed prior to operation.

Back to Archived Ballots

Archived Comments for Ballot: IN16-0701-MC	
Richards,Michael 3/30/2017 1:04:53 PM *Reply To: Hopkins,Craig*	Am considering'pulling' this item from consideration and going back to committee for additional work.
Hopkins,Craig 3/16/2017 6:25:24 PM	I have observed some boilers leak at hydrotest during installation, perhaps due to damage during transit. I don't believe a 1.5x test should be required but at least a 1x leak test

Voting:

Name	Email	Votes	Vote Date
Bradley Besserman	bbesserman@nationalboard.org	Not Voted	N/A
Brian Morelock	morelock@eastman.com	Approve	03/12/17
Craig Hopkins	chopkins@seattleboiler.com	Disapprove	03/16/17
Don Cook	dcook@dir.ca.gov	Approve	02/17/17
Gary Scribner	gscribner@nationalboard.org	Not Voted	N/A
George Galanes PE	ggalanes@diamondtechnicalservices.com	Approve	02/23/17
james getter	jim.getter@worthingtonindustries.com	Approve	02/21/17
James Pillow	jpillow@commonarc.com	Approve	02/18/17
Jim Riley	jim.riley@conocophillips.com	Approve	03/09/17
Jim Sekely	jsekely@comcast.net	Approve	02/22/17
Joel Amato	joel.amato@state.mn.us	Approve	02/17/17
John Burpee	john.h.burpee@maine.gov	Not Voted	N/A
Kevin Simmons	kevin.simmons@pentair.com	Approve	03/15/17
Larry McManamon	lmac@glabap.com	Not Voted	N/A
Mark Mooney	mark.mooney@libertymutual.com	Approve	02/16/17
Melissa Wadkinson	melissa.wadkinson@fulton.com	Approve	03/01/17
Michael Richards	Hmichaelrichards.pe@gmail.com	Approve	02/20/17
Michael Webb	mike.webb@xcelenergy.com	Approve	02/27/17
Paul Edwards	edwar1pd@westinghouse.com	Approve	02/20/17
Paul Welch	paul.Welch@ariseinc.com	Approve	03/08/17
Randy Austin	randy.austin@azdosh.gov	Approve	02/22/17
Robby Troutt	rob.troutt@tdlr.texas.gov	Approve	03/03/17
Robert Wielgoszinski	Robert_Wielgoszinski@hsbct.com	Not Voted	N/A
Sid Cammeresi	sidneycammeresi@hotmail.com	Approve	03/03/17
Stanley Staniszewski	stanley.staniszewski@dot.gov	Approve	03/13/17
Venus Newton	venus.newton@bpcllcga.com	Not Voted	N/A

Draft 16-09-1

NB11-1901

S3.0 Installation of High Pressure Composite Pressure Vessels

At the time of vessel installation, the current edition of all referenced documents shall apply.

S3.1 Scope

This supplement provides requirements for the installation of high pressure composite vessels (HPCPV). This supplement is applicable to pressure vessels with the MAWP not exceeding 15,000 psi, and is applicable to the following classes of vessels:

a) Metallic vessel with a Fiber Reinforced Plastic (FRP) hoop wrap over the shell part of the vessel (both load sharing)

b) Metallic vessel with a full FRP wrap (both load sharing)

c) FRP vessel with a non load sharing metallic liner

d) FRP vessel with a non load sharing non metallic liner

S3.2 Supports

Design of supports, foundations, and settings shall consider the dead loads, live loads, wind, and seismic loads. Vibration and thermal expansion shall also be considered. The design of supports, foundations, and settings shall be in accordance with ASCE/SEI 7, *Minimum Design Loads for Buildings and Other Structures*. The importance factors used in calculating the seismic and wind loads shall be the highest value specified for any category in ASCE/SEI 7.

S3.3 Clearances

The pressure vessel installation shall allow sufficient clearance for normal operation, maintenance, and inspection. Stacking of pressure vessels is permitted. The minimum clear space between pressure vessels shall be 1 ft. vertical and 2 ft. horizontal. Vessel nameplates shall be visible after installation for inspection.

The location of vessels containing flammable fluids shall comply with NFPA [2, Table 7.3.2.3.1.2(a)] *Minimum Distance From Outdoor (GH_2) Systems to Exposures (U.S.Units).* The vessel owner shall document the vessel pressure and pipe diameters used as a basis for compliance with NFPA 2 location requirements.

S3.4 Piping Loads

Piping loads on vessel nozzles shall be determined by a formal flexibility analysis per ASME B31.12: paragraph IP-6.1.5(b). The piping loads shall not exceed the maximum nozzle loads defined by the vessel manufacturer.

S3.5 Mechanical Connections

Mechanical connections shall comply with pressure vessel manufacturer's instructions. Mechanical connections shall comply with applicable codes. Connections to threaded nozzles shall have primary and secondary seals. The seal design shall include a method for detecting a leak in the primary seal. Seal functionality shall be demonstrated at the initial pressurization of the vessel.

S3.6 Pressure Indicating Devices

Each pressure vessel shall be equipped with a pressure gage mounted on the vessel. The dial range shall be from 0 psi to not less than 1.25 times the vessel MAWP. The pressure gage shall have an opening not to exceed 0.055in (1.4mm) (No. 54 drill size) at the inlet connection. In addition, vessel pressure shall be monitored by a suitable remote pressure indicating device with alarm having an indicating range of 0 psi to not less than 1.25 times the vessel MAWP.

S3.7 Pressure Relief Devices

Each pressure vessel shall be protected by pressure relief devices per the following requirements.

a) Pressure relief devices shall be suitable for the intended service.

b) Pressure relief devices are to be manufactured in accordance with a national or international standard and certified for capacity (or resistance to flow for rupture disk devices) by the National Board.

c) Dead weight or weighted lever pressure relief valves are prohibited.

d) Pressure relief valves shall not be fitted with lifting devices.

e) The pressure relief device shall be installed directly on the pressure vessel with no isolation valves between the vessel and the pressure relief device except:

1) when these isolation valves are so constructed or positively controlled below the minimum required capacity, that closing the maximum number of valves at one time will not reduce the pressure relieving capacity, or

2) upon specific acceptance of the jurisdiction, an isolation valve between vessel and its pressure relief device may be provided for vessel inspection and repair only. The isolation valve shall be arranged so it can be locked or sealed open.

f) The discharge from pressure relief device(s) shall be directed upward so as to prevent any impingement of escaping fluid upon the vessel, adjacent vessels, adjacent structures, or personnel. The discharge must be to outdoors, not under any structure or roof that might permit formation of a “cloud”. The pressure relief device(s) discharge piping shall be designed so that it cannot become plugged by animals, rain water, or other materials.

g) The pressure relief device(s) shall be set at a pressure not exceeding the MAWP of the vessel.

h) The pressure relief device(s) shall have sufficient capacity to ensure the pressure vessel does not exceed the MAWP of that specified in the original code of construction.

i) The owner shall document the basis for selection of the pressure relief device(s) used, including capacity.

j) The owner shall have such analysis available for review by the jurisdiction.

k) Pressure relief devices and discharge piping shall be supported so that reaction forces are not transmitted to the vessel.

l) Heat detection system: a heat activated system shall be provided so that vessel contents will be vented per f) (above), if any part of the vessel is exposed to a temperature higher than 220 ^{o}F.

m) Positive methods shall be incorporated to prevent overfilling of the vessel.

S3.8 Assessment of Installation

a) Isolation valve(s) shall be installed directly on each vessel, but not between the vessel and the pressure relief device except as noted in 3.7, e), above.

b) Vessels shall **not** be buried.

c) Vessels may be installed in a vault subject to a hazard analysis, verified by the Authorized Inspector, or the jurisdiction, to include as a minimum the following:

1) Ventilation
2) Inlet and outlet openings
3) Access to vessels
4) Clearances
5) Intrusion of ground water
6) Designed for cover loads
7) Explosion control
8) Ignition sources
9) Noncombustible construction
10) Remote monitoring for leaks, smoke, and fire
11) Remote controlled isolation valves

12) Other safety requirements

d) Fire and heat detection/suppression provisions shall comply with local jurisdictional requirements and as a minimum include relief scenarios in the event of a fire or impending overpressure from heat sources.

e) Installation locations shall provide the following:

1) Guard posts shall be provided to protect the vessels from vehicular damage per NFPA [2:4.14.1]. Protection from wind, seismic events, and other miscellaneous impacts shall be provided.

2) Supports and barriers shall be constructed of non-combustible materials.

3) Vessels shall be protected from degradation due to direct sunlight.

4) Access to vessels shall be limited to authorized personnel.

5) Any fence surrounding the vessels shall be provided with a minimum of two gates. The gates shall open outward, and shall be capable of being opened from the inside without a key.

6) Access for initial and periodic visual inspection and NDE of vessels, supports, piping, pressure gages or devices, relief devices and related piping, and other associated equipment.

7) Completed installations shall be validated by the local jurisdiction or an Authorized Inspection Agency as addressing all of the above and jurisdictional requirements prior to first use. This verification shall include an itemized check list identifying all applicable areas and date of the inspection by authorized personnel. This verification shall be posted in a conspicuous location near the vessel and on file with the local jurisdiction. Certificates shall be updated as required by mandated subsequent inspections.

8) Piping installation shall comply with ASME B31.12 *Hydrogen Piping and Pipelines* or NFPA [2:7.1.15] [2:7.3.1.2.5].

10) The vessels shall be electrically bonded and grounded per NFPA [55:10.2.6].

S3.9 Ladders and runways

A minimum of two exits shall be provided for each walkway or enclosed space. The distance from any point on the walkway to the nearest exit shall not exceed 75 ft.

S3.10 Guide for Developing an Installation Assessment Checklist

The following checklist lists most, but not necessarily all, items that should be reviewed at the time of vessel installation.

Item NB14-0403 Index

Suggested new items resulting from this review and general comments are in green.

1. Add aluminum. Cast iron is indexed, but aluminum is neither used nor indexed.

   Note: Suggest new item to develop a new subsection under Section 3 to cover these. This might also fit under condensing boilers.

   Note: Since the whole of Part 1 addresses installation, suggest opening a new item to delete the indexed term "Boiler Installation" and adding sub-definitions as follows:

2. Boilers,
   - Low-pressure Steam Heating
   - Hot-water Heating
   - Hot-water Supply
   - Modular steam heating
   - Modular hot-water heating
   - High-pressure Steam
   - High-temperature Water
   - Fluidized Bed
   - Installation Report (I-1)

   Note: Adding a specific listing for Boiler Installation Report makes the report easier to find.

3. Low-water Fuel Cutoff
4. Flue

   Note: The expression "Chimney or Stack" indexed, but not flue.

   Note: Within Part 1, the word "capacity" is used 176 times and all are in reference to PRDs. It would be useful to a user to group all related PRD "capacity" terms together.

5. Capacity
   - Safety Valve
   - Safety Relief Valve
   - Thermal Fluid Pressure Relief Devices

   Note: It would be user friendly to breakup "controls" into categories.

6. Controls
   - Pressure
   - Temperature
   - Level

Note: To avoid confusion with a "conversion burner" or any other conversion (Conversion Coils in Figure S3.6.1-a), suggest opening a new item to amend the indexed term "conversion".

7. Conversion (metric)

   Note: The term "design" appears 104 times in Part 1. Without some sort of categorization, this number is probably not useful for users. Suggest either deleting the term "design" from the index or add subcategories.

8. Design
   - subcategory a
   - subcategory b

   Note: The term "weld" and all of its derivatives appear 73 times in Part 1. Without some sort of categorization, this number is probably not useful for users. Suggest either deleting the term "weld" from the index or add subcategories.

9. Weld
   - subcategory a
   - subcategory b

   Note: The term "High Temperature Water" as used in Part 1 seems to apply to heat exchangers. Users could be confused by this term versus "high-temperature water boiler". Suggest opening an item to consider usage of this term.

   Note: The phrase "Instruments and Controls" is only indexed to three paragraphs in Part 1; 4.4 in the index, 4.4 in the body, and in the index referencing subsection 4.4. Suggest opening an item to review this phrase and other ways to list instruments and controls to make the phrase easier to find.

   Note: The term "foundations" and its parent term "foundation" are only indexed to two locations, but there are 17 locations where the term appears. Suggest adding all locations of both the plural and singular terms.

10. Foundations — add all locations.

    Note: The term "ladder", both as a standalone term and in conjunction with "runways", is only indexed to one paragraph, but is used 17 times in Part 1. Suggest list all locations of both the plural and singular terms.

11. Ladder — and all locations of both "ladder" and "ladders and runways".

    Note: The phrase "Permissible Mountings (PRD)" is only used twice in Part 1; 3.9.1.1.1 and in the index. Suggest opening an item to consider other ways to index "permissible mountings" as well as incorporating requirements in other subsections of Part 1.

    Note: Suggest opening an item to break up the phrase "pressure relief devices" into subcategories - Safety Valve, Safety Relief Valve Thermal Fluid Pressure Relief Devices, Rupture Disk.

12. Rupture Disk

    Note: suggest adding "rupture disk" as a standalone phrase and list it under "Pressure Relief Devices".

    Note: Suggest listing each type as separate entries in the index and listing each under "Pressure Relief Devices".

13. Steam Heating Boilers — add all locations

    Note: the phrase "steam heating boiler" is only indexed to 7 locations, but is used 35 times. Suggest a complete listing.

Supplement XX

High-Temperature water boilers

A high-temperature water boiler is a power boiler intended for operation at pressures exceeding 160 psig (1.1 MPa) and/or temperatures exceeding 250° (120°C).

In addition to the requirements listed in Section I and Section 2 for Power boilers, the requirements below shall apply:

- High-temperature water boilers shall be provided with a means of adding water to the boiler or system which under pressure. (relocate 2.5.1.1 (g))
- The recirculating return line for a high-temperature water boiler shall be provided with the stop valve, or valves, required for the main discharge outlet on the boiler. (relocate 2.5.1.4 (j)).
- Each high-temperature water boiler shall have drain of NPS 1 (DN25) minimum discharged to a safe location (relocate 2.6.3.1 (c)).
- Each high temperature water boiler shall have a temperature gage or other reporting device located to provide an accurate representation of the temperature at or near the boiler outlet.(relocate 2.8.3)
- For high-temperature water boilers, safety relief valves shall have a closed bonnet, and safety relief valve bodies shall not be constructed of cast iron (2.9.1 (e))
- The required relieving capacity in pounds per hour of the safety or safety relief valves on a high-temperature water boiler shall be determined by dividing the maximum output in Btu at the boiler nozzle obtained by the firing of any fuel for which the unit is designed by one thousand. (metrication) (2.9.1.3)
- Discharge piping from safety relief valves on high-temperature water boilers shall have adequate provisions for water drainage as well as steam venting. (2.9.6)
- Piping for high-temperature water boilers shall include provisions for the expansion and contraction of hot water mains connected to the boiler(s) so there will be no undue strain transmitted to the boiler(s). (3.7.9.1 (3b)).
- Expansion tanks, installed in closed loop systems, shall have sufficient volume to handle the required expansion of the total system at the required operating temperature.
    - A low pressure interlock and a low water level interlock are recommended.
- It is essential that the pump selection provides the required flow across the boiler, handles the total system head and be specifically designed to handle water at the required operating temperature.
- Each high-temperature water boiler shall be protected from over-temperature by two temperature-operated controls.
    - Each boiler shall have a control that will cut off the fuel supply when the water temperature reaches an operating limit which shall be less than the maximum allowable temperature.
    - In addition to the above, each high-temperature water boiler shall have a safety limit control with manual reset that will cut off the fuel supply to prevent the water temperature from exceeding the maximum allowable temperature at the boiler outlet.

NB15-2202

High Pressure Vessel Installation Checklist (draft 4R1)

Preface: This checklist is a guide to be used in preparation of formal installation inspection documents in conjunction with regulatory authorities.

1. Construction code compliance
    a. Manufacturer's data plate (record all information)
    b. ASME Code with appropriate designator for the type of construction
    c. Capacity (when indicated on nameplate in water volume)
    d. Manufactured date, expiration date, or service life
2. Condition of tank – paint, signs
    a. Condition of all painted surfaces
    b. Visible damage per inspection guidelines ~ (scratches, gouges, impact, etc.)
    c. Flammable warning signs
    d. No smoking, welding, or open flame signs
    e. Exterior protective barrier condition
3. Foundations/Supports per the jurisdiction building code
    a. Fire protection
    b. Painted metallic parts
    c. Anchoring/securing of supports
    d. Is support frame condition acceptable
    e. Are tanks installed on a firm foundation
4. Tank connections/fittings
    a. Connections equipped with required correctly rated valves, (shut off valves, relief device, excess flow valve)

b. Remote operated emergency shut off or isolation valves
c. Protected from damage
d. Leak free

5. Gauges
   a. Dedicated pressure gauge for each tank.
   b. Gauges in good condition, display ~ 1.25 x operating pressure
   c. Remote and local indicating gauges function
6. Pressure relief device(s)
   a. Information legible
   b. Isolation valve between PRD and tank
   c. Pressure relief device is properly certified (ASME/NB)
   d. Discharge unobstructed
   e. Properly capped/protected to prevent entry of foreign material or objects
   f. Weep holes to drain moisture
   g. Free of corrosion
   h. Routine inspection and test documents (date and results)
7. Fence/Security
   a. Area properly secured
   b. Limited/restricted access provided
   c. Camouflaged
   d. Properly protected from errant vehicle damage
   e. Protection from vandalism (rifle shot, etc)
8. Location and spacing of tanks
   a. Proper tank spacing to allow inspection

NB15-2202

b. Proper tank spacing to allow for maintenance or replacement

c. Stacking does not exceed allowable limits

9. Presence of combustible materials

Area is free from combustible materials

10. Vault installed tanks

a. Non combustible construction

b. At least two points of access (entrance and egress)

c. Secured against unauthorized entry

d. Adequate ventilation

e. Fire suppression

f. Adequate access for inspection, maintenance, and replacement

g. Confined space signs (vault installation)

11. Shading

Shade to prevent solar heating

NB15-2209 – SG Graphite – Mar-28-17 rev7

Supplement X Installation of Graphite Pressure Equipment

SX.1 SCOPE

This supplement provides guidelines for the installation of impregnated graphite pressure vessels.

SX.2 Definitions: SX.2 Glossary of terms/definitions: "see last page of this document…"

~~Prior to installation, the~~

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Sx3 General requirements

Sx3.1 Receiving and Initial Inspection of Graphite Pressure Equipment

Graphite equipment should be thoroughly inspected and tested as it is received in order to identify any in transit damage. Whenever possible, this inspection should be made before the exchanger is removed from the carrier. To verify the unit has arrived in an undamaged condition, a pressure test may be performed. The bolt torques and spring heights should be verified prior to a pressure test. This pressure test shall not exceed the MAWP of the vessel. Where freezing could occur, open all vents and drains after a pressure test to drain out all water from all passes and pockets to prevent freeze damage. Follow other good practices such as to prime the unit with an antifreeze solution and/or drain and dry it completely. Graphite equipment may arrive from the manufacturer under low pressure and/or with shock detectors as an indication of undamaged arrival. Any crating should be inspected both for direct damage and/or evidence of improper handling. If there is any evidence of damage, notify the manufacturer.

Graphite pressure equipment may be shipped unassembled for later assembly. Review any packing or check list. All parts should be carefully inspected. The surfaces of graphite parts should be thoroughly examined. Avoid pry bars, chisels, wedges or excessive force to separate any protective covers from graphite nozzles or openings. Activity around graphite surfaces should progress gently and with caution.

Prior to installation, bolt torques and spring heights should be verified. Additionally, the manufacturer may be consulted for recommended commissioning activities such as thermal cycling and bolt retorqueing.

Sx3.2 Equipment parameters/ Clearances /Movement

In many cases, graphite pressure equipment is of modular construction and may be assembled or disassembled in the field. The construction details can be obtained by consulting the bill of materials and the assembly drawing provided by the manufacturer. Sufficient space for assembly and installation should be provided. Consideration should be given to the orientation of the equipment for maintenance or disassembly.

Impregnated graphite is more susceptible to damage from mishandling than metal components. Therefore, the following recommendations should considered:

a) Lifting and transportation should be done at designated lifting points or per manufacturer's recommendations;
b) Use only soft slings when handling;
c) Graphite parts should be protected with a barrier if steel cables or chains are employed; and
d) Avoid lifting by placing slings directly around the graphite.

Sx3.x Supports/Foundations

See NBIC Part 1, 1.6.1 for general requirements on supports, foundations, and settings.

Foundations and supports should be adequate to prevent settling or the transmission of stresses, vibrations or shock loads to the graphite pressure vessel. Any base structure should be designed to support the exchanger and also to eliminate movements or moments caused by, but not limited to, possible hydraulic thrusts of process and service fluids. Additionally, graphite pressure equipment should be level and square so that all piping connections may be made without excessive force.

Graphite pressure equipment may include lined components that may or may not be insulated. Any structural support attachments should avoid direct contact with lined components, which could create a cold wall effect.

Sx3.x Piping Connections

Impregnated graphite pressure equipment may require connection to graphite nozzles. Before connecting piping, graphite gasket surfaces including serrations should be thoroughly cleaned to prevent any leakage of fluids. A suitable solvent should be used to completely remove all dirt or contaminants from connections. Use caution so as not to scratch or gouge the graphite surface. Graphite piping connections require gaskets specific for graphite applications. Refer to graphite equipment manufacturer for any spring settings, gasket recommendations, and bolt torque recommendations.

Flexible attachments such as expansion joints and bellows are recommended for impregnated graphite connections. Flexible attachments should be installed as close to the nozzles as possible. These are recommended to isolate the equipment from stress caused by vibration, misalignment, thermal expansion of the piping, or other loads.

After positioning and initial tightening of graphite connections, the bolts/ nuts should be tightened to the torque value on bolt torque charts or assembly drawings provided by the manufacturer. Bolts should be tightened in multiple stages and in a diametrically staggered (i.e. star) pattern starting with a torque value that is a small percentage of the final torque value until design values are achieved.

Sx3.x Instruments and controls.

Pressure:. See NBIC Part 1, 4.4.2 and 4.5 for requirements related to pressure indicating devices and pressure relief devices.

Temperature control: Automatically controlled systems, such as for heating of impregnated graphite pressure equipment, may be considered. The temperature control should provide for over temperature protection such that temperature is

regulated to maintain a specified operating limit which shall be less than the maximum allowable temperature.

Sensors: Continuous monitoring is suggested since process streams used in graphite heat exchangers are usually corrosive and a failure path or crossover to the service side should be identified with immediate corrective action.

Flow control: In order to avoid damage (e.g., erosion, hammering, shock) to the graphite components, instrumentation should be installed to control and monitor flow.

Sx3.1 Post-Installation Activities

- Due to the nature of impregnated graphite, the surface is subject to light scratches and it is often difficult to distinguish scratches from cracks without further investigation. Consult the manufacturer as required.
- Graphite pressure equipment may be damaged by concentrated hydroblasting or pressure washing. Avoid sandblasting graphite pressure equipment.
- Careful consideration should be given to painting graphite pressure equipment because improper painting can damage the equipment.

SX.2 Glossary of terms/definitions:

Impregnated graphite is a composite manufactured by impregnating porous graphite with chemically resistant synthetic resins used in the construction of graphite pressure equipment. With special processing the graphite becomes impregnated, even to gases & under pressure. The final product partakes of the properties of both graphite and resin, but the predominant characteristics are similar to graphite which gives the most useful properties with its natural corrosion resistance and conductivity as a heat exchange material. Unlike corrosion resistant metals, graphite does not depend on the formation of a surface film or oxide for corrosion resistance, nor does it exhibit a measurable corrosion rate. Once rendered impregnated, however, the chemical inertness of graphite may be limited by the characteristics of the resin. For example, ~~such as a~~ phenolic resin ~~which~~ is resistant to most acids, salt solutions and organic compounds but may not be suitable ~~to~~ for alkalis and strong oxidizing chemicals that may degrade & weaken the material with no visible/measurable sign of material loss.

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End components – Components attached to the main shell of graphite pressure equipment including heads, channels, domes, and tubesheets

Cold wall effect – a detrimental condition that promotes corrosion due to a temperature gradient between the inside of a lined vessel and its ~~supports~~exterior. Cold wall effect may be caused locally by attachments that protrude through insulation, or more generally by failure to install insulation.

References (just informational, not intended for inclusion:

http://versaflex.com/cold-wall-effect-and-polyurea-linings/

http://www.paintsquare.com/psf/?fuseaction=answer&psfID=60

http://www.international-pc.com/products/linings/ceilcote/documents/cc30-cold-wall-effect.pdf

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NB16-0104

Rev. 1 7-18-17

2.8.5 AUTOMATIC LOW-WATER FUEL CUTOFF AND/OR WATER FEEDING DEVICE FOR STEAM ~~OR VAPOR SYSTEM~~ BOILERS

a) Each automatically fired steam ~~or vapor system~~ boiler shall have an automatic low-water fuel cutoff so located as to automatically cut off the fuel supply when the surface of the water falls to the lowest visible part of the water-gage glass. If a water feeding device is installed, it shall be so constructed that the water inlet valve cannot feed water into the boiler through the float chamber and so located as to supply requisite feedwater.

b) Such a fuel cutoff or water feeding device may be attached directly to a boiler. A fuel cutoff or water feeding device may also be installed in the tapped openings available for attaching a water glass directly to a boiler, provided the connections are made to the boiler with nonferrous tees or Y's not less than NPS 1/2 (DN 15) between the boiler and water glass so that the water glass is attached directly and as close as possible to the boiler; the run of the tee or Y shall take the water glass fittings, and the side outlet or branch of the tee or Y shall take the fuel cutoff or water feeding device. The ends of all nipples shall be reamed to full-size diameter.

c) In addition to the requirements in a) and b) above, a secondary low-water fuel cutoff with manual reset shall be provided on each automatically fired steam ~~or vapor system~~ boiler.

d) Fuel cutoffs and water feeding devices embodying a separate chamber shall have a vertical drain pipe, extended to a safe point of discharge, and a blowoff valve not less than NPS 3/4 (DN 20), located at the lowest point in the water equalizing pipe connections so that the chamber and the equalizing pipe can be flushed and the device tested.

NB16-0811

Item Number: NB16-0811 **NBIC Location: Part 1**
General Description: Remove references back to general requirements section in Sections 2, 3, 4, 5, S5

The SG & SC Installation passed unanimously to close this with no action.

Example of Current Language:

2.3.1 SUPPORTS, FOUNDATIONS, AND SETTINGS

See NBIC Part 1, Section 1.6.1, *Supports, Foundations and Settings.*

2.3.2 STRUCTURAL STEEL

See NBIC Part 1, Section 1.6.2, *Structural Steel.*

2.4.1 EXIT

See NBIC Part 1, Section 1.6.3, *Exit.*

2.4.2 LADDERS AND RUNWAYS

See NBIC Part 1, Section 1.6.4, *Ladders and Runways.*

Action Item Request Form

Item Number: NB16-2802	**NBIC Location: Part 1, Section 1**	**No Attachment**

General Description: Result of PR16-0406, 0409, 0416; possible contradiction in requirements for compliance with "environmental requirements"

Subgroup: Installation

Task Group: D. Patten (PM), S. Konopacki, M. Wadkinson, E. Wiggins

January 2017: The task group is investigating whether it was appropriate to reference "environmental requirements".

a) Proposed Revisions or Additions

Existing Text:

1.4 CERTIFICATION, INSPECTION, AND JURISDICTIONAL REQUIREMENTS

1.4.1 RESPONSIBILITY

a) The owner is responsible for satisfying jurisdictional requirements for certification and documentation. When required by jurisdictional rules applicable to the location of installation, the boilers, pressure vessels, piping, and other pressure-retaining items shall not be operated until the required documentation has been provided by the installer to the owner and the Jurisdiction.

b) The National Board Commissioned Inspector providing inservice inspection for the facility in which the pressure-retaining item is installed has the following responsibilities:

1) Verify the *Boiler Installation Report* (I-1 Report) has been completed and signed by the installer, when required by the Jurisdiction;

2) Verify pressure-retaining items comply with the laws and regulations of the Jurisdiction governing the specific type of boiler or pressure vessel;

3) Verify any repairs or alterations to pressure-retaining items, which are conducted prior to, or during, the initial installation, are in accordance with the NBIC;

4) Request or assign jurisdictional identification number, when required by the Jurisdiction; and

5) Complete and submit the first inservice inspection/certificate report to the Jurisdiction when required by the Jurisdiction.

c) Unless otherwise specifically required by the Jurisdiction, the duties of the inservice inspector **do not include the installation's compliance to other standards and requirements (e.g., environmental,** construction, electrical, undefined industry standards, etc.) for which other regulatory agencies have authority and responsibility to oversee.

Item NB 16-2802 — disapproved vote

As required by NBIC committee procedures, below is an explanation for my disapproved vote.

The single reference in Part 1 Section 1.4.1, which removes environmental issue from in-service inspection responsibility, is insufficient to explain that the following subsections, which reference environmental, are intended for owner users and not the in-service inspectors: 1.6.5 Fuel, 1.6.8 Chimney or Stack, and 2.5.3.3 c) Controls and Heat Generating Apparatus. Although it can be said that the intent as stated in 1.4.1 should only need to be mentioned once, the reality is that legislators, boiler boards, and other jurisdictional bodies will miss the caveat. I have seen it far too many times that legislators and boiler boards do not understand the intentions of a single paragraph pulled from the book out of context. Lacking any other explanation of the intent, the result is that that single paragraph is then interpreted as mandatory for the in-service inspector by boiler boards and legislators.

Additionally, the NBIC 2015 and 2017 editions already contain this type of “reminder” in Sections 2, 3, 4, 5, and 6 (S5). For example, subsections 2.3.1, 2.3.2, and 2.3.3 refer the reader back to subsection 1.6. Similarly, subsections 3.3.1, 3.3.2, and 3.3.3 also refer the reader back to subsection 1.6.

Standards Development Organizations (SDOs) such as NFPA, ASME, and the National Board want their standards to be as clear as possible concerning the intent of specific provisions in those standards. Restating the owner user responsibility in the subject paragraphs helps to achieve the desired clarity of intent.

My disapproved vote supports my position that subsections 1.6.5, 1.6.8, and 2.5.3.3 c) should be amended to refer the reader back to 1.4.1 and not left as is. My suggested changes to resolve my negative are shown on the attached page in legislative text.

Brian W. Moore, PE
July 19, 2017

1.6.5 FUEL
All fuel systems shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, as applicable. See NBIC Part 1, Section 1.4.1, Responsibility.

1.6.8 CHIMNEY OR STACK
Chimneys or stacks shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, as applicable. See NBIC Part 1, Section 1.4.1, Responsibility.

2.5.3.3 CONTROLS AND HEAT-GENERATING APPARATUS
c) These devices shall be installed in accordance with jurisdictional and environmental requirements, manufacturer's recommendations, and/or industry standards, as applicable. See NBIC Part 1, Section 1.4.1, Responsibility.

Proposed revision / addition

2.5.3.2 REMOTE EMERGENCY SHUTDOWN SWITCHES (17)

. a) A manually operated remote shutdown switch(es) or circuit breaker shall be located just outside the equipment room door and marked for easy identification. Consideration should also be given to the type and location of the switch(es) in order to safeguard against tampering. Where approved by the Jurisdiction, alternate locations of remote emergency switch(es) may be provided.

. b) For equipment rooms exceeding 500 ft.^{2} (46 m^2) floor area or containing one or more boilers having a combined fuel capacity of 1,000,000 Btu/hr. (293 kW) or more, additional manually operated remote emergency shutdown switches shall be located at suitably identified points of egress acceptable to the Jurisdiction.

. c) Where a boiler is located indoors in a facility and not in an equipment room, a remote emergency shut- down switch shall be located within 50 ft. (15 m) of the boiler along the primary egress route from the boiler area.

. d) For atmospheric-gas burners and for oil burners where a fan is on the common shaft with the oil pump, the emergency remote shutdown switch(es) or circuit breaker(s) must disconnect all power to the burner controls.

. e) For power burners with detached auxiliaries, the emergency remote shutdown switch(es) or circuit breaker(s) need only shut off the fuel input to the burner.

f) When existing boiler installations do not include remote emergency shutdown switches, it is not required that these switches be retroactively installed unless required by the Jurisdiction.

Item Number: NB16-2804

NBIC Location: Part 1, 2.7.5 p)

General Description: Result of PR16-0411, remove mandatory reference of NB-27, Guide for Blowoff Vessels

Part 1, 2.7.5 p

Boiler blowoff systems ~~shall~~ should be constructed in accordance with the Guide for Blowoff Vessels (NB-27): which can be found on the National Board website, www.nationalboard.org.

NB16-2806

NBIC Location: Part 1, S6.1 b)

General Description: Result of PR16-0415, delete references to building codes because this is beyond the knowledge of an inservice inspector

Part 1, S6.1 b

~~This supplement is based on Local, State or National Building Codes requiring the installation of a Carbon Monoxide (CO) detector/alarm in the boiler room.~~

S6.3 General Requirements

Condensing boilers shall meet all the requirements of NBIC Part 1, Section 1, Section 3 and this Supplement. The jurisdictional or National Building Codes may require the installation of a Carbon Monoxide (CO) detector/alarm in the boiler room.

Item Number: NB16-2807	NBIC Location: Part 1, S6.4	No Attachment

General Description: Result of PR16-0417; rewrite section to clarify that it is guidance for owners or users, not requirements for inspectors

Subgroup: Installation

Task Group: D. Patten (PM), M. Washington

January 2017: Mr. Patten had been assigned as the project manager.

a) Proposed Revisions or Additions

Existing Text:

S6.4 FLUE GAS VENTING SYSTEM PIPING REQUIREMENTS

a) The vent piping shall be corrosion resistant and fabricated from either stainless alloy or plastic material as defined by the boiler manufacturer and certified for the application.

b) The diameter of the vent piping shall be as defined by the boiler manufacturer and shall not be reduced, except as allowed by the boiler manufacturer.

c) The "Total Equivalent Length" of the vent piping, and the pressure drop through the vent piping, shall not exceed that stated in the Boiler Manufacturer's Installation Manual. (Note: Equivalent Length includes the pressure loss effect of various pipe fittings, such as elbows, etc.) Horizontal pipe runs shall slope toward the boiler and the condensate collection point.

d) The termination point of the vent piping shall be positioned such that there is no possibility of vented flue gas being entrained in the combustion air intake, as defined by the manufacturer and National Fuel Gas Code (ANSI Z223.1). Additionally the vent termination shall be located above the highest known snowline for the location involved, and be designed in such a manner, so as to prevent freezing.

e) This supplement requires the owner/user/installer contact the authority having Jurisdiction regarding the installation of carbon monoxide (CO) detector/alarm in boiler rooms in which condensing boilers are to be installed.

- **This action item is addressed in NB16-2806. The changes in S6.3 General Requirements references Part 1, Section 1.**

17-147 Scribner 6-21-17

Add definition of hot water storage tank to glossary

~~Hot Water Storage Tank - a non-fired pressure vessel used to store potable hot water at temperatures less than 210 deg. F. The heat source for the tank may be from an internal coil or external source, such as a boiler or heat exchanger.~~

Revised **17-147 Austin 7-18-17**

Add definition of potable water storage tank to glossary

Potable Water Storage Tank - an unfired pressure vessel used to store potable hot water at temperatures less than 210°F (99°C). The heat for the tank may be from an internal coil or external source.

New Action Item 17-159

Action Item Request Form

Item Number: 17-147 NBIC Location: Part 1, Section 9

General Description: Define "Hot Water Storage Tank" in glossary

Subgroup: SG Installation

Task Group: R. Austin (PM), P. Schuelke

Statement of Need

Task Group: R. Austin (PM), S. Konopacki, P. Schuelke

In review of the need for a definition of "Hot Water Storage Tank" the committee recognized that the verbiage needed to be revised to reflect the new definition. The new definition "Potable Water Storage Tank".

The use of the words "Hot Water Storage Tank" was found in the following sections to be replaced with "Potable Water Storage Tank":

Table of Contents – 4.7 Requirements for Hot Water Storage Tanks

4.7 REQUIREMENTS FOR HOT WATER STORAGE TANKS

4.7.1 SUPPORTS

Each hot water storage tank shall be supported in accordance with NBIC Part 1, 1.6.1.

4.7.2 CLEARANCE AND ACCEPTABILITY

c) Each hot water storage tank shall meet the requirements of NBIC Part 1, 4.3.2.

4.7.3 TEMPERATURE AND PRESSURE RELIEF DEVICES

a) Each hot water storage tank shall be equipped with an ASME/NB certified temperature and pressure relief device set at a pressure not to exceed the maximum allowable working pressure and 210°F (99°C).

4.7.4 THERMOMETERS

a) Each hot water storage tank shall be equipped with a thermometer.

b) Each hot water storage tank shall have a thermometer so located that it shall be easily readable at or near the outlet. The thermometer shall be so located that it shall at all times indicate the temperature of the water in the storage tank.

4.7.5 SHUT OFF VALVES

a) Each hot water storage tank shall be equipped with stop valves in the water inlet piping and the outlet piping in order for the hot water storage tank to be removed from service without having to drain the complete system.

b) Each hot water storage tank shall be equipped with a bottom drain valve to provide for flushing and draining of the vessel.